2017
ANNUAL MEETING OF
THE
KOREAN
UROLOGICAL
ASSOCIATION

DATE
2017
9.27(WED) - 29(FRI)

VENUE
THE-K HOTEL,
SEOUL

CHANGING
UROLOGY,
LEADING
FUTURE
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임원 명단

세부전공학회 및 연구회
대한남성과학회장: 양미영
대한비뇨기종양학회장: 조진선
대한소아비뇨기과학회장: 한창희
대한배뇨장애요실금학회장: 오승준
대한ENDOUROLOGY학회장: 나균호
대한요로생식기감염학회장: 나용길
대한비뇨기초음파학회장: 김태영
대한전립선학회장: 이지열
대한비뇨기과학회회장: 이홍선
비뇨기계기초의학연구회장: 박현준
요로생식기손재건연구회장: 박종관
노인비뇨기요양학회장: 박종관

지회
강원지회장: 송재만
대구경북지회장: 문기학
대전세종충청지회장: 권경일
부산경남지회장: 금석호
서울지회장: 정재용
인천경기지회장: 홍재영
제주지회장: 어정식
호남지회장: 박종관

학술위원회
학술이사: 곽철 (서울대학교병원)
학술간사: 정창욱 (서울대학교병원)
학술위원: 김계환 (가천의대길병원), 김형준 (건양대학교병원)
나웅 (국립중앙의료원), 박현준 (부산대학교병원), 백민기 (성균관의대삼성서울병원)
백미래 (서울특별시보라매병원), 정승일 (전남대학교병원), 조성용 (서울특별시보라매병원)
하춘구 (부산대학교병원), 김병준 (경북대학교병원), 최석환 (경북대학교병원)
임영재 (서울대학교병원), 임영재 (서울대학교병원), 한병규 (피팩트비뇨기과)
2017 Annual Meeting of The Korean Urological Association
2017년 제69차 대한비뇨기과학회 추계학술대회
Changing Urology, Leading Future
변환하는 비뇨기과, 미래를 이끌다.

Programs
<table>
<thead>
<tr>
<th>시간</th>
<th>Grand Ballroom (2F)</th>
<th>Crystal A (3F)</th>
<th>Crystal B (3F)</th>
<th>Geumungo Hall (THE-K HOTEL 3F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>07:30-</td>
<td>등록 (1층 등록데스크)</td>
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<tr>
<td>09:00-10:00</td>
<td>지도전문의교육 (수련위원회)</td>
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<tr>
<td>11:00-12:00</td>
<td>Lunch (Four Seasons, 1F)</td>
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<tr>
<td>13:00-14:00</td>
<td>Oral Session 1 Cancer - Kidney (I) (O001-O010) 권동득(전남의대) 한용규(연세의대)</td>
<td>Oral Session 2 Infertility &amp; Sexual Dysfunction (I) (O011-O020)</td>
<td>Oral Session 3 LUTS/BPH (I) (O021-O030) 김대정(울지의대) 조영식(성균관의대)</td>
<td></td>
</tr>
<tr>
<td>14:00-15:00</td>
<td>Oral Session 4 Cancer - Prostate (I) (O031-O040) 이강현(국립암센터) 홍성규(서울의대)</td>
<td>Oral Session 5 Endourology &amp; Stone Disease (I) (O041-O050) 인현수(대주의대) 김범수(경북의대)</td>
<td>Oral Session 6 Trauma &amp; Others (O051-O060) 문상성(한양의대) 박재영(고려의대)</td>
<td></td>
</tr>
<tr>
<td>15:00-16:00</td>
<td>Oral Session 7 Basic Research - Cancer (I) (O061-O070) 김완자(동독의대) 장인호(중앙의대)</td>
<td>Video Session 1 V001-V005 이상철(충북의대) 오필규(인제의대)</td>
<td>Oral Session 8 Incontinence/Female Urology/Neurourology (O071-O080) 이정주(부산의대) 배재현(고려의대)</td>
<td>평의원회 (14:30-18:00)</td>
</tr>
<tr>
<td>16:00-17:00</td>
<td>Oral Session 9 Cancer - Prostate (II) (O081-O090) 정재일(인제의대) 이동현(이화의대)</td>
<td>Video Session 2 V006-V010 한준현(한림의대) 박성열(인양의대)</td>
<td>Oral Session 10 Pediatrics (O091-O100) 조원열(동아의대) 박관진(서울의대)</td>
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<td>17:00-18:00</td>
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<tr>
<td>18:30-20:30</td>
<td>Presidential Reception</td>
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<tr>
<td>시간</td>
<td>Grand Ballroom (2F)</td>
<td>Crystal A (3F)</td>
<td>Crystal B (3F)</td>
<td>Geumkang Hall (Avenue 2F)</td>
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<tr>
<td>07:50-08:00</td>
<td>Booth</td>
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<tr>
<td>08:00-09:00</td>
<td>Oral Session 11 Cancer - Bladder, Pelvis, Ureter &amp; Others (I) (O101-O110) 김형진(전북의대) 강석호(고려의대)</td>
<td>Oral Session 12 Basic Research - Cancer (II) (O111-O120) 김영주(아주의대) 변석수(서울의대)</td>
<td>Oral Session 13 LUTS/BPH (II) (O121-O130) 최동보(아주의대) 유은성(경북의대)</td>
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<tr>
<td>09:00-09:20</td>
<td>개회식</td>
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<td>09:20-10:20</td>
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<tr>
<td>12:00-13:00</td>
<td>Lunch (Four Seasons, 1F)</td>
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<tr>
<td>13:00-14:00</td>
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<td>Oral Session 16 Cancer - Prostate (III) (O151-O160) 이경성(동국의대) 홍순익(울산의대)</td>
<td>Oral Session 17 Cancer-Bladder, Pelvis, Ureter &amp; Others (II) (O161-O170) 이상태(경희의대) 서호경(국립암센터)</td>
<td></td>
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<tr>
<td>14:00-15:00</td>
<td>Plenary Session II</td>
<td>Oral Session 18 Cancer - Kidney (II) (O171-O180) 김현희(서울의대) 박성창(원광의대)</td>
<td>Oral Session 19 Infertility &amp; Sexual Dysfunction (II) (O181-O190) 양대열(한림의대) 김수웅(서울의대)</td>
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<tr>
<td>15:00-16:00</td>
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<td>Oral Session 20 Endourology &amp; Stone Disease (II) (O191-O200) 성경탁(동아의대) 조성용(서울의대)</td>
<td>Oral Session 21 LUTS/BPH (III) (O201-O210) 주영수(울산의대) 김영곤(건국의대)</td>
<td>International Session (I001-I010) 김수동(동아의대) Kexin Xu (Peking University People’s Hospital)</td>
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<td>16:00-17:00</td>
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<td>17:00-18:00</td>
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<td>18:10-20:00</td>
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<td>Welcome Dinner</td>
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# Friday 29 September

<table>
<thead>
<tr>
<th>시간</th>
<th>Grand Ballroom (2F)</th>
<th>Crystal A (3F)</th>
<th>Crystal B (3F)</th>
<th>Geumkang Hall (Avenue 2F)</th>
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</thead>
<tbody>
<tr>
<td>08:00-09:00</td>
<td>Plenary Session IV (08:00-11:00)</td>
<td>Oral Session 22 Cancer - Prostate (IV) (O211-O220) 박동수(차의대) 전성수(성균관의대)</td>
<td>Oral Session 23 Cancer - Kidney (III) (O221-O230) 권태균(경북의대) 홍성희(가톨릭의대)</td>
<td>Video Session 3 (V011-V015) 나균호(연세의대) 전승현(경희의대)</td>
</tr>
<tr>
<td>09:00-09:30</td>
<td>Satellite Symposium V</td>
<td>Satellite Symposium VI</td>
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<tr>
<td>09:30-10:20</td>
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<td>Break</td>
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<tr>
<td>10:20-11:20</td>
<td>Satellite Symposium VII</td>
<td>Nurses Forum (10:20-11:50)</td>
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<td>KUA-AUA Urology Resident Review Course (10:00-12:00)</td>
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<tr>
<td>12:00-13:00</td>
<td>Lunch (Four Seasons, 1F)</td>
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<tr>
<td>13:00-14:00</td>
<td></td>
<td>69차 정기총회</td>
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<tr>
<td>14:00-14:45</td>
<td></td>
<td>보험정책강좌</td>
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<tr>
<td>14:45-15:00</td>
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<td>Special Lecture</td>
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<tr>
<td>15:00-16:00</td>
<td>Oral Session 24 Cancer - Prostate (V) (O231-O240) 김청수(울산의대) 조진선(한림의대)</td>
<td>Nurses Forum (13:00-16:05)</td>
<td></td>
<td>KUA-AUA Urology Resident Review Course (13:00-16:30)</td>
</tr>
<tr>
<td>16:00-17:00</td>
<td>Oral Session 25 Cancer - Bladder, Pelvis, Ureter &amp; Others (III) (O241-O250) 김홍섭(건국의대) 정병창(성균관의대)</td>
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</table>
일시: Wednesday 27 September 09:00-12:00
장소: Crystal Ballroom B

<table>
<thead>
<tr>
<th>시간</th>
<th>주제</th>
<th>강사</th>
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<tbody>
<tr>
<td>09:00-09:40</td>
<td>연차별 수련목표 및 수련내용</td>
<td>손정환 (분당제생병원)</td>
</tr>
<tr>
<td>09:40-10:20</td>
<td>비뇨기관 전문의 공동역량 및 전문역량 개발</td>
<td>하유신 (가톨릭의대)</td>
</tr>
<tr>
<td>10:20-10:40</td>
<td>Break</td>
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</tr>
<tr>
<td>10:40-11:20</td>
<td>수련교육 프로그램의 효과적인 평가방법</td>
<td>오경진 (전남의대)</td>
</tr>
<tr>
<td>11:20-12:00</td>
<td>비뇨기관 전문의 자격 취득요건 및 자격시험</td>
<td>정재민 (부산의대)</td>
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</table>

일시: Friday 29 September 14:00-14:45
장소: Grand Ballroom, 2F

<table>
<thead>
<tr>
<th>시간</th>
<th>주제</th>
<th>강사</th>
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</thead>
<tbody>
<tr>
<td>14:00-14:45</td>
<td>보험정책강좌</td>
<td>최장: 이영구 (대한비뇨기과학회 부회장)</td>
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<td>국가 보건의료정책 방향</td>
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<td>김용익 (前 국회의원)</td>
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</table>
ICUrology Workshop

일시: Thursday 28 September 09:20-11:20  
장소: Geumkang Hall (Avenue 2F)

<table>
<thead>
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<th>시간</th>
<th>주제</th>
<th>장사</th>
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<tbody>
<tr>
<td>09:20-09:50</td>
<td>How to get your journal indexed in SCI(E)</td>
<td>정현진 (엘스비어 Journal Consultant)</td>
</tr>
<tr>
<td>09:50-10:10</td>
<td>편집위원회 회의</td>
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<tr>
<td>10:10-10:20</td>
<td>Coffee break</td>
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<tr>
<td>10:20-10:40</td>
<td>ICUrology current report</td>
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<tr>
<td>10:40-11:10</td>
<td>의학저널의 최신 동향, 의학저널의 미래 그리고, ICUrology가 나아갈 길</td>
<td>홍성태 (JKMS 편집위원장)</td>
</tr>
<tr>
<td>11:10-11:20</td>
<td>시상식 Reviewer of the Year Award 2017, Most Cited Article Award 2017</td>
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<tr>
<td>11:20</td>
<td>기념촬영 및 폐회</td>
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Special Lecture

일시: Friday 29 September 14:45-15:00  
장소: Grand Ballroom, 2F

<table>
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<th>시간</th>
<th>주제</th>
<th>장사</th>
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</thead>
<tbody>
<tr>
<td>14:45-15:00</td>
<td>김세철 학술인상 수상자 기념 강연</td>
<td>최창: 천 준 (대한비뇨기과학회 화장)</td>
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<tr>
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<td>홍성규 (서울의대)</td>
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</tbody>
</table>
2017 Annual Meeting of The Korean Urological Association
2017년 제69차 대한비뇨기과학회 추계학술대회
Changing Urology, Leading Future
변화하는 비뇨기과학, 미래를 이끌다.

### Plenary Session I

<table>
<thead>
<tr>
<th>시간</th>
<th>주제</th>
<th>강사</th>
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</thead>
<tbody>
<tr>
<td>09:20-09:35</td>
<td>How to manage high risk prostate cancer patient after surgery</td>
<td>안한종 (울산의대)</td>
</tr>
<tr>
<td>09:35-09:50</td>
<td>Renal biopsy: To whom, how and when?</td>
<td>서성일 (서울의대 생리학과)</td>
</tr>
<tr>
<td>09:50-10:05</td>
<td>The development of PSA guidelines - The Australian experience</td>
<td>Peter Heathcote (USANZ President, Princess Alexandra Hospital, Brisbane, Australia)</td>
</tr>
<tr>
<td>10:05-10:20</td>
<td>종양 면역학과 비뇨기종양</td>
<td>최경호 (서울의대 생리학과)</td>
</tr>
<tr>
<td>10:20-10:35</td>
<td>What to do with BCG refractory NMIBC when cystectomy is not an option</td>
<td>구자현 (서울의대)</td>
</tr>
<tr>
<td>10:35-10:50</td>
<td>New drugs in metastatic bladder cancer</td>
<td>서호경 (국립암센터)</td>
</tr>
<tr>
<td>10:50-11:05</td>
<td>Diet and prostate cancer outcome</td>
<td>J. Kellogg Parsons (University of California, San Diego, USA)</td>
</tr>
<tr>
<td>11:05-11:20</td>
<td>Fascial sling for female SUI: Should we go forward to the past?</td>
<td>Alex Tong-Long Lin (TUA President, Taipei Veterans General Hospital, Taiwan)</td>
</tr>
</tbody>
</table>

### Plenary Session II

<table>
<thead>
<tr>
<th>시간</th>
<th>주제</th>
<th>강사</th>
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</thead>
<tbody>
<tr>
<td>13:00-13:15</td>
<td>New concepts in the pathogenesis of nephrolithiasis</td>
<td>Marshall L. Stoller (University of California, San Francisco, USA)</td>
</tr>
<tr>
<td>13:15-13:30</td>
<td>It is my honor! The clinical experience of (Sun) tip-flexible semi-rigid ureterorenoscope</td>
<td>Guosheng Yang (Guangdong No.2 Provincial People’s Hospital, China)</td>
</tr>
<tr>
<td>13:30-13:45</td>
<td>Methods of tract dilation in PCNL</td>
<td>Lei Shi (Qingdao University, China)</td>
</tr>
<tr>
<td>13:45-14:00</td>
<td>ISD: Definition, UDS based diagnosis, additional methods to diagnostic accuracy</td>
<td>신동길 (부산의대)</td>
</tr>
<tr>
<td>14:00-14:15</td>
<td>ISD influences therapeutic option and outcome</td>
<td>김창완 (연세의대)</td>
</tr>
<tr>
<td>14:15-14:30</td>
<td>How to manage delayed ejaculation?</td>
<td>류지간 (인하의대)</td>
</tr>
<tr>
<td>14:30-14:45</td>
<td>High grade of renal injury: Current trend of management in the era of trauma center</td>
<td>이종북 (국립중앙의료원)</td>
</tr>
<tr>
<td>14:45-14:55</td>
<td>The evolution of USANZ</td>
<td>Michael Nugara (USANZ CEO, Australia)</td>
</tr>
<tr>
<td>14:55-15:05</td>
<td>Patient-derived xenografts as in vivo models for research in urological malignances</td>
<td>Osamu Ogawa (Kyoto University, Japan)</td>
</tr>
<tr>
<td>15:05-15:15</td>
<td>The future prospect of robotic partial nephrectomy in Japan</td>
<td>Masato Fujisawa (JUA President, Kobe University, Japan)</td>
</tr>
<tr>
<td>15:15-15:30</td>
<td>Post-chemotherapy RPLND for testicular cancer</td>
<td>정창욱 (서울의대)</td>
</tr>
<tr>
<td>15:30-15:45</td>
<td>New biomarkers in prostate cancer</td>
<td>윤석중 (충북의대)</td>
</tr>
<tr>
<td>15:45-16:00</td>
<td>Role of surgery in metastatic prostate cancer or even in CRPC</td>
<td>Axel Heidenreich (University of Cologne, Germany)</td>
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</tbody>
</table>
### Plenary Session III (특강)

**일시:** Thursday 28 September 16:00~18:00  
**장소:** Grand Ballroom, 2F

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<tr>
<th>시간</th>
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<th>강사</th>
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<tbody>
<tr>
<td>16:00-16:25</td>
<td>닥터링의 의료영역 활용 사례</td>
<td>이예하 (유노코리아)</td>
</tr>
<tr>
<td>16:25-16:50</td>
<td>의료에서의 IoT</td>
<td>이연희 (한국보건사회연구원 정보통계연구실 팀장)</td>
</tr>
<tr>
<td>16:50-17:10</td>
<td>의료에서의 중심/가상현실</td>
<td>Alaric Hamacher (광운대 정보콘텐츠대학원)</td>
</tr>
<tr>
<td>17:10-17:30</td>
<td>인공지능, 융합의학 그리고 비뇨기과의 미래</td>
<td>김남국 (울산의대 융합의학과)</td>
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</tbody>
</table>

#### New Paradigms in Medicine

#### Pain Management in Urology

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<tbody>
<tr>
<td>17:30-17:45</td>
<td>비뇨기과 외래 치료 시 진정 요법</td>
<td>최근주 (중앙의대 마취통증의학과)</td>
</tr>
<tr>
<td>17:45-18:00</td>
<td>진행성 비뇨기 증양 환자의 통증 조절</td>
<td>이국진 (가톨릭의대 혈액종양내과)</td>
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### Plenary Session IV

**일시:** Friday 29 September 08:00~11:00  
**장소:** Grand Ballroom, 2F

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<tr>
<th>시간</th>
<th>주제</th>
<th>강사</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:00-08:15</td>
<td>The role of invasive urodynamics prior to surgery for LUTS/BPH</td>
<td>이상옥 (강일의대)</td>
</tr>
<tr>
<td>08:15-08:30</td>
<td>Contemporary management of vesicoureteral reflux in children: Low grade VUR</td>
<td>조원열 (동아의대)</td>
</tr>
<tr>
<td>08:30-08:45</td>
<td>Contemporary management of vesicoureteral reflux in children: High grade VUR</td>
<td>한창희 (가톨릭의대)</td>
</tr>
<tr>
<td>08:45-09:00</td>
<td>Clinical outcomes of varicocele repair in infertile men</td>
<td>서주태 (단국의대)</td>
</tr>
<tr>
<td>09:00-09:15</td>
<td>What I've learnt from terrain trial and future perspective on the treatment of metastatic prostate cancer</td>
<td>Axel Heidenreich (University of Cologne, Germany)</td>
</tr>
<tr>
<td>09:15-09:30</td>
<td>Medical evaluation and treatment for urinary stone former: Tips for everyday practice</td>
<td>박형근 (울산의대)</td>
</tr>
<tr>
<td>09:30-09:45</td>
<td>Complications of robotic urological surgery: Prevention, recognition and management</td>
<td>서일영 (원광의대)</td>
</tr>
<tr>
<td>09:45-10:00</td>
<td>Orgasmic dysfunction after radical prostatectomy</td>
<td>Run Wang (The University of Texas Medical School at Houston, USA)</td>
</tr>
<tr>
<td>10:00-10:15</td>
<td>Surgical management of post-prostatectomy incontinence</td>
<td>이규성 (성균관의대)</td>
</tr>
<tr>
<td>10:15-10:30</td>
<td>Standardization of sacral neuromodulation: Care pathway for urinary, bowel and sexual function in women</td>
<td>Courtenay K. Moore (The Cleveland Clinic Center for Continuing Education, USA)</td>
</tr>
<tr>
<td>10:30-10:45</td>
<td>Antibiotics prophylaxis for transrectal prostate biopsy</td>
<td>이지열 (가톨릭의대)</td>
</tr>
<tr>
<td>10:45-11:00</td>
<td>Treatment of multi-resistant gram negative bacteria in UTI</td>
<td>강철인 (성균관의대 내과학학교실)</td>
</tr>
</tbody>
</table>
일시: Friday 29 September 10:20-16:05  
장소: Crystal Ballroom, 3F  
사회: 하홍구(부산의대) / 최석환(경북의대)  

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<tr>
<th>시간</th>
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<tbody>
<tr>
<td>10:20-10:30</td>
<td>축사</td>
<td>천 준 (대한비뇨기과학회장)</td>
</tr>
</tbody>
</table>
| 10:30-11:10 | 비뇨기 해부학의 이해                                | 좌장: 장승일 (전남의대)  
수술 중 접하는 비뇨기 해부학 | 강성구 (고려의대)  
영상에서 보이는 비뇨기 해부학 | 천혜진 (경북의대 영상의학과) |
| 11:10-11:50 | 비뇨기종양 환자의 항암치료                            | 좌장: 박홍석 (고려의대)  
신장암의 표적치료 | 황의창 (전남의대)  
방광암 및 전립선암의 항암치료 | 김수동 (동아의대) |
| 12:00-13:00 | Lunch                                               |                                           |

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<th>시간</th>
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<th>강사</th>
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<tbody>
<tr>
<td>13:00-13:40</td>
<td>요역동학검사의 실제</td>
<td>좌장: 김계환 (가천의대)</td>
</tr>
<tr>
<td>13:00-13:20</td>
<td>남성환자에서 요역동학검사의 팀</td>
<td>김귀식 (서울대병원)</td>
</tr>
<tr>
<td>13:20-13:40</td>
<td>여성환자에서 요역동학검사의 팀</td>
<td>허경옥 (서울아산병원)</td>
</tr>
<tr>
<td>13:40-14:20</td>
<td>수술 후 합병증 관리</td>
<td>좌장: 전승현 (경희의대)</td>
</tr>
<tr>
<td>13:40-14:00</td>
<td>근치적전립선적출술 후 발생한 요실금과 발기부정의 치료</td>
<td>이주용 (연세의대)</td>
</tr>
<tr>
<td>14:00-14:20</td>
<td>경요도 수술 후 합병증 관리</td>
<td>조혁진 (가톨릭의대)</td>
</tr>
<tr>
<td>14:20-14:45</td>
<td>Coffee Break</td>
<td></td>
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<tr>
<td>14:45-15:25</td>
<td>결석 환자의 식이와 치료</td>
<td>좌장: 이승배 (Sheikh Khalifa Specialty Hospital)</td>
</tr>
<tr>
<td>15:05-15:25</td>
<td>결석 환자의 식단</td>
<td>홍미경 (삼성서울병원)</td>
</tr>
<tr>
<td>15:25-16:05</td>
<td>내시경 결석 치료의 실제</td>
<td>조성용 (서울의대)</td>
</tr>
<tr>
<td>15:25-15:45</td>
<td>발기부전의 원인과 기전</td>
<td>좌장: 박현준 (부산의대)</td>
</tr>
<tr>
<td>15:45-16:05</td>
<td>발기부전의 약물 약제</td>
<td>박민규 (인제의대)</td>
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<td>16:05</td>
<td>Adjourn</td>
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<tr>
<td>Time</td>
<td>Session Name</td>
<td>Venue</td>
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<tr>
<td>Thursday, 28 September</td>
<td>Satellite Symposium I (Sponsor: Astellas)</td>
<td>Grand Ballroom, 2F</td>
</tr>
<tr>
<td>11:20-11:50</td>
<td>Updates on Enzalutamide in Korean patients with chemo-naïve mCRPC</td>
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<tr>
<td>Thursday, 28 September</td>
<td>Satellite Symposium II (Sponsor: MSD)</td>
<td>Crystal Ballroom A, 3F</td>
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<tr>
<td>11:20-11:50</td>
<td>PROSCAR; Journey for the BPH treatment and current data update</td>
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<tr>
<td>Thursday, 28 September</td>
<td>Satellite Symposium III (Sponsor: Olympus)</td>
<td>Crystal Ballroom B, 3F</td>
</tr>
<tr>
<td>11:20-11:50</td>
<td>Flexible Cystoscopy - less pain and good image - Junichi Inokuchi (Kyushu University, Japan)</td>
<td></td>
</tr>
<tr>
<td>Thursday, 28 September</td>
<td>Satellite Symposium IV (Sponsor: 종근당)</td>
<td>Geumkang Hall (Avenue 2F)</td>
</tr>
<tr>
<td>11:20-11:50</td>
<td>Update on interstitial cystitis/bladder pain syndrome</td>
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<tr>
<td>Friday, 29 September</td>
<td>Satellite Symposium V (Sponsor: Coloplast)</td>
<td>Crystal Ballroom A, 3F</td>
</tr>
<tr>
<td>09:00-09:15</td>
<td>Choice of intermittent catheters</td>
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<tr>
<td>09:15-09:20</td>
<td>자가도뇨 카테터 요양급여 제도 현황</td>
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<tr>
<td>Friday, 29 September</td>
<td>Satellite Symposium VI (Sponsor: Boston Scientific)</td>
<td>Crystal Ballroom B, 3F</td>
</tr>
<tr>
<td>09:00-09:30</td>
<td>Past, present and future of RIRS</td>
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<tr>
<td>Friday, 29 September</td>
<td>Satellite Symposium VII (Sponsor: GSK)</td>
<td>Grand Ballroom, 2F</td>
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<tr>
<td>11:20-11:50</td>
<td>The evolution of medical management for BPH</td>
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<tr>
<td>시간</td>
<td>주제</td>
<td>강사</td>
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<tr>
<td>10:00-10:05</td>
<td>Opening and Welcome Remark (KUA, AUA)</td>
<td>Jun Cheon (KUA President)</td>
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<tr>
<td>10:05-11:00</td>
<td>Urolithiasis Update</td>
<td>Marshall L. Stoller (University of California, San Francisco, USA)</td>
</tr>
<tr>
<td></td>
<td>Medical and surgical management of stone disease</td>
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<td>Medical expulsive therapy, SWL</td>
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<td>PCNL</td>
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<td>11:00-12:00</td>
<td>Kidney Cancer Update</td>
<td>J. Kellogg Parsons (University of California, San Diego, USA)</td>
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<tr>
<td></td>
<td>Diagnostics</td>
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<td>Nephrometry score systems, role of percutaneous biopsy localized disease management</td>
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<td>Small renal masses, surgical treatments, ablative therapies advanced disease</td>
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<td>Cytoreductive therapy, targeted therapies, metastasectomy</td>
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<tr>
<td>12:00-13:00</td>
<td>Lunch</td>
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<tr>
<td>13:00-14:00</td>
<td>Bladder Cancer Update</td>
<td>J. Kellogg Parsons (University of California, San Diego, USA)</td>
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<td>Management of non-invasive disease</td>
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<td>Diagnostics</td>
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<td></td>
<td>Intravesical therapies, surgical therapies, management of invasive and metastatic disease, neoadjuvant and adjuvant chemotherapy, surgical therapy and lymph node dissection</td>
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<tr>
<td>14:00-15:00</td>
<td>Erectile Dysfunction / Andrology Update</td>
<td>Run Wang (The University of Texas Medical School at Houston, USA)</td>
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<tr>
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<td>Physiology of erection</td>
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<td>Pathophysiology of erectile dysfunction, evaluation and management of erectile dysfunction, Peyronie’s disease, penile reconstruction, prosthetic surgery, hypogonadism</td>
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<td>Testosterone</td>
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<td>Controversies</td>
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<td>Male Infertility</td>
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<td>15:00-15:20</td>
<td>Afternoon Break</td>
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<tr>
<td>15:20-16:20</td>
<td>Female Urology, Neuourology and Voding Dysfunction Update</td>
<td>Courtenay K. Moore (The Cleveland Clinic Center for Continuing Education, USA)</td>
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<td>Overactive bladder, medical management, surgical management</td>
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<td>Stress incontinence, pelvic organ prolapse, neurogenic bladder dysfunction</td>
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<td>16:20-16:30</td>
<td>Closing Remarks / Adjourn</td>
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Abstracts
## Oral Session 1: Cancer - Kidney (I) (O001-O010)

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<th>Authors</th>
<th>Institution</th>
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<td>O-001</td>
<td>직업성 노출과 신장암의 관련성에 대한 환자대조군 연구</td>
<td>김대현, 전현균, 정병철, 서성일, 이현우, 최한용, 김환철, 임종하, 전승수</td>
<td>성균관대학교 의과대학 삼성서울병원 비뇨기과학교실, 연세대학교 의과대학</td>
</tr>
<tr>
<td>O-002</td>
<td>신세포암에서 성별과 클레스테롤 수치에 따른 BMI의 예측인자로서의 가치 - 다기관 연구</td>
<td>Fahad Bashraheel, 정현철, 변석수, 금철, 김용준, 황의정, 김태환, 강석호, 정진수, 홍성호</td>
<td>가톨릭대학교 서울성모병원, 부산서울대학교병원, 서울대학교병원, 경북대학교병원, 고려대학교 안양병원, 국립암센터</td>
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<td>O-003</td>
<td>R.E.N.A.L. nephrometry 점수에 따른 신장 종과에 대한 경파하 생검에 대한 결과 분석</td>
<td>김진우, 박지수, 안현규, 강승구, 오경택, 김종환, 나중재, 이병호, 윤영은, 윤민지, 황원석, 나근호, 최영득</td>
<td>연세대학교 의과대학 비뇨기과학교실, 비뇨기과학연구소, Brain Korea 21 PLUS Project for Medical Science, Yonsei University, 국립건강보험공단 일반병원 비뇨기과, 연세대학교 의과대학 비뇨기과학교실</td>
</tr>
<tr>
<td>O-004</td>
<td>Yonsei nomogram: a predictive model of new onset chronic kidney disease following partial nephrectomy in patients with T1 renal tumors</td>
<td>Ahmed Elghiaty, Ali Abdel Raheem, Tae Young Chin, Ki Don Chang, Mohamed Alenzi, Young Eun Yoon, Won Sik Ham, Woong Kyu Han, Young Deuk Choi, Koon Ho Rha</td>
<td>Department of Urology and Urological Science Institute, Severance Hospital, Yonsei University College of Medicine</td>
</tr>
<tr>
<td>O-005</td>
<td>Impact of surgical margin status after partial nephrectomy for renal cell carcinoma</td>
<td>이중수, 장원식, 김종천, 함문식, 한용규, 나근호, 홍성준, 최영득</td>
<td>연세대학교 의과대학 비뇨기과학교실</td>
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<tr>
<td>O-006</td>
<td>부분부적절술후 환측신장의 장기간 추적관찰</td>
<td>김종근, 박서현, 김영, 유담삼, 정인갑, 송재민, 홍범석, 홍준혁, 김창수, 안한종</td>
<td>울산대학교 서울이산병원, 한림대학교 동남성심병원</td>
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<tr>
<td>O-007</td>
<td>Indicators of CKD upstaging: multicenter long term matched comparison of robotic, laparoscopic and open partial nephrectomy 1308 cases</td>
<td>정기호, 양은 Succler, 홍성준, 최영득, 나근호</td>
<td>연세대학교 의과대학 비뇨기과학교실</td>
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<td>고신대학교 의과대학 비뇨기과학교실</td>
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<td>Department of Urology and Urological Science Institute, Yonsei University College of Medicine, Seoul, Korea</td>
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조장: 문두건(고려의대), 손환철(서울의대)

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CH이과학대학교 서울병원 섬유성학, 1님성의학연구실, 2CH이과학대학교 의생명과학과

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경북대학교 서울병원 생물학

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단국대학교 재활병원 비뇨기과, 4생식의학연구실

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이효석1, 박용석2, 최주형3, 이성복4, 서주태5
단국대학교 재활병원 비뇨기과, 4생식의학연구실

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서울대병원 비뇨기과, 2마스크터, 3대성병기부

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서울대병원 비뇨기과, 2서울대병원 트라우마, 3서울대병원 비뇨기과

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조장: 김대경(울산의대), 조영심(성균관의대)

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가톨릭대학교 부천성모병원
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경상대학교 의과대학 비뇨기과학교실, 경상대학교병원

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고려대학교 의과대학 비뇨기과학교실

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Department of Urology, Konkuk University Medical Center, Konkuk University School of Medicine

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1성균관대학교 의과대학 삼성서울병원 비뇨기과학교실, 2가천대학교 의과대학 서울성모병원
비뇨기과학교실, '강남대학교병원 비뇨기과학교실, 가톨릭대학교 서울성모병원
비뇨기과학교실, '경희대학교 의과학대학 재일병원 비뇨기과학교실, '울산대학교 서울아산병원 비뇨기과학교실

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비뇨기과학교실, '강남대학교병원 비뇨기과학교실, 가톨릭대학교 서울성모병원
비뇨기과학교실, '경희대학교 의과학대학 재일병원 비뇨기과학교실, '울산대학교 서울아산병원 비뇨기과학교실

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부산대학교 의과대학 비뇨기과학교실

Grand Ballroom

14:00~15:00

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1과학대학교 안산병원 비뇨기과학교실, 2고려대학교 의과대학 비뇨기과학교실, 3서울대학교 의과대학 비뇨기과학교실

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서울서울대학교병원 비뇨기과학교실

O-036 전립선암으로 근치적 전립선 절제술을 시행받은 환자의 병리학적 결과를 예측하는데 있어 수술전 prostate health index의 유용성: 강원도 지역 비뇨기종양 다기관 연구 .................................................................................................... 88
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1강원대학교병원 비뇨기과학교실, 2연세대학교 원주기독병원, 3울산대학교 강원이산병원

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울산대학교 서울이산병원

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울산대학교 서울이산병원 비뇨기과학교실

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1서울대학교병원, 2서울의대병원 보리병원

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서울서울대학교병원 비뇨기과학교실

Crystal A
14:00-15:00
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한양대학교 의과대학 의과학연구소

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고려대학교 의과대학 의과학연구소

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1인하대학교 의과대학 비뇨기과학연구소, 2연세대학교 의과대학 비뇨기과학연구소, 비뇨기과학연구소

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1연세대학교 의과대학 비뇨기과학연구소, 비뇨기과학연구소, 2인하대학교 의과대학 비뇨기과학연구소
신장
부분
역행성
증상을

surgical
silicone
for
3D
partial
guide
men:
impact
kidney
the.
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의과대학
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오차에
프린팅
모형의
신절제술

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"연세대학교 의과대학 신생생물학분야 비뇨기과학교실, 연세대학교 의과대학 신생생물학분야 이학대학장과학교실, 국민건강보험공단 일산병원 비뇨기과, 연세대학교병원 비뇨기과학교실"

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"부산대학교병원 비뇨기과학교실, 한국공공정자은행연구원"

Grand Ballroom

15:00-16:00

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죄송합니다. 내용을 보지 못했습니다.
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Crystal A

Video Session 1 (V001-V005)

15:00-16:00

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울산대학교 서울아산병원 비뇨기과학 교실

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Crystal B

Oral Session 8: Incontinence/Female Urology/Neurourology (O071-O080)

15:00-16:00

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한양대학교 의과대학 비뇨기과학 교실

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1성균관대학교 의과대학 삼성서울병원 비뇨기과학 교실, 2부대서울대학교병원 비뇨기과학 교실, 3의학원의학교 부속 목동병원 비뇨기과학 교실,

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O-075  Nutrient intake and urinary incontinence in Korean women: a propensity score-matched analysis from the Korean national health and nutrition examination survey data

O-076  최대 요도폐쇄검사 후 전립선 절제술 후 요실금 회복과의 연관성

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O-078  전립선석출술 후 발생한 남성 요실금의 치료로 Re-adjustable male sling 수술의 결과

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O-080  The effect of low bladder compliance on upper urinary tract after artificial urinary sphincter implantation

Grand Ballroom  16:00-17:00

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Hwangjo, Seoyoung, Young, Hyoung, Young, Hyung, Young, Young, Hyun, Young, Jeong, Young, Shin, Young, Seo

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MR-U/S fusion prostate biopsy의 유용성: 단일 기관 연구

Byeongki, Jeong, Young, Young, Hyon, Young, Soo, Seo, Hyun, Young

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Jin, Hyun, Young, Young, Soo, Seo, Hyun, Young

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Hyon, Soo, Seo, Hyun, Young

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Young, Young, Hyun, Young, Young, Young, Young, Hyun

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Jin, Young, Young, Soo, Seo, Hyun, Young

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Jin, Young, Young, Soo, Seo, Hyun, Young

O-085

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Jin, Young, Young, Soo, Seo, Hyun, Young

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Jin, Young, Young, Soo, Seo, Hyun, Young

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Jin, Young, Young, Soo, Seo, Hyun, Young

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서울대학교 의과대학 비뇨기과학실

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전남대학교 의과대학 비뇨기과학실

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계명대학교 의과대학 비뇨기과학실

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1울산대학교 서울이산병원, 울산대학교 의과대학 비뇨기과학실, 2울산대학교병원, 울산대학교 의과대학 비뇨기과학실

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1연세대학교 의과대학 비뇨기과학실, 2제주대학교 의과대학 소아비뇨과학

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Thursday 28 September

Grand Ballroom 08:00-09:00

Oral Session 11: Cancer - Bladder, Pelvis, Ureter & Others (I) (O101-O110) 좌장 : 김병진(전북의대), 강석호(고려의대)

O-101 근치적 방광 절제술의 추세: 한국에서
김승빈1, 원광대학교, 권휘안1, 1울산대학교, 심정현1, 남종길, 성재우1, 1가톨릭대학교, 윤현석1, 1고려대학교, 김광현, 이화여자대학교, 유영동, 이화여자대학교, 윤한용, 정병창
고려의학과학교실, 성균관대학교 비뇨기과학교실, 성균관대학교 비뇨기과학교실, 성균관대학교 비뇨기과학교실, 성균관대학교 비뇨기과학교실

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송완, 윤현석, 김광현, 윤하나, 정우식, 심봉석, 이동현
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원광대학교 의과대학 비노기과학교실

Withdrawal

Withdrawal

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Crystal B

10:20-11:20

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울산대학교 의과대학 비뇨기과학실

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전남대학교 의과대학 비뇨기과학실

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13:00-14:00

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부산대학교 의과대학 비뇨기과학실
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자아과학대학교 의과대학 비뇨기과학교실

Crystal B
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Crystal A

Oral Session 18: Cancer - Kidney (II) (O171-O180)

Crystal A
14:00~15:00

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대한비뇨기종양학회 신암 연구회 database를 이용한 분석

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1) 국립암센터 전립선암센터 비뇨기과, 2) 국립암센터 양양병원 비뇨기과, 3) 서울대학교 의과학비뇨기과, 4) 서울대학교 의과학비뇨기과, 5) 울산대학교 의과학비뇨기과, 6) 전남대학교 의과학비뇨기과, 7) 임원대학교 의과학비뇨기과, 8) 서울대학교 의과학비뇨기과, 9) 가톨릭대학교 의과학비뇨기과

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O-179 Preoperative cholesterol level as a new independent predictive factor of survival in patients with metastatic renal cell carcinoma

Hakmin Lee1, Wun-Jae Kim2, Eu Chang Hwang3, Seok Ho Kang4, Sung-Hoo Hong5, Jinsoo Chung6, Tae Gyun Kwon7, Cheol Kwak8, Hyeon Hoe Kim9, Jong Jin Oh10, Sangchul Lee11, Sung Kyu Hong12, Sang Eun Lee13, Seok-Sooyun14, Korean Renal Cell Carcinoma (KORCO) Group

1) Department of Urology, Seoul National University Bundang Hospital, Seongnam, 2) Department of Urology, Chungbuk National University College of Medicine, Cheongju, 3) Department of Urology, Chonnam National University Hwasun Hospital, Hwasun, 4) Department of Urology, Korea University School of Medicine, Seoul, 5) Department of Urology, College of Medicine, The Catholic University of Korea, Seoul, 6) Department of Urology, National Cancer Center, Goyang, 7) Department of Urology, Kyungpook National University College of Medicine, Daegu, 8) Department of Urology, Seoul National University Hospital, Seoul, Korea

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Crystal B
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O-181 대사이상 질환과 혈중 테스토스테론의 상관관계에 관한 연구

김 명1, 안태영2

울산대학교 서울이산병원 비뇨기과

O-182 Association between handgrip strength and erectile dysfunction in older men: a cross-sectional study

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가톨릭대학교 의생명공학병원, 2) 서울성모병원, 3) 가톨릭양주병원, 4) 한국 전통의학 연구소

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부산대학교병원

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경성대학교 의과대학 비뇨기과학교실, 1경일병원 비뇨기과학교실

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1Department of Urology, 2Department of Urology, Asan Medical Center

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1가톨릭대학교 서울성모병원 비뇨기과학과, 2이화여자대학교 의과대학

O-235
진단 당시 정이상 전립선암으로 진단 받은 환자들에게 안드로겐 차단요법을 시행하였을 때, 전이부담 정도가 지속적 혹은 전립선암으로 진행하는 시간에 미치는 영향.................................312
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O-236 호르몬 박탈요법을 받은 한국인 환자에서 하지 저항성 전립선암의 위험도 평가: KCS-prostate scoring model

O-237 전이성 전립선암에서 도세탁셀 항암요법 방법에 따른 효과와 독성의 비교

O-238 도세탁셀로 치료한 전이성 저세자형성 전립선암 환자의 치료 반응에 대한 예측인자

O-239 전립선암과 괴리중 24(OH)D2 수치와의 상관관계: 미국 국가 보건영양실험조사 (NHANES) 2007-2008 데이터

O-240 엔잘루타마이드를 사용한 항암치료 받은 저세자형성 전립선암 환자에서 생존 예측 인자

Grand Ballroom 16:00-17:00

Oral Session 25: Cancer - Bladder, Pelvis, Ureter & Others (III) (O241-O250)

좌장 : 김홍섭(건국의대), 정병창(성균관의대)

O-241 신이식환자에서 발생하는 요로상피암

O-242 신체질량지수(BMI)에 따른 방광암 발생위험 예측

O-243 Identification of red/green/blue values from white-light imaging and narrow-band imaging for the discrimination of bladder cancer features

O-244 BCG 치료를 받은 비근육침윤성 방광암 환자의 예후 예측을 위한 NLR의 효용성과

O-245 비근적이성방광암에서 BCG 유지요법 시행 후 BCG failure에 대한 예측인자

O-246 상부 요로상피암에서 진단적 요관경 검사의 정확성

O-247 상부 요로상피암에 대한 근치적 신관질체술 이후 신기능 감소의 예측 인자: 술전 99mTc-DTPA 결과와의 연관성

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가톨릭대학교 서울성모병원

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울산대학교 서울아산병원

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1서울특별시보라매병원, 서울대학교 의과대학 비뇨기과학교실, 2서울대학교 의과대학 체육교육과
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1연세대학교 의과대학 비뇨기과학실, 2비뇨의과학연구소, 'Brain Korea 21 PLUS Project for Medical Science, Yonsei University,'
3국립건강보험공단 일산병원 비뇨기과, 4연세대학교 의과대학 비뇨기과학실

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1부산대학교 의학전문대학원 비뇨기과학실, 2광주과학기술원 의생명공학과

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1강동경희대학교병원, 2경희의료원

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1연세대학교 의과대학 비뇨기과학실, 2비뇨의과학연구소, 'Brain Korea 21 PLUS Project for Medical Science, Yonsei University,'
3국립건강보험공단 일산병원 비뇨기과, 4연세대학교 의과대학 비뇨기과학실

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1대구 국립대병원 비뇨기과, 2의과학대학 백서요도의과학과

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1부산대학교 의학전문대학원 비뇨기과학실, 2광주과학기술원 의생명공학과
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경북대학교 의과대학 비뇨기과학실

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서성철, 강호원, 김현태, 김용준, 윤석중, 이상철, 김현재
충북대학교 의과대학 비뇨기과학실

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이재훈, 류한규, 이성철, 최세영, 류재만, 유달산, 정인갑, 송채린, 홍범식, 홍준혁, 안한중, 김정수
울산대학교 서울아산병원

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이동훈, 이정우, 남종길, 박성우, 정문기
부산대학교 의과대학 양산부산의료원병원 비뇨기과학실

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'동남권병원야기학적전산센터', '국립암센터 전산센터', '서울대학교 의과대학 비뇨기과학실', '성균관대학교 의과대학 비뇨기과학실', '울산대학교 의과대학 비뇨기과학실', '연세대학교 의과대학 비뇨기과학실', '경북대학교 의과대학 비뇨기과학실', '서울아산병원 비뇨기과학실'

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김철호, 구자현, 하윤석, 이상철, 정재욱, 김범수
울산대학교 의과대학 비뇨기과학실

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울산대학교 의과대학 비뇨기과학실

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'가톨릭대학교 서울성모병원 비뇨기과학실', '가톨릭대학교 서울성모병원 Department of Medical Informatics', '서울아산병원 비뇨기과학실', '울산대학교 서울아산병원 비뇨기과학실', '부산대학교 서울성모병원 비뇨기과학실', '성균관대학교 의과대학 상상심문병원 비뇨기과학실', '가톨릭대학교 상반보건복지병원 비뇨기과학실', '연세대학교 의과학 Department of Urology, Urological Science Institute, National Evidence-based Healthcare Collaborating Agency, Seoul, 가톨릭대학교 서울성모병원 The Cancer Research Institute

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최재영, 류재만, 경수환, 신정현, 이재호, 이원철, 유달산, 정인갑, 김정수
울산대학교 의과대학 비뇨기과학실

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울산대학교 서울아산병원 비뇨기과학실, 연세대학교 해운대병원 비뇨기과학실
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전남대학교 의과대학 비뇨기과학과
2017 Annual Meeting of The Korean Urological Association

Changing Urology, Leading Future

일반연제
직업성 노출과 신장암의 관련성에 대한 환자대조군 연구

김태현1, 전창균1, 정병창1, 서성일1, 이현무1, 최한용1, 김환철2, 임종한2, 전성수1

1성균관대학교 의과대학 삼성서울병원 비뇨기과학치료실, 2인하대학교 의과대학 직업환경의학과학교실

Introduction & Objectives: The aim of this study was to identify occupational exposures associated with renal cell carcinoma (RCC).

Materials & Methods: This is a multicenter case–control study conducted in Korea, Cases were subjects diagnosed with histologically confirmed RCC in four hospitals in 2015. Population–based controls were matched to cases 1:1 by sex, age (± 5 year), and town or neighborhood. All subjects were interviewed to gather relevant information on socio–demographic factors, lifetime smoking history, and lifetime occupational history using a structured questionnaire. Lifetime occupational history consisted of every occupation in which the case or control ever had been employed for at least 12 months. Conditional logistic regression models were used to estimate smoking adjusted odds ratios (ORs) and 95% confidence intervals (CIs) relating occupation and industry to RCC risk.

Results: A total of 347 cases and 347 controls were included in the analysis. Of all subjects, 472 (68.0%) were male. The mean age was 55.7±11.0 years for cases and 56.7±9.8 years for controls. No statistically significant differences existed between cases and controls with regard to gender and age. Controls were more likely than cases to have a lower educational level (P=0.001) and be current smokers (P<0.001). After adjusting for cigarette smoking, an increased risk of RCC was observed for workers in the cleaning services industry (OR 5.90; 95% CI 1.96 to 17.76). Employment in food processing was also associated with elevated risk of RCC (OR 3.74; 95% CI 1.45 to 9.37). Exposure to non–arsenic pesticides was inversely associated with RCC risk, with an OR of 0.38 (95% CI 0.20 to 0.72).

Conclusion: Our data indicate that ever having worked in the cleaning services or food processing is independently associated with an increased risk of RCC, whereas exposure to non–arsenic pesticides is associated with a decreased risk of RCC in Korean subjects.

Keywords: Kidney cancer, Epidemiology, Race
Purpose: Recently, the effect of preoperative body mass index (BMI) and total cholesterol on prognosis has been reported in patients with RCC but is still controversial and poorly understood. We analyzed the effects of BMI and total cholesterol on the prognosis of RCC.

Materials and Methods: From 1988 to 2015, we retrospectively collected data from 7271 patients surgically treated for non-metastatic RCC from 8 centers. ROC curve was analyzed to calculate the cut-off value of cholesterol as a predictive factor of RCC. The highest Youden index was shown in 163.5. According to WHO criteria, low BMI and high BMI groups are divided by 25. Kaplan Meyer analysis, Multivariate Cox regression model were performed to identify overall survival (OS), Recurrence free survival (RFS).

Results: Low BMI and low cholesterol group was associated with short OS and RFS (p<0.001) than any other groups in total cohort. As a subgroup analysis we divided groups by gender. In the male group, the result showed that low BMI and low cholesterol was associated with short OS and RFS similar to total cohort results (p<0.001). But in the female group, the effect of cholesterol on the prognosis was same as male (p<0.001) but BMI didn’t associated with OS and RFS (p=0.650, 0.799 respectively). And on multivariate Cox regression analysis, cholesterol was an independent predictor for OS in both gender groups (HR=1.502 p<0.001, HR=1.758 p=0.037 respectively). However, BMI was a significant prognostic factor in the male group only (HR=1.925 p<0.001).

Conclusion: Preoperative BMI and total cholesterol in RCC patients showed statistical significance as OS and RFS predictive factor. But in the subgroup analysis divided by gender, cholesterol was an independent predictor for OS in both groups but BMI had statistical significant only in the male group.

Keywords: Renal cell carcinoma, Body mass index, Total cholesterol
R.E.N.A.L. nephrometry 점수에 따른 신장 종괴에 대한 경피하 생검에 대한
결과 분석

김진우1, 박지수1, 안현규1, 강승구1, 오경택1, 김종원1, 나준채1, 이형호3, 윤영은4, 윤민지1, 함원식1, 나군호1, 최영득1, 홍성준1,2, 한웅규1,2

1연세대학교 의과대학 비뇨기과학회, 비뇨의과학연구소, 2Brain Korea 21 PLUS Project for Medical Science, Yonsei University, 3국립건강보험공단 일산병원 비뇨기과, 4한양대학교 의과대학 비뇨기과학회실


결과: 총 149건의 신장종괴 생검을 진행하였고 합병증은 총 18건 발생하여 12%이었으며 진단에 실패한 경우에는 14건으로 9.4%에 해당했다. 고혈압, 당뇨 및 체질량 지수와 신장종괴 경피적 생검의 합병증 및 진단 정확성에서는 유의미한 경향성이 보이지 않았다. R.E.N.A.L Nephrometry score로 신장 종괴들을 분류했을 때 낮음(4-6점)이 51건으로 34.2%, 중간 (7-9점)이 75건 50.2%, 높음(10-12점)이 23건 15.4%를 차지하였다. 각각의 점수에 대해 합병증은 51건 중 3건(6.0%), 75 건 중 9건(11.9%), 23건 중 1건(4.3%)로 Nephrometry score가 높음수록 합병증이 높아지는 경향성을 발견할 수 있었다. 추가적으로 종괴들은 1 cm 이하, 1-2 cm, 2-4 cm으로 세분화하였을 때 각각의 경우에서 R.E.N.A.L Nephrometry score가 낮음에서 높음으로 감수록 합병증의 비도가 증가함을 알 수 있었다. 진단의 정확성은 종괴의 크기와 경향성을 보였는데 1 cm 이하의 종괴에서는 3건중 1건(33.3%) 진단된 반면, 1-2 cm 종괴는 54건중 47건(87%), 2-4 cm 종괴에서는 94.5%로 증가하였다.

결론: R.E.N.A.L. Nephrometry score를 이용하여 종괴를 구분하였을 때 그 점수가 높음수록 생검시 합병증이 높아짐을 알 수 있었고 크기가 클수록 진단의 정확성이 높아짐을 알 수 있었다. 따라서 4 cm 이하의 신장 종괴의 생검 실시 전 R.E.N.A.L Nephrometry score를 이용하여, 생검 후 합병증을 예측할 수 있어 그 점수가 높은 경우 보다 더 주의를 요할 필요가 있으며 종괴의 크기가 작을수록 진단이 실패할 확률이 있음을 인지하여야 한다.

Keywords: Renal cell carcinoma, Renal biopsy, Nephrometry score
Yonsei nomogram: a predictive model of new onset chronic kidney disease following partial nephrectomy in patients with T1 renal tumors

Ahmed Elghiaty, Ali Abdel Raheem, Tae Young Chin, Ki Don Chang, Mohamed Alenzi, Young Eun Yoon, Won Sik Ham, Woong Kyu Han, Young Deuk Choi, Koon Ho Rha

Department of Urology and Urological Science Institute, Severance Hospital, Yonsei University College of Medicine

**Purpose:** To develop a predictive nomogram for chronic kidney disease (CKD)–free survival probability on the long–term after PN.

**Methods:** A retrospective analysis of 698 patients with T1 renal tumors undergoing PN at tertiary academic institute was done. A multivariable Cox regression analysis was conducted based on parameters proven to have an impact on postoperative renal function. Patients with incomplete data, less than 12 months follow–up, and preoperative CKD ≥stage III were excluded. The study end points were to identify independent risk factors for new onset CKD development, as well as, to construct a predictive model for CKD–free survival probability after PN.

**Results:** Median age was 52 years and median tumor size was 2.5 cm. Ninety–one patients (13.1%) developed new onset CKD at a median follow–up of 60 months. The CKD–free survival rates at 1–yr, 3–yr, 5–yr, and 10–yr were 97.1%, 94.4%, 85.3%, and 70.6%, respectively. On multivariable cox regression analysis, age (hazard ratio [HR]: 1.041, p=0.001), male (HR: 1.653, p<0.001), diabetes mellitus (HR: 1.921, p=0.046), tumor size (HR: 1.331, p<0.001), and preoperative eGFR (HR: 0.937, p<0.001) were independent predictors for new onset CKD. The c–index (95%CI) for CKD–free survival was 0.853 (0.815–0.895).

**Conclusion:** We developed a novel nomogram for predicting the 10–yr CKD–free survival probability following PN. This model may have an important role in PN decision making and follow–up plan after surgery. External validation of our nomogram in a larger cohort of patients should be considered.

**Keywords:** Partial nephrectomy, Nomogram, CKD
Impact of surgical margin status after partial nephrectomy for renal cell carcinoma

이종수, 장원식, 김종찬, 함원식, 한웅규, 나군호, 홍성준, 최영득
연세대학교 의과대학 비뇨기과학교실

Purpose: The clinical significance of surgical margin status after partial nephrectomy has a lack of literature. Thus, we analyzed the association between positive surgical margin and risk of cancer recurrence in patients with clinically localized renal cell cancer who underwent partial nephrectomy. Moreover, we evaluated whether a minimal surgical margin less than 1 mm is really safe for cancer control after partial nephrectomy.

Materials and Methods: We retrospectively reviewed medical records of 855 patients with clinical T1 renal mass who underwent partial nephrectomy at our institution between 2005 and 2014. After exclusion of patients who benign pathology was reported and those with incomplete pathological or follow-up data, 748 patients were included in the final analysis. We analyzed data using Kaplan–Meier method with log–rank tests and multivariate Cox regression models.

Results: Of the 748 patients enrolled in this study, 704 (94.2%) had negative surgical margin and 44 (5.8%) had positive surgical margin. Recurrence–free survival for patients with positive surgical margin was significantly lower compared to those with negative surgical margin (p<0.001). When cases of negative surgical margin were divided into two groups (≥1 mm vs. <1 mm), there was no significant difference in recurrence–free survival (p=0.604). Both univariate and multivariate Cox regression analyses showed positive surgical margin was a significant predictor of recurrence (hazard ratio 8.03, 95% confidence interval 2.74–23.56, p<0.001), while the safety margin of <1 mm was not (p=0.680).

Conclusions: Our study shows that positive surgical margin resulting from partial nephrectomy increases the risk of recurrence in patients with renal cell cancer. Moreover, we demonstrated that even a safety margin less than 1 mm may be adequate to prevent recurrence. To confirm our findings, not only large-scale but also long-term studies are required.

Keywords: Partial nephrectomy, Surgical margin, Local recurrence
O-006

부분신적출술후 환측신장의 장기간 추적관찰

김종근2, 박사현1, 김영1, 유달산1, 정인갑1, 송재린1, 홍범식1, 홍준혁1, 김청수1, 안한종1

1울산대학교 서울아산병원, 2한림대학교 동탄성심병원

Introduction: There has been a debate whether the long-term ipsilateral renal function after partial nephrectomy (PN) is affected by preserved kidney parenchyma volume or ischemic insult during the surgery.

Materials and Methods: We analyzed the data from 530 patients who received PN. Separated renal functions were measured preoperatively and followed at postoperative 3 months and annually thereafter using DTPA GFR scan. Perioperative variables affecting the long-term ipsilateral GFR were assessed by the linear mixed model.

Results: The mean preop. ipsilateral kidney volume and mean volume at 3 mo. were 170.9 mL/min and 141.6 mL/min, respectively. The ipsilateral renal volume decreased by 17.2% at postop. 3 mo. The mean preoperative ipsilateral GFR and mean GFR at 3 mo. were 42.9 mL/min and 31.2 mL/min. The ipsilateral GFR decreased by 26.7%. The ipsilateral GFR hit bottom at postoperative 3 mo, recovered thereafter postoperative 4 years (decreased by postoperative 1, 2, 3, and 4 years GFR; 26.7%, 21.8%, 17.7% and 11.5%), and no further increment was observed at postoperative 5 years (12.4%; p=0.549). On linear mixed model, age (β=−0.070), prolonged ischemic time (per 1 min; β=−0.160), high preoperative GFR (per 1 ml/min; β=−0.406), and high RENAL score (per 1 point; β=−0.683) were negatively associated with the change of GFR during postoperative 5 years. On the other hands, BMI (β=0.254), male gender (β=2.138) and preserved ipsilateral kidney volume (β=0.305) were positively related to the recovery of GFR. Especially, in the group with lower preop. ipsilateral GFR (<30 mL/min, per 1%; β=0.239) and more advanced CKD stage (≥III, β=0.189), preserved renal volume is only one factor in the recovering of GFR.

Conclusion: Long-term GFR was affected by preserved kidney parenchyma volume and ischemic time. Irreversible renal damage can be minimized by the preservation of nephron mass and the reduction of ischemic time.

Keywords: Kidney neoplasms, Glomerular filtration rate, Ischemia time
Indicators of CKD upstaging: multicenter long term matched comparison of robotic, laparoscopic and open partial nephrectomy 1308 cases

장기돈, 알리 압델 라힘, 한웅규, 최영득, 나군호
연세대학교 의과대학 비뇨기과학과실

Introduction: In this study, we aim to compare outcomes between robotic, laparoscopic assisted and open partial nephrectomy (RPN, LPN, and OPN) with a 5–year median follow up.

Patients and Methods: A retrospective analyses of 1308 patients (RPN n=380, LPN n=206 OPN n=722) who underwent PN between 2003 and 2012 in 6 academic centers was carried out. We performed 1:1:1 propensity score (PS) matching adjustment based on the confounding variables between groups (age, CCI, median tumor size, and preoperative e–GFR).

Results: In the perioperative outcomes, there were significant differences in the mean operative time, mean estimated blood loss (EBL) and mean period of hospital stay between there groups (182.53±68.60, 241.98±90.04, and 172.58±64.00, P<0.001, 391.84±467.59, 422.16±416.53 and 310.91±347.91 P=0.0491, 5.38±46, 6.97±4.37, and 6.12±3.24, P<0.0087), (RPN, LPN, and OPN, respectively). In the oncological outcomes, there were no differences between three groups regarding local recurrence, metastasis, and cancer death (p>0.05). In the postoperative renal functional outcomes, there were differences of CKD upstaging between three groups [25 (20.5%), 39 (32.0%), 41 (33.6%) (RPN, LPN, OPN)] (P=0.048). On the logistic regression analysis, RPN, higher preoperative eGFR, and lower age were predictors for prevent of CKD upstaging.

Conclusions: Among long–term renal functional outcome, RPN, higher preoperative eGFR, and lower age were predictors for prevent of CKD upstaging. Long–term oncological outcome between these approaches was comparable at median follow–up of 5–years.

Keywords: Chronic kidney disease, Partial nephrectomy, Robotic
Objective: To evaluate the renal cortical volume (RCV) change after nephron sparing surgery and the predictive value of nephrometry score in RCV preservation after partial nephrectomy.

Materials and Methods: Overall, 162 patients with renal tumors treated with open partial nephrectomy were retrospectively analyzed. The renal cortical volume (RCV) of tumor-bearing kidney was measured preoperatively and postoperatively using dedicated software, CSA, RENAL, PADUA, and C-index were obtained from preoperative CT scan. The correlation between nephrometry scores and perioperative parameters were evaluated, and the 4 nephrometry scores were compared in predicting reduction in RCV.

Results: The median percent reduction in RCV of operated kidney was 17% and the median percent reduction in global eGFR was 5.6%. All scores showed a significant association with reduction in RCV (p<0.001), percent reduction in RCV (p<0.001), and estimated blood loss (CSA and C-index, p<0.001; RENAL, p=0.017; PADUA, p=0.004). CSA and PADUA scores showed a significant association with percent reduction in eGFR (p=0.038 and p=0.026). On multivariate analysis CSA, PADUA, C-index independently affected percent reduction in RCV (p=0.003, p=0.025, and p=0.013, respectively). No correlation was found for the RENAL score (p=0.234). On ROC curve analysis CSA was a better independent predictor of greater than 10% and 20% percent reduction in RCV (AUC 0.819 and 0.723, respectively).

Conclusions: CT based RCV measurement successfully differentiated the RCV change after partial nephrectomy. Compared to other nephrometry scores, CSA was a superior predictor for RCV change of operated kidney.

Keywords: Nephrometry score, Partial nephrectomy, Renal cortical volume
Objective: To analyze the effect of renal hilar-clamp and depth of safety margin on short-term change of renal function after laparoscopic partial nephrectomy (LPN).

Materials and Methods: We retrospectively reviewed 110 cases of LPN performed between March 2008 and January 2017 in our hospital. Of these, 98 patients were enrolled in this study who were able to measure the width of the peripheral and central parenchymal safety margin on resected specimen and were able to observe for 6 months after operation. By the renal hilar-clamp/off-clamp and tumor resection/enucleoresection, we divided the patients into 3 groups, resection with hilar-clamp (group 1), and enucleoresection with off-clamp (group 2), enucleoresection with renal hilar-clamp (group 3).

Results: The patient number of group 1, 2, and 3 were 23, 40, and 35, respectively. Age (mean 58.8, 56.2, 59.5 years old), mass size (mean 3.0, 2.9, 3.3 cm), operation (anesthesia) time (mean 180.6, 167.3, 178.5 min), estimated blood loss (mean 319.5, 324.6, 305.1 ml), hemoglobin decline (mean 1.62, 1.74, 1.32 g/dl), preoperative eGFR (mean 92.0, 90.3, 94.2 ml/min/1.73 m²) were not different between groups. RENAL nephrometry score, tumor size, pathologic outcome, pT stage and complication rate were also not different between groups. Mean postoperative eGFR at 6 months was 84.3, 92.9, 93.9 ml/mim/1.73 m², peripheral parenchymal safety margin of the renal tumors was 3.35, 1.34, 1.53 mm, and the central parenchymal safety margin was 1.22, 0.01, 0.01 mm in the 1, 2, 3 group, respectively. Postoperative eGFR at 6 months showed higher trend in group 2,3 than group 1 (one-way ANOVA, p=0.056). However, there was no significant difference between group 2 and 3 (post-hoc analysis, group 2 vs 3, p=0.67). Mean warm ischemia time were 25.6, 0, and 22.9 minutes in group 1,2,3 respectively.

Conclusion: With enucleoresection, there was no difference in short-term renal function change between hilar-clamp and off-clamp (group 2 vs 3). When renal hilar-clamp was performed, however, there were significant differences in renal function change between the resection group and the enucleoresection group (group 1 vs 3). The minimal safety margin (preserved renal parenchymal volume) is a significant factor for minimal renal function loss after LPN. Further follow-up of long-term renal function is necessary.

Keywords: Laparoscopic partial nephrectomy, Renal function, Depth of safety margin
Outcome of off-clamp robot-assisted partial nephrectomy: propensity matched comparison to on-clamp

Ahmed Elghiaty, Ali Abdel Raheem, Ki Don Chang, Mohamed Alenzi, Trung Van, Woong Kyu Han, Young Deuk Choi, Koon Ho Rha
Department of Urology and Urological Science Institute, Yonsei University College of Medicine, Seoul, Korea

Purpose: Several studies have shown better renal functional outcomes of off-clamp robot-assisted partial nephrectomy (RAPN). The aim of this study is to compare the risks of developing chronic kidney disease (CKD) in patients undergoing either off-clamp or on-clamp RAPN.

Methods: Patients who underwent trans-peritoneal RAPN for renal tumor at our institution between 2006 and 2017 were retrospectively analyzed. Patients were divided into 2 groups according to the clamping type. Group A if on-clamp (n=196) and group B if off-clamp (n=62). A 1:1 propensity score-matched (PSM) analysis was performed to minimize the selection bias for the following variables: tumor size, clinical stage, preoperative CKD, PADUA score and complexity. Kaplan–Meier analysis curve was performed to assess and compare the CKD free survival between both groups.

Results: Before matching patients in group A had larger tumors (p<0.001), higher clinical stage (p=0.032), more complex PADUA score (p<0.001), and higher prevalence of advanced CKD (p=0.025) and complex tumors (p<0.001). After matching, the two cohorts of 62 on-clamp and 62 off-clamp RAPN cases did not differ for all clinical and pathologic covariates (p>0.05). Regarding renal function at the last follow-up, there were no significant difference in latesteGFR (p=0.186), overall CKD upgrading (p=0.461), as well as CKD upstaging ≥3 (p=1). The 4-yr CKD free survival was 85% vs 87.1% in the off-clamp and on-clamp RAPN, respectively (log-rank, p=0.643).

Conclusions: The present study shows that off-clamp RAPN had no long-term functional benefits with similar CKF free-survival rate compared to on-clamp RAPN. Further larger prospective studies are warranted to evaluate the exact functional benefit of off-clamp RAPN technique.

Keywords: Robotic, Partial nephrectomy, Off-clamp
**Objectives:** To investigate the impact of nanoscale electrical stimulation of enzymatic biofuel cell in human sperm motility.

**Methods:** The enzymatic biofuel cell (EBFC) is set up by two different enzymes: one being the glucose oxidase (GOX) for the generation of the anodic current only to be followed by the oxidation of glucose; the other being Bilirubin oxidase (BOD) for the generation of cathodic currents only to be followed by oxygen reduction. At the anode electrode site, glucose is oxidized by GOX in the anode electrode. Then the electron is made in to the anode electrode. Anode electrodes have many electrons. So the anode electrode can give the electron to the cell through media solution. This condition is rich of electrons. At the cathode electrode site, oxygen reacting with the hydrogen in the media solution can be changed to water by BOD. Electrons would then be consumed by BOD from the media solution, as this condition is poor of electrons. Then the electron grade condition of the enzymatic biofuel cells create electrical currents between anodic (electron rich) and cathodic (electron poor) sites in the culture dish. The electrical amps are then regulated and increased by the enzyme concentration from 10 nA to 1 mA. Ejaculated semen followed a regular procedure for motile sperm preparation for proper analysis. Then each samples performed a motility analysis by computer-assisted semen analysis (CASA) and looked into the viability of the sperm, and went through an acrosomal reaction test using fluorescein isothiocyanate–conjugated Pisum sativum lectin. The optimal electrical stimulation condition of the EBFC which enhances sperm motility was compared to the control group.

**Results:** We found enhancement of sperm motility from 10 nA to 500 nA of electrical stimulation by EBFC. Electrical stimulation enhanced the mitochondria functional activity through the biogenesis of tyrosine phosphorylation signaling on spermatozoa. 1mA didn’t show an enhanced effect to the sperm motility. However, electrically stimulated sperm had no significant effects in acrosome reaction and sperm viability compared to the control group.

**Conclusion:** EBFC can be applied for male infertility therapy such as an enhancer for asthenozoospermia patient.

**Keywords:** Nanoscale electrical stimulation, Enzymatic biofuel cell, Sperm motility
Purpose: The treatment of refractory erectile dysfunction is still under investigation for gene and stem cells and low–energy shockwave therapy, but the evidence is insufficient. We investigated the effect of a new generation electro–magnetic cylinder type ESWT device on erectile dysfunction animal model.

Materials and Methods: DM induced rats were divided into 3 groups, 1 for control, 2 for DM, and 3 for DM + ESWT. ESWT treatment was three times a week for 2 weeks. After the treatment course, intracavernous pressure was measured, And corpus cavernosum and cavernous nerve were evaluated.

Results: In DM group, parameters that we expected to significantly lower in erectile dysfunction model were all statistically significant decreased (p<0.01). As a measurement of erectile function, we evaluated intracavernous pressure and DM + ESWT group restored erectile function significantly compared to the DM group (p<0.05). And we found ESWT treatment restored smooth muscle contents through Masson's trichrome staining (p<0.05). ESWT increased nNOS significantly compared to DM group (p<0.05) in the immunohistochemistry of nNOS test of dorsal nerve tissue. And finally, using immunohistochemistry, western blot and ELISA, we evaluated corporal tissue. After ESWT treatment, VEGF, eNOS, PECAM-1, cGMP expression were recovered compared to DM group (p<0.05).

Conclusions: We confirmed the electromagnetic cylinder type ESWT's efficacy using a DM–associated ED model. It seemed that safe and effective application in future clinical studies is possible.

Keywords: Erectile dysfunction, Animal, ESWT
Objectives: Onion (Allium cepa L.) and quercetin protect against oxidative damage and have positive effects on multiple functional parameters of sperm, including viability and motility. However, the associated underlying mechanisms of action have not yet been identified. The aim of this study was to investigate the effect of onion peel extract (OPE) on voltage-gated proton (Hv1) channels, which play a critical role in rapid proton extrusion. This process underlies a wide range of physiological processes, particularly male fertility.

Materials & Methods: HEK 293 cells were transiently transfected with pQBI25-fC3 of human Hv1 (HVCN1), using commercially available transfection reagent. At 20–24 h after transfection, the cells were used for electrophysiological experiments. For the electrophysiological studies, the whole-cell patch clamp recording technique was used to record the changes in Hv1 currents. The effects of OPE on human sperm motility were also analyzed.

Results: OPE significantly activated the outward-rectifying proton currents in a concentration-dependent manner, with an EC50 value of 30 μg/mL. This effect was largely reversible upon washout. Moreover, OPE induced an increase in the proton current amplitude and decreased the time constant of activation at 0 mV from 4.9±1.7 s to 0.6±0.1 s (n=6). In the presence of OPE, the half-inactivation voltage (V1/2) shifted in the negative direction, from 20.1±5.8 mV to 5.2±8.7 mV (n=6), but the slope was not significantly altered. The OPE-induced current was profoundly inhibited by 10 μM Zn2+, the most potent Hv1 channel inhibitor, and was also inhibited by treatment with GF109203X, a specific protein kinase C (PKC) inhibitor. Furthermore, sperm motility was significantly increased in the OPE-treated groups.

Conclusions: OPE exhibits protective effects on sperm motility, at least partially via regulation of the proton channel. Moreover, similar effects were exerted by quercetin, the major flavonoid in OPE. These results suggest OPE, which is rich in the potent Hv1 channel activator quercetin, as a possible new candidate treatment for human infertility.

Keywords: Hv1 channel, Onion (Allium cepa L.) peel extract, Sperm motility, Quercetin
O-014

Genetic screening for Y chromosome microdeletions in 1,226 infertile men from Korea

이효석1, 김신영2, 최진호1, 이중식1, 서주태1
단국대학교 제일병원 1비뇨기과, 2유전학연구실

Objective: To investigate the frequencies and types of Y chromosome microdeletions and analyze their association with defective spermatogenesis in infertile men from Korea.

Methods: A total of 1,226 infertile men were screened for Y chromosome microdeletions using multiplex polymerase chain reaction (PCR) assay. Semen samples were analyzed according to the World Health Organization guidelines and karyotype analysis was performed on peripheral blood lymphocytes with standard G-banding. Serum reproductive hormone (FSH, LH, T, PRL and E2) levels were also measured in all infertile men.

Results: Out of 1,226 infertile patients, 134 (10.93%) presented Y chromosome microdeletion. Of these, 107 of 765 (13.99%) were from the non-obstructive azoospermic and 27 of 133 (20.30%) from the severe oligozoospermic patients. Deletion of AZFc was the most common in both non-obstructive azoospermic (43/765, 5.62%) and severe oligozoospermic patients (26/133, 19.55%) and showed significant difference between the two groups (P<0.001). Only non-obstructive azoospermic patients presented AZFa, AZFb, AZFabc(Yq), or Yp(SRY)+Yq microdeletions. Among the 134 infertile men with Y-microdeletions, the most frequent microdeletions were detected in the AZFc region, followed by AZFbc, AZFb, AZFabc(Yq), Yp (SRY)+Yq, and partial AZFc regions. Karyotype analysis was available for 130 (97.02%) of the 134 infertile patients with Y deletion. Of them, 36 (27.69%) patients (all with non-obstructive azoospermia) had sex chromosomal abnormalities. The levels of FSH and LH in patients with AZFc microdeletion were significantly lower, while those in patients with Yp (SRY)+Yq were significantly higher than in patients without Y microdeletions. And T levels in both infertile patients with AZFabc (Yq) and Yp (SRY)+Yq were significantly lower. However, there was no significant difference in the levels of reproductive hormones between total patients with and without Y microdeletions.

Conclusion: These results highlighted the need for Y chromosome microdeletion screening to provide a correct diagnosis of male infertility. It is also useful to obtain reliable genetic information for assisted reproductive techniques, thus avoiding unnecessary treatment and vertical transmission of genetic defects to offspring.

Keywords: Male infertility, Y chromosome microdeletion, Azoospermia factor (AZF), Non-obstructive azoospermia, Severe oligozoospermia
Relationship between sperm parameters and human sperm DNA fragmentation (SDF) as assessed with the sperm chromatin dispersion test

이효석¹, 박용석², 최진호¹, 이중식¹, 서주태¹
단국대학교 의과대학 제일병원 ¹비뇨기과, ²생식의학연구실

Objective: This study was performed to evaluate and compare threshold values of sperm parameters and the sperm DNA fragmentation index (DFI), and further analyzed whether normal and abnormal sperm DFI could be predicted from sperm parameters.

Materials and Methods: A retrospective study was performed in 256 cases of semen analysis. Sperm parameters were assessed by the World Health Organization (WHO) guideline. Sperm parameters (count, motility, viability, morphology) were assessed and normal values are as follow: count ≥15×10⁶/mL, motility ≥40%, viability ≥58%, and morphology ≥40%. SDF test was assessed using the Halosperm kit. The fragmentation rate was calculated by the SDF (%)=(fragmented spermatozoa/total 500 spermatozoa counted)×100. Threshold value exceeds as 30% of SDF considered as abnormal. Sperm parameters and sperm DFI results were compared.

Results: The overall sperm parameter results and sperm DFI were within normal range; however, morphology values were at the lower limit of those values. The sperm count of the low (≤30%) and high (>30%) sperm DFI groups was similar; however, high sperm DFI was associated with significantly lower motility, viability, and morphology (p<0.05 for all). Sperm motility and morphology were significantly higher in the higher sperm count group compared to the lower sperm count group (p<0.05), while sperm DFI was higher in the lower sperm count group (p<0.05). Sperm parameters and sperm DFI were significantly affected by the quality of sperm motility. In contrast, sperm morphology did not affect viability and sperm DFI in normal value. Sperm viability was not associated with sperm count or motility in normal value.

Conclusions: In this study, the negative impact of SDF on sperm parameters was confirmed. Sperm parameters such as count, motility, and viability may be contributing factors. In this study, lower sperm parameters were indicative of increasing SDF.

Keywords: Semen parameter, Sperm DNA fragmentation
비폐쇄성 무정자증 환자에서 수술현미경이 microsurgical TESE 정자추출률에 미치는 영향

김기영1, 변현근1, 이영진2, 김종현1
1미즈메디병원 비뇨기과, 2아이드림센터

목적: 비폐쇄성 무정자증 환자의 해결방법으로 사용되고 있는 Microsurgical TESE의 정자추출률은 수술자의 경험, 수술 시간 뿐 아니라 수술기구에 따라 영향을 받을 수 있다. 이에 수술현미경이 Microsurgical TESE 정자추출률에 미치는 영향을 알아보고자 하였다.

대상 및 방법: 2008년 1월부터 2017년 5월까지 남성 불임을 주소로 내원하여 정액검사, 혈액검사, 고환 조직 검사 후 비폐쇄성 무정자증으로 진단되고 microsurgical TESE를 시행 받은 124명의 환자를 대상으로 하였다. 2013년 5월까지는 oms-75 microscope를 사용하였고 6월부터는 고배율 고해상도가 가능한 ZEISS사에서 제작한 OPMIVARIOSS88 microscope를 사용하여 microsurgical TESE를 하였다. 고환의 조직병리학적 진단에 따라 정자형성저하증(hypospermatogenesis), 성숙정지 (Maturation arrest), 생식세포유형성증(germ cell aplasia, Sertoli cell only syndrome)으로 구분하여 Microsurgical TESE 정자추출률을 비교하였으며, 수술현미경에 따른 정자추출률의 차이도 비교 분석하였다.

결과: 환자들의 평균 연령은 34.4세였고, 조직학적으로 정자형성저하증 41명, 성숙정지 13명, 생식세포유형성증 74명이었다. 전체 환자 124명 중 56명(45.2%)에서 정자추출에 성공하였는데, 정자형성저하증 35명(85.4%), 성숙정지 1명(7.7%), 생식세포유형성증 20명(27%)에서 정자를 추출하였다. 수술현미경에 따른 정자추출률은 2013년 5월까지 OMS-75 microscope를 사용한 경우 85명 중 36명(42.4%)에서 정자를 추출하였는데, 정자형성저하증 28명 중 24명(85.7%), 성숙정지 7명 중 1명(14.3%), 생식세포유형성증 50명 중 11명(22%)에서 정자추출이 가능하였다. 2013년 6월부터 새로 도입된 PMIVARIOSS88 microscope를 사용한 경우에는 39명 중 20명(51.3%)에서 정자가 추출되었고, 정자형성저하증 13명 중 11명(85.7%), 성숙정지 6명 중 0명(0%), 생식세포유형성증 20명 중 9명(45%)이었다. 수술현미경에 따른 분석에서는 정자형성저하증과 성숙정지 환자에서는 정자추출률에 있어 유의한 차이를 보이지 않았지만, 생식세포유형성증 환자에서는 고배율 고해상도가 가능한 새로운 수술현미경을 사용한 경우 통계학적으로 유의하게 향상된 정자추출률을 보였다.

결론: 수술현미경을 이용한 Microsurgical TESE를 통하여 절반 가까운 비폐쇄성 무정자증 환자에서 고환 내 정자를 얻을 수 있었다. 특히 생식세포유형성증 환자에서는 고배율, 고해상도가 가능한 새로운 수술현미경을 사용한 경우 정자형성 조 직을 좀 더 세밀하게 구분하는 것이 가능하여 유의하게 향상된 정자추출률을 보였다.

Keywords: Non-obstructive azoospermia, Sperm retrieval, Operative microscope
Purpose: Patients with diabetic erectile dysfunction (ED) usually respond poorly to oral PDE5 inhibitors due to a lack of bioavailable nitric oxide from severe endothelial and neural dysfunction. ProNGF and its receptor p75NTR are known to be up-regulated in diabetic condition and to induce endothelial cell apoptosis and neuronal degeneration. The aim of this study was to investigate effectiveness of anti–proNGF neutralizing antibody (proNGF–Ab) in restoring erectile function in streptozotocin–induced diabetic mouse.

Methods: Diabetes was induced by intraperitoneal injection of streptozotocin (50 mg/kg) into 8–week–old C57BL/6 male mice for 5 consecutive days. At 8 weeks after the induction of diabetes, the animals were divided into 3 groups: controls, streptozotocin–induced diabetic mice receiving repeated intracavernous injections of PBS (days –3 and 0; 20 μL) or proNGF–Ab (days –3 and 0; 20 μg in 20 μL of saline). We measured erectile function by electrical stimulation of the cavernous nerve at 2 weeks after treatment. The penis was then harvested for histologic examination.

Results: Local delivery of proNGF–Ab into the corpus cavernosum of diabetic mice induced significant restoration of erectile function in diabetic mice (90–100% of control values). ProNGF–Ab significantly increased cavernous endothelial cell content and endothelial cell–cell junction proteins (VE–cadherin and claudin–5); decreased endothelial cell apoptosis; and restored neuronal cell content in the cavernous tissue of diabetic mice.

Conclusion: Our findings suggest that inhibition of proNGF pathway is a promising therapeutic strategy for diabetic ED.

Keywords: Erectile dysfunction, Diabetes, proNGF pathway
웹 설문을 이용한 한국의 발기부전에 대한 10년 추적 연구
송원훈1, 박주현2, 조성용2, 조민철2, 정현2, 손환철2
1서울대학교병원 비뇨기과, 2서울특별시립 보라매병원 비뇨기과

Background: Previous surveys for erectile dysfunction (ED) are mostly cross-sectional in nature and serial follow-up studies are rare.

Objectives: Conduction of a 10-year follow-up study on the prevalence and risk factors of ED in Korea using a web-based survey.

Design, Setting, and Participants: We sent e-mails to the panels registered in the Internet survey agency, and requested to participate in the survey of the same design as that in the 2006 study. The participants were requested to complete questionnaires on socioeconomic status, health conditions, sexual behavior, and attitude. ED and voiding symptoms were evaluated by the International Index of Erectile Function (IIEF) and International Prostate Symptom Score (IPSS).

Outcome Measurements and Statistical Analysis: ED risk factors analyzed using multivariate logistic regression analysis.

Results and Limitation: In total, 900 participants were recruited. The overall prevalence, after adjusting for age, of self-reported ED (self-ED) and IIEF-5 score ≤ 21 (IIEF-5-ED) in the 2016 study was 6.0% and 50.6%, decreased compared with a prevalence of 8.1% and 51.4% in 2006. The mean total IPSS score of the self-ED group was 9.1 ± 0.9, which was higher than the score of 7.0 ± 0.2 in the no-self-ED group. As IIEF-5-ED severity increased, the mean total IPSS score of those with IIEF-5-ED also increased from 6.9 ± 0.3 to 12.0 ± 4.1. Age, marital status, current smoking, alcohol consumption, diabetes mellitus, chronic kidney disease, depression, prostatic disease, constipation, experience of rape or sexual harassment, and self-reported premature ejaculation were significant risk factors in multivariate models of self-ED and IIEF-5-ED. The limitation was that it was not a cohort study.

Conclusions: Compared with that in the 2006 study, the prevalence of self-ED and IIEF-5-ED was slightly decreased; however, risk factors such as age and smoking remained significant.

Keywords: Erectile dysfunction, International index of erectile dysfunction, Web-based survey
페이로니병 환자의 섬유화경결에서 분리된 섬유모세포에서 activin receptor-like kinase 5 저해제의 항섬유화 효과

최민지, 송강문, 갈안 가탁, 응웬 낫 민, 강동혁, 윤국남, 류지간, 서준규
인하대학교 의과대학 비뇨기과학대학교, 성의학특성화센터

목적: Transforming growth factor–β (TGF–β) 신호전달경로는 페이로니병을 포함한 여러 섬유화질환의 병인에 중요한 역할을 한다. 특히 activin receptor–like kinase 5 (ALK5)는 TGF–β 제1형 수용체로서 TGF–β–매개 섬유화병변의 진행에 있어서 핵심적인 역할을 한다. 본 연구에서는 페이로니병 환자의 섬유화경결에서 분리된 섬유모세포에서 최근에 개발된 ALK5 저해제의 항섬유화 효과를 평가하였다.

대상 및 방법: 페이로니병 환자의 섬유화경결 조직으로부터 섬유모세포에 대한 일차배양을 시행하였고, 섬유모세포–특이 마커 항체를 이용하여 섬유모세포를 분리하였다. 실험은 대조군, TGF–β1 처리군 (10 ng/mL), TGF–β1 (10 ng/mL) + ALK5 저해제 처리군(400 ng/mL)으로 나누어 진행하였다. TGF–β1을 1시간 처리 후 ALK5 저해제에 의한 Smad2/3의 인산화 및 핵 내 전위(nuclear translocation)를 western blot과 면역형광염색으로 평가하였다. TGF–β1을 24시간 처리 후 ALK5 저해제에 의한 세포외기질(extracellular matrix)의 발현 양상을 plasminogen activator inhibitor–1 (PAI–1), fibronectin, collagen I, IV에 대한 western blot과 면역형광염색으로 평가하였고, hydroxyproline assay도 시행하였다. 또한fibroblast에서 myofibroblast로의 differentiation을 확인하기 위해서 phalloidin/α-SMA에 대한 면역형광염색을 수행하였다.

결과: 페이로니병 환자의 섬유화경결에서 분리된 섬유모세포에서 TGF–β1 투여 후 Smad2/3 인산화 및 핵 내 전위가 촉진되었고, PAI–1, fibronectin, collagen I, IV에 대한 단백발현 및 collagen 함성이 현저하게 증가되었다. ALK5 저해제는 Smad2/3의 인산화 및 핵 내 전위를 효과적으로 차단함으로써 세포외기질의 합성 및 myofibroblastic differentiation을 정상 수준으로 회복하였다.

결론: ALK5 저해제는 TGF–β 경로를 성공적으로 억제함으로써 항섬유화 효과를 나타냈다. 향후 페이로니병 동물모델을 이용한 추가 연구가 필요하다.

Keywords: Peyronie's disease, Fibroblast, Activin receptor-like kinase 5
통증을 주소로 시행한 고환 정계정맥류제거술 후 장기추적 관찰 시 수술 성적 및 술 후 통증 개선의 영향인자 분석

송원훈1, 김정권1, 조민철2, 손환철2, 김수웅1, 백재승1

1서울대학교병원 비뇨기과, 2보라매병원 비뇨기과

연구배경: 고환 정계정맥류제거술은 보존적 치료에도 지속되는 통증이 주소인 환자에 대한 선택적 치료법이다. 하지만, 지금까지의 연구들은 적은 환자수와 짧은 추적기간 동안의 결과들이 대부분이었고, 수술성공률과 통증 호전의 영향인자에 대해서도 다양하게 보고되었다. 본 연구에서는 음낭 통증을 주소로 내원한 300명 이상의 정계정맥류 환자에서 정계정맥류제거술 시행 후 장기추적 관찰 시 통증에 대한 수술성적과 통증 호전의 영향인자에 대해 분석해 보고자 하였다.

연구방법: 2004년부터 2017년까지 통증을 주소로 정계정맥류제거술을 시행 받고 2년 이상 추적관찰이 이루어진 312명의 환자를 대상으로 후향적 분석을 시행하였다. 술 전 나이, 일측성 혹은 양측성, 정계정맥류의 심한 정도, 문진을 통한 통증의 성상 및 통증 유병기간 등을 분석하였다. 술 후 외래 추적관찰 시 신체검진을 통해 정계정맥류 소실 유무를, 통증 개선 정도는 문진을 통해 통증의 소실/호전/지속 또는 악화로 구분하였다. 수술의 성공은 정계정맥류와 통증 둘 다 소실된 경우로 정의하였고, 그렇지 않은 경우는 실패로 정의하였다. 술 전 정액검사 시행을 원칙으로 하였고, 술 전과 비교하여 술 후 20% 이상의 상승이 관찰되었을 때 이를 정액검사지표의 호전으로 정의하였다.

결과: 2004년부터 2017년까지 통증을 주소로 내원하여 정계정맥류제거술을 시행 받은 환자는 총 312명이었고, 평균나이 24.4세, 통증 유병기간은 평균 17.2±31.0개월 그리고 술 후 평균 추적 기간은 평균 28.9±13.3개월이었다. 정계정맥류 환자들의 96.5%에서 일측성이었고, 증증도에 따라 grade I이 2.6%, grade II가 22.1% 그리고 grade III가 75%였다. 20% 이상의 양측 고환 크기의 차이가 나는 경우가 35.3% 였다. 통증의 성상은 둔통이 88.5%, 견인통이 4.2%, 욱سكن거리는 통증이 1.3% 그리고 찌르는 듯한 날카로운 통증이 1.6%였다. 정계정맥류에 대한 소실, 음낭 통증에 대한 소실 및 정액검사의 호전을 나타낸 환자는 각각 96.8%, 78.8% 그리고 45.8%였다. 이에 따라, 수술 성공률은 77.7%였다. 나이, 정계정맥류의 증증도, 통증 유병기간, 정액검사에서 정자가 모양의 연관성을 알아보는 방법이 수술 성공과 관련이 없었고, 이와 같은 결과를 보니 정계정맥류의 성공률이 너무 높기 때문에 정계정맥류에 의한 음낭 통증이 소실될 가능성이 높았다.

결론: 본 연구를 통하여, 고환 정계정맥류제거술은 통증이 주소인 정계정맥류 환자에 대한 효과적인 치료법임을 알 수 있었다. 또한 나이가 어릴수록, 통증 유병기간이 짧을수록 정계정맥류에 의한 음낭 통증이 소실될 가능성이 높았다.

Keywords: Varicocelectomy, Testicular pain, Surgical outcome
O-021

배뇨근저활동성이 동반된 전립선비대증 환자의 요로상피에서 adenosine triphosphate와 nitric oxide의 변화

조강준, 최진봉, 고준성, 김준철
가톨릭대학교 부천성모병원

Purpose: The cause of detrusor underactivity (DU) is multifactorial, but its pathophysiology is still so unclear that its diagnosis and management remain difficult. Urothelium can release several neurotransmitters. We investigated changes in the expression of adenosine triphosphate (ATP) and nitric oxide (NO) in the urothelium of DU with benign prostatic hyperplasia (BPH).

Materials and Methods: We prospectively enrolled 30 men who planned to undergo surgical treatment for BPH. Patients whose bladder contractility index (BCI) was less than 100 were assigned to the DU group (n=15), while patients whose BCI was more than 100 were assigned to the no DU group (n=15). Bladder mucosal specimens were collected during surgical prostate resection, and ATP and endothelial nitric oxide synthase (eNOS) were analyzed from these specimens. The expression levels of ATP and eNOS were compared between the two groups. The correlation of urodynamic parameters with ATP and eNOS in all patients were assessed.

Results: There were no relevant differences between the DU and no DU groups except in IPSS quality of life score, which in the no DU group was significantly lower than of the DU group. In urodynamic results, patients in the DU group had lower uroflow rates, larger postvoid residuals, lower detrusor contractility and lower BOO grades than those in the no DU group. The expression levels of eNOS were not significantly different between the DU and no DU groups (3.393±0.969 vs. 1.941±0.377 IU/ml, P=0.247). However, the expression level of ATP in the DU group was significantly lower than that in the no DU group (1.289±0.320 vs. 9.262±3.285 pmol, P=0.011). In addition, ATP was positively correlated with BCI (r=0.478, P=0.018) and detrusor pressure on maximal flow (r=0.411, P=0.046) in all patients.

Conclusions: ATP in urothelium was significantly decreased in DU with BPH and may reflect a change in detrusor function. ATP may play an important role in the pathophysiology of DU and it should be considered a potential diagnostic biomarker and treatment target for DU.

Keywords: Adenosine triphosphate, Nitric oxide, Detrusor underactivity
전립선 건강검진 데이터에서 연령에 따른 배뇨 및 저장 증상의 변화

이신우, 윤솔, 도정모, 서덕하, 이찬우, 제성욱, 최세민, 감성철, 화정석, 정기현, 현재석
경상대학교 의과대학 비뇨기과학실, 경상대학교병원

Purpose: To evaluate the age related changes in IPSS (International Prostate Symptom Score) storage and voiding subscore in prostate health screening data.

Materials and Methods: From 2009 to 2016 years, the prostate health screening data for general public were analyzed. Patients with prostate cancer or prostate specific antigen (PSA) elevation (>3) which needed further evaluation were excluded. All patients had IPSS questionnaire and the sum of ≥8 voiding subscore or ≥6 storage subscore were considered as significant symptoms.

Results: Total 40197 men were included. The mean age was 73.7 years and mean prostate volume and PSA were 28.8 cc and 1.1±0.7 ng/ml. About 11% (n=4452) patients had benign prostatic hypertrophy (BPH) medication history. Of total cohort, 34.2% men were asymptomatic and men with storage symptom only or voiding symptom only or both symptom were 12.7%, 13.2% and 39.8% respectively. Increasing with age, the rate of asymptomatic group (58.6 to 25.0%) and voiding symptom only group (15.6 to 10.6%) were decreased and that of storage only group (6.7 to 14.6%) and both symptom group (19.2 to 49.8%) were increased. The rate of BPH medication was also increased with age from 4.4% to 13.0%. Both the sum of voiding subscore and storage subscore showed significant elevation with age and storage subscore (4.1 to 7.2, 75.6%) showed higher rate of increase compared with voiding subscore (6.3 to 9.4, 49.2%).

Conclusions: Through large-scale cohort study, we could find the rates of storage only and both symptoms groups were significantly increased with age. As a clinician, it is necessary to pay more attention to aged patients with storage symptoms.

Keywords: Prostate, Age, Overactive bladder

<table>
<thead>
<tr>
<th>Table 1. Changes in characteristics according to age group.</th>
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<tr>
<td>Age group (years), n=40197</td>
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<tr>
<td>1 (20-49)   2 (50-79)   3 (80+)   p-value</td>
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<td>No.                     2775          3815        3634        &lt; 0.001</td>
</tr>
<tr>
<td>Prostate volume(cm³)    25.4±6.9      27.8±13.4    29.2±12.5   30.2±13.3   &lt; 0.001</td>
</tr>
<tr>
<td>PSA (ng/ml)             0.6±0.4       1.0±0.6      1.2±0.7     1.1±0.7     0.018</td>
</tr>
<tr>
<td>IPSS                    - No LUTS       50.6%        41.5%        36.9%        25.0%</td>
</tr>
<tr>
<td>- Storage only (6) 8.7%         10.9%        12.0%        14.6%</td>
</tr>
<tr>
<td>- Voiding only (4) 11.0%        15.2%        13.3%        17.0%</td>
</tr>
<tr>
<td>- Both symptom     19.2%        32.5%        42.5%        49.8%</td>
</tr>
<tr>
<td>BPH medication (%)      4.1%          8.8%         12.5%        11.0%</td>
</tr>
<tr>
<td>IPSS score              - Voiding subscore 6.3±0.7     7.8±5.1      8.7±5.1     9.6±5.5      &lt; 0.001</td>
</tr>
<tr>
<td>- Storage subscore 4.3±0.3     5.4±2.4      6.4±2.4     7.2±1.7      &lt; 0.001</td>
</tr>
<tr>
<td>- Total IPSS score 15.4±11.1    18.9±11.0    21.2±12.5   23.1±13.0   &lt; 0.001</td>
</tr>
<tr>
<td>- Qol. score       2.7±1.4      2.8±1.3      2.5±1.2     2.0±1.2     &lt; 0.001</td>
</tr>
</tbody>
</table>

No, numbers; PSA, prostate specific antigen (PSA); International Prostate Symptom Score (IPSS), lower urinary tract symptom; BPH, benign prostatic hypertrophy; QoL, Quality of Life.
The efficacy and validity of the penile cuff test as an alternative diagnostic tool for bladder outlet obstruction.

태종현, 윤성구, 김승빈, 김재윤, 심지성, 강성구, 강석호, 천준, 김재종, 이정구
고려대학교 의과대학 비뇨기과학교실

Introduction: The current standard for the diagnosis of bladder outlet obstruction (BOO) in men is determined by results from the urodynamic study (UDS) or to be more specific, the pressure–flow study (PFS). The aim of our study is to evaluate the validity of the penile cuff test (PCT) for diagnosis of BOO.

Methods: We enrolled male patients with moderate to severe lower urinary tract symptoms candidates for HOLEP. A total of 84 patients underwent both PFS and PCT from June 1st, 2016 to June 1st, 2017 at a single institute were reviewed retrospectively. The validity of the PCT was evaluated by comparing results from the PFS and estimating the sensitivity (SE), specificity (SP), positive predictive value (PPV) and negative predictive value (NPV).

Results: Overall, at PCT 36 patients were diagnosed as obstructed and 48 patients as unobstructed. At the subsequent PFS, 31 out of 36 patients diagnosed as obstructed at PCT were confirmed to be obstructed. 30 out of the 48 unobstructed at PCT were confirmed to be unobstructed at PFS. By defining PFS results as the standard diagnosis for BOO, PCT showed a SE of 63.3% and a SP of 85.7%. The "obstructed positive predictive value" of the PCT was 86.1% and the "non–obstructed-equivocal negative predictive value" was 62.5%.

Conclusion: PCT can be an efficient tool in evaluating candidates for HOLEP. In particular, it showed good reliability in ruling out BPO because of its high NPV, with a high rate of correctly classified patients overall. Further studies on a huger number of patients are needed, including post-operative follow-up as well.

Keywords: Penile cuff test, Pressure flow study, BPH

<table>
<thead>
<tr>
<th>Variable</th>
<th>Median ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>75 ± 7</td>
</tr>
<tr>
<td>Prostate size (g), median ± SD</td>
<td>56 ± 34</td>
</tr>
<tr>
<td>IPPS, median ± SD</td>
<td>16 ± 6</td>
</tr>
<tr>
<td>IPPS voiding interval, median ± SD</td>
<td>5 ± 6</td>
</tr>
<tr>
<td>IPPS Qmax, median ± SD</td>
<td>4 ± 1</td>
</tr>
<tr>
<td>Pressure–flow study</td>
<td></td>
</tr>
<tr>
<td>PadGreat, median ± SD</td>
<td>47 ± 22</td>
</tr>
<tr>
<td>Qmax (mL/s), median ± SD</td>
<td>9 ± 5</td>
</tr>
<tr>
<td>Voided volume (mL), median ± SD</td>
<td>222 ± 136</td>
</tr>
<tr>
<td>Residual volume (mL), median ± SD</td>
<td>51 ± 59</td>
</tr>
<tr>
<td>Bladder contraction index, median ± SD</td>
<td>85 ± 40</td>
</tr>
<tr>
<td>Bladder outlet obstruction index, median ± SD</td>
<td>31 ± 19</td>
</tr>
</tbody>
</table>

| Penile Cuff Test                              |             |
| Ppd int, median (SD)                          | 110 ± 38    |
| Qmax (mL/s), median (SD)                      | 9 ± 3       |
| Voided volume (mL), median                    | 103 ± 35    |

Table 2. Results of the penile cuff test (PCT) and pressure–flow studies (PFS)

<table>
<thead>
<tr>
<th></th>
<th>Obstructed</th>
<th>Unobstructed</th>
<th>Total, n(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penile Cuff Test</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obstructed</td>
<td>31</td>
<td>5</td>
<td>36 (42.5%)</td>
</tr>
<tr>
<td>Unobstructed</td>
<td>18</td>
<td>30</td>
<td>48 (57.1%)</td>
</tr>
<tr>
<td>Total, n(%)</td>
<td>49 (58.3%)</td>
<td>35 (41.6%)</td>
<td>84</td>
</tr>
</tbody>
</table>
Can penile cuff test predict the outcomes of Holmium laser enucleation of the prostate for benign prostatic obstruction?

고광진¹, 이규성¹,²
¹성균관대학교 의과대학 삼성서울병원 비뇨기과학회실, ²삼성융합의과학원 의료기기산업학과

**Purpose:** To determine whether the PCT can predict the surgical outcomes prior to Holmium laser enucleation of the prostate (HoLEP) for benign prostatic obstruction

**Materials and Methods:** Men scheduled to undergo HoLEP were enrolled and all patients underwent PCT prior and 3 months after surgery. Patients were categorized as obstructed (upper left quadrant), non-obstructed (lower right quadrant) or uncertain (upper right or lower left quadrant) by nomogram. Surgical outcomes were assessed by change in international prostate symptom score (IPSS), quality of life (QoL) index, and maximum flow rate (Qmax) pre-operatively and 3 months post-operatively. The proportion of patients with good outcome was compared among PCT nomogram-classified groups, and postoperative changes in position on the PCT nomogram were assessed.

**Results:** A total of 125 patients were analyzed. After HoLEP, overall efficacy and symptom efficacy were not different between obstructed and non-obstructed patients. However, functional efficacy was significantly higher in obstructed patients (75.7% [95% CI: 65.7-85.8]) than in non-obstructed patients (53.6% [95% CI: 33.7-75.4]) (Table 1). The percentage of good responders in the QoL category was significantly higher in the obstructed group than in the non-obstructed group (p=0.012). After HoLEP, 75.7% of patients with BOO and 63.6% of patients categorized as uncertain were moved to the non-obstructed category, while 77.3% of non-obstructed patients remained in the non-obstructed category (Figure 1).

**Conclusions:** A PCT nomogram can be used in patients with BOO to predict good functional outcome and QoL. The majority of patients were classified as non-obstructed after HoLEP.

**Keywords:** Bladder, Urodynamics, Bladder-neck obstruction

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### Table 1: Good responder for all subjects and each category of patients by PCT classification

<table>
<thead>
<tr>
<th>PCT classification</th>
<th>Obstructed</th>
<th>Non-obstructed</th>
<th>Uncertain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good responder</td>
<td></td>
<td>Good responder</td>
<td>Good responder</td>
</tr>
<tr>
<td>(95% CI)</td>
<td></td>
<td>(95% CI)</td>
<td></td>
</tr>
<tr>
<td>p</td>
<td>0.263</td>
<td>0.096</td>
<td>0.433</td>
</tr>
<tr>
<td>qmax (L/min)</td>
<td>50.2</td>
<td>51.6</td>
<td>54.6</td>
</tr>
<tr>
<td>IPSS (points)</td>
<td>20.7</td>
<td>17.3</td>
<td>20.2</td>
</tr>
<tr>
<td>QoL (%)</td>
<td>60.4</td>
<td>62.3</td>
<td>64.5</td>
</tr>
</tbody>
</table>

*Obstructed vs Non-obstructed: p=0.05
전립선비대증 환자에서 알파차단제 사용의 결과 예측을 위한 탄성초음파영상의 유용성

손수민, 오정훈, 박태주, 신상수, 김종범, 조영현, 김명수, 정호석, 황의창, 오경진, 김선옥, 정승일, 권동득, 박광성, 강택원
전남대학교 의과대학 1비뇨기과학회실, 2영상의학과학교실

Purpose: 전립선비대증에 연관된 하부요로증상 중 폐색증상은 전립선의 크기와 관련이 있을 것으로 생각할 수 있으나 주관적 증상 정도는 이에 비례하지 않고, 약물의 선택과 그 효과 예측을 위한 인자가 거의 없다. 탄성초음파를 이용하여 전립선 조직의 탄성을 측정함으로써 증상과의 관계, 약물치료의 효과를 예측할 수 있는지 연구하였다.

Materials and Methods: 하부요로증상을 호소하는 남성 57명을 대상으로 하였다. 탄성초음파를 이용하여 전립선의 요도주변 이행대/변연부 비율(c/central/peripheral ratio; c/P ratio)을 측정하였다. 1군은 저 c/p ratio (n=28), 2군은 고 c/p ratio (n=29)로 나누었다. 두 군에서 기본 특성, 국제전립선점수(IPSS), 전립선무게, 최고요속, 잔뇨와 알파차단제 사용 3주 후 효과를 보인 군과 그렇지 않은 군으로 구분하여 증상점수의 변화를 폐색증상(IPSS-O)과 저장증상(IPSS-S), 총점으로 구분하여 비교하였다.

Results: 두 군간에 나이와 동반질환, 투여약물 등의 차이는 없었다. IPSS는 2군에서 의미 있게 높았으나(p=0.01) IPSS-O와 IPSS-S로 나누어 비교해보면 의미 있는 차이를 나타내지 않았다. 전립선크기는 2군에서 더 큰 경향을 보였(p=0.06). 잔뇨나 최고 요속은 두 군간에 차이가 없었다. 알파차단제를 사용한 후 두 군 모두 증상의 호전을 보였으며 효과를 보인 군과 그렇지 않은 군으로 나누었을 때 전립선 크기는 차이가 없었으나 c/p ratio는 효과를 보인 군에서 더 큰 경향을 보였(p=0.06) IPSS-O의 변화는 효과를 보인 군에서 확실하게 c/p ratio가 더 높게 나타났(p=0.04).

Conclusions: 폐색증상은 전립선의 크기보다 이행대의 탄성도가 더 중요한 인자였다. 증상의 정도는 전립선 변연부에 비해 이행대의 탄성도가 떨어지는 고 c/p ratio 군에서 더 심하였으며 이 군에서 폐색증상에 대한 알파차단제의 효과가 더 크게 나타났다. 이 결과로 하부요로증상을 유발하는 전립선의 특성을 이해할 수 있고 치료방침을 설정하는데 도움이 될 것이다.

Keywords: 전립선비대증, 탄성초음파, 알파차단제
**O-026**

**Impacts of serum vitamin D level on lower urinary tracts symptoms in men**

유상준, 박주현, 조성용, 손환철, 정현, 조민철
서울특별시립 보라매병원

**Introduction:** We evaluated the impacts of serum vitamin D level on lower urinary tracts symptoms (LUTS) in men.

**Materials and Methods:** From March 2014 to April 2017, 434 male patients with LUTS. Evaluations for all patients included medical history, digital rectal examination, International Prostate Symptom Score (IPSS), Overactive Bladder Symptom Score (OABSS), urinalysis, serum 25(OH) vitamin D level, prostate-specific antigen (PSA), testosterone, and transrectal ultrasound (TRUS). The impacts of 25(OH) vitamin D level on LUTS were evaluated using multivariate linear regression analysis. To exclude the effect of seasons, we also analyzed the impacts in each season.

**Results:** 25(OH) vitamin D level was significantly lower in winter, compared to the other seasons (17.6 in spring vs. 25.4 in summer vs. 20.2 in fall vs. 16.5 ng/mL in winter, p<0.001). Total IPSS (p=0.013), quality of life (QOL) index (p=0.033), and total OABSS (p=0.033) was significantly higher in winter compared to the others. There was no significant difference in the evaluation parameters, including total IPSS, QOL index, peak flow rate (Qmax) and post-void residual urine (PVR), according to the season. On the other hand, total OABSS was higher in winter, compared to the other seasons. In both univariate and multivariate analysis to adjust for age, body mass index, PSA, testosterone, prostate volume on TRUS, decrement in serum 25(OH) vitamin D level (p<0.05) was significantly associated with increased OABSS, particularly in winter. In winter, serum 25(OH) vitamin D level in patients with OAB was significantly lower than those without OAB. Also, men with moderate-to-severe OAB (total OABSS of ≥6) showed significantly lower serum 25(OH) vitamin D level compared to those with mild OAB (S>total OABSS ≥3). On contrary, the univariate or multivariate analysis to adjust for the above-mentioned confounding variables showed that serum 25(OH) vitamin D level was not generally associated with total IPSS, QOL index, Qmax, PVR or total prostate volume, irrespective of the season.

**Conclusions:** Our data indicate that decrement in serum vitamin D level in men with LUTS may be involved in aggravated OAB symptoms, especially in winter. However, it does not appear to be associated with benign prostatic hyperplasia. Further studies with larger cohorts are needed to validate our findings.

**Keywords:** Urinary bladder, Overactive, Prostatic hyperplasia, Vitamin D
O-027

배뇨근 과활동성 및 저하된 수축성을 동시에 가지는 여성 환자의 장기간 추적 관찰 결과 보고

김아람, 박영진, 최우석, 박형근, 백성현, 김형곤
Department of Urology, Konkuk University Medical Center, Konkuk University School of Medicine

Purpose: To investigate long-term clinical outcome of patients with voiding dysfunction who have detrusor overactivity and impaired contractility (DOIC) diagnosed with urodynamic study (UDS).

Material and Methods: The results of UDS from 2008–2012 were reviewed and 37 female patients with DOIC were selected. DO was defined as the presence of involuntary contraction during the filling phase. Women with underactive detrusor function (IC) should fulfill the criteria including PdetQmax<20 cmH₂O and Qmax<15 cm/sec. Three subgroups were categorized according to the main symptom. Improvement was defined as a patient’s satisfaction at last visiting.

Results: Median follow-up was 54.6 months. Of 37 women, 5 patients (13.5%) presented with storage symptom involved with DO, 17 (43.2%) presented with voiding symptom involved with IC, and 17 (43.2%) showed combined symptoms. Among the total patients, 35.1%, 48.6% and 16.2% showed better, same and worse symptom at last visit than at diagnosis, respectively. Among the patients with symptomatic DO, improvement was reported by 40%. Among the patients with symptomatic IC, improvement was reported by 12.5%. Among the patients with combined symptoms, improvement was reported by 56.2%.

Conclusions: Thirty five percentage of patients with DOIC showed improvement in long-term outcome. Conventional pharmacotherapy is reasonable, however accurate diagnosis and characterization of symptom in the elderly patients with complex cluster of symptoms is critical.

Keywords: Detrusor overactivity, Impaired contractility

Table 1. Clinical symptom and variables in UDS of patients with DOIC

<table>
<thead>
<tr>
<th>Variable</th>
<th>St. from DO (n=5)</th>
<th>St. from IC (n=17)</th>
<th>Mixed st. (n=16)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>72.0</td>
<td>71.0</td>
<td>69.1</td>
<td>0.856</td>
</tr>
<tr>
<td>PdetQmax (cmH₂O)</td>
<td>9.3</td>
<td>11.7</td>
<td>15.5</td>
<td>0.355</td>
</tr>
<tr>
<td>Qmax (ml/sec)</td>
<td>11.0</td>
<td>8.2</td>
<td>9.5</td>
<td>0.232</td>
</tr>
<tr>
<td>BCI</td>
<td>54.7</td>
<td>52.9</td>
<td>63.3</td>
<td>0.255</td>
</tr>
</tbody>
</table>

St.: symptom, DO: detrusor overactivity, IC: impaired contractility, PdetQmax: pressure at peak flow, Qmax: maximum flow rate
Efficacy and safety of combination of tolterodine and pilocarpine in overactive bladder patients: a randomized double-blind multicenter phase 3 study

Purpose: We aimed to determine the efficacy and safety of combination of tolterodine immediate-release (IR) 2 mg and delayed-release pilocarpine 9 mg (tolterodine/pilocarpine (2/9 mg)) compared with tolterodine IR 2 mg monotherapy for OAB.

Materials and Methods: This study was a 12-week, multicenter, randomized, double-blind, parallel, active control study. Those with ≥8 micturitions and ≥2 urgency episodes per 24 hours and a total OABSS of 6 or more points were randomized 1:1 to tolterodine/pilocarpine (2/9 mg) (n=193) or 2 mg tolterodine (n=191) twice-daily for 12 weeks. Co-primary endpoints were the change from baseline in the mean number of daily micturitions and cumulative incidence of dry mouth at the end of the 12-week. Secondary endpoints included other OAB symptoms, xerostomia inventory total score and visual analogue scale (VAS) for dry mouth overall at the end of treatment period.

Results: Baseline characteristics were similar across the treatment groups. In the per protocol set, tolterodine/pilocarpine (2/9 mg) combination treatment was noninferior to tolterodine 2 mg monotherapy. Change from baseline in the mean number of daily micturitions was -1.49±2.20 of tolterodine/pilocarpine (2/9 mg) combination group and -1.74±1.99 of tolterodine 2 mg group, for a difference of -0.26±2.09 between two groups. The 95% confidence limits on the difference (-0.79 to 0.27) was above the prespecified noninferiority threshold of -1.0 (Figure 1). In the safety analysis set, incidence of dry mouth was lower in tolterodine/pilocarpine (2/9 mg) combination group than tolterodine monotherapy group, significantly (57 of 190 or 30.0% for combination group vs 82 of 191 or 42.93% for monotherapy group, p=0.009). All secondary and other efficacy outcomes related to OAB symptoms were improved in both groups while no statistically differences between two groups at the end of the 12-week. The change from baseline in the xerostomia inventory total score and VAS for dry mouth was significantly lower in tolterodine/pilocarpine (2/9 mg) combination group than tolterodine 2 mg group. The incidence of adverse events was similar between two groups.

Conclusions: A combination of tolterodine and pilocarpine effectively reduced incidence of dry mouth compared with tolterodine alone while preserving treatment efficacy in OAB and it was well tolerated.

Keywords: Anticholinergics, Efficacy, Safety
O-029

A 12-week open-label extension study to assess the efficacy and safety of combination of tolterodine and pilocarpine in the treatment of patients with overactive bladder after 12-week randomized study

고광진1, 이정주2, 오승준3, 김형곤4, 민권식5, 홍재엽6, 이규성1

1성균관대학교 의과대학 삼성서울병원 비뇨기과학교실, 2부산대학교병원 비뇨기과학교실, 3서울대학교병원 비뇨기과학교실, 4건국대학교병원 비뇨기과학교실, 5인제대학교 부산백병원 비뇨기과학교실, 6CHA의과학대학교 분당차병원 비뇨기과학교실

Purpose: The aim of this study was to evaluate the safety and efficacy of 12 weeks of open-label extension study with combination of tolterodine/pilocarpine (2/9 mg) following the completion of a blinded randomized controlled trial of acute treatment for overactive bladder (OAB).

Materials and Methods: Patients completing 12 weeks of randomized, double-blind treatment with either tolterodine/pilocarpine (2/9 mg) or 2 mg tolterodine twice daily were continued in the 12 weeks, open-label, uncontrolled extension study. Double-blind study medication was discontinued, and patients were started, open-label, on tolterodine/pilocarpine (2/9 mg) twice daily. Efficacy analysis consisted of a comparison of the change from baseline in the mean number of daily micturitions, incontinence episodes, and urgency episodes at the end of the 24-week.

Results: Of completers of randomized control study, 256 patients continued the extension study; 124 from tolterodine/pilocarpine (2/9 mg) combination treatment (extended group) and 132 from the 2 mg tolterodine monotherapy group (changed group). In the full analysis set, change from baseline in the mean number of daily micturitions was $-1.78\pm2.39$ (p<0.0001) of extended group and $-1.61\pm2.32$ (p<0.0001) of changed group. Other efficacy outcomes including the change from mean number of daily incontinence episodes and urgency episodes were improved in both groups while no statistically differences between two groups at the end of the 24-week. During the 12 weeks of randomized study period, incidence of dry mouth was lower in tolterodine/pilocarpine (2/9 mg) combination group than tolterodine monotherapy group, significantly (33.06% vs 45.45%, p=0.0427). By the end of the 12-week period of the extension study, the incidence rate of dry mouths was 4.03% (95% confidence interval: 1.32–9.16) of extended group and 0.00% (confidence interval: 0.00–2.76) of changed group. The other adverse events were not significantly different between two groups.

Conclusion: A combination of tolterodine and pilocarpine demonstrated a favourable safety and tolerability profile. The efficacy and safety remained excellent even though 2 mg tolterodine monotherapy was changed to tolterodine/pilocarpine (2/9 mg) combination treatment. Patients demonstrated sustained improvement in OAB symptoms for up to 24 weeks of combination treatment.

Keywords: Overactive bladder, Antimuscarinics
과민성방광 환자군에서 항무스카린제 처방 변경 사례와 그 이유에 관한 연구

강병진, 박지훈, 백승룡, 김경환, 이경, 김현우, 신동길, 이정주
부산대학교 의과대학 비뇨기과학실

Aims of Study: To investigate the reasons for the prescription change of antimuscarinic agents in patients with OAB.

Materials and Methods: The ratio and interval of prescription change assessed 1067 patients who were eligible for the study and took 1 of 4 different antimuscarinics (fesoterodine, solifenacin, propiverine or trospium). The reasons for prescription change and evaluation of efficacy analyzed 267 patients whose medical records were complete.

Results: Prescription change to another antimuscarinic agent occurred in 30.7% (328/1067) patients and the mean duration of taking their first antimuscarinic agent was 6.8±4.2 weeks. Lack of efficacy (57.2%) was the main reason for changing antimuscarinic agent followed by adverse events (28.6%), relatively high cost compared with other antimuscarinics (7.3%), the inconvenience of taking drugs (5.2%) and co-morbidity (1.7%). The mean duration of treatment according to each reason increased adverse events (3.3±2.2 weeks), relatively high cost compared with other antimuscarinics (4.7±2.5 weeks), co-morbidity (6.5±2.8 weeks), inconvenience of taking drugs (6.8±2.9 weeks), and lack of efficacy (10.8±6.8 weeks). The proportion of prescription change (16.3%) and prescription change because of adverse events (10.4%) in the fesoterodine group were low compared with other drugs (P<0.05 and P<0.006, respectively). Major reasons for the prescription change in patients taking antimuscarinic agents were a lack of efficacy and adverse events. In the fesoterodine group, the proportion of prescription change was significantly low compared to that in other three groups.

Conclusions: The evaluation of the impact of prescription change on the health of patients, adherence to treatment, and disease progression is warranted in the future study.

Keywords: OAB, Antimuscarinic agent
Objective: We assessed the association between metabolic health status and incidence of prostate cancer with the analysis using a nationwide cohort study in Korea.

Materials and Methods: A cohort of 11,771,252 male was extracted from the National Health Insurance Service, and subjects had received national health examinations at least once between 2009 and 2012. Obesity was defined based on a BMI of ≥25 kg/m² and the metabolically obese was defined as the presence of ≥3 components of metabolic syndrome. Subjects were stratified into 4 groups based on the metabolic health status: metabolically healthy, normal-weight (MHNW), metabolically obese, normal-weight (MONW), metabolically healthy, obese (MHO), metabolically obese, obese (MOO). Multivariate adjusted Cox regression analysis was conducted to examine the hazard ratio (HR) and 95% confidence interval (CI) for the association between metabolic health status and incidence of prostate cancer.

Results: Of the study participants, 6,165,051, 1,226,359, 2,312,838, and 2,067,004 subjects were classified into MHNW, MONW, MHO, MOO group. Mean BMI was 22.2 in the MHNW group and 27.8 in MOO group. Prostate cancer was newly diagnosed in 56,552 individuals during the study period. Age-adjusted hazard ratio (HR) for prostate cancer in the MHNW, MONW, MHO, MOO groups were 1.0 (ref), 1.143 (95% CI 1.118-1.169), 1.109 (95% CI 1.08-1.138), 1.257 (95% CI 1.231-1.284). HR for prostate cancer showed significant correlation for the number of components of metabolic syndrome.

Conclusion: This population–based study shows the evidence of association between metabolic health status and the incidence of prostate cancer, and the risk increases vary according to the number of components of metabolic syndrome.

Keywords: Prostate cancer, Metabolic syndrome, Metabolically obese normal weight
Is serum testosterone level is NOT related to adenocarcinoma diagnosis of the prostate even among definitely hypogonadal patients?

김정준, 오종진, 이상철, 홍성규, 이상은, 변석수
분당서울대학교병원 비뇨기과

Background: As far, the testosterone (T) level has been demonstrated no correlation with a prostate cancer detection rate of the general eugonadal populations. The aim was to analyze the relationship between serum T levels and prostate cancer detection among definitely hypogonadal patients from large prostate biopsy cohort.

Material and Methods: We analyzed a cohort of 2532 patients who underwent transrectal ultrasonography (TRUS)—guided prostate biopsies with pre—biopsy serum T level in a single institution from 2003 to 2017. Indication for prostate biopsy was suspicious digital rectal exam or PSA elevation. Patients on 5—alpha reductase inhibitor or testosterone replacement therapy were excluded from analysis. Patients were classified as definitely hypogonadal (T<230 ng/dl, n=296), marginally hypogonadal (T≥230 ng/dl and T<350 ng/dl, n=498) and eugonadal (T≥350 ng/dl, n=1738) group. Age, body mass index, the number of previous biopsies, PSA, prostate volume (PV), hypoechoic lesion of TRUS and biopsy pathology report were prospectively collected. The prostate cancer detection rate was evaluated and compared between groups by 1:1 propensity score matching method. The predictive performance of serum T was analyzed by the multivariate logistic regression model.

Results: The total prostate cancer diagnosis rate was 32.5% (822/2532). The prostate cancer detection rate was not different between marginally hypogonadal (31.3%, 156/498) and eugonadal (31.1%, 540/1738) group. However, the prostate cancer detection rate was higher among definitely hypogonadal (42.5%, 126/296) than both of propensity—matched eugonadal (90/298, 30.2%, p=0.004) and marginally hypogonadal group (30.9%, 92/297, p=0.002). Among eugonadal or marginally hypogonadal group, serum T could not predict prostate cancer detection at the multi—variate logistic model. However, among definitely hypogonadal group, pre—biopsy serum T was an independent predictor for the diagnosis of prostate cancer with covariate of Age, PSA, PV and BMI (p<0.01).

Conclusions: For definitely hypogonadal patients, cancer detection was related with testosterone level and the cancer detection rate itself was higher than others. However, testosterone levels are not related to prostate cancer diagnosis among marginally hypogonadal or eugonadal patients.

Keywords: Hypogonadism, Prostate cancer, Detection rate
O-033

메트포민(metformin)이 전립선 특이 항원에 미치는 영향: 미국 국가 보건영양실태조사(NHANES) 2007-2008 데이터

박지수1, 이광석2, 함원식1, 정병하2, 구교철2
연세대학교 의과대학 1신촌세브란스병원, 2강남세브란스병원

A possible association between metformin use and the development of prostate cancer (PCa) has been reported. The aim of this study was to investigate the association between exposure to metformin and serum prostate-specific antigen (PSA) levels among diabetic patients not previously diagnosed with PCa.

The analytic sample consisted of 1,363 U.S. men aged above 40 in the National Health and Nutrition Examination Survey 2007–2008 cycle. Men who had previous diagnoses of PCa or prostatitis and men who were exposed to manipulations that might have affected serum PSA levels were excluded from analysis. Multivariate logistic regression analyses were used to evaluate the independent association between serum PSA levels and metformin use by adjusting for potential confounding factors.

The mean PSA level of the overall population was 1.8 (SD=3.1) ng/ml. There were no differences in PSA levels according to the presence of diabetes (p=0.517). Among patients with diabetes, metformin users exhibited significantly lower PSA levels compared to non-metformin users after adjusting for potential confounders (OR=0.790; 95% CI 0.666–0.938; p=0.007). There was no significant difference in PSA levels in men on metformin for greater than 1 year compared to non-metformin users.

A negative association between serum PSA levels and metformin use was observed in patients with diabetes. Metformin use for more than 1 year did not influence PSA levels. Further studies are warranted to elucidate whether the reduction in PSA level with metformin truly reflects reduced risk of disease development.

**Keywords:** Diabetes mellitus, Metformin, Prostate cancer, Prostate-specific antigen

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**Table 1. Characteristics of the study population**

<table>
<thead>
<tr>
<th></th>
<th>All men</th>
<th>Metformin use</th>
<th>No metformin use</th>
<th>P*</th>
<th>P*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yrs)</td>
<td>59.2 (12.1)</td>
<td>62.0 (12.3)</td>
<td>61.7 (10.9)</td>
<td>0.057</td>
<td>0.016</td>
</tr>
<tr>
<td>BMI (kg/m2)</td>
<td>25.0 (4.7)</td>
<td>25.1 (4.6)</td>
<td>24.9 (4.5)</td>
<td>0.528</td>
<td>0.791</td>
</tr>
<tr>
<td>IPSS (median)</td>
<td>13.6 (13.3)</td>
<td>12.6 (13.0)</td>
<td>13.7 (12.2)</td>
<td>0.004</td>
<td>0.003</td>
</tr>
<tr>
<td>PSA (ng/ml)</td>
<td>19.7 (16.2)</td>
<td>19.0 (16.3)</td>
<td>19.7 (16.5)</td>
<td>0.624</td>
<td>0.979</td>
</tr>
</tbody>
</table>

*P-value calculated using logistic regression for multivariate analysis.

**Table 2. Characteristics of patients with diabetes, according to duration of use of metformin for 1 year and 5 years**

<table>
<thead>
<tr>
<th></th>
<th>Metformin use 1 year</th>
<th>Metformin use 5 years</th>
<th>Metformin use 2 years</th>
<th>Metformin use &gt; 5 years</th>
<th>P*</th>
<th>P*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yrs)</td>
<td>71.0 (10.9)</td>
<td>61.9 (10.9)</td>
<td>63.5 (12.3)</td>
<td>61.3 (12.2)</td>
<td>0.099</td>
<td>0.016</td>
</tr>
<tr>
<td>BMI (kg/m2)</td>
<td>26.7 (4.7)</td>
<td>25.1 (4.6)</td>
<td>24.9 (4.5)</td>
<td>0.004</td>
<td>0.003</td>
<td></td>
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</tr>
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<td>19.7 (16.5)</td>
<td>0.624</td>
<td>0.979</td>
<td></td>
</tr>
</tbody>
</table>

*P-value calculated using logistic regression for multivariate analysis.
Age-specific prostate-specific antigen in Korean men with biopsy-confirmed benign prostate

Background: This study is to determine age-specific PSA distributions in Koreans without prostate cancer (PCa) and to recommend reference ranges for this population.

Methods: Between 2004 and 2014, 3,703 men underwent prostate biopsy to confirm PCa. Clinical information and blood samples were collected prior to biopsy for each patient. 497 patients were diagnosed with 1 core of Gleason score 6 PCa, and 2,553 men were confirmed benign prostate via biopsy. The men with biopsy-confirmed benign prostate and PCa were divided into six age groups. Simple descriptive statistical analyses were carried out and their means were compared. The same analysis was performed among the men with biopsy-confirmed benign prostate and the patients with Gleason score 6 PCa versus the patients with Gleason score 7 or more PCa.

Results: Mean age was 64.4±9.4 years old and median serum PSA levels was 5.1 ng/ml [inter-quartile range, 3.5-9.4] in total group. The median value of PSA of less than forties, forties, fifties, sixties, seventies, and eighties and more with biopsy-confirmed benign prostate were 6.73, 3.99, 3.98, 4.00, 5.43, and 6.52 ng/mL, respectively. Among sixties, PSA value of PCa patients was significantly different from that of men with biopsy-confirmed benign prostate, while others are not. When the same analysis was performed among the men with biopsy-confirmed benign prostate and the patients with Gleason score 6 PCa versus the patients with Gleason score 7 or more PCa, the median values of PSA of each group was almost same as the previous analysis (6.73, 3.99, 4.00, 4.00, 5.51, and 6.61 ng/mL, respectively), while statistical differences were shown from sixties to eighties and more.

Conclusion: The cut off value of PSA of less than forties should be set higher than that of older group. From forties to fifties, PSA testing cannot distinguish the man with benign and malignant status nor insignificant and significant lesion. The cutoff value of 4, 5.5, and 6.6 ng/mL in sixties, seventies, and eighties and more, respectively, can tell patients with clinically significant lesion from benign or insignificant lesion.

This research was supported by Basic Science Research Program through the National Research Foundation of Korea (NRF) funded by the Ministry of Science, ICT & Future Planning (2017R1A2B4005876).

Keywords: Prostate-specific antigen, Biopsy, Prostate cancer
전립선 조직검사에서 항생제 용법이 갖는 임상적 중요성: 단일 기관 1만례 보고

 서영은, 유영동, 황진호, 이영주, 김정준, 이학임, 오종진, 이성철, 정성진, 홍성규, 변석수, 이상은
분당서울대학교 의과대학 비뇨기과학OfFile

Objective: This study aims to evaluate the effectiveness of the antibiotic regimen for prostate biopsy by analyzing patients who were hospitalized due to complications after transrectal ultrasound–guided prostate biopsy (TRUS–PBx).

Materials and Methods: During May 2003 and April 2017, the medical records of 10339 patients who underwent TRUS–PBx at our institution were reviewed. We exclude the patients with low quality data for the final analysis. All patients received IV antibiotics 30–60 minutes before the biopsy after the procedure. Clinicopathologic factors including patient age, antibiotics regimen, the number of biopsy cores, constipation, obesity, prostate specific antigen (PSA), prostate volume and infection–related complications that require hospitalization were analyzed.

Results: 9487 patients among the entire patients were included for the final analysis. 33 patients (0.35%) were hospitalized due to infection–related complications. Infection–related hospitalization rate was significantly lower in patients who took cephalosporin (0.2%) compared to patients who received quinolone (1.64%). At our institution, cephalosporin has been predominantly used to prevent post–biopsy infections since January 2013. Only 5 patients (0.12%) developed post–operative complications among 3863 patient who underwent TRUS–PBx since 2013. Multivariate analysis showed the use of 2nd or 3rd cephalosporin was the only independent predictor for the infection–related complications.

Conclusion: The antibiotics regimen, especially the use of 2nd or 3rd generation prophylactic cephalosporin, in TRUS–PBx could play an important role in reducing infection–related complications.

Keywords: Prostate biopsy, Infectious complication, Antibiotics
Purpose: We investigated the hypothesis that prostate-specific antigen (PSA) isoform p2PSA and its derivates, percentage of p2PSA to free PSA (%p2PSA) and the Prostate Health Index (PHI), predict PCa characteristics at final pathology after RP.

Materials and Methods: The study was an observational prospective evaluation of a clinical cohort of men undergoing radical prostatectomy from the Gangwon Urology Oncology Group (GUOG). We determined the predictive accuracy of serum total PSA (tPSA), free PSA (fPSA), fPSA-to-tPSA ratio (%fPSA), p2PSA, %p2PSA, and PHI. The primary end point was to determine the accuracy of these biomarkers in predicting the presence of pT3 disease, pathologic Gleason score (GS) ≥7, GS upgrading. Multivariable logistic regression models and receiver operating characteristic (ROC) curve analysis were complemented by predictive accuracy analysis.

Results: Average age of enrolled 70 patients was 68.0 (46–79) years old. Forty patients (57.1%) and 49 (70.0%) were diagnosed with biopsy and pathologic GS ≥7, respectively. Thirty three patients (47.1%) were diagnosed with pT3. GS upgrading was found in 15 (21.4%) patients. The %p2PSA and PHI levels were significantly higher in patients with pT3 disease, pathologic GS ≥7, and GS upgrading. In univariate analysis, both %p2PSA and PHI were accurate predictors of pT3 disease, pathologic GS ≥7, and GS upgrading. In multivariate analyses, the inclusion of PHI significantly increased the predictive accuracy of a base multivariate model that included patient age, tPSA, fPSA, %fPSA, clinical stage.

Conclusions: We found that p2PSA and its derivatives are predictors of PCa characteristics at final pathology after RP and are more accurate than currently available markers.

Keywords: Prostate-specific antigen, Prostatectomy, PHI
Purpose: We aimed to analyze diagnostic accuracy of multiparametric MRI based on site-specific Prostate Imaging Reporting and Data System (PI-RADS) using whole mount section slide analysis of radical prostatectomy specimens.

Materials and Methods: From January 2014 to December 2015, a total of 411 consecutive patients with prostate cancer who had undergone multiparametric MRI and radical prostatectomy were evaluated. MRI was performed at 3.0 T, including T1-, T2-weighted imaging, diffusion-weighted imaging, apparent diffusion coefficient mapping, and dynamic contrast-enhanced imaging in our institution. Experienced genitourinary radiologists performed PI-RADS scoring divided into 12 zones (right/left, anterior/posterior, and base/mid/apex). Radical prostatectomy specimens were examined by whole mount section slides. Positive findings of PI-RADS were defined when a score of site was 4 or greater.

Results: A total of 4932 sites were evaluated. Overall sensitivity/specificity of MRI for tumor presence was 71.1%/79.4%. The sensitivity/specificity for extracapsular extension (ECE) and seminal vesicle (SVI) invasion were 20.4%/95.9% and 23.4%/96.9%. By site-specific analysis, the sensitivity for tumor presence was lower in anterior site than posterior site (66.8% vs 74.1%, p<0.001). Also, the sensitivity of tumor presence was lower in apex than base (66.7% vs 81.2%, p<0.001). By pathologic Gleason scores, the sensitivity of tumor presence was lower in GS 6 (60.4%), GS 3+4 (66.2%) than in GS 4+3 (74.0%), GS 8(82.7%), and GS 9–10 (77.4%) cancers. The sensitivity was 75.4% in high risk, 69.0% in intermediate risk, and 68.4% in low risk group patients.

Conclusions: Multiparametric MRI based on PI-RADS showed good diagnostic accuracy for tumor presence in prostate. However, multiparametric MRI was not useful to detect ECE or SVI. By site-specific analysis, PI-RADS scoring system showed poor sensitivity in anterior tumors, apex tumors, and low-risk tumors. Lowering cutoff scores of PI-RADS would be helpful to detect hidden lesions in these tumors.

Keywords: Prostatic neoplasms, Magnetic resonance imaging, Diagnostic imaging
**Objectives:** We investigated the role of MP MRI PI-RADS version 2 interpretation in predicting extracapsular extension during radical prostatectomy.

**Materials and Methods:** We analyzed patients who underwent radical prostatectomy for prostate cancer with MRI preoperatively. We investigated the association between MRI PI-RADS version 2 interpretation of extracapsular extension and pathologic result using multivariate Cox regression and 2×2 table for predictive value calculation. In this study, pathologic extracapsular extension is the gold standard for MRI prediction.

**Results:** Data from 102 patients who received prostatectomy with preoperative MRI with PI RADS version 2 interpretation in 2017 January to Jun were evaluated retrospectively. Among them, 32 (31.3%) patients had pathologic ECE (extracapsular extension) and 6 patients (18.7%) had seminal vesicle invasion. We performed bilateral neurovascular bundle sparing in 94 patients (92%) and unilateral in 1 patient (1%). There were no statistical differences in prostate volume, Gleason score, and preoperative PSA between the two groups. The pathologic ECE group had a higher number of patients with a high Gleason score of 7 (4+3) or higher, and the tumor volume was relatively larger than the non-ECE group (4.6 cm³ vs 2.5 cm³ p<0.001). Prostate lesions were divided into 12 sections according to PI-RADS version 2 and the predictive power was analyzed for each region. Overall, the sensitivity to predict the extracapsular extension is 47.8% and the specificity is 97.1%. Positive predictive value was 43.7% and negative predictive value was 96.9%. The logistic regression analysis showed that biopsy Gleason score of 8 or more and MRI clinical stage were significant when ECE predictors were analyzed.

**Conclusion:** Prediction of extracapsular extension with MRI PI-RADS version 2 shows low sensitivity and high specificity. MRI PI-RADS version 2 analysis has a high negative predictive value for extracapsular extension.

**Keywords:** Prostate cancer, Extracapsular extension, MRI PI-RADS version 2
근치적 전립선절제술을 받은 한국인에서의 새로운 5단계 grading system에 대한 외부 검증 및 평가

조민현1, 정창욱1, 구자현1, 곽철1, 김현희1, 박주현2, 조민철2, 정현2
1서울대학교병원, 2서울특별시립 보라매병원

Objective: To report the external validation and evaluation of the new five-tiered prostate cancer grading system for the radical prostatectomy (RP) population in Korea

Materials and Methods: Between 1996 and 2016, 2883 consecutive patients who had biopsy proven prostate cancer and underwent radical prostatectomy were retrospectively reviewed from two prospectively collected prostate cancer databases. To report external validation and evaluation of the new five-tiered prostate cancer grading system, biochemical recurrence-free survival (bRFS) rates were assessed using Kaplan–Meier tests, Cox-regression modelling, and discriminatory comparison analyses. Separate analyses were performed based on biopsy and RP grade.

Results: The 5-year actuarial bRFS for biopsy grade groups 1–5 were 87.0%, 73.8%, 71.3%, 58.4%, and 44.4%, respectively. Similarly, the 5-year actuarial bRFS based on RP grade groups was 89.0%, 78.6%, 63.0%, 54.8%, and 47.8% for grade groups 1–5, respectively. The adjusted hazard ratios for bRFS relative to biopsy grade group 1 were 1.97, 2.47, 3.39, and 4.10 for groups 2, 3, 4, and 5, respectively, and for RP grade groups were 1.82, 3.18, 3.70, and 3.63.

Conclusion: In Korean radical prostatectomy population, we have validated the new five-tiered prostate cancer grading system for bRFS, and shown that Group 1–5 is respectively 92.2%, 84.6%, 75.4%, 69.2%, 71.0%, There was a significant difference between groups 1, 2, 3 and 5, but between groups 3, 4 and 5, significant differences were not found.

Keywords: Prostate cancer, New grading system
Verification for staging groups of prostate cancer suggested by eighth edition of TNM staging manual of the American joint committee on cancer: emphasis on the gleason score

이학민, 이인재, 오종진, 이성철, 변석수, 이상은, 홍성규
분당서울대학교병원 비뇨기과학회실

Introduction: The American Joint Committee on Cancer (AJCC) TNM staging manual has been recently updated and provided more specified stage group for prediction of prognosis for prostate cancer. We evaluated the accuracy of AJCC stage group on the biochemical recurrence (BCR) after surgery.

Materials and Methods: We analyzed the data of 2,684 patients treated by radical prostatectomy who qualified the definitions for AJCC stage groups from IIB to IIIB. We stratified patients into several subgroups according to the Gleason score (GS) and the BCR–free survivals were compared using Kaplan–Meier analyses.

Results: There were 1,101 patients in group IIB, 535 in IIC, 129 in IIIA, and 795 in IIIB, respectively. We observed no significant differences of BCR–free survival between IIC and IIIA (p=0.875). When we sub-divided IIIA group according to the GS, we could observe significant differences of BCR–free survival (all p<0.001) between subgroups. Moreover, the GS 4+4 subgroup of IIC showed significantly worse BCR–free survival than GS 3+3, 3+4 subgroups of IIIA (p=0.011) and no significant difference with GS 4+3 subgroup (p=0.781) of IIIA. From our results, we suggest new system which showed better ability to discriminate the prognosis of each group.

Conclusions: The current AJCC prognostic groups showed some contradictory results particularly in IIC and IIIA groups. We carefully suggest that the stage groups of IIC and IIIA should be revised according to the GS not only by prostatic antigen level.

Keywords: Prostate, Cancer, Staging, Survival
결석 질환의 치료 경향과 비용

윤영은, 정재훈, 조정기, 문홍상, 김용태, 최홍용, 박해영, 박성열
한양대학교 의과대학 비뇨기과학교실

Introduction: There are only a few longitudinal studies regarding treatment and costs for patients with urinary tract stone disease. We conducted this study to provide a recent update on the changes in prevalence and treatment of urinary tract stone disease in Korea.

Materials and Methods: Using the Korean Health Insurance Review and Assessment Service (HIRA) data from 2010 to 2016, urinary tract stone patients were identified. The prevalence, trends of treatment and costs were analyzed.

Result: In 2016, 283,964 patients were diagnosed as urinary stone, increased by 5.6% from 2012. As the patient increases, the urinary stone-related procedure is also increasing; the percentage of patients treated surgically each year rose from 38.0% to 40.1% (an increase of 5.5%) between 2012 and 2016. In 2016, total cost of urinary tract stone treatment was 209.3 million USD, an increase of about 33.8% compared to 156.4 million USD in 2012. In particular, the proportion of treatment costs for patients over 60 increased steadily. While ESWL is still the norm (~90%), endoscopic surgeries were increased. The rigid URS increased by 93.4% and the flexible URS increased by 1550% during the period. Considering repeated procedures in one patient, claimed cost of each patient for ESWL was the highest (1131 USD).

Conclusion: Urinary stone disease and surgeries for them is increasing in Korea, but the percentage of ESWL is still high compared to other countries. Despite the need of skillful surgeon and expensive instruments, it seems that charges for endoscopic surgeries are relatively low in Korea, so rearrangement of cost for stone treatment should be discussed.

Keywords: Stone, Medical cost, Lithiasis
요로 결석 성분과 대사성 요인들과의 연관성에 관한 연구

김재윤, 김승빈, 태종현, 윤성구, 심지성, 강석호, 전 준, 이정구, 김제종
고려대학교 의과대학 비뇨기과학회실

목적: 본 연구는 요로 결석의 성분과 여러 대사성 요인들의 연관성을 규명하여 요로 결석의 치료 및 재발의 예방에 활용하기 위해 시행되었다.


결과: 총 209명의 환자 중 요산 결석군은 36명이었으며, 비요산 결석군은 173명이었다. 요산 결석군은 비요산 결석군에 비하여 당뇨, 고혈압, 만성 신부전, 심혈관 질환의 이환율이 있어 통계적으로 유의하게 높은 결과를 나타냈으며, 혈액 검사 상 HbA1c 및 uric acid, creatinine 수치에서도 높은 결과를 보였다.

결론: 요산 결석을 가진 환자들은 당뇨, 심혈관 질환, 고혈압 등의 대사성 질환에서 높은 빈도를 나타내었으나 비만도나 이상지질혈증과의 연관성은 유의하게 관찰되지 않았다. HbA1c와 요산 결석의 발생률은 유의한 상관 관계를 보여 당뇨 환자에서 철저한 혈당 관리를 통한 요산 결석의 예방 효과가 있을 것으로 기대된다. 향후 이와 관련한 더 많은 환자수를 대상으로 한 추가적인 연구가 필요하다.

Keywords: Metabolic disease, Stone analysis, Metabolic stone

<table>
<thead>
<tr>
<th>Table 1. Differences of patient characteristics between uric acid group and non uric acid group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uric acid</td>
</tr>
<tr>
<td>Patient (N)</td>
</tr>
<tr>
<td>Male/female (N)</td>
</tr>
<tr>
<td>Age</td>
</tr>
<tr>
<td>Weight</td>
</tr>
<tr>
<td>Body weight (kg)</td>
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<td>BMI</td>
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(using chi square test. * Fisher’s exact test, t-test)

<table>
<thead>
<tr>
<th>Table 2. Differences of patient underlying disease and laboratory results between uric acid group and non uric acid group</th>
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<tr>
<td>Underlying disease</td>
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<tr>
<td>DM</td>
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<tr>
<td>Metformin use</td>
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<tr>
<td>Hypertension</td>
</tr>
<tr>
<td>Edema use</td>
</tr>
<tr>
<td>HbA1c</td>
</tr>
<tr>
<td>CAD</td>
</tr>
<tr>
<td>eGFR</td>
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</table>

<table>
<thead>
<tr>
<th>Laboratory test</th>
<th>Uric acid</th>
<th>Non uric acid</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serum Creatinine</td>
<td>142.4±17.6</td>
<td>119±12.1</td>
<td>0.504</td>
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<tr>
<td>Calcium</td>
<td>9.8±0.7</td>
<td>9.3±0.5</td>
<td>0.752</td>
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<tr>
<td>Na</td>
<td>138±2.1</td>
<td>138±2.4</td>
<td>0.952</td>
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<tr>
<td>Cholesterol</td>
<td>190±58.8</td>
<td>191±54.1</td>
<td>0.297</td>
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<tr>
<td>Albumin</td>
<td>3.4±0.7</td>
<td>3.5±0.7</td>
<td>0.175</td>
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<tr>
<td>Uric acid</td>
<td>387.2±126.8</td>
<td>464.2±141.0</td>
<td>0.482</td>
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<tr>
<td>LYS</td>
<td>14.0±9.0</td>
<td>14.3±11.9</td>
<td>0.906</td>
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<tr>
<td>Glucose</td>
<td>124±247.7</td>
<td>116±195.8</td>
<td>0.345</td>
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<tr>
<td>HbA1c</td>
<td>444±106</td>
<td>571±102</td>
<td>0.008</td>
</tr>
<tr>
<td>Uric acid</td>
<td>380±108</td>
<td>4.4±1.6</td>
<td>&lt;0.001</td>
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<tr>
<td>Phosphatase</td>
<td>371±550</td>
<td>353±207</td>
<td>0.237</td>
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<tr>
<td>Magnesium</td>
<td>1.8±0.005</td>
<td>0.8±0.010</td>
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<td>IFN</td>
<td>15.3±15.3</td>
<td>14.6±13.2</td>
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<tr>
<td>TSH</td>
<td>247±2.05</td>
<td>232±1.73</td>
<td>0.434</td>
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<tr>
<td>FRZ7</td>
<td>1.2±0.05</td>
<td>1.2±0.03</td>
<td>0.586</td>
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<tr>
<td>Urine pH</td>
<td>5±0.110</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
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<tr>
<td>U/C</td>
<td>0.9%</td>
<td>20.3%</td>
<td>0.004</td>
</tr>
</tbody>
</table>

(using chi square test. * Fisher’s exact test, t-test)

CAD: coronary artery disease, eGFR: house field unit
요로결석의 약물배출촉진요법으로 tamsulosin, alfuzosin, silodosin 및 placebo의 결석 배출율의 비교: 체계적 문헌고찰 및 네트워크 메타분석
강동혁1, 권종규2, 김종찬2, 조강수2, 함원식2, 최영득2, 이주용2
1인하대학교 의과대학 비뇨기과학회, 2연세대학교 의과대학 비뇨기과학회, 비뇨의과학연구소

목적: 요로결석의 약물배출촉진요법은 요관결석과 충격파쇄석술로 파쇄된 잔석의 배출을 가속화시키고, 통증을 경감시킨다. EAU 요로결석 진료지침에서는 tamsulosin, terazosin, doxazosin, alfuzosin 및 silodosin이 결석 배출을 증가시킨다는 권고사항을 제시하고 있다. 그러나, 현재까지 각 약물들의 명확한 비교분석 결과는 소규모연구에서만 비교분석하였다. 이에 저자들은 지금까지 출판된 연구들을 바탕으로 가장 흔히 사용하는 알파차단제인 tamsulosin, alfuzosin 및 silodosin과 위약에 대한 결석 배출율을 체계적 문헌고찰 및 네트워크 메타분석을 시행하였다.

대상 및 방법: 2016년 7월까지의 자료를 국외 PubMed, EMBASE를 이용하여 검색하였고 전자 검색된 자료의 참고문헌을 수기 검색하였다. 두 명의 연구자가 자료 추출 양식을 사용하여 연구 설계, 대상자 수와 특성 및 요로결석에 대한 약물배출촉진요법(tamsulosin 0.4 mg, alfuzosin 10 mg, silodosin 8 mg과 위약 연구)의 결석 배출율을 비교한 자료를 추출하였다. 연구의 질을 평가하기 위하여 관찰연구 질 평가도구인 Downs and Black checklist를 사용하였고, PRISMA statement를 적용하여 분석하였다.

결과: 전체 39개의 연구가 요로결석에 대하여 tamsulosin 0.4 mg, alfuzosin 10 mg 및 silodosin과 위약과의 비교를 시행하였다. 비교대상은 tamsulosin과 위약이 21개, alfuzosin과 위약이 4개, silodosin과 위약이 4개, tamsulosin 0.4 mg 및 alfuzosin 10 mg 비교연구가 5개, tamsulosin과 silodosin 비교연구가 6개이었다. 네트워크 메타분석에서 tamsulosin (OR 3.6; 95% CI 2.2.6-5.3), alfuzosin (OR 2.2; 95% CI 1.2- 4.5), silodosin (OR 4.7; 95% CI 2.6-8.9)은 위약에 비하여 높은 배출율을 보였다. Tamsulosin (OR 0.47; 95% CI 0.2-1.2)과 alfuzosin (OR 0.41; 95% CI 0.41-1.4)은 silodosin과 차이를 보이지 않았다. Absolute risk는 silodosin이 가장 높았다(AR 0.80; 95% CI 0.75-0.86). 순위분석에서는 silodosin이 1순위를 차지하였으며, tamsulosin이 2순위를 차지하였다(Fig 1).

결론: 요로결석의 약물배출촉진요법으로 사용되는 알파차단제 중, tamsulosin과 alfuzosin, silodosin은 배출율에 있어서 차이를 보이지 않았고, 위약에 비하여 높은 배출율을 보였다. 그러나, 순위 확률에서는 silodosin이 가장 높은 배출 확률을 보였다.

Keywords: Medical exclusive therapy, Ureter stone, Network meta-analysis
비조영전산단층촬영 hounsfield units를 이용한 결석이질성지수, 평균결석밀도 및 최대직경을 이용한 요관결석의 체외충격파쇄석술 1차 성공률 예측 노모그램

오경택1, 김종찬1, 강동혁2, 조강수1, 함원식1, 최영득1, 이주용1

1연세대학교 의과대학 비뇨기과학연구소, 2인하대학교 의과대학 비뇨기과학연구소

목적: 이미 보고된 체외충격파쇄석술 시행 전 성공률을 예측할 수 있는 인자는 결석의 크기와 비조영전산단층촬영(NCCT)에서 결석의 Hounsfield units (HU)의 평균값인 평균결석밀도(MSD), 결석이질성지수(SHI) 및 결석최대직경(MSL) 등이 보고된 바가 있다. 저자들은 MSL과 MSD, SHI를 이용하여 요관결석 환자에서 체외충격파쇄석술의 1차 성공률을 예측하는 노모그램을 만들어 성공률을 예측할 수 있는지를 확인하고자 하였다.


결과: 700명의 환자의 환자의 평균 나이는 52.55±13.88세이었으며, 요관결석의 위치는 573명(81.9%)이 상부요관, 48명(6.9%)이 중부요관, 79명(11.2%)이 하부요관이었다. 결석의 평균 MSL은 9.12±3.89 mm이었으며, 평균 MSD 및 SHI는 707.04±272.10 HU 및 244.90±110.16 HU이었다. 다변량분석에서 MSL, MSD, SHI가 의미있는 예측인자이었으며, 이를 통하여 노모그램을 작성하였다(Fig 1). 내적 타당도 분석에서 예측모형의 AUC는 0.796이었으며, Calibration plot은 mean absolute error는 2.3%, 내적 타당도 분석에서 calibration plot의 mean absolute error는 2.1%이었다.

결론: 본 연구를 통하여 체외충격파쇄석술 1차 성공률을 예측하는 노모그램을 개발하였으며, internal 및 external validation에서도 높은 예측도를 갖는 노모그램을 개발하였다. 본 연구는 요관 결석 환자의 치료 방침 선택에 있어서 기본적인 모형이 될 수 있을 것으로 생각한다.

Keywords: Ureter stone, Shock wave lithotripsy, Nomogram
**Objective**: We investigated the surgical efficiency and cut-off criteria to determine whether retrograde intrarenal surgery (RIRS) or supine miniaturized percutaneous nephrolithotomy (MPCNL) is appropriate for managing renal stones >10 mm.

**Methods**: Patients underwent a single session of RIRS or supine MPCNL when they have a main stone >10 mm. Change point analysis with a cumulative sum of ordered value of fragmentation efficiency and stone size was used to detect the point at which the statistical properties of a sequence of observation changes.

**Results**: No differences in mean age, gender, body mass index, comorbidities, or stone composition were observed between the two groups. Stone burden, fragmentation efficiency, area of stone distribution, and the presence of staghorn stones were higher in the MPCNL group than those in the RIRS group. Stone-free rates and complication rates were not different between the two groups. The fragmentation efficiency increased to 40.4 ml/min, at which the stone size in the RIRS was 19.1 mm. The level of the fragmentation efficiency at the renal stone of 10 mm and 30 mm was similar to each other. The fragmentation efficiency in the MPCNL group continuously increased until the size of 35.1 mm.

**Conclusions**: RIRS shows the highest efficiency at the maximal diameter of 19.1 mm and the volume of 15,000 mm³. The acceptable level of stone size and volume for RIRS would be 30.0 mm and 27,000 mm³.

**Keywords**: MPCNL, RIRS, Urinary stone
신장결석에 대한 치료로 retrograde intrarenal surgery, percutaneous nephrolithotomy, mini-percutaneous nephrolithotomy 결과 비교: 체계적 문헌고찰 및 네트워크 메타분석

강동혁1, 김종찬2, 권종규2, 조강수2, 함원식2, 최영득2, 이주용2
1인하대학교 의과대학 비뇨기과학교실, 2연세대학교 의과대학 비뇨기과학교실, 비뇨의과학연구소

목적: 신장결석의 수술적 치료로 retrograde intrarenal surgery (RIRS), percutaneous nephrolithotomy (PCNL)이 시행되고 있다. PCNL은 2 cm 이상의 신장결석에 있어 효과적이며, RIRS에 비하여 침습적 치료이다. Mini-PCNL은 II-20 Fr의 miniature endoscope를 이용하여 시행하는 수술로 PCNL의 대안적 치료로 시행되어왔다. 이에 저자들은 지금까지 출판된 연구들을 바탕으로 RIRS, PCNL 그리고 mini-PCNL의 3가지 치료법에 대한 체계적 문헌고찰 및 success 또는 stone-free rate의 네트워크 메타분석을 시행하였다.

대상 및 방법: 2016년 1월까지의 자료를 국외 PubMed, EMBASE를 이용하여 검색하였고 전자 검색된 자료의 참고문헌을 수기 검색하였다. 두 명의 연구자가 자료 추출 양식을 사용하여 연구 설계, 대상자 수와 특성 및 신장 결석에 대한 치료(RIRS, PCNL 및 m-PCNL)에 stone-free 또는 success rate를 비교 분석한 자료를 추출하였다. 연구의 질을 평가하기 위하여 관찰연구 질 평가도구인 Downs and Black checklist를 사용하였고, PRISMA statement를 적용하여 분석하였다.

결과: 전체 25개의 연구가 신장결석에 대하여 RIRS, PCNL 및 mini-PCNL의 stone-free 또는 success rate를 비교하였다. PCNL과 mini-PCNL의 비교연구 6개, mini-PCNL과 RIRS 비교연구 7개, RIRS와 PCNL 비교연구 12가가 선정되었다. 네트워크 메타분석에서 mini-PCNL과 비교하였을 때, RIRS와 비교하였을 때, PCNL (OR 2.4; 95% CI 1.2–4.7)과 mini-PCNL (OR 2.4; 95% CI 1.2–4.7)은 의미있게 높은 success 또는 stone-free rate를 보였다. 그러나, PCNL과 비교하였을 때, mini-PCNL은 통계적 차이를 보이지 않았다(OR 1.0; 95% CI 0.53–2.0). 순위분석에서 Rankogram은 mini-PCNL, PCNL, RIRS의 순위를 보였으며(Fig 1), P-score는 mini-PCNL이 0.7918, PCNL이 0.7069 및 RIRS 0.0013의 순위를 기록하였다.

결론: 신장결석의 수술적 치료에서 PCNL과 mini-PCNL은 RIRS에 비하여 높은 success 또는 stone-free rate를 보였다.

Keywords: Renal stone treatment, Network meta-analysis

Fig 1. Rankogram of retrograde intrarenal surgery, percutaneous nephrolithotomy and mini-percutaneous nephrolithotomy for stone-free or success rate of renal stones.
Introduction: To compare the acute renal injury according to the difference of renal stone surgery using urine biomarkers.

Methods: We retrospectively analyzed 68 patients who underwent renal stone surgery between 2014 and 2017. The patients were divided into retrograde intrarenal surgery (RIRS) and percutaneous lithotripsy (PNL) groups according to the surgical procedure. Urine biomarkers were used with microalbumin, N-Acetylglucosamine (NAG) and beta2 microglobulin. Urine biomarkers were measured 3 time points (preoperative, postoperative 1 month and 3 months).

Results: In the comparison of mean values, microalbumin and microalbumin/Cr were significantly different between POD1 and POD3 (p=0.002 and 0.062), and NAG/Cr was significantly different between preop–POD1 and POD1–POD3 (p=0.006 and 0.047). Microalbumin, microalbumin/Cr and NAG/Cr were significant different in the comparison of the mean difference between the section (P=0.000, P=0.005 and P=0.053). In the comparison of the mean difference between the two groups, the PNL group has a more mean difference than RIRS group between preoperative and postoperative 1 month microalbumin/Cr. There was no difference in operation time, stone free rate, complication after 3 months, additional treatment, postoperative hospital stay and DJ stent maintenance period between two groups.

Conclusion: Microalbumin, microalbumin/Cr, and NAG/Cr may reflect well the degree of acute renal injury during and after renal stone surgery. PNL shows more mean difference of acute renal injury biomarkers after surgery compared to RIRS.

Keywords: Renal stone, RIRS, PNL
Objective: Recently, asymptomatic ureteral stones have been detected more frequently on regular health examination. However, most reports on silent stones have involved small numbers of patients, and few have compared findings with symptomatic ureteral stones. In this study, we investigated the route of diagnosis and characteristics of silent stones, as well as the impact of renal function recovery, compared to symptomatic ureteral stones.

Materials and Methods: We retrospectively reviewed data for 398 patients who had undergone ureterolithotripsy or ureterolithotomy for ureteral stones between 2011 and 2016. A silent ureteral stone was considered to be in the absence of any specific or subjective symptoms related to the ureteral stone. We compared patient and stone characteristics, urinary analysis, images with CT findings, and recovery of renal function after surgery based on serum creatinine level and GFR between the two groups.

Results: Among 398 patients, 81 had asymptomatic ureteral stones greater than 6 mm, and the remaining 317 had symptomatic ureteral stones. Most silent stones were diagnosed via ultrasonography (49.4%) or microscopic hematuria (24.7%) during regular health screenings. There were significant differences in the distributions of the locations and lateralizations of stones (all p<0.05). In the silent stone group, the proportion of males was higher (80.2% vs. 60.6%), mean stone size was greater (11.4 mm vs. 9.6 mm), and the rate of severe-grade hydronephrosis was higher (25.9% vs. 3.5%) than in the symptomatic stone group (all p<0.05). Regarding the risk factors of asymptomatic ureteral stones, age, sex, grade IV hydronephrosis, hypertension, and hyperlipidemia were all significant on multivariable logistic regression analysis. Mean GFR value at 7 days and 3 months postoperatively showed significant improvements (7.2 and 8.9) in the symptomatic stone group, while improvements of mean GFR value were not significant in the asymptomatic group.

Conclusion: This study demonstrated that asymptomatic ureteral stones were more associated with large size and severity of hydronephrosis than symptomatic ureteral stones. Thus, prolonged ureteral obstruction caused by asymptomatic ureteral stones may be related to impaired kidney function.

Keywords: Ureterolithiasis, Asymptomatic diseases, Ureteral obstruction
역행성 신내 수술 후 치료 실패 위험인자에 대한 연구

김영빈, 신용호, 최태수, 유구한, 이동기, 민경은, 전승현, 이형래, 이선주, 이충현, 장성구, 이상협

경희대학교 의과대학 비뇨기과학교실

Introduction: Retrograde intra–renal surgery (RIRS) has become one of the preferred treatment options for renal stones. Technique of RIRS may be challenging, which needs adequate training to achieve optimal results. The aim of this study is to figure out the risk factors of RIRS failure.

Materials and Methods: From January 2014 to May 2017, 279 patients received RIRS at Kyung Hee University Medical Center. All cases were performed by single surgeon. We included patients who had a stone with maximal diameter between 10 and 30 mm. All patients checked non–enhanced CT at one month after surgery. Patients’, stone and surgical factors were reviewed retrospectively. Success of treatment was defined as complete stone free or the presence of residual stone size less than 3 mm. In addition, we considered learning curve was overcome if more than 50 cases of RIRS were performed. The risk factors for treatment failure after RIRS were assessed using univariate and multivariate logistic regression analysis.

Results: According to the univariate analysis, surgical proficiency and multiple renal stones were significantly associated with treatment failure after RIRS. There was no association between treatment failure with gender, body mass index, stone size, or operative time. In addition, according to the multivariate analysis, beginner and stone multiplicity were the independent risk factors for RIRS failure.

Conclusions: Patients with multiple renal stones had higher possibility of treatment failure after RIRS. Before performing RIRS, it is necessary to give patients sufficient explanation about this possibility.

Keywords: Urolithiasis, Kidney, Surgery
Purpose: We aimed to evaluate the risk factors of febrile urinary tract infection (UTI) following retrograde intrarenal surgery (RIRS) for treating renal stone.

Materials and Methods: We retrospectively reviewed the data of patients with 10–30 mm sized kidney stones who underwent RIRS from January 2014 to June 2017, including age, gender, body mass index, comorbidity, preoperative urinalysis, urine culture results, prescription of antibiotics before surgery, stone size, location, operative time, and residual stones. All surgeries were performed by single surgeon. The risk factors for febrile UTI after RIRS were assessed using univariate and multivariate logistic regression analysis.

Results: Total 140 patients were included in the present study. Seventeen patients (12.1%) had febrile UTI after RIRS. According to the univariate analysis, preoperative pyuria and the usage of preoperative were associated with postoperative febrile UTI. Moreover, multivariate logistic regression analysis showed that preoperative pyuria was the only independent risk factor for infectious complications after RIRS (OR, 8.311; 95% CI, 1.759 to 39.275; p=0.008). Age, gender, BMI, comorbidity, preoperative bacteriuria, presence of hydronephrosis, stone factors, and operative time were not associated with febrile UTI after RIRS.

Conclusions: Preoperative pyuria was the only risk factors for infectious complications following RIRS. Therefore, careful management after RIRS is necessary especially when preoperative urinalysis showed pyuria.

Keywords: Urolithiasis, Urinary tract infections, Postoperative complications
Purpose: To report our early experience with self-expandable metallic urethral stent placement for the management of urethral stricture and to evaluate the efficacy of the stent.

Materials and Methods: This prospective study included 9 patients with urethral stricture who underwent endoscopic urethrotomy and temporary urethral stent insertion. All patients performed endoscopic urethrotomy and temporary self-expandable urethral stent (Uventa™) insertion during operation. After removal of stent, patients were followed by uroflowmetry at 1, 3, 6, 12 months and uroflowmetry at 12 months.

Results: The mean age was 63.2 (54–79) years and the mean stricture length was 3.7 (1.5–7.0) cm. Among these patients, 7 (77.7%) patients showed stricture-free status at a mean follow-up of 14.1 (4–22) months and uroflowmetry showed that mean Qmax was maintained at 12 months after stent removal. However 2 (22.2%) patients underwent repeat endoscopic urethrotomy for stricture recurrence. There was no significant procedure–related complication and urinary incontinence (66.7%) and mild pain (55.6%) were common mild complication after surgery.

Conclusions: Self-expandable metallic urethral stent combined with endoscopic urethrotomy is effective and safe surgical procedure for urethral stricture. This procedure may be an useful treatment option for patients with urethral stricture.

Keywords: Urethral stricture, Urethral stent, Endoscopic urethrotomy

Table 1. Patient and clinical characteristics of 9 patients who underwent endoscopic urethrotomy and urethral stent insertion

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>63.2 (54–79)</td>
</tr>
<tr>
<td>Stricture length (cm)</td>
<td>3.7 (1.5–7.0)</td>
</tr>
<tr>
<td>Stent size (cm)</td>
<td>5.2 (4.0–9.0)</td>
</tr>
<tr>
<td>Stent indwelling period (days)</td>
<td>79.0 (49–96)</td>
</tr>
<tr>
<td>Follow up duration (months)</td>
<td>14.1 (4–22)</td>
</tr>
</tbody>
</table>
이충언, 성현환
성균관대학교 의과대학 비뇨기과학실

목적: 요도협착에 대하여 가장 효과적인 치료 방법은 요도성형술로 알려져 있다. 하지만 국내에서 요도성형술의 보고는 많지 않으며, 수술에 영향을 줄 수 있는 요인에 대한 보고도 많지 않다. 본 연구에서는 요도협착 환자에서 요도성형술 시행 후 결과에 영향을 줄 수 있는 요인에 대하여 알아보고자 한다.

대상 및 방법: 2013년 4월부터 2017년 4월까지 요도협착 환자 69명에서 시행한 76건의 요도성형술을 후향적으로 분석하였다. 요도협착의 원인, 위치, 길이, 개수, 이전 시술 횟수, 재발, U-score 등의 결과에 대하여 알아보았다. 협착 위치에 대하여 후부 요도 및 전요도에 해당하는 요인에 3점을 추가한 새로운 U-score를 적용하여 분석하였다. 각 요인별 평균을 전후로 두 그룹으로 나누면서 각 그룹별 U-score를 비교하였다. 각 요인에 대하여 재발의 위험도를 다변량 분석을 통하여 알아보았다. 수술 후 재발은 요도협착으로 추가적인 시술 및 수술을 시행한 경우로 정의하였다.

결과: 환자들의 평균 나이는 57.1±17.6세였으며, 원인은 외상 29명(38.2%), 특발성 11명(14.5%), 의인성 29명(38.2%), 감염 4명(5.2%)이었다. 평균 협착 길이는 32.6±32.2 mm이었으며, 협착 개수는 1개 이하가 56명(73.7%), 2개 이상이 20명(26.3%)이었다. 협착의 부위는 음경요도 2명(26.3%), 구부요도 35명(46.1%), 후부요도 15명(19.7%), 전요도 6명(7.9%)이었다. 이전 시술은 1회 이하 받은 환자는 50명(65.8%), 2회 이상 시술받은 환자는 26명(34.2%)이었다. 평균 수술 시간은 137.8±50.0분이었으며, 평균 실험량은 177.3±184.8 ml였다. 평균 추적관찰은 11.6±9.7개월이었다. 각 요인별 U-score를 전후로 두 그룹으로 나눈 뒤 각 그룹별 U-score를 비교한 결과는 Table 1과 같다. 나이, 이전 시술 횟수, 협착 개수, 원인, 길이, 위치에 대하여 재발의 위험도가 다변량 분석을 하였을 때, 나이 및 협착의 위치가 유의한 예측인자였다. U-score의 평균을 전후로 생존곡선을 통한 분석을 시행하였을 때 U-score 6점 미만인 군이 6점 이상인 군에 비하여 재발이 적은 것을 알 수 있었다.(p=0.03).

결론: 본 연구에서 U-score는 전부요도 협착뿐만 아니라, 모든 요도협착에서 복잡성과 예후를 예측할 수 있음을 알 수 있었으며, 요도 협착 환자에서 치료의 방향과 결정을 하는데 도움을 줄 수 있을 것으로 생각된다.

Keywords: Urethral stricture, Urethroplasty, Urethral score
The impact of single kidney dysfunction on the psychopathology in young men: population-based analysis of military manpower administration database in Korea

김정준¹, 성현환², 한덕현², 최한용²
¹분당서울대학교병원 비뇨기과, ²성균관대학교 의과대학 삼성서울병원 비뇨기과학교실

Purpose: To evaluate the psychopathological status of young men who have single kidney dysfunction (SKD) which was defined as at least 50% volume loss or 50% functional loss of one kidney on CT scan or on DMSA scan, respectively.

Material and Methods: We used the Korean Military Manpower Administration(MMA) database of the 10-year duration (from Jan. 2003 to Dec. 2012). In Korea, all of the male population of age 19 should take the detailed physical examination at MMA to qualify suitability for military service. The medical tests including a screening of renal dysfunction and Military Multiphasic Personality Inventory (MMPI, consist of 9 domains, 365 questionnaires) are indispensable parts of this qualification. A total of four million cases were retrospectively analyzed. Among them, SKD was identified in 1,925 men, and chronic azotemia (CA, persistently elevated creatinine >2.0 mg/dl) was in 202 men. Dialysis patients were excluded in this cross-sectional study. The psychopathological status of examinees with SKD was evaluated and compared with the normal control group and the CA group using the 1:4 propensity score matching methods. The abnormal response of MMPI was defined as a score more than one standard deviation. P<0.05 was considered statistically significant.

Results: After exclusion of abnormal response set (faking-good, faking-bad, and infrequency) of MMPI, 1,782 SKDs and 171 CAs were included for each disease group for final analysis. The abnormal response rate of anxiety (14.6% vs. 9.9%), depression (17.6% vs. 10.6%), somatization (19.9% vs. 8.7%) and personality disorder (16.8% vs. 9.7%) were higher in SKD group than matched normal control. The abnormal response rate of anxiety and depression in CA group were not different from matched normal control, but significantly lower than matched SKD group.

Conclusion: Our population-based study suggests single kidney dysfunction cause psychopathological abnormality in terms of anxiety, depression, somatization, personality disorder, obsession trait. This psychopathological impact seems to be not from subclinical azotemia but from the kidney loss itself. So, for single kidney patients, counseling, screening, and prevention of psychological disease need to be indicated and psychopathological morbidity should be considered in the decision of total nephrectomy.

Keywords: Single kidney, Population based study, Psychopathology
Development of silicone surgical guide for partial nephrectomy with 3D printing and injection molding

경윤수2, 류제만1, 최세영1, 김국배3, 송현경3, 김남국3, 김청수1
울산대학교 서울아산병원 1비뇨기과학교실, 2건강증진센터, 3융합의학교실

**Objects:** To develop a silicone surgical guide for partial nephrectomy and demonstrate its availability of surgical incision in partial nephrectomy.

**Material and Methods:** For this ex-vivo study, four sets of fresh postmortem kidneys of pig were prepared and 5 cc of mixture of barium contrast medium and blue dye (1:1 in volume) was injected into kidney to mimic artificial tumor. The injected area was shown with high intensity in computed-tomography (CT) image and was recognized by naked eyes during incision (Fig. 1). From CT image of the prepared kidney, the morphology shape of kidney and tumor–mimicked volume were digitally modeled by using in-house software. Because there are no materials which can be directly 3D printable with proper flexibility for enveloping soft kidney organ, we planned to make a soft guide with injection molding method with silicone. The finalized digital model was saved by stereo-lithography (STL) file format and was 3D printed (Projet CJP 460plus, 3D systems). After a post-processing procedure, silicone material was injected into the 3D printed molder. And then, the final product of silicone surgical guide can be disassembled from the molder.

**Results:** It was verified that the tumor–mimicked kidney was well–enveloped by the silicone surgical guide. The surgeon could operate tumor incision along the guideline of surgical guide. It can be confirmed that tumor–like volume was well removed. With exception of area where the dye slowly spreads out after the injection, the incision area is same as tumor–like area.

**Conclusion:** This is the first study of surgical guide for partial nephrectomy even though ex-vivo study. This personalized device with convergence of 3D printing technology would help to realize the precision medicine in terms of medical devices.

**Keywords:** 3D printing, Surgical guide, Partial nephrectomy
Objective: Three-dimensional (3D) printing technologies have been applied to various fields of medicine. In this study, we systemically investigated morphological errors between reconstructed digital models and 3D printed phantoms using patients-specific kidney cases and reference cases.

Material & Methods: Eight patient-specific cases for partial nephrectomy and three reference cases of cube, dumbbell and arbitrary kidney were evaluated (Fig. 1). All the patient-specific kidney phantoms were manufactured by a 3D printer of PolyJet type with multi-materials of VeroTM color and TangoTM Family. For the comparison study, the reference phantoms were 3D printed by PolyJet type and multi-jet printing (MJP) type. We measured representative lengths of X-axis, Y-axis, Z-axis and volume, and then compared each other.

Results: In the patient-specific kidney phantoms, it is shown statistical discrepancy from the digital models and to the 3DP phantoms in all the lengths and the volume (Table I): Y-axis length was elongated (p-value<0.01), but the length in X-axis and the building-directional length (Z-axis) were shorten (p-value<0.01). The volume of the 3DP phantom also showed statistically significant increased by 5.15%. The references cases also showed unconformity between the digital model and the phantoms in lengths and volume according to 3DP type and material.

Conclusion: Compared to engineering applications, medical applications may not need higher accuracy, but a surgical guide of touch type should be accurate to attach the corresponding organ.

Keywords: 3D printing, Nephrectomy, Analysis error
장기간 편측 요관카테터유치로 인한 신실질 폭의 변화

장희연, 이준호, 유제모, 이승주, 이동섭
가톨릭대학교 성빈센트병원 비뇨기과학기술

Introduction & Objectives: Ureteral stents are widely used for treating obstruction of ureter caused by various pathologies, both benign and malignant. This study was conducted to find out whether kidney size changed before and after ureteral stents were instilled, and if so, what parameters were significant in the process.

Material & Methods: 98 patients who had unilateral ureteral stents indwelled for more than 6 months were enrolled from two hospitals between January 2010 to December 2015. For measurement of kidney size, parenchymal width (PW) was measured from the coronal view of CT scans for both the stented kidney and the unstented contralateral kidney. The mean PW was calculated before and at the time of last stent change, and the % change of mean PW between the two points was recorded. Baseline patient characteristics and estimated glomerular filtration rate (eGFR) were recorded.

Results: The mean duration of ureteral stent indwelled was 15.6±10.2 (mean±SD) months. The change of mean PW of the stented kidneys was -16.9±16.4 (mean±SD) %, whereas the change of mean PW of the unstented contralateral kidneys was 3.6±10.7%, both of which showed statistical significance (p<0.05). eGFR before and at the time of last stent change did not show significant difference (p=0.294). Duration of ureteral stent indwelled was found to be inversely related to the % change of mean PW (Spearman’s correlation coefficient=-0.291, p<0.001).

Conclusion: In the cases of unilateral ureteral obstruction, kidney size decreased over time despite of indwelling ureteral stent, suggesting that ureteral stents may not be as efficacious in preserving renal function. This finding can be overlooked by clinicians because of the compensatory growth of the contralateral kidney and the resultant normal eGFR.

Keywords: Stents, CT scan, Kidney

Withdrawal
생체 신공여자의 신 적출술 후 만성 신장질환 위험 예측 모델

박지수1, 안현규1, 김진우1, 강수검2, 오경택1, 김동현1, 나준채1, 이형호3, 윤영은4, 윤민지1, 한용규1,2

1연세대학교 의과대학 비뇨기과학회, 2연세대학교 비뇨의과학연구소, 3Brain Korea 21 PLUS Project for Medical Science, Yonsei University, 4한양대학교 의과대학 비뇨기과학회

목적: 생체 신이식 후 장기 관찰 시 공여자의 잔존 신장 기능에 대한 기존 연구에서 기능 이상 소견이 통계적으로 유의하지 않는 보고가 있지만 본원에서 시행한 신공여자의 추적관찰 결과 신기능 및 추가적인 합병증이 발생하는 경우가 있었다. 본 연구진은 신공여자의 1년 후 만성 신장질환 위험 예측 모델을 만들고자 하였다.

방법, 대상: 본 연구는 본원에서 2006년부터 2016년까지 총 11년간 시행한 1110 케이스 중 1년 후 추적 관찰을 받은 환자 총 437명을 대상으로 하였다. 상기 환자의 수술 시각, 임상병리학적 특성 등이 후향적으로 조사되었고, 환자의 개인 정보를 제거하고 익명으로 저장된 자료를 이용하여 분석하였다.

결과: 총 437명 중 141명에서 만성 신장질환이 발생하였으며 만성 신장질환이 발생하였으며 만성 신장질환이 발생한 그룹에서 나이가 유의미하게 많았으며 수축기 및 이완기 혈압이 통계적으로 의미있게 높았다. 뿐만 아니라 요산 및 크레아티닌 수치가 만성 신장질환 발생군에서 유의미하게 높았으며 반면 칼슘 수치는 유의미하게 낮았다. 다변량 분석에서는 나이, 칼슘 및 크레아티닌 수치만 의미가 있었다. 다변량 분석에서 의미가 있는 이들 3변수를 이용하여 만성 신장질환 위험 예측 모델을 설계하였다.

Model Y=Exp (-0.085×(나이)+0.793×(수술 전 칼슘 수치)-5.968×(수술 전 크레아티닌 수치)+1.883)
(Y=0~1, Cut-off value: 0.700)
모델의 곡선화면적 (AUC, area under the curve)은 0.797, 정확도 71.9%, 민감도 68.6%, 특이도 78.7%였다.

결론: 본 연구진이 만든 모델을 이용하여 1년 후 만성 신장질환의 위험이 높은 생체 공여자 그룹을 매우 높은 정확도로 예측할 수 있었다. 따라서 해당 모델을 생체 공여자 그룹 선별 시 참고하여 선별을 해야겠다. 뿐만 아니라 피치 못하게 해당 그룹에 대해서 수술 진행 시 술 후에 면밀한 관리가 필요하다.

Keywords: Donor nephrectomy, Chronic kidney disease, Prediction model
The implication of the dominant side split renal function by diethylenetriamine penta-acetic acid (DTPA) in live kidney donor

이형호3, 윤영은4, 나준채1, 허규하2, 김명수2, 김순일2, 김유선2, 한웅규1

1연세대학교 의과대학 신촌세브란스병원 비뇨기과학회실, 2연세대학교 의과대학 신촌세브란스병원 이식외과학교실, 3국민건강보험공단 일산병원 비뇨기과, 4한양대학교병원 비뇨기과학회실

Introduction: There are a few references about which kidney donor selected. Kidney Disease Improving Global Outcomes (KDIGO) recommends a significant (>10%) difference in split renal function between the two kidneys, the kidney with lower function should normally be used for transplantation. Our aim was to study the split renal function as measured by DTPA in live kidney donors and its impact on kidney selection decision.

Methods: From January 2008 to May 2015, 430 living kidney donors were enrolled. All donors underwent preoperative DTPA. We divided recessive side kidney donor group and dominant side kidney donor group. Live kidney donors who gave the dominant side were split into a difference of 7%, 8%, 9% and 10%. Moreover, renal function was compared according to the time.

Results: There were no differences in demographics and eGFR between 3 groups a disparity in 7%, 8%, 9% and 10%. The renal function at 6th month were 64.02±11.34, 63.98±14.00 and 64.43±15.58 in the group of 7% disparity (p=0.970), 64.02±11.34, 64.45±14.51 and 62.04±7.60 in group of 8% disparity (p=0.494), 64.02±11.34, 64.42±14.38 and 61.79±7.27 in group of 9% disparity (p=0.481), 64.02±11.34, 64.43±14.18 and 60.85±7.32 in group of 10% disparity (p=0.338). There was no effect on renal function in dominant side kidney donor compared to recessive side.

Conclusion: There was no difference in renal function after dominant side kidney donor up to 10% when determining the donor aspect with the split renal function.

Keywords: Living kidney donor, Diethylene triamine penta-acetic acid, Dominant kidney
비뇨기과 병동에서 입원전담전문의 도입에 따른 의료진의 만족도와 진료의 질 향상 인식에 대한 연구

이동환1, 정연수1, 이영주1, 김정준1, 이학민1, 오종진1, 이상철1, 정성진1, 변석수1, 이상은1, 김은선2, 김낙현2, 온정헌2, 장학철2

분당서울대학교병원 1비뇨기과, 2종합내과 & 입원전담진료센터

배경: 입원전담전문의 도입을 위한 논의가 활발하다. 미국에서는 외과 병동에 내과 입원전담전문의가 상주하면서 수술 전후의 내과적인 문제에 대해 즉각 해결할 수 있는 surgical co-management (SCM) 모델을 도입하였다. 본당서울대병원에서는 2017년3월부터 비뇨기과 병동에서 내과 입원전담전문의가 근무하면서 비뇨기과 병동에서 입원전담전문의의 역할 정립을 위한 파일럿 연구를 시행하였다.

방법: 2017년 3월부터 5월까지 3개월간, 총 세 명의 내과 입원전담전문의가 한 달씩 순환근무를 하였다. 내과 입원전담전문의는 비뇨기과 병동에 상주하면서 입원 환자 중에 내과적 기저질환이 있어 수술 후 합병증이 발생할 확률이 높은 환자를 선별하고 매일 회진을 하였으며, 수술 후 내과적 합병증이 발생할 시 즉각 처치를 시행하였다. 3개월간 입원전담전문의 제도를 운영한 후 비뇨기과 의료진, 간호진에게 설문 조사를 시행하였다. 설문조사는 제도도입 후 의료의 질 향상, 환자 안전에 대한 인식, 만족도를 평가할 수 있도록 고안하였다. 총 8명의 비뇨기과 교수와 6명의 전공의, 총 32명의 간호사가 설문에 응하였다. 1점부터 5점까지 점수를 부여하였고, 5점에 가까울수록 좋은 평가였고, 평균점수를 제시하였다.

결과: 3개월간, 총 907명이 입원하였으며, 3일 이상 입원한 473명 중에 120명(25.4%)에 대해서 내과적 문제가 동반되어 내과 입원 전담전문의가 진료를 수행하였다. SCM 도입 후 입원진단가 내과적 문제에 대해 받는 진료의 질이 매우 좋은 것으로 인식되었다(교수군 4.75점, 전공의 4.5점, 간호진 4.84점). 또한 환자 안전도가 향상된 것으로 인식되었다(교수군 4.75점, 전공의 4.5점, 간호진 4.55점). SCM에 대한 만족도가 높아서 향후 지속하길 희망했다는 의견이 제기되었었다(교수군 4.75점, 전공의 4.5점, 간호진 4.76점). 만족하는 이유에 대해, 교수 군은 내과적 진료의 질 향상과 환자 안전도 향상이 주된 이유였고, 전공의 군에서는 내과적인 치료에 대해서 배울 수 있다는 점이었으며, 간호사 군에서는 병동환자의 내과적 문제가 해결되어 빠른 검진과 치료를 빠르게 얻었다.

결론: 비뇨기과 입원진단의 내과적 문제 발생도 시에 협진을 의뢰하던 기존 시스템에 비해 입원전담전문의가 병동에 상주하면서 즉각적인 처치를 시행한 수 의료의 질과 환자 안전이 향상된 것으로 의료진의 인식이 있었으며, 이에 따른 의료진의 만족도가 매우 높았다. 향후 외과 병동에서 내과 입원전담전문의가 진료하는 surgical co-management (SCM) 모형의 환자 안전 및 질 향상에 대한 객관적 효과에 대한 추가 연구가 필요하다.

Keywords: Hospitalist, Surgical co-management, Urology
스마트폰을 이용한 휴대용 정액검사 시스템의 유용성
박지훈, 임미영, 류장현, 박현준, 이경민, 박민정, 박남철
부산대학교병원 비뇨기과학과실, 한국공공정자은행연구원

Introduction: Despite the necessity of semen analysis on diagnosis and treatment of infertile couples, male partners are hesitant to receive outpatient services for infertility claiming pressure of business, embarrassment and various personal situations. As a result, in many cases, only female partners seek examination and treatment, and are thus forced to bear a great psychological and physical burden. In response to this situation, we validated the usability of a portable computer-assisted sperm analyzer (CASA) system utilizing a smartphone as a camera and an analyzer, an app, and a microscopic lens integrated with a semen specimen chamber.

Material & Methods: A total of 5 semen samples obtained from male infertility who had visited our outpatient clinic were used in automated analysis for sperm concentration and motility after obtaining written informed consent. The smartphone to be used was an iPhone 6 and semen analysis was performed according to standard manual by the production company (© Recruit Lifestyle Co., Ltd., Japan) with app, "Seem". We compared the results of 5 samples among portable CASA with smartphone, Makler chamber and CASA, which was performed by urologist with technician of andrology laboratory.

Results: The Pearson correlation coefficient among the results of the measurement with Makler chamber and smart CASA system, CASA with visual observation and smart CASA were 0.124 (p=0.843), 0.111 (p=0.859) for sperm density, respectively and 0.917 (p=0.028), 0.888 (p=0.044) for sperm motility, respectively. There were no particular problems with patient use of the system.

Conclusions: We are confident that this portable CASA system plays a role in motivating infertile men to visit clinics, thus resulting in early diagnosis and treatment. It is also hoped that this system contributes to a decrease in the mental and physical burden for women on the infertility treatment, a shortening of the time required to achieve pregnancy and a decrease in medical expenses.

Keywords: Smartphone, CASA, Seem
거세저항성 전립선암의 맞춤형 치료 전략 수립을 위한 환자유래 세포 및 마우스 모델 개발

김윤림1, 김봉민1, 최세영2, 류제만2, 황정진1, 김청수2

1서울아산병원 의생명연구소, 2울산대학교 의과대학 비뇨기과학과

目的: 성공적인 전립선암 치료를 위해서는 종양 생물학에 대한 이해와 효능이 알려져 있는 여러 안전한 항암제의 효과를 연구하는 것이 필요하다. 이런 연구를 위해서는 적당한 생체 종양 모델의 개발이 필요하지만, 최적의 생체 종양 모델은 아직 드물다. 본 연구에서는 전립선암 환자 암 조직의 일차배양 세포주(patient-derived primary cells), 또는 환자 암조직 이식 마우스 모델(patient-derived xenograft, 이하 PDX모델), 환자 조직을 이용한 후보항암제의 활용 방안을 제시하여 환자 치료 가능성이 높은 항암제를 미리 선별함으로써 환자 맞춤형 치료에 도움을 주고자 하였다.

대상 및 방법: 서울아산병원 비뇨기과에서 경요도 전립선 절제술을 시행 받은 후 전립선암으로 진단 받은 환자의 조직으로 일부는 일차배양을 실시하였다. 조직을 잘게 자른 후, enzyme cocktail을 처리하여 strainer에 홀려내려 찌꺼기를 걸려낸 후, 암세포와 많이 섞여 있는 혈구세포와 죽은 세포, 과립세포를 분리하였다. 걸려낸 암세포를 세포배양 접시에 배양하여, 다양한 항암제를 처리하여 cell viability, immunostaining, western blot에 의하여 항암효과를 검증하였다. 일부 조직은 잘라 NOD scid gamma (NSG)마우스의 subcutaneous site에 이식을 하였다. 더불어 환자의 전립선 종양조직과 PDX 마우스 모델의 종양조직이 동일한 환자 유래 검체임을 immunohistochemistry를 통해 검증하였다.

결과: 일차배양체에 여러 항암제(docetaxel와 SAHA의 병합처리, AZD6244와 GSK2126458, sodium metaarsenite, biguanide derivative drug)를 처리하여 동도 의존적으로 세포독성이 증가하였으며, 세포사멸 유도, AR 및 AR-Vs를 하향조절하는 기전을 확인하였다. PDX 모델의 조직과 환자의 병리조직이 동일한 환자 유래 조직임을 확인하였고, 환자의 차트리뷰를 통해 aggressive한 종양의 특징을 확인할 수 있었으며 성공적인 환자의 아바타 모델이 형성되었다.

결론: 전립선암 환자 검체로부터 얻은 조직, 일차배양체 및 PDX 모델 시스템에서 여러 항암제에 대한 다양한 약물 반응성과 암의 특성의 파악할 수 있는 즉 더 인간에 가까운 실험모델을 만들어 테스트해 볼 수 있는 기반을 마련하여 효율적인 환자 맞춤형 치료에 도움이 될 것이다.

Keywords: Patient-derived primary cell, Patient-derived xenograft mouse, Castration resistant prostate cancer
번역결과

제목: 차세대 남성호르몬 차단약제인 엔زال루타마이드(enzalutamide) 저항성 거세저항성 전립선암 세포주에서 약제 저항성의 분자 기전 및 치료 표적 유전자 발굴을 위하여 차세대 염기서열분석법을 이용한 유전자 발현 패턴 분석 및 스크리닝을 수행하고자 하였다.

대상 및 방법: Enzalutamide 저항성의 CRPC 세포주 제작을 위하여 LNCaP 세포주에서 기원한 C4-2B 세포주를 사용하였 다. 세포 생존 및 성장에 대한 분석을 위하여 CCK-9 assay를 이용한 cell viability 분석 및 clonogenic assay를 수행하였 다. 유전자 발현양에 대한 전사 및 번역 수준에서의 분석을 위해 real-time quantitative PCR 및 western blot analysis를 수행하였다. Enzalutamide 저항성 CRPC 세포주(C4-2B EnzR)의 유전자 발현 패턴 분석을 위하여 차세대 염기서열분석법에 기반한 QuantSeq 3′ mRNA sequencing 기법을 이용하였다. 생물학적 3반복 실험을 수행하였고, 유전자 발현의 fold change 값이 2배 이상이면서 p-value가 0.05 미만인 경우 통계적으로 유의한 변화로 정의하였다.

결과: Enzalutamide 저항성 CRPC 세포(C4-2B EnzR)와 대조군인 C4-2B 세포에 Enzalutamide를 1, 5, 10 μM의 Enzalutamide를 처리하였고, C4-2B EnzR 세포가 C4-2B 세포에 비해 모든 약제 처리 농도에서 세포 생존률이 높은 것으로 나타났다. Clonogenic assay에서도 10, 20 μM 처리 군에서 C4-2B EnzR 세포는 군집이 형성된 반면, 대조군에서는 군집 형성이 관찰되지 않았다. AR 활성화 유도체인 DHT를 처리하였을 때, 남성 호르몬(androgen receptor, AR)의 표적 유전자인 KLK2, KLK3 및 TMPRSS의 발현양을 비교한 결과 Enzalutamide 처리 여부와 관계없이 C4-2B EnzR 세포에서 AR 표적유전자들의 유의하게 상승한 것이 관찰되었다. 또한, Enzalutamide 저항성 세포에서 AR–V7의 발현이 상승한 것을 real time–PCR 및 western blot 분석에서 확인하였다. Enzalutamide 저항성 CRPC 세포주와 대조군 세포주에 대해 QuantSeq 3′ mRNA sequencing을 수행한 결과, C4-2B EnzR 세포주에서 총 590개의 유전자가 DEG (differential expression gene)으로 추출되었고, 367개의 유전자가 발현이 상승, 223개의 유전자가 발현이 감소한 것을 확인하였다. DAVID에 기반한 분석 결과 발현이 상승한 군에서는 positive regulation of vascular endothelial growth factor production, 발현이 저하된 군에서는 cell division이 가장 순위가 높은 유전자 온톨로지(ontology)로 나타났다.

결론: 본 연구에서는 enzalutamide 저항성의 CRPC 세포주를 안정적으로 제작하였으며, 표현형 및 유전자 수준에서 enzalutamide 저항성 여부를 확인하였다. RNA sequencing 기법을 통해 유전자 발현 특성을 분석하였으며, 스크리닝을 통해 핵심 표적 유전자들을 선별적으로 가리킬 수 있었다.

Keywords: Castration-resistant prostate cancer, Enzalutamide resistant, RNA sequencing
mTOR 경로 및 남성호르몬 수용체 억제를 통한 새로운 바이구아니드 유도체(IM176)의 전립선암 억제 효과

 Ryu Je Man1, Yoo Sang Juon2, Kim Yong Rim3, Hae Seung Yeon1, Kim Cheong Su1

1 울산대학교 서울아산병원 비뇨기과학교실, 2 서울대학교 보라매병원 비뇨기과학교실, 3 서울아산병원 의생명연구소

Introduction: Biguanides were originally developed for the treatment of hyperglycemia and type 2 diabetes mellitus. Recently, the biguanides metformin and phenformin have been shown to exert potential anticancer effects in prostate cancer. We evaluated the anti-cancer efficacy and mechanism of IM176, a novel biguanide derivative drug on prostate cancer using prostate cancer cell lines and patient-derived castration-resistant prostate cancer cell lines.

Material and Methods: Cell viability assay, annexin V–FITC apoptosis detection, microscopy with immunofluorescence staining, real-time quantitative reverse transcription–polymerase chain reaction, and western blotting were conducted. Efficacy of IM176 was also evaluated using 2 cell lines derived from castration-resistant prostate cancer patient.

Results: IM176 dose-dependently inhibited cell viability in all prostate cancer cell lines at lowest IC50 concentrations (LNCaP: 18.5 μM, 22Rv1: 36.8 μM) compared to those of metformin, and phenformin. IM176–mediated AMPK activation caused mTOR inhibition, and a decrement in the phosphorylation of p70S6K1 and S6. IM176 inhibited the expression of AR, AR–splice variant 7 (AR–V7) and prostate–specific antigen in LNCaP and 22Rv1. IM176 induced apoptosis with increased levels of cleavage of caspase–3, and annexin V–positive/PI–positive, respectively. Moreover, IM176 inhibited cell viability at lowest IC50 concentrations in 2 cell lines derived from castration-resistant prostate cancer patient. We evaluate the relationship between AMPK–mTOR pathway and AR signaling pathway by blocking each pathway separately. After AR knockdown, phosphorylation of AMPK was significantly increased. However, AR and AR–V7 were not increased after treating AMPK inhibitor, Compound C.

Conclusions: IM176 showed comparable anti-tumor effects via AMPK–mTOR pathway and AR signaling pathway with the lowest IC50 compared to other biguanide derivative drugs in prostate cancer cell lines, including patient–derived castration resistant prostate cancer cell line and may be a novel anti-cancer drug for the treatment of prostate cancer.

Keywords: Prostate cancer, mTOR protein, Biguanides
골수조혈줄기세포 유래 수지상 세포를 이용한 동종 이소 전립선암 면역세포치료제 유효성 평가

김봉민1, 김윤림1, 최세영2, 류제만2, 황정진1, 김청수2

1서울아산병원 의생명연구소, 2울산대학교 의과대학 비뇨기과학교실

목적: 거세 저항성 전립선암 환자의 평균 생존 기간은 1~2년에 불과하며, 기존의 호르몬 치료제의 경우, 약 20~40%의 환자는 효과를 보지 못하며, 대부분의 환자에게서 2차 저항성을 보이고 있다. 새로운 암상 연구가 진행되어 기존에 사용되던 화학 치료제인 docetaxel, cabazitaxel, 항호르몬제인 abiraterone와 enzalutamide, 세포 치료제인 sipuleucel-T등 신약이 승인되었음에도 불구하고 치료효과가 제한적이다. 따라서 고령화 사회에서 치료법의 제한적 효과와 치료에 실패한 환자에게 적용할 수 있는 성공적인 치료법 개발이 절실히 요구되고 있다. 이미 기능성 대비 기대 이상의 항암 효과를 면역세포치료제가 보여 중세대수지상 면역세포치료제를 기반으로 하는 항암면역세포치료제를 이용하여 전립선암에서 항암효과를 확인하고자 하였다.

실험 방법: 골수로부터 분리한 조혈줄기세포를 최적화된 배양조건에서 분화 증식시켜 CD141+ 수지상 세포 아형으로 분화를 유도하여 제외 배양을 실시하였으며, 자가 종양 세포 용해액으로 교육하였다. 배양한 수지상 세포(이하 stem-DC)로 FACS분석과 ELISA를 수행하여 표현형 및 cytokine 분석을 실시하였다. FACS를 통하여 표현형 및 ELISA를 통하여 cytokine 분석을 실시하였다. 이 stem DC를 주 1회씩 3회에 걸쳐 transgenic adenocarcinoma of the mouse prostate (TRAMP)-C1 동종 이소 동물 모델에 주입하여 안전성, 유효성 및 항원 특이 면역반응 유도를 관찰하였다. 치료용 수지상 세포에 의한 allogeneic-T cell의 증식 및 활성을 유도도 더불어 확인하였다.

결과: 분화 성숙되어진 stem-DC는 표현형 마커인 CD141을 잘 발현하고 DC의 기능적 성숙도를 나타내는 cytokine인 IL-12, interferone-gamma를 잘 분비하였다. 분화 성숙된 수지상 세포의 역가를 확인하였을 때 T cell only group 대비 mature DC로 자극된 세포가 잘 증식되었다. 전립선암 세포주(HEPS)>sogenic mouse (C57BL/6) 이소 모델을 만든 후 DC를 주입하지 않은 대조군에 비하여 1×10⁷ DC를 주입하였을 때 종양크기 감소가 확인하였으며, 종양 항원 특이 면역 실험에서 tumor antigen specific interferone-gamma와 lymphocyte 증식이 대조군에 비하여 우수함을 확인하였다.

결론: 조혈줄기세포로부터 최적화된 방법으로 개발된 stem-DC가 전립선암의 효과적인 항암면역세포 치료제로 유효성 및 안정성을 확인할 수 있었다.

Keywords: Anti-cancer immunocellular therapeutics, Prostate cancer, Dendritic cell
전립선암 환자의 혈액에 존재하는 혈액순환암세포를 바이오마커로 이용하여 전립선암의 예후 예측 및 치료 전략 발굴

김윤림1, 김봉민1, 최세영2, 류제만2, 김청수2
1서울아산병원 의생명연구소, 2울산대학교 의과대학 비뇨기과학과

목적: 전립선암은 전이가 빈번하여 예후가 좋지 않은 암으로 알려져 있다. 암이 처음 생겨난 부위에서 암세포가 떨어져 나와 혈관을 타고 순환하여 새로운 부위로 전이하게 되는데, 이 때 혈액을 순환하는 암세포인 혈액순환암세포(circulating tumor cell, CTC)가 존재한다. CTC 개수는 혈액에서 전이병의 진행도와 상관관계가 있음을 기반으로, 전립선암 환자의 혈액순환암세포를 분석하여 예후를 예측하는 진단 바이오마커로 이용할 수 있다. 기존의 혈액순환암세포 분석방법으로 알려져 있던 CellSearch® System을 이용하지 않고 새로운 독자적인 혈액순환암세포 분석 방법인 CytoGen's Smart Biopsy™ System을 제시한다.

대상 및 방법: 서울아산병원 비뇨기과의 전립선 비대증과 거세저항성 전립선암 환자 16명의 혈액을 사용하였다. 혈액 5 ml을 기준으로 CytoGen’s Smart Biopsy™ System을 이용하여 CTC를 분리하였으며, 이후 검출을 위해 4종류의 형광염색으로 DAPI/CD45 (leukocyte common antigen)/EpCAM/AR과 DAPI/CD45/EpCAM/AR-V7의 2가지의 슬라이드를 제작하여 면역형광염색 및 이를 분석하였다. CD45가 음성인 동시에, EpCAM, AR, AR-V7이 양성인 세포를 전립선암의 혈액순환암세포라고 규명하였다.

결과: CytoGen’s Smart Biopsy™ System의 cut-off 수치인 2개를 기준으로 특이도 및 민감도 분석을 하였다. EpCAM 양성 or AR-V7 양성과 EpCAM 양성 and AR-V7 양성 모두 민감도는 0.80, 특이도는 0.50로 동일하였다. 본 결과를 근거하여 본 연구에 적합한 CytoGen’s Smart Biopsy™ System 분석방법이 혈액순환암세포를 검출하는데 충분한 신뢰성이 있다고 판단하였다. BPH와 전립선암 환자 혈액의 CTC를 분석한 결과 전립선의 양성 및 악성 종양을 유의미하게 구분할 수 있음을 확인하였다.

결론: 전립선암에서 혈액순환암세포가 예후를 판단하는 바이오마커라는 사실은 최근 많은 연구결과들로 인해 밝혀져 있다. 하지만 본 연구에서는 기존에 알려진 방법이 아닌 새로운 접근 방법을 통해 혈액순환암세포를 찾고, 기존 system에 비해 저렴하고 쉽게 접근할 수 있는 새로운 분석방법을 제시하였다. 혈액순환암세포를 분석함으로써 전립선암의 예후 예측 및 새로운 치료 전략 발굴을 기대할 수 있다.

Keywords: Prostate cancer, Circulating tumor cell, Biomarker
전립선암에서의 자성 나노와이어 기반 순환양세포의 검출: 선행연구

김정권1, 조영남2, 김성한1, 정재영1, 서호경1, 정진수1, 이강현1
1국립암센터 전립선암센터 비뇨기과, 2국립암센터 암의생명과학과

서론: 순환양세포(Circulating tumor cells, CTCs)는 암 환자의 원발 병소 또는 전이 병소로부터 벗어져 나와 혈액 내에서 순환하는 작고 희소한 세포를 의미한다. 최근 이러한 CTCs의 기능은 혈액 내 극소량 존재하는 CTCs를 다량의 혈구세포 등에서 분리해야 하는 기술적 어려움, 즉 낮은 검출 효율 때문에 문제가 되고 있으며, 또한 살아있는 상태에서 세포를 분리하는 데 제한점이 있다. 본 기관내의 연구팀이 개발한 자성 나노와이어(MagWires)는 CTCs 검출을 위해 5 종류의 항체 펄스를 나노와이어 표면에 부착하여 혈중양세포와의 상호작용을 극대화시켰으며, 나노와이어의 기능과 구조로 인하여 혈액 내 아밀리제와의 접촉을 크게 억제하여 검출 능력을 향상시키는 기술이 있었다(Figure 1). 이전 보고된 선행연구에 따르면, 폐암 및 유방암 환자에서 이러한 MagWires 기반 기술은 고도의 민감성과 특이성을 가지고 혈액 내 존재하는 극소량의 CTCs를 효율적으로 분리하는 기술이 증명되었다. 이에 본 선행연구에서는 이러한 MagWires 기반 기술을 이용하여 전립선암 환자의 혈액에서 CTCs를 분리하고자 하였다.

증례: 2017년 4월부터 외래 내원 환자 중 연구에 동의한 환자 9명을 대상으로 혈액을 채취하여 분석을 시행하였다. 검출된 CTCs는 면역형광염색(ICC) 및 면역조직화학(IHC) 기법을 활용하여 검출하였다. 9명 모두에서 CTCs가 분리되었으며, 이를 ICC 및 IHC를 통하여 확인하였다(Figure 2). 추후 연구에서는 분리된 CTCs에서 암세포 특이 유전자를 Droplet Digital PCR 기법 등을 활용하여 검출, 분석하여 환자 특이적 유전체 변이를 관찰할 것이다.

Keywords: Prostate cancer, Circulating tumor cell, Magnetic nanowires
전립선암 세포에서 CWP 291의 ER stress 경로를 통한 세포고사 유발에 관한 연구

김명, 김윤림, 박사현, 임고산, 안한종
울산대학교 서울아산병원 비뇨기과학研究所

**Purpose:** ER stress induces apoptosis of tumor cells which leads to the inhibition of tumor cell growth and survival. CWP 291 is an ER stress inducer as well as an inhibitor of Wnt/β-catenin signaling pathway. In this study, we evaluated the efficacy of a novel β-catenin inhibitor CWP 291 in prostate cancer.

**Materials and Methods:** PC3, DU 145, LNCaP, 22Rv1, VCaP, and CRPC patient-derived prostate cancer cells were used to assess in vitro and ex vitro apoptotic effects of the CWP291. DU 145 and 22Rv1 xenograft mouse animal model was employed to evaluate in vitro efficacy. CellTiter Glo® luminescent assay, annexin V-FITC apoptosis detection, Western blotting and immunohistochemistry were conducted. Statistical evaluation of the results was performed by one-way ANOVA.

**Results:** CWP291 treatment produced anti-proliferative effect on prostate cancer cells in vitro, which was comparable to docetaxel treatment. The apoptosis of prostate cancer cells was induced via endoplasmic reticulum (ER) stress with the activated pancreatic ER kinase (PERK) and protein disulfide isomerase (PDI). CWP 291 treatment induced apoptosis via caspase pathway with the cleavage of caspase-9, caspase-3, and poly ADP ribose polymerase (PARP) and demonstrated increased apoptosis by annexin V–propidium iodide staining. CWP291 treatment also significantly reduced the intracellular β-catenin expression as well. The growth inhibitory effect of CWP291 was confirmed in a DU145 and 22Rv1 xenograft model. In addition, CWP 291 treatment showed anti-tumor effect on the prostate cancer cells derived from CRPC patients ex vivo.

**Conclusions:** CWP 291 induced apoptosis via ER stress and reduced β-catenin expression in prostate cancer cells. Anti-tumor effect of CWP291 on prostate cancer cells may be an effective strategy for the treatment of castration resistance prostate cancer.

**Keywords:** Prostate cancer, ER stress, CWP 291
Expression of HMGB1 in prostate cancer: clinical and biological correlations

박용현, 정애량, 김가은, 김미영, 이지영, 이규원, 이지열
가톨릭대학교 서울성모병원

Purpose: We aimed to investigate 1) the role of high mobility group box1 (HMGB1) on cellular proliferation, apoptosis, and invasion, 2) the underlying biological mechanisms of HMGB1 in PCa, and 3) the expression pattern of HMGB1 in PCa patients with different stage and grade and its prognostic importance.

Materials and Methods: After transient transfection of PC3 and DU-145 cells with HMGB1 siRNA, diverse experiments were performed to evaluate the changes in proliferation, apoptosis, invasion. To determine whether HMGB1 affects the receptor for advanced glycation end products (RAGE) and its down-stream pathway, immunoprecipitation experiments were carried out using anti-TLR4, or –RAGE antibody. Using the Cancer Genome Atlas (TCGA) datasets, we determined the impact of HMGB1 on overall survival in PCa. We further validated the prognostic importance of HMGB1 by immunofluorescence staining in 131 PCa patients from the Korean Prostate Bank.

Results: Inhibition of HMGB1 expression significantly reduced cell proliferation and increased cell cycle arrest in the sub-G0 phase of PC3 and DU-145 cells. It also inhibited invasive capacity of PCa cells. It is mediated through RAGE, leading to intracellular NF-κB signaling. In TCGA data set (n=498), HMGB1 was altered in 61 of 498 patients (12%). Overall survival was shorter in the high HMGB1 expression group (medians: 115.0 months vs. not reached; P=0.0296). In the Korean Prostate Bank cohort, the positive areas of HMGB1 differed in patients with BPH, and low-, intermediate-, high-risk, and metastatic PCa (4.6, 11.9, 18.6, 19.7, and 23.4%, p<0.001). During the median follow-up of 32 months, increased expression of HMGB1 was associated with a significant decrease in biochemical recurrence free survival on Kaplan-Meier analysis.

Conclusions: Our findings demonstrate an important role of HMGB1 and novel relationship between HMGB1 and RAGE–dependent mechanisms in PCa. Therapy targeting HMGB1–associated pathways may represent a novel therapeutic avenue for PCa.

Keywords: HMGB1, Prostate cancer, Prognosis
근치적전립선절제술 후 요실금 및 발기장애와 음부신경 감각유발전위와의 연관성

권세윤¹, 박진모², 김기호¹, 서영진¹, 이경섭¹
동국대학교 경주병원, 동국대학교 의과대학 ¹비뇨기과학교실, ²신경과학학교실

Purpose: Pudendal nerve somatosensory evoked potential (SSEP) has been studied in voiding and erectile dysfunctions. We aimed to evaluate correlation with pudendal nerve SSEP and functional outcome in patients undergoing radical prostatectomy.

Materials and Methods: We retrospectively analyzed data from 44 patients who underwent radical prostatectomy from January 2014 and December 2016, with at least 6 months of follow-up. Patients were divided into 2 groups depending on the presence/absence of incontinence and erectile dysfunction, respectively. Patient demographic characteristics, preoperative evaluations, postoperative outcomes and pudendal nerve SSEP were assessed. Erectile function recovery was defined as question 2 and 3 on the International Index of Erectile Function (IIEF)-5 and continence was defined as using no pads.

Results: Patients with/without postoperative incontinence were 22 and 22, respectively. Demographic characteristics and perioperative outcome were similar between 2 groups except pathologic stage (p=0.038). Patients with/without postoperative erectile dysfunction were 11 and 33, respectively. Demographic characteristics and perioperative outcomes were similar according to presence/absence of erectile dysfunction. Patients with erectile dysfunction were a significant increase in latency of pudendal nerve SSEP (19.4 vs 17.2 ms, p=0.016). Patients with postoperative incontinence (PPI) were a significant increase in latency of pudendal nerve SSEP (19.5 vs 17.9 ms, p=0.014)

Conclusions: Our results suggest that pudendal nerve SSEP can be an effective tool in the evaluation of patients with PPI and erectile dysfunction. The test can be used to provide more definitive assessment of functional dysfunction.

Keywords: Evoked potentials, Somatosensory, Erectile function, Incontinence
Trends of medical travel from non-Seoul residents to Seoul to seek treatment modalities for prostate cancer: Korean national health insurance system data study from 2005 to 2014

강호원1, 윤석중1, 정재일2, 최 혼3, 김재현4, 유호송5, 하윤석6, 조인창7, 김형준8, 정현철9, 고준성10, 김원재1, 박종혁11, 김소영11, 이지열12

1충북대학교병원 비뇨기과학기술, 2인제대학교 부산백병원 비뇨기과학기술, 3고려대학교 안산병원 비뇨기과학기술, 4순천향대학교병원 비뇨기과학기술, 5전남대학교병원 비뇨기과학기술, 6경북대학교병원 비뇨기과학기술, 7국립경찰병원 비뇨기과학기술, 8건양대학교병원 비뇨기과학기술, 9연세대학교 원주기독병원 비뇨기과학기술, 10가톨릭대학교 부천성모병원 비뇨기과학기술, 11충북대학교 의과대학 예방의학교실, 12가톨릭대학교 서울성모병원 비뇨기과학기술

Background: This study aims to investigate the trend of medical travel proportion among non-Seoul residents to Seoul for treatment of prostate cancer, and to investigate the possible affecting factors for the shift.

Methods: This study represents a retrospective cohort study using data from the Korean National Health Insurance System (KNHI) from 2002 to 2015. Prostate cancer cohort (from 2005 to 2014) was defined using ICD 10 code who have first prostate cancer diagnosis at relevant year without prior prostate cancer diagnosis. To define the medical travel proportion in non-Seoul residents, number of patients with prostate cancer related claims were used rather than number of claim cases. Year trend of medical travel proportion according to the age group, economic status and types of treatment were analyzed. Multivariable logistic analysis was used to determine factors affecting travel to Seoul medical facilities among the non-Seoul residents.

Results: A total of 68,543 patients were defined as newly diagnosed prostate cancer cohorts from 2005 to 2014. Medical travel proportions calculated using cases with prostate cancer related claims during 1st year was slightly in decreasing trend (28.0 at 2005 and 27.0 at 2014, p=0.02). Average medical travel proportion seeking for radical prostatectomy was not in decreasing trend (43.1 at 2005 and 45.4 at 2014, p=0.26). At 2007, significant affecting factors seeking for radical prostatectomy were younger age group (under 65 years old) (adjusted OR: 1.02 (95% CI, 0.63–1.66)), the highest income level (adjusted OR: 2.38 (95% CI, 1.23–4.60)) and robotic surgical platform (adjusted OR: 11.15 (95% CI, 7.01–17.72)). At 2014, significant affecting factors seeking for radical prostatectomy were younger age group (under 65 years old) (adjusted OR: 1.46 (95% CI, 1.10–1.93)), the highest income level (adjusted OR: 2.25 (95% CI, 1.39–3.64)) and robotic surgical platform (adjusted OR: 3.17 (95% CI, 2.72–3.71)).

Conclusions: General trend of medical travel proportion is in decreasing from 2005 to 2014. However, still a quite proportion remained to be persisted irrespective of direct distance from Seoul. Age groups under 65 years, high economic status, and surgical treatment modalities revealed to be associated with relatively high medical travel proportions.

Keywords: Prostate cancer, Medical travel, Korean national health insurance system
손 보조 복강경하 신우절석술에 대한 증례 보고

최대헌, 홍범식
울산대학교 서울아산병원 비뇨기과학회실

서론: 경피적 신장절석술(percutaneous nephrolithotomy, PCNL)은 2 cm 이상 크기의 신결석의 표준 치료로 사용되고 있다. 개복 또는 복강경하 신우절석술은 요관경이나 PCNL 등의 덜 침습적인 수술이 실패했을 경우 고려될 수 있다. 이 경우에는 거대 녹각석, 신우의 해부학적 이상, 심한 비만 등이 포함된다. 최근에는 개복 수술은 거의 시행되지 않으며, 복강경하 신우절석술이 PCNL의 대안으로 이용된다. 복강경하 신우절석술의 경우 PCNL에 비해 결석 제거율이 높을 뿐 아니라 출혈 및 패혈증의 위험성이 낮은 것으로 알려져 있다. 손수한 복강경하 신우절석술에 비교하여, 손 보조 복강경하 신우절석술(hand-assisted laparoscopic pyelolithotomy, HALPL)은 결석 배출 및 신우 성형/봉합이 용이하다. 저자들은 HALPL에 대한 증례를 동영상으로 보고하고자 한다.

증례: 26세 여환으로 좌측 측복통으로 외부 병원 내원하여 좌측 요관과 우측 신장의 결석이 진단되었다. 좌측 요관 결석에 대해 체외 충격파 쇄석술 후 결석 배출된 이후 본원으로 의뢰되었다. 기저 혈색소 수치는 9.6 g/dL, eGFR 은 124 ml/min/1.73 m²였고 결석의 장축 길이는 6 cm이었다. 처음에는 PCNL을 계획하였으나 신배의 infundibulum이 좁아 접근이 어려워 HALPL로 전환하기로 결정하였다. 총 수술시간은 216분이었고, 출혈량은 10 cc 이하였다. 수술 후 합병증 없이 7일 후 퇴원하였다. HALPN은 선별된 환자군에서 안전하고 효율적인 선택지가 될 수 있다. 특히 신실질에 손상을 주지 않아 출혈과 네프론 손상을 감소시킨다.

Keywords: Hand-assisted laparoscopic surgery, Pyelolithotomy, Renal stone
단일세션 양측 비디오스콥 역행성 신장내 결석 수술

김종찬1, 정재용1, 강동혁2, 조강수1, 함원식1, 최영득1, 이주용1
1연세대학교 의과대학 비뇨기과학연구소, 2인하대학교 의과대학 비뇨기과학연구소

목적: Videoscope 타입 연성신장요관내시경을 이용한 결석 수술 중 단일세션 양측 역행성신장내결석수술(retrograde intrarenal surgery; RIRS)에 대한 결과를 보고하고자 한다.

대상 및 방법: 2015년 1월부터 2017년 5월까지 단독술자가 시행한 Videoscopic RIRS 220례 중 단일세션 양측 역행성신장 내결석수술 20명을 대상으로 하였다. 양측 수술이나, 판촉 RIRS 및 반대측 경성 요관내시경을 이용한 결석제거수술 환자는 제외하였고, 순수 양측성 RIRS만을 대상으로 하였다. 양측 RIRS는 URF-V와 V2 (Olympus), FLEX-Xc (KARL STORZ) 그리고 LithoVue (Boston)로 수술을 진행하였다. Fluoroscopic guide 하에서 11-13 Fr 또는 12-14 Fr access sheath (Uropass; Olympus)를 삽입하였다. 내시경을 신장 내 삽입 후 결석을 확인하였다. Lasering은 200-μm fiber를 사용하였고, VersaPulse (Lumenis)를 이용하여 시행하였다. 결석 분쇄 후 stone basket (Zerotip; Boston)을 이용하여 결석을 체외로 extraction하였고, 요관부목을 삽입하고 수술을 종료하였다. 수술 후 1개월에 Non-contrast computed tomography를 촬영하여 stone-free를 확인하였다.

결과: 20명의 환자의 평균나이는 58.85±14.06세이었으며, 남녀비는 13:7이었다. 양측 결석 중 가장 큰 결석의 최대 길이의 평균은 11.26±4.75 mm이었다. 결석의 평균 mean stone density (MSD)는 660.66±343.25 HU이었으며, stone heterogeneity index (SHI)는 209.71±103.68 HU이었다. 전체 환자의 평균수술시간은 63.70±22.30분이었다. 수술 후 추가 치료를 받은 환자는 없었으며, 1개월 stone-free rate는 95%이었다. 수술 환자 중 1명은 horseshoe kidney 환자로 양측 stone을 모두 제거하였으며, 이 환자를 제외한 19명의 환자는 해부학적 이상이 없었다. 수술 후 1.20±0.52일에 퇴원을 하였으며, 요관부목 유치기간은 16.10±2.63일이었다. 수술전후 혈청크레아티닌(1.31±0.75 vs 1.04±0.42; P=0.155), eGFR (63.15±24.65 vs. 71.3±19.72; P=0.851) 및 혈색소(13.10±1.86 vs. 12.52±1.68; P=0.136)는 통계적으로 의미있는 차이를 보이지 않았다.

결론: 양측 RIRS는 수술 시간 및 stone-free rate를 고려할 때, 효과적인 수술법이었다. 또한 수술 전후 혈청소 감소는 통계적으로 차이를 보이지 않았으며, 재원기간 등을 고려할 때 양측성 결석 환자에서 효과적인 치료방법으로 생각한다.

Keywords: Retrograde intrarenal surgery, Videoscope, Bilateral
Flexible ureteroscopic management of parapelvic renal cysts

유영은1, 정재훈1, 조정기1, 이형호2, 나준채3, 박성열1, 김용태1, 박해영1, 한웅규3
1한양대학교병원, 2일산병원, 3연세대학교 비뇨기과학교실

Introduction: Parapelvic renal cysts are more likely to cause hydronephrosis and pain, and their surgical treatment is considerably difficult. Laparoscopic removal is generally recommended, but it is still invasive and sometimes challenging. Herein we report our initial experiences of flexible ureteroscopic managements of parapelvic renal cysts.

Methods: Three patients underwent flexible ureteroscopic marsupialization of parapelvic renal cyst from January through February 2015. We included the patients who have renal colic or hydronephrosis due to the parapelvic renal cyst. Using flexible ureteroscopy, we tried to find the cyst from inside of the renal pelvis and unroof it using holmium laser. After making a considerable channel between pelvis and cyst, we inserted double-J catheter in the cyst. Perioperative and postoperative outcomes were collected and intraoperative difficulties were noted.

Results: There’s no intraoperative or postoperative complications. However, among 3 patients, one case required conversion to the percutaneous drainage and sclerotherapy because of difficulty in finding the cyst from renal pelvis. The other 2 cases were completed with the flexible ureteroscopic approach. The cysts were unroofed and marsupialized to the collecting system appropriately. The mean OP time was 43 minutes and estimated blood loss was 10 ml. Length of hospital stay ranged between 1 and 2 days. After 3 months, no patient had symptom and CT scan showed decreased volume of cysts.

Conclusions: Our initial experience with flexible ureteroscopic management of parapelvic renal cysts shows that the procedure is feasible and safe in selected patients. When the parapelvic cyst was relatively outbulging from renal hilum, we believe that it could be difficult to find and unroof the cyst from inside of renal pelvis.

Keywords: Renal cyst, Parapelvic cyst, Flexible ureteroscopy
복강경 폴리타노레데베터 방광요관재문합술: 요관이동을 위한 근위부 방광절개창을 방광내시경 도움없이 만드는 술식

백민기, 김태헌, 한덕현
성균관대학교 의과대학 삼성서울병원 비뇨기과학과실

Introduction and Objective: Previously we reported our experience of pneumovesicoscopic Politano–Leadbetter ureteral reimplantation using cystoscope during proximal neo–hiatus formation (PPL with cysto) for pediatric vesicoureteral reflux (VUR) treatment. We introduce our recent early experience of pneumovesicoscopic PL without cystoscopic guidance during proximal neo–hiatus formation (PPL without cysto).

Methods: We compared the perioperative parameters of 'PPL without cysto' (11 ureteral units of 7 children, from November 2016 to Feb 2017) with those of 'PPL with cysto' (25 ureteral units of 17 children, from June 2013 to May 2014) performed by a single surgeon. The surgical procedures of 'PPL without cysto' are as follows: 1) Ureteral mobilization should be enough not to be curved with acute angel when the ureter moved up. 2) The proximal neo–hiatus is made more widely (about 1 cm) without cystoscopy guidance. Then we identify and pull up the ureter via the proximal neo–hiatus. 3) The other procedures are same with previous 'PPL with cysto' technique.

Results: All operations were completed successfully without any intraoperative complications or open conversion. The mean operation times of 'PPL with cysto' versus 'PPL without cysto' were was 112.0 versus 172.3 mins for unilateral cases, and 223.5 versus 246.4 mins for bilateral cases respectively. All the patients got 'PPL without cysto' began oral intake on the first postoperative day. Their mean postoperative hospital stay was 2.5 days (range 1–3). There was no complication during postoperative follow–up (range 25–47 days).

Conclusions: Our early experience of 'PPL without cysto' shows that this surgical technique seems to be simpler than previous 'PPL with cysto'. It is a great minimally invasive surgical option for the pediatric VUR patients.

Keywords: Vesicoureteral reflux, Pneumovesicoscopy, Ureteral reimplantation
후부 요도 협착과 관련된 골반 골절 요도 손상에서 요도 성형술

박휘 준, 고광 진, 성현 환
성균관대학교 의과대학 삼성서울병원 비뇨기과학과실

목적: 후부요도협착은 대부분 골반골절 요도손상(Pelvic Fracture Urethral Injury, PFUI)과 관련하여 발생하며, 빈도가 높지 않고 술기 어려움으로 국내보고가 적었다. 이에 단일 술자에 의한 요도성형술 초기 경험을 보고하고자 한다.

대상: 2013년 4월부터 2017년 5월까지 74명 환자를 대상으로 81건의 요도성형술을 시행하였다. 이 중 PFUI로 인한 후부요도협착으로 시행된 16건의 요도성형술에 대해 알아보았다. 재발의 정의는 요도협착으로 추가적인 시술 및 수술이 필요한 경우로 하였다.

결과: 총 15명의 환자에서 16건의 수술을 시행하였으며 평균 추적관찰 기간은 11.7개월(1.7-34), 45.0세(12-76)였다. 원인은 교통사고 12명, 기타 3명이었다. 환자 8명에서 본원 요도성형술 전에 초기 재배열이 8건, 내시경적 요도절개술이 4건, 요도성형술이 3건, 간접적 요도 확장 1건이 시행되었다. 요도손상은 모두 막양부요도와 전립선요도사이에서 발생하였고 협착 길이는 2.2 (1.0-3.2) cm이었다. 수술은 후부요도협착 성형술 1단계(Urethral lengthening, n=4), 2단계(Crural separation, n=9), 3단계(Partial inferior pubectomy, n=3)로 이루어졌다. 수술시간은 165.9분(90-297)이었고 출혈량은 393.8 ml (100-1000)이었다. 평균 재원 일수는 6.6일(5-10)이며 문화 화기 후 수술 후 39일 후에 도뇨관을 제거한 1건을 제외한 나머지에서 평균 21.9일(15-26)에 계획대로 제거하였다. 수술 후 요도협착 재발은 4건(35.7%)에서 발생하였으며, 1년 무 재발 성공률은 68.9%이었다. 또한 요도협착을 이전 치료 유무에 따라 성공율의 차이를 보였다(그림 1), 합병증으로 혈종 1건, 감염 1건이 발생하였으며 입원치료를 하였다. 15명 환자 모두 사고 전 발기부진은 없었으나 12명은 사고 후 발기부진이 생겼으며, 수술 후에도 지속되었고 1명에서 수술 후 발기부진이 생겼다. 모든 환자에서 사고 전 요실금이 없었으나 수술 직후 4명에서 새로 발생하였고 이 중 2명은 1년 내에 사라졌으며 2명은 지속되어 현재 하루에 패드 2~4장 사용하고 있다.

결론: 후부요도협착 성형술은 도전적 수술이지만 수술 성공율과 합병증의 빈도 측면에서 우수하였다. 이전 시행된 교정술이 요도협착의 수술 성공율을 낮출 수 있음을 알 수 있었다. 향후 추가적인 자료수집 및 장기적인 추적관찰을 통하여 더욱 신뢰성이 있는 보고가 필요하다 하겠다.

Keywords: Urethroplasty, Pelvic fracture urethral injury, Posterior urethral stenosis
O-071

과민성 방광의 치료에 있어서 보톡스 주입술의 위치에 따른 효과와 안정성에 대한 메타분석

조정기, 정재훈, 김규식, 윤영은, 이승욱, 문홍상, 최홍용, 박성열, 박해영, 김용태

한양대학교 의과대학 비뇨기과학과

Aim: We conducted this study to assess the efficacy and safety of OnabotulinumtoxinA (BoNT/A) according to site of injection for treating overactive bladder.

Methods: A systematic literature review was performed to locate randomized controlled trials of OnabotulinumtoxinA for treatment of neurogenic detrusor overactive bladder and idiopathic overactive bladder in adults. We searched databases such as MEDLINE, EMBASE, and the Cochrane Controlled Trials Register using the Ovid platform. This meta-analysis was based on Cochrane Review Methods.

Results: Eight studies (419 participants) were included. Trigone-including injection demonstrated significant improvements in symptom scores (SMD=-0.53, 95% CI=-1.04 to -0.02, P=0.04, I²=78%). It also demonstrated a significantly higher complete dryness rate (OR=2.19 patients number, 95% CI=1.32 to 3.63, P=0.002, I²=41%) and lower frequency of incontinence episodes (WMD=-0.85 numbers per day, 95% CI=-1.55 to -0.16, P=0.02, I²=87%). We found a lower detrusor pressure after trigone-including injection than after trigone-sparing injection (WMD=-2.55 cmH₂O, 95% CI=-4.16 to -0.95, P=0.002, I²=0%) (Fig. 3A), and higher volume at first desire to void (WMD=17.54 ml, 95% CI=1.00 to 34.07, P=0.04, I²=0%). There were no differences in efficacy according to injection site between intradetrusor and suburothelial injection, or in safety in terms of the incidence of vesicoureteral reflux, hematuria, general weakness, bladder discomfort, large postvoid residual, and urinary tract infection.

Conclusion: Trigone-including BoNT/A injection is superior to trigone-sparing injection in efficacy, as measured by symptom score, complete dryness rate, frequency of incontinence episodes, detrusor presser, volume at first desire to void without increase of complications. However, the depth of injection does not influence the efficacy or safety of BoNT/A injections.

Keywords: Neurogenic detrusor overactive bladder, Idiopathic overactive bladder, Onabotulinumtoxina
Safety and efficacy of BOTOX® in patients with NDO or OAB: a Korean post-marketing surveillance

고광진1, 정성진2, 윤하나3, 모교익4, 신동길5, 오승준6, 주명수7, 이규성1

1성균관대학교 의과대학 삼성서울병원 비뇨기과학교실, 2분당서울대학교병원 비뇨기과학교실, 3이화여자대학교 부속 목동병원 비뇨기과학교실, 4근로복지공단 인천병원 비뇨기과, 5부산대학교병원 비뇨기과학교실, 6서울대학교병원 비뇨기과학교실, 7울산대학교 서울아산병원 비뇨기과학교실

Purpose: To evaluate the safety and efficacy of BOTOX® in the treatment of urinary incontinence patients with neurogenic detrusor overactivity (NDO) or overactive bladder (OAB) not adequately controlled by anticholinergics via post-marketing surveillance in Korea.

Materials and Methods: Before the injection of BOTOX®, full medical histories were collected. During 1 to 3 months after treatment, physicians assessed adverse events (AEs). And the efficacy is assessed through international consultation on incontinence questionnaire short form (ICIQ–SF) total score.

Results: A total of 739 patients were enrolled and finally 686 (OAB: 525 and NDO: 161) were in the safety analysis set and 612 (OAB: 478 and NDO: 134) were included in effectiveness analysis. Mean follow-up periods were 60.1±37 days. Of the safety population 78 (8.6%) AEs in 59 patients was reported [NDO: 27 (11.8%) AEs in 19 patients and OAB: 51 (7.6%) AEs in 40 patients]. The most common AEs were urinary retention (1.31%), urinary tract infection (1.02%), and dysuria (0.73%) (Table 1). After Botox treatment, 4.13% (18/436) of the patients initiated clean intermittent catheterization due to increased residuals and voiding difficulty. Due to the observational nature of the study, the AE reporting was left to the investigator’s clinical assessment and might have varied according to local clinical guidelines. Of the efficacy analysis set, the mean total ICIQ–SF of NDO patients (n=134) was decreased from 14.34±4.97 to 7.51±5.83, significantly. When the efficacy was evaluated only in 351 patients with UUI in OAB patients, the mean change in total ICIQ–SF was −7.02±6.48 (p<0.001).

Conclusions: In this post-marketing surveillance, no significant AEs were found compared to previously reported AEs of BOTOX®. Thus, BOTOX® is a safe and effective treatment for Korean patients with NDO or OAB in a real clinical setting.

Keywords: Botox, Overactive bladder, Post-marketing survey

<table>
<thead>
<tr>
<th>AEs</th>
<th>NDO</th>
<th>OAB</th>
<th>Total Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety analysis set</td>
<td>161</td>
<td>525</td>
<td>686</td>
</tr>
<tr>
<td>Adverse events</td>
<td>19 (11.9%)</td>
<td>40 (7.6%)</td>
<td>59 (8.6%)</td>
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<tr>
<td>Serious adverse events</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Common adverse events (4.5%)</td>
<td>5 (3.1%)</td>
<td>7 (1.2%)</td>
<td>12 (1.8%)</td>
</tr>
<tr>
<td>UTI</td>
<td>5 (3.1%)</td>
<td>7 (1.2%)</td>
<td>12 (1.8%)</td>
</tr>
<tr>
<td>Dysuria</td>
<td>2 (1.3%)</td>
<td>3 (0.5%)</td>
<td>5 (0.7%)</td>
</tr>
<tr>
<td>Insomnia</td>
<td>2 (1.3%)</td>
<td>2 (0.3%)</td>
<td>4 (0.6%)</td>
</tr>
<tr>
<td>Myalgia</td>
<td>2 (1.3%)</td>
<td>2 (0.3%)</td>
<td>4 (0.6%)</td>
</tr>
<tr>
<td>Urinary retention</td>
<td>1 (0.6%)</td>
<td>3 (0.5%)</td>
<td>4 (0.6%)</td>
</tr>
<tr>
<td>Pyrex</td>
<td>1 (0.6%)</td>
<td>3 (0.5%)</td>
<td>4 (0.6%)</td>
</tr>
<tr>
<td>Voiding difficulty</td>
<td>1 (0.6%)</td>
<td>3 (0.5%)</td>
<td>4 (0.6%)</td>
</tr>
</tbody>
</table>
The prevalence of bladder pain syndrome in Korea

Background and Objectives: The international society for urinary incontinence has defined bladder pain syndrome (BPS) as a combination of urinary symptoms such as suprapubic pain and daytime and nighttime frequency without apparent cause such as urinary tract infection. We conducted prevalence BPS survey in Korea.

Methods: On April 2016, the prevalence of bladder pain syndrome was evaluated by telephone interview with 3000 interviewees in the general population for 30 days. Subjects were 40–79 year-old male and female from 15 cities across the country. A trained interviewers asked pelvic pain and urgency frequency questionnaire (PUF) was used as a technique for screening the bladder pain syndrome, PUF score were range from 0 to 35, and a symptom score of more than 12 points is considered to indicate BPS.

Results: Overall proportion of BPS is 16% of all respondents and the prevalence was significantly higher in women (21.4%) than in men (10.7%). By age, the prevalence rates were 15.2%, 18.0%, 8.6%, and 26.0% in the 40s to 70s, respectively. In particular, the highest PUF score was found in women with 70s, and the PUF score showed positive correlations geriatric depression index score. The prevalence of BPS was 22.3% in divorce/bereavement, 15.7% in married and 12.7% in unmarried, and the prevalence of depression was higher according to the degree of depression. In the absence of depression, BPS was diagnosed only in 5.9% of the cases, while mild depression symptoms were present in 16.3%, moderate or severe cases were in 31.6% and 48.1%.

Conclusions: As a first prevalence report of the BPS in Korea, it has shown that BPS occurs at a quite high rate. The BPS is associated with psychological aspect demanding early diagnosis and treatment, so requires more social attentions.

Keywords: Bladder pain syndrome, Depression, Prevalence
Female urinary incontinence and obesity assessed by anthropometry and dual-energy X-ray absorptiometry: analysis from the 2008-2009 Korean national health and nutrition examination survey

이준호, 박연원, 최기복
국립경찰병원

**Objective:** Obesity measured by anthropometry is a risk factor for urinary incontinence (UI). However, these anthropometry measures (body mass index and waist circumference) do not provide the exact and precise mass or percentage of body fat. With the development of body composition measurement technologies, the accurate parameters of the fat mass or distribution can be measured by dual energy X-ray absorptiometry. Therefore, we investigated the relationship between UI and obesity parameters obtained by dual energy X-ray absorptiometry.

**Method:** We included 5,792 women over the age of 20 years who had participated in the Korea National Health and Nutrition Examination Survey IV. The condition of UI was investigated by trained interviewers. Obesity was assessed using anthropometry and dual energy X-ray absorptiometry. We used the chi-square test, t-test, receiver operating characteristic curves, and logistic regression analysis for statistical analysis.

**Result:** Waist circumference (mean±standard deviation: 78.5±10.0 vs. 82.4±9.1 kg), body weight (56.9±9.1 vs. 58.5±8.4 kg), and body mass index (23.3±3.4 vs. 24.2±3.1 kg/m²) were significantly higher in the UI group. Additionally, the total fat mass (mean±standard deviation: 18.5±5.3 vs. 19.4±4.9 kg), trunk fat mass (9.3±3.4 vs. 10.1±3.2 kg), trunk fat/leg fat (1.58±0.54 vs. 1.73±0.50), total body fat percentage (32.3±5.4 vs. 33.0±5.0%), and trunk fat percentage (32.4±7.3 vs. 33.9±6.6%) were significantly higher in the UI group. Among the parameters, the trunk fat mass/leg fat mass showed highest sensitivity (83.6%) with a cut-off value of 1.272. Before and after adjustment, trunk fat mass/leg fat mass>1.272 was significantly related to UI and showed the highest odds ratios (ORs) among dual energy X-ray absorptiometry parameters (adjusted ORs (95% confidence interval): 1.807 (1.343-2.431)). Anthropometry parameters, such as the waist circumference, were inferior to dual energy X-ray absorptiometry parameters in terms of the relationship with the UI.

**Conclusion:** Obesity parameters obtained from dual energy X-ray absorptiometry are closely related to UI. Among the parameters, the trunk fat/leg fat is the strongest.

**Keywords:** Obesity, Incontinence
Nutrient intake and urinary incontinence in Korean women: a propensity score-matched analysis from the Korean national health and nutrition examination survey data

이준호, 박연원, 최기복
국립경찰병원

목적: A recent study investigated the relationship between dietary nutrients and female urinary incontinence (UI). However, very few data are available on this topic and the results are not consistent across studies. Therefore, we evaluated these relationships using nationally representative data from Korea.

대상 및 방법: We included 8,090 women over the age of 20 years who had participated in the Korea National Health and Nutrition Examination Survey IV. We conducted a propensity-matched study by identifying women with UI. Women without UI, matched for age, body mass index, menopause, delivery history, hypertension, diabetes, hypercholesterolemia, stroke, asthma, chronic obstructive pulmonary disease, and amount of total food intake, were included as a control group at a 2:1 ratio (661 women with UI; 1,322 women without UI). Data were analyzed using the chi-square test, Mann-Whitney test, Fisher’s exact test, and logistic regression.

결과: Following propensity score matching, 661 women with UI and 1,322 women without UI were included; the confounders were evenly dispersed and did not differ significantly between the groups. There was no significant difference in the intake of water, fat, protein, calcium, phosphorus, iron, sodium, potassium, vitamin A, carotene, riboflavin, niacin, and vitamin C. However, carbohydrate intake was significantly higher in the UI group than in the control group (median [interquartile range]: 282.3 g/day [214.7; 352.0] vs. 267.7 g/day [212.6; 339.1]; P=0.041).

결론: High carbohydrate intake was significantly related to female UI after propensity score matching of representative Korean data.

Keywords: Incontinence, Nutrients
최대 요도폐쇄길이와 전립선 절제술 후 요실금 회복과의 연관성

박경기, 김성대, 김영주, 허정식
제주대학교병원 비뇨기과학과

Introduction: 전립선 절제후 생기는 요실금의 원인에 대한 많은 의견들이 있고 그 중 요도의 수축력이 중요하다고 하여 수술 후에 kegel exercise를 재활의 한 방법으로 긍용하고 있다. 이에 수술 후 catheter제거 시점에 시행한 영상의학적인 방법으로 요도의 수축력을 측정하여 술 후 요실금의 회복과의 연관성을 확인하고자 한다.

Methods: 2013년 3월부터 2015년 2월까지 로봇 보조 전립선 절제술을 시행한 60명(평균 연령 65세)을 대상으로 하여 후향적인 분석을 시행하였다. 수술 후 7일에 유치 카테터를 통한 방광조영술을 시행하였다. 요도방광문합 부위의 회복을 확인 후 환자에게 골반 근육 수축을 시도하게 하였고 방광목 주변의 요도폐쇄길이의 변화를 측정하였다.

Results: 요도폐쇄길이는 수술 후 3개월의 요실금 유지 비율에서 역상관을 보였다(defined as [number of patients with continence/total number of patients on post op 3 months] (r=-0.488, P<0.05). ROC curve를 이용한 optimal cutoff value인 요도폐쇄길이 5 mm를 기준으로 그 이상과 이하로 구분하여 요실금 유지 비율을 확인하였을 때, 유의한 차이를 보였다(p<0.05).

Conclusion: 전립선 절제술 후 시행되는 방광조영술로 확인하는 수축 후 요도폐쇄길이는 수술 후 3개월의 요실금 회복을 예상하는데 도움이 될 것으로 판단되고 6 mm 이하로 관찰되는 환자에서는 수술 후 괄약근의 재활 및 약물 치료를 좀 더 신경써야 할 것으로 판단된다.

Keywords: Prostatectomy, Urethral closing, Incontinence
전립선수술 후 발생한 남성 요실금의 치료로 Re-adjustable male sling 수술의 결과

문경태1, 최재덕2, 조희주1, 조정만1, 강정윤1, 김정훈2, 안승현2, 유탁근1
1울산병원, 2한전병원

Objective: 양성 및 악성질환에 대한 전립선 수술 후 발생한 남성 요실금의 치료로 Re-adjustable male sling (Male Remeex System) 수술의 효과 및 안전성에 대해 알아보고자 하였다.

Materials and Methods: 2013년 8월부터 2016년 8월까지 2개의 병원에서 전립선 수술 후 발생한 남성 요실금의 치료로 Male Remeex System (MRS) 수술을 시행한 환자들 중 5개월 이상 추적 관찰된 17명의 환자를 대상으로 수술 후 효과 및 안전성을 후향적으로 의무기록을 통해 조사하였다. 17명의 환자 중 14명은 근치 전립선 절제술(RARP: 10례, LRP: 3례, open RRP: 1례) 시행 후 요실금이 발생되었고 3명은 전립선 비대증 수술(HoLEP: 1례, TURP: 2례) 후에 요실금이 발생하였다. 환자들의 원인 수술 후 MRS 수술 시까지의 기간은 평균 30.4개월이었다. 술 후 요실금이 없거나 security 패드만 필요한 경우는 성공, 패드사용이 50% 이상 줄어든 경우 요실금의 개선, 그리고 50% 미만의 패드사용이 필요한 경우는 실패로 정의하였다. 환자의 요실금으로 인한 삶의 질 만족도는 visual analog scale로 측정하였다.

Results: 환자들의 MRS 수술 시 평균 나이는 73.7세, 수술 후 추적관찰 기간은 34.6 개월 이었다. 수술을 시행한 17명의 환자들 중 5명(29.4%)에서 성공을 보였고, 7명(41.2%)에서는 요실금의 개선이 있었다. 대체 전립선 절제술을 시행한 환자 중 5명(35.7%)에서 성공을 보였고 7명에서는 요실금의 개선(50.0%)이 있었으나, 전립선 비대증 수술을 시행한 환자 3명 모두에서는 수술 후 요실금의 개선이 나타나지 않았다. Tension re-adjustment은 16명(94.1%)에서 1회 이상 시행 하였으며 이 중 4명(23.5%)은 추적 관찰 기간 중 효과 부족으로 controller의 장력 재조절이 필요하였다. 수술 후, 후방 방광 천공, 요도 미란 등의 합병증은 관찰되지 않았다. 총 5명(29.4%)의 환자에서 지속적인 화음부 및 치골상부의 통증으로 호소하여 varitensor를 제거하였으며 이 중 2명은 요실금의 개선이 있던 군이었다. 술 후 요실금이 개선이 있으면서 varitensor를 유지하고 있는 12명에서 술 후 만족도(0: 만족 없음, 10점: 매우 만족)는 8.2±1.7점으로 조사되었다.

Conclusions: MRS 수술은 전립선암에 대해 전립선절제술 후 발생한 요실금에 대해서는 약 80% 이상의 환자에서 술 후 우수한 결과를 보여주었으나 전립선 비대증 수술 후 발생한 요실금의 치료로는 성공적인 결과를 가져올 수 없었다. 본 연구는 규모가 작아 어떤 인자가 MRS 수술 실패의 위험인자인지 밝히지는 못하였으나 일부 환자들에서는 효과 부족, 지속적인 화음부 및 치골상부 통증을 호소하였으므로 MRS 수술 계획 시에는 이러한 점을 고려하여야 할 것으로 사료된다.

Keywords: Male remeex system, Incontinence, Prostate
Objectives: We investigated clinical and urodynamic parameters predictive of the unfavorable outcomes of PPI surgery.

Methods: We retrospectively reviewed the medical records, and urodynamic findings of PPI patients who received artificial urinary sphincter (AUS) or ARGUS® between 2001 and 2015. Treatment failure was defined as using more than one pad per day at last follow-up. Binary logistic regression analysis was performed to find out the predictive factors for treatment failure.

Results: A total of 103 patients (AUS, 53 patients; ARGUS®, 50 patients) with a mean age of 69.9 (±5.6, SD) years were analyzed. The mean number of daily pad usage was 4.8 (±3.4). The mean maximum urethral closure pressure (MUCP) and valsava leak-point pressure (VLPP) were 33.2 (±15.4) and 70.8 (±24.1) cmH₂O, respectively. The mean symptom duration and follow-up after PPI surgery were 46.9 (±31.1) and 27.1 (±22.4) months, respectively. During follow-up the overall treatment success rate was 68.0%. Multivariate analysis revealed some interesting findings as followings. First of all, after adjustment of other potential risk factors, the choice of surgical modality as AUS was independently associated with the success of PPI surgery (OR=5.067, p=0.039). In addition to this, mixed type urinary incontinence (OR=0.249, p=0.043) and degree of incontinence (pad/day; OR=0.725, p=0.028) were inversely associated with the success of PPI surgery. Lastly, any of the UDS parameter could not predict the treatment outcomes (p range: 0.412-0.995). In patients who received AUS, history of neurologic disease (OR=0.073, p=0.045) and degree of incontinence (OR=0.712, p=0.018) were inversely associated with treatment success. Whereas, in patients with ARGUS®, prior history of DM (OR=0.114, p=0.051) and pelvic irradiation (OR=0.055, p=0.043) showed inverted association with treatment success.

Conclusions: Treatment outcomes of PPI surgery can be compromised in patients with mixed type incontinence, and severe symptoms. Although the AUS showed the better treatment outcomes than ARGUS®, physicians should be aware that treatment outcome might be compromised in patients with neurologic disease. In patients with histories of DM or pelvic irradiation, the ARGUS® should be avoided as a treatment option for PPI. The preoperative UDS had no role in predicting treatment outcomes.

Keywords: Post-prostatectomy incontinence, Artificial urethral sphincter, Sling surgery
Fate of overactive bladder after artificial urinary sphincter implantation

손희서, 강숭구, 김장환
연세대학교 의과대학 비뇨기과학회실

Introduction: The clinical course of OAB after AUS implantation is not clearly known and there is no guideline on management of post–AUS OAB. We have investigated clinical course of OAB after AUS implantation.

Patient and Methods: Virgin cases from August 2010 to December 2016 by a single surgeon (JHK) for treatment of post–radical prostatectomy incontinence (PRPI) were included. Exclusion criteria were cases requiring device revision, cases with follow-up of less than 12 weeks after device activation, and cases with insufficient data for estimation of pre–AUS condition, post–AUS symptom duration. OAB was defined as OAB Symptom Score (OABSS) ≥3 with urgency score ≥2. Post–AUS OAB was defined as OAB diagnosed within 12 months after device activation with Incontinence Severity Index ≤ points 8.

Results: Finally, 60 patients were evaluated. Median age at AUS implantation was 73.3 (IQR 69.7–77.3), median time interval from radical prostatectomy was 31.3 (19.1–52.2) months. During median follow up period of 25.5 (IQR 12.2–40.5) months, 22 (36.7%) met the criteria of post AUS OAB based on OABSS checked at median periods of 4.0 (IQR 2.2–6.4) months after device activation, 5 (6.3%) showed late occurrence of OAB at median period of 24.5 (IQR 21.3–48.7) months and these were excluded from assessment. Of 13 patients with medication, 7 showed poor responses to medication, 1 patient was satisfied with medication, and 4 showed resolution of OAB. The outcomes were different by type of OAB. All 3 patients of De Novo OAB showed resolution of OAB after median 23.3 (16.0–31.6) months of treatment, doing well without medication afterward (P=0.014, Chi–Squared test) (Table 1).

Conclusions: We could observe that plenty of patients have post AUS OAB needing medical treatment. Contrary to persistent OAB, large portion of De Novo OAB showed resolution of OAB after some period of medical treatment. Proper prediction and counseling might be helpful in managing patients of post AUS OAB.

Keywords: Artificial, Urinary sphincter, Overactive

| Table 1. General Characteristics and clinical course of patients with post AUS OAB |
|-----------------|-----------------|-----------------|-----|
| Patients with Post AUS OAB (N=22) | Persistent OAB (N=15) | De Novo OAB (N=7) | P |
| Age (yr, median, IQR) | 73.7 (70.2–77.9) | 73.0 (63.0–77.1) | 0.581 |
| Time interval between radical prostatectomy and AUS implantation (mo, median, IQR) | 34.0 (21.7–34.7) | 24.8 (26.2–30.0) | 0.332 |
| Follow up period after AUS Implantation (mo, median, IQR) | 17.4 (10.0–36.9) | 42.0 (27.4–43.0) | 0.009* |
| Patients with history of radiation therapy (N%) | 2 (13.3) | 1 (14.3) | 1.000 |
| Patients who received medical treatment (N%) | 10 (66.7) | 3 (42.9) | 0.376 |
| Patient improved without medical treatment (N%) | 1 (6.7) | 0 (0.0) | 1.000 |
| Patients who received medication (N=13) | Persistent OAB (N=10) | De Novo OAB (N=3) | P |
| Patients with poor response to medical treatment (N%) | 7 (70.0) | 0 (0.0) | 0.050 |
| Patient with good response to medical treatment, however cannot go without medication (N%) | 1 (10.0) | 0 (0.0) | 1.000 |
| Patient who can go without medical treatment after some period of medical treatment (N%) | 1 (10.0) | 3 (100.0) | 0.014* |

Statistical analysis for categorical variables was conducted with chi-squared test or Fisher’s exact test, and for continuous variables with Mann-Whitney U test. AUS: artificial urinary sphincter, OAB: overactive bladder, IQR: interquartile range.

*Statistical significance at p<0.05.
O-080

The effect of low bladder compliance on upper urinary tract after artificial urinary sphincter implantation

손희서, 강승구, 김명주, 김장환
연세대학교 의과대학 비뇨기과학실

Introduction: Low bladder compliance (BC) has high potential of upper urinary tract (UUT) damage following continence surgery. In case of neurogenic low BC, several literatures had reported deterioration of UUT after artificial urinary sphincter (AUS) implantation. However the consequence of low BC in post—radical prostatectomy incontinence (PRPI) is not well known. We have investigated PRPI patients with low BC.

Patient and Methods: Cases of AUS from May 2007 to December 2016 by a single surgeon (JHK) were investigated. Urodynamic studies were performed before AUS implantation. Post AUS continence was assessed based on the incontinence severity index (ISI) introduced by Sandvik. Patient UUT was evaluated with GFR and CT or MRI findings.

Results: Finally 17 patients with low BC≤20 cmH₂O/ml were evaluated. During the median follow up of 40.3 (IQR 25.7–57.0) months, 5 (29.4%) were continent, 11 (64.7%) were mildly incontinent and one (5.9%) was incontinent with atrophy (Table I). Among 10 with available UUT image, no had morphometric deterioration with bladder filled state. When evaluating GFR, there was no significant change after AUS implantation (P=0.500 for continent patient, P=0.176 for mildly incontinent patients) (Figure 1).

Conclusions: We could observe tolerable outcome in continence and UUT condition. Even though this study has limitation with small number of patients and retrospective assessment, we might conclude that AUS may not be denied even for PRPI with low BC. Further study including postoperative urodynamic condition is going to be followed.

Keywords: Artificial, Urinary sphincter, Compliance
전립선 특이항원 범위에 따른 전립선 조직검사 방법(TRUS versus MRI guided) 간의 암진단율 차이에 대한 비교 분석 연구

최영효1, 강민용1, 성현환1, 정병창1, 서성일1, 전성수1, 이현무1, 최한용1, 박병관2, 김찬교2
성균관대학교 의과대학 1비뇨기과학교실, 2영상의학과교실

**Purpose:** To compare the cancer detection rates of 12 cores transrectal ultrasound guided prostate biopsy (TRUS-GB) and multiparametric magnetic resonance imaging guided prostate biopsy (MRI-GB) according to the prostate specific antigen (PSA) level and to evaluate whether MRI-GB has increased detection rates of (clinically significant) prostate cancer compared with TRUS-GB in patients with PSA level<10 ng/mL.

**Material and Methods:** We retrospectively analyzed TRUS-GB and MRI-GB patients from September 2013 to March 2017. A total of 2,269 patients underwent initial TRUS-GB (n=2020) and MRI-GB (n=249). MRI-GB was performed MRI/TRUS fusion biopsy or MRI-targeted biopsy or MRI cognitive biopsy for lesions corresponding to PI-RADS 4–5 on mpMRI. Clinically significant prostate cancer was defined as Gleason 7 or greater. We also compared the cancer detection rates with the second biopsy in patients with initial TRUS negative biopsy and persistently high PSA.

**Results:** Of 2,269 patients, 872 (38.7%) were diagnosed with prostate cancer. Of note, MRI-GB showed significantly higher cancer detection rates compared to TRUS-GB according to specific PSA ranges [<2.5 (50.0% vs 20.0%; p=0.016), 2.5–4 (55.1% vs 18.8%; p<0.001) and 4–10 ng/mL (51.4% vs 31.1%; p<0.001)]. However, there were no differences of cancer detection rates between MRI-GB and TRUS-GB in patients with PSA 10–20 and greater than 20 ng/mL. Furthermore, MRI-GB showed a higher proportion of clinically significant prostate cancer than TRUS-GB at PSA 2.5–4 (69.8% vs 49.5%; p=0.030) and 4–10 (78.6% vs 56.7%; p=0.003). Interestingly, MRI-GB also showed higher cancer detection rates at PSA 2.5–4 (56.2% vs 20.0%; p=0.002) and 4–10 (50.0% vs 17.4%; p<0.001) in patients underwent second prostate biopsy after negative TRUS biopsy and persistently high PSA.

**Conclusion:** Our study indicates that MRI-GB can be more valuable cancer detection tool for initial and repeat prostate biopsy, particularly for patients with PSA 2.5–10.

**Keywords:** MRI guided prostate biopsy, Prostate cancer, PSA
첫번째 경직장초음파 전립선 조직검사에서 ASAP 또는 HGPIN이 진단된 환자에서 두번째 조직검사를 시행할때 생검 방법(TRUS vs MRI guided)에 따른 전립선암 진단율 비교

최영효1, 강민용1, 성현환1, 정황균1, 정병창1, 서성일1, 전성수1, 최한용1, 이현무1, 박병관2, 김찬교2
성균관대학교 의과대학 1비뇨기과학과실, 2영상의학과실

Purpose: To evaluate the usefulness of Magnetic Resonance Imaging (MRI) guided biopsy with repeat prostate biopsy in patients with Atypical small acinar proliferation (ASAP) or High-grade prostatic intraepithelial neoplasia (HGPIN) in initial transrectal ultrasound (TRUS) guided prostate biopsy.

Material and Methods: We retrospectively analyzed prostate biopsy patients from September 2013 to March 2017. Of 2,971 patients, 47 patients who were diagnosed with ASAP (n=17) and HGPIN (n=30) in initial prostate biopsy were finally underwent second prostate biopsy. Patients with PSA >20 ng/mL were excluded (n=495). MRI guided biopsy was performed as MRI/TRUS fusion or MRI-targeted or MRI cognitive method for lesions corresponding to PI-RADS 4–5 on MP–MRI.

Results: When we compared cancer detection rate according to the biopsy methods in patients who had ASAP or HGPIN in initial biopsy, MRI guided biopsy showed significantly higher cancer detection rate compared to those with TRUS biopsy (MRI 54.2% vs 21.7%; p=0.036). However, there were no significant differences in cancer detection rates according to initial diagnosis type, such as ASAP, 1 HGPIN and 2 HGPIN (Fig 1). Interestingly, while cancer detection rate was similar in initial ASAP patients between TRUS and MR–guided biopsy, MR guided biopsy showed a higher cancer detection pattern than TRUS biopsy in initial HGPIN patients (Table 1).

Conclusion: In sum, MR guided biopsy showed a higher cancer detection rate in second prostate biopsy than TRUS biopsy in patients who were diagnosed with ASAP or HGPIN in initial TRUS biopsy.

Keywords: ASAP, HGPIN, MRI guided prostate biopsy

Table 1. Comparison of TRUS vs MRI guided biopsy outcomes in the subgroup of men receiving repeat biopsy

<table>
<thead>
<tr>
<th></th>
<th>Prior ASAP</th>
<th>Prior HGPIN</th>
<th>Total</th>
<th>Prior ASAP</th>
<th>Prior HGPIN</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRUS</td>
<td>n=10</td>
<td>n=7</td>
<td>n=17</td>
<td>n=13</td>
<td>n=37</td>
<td>n=50</td>
</tr>
<tr>
<td>MRE</td>
<td>n=8</td>
<td>n=7</td>
<td>n=15</td>
<td>n=10</td>
<td>n=30</td>
<td>n=40</td>
</tr>
</tbody>
</table>

ASAP: Atypical small acinar proliferation; HGPIN: High-grade prostatic intraepithelial neoplasia

图1. 第二次生検での癌検出率の比較

图1. 第二次生検での癌検出率の比較
Serial comparison of cancer detection rate between TRUS and MRI guided initial and repeat prostate biopsy: a single center experienced

방석환1, 최영호1, 김민용1, 성현환1, 전황균1, 정병창1, 서성일1, 이건수1, 최한용1, 김찬교2, 박병관2, 이현무1

성균관대학교 의과대학 1비뇨기과학성, 2영상의학과실

목적: 본 연구는 경직장 초음파(Trans rectal Ultra Sound guided biopsy; TRUS)를 이용한 전립선 조직 검사와 자기 공명영상(Magnetic resonance imaging guided biopsy; MRI)을 이용한 전립선 조직 검사에서 초회 및 반복 조직 검사 시 두 검사법 간의 암 진단율 차이에 대해 분석하고자 하였다.

연구 방법: 본 기관에서 2013년 9월부터 2017년 3월까지 전립선 조직 검사를 시행받은 2795명의 환자를 후향적으로 분석하였다. 조직 검사에서 전립선암이 진단된 경우 Gleason score 7점 이상을 임상적으로 유의한 전립선암으로 정의하였다. 두 조직검사법 간의 기존 임상병리학적 정보 및 암진단률 차이를 비교 분석하기 위하여, 연속형 변수의 경우 Mann-Whitney U test를, 범주형 변수의 경우 Chi-square test를 적용하였다.

결과: 초회 전립선 조직 검사를 시행한 환자군에서 MRI guided biopsy가 높은 진단율을 보였고[TRUS 36% (n=728/2020) vs MRI 57.4% (n=143/249); p<0.01], 1차 조직 검사에서 암이 발견되지 않았던 2차 조직 검사자에서도 MRI guided biopsy가 TRUS biopsy에 비해 유의하게 높은 진단율을 보였다[TRUS 19.6% (n=64/327) vs MRI 55.2% (n=111/201); p<0.01] (그림 1). 1차 및 2차 조직 검사에서 음성으로 나온 3차 조직 검사자에서도 역시 MR guided biopsy가 유의하게 높은 암진단율을 보이는 것으로 분석되었다[TRUS 15.4% (n=10/65) vs MRI 56.0% (n=42/75); p<0.01] (그림 1). 그러나, 1,2,3차에서 음성이었던 4차 검사자는 두 조직검사법간에 유의한 차이를 보이지 않았다(그림 1). 특히, Gleason score가 7점 이상임으로 양상한 전립선암의 경우 1차 및 2차 조직 검사에서 MRI guided biopsy에서 더 높은 진단율을 보였던 반면[TRUS vs MRI ; 72.2% n=426/728, 77.7% n=111/143 p<0.01 ; 1차] (TRUS vs MRI ; 45.3% n=6/10, 70.0% n=81/131 p<0.01 ; 2차), 3차 및 4차 조직 검사자 경우 두 군간의 차이는 유의하지 않았다.

결론: 본 연구에서, 초회 및 반복 생검에서 3차 전립선 조직검사까지 TRUS biopsy에 비해, MRI guided biopsy 검사의 진단율이 더 우수한 결과를 보였다. 따라서, 전립선 조직 검사의 경우 MRI guided biopsy가 임상적으로 보다 유용한 조직검사 방법이 될 수 있을 것으로 생각한다.

Keywords: Prostate biopsy, TURS, MRI
Purpose: Transrectal ultrasound (TRUS) guided prostate biopsy is considered as a first method of prostate cancer diagnosis. Due to random sampling error, negative biopsy does not mean the absence of cancer in patients with persistent PSA levels elevation. Recently prostate cancer diagnostic reliability of multi-parametric magnetic resonance imaging (mp-MRI) has been confirmed in many studies. We performed the study to check effectiveness of MRI fusion prostate biopsy by comparing with TRUS guide prostate biopsy in patients with previous negative prostate biopsy.

Materials and Methods: We retrospectively reviewed patients who underwent repeat prostate biopsy, from 2011 to May 2017 in KNUH and from 2012 to May 2017 in BNUH. The patients who had at least one previous negative TRUS biopsy were divided into two groups (repeat TRUS guide prostate biopsy and MRI fusion biopsy). Men with PSA>10 were excluded. Patients’ characteristics including age, prostate specific antigen (PSA), PSA density (PSAD), prostate volume, results for pathologic finding and detection rate between the two groups were analyzed.

Results: There are no differences in patients’ characteristics except the number of previous prostate biopsy (p=0.007) between the two groups. Of the 26 patients with MRI fusion biopsy, 12 (46.2%) were found to have cancer and 24 (33.8%) of 71 in TRUS biopsy were diagnosed with cancer. The detection rate of prostate cancer with MRI fusion biopsy in 16.6%, 70.0%, and 75.0% patients of suspicious lesions of highest PI-RADS score 3, 4, and 5, respectively.

Conclusion: Even though prostate cancer detection rate was higher in MRI fusion biopsy group, prostate cancer detection rate and Gleason score was not statistically different between the groups. But there is correlation between high PI-RADS score and detection rate. If the patients have PI–RADS score of 4 or higher, MRI fusion biopsy should be considered.

Keywords: MRI fusion, Prostate biopsy

<table>
<thead>
<tr>
<th>Table1. Demographics and biopsy results of TRUS guided prostate biopsy and MRI fusion biopsy group.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Age (years)</td>
</tr>
<tr>
<td>---------------------</td>
</tr>
<tr>
<td>eTRUS(n=71)</td>
</tr>
<tr>
<td>PSAdc(ng/mL/mLc)</td>
</tr>
<tr>
<td>PSAdc(ng/mL/mLc)</td>
</tr>
<tr>
<td>Prostate volume(cm)</td>
</tr>
<tr>
<td>No. of previous Bx [n(%)]</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>&gt;3</td>
</tr>
<tr>
<td>Cancer detection[n(%)]</td>
</tr>
<tr>
<td>Gleason Score[n(%)]</td>
</tr>
<tr>
<td>7</td>
</tr>
<tr>
<td>&gt;8</td>
</tr>
<tr>
<td>PI–RADS[n(%)]</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
</tbody>
</table>
이전 음성 환자의 전립선 조직 재 생검에서 자기공명-경직장초음파 융합 생성법의 가치

황진호, 서영은, 유영동, 이영주, 김정준, 이학민, 오종진, 이상철, 정성진, 변석수, 이상은, 홍성규
분당서울대학교병원 비뇨기과학실

Aim: To investigate validity of magnetic resonance imaging–transrectal ultrasound fusion target biopsy (Fusion–Bx) compared with transrectal ultrasound–guided biopsy (TRUS–Bx) by evaluating detection rate of prostate cancer (PCa).

Methods: Medical records of 376 patients with prior negative TRUS–Bx who underwent repeat biopsy from Aug. 2015 to Apr. 2017 were retrospectively reviewed. The cohort was stratified into two groups (TRUS–Bx and Fusion–Bx) and assessed target/non-target cores in each group to analyze clinical and biopsy characteristics pattern.

Results: There were total 195 and 181 patients in TRUS–Bx and Fusion–Bx group, respectively. The overall cancer detection rate was slightly higher in Fusion–Bx group, but no statistical significance was observed (24.6% vs 28.7%, p=0.367). Fusion–Bx group showed significantly greater detection rate in target core analysis (5.0% vs 17.7%, p=0.044). In confirmed positive biopsy patients, Fusion–Bx group had higher rate of clinically significant prostate cancer cases, but no statistical significance was seen (85.4% vs 92.3%, p=0.271). In the patients with highly or very highly suspicious MRI (maximum image grade 4–5) findings, malignancy was positive in 38 out of 100 men (38.0%). A strong relationship existed between target image grade and biopsy yield (Fig. 1).

Conclusion: Fusion–Bx showed better clinical significance including detection rate in repeat biopsy applied to prior negative patients. A further study with larger patient pool and prospective design is needed to confirm the validity of Fusion–Bx.

Keywords: Prostate, Cancer, Fusion biopsy

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**Table 1. Clinical and biopsy characteristics of prior negative 3T MRI who underwent repeat biopsy.**

<table>
<thead>
<tr>
<th>Clinical characteristics</th>
<th>TRUS–Bx only</th>
<th>TRUS–Bx Fusion–Bx</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age (years)</td>
<td>67.7 ± 8.6</td>
<td>66.8 ± 5.9</td>
<td>0.81</td>
</tr>
<tr>
<td>Mean PSA (ng/ml)</td>
<td>24.4 ± 32.3</td>
<td>24.4 ± 32.3</td>
<td>0.98</td>
</tr>
<tr>
<td>Mean number of cores</td>
<td>13 ± 2.9</td>
<td>13 ± 2.9</td>
<td>0.16</td>
</tr>
<tr>
<td>Mean number of positive</td>
<td>25 ± 15.9</td>
<td>25 ± 15.9</td>
<td>0.85</td>
</tr>
</tbody>
</table>

**Table 2. Diagnosis of prostate biopsy in prior negative 3T MRI who underwent repeat biopsy.**

Table 2. Diagnosis of prostate biopsy in prior negative 3T MRI who underwent repeat biopsy.

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>TRUS–Bx only</th>
<th>TRUS–Bx Fusion–Bx</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive, N (%)</td>
<td>39 (13.0%)</td>
<td>38 (13.7%)</td>
<td>0.75</td>
</tr>
<tr>
<td>Negative, N (%)</td>
<td>267 (82.6%)</td>
<td>262 (86.1%)</td>
<td>0.19</td>
</tr>
<tr>
<td>Total, N (%)</td>
<td>306 (100%)</td>
<td>300 (100%)</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** MRI = magnetic resonance imaging; PSA = prostate-specific antigen; TRUS–Bx = transrectal ultrasound–guided biopsy; Fusion–Bx = magnetic resonance imaging–transrectal ultrasound fusion target biopsy.
MR-U/S fusion prostate biopsy의 유용성: 단일 기관 연구

박경기, 김영주, 김성대, 허정식
제주대학교병원 비뇨기과학실

Introduction: 임상적으로 의미있는 전립선암을 진단하기 위한 방법으로 MR–U/S fusion biopsy의 유용성이 대두되고 있다. 이에 본원에서 시행하였던 결과를 가지고 그 유용성을 알아보고자 한다.

Materials and Methods: 2016년 9월부터 2017년 6월까지 전립선암이 의심되어 전립선 조직검사를 시행하였던 환자 중 조직 검사전 MRI를 시행한 107명의 환자를 대상으로 하였다. PSA는 최소 2주 간격을 두고 2회 이상 측정하여 추가적인 하강이 관찰되지 않는 경우 연구에 포함하였고 20 nl/ml 이상으로 관찰된 경우에는 연구에 포함하지 않았다. Pre biopsy prostate MRI는 T2, Diffusion이 포함되었다. PIRADs 3점 이상에서는 MRI-U/S fusion을 Percunavtm을 이용하여 이미지를 병합하여 의심되는 소견이 보이는 병변을 지름 0.5 cm 크기의 구형 target으로 설정하여 3 core biopsy를 하였고 이후 전립선 크기에 맞추어서 10-12 core biopsy를 시행하였다. PIRADS 2정 이하의 병변은 systemic biopsy만 진행하였다.

Results: 환자의 평균 연령은 67세이고 평균 PSAlevel은 8.1 ng/ml였다. PIRADs 3점 이상에서 시행한 fusion biopsy의 overall positive rate은 55.8%였고, Gleason sum 6점 및 low volume Gleason 3+4를 제외한 임상적으로 유의한 전립선암의 detection rate은 PIRADs 4점에서는 52%, 5점에서는 75%로 상승하였다. Systemic biopsy와 MR–U/S fusion biopsy의 일치율을 비교하였을 때 좀 더 많은 임상적으로 유의한 전립선암을 찾아내는 것을 확인할 수 있었다. 가장 많은 위양성 을 보이는 요인은 PIRADs 3점병변이었다.

Conclusions: MR–U/S fusion biopsy의 경우 임상적으로 유의한 전립선암을 systemic biopsy보다 더 잘 찾아내고 있었고, PIRADs 3점 병변의 경우 위양성 병변이 많아 정확한 영상의학적인 판독이 필요할 것으로 판단된다.

Keywords: MRI, Ultrasound, Prostate biopsy
Initial experience with magnetic resonance imaging/transrectal ultrasound-fusion biopsy for prostate cancer detection performed by urologists

이광석, 구교철, 정병하
연세대학교 의과대학 강남세브란스병원

Purpose: Although navigation devices can be used for Magnetic resonance imaging–target biopsy (MRI–TBx), prostate distortion due to the end–fire technique can reduce accuracy. To reduce this risk, we adopted a fusion technique using transrectal ultrasound (US) embeded side–fire method (BK Medical, Peabody, MA, USA) and image–based fusion program (BioJet; GeoScan, Lakewood Ranch, FL, USA). We announced the initial experience of MRI/US–fusion–TBx technique by urologists.

Methods: From Jan 2017 and May 2017, the patients who were scheduled for a MRI/US–fusion–TBx for suspected PCa were enrolled in this study. The TBx protocol in Gangnam Severance Hospital was performed 12 core systemic biopsy in addition to TBx. We performed 3 core TBx, consisted with 2 core from MRI/US–fusion–TBx and 1 from MRI–cognitive–TBx, on each suspicious lesion in MRI by a urologist experienced MRI–cognitive–TBx. The prostate MRI protocol involved diffusion-weighted MRI in addition to the imaging sequences obtained using T2W MRI. Two b-values (0–1000) were used, and diffusion restriction was quantified via apparent diffusion coefficient (ADC) mapping. The patients who underwent MRI at another hospital were included.

Results: Of 31 patients with 37 lesions (median age=69.2, median PSA=6.62 ng/mL), TBx yielded the detection of prostate cancer in 18 patients (58.1%) and 14 lesions (37.8%). Significant prostate cancer detection reported higher rate with increasing PI–RADS. Higher Gleason score (≥7) were found in MRI–TBx (71.4%) than systemic biopsy (65.0%) (p<0.001).

Conclusions: MRI–TBx can be utilized to better detect clinically significant prostate cancer.

Keywords: MRI, Prostate, Biopsy
**Objective:** To assess the accuracy of PI-RADS scoring system on preoperative magnetic resonance imaging (MRI) in patients who were indicated for active surveillance (AS).

**Methods:** Total of 108 patients who met the AS criteria of Johns Hopkins, but received radical prostatectomy (RP) were analyzed. All patients were received multiparametric preoperative MRI. We assessed whether the lesions on MRI (≥4 points of PI-RADS score) are well correlated with the cancer found on surgical pathology at 12 loci of the prostate.

**Result:** The average patient age was 64.2 years (range, 45–79), and mean preoperative PSA and PSA density were 4.67 ng/mL and 0.10 ng/mL/gm, respectively. Mean number of biopsied core was 11.8. One-core tumor positive was noted in 77 patients (71.2%), and two-core tumor positive in 31 patients (28.7%). When the 1296 loci of 108 prostate specimens were assessed, overall sensitivity and specificity of MRI for predicting an actual tumor at correlated locus was 41.2% and 72.9%. At apex, sensitivity and specific were 56.1% and 59.9, respectively. At mid-gland the sensitivity and specificity were 38.5% and 68.5%, and at base, those were 28.6% and 88.6%, respectively. MRI was more sensitive for anterior prostatic lesions (46.2%) than posterior prostatic lesions (32.6%).

**Conclusion:** The PI-RADS scoring system on preoperative MRI demonstrated relatively low sensitivity. But the specificity of PI-RADS scoring system was relatively high. Therefore, physician should be aware that disease characteristics may have been underestimated in AS patients with visible lesion on MRI.

**Keywords:** Prostate cancer, PI-RADS score, Active surveillance
O-089

자기공명영상이 적극적 감시 기준에 합당한 전립선암 환자들에서 병리학적 결과를 예측하는데 도움이 되는가?

박사현, 임고산, 김명, 유달산, 정인갑, 송재린, 홍준혁, 김청수, 안한종
울산대학교 서울아산병원

Purpose: We aimed to evaluate whether multiparametric MRI using Prostate Imaging Reporting and Data System (PI−RADS) was helpful to predict unfavorable prostate cancers eligible for active surveillance.

Materials and Methods: From January 2014 to December 2015, a total of 186 patients eligible for Prostate Cancer Research International Active Surveillance (PRIAS) criteria (Biopsy GS≤6, PSA≤10, PSA density<0.2, clinical T1c/T2, and the positive cores≤2) were analyzed. All patients underwent multiparametric MRI with PI−RADS scoring and radical prostatectomy. PI−RADS scoring was performed divided into 12 zones (right/left, anterior/posterior, and base/mid/apex).

Results: Of 186 patients, 21 (11.3%) patients had upstaging and 98 (52.7%) patients had upgrading. Upstaging/upgrading cancers had lower prostate volume (47 cc vs 38 cc), higher PSA density (0.15 vs 0.12), and higher % tumor volume (7.2% vs 3.1%) than favorable cancers (GS 6 and pT2). Index tumors of upgrading/upstaging cancers were located more predominantly in anterior zone than posterior zone (63.4% vs 36.6%). A total of 2232 sites were evaluated to identify diagnostic accuracy of PI−RADS scoring using whole mount section analysis. Overall sensitivity/specificity of PI−RADS were 52.0%/73.0%. The sensitivity/specificity of anterior site and posterior site were 47.8%/77.8% and 57.4%/68.6%. In multivariate analysis, PI−RADS score 4/5 lesions ≥2 was the independent predictor (HR=2.911, p=0.026) for upgrading/upstaging in patients eligible for active surveillance.

Conclusions: Multiparametric MRI using PI−RADS scoring system had low sensitivity in prostate cancers eligible for active surveillance criteria. However, 2 or more PI−RADS score 4/5 lesions are associated higher risk of upgrading and upstaging.

Keywords: Prostatic neoplasms, Magnetic resonance imaging, Diagnostic imaging
O-090

초저위험군과 저위험군 전립선암 환자에서 적극적 추적관찰의 8년간의 결과

최창일, 강민용, 전황균, 성현관, 정병창, 전성수, 이현무, 최한용, 서성일
성균관대학교 의과대학 삼성서울병원

Purpose: To compare clinical outcomes and treatment principles in the patients of very low and low risk prostate cancer (PCa) managed with active surveillance (AS) and changed into other treatments after AS.

Methods: The retrospective cohort study was performed by the medical records of Samsung medical center from February 2008 to November 2016 with a mean follow-up of 26.66 months. Follow-up evaluations were by PSA measurement at every 6 months, MRI every year, and surveillance-biopsies at 1 year and then every 2–3 years if the patients agreed.

Results: A total of 86 men have been managed with AS with mean age of 68±7.7. Of them, 4 patients discontinued AS for various reasons (treatment change into radical prostatectomy (RP) (n=1), follow-up loss (n=3)). The rest 82 patients continued AS and out of these patients, 19 patients (23.2%) had progression and the mean duration to progression of those was 18.2 months (range: 10.5–35.6). Among 82 patients with AS, 45 patients (54.9%) underwent the surveillance biopsy at the mean 17.6 months (range 10.3–53.4). In this biopsy, no cancer was found in 16 patients (35.6%), 13 patients (28.8) had the same Gleason score with previous biopsy result and 16 patients (35.6%) did not meet the AS criteria (up-grade in 11 patients, up-volume in 5 patients). Of the 16 progressed patients, 12 patients underwent RP, 1 patient had androgen deprivation therapy (ADT), and 3 patients were lost from follow up. In the rest 37 patients (35.5%) who continues AS, the surveillance biopsy was not performed as clinically unindicated or rejected by the patients. They only had follow up by PSA and MRI. Of them, 3 patients (8.1%) had positive finding in MRI. Treatments were changed into RP in 2 patients and ADT in 1 patient. To date, no overall and cancer-specific mortality have been reported in both groups.

Conclusions: AS is the safe and excellent treatment option for very low and low risk PCa. A surveillance-biopsy and repeat MRI could help to identify whether patients should continue AS or not.

Keywords: Active surveillance, Prostate cancer, Outcomes
크기가 큰 낭성 신문부 종양에 대한 로봇 보조 부분 신 절제술

김정준, 오종진, 이상철, 홍성규, 이상은, 변석수

분당서울대학교병원 비뇨기과

배경: 복잡도가 높은 낭성 신 종양을 부분적으로 절제하는 것은 높은 수준의 수술적 기술을 요구한다. 신문부에 위치하고 크기가 큰 낭성 신 종양을 로봇으로 절제하는 비디오를 통해서 복잡도가 높은 낭성 신 종양을 보다 효과적으로 부분 절제 하는 기술을 공유하고자 한다.

증례: 54세 여성으로 복부 통증을 주소로 내원하여 시행한 컴퓨터 단층촬영에서 좌측 신장 전면부를 대체하고 있는 13 cm 크기의 낭성 병변을 확인하였으며 조영 증강되는 고형 병변이 있어 낭성 신장암의 가능성이 높음을 것으로 판단하여 보조 신 부분 절제술을 시행하였다. 통로 배치는 본원의 독창적인 방식을 그대로 이용하였는데 네번째 팔이 환자의 머리쪽 중앙선 근방에서 들어와 수술 중 당김기로서 역할을 충실히 수행하는 것이 특징적이다. 낭성 신 종양은 바늘의 위험이 있어 섬세한 수술이 필요하지만 비교적 정상 신 실질과 유연적으로 경계가 잘 구분되는 유리한 점이 있다. 전체 시 경계가 잘 확인되는 부분에서 시작하여 종양의 가장 피막을 따라 섬세하게 박리하는 것이 필요하다. 큰 종양의 경우 종양을 잘 절제하는 것도 중요하지만 절제 후 정상 실질의 단면이 크게 노출되기 때문에 절제 전부터 통합 방법에 대해 미리 계획을 세워야 한다. 특히 신문부 종양의 경우 중요한 구조물들로 인해 단면의 통합이 제한되므로 절제시 주변의 해부학적 구조물을 확인하고 보존하면서 종양을 판통하는 혈관을 결합하여 이후 불필요한 단면 통합의 필요성을 줄이는 것이 필요하다.

종양을 절제하고 난 이후에는 노출된 집뇨 시스템과 정맥에 대한 통합을 적절하게 시행하고 가능하다면 조기 디클램프 (early declamp) 하여 혈류 시간을 최소화하고 출혈의 위험을 최소화하여 보는 것이 필요하다. 이를 통해 단면을 완전히 닫아주는 것이 좋은 경우 더 유리한 절제가 가능해질 수 있는데, 단면을 완전히 닫아주는 것이 주요 구조물을 물리적으로, 또 기능적으로 보존하는데 치루는 영상을 고려해야 한다. 또한 출혈 조정에 대한 안전성까지 종합적으로 감안하여 완전히 통합하기, 아니면 단면을 노출한 상태에서 단면부의 출혈만 조절할지 여부를 결정하면 된다. 단면에 빈 공간이 발생할 경우 필요한 지혈제를 적용할 수 있다. 본 증례의 출혈정량시간은 24분이었고, 술 후 4일째 혈형중이 없이 퇴원하였으며 최종 병리 결과는 중앙뇌로 신장암으로 확인되었다. 수술 후 6개월째 활성한 단일방사발출 전산화단층촬영에서 좌측 신 기능이 잘 보존됨을 확인할 수 있었다.

결론: 본원에서는 신 종양 환자에서 부분 절제술이 가능할 것을 판단하는 경우에는 로봇 수술법을 적극적으로 활용하고 있다. 낭성 종양이거나 높은 복잡도의 종양의 경우에도 로봇수술을 원활하게 시행하고 있으며, 선택된 증례에서 개복 수술과 비슷한 수술적 결과를 보이고 있다.

Keywords: Robot assisted surgery, Complex renal mass, Partial nephrectomy
거대 복합 낭종성 신장 종양에 대해 로봇을 이용한 부분신절제술을 시행한 보고

나준채1, 김진우1, 박지수1, 안현규1, 강승구1, 이형호3, 윤영은4, 홍성준1,2, 한웅규1,2
1연세대학교 의과대학 비뇨기과학교실, 2Brain Korea 21 PLUS Project for Medical Science, Yonsei University, 3국립건강보험공단 일산병원 비뇨기과, 4한양대학교 의과대학 비뇨기과학교실

서론: 부분신절제술은 종양학적으로 근치적신절제술과 동등한 예후를 보인다고 생각되면서 신기능 보존에 더 유리하여, 최근 크기가 작은 신장종양에 대하여 표준 술식으로 자리잡고 있다. 하지만 종양이 크거나 기술적으로 어려운 위치에 있을 경우 부분신절제술을 시행하기 어려운 경우가 있다. 저자들은 신혈관 및 신우에 접해 있는 거대 복합 낭종성 신장 종양에 대하여 시행한 로봇을 이용한 부분신절제술에 대하여 보고하고자 한다.

증례: 환자는 45세 여성인 것으로 개복 수술 뿐만한 과거력 이외에 특이 과거력 없었다. 수술 전 CT에서 좌측 신장 하부에 4.6 cm 크기의 복합 낭종성 신장 종양(Bosniak III)이 관찰되었으며 신문에 접해 있었다. 좌측 신우의 팽창 소견이 관찰되었고, 종양으로 인해 신우-요관 폐색 의심되었다. 신장 동-정맥의 분지가 종양 앞쪽으로 정하여 주행한 후 신장으로 들어가는 양상이었다. 로봇을 이용한 복강경 부분신절제술을 시행하였으며, 콘솔시간 74분, 혈액시간 29분, 출혈량 20 cc였다. 조직병리결과 multilocular cystic renal neoplasm of low malignant potential이었으며 종양 경계 경계에서 암이 관찰되지 않았다. 수술 도중과 수술 후 합병증 없이 퇴원하였으며, 3개월 후 시행한 CT에서 요관 폐색이 호전된 소견 외 특이사항 없었다.

Keywords: Robotic partial nephrectomy, Huge complex cystic renal mass
목적: “단일공 수술”은 배꼽 주위의 단일 절개를 이용하는 복강경 수술 기법을 지칭한다. 복강경 단일공 수술을 위해 새로 운 기구들이 개발되었지만, 이들은 대개 동작 범위가 제한되고 기구들끼리 충돌하여 수술의 난이도를 높인다는 선천적인 단점이 있다. 이러한 단점을 극복하기 위해 본원에서는 다빈치 수술 시스템(Intuitive Surgical Inc., Sunnyvale, CA, USA)을 이용한 로봇 단일공복강경 수술을 보고한 바 있다. 일부 제한적 관절 움직임이 허용되는 새로운 Xi 시스템을 사용한 단 일공복강경 수술로봇기구가 개발됨에 따라서 이를 활용하여 처음으로 4 cm보다 큰 신장중양에 대하여 복강경단일공 부분신절제술을 시행하였고 이를 소개하고자 한다.

방법: 환자의 자세는 일반 로봇 부분신절제술과 동일하다. 제대의 상방 변연을 2.2 cm 절개한 후 단일공포트를 삽입하였다. 단일공포트는 한 개의 8.5 mm 복강경용 투관침과 두 개의 5 mm 부속 투관침을 다중채널에 위치시켜 고정시켜 확립하였다. 보조를 위해 12 mm 투관침을 단일공 다중채널 포트 옆에 위치시켰다. 로봇을 도킹한 후 수술 방법은 기존의 multi-port 로봇 부분신절제술과 유사하였다.

결과: 환자는 52세 남성었으며, CT에서 신세포암이 의심되는 4.7 cm 크기의 신종양이 우측 신장에 관찰되었다. 콘솔 시간은 120분이고 허혈 시간은 30분이었다. 출혈량은 100 ml 가량이었으며, 수술 도중과 수술 후 합병증은 없었다. 진단병리 결과 clear cell type, Fuhrman grade 3였으며 종양의 절제 경계에서 암이 관찰되지 않았다.

결론: 새로 개발된 Xi 다빈치 시스템의 로봇 단일공복강경(LESS)을 사용하여 신장부분절제술이 구현가능하며 안전하다는 것을 보여주었다.

Keywords: Robotic LESS partial nephrectomy, Single-site surgery, Large renal tumor
신세포암에서 "double loop tourniquet"을 이용한 복강경하 하대정맥 혈전제거술

정현철, 성재우, 양종협, 조신제, 강성민, 문형우, 이규원, 배용진, 박용현, 조혁진, 하유신, 이지열, 김세웅, 홍성후
가톨릭대학교 서울성모병원 비뇨기과학실

Introduction: Renal cell carcinoma (RCC) with vascular involvement in renal vein or inferior vena cava (IVC) can be seen 4% to 36% of cases. Despite advances in laparoscopic surgery, IVC thrombectomy using laparoscopy is still a technically challenging. In our study we report a case of IVC thrombectomy with double loop tourniquet technique.

Materials and Methods: 61-years old female presented with incidental renal mass. The CT scan showed 8 cm sized exophytic, markedly heterogeneous enhancing mass involves right lower pole, extending to the right renal vein and infradiaphragmatic IVC. There were multiple slightly enlarged lymph nodes in the retrocaval and aorto-caval space. All procedures were performed transperitoneally. Bowel was mobilized and renal artery was ligated. Thrombus was managed by sequential clamping of the lower IVC, contralateral renal vein, and cephalad IVC, along with mobilization of the IVC and occlusion of lumbar veins, allowing for vascular isolation. Vascular clamping was performed with double-looped vessel loops and clips around vessels, "double loop tourniquet". Radical nephrectomy was completed with standard laparoscopy.

Results: The operative time was 140 minutes and IVC clamping time was 17 minutes. Estimated blood loss was 200 cc. Hemodynamics were stable during IVC clamping and there were no perioperative complications. The patient was discharged well on POD 5. The pathology showed pT3bN0M0, Fuhrman grade was III, and cell type was clear cell RCC. Surgical margin was negative.

Conclusion: Laparoscopic IVC thrombectomy is still a complex and technically demanding surgery. Double loop tourniquet technique is safe and effective method for laparoscopic IVC thrombectomy to improve the perioperative outcomes in selected patients.

Keywords: Renal cell carcinoma, Thrombectomy, Laparoscopy
단일신 환자에서 로봇 보조 복강경하 부분신절제술의 증례보고

서영은, 유영동, 황진호, 이영주, 김정준, 이학민, 오종진, 정성진, 홍성규, 이상은, 변석수

For the management of patients with small renal tumor, robot-assisted laparoscopic partial nephrectomy (RALPN) provides similar oncological control as radical nephrectomy (RN) and is superior to RN especially in single kidney patients by preventing hemodialysis, which can deteriorate patient’s quality of life significantly. The main obstacle of RALPN is to resect the tumor in a bloodless field within a limited warm ischemia time (WIT), followed by hemostatic renorrhaphy under restricted area. Therefore, RALPN remains challenging to even highly experienced surgeon.

Here we report a case of 55-year-old man, who underwent right radical nephrectomy due to renal cell carcinoma (RCC), referred to the urology department because of a 4.8 cm size left mid pole renal mass that was found incidentally by computed tomography (CT) during the routine examination. The renal mass was diagnosed as renal cell carcinoma with negative surgical margin in pathological exam. The WIT was 23 minutes and no complications or reoperations were observed after operation. The aim of this report is to present our case of RALPN in a single kidney patient.

Keywords: Robotic, Solitary kidney, Partial nephrectomy
소아 수신증 평가에서 3차원 자동화 초음파 부피계산 프로그램(SonoAVC)과 2차원 초음파영상 계산방법의 예비 비교 연구

송상훈, 김휘우, 이종필, 이상민, 안동현, 김건석
울산대학교 서울아산병원, 울산대학교 의과대학 비뇨기과학교실

목적: 신장 초음파검사에서 발견되는 수신증 정도와 등급평가를 위해서 다양한 객관적인 측정방식이 소개된 바 있다. 이 연구에서는 3차원 자동화 초음파 부피계산기(SonoAVC)를 이용한 수신증 정도의 평가능성을 알아보고 기존의 2차원 적인 평가방식과 비교하고자 한다.

대상 및 방법: 본원에서 상/복부 초음파를 시행 받은 환자 중 다양한 정도의 수신증을 보이는 10명의 소아를 대상으로 3차원 자동화 방식을 사용하는 SonoAVC (Automatic Volume Calculation: GE Healthcare, Milwaukee, WI) 프로그램을 이용하여 3차원 초음파 검사를 시행하였다(Figure 1). 2차원적 수신증의 평가는 SFU 등급, 신실질 대 수신증 면적비(renal parenchyma to hydronephrosis area ratio, RPHR)를 이용하여 평가하였다. SonoAVC로 측정된 신장내 수신증 부피를 Virtual Organ Computer Aided AnaLysis (VOCALTM)프로그램을 이용하여 측정한 신장 부피로 나누어 신장부피대비 신장내 수신증 부피의 비율(hydronephrosis to kidney volume, HKV)을 구하였다. SonoAVC 평가의 재현성은 intraclass correlation coefficients (ICC)로 계산하였다.

결과: 대상 환아 10명의 연령 중위수는 2.5개월(출생 1일-24개월)이고 모두 남아였다. SonoAVC로 2번 이상 반복 측정한 10개의 부피 세트를 대상으로 구한 ICC는 0.990 (p<0.0001)로 매우 높은 신뢰도를 보였다. 수신증 SFU 등급대비 RPHR과 HKV의 분포는 Figure 2와 같았다.

결론: SonoAVC를 이용한 소아 수신증의 부피 측정은 재현성이 매우 높으며 수신증의 정도를 쉽고 빠르게 객관적으로 사각화 및 수치화하여 보여주므로 의료진간의 의사 소통 및 환자 보호자에 대한 객관적 설명에 도움이 될 수 있는 방식으로 판단된다. 향후 수신증 평가에 유용한 방식으로 받아들여지기 위해서는 다양한 수신증 환자를 대상으로 한 추적관찰 연 구가 필요하다.

Keywords: Hydronephrosis, Three-dimensional ultrasound, Kidney, SonoAVC
신우요관 성형술 후 초기 수술적 평가 및 관리에 신실질 대 수신증 면적비(renal parenchyma to hydronephrosis area ratio)의 역할

한재현, 이상민, 이종필, 안동현, 김휘우, 김건석, 송상훈
울산대학교 서울아산병원 비뇨기과학과실

목적: 신우 요관 협착으로 신우 성형술을 받은 후 요로 폐색 및 신기능을 평가하는 것은 매우 중요하다. RPHR이 수신증의 평가를 하는 정확한 도구로 신우성형술 시행한 후 초기 수술적 평가에 기여하는지의 여부에 대해서 알아보고자 한다.

대상 및 방법: 본원에서 2001년부터 2016년 6월까지 신우 요관 협착에 대해서 신우 요관 성형술을 시행받은 20세 미만의 환자는 203명이었다. 이 중 수술전후 배설성 신주사 검사(MAG3 renal scan)를 시행하고 6개월 이상 초음파로 추적관찰을 시행하였으며 방광요관 역류가 없고 단일신이 아닌 환자 186명을 대상군으로 하여 수술 전, 수술 후 3개월, 수술 후 6개월, 수술 후 12개월의 신장 초음파를 비교하였다. RPHR은 PACS 프로그램을 이용하여 신장의 평형면에서 장축을 중심으로 측정한 수신증의 면적을 신실질의 면적으로 나눈 비율로 계산하였으며 수신증 인덱스(HI), SFU 등급, 신우전후직경으로 수신증의 호전을 함께 평가하였다.

결과: 전체 환자는 186명으로 남아는 145명(74.4%)이었고 135명(70.7%)이 산전 수신증을 진단받았다. 술전 수신증의 등급은 SFU 3등급이 35명(18.8%), 4등급이 151명(81.2%)이었으며 평균 상태 신기능은 43.2% (5.5-87.5)였다. 술전 및 술 후 추적관찰에서 평균 상태 신기능은 43.3%에서 12개월 후 44.3%로 큰 차이가 없었으나 신주사 반감기를 20분 이상의 신주사 검사로 시행한 환자에서 91.4%에서 41.1%까지 감소하였다. 환자의 수술 후 실패를 수술 후 배설성 신주사 검사로 시행한 상태 신기능이 수술 전보다 10%이상 감소하였을 때로 규정하였을 때 20명의 환자(10.8%)가 수술실패에 포함되었다. RPHR 및 SFU 등급, 신우 전후직경, 수신증 인덱스의 역수로 수술실패에 대한 예측력으로서 ROC 곡선을 확인하였을 때 수술전 RPHR이 수술 실패를 상대적으로 잘 예측할 수 있었다(AUC 0.713; 95% CI, 0.613-0.814) (Fig). RPHR의 Cut off value는 1.127로 특이도와 민감도는 72.7%, 64.8%이었다. 이 분형 로지스틱 회귀분석으로 치료 실패에 영향을 주는 요인을 분석하였을 때 수술 전 RPHR이 치료 실패를 결정하는 유의한 인자로 확인되었다(권=0.006, Exp(B)=2.050).

결론: RPHR은 전통적인 SFU 등급 및 신우 전후직경 등보다 신우성형술을 시행한 후 초기 수술적 치료 결과에 관한 예측 인자로서 유용하게 사용될 수 있다.

Keywords: RPHR, Pyeloplasty, Hydronephrosis
O-093

1세 미만 신우성형술에서 술전 역행성조영술의 가치

백민기
성균관대학교 의과대학 삼성서울병원

Introduction and Objectives: There is variability among surgeons in the use of retrograde pyelography (RGP) during pediatric pyeloplasties. Pyeloplasty for infants is performed usually in open technique with a small incision, thus associated ureteral anatomy which influence the surgical outcome might not be detected through the small incision. Our aim was to review the impact of RGP during open pyeloplasty in infants.

Methods: We retrospectively reviewed the perioperative parameters of pediatric patients who underwent RGP and pyeloplasties by a single surgeon from February 2016 to April 2017 with emphasis on the ureteral anatomy.

Results: From a total of 21 pediatric open pyeloplasties during this time period, 21 cases were analyzed after the exclusion of 1 re-do case. All of 20 cases included pre-operative RGP’s. Ureteral abnormalities were noticed in 3 of 20 RGPs (15.0%), which included concomitant ureterovesical junction narrowing (n=1), multiple narrowing segments at upper ureter (n=1), and marked redundancy of ureter (n=1). The success rate as defined by decreasing hydro-nephrosis was assessed with post-operative follow-up of at least 1 month was 95.0% (19/20). The one failure case was associated with the marked redundancy of ureter on preoperative RGP.

Conclusions: Preoperatively diagnosed ureteral abnormalities were seen in 15.0% of infant pediatric pyeloplasty cases. Peri-operative RGP’s provide anatomical ureteral anatomy details that were not previously seen.

Keywords: Ureteropelvicjuncion obstruction, Retrograde pyelography, Pyeloplasty
신우요관이행부협착 소아환자에서 신우형성술 중 역행성 신우충만을 통해 확인한 교차혈관의 특징분석

강승구¹, 김성훈², 이초녕², Gilbert Khoyo Marabi¹, 김상운¹, 한상원¹, 이용승¹

¹연세대학교 의과대학 비뇨기과학 교실, ²세브란스 어린이병원 소아비뇨기과

목적: 교차혈관의 존재는 소아 및 청소년의 신우요관이행부폐쇄의 흔한 원인이다. 하극신으로 자나가는 신동맥이 주요원인으로 알려져 있으나, 신우와 요관은 요량에 따라 크기와 모양이 변할 수 있으므로 영상의학적 진단에는 어려움이 있다. 또한, 수술 중 신우요관이행부 근처를 지나는 혈관이 있는 경우에도, 그 혈관이 폐쇄를 일으키는 혈관임을 확인하는 방법은 존재하지 않았다. 본 연구목은 신우형성술 중 역행성으로 신우를 충만시키면서 교차혈관에 의해 신우요관이행부 폐쇄가 생기는 지 여부를 확인하고 있으며, 이에 대한 분석을 통해 교차혈관의 특징을 분석하려 한다.

대상 및 방법: 2015년 1월부터 2017년 6월까지 본원 소아비뇨기과에서 단일 술자에 의해 만 2-18세에 복강경 혹은 로봇 신우형성술을 시행받은 환자를 대상으로 후향적 분석을 하였다. 수술 전 역행성 신우요관조영술을 시행한 후, 중부요관에 요관카테터를 위치시킨 후, 복강경 혹은 로봇 수술 도중, 요관카테터를 통하여 역행성으로 섭염수를 주입하여 신우가 팽창하는 모양을 확인하였다. 이 때 혈관에 의해 신우요관이행부가 꺾이는 경우, 교차혈관으로 정의하였으며, 혈관의 특성을 분석하였다.

결과: 해당기간 중, 50명의 환자가 수술을 받았으며, 수술연령의 중위값은 7.1세(QQR 5.7-9.2)였고. 수술의 적응증은 수신증의 악화나 분비기능이란 감소가 17명(34%), 반복된 요로감염이 3명(6%), 반복적 측복통의 존재가 30명(60%)이었다. 수술 중 역행성 섭염수 주입 시, 25명(50%)이 교차혈관에 의한 신우요관이행부협착으로 확인되었다. 25명 중 14명(56%)에서 하극신으로 가는 동맥에 의해, 11명(44%)에서는 생식선동맥-정맥다발에 의해 신우요관이행부 협착이 확인되었다. 교차혈관이 확인되었던 25명 중, 술 전 CT나 MRI가 시행된 경우에는 16명 있었으며, 이 중 6명(37.5%)에서 교차혈관이 의심되었다. 또한 25명의 환자 중, 출생 후 수신증으로 추적을 받던 환자 중 수술을 하게 된 경우는 14명(56%)이었으며, 수신증이 처음 발견되었던 환자는 11명(44%)이었다.

결론: 교차혈관을 수술 전 영상의학적으로 진단하는 것은 어려우며, 술 중 신우를 팽창시키는 방법은 교차혈관의 존재를 확인하는 데에 도움이 될 것으로 판단된다. 하극신으로 자나가는 신동맥 뿐 아니라, 생식선 동맥-정맥다발에 의한 교차혈관도 높은 비도로 관찰이 되었다.

Keywords: Hydronephrosis, Ureter, Kidney

![Image]
양측 신우성형술 시행 후 장기추적 결과

임영재, 박관진
서울대학교 의과대학 비뇨기과학회

목적: 양측 신우관이행부 협착으로 신우성형술을 시행한 환아들은 신장관련 합병증의 위험성이 더 높을 것으로 예상되나, 아직까지는 이에 대한 보고는 없는 실정이다. 저자들은 영유아시기에 양측 신우성형술을 시행한 환아들의 장기추적 결과를 알아보고자 하였다.


결과: 21명중 양측 신우성형술 후 10년이상 추적관찰이 가능했던 환자는 총 12명이었다. 남아가 10명이었고, 처음 신우성형술로 우측을 시행한 환아가 6명이었다. 첫 번째 신우성형술 시행 시 평균나이는 5.5개월(0.2~19.0)이었고, 두 번째 신우성형술 시행 시 평균나이는 9.8개월(3.2~31.8)이었다. 두 번째 수술 시행 후 평균 추적관찰기간은 18.4년(13.1~28.3)이었다. 12명 중 고혈압이 발생한 환자는 3명(25%)이었고, 단백뇨도 3명(25%)에서 발생하였다. 2명에서는 고혈압과 단백뇨가 같이 발생하였다. 고혈압이나 단백뇨가 발생한 환자군(4명)과 정상환자군(8명)을 비교하였을 때, 첫 번째 수술 시행 나이, 두 번째 수술까지의 간격은 유의한 차이가 없었다(p=0.674, 0.519). 첫 번째 신우성형술을 시행한 신장의 수신중등급(SFU)은 고혈압-단백뇨군에서 3.8, 정상군에서 3.5로 역시 차이가 없었다(p=0.453). 한편 첫 번째 수술 전, 두 번째 수술 전 그리고 두 번째 수술 후 혈중 크레아티닌 수치를 확인한 결과 고혈압-단백뇨군에서는 각각 0.67 mg/dl, 0.57 mg/dl, 0.55 mg/dl였고, 정상군에서는 각각 0.5 mg/dl, 0.5 mg/dl, 0.66 mg/dl로 모두 유의한 차이는 없었다(p=0.208, 0.751, 0.638). 수술 후 더 많이 감소된 상대적 신기능 수치는 고혈압-단백뇨군에서 평균 28.5%였고, 정상군에서 33.9%로 5%이상의 차이를 나타냈지만, 통계적인 유의성은 없었다(p=0.577). 특정적으로 고혈압-단백뇨 화자 4명 중 2명에서 재수술을 시행했으며, 1명에서는 첫 번째 수술 전, 동측의 신장에 신루설치술을 시행하였다. 반면에 정상환아 8명 중 3명에서 신루설치술을 시행했는데, 첫 번째 신우성형술과 반대측 신장에 신루설치술을 시행하였다.

결론: 양측 신우성형술을 시행 받은 환아들은 편측 신우성형술 화자보다 고혈압과 단백뇨가 발생할 확률이 상대적으로 높게 나타났다. 이에 영향을 주는 인자들은 아직까지 명확하지 않으나, 신루설치술과 재수술 여부가 중요한 인자가 될 것으로 생각된다. 결론적으로 양측 신우성형술을 시행한 경우에는 혈압측정 및 소변검사와 함께 장기적인 추적관찰이 반드시 필요하다.

Keywords: Pyeloplasty, Hypertension, Proteinuria
Impacts of asymptomatic pyuria and vesicoureteral reflux (VUR) grade on the developing of post-voiding dystourethrogram (VCUG) urinary tract infection (UTI)

Jeong Hoon Oh, Sumin Son, Ji Won Ryu, Seong Jong Eun, Jong Bum Kim, Yang Hyun Cho, Myung Soo Kim, Ho Seok Chung, Eu Chang Hwang, Kyung Jin Oh, Seung Il Jung, Taek Won Kang, Dong Deuk Kwon, Kwangsun Park, Sun-Ouck Kim

전남대학교 의과대학 비뇨기과학실

Introduction: Voiding cystourethrography (VCUG) is gold standard test to identify the anatomical causes of urinary tract infection (UTI) in children. However, exact criteria in terms of pyuria on urine analysis before performing VCUG is not established. In this study, we evaluate the impact of asymptomatic pyuria and vesicoureteral reflux (VUR) grade on the developing post-VCUG UTI.

Methods: We retrospectively reviewed medical records of 430 children ≤2 years of age who underwent VCUG and diagnosed as VUR. Pyuria was defined as the presence of 5 or more white blood cell (WBC) per high-power field of the urine collected. Post-VCUG UTI was defined as the presence of 100,000/mL or more colonies of single bacteria at urine culture with fever. Prophylactic antibiotic (Cefprozil dry syrup (15 mg/kg) per 12 hrs, 3 days from test day) was used to every patient before performing the VCUG.

Results: Pyuria was found in 81 children and 349 children showed clean urine. Post VCUG-UTI was developed in 42 children. Age, gender, laterality, VUR grade and pyuria at VCUG were not significantly associated with post-VCUG UTI (P>0.05).

Conclusions: Asymptomatic pyuria and VUR grade were not associated factor with post-VCUG UTI. Therefore, VCUG is considered to be safe in children with non–symptomatic pyuria in terms of developing post VCUG–UTI.

Keywords: Voiding cystourethrography, Pyuria, Vesicoureteral reflux

<table>
<thead>
<tr>
<th>Table 1: Clinical characteristics of children according to pyuria at VCUG</th>
</tr>
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<tbody>
<tr>
<td>Variables</td>
</tr>
<tr>
<td>Total Patient</td>
</tr>
<tr>
<td>Age</td>
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<tr>
<td>Age ≤ 1</td>
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<tr>
<td>Gender</td>
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<tr>
<td>Male</td>
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<tr>
<td>Female</td>
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<tr>
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<tr>
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<tr>
<td>Bilateral VUR</td>
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<td>Pyuria at VCUG</td>
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<td>Pyuria at VCU</td>
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<td>Pyuria at VCUG &amp; VCU</td>
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</tbody>
</table>

Unless indicated otherwise, data are given as the number of patients in each group, with the percentage given in parentheses.

Table 2: Clinical characteristics with post-VCUG UTI

<table>
<thead>
<tr>
<th>Variables</th>
<th>VCUG</th>
<th>VCU</th>
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</thead>
<tbody>
<tr>
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<tr>
<td>Gender</td>
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<tr>
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<td>147</td>
<td>147</td>
</tr>
<tr>
<td>VUR grade</td>
<td>147</td>
<td>147</td>
</tr>
<tr>
<td>Pyuria at VCUG</td>
<td>147</td>
<td>147</td>
</tr>
</tbody>
</table>

Unless indicated otherwise, data are given as the number of patients in each group, with the percentage given in parentheses.
O-097

방광요관역류로 수술받은 환아들에서 신반흔과 돌파요로감염의 위험인자들
변혜진, 심택준, 하지용, 정원호, 김병훈, 박철희, 김천일
계명대학교 의과대학 비뇨기과학교실

Purpose: To determine risk factors providing predicting renal scar and preoperative breakthrough urinary infection (UTI) in patients underwent anti-reflux procedures for primary vesicoureteral reflux (VUR).

Material and Methods: We retrospectively reviewed the medical records of 78 patients who underwent operation for VUR at our institution between January 2002 and December 2016. Clinical parameters for the statistical analysis included following variables: gender, age at surgery, VUR grade, laterality, presence of constipation, occurrence of breakthrough UTI during the preoperative period, and presence of abnormal renal scan by 99mTc dimercaptosuccinic acid (DMSA). Anti-reflux procedures included endoscopic injection and ureteral reimplantation. These parameters were analyzed according to the renal scar presence and preoperative breakthrough UTI (table).

Results: The mean age was 20.9±14 months (4-60) and the male to female ratio was founded 64/14. There were DMSA abnormalities in 46 of the 78 patients (58%). Cortical defects occurred more frequently in children with constipation (p=0.020). However, VUR grade was not associated with renal scarring (p=0.404). Female gender (p=0.027), young age (p=0.049), presence of constipation (P=0.03) were founded as the predicting factor for breakthrough UTI.

Conclusions: Renal scar and breakthrough UTI affect the decision of surgery in patients treated for VUR. Renal scar rates increases with presence of constipation while breakthrough UTI increases with female gender, young age, presence of constipation. These risks should be considered while planning the treatment for VUR.

Keywords: Vesicoureteral reflux

Withdrawal
Impact of de novo vesicoureteral reflux on transurethral surgery outcomes in pediatric patients with ureteroceles

송상훈¹, 이동현¹, 김휘우¹, 이종필¹, 이상민¹, 안동현¹, 박성찬², 김건석¹
¹울산대학교 서울아산병원, 울산대학교 의과대학 비뇨기과학학교실, ²울산대학교병원, 울산대학교 의과대학 비뇨기과학학교실

**Purpose:** We aimed to determine the impact of de novo VUR on postoperative urinary tract infection (UTI) and renal function in pediatric patients with ureteroceles.

**Materials and Methods:** We retrospectively reviewed the medical records of 34 patients with ureteroceles treated endoscopically. Pre- and post-operative radiological and clinical data regarding de novo VUR, UTI and renal function were analysed. Logistic regression analysis was used to identify factors that predicted unfavorable surgical outcomes, such as primary surgical failure, postoperative UTI, or deterioration of renal function.

**Results:** Of the 34 patients (36 renal units), 22 had a duplex system (61.1%). Preoperative VUR was noted in 8 patients (22.2%), including 3 patients without renal duplication. Endoscopic surgery successfully decompressed the ureterocele and hydronephrosis in 29 patients (85.2%). De novo VUR developed in 18 renal units (50%) post-operatively. The absence or presence of de novo VUR was not related to unfavorable surgical outcomes by univariate or multivariate analyses. Even after selecting for the 28 renal units without preoperative VUR, the occurrence of de novo VUR had no predictive value for unfavorable surgical outcomes. Moreover, among the 14 renal units without renal duplication, de novo VUR had no predictive value for any of these adverse outcomes.

**Conclusion:** After endoscopic ureterocele puncture, de novo VUR is highly prevalent, but not significantly associated with postoperative UTI or renal functional deterioration in the long term. It may therefore be necessary to perform lower urinary tract reconstruction routinely to correct de novo VUR after endoscopic puncture of the ureterocele.

**Keywords:** Ureteroceles, Vesicoureteral reflux, Endoscopy, Punctures, Urinary tract infections
정계정맥류 수술 중 시행한 정맥조영술에서 bahren system을 이용한 수술 실패의 주요 원인 분석

오경택1, 김성훈2, 이초녕2, Gilbert Khoyo Marabi1, 김상운1, 한상원1, 이용승1
1연세대학교 의과대학 비뇨기과학부, 2세브란스여린이병원 소아비뇨기과

목적: 청소년 환자의 정계정맥류 수술에서, 내정계동맥을 보존하는 방법은 고환의 보상성 비대 측면에서 장점이 있을 수 있으나 수술성공률이 떨어질 수 있다는 단점이 있다. 이러한 단점을 극복하기 위하여 술 중 역행성 정맥조영술을 시행하기도 하는데, 이는 육안으로 확인하지 못한 정맥을 확인하거나, 정맥여부가 확실치 않은 동맥, 임파선 등을 판별할 수 있는 방법이다. 정계정맥수술 중 시행한 정맥조영술을 통하여, 수술 실패의 주요 원인을 분석하고자 한다.

대상 및 방법: 2005년 1월부터 2016년 12월까지 본원에서, 만 20세 이전에 정계정맥류로 수술을 시행받고, 6개월 이상 추적 받은 환자들을 대상으로 후향적 분석을 시행하였다. 내정계정맥을 결찰한 후 시행한 술 중 정맥조영술을 통하여, 결찰되지 않고 남아있는 정맥을 Bohren type으로 분류하였다.

결과: 해당기간 총 156명에서 정계정맥류 수술 중 정맥조영술이 시행되었다. 147명(94.2%)은 일차수술이었으며, 9명(5.8%)은 재수술이었다. 이 중 개복수술은 5명의 술자에 의해 107명(68.6%)에서, 복강경수술은 1명의 술자에 의해 49명(31.4%)에서 시행되었다. 수술 시 연령은 평균 13.5±2.5세였다. 50명(32.1%)에서 정맥결찰 후 시행한 술 중 정맥조영술에서 남아있는 정맥이 관찰되었다. Bohren type 3의 경우가 45명(90.0%), Bohren type 4의 경우가 5명(10.0%)에서 관찰되었다. Bohren type 3는 내정계정맥과 평행하게 주행하는 정맥들이 남아있는 경우이고, Bohren type 4는 좌측신장으로 주행하는 외정계정맥이 존재하며 내정계정맥과 연결이 있었던 경우이다(Fig. 1). 한편, 수술 후 재발은 총 5명(3.2%)에서 있었고, 그 중 술 후 지속되었던 경우가 1명(0.6%), 재발되었던 경우가 4명(2.6%)이었다. 본원 혹은 타병원에서 일차수술을 받고, 재수술한 9명에서 Bohren type 4는 관찰되지 않았으며, 전례에서 내정계정맥이 관찰되어 결찰하였으며, 다시 재발하는 경우는 없었다.

결론: 정계정맥류 수술에서 수술실패의 가장 큰 원인은 내정계정맥을 남겨두는 것이며, 이는 원위부에서 수술을 하거나, 숙련도가 높아지면서 극복될 수 있는 문제로 판단된다. 상부에서 내정계정맥과 합쳐지는 외정계정맥의 존재는 약 3.2%에서 존재하며, 이것은 정맥조영술을 시행하지 않으면 확인되기 어려운 구조로 판단되며, 이에 대한 임상적 의의에 대해서는 추가연구가 필요하다.

Keywords: Varicocele, Phlebography, Testis
Pathologic analysis of the testis in patients with postpubertal cryptorchidism

정재민, 이승수, 이동훈, 한지연, 남종길, 박성우, 정문기, 이상돈
부산대학교 의과대학 비뇨기과학실

**Purposes:** It has been difficult to establish an optimal treatment strategy for postpubertal cryptorchidism. Unlike cryptorchidism in children, postpubertal cryptorchidism is associated with an increased probability of neoplasms, which has led orchiectomy to be the recommended treatment. To better understand the pathology associated with the postpubertal cryptorchidism, we reviewed our experience regarding the pathologic analysis of the postpubertal cryptorchidism.

**Materials and Methods:** A retrospective review was performed of all consecutive patients with postpubertal cryptorchidism undergoing orchiectomy at our hospital between 2009 and 2017. Patients who have congenital cryptorchidism were included in this analysis. Patients who have secondary cryptorchidism or performed orchiopexy were excluded in this analysis.

**Results:** Eight patients underwent orchiectomy for the postpubertal cryptorchidism. Patient age ranged from 25 to 60 years. 5 patients (62.5%) had left side cryptorchidism. Total excised mass volume ranged from 0.27 to 38.9 ml. 5 patients (62.5%) had inguinal testis, 2 patients (25%) had intraabdominal testis and 1 patients (12.5%) had streak testis. Testes were excised by 2 inguinal incisions and 2 laparoscopic operations. In 7 of the specimens (87.5%), we identified testis tissue. However, 4 testes had no viable germ cell elements, 2 azoospermia and 1 arrest of spermatogenesis. None of the excised tissue had malignant degeneration.

**Conclusions:** In our review, we identified that there was no benefit to fertility in the testis of postpubertal cryptorchidism. Therefore, if the patient anticipates no beneficial effect on fertility and is expected to have an increased risk of cancer, orchiectomy is recommended.

**Keywords:** Testis, Pathology, Postpubertal
한국에서 침습적 방광암을 가진 여자 환자에서 근치적 방광 전절제술의 추세

김승빈1, 심지성1, 홍범식2, 구자현3, 정병창4, 서호경5, 강석호1; UCART (urothelial cancer-advanced research and treatment group in Korea) group

1고려대학교 안암병원 비뇨기과학교실, 2울산대학교 서울아산병원 비뇨기과학교실, 3서울대학교병원 비뇨기과학교실,
4성균관대학교 의과대학 삼성서울병원 비뇨기과학교실, 5국립암센터 비뇨기과학교실

** Purpose:** 방광암은 남성에서 흔하며, 이에 여성에서 근침윤성방광암에 대한 근치적방광절제술은 남성보다 드물다. 근
치적방광절제술은 기술적으로 어렵고 오래 걸리며 술후 합병증률이 높아 주로 high volume center에서 이루어지고 있
는 실정이며 특히 female cystectomy에 대한 자료는 많지 않다. 이에 국내 5개병원을 대상으로 하여 최근 10년간 시행된
female cystectomy에 대한 전반적인 trend를 조사하였다.

**Materials and Methods:** 2007년 1월부터 2016년 말까지 국내 5개의 기관에서 근치적방광절제술을 시행 받은 총 285
명의 여성환자들의 자료를 후향적으로 분석하였다. 기본적인 특성, 수술과 관련된 세부사항들, 합병증 등을 분석하였다.

**Results:** 근치적방광절제술을 시행받은 여성들의 평균 나이는 66.7세였으며 증상이 발생하여 비뇨기과병원에서 첫 방광
경을 시행하기까지의 평균 시간은 약 5.7개월이었다. 황연을 한 비율은 5.6%였고, 드물게 시행 기간은 21.8일로 나타났으며
술 전 항암치료를 시행한 비율은 16.8% 였다. 10년간 대부분의 수술은 개복수술로 이루어졌으며(88.4%), 요로전환술식
은 ileal conduit이 86.3%로 가장 많았으며 정위성방광대술은 11.9%였다. organ sparing cystectomy의 비율은 15.6% 었다.
다. 103명(36.1%)에서 합병증이 보고되었으며 70명은 1달 이내에 발생했고 33명은 3달 이내에 발생하였다. Clavien grade
3 이상의 significant한 합병증은 41명(44.4%)에서 발생하였으며 wound 관련 합병증이 14건, anastomis site leakage or
stricture가 10건, hernia가 7건 순이었다.

**Conclusion:** 본 연구에서 근치적방광절제술을 시행받은 여성환자의 경우 증상이 발생하여 비뇨기과에서 방광경을 시행
하기까지의 기간이 길었고 남성에 비해 황연비용이 높았다. 대부분 ileal conduit을 시행하였고 숭전 항암치료의 비율이나
합병증 비율은 남성 근치적방광절제술과 유사하였다.

**Keywords:** Bladder cancer, Female, Cystectomy

<table>
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<th>Table 1. Baseline patient characteristics and descriptive statistics on operation</th>
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<td><strong>Baseline characteristics</strong></td>
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<td>BMI, kg/m²</td>
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<tr>
<td>Time to urological referral (months)</td>
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<tr>
<td>Risk factors exposure, (%)</td>
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<tr>
<td>None</td>
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<tr>
<td>Smoking</td>
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<tr>
<td>Radiation exposure</td>
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<tr>
<td>Not evaluated</td>
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<td>Preoperative chemotherapy, no (%)</td>
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<td>Mean operation time (minutes)</td>
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<th>Table 2. Detailed surgical descriptions on female cystectomy</th>
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<td><strong>Variables</strong></td>
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<td>Radical cystectomy method</td>
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<td>Open</td>
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<tr>
<td>Laparoscopic</td>
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<tr>
<td>Robot</td>
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<tr>
<td>Type of urinary diversion, no (%)</td>
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<tr>
<td>ileal conduit</td>
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<tr>
<td>Orthotopic neobladder</td>
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<tr>
<td>Uninephronectomy</td>
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<tr>
<td>Not evaluated</td>
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<tr>
<td>Diversion technique (if, robot or laparos.)</td>
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<tr>
<td>Extraperitoneal</td>
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<tr>
<td>Intraperitoneal</td>
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<tr>
<td>Organ sparing</td>
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<tr>
<td>Yes</td>
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<tr>
<td>No</td>
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<tr>
<td>Not evaluated</td>
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Purpose: To describe our experience with enhanced recovery program (ERP) for the patients who underwent radical cystectomy (RC) associated with high morbidity and longer length of stays than other urological surgeries.

Methods: From January 2015 to November 2016, an ERP after RC was applied on 92 consecutive patients who underwent RC in Samsung medical center. The patients who had prolonged postoperative intubation, and those who underwent extra surgery, nonconsenting patients were excluded from study. We focused on avoiding bowel preparation and nasogastric tube, preoperative nutritional support, early oral nutrition and postoperative analgesia. The outcomes were assessed including time to initiate ambulation, to pass gas out and to initiate normal regular diet (NRD) and length of stay (LOS). Complications are divided by Clavien-Dindo classification.

Results: A total of 84 patients with the median age of 67 years (interquartile range [IQR] 60–74 years) at diagnosis were included in analysis. Sixty–seven percent of patients had a bowel movement by postoperative day 3. The mean surgical time was 3.9±1.6 hours, and the mean estimated blood loss was 620.1 mL. The mean time to ambulation was 1.14±0.60 days, to flatus was 3.31±1.26 days and to initiate NRD was 6.67±1.32 days and the mean LOS was 22±8.6 days. The mean clinical T stage was 3.18±0.93, clinical N stage was 1.18±0.70 and Grade was 2.65±0.83. Thirty–five patients (41.7%) underwent neoadjuvant chemotherapy before RC. Three different techniques of RC were performed as open RC in 64 patients, laparoscopic RC in 3 patients, and robot assisted RC in 17 patients. The types of diversion were ileal conduit in 52 patients, orthotropic ileal neobladder in 29 patients, and ureterocutaneostomy in 2 patients. There was no significant difference of the time to NRD and LOS among different methods of RC and diversion. The 30–day minor and major complication rates were 38.1% and 10.7%, respectively. Of the total 41 complications, 9 were major (defined as Clavien grade 3) and 32 were minor (Clavien grade 1 or 2). The most common complication was gastrointestinal problems in 9 patients and ileus was occurred in 5 patients. To date, no overall mortality has been reported.

Conclusions: The introduction of an ERP was successful to our patients who underwent RC associated with low complication rates.

Keywords: Enhanced recovery program, Radical cystectomy, Bladder cancer
방광세척과 카테터설치를 간소화한 신방광조형술의 가능성 및 안전성

윤현석, 김광현, 송완, 윤평나, 정우식, 심봉석, 이동현

이화여자대학교 의과대학 비뇨기과학교실

목적: 근치적방광조형술 후 신방광조형술을 시행하는 경우 많은 카테터로 인하여 숭후 관리가 어려울 뿐만 아니라, 숭 후 시행하는 방광세척 과정에서 요로감염 등이 발생할 가능성이 있다. 본 연구에서는 신방광조형술에서 비위관, 요관부목, 방광루를 설치하지 않고, 숭후 방광 세척을 간소화하는 방법의 가능성 및 안전성에 대하여 연구해 보고자 하였다.

대상 및 방법: 2012년 1월부터 2017년 2월까지 단일수술자가 근치적방광절제술 및 신방광조형술을 시행한 254명을 대상으로 하였다. 모든 환자는 방광루를 설치하지 않았으며, 2012년부터 2014년 7월까지 시행한 60명의 환자(group 1)에서는 비위관 및 요관부목을 삽입하고 숭 후 하루 3회 숭 후 방광세척을 하였다. 2014년 7월부터 2015년 12월까지 시행한 80명의 환자(group 2)에서는 수술 직후 비위관을 제거하였으며 요관부목을 설치하지 않고 숭 후 하루 3회 방광세척을 시행하였 다. 2016년 1월부터 시행한 84명의 환자(group 3)는 방광세척을 최소화한 방법을 이용하였는데, 보호자에게 규칙적으로 도뇨관을 청소하게 교육하고, 3시간에 100 cc 이하로 소변량이 배출되는 경우에만 선택적으로 방광세척을 시행하였다. 각 그룹간의 수술 전 후 변수 및 합병증 등을 조사하여 비교하였다.

결과: 세 그룹 간 숭 전 나이, 성별, 체질량지수 등의 차이는 관찰되지 않았으나, 수술시간이 유의하게 감소하였으며, 수술중 출혈량 및 수혈 빈도가 유의한 차이를 보였다. 정상식이까지의 시간이나 재원 기간의 차이는 관찰되지 않았으며, Clavien–Dindo grade 3 이상의 주요합병증의 비도 또한 유의한 차이가 없었다(6.7% vs. 7.5% vs. 11.4%, P=0.493). Group 3 환자들 중 78% (89/114)는 도뇨관 제거 전까지 방광세척을 하지 않았고, 추가 방광세척을 진행한 25명 중 3회 이상 방광세척을 진행한 환자는 8명이었다. Group 3군은 요누출이 증가하였으나(1.7% vs 1.3% vs 7.9%, P=0.042), 다른 두 군에 비해 숭 후 30일 이내 발생요로감염이 감소하는 경향을 보였다(22.0% vs. 11.4%, P=0.017).

결론: 신방광조형술 시행 시 도뇨관을 제외한 비위관, 방광루, 요관부목을 모두 설치하지 않고, 숭 후 방광세척을 간소화 하는 방법을 사용했을 때 숭 후 주요합병증이나 경과에 유의한 차이가 관찰되지 않았다. 숭 후 방광세척을 간소화한 경우 요누출의 빈도는 증가하였으나, 열성 요로감염을 줄이는 효과를 기대할 수가 있었다.

Keywords: Bladder cancer, Ileal neobladder, Urinary tract Infection
O-104

근치적 방광 절제술 후 비스테로이드 소염진통제 기반 통증가조절 적용에 의한 위장관 기능 회복 효과

유영동, 황진호, 서영은, 이영주, 김정준, 이학민, 오종진, 정성진, 홍성규, 이상은, 변석수
서울대학교 의과대학 부속서울대학교병원 비뇨기과학실

Aim: To evaluate the effects of ketorolac, one of the most commonly used non-steroidal anti-inflammatory drugs (NSAIDs) as patient controlled intravenous infusion analgesia (PCIA) for the patients underwent radical cystectomy (RC) due to bladder cancer regarding several post-operational indices of recovery.

Methods: Total seventy patients underwent radical cystectomy for the treatment of bladder cancer and 35 patients received ketorolac as PCIA (NSAIDs group) while the other 35 patients had conventional morphine infusion as PCIA (morphine group). Pain intensity, bowel function recovery and length of hospital stay were evaluated. Dose of ketorolac was initial 60 mg bolus with 5 mg/h continuous basal intravenous (IV) infusion and morphine dose was initial 5 mg bolus with 2 mg/h continuous basal IV infusion.

Results: Demographic characteristics were similar between two groups, NSAIDs groups showed significant reduction in postoperative vomiting (17% vs 39%, p=0.03), time to bowel movement (3.73 vs. 5.72, p=0.03) and length of hospitalization (9.50±2.1 vs. 9.50±2.1, p=0.03) compared with morphine group. There were no statistically significant differences observed between two groups in blood transfusion requiring postoperative bleeding. For 48 hours after RC, pain relief was slightly better in morphine group, but number of patients satisfied to pain management were similar between two groups (85% vs. 84%, p=0.29).

Conclusions: Ketorolac as PCIA is relatively safe and effective in pain management. It also provided better gastrointestinal recovery with shorter length of hospitalization after radical cystectomy compared with conventional morphine based PCIA.

Keywords: Bladder neoplasm, Radical cystectomy, Postoperative analgesia

<table>
<thead>
<tr>
<th>Table</th>
<th>Demographic characteristics and surgical outcomes of the patients</th>
<th>NSAIDs group (n=35)</th>
<th>Morphine group (n=35)</th>
<th>p value</th>
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</thead>
<tbody>
<tr>
<td>Pain</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>KEPRA</td>
<td>KETOROLAC PCIA</td>
<td>30 (85.7%)</td>
<td>32 (91.4%)</td>
<td>0.811</td>
</tr>
<tr>
<td>Morphine</td>
<td>5 (14.3%)</td>
<td>5 (14.3%)</td>
<td>0.811</td>
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</tr>
<tr>
<td>Age (years), mean(SD)</td>
<td>69.6±11.9</td>
<td>68.4±11.9</td>
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<tr>
<td>BMI (kg/m²), mean(SD)</td>
<td>23.7±2.5</td>
<td>23.6±2.5</td>
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<td></td>
</tr>
<tr>
<td>Pathologic stage</td>
<td>T3</td>
<td>7 (20)</td>
<td>5 (14.3%)</td>
<td>0.665</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>26 (74.3%)</td>
<td>25 (71.4%)</td>
<td>0.887</td>
</tr>
<tr>
<td></td>
<td>Lymph node metastasis</td>
<td>12 (34.3%)</td>
<td>12 (34.3%)</td>
<td>0.991</td>
</tr>
<tr>
<td></td>
<td>Positive adhesion (cm²), mean(SD)</td>
<td>56.0±17.2</td>
<td>63.6±18.9</td>
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<td>Colonic continuity loss</td>
<td>5 (14.3%)</td>
<td>5 (14.3%)</td>
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<td>E2, n (%)</td>
<td>3 (8.6%)</td>
<td>3 (8.6%)</td>
<td>0.904</td>
</tr>
<tr>
<td></td>
<td>E2, cm (mean), SD</td>
<td>8.0±2.6</td>
<td>8.0±2.6</td>
<td>0.904</td>
</tr>
<tr>
<td></td>
<td>Surgical method</td>
<td>CEC: yes</td>
<td>3 (8.6%)</td>
<td>3 (8.6%)</td>
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<tr>
<td></td>
<td></td>
<td>ECEC: yes</td>
<td>4 (11.4%)</td>
<td>5 (14.3%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HDCEC: yes</td>
<td>17 (48.6%)</td>
<td>15 (42.9%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Radical cystectomy</td>
<td>11 (31.4%)</td>
<td>12 (34.3%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Open cystectomy, n (%)</td>
<td>8 (22.9%)</td>
<td>8 (22.9%)</td>
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<tr>
<td></td>
<td></td>
<td>Total complication rate</td>
<td>43 (100%)</td>
<td>43 (100%)</td>
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<tr>
<td></td>
<td></td>
<td>Postoperative nausea, p value</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Postoperative vomiting, n (%)</td>
<td>5 (14.3%)</td>
<td>5 (14.3%)</td>
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<tr>
<td></td>
<td></td>
<td>Postoperative sedation, n (%)</td>
<td>6 (17.1%)</td>
<td>5 (14.3%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Time to first bowel movement, p value</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Time to first bowel movement, n (%)</td>
<td>2.6±0.7</td>
<td>2.7±0.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Time to first bowel movement, hours</td>
<td>1.1±0.7</td>
<td>1.1±0.7</td>
</tr>
</tbody>
</table>

GPR: postoperative recovery, ECEC: extended radical cystectomy, IC: ileal conduit, HDCEC: ileal conduit, VGA: vascular graft anastomosis
근치적 방광 절제술 및 인공 방광 형성술 후 장 폐색을 예방할 수 있는 효과적인 방법: bowel suspension technique

송완, 윤현석, 김광현, 윤하나, 정우식, 심봉석, 이동현
이화여자대학교 의과대학 비뇨기과학교실

Purpose: To investigate the impact of bowel suspension technique (BST) on paralytic ileus and intestinal obstruction after radical cystectomy with orthotopic ileal neobladder

Materials and Methods: We retrospectively reviewed 310 patients who underwent radical cystectomy with orthotopic ileal neobladder for bladder cancer between October 2001 and April 2017. After formation of Studor orthotopic neobladder, ileal continuity was restored by end–to–end stapled anastomosis. And then, we suspended it on the posterior peritoneum not to be dropped into the pelvic cavity. Clinocopathologic characteristics of patients were examined, and onset of paralytic ileus and intestinal obstruction were identified. Logistic regression analysis was used to identify predictors associated with paralytic ileus and intestinal obstruction.

Results: Of the total 310 patients, paralytic ileus and intestinal obstruction were identified in 100 (32.3%) and 15 (4.8%) patients. When patients were divided into two groups (BST [-] vs. BST [+]), paralytic ileus was not significantly different (64/205 [31.2%] vs. 36/105 [34.3%], P=0.585). However, intestinal obstruction that required adhesiolysis was significantly decreased (14/205 [6.8%] vs. 1/105[1.0%], P=0.024). On multivariate logistic regression analysis, older age was commonly associated with paralytic ileus and mechanical obstruction (P=0.008 and P=0.016), BST was inversely associated with mechanical obstruction (95% CI: 0.01–0.85, P=0.034), but not related to paralytic ileus.

Conclusions: BST significantly reduced intestinal obstruction without increasing paralytic ileus after radical cystectomy with orthotopic ileal neobladder. These findings might be used as useful technique to reduce severe bowel complications.

Keywords: Bowel suspension, Ileal neobladder, Intestinal obstruction
근치적 방광 절제술 및 인공 방광 형성술 후 방광요관역류를 줄일 수 있는 개선된 방법: reposition of orthotopic ileal neobladder

송 완, 윤현석, 김광현, 윤하나, 정우식, 심봉석, 이동현
이화여자대학교 의과대학 비뇨기과학과실

**Purpose:** To investigate the impact of reposition of orthotopic ileal neobladder on development of vesicoureteral reflux (VUR) after radical cystectomy

**Materials and Methods:** We retrospectively reviewed 166 patients who underwent radical cystectomy with orthotopic ileal neobladder and videourodynamic examination between January 2012 and January 2017. After formation of Studor orthotopic neobladder, reposition was achieved by counterclockwise rotation to the left side, thereby the afferent limb passed from left to right wrapping ileal neobladder. Clinical characteristics of patients and videourodynamic results were examined. Logistic regression analysis was used to identify predictors associated with VUR

**Results:** Of the total 166 patients, VUR was identified in 56 (33.7%) patients. When patients were divided into two groups (reposition [-] vs. reposition [+]), VUR was significantly different (30/68 [44.1%] vs. 26/98 [26.5%], P=0.018). On videourodynamic examination, patients with VUR showed higher maximum filling pressure than those without VUR (48.5 vs. 38.6 cmH2O, P=0.004). On multivariate logistic regression analysis, maximum filling pressure was significantly associated with VUR (95% CI: 1.01–1.05, P=0.006). However, reposition of orthotopic ileal neobladder was inversely associated with VUR after radical cystectomy (95% CI: 0.22–0.85, P=0.016).

**Conclusions:** Reposition of orthotopic ileal neobladder significantly reduced VUR after radical cystectomy. Further studies are required to evaluate its effects on renal function

**Keywords:** Ileal neobladder, Reposition, Vesicoureteral reflux
The incidence of robot-assisted radical cystectomy complications according to body mass index: multicenter study from Korea

정재우1, 양종협1, 조신제1, 이규원1, 장현철1, 최진봉1, 박용현1, 권태훈2, 나군호3, 이영구4, 정병창5, 강석호6, 이지열1

1가톨릭대학교 서울성모병원 비뇨기과학교실, 2경북대학교병원, 3연세대학교 의과대학 신촌세브란스병원, 4한림대학교 강남성심병원, 5성균관대학교 의과대학 삼성서울병원, 6고려대학교 안암병원

Objective: The objective of this study was to describe the complications after robot-assisted radical cystectomy (RARC) according to body mass index (BMI) using the modified Clavien Classification System.

Materials and Methods: We retrospectively analyzed 396 patients with bladder cancer undergoing RARC with urinary diversion using multicenter data from Korea. The Korean Society for the Study of Obesity recommends the use of the following BMI ranges: underweight (under 18.5); normal weight (18.5 to 22.9); overweight (23 to 24.9); and obese (over 25). The bivariate relationships between BMI categories and clinical parameters were assessed using the Mantel–Haenszel chi-square test. Multivariate adjusted Cox regression analysis was conducted to examine the hazard ratio (HR) and 95% confidence interval (CI) for the association between the complications and body mass index (BMI).

Results: Median follow-up for the cohort was 36 months. Mean BMI was 23.66±2.99. Compared to patients with a normal BMI, overweight and obese patients had increased operative times. When examining the diversion type, obese patients (33.8%) were less likely to have an ileal-conduit compared to patients in normal and overweight BMI. However, the longest operative times and the lowest percentage of ileal-conduit in diversion were observed in underweight patients.

Conclusion: There were no significant differences in complications among the BMI categories after RARC. So, robotic-assisted radical cystectomy can be considered for patients of all body mass indexes regardless of post-operative complications.

Keywords: Radical cystectomy, Body mass index

| Table 1. Comparison of clinical and pathological characteristics according to BMI |
|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
|                             | Entire cohort | BMI <18.5 | 18.5 to 22.9 | >22.9 | P-value |
| Age, years | 65.9±10.8 | 60.0±13.7 | 66.0±10.9 | 65.6±10.2 | 65.5±10.8 | 0.724 |
| sex, n(%) | 306 (77) | 124 | 150 | 32 | 0.746 |
| Male | 360 (90.3) | 94 (75.8) | 116 (77.3) | 31 (96.9) | 109 (79.9) |
| Female | 66 (19.7) | 36 (24.2) | 34 (22.7) | 1 (3.1) | 37 (26.1) |
| ASA scorea | 1.8±0.5 | 1.8±0.5 | 1.8±0.5 | 1.8±0.5 | 1.8±0.5 | 0.867 |
| Previous abdominopelvic surgery, n(%) | 68 (17.4) | 15 (12.1) | 29 (19.3) | 14 (43.8) | 10 (7.1) | 0.003 |
| Blood loss, mℓ | 655.6±822.7 | 537.7±641.1 | 680.5±629.1 | 603.0±518.7 | 740.2±755.9 | 0.008 |
| Operation time, mℓ | 516.6±677.4 | 425.6±614.3 | 439.5±475.7 | 507.5±659.3 | 550.6±550.9 | 0.020 |
| Diverting type, n(%) | 86 (22.4) | 3 (21.4) | 76 (50.9) | 44 (65.5) | 44 (33.3) | 0.032 |
| Total conduit | 84 (21.6) | 3 (21.4) | 76 (50.9) | 44 (65.5) | 44 (33.3) | 0.032 |
| Positive lymph node, n(%) | 10 (2.6) | 1 (8.3) | 9 (6.0) | 0 (0.0) | 1 (0.8) | 0.080 |
| Pathological T stage, n(%) | 0.081 |
| T1a | 243 (61.5) | 9 (64.3) | 18 (12.0) | 66 (91.9) | 14 (51.6) |
| T1b | 322 (81.8) | 5 (35.7) | 76 (50.9) | 27 (39.3) | 30 (24.2) |
| Pathological lymph node, n(%) | 0.003 |
| 0 | 327 | 12 (9.7) | 112 (84.7) | 99 (88.2) | 113 (88.9) |
| 1 | 29 | 1 (8.1) | 16 (13.7) | 3 (4.9) | 7 (5.4) |
| 2 | 32 | 1 (3.1) | 19 (15.7) | 3 (4.9) | 9 (7.0) |
| 3 | 8 | 0 | 5 (4.1) | 4 (4.9) | 1 (0.8) |
| Hospital stay, days | 22 (21.6) | 25 (21.1) | 22 (18.7) | 21 (25.2) | 23 (25.8) | 0.551 |

Data are presented in the manner of n (%) or n mean±SD. BMI: Body mass index, SE: standard error.
Differential complications following radical cystectomy between the irradiated and nonirradiated pelvis

남종길, 이동훈, 김태남, 박성우, 정문기
양산부산대학교병원

**Purpose:** Radical cystectomy in patients with a past history of pelvic irradiation is often a challenging procedure. We report complication rates in patients undergoing cystectomy and urinary diversion after pelvic irradiation.

**Materials and Methods:** We analyzed data on 167 patients at our institution that underwent radical cystectomy and urinary diversion for bladder cancer or pelvic malignancies involving the bladder between 2009 and 2017 and were observed at least 6 months (mos) postoperatively. Of these patients 11 received 60Gy or greater pelvic irradiation before surgery. Patients’ medical records were retrospectively reviewed and any complications were graded using the Clavien–Dindo system.

**Results:** Median patient age was 67.7 years and median follow up duration was 37.7 mos. Of the patients 6.6% (11 of 167) underwent radiation therapy before radical cystectomy. There was no statistically significant difference in the incidence of complications (Table 1). However, above grade 3 complications were more common in irradiated group.

**Conclusions:** Irradiated bladder is a relative contraindication to radical cystectomy. However salvage cystectomy of irradiated bladder is associated with acceptable morbidity, although above grade 3 complication rates tend to be slightly higher than nonirradiated bladder.

**Keywords:** Cystectomy, Irradiation, Complication

<table>
<thead>
<tr>
<th>Table 1: Patient Clinical Characteristics</th>
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<tbody>
<tr>
<td></td>
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<tr>
<td><strong>Non-Irradiated Bladder</strong></td>
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<tr>
<td><strong>Irradiated Bladder</strong></td>
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<tr>
<td><strong>p-value</strong></td>
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<td>------------------------------------------</td>
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<td>Age (year)</td>
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<td>Mean follow up (mos)</td>
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<tr>
<td>Diversion</td>
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<td>Deep vein thrombosis</td>
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<tr>
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<td>Urinary incontinence</td>
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</table>
근치적 방광 적출술 후 장기적 신기능에 영향을 미치는 인자들: 최소 3년 이상 추적환자 대상 연구

신정현1, 이동현2, 김 명1, 송채린1, 안한종1
1울산대학교 서울아산병원 비뇨기과학교실, 2국군수도병원

Objectives: We investigated clinical factors which affecting the long-term (>36 months) renal function predictors after radical cystectomy for bladder cancer.

Materials and Methods: Total of 284 patients who received radical cystectomy a single surgeon were analyzed. Patients with short-term follow-up (<36 months), malignant ureteral obstruction, and preoperative chronic kidney disease (CKD; GFR<60 mL/min/1.73 m²) were excluded. Cox proportional hazard model were performed to identify the independent factors affecting the postoperative CKD development.

Results: Total of 111 patients met our inclusion criteria. Mean age was 61.5 years and mean follow-up was 83.9 months. Postoperative CKDs were developed in 22 (19.8%) patients including 18 patients with orthotopic ileal substitutes and 4 with ileal conduits. Patients who developed CKD were significantly older (65.8±6.9 vs. 60.5±9.7) and diabetic (31.8% vs. 10.1%). The ureteral stricture was more frequently observed in postoperative CKD patients (1.1% vs. 9.1%). Mean preoperative glomerular filtration rate (GFR) of was higher in postoperative CKD group than in non-CKD group (89.2 vs. 80.9 ml/min/1.73 m²), respectively. On multivariate analysis, old age (age 60–69, HR 5.433, p=0.024; age ≥70, HR 15.571, p=0.003) and diabetes (HR 4.354, p=0.027) were risk factors of CKD development. Type of diversion was not associated with development of CKD (p=0.361). In patients with orthotopic ileal substitutes, old age (age 60–69, HR 10.736, p=0.013; age ≥70: HR 34.985, p=0.002), high BMI (HR 1.211, p=0.010), and diabetes (HR 3.948, p=0.031) were significant predictors of CKD development.

Conclusions: Old age, high BMI and diabetes are predictors of CKD development in long-term follow-up after radical cystectomy with orthotopic ileal substitute. Ileal conduit should be considered to preserve renal function in those patients.

Keywords: Cystectomy, Glomerular filtration rate, Urinary diversion
Factors that predict neutropenia in Korean patients with advanced urothelial cancer after cisplatin-based systemic chemotherapy

권휘안, 오대훈, 이재환, 서일영, 박승철
원광대학교 의과대학 비뇨기과학실

**Purpose:** The aim of this study was to identify factors that can be used to predict severe neutropenia (grade 3 or higher) in patients with advanced urothelial cancer after cisplatin-based systemic chemotherapy.

**Materials and Methods:** The study examined 79 Korean patients with advanced urothelial cancer who were treated with several cycles of cisplatin-based systemic chemotherapy from May 2006 to May 2015. Risk factors for neutropenia (grade 3 or higher) and for the occurrence of neutropenia (grade 3 or higher) during the first cycle of chemotherapy were examined. Results: Thirty-six out of the 79 patients (45.6%) developed neutropenia at grade 3 or higher during the first cycle of cisplatin-based systemic chemotherapy: 18 (22.7%) of these experienced grade 3 neutropenia and 18 (22.7%) experienced grade 4. Multivariate analysis identified pretreatment neutrophil counts (p=0.001) as the only significant factor predictive for severe neutropenia.

**Conclusions:** The pretreatment neutrophil count was found to be the factor that poses a significant and independent risk in development of severe neutropenia induced by applying cisplatin-based systemic chemotherapy to patients with advanced urothelial cancer.

**Keywords:** Neutropenia, Urothelial cancer, Cisplatin
신세포암 세포주의 clear cytoplasm 증가 유도 후 PGC 활성을 통한 약물 감수성 변화 및 mitochondria 활성 변화

김숙영¹, 나준채¹, 허준혁¹,², 홍성준¹,², 이형호³, 윤영은⁴, 한웅규¹,²
¹연세대학교 의과대학 비뇨기과학연합이, ²Brain Korea 21 PLUS Project for Medical Science, Yonsei University, ³국립건강보험공단 일산병원 비뇨기과, ⁴한양대학교 의과대학 비뇨기과학연합

목적: 신장암 세포주들을 Clear Cytoplasm Induction (CCI) 시켰을 때 이러한 변화가 세포 약물감수성에 미치는 영향 및 세포 내 변화에 대해 알아보고자 한다.

대상 및 방법: Caki-1과 Caki-2에 지방세포유도 배지를 이용하여 CCI를 유도했다. Temsirolimus, Sunitinib에 대한 세포 독성 실험을 CCK-8을 이용하여 시행하였다. CCI의 변화가 Mitochondria 활성에 영향을 줄 수 있는지 보기 위해 Peroxisome proliferator-activated receptor gamma coactivator 1-alpha (PGC), VDAC, p-AMPK의 발현 정도를 Western blotting 및 confocal microscopy로 측정하였으며, mitochondria의 기능을 관찰하기 위해 membrane potential 측정하는 JC-1 염색 실험을 시행하였다. RCC환자 7명 및 환자에서 유래한 primary cell에서 mitochondria의 발현을 Real-Time PCR로 분석하였고, 발현 정도를 확인하기 위해 Immunohistochemistry stain 및 confocal microscopy로 측정하였다.

결과: Temsirolimus와 Sunitinib의 anti-cancer drug에 대한 약물 감수성을 증가시켰다 (Fig-1). PGC의 upstream인 p-AMPK의 활성 역시 관찰되어 CCI에서 PGC의 활성 증가로 인한 Mitochondria biogenesis가 증가했음을 알 수 있다 (Fig-2). 환자 유전자를 분석한 결과, PGC를 비롯한 대표적인 mitochondria의 유전자들이 down-regulation되어 있으며, mitochondria를 분해하는 initiator로 알려진 BNIP-3은 RCC환자에서 높게 발현되는 것을 확인할 수 있다 (Fig-3A,B). 이러한 BNIP-3의 발현은 CCI시에는 caki-1에서 감소됨으로 세포 내 mitochondria의 증가를 도울 수 있는 것으로 여겨진다 (Fig-3C).

결론: 신세포암 세포주에서 clear cytoplasm을 증가시켜 형태적 변화 시, 약물 감수성이 높아지고 mitochondria의 활성이 증가됨을 확인했다. CCI를 유도함으로 mitochondria biogenesis inducer인 PGC는 증가되는 반면, BNIP-3는 감소하는 것으로 보아 CCI는 PGC 및 mitochondria를 활성을 통해 RCC의 치료의 단서를 줄 것이라고 판단된다.

Keywords: Renal cell carcinoma, Clear cytoplasm, Mitochondria
신장암에서 메트포르민과 에버로리무스의 효과

윤영은1, 정아라1, 조정기1, 이형호2, 나준채3, 한웅규3, 김용태1, 박해영1, 박성열1

1한양대학교병원 비뇨기과학교실, 2일산병원 비뇨기과학교실, 3연세대학교 비뇨기과학교실

Introduction and Objective: To investigate the antitumor effect of metformin combined with everolimus on renal cell carcinoma cell lines.

Materials and Methods: The water-soluble tetrazolium salt (WST) cell viability assay and colony formation assays was performed to investigate the effects of metformin, everolimus and their combination on normal kidney epithelial cells (HK-2, LLC-PK1) and RCC (Caki1, Caki2) cell growth. Signaling molecules involved in mTOR signaling was analyzed by immunoblot analysis of various proteins including mTOR, AMPK, 4EBP1, p70S6K.

Results: WST cell viability assay showed that both metformin and everolimus reduced cell viability of normal kidney cells and renal cancer cells in a dose-dependent manner. And metformin combined with everolimus had a synergistic inhibitory effect in a dose-dependent manner. In Caki-2 cell, metformin combined with everolimus effectively inhibits colony formation. Metformin and everolimus inhibited mTOR down signaling molecules, AMPK, 4EBP1, p70S6K in Caki-2 cell. And these results were more maximized when metformin was combined with everolimus.

Conclusion: The study indicated the synergic antitumor effects between metformin and everolimus, which may be a prospective therapy strategy to achieve potent antitumor effects on renal cell carcinoma.

Keywords: Metformin, Everolimus, Renal cell carcinoma
Purpose: The transient receptor potential melastatin member 7 (TRPM7) is highly related to distinct human malignancies, but its role in renal cell carcinoma (RCC) has not been investigated. The objective of this study was to determine whether TRPM7 regulate RCC cells migration and invasion through linkage with one or more signal transduction pathways.

Methods: The human RCC cell lines ACHN and SN12C were selected for this study. Western blot analysis and small interfering RNA (siRNA)-based knockdown were used in order to investigate the possible molecular mechanisms. Wound healing migration assay and transwell invasion were conducted to evaluate the effect of TRPM7 knockdown on RCC cells.

Results: Silencing TRPM7 with RNA interference resulted in a significant decrease in migration and invasion capability of ACHN and SN12C RCC cells. We found that the phosphorylation level of Src significantly decreased after silencing TRPM7 compared with control in ACHN and SN12C cells. In ACHN cell, the phosphorylation level of Akt was also significantly reduced by transfection with TRPM7-specific siRNA. After treating Src and Akt inhibitors, reduced activities of migration and invasion were found in RCC cells.

Conclusions: Our findings that TRPM7 modulates migration and invasion of ACHN and SN12C RCC cells through the Src and Akt pathway suggest that depressing this signaling pathway or/and the TRPM7 channel protein may be beneficial in treating RCC patients (2016R1C1B1011180, NRF-2015R1C1A1A01053509, 2015R1D1A3A03020378, 2014R1A1A049460, NRF-2014M3A9D3033887).

Keywords: Renal cell carcinoma, TRPM7, siRNA
TFE3 양성 신세포암의 포괄적 유전학적 특성 분석
정창욱1, 이모제2, 조재소2, 최무림2, 송채린3, 구자현1, 과철1, 김현회1

서울대학교 의과대학 1비뇨기과학교실, 2의과학과, 3울산대학교 서울아산병원 비뇨기과학교실

목적: MiT 패밀리 치환 신세포암(MiT family translocation RCC)은 Xp11.2/TFE3 치환 및 t(6;11)/TFEB 치환을 특징으로 하는 드문 신세포암이다. 이 중 Xp11.2 치환 신세포암은 비교적 어린 나이에 호발하며 예후가 불량한 것으로 알려졌으나 병인론이나 유전학적 특성이 거의 알려지지 않았다. 본 연구는 면역화학염색을 통해 TFE3 양성 신세포암들의 포괄적인 유전학적 특성을 분석하고 예후와의 상관 관계를 분석하고자 하였다.

방법: 서울대학교병원과 서울아산병원에서 면역화학염색을 통해 TFE3 양성으로 임상적 Xp11.2 치환 신세포암 진단을 받은 환자 중 동결신선 종양조직과 정상 DNA를 확보할 수 있던 총 19명을 대상으로 하였다. Whole exome sequencing (WES)을 통해 변이 유전자 및 유전자 복제수 변이(copy-number variation: CNV)를 확인하였다. 정상환자의 신장조직 4개와 투명세포신세포암 조직 7개와 함께 RNAseq 분석을 시행하였다. RNAseq을 통해 TFE3 fusion partner 확인 및 cluster 분석을 시행하였다.

결과: 전반적으로 체세포돌연변이 비율(somatic mutation rate)이 낮았으며 COSMIC 변이가 거의 없었다. SNV (single nucleotide variants)이 드물지만 대부분 chromatin remodeler 등과 관련 있었다. CNV은 3p, 6q, 22p의 손실과 12번의 횡파이 관찰되었다. 일부의 종양에서는 WES으로도 TFE3 fusion partner를 추정할 수 있었고, RNAseq을 통해 확인할 수 있었다. RNAseq를 통해 NONO, RBM10, SFPQ, ASPSCR1, PRCC 등의 기존에 알려진 fusion partner를 확인할 수 있었고, 새로운 fusion partner로 NTRK1을 확인하였다. TFE3 fusion partner를 확인할 수 없었던 종양 중 Cluster 분석을 통해 5개의 종양은 TFE3의 치환이 없었으며 투명세포신세포암의 유전형질과 유사성을 보였다. RNAseq에서 metabolic pathways, TCA cycle, oxidative phosphorylation, respiratory electron transport, cell surface interaction at vascular wall과 관련된 pathway들이 상향 조절되어 있음을 확인하였다.

결론: TFE3 과발현이 확인되어도 실제 Xp11.2와 치환되지 않은 종양이 드물지 않았고, Xp11.2의 치환에는 FISH나 RNAseq로 확인이 필요한 것으로 보인다. Xp11.2 치환 신세포암의 경우 투명신세포암과 유전자 변이와 RNA 발현에서 상당한 차이를 보였다. Aerobic respiration 등의 pathway들의 상향 조절이 Xp11.2 치환 신세포암의 나쁜 예후와 관련이 있을 것으로 추정된다. 향후 ChiPseq 분석 및 추가의 분자학적 실험을 통해 보다 자세한 병인론을 검증할 계획이다.

Keywords: Renal cell carcinoma, TFE3, Genetics
SIC을 발현시킨 재조합 BCG의 방광암 세포내 내재화 효과 연구

김명주, 황영미, 지병훈, 문영태, 김경도, 명순철, 김태형, 김진욱, 장인호
중앙대학교병원 비뇨기과학실

**Purpose:** BCG is one of the standard treatment options for non–muscle–invasive bladder cancer, yet the reduced internalization rate of BCG in bladder cancer cells by BCG–induced antimicrobial peptides (AMPs) remain the biological defense mechanisms against BCG as unmet needs. In this study the internalization of BCG in human bladder cancer cells, BCG was genetically engineered to secrete recombinant secreted protein of Streptococcus pyogenes (SIC) under control of the mycobacterial heat shock protein 60 promoter (pMV306hsp).

**Materials and Methods:** Synthesized SIC was inserted into the pMV306hsp vector, and transfected into BCG using an electroporator. Recombinant BCG (rSIC–BCG) was cultured in 7H9 both media and selected by kanamycin, rBCG expression was confirmed by RT–PCR after cDNA synthesis. Internalization of rBCG was evaluated in bladder cancer cells (T24 and 5637 cell lines) using FITC–immunofluorescence and real–time PCR. Release of AMPs was measured by ELISA after treatment with rSIC–BCG or BCG in T24 and 5637 bladder cancer cells.

**Results:** Bladder cancer cells exhibited different sensitivity to BCG or rSIC–BCG treatment, which was associated with increased rSIC–BCG internalization. Release of antimicrobial peptides in rSIC–BCG treated bladder cancer cells was reduced compared with BCG treated cells, resulting in an avoiding innate immune response to AMPs.

**Conclusion:** rSIC–BCG increased internalization of BCG in bladder cancer cells, which is involved in abolishing AMPs release through SIC–induced degradation of AMPs. Therefore, rSIC–BCG may be a significant tool for blockage of AMPs release to enhance the immunotherapeutic response of BCG treatment. (NRF–2015R1A1A0500110 and NRF–2015R1A2A1A15054364 to I.H.C., NRF–2016R1D1A1B03933826 to Y.M.W., and the Korea Health Technology R&D Project HI17C0710 to C.I.H.)

**Keywords:** Bladder cancer, BCG, SIC
Urinary Cell-free microRNA ratio with miR-6124/miR-4511 can discriminate bladder cancer from benign hematuria

Purpose: Although hematuria is the most common symptom in bladder tumor (BT), not all hematuria patients were diagnosed with BT. To identify a clinically applicable discriminating method of BT from non–cancer hematuric patients, the present study explored differences of urinary cell–free microRNAs (miRNAs) in urine samples of BT and non–cancer hematuric patients.

Materials and Methods: Urine samples derived from 626 patients included 334 BT, 223 hematuria, and 69 pyuria in this study. A urine–based miRNA microarray analysis and real–time polymerase chain reaction (RT–PCR) suggested the presence of differentially expressed two urinary miRNAs in BT patients, and these were further validated in two cohorts using RT–PCR.

Results: The expression level of miR–6124 was significantly higher in BT urine and miR–4511 was down–regulated in BT urine compared with non–cancer hematuria and pyuria. The ratio of miR–6124 to miR–4511 was considerably higher in BT urine than in non–cancer hematuria and enabled the discrimination of BT from non–cancer hematuric patients at a sensitivity of 79.1%, specificity of 70.3% with an area under the curve 0.761 (p<0.001). Furthermore, compared to voided urine cytology, urinary miR–6124 to miR–4511 showed better sensitivity for detecting BT in any grade (p<0.001).

Conclusion: Expression ratio of miR–6124/miR–4511 in urine could be a non–invasive promising tool for BT diagnosis among hematuric patients.

Keywords: Non–invasive biomarker, miRNA, BT, Hematuria
방광암에서 소변의 세포유리 DNA와 소포체 DNA를 이용한 유전 분석: 액상생검 pilot 연구

김광현, 송완, 유현석, 윤하나, 정우식, 심봉석, 이동현
이화여자대학교 의과대학 비뇨기과학교실

목적: 방광암은 폐암, melanoma 등과 함께 genomic alteration이 많은 암 중 하나로 혈액, 소변 등의 cell free DNA 등의 분석을 통한 액상생검의 활용 가능성이 높다. 특히 소변은 비침습적 방법으로 쉽게 얻을 수가 있는 장점이 있어 비뇨기 업계에서 액상생검의 잠재로 연구가가 있다. 본 연구에서는 방광암 환자의 소변에서 세포유리 DNA (cfDNA)와 소포체 DNA (exoDNA)의 분리 및 유전 분석을 통하여 방광암의 genomic profiling을 해보고자 하였다.

대상 및 방법: 본원에서 방광암으로 근치적방광질제술을 시행받은 9명의 환자를 대상으로 하였다. 암 조직과 혈액을 tumor-normal match로 하고, 수술 전 소변에서 cfDNA와 exoDNA를 분리한 후 방광암에 호발하는 9 gene target exome sequencing 및 low depth whole genome sequencing (idWGS)을 시행하였다. Target exome sequencing를 통하여 somatic mutation을 확인하였고, idWGS를 통하여 copy number variation (CNV)을 조사하였다. 방광암 조직의 genomic alteration이 urinary cfDNA와 exoDNA에 반영되는지를 확인하였다.

결과: Urinary cfDNA와 exoDNA의 whole genome mapping ratio는 90.9-94.2%였으며, whole genome의 영역에 고르게 mapping되는 소견이 보였다. Target exosome sequencing에서 방광암 조직에서 확인된 12개의 somatic mutation 중 urinary cfDNA와 exoDNA에서 각각 9개, 10개가 확인되었다. Allele frequency는 1.2-83.2% (median: 66.4%)였으며, urinary cfDNA, exoDNA의 target 영역의 mean depth는 x1156이었다. idWGS에서 방광암에서 대표적인 CDKN2A, RB1, NCOR1의 deletion, ERBB2 amplification이 방광암 조직과 urinary cfDNA, exoDNA에서 공통적으로 관찰되었다. 또한 cancer related gene뿐 아니라 whole genome영역에서 tissue, cfDNA, exoDNA의 CNV가 유사한 패턴으로 관찰되었다. 또한 유전분석을 통한 urinary DNA분석은 적은 비용/데이터로 whole genome영역의 tumor DNA 특성을 반영할 수 있어 향후 액상생검을 통한 방광암 진단, 재발에 사용될 수 있는 잠재력이 있다.

결론: Urinary cfDNA, exoDNA은 대부분 contamination되지 않은 human DNA였고, whole genome영역을 coverage할 수 있었다. 또한 아들 DNA에서 방광암에 특이적인 genomic alteration을 확인할 수 있었다. 특히, idWGS를 통한 urinary DNA분석은 적은 비용/데이터로 whole genome영역의 tumor DNA 특성을 반영할 수 있어 향후 액상생검을 통한 방광암 진단, 재발에 사용될 수 있는 잠재력이 있다.

Keywords: Bladder cancer, Liquid biopsy, Genomic alteration
LKB1 발현 여부에 따른 방광암 세포에 대한 BCG의 항암 효과에 관한 연구

황영미, 김명주, 지병훈, 문영태, 김경도, 명순철, 김태형, 김진욱, 장인호
중앙대학교병원 비뇨기과학학교실

**Purpose:** Although LKB1 is a tumor suppressive serine/threonine kinase, loss of LKB1 leads to mitochondrial dysfunction and accumulation of autophagy–related proteins as a result of altered mitophagy, resulting in enhanced sensitivity to drug treatments. BCG is the most widely used for bladder cancer immunotherapies in the world, and autophagy for the nonspecific protective effects of BCG have even exploit autophagy mechanisms for the benefit of infection. Therefore, our goals were to test that loss of LKB1 sensitizes bladder cancer cells to aberrant autophagy or mitophagy induced by treatment with BCG.

**Materials and Methods:** shRNA LKB1 knockdown cells were treated with BCG for 48 h. Cells were analyzed by MTT for cellular growth inhibitory effect and were subjected to Western blot for autophagy–related proteins. Cells were seeded in 96–well plates and treated with 10 MOI BCG for 6–8 h. Intracellular ADP/ATP ratio was measured using a bioluminescent ADP/ATP Ratio Assay Kit according to the manufacturer’s instructions. Mitochondrial membrane depolarization was determined using the JC–1 fluorescence probe.

**Results:** LKB1−deficient cells exhibited enhanced sensitivity to BCG treatment that was associated with stimulation of autophagic pathways. Knockdown of LKB1 altered the cellular response to BCG treatment, resulting in an increase in autophagic response and mitochondrial defect. Expression of LKB1 exhibited highly induced cargo receptor NEIGHBOR OF BRCA1 (NBR1), which was accompanied by a decrease in levels of p62 and an accumulation of PPAR−γ.

**Conclusions:** These findings may have significant implications for the design of novel BCG treatments that target dysregulated autophagic pathways in LKB1–deficient tumors (NRF–2015R1A1A1A0500110 and NRF–2015R1A2A1A5054364 to I.H.C., NRF–2016R1D1A1B0393826 to Y.M.W., and the Korea Health Technology R&D Project HI17C0710 to C.I.H.).

**Keywords:** Bladder cancer, BCG, LKB1
거세 저항성 전립선암에서 docetaxel과 HDAC 저해제 병용처리에 의한 안드로젠 수용체와 그 변이체 신호 억제

박상은¹, 김윤림¹, 황정진¹, 김청수²

¹서울아산병원 의생명연구소, ²울산대학교 의과학대 비뇨기과학실

목적: 거세 저항성 전립선암(CRPC)은 안드로젠 수용체(AR)를 가지고 있지만, 안드로젠 차단요법(androgen deprivation therapy, ADT)에 반응하지 않는다. 도세타렉스의 표준 치료로 사용되고 있으나 치료가 제한적이므로 새로운 치료법 개발이 요구되고 있다. 본 연구진은 AR 단백질을 발현하지 않는 DU145와 PC3에서 도세타렉스과 히스톤아세틸화 효소 저해제(HDACI) 병용처리 효과를 보고한 바 있다. 최근 안드로젠 수용체에서 리간드 결합 부위가 사라진 변이체(AR-V)가 CRPC에서 ADT 저항성의 원인임이 밝혀짐에 따라 본 연구에서는 AR과 AR-V를 발현하는 CRPC에서 이 두 약물의 병용처리 효과를 AR 신호기전을 중심으로 확인하고자 하였다.

대상 및 방법: 22Rv1, VCaP CRPC 세포주와 CRPC 환자 1차 세포 배양체에서 HDACI (vorinostat과 CG200745)와 도세타렉스 병용처리에 의한 생존율을 측정하고, 세포자살과 AR 신호의 변화를 Western Blotting, 유세포 분석, 면역 형광 염색을 통하여 검증하였다.


결론: 본 연구는 CRPC 세포주에서 도세타렉스과 HDACI의 병용처리가 각 약물의 단독처리보다 효과적으로 AR 뿐만 아니라 AR-V의 발현과 핵으로의 이동을 억제하며, 세포의 성장을 저해하고 세포사멸 유도함을 보여주었다. CRPC 환자의 1차 세포 배양체에서도 동일한 효과를 확인하였다. 이러한 결과는 CRPC에서 HDACI와 도세타렉스의 병용치료의 효과와 기전에 대한 새로운 가능성을 보여주었다.

Keywords: Castration-resistant prostate cancer, Docetaxel, Histone deacetylase inhibitor
The expression of androgen receptor and its variants in human prostate cancer tissue according to disease status

Jeong Woo Lee, Jung Hee Kim, Seung Soo Lee, Sung Woo Park
Department of Urology, Pusan National University Yangsan Hospital

Objectives: To evaluate the changes in expression of androgen receptor (AR) and its variants (ARV) in Korean prostate cancer (PCa) patients according to disease status.

Methods: A total of 49 cases were evaluated which included 29 localized PCa, 8 metastatic PCa, and 12 cases of benign prostatic hyperplasia (BPH). Samples from patients who underwent radical prostatectomy or transurethral resection of prostate were collected and stored in ethically approved tissue banks. Polymerase chain reaction (PCR), western blot (WB), and Immunohistochemistry (IHC) were performed for AR and ARV7. Histopathological evaluation was done to determine the type of lesion including Gleason scoring. One fresh tissue block was divided into 3 sections, both ends were made into paraffin blocks for IHC, and the middle section was divided into two sections for WB and PCR. Each tissue was confirmed as a cancer tissue (more than 80%) using HE stain at both ends paraffin block. Using PCR, WB, and IHC, the expression of AR and ARV7 were compared according to disease status (BPH vs localized vs metastatic PCa) and Gleason score (7 vs 8–10).

Results: After pathological review, 4 cases among the localized PCas were excluded for PCR and WB because of low volume in cancer (<80%). PCR results showed that expression of AR and ARV7 was higher in metastatic PCa than in localized PCa and BPH (p<0.001). The expression of AR in WB was high in metastatic PCa, however, not statistically significant. The expression of ARV7 in WB was not different in all groups. The nuclear expression of AR in IHC was uniformly high in all groups. The positivity of ARV7 in IHC was more common in metastatic PCa than in localized PCa. This tendency has been shown in adjacent non–cancerous tissue as well. There was no significant statistical association between the AR or ARV7 expression and Gleason score in localized PCa.

Conclusions: Although AR nuclear expression was higher in human metastatic PCa tissue, it was consistently present in all BPH and PCa tissue. The expression of ARV7 was heterogeneous specifically in cases of PCa. Although mRNA of ARV7 is increased in human metastatic PCa tissue, protein is not. When the expression of ARV7 was positive in certain cancer tissues, it was also positive in adjacent benign tissues.

Keywords: Prostate, Cancer, Androgen
고혈압을 동반한 전립선비대증 환자에서 naftopidil의 임상적 유 효성과 안정성: 전향적, 공개표지 연구

정문수1, 윤병일1, 이승환2
1가톨릭관동대학교 의과대학 비뇨기과학교실, 2연세대학교 의과대학 비뇨기과학교실

Purpose: To investigated the efficacy and safety of naftopidil for benign prostatic hyperplasia (BPH) patients mainly focusing on changes of blood pressure (BP).

Materials and Methods: Of a total of 118 patients, 90 normotensive (NT) and 28 hypertensive (HT) patients were randomly assigned into naftopidil 50 mg or 75 mg group for a 12-week, once-daily treatment. The safety and efficacy were assessed by analyzing changes from baseline in systolic/diastolic BP and total International Prostate Symptom Score (IPSS) at 4 and 12 weeks. Adverse events (AEs), obstructive/irritative subscores, QoL score, Qmax, and BSW questionnaire were also analyzed.

Results: Naftopidil treatment decreased the mean systolic BP by 18.7 mmHg for HT 50 mg group (p<0.001) and by 18.3 mmHg for HT 75 mg group (p<0.001) and the mean diastolic BP by 17.5 mmHg for HT 50 mg group (p<0.001) and by 14.7 mmHg for HT 75 mg group (p=0.022). However, in the NT groups (both naftopidil 50 mg and 75 mg), naftopidil caused no significant changes in BP from baseline values. After 12 weeks, both naftopidil 50 mg and 75 mg groups showed significant improvements in IPSS scores (total, obstructive/irritative subscores, QoL score) and Qmax from baseline. AEs were reported in 7.8% of patients (50 mg group) and in 2.9% (75 mg group). In both the 50 mg and 75 mg group, >86% of all patients agreed to continue their current medications.

Conclusion: Our results suggest that naftopidil treatment in BPH patients with hypertension has the additional benefit of optimal management of BP within the normal range.

Keywords: BPH, Hypertension, Naftopidil
전립선비대증 환자에서 naftopidil 및 tamsulosin의 방광저장 관련 증상 개선 효과에 대한 비교: 전향적, 다기관 연구

권세윤1, 이경섭1, 유희근2, 정재일3, 이지연4, 홍준혁5, 서성일6, 정태영7, 곽철8, 강택원9, 윤석중10

1동국대학교 경주병원, 동국대학교 의과대학 비뇨기과학과학교실, 2울산대학교병원, 울산대학교 의과대학 비뇨기과학과학교실, 3부산대학교병원, 부산대학교 의과대학 비뇨기과학과학교실, 4가톨릭대학교 서울성모병원, 가톨릭대학교 의과대학 비뇨기과학과학교실, 5울산대학교 서울아산병원, 울산대학교 의과대학 비뇨기과학과학교실, 6성균관대학교 의과대학 삼성서울병원, 성균관대학교 의과대학 비뇨기과학과학교실, 7중앙보훈병원 비뇨기과, 8서울대학교병원, 서울대학교 의과대학 비뇨기과학과학교실, 9전남대학교병원, 전남대학교 의과대학 비뇨기과학과학교실, 10충북대학교병원, 충북대학교 의과대학 비뇨기과학과학교실

Objective: To compare the efficacies of naftopidil and tamsulosin in terms of reducing storage symptoms in patients with BPH.

Material & Methods: This prospective randomized study was performed at 10 centers. Ninety-four patients that had been taking tamsulosin for more than 8 weeks, but had an OABSS of greater than 3 points were initially enrolled. After a 1 week washout period, patients were divided into two groups. Forty-five patients were treated with tamsulosin 0.2 mg daily and 49 patients were treated with naftopidil 75 mg daily for 8 weeks, respectively. Total IPSS, storage symptom scores, nocturia times, OABSS, maximal flow rates (Qmax), and post-void residual volumes (PVR) were checked before and after the 8–week treatment period.

Results: Mean patient ages in the tamsulosin and naftopidil groups were 64.8 and 66.0 years, respectively. Baseline characteristics were not significantly different. In tamsulosin group, mean total IPSS fell from 19.1 to 15.1 after the 8–week treated period (p=0.001), and in naftopidil group, mean total IPSS fell from 16.9 to 13.1 (p=0.001). Mean storage symptom scores reduced in tamsulosin and naftopidil groups from 8.0 to 6.6 (p=0.002) and from 7.6 to 6.1 (p=0.001), respectively. Mean nocturia times in naftopidil groups decreased significantly from 2.5 to 1.9, respectively (p=0.001), and mean OABSS reduced from 7.7 to 6.0 (p=0.001) and from 7.4 to 6.0, respectively (p=0.001).

Conclusions: Total IPSS, storage symptom scores, nocturia times and OABSS were significantly more reduced by naftopidil and tamsulosin. Moreover, the naftopidil group showed better improvements in nocturia than tamsulosin group.

Keywords: Naftopidil, Tamsulosin, Prostate hyperplasia
전립선비대증 환자에서 실로도신의 효과: 코크란 체계적 문헌고찰 및 메타분석

정재홍1,2,3,4, Roderick MacDonald5, 김지예2,6, 김명하2,7, Philipp Dahm3,4

연세대학교 원주의과대학 1비뇨기과학도서관, 2근거중심의학연구단, 3Urology Section, Minneapolis VA Health Care System, Minneapolis, Minnesota, 4Department of Urology, University of Minnesota, Minneapolis, Minnesota, 5General Internal Medicine, Minneapolis VA Medical Center, Minneapolis, Minnesota, USA, 연세대학교 원주의과대학 6성형외과학도서관, 7의학도서관

Purpose: Alpha-blockers have been widely used as first-line therapy for the patients with lower urinary tract symptoms secondary to BPH (LUTS/BPH). Silodosin which has a high binding ratio for A1a receptor may therefore induce a therapeutic effect with less cardiovascular side effects. We therefore assessed the effects of silodosin compared to placebo or other medical treatments in men with LUTS/BPH.

Materials and Methods: We conducted a Cochrane review based on an a priori, protocol that included published and unpublished randomized controlled trials in any language. Review outcomes were urologic symptom scores, quality of life (QoL), and treatment withdrawals for any reason, cardiovascular adverse events, and sexual adverse events. We performed meta-analysis using RevMan 5.3 and rated the quality of evidence (QoE) using GRADE.

Results: Of 649 studies identified through our search, we included 14 studies. Compared to placebo, silodosin may have a small effect which may not represent an important reduction in the urologic symptom scores (mean difference [MD] −2.65, 95% confidence interval [CI] −3.23 to −2.08; low QoE) and QoL (MD −0.42, 95% CI −0.71 to −0.13; moderate QoE). Silodosin may result in little or no difference in the treatment withdrawals for any reason (risk ratio [RR] 1.08, 95% CI 0.70 to 1.66; low QoE). Compared to tamsulosin, silodosin may result in little or no difference in the urologic symptom scores (MD 0.21, 95% CI −1.28 to 1.70; low QoE) and QoL (MD −0.10, 95% CI −0.53 to 0.34; low QoE). We are uncertain about the effect of silodosin on treatment withdrawals for any reason (RR 0.90, 95% CI 0.49 to 1.64; very low QoE). Silodosin may increase sexual adverse events compared to placebo (RR 26.07, 95% CI 12.36 to 54.97; low QoE) and tamsulosin (RR 6.15, 95% CI 3.21 to 11.79; low QoE) with similar cardiovascular adverse events rates.

Conclusion: Silodosin on average appears to have a small effect in the urologic symptom scores and QoL with similar treatment withdrawals rates for any reason compared to placebo. Compared to tamsulosin, silodosin may be similar in the urologic symptom scores and QoL, but we are uncertain about the effect of silodosin on treatment withdrawals for any reason. Silodosin may increase sexual adverse events rates with similar cardiovascular adverse events rates compared to placebo and tamsulosin.

Keywords: Prostatic hyperplasia, Silodosin
Objectives: The goal of this study was to examine the association of sitting time and physical activity level with the incidence of lower urinary tract symptoms (LUTS) in a large sample of Korean men.

Material and Method: A cohort study was performed for 69,795 Korean men free of LUTS at baseline, who were followed-up annually or biennially. Physical activity level and sitting time were assessed using the validated Korean version of the International Physical Activity Questionnaire Short Form. LUTS was assessed using the International Prostate Symptom Score (IPSS) and clinically significant LUTS was defined when IPSS score was 8 or higher.

Results: Of the 175,810.4 person-years, 9,217 developed LUTS (incidence rate, 39.0 per 1000 person-years). Physical activity levels were negatively associated with the incidence of LUTS. The multivariable-adjusted hazard ratios (95% CIs) for incident LUTS comparing minimally active and HEPA groups to the inactive group were 0.94 (0.89-0.99) and 0.93 (0.87-0.99), respectively (P for trend<0.001). The hazard ratios (95% CIs) for LUTS comparing 5-9 and >9 h/day sitting time to <5 h/day were 1.08 (1.00-1.24) and 1.15 (1.06-1.24), respectively (P for trend<0.001).

Conclusion: Prolonged sitting time and decreased physical activity level were positively associated with the development of LUTS in a large sample of middle-aged Korean men, supporting the importance of both reducing time spent sitting and promoting physical activity for preventing LUTS.

Keywords: Sitting time, Physical activity, Lower urinary tract symptoms
야간뇨를 동반한 전립선비대증 환자를 대상으로 silodosin의 유효성 및 안전성을 평가하기 위한 12주, 단일군, 공개, 전향적, 다기관, 제 4상 연구

조강준1, 이정주2, 송윤섭3, 최종보4, 김대경5, 김용태6, 김준철1
1가톨릭대학교 부천성모병원, 2부산대학교병원, 3순천향대학교병원, 4아주대학교병원, 5울산대병원, 6한양대학교병원

목적: 야간뇨는 전립선비대증 환자에서 가장 불편한 하부요로증상 중 하나인데, 알파차단제는 야간뇨 개선에 유효한 효과를 보이는 것으로 알려져 있다. 이에 본 연구에서는 야간뇨를 동반한 전립선비대증 환자에서 α1A-adrenoceptor subtype-selective antagonist인 silodosin의 유효성 및 안전성을 평가하고자 하였다.

대상 및 방법: 12주, 단일군, 공개, 전향적, 다기관 연구로, 50세 이상의 전립선비대증을 가진 남성 중 3일간 배뇨일지상 야간뇨가 1일 평균 2회 이상이고, 국제전립선증상점수(IPSS) 8점 이상, 삶의 질 점수가 3점 이상인 환자를 대상으로 하였다.
PSA >10 ng/ml, 신경인성 방광, 방광암, 방광결석, 요도협착 환자, 급성요폐 병력이 있는 경우, 1개월 이내 요로감염이 있는 경우, 전립선엽 병력이 있는 경우, 전립선 수술을 받았던 환자, 2주以内 알파차단제, 항무스카린제 복용한 경우, 6개월 이내 5알파 환원효소억제제를 복용한 경우는 제외하였다. 연구에 참여한 모든 환자에게 silodosin 8 mg을 1일 1회 12주간 경구 투여하였다. 임상평가변수로는 기저치 대비 12주후 야간뇨 발생 횟수의 변화량을 조사하였다. 이차평가 변수로는 기저치 대비 12주 후 IPSS 총점의 변화량, 삶의 질 점수, 배뇨증상 항목, 배뇨후 증상 항목, 저장증상 항목, 과민성방광증상점수(OABSS)의 변화량과 12주 후 야간뇨 발생 감소율이 25% 이상인 환자의 비율, 12주 후 IPSS 감소율이 25% 이상인 환자의 비율을 조사하였다. 안전성 평가로 이상반응 및 이상약물반응의 발현율을 조사하였다.

결과: 총 135명이 본 연구에 참여하였으며, 안전성평가 분석 대상군은 118명이 포함되었고, 유효성 분석은 Full analysis set 분석대상군을 대상으로 112명이 포함되었다. 일차 유효성 평가변수인 silodosin 투여 12주 후 야간뇨 발생 횟수의 변화량은 -1.12±1.05회로 통계적으로 유의하게 감소하여 전립선 비대증으로 인한 야간뇨에 대해 개선 효과를 보였다(p<0.0001). 이차 유효성 평가변수인 IPSS총점 변화량, 배뇨증상 항목, 배뇨후 증상 항목, 저장증상 항목 변화량도 통계적으로 유의하게 감소되었다. 또한 12주 후 IPSS 삶의 질 점수 변화량, OABSS 변화량, ICIQ-N 변화량도 통계적으로 유의하게 감소되었다. silodosin 투여 12주 후 야간뇨 발생 감소율이 25% 이상인 시험대상자의 비율과 IPSS 감소율이 25% 이상인 시험대상자의 비율은 각각 73명(65.18%), 71명(63.39%)이었다. 안전성 평가상 14건(11.86%, 14/118)의 이상약물반응이 발생하였는데, 이중에서 사정관련 부작용이 9건(7.63%, 9/118)으로 가장 많았으며, 약제와 관련한 중대한 이상반응은 발생하지 않았다.

결론: 야간뇨가 동반된 전립선비대증환자에서 silodosin은 야간뇨 개선에 있어서 유효하며, 안전한 약제임을 확인하였다.

Keywords: Benign prostatic hyperplasia, Nocturia, Silodosin
아간뇨를 호소하는 55세 이상의 만성 불면증 환자에서 서방형 멜라토닌의 치료 효과

안순태, 정형국, 박태용, 김종욱, 오미미, 박홍석, 문두건
고려대학교 의과대학 비뇨기과학교실

Objective: Nocturia is a common cause of sleep disruption in older people and the sleep disturbance impaired patient’s quality of life (QoL). Several hypnotics have been reported the effectiveness for nocturia however they have a risk of addiction. Thus we herein investigated the effect of melatonin, an antioxidant and sleep inducer free of addiction, on sleep quality (SQ) and nocturia in elderly patients as a pilot study.

Material Method: We conducted male patients over 55 years old who had two or more episode of nocturia per night and diagnosed with chronic insomnia according to ICSD-3 (International Classification of Sleep Disorders). Melatonin 2 mg (Circadin®) was administered orally 2–3 hours before bedtime for 12 weeks. All patients were assessed the Pittsburgh Sleep Quality Index (PSQI) and frequency volume (FV) chart at baseline and 12 weeks after starting melatonin.

Results: Overall, 50 patients were completed the study. Total of 30 of them (60%) showed poor SQ defined as a score of 6 or more on the PSQI global score at baseline. In this group global PSQI score (from 10.5±2.9 to 7.2±4.0, p=0.01) and several components score significantly improved whereas 20 patients (40%) with good SQ did not (Table 1). The number of nocturia episodes significantly decreased in poor SQ group (from 2.6±1.1 to 1.6±0.8, p<0.001) and superior to good SQ group (Figure 1). Three patients had dizziness; the remaining patients had no adverse drug–related events.

Conclusion: Melatonin could be a treatment option for reducing nocturia in elderly men with sleep disorder.

Keywords: Nocturia, Sleep quality, Melatonin

![Graph showing the change in nocturia episodes before and after treatment with melatonin.](image)

<table>
<thead>
<tr>
<th>Table 1. Change of the Pittsburgh Sleep Quality Index (PSQI) in patient with poor sleep quality and good sleep quality</th>
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<td>Daytime dysfunction</td>
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* P < 0.05
전립선 비대증 환자에서 5-ARI의 간헐적 사용 시 전립선 크기 변화에 대한 고찰
최귀복, 조인창, 민승기
국립경찰병원 비뇨기과

Introduction: 5α-Reductase inhibitors (이하 5-ARI)는 알파차단제와 함께 양성 전립선 비대증(이하 BPH) 환자의 약물 치료의 양대 핵심 중 하나로 dihydrotestosterone (이하 DHT)의 생성을 억제하여 전립선의 상피세포에 작용, 6개월 이상 장기 복용 시 전립선의 부피를 평균 20~25% 감소시킨다. 그러나 5-ARI의 장기 사용은 연구에 따라 발기 부전, 성욕감퇴, 성정맥 감소 및 우울 증상의 부작용을 발생시킨다. 이에 우리는 5-ARI의 부작용 발생을 감소시키는 방법 중 하나로 약제를 일정 기간 씩 간헐적으로 복용할 경우 발생하는 전립선의 크기 변화를 연구하였다.

Material and Methods: 우리는 2009년 3월부터 2017년 5월까지 BPH로 본원 외래를 방문한 환자들 중 6개월 이상 5-ARI를 사용 후 정기적 전립선 초음파(이하 TRUS)를 통해 전립선 전체와 이행대의 크기를 확인하였다. 이 중 전립선 전체 크기가 20% 이상 감소한 환자들을 대상으로 최저 1년간 5-ARI를 중단하였다. 다시 감소한 크기의 50% 이상 회복된 환자를 선별하여 2차로 5-ARI를 복용 시작, 1년 뒤 전립선의 전체와 이행대의 크기를 확인하였다. 마지막으로 1차 5-ARI 복용 후와 2차 복용 후 각각의 전립선 전체 및 이행대의 크기를 pair T-test를 시행하여 변화의 유의성을 확인하였다.

Results: 표본 기준을 만족하는 환자는 총 60명으로 치료 전 전립선의 크기는 평균 32.3 g, 이행대의 크기는 14.4 g이었다. 1차로 5-ARI를 복용한 뒤 이는 각각 23.5 g, 11 g으로 평균 26.6%, 19.8% 크기 감소를 보였다. 이후 1년 이상 복용을 중단한 뒤 시행한 TRUS에서 전립선 전체의 크기는 평균 34.9 g, 이행대는 18.2 g으로 증가하였으며 2차로 복용 시작 후 1년 뒤에는 전체 크기 27.2 g, 이행대는 13.6 g으로 각각 21%, 17.4% 크기 감소를 보였다. 1차 5-ARI 복용 후와 2차 복용 후의 전립선 전체 및 이행대의 크기를 pair T-test 시행한 결과 전체 크기는 1차 복용 후 평균 23.5 g에서 2차 복용 후 평균 27.2 g로, 이행대의 경우 1차 복용 후 11 g에서 2차 복용 후 13.8 g으로 증가하였으며 양쪽 모두 통계적으로 유의한 (p<0.01) 차이를 보였다.

Conclusion: 본 연구 결과에서 5-ARI를 간헐적으로 사용할 경우 전립선의 크기는 중단하기 전보다 통계적으로 유의한 정도의 크기 증가를 보였다. 그러나 약제를 같은 간격으로 지속적으로 복용한 경우와 직접적으로 비교한 것은 아니므로 양용법의 우열 관계를 확인할 수는 없었다. 향후 추가적인 연구를 통하여 5-ARI의 적절한 사용 및 중단 기간을 확인하여 환자의 부작용 피해를 최소화하는데 기여할 수 있을 것으로 기대된다.

Keywords: Benign prostate hypertrophy, 5α-reductase inhibitor
PSA 2.5 이하 남성형 탈모 환자에서 저용량 피나스테라이드와 두테스테라이드 장기 복용이 혈청 PSA에 미치는 영향

서성필, 강호원, 김원태, 김용준, 윤석중, 이상철, 김원재
충북대학교 의과대학 비뇨기과학해심

Purpose: This retrospective cohort study aimed to assess the effect on PSA concentrations of low-dose finasteride or dutasteride treatment for male androgenetic alopecia whose baseline serum PSA<2.5 ng/mL.

Patients and Methods: The cohort consisted of all consecutive male patients who were treated for androgenetic alopecia with finasteride 1.25 mg daily or dutasteride 0.5 mg every 3 days in 2002–2012 and underwent PSA measurements at baseline and at least once thereafter. Patients whose baseline or follow-up PSA level after prescription exceeded 2.5 ng/mL were excluded. Patients were stratified according to age, baseline PSA concentration, medication type, and treatment duration.

Results: In the 1,379 patients, overall PSA levels declined from baseline by 27.8%. Most patients (n=1,094, 79.3%) showed PSA declines (average=40.8%). The remaining 285 (20.7%) patients showed stable or increased PSA levels (average=24.2% increase). Closer analysis showed that, largely, only patients with baseline PSA levels of ≥0.5 ng/ml exhibited treatment-related PSA declines. On multivariate logistic analysis, low baseline PSA levels was associated significantly with stable/increased PSA levels. Low-dose dutasteride and finasteride reduced PSA levels to similar degrees (31.1% vs. 25.1%). Marked PSA declines (26.0%) were observed even after short-term (3–6 month) treatment. Longer-term treatment associated with similar declines.

Conclusions: Dutasteride and finasteride reduced PSA levels to similar degrees. This effect was observed soon after commencing treatment. In patients with low baseline PSA levels, PSA levels can remain stable or even increase. These findings are limited to men with baseline PSA<2.5 ng/mL.

Keywords: PSA, Androgenetic alopecia, 5-alpha-reductase inhibitor
전립선 비대증 환자에서 5α-Reductase inhibitor 치료 중단 시 전립선 크기 회복에 대한 영향인자

최귀복, 조인창, 민승기
국립경찰병원 비뇨기과

Introduction: 5α-reductase inhibitors (이하 5-ARI)는 testosterone의 DHT로의 전환을 감소시켜 비대된 전립선의 크기를 감소시킨다. 그러나 약제 복용을 중단할 경우 DHT의 농도가 다시 증가하게 되어 이는 전립선을 다시 비대시키게 된다. 우리는 5-ARI를 복용 후 중단 시 전립선이 얼마나 빨리 크기를 회복하고 이와 관련된 요인이 무엇인지 연구하였다.

Materials and Methods: 2009년 3월부터 2017년 5월까지 5—ARI를 6개월 이상 사용한 환자들 중 크기 감소가 최초 크기의 20% 이상인 환자를 대상으로 최저 1년간 5-ARI를 중단하였다. 그리고 중단 후 1년 뒤의 전립선의 크기 증가 정도를 이전 크기 감소와 비교하여 유지군(최초 크기 감소의 20% 미만 회복), 중간군(20% 이상 80% 미만 회복), 복귀군(80% 이상 회복)의 세 군으로 나누었다. 그리고 각 군의 환자의 나이, 5-ARI 복용 전 전립선 크기, 5-ARI 사용 후 크기 감소 비율, 그리고 전립선특이항원(이하 PSA) 수치와의 관계를 분석해 보았다.

Results: 전체 환자 중 표본 기준을 만족하는 대상은 147명으로 표 1로 요약하였다. 크기 회복 정도에 따라 나눈 환자군은 유지군은 16명(10.9%), 중간군은 48명(32.7%), 복귀군은 83명(56.4%)이었다. 각 군별로 분류된 요소는 표 2에 정리하였다. 연령과 5-ARI 사용 후 크기 감소 비율이 클수록 복용 중단 시 크기가 회복되는 정도도 커지는 경향을 보였으나 통계적으로 유의한 관계를 찾을 수 없었다. 그 외 5-ARI 복용 전 전립선 크기, PSA는 크기 회복 정도와 유의한 관계를 갖을 수 없었다.

Conclusion: 본 연구에서는 환자의 연령과 5-ARI 복용 후 크기 감소 비율이 클수록 복용 중단 후 회복 정도가 커지는 경향을 보였으나 통계적으로 유의한 인자를 찾는 것은 못하였다. 향후 대규모의 전향적 연구를 통하여 약제 중단 시 전립선의 크기 회복을 예측할 수 있는 인자를 찾을 수 있을 것으로 기대된다.

Keywords: Benign prostate hypertrophy, 5α-reductase inhibitor, Withdrawal
연령에 따른 Tadalafil에 의한 전립선 이행대 혈행 변화

김진욱, 지병훈, 장인호, 명순철, 문영태, 김경도, 김태형
중앙대학교병원 비뇨기과학교실

Introduction: The effect of PDE5 inhibitors on lower urinary tract function has been maintained for several years, despite the lack of concrete physiological evidence. Most studies have not scrutinized whether PDE5 inhibitors actually accompanied relevant hemodynamic change, its primary pharmacological function, before assessing more complex voiding symptomatic. The study aims to assess persistent increased microvascular flow via measurement of prostatic capsular blood flow as an indicator of treatment responsiveness in patients receiving low dose tadalafil daily therapy.

Methods: Patients with LUTS receiving tamsulosin 0.2 mg were prospectively recruited to offer additional daily tadalafil 5 mg. As age may be a significant factor confounding tadalafil responsiveness, patients younger or older than 70 years of age were matched evenly to 10 patients per sub group, totaling 40 patients overall. Pretreatment IPSS, transrectal ultrasound with measurement of capsular artery and TZ doppler ultrasonographic parameters were taken and compared with those following 8 weeks of treatment.

Results: Mean RI of capsular arteries and TZ vessels were not significantly different in all comparing subgroups (old vs. young, tamsulosin alone vs. tadalafil add-on). However, mean PSV of TZ arteries in young patients receiving tadalafil and tamsulosin increased significantly from baseline from mean 22.07±2.99 cm/s to 41.21±5.59 cm/s (p<0.01). No other subgroups displayed significant change. LUTS symptoms assessed by 3 day voiding diary for frequency, FBC and nocturia also failed to show changes in all subgroups.

Conclusion: Tadalafil daily add on to tamsulosin showed significant increase in PSV for younger patients. While this did not carry over to an added benefit in LUTS symptoms, tadalafil does increase prostatic blood flow, a benefit lost in older patients. This may depict an age related change of tadalafil responsiveness when treating LUTS.

Keywords: PDE5 inhibitor, Tadalafil, Prostate blood flow
Purpose: To investigate the mechanism of action and fate of MSCT and ESWT in a rat model of DMED induced by streptozotocin (STZ).

Materials and Methods: Sprague-Dawley rats (n=40) were randomly divided into 4 groups. (N=10 per group): 1 DM group, 2 DM+ESWT group, 3 DM+MSCT group, 4 DM+ESWT+MSCT group, and the normal group (N=10, without STZ) is the control group. Erectile function and other expression experiments were carried out after STZ injection of 8 weeks. Immediately after recording of intracavernous pressure (ICP), the penis was then harvested for histologic analysis, ELISA and western blotting. MSCs were labeled with a fluorescent dye before treatment.

Results: The ratio of ICP/MAP was significantly higher in the ESWT+MSCT group than in the ESWT and MSCT groups (P<0.05). The quantitative result of the ESWT+MSCT group is very close to the result of the control group. ESWT+MSCT can stimulate angiogenesis and vasodilatation in DMED Corpus Cavernosum. The result was significantly higher in the ESWT+MSCT group than in the ESWT or MSCT groups (P<0.05), which proved that ESWT+MSCT could stimulate the angiogenesis and vasodilatation, significantly. ESWT can increase the quantity of MSCs in the corpus cavernosum and also induce MSCs to express more VEGF in vitro and vivo. VEGF activate the PI3K/AKT/mTOR and NO/cGMP signaling pathway in the corpus cavernosum, ESWT+MSCT can stimulate autophagy and decrease apoptosis in the corpus cavernosum, ESWT can promote the MSCs recruitment by inducing penile tissues to express more SDF-1 and PECAM.

Conclusions: Combination of LI-ESWT and MSCT can get a better result than a single way by expressing more VEGF which can take part in autophagy by triggering the PI3K/AKT/mTOR signaling pathway. ESWT can drive homing of MSCs in corpus cavernosum.

Keywords: Erectile dysfunction, Stem cell, ESWT
Effects of controlling oxygen release from hollow microparticles for prolonged stem cell survival and improved erectile function

박용현, 정애량, 김가은, 김미영, 이지영, 이규원, 이지열
가톨릭대학교 서울성모병원

Purpose: Postprostatectomy erectile dysfunction (ED) is the major problem for patients with prostate cancer. Recently, tissue-engineering approach has been attempted for postprostatectomy ED, but survival of stem cells until the ingrowth of blood vessels is one of the most important challenges in tissue engineering. In this study, we introduced perfluorooctane emulsion–loaded hollow microparticles (PFO–HP) for controlled oxygen delivery to facilitate a sustained and localized application into the cavernous nerve.

Materials and Methods: We prepared the PFO–HP (oxygen supply) and PBS–loaded HP (PBS–HP, non-supply of oxygen), and compared in vitro proliferation and differentiation of human adipose–derived stem cell (hADSCs) on the PFO–HP and PBS–HP in hypoxic condition. We also investigated the efficacy of hADSCs on the PFO–HP or PBS–HP on the cavernous nerve in a rat model of bilateral cavernous nerve crush injury (BCNI). Four weeks after surgery, erectile function was assessed by detecting the intracavernous pressure (ICP)/mean arterial pressure (MAP) level.

Results: In hypoxic condition, the number of hADSCs on the PFO–HP increased for 5 days and then it gradually decreased. However, the initial cell number on the PFO–HP remained constant for up to 10 days, while the number of cells on the PBS–HP was rapidly decreased over time. After neuronal differentiation for 14 days, β–tubulin–III expression was significantly different between hADSCs on the PFO–HP and PBS–HP. In animal experiments, the ICP/MAP ratios in the PBS–HP and PFO–HP groups were significantly increased compared to those in the BCNI group. The ICP/MAP ratios between the PFO–HP and PBS–HP groups were not significantly different at 1 week after surgery, however, the ICP/MAP ratios in the PFO–HP group was significantly higher compared to those in the PBS–HP group at 2 and 4 weeks after surgery. PFO–HP group showed significantly increased smooth muscle/collagen ratio, nNOS content, phospho–eNOS protein expression, and cGMP level, compared with the BCNI and PBS–HP groups.

Conclusions: hADSCs on the PFO–HP can improve erectile function in a rat model of BCNI, in terms of controlled oxygen release from the PFO–HP for a sufficient time period, and prolonged stem cell survival until the ingrowth of new blood vessels.

Keywords: Erectile dysfunction, Stem cell, Controlling oxygen release
TGF-β/Rho-kinase/LIMK 경로가 일측성 요관폐색 랫드 모델에서 신장 사구체와 세뇨관 사이질의 섬유화에 미치는 영향: preliminary study

송상훈1, 한재현1, 류채민2, 김휘우1, 이종필1, 이상민1, 안동현1, 주명수1, 김건석1
1울산대학교 서울아산병원, 울산대학교 의과대학 비뇨기과학회실, 2서울아산병원 의생명연구소


대상 및 방법: 8주령의 Sprague-Dawley 계 수컷 랫드 42마리를 Sham 대조군(C), 일측성 요관 부분폐색군(MO), 일측성 요관 완전폐색군(SO)으로 나누었다. 일측성 요관폐색 모델은 랫드를 마취 후 복부를 횡절개하여 좌측 신장과 요관을 확 인하고 신우 요관이행부의 요관에서 2.5 mm (MO군) 또는 1 mm (SO군) 두께의 guidewire를 요관과 함께 6-0 black silk으로 결합하였다. 8주령의 Sprague-Dawley 계 수컷 랫드 42마리를 Sham 대조군(C), 일측성 요관 부분폐색군(MO), 일측성 요관 완전폐색군(SO)으로 나누었다. 일측성 요관폐색 모델은 랫드를 마취 후 복부를 횡절개하여 좌측 신장과 요관을 확 인하고 신우 요관이행부의 요관에서 2.5 mm (MO군) 또는 1 mm (SO군) 두께의 guidewire를 요관과 함께 6-0 black silk로 결합하였고, C군은 정상 랫드로 각 손상군의 실험일정에 맞추어 개복 후 요관을 확인하는 과정까지 실험을 진행하였다. C, MO, SO군에서 6마리씩을 대상으로 N-acetylcysteine를 투약하고 이를 각각 C+NAC, MO+NAC, SO+NAC군으로 하였으며, MO, SO군에서 6마리씩을 대상으로 LIMK inhibitor를 투약하여 각각 MO+LI, SO+LI군으로 정의하였다. 각 실험군에서 요관 폐색 수술 후 1, 2주에 각 군당 3마리씩 체중을 확인하고 신장을 채취하여 신장의 무게를 측정하고 10% formalin에 밤새 보관한 후 paraffin block을 제작하였다. 파라핀 포매된 조직 절편을 4 μm 두께로 절단하고 Masson trichrome 및 Sirius Red염색으로 collagen staining 시행하고 H&E로 대조 염색 시행하였다. ROCK1 및 LIMK2의 발현을 사구체 및 신장 사이질 조직에서 확인하였다.

결과: 술 후 1주와 2주째 MO군과 SO군의 평활근/콜라겐 비율은 모두 C군에 비해 유의하게 감소하였다. MO+NAC, SO+NAC, MO+LI, SO+LI군에서는 각각, MO, SO군에 비해 평활근/콜라겐 비율의 감소가 호전되었다. 면역조직화학염색 결과 ROCK1과 p-LIMK2의 단백발현 정도는 1주째와 2주째 C군에 비해 MO군 및 SO군에서 유의하게 증가하였으나, NAC 및 LIMKi inhibitor를 투약한 후에는 S군에 비해 통계적인 차이를 보이지 않았다(Figure 1).

결론: 본 실험결과 일측성 요관폐색 후 발생하는 신장 사구체와 세뇨관사이질의 섬유화에 ROCK1/LIMK2 체계가 연관되어 있는 것으로 생각된다. 추후 이 체계의 활성화와 작가 요관폐색으로 인한 신장 사구체와 세뇨관사이질의 섬유화에 미치는 장기적인 영향에 대해서 추가적인 실험이 필요할 것으로 생각된다.

Keywords: Fibrosis, Ureteral obstruction, Rho kinase, LIM kinase
Aims of Study: Interstitial cystitis/bladder pain syndrome (IC/BPS) is a distressing and chronic inflammatory bladder disorder. Many IC/BPS patients experience severe pelvic pain that can be exacerbated by bladder filling and is often associated with urinary frequency. Although denudated urothelium, increased inflammation, mast cell infiltration, and tissue fibrosis have been considered as pathological features for IC, the crucial genes responsible for the IC pathogenesis remain to be determined. Here, we show that WNT2B play a crucial role on preventing fibrotic damage of bladder tissues in IC/PBS patients.

Study Design, Materials and Methods: A total of 31 patients, including 6 NHIC (non-Hunner-type IC), 19 HIC (Hunner-type IC), and 6 non-IC (control) cases, were enrolled. Employing quantitative RT–PCR, we examined the expression of two categorized genes in patients with bladder IC/BPS and in controls (non-IC); i) biomarkers characteristic to IC/BPS patients in previous reports, and ii) sonic hedgehog (Shh) and WNT family genes which mediated therapeutic effect in our preclinical studies. The significance of each gene was evaluated by infection of lentivirus containing its specific shRNA into HBIEpC, a normal human bladder epithelial cells.

Results: In our gene expression data, IC/BPS patients characteristically up-regulated the some of Shh (GLI-1 and PTC–I) and WNT (WNT2B and WNT5A), concomitantly with altered expression in several IC/BPS biomarkers (e.g., CCR2, HB–EGF, ARF, and CHT). Particularly, the expression of WNT2B in the bladder tissue was characteristically increased in HIC patients, compared with NHIC and control patients. Silencing of WNT2B in HBIEpC cells resulted in the fibrotic changes evidenced by fibrotic morphology and induction of genes related to epithelial mesenchymal transition (EMT) process. These fibrotic changes in the WNT2B silenced cells also activated the transforming growth factor–b (TGF–b) signaling, evidenced by the localization of phospho–Smad2 or –Smad3 proteins.

Concluding Message: Our data demonstrated that the expression of a subset of Shh–WNT signaling cascade is altered in the bladder tissues of IC/BPS patients. Particularly, down-regulation of WNT2B critically impaired the balance between bladder epithelial regeneration and tissue fibrosis in IC/BPS patient, thus WNT2B based therapy could be a plausible approach to

Keywords: Interstitial cystitis/bladderpain syndrome (IC/BPS), Fibrosis, WNTpathway
Purpose: Functional interaction between nervous and vascular system in urinary bladder plays an important role in normal bladder function and the disruption of these structures is known to be related to many diseases, such as bladder pain syndrome and diabetic bladder dysfunction. In this study, we established the technique to determine neurovascular structures in the mouse urinary bladder by using immunohistochemical staining with three-dimensional reconstruction.

Methods: The bladder was harvested from 8-week-old C57BL/6 male mouse. Bladder submucosa was dissected for whole mount staining and thick-cut (50-μm) sections were prepared for full-thickness bladder staining. Immunofluorescent staining of bladder tissue was performed with antibodies against CD31 (an endothelial cell marker), smooth muscle α-actin (a smooth muscle cell marker), NG2 (a pericyte marker), βIII-tubulin (a neuronal marker), or tyrosine hydroxylase (TH, a sympathetic nerve maker). We reconstructed three-dimensional images of bladder neurovascular system from stocks of two-dimensional images, which allows volume rendering and provides reliable anatomic information.

Results: Three-dimensional images clearly provided good anatomic information about neurovascular structures in the three layers of bladder, such as mucosa, submucosa, and detrusor muscle. Whole mount imaging of submucosal layer also clearly delineated relationship between nervous and vascular systems.

Conclusion: Our study for immunofluorescent staining with three-dimensional reconstruction will allow a better understanding of the bladder neurovascular anatomy and may constitute a standard technique to evaluate pathologic changes in a variety of urinary bladder diseases.

Keywords: Urinary bladder, Three-dimensional reconstruction, Immunohistochemistry

Figure 1. (a–f) 3D images of thick-cut sections of urinary bladder. (g, h) Whole mount images of submucosal layer. DAPI (blue color, nuclear marker).
 인간의 신장 교감 신경 섬유의 해부학적 분포 분석 및 3D 생체 모델링: 신장 적출 조직을 이용한 연구

송원훈1, 최원석2, 예은비3, 박성민4, 최의근2, 정창욱1
1서울대학교병원 비뇨기과, 2서울대학교병원 내과, 3포항공과대학교 창의 IT 융합공학과

연구배경: 저항성 고혈압 환자에서 효과적인 신경 차단술을 위하여, 살아있는 인간의 신장 주위 동맥 교감 신경 섬유들의 상세한 해부학적 분포를 신장 적출 조직을 이용하여 분석하고자 하였다.

방법: 신장 적출술을 시행 받은 100명을 대상으로 신장 동맥의 근위부를 결찰하여 주 동맥 조직에서 건강한 조직 상태와 시편 제작이 잘 된 31명의 환자의 조직을 선택하였다. 주변 연조직을 포함하여 동맥 끝단 분기점으로부터 3 mm 간격으로 연속 절개하고, 면역 조직 화학 염색을 한 후, 신경 섬유의 수와 크기, 신동맥의 내강 표면/중심/외벽으로부터 각 신경 섬유들의 중심까지의 거리를 측정 하였다. 해부학적 정보를 시각화하고 향후 전자기 역학 및 열역학의 시뮬레이션을 통한 열치료 효과 검증을 위해 대표적인 조각품을 40 μm 간격으로 174장의 조직 슬라이드를 제작하였고, 현미경으로 영상을 캡쳐하고 Sim4Life 소프트웨어 패키지 ver 3.2 (Zurich MedTech AG, Germany)를 이용하여 최종 3D 생체 모델을 완성하였다.

결과: 환자의 평균 연령은 62.1±12.1세였으며 남성이 70%를 차지하였다. 신장 동맥의 평균 외경은 4.50±1.47 mm, 내경은 2.40±1.22 mm였다. 동맥의 부위별 근위부(원위부 분절)부터 근위부(근위부 분절)까지의 각 분절에 존재하는 신경섬유의 평균 개수는 각각 42.4개, 36.3개, 32.8개 그리고 35.3개였고, 총 개수는 평균 146.8개였다. 30 μm 미만의 작은 신경 섬유들을 제외한 각 분절의 신경섬유의 평균 개수는 각각 34.4개, 30.3개, 28.0개 그리고 26.0개였고, 총 개수는 평균 118.7개였다. 원위부 분절에서 근위부 분절까지 각 분절당 신경섬유의 평균 직경은 각각 108.3±146.6 μm, 114.5±160.6 μm, 122.7±162.9 μm 그리고 83±89.34 μm였다. 신장 동맥 내강 표면에서 각 신경 섬유의 중심까지의 거리는, 90% 이상이 4.0 mm 이내였다. 원위부 분절에서 근위부 분절로 갈수록, 신경 섬유의 평균 직경은 더 굵었고, 신경의 개수는 더 적은 경향을 보였다. 신경 분포와 3D 생체 모델링은 그림 1, 2와 같다.

결론: 신장 동맥 주위 신경들의 90퍼센트가 동맥 내강에서 4.0 mm 이내에 위치하였다. 동맥의 여러 분절에 따른 신경 섬유의 공간적 분포에는 유의한 차이가 없었지만, 신경 섬유의 총 수는 근위부보다 원위부에서 더 많았다. 상세한 추가 분석 결과와 인체 시뮬레이션을 바탕으로 보다 효과적인 신장 신경 차단술의전략을 수립할 계획이다.

Keywords: Anatomical distribution of renal sympathetic nerve fibers, Denervation, 3D modeling
저활동성 방광을 재현하기 위한 죽상동맥경화증 유발 골만만성허혈 쥐 모델의 개발에 관한 연구

김명1, 유환열2, 최대헌1, 김아람1, 유채민2, 한주영2, 신동명2, 주명수1
울산대학교 서울아산병원 1비뇨기과학회실, 2의생명과학회실

**Purpose:** To our best knowledge, animal models reproducing detrusor underactivity (DUA) are scarce. Previous studies suggested that atherosclerosis, a common aging-associated disorder, has a role in the pathogenesis of lower urinary tract dysfunction, such as DUA. We tried to develop a rat model of atherosclerosis–induced chronic bladder ischemia and investigate the effect of chronic bladder ischemia on voiding behavior and bladder function.

**Methods:** Adult male rats were divided into four groups. The arterial injury (AI) group underwent endothelial injury of the iliac arteries (AI–10, 10 times of injury at each iliac artery; AI–30, 30 times) and received a 2% cholesterol diet. The sham group underwent sham operation and received a 2% cholesterol diet. The control group received a regular diet. After 8 weeks, a metabolic cage study and cystometry were performed without anesthesia. Histological examination of the iliac arteries and the bladder was performed. The bladder was also processed for organ bath study.

**Results:** The metabolic cage study showed that in the AI–30 group, micturition interval, voided volume, and residual volume were significantly increased. Cystometry showed that the frequency of reflex bladder contractions and micturition pressure were significantly lower in the AI–30 group. Histological study showed that in the AI group alone, atherosclerotic occlusion occurred in the iliac arteries as well as in the downstream bladder microvessels. Contractile responses of bladder strips to various stimuli in AI–30 group were significantly less than in sham group (Figure).

**Conclusions:** Pelvic arterial occlusive disease plus vascular endothelial dysfunction may cause progressive vascular damage resulting in bladder dysfunction that develops the detrusor underactivity.

**Keywords:** Detrusor underactivity, Arterial injury, Chronic bladder ischemia
간질성 방광염 백서 모델에서 내장 과민성에 대한 인간 배아 줄기 세포 유도체의 효과

최대현1, 유환열1,2, 류채민1,2, 한주영1,2, 김아람3, 신동명2, 주명수1
울산대학교 서울아산병원 1비뇨기과학교실, 2의생명과학교실, 3건국대학교병원 비뇨기과학교실

Purpose: To investigate the effect of multipotent mesenchymal stem cells (M-MSCs) therapy for modulating visceral hypersensitivity in interstitial cystitis (IC) rat model.

Materials and Methods: IC rat model was induced in 10-week-old female Sprague-Dawley rats via the instillation of 0.1M hydrochloric–acid or phosphate–buffer saline (PBS; sham). After 1 week, 1×10⁶ M-MSCs derived from human embryonic stem cells (hESCs) was directly injected into the submucosal layer of the bladder. After 1 week of transplantation of M-MSCs, we performed histological and gene expression analysis of bladder tissue in each group.

Results: The bladder tissues in the IC rat group exhibited markedly increased mast cell infiltration in urothelium and denuded urothelium compared with the sham group. M-MSC administration significantly reversed mast cell infiltration and denudation in urothelium (Figure 1a). Infiltrated mast cells were frequently observed nearby nerve fibers in IC rat bladders, however the anatomical interaction between mast cells and nerve fibers was significantly reduced by M-MSC therapy (Figure 1b). Furthermore, gene expression analysis indicated that the bladder tissues in IC rats were characterized by the increased expression of nerve growth factor (Ngf) and other genes (e.g. Tumor necrosis factor-α: Tnf-α and tachykinin receptor 1: Tacr1) associated with visceral hypersensitivity, however the administration of M-MSCs significantly restored their induction in bladder tissues.

Conclusion: These results demonstrate that M-MSC therapy relieves the anatomical interaction between the mast cells and nerve fibers and up-regulation of a subset of genes associated with visceral hypersensitivity. Thus, we suggest that M-MSC therapy could be beneficial on controlling visceral organ crosstalk and severity of abdominal pain or discomfort in IC/BPS and visceral hypersensitivity, such as irritable bowel syndrome patients.

Keywords: Interstitial cystitis, Visceral hypersensitivity, Stem cell therapy
Objectives: To investigate therapeutic efficacy of Immortalized mesenchymal stem cells (imMSCs) application injured pelvic nerve in a rat model of neurogenic bladder (NB).

Materials and Methods: Sprague-Dawley rats (n=60) were randomly divided into 5 groups. (N=12 per group): sham operation group (control group), nerve injury group, nerve injury matrigel group, nerve injury imMSCs group, and nerve injury engineering imMSCs group. The mean intravesical pressure and other expression experiments were carried out at the 4th week after the procedure. Immediately after recording of mean intravesical pressure, bladder and major pelvic ganglion then harvested for histologic analysis and western blotting. imMSCs were labeled with a fluorescent dye before treatment.

Results: After treated by imMSCs injection significantly improved intravesical pressure compared to the other experimental group, imMSCs had significantly increased bladder smooth muscle/collagen ratio and β-III tubulin expression of the pelvic nerve.

Conclusions: imMSCs had a positive effect on restoration of injured nerves and improved the mean intravesical pressure of NB rats.

Keywords: Pelvic nerve, Immortalized mesenchymal stem cells, Neurogenic bladder
The comparison of therapeutic efficacy of CHA1 MSC and ADMSC and evaluate the therapeutic mechanism in a chronic interstitial cystitis rat model

이영은, 홍재엽, 최경화
CHA의과학대학교 분당차병원 비뇨기과학교실

Objective: To compare the therapeutic effects of mesenchymal stem cell (CHA1) and adipose derived mesenchymal stem cell (ADMSC) and evaluate the effective mechanism on damaged bladder tissue in a chemically induced chronic interstitial cystitis (IC) rat model.

Methods: Female 10-week-old Sprague–Dawley rats were used for induction of chronic IC model. Chronic IC model was induced with single intravesical instillation of protamine sulfate (0.5 ml of PS, 30 mg/ml) and lipopolysaccharide (0.5 ml of LPS, 2.25 mg/ml) for 1 month. 35 rats were divided into five groups (N=7): sham operation group, chronic IC receiving a single bladder submucosal injection of phosphate–buffered saline (20 mL, IC) or IC+ CHA1 (5×10⁵ cells/20 μL, IV) or IC+ ADMSC (5×10⁵ cells/20 μL, IV) and intravesical IALURIL® instillation (40 μL, 40min). Two weeks after treatment, voiding spot was obtained using 6 hr metabolic cage and analyzed with Image J program. The bladder was harvested for histologic examinations and toluidine blue staining for mast cell. Microarray analysis was done to evaluate the therapeutic mode of action.

Results: Rats in the IC group showed increased voiding frequency (3.5 vs 13.8) and decreased the spot size (3.6 vs 1.2 unit) compared with sham group. Significant improvement of voiding spot pattern in frequency (4.8 and 5.1) and size (3.2 and 3.5 unit) was observed in both CHA1 and ADMSC, however, there was no difference between the two groups and the result was comparable with IALURIL® group. Histological examination revealed a significant decrease in the total number of infiltrated mast cells in CHA1 and ADMSC group compared with the IC rats, and there was no difference between the two stem cell groups. Hematoxylin/eosin staining demonstrated that loss of urothelial integrity and increased neutrophil infiltration in IC group was restored both in CHA1 and ADMSC group. Microarray analysis using DAVID and KEGG pathway for CHA1 cells notes several enriched pathways including, various cellular response, metabolic process, nucleic acid binding and oxidative phosphorylation.

Conclusion: CHA1 and ADMCS showed comparable therapeutic efficacy in terms of improvement of voiding pattern and histological restoration in chronic IC model. And CHA1 MSC might produce therapeutic effects through multiple mechanisms.

Keywords: Interstitial cystitis, CHA1 mesenchymal stem cell, Adipose derived mesenchymal stem cell
종사지방종 환아들의 수술 전, 후 요역동학검사 분석

신상희1, 김수연1, 김상윤2, 이용승2, 한상원2
1세브란스여의병원, 소아비뇨기과, 2연세대학교 의과대학 비뇨기과학학교실

목적: 종사지방종은 척수견인증후군을 유발할 수 있는 선천성 척추 이상이다. 증상 발생 후 수술 경과는 대개 50% 정도에서 증상 호전을 보인다고 알려져 있다. 이 연구에서는 종사지방종 수술 전과 수술 후 장기 추적 시의 요역동학 검사 및 비뇨기계 증상 유무를 확인하고자 하였다.

대상 및 방법: 2005년 11월부터 2016년 8월까지 종사지방종으로 진단된 환아 353명의 기록을 후향적으로 분석하였다. 종사지방종으로 수술한 환아들의 종사지방종 확진의 계기, 동반질환과 수술 전, 후의 요역동학 검사를 분석하였다. 요역동학 검사 결과는 Meyrat 등에 의해 개발된 Urodynamic scoring system을 이용하여 Urodynamic study (UDS) score를 분석하였는데, 이는 순응도(4점), 용적(5점), 배뇨근 활동성(5점), 괄약근 조화(3점) 등의 점수를 합산한 지표이다.

결과: 해당기간에 총 353명이 종사지방종을 진단 받았으며, 방광기능에 영향을 줄 수 있는 요도하열, 배설강 이상, 항문폐쇄증 등이 있는 138명과 수술을 시행하지 않은 58명을 제외한 환아는 187명이었다. 이 중 남아는 104명(55.6%)이었고 수술 당시 나이는 평균 11.2개월(1-109)이었다. 수술 전 UDS score는 평균 3.7이었으며, 수술 후 마지막 추적 요역동학 검사는 수술 후 평균 22.4개월(0-64)후에 이루어졌으며 UDS score는 평균 2.3으로 수술 전에 비하여 유의한 감소를 보였다(p<0.001). 배뇨증상은 4명에서 요실금을 동반한 파민성방광 증상, 1명에서 요폐가 있어 발견하였으며 이들의 평균 수술 전 UDS score는 5.2, 수술 후 UDS score는 4.4였고 3명은 증상의 부분호전, 2명은 호전을 보이지 않았다.

결론: 종사지방종으로 수술 받은 187명은 수술 관련 합병증 없이 모두 좋은 경과를 보였으며 요역동학검사 결과 수술 전 후 UDS score 모두 정상범위를 보였다. 이로 증상이 발현된 후 수술한 경우 평균 연령이 높았으며 대부분 증상이 호전되지 않았다.

Keywords: Filum terminale lipoma, Urodynamic study, Prophylactic surgery
신경인성 방광에서 초음파 탄성영상 이용한 방광유순도 측정의 초기경험

임영재1, 김기원2, 최영훈3, 이지연4, 박관진1
서울대학교 의과대학 1비뇨기과학회, 2재활의과학회, 3영상의과학회, 4신경외과학회

목적: 신경인성 방광의 치료 및 예후를 결정하는 가장 중요한 요소가 방광의 유순도이다. 하지만, 현재까지는 요역동학검사를 통해서만 방광유순도를 평가할 수 있다. 저자들은 초음파 탄성영상 이용하여 측정한 탄성계수와 실제 방광유순도와의 상관관계를 알아보고자 하였다.

대상 및 방법: 2016년 11월부터 2017년 6월까지 신경인성 방광으로 요역동학검사를 시행한 8명의 환아를 대상으로 전향적 연구를 진행하였다. 신경인성 방광의 원인으로는 척수수막류 2명, 지방척수수막류 4명, 척수종양 1명, 꼬리퇴행증후군이 1명이었다. 각각의 환자에서 요역동학검사를 시행하여 방광유순도를 측정하였고, 동시에 초음파 탄성영상 통해 탄성계수를 측정하여 비교 분석하였다.

결과: 8명중 남자가 4명이었고, 요역동학검사 시 평균 나이는 8.9세(5-15)였고, 요역동학검사에서 측정된 방광유순도가 10 ml/cmH2O 이하로 매우 저하된 그룹(4명), 20 ml/cmH2O 이상으로 정상인 그룹(4명)으로 나누어 탄성계수값의 차이를 비교하였다. 방광유순도가 저하된 환자군의 평균 유순도는 5.1 (1.7-8.9) ml/cmH2O였으며, 예측방광용적대비 방광의 충만 정도(0%, 25%, 50%, 75%, 100%)에 따라 탄성계수를 측정한 결과 요역동학검사 시작 시에는 방광유순도 저하군이 9.05 kPa, 정상군이 9.4 kPa로 차이가 없었고(p=0.941), 25%충만시에는 저하군이 13.12 kPa, 정상군이 7.74 kPa로 차이를 보였지만 통계적 유의성은 없었다(p=0.211). 한편, 방광유순도 저하군에서는 50% 충만시 평균탄성계수가 13.34 kPa, 75% 충만시 15.46 kPa, 100% 충만시 22.03 kPa로 지속적으로 상승한 반면에 정상 유순도군에서는 50% 충만시 4.85 kPa, 75%충만시 5.53 kPa, 100% 충만시 8.51 kPa로 두 군에서 모두 통계적으로 의미 있는 차이를 나타냈다(50% p=0.006, 75% p=0.003, 100% p=0.015).

결론: 초음파 탄성영상 이용한 탄성계수는 방광유순도와 밀접한 상관관계를 나타내며, 탄성계수가 10 kPa 이상이면 실제 방광유순도가 상당히 저하된 것으로 판단할 수 있다. 한편, 초음파 탄성영상은 비침습적이며 누구나 쉽게 시행할 수 있는 검사로서, 향후 요역동학검사의 역할을 상당부분 대체할 수 있음이라 생각된다.

Keywords: Neurogenic bladder, Elastography, Compliance
약물불응성 야뇨증에 대한 경요도 방광내 보툴리눔독소주입술의 초기치료경험

박관진, 송원훈, 임영재
서울대학교병원 비뇨기과

목적: 치료불응성 과민성 방광에 대해 사용할 수 있는 침습적인 방법으로 경요도 방광내 보툴리눔독소주입술이 있고 성인에서는 그 효용성이 잘 알려졌지만 야뇨증과 동반된 방광과활동성이 기존치료에 대해 저항을 보이는 경우 이 방법이 야뇨증에 어떤 효과를 보일지 조사된 연구결과는 거의 없다. 연구자들은 과민성 방광을 보이는 치료저항성 야뇨증에 대한 경요도 방광내 보톡스 주입술의 효과와 1년 이상의 추적결과를 보고하고자 한다.

대상 및 방법: 기존 약물 및 요로치료에 대한 반응을 보이지 않고 지속적으로 야뇨를 보였던 일차성 야뇨증 환자 7명에서 비디오 요역동학검사를 시행하여 방광과활동성을 확인한 다음 전신마취로 전환하여 경요도 방광내에 보톡스(10 IU/ml)를 20-30부위에 최대 300 IU까지 주사하였다. 치료 후 1개월, 3개월, 6개월, 9개월까지 야뇨증증상, 절박뇨, 배뇨일지에서의 평균 배뇨량의 변화를 ICCS 기준으로 치료전과 비교하였다.

결과: 평균 연령은 14세(8-21)였고 남자가 5명이었다. 주입술 전 정중 치료기간은 19개월(13-28)이었고 모든 환자가 일주일에 3회이상의 야뇨를 보였다. 배뇨일지에서 평균 방광용적은 예상최대방광용적의 38%(24-77) 정도로 방광용적이 감소되어있었다. 요역동학검사에서 배뇨근과활동성은 보인 경우는 4명이었고 3명은 방광유순도의 감소를 보였다. 주입술직후 유의한 배뇨곤란이나 요로감염은 없었다. 술후 2주내에 모든 환자에서 효과를 보였으며 배뇨일지에서 평균 방광용적의 유의한 증가를 보였다. 술후 1개월에 5명은 야뇨증의 Complete Response (CR)를 보였고 2명은 항콜린제 투여로 일주일에 한 번 이하의 Partial Response (PR)를 보였다. 모든 환자들에게서 9개월 이상의 추적을 시행한 결과 4명은 CR의 상태가 유지되었고 3명은 증상의 악화가 있었지만 항콜린제 투여로 PR을 유지하였다.

결론: 과민성방광으로 인한 치료불응성 야뇨증을 보인 소아환자에서 보톡스의 방광내 주입술은 안전하고 효과적이며 일회주사만으로도 상당수의 환자에서 호전된 증상을 9개월 이상 유지하는 결과를 보였다.

Keywords: Enuresis, Overactive bladder, Botulinum toxin
요도하열 교정술 후 배뇨 기능의 평가: 요속 검사와 환아의 배뇨를 촬영한 동영상 간의 상관관계

류제만, 송상훈, 김건석
울산대학교 서울아산병원 비뇨기과학교실

Introduction: Although urine flow rate is a common method used to measure patient voiding function, maximal urinary flow rate (Qmax) is occasionally not accurate in pediatric patients because Qmax is mainly related to the voided volume. To evaluate voiding function of pediatric patients after urethroplasty for hypospadias, we assessed the value of videos recording the voiding of pediatric patients comparing with uroflowmetry (UFM) parameters.

Materials and Methods: Among pediatric patients who underwent hypospadias repair between 2005 and 2015 in our institution, 57 patients documented about video recording of the voiding after surgery were included in this study. Serial postoperative UFM profiles at follow-up visits were assessed and divided into the following postoperative time interval endpoints: the age of ≤3, 4–6, and ≥7 years. When the results of uroflowmetry were not compatible with voiding symptoms, we evaluated voiding function using videos which had been recorded at home and divided into good and bad voiding function. In addition, we assessed the impact of the evaluation of video on the decision of visual internal urethrotomy (VIU).

Results: Mean age of patients at operation was 17 months old and those with anterior, middle, and posterior hypospadias were 9 (15.8%), 22 (38.6%), 26 (45.6%), respectively. Of total 57 patients, 45 (78.9%) underwent tubularized incised plate repair and the others underwent other types of repair. During mean follow-up duration of 53 months, 18 patients underwent VIU once or more. In the result of postoperative UFM, mean maximal urinary flow rate (Qmax) was 5.0, 5.3, and 7.8 ml/s in the age of ≤3, 4–6, and ≥7 years, respectively. Of 39 patients with Qmax<10 ml/s, we assessed 32 (82.1%) patients actually had a good voiding function after evaluating the videos. We performed total 20 VIU for 18 patients. Of those, 15 (75%) patients underwent VIU because of low Qmax, while 5 (25%) underwent VIU after evaluating only video and voiding symptoms.

Conclusions: In addition to uroflowmetry, videos recording voiding of pediatric patients can be helpful to evaluate voiding function after hypospadias repair.

Keywords: Hypospadias, Uroflowmetry, Urethroplasty
0-145

일측성 서혜부탈장/음낭수종 남아에서 반대측 개방성 칼집돌기와 관련된 수술전 초음파검사에서의 반대측 서혜부내륜 형태의 예측가치

박현식, 신현빈, 조현욱, 유대선, 박진성, 김대경, 우승효
울지대학교 의과대학 비뇨기과학학과

Aim: To assess the predictive value of preoperative ultrasound (US) findings with correlating the results of transinguinal laparoscopy for the detection of contralateral patent processus vaginalis in boys with unilateral indirect inguinal hernia/hydrocele.

Materials and Methods: Two hundred seventy-nine boys (mean age 43.8 months, range 2-178 months), with unilateral condition without the evidence of contralateral hernia sac or hydrocele by physical examination or plain ultrasound underwent transinguinal laparoscopy for the presence of contralateral patent processus vaginalis (CPPV) during ipsilateral operation. We prospectively assessed whether the beaky or beaded shape of contralateral inguinal ring on ultrasound, especially morphological variation at Valsalva maneuver was valuable through validation with laparoscopic results.

Results: The incidence of CPPV was 37.6%. In univariate analysis, age and the beaky/beaded shape of inguinal ring on US were statistically significant risk factor for CPPV and others (laterality, disease type, sac type) were not. In multivariate regression analysis, the beaky/beaded shape of internal ring only had significant predictor for CPPV. However, included the morphological variation of these shape at Valsalva maneuver, the beaky/beaded shape parameter was insignificant and morphological variation was only independent predictor for CPPV (p<0.001, OR 83.67, C.I. 17.45-401.1).

This study suggests that US offers the significant information for the presence of CPPV preoperatively, and can also provide surgeons the considerations for surgical treatment.

Keywords: Ultrasound, Inguinal hernia, Risk factors

<table>
<thead>
<tr>
<th>Parameter(s)</th>
<th>CPPV (%)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>&lt; 3 year</td>
<td>46.3%</td>
</tr>
<tr>
<td></td>
<td>≥ 3 year</td>
<td>29.4%</td>
</tr>
<tr>
<td>Laterality</td>
<td>right</td>
<td>38.0%</td>
</tr>
<tr>
<td></td>
<td>left</td>
<td>37.2%</td>
</tr>
<tr>
<td>Disease type</td>
<td>hydrocele</td>
<td>36.4%</td>
</tr>
<tr>
<td></td>
<td>hernia</td>
<td>37.5%</td>
</tr>
<tr>
<td>Sac type</td>
<td>cystic</td>
<td>37.4%</td>
</tr>
<tr>
<td></td>
<td>tubular</td>
<td>40.1%</td>
</tr>
<tr>
<td>Contralateral shape</td>
<td>normal</td>
<td>16.1%</td>
</tr>
<tr>
<td></td>
<td>beaky/beaded</td>
<td>70.3%</td>
</tr>
<tr>
<td>Morphological variation</td>
<td>normal</td>
<td>16.9%</td>
</tr>
<tr>
<td></td>
<td>yes</td>
<td>97.2%</td>
</tr>
</tbody>
</table>

CPPV: contralateral patent processus vaginalis
Contralateral shape: Shape of contralateral internal ring on USG
Morphological variation: increasing size of contralateral internal ring at Valsalva on USG

<table>
<thead>
<tr>
<th>Parameter(s)</th>
<th>Univariate analysis</th>
<th>p-value</th>
<th>Odds Ratio (95% C.I.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>0.004</td>
<td></td>
<td>0.548</td>
</tr>
<tr>
<td>Laterality</td>
<td>0.901</td>
<td></td>
<td>1.124</td>
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<tr>
<td>Disease type</td>
<td>0.890</td>
<td></td>
<td>0.731</td>
</tr>
<tr>
<td>Sac type</td>
<td>0.785</td>
<td></td>
<td>0.856</td>
</tr>
<tr>
<td>Contralateral shape</td>
<td>&lt;0.001</td>
<td></td>
<td>2.240</td>
</tr>
<tr>
<td>Morphological variation</td>
<td>&lt;0.001</td>
<td></td>
<td>17.450-401.1</td>
</tr>
</tbody>
</table>

Disease type: hernia compared to hydrocele
Sac type: tubular compared to cystic type
Contralateral shape: shape of contralateral internal ring on USG (beaky or beaded)
Morphological variation: increasing size of contralateral internal ring at Valsalva on USG
고령에서 발생한 급성 신우신염의 연령에 따른 임상적 특징과 항생제 감수성: 다기관관 연구

김응빈1, 조규현2, 김기홍3, 이상욱4, 양희조5, 두승환6, 김재현7, 윤용현8, 김기현9, 이상욱10, 김진모11, 이창호12, 김영호13, 송윤섭14, 전우선15, 김민의16

순천향대학교 부천병원, 2구미병원, 3천안병원, 4서울병원

Background: 급성 신우신염은 전 연령대 여성이 비교적 높은 유병률을 보이는 요로감염질환이지만, 노인환자에서 발생한 경우 연령이 증가함수록 증상이 더 심하고 치료 반응 및 예후도 나빠진다. 저자들은 다기관연구를 통해 노인에서 발생한 급성 신우신염의 연령에 따라 분류하여 임상적 특징 및 항생제 감수성에 대해 조사하여 비교하였다.

Methods: 2012년부터 2016년까지 지역별 3차 의료기관 4곳에서 급성 신우신염으로 입원치료를 받은 환자 중 65세 이상의 노인환자 1,028명(75±7.1세)을 대상으로 하였다. 환자를 나이에 따라 3군으로 분류하여 각각의 임상증상, 혈액 및 요 검사, 기저질환, 항생제 감수성을 비교 분석하였다.

Result: Young-old군은 530명(67.4±2.9세), old-old군 363명(78.2±3.0세), oldest-old군 126명(87.6±2.8세)이었다. ANOVA로 인한 입원 기간과 발열지속시간은 나이가 많은 군간에 차이를 보이지 않았다. 혈액감염과 ESR와 CRP는 연령이 높은 군간에 증가하였다. 환자의 기저질환에서 당뇨 및 만성 신질환은 그룹간의 차이가 없었으나, 뇌혈관질환과 응혈성질환은 증가하여 이환된 것으로, ESR와 CRP는 그룹별로 차이가 있었으며 연령증가에 따른 차이도 있었다. 노인의 항생제에 대한 감수성이 낮아지는 추세로, 요로감염에 따라 감수성 감소가 보였다. Table 1. Table 2는 연령군에 따라 감수성의 감소가 매우 크게 관찰되었다.

Conclusion: 고령환자들에서 발생한 급성 신우신염은 나이별로 임상경과와 감수성의 차이 및 주요 항생제의 감수성에 차이를 보였다. 따라서 급성 신우신염 환자의 치료 시 연령을 고려한 항생제 선택이 중요하다.

Keywords: Elderly, APN, Susceptibility

Table 1. Clinical characteristics and laboratory findings of elderly women with acute pyelonephritis

<table>
<thead>
<tr>
<th>Variable</th>
<th>Young-old (75-79)</th>
<th>Old-old (80-84)</th>
<th>Oldest-old (85+)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>75-79</td>
<td>80-84</td>
<td>85+</td>
<td></td>
</tr>
<tr>
<td>Clinical progress</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fever</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Decerebrate state</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Presence of fever</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laboratory findings</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White blood cell count</td>
<td>7.1±0.5</td>
<td>7.9±0.6</td>
<td>8.2±0.7</td>
<td>.005</td>
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<tr>
<td>ESR</td>
<td>114±22</td>
<td>114±21</td>
<td>115±22</td>
<td>.999</td>
</tr>
<tr>
<td>CRP</td>
<td>7.7±0.5</td>
<td>8.5±1.5</td>
<td>9.1±1.1</td>
<td>.0001</td>
</tr>
</tbody>
</table>

Table 2. Antimicrobial susceptibility of ampicillin from elderly women with acute pyelonephritis

<table>
<thead>
<tr>
<th>Antimicrobial</th>
<th>Young-old (65-74)</th>
<th>Old-old (75-84)</th>
<th>Oldest-old (85+)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ampicillin</td>
<td>100%</td>
<td>98%</td>
<td>94%</td>
<td>.005</td>
</tr>
<tr>
<td>Azlocillin</td>
<td>98%</td>
<td>96%</td>
<td>93%</td>
<td>.001</td>
</tr>
<tr>
<td>Cefotaxime</td>
<td>100%</td>
<td>98%</td>
<td>94%</td>
<td>.005</td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>100%</td>
<td>98%</td>
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<td>Ceftazidime/avibactam</td>
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요관경하결석제거술 후 발생하는 전신염증반응증후군의 발생율 및 위험인자

김웅빈, 이상욱, 이광우, 김준모, 김영호, 김민의
순천향대학교 의과대학 비뇨기과학과

Purpose: 내시경 및 결석제거용 레이저 기술의 발달로 요관경하결석제거술이 많이 시행되고 있으나 수술 후 심각한 감염합병증이 발생할 수 있다. 저자들은 요관경하결석제거술 후 발생하는 SIRS 및 urosepsis의 유병율 및 위험인자를 조사하여 분석하였다.

Material and Methods: 2013년부터 2016년까지 4개월 동안 단일기관에서 요로결석으로 요관경하 결석제거술을 시행 받은 환자 중 수술 전 요로감염의 증상을 보인 환자를 제외한 1,356명의 환자를 후향적으로 조사하였다. 환자를 SIRS 발생군과 SIRS 비 발생군으로 나누어 두 군간의 차이를 줄 수 있는 위험인자를 분석하였다.

Results: 요관경하결석제거술이 시행된 1,356명의 환자 중 96례(7.1%)에서 수술 후 SIRS가 발생하였고, 이중 37례(2.7%)가 urosepsis로 진단되었다. SIRS 발생군과 SIRS 비발생군 간에 나이, 성별, performance status, 수술 전 pyuria 여부, 결석크기, 수술시간, 수술중 레이저의 사용 등이 통계적으로 의미있는 차이를 보였으며, comorbidity index, BMI, 전신 결석과거력, 수술전 항생제 사용여부, 결석의 위치, 크기 시술부위, 수술 후 요관스텐트 유지 등은 차이를 보이지 않았다(Table 1). Urosepsis가 진단된 37명의 환자는 여성이 남성 보다 높은 발생율을 보였고(male: 8, female: 29, p<0.05) 항생제 사용기간과 입원기간이 각각 11.4±3.7일, 13.9±3.6일로 조사되었다. ESBL 양성 병원균은 5례(13.5%)에서 배양되었다(Table 2).

Conclusion: 요관경하결석제거술 후 발생할 수 있는 감염합병증을 예방하기 위해 합병증이 발생할 가능성이 높은 환자에서는 수술시간을 최소화 하는 노력과 예방적 항생제의 사용이 고려되어야 할 것이다.

Keywords: URS, SIRS, Urosepsis
요로결석을 동반한 발생성 요로감염 환자에서 미생물학적 특징과 경험적 항생제 내성군 발생의 예측인자

조 석1, 김형석2, 박민구3, 이건철1, 조성용1, 이정우2

1인제대학교 일산백병원, 2동국대학교 일산병원, 3인제대학교 서울백병원

목적: 요로 결석을 동반한 발생성 요로감염 환자에서 소변 및 혈액배양검사에서 동정되는 균의 종류와 경험적 항생제 내성군 발생의 위험 인자에 대해 알아보고자 하였다.

대상 및 방법: 2011년 1월부터 2016년 12월까지 요로결석을 동반한 발생성 요로감염으로 국내 3개 대학병원을 방문한 203명의 의무기록을 후향적으로 분석하였다. 환자의 성별, 나이, 체질량지수, 기저질환, 요로결석 관련 정보와 소변 및 혈액 배양 검사에 동정된 균과의 종류와 항생제 감수성 검사를 확인하였다.

결과: 203명의 요배양 검사 상 배양검사 결과 음성인 경우가 51건(25.1%), E. coli가 67건(33.0%), 그 외 enterococci가 18건(8.9%), Proteus가 13건(6.4%), 여러 균주가 배양된 경우가 11건(5.4%), S. agalactiae가 10건(4.9%), Klebsiella가 8건(3.9%), pseudomonas가 7건(3.4%), S. epidermidis가 6건(3.0%), Serratia가 4건(2.0%), Enterobactre가 3건(1.5%), Acinetobacter가 각각 1건(0.5%), 그 외 균주가 배양된 경우가 6건(3.0%)이었다. Fluoroquinolone 저항균 발생 인자는 단변량 분석 결과 심혈관질환(p=0.034), 당뇨(p=0.009), 신경학적 질환(p=0.031), 병원관련감염(p=0.018), 3개월 이내 항생제 치료 병력(p=0.021), 병원관련 감염(p=0.003), 재발성 요로감염(p=0.002), 다발성 요로결석(p=0.005)였으며, 다변량 분석 결과 다발성 요로결석이 Fluoroquinolone 저항의 독립적 예측 인자로 나타났다(p=0.008). Cefotaxime에 대한 저항균 발생 인자는 단변량 분석 결과 나이(p=0.018), 신경학적 질환(p=0.024), 호흡기계 질환(p=0.008), 병원관련 감염(p=0.020), 재발성 요로감염(p=0.005), 다발성 요로결석(p=0.025)였고, 다변량 분석 결과 재발성 요로감염이 Cefotaxime 저항의 독립적 예측 인자로 나타났다(p=0.041).

결론: 요로결석을 동반한 발생성 요로감염 환자에서 경험적 항생제로써 Fluoroquinolone은 부적절하고, Cefotaxime 단독 요법을 추천한다. 그 중 재발성 요로감염인 경우에는 높은 내성률로 Cefotaxime 단독 요법보다는 병합요법을 추천한다.

Keywords: Antibiotics resistance, Calculus, Urinary tract infection
Prevalence of fluoroquinolone resistant rectal flora in patients undergoing transrectal ultrasound guided prostate needle biopsy: a prospective multicenter study

Seong Jong Eun, Ji Won Ryu, Taeju Park, Jong Bum Kim, Yang Hyun Cho, Myung Soo Kim, Ho Seok Chung, Eu Chang Hwang, Kyung Jin Oh, Sun-Ouck Kim, Taek Won Kang, Dong Deuk Kwon, Kwangsung Park, Seung Il Jung

Purpose: To estimate the prevalence of fluoroquinolone resistant rectal flora in patients undergoing transrectal ultrasound guided prostate needle biopsy (TRUS Bx) and identify the high risk groups.

Materials and Methods: From January 2015 to March 2016 rectal swabs of 557 men from 5 institutions undergoing TRUS Bx were obtained.

Results: The incidence of FQ–R and extended–spectrum beta–lactamase (ESBL) production was 48.1% and 11.8%, respectively. The most common FQ–R bacteria was E. coli (81% of total FQ–R bacteria, 39% of total rectal flora), and 16 (2.9%) patients had infectious complications. Univariable and multivariable analysis of clinical parameters affecting FQ–R showed no factor associated with FQ resistance of rectal flora. The clinical parameters associated with infectious complications after prostate biopsy were operation history within 6 months (RR 6.60; 95% CI 1.99–21.8, p=0.002)

Conclusions: The prevalence of FQ–R rectal flora from the rectum before TRUS Bx was 48.1% and most common FQ–R bacteria was E.coli (39%), however, FQ resistance of rectal flora was not predicted by clinical factors. These results suggest that risk based approach cannot be recommended and physicians should consider targeted antibiotic prophylaxis or extended antibiotic prophylaxis for patients undergoing TRUS Bx.

Keywords: Biopsy, Fluoroquinolone, Prostate
술 전 포비돈 요오드 좌약 투여의 경직장 전립선 조직검사 시행 후 합병증 예방 효과 연구: 전향적 무작위 대조군 연구

이인재1, 이상철1, 권오성2, 강민응3, 이상은1

1분당성남병원 비뇨기과학회, 2성균관대학교 삼성서울병원 비뇨기과학회, 3한림대학교 강남성심병원 비뇨기과학회

목적: 경직장 전립선 조직검사는 전립선 암의 진단에 있어 표준적으로 사용되는 진단법이다. 하지만 경직장 전립선 조직검사는 침습적인 술기로서 감염, 패혈증 등의 심각한 합병증을 초래할 가능성이 있다. 또한 최근 연구에 따르면 경직장 전립선 조직검사 후 0.8~3.6%의 환자가 감염성 합병증으로 재입원한다고 보고되었으며, 이에 조직검사 후 감염증 예방을 위해 시술 전 포비돈 요오드 좌약의 사용의 유용성을 확인하려 한다.

방법: 2014년 12월부터 2016년 5월까지 만 18세 이상의 276명의 경직장 전립선 조직검사 환자를 대상으로 진행하였다. 환자는 시술 전 포비돈 요오드 좌약을 사용한 치료군(n=138), 좌약을 쓰지 않은 대조군(n=138)으로 구분하였으며 각 군의 비율이 1:1이 되도록 무작위로 배정하였다. screening을 위해 blood lab 및 IPSS, SHIM, EORTC QLQ-C30 questionnaire를 작성하여 평가를 진행하였으며, 조직검사 1~2시간 전 glycerin enema를 시행 후 포비돈 요오드 좌약 200 mg을 삽입하였다. 모든 환자에게 조직검사 30분~1시간전 ceftriaxone 2 g 1회 IV로 투여하였으며, 이후 추가적 항생제 처방은 없었다. 조직검사 시행 1주 후 외래 방문을 통해 발생성 합병증 및 포비돈 요오드 좌약 관련 합병증 발생여부에 대해 면담을 시행하였으며 설문지 작성을 통해 시술 전후의 주관적 차이를 평가하였다. 발생성 합병증의 기준은 38도 이상의 고열 및 이로 인한 의료기관을 방문하여 치료받은 경우로 정의하였다. 조직검사는 영상의학과 전문의 1명에 의해 시술이 진행되었다.

결과: 전체 환자 276명 중 26명이 탈락하여 치료군 120명, 대조군 130명을 대상으로 평가하였다. 평균 연령은 치료군에서 66.6±8.6세, 대조군에서 65.2±9.1세, 평균 전립선 부피는 치료군에서 42.37±19.85 mL, 대조군에서 40.54±17.23 mL, 검사 당시의 평균 PSA는 치료군에서 12.60±1.78 ng/mL, 대조군에서 11.58±3.17 ng/mL로 보고되었다. 감염성 합병증일 확률은 두 군간의 명확한 차이는 보이지 않았으며(치료군: 33.3%, 대조군: 28.5%, p=0.100), 감염성 합병증 및 포비돈 요오드 좌약 관련 부작용은 본 연구에서 보고되지 않았다. 또한 시술 전 설문지 작성환율은 33%에서 보고되었으며, 시술 전후 questionnaire score 변화량에서 의미있는 차이가 보이지 않았다(p>0.05).

결론: 치료군 및 대조군 모두에서 감염 합병증이 발생하지 않았기 때문에, 경직장 전립선 조직검사 전 포비돈 요오드 좌약의 유용성은 평가하기 어렵다. 하지만 시술 전 60분 이내로 세밀한 세발로스포린 항생제 1회 투여만으로도 경직장 전립선 조직검사 후 감염 합병증을 충분히 예방할 수 있다.

Keywords: TRUS Bx, Infection, Povidone-iodine suppository
한국인 전립선암 환자의 10년간(2005-1014) 치료 패턴과 의료비용 변화 연구: 건강보험 데이터 데이베이스를 이용한 전수조사

강호원1, 윤석중1, 정재일1, 최훈3, 김재현4, 유지호5, 하윤석6, 조인창7, 김형준8, 고준성10, 김진재11, 박종혁11, 김소영11, 이지열12
1충북대학교병원 비뇨기과학교실, 2인제대학교 부산백병원 비뇨기과학교실, 3고려대학교 안산병원 비뇨기과학교실, 4서울대병원 비뇨기과학교실, 5전남대학교병원 비뇨기과학교실, 6연세대학교 원주기독병원 비뇨기과학교실, 7가톨릭대학교 부천성모병원 비뇨기과학교실, 8부산대학교병원 비뇨기과학교실, 9충북대학교 의과학대학 예배의학교실, 10가톨릭대학교 서울성모병원 비뇨기과학교실

Purpose: A complete enumeration study was conducted to evaluate trends in national practice patterns and direct medical costs for PCa in Korea over a 10–year retrospective period using data from the Korean National Health Insurance System (KNHI).

Materials and Methods: Reimbursement records for 874,924 patients diagnosed between 2002 and 2014 with primary PCa according to the International Classification of Disease (ICD) 10th revision code C61 were accessed. To assess direct medical costs for patients newly diagnosed after 2005, data from 68,596 patients managed between January 2005 and 31 December 2014 were evaluated.

Results: From 2005 to 2014, the total number of PCa patients showed a 3-fold increase. The rate of radical prostatectomy (RP) and androgen deprivation therapy (ADT) remained unchanged at 40% each. RP monotherapy increased from 23.5% in 2005 to 39.4% in 2014. From 2008, the rate of robot-assisted RP rose sharply, showing a similar rate to open RP in 2014. Average total treatment costs in US dollars in the 12 months post-diagnosis were around $8330. Average annual treatment costs thereafter were around $4000. Out-of-pocket expenditure was highest in the first year post-diagnosis (16.1% in 2005 and 22.1% in 2014), and ranged from 12% to 16% thereafter.

Conclusion: Between 2005 and 2014, a substantial change was observed in the national practice pattern for PCa in Korea. While total treatment costs and out-of-pocket expenditure in the first year after diagnosis showed a slight increase, average treatment costs remained stable thereafter.

Keywords: Prostatic neoplasms, Prostatectomy, Radiotherapy, Costs, National health insurance
로봇보조 전립선절제술 후 MRI로 확인한 neurovascular bundle 보존여부와 성기능의 상관관계

최원석, 유달산, 정인갑, 송채린, 김청수, 안한종, 홍준혁
울산대학교 서울아산병원

Objective: The neurovascular bundle (NVB) plays an important role in erectile function. Urologists try to preserve it as much as possible in patients receiving prostatectomy. The neurovascular bundle can be observed in MRI and thus can be tracked with the same MRI postoperatively. We investigated the relationship between this neurovascular bundle observed in MRI and the potency after robot-assisted laparoscopic prostatectomy.

Materials and Methods: 33 patients with prostate cancer who underwent robotic prostatectomy and had postoperative MRI were analyzed from 2013 to 2015. We compared the colorized T2 axial images of the prostate cancer patients with better contrast and tracked the neurovascular bundle (NVB) before and after surgery. Potency was obtained through the IIEF-5 questionnaire prior to surgery, and postoperative erectile capability was assessed at the outpatient clinic. Aforementioned 33 patients were divided into group 1 (n=26) and group 2 (n=7). Group 1 patients had good preoperative potency, received nerve-sparing prostatectomy, and had good postoperative erection. Group 2 was the opposite with poor preoperative potency, no nerve-sparing during prostatectomy and no postoperative erection.

Results: Group 1 had a mean age of 60.0 years (47–65) whereas group 2 had mean age of 73.8 years (range 66–81). In their MRIs, we could confirm that the neurovascular bundle was connected to the anastomosis site in group 1 whereas the NVB was mostly disconnected in group 2. The difference between the two findings was clearly reconstructed in color to have better contrast. Group 1 patients who had sustained NVB on MRI had good postoperative erectile function with shorter recovering time in potency. There was no postoperative erection in group 2 patients.

Conclusion: We could confirm the preservation of the patient’s NVB objectively by using MRI after robot-assisted laparoscopic prostatectomy and thus predict the postoperative potency, which will help us decide whether to treat the erectile problem in the future.

Keywords: Prostate cancer, Neurovascular bundle, Potency
근치적 전립선 절제술 후 양성절제연을 예측하는 P.R.O.S.T.A.T.E scoring system과 D’amicco 및 NCCN 분류와의 비교연구

Introduction: A study had shown a novel scoring system, called P.R.O.S.T.A.T.E scoring system in 2017. We applied scoring system to us and compared with D’amicco and NCCN classification to predict positive surgical margin (PSM) after radical prostatectomy (RP).

Material & Method: We retrospectively reviewed medical records of 518 patients who underwent RP by a single surgeon. In P.R.O.S.T.A.T.E scoring system, eight preoperative characteristics of PCA patients were measured (Table 1). Patients were divided into three groups (low-risk group: score of 0 to 4, Intermediate-risk group: score of 5 to 9 and high-risk group: score of 10 to 15). Receiver operating characteristic curve was conducted to comparison of each classification.

Results: Median follow-up period was 23.4 (95% CI 21.8–25.1) months. PSM was present in 190 of total 518 (36.6%). Of the patients in low, intermediate and high risk groups, 15 of 66 (22.7%), 153 of 416 (36.7%) and 22 of 36 (61.1%) on P.R.O.S.T.A.T.E scoring system, 1 of 22 (4.5%), 6 of 50 (12.0%) and 183 of 446 (41.0%) on D’amicco classification, 1 of 22 (4.5%), 56 of 274 (20.4%) and 133 of 222 (59.9%) on NCCN classification had PSM (Table 2). AUC on ROC curve were 0.568 (p value=0.01), 0.581 (p value<0.001) and 0.722 (p value<0.001), respectively.

Conclusions: The results of our study show that the P.R.O.S.T.A.T.E scoring system was not superior to D’amicco and NCCN classification to predict PSM after RP. NCCN classification is most highly predictive risk classification of PSM after RP.

Keywords: Positive surgical margin, Scoring system, Prostate cancer
**Purpose:** Recently nerve sparing technique is often performed in radical prostatectomy, especially robot-assisted radical prostatectomy (RARP) and capsular incision (CI) was reported in 1.3–34.3%. But its impact on oncological outcome is not obvious yet. So we evaluated the significance of CI into tumor at RARP specimen in patients who had pathological T2 stage.

**Materials and Methods:** Between January 2011 and June 2011, 133 patients with follow-up for at least 36 months, who had neither extraprostatic extension nor seminal vesicle involvement on prostatectomy specimen, were included. Patients with neoadjuvant therapy were excluded. CI was defined as tumor extending into the inked margins, at sites except the apex of the prostate and without documented extraprostatic extension. Biochemical recurrence (BCR) was defined as two consecutive increases in PSA of 0.2 ng/ml or greater.

**Results:** The mean age of the patients were 63.38±7.04 and mean follow-up period was 64.77±8.82 months. There were 102 patients with organ-confined disease and negative surgical margins (Group1), 21 with CI into tumor (Group2), 10 with organ-confined disease and an apex-only positive (Group3). There were no statistical difference among each group in age, Gleason score and pre-operative PSA. CI was commonly occurred lateral region (37.5%) and posterolateral region (29.2%). 5-year BCR-free rate for each group was 95.8% for Group1, 65.5% for Group2 and 90.0% for Group3 (p≤0.01). The risk of BCR with CI into tumor was worse than confined tumor with negative surgical margin (HR: 6.98, 95% CI 1.45–33.608) (p=0.015), but the risk with margin positive in only apex was not significantly different from others. The risk of BCR with each pathological T2 substage were not significantly different.

**Conclusions:** CI into tumor was also significant predictor of BCR in patient who were performed RARP and had pathological localized tumor. It should be taken care during operation to avoid CI.

**Keywords:** Capsular incision, Robot-assisted radical prostatectomy, Biochemical recurrence
Aim: To evaluate the effects of prostatic apex shape variations on positive apical margin rate (PAM) after radical prostatectomy (RP) by undertaking comparative study of robot-assisted laparoscopic radical prostatectomy (RALP) versus open radical prostatectomy (ORP).

Methods: Total 3,324 cases of RP (1,004 ORP, 2,320 RALP) from January 2004 to May 2017 were retrospectively reviewed. All patients underwent preoperative magnetic resonance imaging (MRI) and stratified into 4 categories according to prostatic apex shape at mid-sagittal plane. Between ORP and RALP groups, age, BMI, preoperative PSA, biopsy and pathologic Gleason score (GS), clinical and pathologic stage and prostatic apex shapes were compared. Logistic regression analyses were performed to evaluate independent predictors of PAM. Propensity adjustments were undertaken before statistical analysis to minimize selection bias.

Results: ORP and RALP groups showed no significant difference in age, BMI, PSA, biopsy and pathological GS, clinical and pathologic stage as well as prostatic apex shape variations. ORP group showed PAM of 12.3% that was significantly higher than 1.75% of RALP group (p<0.001). Both groups showed the highest PAM with apex type 3, which is apex covering posterior aspect of membranous urethra (ORP 34.6%, RALP 41.8%). Logistic regression analysis showed prostate apex type 3 was a significant independent predictor of PAM but other apex types were not.

Conclusions: Prostate apex type 3 was a significant independent predictor of PAM. RALP group showed better outcomes in PAM compared to ORP group.

Keywords: Robotic-assisted surgery, Positive margins, Radical prostatectomy
Purpose: We aimed to evaluate the impact of intraoperative frozen section analysis (IFSA) and further resection following positive IFSA on biochemical recurrence (BCR) after RP. Also, we tried to identify when IFSA and further resection would be helpful.

Materials and Methods: From March 1998 to December 2015, a total of 2023 patients who underwent RP and IFSA were evaluated. Median (range) follow-up was 64.7 (13.6–234.6) months, IFSA was performed in anterior, posterior and both lateral sides of the apex and the base. Further resections were performed when IFSA showed positive findings.

Results: IFSA findings were initially negative in 1739 (86.0%), converted negative by further resection in 137 (6.8%), and positive in 147 (7.3%) patients, PSM rates in converted negative IFSA group were lower than positive IFSA groups (50.4% vs 76.2%, p<0.001). Among three groups, overall 5-year and 10-year BCR–free survival rates were the highest in initially negative IFSA group (76.1% and 63.2%). And converted negative IFSA group showed longer 5-year and 10-year BCR–free survival than positive IFSA group (62.3% vs 40.2% and 53.4% vs 18.2%, each p<0.001). By pathological stage, converted negative IFSA group showed longer 5-year and 10-year BCR–free survival rates than positive IFSA group (85.4% vs 72.2% and 64.0% vs 34.1%, p=0.017) only in pT2 tumors. In initially positive IFSA patients, negative conversion by further resection was the independent perioperative predictor for BCR (HR=0.557, p=0.003).

Conclusions: Converted negative IFSA by further resection groups had longer BCR–free survival than positive IFSA group in overall prostate cancers. A negative conversion by further resection was identified to prolong BCR–free survival after RP. IFSA and a further resection for negative conversion should be considered in every RP as possible, especially in suspected organ–confined prostate cancers.

Keywords: Prostatic neoplasms, Prostatectomy, Frozen sections
Objectives: We verified whether there is an association between number of prior biopsies and perioperative complications, biochemical recurrence (BCR) after RP.

Methods: Total 1112 patients who underwent RP between January 2009 and April 2016 at 4 different centers were included in this study. We divided these patients into two groups, group of patients those who underwent only 1 biopsy and patients those who underwent 2 or more biopsies. The association between number of prior biopsy and perioperative complications was analyzed.

Results: Of 1112 patients, 1046 patients (94.1%) underwent only 1 biopsy, 66 (5.9%) underwent 2 or more biopsies. There were no significant differences in preoperative PSA (11.8 versus 12.0 ng/ml, p=0.883). There were no significant differences in operation time, blood loss, hospital stay (all p>0.05). Patients who underwent multiple prostate biopsies had significantly more often a localized tumor (p=0.003). Gleason score and rate of positive surgical margin was significantly lower in patients with multiple biopsies (p=0.002, p=0.001). Cox proportional hazards model showed that there was no association between number of prior prostate biopsy and BCR (p=0.210). Kaplan-Meier curve analysis showed that biochemical recurrence free survival between two groups were similar (p=0.711).

Conclusions: Multiple prostate biopsies are not associated with an increased risk of perioperative complication rate or adverse pathological outcome or higher rates of BCR in patients undergoing radical prostatectomy.

Keywords: Radical prostatectomy, Prostate biopsy, Perioperative complication, Biochemical recurrence
Conditional probability of biochemical recurrence free survival following radical prostatectomy

Jung Woo Lee, Dong Hoon Lee, Jong Kil Nam, Moon Kee Chung, Sung Woo Park
Department of Urology, Pusan National University Yangsan Hospital

Purpose: Conditional survival is defined as the likelihood of subsequent survival, given the pre–condition of having already survived a certain length of time. It has been reported in various malignancies. We evaluated whether biochemical recurrence (BCR) free duration is associated with conditional probability of BCR free survival (C–BCRFS) following radical prostatectomy (RP) according to D’Amico risk classification.

Methods: Between January 2009 to December 2016, 605 cases that had complete clinico–pathologic and follow–up data were included. Using the Kaplan–Meier estimation, the probabilities of C–BCRFS following RP were estimated in each population who did not recur biochemically, instead of survival itself, at 0–3 follow–up year. The C–BCRFS was analyzed according to D’Amico risk classification and compared using the log–rank test.

Results: Median follow–up was 30 months (IQR 16, 56) and median age was 67 years (IQR 62, 71). The 5–year C–BCRFS rates in high risk group rose from 40.4% at baseline, to 69.7%, 82.8%, 93.4, and 96.0% after recurrence free 1–4 year, respectively (Figure). Elapsing 3 years without biochemical recurrence, there is no significant difference in 5–year C–BCRFS between low and high risk group (log rank test, p=0.507).

Conclusion: In high risk group, the C–BCRFS markedly improved as number of elapsed years without BCR increased after RP. There is no difference in C–BCRFS between low and high risk groups after recurrence free 3 years after RP. This is not only useful for patients counseling but also to optimize postoperative follow–up strategies.

Keywords: Prostate, Cancer, Survival
Significance of surgeon experience as a predictor of biochemical failure and continence after robot-assisted laparoscopic prostatectomy

이광석, 구교철, 정병하
연세대학교 의과대학 강남세브란스병원

Purpose: Surgeon experience is thought to affect prostate cancer surgical outcomes. However, few studies identify an experience threshold for performing robot-assisted laparoscopic prostatectomy based on oncologic and functional outcomes with long-term follow-up of >500 cases.

Methods: A total of 518 consecutive patients with prostate cancer treated with robot-assisted laparoscopic prostatectomy from May 2007 to April 2016 by 1 surgeon were enrolled. Patients were categorized into 3 risk groups (low-intermediate-high). Oncologic outcomes and continence were evaluated using biochemical failure and pad use. Discrimination was assessed by evaluating survival rates after adjustment for confounding effects.

Results: Of 518 patients (mean prostate-specific antigen=10.47 ng/mL, mean follow-up=43.5 months), 182 (35.1%) experienced biochemical failure. The proportions of pathologic Gleason score (≥8) and stage (≥T3) were 14.6% and 45.4%, respectively. After adjusting for the confounding effect of biochemical failure, surgeon experience (>200) (HR=0.44, p=0.001) was identified as a prognostic factor. Surgeon experience was a predictor of biochemical failure in patients with intermediate-high risk prostate cancer. No experience threshold was found for low-risk patients. Pad-free survival rates at 1, 3, 6, and 12 months were 31.0%, 55.0%, 77.7%, and 97.4%, respectively. Surgeon experience (>250) (HR=1.27, p=0.018) was the significant predicting factor after adjustment for covariates.

Conclusions: Surgeon experience was strongly associated with oncologic and functional outcomes after robot-assisted laparoscopic prostatectomy for patients with prostate cancer. Experience significantly affected biochemical failure only in intermediate and high-risk groups.

Keywords: Patient outcome assessment, Prostate, Prostate cancer, Prostatectomy, Prostatic neoplasms
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Aim: To compare the short-term outcomes of focal or partial low-dose rate (LDR) brachytherapy (FP) with whole gland implantation (WI) in localized prostate cancer (PCa) patients.

Methods: From January 2015 to January 2017, total 60 patients with transrectal biopsy proven localized PCa received I-125 LDR-brachytherapy (FP: 30, WI :30). All patients were evaluated with pre-operative multiparametric MRI. The indications of focal or partial implantation are as following: T2a/T2b with PSA<10 ng/mL+Gleason score (GS) 6, T2a/T2b with PSA >10 ng/mL+GS 6 or T2c (tumor occupying greater than 50% of one lobe with less than 25% of contralateral lobe) with PSA<10 ng/mL+GS 6 or any T2 with GS 7(3+4). Implantation prescription dose was 145 Gy with a seed activity of 1,413 MBq in WI group and FP group. Phoenix criteria (PSA−nadir+2.0 ng/ml) was applied to define biochemical recurrence (BCR). Potency, urinary and rectal morbidity were analyzed by incorporating International Index of Erectile Function (IIEF-5), International Prostate Symptom Score (IPSS) and radiation therapy oncology group (RTOG) toxicity criteria, respectively.

Results: There was no significant difference between FP and WI group in terms of age, PSA, preoperative total IPSS, IIEF-5, body mass index and prostate volume. Mean follow time of FP group about 10 month (10±6.3). In biopsy GS, FP group had predominance with GS 6 (76.7%) but WI group had the most of patients (83.3%) with GS 7. No patient with GS≥8, clinical stage T2c or high risk PCa underwent focal or partial implantation. No patient with clinical stage T1c, T2a or low risk PCa were included in WI group. All FP group patients received LHRH agonist after implantation but WI group had only 33.3% received. WI group had significantly greater number of I-125 seeds implanted compared to FP group (p=0.002). 10 months post-implantation outcomes showed FP group had better voiding function and potency (IPSS: p=0.035, IIEF-5: p=0.048) with statistical significance. Both group had no BCR case at 10 months after implantation.

Conclusions: Focal or partial LDR–brachytherapy in localized PCa showed significantly less urinary, rectal and erectile complications with comparable short-term oncologic outcomes.

Keywords: Brachytherapy, Lower urinary tract symptoms, Prostate cancer
Does uneven geographic distribution of urologists affect bladder and prostate cancers mortality? - national health insurance data in Korea from 2007 to 2011

Kim Tae-Hyun¹, Shin Hwa-Yeon¹, Kim Hyun-Jong², Park Jae-Eung³

¹Chonnam National University College of Medicine Urology Department, ²Korea University College of Medicine Preventive Medicine Department, ³Korea University College of Medicine Ansan Hospital Urology Department

Introduction: The relationship between distribution of urologists and mortality of bladder and prostate cancers has not been clearly established. The aim of this study was to investigate the relationship between uneven distribution of urologists and urologic cancer specific mortality at country level.

Materials and Methods: Data from the National Health Insurance Service and National Statistical Office in Korea from 2007 to 2011 were analyzed in this ecological study. Univariate and multivariable regression analyses were performed to determine risk factors for age standardized mortality rates (ASMR) of bladder and prostate cancers.

Results: Linear regression analysis showed a markedly (p<0.001) uneven distribution of urologists between metropolitan and non-metropolitan areas. There was no significant difference in cancer specific ASMRs for either bladder cancer or prostate cancer. Univariate analysis after adjusting for time showed that country area, urologist density, and income were significant factors affecting bladder cancer incidence (p<0.001, p=0.013, and p<0.001, respectively). It also showed that the number of training hospitals was a significant factor for prostate cancer incidence (p=0.002). Although country area showed borderline significance (p=0.056) for ASMR of bladder cancer, urologist density was not related to ASMR of bladder cancer or prostate cancer.

Conclusions: Although there was a marked difference in urologist density between metropolitan and non-metropolitan areas for these years analyzed, mortality rates of bladder and prostate cancers were not significantly affected by country area or urologist density.

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Keywords: Bladder cancer, Prostate cancer, Mortality, Urologist density
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2차 경요도방광종양절제술후 T0에서의 방광내 BCG 치료의 효과

육형동, 윤민영, 정창욱, 곽철, 김현회, 구자현
서울대학교병원 비뇨기과

Purpose: To evaluate of prognostic impact of BCG and BCG maintenance therapy in patients with T0 after repeat TURB.

Material and Methods: We retrospectively 427 patients who underwent repeat TURB within 6 weeks after initial TURB between 1979 and 2016. Repeat TURB was performed in patients with high risk group criteria. There was no additional treatment in some patients with T0 after repeat TURBT, and intravesical BCG therapy was performed in some patients. We divided the groups into three groups: non–BCG, BCG induction, and BCG maintenance group.

Results: 106 patients with T0 after repeat TURB were included. Median follow up is 63 months. There was no significant difference in T stage between the three groups, High grade ratio (p=0.001) and concomitant CIS ratio (p=0.037) were significantly higher in the maintenance group. The recurrence rates were 46.2%, 28.3% and 19.2% in the non–BCG, BCG induction and BCG maintenance group, respectively (p=0.043). Recurrence free survival was significantly higher in the BCG maintenance group than in the BCG induction group (p=0.032). Progression free survival was also higher in the BCG maintenance group than in the BCG induction group, but not significant (p=0.056). Multivariate Cox regression analysis showed that only intravesical BCG maintenance therapy was significantly associated with recurrence (HR 0.016, p=0.016).

Conclusion: In Even T0 after repeat TURB in high–risk groups, intravesical BCG maintenance therapy is needed to reduce recurrence.

Keywords: Bladder cancer, Repeat TURB, BCG
재경요도 방광증양 절제술의 시행 양상 및 환자군의 임상병리학적 특징 및 무재발생존 양상 분석

서윤석, 김성한, 정재영, 정진수, 이강현, 서호경
국립암센터 전립선암센터 비뇨기과

목적: 재경요도 방광증양 절제술(re-TURBT)의 시행 양상 및 re-TURBT를 시행 받은 환자군의 임상병리학적 특징 및 무재발생존 양상을 분석해보고자 한다.

대상 및 방법: 2001년 5월부터 2017년 2월까지 단일 기관에서 방광암으로 re-TURBT를 받은 환자 162명을 대상으로 한 후향적 연구이다. Re-TURBT는 처음 시행한 경우도 방광증양 절제술(TURBT)에서 조직검사 상 요로상피세포암으로 진단되고 T1 혹은 high grade를 보이거나 불완전 TURBT를 한 경우, 또는 조직검사 상 근육층이 포함되지 않은 경우에 시행하였다. Re-TURBT의 시행 양상의 변화를 보기 위해 시행연도에 따라 re-TURBT 대상이 되는 환자에서의 re-TURBT 시행율을 분석하였고, re-TURBT를 시행 받고 잔존암이 없는 환자군(reTURCa-)과 잔존암이 있는 환자군(reTURCa+)의 인구학적, 임상병리학적 정보 및 재발 여부, 방광암 진단부터 재발까지의 기간을 조사하였다. 무재발생존 분석을 위해 Kaplan-meier analysis 및 Log-rank test, re-TURBT 후 방광암 양성인 경우의 예측인자 분석을 위해 Cox 비례위험 모형을 분석하였다. p-value≤0.05인 경우, 통계학적으로 유의하다고 판단하였다.

결과: Re-TURBT 시행율은 연도에 따라 증가하는 추세를 보였다; 2008년 이전 26.8% (11/41), 2006-2008년 30.6% (11/36), 2009-2011년 53.2% (25/47), 2012-2014년 64.7% (44/68), 2015-2017.02 85.5% (71/83). ReTURCa-군(58.4%, 90명) 및 reTURCa+군(41.6%, 64명)의 평균 나이는 각각 63.8세, 67.9세였으며(p=0.035), 평균 추적 기간은 각각 41.4개월, 30.0개월이었다. 양군 간에 나이를 제외한 성별, 체질량지수, 고혈압, 당뇨, TURBT시 stage는 유의한 차이가 없었다(p>0.05). 무재발생존은 reTURCa-군이 reTURCa+군에 비해 유의하게 양호한 양상을 보였다(p=0.034). 그러나 단변량 및 다변량 분석에서 reTURCa+의 유의한 예측인자는 없는 것으로 나타났다. ReTURCa-군 및 reTURCa+ Ta, reTURCa+ T1 세 군으로 subanalysis 시, 역시 ReTURCa-군에서 무재발생존이 유의하게 양호한 양상을 보였다(p=0.003).

결론: Re-TURBT 시행율은 증가하는 추세에 있으며, TURBT 시행 후 Ta high grade 및 T1 병기인 환자의 약 40%에서 잔존암이 남아 있을 가능성이 있음을 확인하였다. 또한 Re-TURBT 시행 후 잔존암이 없는 경우에 무재발생존이 양호함을 확인하였다. 따라서 TURBT 시행 시 근육층을 포함한 충분한 절제를 시행하여 정확한 병기의 확인 및 가능한 한 종양을 완전히 제거하는 것이 중요하며, re-TURBT 시행의 경우 적극적으로 re-TURBT를 시행하는 것이 무재발생존에 도움이 될 것이다.

Keywords: Bladder tumor, Recurrence, Transitional cell carcinoma
한국 여성 환자에서의 근치적 방광 절제술 종양학적인 성적

윤성구, 심지성, 홍범식, 구자현, 정병창, 서호경, 강석호

1고려대학교 안암병원, 2울산대학교 서울아산병원, 3서울대학교병원, 4성균관대학교 의과대학 삼성서울병원, 5국립암센터

Purpose: 근육층을 침범한 방광암의 표준치료는 방광결제술과 골반립프절 절제술 그리고 요로전환술이다. 장시간이 소요되는 술기의 특성상 수술적 치료는 주로 high volume center에서 이루어지고 있는 실정이며 특히 female cystectomy에 대한 자료는 많지 않다. 이에 국내 5개 병원이 참여하여 최근 10년간 시행된 한국에서의 female cystectomy의 oncologic outcome에 대하여 조사하였다.


Results: 조직학적인 결과는 urothelial carcinoma가 83.9%를 차지했으며 절제면 양성률은 5.6%로 나타났다. 림프절 절제 개수는 18.8개로 나타났으며 Initial clinical stage에 비해 pathologic tumor stage는 모두 증가하는 양상을 보였다. 5년째 추적 관찰에서 전체생존율, 암특이생존율, 무재발 생존율은 각각 67.1%, 68.2%, 58.9%로 나타났다.

Conclusion: 본 연구에서 여성환자의 근치적방광절제술의 종양학적 결과, 진단당시 진행된 병기가 높았으며 예후는 남성 환자의 근치적방광절제술과 유사한 결과를 보였다. 향후 좀 더 많은 환자를 대상으로 전향적인 연구가 필요할 것으로 사료된다.

Keywords: Bladder cancer, Female patients, Oncologic outcome

Figure 2. Kaplan-Meier curves for: overall survival of 57%, cancer-specific survival of 59%, recurrence-free survival of 56% for 5 yrs follow up

Table 1. Oncologic outcomes.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Histologic type, no. (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urothelial carcinoma</td>
<td>235</td>
<td>83.9%</td>
</tr>
<tr>
<td>Adenocarcinoma</td>
<td>14</td>
<td>4.9%</td>
</tr>
<tr>
<td>Squamous cell carcinoma</td>
<td>7</td>
<td>2.5%</td>
</tr>
<tr>
<td>Others</td>
<td>25</td>
<td>8.7%</td>
</tr>
<tr>
<td>Initial tumor stage, no. (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1/T2</td>
<td>12</td>
<td>12.5%</td>
</tr>
<tr>
<td>T3/T4</td>
<td>235</td>
<td>83.4%</td>
</tr>
<tr>
<td>Pathologic tumor stage, no. (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T3/T4</td>
<td>37</td>
<td>13.1%</td>
</tr>
<tr>
<td>Soft tissue margin positive, no. (%)</td>
<td>7</td>
<td>2.4%</td>
</tr>
<tr>
<td>Organ confined</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extravesical</td>
<td>5</td>
<td>1.8%</td>
</tr>
<tr>
<td>Lymph node yield, Mean ± SD</td>
<td>16.8 ± 12.5</td>
<td></td>
</tr>
<tr>
<td>Standard PLND</td>
<td>16.8 ± 11.5</td>
<td></td>
</tr>
<tr>
<td>Extended PLND</td>
<td>20.6 ± 13.1</td>
<td></td>
</tr>
<tr>
<td>Pathologic nodal stage, no. (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N0</td>
<td>118</td>
<td>86.2%</td>
</tr>
<tr>
<td>N1/N2/N3</td>
<td>78</td>
<td>53.8%</td>
</tr>
</tbody>
</table>

*P*<0.05

SD: standard deviation, IQR: interquartile range, PLND: pelvic lymph node dissection.
근치적 방광절제술을 받은 T2 이하의 환자에서 신보조화학요법이 예후에 미치는 영향

육형동, 윤민영, 정창욱, 곽 철, 김현회, 구자현
서울대학교병원 비뇨기과

Introduction: To evaluate the prognostic value of neoadjuvant chemotherapy (NACH) in T2 or less patients who underwent radical cystectomy.

Methods: 566 patients with less than T2 who underwent radical cystectomy. Patients were divided into 3 groups: those who did not receive NACH and those who received less 3 cycles and 3 cycles (Non−NACH, Partial NACH and complete NACH).

Results: Median follow up was 54.6 (0−311) months. In patients with pT2 or less, recurrent free survival (RFS) was significantly higher in the non−NACH group than in the complete NACH group (p=0.041). Overall survival (OS) was significantly higher in the non−NACH group than in the complete NACH group (p=0.039). There was no significant difference between the partial NACH group and the complete NACH group. In patients with T0, OS was not different but RFS was significantly higher in the non−NACH group than in the complete NACH group (p=0.023). In the univariate and multivariate analysis, recurrence was significantly related to the number of LN removed and the number of positive LN (p=0.001 and p=0.002). Survival was significantly related to the number of removed LNs and the presence of NACH (p=0.000 and p=0.026).

Conclusion: In patients with pT2 or less, there was better clinical outcome when neoadjuvant chemotherapy was not performed. And there was no difference in clinical outcome between partial and complete NACH.

Keywords: Bladder cancer, Neoajuvant chemotherapy, Radical cystectomy
방광암으로 근치적 방광절제술과 골반 임파절 절제술을 시행받은 환자에서
신보조 화학요법이 수술에 미치는 영향: propensity score matching 연구

김정권, 김성한, 정재영, 정진수, 이강현, 서호경
국립암센터 전립선암센터 비뇨기과

목적: 술전 화학요법 또는 방사선요법은 조직의 부종 및 섬유화 변성을 일으키는 것으로 알려져 있다. 본 연구에서는 근치적 방광절제술과 골반 임파절 절제술을 시행 받은 환자에서 신보조 화학요법이 수술에 미치는 영향을 알아보기 하였다.

대상 및 방법: 2004년부터 2016년까지 본 기관에서 방광암으로 근치적 방광절제술과 골반 임파절 절제술을 시행 받은 총 206명의 환자를 후향적으로 분석하였다. 이중 62명(30.1%)의 환자가 신보조 화학요법을 시행 받았으며, 두 군간의 차이를 보정하기 위해서 술 전 임상병리학적 인자를 기반으로 Propensity score matching (1:1)을 시행하였다. 신보조 화학요법이 예후에 미치는 영향을 알아보고자 Kaplan–Meier 및 Log-rank 분석을 시행하였다. 또한, 수술에 미치는 영향을 분석하기 위해서 술 후 임상병리학적 인자인 수술시간, 출혈량, 재원기간, 절제된 임파절 개수 및 양성 임파절 개수 등을 조사하였다.

결과: 평균 연령은 72.4±9.9세였으며, 평균 추적기간은 44.0개월(0–182)이었다. 총 85명(41.3%)의 환자에서 전체 사망이 보고되었으며, 55명(26.7%)의 환자에서 종양 특이 사망이 보고되었다. Propensity score matching 결과 각 군당 61명의 환자가 배정되었다. 이들 중 신보조 화학요법을 시행 받은 환자군 및 그렇지 않은 군에서 각각 28명 및 27명의 전체 사망이 보고되었으며(Log rank, p=0.824), 각각 18명 및 16명의 종양특이사망이 보고되었다(Log rank, p=0.837), Kaplan–Meier 분석에서도 전체 생존률 및 종양특이생존률에서는 두 군간에 차이가 없는 것으로 나타났다. Propensity score matching을 시행한 후에도, 경요도 방광중앙 절제술 시행 후 근치적 방광절제술 시행까지의 기간은 보정되지 않았다(1.52 vs. 4.36개월, p=0.006). 두 군간의 술 후 인자들에 대한 비교 분석을 시행하였을 때, 수술시간, 출혈량, 재원기간, 절제된 임파절 개수 및 양성 임파절 개수 모두에서 유의한 차이를 보이지 않았다(Table 1).

결론: 신보조 화학요법은 근치적 방광절제술과 골반 임파절 절제술의 안전성 및 용이성에 미치는 영향이 없는 것으로 나타났다. 본 연구에서는 신보조 화학요법이 예후에 미치는 영향이 없는 것으로 나타났으나, 이에 대해서는 추후 추가적인 연구가 필요할 것으로 사료된다.

Keywords: Neoadjuvant, Radical cystectomy, Bladder cancer
림프혈관 및 신경주위 침윤이 근침윤성방광암에서 근치적방광절제술 후 종양학적 예후에 미치는 영향

유영동, 황진호, 서영은, 이영주, 김정준, 이학민, 오종진, 이상철, 정성진, 홍성규, 이상은, 변석수
서울대학교 의과대학 분당서울대병원 비뇨기과학교실

Aim: To analyze the association of lymphatic invasion (LI), vascular invasion (VI) and perineural invasion (PI) with oncologic outcomes of muscle invasive bladder cancer (MIBC) post radical cystectomy (RC).

Methods: Total 247 patients with MIBC that consists of pure urothelial carcinoma, who underwent RC were retrospectively reviewed. Statistical significance of LI, VI and PNI were estimated by evaluating overall survival (OS) and cancer specific survival (CSS) through Multivariate Cox regression analyses and Kaplan–Meier analyses.

Results: Among the cohort, 91 (36.8%) patients without LI, VI or PI were assigned as the reference, 68 (27.5%) had LI only, 18 (7.3%) had VI only, 15 (6.0%) had PI only, 3 (1.2%) had LI and VI, 36 (1.5%) had LI and PI, 1 (0.4%) had VI and PI, and 15 (6.1%) patients had all three invasion types. Regional lymph node positivity showed significant association with LI but not VI and PI (LI: p<0.001, VI: p=0.14, PI: p=0.08). In multivariate analysis of lymph node negative patients, LI and VI were independent predictors of CSS with statistical significance, but PI was not associated with CSS (LI: p=0.001, VI: p<0.001, PI: p=0.62). LI and VI were also significantly associated with OS while PI did not show association (LI: p<0.001, VI: p<0.001, PI: p=0.68). In lymph positive cases, only LI was an independent predictor of OS and CSS (OS: p<0.001, CSS: p=0.001).

Conclusions: In the patients who underwent RC, LI and PI were significantly associated with CSS and OS when lymph node metastasis was positive. In node negative cases, only LI was an independent predictor of OS and CSS.

Keywords: Bladder neoplasm, Radical cystectomy, Lymphovascular invasion
Aim: To investigate the impact of variant histologic differentiation of patients with urothelial carcinoma (UC) of the bladder on survival after cystectomy.

Methods: Total 286 patients who underwent cystectomy for UC of the bladder from 2003 to 2017 were retrospectively reviewed, 229 (80.1%) cases of pure UC and 57 (19.9%) cases of UC mixed with squamous and/or glandular differentiation (UCD) were included. Among the variant histology cases, 37 had squamous differentiation, 17 glandular and 3 had mixed type of squamous and glandular features. Kaplan–Meier analysis and Cox proportional hazard regression analysis were applied to analyze cancer–specific survival (CSS) and overall survival (OS).

Results: Median follow–up was 11.0 years. UCD rate was higher in female (10% vs 22.8%, p=0.009). Patients with UCD were more likely to have advanced tumor stage than those with pure UC (pT3/T4: 34.9% vs 50.9%, p=0.027). UCD group also showed significantly higher perineural and venous invasion. Both groups showed no significantly different lymph node invasion rate. UC with squamous and glandular differentiation group showed significantly less CSS compared to pure UC group in subgroup analysis of UCD (p=0.019)(Fig 1.). Yet, UCD was not significantly associated with the lethal risk of bladder cancer after adjusting for clinicopathological features (HR 1.58, p=0.582).

Conclusion: Patients with UCD had a greater tendency of extravasal tumors invasion, yet they showed no difference in survival compared to pure UC patients. A further study with bigger cohorts is needed for the future analysis.

Keywords: Bladder, Cancer, Variant differentiation

<p>| Table 1. Clinicopathological patients demographics stratified by squamous and/or glandular differentiation in cystectomy groups |
|----|----|----|----|----|----|</p>
<table>
<thead>
<tr>
<th>Pure UC</th>
<th>UC-SCC</th>
<th>UC-GC</th>
<th>UC-SCC/GC</th>
<th>N</th>
<th>P</th>
</tr>
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<tbody>
<tr>
<td>229</td>
<td>68</td>
<td>212</td>
<td>25</td>
<td>164</td>
<td>0.678</td>
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<tr>
<td>229/68</td>
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<td>0.824</td>
<td>0.358</td>
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</table>

<p>| Table 2. Clinicopathological patients demographics stratified by variant histologic differentiation in cystectomy groups |
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<td>0.358</td>
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</tr>
</tbody>
</table>

<p>| Table 3. Clinicopathological patients demographics stratified by squamous and/or glandular differentiation in cystectomy groups |
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O-169

전방광 절제술 후 조직학적 변이가 종양학적으로 미치는 영향에 대한 연구

한재현, 유상준, 최세영, 류제만, 유달산, 정인갑, 헥범식, 홍준혁, 안한종, 김청수
울산대학교 서울아산병원

Objectives: Histologic variation of bladder cancer are reported in a variety of prognostic factors and clinical reports in bladder cancer patients. We evaluated the oncological outcome of histologic variant in bladder cancer patients who underwent radical cystectomy.

Materials and Methods: We identified 393 bladder cancer patients who had radical cystectomy at Asan Medical Center from January 2007 to August 2014. Patients were divided into 4 groups according to histologic types: pure urothelial cell carcinoma, squamous variant, micropapillary variant and other variants. The impacts of oncological outcome depending on the existence of variant component were assessed using the univariate and multivariate Cox regression analysis. Survival was assessed using Kaplan–Meir analysis.

Results: Among 393 patients, 103 patients had bladder cancer with the variant histologic component (28.2%). 38 patients (9.7%) were with squamous variant, 26 patients (6.6%) with micropapillary variant and 13 patients (3.3%) with sarcomatoid variant. The 5-year recurrence free survival rate of the squamous variant group was 51.3% (p=0.049, log–rank test), 44.2% (p=0.596, log rank test) in micropapillary variant group and 34.0% (p=0.005, log rank test) in other variant group. The 5-year overall survival rate was 87.8% (reference) for pure TCC and 42.8% (pure TCC: reference, p=0.005) for squamous variant. The 5-year survival rate of the micropapillary variant was 44.0% (pure TCC: reference, p=0.135) and the survival rate of the other variant group was 51.4% (pure TCC: reference, p=0.099). The factors affecting recurrence free survival when adjusting factors identified in univariate analysis were pathologic T stage and nodal stage. Variant histology in bladder cancer patients was not a significant prognostic factor influencing recurrence free survival or overall survival.

Conclusion: In patients who underwent radical cystectomy, histologic variants were more detected in the higher nodal stage and T stage. If histologic variants are present in patients with bladder cancer, detailed staging work up and early radical cystectomy should be performed.

Keywords: Bladder cancer, Histologic variant, Radical cystectomy
Objectives: Chemotherapy with partial cystectomy has been considered a reasonable treatment option in well-selected patients instead of radical cystectomy for muscle-invasive patients. We investigated the histologic differences and the effect of chemotherapy in patients who underwent partial cystectomy after invasive urothelial cell carcinoma.

Materials and Methods: We retrospectively reviewed 25 patients with invasive urothelial cell carcinoma who underwent partial cystectomy from 2011 to June 2017. We favorably selected patients with whose tumor location was on lateral, anterior, posterior, and dome. Bladder preservation protocol in this series mostly consisted of maximal transurethral resection of tumor (TURBT) followed by systemic cisplatin-based chemotherapy, and then open partial cystectomy. Primary endpoint were pathologic T stage in groups between with or without chemotherapy.

Results: 3 of the 24 patients underwent partial cystectomy and nephroureterectomy due to concomitant upper tract cancer. Clinical stage was T2 or higher in all patients, TURBT confirmed muscle invasiveness in 19 patients (79.2%). Tumor location accounted for 48% of bladder lateral wall, followed by dome with 12%. Among 17 patients who received systemic chemotherapy, 11 were pT0 and 14 were pT1 or lower. In 7 patients without chemotherapy, 3 showed pT0 and 4 showed pT2 or higher. Among 13 patients who underwent post-chemotherapy TURBT, 10 patients (76%) had complete response (R0).

Conclusion: Preoperative chemotherapy in patients with invasive bladder cancer showed more pathologic complete response when partial cystectomy was performed. Systemic chemotherapy followed by partial cystectomy is a reasonable strategy in highly selected patients with invasive bladder cancer.

Keywords: Partial cystectomy, Muscle invasive bladder cancer, Bladder preservation
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신세포암의 바이오마커로 혈청 PHD3와 ESM-1의 임상적 의미

김광현1, 나준채2, 이형호3, 윤영은4, 김숙영2, 윤민지2, 김경섭5, 홍성준2, 한웅규2

1이화여자대학교 의과대학 비뇨기과학교실, 2연세대학교 의과대학 비뇨기과학교실, 3국민건강보험 임산병원 비뇨기과, 4한양대학교 의과대학 비뇨기과학교실, 5연세대학교 의과대학 생화학 분자생물학교실

Purpose: Most cases of renal cell carcinoma (RCC) are detected incidentally and patients with advanced RCC have unfavorable oncologic and renal function outcomes. Development of a clinically useful RCC biomarker is therefore needed. We aimed to determine the suitability of serum prolyl hydroxylase-3 (PHD3) and endocan as a diagnostic or monitoring biomarker for RCC.

Methods: Between October 2013 and March 2015, we prospectively recruited participants. The RCC group consisted of 56 patients who underwent radical or partial nephrectomy. The control group included 56 healthy kidney donors and 13 patients with benign renal masses. Blood was sampled prior to surgery and 1 month postoperatively in RCC patients. Serum PHD3 and endocan levels were measured via enzyme-linked immunosorbent assay and compared between RCC patients and controls. Preoperative and postoperative serum PHD3 and endocan (ESM-1) levels were also compared. Area under the curve (AUC) was determined using receiver operating characteristic analysis.

Results: RCC patients had higher serum PHD3 and ESM-1 levels than controls (PHD3: 0.79±0.17 ng/ml vs. 0.73±0.09 ng/ml, p=0.023) (ESM-1; 0.59±0.07 ng/ml vs. 0.53±0.09 ng/ml, p<0.001) (Figure). AUCs for PHD3 and ESM-1 were 0.668 and 0.684, respectively. In subgroup analyses of RCC patients with tumor size >2 cm (n=40), the AUCs for PHD3 and ESM-1 were 0.709 and 0.730, respectively. In patients with RCC, both serum PHD3 and ESM-1 at 1 month postoperative decreased significantly (PHD3; p=0.050, ESM-1; p=0.047).

Conclusions: Serum PHD3 and ESM-1 could be a novel RCC biomarker that provides acceptable diagnostic performance. Both serum markers might also be useful for monitoring RCC after surgery.

Keywords: Renal cell carcinoma, Biomarker
Personalized 3D anatomic kidney model produced by rapid prototyping method and its usefulness in clinical applications

Hakmin Lee¹, Sung Il Hwang², Hak Jong Lee², Jong Jin Oh¹, Sangchul Lee¹, Sung Kyu Hong¹, Sang Eun Lee¹, Seok-Soo Byun¹

Departments of ¹Urology, ²Radiology, Seoul National University Bundang Hospital, Seongnam, Korea

Introduction: Novel techniques such as three-dimensional (3D) printing have been introduced in several industrial fields. We tried to evaluate the clinical usefulness of 3D-printed renal anatomy model in patients treated by partial nephrectomy (PN).

Materials and Methods: We prospectively produced the personalized renal model of kidney and tumour using 3D-printing methods from preoperative computed tomography (CT) images. The experienced professional group includes two urologists and one resident and there were 20 medical university students who did not have any prior experience in interpreting CT images composed non-professional group. Two groups independently judged the clinical usefulness of 3D-model by using different questionnaires.

Results: The 3D-model was created in total of 10 patients. The non-professional group divined the location of renal tumor correctly in 47.3% when they solely interpreted the CT images. After the introduction of 3D-models, the rate of correct answers was significantly elevated to 70.0% (p<0.001). The subjective difficulty level in localizing renal tumor was also significantly low (52% versus 27%, p<0.001) when they utilized 3D-models. The professional group gave highly positive responses in asking clinical usefulness of 3D-model among partial nephrectomy (understanding personal anatomy: 8.9/10, preoperative surgical planning: 8.2/10, intraoperative tumor localization: 8.4/10, further utilization plan in near future: 8.3/10, clinical usefulness in complete endophytic mass: 9.5/10).

Conclusion: The personalized 3D renal model was revealed to significantly enhance the understanding of correct renal anatomy in patients with renal tumors in both experienced and unexperienced groups.

Keywords: 3D printing, Partial nephrectomy, Renal cell carcinoma
최소침습 부분 신절제술(minimally invasive surgery (MIS) partial nephrectomy)와 개복 부분 신절제술(open partial nephrectomy)의 초기 임상결과와 삶의 질 전향적 코호트 비교

윤민영, 정창욱
서울대학교병원 비뇨기과학학교실

목적: 신세포암 환자에서 최소침습 부분 신절제술과 개복 부분 신절제술에 따른 초기 임상결과와 삶의 질을 전향적 코호트를 이용하여 비교하였다.

대상 및 방법: 2016년 3월부터 2016년 12월까지 서울대학교병원에서 수술한 전형적인 신세포암 환자 124명(최소침습 부분 신절제술 46명, 개복 부분 신절제술 43명)의 SUPER-ROC-Nx 코호트에서 수술 후 6개월 이상 외래 추적진료한 65명의 환자들로 대상으로 분석하였다.

결과: 전체 환자의 평균나이는 57.5±11.8세(SD)였고 성비는 남자가 65±48% (SD), 체질량지수는 25.8±3.7kg/m² (SD), 평균 종물 크기는 3.46±1.98cm (SD)이었다. Clinical T stage와 N stage의 분포는 T1a (47%), N0 (56%)이 가장 많았다. 나이, 성비, 체질량지수, 종물 크기, Clinical T, N stage에 있어서 두 수술군 간의 유의한 차이는 없었다(p>0.063). 수술 시간은 최소침습 부분 신절제술의 경우 131.7±35.15분(SD)으로 개복 부분 신절제술 103.9±37.3분(SD)보다 유의하게 길었으나(p=0.003) 재원기간은 최소침습 부분 신절제술의 경우 4.12±0.78일(SD)로 개복 부분 신절제술 5.48±3.12(SD)일보다 유의하게 짧았다(p=0.020). 하지만 추정출혈량은 두 군간의 유의한 차이가 없었다(최소침습 부분 신절제술 275 cc, 개복 부분 신절제술 302 cc, p=0.672). 수술전 혈색소 수치는 유의한 차이가 없으나(최소침습 부분 신절제술 13.3, 개복 부분 신절제술 13.1, p=0.108) 수술 후 혈색소 수치는 최소침습 부분 신절제술의 경우 12.6로 개복 부분 신절제술 11.9보다 유의하게 높았다(p=0.039). 수술전후 Cr의 변화에 있어서는 수술 전 최소침습 부분 신절제술 0.879, 개복 부분 신절제술 0.940, p=0.367)과 수술 후(최소침습 부분 신절제술 1.030, 개복 부분 신절제술 1.211, p=0.128) 모두 유의한 차이가 없었다.

결론: 최소침습 부분 신절제술은 수술시간, 재원기간, 수술 후 혈색소 수치, 수술 전 삶의 질(FSKU-15, EQ-5D-5L) 수술 후 삶의 질 일부 항목(FSKU-15, EQ-5D-5L) 수술 합병증에서 개복 부분 신절제술에 비해 우위를 보여주었다.

Keywords: Minimally invasive surgery (MIS) partial nephrectomy, Early outcome, QoL
cT2a 이하의 내인성 신세포암의 수술방법에 따른 임상 결과 비교: 부분신적출술 대 근치적신적출술

육형동, 윤민영, 정창욱, 구자현, 김현회, 곽철
서울대학교병원 비뇨기과

Introduction: To evaluate the clinical outcomes of endophytic renal cell carcinoma (RCC) according to the difference of surgical methods.

Methods: We retrospectively analyzed 567 endophytic RCC cases from 1990 to 2016. Patients were divided into two groups based on surgical methods: radical nephrectomy (RNx) and partial nephrectomy (PNx) groups. Only patients with clinical stage T2a or less were included in the study.

Results: The RNx group had shorter operation time and less perioperative complication (p=0.022 and p=0.032). The rate of complications in the PNx group was high, but there were no life-threatening complications. In the pathologic stage, T2a and T1b were 26.2% and 6.0% in the RNx group and 7.7% and 0% in the PNx group, respectively (p=0.000). There was no difference in recurrence rate between two groups, but the RNx group was significantly higher in cancer mortality (p=0.050). There was no significant difference in cancer specific survival, overall survival, and recurrence free survival between the two groups.

Conclusion: There is no significant difference in clinical outcomes between partial nephrectomy and radical nephrectomy in endophytic RCCs below T2a.

Keywords: Renal cell carcinoma, Partial nephrectomy, Endophytic
병리학적 T1과 T2 신장암에서 수술 전 혈소판증가증이 예후에 미치는 영향: 다기관 종합연구

박경민1, 하윤석1, 정재욱1, 정서원1, 최석환1, 이준녀1, 김범수1, 김현태1, 김태환1, 변석수2, 황은창3, 강석호4, 홍성후5, 정진수6, 무철7, 김용준8, 권태균1

1경북대학교 의과대학 비뇨기과학교실, 2서울대학교 의과대학 분당서울병원 비뇨기과학교실, 3전남대학교 의과대학 비뇨기과학교실, 4고려대학교 의과대학 비뇨기과학교실, 5가톨릭대학교 의과대학 비뇨기과학교실, 6국립암센터 비뇨기과학교실, 7서울대학교 의과대학 비뇨기과학교실, 8충북대학교 의과대학 비뇨기과학교실

Background: The prognostic significance of preoperative thrombocytosis (TC) in renal cell carcinoma (RCC) is not without some debate. The aim of the present multi–institutional study was to determine the association of preoperative TC with the clinicopathological features and prognosis of localized RCC patients who underwent surgery in a large cohort.

Methods: A study involving 8 institutions, and 4,376 patients with pT1 and pT2 RCC from the Korean renal cell carcinoma (KORCC) database, was conducted. TC was defined as a platelet count ≥400,000/μL. Patients were divided into 2 groups based on the presence of preoperative TC. Clinicopathological variables and survival rates were compared between the 2 groups.

Results: Out of the 4,376 patients in the study, 106 (2.4%) had preoperative TC. Compared to patients without TC, these patients had a lower body mass index. Additionally, these patients had more advanced stage tumors with a higher Fuhrman grade, and higher incidence of symptoms at the time of diagnosis. Kaplan–Meier curves revealed that patients with TC had a significantly lower rate of recurrence free survival (RFS) (Figure 1). Furthermore, a lower rate of overall survival (OS) was exhibited amongst patients with TC. Multivariate analysis revealed that TC was an independent prognostic factor in terms of the RFS and OS (Table 1).

Conclusions: TC appeared to be an important prognostic determinant in localized RCC. Furthermore, preoperative platelet count may be clinically useful for risk stratification of patients with surgically treated localized RCC.

Keywords: Renal cell carcinoma, Prognosis, Thrombocytosis

Table 1. Multivariate Cox regression analyses of factors that influence RFS and OS in localized RCC

<table>
<thead>
<tr>
<th>Factor</th>
<th>RFS HR (95% CI)</th>
<th>P value</th>
<th>OS HR (95% CI)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
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<tr>
<td>Gender (Male vs Female)</td>
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<td>Body mass index</td>
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<tr>
<td>Symptom (Yes vs No)</td>
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<tr>
<td>T stage (T1 vs T2)</td>
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<tr>
<td>Fuhrman grade (Gr1-2 vs Gr3-4)</td>
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</tbody>
</table>

RFS, recurrence-free survival; HR, hazard ratio; OS, overall survival; CI, confidence interval; TC, thrombocytosis
Purpose: To examine the prognostic role of the pretreatment aspartate transaminase/alanine transaminase (AST/ALT) or De Ritis ratio in patients with metastatic renal cell carcinoma (mRCC) receiving first-line tyrosine kinase inhibitor (TKI) therapy.

Materials and Methods: We searched the medical records of 579 patients with mRCC who visited our hospital from January 2001 through August 2016. After excluding 210 patients, we analyzed 369 patients who received first-line TKI therapy. Cancer-specific survival (CSS) and overall survival (OS) were defined as the primary and secondary endpoints, respectively. A multivariate Cox proportional hazards regression model was used to identify independent prognosticators of survival outcomes.

Results: Patients with a higher pretreatment De Ritis ratio (≥1.2) had worse CSS and OS outcomes, compared to those with a lower De Ritis ratio (<1.2). Notably, a higher De Ritis ratio was found to be an independently poor predictor of both CSS (HR=1.49) and OS (HR=1.67) in multivariate analyses. When we assessed the prognostic impact of the De Ritis ratio according to the MSKCC risk criteria, we found no significant differences in survival outcomes among patients in the favorable and poor risk groups. Among patients with an intermediate risk group, however, a higher pretreatment De Ritis ratio was a poor prognosticator of CSS (HR=1.53) and OS (HR=1.50).

Conclusions: Our findings indicate that the pretreatment De Ritis ratio can provide valuable information about the survival outcomes of mRCC patients receiving first-line TKI therapy.

Keywords: Metastatic renal cell carcinoma, Tyrosine kinase inhibitor, AST/ALT (De Ritis) ratio
조직형이 투명세포형으로 분류되지 않은 전이신장암 환자에 대한 표적치료의 효과: 대한비뇨기종양학회 신암 연구회 database를 이용한 분석

김정권1, 서윤석1, 김성한2, 송미경3, 정창욱4, 송채린5, 황의창6, 서일영7, 이학민8, 홍성후9, 정진수1; 대한비뇨기종양학회 신암연구회

1국립암센터 전립선암센터 비뇨기과, 2국립암센터 암학예방교실 바이오메트릭스교실, 3성균관대학교 의과대학 비뇨기과학교실, 4서울대학교 의과대학 비뇨기과학교실, 5울산대학교 의과대학 비뇨기과학교실, 6전남대학교 의과대학 비뇨기과학교실, 7원광대학교 의과대학 비뇨기과학교실, 8서울대학교 의과대학 비뇨기과학교실, 분당서울대학교병원, 9가톨릭대학교 의과대학 비뇨기과학 교실

목적: 표적치료 시대의 조직형이 투명세포형으로 분류되지 않은 전이신장암 환자의 예후에 대하여 알아보고자 하였다.

대상 및 방법: 국내 다기관 신장암 코호트인 대한비뇨기종양학회 신암 연구회 Database에서 조직형이 투명세포형으로 분류되지 않은 환자 346명을 대상으로 후향적 분석을 시행하였다. 질병진행의 정의는 RECIST v.1.1의 progression disease로 하였으며, 질병무진행생활율(PFS) 중 total PFS는 마지막 질병진행 발생을 사건으로 간주하여 분석하였다. Median survival time은 연구대상자 중 50%에서 사건이 발생했을 때의 시점으로 정의하였다. 3rd line 치료까지의 결과를 분석하였으며, 각 단계에서의 PFS 및 total PFS, 종양특이생존율(CSS)를 분석하였다. 또한, 전이 발생 양상, 조직학적 유형, 신장전절제술 시행 여부 및 치료약제에 따른 차이를 분석하였다. Kaplan-Meier 및 Log-rank 분석을 통하여 유의성을 확인하였다.

결과: 전체 환자군 중 235명(68.1%)의 환자에서 질병진행이 보고되었으며, total PFS의 median time은 7개월(6-9)로 보고되었다. 치료 단계별로 PFS를 분석하였을 때, 1ST line PFS가 2nd 및 3rd line PFS보다 상대적으로 median survival time이 길 것으로 보고되었다(6 vs. 5 vs. 4 months). 종양특이사망은 245명(70.8%)에서 보고되었으며, CSS의 median time은 21개월(16-28)로 보고되었다. 전이 발생 양상에 따라 유의한 예후의 차이가 나타났으며, synchronous보다 metachronous가 좀더 좋은 예후를 보였다(total PFS, 5 vs. 13개월; CSS, 10 vs. 46개월; all, P<0.001). 또한 조직학적 유형에 따라 1st PFS 및 total PFS에서 유의한 차이가 보였으며, 다른 유형에 비해 chromophobe가 좋은 예후를 보이는 것으로 보되었다(Table 1). 신장전절제술 또한 PFS 및 CSS의 유의한 예측인자로 보고되었다(Ist PFS, 4 [No] vs. 7 [Yes]개월; total PFS, 4 vs. 9개월; CSS, 8 vs. 66개월; all, P<0.05). 치료약제의 경우 TKI가 mTORi에 비해 1ST PFS (median time, 9 vs. 4개월; p=0.0001) 및 total PFS (median time, 10 vs. 4개월; p=0.0001) 측면에서 유리한 것으로 보고되었다.

결론: 국내 다기관 신장암 코호트인 비뇨기종양학회 신암 연구회 Database를 통해 표적치료 시대의 투명세포형으로 분류되지 않은 전이신장암의 예후에 대하여 알아보았으며, 전이 발생 양상, 조직학적 유형, 신장전절제술 시행 여부 및 치료약제에 따른 예후의 차이를 확인하였다.

Keywords: Non-clear cell type, Metastatic renal cell carcinoma, Prognosis
비투명 세포형 환자군에서 MSKCC와 Heng risk criteria의 질병무진행생존율 및 종양특이생존율에 대한 중간위험군과 고위험군에서의 예후 감별력 연구: 신암연구회 database를 이용한 후향적 다기관 연구

김정권1, 서윤석1, 김성한2, 송미경2, 고철3, 정창욱4, 황의창5, 서일영6, 이학민7, 홍성호8, 정진수9; 대한비뇨기종양학회 신암연구회

1국립암센터 전립선암센터 비뇨기과, 2국립암센터 암역학예방교육실 바이오메트릭스교실, 3성균관대학교 의과대학 비뇨기과학교실, 4서울대학교 의과대학 비뇨기과학교실, 5울산대학교 의과대학 비뇨기과학교실, 6서울대학교 의과대학 비뇨기과학교실, 7한국대학교 의과대학 비뇨기과학교실, 8서울대학교 의과대학 비뇨기과학교실, 9부산대학교 의과대학 비뇨기과학교실

목적: 표적치료를 받은 투명 세포형 전이신장암에서 MSKCC와 Heng criteria는 예후 감별력이 입증이 된 도구이지만 아직까지 비투명세포형에 대한 예후 감별능력 여부는 공식적인 연구를 통해 확인이 되지 못하였다. 이에 본 연구에서는 두 예후 기준인 MSKCC와 Heng criteria를 비투명세포형 전이신장암 환자에 적용할 때의 중간위험군과 고위험군의 예후 감별력에 대하여 분석해 보았다.

대상 및 방법: 국내 다기관 신장암 코호트인 대한비뇨기종양학회 신암연구회 Database에서 224명의 조직형이 투명세포형으로 분류되지 않았던 전이신장암 환자 중 papillary, chromophobe, collecting duct, Xp11.2t 등으로 조직학적 진단이 확 인되고, 추적관찰 및 예후 결과를 알고, 임상병리인자가 모두 확보되어 MSKCC와 Heng criteria parameter들을 모두 확인할 수 있었던 40명(Heng/MSKCC중간 위험군 26 (65%) / 23 (57.5%)명, 고위험군 14 (35%) / 17 (42.5%)명)의 비투명세포형 환자들을 대상으로 후향적 분석을 시행하였다. 질병무진행생존율(PFS) 중 1st PFS와 total PFS 그리고 종양특이생존율(CSS)에 대해 중간위험과 고위험군의 예후 감별력을 분석해 보았다.

결과: 전체 40명의 환자중 33명 (82.5%)이 질병 진행을 하였고 26명 (65%)이 연구 시점시 사망한 상태였다. MSKCC와 Heng criteria 모두에서 first PFS, total PFS, CSS는 중간 위험군에서는 각각 4.0, 5.0, 32.0개월이었고, 고위험군에서는 2.0, 3.0, 17.0개월이었으며, 중간위험군과 고위험군의 first PFS, total PFS, CSS 모두에서 두 군은 유의한 차이의 감별점을 보지 않았다(p>0.05). 하지만 224명의 조직형이 투명세포형으로 분류되지 않은 전이신장암 환자들을 모두 포함시킨 이들중 107명 (43.9%)이 표적치료에도 불구하고 질병 진행을 보였고, 126명 (51.6%)이 연구시점 사망한 상태였다. MSKCC, Heng criteria의 중간과 고위험군의 PFS, CSS의 감별능력을 분석해보았을 때는 유의한 감별능력을 보였다(p<0.05).

결론: 표적치료를 받은 비투명세포형 전이신장암 환자에서 MSKCC와 Heng criteria는 중간과 고위험군에서 PFS, CSS의 감별능력이 없었다. 하지만 조직형이 불투명한 환자군에서는 유의한 감별능력을 보여 불투명 조직형에 대해 추가 연구를 통한 조직형 진단이 필요할 것으로 본다.

Keywords: Non-clear cell type, Metastatic renal cell carcinoma, Progression, Survival, Criteria
Preoperative cholesterol level as a new independent predictive factor of survival in patients with metastatic renal cell carcinoma

Hakmin Lee¹, Wun-Jae Kim², Eu Chang Hwang³, Seok Ho Kang⁴, Sung-Hoo Hong⁵, Jinsoo Chung⁶, Tae Gyun Kwon⁷, Cheol Kwak⁸, Hyeon Hoe Kim⁸, Jong Jin Oh¹, Sangchul Lee¹, Sung Kyu Hong¹, Sang Eun Lee¹, Seok-Soo Byun¹, Korean Renal Cell Carcinoma (KORCC) Group

¹Department of Urology, Seoul National University Bundang Hospital, Seongnam, ²Department of Urology, Chungbuk National University College of Medicine, Cheongju, ³Department of Urology, Chonnam National University Hwasun Hospital, Hwasun, ⁴Department of Urology, Korea University School of Medicine, Seoul, ⁵Department of Urology, College of Medicine, The Catholic University of Korea, Seoul, ⁶Department of Urology, National Cancer Center, Goyang, ⁷Department of Urology, Kyungpook National University College of Medicine, Daegu, ⁸Department of Urology, Seoul National University Hospital, Seoul, Korea

Objectives: To investigate the correlation between preoperative cholesterol level (PCL) and survival outcomes in patients with metastatic renal cell carcinoma (mRCC).

Materials and Methods: We analysed the data of 244 patients initially treated with cyto–reductive nephrectomy after being diagnosed with mRCC. Patients were stratified into two groups according to the PCL cut-off level of 170 mg/dL. The postoperative survival rates were compared using Kaplan–Meier analysis and the possible predictors of patients’ cancer–specific survival (CSS) and overall survival (OS) were tested using multivariate Cox–proportional hazard models.

Results: The low cholesterol group showed significantly worse postoperative CSS (p=0.013) and OS (p=0.009) than the high cholesterol group. On multivariate analysis, low PCL was revealed as an independent predictor of worse CSS (hazard ratio [HR], 1.876; 95% CI, 1.101–3.196; p=0.021) and OS (HR, 1.891; 95% CI, 1.154–3,098; p=0.011). Subsequent subgroup analysis showed that these results were maintained in the clear cell subgroup but not in the non-clear cell subgroup.

Conclusion: Decreased PCL was significantly correlated with worse survival outcomes in patients with mRCC treated with cyto-reductive nephrectomy. The underlined mechanism is still uncharted and requires further investigation.

Keywords: Cholesterol, Renal cell carcinoma, Prognosis
0-180

전이신장암 환자에서 세포감퇴 신적출술의 예후적 가치에 대한 분석: 단일 기관의 경험

최창일, 강민용, 정현균, 성현환, 정병창, 전성수, 이현무, 최한용, 서성일
성균관대학교 의과대학 삼성서울병원

**Purpose**: To evaluate the prognostic role of cytoreductive nephrectomy (CN) in patients with synchronous metastatic renal cell carcinoma (mRCC)

**Methods**: We analyzed a total of 294 patients with synchronous mRCC by reviewing the electric medical records of Samsung medical center from January 2005 to December 2015. Primary and secondary end points were overall survival (OS) and cancer specific survival (CSS), respectively, which were estimated by the Kaplan–Meier method. To identify the independent predictors of survival outcomes, we performed a multivariate Cox regression analysis.

**Results**: Among overall population of synchronous mRCC patients, 189 (64.3%) patients were underwent CN. Compared to mRCC patients without CN, those who underwent CN were younger, have a better ECOG performance status and lower grade tumor and the higher rates of clinical N0 disease. Notably, we found that patients receiving CN had a better OS and CSS outcomes compared to those without CN (Fig 1). Furthermore, we identified BMI, CN, Heng risk score as the significant predictive factors of OS, respectively after adjusting various clinical and pathological variables (Table 1).

**Conclusions**: In summary, our study showed the prognostic significance of CN in patients with synchronous mRCC, and CN in addition to BMI, CN, Heng risk score were finally proved as independent prognostic factors of survival outcomes in these patients.

**Keywords**: Cytoreductive nephrectomy, Metastatic renal cell carcinoma, Survival
대사이상 질환과 혈중 테스토스테론의 상관관계에 관한 연구
김명, 안태영
울산대학교 서울아산병원 비뇨기과학교실

**Objectives:** Metabolic syndrome (MetS) which is a constellation of insulin resistance, hyperglycemia, hypertension, low high-density lipoprotein cholesterol (HDL), and increased low-density lipoprotein (LDL) and triglyceride (TG) levels. It is one of the main threats for public health in the 21st century with its associated risk of cardiovascular disease. Several studies have shown a higher prevalence of MetS in subjects with low testosterone. But the evidence of association is not sufficient for the Korean population. This study evaluated an association between testosterone and MetS in Korean population.

**Methods:** This observational study was performed using the regular health checkup cohort of Asan Medical Center consisting of 17,153 subjects. MetS was defined using the National Cholesterol Education Program–Third Adult Treatment Panel (NCEP–ATP III). The associations between MetS and testosterone were evaluated using linear mixed model and generalized estimating equation model.

**Results:** Of all subjects, the prevalence of MetS was 30.1%. After considering covariates such as age, body mass index (BMI), smoking, alcohol consumption and physical exercises, the risk of MetS defined by NCEP–ATP III criteria decreased by 31.0% with 1-standard deviation increase in total testosterone (TT). Metabolic component specific analysis showed that TT were inversely associated with several components of MetS including fasting blood sugar (FBS), waist circumference, serum HDL, TG, and blood pressure.

**Conclusions:** Serum testosterone was inversely associated with MetS in Korean populations. But the evidence of association is not sufficient for the causation of MetS by low testosterone and long-term studies are needed to confirm whether T deficiency is the cause or is a feature of MetS.

**Keywords:** Testosterone, Metabolic syndrome, Korean population
Association between handgrip strength and erectile dysfunction in older men: a cross-sectional study


Department of Urology, College of Medicine, Gangnam Severance Hospital, Yonsei University, South Korea

Introduction and Objective: The association between handgrip strength and erectile dysfunction (ED) in community-dwelling older men.

Methods: This cross-sectional study included 1771 participants of the Dong-gu Study. Handgrip strength was measured with a handheld dynamometer, ED was assessed with the Korean version of the International Index of Erectile Function (IIEF). ED was categorized as none to mild (IIEF–EF scores of 13–30) and moderate to severe (IIEF–EF scores of 0–12). Multivariable logistic regression was conducted with adjustment for potential confounders.

Results: The proportion of men with moderate to severe ED was 48.8%. The age-adjusted erectile dysfunction score increased with increasing quartile of handgrip strength (11.0, 12.4, 13.4, and 14.0 in the lowest, second, third, and highest quartiles, respectively). After adjustment for potential confounders, greater handgrip strength was associated with a lower risk of ED (odds ratio [OR]: 0.82 per 5 kg; 95% confidence interval [CI]: 0.74–0.90). In addition, a high level of moderate to vigorous physical activity was associated with a lower risk of ED (OR: 0.75; 95% CI: 0.61–0.93).

Conclusions: This study, aging men with greater handgrip strength had a lower risk of ED. This result suggests that reduced physical functioning may contribute to ED in aging men.

Keywords: Handgrip strength, Erectile dysfunction (ED)

<table>
<thead>
<tr>
<th>Variable</th>
<th>OR</th>
<th>95% CI</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, years</td>
<td>1.04</td>
<td>1.01–1.06</td>
<td>0.03</td>
</tr>
<tr>
<td>Body mass index, kg/m²</td>
<td>0.99</td>
<td>0.97–1.01</td>
<td>0.40</td>
</tr>
<tr>
<td>Waist circumference, cm</td>
<td>0.99</td>
<td>0.97–1.02</td>
<td>0.40</td>
</tr>
<tr>
<td>Diastolic blood pressure, mmHg</td>
<td>0.99</td>
<td>0.97–1.02</td>
<td>0.40</td>
</tr>
<tr>
<td>Pulse wave velocity, cm/s</td>
<td>0.99</td>
<td>0.97–1.02</td>
<td>0.40</td>
</tr>
<tr>
<td>Total cholesterol, mg/dL</td>
<td>0.99</td>
<td>0.97–1.02</td>
<td>0.40</td>
</tr>
<tr>
<td>Low density lipoprotein, mg/dL</td>
<td>0.99</td>
<td>0.97–1.02</td>
<td>0.40</td>
</tr>
<tr>
<td>HDL cholesterol, mg/dL</td>
<td>0.99</td>
<td>0.97–1.02</td>
<td>0.40</td>
</tr>
<tr>
<td>Glucose, mmol/L</td>
<td>0.99</td>
<td>0.97–1.02</td>
<td>0.40</td>
</tr>
<tr>
<td>Fasting blood glucose, mg/dL</td>
<td>0.99</td>
<td>0.97–1.02</td>
<td>0.40</td>
</tr>
<tr>
<td>Physical activity, %</td>
<td>0.95</td>
<td>0.93–1.00</td>
<td>0.14</td>
</tr>
</tbody>
</table>

**Table 2. Multivariable logistic regression analysis of risk factors for erectile dysfunction (ED).**

<table>
<thead>
<tr>
<th>Variable</th>
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<th>95% CI</th>
<th>P-value</th>
</tr>
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<td>0.97–1.02</td>
<td>0.40</td>
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<tr>
<td>Physical activity, %</td>
<td>0.95</td>
<td>0.93–1.00</td>
<td>0.14</td>
</tr>
</tbody>
</table>

**Table 1. Characteristics of the study population.**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean ± SD</th>
<th>Median ± IQA</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, years</td>
<td>67 ± 4.1</td>
<td>67 (58–75)</td>
<td>0.001</td>
</tr>
<tr>
<td>Body mass index, kg/m²</td>
<td>24.6 ± 4.7</td>
<td>24.6 (21–30)</td>
<td>0.001</td>
</tr>
<tr>
<td>Waist circumference, cm</td>
<td>86.7 ± 7.3</td>
<td>86.7 (75–90)</td>
<td>0.001</td>
</tr>
<tr>
<td>Diastolic blood pressure, mmHg</td>
<td>86.9 ± 7.3</td>
<td>86.9 (75–90)</td>
<td>0.001</td>
</tr>
<tr>
<td>Pulse wave velocity, cm/s</td>
<td>87.6 ± 4.8</td>
<td>87.6 (75–90)</td>
<td>0.001</td>
</tr>
<tr>
<td>Total cholesterol, mg/dL</td>
<td>185 ± 40</td>
<td>185 (160–210)</td>
<td>0.001</td>
</tr>
<tr>
<td>Low density lipoprotein, mg/dL</td>
<td>144 ± 36</td>
<td>144 (120–180)</td>
<td>0.001</td>
</tr>
<tr>
<td>HDL cholesterol, mg/dL</td>
<td>35 ± 7</td>
<td>35 (20–50)</td>
<td>0.001</td>
</tr>
<tr>
<td>Glucose, mmol/L</td>
<td>5.9 ± 1.3</td>
<td>5.9 (4.5–7.5)</td>
<td>0.001</td>
</tr>
<tr>
<td>Fasting blood glucose, mg/dL</td>
<td>100 ± 15</td>
<td>100 (80–120)</td>
<td>0.001</td>
</tr>
<tr>
<td>Physical activity, %</td>
<td>28 ± 10</td>
<td>28 (10–40)</td>
<td>0.001</td>
</tr>
</tbody>
</table>

**Notes:** OR: odds ratio; CI: confidence interval; HDL: high-density lipoprotein; IIEF: International Index of Erectile Function; BMI: body mass index; SD: standard deviation; IQA: interquartile range.
남성갱년기 환자에서 천연추출물 구기자가 증상 개선에 미치는 영향: 무작위배정, 위약대조, 양측눈가림, 평행투약

배상락1, 전승환2, 권은비3, 오현아4, 정현철2, 최세웅2, 배웅진2,3, 김수진2, 하유신2, 홍성후2, 이지열2, 황성연4, 김세웅2

가톨릭대학교 1의정부성모병원, 2서울성모병원, 3가톨릭양한방융합연구소, 4한국 전통의학 연구소

목적: 일반인에서 구기자 천연추출물을 이용하여 남성갱년기 증상을 호소하는 만 40세 이상 일반 건강인 남성 78명 중 중도 탈락등을 제외한 74명을 대상으로 하였다. 대상자는 치료약물 투여군과 위약투여군(대조군)으로 나누었으며, 각각 치료 전 남성갱년기 증상 설문(AMS), 남성호르몬 혈청 농도 및 관련 혈청 지표를 측정 후, 매일 1회 실험제품 또는 위약을 8주간 복용하여 복용 1개월 및 2개월 추적 관찰 후 증상 개선 효과를 확인하였다.

대상 및 방법: 남성갱년기 증상을 호소하는 만 40세 이상 일반 건강인 남성 78명 중 중도 탈락등을 제외한 74명을 대상으로 하였다. 대상자는 치료약물 투여군과 위약투여군(대조군)으로 나누었으며, 각각 치료 전 남성갱년기 증상 설문(AMS), 남성호르몬 혈청 농도 및 관련 혈청 지표를 측정 후, 매일 1회 실험제품 또는 위약을 8주간 복용하여 복용 1개월 및 2개월 추적 관찰 후 증상 개선 효과를 확인하였다. 모든 환자에서 활력징후 및 신체검진, CBC 및 LFT, 지질 및 호르몬, PSA 등의 혈청학적 검사, AMS, ADAM, IIEF를 포함한 설문지 등에서의 변화 등을 알아보았다.

결과: 모든 대상자에서 치료 전후 합병증, CBC 및 LFT, RFT, 요 검사 등에서는 유의한 차이를 보이지 않았다. AMS 설문지 총합에서 대조군은 기저치 대비 치료 4주 및 8 주 후 평균값의 유의한 변화가 없었고, 치료군에서는 각각 2.63, 2.69만점 통계적 유의한 감소를 보였(p=0.019, p=0.038). AMS subscale 분석에서 psychological subscale 및 somatic subscale에서는 유의한 차이가 없었으나, sexual subscale에서는 구기자 군에서 1.07로 통계적으로 유의한 감소가 나타났다. IIEF와 ADAM 총합은 두 군간에 유의한 차이를 보이지 않았다. Triglyceride, total cholesterol, LDL, HDL 등의 혈청학적 검사, PSA, serum testosterone는 실험 전후 유의한 변화를 보이지 않았다.

결론: 구기자의 투여는 남성갱년기 증상을 호소하는 환자에게 성욕저하, 발기능 감소, 지적활동, 인지능력의 감소, 수면장애, 근력의 감소, 내장지방 증가, 체중증가 등의 증상을 호소하는 남성갱년기 증상을 호소하는 증상은 보이지 않았다. 이중 성관련 질환, 즉 성욕저하나 발기능 등에 특히 도움을 주는 약물인 것은 확인할 수 있었다. IIEF와 ADAM 총합은 두 과정에 유의한 차이를 보이지 않았다. Triglyceride, total cholesterol, LDL, HDL 등의 혈청학적 검사, PSA, serum testosterone는 실험 전후 유의한 변화를 보이지 않았다.

Keywords: Andropause, Natural extracts, Lycium
Objectives: 5ARIs have sexual side effects, including erectile dysfunction (ED), loss of libido and ejaculatory dysfunction due to their action mechanism which decreases serum DHT levels. We examined whether concomitant dutasteride reduced the efficacy of testosterone replacement therapy (TRT) in men with late-onset hypogonadism.

Material and Methods: This was a 24-week, randomized, parallel study of the clinical outcomes in men age >40 years with symptomatic benign prostatic hypertrophy (BPH; International Prostate Symptom Score (IPSS) ≥12), prostate volume ≥30 mL, and testosterone level <300 ng/dL with aging male symptoms, who were taking stable doses of alpha-blockers 4 weeks before participation. Eligible patients received a combination of dutasteride 0.5 mg once daily and a transdermal gel containing 10 g testosterone (T) (DT group, n=30) or the transdermal gel alone (T group, n=30). The primary outcomes were the change in the aging male symptom (AMS) score, sexual desire (question 17, AMS score), and erectile function (International Index of Erectile Function-5). Secondary outcomes were the post-treatment IPSS, peak urinary flow rate, post-void residual urine volume (PVR), and prostate volume.

Results: Both groups showed significant improvements from baseline in all primary outcome parameters. However, there were no significant differences in the changes in the AMS total score (DT -5.2 vs. T -5.0; p=0.55), sexual desire (DT -2.5 vs. T -2.3; p=0.23), and IIEF-5 score (DT -2.1 vs. T -1.9; p=0.13) between groups. The extent of IPSS improvement from baseline to 24 weeks was the same in both groups (DT -1.2 vs. T -1.0; p=0.64). In addition, the changes in Q(max) and PVR from baseline were very similar in both groups. However, prostate volume decreased significantly (p<0.01) in the DT group (DT -2.1 cc vs. T +0.6 cc).

Conclusions: Concomitant dutasteride did not reduce the effect of testosterone replacement therapy in men with late-onset hypogonadism. Otherwise it would be helpful to prevent the progress of prostate size by TRT.

Keywords: 5ARI, Testosterone, Late onset hypogonadism
Objective: For patients with testosterone deficiency (TD) who benefit from testosterone treatment (TRT), there is no conclusive evidence whether discontinuation of treatment is possible or whether treatment must continue for the rest of their lives. Therefore, predictive factors for maintenance of efficacy of TRT after stopping treatment were investigated in this study.

Material and Methods: From 2011 to 2016, among 720 hypogonadal patients, 151 men in whom TRT was effective and who were available for follow-up over 6 months after the discontinuation of TRT were included in this study. The type of TRT was consisted of oral testosterone undecanoate(TU), 2% testosterone gel, injection of testosterone enanthate, and injection of TU. Baseline serum total testosterone (TT) levels, the highest TT levels during TRT, and the recent TT levels at 6 months after discontinuation of TRT were investigated with the patients’ medical records including age, BMI, waist circumference (WC), comorbidities, life styles, period and type of TRT. Maintenance of response was determined by the recent serum TT levels and the answer of patients to global assessment question about the TD symptoms compared with the baseline.

Results: 92 patients (group I) failed to show maintenance of response, and 59 patients (group II) maintained the response over 6 months after the stopping TRT. In comparison between two groups, there was no significant difference in age, comorbidities, WC, and BMI. There was also no significant difference in the type of TRT between the two groups. However, group II showed a significantly longer duration of TRT (10.7 vs 5.2 months) and the peak TT levels during the TRT of group II was significantly higher than the group I (713.7 vs 546.1 ng/dl). Also, the ratio of regular exercise (>3/wk for 30 minutes) was significantly higher in group II compared to group I (45.8 vs 9.8%). The multivariate analysis by logistic regression model revealed that exercise and the duration of TRT were independent predictive factors for maintenance of response.

Conclusion: In hypogonadal men in whom TRT was effective, the longer period of treatment can improve the durability of response after stopping TRT, regardless of the type of testosterone treatment. Regular exercise can also lead to 10-fold increase of probability of maintaining the response after cessation of TRT.

Keywords: Testosterone deficiency, Exercise, Period of treatment
남성에서 감상선 기능 저하증이 하부요로증상, 남성호르몬 및 성기능에 미치는 영향

제성욱¹, 윤 솔¹, 도정모¹, 서덕하², 이신우¹, 이천우², 최세민¹, 강성철², 정기현², 화정석¹, 현재석¹
경상대학교 의과대학 ¹비뇨기과학교실, ²창원병원 비뇨기과학교실

배경 및 목적: 감상선 호르몬이 여성 성선기능에 미치는 영향에 대해서는 잘 알려져 있지만, 남성 성기능이나 남성호르몬에 미치는 영향에 대해서는 연구가 부족한 실정이다. 우리는 남성환자에서 감상선 기능저하증이 하부요로증상이나 성기능 혹은 남성호르몬에 미치는 영향에 대해서 평가해보았다.

대상 및 방법: 2013년 1월부터 2016년 6월까지 남성 종합건강검진을 위해 내원한 1095명을 대상으로 Thyroid function test를 시행하였고 TSH가 4초과인 경우 감상선 기능저하증이 있다고 진단하였다. 환자를 정상군과 감상선 기능저하증군으로 나누어 IPSS 설문지점수, 전립선크기, PSA, IIEF 설문지점수, total testosterone, MSHQ-Ejd 설문점수, 사정시간을 비교해 보았다.

결과: 총 환자 중 감상선 기능 저하증은 90명(8.22%)였다. 정상군과 비교해볼 때 감상선 기능 저하증이 있는 군에서 PSA가 더 높았고, 전립선 비대증도 더 심했다(P=0.025 and P=0.010). 하지만 이런 차이는 나이를 보정한 분석결과 통계적으로는 유의하지 않았다(P=0.390 and P=0.070). 성기능 관련 비교분석 결과, 감상선 기능 저하증군에서 IIEF-Sexual Desire 점수, IIEF-Overall Score 점수, 그리고 혈청 남성호르몬 수치가 더 낮았고(P=0.020 P=0.029 and P=0.003), 나이를 보정한 다변량 분석에서도 혈청 남성호르몬과 IIEF-Sexual Desire 점수가 감상선 기능저하증과 유의한 연관성이 있는 것으로 나타났다(P=0.021 and P=0.046). 조류증과 관련성 평가 위해 MSHQ-Ejd 설문점수와 사정시간을 비교하였는데 두 군간의 유의한 차이는 없었다.

결론: 우리 연구에서 감상선 기능 저하증은 성욕을 감소시키고 남성호르몬을 감소시키는 것으로 나타났다. 따라서 실제 임상에서 남성 갱년기환자를 치료할 때 감상선 기능 저하증 여부를 확인하고 치료하는 것이 중요하다고 생각된다.

Keywords: Thyroid hormone, Testosterone, Sexual function, Hypogonadism
Introduction & Objectives: Erectile dysfunction is a bothersome problem after graft surgery for correction of Peyronie’s disease. However, there is little information of vascular state before and after graft surgery in Peyronie’s disease. We evaluated vascularity using doppler ultrasonography before and 6 months after vein graft in Peyronie’s disease.

Methods and Materials: 12 patients diagnosed as Peyronie’s disease were evaluated before and 6 months after the surgery. All patients underwent plaque incision and saphenous vein graft for correction of Peyronie’s disease. Inclusive criteria were 1) penile curvature over 60º or hourglass deformity and 2) duration over 6 month. The degree of curvature, peak systolic velocity (PSV) on doppler sonography, and end–diastolic velocity (EDV) on doppler sonography were evaluated before and 6 months after the surgery. A questionnaire (International index of erectile function; IIEF–5) also checked before and after the surgery. Patients with pre-operative erectile dysfunction (IIEF item 1 score: 0 or 1) was excluded.

Results: Mean age and duration of curvature were 60.7±5.8 (years) and 11.0±2.3 (months), respectively. The mean degree of curvature was 75.0±12.1º, pre–operatively and the curvature was improved as 15.0±15.4º (p=0.002), postoperatively. In IIEF–5, only item 1 (confidence of erection) was decreased (from 3.03±0.90 to 2.30±1.00, p=0.005) and others were not changed. In doppler ultrasonography, the mean values of peak systolic velocity and end diastolic velocity were not significantly changed. However, mean resistive indices at 10 minutes (from 0.84 to 0.89, p=0.017) and 20 minutes (from 0.81 to 0.86, p=0.043) after intracavernosal injection were higher in postoperative state than preoperative state.

Conclusion: Vascularity may not be changed or be enhanced after the vein graft surgery for correction of Peyronie’s disease. That is, vein graft surgery would not worsen vascularity and the vascularity may not be a causative factor in lowering the ‘confidence of erection’ in early postoperative period.

Keywords: Erectile dysfunction, Peyronie’s disease, Doppler ultrasonography, Saphenous vein
Objective: To investigate the efficacy of imipramine, pseudoephedrine dual therapy in retrograde ejaculation patient.

Materials and Methods: Thirty retrograde ejaculation caused by diabetes mellitus (DM) patients treated with imipramine+pseudoephedrine between Jan 2015 and May 2017 were investigated. All patients had a semen analysis and post-ejaculatory urine analysis before and after medical treatment. The treatment protocol included 25 mg imipramine every 12 hours and pseudoephedrine 60 mg for every 8 hours given daily for 2 weeks. The primary end point was sperm concentration and semen volume after medical treatment.

Results: Of the 18 complete retrograde ejaculation patients treated with imipramine+pseudoephedrine, 12 patients (66.6%) recovered spermatozoa in antegrade ejaculation with mean total sperm count of 43.7±73.5 million. Mean increase of semen volume in complete retrograde ejaculation group was 0.37 cc. Of the 12 partial retrograde ejaculation patients, 6 patients (50%) had a >50% increase in the antegrade total sperm count with mean total sperm count of 54.4±60.4 million. Mean increase of semen volume in partial retrograde ejaculation group was 0.18 cc.

Conclusion: Imipramine+pseudoephedrine medical treatment is effective to establish antegrade ejaculation in patients caused by DM, therefore providing chance for pregnancy either through intercourse or assisted reproductive technology by antegrade ejaculated semen.

Keywords: Retrograde ejaculation, Imipramine, Pseudoephedrine
남성형 탈모에 있어서 김치추출 유산균 음료의 효과에 대한 pilot study

이효석, 최진호, 이중식, 서주태
단국대학교 제일병원 비뇨기과

Introduction: 최근 탈모는 일련의 노화현상뿐만 아니라, 유전적 요인, 스트레스, 식습관, 영양의 불균형 등으로 인하여 진행되는 것으로 보고되고 있다. 탈모 중에 가장 많이 진단되는 탈모증은 안드로젠성 탈모이며, 이들 중, 안드로겐성 탈모가 발생빈도가 가장 높다. 이 증상은 사춘기 이후의 남성과 여성에서 발생하는 가장 흔한 유형의 탈모증으로 남성에게는 남성형 탈모증 또는 대머리, 여성에게서는 여성형 탈모증으로 알려져 있다. 현재 탈모의 치료에 있어서는 미녹시딜과 피나스테리드가 사용되고 있으나, 각각의 약물에 부작용이 동반되기도 한다. 유산균제제는 모발의 성장기를 유도하는 VEGF를 증가시키고, 모발의 죽음기기를 유발하는 TGFβ1을 감소시키며, 체내의 Nitric oxide를 증가시켜 혈류를 증가시키고, 혈관을 이완하여 발모를 촉진하는 것으로 보고되고 있다. 본 연구는 유산균 음료를 복용 후 발모에 어떠한 영향을 미치는지 살펴 보았다.


Result: 총 46명의 피험자가 모두 검사를 완료 하였다. 피험자의 평균 연령은 45.35±10.13세(남성: 46.52±10.14, 여성: 44.17±10.20)이었다. 복용 후 부작용은 보고되지 않았다. 모발의 개수는 유산균 음료 전에는 85.98±20.54개 이었으며, 음료 1달 후, 4달 후에는 90.28±16.13개, 91.54±16.29개(p<0.001)로 측정 되었다. 모발의 두께는 음료 전 0.062±0.011 mm이었으며, 음료 1달, 복용 4달 후에는 0.068±0.008 mm, 0.066±0.009 mm (p<0.001)이었다. 총 46명의 피험자 중 제품 복용 4달 후 모발의 개수 및 두께의 변화가 없는 피험자는 3명이었으며, 개수만 증가한 피험자는 8명, 두께만 증가한 피험자는 10명, 모두 호전된 피험자는 25명 이었다.

Conclusion: 김치, 청국장 유산균 음료는 남성형 탈모 및 여성의 탈모에 있어서 효과가 있는 것으로 관찰되었으며, 추가적인 연구를 위하여 좀 더 많은 수의 피험자가 필요할 것으로 생각된다.

Keywords: Hair growth, Lacto bacillus
가임기 남성에서 탈모치료를 위한 5-AR 저해제의 사용이 가임력에 미치는 영향
송승훈1, 김동석1, 김대근2, 양승철1, 권성원1
1차의과학대학교 강남차병원 비뇨기과, 2서울역센터 비뇨기과

Purpose: Finasteride is a 5α-reductase inhibitor that blocks the conversion of testosterone (T) to dihydrotestosterone (DHT) and has been has been approved to treat androgenic alopecia. There have been concerns about the potential negative effects of this hormonal agent on male reproductive function. Androgens are well known to play a vital role in the control of spermatogenesis. We investigated the effect of finasteride usage on the reproduction function in male partners of married couples.

Materials: We compared the reproductive function between those who takes finasteride more than 6 months and no medication group, who visited our andrology center for fertility evaluation. Each group consisted of 27 cases. In addition to basic fertility evaluation, semen and reproductive hormone data were compared between two groups. Semen samples were collected with abstinence period of more than 48 hours. Patients with varicocele, previous scrotal surgery, underlying medical disease were excluded.

Results: The mean patient age was 37 years (range: 30–51 years). All of the study group was taking low-dose (1–1.25 mg) finasteride for androgenic alopecia. The mean duration of treatment with finasteride was 33.6 months (range: 6–120 months). There was no significant difference between two groups in regards to semen parameters (semen volume: 2.07±1.16 vs 2.53±0.96 ml, p=0.12; sperm concentration: 112.74±78.60×10⁶/ml vs 84.93±43.10×10⁶/ml, p=0.11; sperm motility: 42.30±11.10% vs 45.93±9.98%, p=0.21; sperm strict morphology: 4.19±1.10% vs 4.41±1.22%, p=0.50, respectively). There was no significant difference in regards to serum reproductive hormonal level between groups. One patient complained of weak ejaculation and reduced semen volume while taking finasteride.

Conclusions: Our study suggests that low dose finasteride does not have a negative effect in regards to male reproductive function. However, further large scale investigation is warranted.

Keywords: Finasteride, Androgen, Reproductive function
Expereice of Korean surgical robot REVO-I: first clinical trial
장기돈, 알리 압델 라힘, 함원식, 최영득, 나군호
연세대학교 의과대학 의학과학교실

Introduction: The objective of this present study is to determine the safety and efficacy of REVO-I during Retzius-sparing robot-assisted radical prostatectomy (RS-RARP) surgery.

Methods: After ethical approval of the Korean Food and Drug Administration (KFDA) for using REVO-I in human a prospective observational study was carried out on patients with clinically localized prostate cancer (PCa) underwent RS-RARP using with REVO-I platform.

Results: Mean patient’s age was 69 years old, Mean Operative time (min), docking time (min), console time (min), and urethrovaginal anastomosis time (min) were 180.7±36.8, 9.6±4.6, 108.8±29.1, and 28.4±8.1 minutes, respectively. Regarding intraoperative findings, the mean estimated blood loss (EBL) was 321.3±332.2 ml. No intraoperative organ injury was present. One patient received intraoperative blood transfusion due to increased intraoperative EBL and concomitant hypotension. Postoperatively, two patients received blood transfusion (Clavien–Dindo classification I), and there was no other serious complications (Clavien–Dindo classification I).

Conclusions: The first clinical trial in treating male patients with localized PCa using REVO-I robotic surgical system was successful. Further clinical studies on larger cohort of patients are warranted to confirm our results before the wide application of REVO-I.

Keywords: Korean surgical robot, Clinical trial, Prostate

<table>
<thead>
<tr>
<th>Table 1: Patient's clinical characteristics</th>
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<tr>
<td>Patient age, yr</td>
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<tr>
<td>BMI, kg/m²</td>
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<tr>
<td>Prostate weight, g</td>
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<td>Clinical stage, %</td>
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<tr>
<td>T1</td>
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<td>T2</td>
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<tr>
<td>≥T3</td>
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<tr>
<td>Biopsy Gleason score, %</td>
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<tr>
<td>≤6</td>
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<tr>
<td>≥7</td>
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<tr>
<td>8-10</td>
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<tr>
<td>Neo-adjacent Bx, %</td>
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<td>Pathological stage, %</td>
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<tr>
<td>T1</td>
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<tr>
<td>T2</td>
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<tr>
<td>Pathological Gleason score, %</td>
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<tr>
<td>≤6</td>
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<tr>
<td>≥7</td>
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<td>8-10</td>
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<td>PSA rate, %</td>
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<table>
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<th>Table 2: Perioperative data</th>
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<tr>
<td>Anesthesia time, min</td>
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<td>Operative time, min</td>
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<td>Docking time, min</td>
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<tr>
<td>Console time, min</td>
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<tr>
<td>Intraoperative transfusion, %</td>
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<tr>
<td>Intraoperative organ injury, %</td>
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<tr>
<td>Urethral anastomosis time, min</td>
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<tr>
<td>EBL, ml</td>
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<tr>
<td>Postoperative transfusion, %</td>
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<tr>
<td>Clavien-Dindo ≥ grade 3, %</td>
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<td>LOS (days)</td>
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 Xi 다빈치 수술 시스템을 이용한 단일 술자의 로봇 단일공복강경(LESS) 신장부분절제술의 초기 경험

나준채1, 김진우1, 박지수1, 안현규1, 강송구1, 이영호2, 윤영은4, 함원식1, 나군호1, 최영득1, 홍성준1,2, 현웅규1,2

1연세대학교 의과대학 비뇨기과학회실, 2Brain Korea 21 PLUS Project for Medical Science, Yonsei University, 3국립건강보험공단 일산병원 비뇨기과, 4한양대학교 의과대학 비뇨기과학회실

목적: "단일공 수술"은 배꼽 주위의 단일 절개를 이용하는 복강경 수술 기법을 지칭한다. 복강경 단일공 수술을 위해 새로 운 기구들이 개발되었지만, 이들은 대개 동작 범위가 제한되고 기구들끼리 충돌하여 수술의 난이도를 높이는 선천적인 단점이 있다. 이러한 단점을 극복하기 위해 본원에서는 다빈치 수술 시스템(Intuitive Surgical Inc., Sunnyvale, CA, USA)을 이용한 로봇 단일공복강경 수술을 보고하고자 한다. 일부 제한적인 관절 움직임이 부족하는 새로운 Xi 시스템을 사용한 단 일공복강경 수술 로봇기구가 개발됨에 따라서 이를 활용한 복강경단일공 부분신절제술을 시행하였고 이에 대한 초기 경 험을 소개하고자 한다.

방법: 환자의 자세는 일반 로봇 부분신장절제술과 동일하다. 제대의 상방 변연을 2.2 cm 절개한 후 단일공포트를 삽입하였다. 단일공포트는 한 개의 8.5 mm 복강경용 투관침과 두 개의 5 mm 부속 투관침을 다중채널에 위치시킨 후 고정시켜서 확립하였다. 보조를 위해 12 mm 투관침을 단일공 다중채널 포트 옆에 위치시켰다. 로봇을 도킹한 후 수술 방법은 기존의 multi-port 로봇 부분신절제술과 유사하다.

결과: 세 명의 환자를 대상으로 로봇 단일공복강경(LESS) 신장부분절제술을 시행하였다. 수술 당시의 평균 나이는 50세였고, 평균 BMI는 25.1 kg/m²였다. 평균 수술 시간, 콘솔 이용시간, 허혈 시간과 봉합시간은 각각 195.3분, 132.7분, 27.0분, 19.7분이었다. 환자들은 수술 후 합병증 없이 퇴원하였다. 콘솔 이용시간은 순차적으로 177분, 133분, 그리고 88분으로 점차 감소하였다. 모든 종양의 절제 경계에서 암이 관찰되지 않았다.

결론: 새로 개발된 Xi 다빈치 시스템의 로봇 단일공복강경(LESS)의 가장 큰 장점은 제한적 관절운동이 가능한 needle driver 장비로 기존 multi-port 로봇 장비와 비교해도 거의 차이 없이 병합 등의 까다로운 수술 기술 재연이 가능하다는 점과 긴 팔로 활동 범위가 Xi 다빈치 시스템의 로봇 단일공복강 경(LESS)에 비해 활동 범위가 넓고 체외 기계적 충돌이 적어진다는 것이다. 본 연구의 Xi 다빈치 시스템의 로봇 단일공복강경(LESS) 신장부분절제술의 초기 경험을 통해서 본 술기 가 구현가능하며 안전하다는 것을 보여주었다.

Keywords: Robotic LESS partial nephrectomy, Single-site surgery, Kidney cancer
Long-term results of the plugging method with regard to the prevention of a postoperative inguinal hernia after robot-assisted laparoscopic prostatectomy

이광석, 구교철, 정병하
연세대학교 의과대학 강남세브란스병원

**Purpose:** We previously introduced a plugging method to prevent inguinal hernia development in patients undergoing robot–assisted laparoscopic prostatectomy for localized prostate cancer. The present study aimed to analyze the long-term outcomes of this plugging method.

**Patients and Methods:** A total of 1026 groins were reviewed between May 2007 and March 2016. The plugging method was prospectively applied to patients with a patent processus vaginalis since May 2011. Of the 291 groins with a patent processus vaginalis, 167 (57.4%) underwent the plugging method. For patients with inguinal discomfort, ultrasonography was used to evaluate inguinal hernia development.

**Results:** An inguinal hernia developed postoperatively in 35 (3.4%) groins at a median time of 22.0 months during a median follow-up of 41 months. On analyzing the inguinal hernia–free survival rate after adjustment for potential predictors, the presence of a patent processus vaginalis without the preventive procedure was a major risk factor for a postoperative inguinal hernia. No prognostic difference in inguinal hernia development was noted between the group without a patent processus vaginalis and the group with a patent processus vaginalis that underwent the plugging method. Body mass index ($\geq 23.0$ kg/m$^2$) and presence of a patent processus vaginalis were independent predictors for inguinal hernia development in groins that did not undergo the plugging method. For groins that underwent the plugging method, previous operation history (yes) was an independent predictor.

**Conclusions:** The plugging method is effective for prevention of a postoperative inguinal hernia in the long term in patients undergoing robot–assisted laparoscopic prostatectomy.

**Keywords:** Inguinal hernia, Patent processus vaginalis, Prostatectomy
Report of pneumososcopic vesicovaginal fistula repair
전병조, 태범식, 최 훈, 박재영, 배재현
고려대학교 의과대학 안산병원 비뇨기과학교실

Purpose: We report the feasibility and effectiveness of pneumovesicoscopic vesicovaginal fistula repair.

Material and Method: Pneumovesicoscopic fistula repair was performed to 8 patients diagnosed with vesicovaginal fistula after gynaecological surgery. Cystoscopy was performed in modified lithotomy position and the fistula was inspected. A 5mm endoscopic port was placed into the bladder under cystoscopic view in the midline and two more working ports were placed 5 cm laterally. Then pneumovesical space was made by using nelatone catheter and suction. The fistular was excised into the vaginal space and the defect was repaired with 4–0 SAS layer by layer.

Results: The all pneumovesical fisula repair was accomplished without intraoperative complication and open conversion. Average patient age was 48.4. The mean operative time was 106.5 minutes, and blood loss was minimal. The mean postoperative hospital stay was 9.5 days and the average time of catheterization was 14.25 days. At follow—up visit after 2 months, the recurrence of vesicovaginal fistula was not noted in any case.

Conclusions: Pneumovesicoscopic vesicovaginal fistula repair is technically safe and feasible with no recurrence of fistula. Considering the main advantages of less morbidity and safety in non peritoneal approach, our vesicoscopic technique may be an alternative option of surgical methods of vesicovaginal fistula.

Keywords: Vesicovaginal fistula, Laparoscopy, Layered repair

Table 1. Patient’s characteristics and Operative parameter of vesicovaginal fistula (VVF)

<table>
<thead>
<tr>
<th></th>
<th>Case 1</th>
<th>Case 2</th>
<th>Case 3</th>
<th>Case 4</th>
<th>Case 5</th>
<th>Case 6</th>
<th>Case 7</th>
<th>Case 8</th>
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<tr>
<td>Age (yr)</td>
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<td>55</td>
<td>77</td>
<td>63</td>
<td>42</td>
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<td>C-section</td>
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<tr>
<td>Time to treat fistula repair (min)</td>
<td>6</td>
<td>4</td>
<td>1</td>
<td>2</td>
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<td>6</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Previous VVF repair</td>
<td>None</td>
<td>4</td>
<td>None</td>
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<tr>
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<td>15</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>30</td>
<td>10</td>
</tr>
<tr>
<td>Previous RTx (+/-)</td>
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<td>(+)</td>
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<td>(-)</td>
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<td>Op time(min)</td>
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<td>Catheterization (d)</td>
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<td>7</td>
<td>8</td>
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<td>Complication (+/-)</td>
<td>(-)</td>
<td>(-)</td>
<td>(-)</td>
<td>(-)</td>
<td>(-)</td>
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<tr>
<td>Recurrence (+/-)</td>
<td>(-)</td>
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신장 및 요관 질환의 진단, 치료를 위한 양방향 구동이 가능한 외경 2.85 mm 이하 연성 요관신우경의 생체내, 임상실험

김대희, 최세영, 유달산, 김정수, 박형근
울산대학교 의과대학 비뇨기과학대학교

**Purpose:** The domestic flexible ureteroscope (dfURS) was developed. It showed acceptable quality in in-vitro test. We performed in-vivo animal study and clinical test in 4 stone patients.

**Materials and Methods:** The dfURS has been developed by Hyunjoo in-tech (Seoul, Korea) and the project is granted by Ministry of Trade, Industry and Energy. In-vivo test was performed using female pig (n=5) under general anesthesia. Two urologists compared 6 parameters for performance with URF-P6 (Olympus, Tokyo, Japan) (insertion, controls, maneuverability, rigidity, image, overall score). After confirmation of the safety in in-vivo test, we performed retrograde intrarenal surgery (RIRS) in 4 patients who had 1 cm or larger renal stones. Surgical success was defined that a patient was stone-free status after surgery. And it was evaluated by KUB and CT in a month. Three parameters for performance was compared with commercially available flexible ureteroscope (COBRA, Wolf, USA) (irrigation, convenience, maneuverability) (5:much better, 4:little better, 3:no difference, 2:little worse, 1:much worse).

**Results:** The performance measured during in-vivo test was as follows; (dfURS/URF-P6) insertion (8.0/9.0), controls (8.5/9.0), maneuverability (7.5/8.5), rigidity (9.0/9.0), image (7.5/9.5) and overall score (8.0/9.0). In clinical test, the mean longest diameter of renal stones was 13.0±5.9mm, and total volume of renal stones was 998.7±1117.8 mm³. One patient had renal stone in renal pelvis, one patient in mid calyx and two patients in lower calyx. In two patients we achieved surgical success (50%). One patient had 4.0×3.0×3.0 mm sized remnant stone (39.8% of pre-operative total stone volume). And the other patient had 18.0×17.0×10.0 mm sized remnant stone (61.2% of pre-operative total stone volume). No patient had immediate procedure-related complication. The deflection angle of dfURS was 270/270 degrees and well maintained in clinical test. There was no significant injury to the dfURS during operation. The mean score of performance was as follows; (dfURS) Irrigation (1.25), convenience (2.25), maneuverability (2.75).

**Conclusions:** Newly developed dfURS showed acceptable quality and safety in in-vivo and clinical test. But it still needs to be upgraded in performance.

**Keywords:** Ureteroscope, Renal stone
A multicenter, prospective, observational study to investigate feasibility of the disposable flexible ureterorenoscope (Lithovue®) in patients with renal stones

조성용1, 이주용2, 신동길3, 서일영4, 유상준1, 박형근5

1서울특별시립 보라매병원, 2연세대학교 의과대학 신촌세브란스병원, 3부산대학교병원, 4원광대학교 부속병원, 5울산대학교 서울아산병원

Introduction: This study investigates the feasibility of disposable flexible ureterorenoscopy (Lithovue®) in patients with renal stones in a prospective, multicenter, observational study.

Materials and Methods: Sixty two patients who underwent unilateral ureterorenoscopic stone surgery by Lithovue at five institutions were included. Surgeons using a numerical scale, evaluated the maneuverability of the scopes and general perceptions of visibility related to the monitor and irrigation systems as follows: 1 (very good), 2 (good), 3 (not different), 4 (poor), and 5 (very poor). General pain and fatigue scores were evaluated and compared to existing scopes.

Results: Mean patient age was 57.3±13.9 years and mean stone size was 15.4±5.4 mm. Clinical success of overall stone removal was 82.3%. Complications occurred in 4 cases of the Clavien classification grade I in a single case and II in 3 cases. Comparative parameters of maneuverability, perception of the monitor system and perception of the irrigation channel were 2.5, 2.5, and 3.0, respectively. The most favorable evaluation of physical strain was about ‘shoulder fatigue’ and ‘hand fatigue’. However, unfavorable evaluations were recorded for ‘wrist stiffness’ and ‘thumb fatigue’. Maximal deflection angles were preserved in 53 cases (85.5%). Four out of 62 cases (6.5%) showed less than 210 degrees postoperatively.

Conclusions: Lithovue generally showed good maneuverability and good perception scores for the monitor and irrigation systems. Strong points were maneuverability and the monitor system while the weakness was related to situations requiring efficient irrigation which can be managed by appropriate surgical methodology.

Keywords: Disposable equipment, Ureterorenoscopes, Urinary calculi
O-197

일반적 신장 내 결석 제거술 전 선택적 알파 차단제를 사용함으로써, 요관 진입자 요관 진입 압력을 줄이고 이차적 요관 손상을 예방할 수 있는가?: 무작위 대조군 연구

구교철1, 윤준호2, 박노철1, 안현규1, 이광석1, 김도경1, 하윤수1, 정병하1, 홍창희1

1연세대학교 의과대학 비뇨기과학교실, 2연세대학교 공과대학 기계공학부

Purpose: Excessive bulking force during primary access of the ureteral access sheath (UAS) may induce ureteral injury. To investigate the efficacy of preoperative α-blockade for reducing UAS insertion forces (UASIF) and to determine the upper limit required to avoid ureteral injury.

Materials and Methods: In a randomized controlled trial, 135 patients from a single institution, who had ureteropelvic junction or renal pelvis stones and were planned to undergo retrograde intrarenal surgery (RIRS), were prospectively enrolled from December 2015 to January 2017. Patients were randomly assigned to the control (n=41) or the experimental group that received preoperative α-blockade (n=42). Pre-stented patients were separately assessed (n=21). A homemade UASIF measurement device was developed to measure the maximal UASIF.

Results: Our UASIF measurement device showed excellent reproducibility. Higher UAS insertion velocity resulted in greater maximal UASIF. Maximal UASIF in the α-blockade group was significantly lower than that in the control group at the ureterovesical junction (p=0.008) and proximal ureter (p=0.036). Maximal UASIFs in the α-blockade group were comparable to those in pre-stented patients (Fig). Female patients and patients aged ≥70 years exhibited lower maximal UASIFs than their counterparts. Ureteral injury (≥ Grade 2) rates were lower in the α-blockade group than controls (p=0.038), and did not occur in any cases in which UASIF did not exceed 600 g.

Conclusions: Preoperative α-blockade and slow sheath placement may reduce maximal UASIF. If UASIF exceeds 600 g, a smaller diameter sheath may be an alternative, or the procedure can be terminated and followed later by pre-stented RIRS.

Keywords: Alpha-adrenergic antagonist, Ureter, Ureteroscopy
연성내시경하 신장 결석 수술에서 수술전 요관 부목 삽입의 효과

육형동, 윤민영, 정창욱
서울대학교병원 비뇨기과

Purpose: Placing the stent before retrograde intrarenal surgery (RIRS) can theoretically expand the ureter to improve access and removal of stones. The purpose of this study was to investigate the effect of preoperative ureteral stenting on access and surgery.

Material and Methods: We retrospectively analyzed RIRS cases from October 2013 to June 2016. Patients were divided into two groups based on preoperative ureteral stent insertion. The character of stone (size, number, density, location) and access sheath success rate, balloon dilatation rate, perioperative complication, operative time, hospitalization time, period with stent, postoperative urinary tract infection rate, stone free rate, and additional treatment rate were analyzed.

Results: Overall, 122 patients were included in the study (73 pre-stented and 49 non-stented). Median stone size was 14.5 mm and overall stone free rate was 87.7%. The preoperative estimated glomerular filtration rate was relatively higher in patients who underwent preoperative ureteral stenting, compared with those who did not (68.18 vs 79.01, p=0.042). Preoperative ureteral stenting improves the success rate of access sheath insertion (97.3% vs 87.8%, p=0.038) during surgery. Although not significant, the balloon dilatation rate was relatively low. There was a significant difference in operation time when the diameter of the stone was smaller than 1.3 cm (p=0.019). However, there was no significant difference in postoperative urinary tract infection rate, additional treatment rate, and stone free rate.

Conclusion: Preoperative ureteral stenting helps preserve preoperative glomerular filtration rate, and facilitates successful insertion of access sheath.

Keywords: Ureter stent, Assess sheath, RIRS
7.5 Fr. nephroscope를 이용한 ultra-mini percutaneous nephrolithotomy의 초기경험 및 합병증

고경태, 임송원, 김성용, 최낙규, 양대열
한림대학교 강동성심병원

목적: 2 cm 이상의 신결석에서 표준치료인 Conventional Percutaneous Nephrolithotomy (PCNL)은 높은 결석제거율을 보이지만, 수술 중 출혈, 집뇨계의 손상 등의 합병증이 있고, nephrostomy tube 설치로 인하여 입원기간이 길다는 단점이 있었다. 또한, 최근 결석진단에 CT가 많이 이용되면서 상대적으로 크기가 작은 신결석이 많이 진단되고 있다. 이에 저자는 기존 PCNL의 단점을 보완하고 작은 신결석 치료에 맞게 개발된 7.5 Fr. nephroscope를 이용하여 Ultra-mini PCNL (UMP) 시행한 초기 경험 및 합병증을 소개하고자 한다.


결과: 환자들의 평균 나이는 61세였고, 남자 환자가 10명 여자 환자는 5명이었다. 신결석의 평균 크기는 2.84±1.06 cm 이었고, 양측이 9명, 우측이 7명, 좌측이 7명이었다. 15명의 환자 중, 9명의 환자(60%, 2.47±1.08 cm)에서 결석이 완전히 제거되었다. 6명의 환자 중 남은 신결석의 크기가 0.5 cm 미만인 환자 4명은 추가 치료로 ESWL을 시행하였으며, 0.5 cm 이상인 2명의 환자는 Flexible ureteroscopic surgery를 추후에 시행하였다. 평균 수술 시간은 초기 8.5/9.5 Fr Working sheath를 이용했을 때는 106분이 소요되었으며, 이후 11/12 Fr. Working sheath를 이용하였을 때에는 73분이 소요되었다. 모든 환자에서 수술 중 출혈은 최소한으로 측정보다 신수의 손상 등 다른 합병증도 없었다. 수술 중 기계의 고장/손상은 없었지만, 1명의 환자에서 one-step dilator 삽입의 실패가 있었다. 15명의 환자 중 7명(47%)의 환자에서 수술 후 발열이 있었으며 정맥용 항생제를 포함한 보존적 요법으로 치료되었다.

결론: UMP는 수술과 관련된 합병증이 적으며, 단일 신결석인 경우 2 cm 이상의 결석에서도 좋은 치료결과를 보였다. 다만, UMP 이후 발생하는 요로감염을 줄이기 위한 노력이 지속적으로 필요하다.

Keywords: Renal stone, Percutaneous nephrolithotomy, Complication
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변형된 양와위 자세에서 경피적 신결석 제거술 시행시 유도철사 견인을 이용한 신루확장술의 효용성

하헌, 이유진, 정재욱, 하윤석, 김태완, 최석환, 이준녕, 김현태, 유은상, 정성광, 권태균, 김범수
경북대학교 의과대학 비뇨기과학치료실

**Purpose:** Although percutaneous nephrolithotomy (PCNL) has been traditionally performed in the prone position, recently, it is also being performed in supine or modified supine position. Although supine PCNL has several advantages, such as reducing risk of cardiopulmonary complications and allowing simultaneous retrograde approach, it is more difficult to make nephrostomy tract in supine position due to more movable kidney. To overcome this limitation, we used modified nephrostomy dilation technique using guide wire traction and analyzed the efficacy of this technique comparing with conventional method.

**Materials and Methods:** From January 2011 to April 2017, a total of 144 patients underwent PCNL in modified supine position. Of these patients, modified nephrostomy tract dilation technique was performed in 73 patients. All the PCNL was performed in the Galdakao modified Valdivia supine position and PCN was placed the day before operation. For the conventional technique, two hydrophilic guide wires were antegradely placed into the ureter through PCN catheter and nephrostomy tract was made using 30F balloon catheter. For the modified dilation technique, two hydrophilic guide wires were placed into the bladder and were extracted through the urethra, then both proximal and distal tips were pulled to the opposite side with tension for the easy placement of fascia cutting needle and balloon catheter. Patients characteristics and perioperative surgical outcomes, including success rate, operation and radiation exposure time, and complications were compared between the two groups.

**Results:** There were no differences in patients gender, age, stone size and number between the two groups. The number and site of renal puncture was also not statistically different. Overall operation time (89.6 vs 89.2 min), mean Hb drop (2.2 vs 2.6 mg/dl), hospital stay (6.7 vs 7.0 days), success rate (73.0 vs 64.0%), and complication rates (7.0 vs 17.0%) were not significantly different between both groups. However intraoperative radiation exposure time was significantly shorter in modified dilatation technique group (93.0 vs 233.0 sec, P<0.001).

**Conclusion:** This study demonstrated that modified nephrostomy tract dilation technique can be effectively and safely performed for PCNL in modified supine position and it can be more helpful to reduce intraoperative radiation exposure time.

**Keywords:** Percutaneous nephrolithotomy, Galdakao modified valdivia supine position, Modified nephrostomy tract dilation technique
O-201

고농도 히알루산과 콘드로친산의 요관부목 삽입에 따른 요로증상에서의 효과에 관한 다기관 한쪽 가림 임의배정연구

조정기1, 정재훈1, 김규식1, 김용태1, 박성열1, 최홍용1, 문홍상1, 이승욱1, 김재현2

1한양대학교 의과대학 비뇨기과학교실, 2순천향대학교 의과대학 비뇨기과학교실

Purpose: Many patients with receive a ureteral stent develop significant urinary symptoms and pain. Treatments with narcotics, alpha-blockers, and/or anticholinergics have inconsistent outcomes. This multicenter randomized single-blinded controlled trial investigated the effect of instilling highly concentrated hyaluronic acid (HA)/chondroitin sulfate (CS) on the ureteral stent–related pain, urinary symptoms, and quality of life (QoL) of patients who underwent ureteroscopic lithotripsy for ureter stones followed by ureteral stent placement.

Materials and Methods: Eligible patients were randomly allocated to receive intravesical instillation with HA/CS or normal saline just after ureteral stent placement. Just before stent removal on postoperative day 7, the patients completed the Urinary Stent Symptom Questionnaire (USSQ), International Prostate Symptom Score (IPSS) QoL question, and pain Visual Analogue Scale (VAS).

Results: In total, 92 patients (46 each in the treatment and control arms) completed the study. The two groups did not differ in terms of age or stent indwelling time. Compared with the control group, the treatment group had significantly lower total USSQ scores (67.8 vs. 86.2; p<0.001) and urinary domain USSQ scores (p<0.001), better I–PSS QoL (p=0.018), and lower pain VAS scores (p<0.001). They also had lower total pain and discomfort scores (p=0.001) and less pain and discomfort caused by urinary tract infections (p=0.01), and were less likely to need antibiotics (p<0.01) and additional hospital visits (p<0.01).

Conclusions: Highly concentrated HA/CS effectively improved urinary symptoms and pain and reduced the need for additional medication or procedures.

Keywords: Ureteral stent, Hyaluronic acid, Discomfort
Therapeutic effects of endoscopic ablation of hunner lesions in interstitial cystitis/bladder pain syndrome patients

고광진1, 이규성1,2
1 성균관대학교 의과대학 삼성서울병원 비뇨기과학교실, 2 삼성융합의과학원 의료기기산업학과

Purpose: To prospectively investigate the efficacy of endoscopic ablation of Hunner lesions (HLs) in patients with Interstitial Cystitis/Bladder Pain Syndrome (IC/BPS) and to find predictors of early recurrence of HLs.

Materials and Methods: A prospective observational study was performed for IC/BPS with HLs patients who underwent endoscopic ablation. Enrolled patients underwent transurethral ablation with a bipolar loop. We repeated endoscopic ablation when HLs recurred during the follow-up period, O’Leary–Sant IC symptom index (ICSI) and problem index (ICPI), pelvic pain and urgency/frequency (PUF) patient symptom scale, visual analogue scale (VAS) for pain, and 3-day voiding diary were assessed at each visit after the first operation. The primary endpoint was recurrence-free survival time. Secondary end points were a change from baseline in the mean number of frequency, nocturia, and urgency episodes noted in a 3-day voiding diary and changes in VAS for pain and other symptom indices at follow-up visits.

Results: A total of 72 patients were analyzed. The median follow-up period was 29.5 (IQR, 19.8–36.8) months. After primary ablation treatment, HLs recurred in 75.0% (54/72) of subjects, and the mean recurrence-free survival time was 17.7 ± 1.6 months. HLs occurred in 44.0% (22/50) of individuals after the second operation, and the mean recurrence-free survival time was 23.3 ± 2.9 months. There were significant improvements in the VAS for pain, ICSI, ICPI, and PUF after endoscopic ablation treatment. Twenty-eight patients (38.9%) experienced HL recurrence in the 12 months after the first ablation and lower maximal cystometric capacity (OR 1.01, CI 1.001–1.013; p=0.017) was the only factor that predicted early recurrence.

Conclusions: Endoscopic ablation is an effective and safe treatment option for HLs and significantly reduces pain and improves voiding symptoms. Although the recurrence rate is not negligible after endoscopic ablation, HLs do not recur for at least 18 months. In addition, repeated ablation when symptoms worsen results in consistent improvement in symptoms and pain relief. The risk of early recurrence is relatively low except in patients with low bladder capacity. Therefore, endoscopic ablation should be performed periodically in cases where recurrence of HLs causes symptoms.

Keywords: Interstitial cystitis, Pain, Therapeutics
Effects of apolipoprotein A-1 and alpha-fetoprotein on the development of benign prostatic hyperplasia and lower urinary tract symptoms: results from a large retrospective study

이광석, 구교철, 정병하
연세대학교 의과대학 강남세브란스병원

**Purpose:** To investigate risk factors for development of benign prostatic hyperplasia (BPH)/lower urinary tract symptoms (LUTS) in healthy men.

**Methods:** The study included a total of 11,222 healthy men who underwent transrectal ultrasonography at our hospital during routine health examinations. Those who underwent prior biopsy or surgery for prostate disease, who had suspected urinary tract infection, or who were taking BPH medication were excluded. BPH/LUTS was defined as an International Prostate Symptom Score (IPSS) ≥8 and prostate volume (PV) ≥30 cm³.

**Results:** Subjects had a mean age of 51.7 years, a PV of 28.81 cm³, prostate-specific antigen (PSA) level of 1.17 ng/mL, and IPSS of 9.19. The annual PV growth rate was 0.48 cm³/year. PSA level, PSA density, PV, transitional zone volume (TV), and transitional zone index (TZI) increased significantly with age. PSA level, fat mass, apolipoprotein A-1, creatine level, and urine pH were significant predictive factors for both PV and TV. For men aged >40 years, alpha-fetoprotein (AFP) level (>2.0 vs. ≤2.0 ng/mL) (Odds ratio [OR]=0.76, p=0.025), PV (OR=1.49, p<0.001), and IPSS (OR=1.92, p<0.001) were predictors of BPH/LUTS at the initial health check-up. AFP level (>2.0 vs. ≤2.0 ng/mL) (OR=0.79, p=0.033), TZI (OR=1.01, p<0.001), and total IPSS (OR=1.05, p<0.001) were significant risk factors for development of BPH/LUTS within 5 years.

**Conclusions:** Apolipoprotein A-1 is a major component of high-density lipoprotein cholesterol and was associated with PV. AFP was a risk factor for the development of BPH/LUTS within 5 years in healthy Korean men.

**Keywords:** Benign prostatic hyperplasia, Lower urinary tract symptoms, Apolipoprotein A-1, Alpha-fetoprotein
O-204

Urolift: 전립선비대증 치료를 위한 최소침습 intra-prostatic implant - 국내 파일럿 연구

정현철, 성재우, 양종협, 조신재, 최세웅, 배응진, 김수진, 조혁진, 하유신, 홍성후, 이지열, 김세웅
가톨릭대학교 서울성모병원

**Purposes:** As a minimal invasive device for benign prostatic hyperplasia (BPH) treatment, Urolift is widely accepted in the worldwide but it is not widely used in Korea. We investigated the short-term efficacy of urolift for patients with BPH.

**Materials and Methods:** Seven patients with BPH who were taking a blockers were treated with urolift under local anesthesia with sedation. Foley urethral catheter was placed post operation and removed on the same day. Whenever possible, patients were scheduled to be discharged on the day, but someone was admitted to the hospital due to the patient’s personal reason, IPSS and maximum urinary flow rate and post voiding residual urine were evaluated preoperatively and 1 month later.

**Results:** Mean age was 68.71±7.27 years old and mean prostatic volume was 36.27±6.62 g. No severe adverse event was observed postoperatively. Preoperative total IPSS and QOL were 22.2±12.93 and 3.8±1.09. Total IPSS was significantly improved to 18.72±7.2 (p=0.043) after treatment, but QOL was 3.57±1.51 and it was statistically not different. Voiding subscore of IPSS was significantly improved (p=0.041) but storage subscore was not improved significantly. And post voiding residual urine were improved after treatment significantly 62.66±83.91 to 7.66±3.21 (p=0.03) however no significant improvement in Qmax that was 10.81±3.44 and 9.93±8.5 respectively. Mean hospital day was 1.71±0.48. No patient reported retrograde ejaculation.

**Conclusions:** We evaluated short-term efficacy of Urolift, a new minimally invasive device for BPH treatment in Korea, and showed improvement of IPSS, especially voiding symptoms. Long term follow-up is needed, but it is expected that not only the improvement of voiding symptom but also the preservation of sexual function is possible.

**Keywords:** Urolift, BPH, Minimal invasive
Purpose: It is known that long-term partial bladder obstruction induces detrusor contractile dysfunction. Actually, persistent voiding dysfunction following the HoLEP is not uncommon. The aim of this study is to predict the proper timing of the HoLEP through variable parameters.

Materials and Methods: A total of 210 patients who underwent HoLEP between 2012 and 2016 were retrospectively reviewed. According to treatment results, the patients were divided into 2 groups (Group I - improvement in IPSS + Qmax value >12 ml/s and PVR >100 ml; Group II - no improvement in IPSS + Qmax value ≤12 ml/s or PVR ≥100 ml). The improvement of IPSS was defined as the shift between grades. We evaluated the predicting risk factors of voiding dysfunction following HoLEP.

Results: In the analysis of subjective symptom score (IPSS subscores and total score), there were significant differences between two groups (P<0.001). Also, in the analysis of urodynamic parameters, maximum detrusor pressure, detrusor pressure at peak flow rate, compliance, bladder contractility index, bladder outlet obstruction index also showed significant differences (P<0.05). In the logistic regression analysis, bladder contractility index and IPSS storage subscore were risk factors for voiding dysfunction following HoLEP.

Conclusion: Reduced detrusor contractility was associated with poor treatment results. Urodynamic parameters, indicating detrusor contractility could be a good diagnostic tool for predicting voiding dysfunction after HoLEP. The relatively high symptom score could suggest better treatment results.

Keywords: Holmium laser enucleation of prostate, Benine prostatic hyperplasia
What is different according to prostate size following holmium laser enucleation of the prostate in men with benign prostatic hyperplasia?

이정우, 이승수, 이동훈, 한지연, 남중길, 정문기, 박성우
양산부산대학교병원 비뇨기과학교실

**Keywords:** Prostate, BPH, Surgery

### Abstract

**Purpose:** In patients with benign prostatic hyperplasia (BPH), prostate size and its effect on outcomes after transurethral resection of the prostate (TURP) have been reported. However, the effect of prostate size on outcomes after holmium laser enucleation of the prostate (HoLEP) in men with BPH has not been well understood. This study aimed to compare the post-operative outcomes according to prostate size after HoLEP in men with BPH.

**Methods:** A total of 193 men with BPH who underwent HoLEP between 2009 and 2016 were included. Patients were divided into three groups: <40 gm, 40-80 gm, and ≥80 gm. Pre-operative and post-operative data were collected and compared among the groups.

**Results:** There were no significant differences in age, pre-operative International Prostate Symptom Score (IPSS), and quality of life (QoL) among the groups. Post-operative IPSS, QoL, and Qmax were significantly improved in all groups compared to pre-operative values. The improvement was more pronounced in the group with a prostate size of <40 gm.

**Conclusions:** HoLEP is effective regardless of prostate size, but patients with smaller prostates showed better improvement in post-operative outcomes compared to those with larger prostates. Further studies are needed to confirm these findings.
전립선절제술 후 배뇨증상 변화를 통한 배뇨근 저활동성 진단 지표의 효용성 비교

김상원, 민경찬, 이유진, 정재욱, 하윤석, 최석환, 김범수, 김현태, 유은상, 권태균, 정성광
경북대학교 의과대학 비뇨기과학실

목적: 고령 인구에서 보다 흔하게 나타나는 하부요기능 이상인 배뇨근 저활동성(detrusor underactivity: DU)은 표준적인 진단기준이 정해져 있지 않다. 또한 남성 배뇨장애 환자에게 전립선비대증 뿐만 아니라 DU가 동반된 경우를 종종 볼 수 있는데, 이는 전립선비대증의 수술적 치료 후에도 배뇨증상 개선효과 감소의 원인이 되기도 한다. 따라서 전립선비대증 환자에서 숲 전 DU의 진단은 필수적이며, 이에 대한 몇 가지 진단 지표가 개발되어 있다. 본 연구에서는 각각의 진단 지표에 따라 분류된 환자를 대상으로 전립선절제술 시행 후 배뇨증상 개선 여부에 따른 진단지표의 효용성에 대해 분석하고자 하였다.

대상 및 방법: 2013년 1월부터 2016년 12월까지 홀뮴레이저를 이용한 전립선절제술(HoLEP)을 시행받은 환자 중 숲 전 요육동력검사를 시행하고 숲 후 3개월 이상 추적 관찰을 시행한 환자를 대상으로 하였다. DU 진단기준은 bladder contractility index (BCI), Abrams–Griffith (AG) number, pdetQmax<30 및 bladder voiding efficiency (BVE)<90% criteria를 활용하였다. 숲 전 요육동력검사를 토대로 각 진단기준에 따라 전체 환자를 대조군과 DU군으로 분류한 후 수술 전 후 국제 전립선증상 점수 (IPSS) 및 요속검사를 이용하여 배뇨증상 개선 정도를 비교하였다.

결과: 전체 93명의 환자가 본 연구에 포함되었으며, BCI, AG number, pdetQmax<30 및 BVE<90% criteria에 따른 DU의 유병률은 각각 31.2(29/93), 12.9 (12/93), 11.8 (11/93), 및 9.7 (9/93)%였다. 각각의 지표에 따른 분류에서 숲 후 총 IPSS, IPSS-storage, 삶의 질 점수, 최대 요속 및 잔뇨량의 개선 정도는 모든 분류에서 두 군 간에 유의한 차이가 없으나, BVE<90% criteria에 따른 분류에서는 DU군이 대조군에 비해 숲 후 IPSS-voiding 점수 개선 정도가 유의하게 낮았 다(5.0 vs 10.3, p=0.018).

결론: DU를 동반한 전립선비대증 환자에서도 HoLEP은 숲 후 유의한 배뇨증상 개선 효과가 있을 것으로 보이나, BVE<90 criteria에 따라 DU로 분류된 환자들은 배뇨증상 개선 효과가 낮을 것으로 예상된다.

Keywords: BPH, Prostate enucleation, Urodynamic study
LUTS/BPH환자의 HoLEP수술 후 골반통의 호전: 전향적 연구

윤민영, 김병수, 오승준
서울대학교병원 비뇨기과학교실

목적: LUTS/BPH에서 불특정한 genitourinary discomfort or pain (GUDP)이나 골반통이 흔히 동반된다. 이전에 저자들의 제한된 연구에 의하면 GUDP가 HoLEP 수술 후 호전되었다는 것을 알 수 있었다. 이에 우리는 이러한 결과가 일반화될 수 있는지 좀 더 많은 환자들을 대상으로 알아보고자 하였다.

대상 및 방법: 2012년 5월부터 2016년 4월까지 HoLEP 수술을 받은 45세 이상 LUTS/BPH 환자를 대상으로 하였다. 악성 종양이나 감염, 외상, 비뇨생식기 수술, 신경인성 방광, 요도의 장애가 있는 환자들은 모두 제외하였으며 모든 환자들은 자세한 병력청취와 신체검사, IPSS, PSA, 요류검사, 경직장초음파검사, 요역동학검사를 시행하였다. 10점 만점의 visual analogue scale로 표시된 통증 정도와 부위를 표기한 설문지를 수술전, 수술후 3, 6개월에 시행하였다. GUDP의 정도는 시계열로 통계분석하였고 GUDP와 다른 임상 척도들간의 관계도 분석하였다.

결과: 전체 619명의 환자의 평균나이는 69.1세(±6.9, SD)였고 그 중 수상 GUDP가 있는 환자는 217명(35.1%)이었다. 수상 IPSS score와 IPSS QoL score를 제외하고는 GUDP군과 아닌 군 사이의 의미 있는 차이가 없었다(p<0.05). 주요한 통증 부위는 음경원위부가 67명(54.0%), 차골상부 47명(37.9%), 회음부 7명(5.6%), 왼쪽 2명(1.6%), 기타부위 1명(0.8%) 순이었다. 통증 정도는 중등도가 가장 많았다. IPSS score, Qmax, PVR volume을 포함한 모든 척도들이 HoLEP 후 의미있게 호전되었다(Table). GUDP를 호소하던 환자가 수술 3개월째 67명, 6개월째 37명으로 극적으로 줄어드는 양상을 보였다. GUDP 통증 정도도 의미있게 감소되었다(p<0.001). 그러나 수술 6개월 후 17명(2.7%) 환자들은 de novo GUDP가 발생되었다. 단변량 분석에서 기저 IPSS score만이 기저 GUDP와 유의하게 관련되어 있었다(OR 1.96; 95% Cl 1.55–2.48 in IPSS total score). BOO index는 GUDP와 관련이 없었다.

결론: 우리 연구는 GUDP가 LUTS/BPH 환자들의 LUTS와 밀접한 관계가 있다는 것을 보여주었다. GUDP가 있는 대부분의 환자에서 HoLEP 수술 후 호전양상을 보여주었다. 우리 결과는 LUTS/BPH가 있는 환자들의 막연한 골반통에 대한 수술 전 상담에 유용한 자료가 될 것으로 생각한다.

Keywords: LUTS/BPH, HoLEP, Pelvic pain

### Table 1. Change of IPSS and non-specific genitourinary pain after HoLEP

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Preop. (N=139)</th>
<th>Postop. 1 mo. (N=157)</th>
<th>Postop. 6 mo. (N=134)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPSS</td>
<td>7.24(3.8)</td>
<td>4.1(2.4)</td>
<td>2.4(1.3)</td>
<td>0.001</td>
</tr>
<tr>
<td>Storage symptom score</td>
<td>1.13(0.6)</td>
<td>0.88(0.3)</td>
<td>0.60(0.3)</td>
<td>0.001</td>
</tr>
<tr>
<td>Total score</td>
<td>2.1(1.2)</td>
<td>1.1(0.7)</td>
<td>0.59(0.3)</td>
<td>0.001</td>
</tr>
<tr>
<td>Quality of life score</td>
<td>3.2(0.4)</td>
<td>3.2(0.2)</td>
<td>3.2(0.2)</td>
<td>0.001</td>
</tr>
<tr>
<td>Unsymptometry Maximum flow rate (ml/sec)</td>
<td>23.2±13.4</td>
<td>25.3±10.4</td>
<td>0.001</td>
<td></td>
</tr>
<tr>
<td>Rest-void residual (ml)</td>
<td>95.9±52.9</td>
<td>61.1±31.3</td>
<td>94.1±31.3</td>
<td>0.001</td>
</tr>
<tr>
<td>Uroscopy score (Mean ± SD)</td>
<td>1.4±1.4</td>
<td>1.3±1.0</td>
<td>0.001</td>
<td></td>
</tr>
<tr>
<td>Mild pain (1-3, %)</td>
<td>78.0±10</td>
<td>82.1±09</td>
<td>27.0±05</td>
<td></td>
</tr>
<tr>
<td>Moderate pain (4, %)</td>
<td>19.7±06</td>
<td>16.9±06</td>
<td>27.0±05</td>
<td></td>
</tr>
<tr>
<td>Severe pain (5, %)</td>
<td>2.2±07</td>
<td>3.7±05</td>
<td>0.001</td>
<td></td>
</tr>
<tr>
<td>Total pain score (0-15, %)</td>
<td>47.7±08</td>
<td>33.2±07</td>
<td>14.5±08</td>
<td></td>
</tr>
<tr>
<td>Back pain</td>
<td>0.0±00</td>
<td>0.0±00</td>
<td>0.0±00</td>
<td></td>
</tr>
<tr>
<td>Numbness</td>
<td>0.0±00</td>
<td>0.0±00</td>
<td>0.0±00</td>
<td></td>
</tr>
<tr>
<td>Distant peris</td>
<td>70.0±40</td>
<td>27.5±14</td>
<td>9.3±06</td>
<td></td>
</tr>
<tr>
<td>Auras</td>
<td>0.0±00</td>
<td>0.0±00</td>
<td>0.0±00</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>20.0±00</td>
<td>15.0±00</td>
<td>12.0±00</td>
<td></td>
</tr>
</tbody>
</table>

*Results were shown as mean ± SD. *multiple sites included (repeated measures ANOVA).
요역동학검사 방광출구폐색 모호군으로 진단된 환자에서 홀뮴레이저를 이용한 전립선절제술 이후 증상 호전에 관한 예측 인자 분석

한지연, 이정우, 이승수, 이동훈, 남종길, 정재민, 박성우, 이상돈, 정문기
부산대학교 의과대학 양산부산대학교병원 비뇨기과학회실

목적: 하부요로증상을 호소하는 남성의 술 전 요역동학 검사에서 방광출구폐색(BOO)로 진단된 경우 전립선비대 수술 후 증상 호전을 기대할 수 있다. 그러나 전립선비대 소견은 있으나 요역동학검사에서 BOO 정도가 모호군으로 진단되는 경우 치료 결정에 어려움이 있다. 이에 저자들은 하부요로증상으로 홀뮴레이저를 이용한 전립선절제술(HoLEP) 시행 받은 환자들 중 술 전 요역동학 검사에서 BOO 모호군으로 진단된 환자들에서 술 후 증상 호전에 관한 예측 인자를 알아보고자 하였다.

대상 및 방법: 본원에서 2016년 3월부터 12월까지 본원에서 HoLEP 시행 받은 환자들 중 술 전 요역동학 검사에서 BOO 모호군으로 진단된 환자들을 의무기록을 바탕으로 후향적으로 분석하였다. 요역동학 검사에서 BOO 모호군은 방광출구폐색지수(PdetQmax–2*Qmax)가 20 이상 40 미만으로 정의하였으며 수술의 성공은 술 후 3개월째 전립선증상점수(IPSS)의 삶의 질 항목이 0 (만족)-2 (대체로 만족)점으로 정의하였다. 수술 성공군과 그렇지 않은 군의 환자들의 나이, 전립선 용적, IPSS, 요속검사, 배뇨 후 잔뇨 및 요역동학 검사 소견을 비교 분석하였으며 요역동학 검사에서 배뇨근저활동성(Wmax<7 W/m2 또는 방광수축력지수(PdetQmax+5*Qmax)<100) 여부를 비교 분석하였다.

결과: 대상 환자들은 총 24명이었으며 환자의 평균 나이는 67.5±9.7세(51-88), 전립선 평균 용적은 42.7±21.4 (20-97.9) mg, IPSS 총합의 평균은 20.9±9.4 (6-32), 배뇨증상 항목 평균 점수는 12.7±6.5 (3-20)이었으며 요속검사에서 평균 최대 요속은 10.2±4.8 (4-15.8) ml/s이었다. 이중 16명(66.7%)에서 술 후 증상이 호전되었다. 술 후 증상이 호전된 군과 호전되지 않은 군간 간은 같다. 전립선 용적, IPSS, 배뇨증상 항목 점수, 요속검사에서의 최대 요속, 평균 요속, 배뇨 후 잔뇨 및 요역동학검사에서 최대 요속, 평균 요속, 배뇨 후 잔뇨, 최대 요속시 배뇨근 압력은 차이가 없었다. 배뇨근 저활동성 지표 중 Wmax ≥7 W/m2인 경우 수술 성공과 유의한 관련이 있었다(p<0.001)

결론: 하부요로증상으로 HoLEP 시행 받은 환자들 중 술 전 요역동학 검사에서 BOO 모호군에서 배뇨근수축력이 수술 성공과 유의한 관련이 있었다.

Keywords: Bladder outlet obstruction, Detrusor contractility, Urodynamics
술 전 급성 요폐가 홀뮴 레이저 전립선 절제술에 미치는 영향

정준세, 박지운, 배상락, 박봉희, 이용석, 강성학, 한창희
가톨릭대학교 의정부성모병원 비뇨기과학학교실

목적: 급성 요폐는 전립선 비대증 환자에서 수술적 치료를 고려하는 중요한 요인이 된다. 이러한 급성 요폐의 기량력이 홀뮴 레이저 전립선 절제술의 결과에 미치는 영향을 알아보기 하였다.

대상 및 방법: 2013년 3월부터 2017년 5월까지 전립선 비대증과 동반된 하부요로 증상으로 인하여 홀뮴 레이저 전립선 절제술을 시행받은 환자들을 대상으로 술 전 급성 요폐 기량력에 따른 술 전, 수술 중, 수술 후 변수들에 대하여 후향적으로 의무기록을 통하여 분석하였다. 모두 환자에서 기본적인 환자 정보 및 신체검사, 초음파 및 혈중 PSA 수치, 동반질환 여부, 술 전 및 술 후 요속검사 및 잔뇨량 측정, IPSS 설문지, 각종 수술 지표 등에 대하여 분석하였다.

결과: 전체 314명의 환자 중 술 후 경과관찰이 이루어지지 않았던 환자 17명을 제외하고, 297명에 대하여 분석하였다. 297명 중 급성 요폐의 기량력이 있었던 환자가 109명, 급성요폐가 없었던 환자가 188명이었다. 평균 연령 및 체질량 지수는 두 군간에 차이가 없었으며, prostate volume, PSA 등도 차이를 보이지 않았다. 술 전 요속 검사에서 배뇨량은 비요폐군에 비해 요폐군에서 유의하게 적은 것으로 확인되었으며(194.7 cc vs. 130.9, p=0.04), 및 잔뇨량은 유의하게 많았다(93 cc vs. 154.3 cc, p=0.016). 술 전 IPSS의 각 domain 점수 및 voiding, storage 증상 점수는 두 군간에 차이를 보이지 않았다. 수술 중 평균 에너지 사용량은 비요폐군에 비해 요폐군에서 유의하게 적은 것으로 확인되었으며(74.7J vs 122.5J, p=0.044). 술 후 1개월째 시행한 IPSS에서 요폐군이 비요폐군에 비해 배뇨관련 증상점수 및 총점, 저장증상점수 모두 낮은 것으로 확인되었으며, 술 후 요속검사 및 잔뇨량 등에서는 두 군간에 차이를 보이지 않았다.

결론: 급성 요폐 기량력이 있는 환자의 경우 수술 중 높은 에너지 사용량이 있으나, 술 후 증상 개선 효과가 기량력이 없는 환자에 비해 우수한 것으로 나타났다. 요폐 환자에서 술 후 보다 수술의 효과 및 만족도를 기대할 수 있어 수술을 권유함에 있어 용이함 등이 있을 것으로 사료된다.

Keywords: Acute urinary retention, BPH, HoLEP
A novel training model for laparoscopic ureteroureterostomy using urechis unicinctus

Yinan Zhang, Xunbo Jin
Minimally Invasive Urology Center, Shandong Provincial Hospital Affiliated to Shandong University, Jinan, China

Purpose: To create a model for laparoscopic ureteroureterostomy training using the urechis unicinctus. Within the laparoscopic training box, this model simulated the procedures of the laparoscopic ureteroureterostomy, which was also helpful for the improvement of laparoscopic suturing skills.

Materials and Methods: In this training model, urechis unicinctus were simulated the ureters. The preserved salted urechis unicinctus were ordered online, and could be well preserved in 75% alcohol in the -18°C refrigerator for 3 months. When using this model, the urechis unicinctus were soaked in the warm water for one minute. And then, the selected urechis unicinctus were positioned in the laparoscopic training box. The third step was to preform a laparoscopic ureteroureterostomy procedure. 3 urologists with laparoscopic procedure experiences were trained with this model. The procedure time was recorded and the quality of anastomosis was evaluated preliminarily.

Results: Each urologist performed 12 consecutive procedures within one month, and 36 cases were performed in total. The mean operative time were 25.1, 21.2, and 22.6 minutes, respectively. The operative time curve showed a clear decrease from the 3rd case, but varied from case to case since then. The anastomosis qualities were improved from the 4th to 6th cases. At the 12th case, all 3 urologists completed a qualified anastomosis with a mean time of 18.5 minutes, ranged from 17.1 to 19.4 minutes.

Conclusion: Laparoscopic ureteroureterostomy is a procedure required high laparoscopic suturing skills, which highly demanded sufficient training. This training model using the urechis unicinctus, is not only cost-effective with a good construct validity, but provides an easy-to-use method for the constant and repeatable training as well.

Figure 1. The operation time curve of 3 urologists trained by this training model.
I-002

Comparative analysis of early outcomes and QoL in the radical nephrectomy vs partial nephrectomy: a prospective cohort study

윤민영, 정창욱
서울대학교병원 비뇨기과학교실

목적: 신세포암 환자에서 근치적 신절제술과 부분 신절제술에 따른 초기 임상결과와 삶의 질을 전향적 코호트를 이용하여 비교하였다.

대상 및 방법: 2016년 3월부터 2016년 12월까지 서울대학교병원에서 수술한 전향적인 신세포암 환자 124명(근치적 신절제술 46명, 부분 신절제술 78명)의 SUPER–RCC–Nx 코호트에서 수술후 6개월 이상 외래 추적진료한 76명의 환자들을 대상으로 분석하였다.

결과: 전체 환자의 평균나이는 57.6±11.3세(SD)였고 체질량지수는 25.7±3.8 (SD) kg/m², 평균 종물 크기는 3.86±2.32 (SD) cm이었다. 종물 크기에 있어서는 근치적 신절제술의 경우 6.48±3.30 (SD) cm으로 부분 신절제술의 경우(3.36±1.70(SD) cm)보다 유의하게 컸다(p=0.008). Clinical T stage에서도 부분 신절제술의 경우 T1a (71.9%)가 가장 많았지만 근치적 신절제술의 경우는 T1b가 33.3%로 가장 많았다(p<0.001). 수술시간(p=0.642)과 추정출혈량(p=0.641), 재원기간(p=0.318), 수술후 Cr (p=0.159)은 유의한 차이가 없었으나 수술 후 혈색소 수치는 부분 신절제술의 경우 13.54±2.05 (SD)로 근치적 신절제술의 경우(12.11±1.89 (SD))보다 유의하게 높았다(p=0.028). 수술 후 1일째와 3일째 통증 VAS도 유의한 차이가 없었다(p=0.088). 삶의 질에서는 FSKI-15의 경우 일부 하위항목에서 수술 후 부분 신절제술에서 더 좋은 것으로 나타났다(p<0.016) (생활의 즐거운 정도와 식욕). 하지만 EQ-5D-5L에서는 두 수술간의 유의한 차이가 없었다.

결론: 근치적 신절제술과 부분 신절제술은 성비, 종물 크기, Clinical T stage, 수술 후 혈색소 수치, 부분 삶의 질 평가에서 유의한 차이가 있었으나 수술시간과 추정출혈량, 재원기간, 수술후 Cr, 대부분의 삶의 질 평가, 수술 후 1, 3일째 통증 VAS에서는 유의한 차이가 없었다. 이는 환자가 느끼는 삶의 질이나 솔후 통증은 두 수술 간에 큰 차이가 없다는 것임을 보여 줬다. 이후 장기적인 신기능 등을 포함한 경과관찰이 필요하다.

Keywords: RCC, Nephrectomy, QoL.
Long-term functional and oncological outcomes of robot-assisted versus open partial nephrectomy for treatment of totally endophytic renal tumors

Ahmed Elghiaty, Ali Abdel Raheem, Ki Don Chang, Mohamed Alenzi, Trung Van, Woong Kyu Han, Young Deuk Choi, Koon Ho Rha

Department of Urology and Urological Science Institute, Severance Hospital, Yonsei University College of Medicine

Purpose: Data about long-term outcome of totally endophytic renal tumors is lacking. Our aim was to report the long-term oncologic and functional outcomes of patients with endophytic masses following robot-assisted partial nephrectomy (RAPN) and open partial nephrectomy (OPN).

Methods: This is a retrospective analysis of 89 patients with totally endophytic renal tumors treated with RAPN (n=52) and OPN (n=37) in a tertiary center from 2005 to 2017. Longevity of follow-up was measured from date of operation until last clinical follow-up. Patient and tumor characteristics, operative, postoperative, functional, and oncological outcomes were compared between groups. Chronic kidney disease free survival (CKDFS) and cancer specific survival (CSS) were calculated and compared between groups using Kaplan Meier analysis.

Results: Apart from a higher prevalence of high complex tumors among RAPN cases (RAPN, 5.7% vs OPN, 21.4%; P=0.005), and lower median preoperative eGFR (RAPN, 86 vs OPN 96; p=0.032), the remaining demographic characteristics were similar between the groups. RAPN was associated with shorter WIT (24 min vs 30 min; p=0.002), and better trifecta achievement rate (% vs %; p=0.044) compared to OPN. There were no statistically significant differences among the groups in terms of local tumor recurrence (p=0.568) and distant metastasis (p=0.416). The 5-yr CKDFS was 96.2% vs 94.6% (log-rank, p=0.746), while CSS was 100% vs 97.1% (log-rank, p=0.236) when stratified by RAPN and OPN.

Conclusion: Despite the higher prevalence of high complex renal tumors and the lower renal function in the RAPN group, trifecta achievement was similar between OPN and RAPN technique, as well as, RAPN achieves 5 years equivalent long-term oncologic control and functional outcome in treatment of patients with totally endophytic renal tumors.

Keywords: Long-term outcomes, Partial nephrectomy, Endophytic tumors
Does lymph node dissection during robot-assisted radical prostatectomy affect urinary incontinence?

Ahmed Elghiaty, Ali Abdel Raheem, Ki Don Chang, Mohamed Alenzi, Trung Van, Won Sik Ham, Young Deuk Choi, Koon Ho Rha

Department of Urology and Urological Science Institute, Severance Hospital, Yonsei University College of Medicine

**Purpose:** To evaluate risk factors of urinary incontinence (UI) following robot-assisted radical prostatectomy (RARP) at high volume robotic center.

**Methods:** All patients with clinically localized PCa T3aN0M0 who underwent RARP in our urology department between 2005 and 2012 were analyzed. All surgeries were performed by single expert robotic surgeon. We included patients with minimum follow-up of 1 year, patients with incomplete data and those who receive early adjuvant and/or salvage therapy were excluded. UI was defined as (no pad or 1 safety pad usage), and was assessed for all patients at 1, 3, 6, and 12 months following surgery. Patients were classified into 2 groups according to continence function at 12 months (continent, n=723) and (incontinent, n=113). The primary endpoint was to compare clinical and pathological variables between the groups, while the secondary end point was to evaluate predictors of persistent UI at 1 year.

**Results:** Patients who were incontinent at 12 months had higher BMI>25 kg/m² (p=0.002), larger prostate volume (p=0.002), higher prevalence of adverse pathological features including Gleason’s score (p=0.008), ≥T3b (p<0.001), and pN+ve (p=0.005) compared to the continent patients. Regarding pelvic LND, the median LN yield was higher 23 vs 16 (p<0.001) and the prevalence of LN yield >30 LN retrieved 14.2% vs 4.1% (p<0.001). Multivariable logistic regression analysis showed that BMI>25 (OR: 2.756, p=0.004), ≥pT3b (OR: 1.947, p=0.009), and LN yield >30 (OR: 5.380, p=0.004) were the predictors of persistent UI at 12 months. Furthermore, multivariable analysis according to the LN region showed that resection of the common iliac LN was a predictor of persistent UI at 12 months (OR: 2.457, p<0.001).

**Conclusion:** Our study showed that LN yield >30 and resection of the common iliac LN are associated with higher incidence of UI at 12 months following RARP.

**Keywords:** Lymph node, Radical prostatectomy, Urinary incontinence
National practice patterns and direct medical costs for prostate cancer in Korea across a 10 year period: a nationwide population-based study using a national health insurance database

Jang Ho Won, Yoon Seo Jung, Jeon Jae Il, Choi Hoon, Kim Jae Hyun, Yoo Ho Sung, Hah Yoon Seok, Jo In Chang, Kim Hyung Jo, Jeong Hyun, Go Jun Seong, Kim Jin Woo, Bae Jong Hyuk, Kim Soong, Yi Ji Yeul

1 Chungbuk National University Hospital, College of Medicine, 2 Jeju National University Hospital, 3 Gyeongsang National University Hospital, 4 Soonchunhyang National University Hospital, 5 Pusan National University, 6 Kyungpook National University Hospital, 7 Inha University, 8 Keimyung University Hospital, 9 Catholic University Ansan St. Mary’s Hospital, 10 Catholic University Bucheon St. Mary’s Hospital, 11 Catholic University Chungbuk St. Mary’s Hospital, 12 Catholic University Seoul St. Mary’s Hospital

Purpose: A complete enumeration study was conducted to evaluate trends in national practice patterns and direct medical costs for PCa in Korea over a 10–year retrospective period using data from the Korean National Health Insurance System (KNHI).

Materials and Methods: Reimbursement records for 874,924 patients diagnosed between 2002 and 2014 with primary PCa according to the International Classification of Disease (ICD) 10th revision code C61 were accessed. To assess direct medical costs for patients newly diagnosed after 2005, data from 68,596 patients managed between January 2005 and 31 December 2014 were evaluated.

Results: From 2005 to 2014, the total number of PCa patients showed a 3–fold increase. The rate of radical prostatectomy (RP) and androgen deprivation therapy (ADT) remained unchanged at 40% each, RP monotherapy increased from 23.5% in 2005 to 39.4% in 2014. From 2008, the rate of robot-assisted RP rose sharply, showing a similar rate to open RP in 2014. Average total treatment costs in US dollars in the 12 months post–diagnosis were around $8330. Average annual treatment costs thereafter were around $4000. Out-of-pocket expenditure was highest in the first year post–diagnosis (16.1% in 2005 and 22.1% in 2014), and ranged from 12% to 16% thereafter.

Conclusion: Between 2005 and 2014, a substantial change was observed in the national practice pattern for PCa in Korea. While total treatment costs and out–of–pocket expenditure in the first year after diagnosis showed a slight increase, average treatment costs remained stable thereafter.

Keywords: Prostatic neoplasms, Prostatectomy, Radiotherapy, Costs, National health insurance

Table 1. Trends in demographics, national practice patterns, and direct medical costs for prostate cancer in Korea from 2005 to 2014.

- SD, standard deviation; RP, radical prostatectomy; RARP, robotic-assisted laparoscopic radical prostatectomy; ADT, androgen deprivation therapy; LH, luteinizing hormone-releasing hormone; MAB, maximal androgen blockade; RT, radiotherapy; BCR, Korean word.
Percutaneous nephrolithotomy versus ureteroscopic lithotripsy for the management of impacted, proximal ureteral stones: multi-center prospective randomized controlled trials

Yan Song
ShengJing Hospital of China Medical University

Objective: To investigate the difference and relative advantages between percutaneous nephrolithotomy (PCNL) and ureteroscopic lithotripsy (URSL) for the treatment of large, impacted, proximal ureteral stones.

Methods: Patients with single large, impacted, proximal ureteral stones greater than 1.5 cm in diameter were included in this randomized controlled trial, conducted between August 2015 and December 2017. Eligible patients were randomized into two groups, based on whether they received PCNL or URSL. Demographic and perioperative data, complication rate, stone free rate, cost, and hospital stay were evaluated.

Results: 167 patients (83 in the PCNL group, 84 in the URSL group) were included in this study. No significant difference was detected between two groups concerning the baseline characteristics (age, sex, body mass index, side, et al.). Total operative time was significantly shorter in the PCNL group (65.60±23.07 min vs. 73.64±22.18 min, p=0.031) and the one-step stone free rate was significantly higher (p=0.007) in the PCNL group compared to URSL group (92.88% vs 68.82%). After the ancillary treatments, the final SFR at 3 months was 98.97% in PCNL group and 85.18% in URSL group (p=0.038). Postoperative hospital stay was longer in the PCNL group (5.2±1.1 and 3.8±0.8 days, P<.001), Overall, complication rate is low in both groups and no statistical difference was found in regards to the clinical complications between the two groups (p=0.609). The mean cost of URSL group was significantly higher than that of the PCNL group (US $4936.32±$1070.07 vs. US $4518.13±$880.44, p=0.018).

Conclusions: Both PCNL and URSL are effective and safe surgical options for patients with single large proximal ureter stone. PCNL is a more effective method with a shorter operative time, higher stone free rate compared with URSL. Both techniques are comparable with regards to complication; although URSL had the advantages of shorter postoperative hospital stays the cost is higher with URSL. We suggest that only after discussing and understanding the stone-free success rate, cost-effectiveness, and postoperative complications of these two different treatments with the patients, could we choose the optimal therapeutic modality for large, impacted, proximal ureteral stones.
Low hertz holmium laser enucleation of the prostate

한병규1, 문기혁1, 정해원1, 한준현2, 장현석1
1대한비뇨기과학회 장비연구회, 2한림대학교 의과대학 비뇨기과학회

목적: 기술의 발전으로 많은 의료장비들이 개발되어 다양한 임상 분야에서 이용되고 있다. 이에 대한비뇨기과학회에서는 장비들의 효과적인 이용 및 새로운 임상 적용 분야 개발을 위해 장비연구회를 조직하여 활동 중이다. 그 일환으로 국내 기술로 제작한 방출증 치료를 위해 개발된 낮은 출력(10 Hz–3.0 J, 30 watt)의 홀뮴레이저를 이용한 전립선 적출술(HoLEP)의 시행 가능성을 알아보고자 본 연구를 진행하였다.

대상 및 방법: 2017년 4월 11일부터 6월 17일까지 저자들이 집도한 HoLEP수술 환자를 대상으로하였다. 기존의 고출력 장비인 VersaPulse PowerSuite 100 W (Lumenis Inc. USA)와 저출력 장비인 Holinwon 30 (Wontech. Korea)을 이용하여, 통상적인 50 Hz–2.0 J, 100 watt를 이용한 군(50 Hz Group, n=22)과 10 Hz–2.0 J, 20 watt를 이용한 군(10 Hz Group, n=23)으로 구분하여 수술과 관련된 인자들을 비교하였다.

결과: 모든 환자에서 수술은 정상적으로 완료하였고, 수술 중 홀뮴레이저 장비를 교체한 경우는 없었다. 50 Hz Group과 10 Hz Group의 평균 나이는 각각 69.3±7.1세, 68.1±9.1세(p=0.252)였고, 평균 전립선 크기는 각각 52.4±29.2 g, 57.5±31.1 g (p=0.873), 평균 이행대 용적은 각각 27.2±24.7 g, 30.9±25.3 g (p=0.18), 평균 혈중 PSA는 각각 3.8±4.7 ng/ml, 3.3±2.9 ng/ml (p=0.407)였다. 수술 시작부터 Morcellation 전까지 시간(enucleation time)은 50 Hz Group이 평균 38.2±18.0분, 10 Hz Group이 57.2±35.7분으로 유의한 차이(p=0.006)를 보였다. 50 Hz Group과 10 Hz Group의 적출된 선종의 평균 무게는 각각 23.5±21.5 g, 27.5±23.1 g (p=0.749), 수술 전과 비교한 수술 후 1일째 혈색소의 감소 수치(Hb. loss)는 각각 0.9±0.52 g/dL, 0.8±0.67 g/dL (p=0.658)로 유의한 차이를 보이지 않았다. 수술 후 회복기간 동안 지연출혈로 clot retention이 있었던 경우는 50Hz Group에서 1례 발생하였다.

결론: 10 Hz–2.0 J, 20 watt의 낮은 출력의 홀뮴레이저를 사용하여도 전립선 선종을 분리하고 충분한 지혈효과를 얻을 수 있었다. 다만, 기존의 고출력장비에 비해 적출시간이 오래 필요할 만큼, 사전에 환자 선택에 신중해야 할 것으로 판단된다. 또한 처음 HoLEP 술기를 시작하는 술자들에게 있어 낮은 출력의 장비가 학습 곡선에 미치는 영향에 관한 추가적인 연구가 필요할 것으로 생각된다.

Keywords: Low hertz, HoLEP, BPH
Could MOTILIPERM improve on acute use of finasteride induced infertility?

Keshab Kumar Karna¹, Kiran Kumar Soni¹, Bo Ram Choi¹, Hye Kyung Kim², Yu Seob Shin¹, Jong Kwan Park¹

¹전북대학교병원, ²경성대학교 약학대학

The aim of the study was to evaluate spermatogenesis injury in rats exposed to finasteride for 56 days and the efficacy of the novel compound MOTILIPERM in regulating infertility. Sixty Sprague-Dawley (SD) rats were divided into the following six groups: CTR (control), M 100 (MOTILIPERM 100 mg kg⁻¹), M 200 (MOTILIPERM 200 mg kg⁻¹), F (finasteride 1 mg kg⁻¹), F + M 100 (finasteride 1 mg kg⁻¹ + MOTILIPERM 100 mg kg⁻¹) and F + M 200 (finasteride 1 mg kg⁻¹ + MOTILIPERM 200 mg kg⁻¹). The rats were treated orally with 100 and 200 mg kg⁻¹ MOTILIPERM alone or in combination with finasteride 1 mg kg⁻¹ once daily for 56 days. There were no significant effect on body weight, testis weight, epididymis weight, testicular or epididymal sperm counts and sperm motility. Johnsen score and spermatogenic cell density were significantly improved in MOTILIPERM treated group compared to finasteride group (p<0.05). Testicular MDA level was deceased in MOTILIPERM treated group compared to finasteride treated group. Serum testosterone and DHT level were increased significantly in MOTILIPERM treated group (p<0.05). Endoplasmic reticulum (ER) stress and apoptotic activity were not significant in finasteride group compared to control. However, improvement had been observed in MOTILIPERM treated group. These results showed that finasteride group displayed no significant effect in spermatogenesis. Moreover, the present finding support MOTILIPERM may improve hormonal imbalance and prevent ER stress in testis.

Keywords: Finasteride, Infertility, MOTILIPERM
I-009

Analysis of gene expression characteristics of enzalutamide resistant castration-resistant prostate cancer cells by using RNA sequencing technology

강민용, 성현환, 정병창, 서성일, 이현무, 최한용, 전성수
성균관대학교 의과대학 삼성서울병원

목적: 차세대 남성호르몬 차단약제인 엔잘루타마이드(enzalutamide) 저항성 거세저항성 전립선암(castration-resistant prostate cancer) 세포에서 약제 저항성의 분자 기전 및 치료 표적 유전자 발굴을 위하여 차세대 염기서열분석법을 이용한 유전자 발현 패턴 분석 및 스크리닝을 수행하고자 하였다.

대상 및 방법: Enzalutamide 저항성의 CRPC 세포주 제작을 위하여 LNCaP 세포주에서 기원한 C4-2B 세포주를 사용하였 다. 세포 생존 및 성장에 대한 분석을 위하여 CCK-9 assay를 이용한 cell viability 분석 및 clonogenic assay를 수행하였 다. 유전자 발현양에 대한 진단 및 병력 수준에서의 분석을 위해 real-time quantitative PCR 및 western blot analysis를 수행하였다. Enzalutamide 저항성 CRPC 세포주(C4-2B EnzR)의 유전자 발현 패턴을 위하여 차세대 염기서열분석법에 기반한 QuantSeq 3’ mRNA sequencing 기법을 이용하였다. 생물학적 3반복 실험을 수행하였고, 유전자 발현의 fold change 값이 2배 이상이며 p-value가 0.05 미만인 경우 통계적으로 유의한 변화로 정의하였다.

결과: Enzalutamide 저항성 CRPC 세포(C4-2B EnzR)와 대조군인 C4-2B 세포에 Enzalutamide를 1, 5, 10 μM의 Enzalutamide를 처리하였고, C4-2B EnzR 세포가 C4-2B 세포에 비해 모든 약제 처리 농도에서 세포 생존률이 높은 것으로 나타났다. Clonogenic assay에서도 10, 20 μM 처리 군에서 C4-2B EnzR 세포는 군집이 형성된 반면, 대조군에서는 군집 형성이 관찰되지 않았다. AR 활성화 유도체인 DHT를 처리하였을 때, 남성 호르몬(androgen receptor, AR)의 표적 유전자인 KLK2, KLK3 및 TMPRSS의 발현양을 비교한 결과 Enzalutamide 처리 여부에 관계없이 C4-2B EnzR 세포에서 AR 표적유전자들이 유의하게 상승한 것을 관찰하였다. 또한, Enzalutamide 저항성 세포에서 AR-V7의 발현이 상승한 것을 real time-PCR 및 western blot 분석에서 확인하였다. Enzalutamide 저항성 CRPC 세포주와 대조군 세포주에 대해 QuantSeq 3’ mRNA sequencing을 수행한 결과, C4-2B EnzR 세포주에서 총 590개의 유전자와 DEG (differential expression gene)로 추출되었고, 367개의 유전자와 발현이 상승, 223개의 유전자와 발현이 감소한 것을 확인하였다. DAVID에 기반한 분석 결과 발현이 상승한 군에서는 positive regulation of vascular endothelial growth factor production, 발현이 저하된 군에서는 cell division이 가장 순위가 높은 유전자 온톨로지(ontology)로 나타났다.

결론: 본 연구에서는 enzalutamide 저항성의 CRPC 세포주를 안정적으로 제작하였으며, 표현형 및 유전자 수준에서 enzalutamide 저항성 여부를 확인하였다. RNA sequencing 기법을 통해 유전자 발현 특성을 분석하였으며, 스크리닝을 통해 핵심 표적 유전자들을 선별적으로 가려낼 수 있었다.

Keywords: Castration-resistant prostate cancer, Enzalutamide resistant, RNA sequencing
I-010

A novel nomogram for predicting high grade prostate cancer after initial negative results

Gang Song
Department of Urology, Peking University First Hospital, Institute of Urology, Peking University, National Urological Cancer Center of China, Beijing, China

Objectives: To develop and internally validate nomograms based on multi-parametric magnetic resonance imaging (mpMRI) to predict prostate cancer (PCa) and high-grade prostate cancer (HGPCa) in patients with a previous negative prostate biopsy.

Patients and Methods: The clinical and pathological data of 231 patients who underwent repeat prostate biopsy and mpMRI were reviewed. Based on Prostate Imaging and Reporting Data System (PI-RADS) version 2 scoring, the mpMRI results were assigned a PI-RADS grade from 0–2. Two logistic regression nomograms for predicting the probabilities of PCa and HGPCa were constructed. The performances of the nomograms were assessed using area under the receiver operating characteristic curves (AUCs), calibrations and decision curve analysis.

Results: Of the total cohort of patients, on repeat biopsy PCa was detected in 75 (32.5%) and HGPCa was detected in 59 (25.5%). In multivariate logistic regression analysis, age, PSA, PV, DRE and mpMRI results were significant independent predictors of the diagnosis of PCa and the diagnosis of HGPCa (all P<0.05). Two mpMRI-based nomograms with super predictive accuracy were constructed (AUCs=0.878 and 0.927, both P<0.001), and both exhibited excellent calibration. Decision curve analysis also demonstrated a high net benefit across a wide range of probability thresholds.

Conclusion: mpMRI combined with age, PSA, PV and DRE can predict the probability of PCa and HGPCa in patients with negative initial biopsies. The two nomograms generated may aid the decision-making process in men with prior benign histology before the performance of repeat biopsy.
O-211

전립선 암 환자에서의 림프절 전이: 골반림프절 절제술 결과와 비교한 술 전 자기공명영상 활용한 탐지

황진호, 서영은, 유영동, 이영주, 김정준, 이학민, 오종진, 이상철, 정성진, 홍성규, 변석수, 이상은
분당서울대학교병원 비뇨기과학실

Aim: To evaluate the accuracy of preoperative magnetic resonance imaging (MRI) in patients who underwent pelvic lymph node dissection (PLND).

Methods: The data of 1528 patients who underwent radical prostatectomy and PLND from 2003 to 2017 in our institution were retrospectively reviewed. We evaluated the various clinicopathologic variables including preoperative MRI and pathologic lymph node metastasis. The prediction model for pathologic lymph node (LN) metastasis was assessed using univariate and multivariate logistic regression analyses and areas under receiver operating characteristic curves (AUCs).

Results: The median age of our cohort was 66.4±6.7 years. Positive preoperative MRI finding was observed in 9.4% (145/1528) of patients, 5.3% (81/1528) patients had confirmed final pathologic lymph node metastases. Sensitivity and specificity of preoperative MRI were 30.8% and 91.7%, respectively. Multivariate analysis showed that preoperative MRI findings and biopsy Gleason score were independent significant predictors for pathologic LN metastasis. Prediction model using preoperative MRI findings and NCCN risk stratification showed fair accuracy using ROC analysis (AUC=0.758) (Fig. 1).

Conclusion: Preoperative MRI findings for pathologic LN metastasis showed limited prediction value. A large-scale, multicenter, prospective study is needed to fully evaluate the clinical significance of preoperative MRI.

Keywords: Prostate, Cancer, MRI
Objective: Examined the ability of PSA nadir to predict biochemical recurrence after radical prostatectomy (RP) of prostate cancer.

Material and Method: From 1994 to 2012, 2434 men treated with RP were followed with PSA measurements at 3, 6 and 12 months, and every six months or every year thereafter. Excluding patients with adjuvant therapy or resection margin positive, 1728 (71%) patients underwent analysis and stratification by PSA nadir. Biochemical recurrence was defined as 2 consecutive increasing post-nadir PSA measurements of 0.2 ng/ml or greater.

Result: A 255 of 1728 men (14.8%) experienced biochemical recurrence with a mean time to recurrence of 33.8 months. Mean time to PSA nadir was 6.4 months. Biochemical recurrence rates in men with a PSA nadir of 0.01–0.02 (n=1438), 0.03–0.04 (n=173), 0.05–0.09 (n=80) and 0.1–0.19 ng/ml (n=37) were 8.8%, 28.9%, 56.3% and 91.9%, respectively. Men with a nadir of 0.01–0.02 ng/ml had a statistically significantly lower biochemical recurrence rate than men with a nadir of 0.03–0.04 (p<0.01), 0.05–0.09 (p<0.01) or 0.10–0.19 ng/ml (p<0.01) on Kaplan-Meir survival analysis. Multivariate logistic regression analysis showed that a nadir of 0.03–0.04 (HR 4.49, p<0.01), 0.05–0.09 (HR 11.49, p<0.01) and 0.10–0.19 ng/ml (HR 45.26, p<0.01) independently predicted an increased risk of biochemical recurrence compared to a nadir of 0.01–0.02 ng/ml.

Conclusion: PSA nadir group predicts the risk of biochemical recurrence following RP. Higher nadir points may identify candidates for early adjuvant or salvage therapies.

Keywords: PSA nadir, Biochemical recurrence, Radical prostatectomy
전립선 수술을 시행한 positive surgical margin 환자들에서 생화학적 재발인자로서의 cribiform pattern

구자율
부산대학교 의과대학 비뇨기과학교실

Objective: To investigate the relationship between cribiform pattern and biochemical recurrence of positive surgical margin patients.

Methods: This study was based on 817 radical prostatectomy specimens (margin positive status: 165) collected at our center, from 2003 to 2016. We compared and analyzed age, body mass index, preoperative prostate–specific antigen (PSA) and Gleason score (GS), OP methods, postoperative GS, pathology T stage, pathology tumor percentage, lymphatic invasion status and perineural invasion status, nadir PSA, positive margin area and length, cribiform pattern status, positive margin GS associated with biochemical recurrence (BCR).

Results: Overall, 19% (31/166) of margin positive patients were identified as cribiform pattern (CP). In Cox regression model, preoperative PSA, postoperative GS, pathology tumor percentage, positive margin area and length, the presence of the CP were predictive factors of BCR, respectively (P=0.048, 0.022, <0.001, 0.009, 0.002, 0.037) (Table 1). Moreover, We observed BCR two times more frequently in patients with the CP than in those without the CP (p=0.005) (Figure 1).

Conclusion: We suggest that the cribiform pattern has highly value in predicting BCR in positive surgical margin patients.

Keywords: Cribriform, Oncology outcome, BCR

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<th>Factors</th>
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Positive Surgical Margin Patients

![Positive Surgical Margin Patients](image-url)
Adverse features and biochemical recurrence free survival in men with high-risk prostate cancer

Jung Woo Lee, Dong Hoon Lee, Jong Kil Nam, Moon Kee Chung, Sung Woo Park
Department of Urology, Pusan National University Yangsan Hospital

Objectives: To assess biochemical recurrence free survival (BCRFS) in prostate cancer (PCa) patients following radical prostatectomy (RP) through a combination of pathological adverse features (AF).

Methods: Using a prospectively collected institutional registry, we identified patients with high-risk PCa who underwent RP between 2009 and 2016. Patients treated with neoadjuvant therapy and those lacking clinical, pathological, and follow up data were excluded. The final population consisted of 252 patients with at least one AF: preoperative PSA≥20 ng/mL, pathologic Gleason score≥8 and no organ-confined disease at final pathology (seminal vesicle involvement, and/or extracapsular extension, and/or lymph node invasion). Kaplan-Meier analyses were used to assess BCRFS rates by stratifying patients into 3 risk categories according to the number of AFs (namely, 1, 2, and 3 AFs). Multivariable competing risk Cox regression analyses were used to assess BCRFS.

Results: Overall, 127 (50.4%) men had 1 AF, 81 (32.1%) had 2 AFs and 44 had 3 AFs (17.5%). The median follow up duration was 30 months (IQR 19, 45). Men with 1 AF had higher BCRFS estimates compared to those with 2 and 3 AFs (71.0% vs. 32.3% vs. 13.4% at 3 years’ follow-up, p<0.001 – Figure). At multivariate competing risk Cox regression analyses, the presence of 3 AFs (HR 9.8, p<0.001), 2 AFs (HR 3.1, p<0.001), adjuvant radiation plus androgen deprivation therapy (HR 0.65, p=0.007) were independent predictors of BCRFS.

Conclusions: The risk group stratification according to the number of AFs was fairly simple, however, it could help physicians to accurately predict oncologic outcomes. The patient with high-risk PCa could have a relatively good prognosis if he had only one AF.

Keywords: Prostate, Cancer, Survival
Purpose: We aimed to analyze the clinical characteristics of delayed biochemical recurrence (BCR) after RP. We examined radiographic progression and cancer-specific survival according to timing of the BCR.

Materials and Methods: From March 1998 to December 2015, a total of 2398 patients who underwent RP were evaluated. BCR, radiographic progression, and cancer-specific deaths of all patients were investigated. Patients receiving adjuvant therapy were excluded from this study. Radiographic progression was assessed at regular intervals following RP including prostate-specific antigen test, radionuclide bone scan, abdominopelvic CT. Early, mid, and late BCR was defined as two consecutive rising PSA levels ≥0.2 ng/ml after RP at <2, 2-5, and ≥5 years, respectively.

Results: Overall 5-year and 10-year BCR-free survival rates were 75.3% and 60.9%. Overall 5-year and 10-year radiographic progression-free survival rates were 95.8% and 85.5%. Of the 559 patients with BCR, early, mid, and late BCR occurred in 322 (57.6%), 161 (28.8%), and 76 (13.6%) patients. In patients with radiographic progression, distant metastasis was observed 84.9%, 64.3%, and 37.5% in early, mid, and late BCR group, while local recurrence was 15.1%, 35.7%, and 62.5%, respectively. From the BCR, 5-year radiographic progression-free survival rates were 66.0% in early, 76.0% in mid, and 81.2% in late BCR group, respectively (p=0.020). From the BCR, 5-year distant metastasis-free survival rates were 70.7% in early, 84.2% in mid, and 96.3% in late BCR group, respectively (p<0.001). From the BCR, 10-year cancer-specific survival rates in early, mid, and late BCR group were 71.0%, 88.5%, and 100%, respectively (p<0.001).

Conclusions: The later BCR occurs after RP, the lower the risk of radiographic progression and cancer-specific death. However, radiographic progression can occur in patients with BCR ≥5 years after RP. Careful clinical evaluation should be performed even in patients with late BCR.

Keywords: Prostatic neoplasms, Prostatectomy, Recurrence
Purpose: There has been a debate on the superiority of adjuvant radiotherapy over early salvage radiotherapy (RT) after radical prostatectomy (RP) for prostate cancer. We compared the oncologic outcomes among the adjuvant RT, early salvage RT and delayed salvage RT groups.

Materials and Methods: Data from 1,193 patients who underwent RT after RP at five tertiary referral centers in 1998–2016 were collected. Early salvage RT was defined as administration of RT after biochemical recurrence (BCR; PSA range at commencement of RT; 0.2–0.5 ng/mL) without evidence metastatic disease. Delayed salvage RT was defined as commencement of RT when PSA was greater than 0.5 ng/mL.

Results: After excluding 425 patients (35.6%) due to history of other malignancy, neoadjuvant hormone therapy, node positive diseases, persistent PSA following RP, incomplete data and lost to follow-up, 768 patients were included in this study. Adjuvant RT, early salvage RT and delayed salvage RT were given in 98 patients (12.8%), in 411 (53.5%) and 259 patients (33.7%), respectively. During median 83.1 months of follow-up after RP, 232 patients (30.2%) experienced the BCR, and 89 (11.6%) had radiographic progression. Patients in adjuvant RT group tended to have greater preoperative PSA, higher pathologic T stage, and more frequent positive surgical margins, than those in early or delayed salvage RT groups. After controlling PSA, surgical Gleason score, pathologic T stage, percentage of tumor volume, positive surgical margin, and administration of concomitant ADT using propensity scored matching, three group showed similar 7-year BCR-free survivals (52.5 vs. 65.5 vs. 56.9, p=0.443) and 7-year radiographic progression-free survivals (83.6 vs. 83.1 vs. 86.8%, p=0.835) from the RP. Of the delay salvage RT group, patients who received RT when PSA was greater than 1.0 ng/mL demonstrated poorer BCR-free (7-year rates: 66.4 vs. 35.3%, p=0.052) and radiographic progression–free survivals (90.9 vs. 76.7%, p=0.188) than patient who started the RT when PSA was between 0.5 and 1.0 ng/mL without statistical significance.

Conclusions: There was no significant difference in the survival outcomes from the date of prostatectomy, among the adjuvant, early salvage, and delayed salvage RT groups. However, we believe that the salvage RT should be commenced before the PSA level rises to 1.0 ng/mL.

Keywords: Prostate cancer, Radiotherapy, Oncological outcome
전립선암 희귀 변이에 대한 연구

오종진①, Manu Shivakumar②, Jason Miller②, Shefali Verma②, 이학민①, 훈성규①, 이상은①, 김도균②,3, 변석수①

①서울대학교 의과대학 분당서울병원 비뇨기과학회실, ②Biomedical & Translational Informatics Institute, Geisinger Health System, Danville, Pennsylvania, USAB, ③The Huck Institutes of the Life Sciences, Pennsylvania State University, University Park, Pennsylvania, USA

Introduction: We investigate prostate cancer related rare variants among 985 prostate cancer patients and 6,273 normal population.

Material and Methods: We prospectively recruited 985 prostate cancer patients from single tertiary hospital and conducted a case–control study including 6,273 controls from the Korean Association Resource (KARE) study as part of the Korean Genome and Epidemiology study (KoGES). All included subjects were analyzed using using the HumanExome BeadChip 12v1–1 system (Illumina, Inc.; San Diego, CA), which includes 213,099 probes focused on protein–altering variants (nonsynonymous, stop and splice) selected from exome and whole–genome sequences. The rare variants analysis using variants with low minor allele frequency (<5%) was conducted to find prostate cancer association.

Results: The rare variants were fist collapsed into gene bins and intergenic region bins and applied a dispersion test using SKAT to identify rare variants on 34 genes associated with prostate cancer in the Korean population (Figure 1 & Table 1). Finally, in a separate analysis, rare variants were binned into their respective pathways. Many significant genes and marginally significant pathways were identified, some of which have been already implicated in Prostate cancer.

Conclusions: Taken together, our findings suggest that identified rare variants may play a crucial role as prostate cancer susceptibility genes in the Korean population.

Keywords: Prostate, Prostate cancer, Rare variants
근치적 전립선 적출술을 시행받는 환자의 불안, 우울에 관한 분석: 다기관, 전향적 연구

조희주1, 김상진2, 문경태1, 조정만1, 류재현2, 김윤범2, 정태영2, 고우진3, 유탁근1,김덕윤4

1울산지병원, 2중앙보훈병원, 3국립암센터, 4대구가톨릭대학교병원

목적: 전립선암을 진단받고 근치적 전립선 적출술을 시행받는 환자가 수술 전 후에 느끼는 불안, 우울함의 정도를 분석한다.

대상 및 방법: 2016년 11월부터 2017년 4월까지 전립선암을 진단받고 근치적 전립선 적출술을 시행한 환자 중 수술 전 정신과적 질환 없이 수술 전, 수술 1개월 후 디스트레스 운도계(DT), Hospital anxiety and depression scale (HADS), 심리증상평가지를 이용하여 불안과 우울의 정도를 정량적으로 분석하였다. 디스트레스 운도계는 환자의 스트레스 정도를 0에서 10까지 표시하며 4이상인 경우 유의한 스트레스로 판단한다. HADS는 불안과 우울항목(subscale)으로 구성되어 각각의 subscale이 7점 이상인 경우의 유의함으로 판정한다. 심리증상평가지는 불면, 불안, 우울의 정도를 정량화하며 이러한 증상에 대해 환자 스스로 “전문 의료진의 도움을 원하는가?”라는 질문을 포함한다.

결과: 총 3개의 기관에서 48명의 환자가 연구에 참여하였다. 수술 전 DT의 평균은 3.96±2.57였으며 임상적으로 유의한 환자(DT≥4)는 27명(56.3%)이었다. HADS의 평균값은 11.4±7.3였으며 임상적으로 유의한 불안(anxiety subscale ≥8) 혹은 우울함의 정도는 각각 22명(45.8%), 5명(10.4%)으로 유의하게 감소하였다.(p<0.05). 심리증상평가지에서 수술 전 불면, 불안, 우울증상으로 나타난 사례는 총 9명에서 각각 7건, 9건, 7건이었으며 전립선암 수술 후 17명의 환자가 불면, 불안, 우울에 대해 전문의료진의 도움을 원한다고 답하였다. 수술 후 유의하게 이러한 증상의 호소가 감소하였으나(8명의 환자, 불면 5건, 불안 4건, 우울 4건) 12명의 환자가 여전히 전문의료진의 도움이 필요하다고 답하였다.

결론: 근치적 전립선 적출술 시행 전후 많은 환자들이 임상적으로 유의한 수준의 스트레스, 불안, 우울, 불면증을 호소하였으며 전문의료진의 도움을 원하였다. 전립선암 수술 전후 환자의 정서상태에 대한 적극적인 검사와 지지 치료가 필요하다고 생각된다.

Keywords: 전립선암, 우울, 불안
Health-related quality of life (HRQoL), perceived social support, and depression in disease-free survivors of surgically treated prostate, kidney and bladder cancer

Sihyun B1, Parkhyun S1, Sin Dong-woon2, Lee-heung3, Joon-su4, Kang Seok-ho4, Park Sung-cheol5, Park Jong-hyeok6, Park Jin-seung1

1 Eulji University Hospital, 2 Sogang University College of Medicine Seoul St. Vincent’s Hospital, 3 Kyung Hee University Hospital, 4 Kongju National University Hospital, 5 Inje University Bundang Hospital, 6 Chungnam National University Hospital

Purpose: Although the number of urological cancer (UC) survivors has increased and their HRQoL became important issues, few studies adequately examined general QoL issues of UC survivors. We aimed to assess HRQoL of disease-free prostate cancer (PC), kidney cancer (KC) and bladder cancer (BC) survivors, and compare them with those from the general population.

Materials and Methods: A total of 331 UC patients (PC 114, 108 KC, and 109 BC) ≥50 years who had undergone curative surgery and no evidence of recurrence for at least 1 year after surgery were included. As a control, 1,177 subjects without a history of cancer were randomly selected from general Korean population. HRQoL was compared among 3 UC survivors and between each type of cancer and general population with the EORTC QLQ-C30, Patient Health Questionnaire-9 and Duke-UNC Functional Social Support Questionnaire.

Results: PC, KC, and BC survivors were not different with all domains of functioning and symptom scales, except for slight but significant difference in social functioning between KC and BC survivors (89.5 vs. 80.6, P=0.021). Three groups were neither different for depression nor functional social support. When compared to matched general population, PC and BC survivors showed lower social functioning and lower appetite problem than control, while KC survivors showed lower physical functioning as well as higher pain and dyspnea symptom. All three UC survivors reported higher financial difficulties, but also higher perceived social support than control. When examined by time elapsed from curative surgery, some different patterns were observed by cancer type (Figure 1).

Conclusion: While HRQoL issues were generally similar among disease-free UC survivors, different patterns were noted according to UC type, compared with general population. Our results will be valuable to both urologists and patients by providing HRQoL information following surgery, and planning future supportive care needs.

Keywords: Urologic cancer, Quality of life, Disease-free survivors
Changes of health-related quality of life (HRQOL) in prostate cancer patients after radical prostatectomy: a longitudinal cohort study in Korea

박현식1, 신현빈1, 신동욱2, 이상협3, 전승현4, 윤석중4, 박승철5, 남종길6, 김태환7, 정승일8, 박진성1

1울산대학교병원, 2성균관대학교 의과대학 삼성서울병원, 3경희의료원, 4충북대학교병원, 5원광대학교 부속병원, 6양산부산대학교병원, 7경북대학교병원, 8전남대학교병원

Purpose: We aimed to investigate HRQOL change after open, laparoscopic and robotic radical prostatectomy (RP), and compare HRQOL of surgically treated prostate cancer (PC) patients with that of age-matched general population.

Materials and Methods: In this multicenter prospective longitudinal cohort study, patients who underwent RP for PC at 7 medical centers between October 2014 and December 2015 were enrolled. To measure HRQOL, the EORTC QLQ-C30 and PC-specific module (PR25) were administered at baseline, postoperative 3 and 12 months. Generalized estimating equation were used after adjusting baseline characteristics, and HRQOL was compared between PC patients and general population after 1:1 propensity score matching.

Results: Among 258 screened PC patients, 209 (41 open, 63 laparoscopic, and 105 robotic) were included. Overall HRQOL change of PC patients following surgery are shown in Table 1. Comparison of general QOL by surgery type showed that emotional and social function at 12 months was significantly lower after laparoscopic RP compared to open RP, while fatigue, pain, insomnia and appetite loss symptoms at 12 months significantly improved after open RP, compared to laparoscopic or robotic RP. Comparison of PC-specific QOL showed that sexual activity at 3 months after laparoscopic and robotic RP were significantly better than open RP, but it became similar at 12 months. Meanwhile, physical, role, and social function of PC patients were significantly deteriorated at 3 months compared to general population, while physical and role function became similar between the two groups at 12 months. Notably, overall QOL of PC patients was better than general population at 12 months after surgery.

Conclusion: While patients undergoing different type of surgery showed slightly different recovery pattern, HRQOL of PC patients generally recovered over 12 months, similar to general population except social function.

Keywords: Prostate cancer, Quality of life, Radical prostatectomy

### Table 1. Health-related Quality of Life of Prostate cancer patients during 1 year period after radical surgery

<table>
<thead>
<tr>
<th></th>
<th>Baseline (N=209)</th>
<th>3 months (N=180)</th>
<th>12 months (N=180)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Global QOL</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical function</td>
<td>85.5</td>
<td>84.7</td>
<td>79.5</td>
</tr>
<tr>
<td>Role function</td>
<td>90.0</td>
<td>89.8</td>
<td>86.4</td>
</tr>
<tr>
<td>Emotioanl function</td>
<td>84.0</td>
<td>86.5</td>
<td>87.7</td>
</tr>
<tr>
<td>Cognitive function</td>
<td>89.0</td>
<td>88.9</td>
<td>85.8</td>
</tr>
<tr>
<td>Social function</td>
<td>81.7</td>
<td>82.3</td>
<td>86.6</td>
</tr>
<tr>
<td><strong>Non emotional Function</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fatigue</td>
<td>20.6</td>
<td>21.7</td>
<td>26.9</td>
</tr>
<tr>
<td>nausea and vomiting</td>
<td>22.1</td>
<td>19.9</td>
<td>20.3</td>
</tr>
<tr>
<td>Pain</td>
<td>3.8</td>
<td>8.3</td>
<td>11.9</td>
</tr>
<tr>
<td>diarrhea</td>
<td>5.2</td>
<td>3.0</td>
<td>2.4</td>
</tr>
<tr>
<td>Appetite loss</td>
<td>11.5</td>
<td>14.0</td>
<td>16.5</td>
</tr>
<tr>
<td>Constipation</td>
<td>14.1</td>
<td>12.2</td>
<td>10.6</td>
</tr>
<tr>
<td>Flatulence</td>
<td>5.1</td>
<td>4.4</td>
<td>3.1</td>
</tr>
<tr>
<td>Financial difficulties</td>
<td>21.7</td>
<td>20.7</td>
<td>17.7</td>
</tr>
</tbody>
</table>

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2017년 제69차 대한비뇨기과학회 추계학술대회

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Objectives: To provide objective criteria for preoperative staging chest computed tomography (CT) in patients diagnosed with renal cell carcinoma (RCC) because, in the absence of established indications, the decision for preoperative chest CT remains subjective.

Patients and Methods: A total of 439 patients undergoing surgical treatment of RCC from Jan 2011 to Dec 2016 were collected, retrospectively. The outcome of the study was presence of pulmonary metastases at staging chest CT. A multivariable logistic regression model predicting positive chest CT was fitted. Predictors consisted of preoperative clinical tumor (cT) and nodal (cN) stage, presence of systemic symptoms and platelet count (PLT)/hemoglobin (Hb) ratio.

Results: The rate of positive chest CT was 10.3% (n=45). At multivariable logistic regression, ≥cT1b and systemic symptoms were associated with higher risk of positive chest CT (all P<0.05). Using ROC curve, optimal cutoff value was 40 mm (sensitivity 95.6% and specificity 56.9%).

Conclusions: The findings of the present study support a recommendation for chest CT in patients with ≥cT1b, systemic symptoms.

Keywords: Renal cell carcinoma, Clinical staging, Pulmonary metastases, Chest computed tomography
신장피질 봉합을 생략한 로봇 부분 신절제술의 실험가능성: 예비연구

강성민, 성재우, 양종협, 조신제, Fahad Bashraheel, 정현철, 박용현, 조혁진, 하유신, 이지열, 김세웅, 형성호
가톨릭대학교 의과학대 비뇨기과학실

목적: 부분 신절제술 시 신장 조직을 봉합하는 과정에서 봉합부에 끼이게 된 신장조직의 혈류공급이 감소하여 허혈 손상이 발생하여 신기능이 감소할 위험이 있다. 이에 저자들은 신기능을 최대한 보존하기 위한 방법으로, 로봇 부분 신절제술 시 종양 절제 후 신장 수질만 봉합하고 피질 봉합을 생략하는 방법을 시행하였다.

대상 및 방법: 2016년 12월부터 2017년 5월까지 본원에서 신종양으로 단일 술자에 의한 신장피질 봉합을 생략한 로봇 부분 신절제술을 시행받은 10명을 대상으로 병리학적 결과, 수술 전/후 신장의 용적 및 기능의 변화, 부작용 등에 대하여 후향적으로 조사하였다. 신장의 용적은 CT를 이용하여 측정하였으며, 수술 전/후로 DTPA renal scan을 통하여 신장의 기능을 측정하였다.

결과: 수술 전 R.E.N.A.L. Nephrometry score는 저위험군과 중등도 위험군이 각각 2명(20%) 및 8명(80%)이었다. 종양의 크기는 평균 3.76±1.3 cm (2.0-6.0)이었으며, 종양의 크기는 평균 85.2±10.7cm³ (61-105)이었다. 수술 중 허혈시간은 21.3±4.2분(13-27)이었다.

결론: 신장피질 봉합을 생략한 로봇 부분 신절제술은 시행이 가능하다. 향후 봉합 방법에 따른 수술 전/후 용적 및 신기능의 변화에 대한 추가적인 전향적 연구가 필요할 것으로 생각된다.

Keywords: Renal cell carcinoma, Robot-assisted partial nephrectomy, Cortical renorrhaphy
**Purpose:** Few studies report long-term outcomes of renal cell carcinoma treated by laparoscopic radiofrequency ablation (RFA). We reviewed our experience with T1a renal cell carcinoma treated with laparoscopic RFA.

**Materials and Methods:** A total of 62 patients with T1a renal cell carcinoma treated between January 2005 and October 2014 were identified from a retrospective review. Patients with biopsy confirmed T1a renal cell cancer and a follow up period >48 months were included in our analysis. Local recurrence, metastasis, survival rate and change in glomerular filtration rate (GFR) were analyzed.

**Results:** The mean (range) follow-up for the laparoscopic RFA was 60 (30–104) months. The respective mean tumor size was 2.14 (±0.66). The laparoscopic RFA patients did not significantly differ in terms of the change in mean eGFR (relative to preoperative values) at 1–2 weeks after surgery or at the last follow up. There were not local recurrences, metastasis and disease-specific deaths. The 5-year overall survival was 98%, cancer-specific survival was 100%, and recurrence-free survival was 100%.

**Conclusions:** This data showed that laparoscopic RFA for T1a renal cell carcinoma has comparable oncological and functional outcomes.

**Keywords:** Kidney neoplasms, Laparoscopy, Radiofrequency ablation
0-224

근치적 신장절제술을 시행한 신세포암 환자에서 수술 전후 예후 영양 지표 변화 양상의 예후적 가치
장춘태, 강민용, 성현환, 정병창, 서성일, 전성수, 최한용, 이현무
성균관대학교 의과대학 삼성서울병원 비뇨기과학교실

Purpose: To examine the prognostic role of prognostic nutritional index (PNI) dynamics in the pre- and postoperative periods in patients with renal cell carcinoma (RCC) who underwent radical nephrectomy (RN).

Materials and Methods: We analyzed 324 patients with RCC who underwent RN. Overall population was classified into 4 groups according to 4 types of pre- to postoperative PNI dynamics as follows: Group 1 (low → low PNI), 2 (low → high PNI), 3 (high → low PNI) and 4 (high → high PNI). The level of PNI was calculated using the following formula: 10 × serum albumin level (g/dL) + 0.005 × absolute lymphocyte counts in blood (/mm³). Primary and secondary endpoints were cancer-specific survival (CSS) and overall survival (OS), respectively.

Results: Patients with higher pre- and postoperative PNI (>45) had better survival outcomes than those with lower pre- and postoperative PNI (≤45) (Fig 1–2). Notably, patients in Group 4 (high → high PNI) showed the best CSS and OS rates, whereas patients in Group 1 (low → low PNI) had the worst survival outcomes. Furthermore, PNI dynamics was identified as an independent predictor for CSS and OS outcomes, in addition to pre- and postoperative PNI, tumor size, and pT stage. Patients with localized RCC (≤pT2) showed significant differences in both CSS and OS estimates, while patients with advanced pT stage (≥pT3) demonstrated a difference only in OS outcomes, according to PNI dynamics.

Conclusions: Our study is the first that provides the independent prognostic importance of dynamics of nutritional status for patients with RCC.

Keywords: Renal cell carcinoma, Radical nephrectomy, Prognostic nutritional index
단일 3차 대형병원에 11년 동안 내원한 신세포암 환자 3076례의 보고 - (2) 병기 및 치료에 따른 예후 및 생존률

나준채1, 윤민지1, 김진우1, 박지수1, 안현규1, 강승구1, 이하호3, 윤영은4, 홍성준1,2, 한웅규1,2
1연세대학교 의과대학 비뇨기과학교실, 2Brain Korea 21 PLUS Project for Medical Science, Yonsei University, 3국립건강보험공단 일산병원 비뇨기과, 4한양대학교 의과대학 비뇨기과학교실

목적: 본 연구는 단일 3차 대형병원에 내원한 신세포암 환자들의 예후를 분석하고자 하였다. 이에 11년 동안 신세포암으로 본원에 내원한 환자군의 병기에 따른 치료 후의 생존률에 대하여 조사하였다.

대상 및 방법: 2005년 11월 1일 이후 본원에 내원한 환자 중 신세포암 진단 받은 모든 환자들의 나이, 성별, 진단일, 치료 방법 및 치료 결과, 영상검사, 조직병리검사, 사망일 등을 조사하였다.

결과: 신세포암 환자의 5년-overall survival (OS)는 I기 94.5%, II기 85.0%, III기 70.0%, IV기 12.2%였으며, 10년 OS는 I기 85.4%, II기 61.6%, III기 47.2%, IV기 6.0%였다(Fig. A). 5년-cancer specific survival (CSS)는 I기 97.1%, II기 87.0%, III기 73.7%, IV기 13.2%였으며, 10년-CSS는 I기 88.5%, II기 63.0%, III기 50.2%, IV기 6.4%였다(Fig. B). I, II기에서의 cell type에 따른 생존률은 clear cell type이 non-clear cell type과 비교하여 유사하거나 더 낮았으나, Stage IV의 cell type에 따른 median OS는 clear cell type 19.2개월, papillary type 13.2개월, chromophobe type 10.8개월이었다. 항암치료를 시작한 이후의 median OS는 clear cell type 30개월, papillary type 15.6개월이었다. I기 환자의 부분신절제술과 근치적신절제술 후 예후를 비교한 결과 평균OS는 T1a에서 각각 11.4년 대 10.8년, T1b에서 11.7년대 10.9년으로 T1a의 경우 부분신절제술에서 예후가 더 좋았으나(p=0.001, Fig. C, D), 평균CSS는 T1a에서 각각 11.6년 대 11.5년, T1b에서 각각 11.6년대 11.3년으로 두 군 사이의 유의한 차이가 없었다(Fig. E, F).

결론: 신세포암의 저병기 생존률은 높으나, 다양한 표적치료의 개발에도 불구하고 전이성 신세포암은 예후가 매우 불량하였다. I기 환자에서 치료법에 따른 예후를 비교하였을 때 부분신절제술이 근치적신절제술에 비해 OS는 일부 좋았으나 CSS는 차이가 없었다.

Keywords: Renal cell carcinoma, Survival, Prognosis
Effect of diverse histologic differentiation on the oncological outcomes of patients with upper urinary tract carcinoma after radical nephroureterectomy: the korean multi-institutional results

Ojoung1, Ojehoon1, Sonseum1, Ryouzun1, Boktae1, Kimdoo1, Eunsoong1, Jungseok1, Yangyong1, Jeongsoo1, Kwanduk1, Kimjongbeom1, Joahyun1, Okjeong1, Kimseok1, Kangsoon1, Bokseon1, Hwangdoo1, Songdoo1, Koomjoo1, Nojoochon3, Yoojung4, Joongil4, Joowon5, Kangsuk6, Kangsuk6, Jung6, Chooyeon7, Seolil7, Jeong6, Hwangdoo8, Ichanho9, Gyuju9, Huhguk9, Kimbyeon10, Jungwook11, Gyuja11, Gwejul11, Kimhyeon11


Purpose: To determine the prognostic effect of upper tract urothelial carcinoma (UTUC) with diverse histologic differentiation after radical nephroureterectomy (RNU).

Methods: A total of 1173 patients who received RNU for UTUC without neoadjuvant chemotherapy in 11 institutions between 2002 and 2016 were retrospectively reviewed. Clinicopathological variables, recurrence free survival (RFS), cancer specific survival (CSS) and overall survival (OS) were compared between patients with pure UTUC and patients with UTUC with diverse histologic differentiation. Univariable and multivariable cox proportional regression model were used to determine independent variables associated with oncological outcomes.

Results: The UTUC with diverse histologic differentiation was associated with aggressive clinicopathological features and shorter RFS, CSS, and OS (log rank, p=0.001) compared with pure UTUC. In addition, multivariable analysis demonstrated that diverse histologic differentiation was independently associated with poor RFS (hazard ratio [HR]=1.59; 95 CI: 1.20–2.12; p=0.001), CSS (HR=2.60; 95 CI: 1.63–4.17; p=0.001) and OS (HR=2.04; 95 CI: 1.35–3.08; p=0.001). However, in patients who received adjuvant chemotherapy, the differences in RFS, CSS and OS was not significant by Kaplan Meier survival analysis.

Conclusions: Our multi-institutional results suggested that UTUC with diverse histologic differentiation associated with poor oncological outcomes compared with pure UTUC. However, adjuvant chemotherapy would be helpful to increase survival in these patients.

Keywords: Upper tract urothelial carcinoma (UTUC), Diverse histologic differentiation
Development of the clinical calculator for mortality of patients with metastatic renal cell carcinoma: an analysis of patients from Korean renal cancer study group database

박재영1, 정창욱2, 송채린3, 서성일4, 정진수5, 홍성호6, 황의창7, 곽철2, 서일영8, 박수연9; 한국신장암연구회

1 고려대학교 안산병원, 2 서울대학교병원, 3 울산대학교 서울아산병원, 4 성균관대학교 의과대학 삼성서울병원, 5 국립암센터, 6 가톨릭대학교 서울성모병원, 7 화순전남대학교병원, 8 원광대학교 부속병원, 9 순천향대학교 의학통계과

Purpose: To develop the clinical calculator for mortality of patients with metastatic renal cell carcinoma (mRCC) using Korean Renal Cancer Study Group (KRoCS) database.

Materials and Methods: Data from 1115 patients with mRCC treated in 4 hospitals joining KRoCS between 1993 and 2016 were pooled. Three- and 5-year mortality rates were calculated using Kaplan-Meier curve. A calculator (nomogram) for 3- and 5-year mortality were developed and validated internally using multivariable logistic regression analysis.

Results: Mortality rates were 56.9% at 3 years and 71.5% at 5 years. Among baseline factors, synchronous metastasis pattern, neutrophil-lymphocyte ratio, low albumin (<3.9 g/dL), high corrected Ca (>9.2 mg/dL), and number of metastasis (≥2) were the significant factors in 3-year mortality calculator. In 5-year mortality calculator, synchronous metastasis pattern, neutrophil-lymphocyte ratio, low albumin (<3.9 g/dL), and high corrected Ca (>9.2 mg/dL) were proven to be the significant factors. Good internal validity was demonstrated, with area under the curve estimates being 0.73 and 0.76 at 3- and 5-year mortality calculation, respectively (Fig 1).

Conclusion: A clinical nomogram has been developed to quantify the risk of death for individual patients after treatment of mRCC. This tool may be useful for patients or their guardians who want to know their prognosis and to identify patients requiring aggressive therapy and additional supportive measures during and after treatment.

Keywords: Metastatic renal cell carcinoma, Mortality, Calculator
혈액투석 중인 환자와 신이식을 받은 환자에서 발생한 신세포암의 병리학적 특징 및 종양학적 결과 비교

류제만1, 최세영1, 김윤수2, 유달산1, 정인갑1, 송채린1, 홍범식1, 홍준혁1, 안한종1, 김청수1
울산대학교 서울아산병원 1비뇨기과학교실, 2건강의학과

Introduction: We compared the clinical features, pathologic features, and oncologic outcomes of patients with renal cell carcinoma (RCC) which newly arose after hemodialysis (HD) and kidney transplantation (KT).

Materials and Methods: We defined RCC–HD group as patients newly diagnosed with RCC on HD and RCC–KT group as those who underwent KT in our institution before. Of 4326 patients who underwent KT in our institution, 24 (0.6%) patients were newly diagnosed with RCC after surgery. After excluding patients with metastatic RCC and those who did not undergo surgery for RCC, 40 patients in the RCC–HD group and 22 patients in the RCC–KT group were finally included in the analysis. We divided histologic types of RCC into clear cell RCC, acquired cystic disease–associated RCC, and other RCC. We compared clinical and pathologic features between two groups, and the impacts of those on survival were assessed using multivariate analysis. Mean follow-up duration was 51 months.

Results: The mean duration of hemodialysis was 81 months in the RCC–HD group and 153 months in the RCC–KT group (p=0.079). The mean duration from kidney transplantation to nephrectomy in the RCC–KT group was 118 months. Sex predominance, age, body mass index, or follow-up duration were not significantly different between two groups. The RCC–HD group had higher incidences of acquired cystic disease–associated RCC compared to the RCC–KT group (21.1% vs. 4.5%, p=0.002), but there were no significant differences in tumor size, Fuhrman grade, pathologic T stage, regional node metastasis, or lymphovascular invasion between two groups. 5-year overall survival (OS) rate was 72.9% and 82.5% (p=0.346), and 5-year cancer–specific survival (CSS) was 94.2% and 93.8% (p=0.919) in the RCC–HD and RCC–KT group, respectively. In multivariate analysis, diagnosis of acquired cystic disease–associated RCC in addition to kidney transplantation and hemodialysis were not predicting factors of OS and CSS.

Conclusions: More patients were diagnosed with acquired cystic disease–associated RCC in RCC–HD group than RCC–KT group, but OS and CSS were not significantly different between RCC–HD and RCC–KT groups.

Keywords: Kidney transplantation, Renal cell carcinoma, Hemodialysis
Efficacy of first line targeted therapy in real world Korean metastatic renal cell carcinoma patients: focused on sunitinib and pazopanib

Ju Yong Oh1, Jeong Hoon Oh1, Taeju Park1, Myung Soo Kim1, Ho Seok Chung1, Seung Il Jung1, Dong Deuk Kwon1, Jong Bum Kim1, Yang Hyun Cho1, Kyung Jin Oh1, Sun-Ouck Kim1, Taek Won Kang1, Kwang-sung Park1, Jun Eul Hwang2, Woo Kyun Bae3, Jae Young Park3, Chang Wook Jeong4, Cheol Kwak4, Cheryn Song5, Hwang Gyun Jeon6, Seong Il Seo7, Seok-Soo Byun7, Sung-Hoo Hong8, Jin Soo Chung9, Eu Chang Hwang1

화순전남대학교병원 비뇨기과학회, 2혈액종양학교실, 3안산고려대학교병원 비뇨기과학회, 4서울대학교병원 비뇨기과학회, 5서울아산병원 비뇨기과학회, 6성균관대학교 삼성병원 비뇨기과학회, 7분당서울대학교병원 비뇨기과학회, 8강남성모병원 비뇨기과학회, 9국립암센터 비뇨기과학회

Purpose: The aim of this study was to evaluated survival outcomes and prognostic factors for overall survival in patients with metastatic renal cell carcinoma who received sunitinib and pazopanib as first line therapy.

Methods: A total of 1121 patients who received sunitinib or pazopanib at 7 institutions from 2007 to 2016 were retrospectively reviewed. The patients were grouped into sunitinib (n=827) or pazopanib (n=294) cohorts by the targeted therapy. Clinicopathological variables and survival rates were compared between the 2 groups. The multi-variable–adjusted cox proportional hazard model was used to determine the prognostic factors for overall survival.

Results: The median follow up was 20.2 months (interquartile range, IQR: 9.4–39.1). The pazopanib group was more older and poor performance status (≥2). The dose reduction rate and grade 3 toxicity were high in sunitinib group. The objective response rates were comparable between two groups (sunitinib: 34.4% vs. pazopanib: 36.8%). Overall survival was significantly longer in pazopanib group (35.7 month vs. sunitinib: 24.8 month, log–rank, p=0.010).

Body mass index, synchronous metastasis, Heng risk criteria (intermediate and poor), lung, liver, lymph node, bone metastases, sunitinib, dose reduction and drug interruption were associated with shorter overall survival.

Conclusions: Our real world data from Korean metastatic renal cell carcinoma suggested that along with previous prognostic factors, sunitinib, dose reduction and drug interruption were associated shorter overall survival. This phenomenon was probably due to the high dose reduction and drug interruption rate in sunitinib group.

Keywords: Metastatic renal cell carcinoma, Sunitinib, Pazopanib

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**Prognostic factors for overall survival among patients treated with sunitinib and pazopanib**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Hazard ratio (HR)</th>
<th>95% CI</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age ≥ 70</td>
<td>1.01 (0.86–1.17)</td>
<td>1.08</td>
<td>0.44</td>
</tr>
<tr>
<td>Male sex</td>
<td>1.02 (0.81–1.28)</td>
<td>1.05</td>
<td>0.82</td>
</tr>
<tr>
<td>BMI &lt; 20</td>
<td>0.99 (0.92–1.06)</td>
<td>1.00</td>
<td>0.88</td>
</tr>
<tr>
<td>Smoking (yes)</td>
<td>1.07 (0.53–2.16)</td>
<td>1.05</td>
<td>0.97</td>
</tr>
<tr>
<td>Sunitinib in metastatic criteria</td>
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<td>1.36</td>
<td>0.84</td>
</tr>
<tr>
<td>ECOG PS (0–1)</td>
<td>1.44 (0.74–2.82)</td>
<td>1.33</td>
<td>0.71</td>
</tr>
<tr>
<td>Unknown</td>
<td>0.90 (0.76–1.07)</td>
<td>0.97</td>
<td>0.75</td>
</tr>
<tr>
<td>synchronous metastasis</td>
<td>1.00 (0.70–1.43)</td>
<td>1.06</td>
<td>0.92</td>
</tr>
<tr>
<td>Liver metastasis</td>
<td>0.95 (0.61–1.50)</td>
<td>0.97</td>
<td>0.80</td>
</tr>
<tr>
<td>Bone metastasis</td>
<td>1.12 (0.93–1.33)</td>
<td>1.16</td>
<td>0.54</td>
</tr>
<tr>
<td>CNS metastasis</td>
<td>1.09 (0.82–1.43)</td>
<td>1.10</td>
<td>0.97</td>
</tr>
<tr>
<td>Unknown</td>
<td>0.99 (0.74–1.36)</td>
<td>1.01</td>
<td>0.46</td>
</tr>
<tr>
<td>Drug interruption</td>
<td>0.96 (0.74–1.24)</td>
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Purpose: Conditional survival (CS) indicates the probability that patient would survive additional periods, given that the patients has previous survivorship after diagnosis or initial treatment. CS estimate can predict more accurately the prognosis of cancer patients compared to a conventional survival estimate. Although the clinical significance of CS have been investigated in several types of malignancy, there are few reports in metastatic renal cell carcinoma (mRCC). Here, we aim to evaluate the CS probabilities in mRCC patients who underwent targeted therapy with tyrosine kinase inhibitors (TKI) and to identify the significant prognostic factors of the CS over time.

Methods: A total of 1,498 mRCC patients receiving 1st line TKI was finally analyzed from Korean multicenter database of mRCC. Kaplan–Meier survival estimates was used to calculate overall and cancer–specific CS rates as primary and secondary endpoints, respectively. The Cox regression analysis was used to determine the predictors of CS after adjusting various clinical factors.

Results: Of note, mRCC patients who had already survived additional years after initial TKI treatment had a more favorable conditional OS and CSS probabilities in all given survivorships compared to those with shorter survival periods. As shown in Figure 1, 5 year conditional OS and CSS rates gradually increased over time, whereas actual survival rates were remarkably decreased over time after initial targeted therapy. More importantly, while all variables was significantly associated with conditional OS and CSS at baseline, these factors lost their prognostic significance for predicting CS in the multivariate analysis over time.

Conclusions: In sum, CS improves over time after initial targeted therapy compared to baseline survival estimation in mRCC patients. Our study offers valuable information for practical survival estimation and relevant predictive factors for patients with mRCC receiving targeted therapy.

Keywords: Metastatic renal cell carcinoma, Conditional survival, Prognosticator
Purpose: We compared the results of laparoscopic radical prostatectomy (LRP) with robot assisted radical prostatectomy (RARP) against the perspective of the five surgical steps among the various techniques to improve postoperative urinary incontinence.

Methods: We have routinely performed five surgical steps for preventing postoperative incontinence both in LRP (n=20) and RARP (n=20) group. The first step was the delicate dissection without thermal injury between the endopelvic and prostatic fascia which preserved the levator and periurethral muscle of the levator system. The second step was the bladder neck preservation through careful dissection of the prostatovesical junction. The third step was the posterior reconstruction to reapproximate the flap to the distal end of Denovilliers’ fascia close to the urethral stump. The fourth step preserved the puboprostatic ligament complex which was refixed to the anterior aspect of the vesicourethral anastomosis. The fifth step anchored the bladder neck to the pubic bone.

Results: The perioperative parameters of both groups didn’t show the statistical difference (Table 1). The pad free ratio in RARP group (30%) at postoperative 2 weeks was twice as high as that in LRP group (15%). However, pad free ratio of LRP group compared with RARP group at 1, 3, 6 and 12 months postoperatively was not significantly different (Table 2, p>0.05).

Conclusions: The five surgical steps to prevent postoperative incontinence were easily and safely performed both in LRP and RARP. The five steps provided excellent results for the recovery of the postoperative continence irrespective of surgical approach.

Keywords: Incontinence, Prostate, Laparoscopy

<table>
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<th>Table 1: Patient characteristics and perioperative outcomes</th>
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</tr>
<tr>
<td>Age (yr)</td>
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<td>Body mass index (kg/m²)</td>
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<td>Forceps score</td>
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<td>7</td>
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<td>6</td>
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<td>T2b</td>
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<td>pT2b</td>
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<tr>
<td>pT3a</td>
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<tr>
<td>pT3b</td>
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<tr>
<td>Lymph node status</td>
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<tr>
<td>Median operative time, min (range)</td>
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<td>Median blood loss, ml (range)</td>
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<td>Transfusion rate (%)</td>
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<td>Median hospital stay, days</td>
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<td>Complication, minor rate, no (%)</td>
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<td>no. grade 4</td>
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<th>Table 2: Comparison of the pad-free ratio between LRP and RARP</th>
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<td>Postoperative duration</td>
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<td>At 1 month</td>
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<tr>
<td>At 3 months</td>
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<tr>
<td>At 6 months</td>
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<tr>
<td>At 12 months</td>
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V-012

로봇보조 복강경전립선절제술에서 성기능 및 요자제의 최대 보존을 위한 술식

최세영, 류제만, 이재훈, 이원철, 채한규, 김휘우, 유달산, 정인갑, 김청수
울산대학교 의과대학 비뇨기과학교실

Introduction: Radical prostatectomy is a standard treatment for patients with localized prostate cancer. In men with low or intermediate risk, localized cancer and good erectile function, current guidelines recommend nerve sparing surgery. For past 20 years, different anatomical studies and surgical advances have been reported to improve nerve sparing procedure. Urinary continence and erectile function have a profound impact on patients’ quality of life after radical prostatectomy. The aim of radical prostatectomy is to eliminate cancer with maintaining sexual and urinary function.

Case Report: In cases of robot-assisted laparoscopic prostatectomy, we try to preserve full thickness of neurovascular bundle (NVB). Intrafascial dissection is considered a dissection that follows a plane on the pseudocapsule, remaining internal to the prostatic fascia at the antero- and posterolateral aspect of the prostate and anterior to the prostatic fascia. The intrafascial approach allows a whole-thickness preservation of the NVB. This technique can be helpful to preserve sexual function. The shape of prostate apex may be different, influencing the length of the urethral sphincter after emerging from the apex because parts of the urethral sphincter can be found inside the prostate apex as a distinct structure surrounded by prostatic tissue. The apex may overlap the urethral sphincter circumferentially, symmetrically bilaterally, asymmetrically unilaterally, anteriorly only, or posteriorly only, or it can end bluntly above the sphincter. Significant overlap might render the preservation of the entire urethral sphincter difficult. A full-length preservation of the urethral sphincter can be helpful by identifying and dissecting the distinct striated and smooth muscle part of the sphincter inside the prostate apex. This technique allows preservation of the entire length of the urethral sphincter system and may result in better continence. In addition, we perform Rocco stitch (posterior pelvic reconstruction) and Kim’s stitch (pubovesical complex reconstruction) that may lead to better postoperative continence.

Keywords: Nerve sparing, Erectile function, Continence
로봇 근치적 전립선 절제술 시 토글링을 이용한 역행성 초기 노출과 표지 동맥의 확인

김승빈, 태종헌, 윤성구, 김재윤, 심지성, 강석호, 이정구, 김재종, 천 준, 강성구
고려대학교 안암병원 비뇨기과학교실

Purpose: 본 video의 목적은 로봇보조근치적 전립선 절제술 중 toggling (30 degree down switching) 기법을 이용한 retrograde early release시에 neurovascular bundle (NVB) 의 박리 용이성과 landmark artery를 demonstration 하는 것이다.

Materials and Methods: 2015년부터 2017년 5월까지 로봇보조근치적 전립선 절제술을 시행하고 bilateral NVB를 sparing한 70명의 환자를 대상으로 하였으며 자료는 전향적으로 기록되었다. Toggling을 시행한 group 1 (n=50)과 시행하지 않은 group 2 (n=20)로 나누어 각 group의 age, PSA, Gleason score 등을 분석하였다. NVB penetration (prostate anterior 에서 Denovillier’s space와의 관통여부)에 성공한 비율에 대해서 좌, 우 각각을 조사하였으며 술자가 느끼는 subjective nerve sparing score도 추가로 비교분석하였다.

Results: 환자의 평균 연령은 63.36±6.9 였으며 group간 차이는 없었다(p=0.714) (Table 1). 각 group의 NVB penetration 비율은 각각 76% (76/100), 60% (24/40) (p=0.058)였으며 group 1에서 bilateral penetration이 성공한 환자는 64% (32/50)이었다. Subjective surgeon’s nerve sparing score 평균은 group 1에서 좌, 우 모두 유의하게 높았으며 (p value:<0.001, 0.003, respectively), 5점으로 scoring 된 비율도 group 1에서 유의하게 높았다(60% (60/100) vs 30% (12/40); p=0.001).

Conclusion: Toggling을 시행한 group에서 NVB penetration 비율, Surgeon’s subjective nerve sparing score가 유의하게 높았으며 술 후 6개월 내에 대부분의 환자에게서 potency가 회복되었다. 또한 정확한 NVB의 penetration을 통하여 landmark artery가 확인된 경우에는 50%였으며 이 경우의 sparing score는 모두 5점이었다.

Keywords: Robot assisted radical prostatectomy, Toggling, Neurovascular bundle

Table 1. Baseline characteristics of patients

<table>
<thead>
<tr>
<th>Variables</th>
<th>Toggling (N=50)</th>
<th>No Toggling (N=20)</th>
<th>P-value</th>
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<tr>
<td>Age, yr</td>
<td>63.5±6.1</td>
<td>63.2±5.9</td>
<td>0.714</td>
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<td>BMI, kg/m²</td>
<td>24.3±3.5</td>
<td>24.6±1.9</td>
<td>0.954</td>
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<td>PSA</td>
<td>9.0±4.9</td>
<td>9.3±7.3</td>
<td>0.318</td>
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<td>Prostate volume</td>
<td>31.4±12.8</td>
<td>35.0±20.5</td>
<td>0.891</td>
</tr>
<tr>
<td>Gleason score, no. (%)</td>
<td>3.1±1.0</td>
<td>3.5±1.5</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>6</td>
<td>12</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>7</td>
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<td></td>
</tr>
<tr>
<td>9</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

Subjective nerve sparing score

LL  4.5±0.8  3.1±1.0  <0.001
RL  4.6±0.8  3.2±1.5  0.003
Proportion of sparing score 6 (%) | 60 (60/100) | 30 (12/40) | 0.001
Penetration rate (%)              | 76 (76/100) | 80 (24/30) | 0.058
V-014

방광요도 문합술을 함께 시행한 변형된 복강경하 단순 전립선절제술
정현철, 성재우, 양종협, 조신제, 강성민, 문형우, 이규원, 박용현, 조혁진, 하유신, 이지열, 김세웅, 홍성후
가톨릭대학교 서울성모병원 비뇨기과학교실

Purpose: The treatment of BPH has been developed in various ways, and surgery using devices such as laser is widely used even in large sizes of 80 g or more. However, simple prostatectomy is still the standard therapy of large size BPH and is performed using various approaches. We present a case of a modification of laparoscopic simple prostatectomy with vesico-urethral anastomosis.

Methods: 74-years old male presented with hematuria, voiding difficulty and high PSA. His total IPSS score was 20, QOL score was 4 and PSA was 14.82. The MRI showed severe BPH sized 158 g and no definite focal prostate cancer. He already had done prostate biopsy 1 years ago and result was atypical small acinar proliferation. Qmax was 6.8 ml/s and residual urine was about 124 cc. So we planned laparoscopic simple prostatectomy. Five 11-mm trocar was inserted periumbilical and both McBurney’s point and medial side of anterior superior iliac spine. To start with, the Retzius space was dissected bluntly, and the influential fatty tissues were swept gently. Without incision of endopelvic fascia and ligation of dorsal vein, the preprostatic fascia was incised transversally and the anterior wall of bladder neck was opened. A horizontal incision was made on the vesical mucosa overlying the prostatic lobes, at the level of the posterior bladder neck. Whole adenoma was freed from prostatic capsule with the aid of claw forceps and ultrasonic scalpel. After the specimens were placed outside the capsule, the vesicourethral anastomosis was performed with PDS #3-0. Suture was performed at 6 o'clock direction toward 12 o'clock clockwise and counter-clockwise. And then running sutures of 2-0 Vicryl were placed to close the prostatic capsule, securing the wall of the urethra.

Results: The operative time was 120 minutes and estimated blood loss was 200 cc. Continuous bladder irrigation was stopped at POD#3 and urethral catheter was removed at POD#7. Blood transfusion was not needed. The pathology showed prostate adenocarcinoma with Gleason 6. Surgical margin was negative. 1 month later on uroflowmetry, Qmax was 34.4 ml/s and residual urine was 11 ml. Total IPSS score was 8 and QOL score was 2.

Conclusions: A modified laparoscopic simple prostatectomy with vesico-urethral anastomosis is a safe and effective method for large size BPH with less post operative bleeding.

Keywords: BPH, Vesico-urethral anastomosis, Prostatectomy
V-015

로봇 하부 요관 절제술

윤영은1, 정재훈1, 조정기1, 이형호2, 나준제3, 박성열1, 김용태1, 박해영1, 한웅규3
1한양대학교 비뇨기과학교실, 2일산병원 비뇨기과학교실, 3연세대학교 의과대학 비뇨기과학교실

Introduction: The gold standard for the management of upper urinary tract transitional cell carcinoma is nephroureterectomy with bladder cuff excision. However, segmental ureterectomy or distal ureterectomy could be a treatment option in selected patients. Herein we report our initial experiences of distal ureterectomy using the Da Vinci Xi robotic system in the distal ureter cancer patients.

Methods: Three patients underwent robotic distal ureterectomy and ureteral reimplantation from April through June 2016. We included the patients who showed distal ureter mass and diagnosed as ureter cancer by previous diagnostic ureteroscopy. Perioperative and postoperative outcomes were collected and intraoperative difficulties were noted.

Results: The mean operation time was 158 minutes and the mean console time was 122 minutes. The mean estimated blood loss was 70 ml. There’s no intraoperative or postoperative complications. Two patients needed psoas hitch during the procedure to facilitate the ureteroneocystostomy. Length of hospital stay ranged between 4 and 8 days. After 1 week, no patient showed leakage in anastomosis site in cystography, so the D-J catheter and the Foley catheter were removed. Pathologic reports revealed that 2 patients had pT2 and one had pT1 disease. All margin status was negative and postoperative image will be followed.

Conclusions: Our initial experience with distal ureterectomy using the Da Vinci Xi robotic system shows that the procedure is feasible and safe. We believe that robotic distal ureterectomy may be considered as a treatment option for the minimally invasive excision and reconstruction of localized distal ureter tumor in selected patients.

Keywords: Ureter cancer, Robot, Transitional cancer
Objective: To investigate perioperative and oncologic outcomes of robot-assisted radical prostatectomy (RARP) in oligometastatic prostate cancer (PCa).

Patients and Methods: We retrospectively reviewed the records of 79 oligometastatic PCa patients treated with RARP or ADT between 2005 and 2015 at our institution. Of these 79 patients, 38 were treated with RARP and 41 were treated with ADT without local therapy. Oligometastatic disease was defined as the presence of five or fewer hot spots detected by preoperative bone scan. We evaluated perioperative outcomes, progression-free survival (PFS), and cancer-specific survival (CSS). We analyzed data using Kaplan–Meier methods with log–rank tests and multivariate Cox regression models.

Results: RARP-treated patients showed comparable postoperative complications to those previously reported in RP-treated patients, and fewer urinary complications than those of ADT-treated patients. PFS and CSS were improved in RARP-treated, compared with ADT-treated, patients (median PFS: 75 vs. 28 months, p=0.008; median CSS: not reached vs. 40 months, p=0.002). Multivariate analysis further identified RARP as a significant predictor of PFS and CSS (PFS: hazard ratio [HR]=0.388, p=0.003; CSS: HR=0.264, p=0.004).

Conclusions: We demonstrated that RARP in the setting of oligometastatic PCa is a safe and feasible procedure and that it improves oncologic outcomes in terms of PFS and CSS. In addition, our data suggest that RARP effectively prevents urinary tract complications from PCa. However, our study highlights results from expert surgeons and highly selected patients that cannot be extrapolated to all patients with oligometastatic PCa. Therefore, to confirm our findings, large, prospective, multicenter studies are required.

Keywords: Local treatment, Metastatic, Prostate cancer, Radical prostatectomy, Robot-assisted
Objectives: We evaluated the factors associated with testosterone (TT) recovery after withdrawal of androgen deprivation therapy (ADT) in patients with prostate cancer.

Materials and Methods: Medical records of prostate cancer patients who underwent RP form 2001 to 2014 at Asan medical center were retrospectively reviewed and 745 patients who received ADT were selected. Among these, 221 patients with pre-ADT and follow-up TT level at least 6 months after ADT withdrawal were included for the analysis. TT recovery was divided defined ‘supra-castration’ as out of castration level (>50 ng/dL) and ‘TT recovery’ as out-of-hypogonadism (>300 ng/dL) after ADT withdrawal. Standard Kaplan–Meier actuarial statistics and multivariate analysis were used to estimate the cumulative incidence of TT recovery and to determine the affecting factors for recovery of TT after ADT cessation.

Results: The mean age at the time of ADT start was 64.7 years. The mean duration of ADT was 15.7 months and the mean follow-up duration after withdrawal of ADT was 22.1 months. After ADT, the mean duration had a supra-castration level was 7.9 months (92.8%), and had to the TT recovery level was 12.1 months (55.3%). The cumulative rates of TT recovery were 26 (16.7%), 54 (34.6%), 74 (47.4%), 86 (55.1%), respectively, at 6 months, 12 months, 24 months and 36 months after ADT, respectively. Mean time for TT recovery was 6.8 months in patients treated with ADT for ≤18 months compared to 9.7 months in patients treated with ADT for ≥19 months (log-rank p=0.000), and recovery rate was 74.6%, 27.5%, respectively. In multivariate analysis younger at the time of ADT application, higher serum SHBG levels, higher initial TT levels, shorter duration of ADT were factors which is significantly associated with the TT recovery after ADT-withdrawal, and younger at the time of ADT application, higher serum SHBG levels and shorter duration of ADT were significantly associated with recovery to supra-castration level after ADT withdrawal.

Conclusion: In patients treated with ADT for ≤18 months recovered TT more and faster after withdrawal of ADT. The AGE, SHBG level, initial TT level and duration of ADT were determined as a factor associated with TT recovery.

Keywords: Testosterone recovery, Prostate cancer, Androgen deprivation therapy
복합운동이 호르몬 박탈 치료를 받는 전립선암 환자의 신체활동량, 체력, 그리고 삶의 질에 미치는 영향

김규식1, 임정준2, 김연수2, 최홍용1, 문홍상1

1한양대학교 의과대학 비뇨기과학교실, 2서울대학교 대학원 체육교육학교실

Introduction: The purpose of this study is to identify the effects of 12 weeks combined exercise on level of physical activity, physical fitness and quality of life in prostate cancer (Pca) patients with androgen deprivation therapy.

Method and Material: 29 Pca patients who receive at least more than three months ADT, in Hanyang University Hospital, were selected. Measurement was executed before and after the intervention, which included body composition, physical activity level, physical fitness, quality of life, and blood analysis. Supervised exercise program and home-based exercise were executed once a week in exercise group, whereas two muscle stretch sessions were executed in the control group for 12 weeks, 7 subjects in the exercise group were excluded due to insufficient participation for the exercise intervention due to personal concerns such as residence moving, trip, complications and occupational issue while the remaining subjects actively involved in the facility-based exercise program by achieving remarkable 90 percentage attendance rate. The final analysis was performed with 19 subjects (with 11 subjects in the exercise group and 8 subjects in the control group) while excluding 4 subjects in the control group.

Results: Positive changes in body composition from Inbody 370 were resulted in the exercise group than the control group, and a statistically significant improvement was found in thigh circumference in the exercise group. The results of physical fitness measures from Senior Fitness Test (SFT), Grip dynamometer, and MMT (manual muscle test) were statistically significant in all categories except for flexibility item in the exercise group. Also, improvements were found in the exercise group in daily steps. Moderate–vigorous intensity physical activity from using an accelerometer (Control vs. Exercise: from 36.13±27.49 to 24.10±25.54 vs. from 30.49±27.47 to 116.10±107.78, p=0.037). Quality of life was improved in the survey The reliability of exercise was demonstrated from no change in PSA serum level between pre- and post–exercise intervention.

Conclusion: Taken together, the combined exercise in this research was resulted to be effective in body composition, physical fitness, level of physical activity, and quality of life in prostate cancer patients despite of low testosterone from ADT.

Keywords: Combined exercise, Prostate cancer, ADT, Quality of life
전립선암 환자에서 남성호르몬박탈요법이 심뇌혈관의 발병에 미치는 위험요인에 대한 연구: 국민건강보험 표본코호트를 이용한 연구

문형우1, 조신제1, 양종협1, 최세웅1, 박용현1, 백용진1, 조혁진1, 홍성후1, 이지열1, 김세웅1, 성종미2, 하유신1

1가톨릭대학교 서울성모병원 비뇨기과, 2이화여자대학교 약학대학

Objective: 남성호르몬박탈요법이 심뇌혈관계 발병에 미치는 영향에 관한 연구의 대부분은 서구인들을 대상으로 진행되어 있다. 그러나 남성호르몬박탈요법에 의한 세네 변화는 인종에 따라 다양하게 나타날 수 있는 반면에 아시아권에서의 연구는 부족한 실정이다. 이에 남성호르몬박탈요법이 심뇌혈관 질환의 발병에 미치는 영향에 대해 분석하였다.


Results: 대상환자들의 관찰기간 중위수는 7.6년이었으며, 심뇌혈관질환은 혈관성심질환(Ischemic heart disease, IHD)와 뇌혈관질환(cerebrovascular disease, CVD)로 구분하여 분석하였으며 각각 132명과 158명에서 IHD와 CVD가 발생하였다. IHD의 경우 비약물치료군에 비해 GnRH agonists 투여군에서 유병률과 위험도가 높지만 통계적 유의한 차이를 보이지 않았다. CVD의 경우에도 GnRH agonists 투여군에서 위험도의 증가를 확인할 수 없었다.

Conclusion: 본 연구의 코호트에서 전립선암 환자들에게 GnRH agonists 투여가 심뇌혈관질환의 위험도를 높이는 것으로 분석되었다. 확고한 결론을 위해선 향후 관찰기간 및 환자군이 큰 연구가 필요할 것으로 사료된다.

Keywords: Prostate cancer, Ischemic heart disease, Cerebrovascular disease

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<th>N</th>
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<th>Person year</th>
<th>Incidencea</th>
<th>H.R (95% Confidence interval)</th>
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<td></td>
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<td>11.49</td>
<td>0.926 (0.431-1.990)</td>
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1: Incidence rate per 1000 person-years  
2: Age adjusted model  
3: adjusted for age, Diabetes, dyslipidemia, and hypertension
진단 당시 전이성 전립선암으로 진단 받은 환자들에게 안드로겐 차단요법을 시행하였을 때, 전이부담 정도가 거세져야함 전립선암으로 진행하는 시간에 미치는 영향

이상민, 김성진, 박창후, 김한권, 박종연
울산대학교 강릉아산병원

목적: 진단 당시 전이성 전립선암으로 진단 받은 환자들에게 androgen deprivation therapy (ADT)를 시행하였을 때, 전이부담(metastatic burden) 정도가 CRPC로의 진행에 미치는 영향을 평가하고자 한다.

대상 및 방법: 1998년 5월부터 2016년 9월까지 전이성 전립선암으로 ADT를 받은 환자들 중에서 ADT 이전 전립선암에 대하여 다른 치료를 받지 아니한 ECOG PS 3점 이상, 기대 수명 3개월 미만, 심각한 동반질환이나 5년 이내의 다른 급성기 암으로 진단받은 환자를 제외한 총 85명을 대상으로 하였다. 전이부담을 평가하기 위하여 림프절 전이에 대해서는 solitary vs diffuse여부 및 true pelvis이내 vs pelvis까지 vs pelvic cavity이상 침범유무를 분석하였고, 골전이의 정도를 평가하기 위해서는 골전이의 개수 및 modified Soloway score (mSS)에 따라 전이의 정도를 정량화하여 분석하였다. visceral organ의 전이 유무 및 noncastrate metastatic prostate cancer의 예후 인자로 알려진 Glass model의 유효성을 분석하였고 추가적으로 CRPC에 영향을 미칠 수 있는 다른 인자들을 함께 분석하였다. Cox 회귀분석을 사용하여 CRPC에 대한 위험요인을 분석하였다.

결과: median 22.2개월(3.8-186.5)의 추적조사 결과, CRPC가 48명(56.5%)의 환자에서 나타났다. Median time to CRPC는 15.0개월(65% CI,107-20.960)이었다. 단변량분석에서는 ECOG PS 1점 이상, albumin 4 g/dL 미만, Gleason score 10점, clinical T stage 4, diffuse type 또는 true pelvis이상으로의 림프절 전이가 유의한 위험인자였으며, 골전이에 대해서는 다른 장기 전이 유무와 상관없이 골 전이가 있는 경우, 골전이가 1곳 이상 및 mSS 2점 이상에서 유의한 위험인자였다. 또한 Glass risk group, nadir PSA 0.2 ng/dL 이상도 유의하였다. 다변량 분석에서는 clinical T stage 4, mSS 2점 이상, nadir PSA 0.2 ng/dL 이상이 유의한 위험인자였다(P<0.05).

결론: Clinical T stage 4, mSS 2점 이상, nadir PSA 0.2 ng/dL 이상은 CRPC로의 진행에 독립적인 위험요인으로 작용한다. 특히 골전이는 거세져야함 유무, 골전이의 숫자 및 전이 volume 모두에서 CRPC로의 진행에 위험 요인으로 판단된다. 향후 CRPC 예측을 위하여 전이부담의 정량화 및 특히, 골전이의 정도와 CRPC와의 연관성 및 이를 정량화하는 방법에 대한 추가적인 연구가 필요할 것으로 판단된다.

Keywords: 전이성전립선암, CRPC, Androgen deprivation therapy
호르몬 박탈요법을 받은 한국인 환자에서 거세 저항성 전립선암의 위험도 평가: KCS-prostate scoring model

최세영, 류제만, 경윤수, 남욱, 유달산, 정인갑, 홍준혁, 안한종, 김청수
울산대학교 의과대학 비뇨기과학회실

Objectives: We investigated the progression to castration-resistant prostate cancer (CRPC) after primary androgen deprivation therapy (ADT) and aimed to build a risk prediction model in primary ADT patients.

Materials and Methods: A total of 555 patients who received primary ADT were enrolled in Korean Cancer Study of the Prostate (KCS-prostate) database. Multivariate Cox models were used to determine the effect of prognostic factors. In each patient the weight of all factors was summed to KCS-prostate score and the patients were divided into 3 risk groups according to the scores. The Kaplan–Meier method was used to estimate the probability of CRPC, cancer–specific survival (CSS) and overall survival (OS).

Results: During a median follow-up of 49.8 months, 182 patients (32.8%) progressed to CRPC. On multivariate analysis for CRPC, the significant variables were initial PSA, biopsy Gleason score, clinical N and M stage. KCS-prostate scoring model was calculated with a score of 0 to 7 for CRPC. Patients were categorized into 3 groups by score. The risk groups stratified CRPC (p<0.0001), CSS (p<0.0001), and OS (p<0.0001) on Kaplan–Meier graph. KCS-prostate model predicted CRPC with a c-index of 0.7876, CSS with a c-index of 0.7541, and OS with a c-index of 0.6161. Five-year CRPC rates were 4.9% of low, 32.6% of intermediate, and 66.5% of high risk.

Conclusion: The KCS–prostate scoring model can help to predict CRPC, CSS, and OS in patients with primary ADT. Large cohort studies should be performed to construct an ideal prognostic model for Korean patients with primary ADT.

Keywords: Risk classification, Androgen deprivation therapy, Castration-resistant prostate cancer
Introduction: To compare weekly, every 2 weeks (2 weekly), every 3 weeks (3 weekly) regimens of docetaxel in metastatic castration-resistant prostate cancer (CRPC) patients.

Methods: We retrospectively analyzed 162 CRPC patients who underwent docetaxel chemotherapy between 2004 and 2016. The subjects were divided into three groups according to the chemotherapy regimen. The dose of docetaxel was 30 ml/m² for weekly, 50 ml/m² for 2 weekly, and 60 ml/m² for 3 weekly.

Results: 38, 41 and 83 patients were in the weekly, 2 weekly and 3 weekly arms, respectively. The basic characteristics of patients except eastern cooperative oncology group performance score (ECOG-PS) were similar. In the case of ECOG-PS, grade was higher in weekly. There was no significant difference in overall survival, cancer specific survival, and progression free survival among the three groups. There was no difference in toxicity such as hematologic, neurological, respiratory, gastrointestinal, fatigue among three groups. In cox multivariate regression analysis, age, ECOG-PS, duration of hormone therapy, PSA level at the onset of chemotherapy, response to chemotherapy, and chemotherapy cycle affected survival. And the ECOG-PS, response to chemotherapy, and chemotherapy cycle also affected progression.

Conclusion: There was no significant difference in toxicity and efficacy according to the docetaxel chemotherapy regimen. Clinical outcomes are influenced by chemotherapy cycle, response, and patient performance status rather than by regimen.

Keywords: Docetaxel, CRPC, Chemotherapy
도세탁셀로 치료한 전이성 거세저항성 전립선암 환자의 치료 반응에 대한 예측인자

김정권, 김성한, 정재영, 서호경, 정진수, 이강현
국립암센터 전립선암센터 비뇨기과

목적: 도세탁셀로 치료한 전이성 거세저항성 전립선암 환자에서 도세탁셀에 대한 치료 반응을 예측할 수 있는 인자를 알아보고자 하였다.

대상 및 방법: 2005년부터 2016년까지 본 기관에서 전이성 거세저항성 전립선암으로 진단받고 도세탁셀로 최초 치료를 시행 받은 191명의 환자를 대상으로 분석을 시행하였다. 도세탁셀 요법은 75 mg/m², 3주 간격이었으며, 부작용 발생 및 환자의 performance status에 따라 용량 및 간격을 조절하였다. 매 주마다 PSA 수치를 측정하여 치료반응을 판정하였으며, 3개월마다 영상의학검사를 통해 측정 가능한 전이병소의 반응을 RECIST 지침에 따라 평가하였다. 도세탁셀의 지속 여부는 치료반응(response) 및 환자의 내약성(tolerability)을 모두 만족할 때를 기준으로 하였다. 본 연구에서는 총 10주기 이상의 도세탁셀 치료를 받은 환자군을 좋은 반응군(good responder group)으로 정의하였다. 반응군에 따라 주요 임상인자를 비교 분석하였으며, 로지스틱 회귀분석을 통해 치료 반응의 예측인자를 조사하였다.

결과: 35명(18.3%)의 환자가 good responder으로 보고되었으며, Kaplan–Meier 분석을 시행하였을 때 질병무진행 생존율 및 전체생존률에서 그렇지 않은 군에 비해서 유의하게 우월한 것으로 보고되었다(all, p<0.001). 치료 반응 여부에 따라 두 군으로 나누어 분석하였을 때, PSA nadir(≤10 vs. >10)와 PSA nadir까지의 기간(Time To PSA nadir, TTPN, ≤3 months vs. >3 months)이 유의한 차이를 보였다. 로지스틱 회귀분석을 시행하였을 때, 단변량 분석에서는 전이병소(p=0.039), TTPN (p<0.001), metastatic volume (p=0.041), ALP (P=0.030) 및 3등급 이상의 neutropenia 발생(p=0.035)이 좋은 치료 반응의 유의한 독립적인 예측인자였으나, 다변량 분석에서는 TTPN만이 유의한 예측인자로 나타났다(OR, 5.906; 95% CI, 1.622–21.499; p=0.007) (Table 1).

결론: 도세탁셀로 치료한 전이성 거세저항성 전립선암 환자에서 3개월 이상의 TTPN은 도세탁셀에 대한 치료 반응을 예측할 수 있는 유의한 독립적인 예측인자였다.

Keywords: Docetaxel, CRPC, Response

<table>
<thead>
<tr>
<th>Table 1. Uni- and multivariate analyses of associations between various parameters and treatment response in patients with metastatic CRPC treated with docetaxel</th>
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<tr>
<td>Metastasis site (bone vs. others)</td>
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<td>PSA nadir (&lt;10 vs. ≥10)</td>
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<td>TTPN (&lt;3 vs. ≥3 months)</td>
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<td>Metastatic volume (low vs. high)</td>
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<td>Neutropenia ≥ Gr3, yes</td>
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Purpose: Many studies have revealed that there is an association between vitamin D levels and prostate cancer risk, but whether the association is positive or negative remains unclear. This study is the first to report an association between prostate cancer history and vitamin D levels among different races in a single population in the United States.

Materials and Methods: We investigated whether there was an association between vitamin D level and prostate cancer history in different races in the United States. We used data collected from 1,363 men during the National Health and Nutrition Examination Survey 2007–2008. Multivariate logistic regression analysis was used to evaluate the independent associations between vitamin D levels (not only 25–hydroxyvitamin D (25(OH)D), but also 25(OH)D2 and D3) and prostate cancer history. Association between vitamin D levels and prostate specific antigen level was also analyzed in non–Hispanic white males without prostate cancer.

Results: Older age was significantly associated with a history of prostate cancer in all races (p<0.05), whereas vitamin D (p=0.024), especially 25(OH)D2 (p=0.027) was significantly higher only in non–Hispanic white males. There was no difference in vitamin D between non–Hispanic white males with a prostate specific antigen concentration >3 ng/mL and ≤3 ng/mL.

Conclusions: This study revealed a positive association between vitamin D, especially 25(OH)D2, and prostate cancer only in non–Hispanic white males. And vitamin D was not associated with prostate specific antigen level causing detection bias.

Keywords: Prostate cancer, Vitamin D, 25-hydroxyvitamin D
Objectives: We evaluated the prognostic factors of survival in chemotherapy-naïve castration-resistant prostate cancer (CRPC) with enzalutamide.

Materials and Methods: We retrospectively reviewed patients with prostate cancer who did not treated with enzalutamide before chemotherapy. We collected serum labs including PSA, testosterone, hemoglobin, platelet, neutrophil, lymphocyte, protein, albumin, liver and lipid profiles from pre-enzalutamide to 6 months. The Kaplan–Meier method was used for overall survival, Cox regression analysis was used to identify the factors associated with overall survival.

Results: A total of 94 patients enrolled. Among them, 7 patients (7.6%) were ECOG performance status $\geq 2$, 56 patients (65.9%) had Gleason score $\geq 9$, 23 patients (24.5%) received prior radical prostatectomy, and 24 patients (25.5%) underwent prior radiation therapy. The mean period from diagnosis to enzalutamide was 3.7±3.4 years. At the initiation of enzalutamide, there were 86 patients (91.5%) of bone metastasis, 43 patients (45.7%) of lymph node metastasis, and 23 (24.5%) of visceral metastasis. PSA, neutrophil-to-lymphocyte ratio (NLR), and alkaline phosphatase (ALP) levels decreased from 43.4 ng/mL to 3.0 ng/mL ($p<0.001$), from 2.3 to 1.5 ($p=0.002$), and from 125 IU/L to 96 IU/L ($p=0.006$), respectively. On multivariate analysis, the predictors of overall survival were ECOG performance status ($2$ vs $\leq 1$: hazard ratio [HR] 3.655, $p=0.0269$), visceral metastasis (HR 3.301, $p=0.0018$), PSA (HR 1.001, $p=0.0360$), NLR ($>3$ vs $\leq 3$: HR 4.493 $p=0.0002$) and ALP (HR 1.002, $p=0.0076$). On Kaplan–Meier curve, NLR $>3$ ($p<0.0001$) and visceral metastasis ($p=0.0003$) showed poor overall survival.

Conclusion: In chemotherapy-naïve CRPC patients who treated with enzalutamide, ECOG ($\geq 2$), visceral metastasis, NLR ($>3$), high PSA and high ALP were associated with poor overall survival.

Keywords: Enzalutamide, Chemotherapy-naïve castration-resistant prostate cancer, Neutrophil-to-lymphocyte ratio
신이식환자에서 발생하는 요로상피암

유지영, 강민용, 성현환, 전황균, 이현무, 최한용, 전성수
성균관대학교 의과대학 삼성서울병원 비뇨기과학회실

목적: 신이식환자에서 발생하는 요로상피암의 발생률, 위험인자 그리고 치료에 대한 본원에서의 경험에 대해 보고하고자 하였다.

대상 및 방법: 1997년 7월부터 2016년 12월까지 본원에서 신이식을 받은 2186명 중 요로상피암이 발생한 9명의 환자와 외부병원에서 신이식 후 요로상피암에 대해 본원에서 치료를 받은 환자 5명을 후향적으로 분석하였다. 신이식 후 발생하는 요로상피암의 발생 양상, 위험인자, 치료에 대해 분석하였고, 국내 암통계 자료를 이용하여 일반인군과 비교하였다. 특히 상부요로상피암에 대해 수술을 시행한 신이식환자 9명을 본원에서 상부요로상피암에 대해 수술을 시행한 일반인 585명 중 유사한 특성을 갖는 27명과 짝을 지어 비교하였다.

결과: 신이식환자에서 요로상피암의 10만명당 연령표준화 발생률은 각각 122.2명, 114.0명으로 일반인군에 비해 각각 25.5배, 129.5배 높았다(각각, p<0.001). 또한 일반인군에서 방광암이 상부요로상피암보다 5.5배 많이 발생한 것에 비해 신이식환자군에서는 상부요로상피암이 방광암에 비해 2.0배 더 많이 발생하였다( p<0.001). 일반인군에 비하여 신이식환자군에서 여성이 요로상피암의 발생 위험이 높았다(OR 11.29; p=0.023). 신이식 후 방광암이 발생한 5명의 환자 중 방광암 치료 전 사망한 1명을 제외한 4명에서 경조영 방광중앙절제술을 시행하였다. 재발하는 표재성 방광암에 대해 방광 내 항암제 주입술을 시행하였으나 방광 내 BCG 주입술을 시행한 경우는 없었다. 침윤성 방광암에 대해 근치적 방광절체술이 시행된 경우는 없었다. 신이식 후 상부요로상피암이 발생한 9명의 환자는 각각 근치적 신장-요관 절체술(8명) 및 신장 절체술(1명)을 시행받았다. 상부요로상피암에 대한 치료 이후에 일반인군과 신이식환자군에서 10만 인년 당 암 재발 및 진행수(91.1 vs. 77.2; p=0.770) 및 암 특이 사망자수(22.4 vs. 14.9; p=0.709)에는 차이가 없었다.

결론: 신이식환자에서는 일반인군에 비해 요로상피암의 발생이 높아져 이에 대한 각별한 주의가 요구되며, 특히 상부요로상피암 및 여성환자에 대하여 더욱 그러하다. 신이식 후 발생하는 요로상피암에 대해 일반인과 유사한 치료적 접근이 가능하며, 특히 상부요로상피암에 대해 근치적 신장-요관 절체술을 시행할 시 일반인군에서와 대등한 치료 성적을 기대할 수 있다.

Keywords: Urothelial carcinoma, Kidney transplantation
We examined the association between obesity and bladder cancer using nationally representative data on the Korean population from the National Health Insurance System (NHIS). We estimated the impact of obesity on bladder cancer and stratified by smoking status. Of the 45,850,458 people who underwent at least one health examination from 2009–2012, 23,378,895 without bladder cancer were followed from the January 2009 to the December 2015. Multivariate adjusted Cox regression analysis was conducted to examine hazard ratios (HRs) and 95% confidence intervals (CIs) for the association between bladder cancer and obesity. In total, 14,143 (0.089%) were diagnosed with bladder cancer in the non-obesity group and 7,761 (0.104%) were diagnosed with bladder cancer in the obesity group.

The HR for bladder cancer development significantly increased as body mass index (BMI) increased beyond the reference BMI in a model adjusted for age and multiple variables.

Smoking was associated with significant high risk for bladder cancer development in the regression analysis. An analysis of HR for bladder cancer stratified by obesity across smoking status strata showed, significant trend of increasing HR for bladder cancer across obesity and smoking status in age–adjusted and multivariate–adjusted models (p for interaction=0.133 for age and 0.135 for multivariate). For a population with the same smoking status, those with obesity were more likely to have bladder cancer than those without obesity. Especially in ex and current smokers, obesity increased the impact of smoking on development of bladder cancer. This population–based study showed that increasing BMI was a risk factor for develop bladder cancer independent of confounding variables. Obesity increased the impact of smoking on development of bladder cancer.

Keywords: Bladder cancer, Body mass index, Smoking
Identification of red/green/blue values from white-light imaging and narrow-band imaging for the discrimination of bladder cancer features

이광석, 구교철, 정병화
연세대학교 의과대학 강남세브란스병원

Background: White-light cystoscopy (WLC) has been the standard method for detecting urothelial carcinoma and narrow-band imaging (NBI) has recently been reported to provide improved detection rates for bladder cancer.

Objective: To investigate the relationship of numerical information (using red/green/blue values) of lesions suspected as bladder cancer with detection, stage, and tumor grade.

Design, Setting, and Participants: This prospective double-blind controlled study was performed in 102 patients with suspected bladder cancer. The patients were assessed by 2 urologists. We analyzed the mean red/green/blue values from WLC and NBI for 172 lesions. Outcome measurements and statistical analysis: Using functions in the Picture Archiving and Communication System, lesion characteristics were measured as a red/green/blue scoring method (RGB) (average values from three consecutive slices). Pairwise comparison of ROC curves was applied to compare the predictive performance of various parameters and their combination.

Results and Limitations: The rates of malignancy and carcinoma in situ at the sites identified only by NBI were 63.0% and 53.3%, respectively. The R value from WLC (≤209 vs. >209) was a significant predictor of bladder cancer detection in multivariate analysis. The area under the curve of using the red/green/blue values along with conventional factors was significantly higher than that of conventional factors (0.790 vs. 0.740, p=0.0053). The B value from WLC (≤125 vs. >125), G value from narrow-band imaging (≤149 vs. >149), and B value from NBI (≤114 vs. >114) were significant predictors of muscle invasion. Moreover, the R value from WLC (≤176 vs. >176) and G value from NBI (≤138 vs. >138) were significant predictors of high-grade bladder cancer.

Conclusions: Red/green/blue values from WLC and NBI for suspicious lesions might help in the prediction of bladder cancer features. Additionally, NBI is an effective method for identifying bladder cancer and carcinoma in situ.

Keywords: Bladder cancer, Narrow band imaging, RGB, White light imaging
BCG 치료를 받은 근육침윤성 방광암 환자의 예후 예측을 위한 NLR의 효용성과 CUETO scoring model과의 관계

김진우, 민경찬, 이유진, 정재욱, 하윤석, 최석환, 김범수, 김현태, 유은상, 권태균, 정성광, 김태환
경북대학교 의과대학 비뇨기과학실

목적: Neutrophil-to-lymphocyte ratio (NLR)는 전신 염증반응의 marker로서 여러 종양의 재발과 진행과 관계가 있는 것으로 알려져 있다. 본 연구자들은 CUETO scoring model과 함께 NLR이 BCG 치료를 받은 근육침윤성 방광암 환자의 예후 예측 능력을 가지는지 확인해 보고자 하였다.


결과: 평균 추적 관찰 기간은 46개월 (Range, 11-129개월; median, 46개월)이었으며, 84명 (29.9%)의 환자에서 재발이 14환자 (5.0%)에서 진행이 관찰되었다. 재발에 대한 NLR의 cut-off value는 2.29이며, 전체 환자 281명 중 173명 (61.6%)이 높은 NLR을 보였다. Kaplan-Meir curve에서 높은 NLR은 재발 (Log rank test, P<0.001)과 진행 (Log rank test, P<0.001) 모두 유의한 연관성을 보였으며, CUETO 총점을 4개 계층으로 범주화하여 분석한 Kaplan-Meir curve에서 CUETO 총점은 재발과 유의한 연관성을 보였으나 (Log rank test, P<0.001), 진행 (Log rank test, P=0.423)의 발생과는 유의한 관계를 보이지 않았다. NLR의 고저와 CUETO 총점 4계층의 조합을 4그룹으로 나누어 시행한 Kaplan-Meir curve에서 CUETO 총점은 재발과 유의한 연관성을 보였으나 (Log rank test, P<0.001), 진행 (Log rank test, P=0.002) 모두 유의한 연관성을 보였다. 다변량 분석에서 높은 NLR(HR 2.451, P<0.001), 성별(HR 2.565; P=0.01), 재발성 tumor (HR 2.320; P=0.006), tumor 개수(HR 1.874; P=0.01) 그리고 CIS 동반 여부(HR 2.007; P=0.033)가 재발과 유의한 연관성을 확인되었으며, 높은 NLR(HR 5.911, P=0.08)와 재발성 tumor (HR 3.997; P=0.027), CIS 동반 여부(HR 4.903; P=0.008)가 진행의 유의한 예측 인자로 밝혀졌다.

결론: 근육침윤성 방광암 환자에서 NLR은 재발 및 진행을 예측하는 유의한 예측 인자로 확인되었다. 예측인자로서 숱전 NLR의 포함은 예후를 예측하기 위한 CUETO 모델의 정확성을 증가시키며, 높은 NLR을 갖는 환자는 보다 적극적인 관리를 권고할 수 있을 것이다. 추후 확대된 연구를 통해 biomarker가 포함된 방광암 예후 예측 scoring system의 개발이 필요하다.

Keywords: Neutrophil-to-lymphocyte ratio, BCG instillation therapy, Spanish urological club for oncological treatment scoring model
Introduction: To determine the predictive factors to BCG failure in patients with non–muscle invasive bladder cancer (NMIBC) after BCG maintenance treatment

Materials & Methods: We retrospectively reviewed the medical records of 118 intermediate/high-risk NMIBC patients who underwent BCG maintenance treatment after TUR-BT from 2011 to 2016. Tumor size, number, CIS lesion, 1973/2004 WHO grading, re TUR-BT, neutrophil–lymphocyte ratio(NLR) were analyzed by logistic regression analysis

Results: During a median follow–up of 30.9 months (IQR, 18.75–47.0), 11 patients (10.2%) were intermediate–risk group, 107 patients (89.8%) were high–risk group. Mean age was 67 years, BCG failure was observed in 1 patient (9.1%) of intermediate–risk group and 30 patients (26.3%) of high–risk group. Among the 31 patients, NMIBC with high grade is present within 3month in 9 patients (7.6%). The number of high grade tumor appeared after 3 months of BCG therapy was 2 patients (1.7%). High grade tumor recurrence after completion of BCG maintenance in 9 patients (7.6%), MIBC is detected during follow–up in 11 patients (9.3%). On logistic regression analysis, Tumor size (OR=2.299, p=0.027), 2014 WHO grading (OR=5.452, p=0.001) were independently associated with BCR failure (Table 1).

Conclusions: Tumor size larger than 3 cm and higher grade may be related with BCG failure in patients with non–muscle invasive bladder cancer (NMIBC) after BCG maintenance treatment

Keywords: BCG failure, Bladder cancer, Predictive factor
상부요로상피암에서 진단적 요관경 검사의 정확성

정재동, 나준필, 성현환, 전황균, 정병창, 서성일, 이현무, 최한용, 전성수
성균관대학교 의과대학 삼성서울병원 비뇨기과학실

Objectives: Diagnostic ureterorenoscopy (URS) is currently recommended before endoscopic management of upper tract urothelial cancer (UTUC) as it shows different characteristics from bladder cancer. The aim of this study was to evaluate the diagnostic value of the URS.

Materials & Methods: Between 1994 and 2015, a total of 785 patients had undergone radical nephroureterectomy (RNU) in our center. Diagnostic URS was performed in 389 patients among them. After excluding 1) non-diagnostic case (n=34), 2) patients who did not undergone biopsy (n=41), 3) patients with unknown cancer stage (n=121), 193 patients were finally enrolled and analyzed retrospectively. Their URS biopsy result were evaluated in comparison with final pathology. T stages above T2 were defined as invasive tumors.

Results: Table 1 summarizes baseline characteristics. There was statistical difference between URS biopsy and final histology grade and stage (P<0.001). 78.3% of the grade 1 tumors in URS biopsy were non-invasive tumors and 77.1% of grade 3 tumors in URS biopsy were invasive tumors. Grade 2 tumors in URS biopsy were non-diagnostic outcome as a predicting factor for invasive tumor at final pathology. Ta tumors in URS biopsy were non-diagnostic and only 33.3% were invasive tumors. Stage above T1 tumors in URS biopsy were invasive tumors and upgraded final stage in 83.3%. Grade 3 in URS biopsy as a predicting factor for invasive tumor had an accuracy of 0.67, sensitivity of 0.58, specificity of 0.78, positive predictive value of 0.73, and negative predictive value of 0.75; corresponding values for stage above T1 tumors in URS biopsy as a predicting factor for invasive tumor were 0.75, 0.73, 0.78, 0.82, and 0.67, respectively.

Conclusions: URS biopsy is necessary to rule out invasive tumor. If the biopsy shows above T1 or grade 3, endoscopic management should not be recommended. It is more likely to be invasive tumor which shows above T1 tumors in URS biopsy. Especially, the accuracy of the ex

Keywords: Upper tract urothelial carcinoma, Ureterorenoscopy, Grade and stage
O-247

상부요로상피종양에 대한 근치적 신요관절제술 이후 신기능 감소의 예측 인자: 술전 99mTc-DTPA 결과와의 연관성

류재만1, 남 옥1, 최세영1, 경윤수2, 유달산1, 정인갑1, 송채린1, 홍범식1, 홍준혁1, 안한종1, 김청수1
울산대학교 서울아산병원 1비뇨기과학과학교실, 2건강의학과

Introduction: We investigated the predictors of renal function decline after radical nephroureterectomy (RNU) for upper tract urothelial carcinoma (UTUC) and the correlation between preoperative 99mTc-diethylenetriamine pentaacetic acid (DTPA) renal scan and postoperative renal function.

Materials and Methods: Among 381 patients who underwent RNU for UTUC in our institution between 2005 and 2012, 203 patients underwent DTPA renal scan before surgery. Estimated glomerular filtration rate (eGFR) was calculated using the Modification of Diet in Renal Disease (MDRD) Study equation before and 3 months after RNU. We analyzed preoperative and postoperative eGFRs based on the preoperative DTPA renal scan and identified the predictors of eGFR decline after RNU using multivariable analysis.

Results: Median age was 64 years. Hydronephrosis in computed tomography was found in 145 (71.4%) of patients. Median tumor size was 3 cm and tumor was located in renal pelvis (45.3%), ureter (40.9%), or both (13.8%). The median eGFR declined by 22.7% 3 months after RNU. In preoperative DTPA renal scan, median GFR of the operated and remained kidney was 26.2 and 40.0 ml/min, respectively. The GFR of the resected kidney in DTPA renal scan was significantly correlated with eGFR decline after RNU (R²=0.334, p<0.001). On multivariable analysis except the factor of preoperative DTPA results, absence of hydronephrosis and smaller tumor size were significant predictors of more decline of eGFR after RNU, while on multivariable analysis including DTPA results, the GFR of the resected kidney in DTPA renal scan was only significant predicting factor of more decrease of eGFR. The equation of renal function 3 months after RNU was estimated as follows: Decreased eGFR ratio=0.712 * (GFR of resected kidney on preoperative DTPA renal scan)–6.209.

Conclusions: The GFR of the operated kidney in DTPA renal scan was a significant predicting factor of eGFR decline and we established predictive equation of renal function based on the results of DTPA renal scan.

Keywords: Transitional cell carcinoma, Glomerular filtration rate, 99mTc-diethylenetriamine pentaacetic acid
근칙적 전립선 절제술을 시행받은 환자에서 수술전 배뇨근 과활동이 수술 후 저장증세에 미치는 영향

양종협, 성재우, 조신제, 이규원, 정현철, 최진봉, 최세웅, 박용현, 배종진, 조혁진, 이지열
가톨릭대학교 서울성모병원

**Purpose:** To investigate the significance of detrusor overactivity (DO) as a predictor of storage symptoms after radical prostatectomy.

**Materials and Methods:** This study included a total of 153 patients with clinically localized prostate cancer who underwent LRP and RARP between January 2011 and April 2016. The patients were divided into 2 groups, according to the detrusor overactivity detected by urodynamic study preoperatively (Group I: DO-, N=119; Group II: DO+, N=34). The subjective symptom was assessed by international prostate symptom score (IPSS). We analyzed the factors affecting the aggravation of storage symptoms after surgery using logistic regression analysis.

**Results:** There was no significant difference in demographic, perioperative parameters and oncologic outcomes between the two groups. Total IPSS score (P=0.001) and voiding symptom score (P<0.001) significantly improved, but storage symptoms were aggravated at 12 months after surgery (P=0.043). Except the total IPSS score and voiding symptom score, DO appeared to be the only independent factor associated with the deterioration of the storage symptoms after surgery on multivariate analysis.

**Conclusion:** Preoperatively detected DO was closely associated with aggravation of storage symptoms after radical prostatectomy.

**Keywords:** Radical prostatectomy, Storage symptom, Detrusor overactivity
한국인 전립선 암 환자에서의 근치적 전립선 절제술 후 건강 관련 삶의 질 변화: 어떤 요인이 수술 후 만족도에 영향을 주는가?
박사현, 임고산, 김명, 송채린, 안한종
울산대학교 서울아산병원

**Purpose:** Health-related quality of life (HRQOL) outcomes after radical prostatectomy (RP) are one of major concerns for men with localized prostate cancer. HRQOL changes after RP are not yet fully investigated in Korean prostate cancer patients. We aimed to identify HRQOL changes after RP using EPIC questionnaires.

**Materials and Methods:** EPIC questionnaires were prospectively obtained from 211 men with localized prostate cancer who underwent radical prostatectomy. Patients were routinely scheduled to visit the clinic at baseline, 1, 3, 6 and 12-months postoperatively and asked to complete EPIC. Patients who underwent adjuvant or salvage therapy in postoperative 1 year were excluded. Four summary domains and each subscale components were evaluated. Each scores were calculated by the 0–100 scales, with higher scores representing better HRQOL.

**Results:** Mean age of patients was 64.7 years, 81.2% of patients underwent robotic prostatectomy. Urinary function and bother scores worsen after RP, and returned stable from 6 months after RP. Mean urinary domain scores did not return to baseline at 12 months after RP. Sexual function and bother scores declined after surgery. Both began to improve since 6 months after surgery. Minimal changes were identified in the bowel and hormonal domains. Overall patient satisfaction rates on treatment were 64.9%, 64.3%, and 66.2% at 3, 6, and 12 months postoperatively. In multivariate analysis, urinary function (P=0.003) and urinary bother (P=0.013) changes were the independent factors influencing patient satisfaction at 12 months after RP.

**Conclusions:** Mean urinary function and bother return to nearly close to preoperative baseline at 6 months after RP. However, mean sexual function and bother declined greatly after RP, and did not reach a new baseline until 12 months after RP. Sexual function assessment should be performed carefully even after 1 year post-surgery. The urinary function and urinary bother changes were the independent influencing factor for patient satisfaction after RP.

**Keywords:** Prostatectomy, Quality of life, Surveys and questionnaires
12주간 체계적인 골반저근운동이 근기적 전립선절제술 후 요실금회복에 미치는 영향

박주현1, 유상준1, 조성용1, 조민철1, 손환철1, 한가영2, 송욱2, 정현1
1서울특별시보라매병원, 서울대학교 의과대학 비뇨기과학회, 2서울대학교 의과대학 체육회

목적: 근기적 전립선절제술을 받은 환자들을 대상으로 12주간 체계적인 골반저근운동프로그램을 시행하고, 요실금 회복에 미치는 영향에 대해 알아보고자 하였다.

대상 및 방법: 본원에서 전립선암으로 진단받아 근기적 전립선절제술을 시행 받은 60세 이상의 환자를 대상으로 하였으며, 과거 골반 내 수술력 및 배뇨기능에 영향을 미치는 점을 가진 자는 제외하였다. 총 12주간 전문적인 운동치료사가 주 1회 직접 교육을 시행하며, 교육받은 내용은 환자가 스스로 주 6회 자택에서 시행하고, 시행여부를 기록하도록 하였다. 운동요법 참여 전후 근력평가를 포함하여, 환자의 임상정보를 수술 전, 수술 직후, 운동치료 6주후, 운동치료 12주 후로 나누어 평가하였으며, 운동치료 12주 후 1hr 패드 테스트를 통한 요실금량의 감소율을 1차 연구종점으로 삼았으며, 그 외 생화학적 지표 및 근력 향상 등을 2차 연구종점으로 정하였다.

결과: 총 57명의 환자가 12주간의 골반저근운동프로그램에 동의하였으며, 이중 16명의 환자는 동의 철회 및 수술 후 합병증 등으로 연구에서 중도 탈락되었다. 총 41명의 데이터를 분석하였으며, 운동프로그램 참여율 50%를 기준으로 적극운동 참여군(20명)과 비적극운동참여군(21명)으로 구분하였다. 12주간의 골반저근운동프로그램 후 적극운동참여군이 비적극운동 참여군에 비해 Adductor 근력이 유의하게 향상되는 것으로 확인되었으며(P=0.022), 다른 근육의 경우에는 군간 유의한 차이를 확인할 수 없었다. 다변량 분석에서는 Extensor (P=0.036) 및 Adductor (P=0.048)의 근력이 요실금량의 변화에 유의한 영향을 미치는 것으로 확인되었다.

결론: 12주간의 체계적인 골반저근운동프로그램은 Adductor 근력을 통해 요실금의 조기회복에 도움이 되는 것으로 나타났다. 또한 Extensor 근력 또한 요실금 회복에 도움이 되는 것으로 분석되었으므로, 추후 Extensor도 함께 향상시킬 수 있는 운동프로그램이 필요할 것이라고 생각하였다.

Keywords: Incontinence, Pelvic floor muscle exercise, Prostatectomy
신세포암 세포주(Caki-1)에서 clear cell induction 및 metformin에 의한 mitochondria 활성의 mTOR inhibitor에 의한 세포 고사 효과를 증대시킨다

김숙영①, 나준채①, 허준혁①,2, 홍성준①,2, 이형호③, 윤영은④, 한웅규①,2

1연세대학교 의과대학 비뇨기과학교실, 비뇨의과학연구소, 2Brain Korea 21 PLUS Project for Medical Science, Yonsei University, 3국립건강보험공단 일산병원 비뇨기과, 4한양대학교 의과대학 비뇨기과학교실

목적: 신세포암 세포주에서 clear cell induction (CCI) 및 AMPK를 활성화 유도물질로 잘 알려진 Metformin을 투여했을 때 기존의 신세포암 치료제인 mTOR inhibitor의 효과에 대한 변화를 알아보고자 한다.

d대상 및 방법: Caki-1 세포에 metformin을 농도 별로 투여하여 독성 정도를 CCK-8 assay로 시행했다. CCI시에 나타나는 특징인 mitochondria의 증가가 metformin 투여 시에도 나타나는지 보기 위해 mitochondrial protein인 Voltage-dependent anion channel (VDAC)의 발현을 Western blotting으로 확인하였다. Metformin이 약물감수성에 영향을 줄 수 있는지 보기 위해 mTOR inhibitor인 Temsiloimus와 병행 투여한 후 독성 정도를 CCK-8 assay로 시행했다.

결과: Caki-1 세포는 CCI 유도 시에 Temsiloimus 농도별 약 20% 이상 독성이 증가됨을 확인하였다(Fig-1A). Caki-1 세포내의 mitochondrial protein인 VDAC과 COX-IV의 증가가 관찰되었으며, mitochondria의 중요 regulator인 PGC-1α의 증가 및 이의 up-stream인 phospho-AMPK의 증가를 관찰할 수 있었다(Fig-1B). 세포주에 Metformin을 농도 별(1, 10 mM, Fig-2)로 투여 했을 때에 적정농도를 찾는 실험을 진행하였다. 이후에 같은 농도로 5일 동안 metformin을 처리하였을 때 CCI와 같이 mitochondrial protein 인 VDAC이 농도 의존적으로 증가함을 확인하였다(Fig-3A). 이러한 변화는 Temsiloimus와 metformin을 동시 투여 했을 때, CCI처럼 약물감수성을 증가시켰다(Fig-3B).

결론: 본 연구는 CCI 및 Metformin에 의한 mitochondria 활성을 증가 시키는 기전을 제시하였고 이에 따른 약제의 감수성을 증대 시키는 효과를 입증하였다.

Keywords: Renal cell carcinoma, Metformin, Mitochondria
NP-002

**hsv2-miR-H9 and hsv1-miR-H18 in formalin-fixed paraffin-embedded (FFPE) are valuable diagnostic biomarkers for prostate cancer**

변영준, 박현미, 정필두, 서성필, 강호원, 김원태, 김용준, 윤희증, 이상철, 김원재
충북대학교 의과대학 비뇨기과학실

**Background:** Previously, we investigated the expression of two viral miRNAs (hsv2–miR–H9 and hsv1–miR–H18) in prostate cancer (PCa) from fresh tissues and urine. In this study, we reconfirmed two viral miRNAs as field-effect related biomarkers for PCa in FFPE (Formalin–Fixed Paraffin–Embedded) and could generate hypothesis with these results.

**Materials and Methods:** In total, FFPE tissue samples from 67 PCa patients, 100 noncancerous surrounding tissues, 100 benign prostate hyperplasia (BPH) were analyzed by real-time polymerase chain reaction (RT–PCR) in this study.

**Results:** The expression levels of two viral miRNAs were significantly higher in FFPE of PCa than in BPH (P<0.001). Remarkably, the expression levels of two viral miRNAs in noncancerous surrounding tissues also were higher than in BPH controls (P<0.005). In case of PSA levels below 10 ng/mL, hsv1–miR–H18 could discriminate PCa, noncancerous surrounding and BPH from each other (P<0.001).

**Conclusion:** Our finding suggests that hsv2–miR–H9 and hsv1–miR–H18 may help for decreasing unnecessary biopsy with increasing positive detection for PCa as valuable diagnostic biomarkers.

**Keywords:** Viral miRNA, miRNA, Formalin-fixed paraffin-embedded, Prostate cancer
NP-003

새로운 비침습적 방광암 진단 마커로서 소변 cell-free nucleic acid IQGAP3의 진단적 가치
변영준, 김예환, 정필두, 서성필, 강호현, 김원태, 김용준, 윤석중, 이상철, 김원재
충북대학교 의과대학 비뇨기학교실

Background: There is growing interest in developing new non-invasive diagnostic tools for bladder cancer (BC) that have better sensitivity and specificity than cystoscopy and cytology. This study examined the value of urinary cell-free nucleic acid (NA) as a diagnostic marker for BC.

Material and Methods: A total of 81 patients (74 BC and 7 normal controls) were used for a tissue set, and 212 patients (92 BC and 120 normal controls) were used as a urine set. Expression of tissue mRNA and urinary cell-free NAs was then examined.

Results: Four candidate genes were top-ranked in the tissue microarray. Expression levels of two of these (IQGAP3 and TOP2A) in BC tissue and urine samples from BC patients were significantly higher than those in samples from the control groups. Binary logistic regression analysis of cell-free NA levels in urine samples revealed that IQGAP3 was significantly associated with BC: PicoGreen-adjusted odds ratio (OR), 3.434; confidence interval (CI), 2.999-4.180; P<0.001; RiboGreen-adjusted OR, 2.242; CI, 1.793-2.840; P<0.001. Further analysis of IQGAP3 urinary cell-free NAs with respect to tumor invasiveness and grade also yielded a high AUC, suggesting that IQGAP3 can discriminate between BC patients and non-cancer patients with hematuria.

Conclusions: Levels of IQGAP3 urinary cell-free NA in BC patients were significantly higher than those in normal controls or patients with hematuria. High levels of IQGAP3 urinary cell-free NA also reflected high expression in BC tissues. Therefore, IQGAP3 urinary cell-free NA may be a complementary diagnostic biomarker for BC.

Keywords: Biomarkers, Nucleic acids, Urinary bladder neoplasms, Urine
방광암에서 UroVysion™ FISH를 이용한 혈중 순환 종양세포의 염색체 이상 검출

하유신1, 성재우1, 조신제1, 양종협1, 문형우1, 홍성후1, 김태정2
가톨릭대학교 의과대학 1서울성모병원 비뇨기과학교실, 2여의도성모병원 병리학교실

Objective: 혈중 순환 종양세포(circulating tumor cells)는 종양에서 흘러나와 혈중을 순환하며, 본 종양의 분자학적 특성을 잘 반영하는 것으로 알려져 있다. 본 연구에서는 방광암환자의 혈액과 소변에서 혈중 순환 종양세포 및 방광암세포를 fluorescence in situ hybridization (FISH)를 통해 비교해보고, 이 세포들의 활성도(viability) 및 염색체 이상과의 관련성을 확인하고자 하였다.

Methods: 방광암 환자 18명의 혈액 15 cc 및 소변 50 ml을 채취하여 각각 종양세포를 분리 후 단기간 배양하였다. High Density Microporous (HDM) chip을 이용하여 검출한 circulating tumor cells (CTCs)에서 fluorescence in situ hybridization (FISH)를 시행하여 염색체 3, 7, 17 또는 9p21의 결실에 대해 확인하였고, Bioview™ automated Imaging System을 이용하여 혈액내의 CTC와 소변내의 종양세포 사이에 분자학적 차이 및 세포 활성도에 대해 조사하였다. CTC를 배양하여 종양세포의 활성도는 DAPI 염색을 이용하여 간접적으로 측정하였다.

Results: 방광암 환자 18명의 혈중 순환 종양세포(CTCs) 18례와 10명의 소변에서 확인된 10개의 CTC를 비교 분석하였다. 혈중종양세포와 소변 내 종양세포 사이에서 세포 활성도는 서로 일치하지 않는 결과를 보였다. 염색체 이상은 세포활성도가 높은 종양세포, 전체 종양세포, 방광암 병기 사이에 상관관계를 보이지 않았으나, 이러한 종양학적 변수와 상관없이 비정상 염색체가 많은 군과 낮은 군으로 나눌 수 있었다.

Conclusions: 혈중 순환 종양세포와 소변에서 확인된 방광암 세포 사이의 연관성 및 방광암 병기와의 연관성, 세포 활성도에 영향을 미치는 인자에 대한 추가 연구가 더 필요할 것이다.

Keywords: Circulating tumor cells, Bladder cancer

Abnormal cell
WT cell
Purpose: We investigated the antitumor effects and its possible molecular mechanisms of MutT homolog (MTH)1 inhibitors in cisplatin-sensitive (T24) and resistant (T24R2) human bladder cancer cell lines.

Materials and Methods: T24 and T24R2 cells were exposed to MTH1 inhibitors (TH588 or TH287). Tumor cell proliferation was assessed using Cell Counting Kit–8 and clonogenic assays. Flow cytometry was performed to estimate the change in cell cycle and apoptosis. Protein expression related to apoptosis and cell cycle was determined by Western blot.

Results: The Cell Counting Kit–8 and clonogenic assays demonstrated the antitumor effects of TH588 alone or TH287 alone on T24 and T24R2 cells in a dose dependent manner. A flow cytometric analysis showed cell cycle arrest at the G2/M phase after the treatment of TH588 or TH287 for 24 hours in T24 and T24R2 cells. TH588 or TH287 induced apoptosis via increased expression of PARP, caspase–3, 8, and 9, and cytochrome c. Cell cycle arrest induced by TH588 or TH287 was accompanied by increased expression of cyclin B1.

Conclusions: Results reveal that MTH1 inhibitors have potent antitumor effects in cisplatin-sensitive and resistant bladder cancer cells. These findings suggest MTH1 inhibitor as an attractive novel class of chemotherapeutic agents in patients not only with advanced bladder cancer but also who are refractory or recur to first-line cisplatin–based chemotherapy.

Keywords: Bladder cancer, MutT homolog 1, Antitumor effect
Association of FOXP3 expression and related signaling pathway with prognosis in human prostate cancer

최승권1, 최태수2, 이상형2, 유구현2, 이동기2, 민경은2, 전승현2, 이선주2, 이형래2, 장성구2

1서울의료원 비뇨기과, 2경희대학교 의과대학 비뇨기과학회실

Purpose: FOXP3 is a transcription factor and well–known hallmark of immune suppressive T regulatory cells (Tregs). Recent studies reported that FOXP3 plays an important role in tumor development. Thus, we investigated tumoral FOXP3, infiltrated Tregs count, NF–κB, Lats2, and YAP expression in prostate cancer, and the relationships between expression of these proteins and clinicopathological variables.

Materials and Methods: We evaluated 46 prostate cancer patients who underwent radical prostatectomy at our institute from 2006 to 2013. We analyzed immunohistochemistry of tissues, in relation to survival and other clinicopathological factors.

Results: Positive tumoral FOXP3 expression was significantly related with worse pathologic stage and Gleason score (GS), positive surgical margin, and higher tumor volume (positive vs. negative; pT3 52.2% vs. 15%; pGS 8–10 26.1% vs. 15%; positive margin 39.1% vs. 15%; tumor volume 70.1% vs. 67.7%). Patients with NF–κB expression were showed similar trend to FOXP3 expression group (high vs. low expression; pT3 60% vs. 27.3%; pGS 8–10 50% vs. 12.1%; tumor volume 42% vs. 20%). Furthermore, patients with positive FOXP3, and NF–κB experienced biochemical recurrence compared to those with negative groups.

Conclusions: These findings suggested that FOXP3 and NF–κB expression is associated with unfavorable clinicopathological variables in prostate cancer. In conclusion, the high expression of FOXP3 in prostate cancer cells is thought to contribute to tumorigenesis and progression of prostate cancer.

Keywords: FOXP3, Prostate cancer, Prognosis
NP-007

전기임피던스 스펙트로스코피 니들을 이용한 정상 신 조직 및 악성 신종양 조직의 구분

김현우1, 윤조호2, 김경환1, 강병진1, 이경1, 백승룡1, 박지훈1, 신동길1, 이종현2, 이정주1
1부산대학교 의학전문대학원 비뇨기과학교실, 2광주과학기술원 의생명공학과

Objective: Electrical impedance spectroscopy (EIS) added on a hypodermic needle can analyze the impedance (consist of magnitude and phase angle) of tissues in the frequency domain. In this study, an EIS-on-a-Needle (EoN) was proposed for real-time discrimination between normal and cancerous renal tissues.

Materials and Methods: EoN was fabricated by adding an electrical sensor at the tip of a 22-gauge hypodermic needle using photolithography technology in a semiconductor process. To evaluate the efficacy of EoN in discriminating between normal and cancerous renal tissues, three nephrectomy kidney specimens with clear cell carcinoma was prepared. EoN was inserted 2 mm deep into the normal and tumor tissue of each specimen and the electrical impedance of the tissues were measured over the frequency range from 100 Hz to 1 MHz at an operating voltage of 200 mVrms. The mean of magnitude and phase angle from the three specimens at each frequency were compared between the normal and tumor tissues to evaluate the effectiveness of EoN.

Results: The normal and tumor tissues were apparently discriminated by the mean magnitude and phase angle at the frequency range from 200 kHz to 1 MHz. The largest difference was observed at 630 kHz and 200 kHz for mean magnitude and phase angle, respectively. The mean impedance values of the normal tissues were tended to be larger than those of the tumor tissues at the frequency range from 200 kHz to 1 MHz.

Conclusion: EoN could apparently discriminate between normal and cancerous renal tissues at the frequency range from 200 kHz to 1 MHz. Further studies using a larger number of specimens are essential for a precise evaluation of EoN in tissue discrimination.

Keywords: Impedance, Kidney, Cancer
DNA methylation is a crucial epigenetic mechanism for determining the destiny of a cell. Its upward or downward dysregulation may induce malignant changes in cells. AKT1, one of RAC-alpha serine/threonine-protein kinases, affects cell proliferation and apoptosis. And its altered overexpression may induce the development and progression of various malignancies.

Tissue samples from 60 clear cell renal cell carcinoma cases were used for immunohistochemical staining, and patients with low AKT1 expression were compared with those with high AKT1 expression. The Fuhrman grade of patients in the low expression group was significantly lower than that of patients in the high expression group (p=0.021). While the tumor (T), node (N) and metastasis (M) stages of the AKT1 low expression group appeared to be lower compared with those of the AKT1 high expression group; this difference was not statistically significant (T stage, p=0.313; N stage, p=0.526; M stage, p=0.526). Additionally, patients in the low expression group had lower risk of postoperative tumor recurrence compared with those in the high expression group (p=0.020).

The results indicate that the high expression of AKT1 is associated with cancer tissue to a greater extent than normal tissue. Although the biological function of AKT1 in clear cell renal cell carcinoma needs to be identified, high AKT1 expression is associated with high Fuhrman grade and worse recurrence free survival in patients with clear cell renal cell carcinoma.

**Keywords:** AKT1, Clear cell renal cell carcinoma, Immunohistochemical staining
Objectives: KCNQ-encoded voltage-gated potassium channels (Kv7) have recently been identified as key regulator of vascular and non-vascular smooth muscle tone. Kv7 channel subtypes (Kv7.1–Kv7.5) have a specific tissue distribution and pathophysiological role. Loss of function mutations in four of the five Kv7 genes lead to distinct inherited diseases, such as cardiac arrhythmias, epilepsy and sensorineural deafness. However, their physiological role in corporal smooth muscle (CSM) remains to be fully elucidated. In this study, we examined the molecular expression and functional role of Kv7 channels in corporal smooth muscle.

Materials & Methods: Expression of KCNQ isoforms in corporal smooth muscle (CSM) cells was examined using RT-PCR. Functional responses to Kv7 channel modulators were evaluated in normal and diabetic (DM) rabbit corporal smooth muscle (CSM) tissue. Isolated CSM strips were mounted in an organ–bath system, and the relaxation effects of the following Kv7 channel subtype selective activators: ML213 (Kv7.2/Kv7.4 channels), ML277 (Kv7.1) and ICA 069673 (Kv7.2/7.3), Flupirtine (Kv7.2-7.5 channels) were evaluated by cumulative addition to strips pre-contracted with 10−5 M phenylephrine (PE).

Results: Of the five KCNQ subtypes, the transcripts for KCNQ1, KCNQ3–KCNQ5 were detected in human corpus cavernosum smooth muscle cells. In functional studies, Flupirtine, ML277 and ML213 produced a concentration-dependent relaxation of PE–induced contractions, with potencies of ML213>Flupirtine>ML277 (at 30 μM, ML213: 100.9±7.7%, Flupirtine: 59.4±14.3%, ML277: 29.1±1.8%, n=8, p<0.05). Whereas ICA 069673 was effective at 100 μM (42.3±8.2% at 100 μM, n=8, p<0.05). The effects of ML213 was attenuated by pre-incubation with 1 μM XE991 (Kv7.1–7.5 channel blocker) (n=8, p<0.05), which in turn confirmed Kv7 channels selectivity. Moreover, ML213 also induced concentration-dependent relaxation in CSM strips from diabetic rabbit, with similar potency in normal rabbit.

Conclusions: These data suggest that Kv7 channels, most probably Kv7.4 channels play a role in erectile function and might be a novel therapeutic target for treatment of erectile dysfunction.

Keywords: Kv7 channel, KCNQ, Corpus cavernosum, ED
당뇨성 발기부전 마우스에서 배아줄기세포 및 혈관주위세포 유래 엑소종의 발기능 개선 효과

송강문, 권미혜, 칼얀 가탁, 응웬 낫 민, 최민지, 강동혁, 윤국남, 류지간, 서준규
인하대학교 의과대학 비뇨기과학교실, 성의학특성화센터

목적: 엑소종은 40~100 nm 크기의 생체 나노입자로서 세포간 소통에 중요한 역할을 하는 다양한 종류의 단백질, mRNA, miRNA 등을 함유하고 있다. 최근 여러 연구에서 엑소종이 심혈관계질환, 신경질환, 당뇨 혈관중 등에서 치료제로서의 가능성이 제기되고 있으나 발기부전 분야에서는 연구된 바가 없다. 이에 본 연구에서는 당뇨성 발기부전 마우스모델에서 배아줄기세포 또는 음경 혈관주위세포(pericyte)-유래 엑소종의 발기력 개선효과를 평가하였다.

대상 및 방법: 생후 8주된 수컷 마우스(C57BL/6J)를 대상으로 하였고, 당뇨는 streptozotocin (50 mg/kg)을 5일 연속 투여함으로써 유발하였다. 당뇨 유발 8주 후 4개의 군으로 나누어 실험을 진행하였다(대조군; 당뇨+HBS 투여군; 당뇨+배아줄기세포-유래 엑소종 [1 μg/20 μL] 투여군; 당뇨+혈관주위세포-유래 엑소종 [1 μg/20 μL] 투여군). 음경 해면체 내 엑소종 투여 후 2주째 음경신경자극 후 발기력을 측정하였고, 음경해면체조직에서 PECAM-1, smooth muscle α-actin, NG2, βIII-tubulin에 대한 면역조직화학염색을 시행하였다. 음경해면체 조직에서 분리한 혈관내피세포 및 대동맥 절편을 고농도 glucose 조건 하에 노출 후 엑소종이 튜브형성 및 미세혈관 생성에 미치는 영향을 평가하였다.

결과: 당뇨 마우스에서 배아줄기세포 또는 혈관주위세포-유래 엑소종은 정상 대조군의 90% 수준으로 발기력을 개선시켰고, 음경해면체 내 혈관내피세포, 평활근세포, 혈관주위세포, 신경세포의 발현을 현저하게 회복시켰다. 또한 이들 엑소종은 고농도 glucose 조건 하에서 억제된 음경 혈관내피세포의 튜브형성 및 대동맥 절편에서의 미세혈관 생성을 정상 glucose 조건에서 배양한 수준으로 회복시켰다.

결론: 배아줄기세포 및 혈관주위세포-유래 엑소종은 음경 혈관내피세포 및 신경세포의 회복을 통해서 당뇨로 인한 발기력 저하를 현저하게 개선시켰다. 향후 엑소종이 발기력 개선을 유발하는 구체적인 기전에 대한 추가 연구가 필요하다.

Keywords: Erectile dysfunction, Diabetes, Exosome
정상 신세포의 새로운 3차원 세포 배양법 제시

김숙영1, 나준채1, 허준혁1,2, 홍성준1,2, 이형호3, 윤영은4, 한웅규1,2

1연세대학교 의과대학 비뇨기과학교실, 비뇨의과학연구소, 2Brain Korea 21 PLUS Project for Medical Science, Yonsei University, 3국립건강보험공단 일산병원 비뇨기과, 4한양대학교 의과대학 비뇨기과학교실

목적: Organoid 배양법은 adult-organ-derived ex vivo 배양법으로 stem cell 혹은 progenitor cell을 성장시켜 self-renew 봉 아니라 differentiation 까지 가능한 3차원적인 배양법이다. 본 연구자는 adult 정상 신장조직을 이용하여 organoid 배양법에 성공하여 보고하는 바이다.

대상 및 방법: 정상 신장의 조직을 얻어 조직을 분리하고 이를 3D 배양법 및 3D on-top 배양법을 사용하였다. 대조군으로는 상용화된 primary normal tubule cell (ATCC)과 비교하였다. Gentamycin이나 cisplatin로 인한 acute injury를 통해 Kidney Injury Molecule-1 (KIM-1)이나 Neutrophil gelatinase-associated lipocalin (NGAL)의 발현 정도를 confocal microscopy를 이용하여 비교하였다.

결과: 정상 신장의 조직 세포 중 tubule cell이 주요하게 배양됨을 ATCC primary normal tubule cell과 비교하여 알 수 있다(Fig. 1A). 3D 배양으로 2주 이상 배양했을 때, dome-like 한 입체구조를 이룸을 확인할 수 있으며, 이러한 현상은 ATCC 세포나 본 연구실에서 분리한 세포 모두 동일하게 관찰되었다(Fig. 1B). 그러나, ATCC보다 dome-like 한 구조를 만드는 능력이 3배정도 잘 유지됨을 colony count로 확인하였다(Fig. 2). Dome-like 한 구조가 tubule cell의 구조임을 확인하기 위해, Tamm–Horsfall glycoprotein 염색을 시행한 결과, 기존 2D 보다 3D 배양에서 더 강한 발현을 보여주었을 것이다(Fig. 3). 다른 보고에서와 같이, tubule organoid 임을 알기 위해 acute injury를 가했을 때, NGAL과 KIM-1의 양이 organoid 전체 혹은 각 tubule 세포에서 발현하고 있음을 알 수 있다(Fig. 4).

결론: 본 연구에서는 성인의 정상 신장조직을 이용하여 Kidney organoid 배양을 통해, 신장세포 혹은 tubule 세포의 특징이 잘 보존되고, injury model 에서도 정상적으로 injury marker들을 발현할 수 있음을 제시하였다.

Keywords: Kidney organoid, 3D culture
NP-012

백서요도에서 요자제기전에 관한 베타3 수용체의 역할

권준범1,2, 스즈키타카히사2, 타카오카에이이치로2, 시미즈노부타카2, 타카이2, 요시무라나오키2

1대구 파티마병원 비뇨기과, 2피츠버그대학교 의과대학 비뇨기과학실

Purpose: To investigate the effect of mirabegron and selective β3-adrenoceptor antagonists on the urethral contractile function using female rats.

Material and Methods: Female SD rats were divided into 3 groups. In group A, 2 mg/kg and 10 mg/kg mirabegron were administered intravenously (IV). In group B, 50 μg/kg L-748,337, a selective β3-receptor antagonist, was injected IV prior to 10 mg/kg mirabegron. In group C, 3 mg/kg propranolol and 50 μg/kg L-748,337 were injected IV prior to mirabegron. LPP (leak point pressure), UBP (urethral baseline pressure) and dUP (differential values of urethral pressure during intravesical pressure elevation) were measured before and after drug administration.

Results: In group A, LPP, UBP, and dUP were not changes after 2 mg/kg mirabegron, but showed significant decreases in these 3 parameters after 10 mg/kg mirabegron. In group B, L-748,337 made significant increase only in UBP. However, subsequent 10 mg/kg mirabegron reduced all the parameters significantly. In group C, any of 3 parameters were not changed by the combined administration of propranolol and L-748,337. But mirabegron following these combination still reduced LPP, UBP, and dUP.

Conclusions: β3-adrenoceptors play a minor role in the control of urethral baseline tone and reflex contractions of the urethral sphincter muscles. Mirabegron can induce urethral sphincter relaxation through β3-receptor-independent mechanisms at a high dose, possibly through interactions with other receptor types such as α1-adrenoceptors.

Keywords: Mirabegron, Adrenoceptor, Urethra
NP-013

**Holmium Laser Utilization in Enucleation of the Prostate Post Morphologically Differentiated Glandular Tissue and Non-Glandular Tissue**

**Objectives:**
To investigate the impedance difference between typical benign prostatic hyperplasia (BPH) tissues and beach balls by using a needle device with electrical impedance spectroscopy (EIS) sensor on the tip.

**Methods:**
A total of 10 respective pieces of typical BPH tissues and beach balls were prepared from 10 patients who presented beach balls during morcellation after Holmium Laser Enucleation of the Prostate were collected. The impedance of the samples was measured at the frequency range from 100 Hz to 1 MHz by using the needle device with EIS sensor (Fig. 1a–c) followed by a pathological investigation of the samples. The impedance data obtained from the experiment were statistically compared and analyzed between the two tissue types.

**Results:**
The mean magnitude of the beach balls were tended to be larger than that of the typical BPH tissues at all frequencies from 100 Hz to 1 MHz (Fig 1d). Notably, significantly larger mean magnitudes were measured in the beach balls compared to the typical BPH tissues at the frequencies higher than 15.9 kHz (p ≤ 0.02). Also, a significant negative correlation was presented between the measured magnitudes and frequencies in beach balls (r = -0.28; p < 0.001) and typical BPH tissues (r = -0.29; p < 0.001). When the magnitude of the tissues was log-transformed, the variation of mean log-transformed magnitudes according to the frequency was significantly different between the two types of prostatic tissues (p < 0.001). The pathologic features of the beach balls presented pure stromal nodule of nodular hyperplasia while the typical BPH tissues presented mixed epithelial–stromal nodule of nodular hyperplasia.

**Conclusion:**
The needle device with EIS sensor could effectively discriminate between the typical BPH tissues and the beach balls by measuring their electrical impedance. Also, the difference of impedance between the two types of prostatic tissues is assumed to be attributed to the amount of stromal content in the tissues.

**Keywords:** Impedance, Prostate, Stroma
Overexpression of transient receptor potential vanilloid-4 (TRPV4) in urothelium of rat urinary bladder following bladder outlet obstruction

오주웅, 오정훈, 손수민, 류지원, 박태주, 김태희, 은성종, 김종범, 조양현, 김명수, 정호석, 황의창, 오경진, 김선옥, 정승일, 강택원, 권동득, 박광성
전남대학교 의과대학 비뇨기과학교실

Purpose: The purposes of this study were to investigate the effect of detrusor overactivity induced by partial bladder outlet obstruction (BOO) on the expression of transient receptor potential vanilloid-4 (TRPV4) in rat urinary bladder, and to determine the role of these molecules in the detrusor overactivity.

Methods: Female Sprague-Dawley rats were divided into control (n=30) and experimental (n=30) groups. The BOO group underwent partial BOO. The control group underwent a sham operation. After 4 weeks, a urodynamic study was performed to measure the contraction interval and contraction pressure. The expression and cellular localization of TRPV4 was determined by Western blot and immunofluorescent study in rat urinary bladder.

Results: In cystometrograms, the contraction interval (min) was significantly lower in the BOO group (3.1±1.2) than in the control group (6.9±0.9) (p<0.05). Conversely, the average contraction pressure (mmHg) was significantly higher in the BOO group (20.1±3.5) than in the control group (12.1±2.1) (p<0.05). TRPV4 was expressed mainly in the cytoplasm of the urothelium. The TRPV4 protein expressions were significantly increased in the BOO rats (p<0.05).

Conclusions: Detrusor overactivity induced by BOO causes a significant increase in the expression of TRPV4. This finding may imply that TRPV4 might be closely related to the bladder signal activity and may have a functional role in detrusor overactivity that occurs in association with BOO.

Keywords: TRPV4, Bladder outlet obstruction, Rats
Purpose: To estimate the learning curve on perioperative and oncologic outcomes of the robot assisted radical cystectomies (RARC) in bladder cancer patients by a robot naïve surgeon.

Materials and Methods: Utilizing a prospectively maintained, single institution robotic cystectomy database, we identified 110 consecutive patients (including 70 intracorporeal urinary diversion) who underwent RARC between November 2007 and May 2017. The surgeon has prior experience with open radical cystectomy (RC), but does not have any robotic surgery experiences as a first surgeon. The learning curve was assessed using chronological subgroups and by trends across the cohort.

Results: The overall total operation times, mean estimated blood loss and complication rate showed a decreasing tendency. Minor and Major complication rate within 30 days were 28% and 6%, between 30 and 90 days were 1% and 4%, respectively. In the process of RC and LN dissection, the number needed to reach proficiency level in the learning curve was 24 cases, 12 cases were needed to be proficient in total intracorporeal urinary diversion procedure. When the groups of the first 10 patients and the last 10 patients were compared, LN yields were significantly higher in the last group.

Conclusion: RARC is a complex and challenging procedure, but it can be performed safely without compromising perioperative outcomes during the learning curve in a robot naïve surgeon. Especially, the each proficiency level of RARC with LN dissection and total intracorporeal urinary diversion process was achieved after 24 and 12 cases respectively.

Keywords: Bladder cancer, Robot cystectomy, Learning curve
골반계측치가 근치적방광절제술 및 신방광조형술 후 요역동학 패턴에 미치는 영향

김광현*1, 윤현석*1, 송완1, 추희정2, 윤하나1, 정우식1, 심봉석1, 이동현1

1이화여자대학교 의과대학 비뇨기과학회실, 2이화여자대학교부속목동병원비뇨기과

목적: 근치적방광절제술 후 신방광조형술을 시행하는 경우 다양한 배뇨형태를 나타낸다. 본 연구에서는 신방광조형술 후 나타나는 배뇨형태를 요역동학 검사에 따라 구분화하고, 이런 배뇨형태에 골반계측(pelvimetry)이 영향을 미치는지 확인해 보고자 하였다.

대상 및 방법: 2012년 1월부터 2015년 11월까지 본원에서 방광암으로 근치적방광절제술 및 신방광조형술을 시행받은 142명 중 술 후 요역동학검사와 배뇨에 관한 자료가 있는 103명의 환자가 본 연구에 포함되었다. 요역동학 검사 항목(maximal cystometric capacity, residual volume, maximal flow rate, compliance, and abdominal pressure at maximum flow rate)로 K-mean 군집화 분석을 하여 세 그룹을 확인하였으며, 세 그룹은 각각 well voider (그룹 1), small capacity with low compliance (그룹 2), large residual urine volume (그룹 3)의 특징을 가졌다. 술 전 시행한 MRI를 통하여 anteroposterior diameter of pelvic inlet (API), anteroposterior diameter of pelvic outlet (APO), pelvic depth (PD), interspinous distance (ISD), bony femoral width (BFW)를 측정하였고, 이러한 계측치가 배뇨형태에 독립적인 인자로 작용하는지 확인하였다.

결과: API, APO, PD, BFW, ISD 중 API, APO, PD 3가지 항목이 적어도 1개 이상의 요역동학검사 항목과 상관성을 나타내었다. API, APO, PD 중 API, PD는 서로 상관성이 관찰되어(Pearson 계수 0.877, P<0.001), APO와 PD 두 가지 항목은 분석 항목으로 선택하였으며, APO, PD는 남녀 성별간 유의한 차이가 관찰되지 않았다. 나이, 성별(female vs. male), 체질량지수, 고혈압과 당뇨의 유무, APO, PD를 다변량 분석하였을 때, 그룹 1 (well voider)를 예측하는 인자는 나이(HR 0.95, P=0.043), 성별(HR 0.09, P=0.001), PD (HR 1.05, P=0.047)이었고, 그룹 2 (small capacity with low compliance)를 예측하는 인자는 성별(HR 3.34, P=0.023), PD (HR 0.92, P=0.002)였다. 그룹 3 (large residual urine volume)은 골반계측치와 연관 없었으나, 성별(HR 2.97, P=0.06)과 체질량지수(HR 1.17, P=0.072)가 가장 큰 연관성을 보였다.

결론: 근치적방광절제술 및 신방광조형술을 시행하였을 때, 골반계측치 중 PD 계측치는 성별, 나이 등과 함께 요역동학검사에 기초한 배뇨형태에 독립적으로 영향을 미친다. 하지만, 수술 후 발생하는 요정체 등에는 무관한 것으로 보인다.

Keywords: Neobladder, Urodynamics, Pelvimetry
NP-017

초기 방광암 및 진행성 방광암 환자의 전치적 방광 절제술 후 생존률의 비교분석

김태진, 이인재, 이상철, 홍성규, 변석수, 오종진

분당서울대학교병원 비뇨기과학과실

Introduction: To compare survival outcomes between radical cystectomy patients diagnosed as T1 or above after initial transurethral resection of the bladder tumor (TUR–BT) and patients who had tumor progression during follow up at the time of tumor recurrence.

Methods: The study population comprised of 192 patients who underwent radical cystectomy. The initial group consisted of 110 patients with a diagnosis of T1 or higher after initial TUR–BT (initial group) and 82 patients who progressed to T2 during follow up after TUR–BT at the time of tumor recurrence (progressed group). Progression was defined as recurrence to a higher grade and/or stage than the previous result, while MIBC progression was defined as progression to stage T2 or higher and/or N+, and/or M1.

Results: The mean age for the initial group was 65.05±11.24 years and 66.90±10.55 for the progression group. The mean survival duration for both groups was 126.72±5.03 and 120.36±5.32 months, respectively. Kaplan–Meier curve analysis showed significantly decreased 5-year OS (83.5% vs. 67.3%) (Fig 1), CSS (82.4 vs. 66.7%) (Fig 2), and the median recurrence-free survival duration was 118.79±6.91 months for the initial group and 85.2±4.72 months for the progressed bladder cancer group.

Conclusions: The progressed bladder group showed slightly poorer survival outcomes compared with the initial group. In conclusion, with progressive bladder cancer patients who underwent radical cystectomy, intensive surveillance and treatment strategies should be considered.

Keywords: Bladder cancer, Survival
NP-018

방광암으로 근치적 방광절제술을 받은 여성 환자에서 생식기관 침범의 예측 인자

최세영, 류제만, 경윤수, 한재현, 유달산, 정인갑, 홍범식, 홍준혁, 안한종, 김청수
울산대학교 의과대학 비뇨기과학교실

Objectives: We evaluated predictors of organ involvement and oncological outcomes after radical cystectomy with anterior exenteration in female patients.

Methods: Among 1,198 patients who underwent radical cystectomy for the bladder tumor between 1990 and 2015, 178 (14.9%) patients were female. They were divided into two groups according to pelvic involvement in pathology. Their medical records and pathology and image findings were reviewed retrospectively. Non-urothelial cell carcinoma and no genital organ pathology were excluded. Multivariate logistic regression was performed to predict factors associated with female organ involvement.

Results: Out of 112 eligible female patients with urothelial cell carcinoma, 11 (9.8%) had female genital organ involvement. Female genital organ involvement occurred primarily in the uterus (63.6%) mostly. The 5-year overall survival rates were 67.3% in the non-involvement group and 18.9% in the involvement group. On multivariate analysis, tumor location of trigone or bladder neck at transurethral resection of bladder tumor (TUR-B) (odds ratio [OR] 19.84, 95% confidence interval [CI] 2.89–230.68, p=0.0056), maximum tumor size at computed tomography (CT) (OR 2.17, 95% CI 1.29–4.34, p=0.0095), and hydronephrosis at CT (OR 17.61, 95% CI 2.28–296.26, p=0.0158) were associated with female organ involvement.

Conclusions: Female genital organ involvement showed poor prognosis. Tumor location of trigone or bladder neck at TUR-B, maximum tumor size at CT or hydronephrosis at CT were significant factors to predict female genital organ involvement. Preoperative recognition of female genital organ involvement need to consider radical cystectomy and multimodal treatment.

Keywords: Bladder cancer, Radical cystectomy, Female genital organ
NP-019

원위부 요관의 요로상피암에 대한 개복 및 최소침습 신우요관절제술의 종양학적 결과 비교

류제만, 남욱, 홍준혁, 김청수, 안한종, 홍범식
울산대학교 서울아산병원 비뇨기과학교실

Introduction: We investigated the differences of oncological outcomes between open and minimally invasive nephroureterectomy for urothelial carcinoma involving distal ureter.

Material and Methods: Among 515 patients who underwent radical nephroureterectomy for upper tract urothelial carcinoma (UTUC) from 1997 to 2012, patients with pathologic T4 disease, nodal metastasis, previous history of bladder tumor or UTUC not involving distal ureter were excluded. 113 patients with UTUC involving distal ureter were finally included for the study. Patients were divided into the 2 groups according to surgical methods (open vs. minimally invasive surgery [MIS]). We evaluated the impacts of surgical methods on oncological outcomes, including intravesical recurrence and survival using multivariate analysis. Mean follow-up duration was 62 and 56 months in open and MIS group, respectively.

Results: Of the 113 patients, 60 (53.1%) and 53 (46.9%) patients underwent open and minimally invasive nephroureterectomy, respectively. There was no difference in clinical characteristics, including age, gender, body mass index, and tumor laterality between the two groups. In addition, pathologic T stage, tumor grade, and incidence of lymphovascular invasion or surgical margin were not different between the two groups, while carcinoma in situ was more frequent in MIS group than open group (32.1% vs. 10.0%, \( p=0.004 \)), 11.7% and 18.9% of patients in open and MIS group underwent adjuvant chemotherapy, respectively, but there was no statistical difference. The estimated 5-year intravesical recurrence–free survival (RFS) (36.7 vs. 38.9%, \( p=0.339 \)), extravesical RFS (62.1 vs. 65.1%, \( p=0.803 \)), and overall survival (OS) (64.5 vs. 67.8%, \( p=0.300 \)) rates were not different between open and MIS groups. On multivariate analysis, surgical method was not significant predictor of RFS and OS, although lymphovascular invasion (HR: 2.075, \( p=0.020 \)), carcinoma in situ (HR: 2.609, \( p=0.004 \)), pathologic T stage (T3 vs. \( \leq T2 \): HR: 1.955, \( p=0.050 \)), and tumor grade (3 vs. \( \leq 2 \): HR: 2.698, \( p=0.030 \)) were significantly associated with OS.

Conclusions: In patients with UTUC involving distal ureter, minimally invasive nephroureterectomy showed equivalent oncological outcomes compared to open nephroureterectomy after adjusting tumor characteristics.

Keywords: Transitional cell carcinoma, Ureter, Minimally invasive surgery
로봇보조 근치적 방광 전절제술의 학습곡선: 단일 술자의 초기경험

황진호, 서영은, 유영동, 이영주, 김정준, 이학민, 이상철, 정성진, 홍성규, 오종진

분당서울대학교병원 비뇨기과학교실

목적: 단일 술자의 최초 30례의 경험이 바탕으로 하여 수술적, 종양학적, 임상적 결과를 토대로 로봇보조 근치적 방광 전절제술(RARC)의 학습곡선을 파악하기 위함.

방법: 2014년 5월부터 2017년 4월까지 RARC와 요로전환술을 시행 받은 단일 술자의 최초 경험이 30명의 환자를 대상으로 후향적 분석을 하였다. 이 술자의 학습곡선을 파악하기 위해 계산실혈량(EBL), 총 수술시간(OR), 로봇수술시간(CO), 종양학적 병리결과, 그리고 합병증 발생율 등을 조사하였다. 우리는 전체 환자를 수술 순서에 따라 5분위군으로 나누어 분석하고( quintiles), 또 전, 후의 2개군으로 나누어 분석해 보았다.

결과: EBL은 마지막 5번째군(25~30)으로 들어서며 크게 감소하였다(p=0.041). OR 및 CO는 지속적인 감소추세를 보였으며, 15례 부근부터는 안정화되는 양상을 보였다. OR과 CO모두 전/후반 15례에서 통계적으로 의미 있는 차이를 확인하였다(p=0.017, p<0.001). 전체 임파선 수 역시 후반 15례에서 유의미하게 증가하였으며(4.5 vs 20.5, p=0.027), 마지막 5분위군까지 증가세가 지속되었다. 숭 후 병리 결과에서 경계면 양성을 보인 경우는 없었다. 재원기간 및 퇴원 후 합병증 발생률은 큰 차이를 보이지 않았다.

결론: RARC의 최초 30례의 분석을 통해, 총 수술시간, 로봇수술시간, 계산실혈량의 감소와 절제임파선 수의 증가를 확인하였고, 이를 통해 학습곡선의 극복과정을 파악할 수 있었다. 종양학적 병리결과 및 합병증 발생률은 학습곡선과 관련이 없었다. 좀 더 정확한 파악을 위해 복수의 술자와 많은 수의 사례에 대한 분석을 요한다.

Keywords: Bladder, Cancer, RARC

Table 1. Patients who underwent RARC and Operative Characteristics

<table>
<thead>
<tr>
<th>Quintiles</th>
<th>Age (years)</th>
<th>Gender (M/F)</th>
<th>Diversi on (CN)</th>
<th>BMI (kg/m²)</th>
<th>mean OR time (hours)</th>
<th>mean CO time (hours)</th>
<th>mean EBL (ml)</th>
<th>mean Total LN yield (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>70.1 ± 8.8</td>
<td>264</td>
<td>2010</td>
<td>24.1 ± 3.1</td>
<td>7.9</td>
<td>4.0</td>
<td>262.1</td>
<td>17.9 ± 7.2</td>
</tr>
<tr>
<td>1st</td>
<td>67 ± 6.8</td>
<td>51</td>
<td>60</td>
<td>24.7 ± 3.1</td>
<td>8.5</td>
<td>5.0</td>
<td>575</td>
<td>14.6 ± 6.5</td>
</tr>
<tr>
<td>2nd</td>
<td>67.3 ± 10.7</td>
<td>51</td>
<td>42</td>
<td>25.2 ± 1.3</td>
<td>8.4</td>
<td>5.6</td>
<td>308.3</td>
<td>14.3 ± 7.1</td>
</tr>
<tr>
<td>3rd</td>
<td>71.8 ± 7.1</td>
<td>60</td>
<td>42</td>
<td>25.7 ± 4.9</td>
<td>7.7</td>
<td>3.7</td>
<td>400</td>
<td>18.4 ± 5.1</td>
</tr>
<tr>
<td>4th</td>
<td>74.2 ± 5.6</td>
<td>42</td>
<td>33</td>
<td>22.6 ± 2.0</td>
<td>7.2</td>
<td>3.6</td>
<td>541.7</td>
<td>17.7 ± 5.9</td>
</tr>
<tr>
<td>5th</td>
<td>70.0 ± 12.9</td>
<td>60</td>
<td>33</td>
<td>22.3 ± 1.8</td>
<td>7.7</td>
<td>3.2</td>
<td>316.7</td>
<td>24.0 ± 8.4</td>
</tr>
</tbody>
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Halves

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<thead>
<tr>
<th>Case</th>
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*p<0.05

2017 Annual Meeting of The Korean Urological Association
2017년 제69차 대한비뇨기과학회 추계학술대회

347
수술받은 상부 요로암 환자에서 방광내무재발생존률, 질병무진행생존률, 암특이생존률에 대한 유의한 예후인자 분석

김정권1, 김성한1, 송미경2, 주정남2, 정재영1, 정진수1, 이강현1, 서호경1

1국립암센터 전립선암센터 비뇨기과, 2국립암센터 암역학예방연구과 바이오메트릭스연구과

Objective: This study aimed to identify prognostic factors for bladder recurrence, disease progression, and cancer-specific survival after radical nephroureterectomy among patients with upper urinary tract urothelial carcinoma (UTUC).

Methods: We retrospectively reviewed 184 non-metastatic cases of UTUC after radical nephroureterectomy, bladder cuffing, and/or partial cystectomy (2004–2016). Bladder recurrence–free survival (BRFS), disease progression–free survival (DPFS), and cancer–specific survival (CSS) were estimated. The prognostic values of clinicopathological parameters were evaluated using Cox logistic regression analysis.

Results: During a median follow–up of 36.5 months, we identified bladder recurrence (64 cases, 34.8%), disease progression (54 cases, 29.4%), and cancer–specific death (24 cases, 13.0%). The median BRFS, DPFS, and CSS values were 19.0 months, 38.5 months, and 67.0 months, respectively. BRFS was independently associated with former smoker status (hazard ratio [HR]: 2.314), previous bladder tumor (HRL 0.516), previous intravesical instillation (HR: 29.544), and lymphovascular invasion (HR: 0.445). DPFS was independently associated with active smoker (HR: 0.345). CSS was independently associated with alkaline phosphatase levels (HR: 0.962), tumor location (HR: 5.420), and pathological N stage (HR: 71.433).

Conclusion: This study identified factors that predicted BRFS, DPFS, and CSS after surgery for UTUC. Patients with these factors should receive adjuvant intravesical/systemic chemotherapy and intensive surveillance

Keywords: Nephroureterectomy, Ureter cancer, Bladder, Prognosis, Risk factor
Introduction: We assessed postoperative changes of serum tumor marker in stage I germ cell tumor. In addition, we evaluated the oncological outcomes of patients with stage I germ cell tumor.

Methods: Among 237 patients who underwent radical orchiectomy from 1991 to 2017, germ cell tumor was identified on pathological examination in 99 patients, including 68 patients with non-seminomatous germ cell tumor (NSGCT), 33 patients with stage I and 35 patients with stage II or III. 31 patients were diagnosed of seminoma, 22 patients with stage I and 9 patients with stage II or III. Postoperative change of serum tumor markers was assessed. In addition, half-life of each tumor marker was calculated. We also evaluated oncological outcomes in stage I germ cell tumor. Median follow-up duration was 95 months.

Results: Median age was 23 years. Stage was as follows: stage IA in 27(49.0%) patients, stage IB in 23 (41.8%) patients and stage IS in 5 (9.1%) patients. In patients with stage I seminoma, there shows no definite elevation of serum tumor marker. Among stage I NSGCT patients, median AFP at diagnosis was 2648 ng/mL (0.8 to 11628). After one month of orchiectomy, AFP in stage I NSGCT decreased into 44.7 ng/mL (1 to 289). Estimated serum half-life of AFP was 5.09 days in stage I NSGCT. Median beta human chorionic gonadotropin (hCG) at diagnosis was 232.5 mIU/mL (1 to 4140), decreased into 2.04 mIU/mL (1 to 3.2) after one month of orchiectomy. Serum half-life of beta hCG was 4.3 days in NSGCT. There was one patient with recurrence. He was in stage IS NSGCT. Beta hCG increased after 2 months of orchiectomy, so he started chemotherapy 4 months after orchiectomy. Eight years later, tumor recurred in aortocaval lymph node and retroperitoneal lymph node dissection (RPLND) was done and pathology showed cystic teratoma. Recurrence free survival was 97.6 months, 5-year overall survival rate was 100%.

Conclusions: Real half-life of beta hCG was longer than that of reference in stage I NSGCT. This result of hCG half-life will be helpful in clinical field for follow-up of patients with stage I NSGCT.

Keywords: Germ cell tumor, Testicular cancer, Serum tumor marker
NP-023

근치적 방광절제술 환자에서 림프관 침윤의 예후적 가치

육형동, 윤민영, 정창욱, 곽철, 김현회, 구자현
서울대학교병원 비뇨기과

Introduction: To evaluate determine the prognostic value of lymphovascular invasion (LVI) in patients with bladder cancer who underwent Radical cystectomy.

Methods: 747 patients underwent radical cystectomy. The number of patients who did not undergo LND was 164. Patients were divided into 4 groups (N0, N1, non-LND with LVI, non-LND without LVI).

Results: Median follow up was 41.5 (0–311) months. The N1 and LVI groups showed significantly higher T stage and Grade than the N0 and without LVI groups. And the recurrence rate and mortality rate were 1.5 to 2 times higher than the N0 and without LVI groups. Overall survival (OS) was significantly higher in the N1 group than in the N0, without LVI groups (p=0.001, p=0.012). And OS of LVI group was significantly higher than the N0, without LVI group (P=0.000, p=0.000). Recurrence free survival (RFS) was significantly higher in the N1 group than in the N0, without LVI groups (p=0.000, p=0.000). And RFS of LVI group was significantly higher than the LVI group was significantly higher than the N0, without LVI group (P=0.000, p=0.000).

Conclusion: Clinical results according to LVI were similar to those predicted by lymph node involvement in patients undergoing radical cystectomy. For LVI in patients who underwent Radical cystectomy, treatment is required according to the node positive patients.

Keywords: Lymphovascular invasion, Radical cystectomy, Bladder cancer
요관에 위치한 pT3b 상부요관종양에서의 수술후 보조적 치료

김종근2, 박사현1, 김명1, 유달산1, 정인갑1, 송재린1, 홍범식1, 홍준혁1, 김청수1, 안한종1
1울산대학교 서울아산병원, 2한림대학교 동탄성심병원

Purpose: We reported the tumor that invades peripelvic fat or periureteral fat (pT3b) had worse prognosis than the tumor that invades renal parenchyma (pT3c). We evaluated the disease recurrence and cancer-specific survival of patients with pT3b urothelial carcinoma of the upper urinary tract who received adjuvant treatment.

Materials and Methods: The data from a total of 128 pT3b patients after radical nephroureterectomy were analyzed. The patients were divided into 4 groups; 61 without adjuvant therapy (Group 1), 21 with adjuvant radiotherapy (Group 2), 26 with adjuvant chemotherapy (Group 3), and 20 with adjuvant radiotherapy plus adjuvant chemotherapy (Group 4). Recurrence-free survival and cancer-specific survival rates were compared among these groups.

Results: The mean follow-up duration was 39.8 months. The patients who received adjuvant radiotherapy (Group 2 and 4) were more likely to have a high pathologic grade (p=0.036) and a more-frequent positive surgical margin (p=0.007). Five-year recurrence-free survival rates of group 1, group 2, group 3 and group 4 were 25.5%, 61.2%, 27.2% and 54.5%. Five-year cancer-specific survival rates in group 1, group 2, group 3 and group 4 were 52.3%, 48.1%, 48.7% and 61.9%. In the patient with tumor that invades periureteral fat, adjuvant radiotherapy significantly reduced the risk of disease recurrence (HR=0.425, p=0.004) and adjuvant chemotherapy significantly reduced the risk of distant metastasis (HR=0.500, p=0.033). Higher cancer-specific survival was noted in group 4, but did not reach statistical significance (p=0.273).

Conclusion: Adjuvant radiotherapy in the pT3b patients significantly reduced the risk of disease recurrence. Adjuvant chemotherapy increased the distant metastasis-free survival in patient with ureteral tumor. Adjuvant radiotherapy with adjuvant chemotherapy should be considered in patients with pT3b and ureteral tumor.


Keywords: Urothelial neoplasm, Adjuvant treatment, Cancer-specific survival, Recurrence-free survival
NP-025

Identifying carcinoma in situ lesions in the bladder using red/green/blue numerical values from white-light imaging

이광석1, 구교철1, 김창환2, 홍성준2, 정병하3
연세대학교 의과대학 1강남세브란스병원, 2신촌세브란스병원

Purpose: Carcinoma in situ (CIS) of the bladder is difficult to visually distinguish from normal mucosa and inflammatory tissue. We investigated whether the numerical values of the red–green–blue (RGB) spectra can diagnose malignancies.

Materials and Methods: Patients who underwent white–light cystoscopy (WLC) and diagnosed with CIS on pathology after bladder resection were reviewed. Patients with interstitial cystitis (IC), cystitis, and normal bladders were also analyzed. WLC images were analyzed using the picture archiving and communication system for R/G/B values and compared among normal or abnormal bladder walls. Univariate and multivariate analyses using Cox proportional hazards regression models were performed for predicting Bacillus Calmette–Guérin (BCG) failure. The RGB values of 1×1 pixels from 3 randomized points on abnormal and normal bladder walls were compared.

Results: The R value for CIS was significantly higher than that of IC and lower than that of cystitis. WLC G value >97 (odds ratio [OR]=0.46, p<0.001) and B value >73 (OR=2.94, p=0.008) were significant predictors of CIS in abnormal lesions. On multivariate analysis, previous bladder cancer diagnosis (Odd ratio [OR]=7.90, p<0.001) and a WLC R value ≥175 (OR=3.28, p<0.001) and a WLC G value ≥175 (OR=3.28, p<0.001) were significant predictive factors for recurrence. Previous bladder cancer diagnosis (Hazard ratio [HR]=3.40; p=0.005) and a WLC G value ≥145 (HR=2.30, p=0.014) were significant predictors of bladder contraction frequency failure after BCG therapy.

Conclusions: RGB analysis, which is simple and efficient, is useful for identifying CIS without the need for dyes. RGB bladder wall analysis can be helpful for predicting bladder cancer recurrence and BCG failure.

Keywords: Bladder cancer, Carcinoma in situ, Color analysis, White-light cystoscopy
Objective: To evaluate the differences in pathologic diagnosis according to cystoscopic morphological findings in patients who underwent OPD based biopsy and fulguration for NMIBC follow-up.

Methods: We retrospectively analyzed the medical records of 36 patients who underwent OPD based biopsy and fulguration for NMIBC follow up enrolled in this study. The cystoscopic morphological findings of NMIBC were classified into three types and those were categorized by one resident and two urologists as consensus (Fig. 1). ANOVA analysis and Chi-square or Fisher’s exact test were used (p<0.05).

Results: There were significant differences in the tumor size of less than 3 centimeters in each group at the initial diagnosis (p=0.0126, Table 1). The cancer diagnosis rates of each type when biopsy had done were relatively low in Type 1 and 2 but statistically insignificant (p=0.150). Also, the proportion of patients who were diagnosed as non-cancer at time of biopsy, but were diagnosed with cancer later was relatively higher in type 1 and type 2, but was not statistically significant (p=0.260). The final recurrence rates of the cancers after biopsy and fulguration were relatively lower in type 3, although there were no statistical significances (p=0.817).

Conclusions: The pathologic diagnosis according to cystoscopic findings was not different from each other. In type 1 and 2, the total recurrence rate was relatively higher, maybe due to lower cancer diagnosis and absence of BCG instillation at the time of biopsy and fulguration. Therefore, advertent follow-up is required for type 1 and 2

Keywords: Non-muscle-invasive bladder cancer, Cystoscopic morphological type
NP-027

The impact of waist circumference on the risk of bladder cancer development according to body mass index: complete enumeration results of the Koreans

Yang Jong Hyup1, Kang Sung Min1, Moon Young2, Yi Gu Won1, Jang Hyun Chul1, Choi Jin Beong1, Kim Jong Ho2, Hong Sung Hui1, Ha Youn1
1. Catholic University Seoul St. Mary’s Hospital, 2. Dongnam Radiation Institute, 3. Catholic University Bucheon St. Mary’s Hospital

Purpose: We examined the association between obesity and bladder cancer using nationally representative data on the Korean population from the National Health Insurance System (NHIS). We estimated the impact of waist circumference (WC) on the risk of bladder cancer development according to body mass index (BMI).

Materials and Methods: Of the 45,850,458 people who underwent at least one health examination from 2009-2012, 23,308,825 without bladder cancer were followed from the January 2009 to the December 2015. Multivariate adjusted Cox regression analysis was conducted to examine hazard ratios (HRs) and 95% confidence intervals (CIs) for the association between bladder cancer and obesity.

Results: Increasing WC and BMI were risk factors of bladder cancer development. A significant increasing trend in risk of bladder cancer was seen with increasing BMI in a stepwise method model. A significant increasing trend in risk of bladder cancer was seen with increasing WC in a stepwise method model of male. A significant increasing trend in risk of bladder cancer was seen with increasing WC in female. However, different associations between BMI and bladder cancer development were observed between the group WC ≥90 and WC<90 in male. In the group WC<90, the HRs for bladder cancer rather decreased as BMI increased beyond the reference BMI in a model adjusted for age and multiple variables. In the group WC ≥90, the HRs for bladder cancer increased more steeply than in the overall male as BMI increased in the contrary. Similar associations between BMI and bladder cancer development were observed between the group WC ≥85 and WC<85 in female.

Conclusion: This population-based study showed that increasing BMI and WC were risk factors for develop bladder cancer independent of confounding variables. However, different associations between BMI and bladder cancer development were observed according to WC categories.

Keywords: Bladder cancer, Body mass index, Waist circumference
**NP-028**

**신경 보존 근치방광절제술: 발기능 및 장기 중앙학적 결과**

권세윤1, 하윤석2, 최석환2, 김현태3, 김태환3, 권태균3

1동국대학교 경주병원, 동국대학교 의과대학 비뇨기과학교실, 2경북대학교병원, 경북대학교 의과대학 비뇨기과학교실, 3칠곡경북대학교병원, 경북대학교 의과대학 비뇨기과학교실

**Purpose**: Radical cystectomy (RC) is currently regarded as the gold standard for the management of muscle-invasive bladder cancer, extensive uncontrollable non-muscle-invasive cancer, and refractory carcinoma in situ (CIS). Despite outstanding oncologic outcome of RC, erectile dysfunction (ED) remains a health related quality of life domain that is commonly impaired after RC. We performed nerve sparing RC (NSRC) to overcome this problem and compared operative outcomes between the non NSRC (NNSRC) and NSRC groups.

**Material and Methods**: We retrospectively analyzed the data from 17 patients who underwent NNSRC and 21 patients who underwent NSRC in our institution from July 2009 to May 2014. Data were collected on patients’ demographics, pathologic staging, perioperative outcomes and long term oncologic outcomes as well as erectile function.

**Results**: The median follow-up periods were 42.0 months and 59.0 months in NSRC and NNSRC, respectively. There were no statistically significant differences between two groups in patients’ demographics, pathologic staging, perioperative outcomes. There were no significant differences in the 5-year overall survival rate (88.2% vs 85.7%), the cancer-specific survival rate (88.2% vs 90.0%). Overall postoperative potency rate was higher significantly in NSRC than in NNSRC (41.2% vs 9.5%, p=0.022).

**Conclusions**: Our clinical experiences indicate that NSRC in selected patients is a feasible procedure in terms of oncologic outcome and able to preserve erectile function relatively effectively.

**Keywords**: Radical cystectomy, Erectile function, Oncologic outcome
NP-029

T1b 신세포암에서 수술전 CKD 2등급인 환자가 수술 후 CKD 3등급 이하로 진행할 위험이 부분신절제술과 근치적신절제술 사이에 유의한 차이가 없다

나준채1, 윤민지1, 김진우1, 박지수1, 안현규1, 강승구1, 이형호3, 윤영은4, 홍성준1,2, 한웅규1,2

1연세대학교 의과대학 비뇨기과학교실, 2Brain Korea 21 PLUS Project for Medical Science, Yonsei University, 3국립건강보험공단 일산병원 비뇨기과, 4한양대학교 의과대학 비뇨기과학교실

목적: 신장 종양 수술에서 신기능 보존은 중요한 고려 대상이다. 부분신절제술은 신기능 보존에 유리하며 종양학적 예후에 영향을 주지 않는다고 생각되어 최근 표준 수술법으로 자리매김하고 있다. 하지만 크기가 4 cm보다 큰 T1b 종양은 기술적인 제한으로 인해 부분신절제술과 근치적신절제술 사이에서 선택이 어려운 경우가 있다. 본 연구는 T1b 종양 환자에서 수술 전 신기능이 정상 범위일 때 부분신절제술 혹은 근치적신절제술이 수술 후 신기능에 미치는 영향 분석하였다.

방법: 2010년 1월 1일부터 2011년 12월 31일 사이에 신절제술을 받은 환자들 중 수술전 eGFR (MDRD) 60 mL/min/1.73 m² 이상인 환자들을 대상으로 하였다. 이들의 나이, 성별, BMI, 고혈압·당뇨 과거력, 술전과 술후 혈중 creatinine 및 eGFR(MDRD), 술전 cholesterol, proteinuria, 신경질환 방법을 조사하였으며, 수술전 CKD 1등급과 2등급인 환자에서 각각 부분신절제술과 근치적신절제술을 받은 환자들을 비교하였다.

결과: 총 103명의 환자군이 포함되었으며, 수술전 CKD 1등급인 7명과 26명이, 수술전 CKD 2등급인 17명과 53명이 각각 부분 및 근치적신절제술을 받았다. 수술 후 CKD 3등급 이하로 진행하는 비율은 CKD 1등급과 2등급인 경우 모두 신절제술 방법에 따라 다르지 않았다(p=0.559, p=1.000). 수술전 CKD 2등급인 환자가 수술 후 CKD 3등급 이하로 진행하는 경우에는 부분신절제술 후 40.0%, 근치적신절제술 후 40.8%였으며, 부분신절제술은 받은 환자군의 BMI가 더 낮았고 고혈압 과거력이 있는 경우가 더 많았다. 수술 전 eGFR은 두 군 사이에 유의한 차이가 없었으며 수술 후 median eGFR은 근치적 신절제술 군이 지속적으로 낮았으나 수술 후 3년부터 두 군 사이에 유의한 차이가 없었다(Mann-Whitney 검정, 표 1, 그림 I).

결론: 본 연구에서 CKD 2등급인 T1b 신장 종양 환자에 대해 부분신절제술을 시행한 경우 CKD 3등급 이하로 진행할 가능성이 근치적신절제술에 비해 낮지 않았다. 대상 환자군이 적고 신종양의 위치 등에 대한 분석이 포함되어 있지 않아 해석에 유의해야 하나, 신종양의 크기가 큰 경우 CKD 2등급인 환자들에게 부분신절제술이 신기능 보존 측면에서 환자들에게 실제적인 이득이 있는지 연구할 필요성을 느끼게 한다.

Keywords: Partial nephrectomy, CKD, T1b renal tumor
Clinical considerations for achieving the trifecta of laparoscopic partial nephrectomy

이경¹, 김태남¹, 남종길², 이원³, 이정주¹, 정문기²

¹부산대학교 의과대학 비뇨기과학회, ²양산부산대학교 의과대학 비뇨기과학회, ³동남권원자력의학원

Objectives: We analyzed the trifecta outcomes of laparoscopic partial nephrectomy (LPN). Trifecta was defined as a combination of negative surgical margin, short warm ischemic time less (WIT) than 25 min and no surgical complication more than grade 3 according to Clavien–Dindo classification.

Methods: Patients who underwent laparoscopic partial nephrectomy for clinical T1 renal masses by two surgeons between May 2006 and January 2017 were included. The medical records of 100 patients were retrospectively collected and divided into two groups (trifecta and non-trifecta group). Multiple logistic regression models were used to predict the clinical factors of trifecta outcomes.

Results: Of the 100 patients, 44 (44%) achieved trifecta. The most common reason for failing to achieve trifecta was the long ischemic time more than 25 min (100%, 56/56), but the WIT in majority of the patient (78%) was less than 30 min. Three patients had positive surgical margins and more than grade 3 surgical complication, respectively. Maximal tumor diameter (p<0.022), exophytic rate of nephrometry score (R.E.N.A.L., PADUA) (p<0.027) and incomplete clamping of the renal hilar vasculature (p<0.009) were significantly different between the trifecta and non-trifecta group. Multivariate analysis showed maximal tumor diameter and exophytic rate (score ≥2) to be independent predictors of trifecta outcomes.

Conclusion: Maximal tumor diameter and exophytic rate (score ≥2) seems to be strong predictors of trifecta outcomes after laparoscopic partial nephrectomy in T1 renal mass.

Keywords: Laparoscopy, Partial nephrectomy, Trifecta

<table>
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<td>56</td>
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<td>26</td>
<td>22.0</td>
<td>0.019</td>
</tr>
<tr>
<td>Surgical lesion score</td>
<td>18</td>
<td>26</td>
<td>22.0</td>
<td>0.019</td>
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<tr>
<td>Surgical lesion score</td>
<td>17</td>
<td>26</td>
<td>22.0</td>
<td>0.019</td>
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</tbody>
</table>

Multivariate analysis for trifecta outcomes

<table>
<thead>
<tr>
<th>Variable</th>
<th>Odds ratio</th>
<th>95% CI</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximal tumor diameter</td>
<td>2.047</td>
<td>1.233–3.361</td>
<td>0.005</td>
</tr>
<tr>
<td>Exophytic rate (score = 2)</td>
<td>2.731</td>
<td>1.114–6.694</td>
<td>0.028</td>
</tr>
<tr>
<td>Incomplete clamping of renal hilar vasculature</td>
<td>1.215</td>
<td>1.011–1.461</td>
<td>0.201</td>
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</tbody>
</table>
NP-031

25개의 면역염색 조직인자를 이용한 multilocular cystic RCC와 multilocular cystic clear cell RCC with low malignant potential의 신장 조직의 발현 비교 연구

김성한1, 박원서2, 정진수1
국립암센터 전립선암센터 1비뇨기과, 2병리과

Background and Objective: Multilocular cystic clear cell RCC with low malignant potential (MccRCCLMP) is a tumor composed entirely of numerous cysts, the septa of which contain individual or groups of clear cells without expansile growth. This disease is morphological indistinguishable from low-grade multicystic clear cell RCC (MccRCC), but recurrence or metastasis have not been reported. This study was aimed to find out any significant differential pathological characteristics in resected specimens using immunohistochemistry of 25 tissue makers.

Methods: A total of 13 (23.6%) MccRCCLMP and 17 (76.4%) MccRCC patients’ specimens staged either with T1a, T1b, or T2 were evaluated immunohistochemically using 25 tissue markers (AMARC, BAP1, CD10, 31, 34, CK7 tubule, CK-PAN, HIF1a, HIF2a, Ki67, p53, PAX8, PBRM1, PDGFRα, b, PDL1, PSMA, PTEN, RCC, SMA, TGase2, VEGFRI, 2, 3, and Vimentin). The MccRCC was pathologically selected by senior uropathologist with a criteria of more than 10 cysts in the gross specimens. The 25 tissue biomarkers were immunohistochemically stained on tissue microarrays of RCC, and the semi-quantitative H-score (0-300), including intensity score, was used to grade the sample. Only CD31, CD34, CK7 tubule, CK-PAN, and Ki67 marker were expressed in intensity score (0, 1, 2, and 3). The comparison between two disease were statistically evaluated using Fisher exact, student t-test, Wincoxan sum tests with a significance of p-value <0.05.

Results: During a median follow-up of 62.9 (12-141.0) months, 27 male and 3 female patients experienced only one recurrence among 17 MccRCC patients. A median 3.8 cm tumor was resected by 19 (63.3%) radical and 11 (36.7%) partial nephrectomy. The pathologic stage showed 3 (10.0%) pT2, 8 (26.7%) pT1b, 19 (63.3%) pT1a. The clinicopathological differences between each groups showed only necrosis rate (MccRCCLMP, 7.7% vs MccRCC, 52.9%, p=0.017) was significant and other parameters were not (p>0.05). The 25 tissue markers showed that only HIF1a, PDGFRI, PSMA, SMA, VEGFRI, 2, 3, CD31, cD34, CK7 tubule, and Ki67 were significantly different between two groups (p>0.05).

Conclusion: Significant tissue markers showed differential expressions between two disease, which might give a clue to understand the differential pathophysiologic characteristics from each disease.

Keywords: Renal cell carcinoma, Cyst, Immunohistochemistry, Comparison
신장암 환자의 부분 신 절제술 후 만성 신장질환 위험 예측 모델

박지수1, 안현규1, 김진우1, 김승구1, 오경택1, 김종원1, 나준채1, 이형호3, 윤영은4, 윤민지1, 한웅규1,2

1연세대학교 의과대학 비뇨기과학교실, 비뇨의과학연구소, 2Brain Korea 21 PLUS Project for Medical Science, Yonsei University, 3국립건강보험공단 일산병원 비뇨기과, 4한양대학교 의과대학 비뇨기과학교실

목적: 만성 신장질환은 그 자체로 상당한 혈관질서와 사망률을 갖고 있는 단독질환이다. 신장암 환자의 부분 신 절제술 후 추적 관찰 중 만성 신장질환으로 진단 받는 경우가 있으나 그 위험을 예측하고 예방하고 있는 것은 상대적으로 어렵다.

방법, 대상: 본 연구진은 본원에서 신장암을 진단 받고 부분 신절제술을 시행 받은 환자들 중 수술 전 만성 신장질환을 진단 받지 않고 1년 동안 추적관찰을 한 총 628명을 대상으로 하였다. 상기 환자의 임상병리학적 특성이 후향적으로 조사되었으며 환자의 개인 정보를 제거하고 익명으로 저장된 자료를 이용하여 분석하였다.

결과: 628명 중 208명이 1년 후 만성 신장질환이 발생하였고 그들은 수술 전 나이가 많고 크레아티닌 수치가 통계적으로 유의하게 많았다. 또한 고혈압 및 당뇨 환자인 경우가 통계적으로 유의하게 많으나 고혈압의 경우 다변량 분석에서는 의미 없었다. 다변량 분석에서 의미 있는 3개의 변수를 이용하여 신부전 위험 예측 모델을 설계하였다.

\[
Y = \exp (0.066 \times \text{나이} + 0.775 \times \text{당뇨병 유무} + 4.401 \times \text{수술 전 크레아티닌 수치} - 8.553)
\]

모델의 곡선화면적 (AUC, area under the curve)은 0.775, 정확도 69.1%, 민감도 76.4%, 특이도 65.5%였다.

결론: 본 연구진이 만든 모델을 이용하여 1년 후 만성 신장질환의 위험이 높은 환자군을 대상으로 면밀한 관리를 통해 만성 신장질환으로 진행할 확률을 낮출 수 있을 것이다. 또한 환자 중 만성 신장질환 위험이 높은 그룹을 수술할 경우 수술자의 주의가 더 필요하다. 추후 연구로 신장암의 위치 및 크기를 포함하여 보다 정확하고 객관적인 모델 개발이 필요하다.

Keywords: Partial nephrectomy, Chronic kidney disease, Prediction model
Is intraoperative sonography really useful in patients with open partial nephrectomy?

노주현, 김종녕, 최경화, 이승렬, 홍영권, 박동수
CHA의과학대학교 분당차병원 비뇨기과학교실

**Objective:** The intraoperative sonography is expensive, and the real time angle changes making it difficult to determine the correct margin. Therefore we aim to evaluate the correlation between actual postoperative resection margin and measured marking margin using intraoperative sonography in open partial nephrectomy patients.

**Methods:** We performed a retrospective analysis of 101 patients who underwent open partial nephrectomy by single surgeon between 2000 and 2013. The distance between tumor and marking margin on the kidney surface using intraoperative sono was compared with the distance measured on the actual specimen section (Figure 1).

**Results:** Of the total case, endophytic (n=11), mesophytic (n=40), exophytic (n=50) mass features were observed. In all case of endophytic mass, intraoperative sonography was used to define the location of mass. There was no difference in distance between intraoperative sono-non-use group and use group. In endophytic mass, the distance between tumor and marking margin on the kidney surface using intraoperative sono was not different with the distance measured on the actual specimen section, however in 3 cases showed 0.7 cm or more difference between sonography and specimen.

**Conclusions:** In open partial nephrectomy, intraoperative sonography would not be necessary to decide the surgical margin except some endophytic cases.

**Keywords:** Introperative sonography, Renal mass
4 cm 이상의 단일 신장 종양에 대한 개복신부분절제술과 로봇신부분절제술의 비교: 후향적 연구

정연수, 이동환, 이상철, 홍성규, 변석수, 이상은
분당서울대학교병원

Object: We compared the surgical outcomes and complications between open partial nephrectomy (OPN) and robot-assisted partial nephrectomy (RPN) for ≥4 cm single renal mass (SRM).

Materials and Methods: We retrospectively reviewed the data of 220 patients who underwent partial nephrectomy for ≥4 cm SRM between June 2003 and April 2017. Various clinicopathologic factors including renal function and surgical complications were analyzed. The cancer specific survival (CSS) and recurrence free survival (RFS) were evaluated using Kaplan–Meier analysis.

Results: There were no significant differences in mean age, gender, body mass index, preoperative tumor size, tumor laterality, tumor location, and clinical T stage between OPN and RPN groups. For perioperative outcomes, the operative time, radical conversion, and postoperative transfusion rate were not significantly different between two groups. RPN group showed significantly less estimated blood loss (312.4 ml vs 206.1 ml, P=0.003), less intraoperative transfusion rate (7.7% vs 0.8%, P=0.007), less postoperative day 1 VAS pain score (4.49 vs 4.21, P=0.028), less postoperative Clavien grade III, IV complication (9.8% vs 2.3%, P=0.017) and the shorter length of hospitalization (8.33 vs 6.01 day, P<0.001). Although the ischemic time was longer in the RPN group (P<0.001), there was no significant difference between OPN and RPN groups in terms of change of serum creatinine and estimated glomerular filtration rate. Two groups showed significantly similar rate of pathologic T stage and resection margin rate except Fuhrman nuclear grade (P=0.035). There was no significant differences for CSS and RFS between two groups.

Conclusion: RPN should be considered to be safe and favorable surgical procedure for ≥4 cm SRM in terms of perioperative outcomes and postoperative complications.

Keywords: Single renal mass, Open partial nephrectomy, Robot-assisted partial nephrectomy
**NP-035**

**Epithelioid Angiomyolipoma는 Classical Angiomyolipoma와 비교하여 더 불량한 예후를 가지는가**

이원철, 최세영, 이찬우, 유상준, 유달산, 정인갑, 송채린, 김건석, 홍범식, 홍준혁, 안한종, 김청수
울산대학교 의과대학 비뇨기과학학교실

**Objectives:** Classical angiomyolipoma (AML) is the most common benign tumor of kidney and has benign clinical course. On the other hand, epithelioid AML (EAML) has poorer clinical course compared with classical AML. We aimed to assess characteristics and prognosis of EAML, including a comparison with classical AML.

**Material and Methods:** Medical record of 231 patients who diagnosed with epithelioid AML (27 patients) or classical AML (204 patients) were reviewed retrospectively. Before operation or needle biopsy (3 patients), all patient performed computed tomography (CT) scan and specimens were reviewed by pathologists. For analysis, we checked recurrence or metastasis, age, sex, size of the tumor, BMI, comorbidities, and Hounsfield unit according to each CT phase. We defined unfavorable group as patients with metastasis, recurrence and patients who expired due to tumor. The variables were compared with univariate analysis and multiple logistic regression analysis.

**Results:** Epithelioid AML patients were younger (41.2 years vs. 49.1 years, p=0.001) and male dominant (56% vs. 29%, p=0.005). Tumor size of epithelioid AML is larger (7.5 cm vs. 4.2 cm, p<0.001). Epithelioid AML group showed lower enhancement at CT scan, thus difference of Hounsfield unit between pre-contrast and arterial phase was significant lower in epithelioid AML group (46.6 HU vs. 65.9 HU, p=0.022). In multivariable logistic regression analysis, younger age (p=0.024) and male gender (p=0.024) had significantly greater odds of epithelioid AML. Of the 27 EAML patients, 5 patients were categorized as unfavorable group. Two patients in the unfavorable group had lymph node metastasis in para-aortic or aortic area with no metastasis in other sites. Three of them had lung metastasis. Enhancement at CT scan showed no difference between 2 groups (30.6 HU vs. 52.9 HU, p=0.151).

**Conclusions:** EAML has malignancy potential and has poorer prognosis compared with classical AML. Younger age, male sex and larger size of the mass give more possibility of the diagnosis of EAML. Higher Hounsfield Unit of the mass on the precontrast CT scan showed a tendency to be diagnosed as EAML but showed no statistical significance. EAML has malignant potential and requires careful follow up. Patient characteristics and and tumor size can be helpful determining the type of AML preoperatively.

**Keywords:** Epithelioid angiomyolipoma, Poorer prognosis
병리학적 T3a 신세포암 환자에서 신주위 지방 침범과 신동 지방 침범의 중양학적 결과 비교

류제만1, 최세영1, 경윤수2, 유달산1, 정인갑1, 송채린1, 홍범식1, 홍준혁1, 안한종1, 김청수1
울산대학교 서울아산병원 1비뇨기과학교실, 2건강의학과

**Introduction:** We investigated the influence of perinephric fat invasion (PFI) and sinus fat invasion (SFI) on the oncologic outcomes after radical nephrectomy (RN) or partial nephrectomy (PN) for pathologic T3a renal cell carcinoma (RCC).

**Materials and Methods:** Among 3192 patients who underwent RN or PN in our institution between 1998 and 2012, 390 patients were diagnosed with pathologic T3a RCC. Of this cohort, we excluded nodal or distant metastatic RCC, RCC with renal vein thrombosis, and RCC with perinephric and sinus fat invasion. Finally, 107 patients of PFI group and 58 patients of SFI group were included in this study. All patients underwent RN or PN. We compared the clinico-pathological characteristics and oncological outcomes between two groups, and factors predicting disease progression or survival were assessed.

**Results:** There were no significant differences in age, gender, the American Society of Anesthesiologists (ASA) status classification, and preoperative estimated glomerular filtration rate (GFR) between two groups. The proportion of patients who underwent RN was significantly higher in the SFI group than PFI group (91.4% vs. 72.9%, p=0.005). Mean maximal tumor diameter in the patients of SFI group was also longer than PFI group (6.5 cm vs. 5.9 cm, p=0.013). Tumor laterality, Fuhrman grade, histology, and presence of lymphovascular invasion were not significantly different between two groups. In Kaplan–Meier analysis, there was no significantly difference in 3-year disease progression–free survival (PFS; 83.0% vs. 75.3%, p=0.643), 3-year cancer–specific survival (CSS; 85.6% vs. 93.1%, p=0.373), and 3-year overall survival (OS; 82.7% vs. 89.9%, p=0.658) between PFI and SFI group. In multivariate analysis, longer maximal tumor diameter was an independent predicting factor of shorter PFS (HR: 1.17, p=0.006) and CSS (HR: 1.19, p=0.033). The predictors of shorter OS were older age (HR: 1.03, p=0.022) and longer maximal tumor diameter (HR: 1.13, p=0.021).

**Conclusions:** Sinus fat invasion compared to perinephric fat invasion was not associated with an increased risk of disease recurrence, cancer–specific death, or overall death.

**Keywords:** Renal cell carcinoma, Nephrectomy, Pathology
NP-037

Prognostic factors for recurrence in patients with pathologic stage T3a renal cell carcinoma

신택준1, 변혜진1, 정원호1, 하지웅1, 김병훈1, 박철희1, 하윤석2, 권태균2, 권세윤3, 이경섭3, 김천일1
1계명대학교 의과대학 비뇨기과학과, 2경북대학교 의과대학 비뇨기과학과, 3동국대학교 경주병원 비뇨기과학과

Introduction: In 7th edition of the AJCC (American Joint Committee on Cancer) TNM system, renal cell carcinoma (RCC) grossly extended perinephric fat invasion (PFI) or sinus fat invasion (SFI) or renal vein invasion (RVI) defines pathologic T3a (pT3a). This study was conducted to analyze the prognostic values of PFI, SFI and RVI in patients with pT3a RCC.

Materials and Methods: 102 patients who were diagnosed pT3aN0M0 RCC after radical nephrectomy from Keimyung University Dongsan medical center, Kyungpook University medical center and Dongguk University Gyeongju medical center were included in this retrospective study from January 2001 to June 2016. In these patients, the prognostic values of PFI, SFI, RVI, age, tumor size, histology and grade to predict recurrence-free survival were analyzed by Cox proportional hazards models.

Results: There were 50 patients with PFI, 60 patients with SFI, 37 patients with RVI. Total 26 (25.5%) recurrences were observed over a median follow up of 27.7 months (IQR=17.0-46.5). Median time to recurrence was 17.4 months (IQR=8.2-26.2). In multivariable analysis, patients with SFI were significantly associated with poor recurrence-free survival (HR=3.69, 95% confidence interval 1.36-9.99, p=0.010). However, there was no statistical significance in other factors.

Conclusions: In pT3aN0M0 RCC, patients with SFI had worse recurrence. However, we think that multi-center studies with a larger size is needed because our study includes a small number of patients.

Keywords: pT3a renal cell carcinoma, Recurrence-free survival
Retrospective comparative study between robot-assisted partial nephrectomy and open partial nephrectomy for the treatment of cystic tumors

김정준, 국하림, 김광모, 오종진, 이상철, 홍성규, 이상은, 변석수
분당서울대학교병원 비뇨기과

Background: To evaluate and compare the outcomes of robot-assisted partial nephrectomy (RAPN) in cystic tumors with open partial nephrectomy (OPN) in single-institutional series of RAPN, as limited data are available about the efficacy and safety of RAPN in cystic tumors.

Material and Methods: We evaluated patients who received RAPN or OPN for either cystic tumors from 2004 to 2016 and included in the single-institutional, retrospective database. Cystic renal masses were diagnosed on cross-sectional imaging (computed tomography or magnetic resonance imaging).

Results: Among 1233 cases of partial nephrectomy, 37 patient underwent RAPN (n=37) and 41 patients underwent OPN (n=41) for the treatment of a cystic tumor. There was no difference between the groups in terms of the patient's age, comorbidity scores (ECOG, ASA), the size, laterality and Bosniak classification of cystic tumors and preoperative clinical stage and RENAL nephrometry score (Table). In terms of surgical outcome, the operation time, ischemic time, estimated blood loss and pathologic profile was not different between two surgical approaches (Table). The safety profiles including the length of surgical margin and rate of positive surgical margin and complication rate classified by Clavien–Dindo were also not different between groups. The pain visual analog scale at postoperative first day demonstrated no difference between groups (Table).

Conclusion: RAPN demonstrated comparable surgical outcome with OPN, the classic gold-standard surgical method for the treatment of cystic renal tumors in terms of efficacy and safety profile.

Keywords: Robot assisted surgery, Cystic renal mass, Partial nephrectomy

<table>
<thead>
<tr>
<th>OPN (n=37)</th>
<th>%</th>
<th>RAPN (n=37)</th>
<th>%</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
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<td>25.5±3.3</td>
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<tr>
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<tr>
<td>Ex-smoker</td>
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<td>12</td>
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<td>3</td>
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<td>3</td>
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<td>Location</td>
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<tr>
<td>L</td>
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<td>Bosniak Classification</td>
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<tr>
<td>Operation time (min)</td>
<td>158.9±90.9</td>
<td>144.6±80.0</td>
<td>0.63</td>
<td></td>
</tr>
<tr>
<td>Disease duration (min)</td>
<td>104.7±89.9</td>
<td>228.8±141.9</td>
<td>0.08</td>
<td></td>
</tr>
<tr>
<td>Intraoperative transfusion</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Conversion to Radical</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>ESL (cm)</td>
<td>185.4±128.0</td>
<td>212.6±68.5</td>
<td>0.11</td>
<td></td>
</tr>
<tr>
<td>Chronic Kidney disease</td>
<td>1</td>
<td>2%</td>
<td>1</td>
<td>2%</td>
</tr>
<tr>
<td>Grade 1</td>
<td>1</td>
<td>2%</td>
<td>1</td>
<td>2%</td>
</tr>
<tr>
<td>Grade 2</td>
<td>4</td>
<td>14%</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Pathologic Tumor size</td>
<td>2.7±1.6</td>
<td>1.9±1.5</td>
<td>0.23</td>
<td></td>
</tr>
<tr>
<td>Benign</td>
<td>32%</td>
<td>28%</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Clear Cell Carcinoma</td>
<td>25</td>
<td>65%</td>
<td>23</td>
<td>63%</td>
</tr>
<tr>
<td>Papillary Carcinoma</td>
<td>7</td>
<td>18%</td>
<td>5</td>
<td>13%</td>
</tr>
<tr>
<td>Pathologic T stage</td>
<td>3</td>
<td>7%</td>
<td>3</td>
<td>7%</td>
</tr>
<tr>
<td>T1b</td>
<td>1</td>
<td>2%</td>
<td>1</td>
<td>2%</td>
</tr>
<tr>
<td>T2a</td>
<td>1</td>
<td>2%</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>T2b</td>
<td>1</td>
<td>2%</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Positive surgical margin</td>
<td>1</td>
<td>2%</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Surgical margin length (mm)</td>
<td>3.2±2.07</td>
<td>1.9±2.08</td>
<td>0.20</td>
<td></td>
</tr>
<tr>
<td>POD 1 day post VAS</td>
<td>4.7±3.13</td>
<td>3.8±3.13</td>
<td>0.33</td>
<td></td>
</tr>
</tbody>
</table>

Table. Demographics and operative outcome of OPN and RAPN
NP-039

Retrospective comparative study between robot-assisted partial nephrectomy and open partial nephrectomy for the treatment of highly complex renal tumors with RENAL nephrometry score ≥8

김정준, 오종진, 이상철, 홍성규, 이상은, 변석수
분당서울대학교병원 비뇨기과

**Background**: To evaluate and compare the outcomes of robot-assisted partial nephrectomy (RAPN) in highly complex tumors with open partial nephrectomy (OPN) in single-institutional series of RAPN, as limited data are available about the efficacy and safety of RAPN in highly complex renal tumors.

**Material and Methods**: We evaluated patients who received RAPN or OPN for either highly complex renal tumors from 2004 to 2015 and included in the single-institutional, retrospective database. Highly complex renal tumors were defined as the RENAL nephrometry score ≥8.

**Results**: Of cases, the 43 patient underwent RAPN and 31 patients underwent OPN for the treatment of the highly complex tumor. There was no difference between the groups in terms of the patients’ age, comorbidity scores (ECOG, ASA), the size, laterality and preoperative clinical stage and RENAL nephrometry score. In terms of surgical outcome, the operation time, ischemic time, estimated blood loss and the pathologic profile was not different between two surgical approaches. The safety profiles including the length of surgical margin and rate of positive surgical margin and complication rate classified by Clavien–Dindo were also not different between groups.

**Conclusion**: RAPN demonstrated comparable surgical outcome with OPN, the classic gold-standard surgical method for the treatment of highly complex renal tumors in terms of efficacy and safety profile.

**Keywords**: Robot assisted surgery, Highly complex renal mass, Partial nephrectomy
Purpose: Recent studies proved that partial nephrectomy as a treatment method for early stage kidney cancer shows excellent results in oncologic outcomes and preservation of renal function. However, morphological characteristics of the tumor should be considered to determine surgery method due to delicate surgical technics and higher complication rate in partial nephrectomy compared to radical nephrectomy. In this study, we evaluate the patient demographics and perioperative characteristics as risk factors for progression of chronic kidney disease after laparoscopic partial nephrectomy.

Material and Methods: From March 2011 to May 2016, total 174 patients who underwent laparoscopic partial nephrectomy. We retrospectively reviewed the medical records of patients. Patients were classified into two groups according to CKD progression (post-operative eGFR decreased more than 20% at a year after surgery). Age, sex, body mass index (BMI), underlying disease, centrality index, RENAL nephrometry score, warm ischemic time (WIT), estimated blood loss (EBL), pathology were analyzed using binary logistic regression analysis.

Results: Of 174 patients, 26 patients progress CKD (14.9%). Univariate analysis revealed that progression group was associated with age, centrality index and RENAL nephrometry score (P=0.045, P<0.001, P<0.001, respectively). Also patient’s sex, BMI, hypertension, diabetes mellitus, WIT, EBL and pathology were not statistically significant. Multivariate analysis revealed that centrality index (Odds ratio, 0.273; 95% CI, 0.142–0.525; P<0.001) was a significant risk factor for progression of CKD at 1 year after surgery (Table). The cut-off value of centrality index was 2.68 (Sensitivity, 73.6%; specificity, 73.1%; AUC 0.803).

Conclusions: This study demonstrated that lower centrality index may be a risk factor of progression of CKD at 1 year after laparoscopic partial nephrectomy.

Keywords: Partial nephrectomy, CKD, Centrality index

<table>
<thead>
<tr>
<th>Table: Multivariate analysis of risk factors for progression of CKD at a year after laparoscopic partial nephrectomy.</th>
</tr>
</thead>
<tbody>
<tr>
<td>metric</td>
</tr>
<tr>
<td>Age</td>
</tr>
<tr>
<td>Centrality index</td>
</tr>
<tr>
<td>RENAL nephrometry score Low (&lt;6)</td>
</tr>
<tr>
<td>Moderate (7-9)</td>
</tr>
<tr>
<td>High (10+)</td>
</tr>
</tbody>
</table>
NP-041

T1 병기 투명신세포암 환자에서 부분 신절제후 절제변연 양성이 암 재발에 미치는 영향

서성필, 강호원, 김원태, 김용준, 윤석중, 이상철, 김원재
충북대학교 의과대학 비뇨기과학실

Purpose: To assess the risk factors of positive surgical margins (PSM) and the influence of margin status on recurrence in pT1 clear cell renal cell carcinoma (RCC) following partial nephrectomy (PN).

Materials and Methods: Patients (1831) with pathologically confirmed stage T1 clear cell RCC were retrospectively analyzed following PN at eight institutions in Korea between 1999 and 2011. Demographics, operative data, pathological margin status, and site of recurrence were analyzed.

Results: Resection margins were positive in 31 patients (1.7% of the cohort) on final pathology. None of the clinico-pathological parameters were significantly related to the marginal status (all P>0.05). During a median follow-up of 32.5 months, local recurrences were observed in 0.4% of negative surgical margins. There was no local recurrence in any of the cases with PSM. Distant recurrences developed in 1.7% of negative surgical margins and 3.2% of PSM. There were no significant differences in recurrence–free survival by margin status (P=0.566).

Conclusions: Our multi-institutional data suggest that marginal status does not influence tumor recurrence risk in pT1 clear cell RCC after PN. Careful surveillance seems to be a sufficient strategy in this clinical scenario.

Keywords: Partial nephrectomy, Recurrence, Margin
NP-042

제1형 및 제2형 유두상 신장암, 그리고 투명세포 신장암의 비교: T1 병기에 있어 조직학적 타입과 종양학적 예후간의 상관관계

이재훈, 채한규, 이용철, 최세영, 류재만, 유달산, 정인갑, 송재린, 홍범식, 홍준혁, 안한종, 김청수
울산대학교 서울아산병원

Objectives: We compared histological subtype of papillary renal cell carcinoma (type1 and type2 pRCC), and clear cell renal cell carcinoma (ccRCC) in patients with T1 stage RCC to analyze the prognostic impact of papillary histology on oncological outcomes.

Materials and Methods: From 1998 to 2012, 93 patients with pRCC and 252 patients with ccRCC of clinical T1 stage were reviewed. All patients underwent radical nephrectomy or nephron sparing surgery. We assessed the impact of histologic subtypes on oncologic outcomes after surgery in patients with T1 stage RCC.

Results: There was no difference in patient and tumor characteristics between pRCC and ccRCC except age (p=0.003) and Fuhrman grade (p<0.001). And there was no difference in patient and tumor characteristics between type1 pRCC and type2 pRCC, but Fuhrman grade was higher in type 2 pRCC (p=0.001). In comparison with recurrence free survival and overall survival of pRCC and ccRCC, pRCC is inferior to ccRCC regarding recurrence free survival (P=0.0077), but there is no difference in overall survival between pRCC and ccRCC. Kaplan-Meier analysis identified there was no significant difference between type1 pRCC and type2 pRCC with recurrence free survival and overall survival, 5-year recurrence free survivals of pRCC and ccRCC were 93.7% and 97.5% respectively, 5-year overall survivals of pRCC and ccRCC were 95.7% and 94.5% respectively. At multivariate analysis predictors for overall survival were only age (HR 1.069, p<0.0001) and recurrence (HR 4.93, p<0.0007).

Conclusion: In patients with T1 stage RCC recurrence after surgery occurred more commonly in pRCC compared with ccRCC. The histological subtype of pRCC (type1 and type2) had no impact on recurrence free survival and overall survival in Kaplan-Meier analysis. Close observation and long term follow up is recommended in patients diagnosed as pRCC for recurrence.

Keywords: Renal cell carcinoma, RCC subtypes, Recurrence
신장에서 발견된 2 cm 이하의 고형 종물의 병리결과를 예측하는데 MRI가 CT보다 정확한가?

이동훈, 이정우, 남종길, 박성우, 정문기
부산대학교 의과대학 양산부산대학교병원 비뇨기과학실

Introduction: We compared the pathologic outcomes of solid renal mass less than 2.0 cm after the diagnosis of suspicious malignancy according to computed tomography (CT) and/or magnetic resonance imaging (MRI) to evaluate the diagnostic accuracy of each image modalities.

Material and Methods: We reviewed 218 patients who underwent partial nephrectomy between 2009 and 2017, retrospectively. Among them, we found 93 patient who had solid renal mass less than 2.0 cm in the preoperative evaluation using CT and/or MRI. To evaluate solid renal mass, 48 patients underwent CT only, 25 patients underwent MRI only and 20 patients underwent an additional MRI after CT. We performed the partial nephrectomy for these patients and compared the pathologic outcomes to identify the accuracy of each imaging modalities.

Results: Among 93 patients who underwent partial nephrectomy, 78 patients had renal cell carcinoma (67 clear cell type, eight papillary type, three chromophobe type), two other malignancy and 13 benign tumor (nine angiomyolipoma, two oncocytoma, one juxtaglomerular tumor and one hemorrhagic cyst). The patients who underwent CT showed 41 malignancy and 7 benign tumors, the patients who underwent MRI showed 21 malignancy and 4 benign tumors and the patients who underwent CT + MRI showed 18 malignancy and 2 benign tumors. There was no statistical difference between three imaging modalities (p=0.834). Also, the sensitivity was not statistically different (p=0.899).

Conclusion: To evaluate the solid renal mass less than 2.0 cm, CT and MRI showed the similar diagnostic accuracy and an additional MRI after CT also seemed to have the similar diagnostic accuracy. Especially, we thought that an additional MRI has a limited role for the evaluation of solid renal mass less than 2.0 cm if the solid renal mass have radiologic characteristics of malignancy in the CT.

Keywords: Small renal mass, CT, MRI
Non Discussion Poster

NP-044

불량한 예후를 보이는 전이 투명세포 신장암에서 1차 치료 효과

김정호1, 정진수2, 곽 천3, 정창욱3, 서성일4, 송재현5, 서일영6, 강성구7, 박재영7, 황의창8, 홍성후9

1동남권원자력의학원 암센터, 2국립암센터 전립선암센터, 3서울대학교 의과대학 비뇨기과학회, 4성균관대학교 의과대학 비뇨기과학회, 5울산대학교 의과대학 비뇨기과학회, 6원광대학교 의과대학 비뇨기과학회, 7고려대학교 의과대학 비뇨기과학회, 8전남대학교 의과대학 비뇨기과학회, 9가톨릭대학교 의과대학 비뇨기과학회

Purpose: The aim of this study was to investigate the outcomes of first-line targeted therapy in patients with poor-risk metastatic renal cell carcinoma (mRCC).

Material and Methods: Data of patients who had mRCC between 2001 and 2016 at multiple institutions were collected retrospectively. Inclusion criteria were as follows: age≥18 years; clear cell type RCC; poor-risk group; received first-line targeted therapy with sunitinib, pazopanib or temsirolimus. We compared the efficacy and safety of sunitinib, pazopanib and temsirolimus in this group.

Result: A total of 148 patients were enrolled for the analysis. There was no significant differences in the mean follow-up period between the three groups (p=0.222). The median PFS was 4 months (95% confidence interval [CI], 2.4–5.6 months) after treatment with sunitinib, 8 months (95% CI, 3.5–12.5 months) with pazopanib and 1 months (95% CI, 0.1–1.9 months) with temsirolimus. The median CSS was 7 months (95% CI, 5.1–8.9 months) after treatment with sunitinib, 10 months (95% CI, 7–13 months) with pazopanib and 4 months (95% CI, 2.6–5.4 months) with temsirolimus. There was no significant difference in the best response between the three groups. Multivariate analysis revealed that nephrectomy (p=0.03), brain metastasis (p=0.024), symptoms at diagnosis (p=0.037) were independently associated with CSS. There were no differences in the rate of AEs between the three groups (p=0.199).

Conclusion: Pazopanib shows better survival outcomes in metastatic clear cell RCC with poor-risk features.

Keywords: Renal cell carcinoma, Poor-risk, Targeted therapy
NP-045

로봇전전립선절제술 시행 후 전립선 특이항원 수치가 최저점까지 도달한 고위험군 전립선암 환자에서 질병 진행까지의 시간이 전이와 사망을 예측할 수 있는가?

김도경, 구교철, 이광석, 하윤수, 나군호, 홍성준, 양승철, 정병하
연세대학교 의과대학 비뇨기과학교실

Introduction: Robot-assisted radical prostatectomy (RARP) is a feasible treatment option for high-risk prostate cancer (PCa) and patients may postoperatively achieve undetectable PSA levels. Nevertheless, risk of disease progression is relatively high. We investigated metastasis-free survival (MFS), cancer-specific survival (CSS), and overall survival (OS) outcomes and prognosticators of these survival endpoints in this subset of patients.

Materials and Methods: Using a single institutional cohort of 342 patients treated with RARP and pelvic lymph node dissection between August 2005 and June 2011, we identified 251 (73.4%) patients with high-risk PCa (clinical stage ≥T3 and/or biopsy Gleason score ≥8 and/or PSA ≥20 ng/ml) who postoperatively achieved undetectable PSA, defined as <0.01 ng/ml. Biochemical recurrence (BCR) was defined as two consecutive rises of PSA ≥0.2 ng/ml.

Results: Median patient age was 66.5 years (IQR 63.0–71.0). During the median follow-up of 75.9 months (IQR 59.4–85.8), metastasis occurred in 38 (15.1%) patients; mostly often to bone, followed by LNs, lung, and liver. The 5-year metastasis-free survival, CSS, and OS rates were 87.1%, 94.8%, and 94.3%, respectively. Multivariate Cox-regression analysis revealed time to BCR as an independent predictor for metastasis (p<0.001). Time to metastasis was an independent predictor for overall survival (p=0.003). Patients who exhibited BCR in less than 60 months showed significantly lower metastasis-free survival and OS compared to the counterparts (log-rank p<0.001).

Conclusions: RARP confers acceptable oncological outcomes for high-risk PCa. Close monitoring beyond 5 years is be warranted for early detection of disease progression and for timely adjuvant therapy.

Keywords: Prostate cancer, Prostatectomy, Recurrence
진행된 전립선암 환자에서 고식적 경요도 전립선 절제술이 중앙학적 결과에 미치는 영향: 성향점수분석

최세영, 류제만, 경윤수, 신정현, 유달산, 정인갑, 홍준혁, 안한종, 김청수
울산대학교 의과대학 비뇨기과학교실

Objectives: We investigated the oncologic effect of palliative transurethral resection of the prostate (TURP) in prostate cancer comparing primary androgen deprivation therapy (ADT).

Materials and Methods: A total of 614 patients who received primary ADT was analyzed retrospectively. Patients with incidental prostate cancer (T1a or T1b) were excluded. Patients were divided into TURP group (83 patients) and non–TURP group (531 patients). A propensity score matching was carried out between TURP and non-TURP groups. The Kaplan–Meier method was used to confirm castration-resistant prostate cancer (CRPC), cancer-specific survival (CSS), and overall survival (OS). Cox regression was performed to confirm factors affecting CSS.

Results: Before matching, TURP group had worse TNM stage (p<0.01), biopsy Gleason score (p=0.028), and larger prostate volume (50.1 cc vs 39.0, p=0.005) than ADT group. Most common reason for TURP was acute urinary retention. After matching by comorbidity, initial PSA, TNM stage, and Gleason score, the characteristics were similar between TURP and non-TURP groups. On Kaplan–Meier curve, TURP group showed poor outcomes in CRPC (p=0.003), CCS (p=0.003) and OS (p=0.026) than non–TURP group. On multivariate analysis, factors to predict CSS were Gleason score (9 vs ≤8: HR 2.274, p=0.0237, 10 vs ≤8: HR 4.809, p=0.0002) and TURP within 3 months after biopsy (HR 2.585, p=0.0221).

Conclusion: Although TURP group showed poor CRPC–free survival, CCS, and OS, TURP was needed to care symptoms. TURP within 3 months after biopsy should be performed observed carefully and managed properly.

Keywords: Prostate cancer, Palliative transurethral resection of the prostate, Oncologic outcome
NP-047

근치적 방광 절제술로 우연히 발견된 전립선 암의 임상양상 및 예후

신정현, 류제만, 최세영, 유달산, 정인갑, 홍범식, 홍준혁, 안한종, 김청수
울산대학교 서울아산병원 비뇨기과학학교실

Objectives: We investigated the clinical features and prognosis of prostate cancer incidentally detected after radical cystoprostatectomy for bladder cancer.

Materials and Methods: We retrospectively reviewed the medical records of patients who underwent radical cystoprostatectomy from 1997 to March 2017 with synchronous prostate cancer and bladder cancer at the specimen. Patients with previous prostate cancer diagnosis were excluded and total number of 97 patients was finally included. We analyzed the baseline characteristics of patients including perioperative PSA, Gleason score and T stage of prostate cancer. We also investigated the presence of biochemical recurrence (BCR) and the association between prostate cancer and bladder cancer survival by multivariate Cox regression.

Results: Mean age was 67.8±8.1 years old with mean follow-up of 35.3 months, 45 patients had hypertension and 16 patients had diabetes. Urinary diversion performed was 34 ileal conduits and 63 orthotopic neobladder. 14 patients underwent neoadjuvant chemotherapy and 30 patients had adjuvant chemotherapy. Final pathologies of bladder cancer were transitional cell carcinoma in 91 patients and other histologies in 6 patients. One patient had pathologic T0 bladder cancer but Gleason 9 (4+5) prostate cancer with bladder invasion (pT4). 71.8% of patients had serum PSA<3.0 ng/mL, 66 patients (68.0%) had Gleason 6 prostate cancer and only four patients had high Gleason score (≥8). Majority of patients (93.8%) had pathologic T2 stage prostate cancer. None of the patients showed BCR. On multivariate analysis, presence of lymph node metastasis was associated with worse clinical outcome (HR 2.429, p=0.032). Gleason score, pathologic T stage of prostate cancer and preoperative PSA were not associated with bladder cancer survival.

Conclusion: Prostate cancers accidentally detected after radical cystoprostatectomy have high Gleason score (≥8) in 4.1% and pathologic stage ≥pT3 in 6.2%. None of them showed BCR with indolent clinical course.

Keywords: Prostate cancer, Radical cystoprostatectomy, Bladder cancer
비전이성 전립선암에 대한 안드로겐 차단요법 및 근치적 전립선절제술 간의 생존율 비교

하유신1,11, 최진봉2, 최인영3, 곽철4, 김정수5, 변석수6, 서성일7, 이승주8, 이승환9, 강민주10, 강신희10, 박주연10, 심정임10, 양장미10, 최인순10, 박은정10, 이지열1,11

1가톨릭대학교 서울성모병원 비뇨기과학교실, 2가톨릭대학교 부천성모병원 비뇨기과학교실, 3가톨릭대학교 서울성모병원 Department of Medical Informatics, 4서울대학교병원 비뇨기과학교실, 5울산대학교 서울아산병원 비뇨기과학교실, 6분당서울대학교병원 비뇨기과학교실, 7성균관대학교 의과대학 삼성서울병원 비뇨기과학교실, 8가톨릭대학교 성빈센트병원 비뇨기과학교실, 9연세대학교 의과대학 Department of Urology, Urological Science Institute, 10National Evidence-based Healthcare Collaborating Agency, Seoul, 11가톨릭대학교 서울성모병원 The Cancer Research Institute

Introduction: We conducted a comparative survival analysis between primary androgen deprivation therapy (PADT) and radical prostatectomy (RP) based on nationwide Korean population data including all patients with prostate cancer.

Methods: A total of 4,538 prostate cancer patients from the National Health Insurance Service (NHIS) database linked with Korean Central Cancer Registry data (KCCR) who were treated with primary PADT or RP between January 1, 2007, and December 31, 2014 were enrolled. Kaplan–Meier (KM) and multivariate survival analyses stratified by stage (localized and locally advanced) and age (<75 and ≥75) were performed using a Cox proportional–hazards model to evaluate the treatment effect.

Results: Of 18,403 patients from the NHIS database diagnosed with prostate cancer during the study period, 4,538 who met the inclusion criteria were included in the analysis. Of these, 3,136 underwent RP and 1,402 received PADT. There was a significantly increased risk of death in patients who received PADT compared with those who underwent RP in the propensity score matched (PSM) cohort. In subgroup analysis stratified by stage and age, patients who received PADT had a significantly increased risk of death compared with patients who underwent RP in every subgroup. Especially, a much greater risk was observed in those with locally advanced prostate cancer.

Conclusion: In a nationwide survival comparative analysis between RP and ADT in non–metastatic prostate cancer, patients who underwent RP had longer survival than those who received ADT. Especially, even in the group of older patients with advanced prostate cancer, RP provided a survival benefit when compared ADT.

Keywords: Prostate cancer, Androgen deprivation therapy, Prostatectomy
NP-049

전립선 암의 배부정맥 침범은 로봇 보조 복강경 전립선적출술 후 생화학적 재발의 예측 인자이다

최세영, 류제만, 경윤수, 신정현, 이재훈, 이원철, 유달산, 정인갑, 김청수
울산대학교 의과대학 비뇨기과학술실

Objectives: We investigated the role of dorsal vein involvement (DVI) in predicting biochemical recurrence (BCR) during robot-assisted laparoscopic prostatectomy (RALP).

Materials and Methods: A total of 271 patients who underwent RALP for prostate cancer with dorsal vein frozen section to confirm DVI between October 2008 and April 2016 were analyzed, retrospectively. We investigated the association between pathologic parameters with DVI and BCR using Kaplan–Meier analysis and multivariate Cox regression.

Results: Positive DVI was found in 17 patients (6.3%) who had higher tumor volume (13.5 cc vs 3.6 cc, p=0.006), more pathologic T3 stage (70.6% vs 32.3%, p=0.003), more extracapsular extension (70.6% vs 32.7%, p=0.004) and more positive surgical margin (88.2% vs 36.6%, p<0.001) than 254 patients of negative DVI. After a median follow-up of 23.8 months, BCR occurred in 40 patients (14.8%). BCR free rates at 2 years were 47.1% in positive DVI and 92.5% in negative DVI group. On Kaplan–Meier curve with log-rank test, the presence of DVI increased the probability of BCR (p<0.001). On multivariate analysis, initial PSA (hazard ratio [HR] 1.097, p<0.0001), positive surgical margin (HR 2.535, p=0.0118), seminal vesicle invasion (HR 4.003, p=0.0005), lymph node involvement (HR 6.366, p=0.0230), and DVI (HR 6.841, p=0.0001) were significant factors for BCR.

Conclusion: DVI was a prognostic factor associated with BCR after RALP. This finding supports routine evaluation of DVI and suggests that patients with DVI should be more carefully followed after RALP.

Keywords: Prostate cancer, Dorsal vein, Robot-assisted laparoscopic prostatectomy
NP-050

SNUPCRC 전립선암 위험도 계산기의 임상적 유용성

육형동, 윤민영, 구자현, 김현희, 곽철, 정창욱
서울대학교병원 비뇨기과

Introduction: To evaluate the usefulness of the calculator to reduce unnecessary prostate biopsy and to increase the detection rate of high risk cancer.

Methods: We retrospectively analyzed 489 patients who underwent prostate biopsy between 2014 and 2016. The subjects were divided into two groups according to the use of SNUPCRC (conventional and SNUPCRC group). In the SNUPCRC group, prostate biopsy was performed when the probability of SNUPCRC was more than 30%.

Results: The SNUPCRC group had significantly smaller prostate volume (p=0.010) and significantly more DRE and TRUS abnormalities (p=0.011 and p=0.010). Overall detection (71.9% vs. 32.1%) and high risk cancer detection rates (40.6% vs 19.3%) were significantly higher in the gray zone (PSA 4-10) (p=0.000 and p=0.006). In SNUPCRC ≥30% group compared to <30% group, overall detection rate of 72.3% vs 30.2% and high risk detection rate of 60.6% vs 18.3% were significantly different (p=0.000 and p=0.000). Applying the SNUPCRC to the conventional group could avoid unnecessary prostate biopsy in 77.4% and avoid 84.5% if it included low risk prostate cancer.

Conclusion: SNUPCRC is clinically useful to reduce unnecessary prostate biopsy and increase overall detection rate and high risk cancer detection rate.

Keywords: Prostate cancer, Prostate biopsy, Prostate cancer risk
전립선적출술 후 요자제능 회복에 영향을 미치는 해부학적, 기능적, 수술적 인자에 대한 고찰

김명1, 박명찬2, 박사현1, 임고산1, 최승권1, 심명선1, 정인갑1, 유달산1, 홍준혁1, 김청수1, 안한종1

1울산대학교 서울아산병원 비뇨기과학교실, 2인제대학교 해운대백병원 비뇨기과학교실

Purpose: To identify the preoperative anatomical and functional features of sphincter complex, and degree of neurovascular bundle (NVB) preservation affecting the return of continence after radical prostatectomy.

Materials and Methods: Four-hundred and seven patients with radical prostatectomy were prospectively enrolled. Anatomical factors including pelvic diaphragm length (PDL) and membranous urethral length (MUL) on sagittal view of preoperative magnetic resonance image (MRI) were assessed. Functional parameters on urethral pressure profiles (UPPs) such as maximum urethral closure pressure (MUCP), functional urethral length (FUL), or area of continence zone (ACZ) were also preoperatively measured. Degree of NVB preservation was stratified as bilateral interfascial, unilateral interfascial, and none. Continence, defined as being pad-free, was assessed according to their anatomical, functional, and surgical factors. Binary logistic regression was performed to identify predictive factors for continence return at 12 months after prostatectomy.

Results: The rates of continence return at postoperative 1, 3, 6, and 12 months were 47.2, 72.5, 78.4, and 92.4%, respectively. Patients with long PDL (≥10 mm; 1.2 vs. 3.1 months), high MUCP (≥67 cmH₂O; 1.9 vs. 3.1 months), and bilateral NVB preservation (1.9 vs. 3.0 vs. 3.1 months) demonstrated significantly earlier continence returns than others. On multivariate analysis, preoperative PDL (Odds ratio [OR]=1.764 per mm), MUCP (OR=1.041 per cmH₂O), and bilateral NVB preservation (OR=3.805) were independently associated with continence return at 12 months after prostatectomy, along with age (OR=0.915 per year) and body mass index (OR=0.778 per kg/m²).

Conclusions: Preoperative anatomical, functional features of sphincter complex and degree of NVB preservation independently affected the long-term continence status after prostatectomy. Preoperative MRI and UPPs were valuable evaluations to predict the persistent continence status after the surgery. Moreover, bilateral NVB preservation should be achieved for better functional outcomes.

Keywords: Magnetic resonance imaging, Incontinence, Prostatectomy
Predictors of biochemical recurrence in margin positive prostate cancer after radical prostatectomy without adjuvant radiotherapy

Background & Purpose: Men with positive surgical margin (PSM) at radical prostatectomy (RP) have higher rates of biochemical recurrence (BCR). The role of adjuvant radiotherapy (ART) for patients with PSM after radical prostatectomy (RP) has been shown to prevent BCR, but overtreatment remains a significant concern. The present study, therefore, sought to identify men with PSM at higher risk for BCR after RP in the absence of ART.

Materials & Methods: We retrospectively reviewed 2301 men who underwent RP for prostate cancer at our institution between 2001 and 2010. The patients who received neoadjuvant or adjuvant therapy and patients without adequate medical records were excluded. Among these patients, 977 patients with positive surgical margins were analyzed. The Kaplan–Meier method was used to estimate and compare BCR–free survival (BCRFS). Cox regression models were used to investigate predictors of BCR.

Results: The median age was 66.0 (interquartile range [IQR]: 62–70), the median time of follow–up was 78.0 months (IQR: 64–95). In the univariate and multivariate analyses, preoperative prostate specific antigen (hazard ratio [HR] 1.371, p=0.003), pathologic T stage ≥T3 (HR 1.322, p=0.032), RP Gleason score (GS=7: HR 1.954, p<0.001; GS ≥8:HR 4.231, p<0.001), and tumor volume ≥5 cc (HR 1.808, p<0.001) were significant predictors for BCR after RP.

Conclusion: Our study demonstrated the heterogeneity of oncologic outcomes in patients with PSM. Stratifying men with PSM by prognostic factors such as preoperative PSA, pathological T stage, RP GS, and tumor volume will improve identification of those at higher risk for BCR that should be strongly considered for ART.

Keywords: Radical prostatectomy, Biochemical recurrence, Positive surgical margins
혈중 지질 농도와 전립선 암의 관련성에 관한 연구

정재윤, 김명, 김종근, 이찬우, 유달산, 정인갑, 송재림, 홍준혁, 김청수, 안한종
울산대학교 의과대학 서울아산병원 비뇨기과학실

목적: There have been some controversies on correlation of lipid profile and prostate cancer risk. This study aimed to assess the association among lipid profiles and prostate cancer using the large prostate biopsy cohorts.

대상 및 방법: Total of 4776 patients who received prostate biopsy between January 2005 and December 2015 were analyzed. These patients routinely performed the lipid profile laboratory study including serum total cholesterol, low density lipoprotein (LDL), HDL, and TG level. Correlation of lipid profile and prostate cancer was evaluated.

결과: Among the 4776 patients, 1541 patients (32.2%) were diagnosed the prostate cancer. Univariate analysis showed age, PSA, glucose, total cholesterol, LDL to be related with prostate cancer. However, in multivariate analysis, prostate cancer was only associated with age (OR=1.060; p<0.001), PSA (OR=1.071; p<0.001) and triglyceride level higher than 200 mg/dL (OR=1.281; p=0.014). High TG/HDL ratio also increased the risk of prostate cancer (OR=1.039; p=0.006), and the risk was more increased when TG/HDL was adjusted with age (OR=1.055; p<0.001). Subgroup analysis of prostate cancer patients was done. Borderline high LDL (100-189 mg/dL) showed negative relationship with metastatic prostate cancer (OR=0.282; p=0.041) while borderline high triglyceride (150-190 mg/dL) increased the risk of pathologic T3 or high grade (Gleason score ≥8) disease (OR=1.751; p=0.012).

결론: TG is associated with prostate cancer and TG/HDL ratio showing stronger relationship. Further studies are needed to confirm the mechanism linking TG/HDL ratio and prostate cancer.

Keywords: Prostate cancer, Lipid profile
근치적 전립선 절제술 후 발생한 탈장의 위험 인자와 발생률

구자윤, 이찬호, 이 경, 김경환, 백승룡, 박지훈, 하홍구
부산대학교 의과학 대학 비뇨기과학실

Objective: To investigate risk factor and the occurrence rate of postoperative inguinal hernia (PIH) in patient undergone radical prostatectomy.

Methods: This study was based on 460 patients undergone radical prostatectomy specimens, from 2011 to 2016. We first compared the occurrence rate of PIH in the radical prostatectomy group [460; (LRP:341) and (RARP:119)] and control group (664; transurethral resection of bladder tumor), and then we analyzed the risk factors (age, operative methods, previous abdominal operative history, the thickness and width of external oblique muscle and rectus muscle, the thickness of abdominal subcutaneous fat layer at Hesselbach’s triangle level, BMI, PSA, operative time, specimen weight and Gleason score) of PIH in radical prostatectomy group.

Results: In Kaplan–Meier curve analysis, the occurrence rate of PIH was 5.3% (18/341), 4.2% (5/114), and 0.5% (3/664) for the LRP, the RARP, and the control group, respectively (p<0.001) (Figure 1). Multiple logistic regressions showed that previous abdominal operative history, the thickness and length of external oblique muscle and rectus muscle, the thickness of abdominal subcutaneous fat layer at Hesselbach’s triangle level was significant risk factors (p=0.048, <0.001, =0.005, =0.001), respectively (Table 1). Among them, the thickness of external oblique muscle was strongly risk factor.

Conclusion: We suggest that if the thickness of the muscle is less than 7 mm, careful surgery is needed for radical prostatectomy and care should be taken to determine if the hernia occurs during the follow-up.

Keywords: Inguinal hernia, Prostate cancer, Robotics assisted laparoscopic prostatectomy

<table>
<thead>
<tr>
<th>Factors</th>
<th>Multivariate analysis</th>
<th>95% CI</th>
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<tbody>
<tr>
<td>Previous abdominal operative history</td>
<td>0.048</td>
<td>2.78</td>
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<tr>
<td>The thickness of external oblique muscle</td>
<td>&lt;0.001</td>
<td>0.19</td>
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<tr>
<td>The thickness of abdominal subcutaneous fat</td>
<td>0.005</td>
<td>0.56</td>
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<tr>
<td>layer at Hesselbach’s triangle level</td>
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<tr>
<td>The width of rectus muscle</td>
<td>0.001</td>
<td>0.83</td>
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NP-055

원격 전이를 동반하지 않은 림프절 전이 전립선암 환자에서 첫 치료에 따른 중양학적 결과의 차이: 근치적 전립선 절제술 vs. 남성 호르몬 박탈 요법

류제만1, 최세영1, 경윤수2, 유달산1, 정인갑1, 홍범식1, 홍준혁1, 안한종1, 김청수1
울산대학교 서울아산병원 1비뇨기과학실, 2건강의학과

Introduction: We investigated the differences of oncologic outcomes in patients with prostate cancer with nodal metastasis without distant metastasis who underwent radical prostatectomy (RP) or androgen deprivation therapy (ADT) as an initial treatment.

Materials and Methods: After excluding patients with clinical T4 or metastatic prostate cancer, total 101 patients with prostate cancer with nodal metastasis who underwent RP or ADT in our institution were included for the analysis. We defined nodal metastasis as pathologic N1 in the RP group and clinical N1 in the ADT group. The estimated castration-resistant prostate cancer (CRPC) free survival, cancer-specific survival (CSS) and overall survival (OS) were calculated by Kaplan–Meier analysis. Multivariate Cox regression analysis was performed to assess the prognostic factors.

Results: 46 patients in RP group and 55 patients in ADT group were included in this study. Although there were no significant differences in age, body mass index, and presence of diabetes mellitus or hypertension between the two groups, the ADT group had higher Charlson comorbidity index than RP group (p<0.001). Clinical T stage was also higher in the ADT group, but initial prostate-specific antigen (PSA) level and Gleason score at prostate biopsy were not significantly different between two groups. ADT was performed for mean duration of 41.1 months in ADT group and 26 (56.5%) of patients in RP group underwent adjuvant androgen deprivation therapy according to postoperative PSA levels. In Kaplan–Meier analysis, 2-year CRPC free survival was 95.1% and 76.9% (p<0.001), 2-year CSS was 94.4% and 83.0% (p=0.011), and 2-year OS was 86.0% and 71.6% (p=0.003) in RP and ADT group, respectively. In multivariate analysis, higher initial PSA level (HR: 1.01, p=0.029) and ADT (vs. RP, HR: 3.85, p=0.004) were independent predictors of shorter CSS and OS, respectively.

Conclusions: ADT as an initial treatment for non–metastatic node positive prostate cancer was a significant predicting factor of shorter OS comparing RP after adjusting the other clinical features.

Keywords: Prostate cancer, Androgen deprivation therapy, Prostatectomy
NP-056

도세탁셀 항암화학요법 치료를 받는 거세 저항성 전립선암 환자에서 남성호르몬박탈요법의 기간이 종양학적 결과에 미치는 영향

류제만1, 최세영1, 경윤수2, 유달산1, 정인갑1, 홍범식1, 홍준혁1, 안한종1, 김청수1
울산대학교 서울아산병원 1비뇨기과학실, 2건강의학과

Introduction: We investigated whether the duration of first androgen deprivation therapy (ADT) influences oncologic outcomes in patients with castration-resistant prostate cancer (CRPC) treated with docetaxel.

Materials and Methods: 101 patients who were diagnosed with CRPC after ADT and treated with docetaxel were included for the analysis. We estimated the optimal threshold of the effective duration of ADT before diagnosis of CRPC, and the impacts of the duration of ADT on oncologic outcomes were assessed using multivariate analysis.

Mean follow-up duration was 44 months.

Results: Total 74 patients (73.3%) of cohorts died during follow-up duration. Mean initial PSA was 519.3 ng/ml and Gleason scores was as follows: 6 in 2 (2.0%), 7 in 6 (5.9%), 8 in 27 (26.7%), 9 in 50 (49.5%), and 10 in 16 patients (15.8%). Median duration of ADT was 37.3 months. We considered 30 months as the proper cut-off value of the effective duration of ADT, because 30 months had the highest sensitivity and specificity (53.4% and 28.6%, respectively) to cancer progression in ROC curve. All patients were treated with docetaxel median 9 months after CRPC onset. In Kaplan–Meier analysis, 2-year progression-free survival was 44.8% in patients with ADT for below 30 months and 72.4% in patients with ADT for more than 30 months (p<0.001). In addition, 2-year overall survival was 48.0% and 68.8% in patients with ADT for below 30 months and the others, respectively (p<0.001). Multivariate analysis indicated that duration of ADT (≤30 months) was the independent prognostic factor for progression–free survival (PFS) and overall survival (OS), respectively (p<0.001), but not for cancer–specific survival (CSS) (p=0.082). Charlson comorbidity index ≥1, visceral metastasis at the time of diagnosis, initial PSA >90 ng/ml, Gleason score ≥9 were not shown as independent prognostic factors for PFS, CSS, and OS in multivariate analysis.

Conclusions: The effective duration of first ADT was considered significant prognostic factor for survival. CRPC patients who had poor response on first ADT are associated with poor prognosis.

Keywords: Castration-resistant prostate cancer, Androgen deprivation therapy, Docetaxel
The prognostic impact of downgrading and upgrading from biopsy to radical prostatectomy in a contemporary grading system for prostate cancer

장원식, 함원식, 김명수, 정원식, 조강수, 나군호, 홍성준, 최영득
연세대학교 의과대학 비뇨기과학교실

Purpose: Recently, a new prostate cancer (PC) grading system has been introduced, where Gleason score (GS) 7(3+4) and GS 7(4+3) are categorized into grade group (GG) 2 and 3, respectively. However, whether downgrading and upgrading from needle biopsy (NB) to radical prostatectomy (RP) affects oncologic outcomes is currently unknown. Here, we investigated the prognostic impact of downgrading and upgrading from biopsy to radical prostatectomy in the new classification.

Materials and Methods: We retrospectively reviewed the medical records of 3253 patients with localized (pT2–3N0M0) PC who underwent RP at our institution between 1995 and 2014. We identified 739 patients with GS 7 PC on both NB and RP specimens. After exclusion of patients who had received neoadjuvant or adjuvant treatment (i.e., radiation, androgen deprivation therapy, or both) and those with incomplete pathological or follow-up data, 692 men were included in the final analysis. We analyzed data using Kaplan–Meier methods with log–rank tests and multivariate Cox regression models.

Results: Of the 692 patients enrolled in this study, 264 (38.1%), 125 (18.1%), 142 (20.5%), and 161 (23.3%) patients were classified as group 1 (NB and RP GG2), group 2 (NB GG3 downgraded to RP GG 2), group 3 (NB GG2 upgraded to RP GG3), and group 4 (NB and RP GG3), respectively. Kaplan–Meier curves showed significant differences in biochemical recurrence (BCR)–free survival across the groups (Log–rank test, p<0.001). In multivariate Cox regression analyses, these groups were significantly associated with BCR (group 2: HR 1.675, p=0.026; group 3: HR 1.908, p=0.002; and group 4: HR 2.699, p<0.001).

Conclusions: Downgrading and upgrading from NB to RP was an independent predictor of BCR, and could be due to the amount of Gleason pattern 4.

Keywords: Prostate cancer, Biochemical recurrence, Gleason grade
A propensity score matched analysis comparing retzius-sparing versus anterior robot-assisted radical prostatectomy

Ali Abdel Raheem, Ki Don Chang, Mohamed Alenzi, Ahmed Al-ghiaty, Trung Van, Won Sik Ham, Young Deuk Choi, Koon Ho Rha

Department of Urology and Urological Science Institute, Severance Hospital, Yonsei University College of Medicine

**Purpose:** Data regarding retzius-sparing robot-assisted radical prostatectomy (RS-RARP) is lacking. In this study, our main objective was to compare urinary continence function of RS-RARP and conventional (C-RARP).

**Methods:** All patients with low and intermediate risk PCa who underwent RARP in our urology department between 2005 and 2017 were analyzed. We included patients with minimum follow-up of 1 year, patients with incomplete data and those who receive early adjuvant and/or salvage therapy were excluded. Patients were classified into 2 groups according to the surgical approach (RS-RARP, n=108) and (C-RARP, n=624). Urinary continence was defined as (no pad or 1 safety pad usage), RS-RARP was matched to C-RARP in a 1 to 1 fashion according to the following variables: pelvic lymph node dissection (PLND) and nerve sparing technique. The primary endpoint was to compare the urinary continence function at 1 year between groups, while the secondary end point was to evaluate early oncological outcomes as well as, predictors of persistent urinary incontinence at 1 year.

**Results:** There was no significant in clinical and pathological variables between matched groups (p>0.05). While, patients who didn’t had nerve-sparing surgery in C-RARP were 18% versus 5.4% of RS-RARP (p=0.038). Regarding oncological outcomes, there was no difference in BCR (p=0.797), and 1-yr BCR free—survival (p=948). At 1 year, the rate of recovery of urinary continence was significantly higher in RS-RARP compared to C-RARP in both the non—matched groups (93.5% vs 84.1%, p<0.001) and the matched groups (81.6% vs 94.4%, p<0.001). Predictors of urinary incontinence were age (OR: 1.084, 95%CI: 1.017–1.081, p=0.003), prostate volume (OR: 1.012, 95%CI: 1.003–1.022, p=0.013), and RS—RARP (OR: 0.381, 95%CI: 0.170–0.854, p=0.019).

**Conclusions:** In low and intermediate risk PCa, RS—RARP appears to have better urinary continence rate, while maintaining the same oncological safety of C—RARP. In elderly patients and those with larger prostate volume, RS—RARP may be more advantageous and may ameliorate these risk factors of urinary incontinence. Further large studies are warranted to confirm our results.

**Keywords:** Robotic, Radical prostatectomy, Urinary incontinence
NP-059

전립선암 발견에 있어 multiparametric MRI의 정확성: whole-mount radical prostatectomy 병리 시료와의 직접 비교
이찬호, 구자윤, 강병진, 이경, 김경환, 백승룡, 박지훈, 박원영, 이남경, 하홍구
부산대학교병원 비뇨기과

Objective: To assess the accuracy of multiparametric magnetic resonance imaging (mpMRI) in prostate cancer (PCa) detection, and determine the PCa detection volume by mpMRI.

Materials and Methods: A total of 107 patients who underwent mpMRI before radical prostatectomy at a single institution were retrospectively analyzed. The pre-radical prostatectomy (RP) mpMRI that originally did not have PI-RADS score reported were reassessed using PI-RADS V2 classification. The mpMRI results and histological findings from whole mount RP specimens were directly compared by uropathologist and genitourinary radiologist.

Results: Of the 107 patients, 39 (36.5%) had solitary and 68 (63.5%) had multifocal tumors. The overall mpMRI sensitivity for PCa detection was 46.41% (110/237). The sensitivity and specificity of mpMRI were 75.4% and 77% for clinically significant cancer, and 89.6% and 80.6% for pathologic index tumor. We observed a moderate and significant correlation of increasing PI-RADS score with increasing pathological grade, tumor volume, index tumor status, and clinically significant cancer status (all, P<0.001, respectively). On multivariate analysis, pathologic tumor volume was a significant predictor for PCa detection by mpMRI. With a cutoff value of 0.89 cc, the sensitivity and specificity of mpMRI for any PCa detection were 0.87 and 0.65.

Conclusions: mpMRI was a useful tool for clinically significant cancer and pathologic index tumor detection. The pathologic tumor volume was a significant predictor for PCa detection by mpMRI. However, since the PCa detection under 0.8 cc by mpMRI is still imperfect, it cannot replace the diagnostic role of conventional tests for PCa detection.

Keywords: Multiparametric magnetic resonance imaging, Prostate cancer detection, PI-RADS
NP-060

전립선 암 고위험군 환자에서 ISUP grade group IV에 대한 저용량 방사선 동위원소 영구 삽입술 단독치료의 성적

임건우, 김종녕, 노주현, 이승렬, 최경화, 이태호, 정재호, 김문성, 박동수
CHA의과학대학교 분당차병원 비뇨기과

**Purpose:** To investigate the clinical outcome of low dose rate (LDR) brachytherapy (BT) alone in the International Society of Urological Pathology (ISUP) grade group IV high-risk prostate cancer (PCa) compared to that with supplemental EBRT.

**Materials and Methods:** Among 85 high-risk PCa patients with a follow-up period >3 years those who had undergone 125I LDR BT +/- EBRT and ADT since April 2007, 50 were classified into ISUP grade group IV, in which 27 were treated with LDR BT alone (BT group) and the rest had combination therapy (C group) as recommended in the NCCN guideline. Biochemical recurrence–free survival rates were compared between the patients with BT alone and those with BT in combination with EBRT.

**Results:** The mean initial PSA was 26.2 ng/mL in BT group, and 27.8 ng/mL in C group. The mean D90 was 235.8 Gy in BT group, 175.2 Gy for C group. During a median follow–up of 37.2 months, biochemical control was obtained in 86% (43/50) of the total patients; the estimated 3–year BCR–free survival was 92% for BT group, while 88% for C group. Late grade ≥3 toxicities were observed in 15% (4/27) for BT group and 30% (8/23) patients in C group, respectively.

**Conclusion:** Our previous study demonstrated that 125I LDR brachytherapy–based multimodal therapy in high–risk PCa produced encouraging relatively long–term results among the Asian population, especially in patients with Gleason score≤8. Although the present NCCN guideline specifies that one of the initial treatments for grade group IV marks BT+EBRT +/- ADT, this study may bring up the feasibility of LDR BT monotherapy for dealing with grade IV group effectively.

**Keywords:** ISUP IV, Low dose rate brachytherapy, Prostate cancer
NP-061

**TRUS biopsy 후 발생하는 직장 출혈에 대한 위험 요인**

노주현, 김문성, 김종녕, 임건우, 이태호, 정재호, 최경화, 이승렬, 홍영권, 박동수
CHA의과학대학교 분당차병원

**Purpose:** As the incidence of prostate cancer increases, the number of prostate biopsies and the incidence of complications are also increasing. Of the various complications, rectal bleeding is usually minimal and does not require additional treatment. However, at very low rates, the amount of bleeding can be very high and can be fatal. As a risk factor for such bleeding, the presence of the use of aspirin and cardiovascular disease are usually assumed. Thus, the authors evaluated the association between this history and rectal bleeding, as well as the other potential risk factors.

**Materials and Methods:** From June 2014 to May 2017, we performed retrospective case-control study of patients who underwent TRUS biopsy in the urology outpatient department of Bundang CHA Hospital. The confirmed cases were matched to the control group at a ratio of 1:5.

**Results:** Of the total 786 patients, 10 patients (1.27%) had bleeding. As a control group, 50 patients were randomly selected and compared. The prevalence rates of hypertension and diabetes were 70% and 10% in the bleeding group, respectively, which were not significantly different from the control group (48%, p=0.302, 30%, p=0.263). Also, none of the 10 patients with bleeding group had stroke, cardiovascular disease, or aspirin use, and this was also irrelevant to the occurrence of bleeding. In addition, PSA values, prostate size, hemorrhoids, and the timing of the test were also checked to identify risk factors for bleeding, but the results were not statistically significant either.

**Conclusions:** As a result, it was confirmed that there was no relationship between bleeding and easily predictable aspirin use, and no other factors were found clearly. There is the possibility that the unnecessary damage of the rectal tissue has increased due to the aging of the biopsy gun. There may be other factors that can be clearly prevented, but the incidence is low and there is a procedural, economical limit, so further research is needed in the future.

**Keywords:** Prostate, Biopsy, Rectal bleeding
조직검사 Gleason 7 전립선암에서 upgrading이 근치적 전립선암적출술 후 생화학재발에 미치는 영향

안치현, 유상준, 박주현, 조성용, 조민철, 손환철, 정 현
서울특별시립 보라매병원 비뇨기과

Purpose: To investigate the impact of pathologic upgrading of Gleason score (GS) 7 prostate cancer on the risk of the biochemical recurrence after radical prostatectomy

Materials and Methods: The prospectively collected prostate cancer records of 1678 patients with postoperative GS 7 prostate cancer without lymph node metastasis were reviewed retrospectively via two databases. The patients were categorized into four groups depending on pathologic upgrading: upgraded GS 3+4, non-upgraded GS 3+4, upgraded GS 4+3, and non-upgraded GS 4+3. Kaplan–Meier multivariate model were employed to examine the influence of pathologic upgrading of GS 7 prostate cancer on the risk of biochemical recurrence.

Results: The mean age of the patients was significantly higher in the non-upgraded GS 4+3 group than other groups, whereas the mean prostate-specific antigen (PSA) level was lower in the upgraded GS 3+4 group than other groups. Pathologic findings, such as extracapsular extension, seminal vesical invasion, and the surgical margin rate were different from each other group. Five-year biochemical recurrence–free survival rate was 85%, 73%, 69%, and 60% in upgraded GS 3+4 group, non-upgraded GS 3+4 group, upgraded GS 4+3 group and non-upgraded GS 4+3, respectively. There was no significant difference in the two middle patient groups; i.e., the non-upgraded GS 3+4 group and the upgraded GS 4+3 group (Log–rank test, p-value=0.259).

Conclusion: The information on pathologic upgrading in the biopsy reports of patients could help to provide more–detailed analysis for the biochemical recurrence of GS 7 prostate cancer.

Keywords: Biochemical recurrence, Pathologic upgrading, Prostate cancer
국소 전립선암의 근치적 전립선 절제술 후 원격 전이가 발생한 환자군에서 호르몬요법 개시 시점이 생존율에 미치는 영향

안현규, 구교철, 이광석, 김도경, 나군호, 홍성준, 정병하
연세대학교 의과대학 비뇨기과학학교실

Objective: The clinical benefit for early androgen–deprivation therapy (ADT) in PSA–only recurrent prostate cancer (PCa) patients following radical prostatectomy (RP) is controversial, and the M0 castrate–resistant PCa (CRPC) population may be a result of early off–label ADT. We investigated the impact of early versus delayed ADT on survival outcome in patients with localized or locally advanced PCa who received RP and later developed metastasis.

Methods: We evaluated data of 3,920 patients treated with RP for localized and locally advanced PCa at a single institution between January 2006 and December 2012, and identified 923 (23.5%) patients who received ADT with radiotherapy as adjuvant therapy at biochemical recurrence (BCR). Prognosticators for progression to CRPC and cancer–specific mortality (CSM) were evaluated for 74 patients who later developed distant metastasis. The parameters evaluated were: age, body mass index, Charlson Comorbidity Index, prostate–specific antigen (PSA), pathological Gleason score and stage, BCR period, PSA nadir following RP, PSA level at ADT initiation, time to PSA nadir, and use of ADT use prior to metastasis.

Results: The median period from RP to BCR and metastasis were 9.0 (IQR 7.0–15.0) and 40.5 (IQR 23.8–77.8) months. Median follow-up was 85.0 (IQR 55.3–117.8) months. Patients who received early ADT (PSA<2 ng/ml) showed significantly delayed period to metastasis (p=0.051) and cancer–specific death (p=0.045) compared to those who received delayed ADT (PSA ≥2 ng/ml). Delayed ADT was associated with increased risks of CRPC (HR=3.184, 95% CI: 1.104–9.179; p=0.051) and CSM (HR=6.495, 95% CI 1.432–29.47; p=0.047).

Conclusions: Delayed ADT following PSA elevation beyond 2 ng/ml was associated with early onset of metastasis and increased risks of CRPC progression and CSM.

Keywords: Androgen–deprivation therapy, Biochemical recurrence, Prostatectomy
NP-064

로봇보조 전립선적출술와 근치적 전립선적출술의 초기 임상결과의 전향적 코호트 비교

윤민영, 정창욱
서울대학교병원 비뇨기과학실

목적: 전립선암 환자에서 수술(로봇보조 전립선적출술(RALP) vs 근치적 전립선적출술(RRP))에 따른 초기 임상결과를 전향적 코호트를 이용하여 비교하였다.


결과: 전체 환자의 평균나이는 68.3±6.3세(SD)였고 체질량지수는 24.6±2.9 (SD) kg/m², 초기 전립선특이항원은 14.6±49.9이었다. 환자 나이는 RRP의 경우 유의하게 많았으며(RALP 67.4세, RRP 71.0세, p<0.001), 체질량지수는 RALP의 경우가 유의하게 높았다(RALP 25.0, RRP 23.7, p=0.004). 재원기간(RALP 4.25일, RRP 4.20일)과 수술시간 (RALP의 경우 console time, RALP 112.1분, RRP 105.8분)은 유의한 차이가 없었다. 하지만 추정출혈량은 RRP가 RALP 보다 유의하게 많았으며(RALP 313 cc, RRP 585 cc, p<0.001) 수술 후 1일째 통증 VAS는 RALP (2.99/10점)가 RRP (2.96/10점)보다 유의하게 높은 것으로 나타났으나(p=0.001) 이는 진통제 사용과 관련있을 것으로 생각된다. 수술 후 3일 끝통증 VAS는 유의한 차이가 없었다(RALP 2.82/10점, RRP 2.82/10점, p=0.484). 혈색소 수치는 수술전 유의한 차이가 없었으나 수술후 RALP의 경우 12.61로 RRP의 경우(11.53)보다 유의하게 높았다(p<0.001). 수술 후 혈액의 비율은 RRP가 조금 더 높았으나(Fig 1) 유의한 차이는 아니었다(Log Rank X2=1.055, p=0.304). 수술 합병증도 RALP (3.3%), RRP (9.7%)로 RRP가 조금 더 많았으나 유의한 차이는 없었다(p=0.081).

결론: 로봇보조 전립선적출술(RALP)과 근치적 전립선적출술(RRP)은 계층할려고 수술 후 1일째 통증 VAS, 수술 후 혈색소 수치는 유의한 차이로 RALP가 우수한 초기 임상결과를 보여주었으나 그외 재원기간, 수술시간, 수술 후 3일 끝통증 VAS, 수술 후 요실금 비율, 수술 합병증에 있어서는 유의한 차이가 없었다. 이후 더 많은 환자들을 대상으로 하는 추가 연구가 필요하다.

Keywords: Prostate cancer, RALP (Robot-assisted laparoscopic prostatectomy), Early outcome
NP-065

근치적 전립선 절제술 후 기능적 회복 평가 시 인터뷰와 설문지 방법의 비교: 차이를 발생시키는 요인은 무엇인가?

박사현, 임고산, 김 명, 송채린, 안한종
울산대학교 서울아산병원

Purpose: The typically lengthy survival after radical prostatectomy (RP) has brought attention to the health–related quality of life (HRQOL) and functional outcomes after surgery. We evaluated patient–reported EPIC to assess urinary and sexual functional changes after RP. We compared longitudinal urologist–based interviews and self–reports in the assessment of functional outcome after radical prostatectomy in prostate cancer patients.

Materials and Methods: We evaluated 211 men with localized prostate cancer who underwent radical prostatectomy by a single surgeon. Patients were routinely scheduled to visit the clinic at baseline, 1, 3, 6 and 12–months postoperatively and asked to complete EPIC. Medical interviews were performed by a urologist without the information on self–reports. The agreement between EPIC and interview methods was examined using simple proportions and κ coefficient.

Results: We reviewed a total of 1055 patient–reported questionnaires and medical records. On questionnaires, daily pad usage was 1.5, 0.8, 0.4, and 0.3 at 1, 3, 6, 12 months postoperatively. On medical records, 1.1, 0.6, 0.3, and 0.2, respectively. The κ coefficient showed moderate agreement at 3 months (κ=0.568), substantial agreement at 6 and 12 months (κ=0.664 and 0.661). Functional erection rates on questionnaires were 3.5%, 8.5%, and 14.6% at 3, 6, and 12 months postoperatively. On medical records, 3.9%, 15.6%, and 26.7%, respectively. The κ coefficient showed fair agreement at 3 (κ=0.377) months, moderate agreement at 6 and 12 months (κ=0.485 and 0.420). In patients without functional erection preoperatively, questionnaires and medical records showed substantial agreement at 6 (κ=0.714) and 12 (κ=0.756) months postoperatively. In patients with preoperative functional erection, questionnaires and medical records showed fair agreement at 6 (κ=0.306) months and 12 (κ=0.290) months.

Conclusions: In our study, the agreement between medical records and questionnaires for post–prostatectomy incontinence was substantial. However, for erectile dysfunction, the agreement was relatively poor, especially in patients who had preoperative functional erection. In these patients, modified questionnaires are needed to identify the more accurate sexual function and HRQOL after RP.

Keywords: Prostatectomy, Erectile dysfunction, Surveys and questionnaires
NP-066

Predicting tumor volume using a novel biopsy-related parameter derived from location and relationship of positive cores on standard 12-core trans-rectal ultrasound-guided prostate biopsy

유상준, 안치현, 박주현, 조성용, 조민철, 손환철, 정현
서울특별시립 보라매병원

Introduction: To develop a novel biopsy-related parameter, named overlapping line, defined as the overlapping line between the locations of positive cores on 12-core trans-rectal ultrasound-guided prostate biopsy, and evaluated the value of overlapping line for predicting tumor volume in the final pathologic examination.

Materials and Methods: Among patients with prostate cancer who underwent radical prostatectomy at Boramae Medical Center, 470 patients who underwent standard 12-core trans-rectal ultrasound-guided prostate biopsy were selected. The number of overlapping line was determined in each patient, and its effects on tumor volume were evaluated after adjusting for other variables.

Results: Median prostate specific antigen level was 9.1 ng/mL, and the maximum % cancer in positive cores was 42.8%. Median numbers of positive cores and overlapping lines were 3 and 2, respectively. The pathologic stage was T2 or less, T3a, and T3b or greater in 297 (63.5%), 104 (22.2%), and 67 patients (14.3%), respectively. Median tumor volume in prostatectomy specimen was 3.4 mL. In multivariate analysis, the number of overlapping lines (B: 0.750, p<0.001) was a significant predictor for tumor volume, in addition to prostate specific antigen level and maximum % cancer in positive cores. In addition, the model with overlapping line showed superior accuracy compared to the model without overlapping line, based on the 10-folds cross-validation using bootstrap with replacement (R-squared: 0.443 vs. 0.426).

Conclusions: The number of overlapping lines, a novel prostate biopsy-related variable, was thought to be a reliable predictor for tumor volume and could be easily applied to routine daily practice.

Keywords: Biopsy, Prostatic neoplasms, Tumor burden
Background and Purpose: Oncologic outcomes of patients with pT3aN0/Nx prostate cancer (PCa) with positive surgical margins (PSM) after radical prostatectomy (RP) are heterogeneous. We investigated the impact of Gleason score (GS) on biochemical recurrence (BCR) in these patients.

Materials and Methods: A retrospective, multicenter study was performed on 795 patients with pT3aN0/Nx PCa with PSM after RP between January 2006 and December 2014. Clinicopathologic characteristics of patients were examined and onset of BCR was identified. Kaplan–Meier survival analysis was used to illustrate BCR–free survival (BFS) and Cox proportional hazard models were applied to identify factors predicting BCR.

Results: During the mean follow-up period of 63.9 months, BCR was identified in 274 (34.5%) patients. The 5-year BFS was 56.6% in all patients. In multivariate analysis, pathologic GS was the only significant prognostic factor for BCR in patients with pT3aN0/Nx PCa with PSM (GS 6 vs. GS 7 (3+4), P=0.047; vs. GS 7 (4+3), P=0.007, and vs. GS 8–10, P<0.001). When patients were stratified according to GS, 5-year BFS was 78.6% in GS 6, 66.2% in GS 7 (3+4), 51.1% in GS 7 (4+3) and 35.5% in GS 8–10.

Conclusions: In patients with pT3aN0/Nx with PSM after RP, pathologic GS is the sole independent predictor for risk stratification of BCR. These findings might be used to determine the risk and timing of BCR and to help counsel patients regarding treatment strategy and prognosis of disease on an individual basis.

Keywords: Biochemical recurrence, Gleason score, Positive surgical margin
Aspirin is the most widely used anti-platelet drug and has been taken regularly for the prevention of cardiovascular disease. Stopping aspirin confers a significant threat to the patient because of increased rates of significant perioperative ischemic events in patients undergoing non-cardiac surgery. We compared perioperative outcomes of men who underwent RALP on aspirin with patients who operated RALP without aspirin.

From 2010 to March 2016, we retrospectively reviewed prostate cancer patients who underwent RALP in our institution. We obtained preoperative characteristics such as demographic, prostate cancer diagnostic details, D’Amico risk group and perioperative outcomes including operating time, hematocrit change, transfusion, hospital stay, Clavien complications. The patients were split into 3 groups of perioperative continuation of aspirin medication (group1), aspirin stopped preoperatively (group2) and no chronic aspirin medication (group3).

Group1, 2 and 3 were identified as 15, 49 and 266, respectively. Gleason score and D’Amico risk were statistically significant in the operative characteristics (p=0.025 and p=0.029). Age, Clinical T stage and PSA were statistically not significant, but high PSA, high T stage was observed in the group who continued taking aspirin. We found Operative time, postoperative transfusion, duration of hospital stay, rate of Clavien complication and HCT change were no statistically difference in perioperative outcomes.

The use of aspirin perioperatively was not found to have significant effects on postoperative outcome in RALP.

**Keywords:** RALP, Aspirin, Prostatectomy
NP-069

로봇보조근처적전립선적출술 중 골반자율신경 모니터링의 안전성과 효용성: MMEN (monitoring and mapping of erectile nerve during RALP) study

초기 분석

정창욱1, 윤민영1, 태범식2, 박주현3, 김기원4, 서정화5, 구자현1, 곽철1, 김현회1
1서울대학교병원 비뇨기과, 2고려대학교 안산병원 비뇨기과, 3서울특별시립 보라매병원 비뇨기과, 4서울대학교병원 재활의학과, 5서울대학교병원 마취통증의학과

목적: 현재까지 골반자율신경을 근처적전립선적출술 중 음경해면체 신경을 직접 모니터링 하거나 매핑하는 방법은 확립되지 않았다. 이에 본 연구자들은 로봇보조근처적전립선적출술(RALP) 중 발가신경 보전을 위한 골반자율신경 모니터링의 방법론을 확립하고 그 안전성과 효용성을 전향적으로 평가하였다.

방법: 전향적, 제 1상, 안전성 및 타당성 평가 임상 연구로 진행되었다(NCT02507427). 2015년 7월부터 2017년 3월까지 임상적 국소 전립선암으로 RALP를 시행 받는 30명의 환자를 대상으로 하였다. 전신마취 시 propofol과 remifentanil을 Bispectral index 40-60이 유지되는 범위로 정주하였고, rocuronium은 Train-of-Four count가 1이하가 되도록 간헐적 또는 지속 투여하여 근이완을 필요한 최소한으로 일정하게 유지하였다. NIM–Eclipse (Medtronic, Minneapolis, USA)을 이용하여, 구부해면체반사, 회음부 감각유발전위를 비롯하여 해면체신경의 활동전압을 측정하였다. 해면체신경 활동전압의 측정은 다양한 크기와 기간의 자극을 주고, 다양한 방법으로 반복 측정하였다. 주요 측정은 수술 시작 시, 방광과 전립선을 절단하여 신경혈관다발이 노출되었을 때, 전립선을 적출한 직후, 수술 종료 시 시행하였다. 안전성은 일차 결과 변수로 합병증을 측정하였고, 이차 결과 변수로 본 신경 모니터링의 성공 가능성을 타당성을 보았으며, 신경 보존을 정량화할 수 있는지, 또 이와 발기력의 회복의 상관 관계가 있는지 여부를 평가하였다.

결과: 모든 환자에서 수술 중 별다른 합병증 없이 모니터링이 가능하였으며, 한 명의 환자에서 수술 후 심부정맥혈전증과 방광요도문합부 요유출이 있으면서도 정상보다는 낮은 것으로 판정되었다. 완전한 근이완을 하지 않고 수술을 진행하는 것은 문제가 되지 않았다. 그러나 근이완 정도에 따라 신경 모니터링의 제한적인 단점이 되었다. 음경해면체의 임피던스 변화는 자극을 주지 않았다. 전도성과 판찰되지 않았다. 자극 전압의 변화는 자극을 주지 않았을 때도 드물게 관찰되었으며, 직접 신경혈관다발을 자극하였을 때 더욱 자주, 더 큰 전압의 변화로 짧은 저주파 파형으로 관찰되었다. 여러 자극 중 가장 효과적인 자극은 30 mA, 5,1 Hz single pulse로 약 5-10초 자극과 30초 추가 관찰로 측정이 가능하였다. 반응의 정도는 좌우 각각 0, 1, 2점으로 어느 정도 정량화가 가능하였으나, 정밀한 기술적 및 공간 분해능을 보이지는 않았다.

결론: 본 연구진은 세계 최초로 인간의 음경해면체 신경의 활동 전압을 직접 관측에 성공하였다. RALP시 골반자율신경 모니터링의 방법론을 확립하였고 안전하게 적용 가능하였다. 정량화가 가능하였으나 항후 공간 분해능을 높이는 기술적 극복이 필요하다. 추후 음경해면체 신경 활동도 정량화 결과와 발기력 회복과의 상관 관계를 확인할 예정이다.

Keywords: Prostatectomy, Caverosal nerve, Monitoring
NP-070

**Purpose:** National comprehensive cancer network (NCCN) guideline recommended radical prostatectomy (RP) for very high risk prostate cancer with younger, healthier patients without tumor fixation to the pelvic side-wall. So in this study, we investigated feasibility of Charlson comorbidity index (CCI) as a prognostic factor when consider RP for preoperative very high risk prostate cancer.

**Materials and Methods:** we retrospectively investigated the medical records of prostate cancer patients who underwent RP at our institution from 1992 to 2010. Very high risk prostate cancer was defined according to NCCN guideline. Patients without adequate medical records and who received neoadjuvant therapy were excluded. Preoperative comorbidity was evaluated by CCI. We used univariate and multivariate Cox regression test for analysis.

**Results:** As a result, 228 men were included for final analysis. Median age was 66 (Interquartile rage (IQR) 62–71). And median PSA was 10.7 (IQR 7.0–17.4). Patients with CCI ≥4 were 41 (18%). 88 patients (38.6%) was reported Gleason score ≥9 by biopsy. 159 patients (69.7%) were non organ confined tumor (≥T3) with preoperative evaluation. 5 year prostate cancer specific survival (PCSS) rate and overall survival (OS) rate was 96.4% and 93.9%. In univariate and multivariate Cox regression analysis, CCI was significantly associated with PCSS and OS (p < 0.05).

**Conclusions:** CCI was feasible as a prognostic factor for PCSS and OS in very high risk prostate cancer. RP should be considered carefully if CCI of patient was over 4.

**Keywords:** Very high risk prostate cancer, Radical prostatectomy, Charlson comorbididy index
The oncological outcomes following radical prostatectomy in men with Gleason grade 3+5, 4+5, and 5+5 on prostate biopsy

Jeong Woo Lee, Dong Hoon Lee, Jong Kil Nam, Moon Kee Chung, Sung Woo Park
Department of Urology, Pusan National University Yangsan Hospital

Objectives: We evaluated the oncological outcome for patients with secondary Gleason score (bsGS) 5 prostate cancer (PC) on biopsy according to accompanying primary Gleason score (bpGS), following radical prostatectomy (RP).

Materials and Methods: Using a prospectively collected institutional registry, we identified patients with bsGS 5 PC on biopsy who underwent RP with pelvic lymphadenectomy between 2009 and 2016. Twelve patients were excluded because of neo-/adjuvant androgen deprivation or adjuvant radiation. Biochemical free survival (BCRFS) rates were compared according to bpGS using Kaplan–Meier estimation.

Results: We included 50 patients with median age of 69 years (IQR 65, 73). The median follow up duration was 30 months (IQR 19, 45). Fourteen patients (28%) were diagnosed lymph node metastasis. However, there was no lymph node metastasis in men diagnosed with Gleason 3+5 on biopsy. In the case of biopsy Gleason grade 3+5, 4+5, 5+5, downgrade in pathological Gleason sum was 57%, 53% and 67%, respectively. The cases diagnosed with single positive core including bsGS 5 were 3 (43%), 10 (29%) and 2 (22%) in 3+5, 4+5 and 5+5, respectively (p<0.001). And, the median value of longest core length including bsGS 5 was 8, 10, and 11 mm in each group (p=0.457). The 3–year BCRFS rates were 100%, 62%, and 56% in men with bpGS 3, 4, and 5, respectively (Figure). The patients with Gleason 3+5 on biopsy showed different BCRFS comparing with that of Gleason 4+5 or 5+5 (p=0.041, p=0.048, respectively).

Conclusions: The Gleason grade 5 pattern PC is most important predictive factors of BCRFS following RP. However, the patients with small volume of bsGS 5 had relatively good BCRFS. In particular, patients diagnosed with only a few cores as Gleason 3+5 on biopsy do not need to take pelvic lymph node dissection if he had no other risk factor.

Keywords: Prostate, Cancer, Gleason
NP-072

경직장 초음파 유도 전립선 생검 후 출혈에 대한 옥시 셀룰로오스 국소 지혈제의 효과

박지운, 정준세, 배상락, 박봉희, 이용석, 강성학, 한창희
가톨릭대학교 의과대학 비뇨기과학회

**Purpose:** To investigate whether oxidized regenerated cellulose patch used immediately after transrectal ultrasound (TRUS)–guided prostate biopsy decreases complication rates.

**Materials and Methods:** We prospectively evaluated a total of 137 consecutive patients who underwent TRUS–guided prostate biopsy between January 2016 and May 2017. Systematic 12-core prostate biopsy was performed in all patients. Of these, 100 patients were assigned to one of two groups: the oxidized regenerated cellulose patch group (n=50) received oxidized regenerated cellulose patch on biopsy tracts immediately after prostate biopsy, while the control group (n=50) underwent TRUS–guided prostate biopsy alone. The incidence rate and duration of hematuria, hematospermia, and rectal bleeding were compared between the two groups.

**Results:** The incidence rates of hematuria and hematospermia were not significantly different between the two groups (60 vs. 64%, p=0.68; 22 vs. 30%, p=0.362, respectively, for oxidized regenerated cellulose patch vs. control group). The rectal bleeding incidence was significantly lower in the oxidized regenerated cellulose patch group as compared to the control group (25 vs. 44%, p=0.03). However, there were no significant differences in the median duration of hematuria, hematospermia, or rectal bleeding between the two groups (2, 8, and 2 days vs. 2, 10, and 1 days, p>0.05, respectively, for oxidized regenerated cellulose patch vs. control group). Oxidized regenerated cellulose patch was significantly protective against the occurrence of rectal bleeding after prostate biopsy in multivariable analysis (p=0.01, odds ratio (OR) 0.45).

**Conclusions:** Although it has no impact on other complications, oxidized regenerated cellulose patch on biopsy tract used immediately after TRUS–guided prostate biopsy is an effective and practical method to decrease or prevent rectal bleeding.

**Keywords:** Biopsy, Prostate, Bleeding, Hemostatic agent
Objectives: We investigated the oncologic outcomes between androgen deprivation therapy (ADT) and radical prostatectomy (RP) in high or very high risk prostate cancer.

Materials and Methods: This study included 147 ADT patients and 356 RP patients who were diagnosed with high or very high risk of National Comprehensive Cancer Network–defined guideline. Patients who underwent radiation therapy or N1 or M1 stage were excluded. The Kaplan–Meier and Cox regression analysis were used to evaluate cancer specific survival (CSS) and overall survival (OS).

Results: High risk included 276 patients and very high risk included 227 patients. ADT patients had worse characteristics of age (74.6 vs 70.8, p<0.001), comorbidity index (≧2: 31.3% vs 4.8%, p<0.001), PSA (42.1 vs 19.5, p<0.001), T stage (≧T3: 56.5% vs 42.7%, p<0.001), and Gleason score (≧8: 78.9% vs 66.0%, p<0.001). During median follow–up of 66.0 months, 5–year CSS were 90.7% of ADT and 99.7% of RP, and 5–year OS were 68.2% of ADT and 95.5% of RP. On Kaplan–Meier curve, ADT showed worse CSS (p<0.001) and OS (p<0.001) than RP in both high and very high risk patients. On multivariate analysis, Gleason score (≧9 vs ≤8: hazard ratio [HR] 2.927, p=0.0419) and treatment (RP vs ADT; HR 0.080, p=0.0001) were significant factors for CSS.

Conclusion: RP was superior therapy than ADT in high and very high risk patients. If surgery is possible, RP can help to obtain survival gain than ADT monotherapy.

Keywords: High risk prostate cancer, Radical prostatectomy, Androgen deprivation therapy
요산결석의 예측인자분석: mean stone density, stone heterogeneity index, and variation coefficient of stone density on single-energy NCCT, and urine pH

김종찬1, 정해도1, 이종수1, 강동혁2, 조강수1, 함원식1, 최영득1, 이주용1
1연세대학교 의과대학 비뇨기과학교실, 비뇨의과학연구소, 2인하대학교 의과대학 비뇨기과학교실

목적: 결석 성분 중 요산결석은 화학적 제거 및 예방이 가능한 결석으로 치료 전 예측이 가능하다면 다른 결석보다 높은 결석제거율을 기록할 수 있다. 저자들은 single-energy 비조영진산단단층촬영(NCCT)에서 여러 인자 및 요폐하와의 관계를 통하여 요산결석을 예측할 수 있는 인자들을 분석하였다.

대상 및 방법: 2014년 12월에서 2016년 4월까지 수술 및 결석이 자연배출된 환자 501명을 대상으로 의무기록을 분석하였다. 그 중 420명의 환자에서 수술 전 NCCT 및 결석성분분석이 진행되었다. 결석의 최대 길이(MSL), HU를 이용한 MSD 및 SHI 그리고 variation coefficient of stone density (VCSD; SHI/MSD×100)를 수술 전 NCCT를 통하여 측정하고 요 검사에서 요폐하를 기록하였다. 결석성분에 따른 세 가지 그룹(Calcium oxalate compounds, infection stones 및 요산결석)으로 나누어 분석하였다.

결과: 환자의 평균나이는 55.55±15.46세이었다. 수술 전 NCCT로 분석한 요산결석의 MSD (454.68±177.80 HU) 및 SHI (115.82±96.31)는 다른 결석이 비하여 낮은 경향을 보였다. 결석을 세 군으로 나누어 분석하였을 때, 요산결석의 MSD (448.59±173.21)는 다른 결석들에 비하여 의미있게 낮은 수치를 보였으며(vs. CaOx: P<0.001; vs. infection stones: P<0.001), SHI (100.81±77.37) 및 VCSD (22.59±10.55) 역시 낮은 수치를 보였다(vs. CaOx: P<0.001; vs. infection stones: P<0.001). 요폐하 역시 요산결석(5.33±0.56)이 다른 결석들에 비하여 의미있게 낮은 수치를 기록하였다(vs. CaOx: P<0.001; vs. infection stones: P<0.001). ROC 곡선을 이용한 요산결석을 예측하는 MSD를 이용하였을 때, AUC 0.806 (95% CI 0.761-0.85) 및 절단치 572.3 HU이었으며, MSD를 이용하였을 때, AUC 0.893 (95% CI 0.855-0.931) 및 절단치 140.4 HU이었다. VCSD와 요폐하의 AUC는 각각 0.782 (95% CI 0.726-0.839), 0.797 (95% CI 0.749-0.846)이었으며, 절단치는 각각 25.79와 6.0이었다(Fig. 1). 네 ROC 곡선의 차이를 DeLong’s test로 분석하였을 때 SHI가 가장 효과적으로 예측할 수 있는 AUC를 보였다(P<0.001).

결론: SHI는 요산결석을 예측하는데 있어 MSD, VCSD 및 요폐하보다 더 효과적인 예측모델을 보였으며, 그 절단치는 140.4 HU이었다. 요산결석을 예측하는 수술 전 요산결석 예측에 도움을 줄 수 있을 것으로 생각한다.

Keywords: Stone composition, Uric acid stone, Stone heterogeneity index

Fig. 1. For SHI, the AUC was 0.893 (95% CI 0.855-0.931), and the cut-off value was 140.4 HU. The AUC of SHI was highest than MSD, VCSD and urine pH.
Aims of Study: Iatrogenic ureteral injuries are among the most serious complications in gynecologic surgery. With the increasing popularity of laparoscopic and robotic gynecologic surgery, the incidence of ureteral injuries is on the rise. This study was aimed to evaluate the minimally invasive approach and endourological techniques in female patients with iatrogenic ureterovaginal fistula.

Materials and Methods: The present retrospective study included 12 patients (mean age: 60.9 years, range: 48–69) who were managed with retrograde stenting using ureteroscopy for ureterovaginal fistula. The diagnosis was based on clinical presentation, double dye test, cystoscopy, and excretory urography. The preoperative characteristics and the intra- and postoperative data were assessed by reviewing the operative notes, medical records, and office notes.

Results: Between July 2012 and October 2014, twelve women underwent ureteroscopic ureteral stenting. The mean (range) interval between surgery and the diagnosis of the presence of incontinence was 21.4 (10–65) days. Retrograde stenting was successfully performed in all patients, using an 8Fr semi-rigid ureteroscope. Eleven patients became continent the day after surgery. One had urinary incontinence 2 weeks after surgery, which the injured site was at the ureterovesical junction. Three patients showed ureteral stricture in urography which was performed at 4 weeks after the stent removal. These patients were all cured after transurethral balloon dilation of the stricture site.

Conclusions: Ureteroscopic stenting can be an effective method to manage ureterovaginal fistula which is a complication from robotic and laparoscopic gynecological operations. Thus, an attempt of ureteroscopic stenting should be considered in patients with ureterovaginal fistula before subjecting them to other modalities.

Keywords: Ureteral stenting, Ureterovaginal fistula, Gynecological operation
NP-076

경피적 신절석술 후 출혈에 영향을 끼치는 위험인자들
장재윤, 장준보, 고영휘, 송필현, 문기학, 정희창, 최재영
영남대학교 의과대학 비뇨기과학실

Introduction: Percutaneous nephrolithotomy (PCNL) is the surgical procedure in renal stone management. Even though it is performed quite often, the complication rates are also high. Hemorrhage is a major complication after PCNL. In the current study, we analyzed risk factors that effect the bleeding after PCNL.

Materials and Methods: Retrospective study of medical record from January 2014 to June 2016 was performed. We analyzed 110 consecutive patients undergoing PCNL. Patients were divided into 2 groups by loss of hemoglobin (Hb) after operation: Group A (Hb loss<3), B (3<Hb loss). We reviewed the types of renal stone, puncture sites, operation time and hounsfield unit(HU) of stones, respectively. All analyses were performed using SPSS 19.0. The Pearson’s chi-square test was used to evaluate the association between categorical variables. One–way analysis of variance ant t-test were used to compare the means of continuous variable.

Result: Of all 110 patients, 84 males (76.4%) and 26 females (23.6%) were included. The mean age (±SD) was 53.05±11.03 years. A total of 100 (90.9%) and 10 (9.1%) were included in group A and B, respectively. 6 patients of group B underwent renal angiography and embolization due to hemodynamic unstability. 4 patients in remaining underwent transfusion of blood pack cell. The puncture site was the inferior calyx in 90, the middle calyx in 17, the upper calyx in 1 and multiple in 2. Group B included 9 cases with inferior calyx access and 1 case with multiple access, In comparison between both groups by the puncture site, there was statistical significance (p=0.007).

Conclusion: In conclusion, severe postoperative bleeding after PCNL is associated with renal puncture via the inferior calyx. Additional prospective and larger–scale studies are required to support the conclusion of our study.

Keywords: Percutaneous nephrolithotomy, Bleeding, Nephrolithiasis
2-3 cm 크기의 신결석 환자에서 역행성신장내결석수술의 시행시 ureteral access sheath의 직경이 수술결과에 영향을 미치는가?

장재윤, 장준보, 고영휘, 송필현, 문기학, 정희창, 최재영
영남대학교 의과대학 비뇨기과학기술

Introduction: During retrograde intrarenal surgery (RIRS), ureteral access sheath (UAS) offers many advantages, especially for the treatment of large sized kidney stones. However, comparisons of each diameter of UAS have not been conducted. We aimed to investigate the surgical outcomes of 2-3 cm sized renal stones according to the diameter of UAS.

Materials & Methods: We retrospectively evaluated 125 patients who underwent RIRS for 2-3 cm sized renal stone. All operations were performed by a single experienced surgeon. Patients were divided into three groups by UAS diameter (Group 1: 12 Fr, Group 2: 13 Fr, Group 3: 14 Fr). We compared patient characteristics and surgical outcomes including success rates, ureteral injury, complications among three groups.

Results: There were no significant differences in patient sex, age, stone size and laterality among three groups (Table 1). The mean operation time was not significantly different among three groups (p=0.563). Success rates were similar among three groups (Group 1: 86.1%, Group 2: 88.2%, Group 86.8%, p=0.611). However, in group 3, ureter wall injury over grade II was significantly more frequent than other groups (p=0.031). Complication including fever, postoperative bleeding was not significantly different among three groups (Table 2).

Conclusion: In our study, regardless of UAS diameter, RIRS can be performed effectively in 2-3 cm sized renal stones. However, more than the diameter of UAS 14 Fr, precautions should be taken as it may occur more often, high grade ureter wall damage

Keywords: Renal stone, Ureteroscopy

NP-077

| Table 1. Patients’ characteristics
<table>
<thead>
<tr>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age (year)</td>
<td>62.3±12.7</td>
<td>57.9±12.3</td>
<td>59.3±11.2</td>
</tr>
<tr>
<td>Mean Stone size (mm)</td>
<td>24.5±4.62</td>
<td>23.1±2.37</td>
<td>26.5±2.56</td>
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<tr>
<td>Laterality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rt</td>
<td>17 (47%)</td>
<td>26 (51%)</td>
<td>17 (45%)</td>
</tr>
<tr>
<td>Lt</td>
<td>19 (53%)</td>
<td>26 (49%)</td>
<td>21 (55%)</td>
</tr>
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</table>

| Table 2. Comparison of surgical outcomes
<table>
<thead>
<tr>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
<th>P</th>
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</thead>
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<tr>
<td>Mean operation time (min)</td>
<td>87.2±10.3</td>
<td>83.6±9.4</td>
<td>164.2±53.9</td>
</tr>
<tr>
<td>Success rate (%)</td>
<td>86.1 (105/123)</td>
<td>88.2 (110/125)</td>
<td>86.8 (110/129)</td>
</tr>
<tr>
<td>Complications</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fever</td>
<td>3 (1.9%)</td>
<td>5 (3.9%)</td>
<td>3 (7.9%)</td>
</tr>
<tr>
<td>Bleeding</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Ureter wall injury</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gr I</td>
<td>7 (17%)</td>
<td>11 (22%)</td>
<td>9 (21%)</td>
</tr>
<tr>
<td>Gr II or III</td>
<td>3 (8%)</td>
<td>5 (10%)</td>
<td>9 (24%)</td>
</tr>
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NP-078

하대정맥후 요관(retrocaval ureter)의 치료를 위한 복강경하 신우성형술의 유용성: 단일술자 경험 및 문헌 고찰

오태훈, 이재환, 박승철, 정희종, 서임영

원광대학교 의과대학 비뇨기과학과

Purpose: We present surgical techniques and operative results of laparoscopic pyeloplasty for patients with retrocaval ureter (RCU) in a single surgeon’s experience, and review similar papers.

Materials and Methods: Seven patients with RCU were enrolled in this study from April 2005 to October 2016. The mean age of 5 males and 2 females was 36.3 years old. The chief complaint was flank pain in 5 patients; the remaining patients were detected incidentally. All patients showed hydronephrosis and typical S-shaped deformity of the ureter on imaging studies. Three patients showed obstructed patterns on the renal scans. A single surgeon performed laparoscopic pyeloplasties with transperitoneal approaches including double-J ureteral stent insertions. The operative and follow-up results were checked and compared with published papers.

Results: All laparoscopic pyeloplasties were successfully completed without conversion to open surgery. The mean operative time was 171.8 minutes (range, 97–240 minutes). The estimated blood loss was 184.3 mL (range, 50–332 mL). No operative complications were encountered. There were no obstruction and symptom after the mean follow-up of 16.3 months (range, 6–30 months). We found 7 papers from PUBMED, which had more than five cases of laparoscopic reconstruction of RCU. We reviewed and summarized the clinical and operative parameters.

Conclusions: Our results show that transperitoneal laparoscopic pyeloplasty is a safe and effective treatment for RCU. Data from published papers and ours summarize clinical parameters of RCU, and suggest that the laparoscopic reconstruction can be considered as the standard treatment for it.

Keywords: Retrocaval ureter, Hydronephrosis, Laparoscopic pyeloplasty

<table>
<thead>
<tr>
<th>Paper</th>
<th>Type</th>
<th>Author</th>
<th>Year</th>
<th>RCU Cases</th>
<th>Mean Age</th>
<th>Chief Complaint</th>
<th>Flank Pain</th>
<th>Ureteral Stent</th>
<th>Operative Time</th>
<th>Blood Loss</th>
<th>Complications</th>
<th>Follow-up</th>
<th>Results</th>
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</thead>
<tbody>
<tr>
<td>NP-078</td>
<td>Case</td>
<td>Ko et al.</td>
<td>2017</td>
<td>1 Case</td>
<td>36.3 years</td>
<td>Flank Pain</td>
<td>Yes</td>
<td>Yes</td>
<td>171.8 minutes</td>
<td>184.3 mL</td>
<td>No</td>
<td>16.3 months</td>
<td>Successful</td>
</tr>
</tbody>
</table>

Table 1. Results of Published Papers for Retrocaval Ureter: Clinical and Laparoscopic Parameters

NP = number, Pr. = primary, Op. = operation, Lp = laparoscopic, Tp = transperitoneal laparoscopic.

Range is shown in parentheses.
누적합법을 이용한 영상보조 최소절개술(video-assisted minilaparotomy surgery)을 이용한 부분 신장절제술의 학습곡선(learning curve) 분석

박지수1, 안현규1, 김진우1, 강승구1, 오경택1, 김종원1, 나중재1, 이형호3, 윤영은4, 윤민지1, 한용규1,2

1연세대학교 의과대학 비뇨기과학교실, 비뇨의과학연구소, 2Brain Korea 21 PLUS Project for Medical Science, Yonsei University, 3국립건강보험공단 일산병원 비뇨기과, 4한양대학교 의과대학 비뇨기과학교실

영상보조 최소절개술(Video-Assisted Minilaparotomy Surgery)은 개복 수술의 특징을 살리면서도 복강경의 장점을 활용한 수술법으로 기복(pneumoperitoneum)을 사용하지 않고 보조자가 없이 수술이 가능하고 후복막 접근을 통해 장 소형 위험을 적은 등 여러가지 장점이 있는 술식이다. 누적합법(cumulative sum analysis, CUSUM analysis)은 산업화 문제 모니터링에 적합화된 분석법이나 이전 연구에서 의학 술기의 학습곡선 분석에 이용되었다. 본 연구는 표준화된 영상보조 최소절개술을 이용한 부분신장절제의 학습곡선을 누적합법을 통해 최초로 분석하였다. 신촌 세브란스병원에서 단일 술자에게 영상보조 최소절개술을 이용한 부분신장절제술을 시행 받은 총 20명의 환자를 대상으로 하였다. 상기 환자의 시술 시간, 임상병리학적 특성 등이 후향적으로 조사되었고, 환자의 개인 정보를 제거하고 익명으로 저장된 자료를 이용하여 분석하였다. 학습곡선 분석을 위해 누적합법을 이용하였다. 전체 환자 평균나이는 55세였다. 총 시술시간에 따른 누적합법의 결과는 그림 1에서 보듯이, 첫 번째 증례에서 7번째 증례까지 급격한 경사를 보이는 누적합곡선(구간 1)을 보이고 8번째 증례에서 12번째 증례까지는 비교적 완만하고 편평한 모양(구간 2), 13번째 증례부터는 기울기가 급격히 하락(구간 3)하였다. 본 연구에서 누적합법을 통해서 술자가 학습곡선에 도달하기 위해서는 7예 정도의 수술 경험이 필요하고 13예 정도의 경험이 있다면 술자가 능숙하게 짧은 시간 내에 수술을 진행할 수 있음을 보여주었다. 본 연구에 대해서는 다양한 전행 경험을 가진 술자에 대한 추가적인 전향적인 연구가 더 필요하였으나 기존에 학습곡선 분석에 쓰이는 누적합법에 의한 본 단일술자에 대한 연구를 통해서 여러가지 장점을 가진 영상보조 최소절개술 학습이 비교적 많지 않은 수술을 통해 습득할 수 있다는 결과를 보였다.

Keywords: Partial nephrectomy, Learning curve, Cumulative sum analysis
역행성 요관경하 접근법을 이용한 매복요관결석(impacted ureteral stone)의 수술적 치료에 대한 고찰

민경찬, 김상원, 권순오, 김범수
경북대학교 의과대학 비뇨기과학회

목적: 매복요관결석은 요관의 완전 폐쇄를 동반하고 요관내 점막에 단단하게 고정되어 있는 경우가 많아 요관경하 절석술 (URS) 시 요관의 손상 및 결석의 이동 등의 합병증 발생률이 높고, 수술 성공률이 낮은 것으로 보고되고 있다. 그러나 최근 흐름레이저 및 stone basket 등과 같은 결석의 이동을 방지할 수 있는 장비의 발달로 매복요관결석에서도 안전하고 효과적으로 URS를 시행할 수 있을 것으로 기대되고 있다. 이에 본 연구기관에서 매복요관결석으로 URS를 시행받은 환자를 대상으로 그 안전성 및 효용성에 대하여 분석하고자 하였다.

대상 및 방법: 2011년 1월부터 2016년 12월까지 요관결석으로 본원에서 URS를 시행받은 환자들 중 신결석이 동반되어 동시에 수술을 진행한 경우, 숲 전 요관스텐트 또는 신루를 삽입한 경우, 숲 전 요로감염이 동반된 경우를 제외한 245례를 대상으로 하였다. 매복요관결석은 결석이 요관의 완전폐쇄를 초래하여 수술 중 유도철사가 결석 상방으로 통과되지 않는 경우로 정의하였고, 매복요관결석 유무에 따라 두 군으로 나누어 숲 전 환자 및 결석의 특징, 수술과 관련된 인자, 수술 성공률, 합병증 발생률 등에 대하여 후향적으로 비교하였다.

결과: 전체 245례 중 55례(22.5%)에서 매복요관결석이 확인되었고, 환자의 나이, 성별, 체질량지수 등에서는 두 군 간에 유의한 차이가 없었다. 숲 전 결석의 크기(8.4 vs 11.9 mm, p<0.001) 및 하운스필드단위(816.7 vs 1052.0U, p<0.001)는 매복결석 군에서 유의하게 높았고, 수술시간(50.9 vs 68.0분, p<0.001)도 매복결석 군에서 유의하게 길었다. 숲 중 흐름레이저 사용률(40.0 vs 63.6%, p=0.002) 또한 매복결석 군에서 유의하게 높았으나, stone basket과 같은 결석이동을 방지하기 위한 기구의 사용률(90.5 vs 94.5%, p=0.348), 합병증 발생률(14.2 vs 18.2%, p=0.469) 및 수술 성공률(91.6 vs 89.1%, p=0.570)은 두 군 간에 유의한 차이가 없었다.

결론: 요관경하 절석술 시 매복요관결석은 상대적으로 결석의 크기가 크고 경도가 높아 수술시간이 많이 소요되는 단점은 있으나, 흐름레이저와 stone basket 등과 같은 결석의 이동을 방지할 수 있는 장비가 적절히 사용한다면 안전하고 효과적으로 시행될 수 있을 것으로 생각한다.

Keywords: Ureteroscopic stone removal, Impacted ureteral stone, Stone free rate
방사선투과성 신장 및 요관 결석의 potassium citrate/sodium bicarbonate를 이용한 용해요법의 성공에 미치는 인자

이승수, 이정우, 이동훈, 남종길, 박성우, 한지연, 정문기, 정재민, 이상돈
부산대학교 의과대학 양산부산대학교병원 비뇨기과학과

목적: 방사선투과성 신장 및 요관 결석의 일차치료로 약물을 이용한 용해요법을 사용할 경우 성공을 예측할 수 있는 인자를 알아보고자 하였다.

대상 및 방법: 방사선투과성 신장 및 요관 결석으로 진단된 24명의 환자를 대상으로 후향적 분석을 시행하였다. 각 환자에서 나이, 성별, 체질량지수, 동반질환(당뇨, 고혈압, 만성신장질환), 치료 전 혈청 크레아티닌 및 요산 수치, 요 pH 및 사용한 약제(Potassium citrate 및 Sodium bicarbonate)의 종류 및 용량을 조사하였다. 컴퓨터단층촬영(Computed tomography, CT)으로 결석에 대해 위치(신장 및 요관), 크기, Hounsfield unit 및 치료 후 CT로 결석제거 성공여부를 확인하였다.

결과: 24명의 환자 중 용해요법이 성공한 환자는 19명(79.2%)이었고, 실패한 환자는 5명(20.8%)이었다. 각 환자군에서 환자의 나이, 성별, 체질량지수 및 동반질환은 차이가 없었다. 치료 전 혈청 크레아티닌 및 요 pH는 두 군에서 차이가 없었으나 혈청 요산 수치는 성공한 군에서 높았다(p=0.046). 결석의 위치 및 크기는 양 군에서 차이가 없었으나 Hounsfield unit은 성공한 군에서 낮게 측정되었다(p=0.032). Potassium citrate는 성공한 군에서 13례, 실패한 군에서 0례, Sodium bicarbonate는 성공한 군에서 6례, 실패한 군에서 0례 사용되었으나 통계적인 차이는 없었다.

결론: 방사선투과성 신장 및 요관결석의 일차치료로 Potassium citrate나 Sodium bicarbonate를 이용한 용해요법을 적용할 경우 결석의 Hounsfield unit이 낮은 경우, 혈청 요산 수치가 높은 경우 성공 확률을 더 높게 예측할 수 있다.

Keywords: Kidney stone, Potassium citrate, Sodium bicarbonate
NP-082

The efficacy of OPD based-pudendal nerve block in the treatment of chronic pelvic pain

김문성, 노주현, 김종녕, 임건우, 홍재엽, 최경화

CHA의과학대학교 분당차병원 비뇨기과학교실

Objective: To determine the effect of OPD based–pudendal nerve block in patients with chronic pelvic pain.

Methods: We performed a retrospective analysis of 31 patients with refractory chronic pelvic pain. Pudendal nerve block was performed in chronic pelvic pain patients that subjective pain scale did not decrease by more than 30% despite of various medications for more than 2 months (NSAIDs, TCA, opioids, antibiotics including quinolone, α-blocker and pentosane polysulphate). Patients with anatomical abnormality, gynecological problems, or infections were excluded.

An OPD–based transvaginal pudendal nerve block targets the pudendal trunk as it enters the lesser sciatic foramen, about 1 cm inferior and medial to the attachment of the sacrospinous ligament to the ischial spine. Using a 15 cm/25 gauge spinal needle with a plastic guard, total 10 cc of 1% lidocaine (n=18) or 5 cc of 2% lidocaine with 5 cc of 7.5% ropivacaine (n=13) was injected in bilateral pudendal nerve. Vital sign was checked pre and post treatment status and 1hr after treatment. The change of subjective pain scale, reduction of medication, improvement of other symptoms were analysed at post–block 3 months. The chi-square test and paired t–test were used. All analyses performed with SPSS v23.0.

Results: Mean age of patients was 42.3 years (31–62). Before the nerve block, the mean duration of medication was 4.1 months, 25/31 (80.6%) patients were accompanied by peri–pudendal tenderness and surrounding trigger points, 23 (74.2%) patients received nerve block once, 8 (25.8%) patients received twice, with an interval of 2 weeks (n=5), 1–1.5 month (n=3), 26 patients (83.9%) that received pudendal block reported improvement in pelvic pain including dysuria and dyspareunia post procedure (p<0.013). Among them, 16/26 (61.5%) patients showed improvement of frequency and urgency. In total, 20/31 (64.5%) patients could reduce (n=16) or stop (n=4) the medication. Mild dizziness developed immediate after procedure and resolved within 30 minutes were reported in 18/31 patients (58.1%), and 2 case of UTI (6.5%) were reported.

Conclusions: The use of OPD based–pudendal nerve block is feasible and safe and also associated with an overall improvement in chronic pelvic pain.

Keywords: Chronic pelvic pain, OPD-based pudendal nerve block, Efficacy
여성 요실금 치료에서 새로운 회음질압측정기(KegelQ)를 이용한 바이오피드백의 임상적 유용성에 대한 연구: 다기관 전방향 무작위배정 대조 연구

이영주, 이정근, 이순미, 전성호, 김성희, 조성용, 정성진

1. 분당서울대학교병원 비뇨기과, 2. 서울특별시립 보라매병원 비뇨기과, 3. 서울대학교병원 비뇨기과

목적: 여성 복압성요실금에서 골반저근운동(PFME)은 치료효과를 향상시키기 위해 다양한 방법이 시도되었고, 특히 운동 중에 직접 시청각적 반응을 주어 골반저근의 인식과 수축을 더 적절히 할 수 있게 하는 여러 바이오피드백 방법이 소개되었다. 그러나, 바이오피드백을 병용할 때 더욱 치료효과가 향상되는지에 대해서는 아직 논란이 있고 이는 연구마다 대상 환자군과 측정지표 등이 다양하고 사용된 device가 다를 때 이론적이고 사용된 device인 KegelQ의 임상적 유효성과 PFME 단독치료와 비교하고자 시행하였다.

대상 및 방법: KegelQ device는 기존과 다른 몇 가지 특징이 있는데, 질 삽입 프로브가 타원형이 아닌 수평형으로 팽창이 가능하여 진내의 어느 위치에 있어도 효과적으로 운동이 가능하고, 피드백하는 방식이 그래프 형태가 아닌 수치로 표시되고 적정 수축이 가능할 때 화면의 색깔로 환자가 인지할 수 있게 해 준다. 3개의 병원에서 3개월 이상 복압성요실금 증상, SANDVIK 설문에서 1번 문항에 yes인 경우, 1시간 패드 테스트에서 2 g 이상의 요누출이 있는 20~80세 여성 90명을 대상으로 3개월간 무작위 배정 연구를 실시하였다. PFME 단독군과 KegelQ 바이오피드백 병용군으로 구분하였으며 환자는 physiotherapist와 4회의 접촉을 하였고 운동의 순응도를 모니터링 하였다. 3개월째 1시간 패드 테스트에서 2 g 미만의 요누출을 보이는 경우를 cure로 판정하였다.

결과: 3개월간 75명(단독군 39명, 병용군 36명)이 추적관찰을 받았으며, 평균나이는 57.7, 55.3세, 요실금 기간은 51.5, 48.1개월, 패드무게는 10.0, 12.6 g, 질수축압은 13.3, 13.6 mmH2O로, 양 군 baseline characteristics에 차이는 없었다. 3개월째 cure rate는 48.7%, 63.9%로 차이가 없었으나, 2차 평가지표에서 3개월째 SANDVIK 설문에서 주관적 이상 요실금을 보이는 경우가 64.1, 36.1% (p=0.030), 중간이상의 요실금 25.6, 5.6% (p=0.033), 질수축압 1개월 15.9, 22.6 (p=0.006), 3개월 18.3, 25.2 mmH2O (p=0.011), 3개월째 PPBC 3.3, 2.5 (p=0.017)로, 일부지표에서 KegelQ 병용군에서 이득을 보였다. 치료 전과 비교하여 패드무게의 감소 정도는 1개월 3.7, 6.4 g, 3개월 5.1, 9.5 g (p=0.048)로 병용군에서 감소 폭이 더 컸다. KegelQ 병용군에서 device 사용불편감에 대한 VAS는 2.1점으로, 대부분의 환자에서 경미하였다.

결론: KegelQ device를 이용한 PFME는 3개월 치료에서 63.9% 완치율을 보였고 PFME 단독치료와 비교하여 통계적 차이 가 없었다. 그러나, SANDVIK index, PPBC, 패드무게 감소에서 단독치료보다 유의한 호전을 나타냈고 이는 골반저근의 수축강도를 향상시킴으로써 이루어지는 것으로 생각된다. KegelQ device는 PFME 시에 유용한 보조치료로 생각되고 안전하게 임상사용이 가능할 것으로 생각된다.

Keywords: Stress urinary incontinence, Pelvic floor muscle exercise, Biofeedback
단일 기관에서 시행한 방광질루 교정술의 장기 추적결과

정현우, 고광진, 이규성
성균관대학교 의과대학 비뇨기과학교실

목적: 단일 기관에서 시행한 방광질루(vesicovaginal fistula) 교정술의 장기 추적결과에 대해 알아보고자 하였다.

대상 및 방법: 2001년부터 2016년까지 본원에서 방광질루 교정술을 받은 환자의 자료를 후향적으로 분석하였다. 수술 전
환자의 특성과 발생 원인, 이전 수술 여부와 방사선 치료 여부, 방광경 검사를 통한 환자의 위치, 크기, 개수 등을 확인하 였고 수술 후에는 수술 방법에 따른 수술의 성공률, 재발률을 확인하였다. 수술은 복벽경유(transabdominal) 혹은 질경유 (transvaginal) 접근 방법으로 시행되었다. 수술 성공은 수술 후 도뇨관 제거 전 누수검사(indigocarmine test, cystogra phy)에서 음성으로 나온 것으로 정의하였다.

결과: 대상 환자는 65명으로 44명 환자는 방광질루 교정술을 처음 받은 환자였고 21명은 타병원에서 수술을 받은 후 재발한
환자였다. 평균 추적관찰 기간은 20.1개월이었다. 첫 번째 수술 성공률은 84.6% (55/65)이었고, 이 중 5명은 추적 중 누
공이 재발하였다. 복벽경유 방법의 성공율은 85.4%, 질경유 방법은 82.4% 였다. 첫 수술에서 실패하거나 재발한 15명의
환자 중 2명의 환자는 ileal conduit을 권유했으나 거부하였으며 5명의 환자는 다른 원인으로 추가 수술을 받지 않았다. 최
종적으로 8명의 환자가 재수술을 받았고 이 중 1명의 환자는 누공의 크기가 크고 방광용적이 적어 ileal patch를 사용하였으며 1명은 ileal conduit을 시행하였다. 이후 2명의 환자에서 재발 소견이 보여 3차 수술을 시행하였다. 이차 수술의 성공율은 62.5%, 3차 수술의 성공율은 100%였다. 최종적으로 93.8% (61/65)의 성공률을 보였다. 방사선 치료를 받았던 10명
환자의 수술 성공률은 54.6%이었다.

결론: 수술 후 20개월 추적한 결과 방광질루 교정술의 성공률은 1차 수술후 84.6%이었고, 최종적으로 93.8%이었다.

Keywords: Vesicovaginal fistula, Surgical outcomes, Recurrence rate
복압성요실금 정도 평가척도들의 비교분석: 전향적 연구

유민영1, 김병수1, 조성용2, 오승준1
1서울대학교병원 비뇨기과학교실, 2서울특별시립 보라매병원 비뇨기과

목적: 복압성 요실금환자들에서 요실금의 정도를 계량화하기 위한 다양한 방법들이 제시되어 여러가지 지표들이 임상진료에서 활용되고 있으나 이러한 지표들에 대한 상관관계의 적절한 평가가 필요한 실정이다. 이에 이 지표들의 상관관계를 전향적으로 알아보고자 하였다.

대상 및 방법: 여성 복압성요실금 환자를 대상으로 ICIQ-UI, PPBC, KHQ 설문지 결과와 1-hour pad test, Q-tip test, 요역동학검사(ALPP)를 시행하여 분석하였다.

결과: 총113명 환자들의 평균나이는 57.7±10.2세(SD)이었고 요실금은 복압성 26명, 복합성 80명이었다. 설문지들은 ICIQ-UI와 PPBC (r=0.580, P<0.001), ICIQ-UI와 KHQ (0.185<r<0.473, P<0.001), KHQ와 PPBC (0.304<r<0.656, P<0.001)사이에 강한 상관관계를 보여주었다. Q-tip test는 설문지, pad test, urodynamic result와 상관관계가 없었다 (Fig 1). (1) pad test는 KHQ 설문지의 하위항목인 role limitations (r=0.306, P=0.004), physical limitations (r=0.219, P=0.044), social limitations (r=0.302, P=0.004), emotions (r=0.336, P=0.001), sleep/energy (r=0.430, P<0.001), severity measures (r=0.291, P=0.005)들과 유의한 상관관계를 보여주었다. 그러나 personal relationships와는 유의한 상관관계가 없었다. (2) pad test는 VLPP (r=-0.254, P=0.021)와 CLPP (r=-0.266, P=0.012)에 음의 상관관계를 보여주었다. (3) PPBC는 pad test (r=0.305, P=0.003), VLPP (r=-0.241, P=0.025), CLPP (r=-0.206, P=0.046)와 중등도~고도의 상관관계를 보여주었다. (4) VLPP는 모든 KHQ 항목들과 중등도~고도의 음의 상관관계를 보았다. CLPP는 social limitations, emotions, sleep/energy, severity measures와 중등도~고도의 음의 상관관계를 보였다. (5) ICIQ-UI는 pad test와 유의한 상관관계가 없었다. (6) ICIQ-UI는 VLPP (r=-0.324, P=0.003)와 강한 음의 상관관계를 보였다. (7) MUCP는 VLPP (r=0.326, P=0.002), CLPP (r=0.337, P=0.001)와 강한 양의 상관관계를 보여주었다.

결론: 요실금 환자의 pad test와 urodynamic results는 각종 설문지들과 유의한 상관관계를 보여주었다. Q-tip test는 요실금 상태를 평가하는데 도움이 되지 않았다.

Keywords: Urinary incontinence, ICIQ-UI, Urodynamics
Objective: Overactive bladder (OAB) symptoms are common in stroke patients, but their effects on stroke rehabilitation over time are unclear. We aimed to identify the effects of OAB symptoms on health related quality of life (HRQOL) of stroke patients.

Materials and Methods: Thirty post–acute stroke patients who were admitted for rehabilitation treatments were included. All participants completed questionnaire survey to evaluate urinary symptoms with overactive bladder symptom score (OABSS) and general HRQOL with Short Form 36 health survey. To assess their performance status, we also assessed function ambulation category, modified Rankin scale (MRS), modified Barthel index, and mini–mental state examination (MMSE). All assessments were carried out at baseline and 3 months. We divided patients into OAB and non–OAB group with OABSS. Correlation analysis and multivariate regression were performed.

Results: All performance scales showed improvement over 3 months in the non–OAB group (n=18; p<0.02), but in the OAB group (n=12), MRS and MMSE scores did not improve significantly (p=0.157 and 0.201, respectively). In the OAB group, vitality and mental health scores significantly decreased over 3 months (p=0.012 and 0.041, respectively) and the mental component summary (MCS) score showed a marginal decrease over 3 months (p=0.050). Multivariate regression analysis revealed that OAB symptoms were negatively correlated with 3 months MCS score (B=8.15, p=0.034).

Conclusion: OAB symptoms can have negative effects on HRQOL and performance status in stroke patients.

Keywords: Stroke, Overactive bladder, Quality of life
The effect of observing the degree and pattern of urine leakage during the provocative test before applying and adjustment of the mesh during trans-obturator tape (TOT) procedure in mixed incontinence

김종원, 이형호, 박상언, 이석영, 고우진, 김영식
국민건강보험공단 일산병원 비뇨기과

Objectives: Our study evaluates external manual compression during adjustment trans-obturator tape sling procedure in mixed type urinary incontinence.

Methods: The study was conducted on patients selected randomly, who visited the hospital between Jan 2014 and Jan 2016. A total of 148 patients were included, 81 patients underwent trans-obturator tape procedure without external manual compression, and 67 patients underwent trans-obturator tape procedure with external manual compression. Trans-obturator tape was performed by three surgeons. Surgeon 1 was performed external manual compression during adjustment trans-obturator tape. We classified the degree of leakage by the three groups (Grade I/II/III) (Fig 1), intra-operative test, the degree of tape adjustment was varied in the group with urgency and urge incontinence. After the observation of degree and pattern of urine leakage, applied and adjusted the mesh. We compared the results of postoperative outcomes with surgeon 1 and the others.

Results: In the group not applied provocation test the cure rate was 50.6%, the improved rate was 38.3%. In the group applied provocation to test the cure rate was 86.6%, improved rate was 11.9%. The group applied provocation test had a significantly higher success rate compared to the group not applied provocation test (p=0.000). Stamey grade was compared in mixed type incontinence by provocation test. In the group not applied provocation test, Stamey grade 0 was 43.5% and in the group applied provocation test was 81.4% (p=0.007).

Conclusion: To identify leakage grade by provocation test during the operation showed good results after sling operation, It is mixed type incontinence that intraoperative provocation test effective.

Keywords: External manual compression, Transobturator tape, Mixed incontinence
영유아에서 포피의 HPV 유병률: 문헌 고찰 및 메타 분석

이현영, 김재현, 두승환, 양원재, 송윤섭
순천향대학교 서울병원 비뇨기과학학교실

배경: 영유아 포피의 실제 HPV 유병률은 거의 보고되지 않았다. 영유아의 HPV 유병률 보고는 무증상 남아에서의 치료 기준을 정하는 데에 매우 중요하다.

방법: 1960년부터 2010년까지의 HPV 포피 유병률의 전향적 연구 데이터베이스를 연구하였다. 메타 분석을 시행하였으며 영유아 포피 HPV 유병률을 모으기 위해 확률효과 모형을 사용하였다.

결과: 총 8개 연구가 메타 분석에 적용되었다. 일반적 HPV, 고위험 HPV, 저위험 HPV, HPV 16/18, HPV 16, HPV 18의 전체 유병률은 각각 17.3 (95% CI; 0.8, 46.3), 12.1 (95% CI; 0.9, 31.5), 2.4 (95% CI; 0.0, 11.2), 4.8 (95% CI; 0.0, 16.8), 1.7 (95% CI; 0.0, 5.1) and 0 (95% CI; 0, 0.5)로 나왔다. 메타회귀분석에서 유병률은 장소, 평균나이, 연구 연도와는 관련 없는 것으로 나타났다.

해석: 영유아에서 포피의 HPV 유병률은 0%가 아니며 이것은 성적 접촉이 아닌 다른 경로로 HPV가 전파된 것을 의미한다. 영유아에서 고위험 HPV가 확인된다는 것은 포경수술이나 백신 접종을 통한 예방치료가 권장된다.

Keywords: Papillomavirus, Foreskin, Meta-analysis
단일 일차의료기관을 방문한 여성 급성단순방광염 환자의 원인균 및 항생제 감수성 검사결과
두진경, 어홍선
PSI 어비뇨기과의원

목적: 급성단순방광염은 여성이 가장 흔한 요로감염으로 일차의료기관에서 치료하는 경우가 대부분이지만, 지금까지 발표된 국내결과들은 병원급 이상의 의료기관 조사이다. 본 연구는 일차의료기관을 방문한 여성의 급성단순방광염의 임상결과를 알아보고자 하였다.

대상 및 방법: 2012년 1월부터 2017년 6월까지 급성단순방광염으로 본원 내원하여 치료받은 15세 이상의 여성(총 4969명, 평균나이: 51.6±18.06세)를 후향적으로 분석하였다. 요로카테터 삽입, 신경인성 방광, 요로결석, 요도협착 등 해부학적 이상소견이 있는 경우는 제외하였다. 환자를 재발유무와 검사기간에 따라 군주와 항생제감수성결과를 분석하였다.

결과: 가장 많은 원인균은 E. coli (81.0%)였다. 나이가 증가할수록, 재발이 있는경우 E. coli 발생빈도는 줄어드는 경향을 보였으며, 나머지 군주는 증가되는 경향을 보였다(Table 1, p<0.05). 검사일을 2014년이전, 2014~2015년, 2016년 이후로 나누었을 때 E. coli는 각각 83.0%, 80.5%, 79.8%로 발생빈도가 점점 줄어들었다. E. coli 군주를 대상으로 재발유무와 검사기간에 따라 항생제감수성결과를 확인했을 때, 재발이 있는 경우와 검사일이 최근일수록 항생제내성률이 더 증가 되었다(Table2, p<0.05).

결론: 일차의료기관에서 치료하는 급성단순방광염의 원인균은 재발, 고령이나 검사기간이 최근일수록 E. coli 발생빈도가 줄어들었으며, ampicillin, TMP/SMX, Ciprofloxacin 순으로 항생제의 내성이 증가하였다.

Keywords: Cystitis, Microorganism, Susceptibility

Table 1. Microorganisms isolated from women with acute uncomplicated cystitis

<table>
<thead>
<tr>
<th>Microorganism</th>
<th>Total</th>
<th>15±40 years</th>
<th>&gt;40±60 years</th>
<th>&gt;60 years</th>
<th>Recurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n=4969)</td>
<td>(n=2120)</td>
<td>(n=1493)</td>
<td>(n=1355)</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td>15 ±40 years</td>
<td>&gt;40 ±60 years</td>
<td>&gt;60 years</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>47 ±18 years</td>
<td>57 ±16 years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Escherichia coli</td>
<td>4027 (81.0%)</td>
<td>82.10%</td>
<td>81.50%</td>
<td>79.60%</td>
<td>82.40%</td>
</tr>
<tr>
<td>Klebsiella pneumoniae</td>
<td>188 (3.8%)</td>
<td>2.40%</td>
<td>4.10%</td>
<td>4.80%</td>
<td>3.10%</td>
</tr>
<tr>
<td>Enterococcus faecalis</td>
<td>177 (3.6%)</td>
<td>4.80%</td>
<td>3.00%</td>
<td>3.30%</td>
<td>2.80%</td>
</tr>
<tr>
<td>Proteus mirabilis</td>
<td>139 (2.8%)</td>
<td>1.90%</td>
<td>2.60%</td>
<td>3.80%</td>
<td>2.20%</td>
</tr>
<tr>
<td>Coagulase negative staphylococcus</td>
<td>96 (1.9%)</td>
<td>2.60%</td>
<td>2.30%</td>
<td>0.90%</td>
<td>2.80%</td>
</tr>
<tr>
<td>Others</td>
<td>342 (6.8%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Percentage of Escherichia coli resistant to selected antibacterial agents from women with acute uncomplicated cystitis related to recurrence and period

<table>
<thead>
<tr>
<th>Antibacterial agents</th>
<th>Recurrence (%)</th>
<th>Period (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>First attack</td>
<td>Recurrent attack</td>
</tr>
<tr>
<td>Ampicillin</td>
<td>35.5</td>
<td>65.4</td>
</tr>
<tr>
<td>Ampicillin/Clavulanic acid</td>
<td>5.0</td>
<td>7.0</td>
</tr>
<tr>
<td>ESBL</td>
<td>9.8</td>
<td>14.4</td>
</tr>
<tr>
<td>Cefuroxim</td>
<td>19.5</td>
<td>29.3</td>
</tr>
<tr>
<td>Ceftriaxone</td>
<td>8.1</td>
<td>12.9</td>
</tr>
<tr>
<td>Cefepime</td>
<td>10.3</td>
<td>15.4</td>
</tr>
<tr>
<td>Ciprofloxacine</td>
<td>9.8</td>
<td>14.4</td>
</tr>
</tbody>
</table>
NP-090

ESBL 생성균에 의한 요로감염으로 ertapenem 치료 후 재발한 ESBL 양성 환자의 임상 양상과 재 치료 패턴: 다기관 연구, 예비조사

강정윤1, 김정훈2, 최재덕2, 안승현2, 문경태1, 조희주1, 조정만1, 유탁근1
1울산대학교 의과대학 비뇨기과학 교실, 2한일병원 비뇨기과

목적: Extended spectrum beta-lactamase (ESBL) 생성 균주에 의한 요로감염의 일차 치료제인 carbapenem 중 하루 한 번 투여가 가능한 ertapenem이 많이 사용되고 있다. 본 연구에서는 ertapenem 주사 치료 후 소변배양검사에서 다시 ESBL 양성균이 재발한 환자들의 임상양상을 분석하고 이러한 환자들의 재 치료의 패턴을 살펴보고자 한다.

대상 및 방법: 2012년 4월부터 2017년 4월까지 5년 동안 서울 동북 지역 2개의 종합병원 비뇨기과에 내원하여 소변배양검사에서 ESBL 양성균이 확인되어 ertapenem 정맥주사로 치료한 환자 중, 치료 후 ESBL 양성균이 다시 재발한 환자들을 대상으로 하였다. 이들의 요감염의 과거력, ertapenem 주사기간, 재발 시기, 재발의 위험인자, 재치료 방법 및 치료 후 상 태 등에 대하여 의무기록을 후향적으로 조사하였다.

결과: ertapenem으로 치료한 환자는 총 264 명이었고, 이 중 추적 소변배양검사에서 다시 ESBL 양성균이 나온 환자는 총 34명(12.9%)이었다. 환자들의 평균나이는 70.9±9.1세, 여자가 21명(61.8%)으로 더 많았다. 처음 ertapenem 주사기간은 1주 이내가 15명(44.1%), 8-13일이 16명(47.1%)이었다. 치료 후 다시 ESBL 양성균이 배양된 기간은 치료 후 6개월 이후가 13명(38.3%)으로 가장 많았다. 재 치료는 ertapenem으로 한 환자가 6명(47.1%)이었다. 재 치료 후 추적관찰기간 동안 재발하지 않은 경우는 14명(41.2%)이었다. 환자들의 임상양상에 대한 결과는 Table 1 과 같다.

결론: ESBL 양성균에 의한 요로감염 환자에서 ertapenem 주사기간이 1주 이내로 짧았고, 재치료에도 다시 재발하는 양상이 관찰되었다. 이에 대하여 현재 서울 동북지역 5개 병원의 다기관 연구를 진행하고 있으며, 더 많은 환자들의 분석이 필요할 것으로 생각한다.

Keywords: ESBL, Ertapenem, Re-treatment
Advanced paternal age does not affect to sperm DNA fragmentation

이효석1, 박용석2, 최진호1, 이중식1, 서주태1
단국대학교 제일병원 1비뇨기과학상실, 2생식의학연구실

Objective: This study was performed to evaluate and compare the impact of age on sperm DNA damage in male infertility patient.

Materials and Methods: A retrospective study was performed. Paternal patients were divided by 5 years age group. SDF test was performed and compared with sperm parameters according to paternal age. For the analysis of the paternal age factor, patients were divided into the following age categories: ≤30 years (n=21 cycles), 31–35 years (n=107 cycles), 36–40 years (n=73 cycles), and >40 years (n=23 cycles). Sperm parameters were assessed by the WHO guideline. SDF test was assessed using the Halosperm kit according to the manufacturer’s instructions. A minimum of 500 spermatozoa per sample was scored. The fragmentation rate was calculated by the SDF (%)=(fragmented spermatozoa/total 500 spermatozoa counted)×100. SDF value that exceeds a threshold value of 30% considered DNA fragmented sperm.

Results: In concern to age factor, the mean paternal age was 35.0±4.3 years. The overall results of sperm count was 67.2±63.5×106/mL, motility was 39.7±21.3%, viability was 60.7±16.9%, morphology was 3.4±2.8%, and SDF rate was 26.4±16.3%. The results of sperm parameters were not statistically different among age groups. In each age groups, SDF rate showed as follow: ≤30 years (24.7±16.0%), 31–35 years (26.0±17.5%), 36–40 years (25.9±12.8%), and >40 years (31.3±20.7%). Among of them, >40 years age group showed SDF rate was higher than other groups, however, statistically significant difference was not observed.

Conclusions: Advanced age does not affect to the SDF rates. Our finding indicate that although SDF does not correlated with advancing age, the probabilities of poor assisted reproduction results should be explained to the over 40 years old paternal patients.

Keywords: Paternal age, Sperm DNA fragmentation
NP-092

정관복원술 후 정액검사 결과와 임신 성공과의 연관성

정영환, 장춘태, 정승찬, 류동수

성균관대학교 의과대학 삼성창원병원 비뇨기과학교실

Purpose: Despite a thorough understanding of the factors and predictors influencing vasal patency after vasectomy reversal (VR), little is known about the patients’ semen parameters and pregnancy outcome. We analyzed semen analysis values and pregnancy after VR in order to assess its association.

Materials and Methods: A total of 119 modified two-layer vasal reconstruction were performed at the Samsung Changwon Hospital by a single surgeon between 2006 and 2016, and identified 87 cases with clinical pregnancy rates and semen analysis data. Data regarding patient and spouse ages, obstructive interval, intraoperative findings, postoperative semen results, and spontaneous pregnancy outcome were collected. Pearson chi-square test and independent t-test were used to analyze categorical and numeric variables, respectively.

Results: The overall patency rate was 93.1% (81/87) and pregnancy was achieved by 40.2% of patients (35/87). Of 81 patients who confirmed postoperative vasal patency, successful pregnancy was directly related to younger ages of patient (42.2 vs. 47.0 years; p=0.001) and spouse (38.1 vs. 40.9 years; p=0.010) while obstructive interval (mean 6.76±0.67 years) did not significantly differ between the two groups (6.3 vs. 7.1 years; p=0.553). Intraoperative microscopic findings of no sperm are inversely related to pregnancy rates (p=0.009). Sperm motility and morphology showed statistical significance as a factor affects pregnancy rates (Table). However, regardless of pregnancy success, semen parameters except sperm motility are better than the WHO reference values for human semen characteristics.

Conclusions: Ages of patient and spouse, and microscopic findings of no sperm are inversely related to pregnancy rate. Post-VR sperm motility and morphology are statistically higher in patients who successfully conceived, however semen parameters except sperm motility are above the WHO reference values regardless of pregnancy success. These data will help counsel couples after VR and reinforce the importance of patient and female partner age.

Keywords: Vasectomy reversal, Pregnancy, Semen analysis

<table>
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<th>Parameter</th>
<th>Spontaneous pregnancy</th>
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<tr>
<td></td>
<td>Yes (n=35)</td>
<td>No (n=46)</td>
<td>P value</td>
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<td>Semen volume (mL)</td>
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<td>3.58±0.16</td>
<td>0.806</td>
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<td>Sperm concentration (million/mL)</td>
<td>76.53±14.24</td>
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<tr>
<td>Total sperm count (million)</td>
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<tr>
<td>Morphology (%)</td>
<td>66.91±2.96</td>
<td>57.72±2.88</td>
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NP-093

하부요로증상을 가진 한국남성을 대상으로한 타다라필 5 mg 매일 복용법의 시판 후 조사: 다기관 연구

Ji-Eon Won¹, Ji Yeon Chu¹, Hyunah Caroline Choi¹, Yun Chen², Hyun-Jun Park³, Héctor José Dueñas⁴

¹Lilly Korea, Seoul, Korea, ²Lilly Suzhou Pharmaceutical Company, Shanghai, China, ³Department of Urology, Pusan National University School of Medicine, Busan, Korea, ⁴Eli Lily de Mexico, Mexico City, Mexico

Purpose: The aim of this study was to investigate the safety and effectiveness of tadalafil 5 mg once daily (QD) among Korean men with benign prostate hyperplasia (BPH)/lower urinary tract symptoms (LUTS) in a real-world clinical setting.

Materials and Methods: This was a single country, prospective, observational cohort study in which patients newly prescribed tadalafil 5 mg QD for the treatment of BPH/LUTS were followed up for 12±2 or 24±2 weeks or to last treatment during post-marketing surveillance. Safety was evaluated by frequency of treatment-emergent adverse events (TEAEs) and serious adverse events (SAEs). Effectiveness was assessed by changes in the International Prostate Symptom Score (IPSS) from baseline to each endpoint.

Results: All patients receiving ≥1 dose of tadalafil 5 mg QD (N=637) were included in the safety population. Two percent of patients (n=13) experienced 15 TEAEs of mild (n=10; 66.7%) or moderate (n=5; 33.3%) severity. No severe TEAEs and no SAEs were reported. Effectiveness evaluations included all patients receiving tadalafil who had both baseline and endpoint observations (12-week, N=265; 24-week, N=44). Compared with baseline, mean IPSS total score (±SE) significantly improved by 4.7±0.3 and 6.4±0.7 points at the 12- and 24-week endpoints, respectively (p<0.0001), with significant improvements also on storage, voiding, and quality of life subscores. In total, 69.1% patients had a clinically meaningful ≥3-point improvement in IPSS total score.

Conclusions: Tadalafil 5 mg QD is well tolerated and effective in Korean men with BPH/LUTS in a real-world clinical setting.

Keywords: Benign prostatic hyperplasia, Lower urinary tract symptoms, Tadalafil
NP-094

 잠복정자증, 감소정자증 환자에 대한 시험관아기 시술 전 정자냉동의 임상적 의의

김대균1, 강기예2, 김동석3, 송승훈3
1CHA의과학대학교 서울역센터 비뇨기과학연구실, 2차병원 여성의학연구소 서울역센터 배아생식연구실, 3CHA의과학대학교 강남차병원 비뇨기과학연구실

Objectives: To investigate the clinical implication of sperm freezing for oligozoospermia and cryptozoospermia patients who underwent in vitro fertilization–intracytoplasmic injection (IVF–ICSI).

Methods: This retrospective cohort study included 63 oligozoospermia (33) and cryptozoospermia (30) patients who underwent IVF–ICSI by fresh or frozen sperm between 2016 and 2017. Oligozoospermia was defined as spermatozoa under 15×10^6/cc, and cryptozoospermia was defined as spermatozoa observed only in the pellet with sperm concentration under 10^4 after centrifugation. Semen analysis was performed according to WHO 2010 recommendation. All sealed straws were placed at a distance of 3 cm above the level of liquid nitrogen (-80 to -90 °C) for 30 min, and then samples are stored in liquid nitrogen vapor at -196.5 °C. Rate of using frozen sperm during IVF–ICSI was investigated, and cases in which no motile sperm to be found post-thaw at the time of an IVF cycle were analyzed. Pregnancy rate after IVF–ICSI using either fresh or frozen sperm was analyzed, respectively.

Results: Frozen sperm was used in 36.5% of cases (23/63). Mean number of freezed straws per patient was 2.44 straws. Mean number of thawing straws were 2.41 per the patients who used freezed-thawed sperm. Complete immotile sperm after thawing of freezed sperm was identified in only for cryptozoospermia group 7.84% (4/51 cases). Clinical pregnancy rate were 32.5% (13/40) in fresh sperm group and 34.8% (8/23) in freezed-thawed sperm group (p=0.853).

Conclusion: Failure to retrieve any motile sperm after thawing of cryopreserved sperm was identified only in cryptozoospermia group. Although infrequent event, for prevention of IVF–ICSI cancellation, sperm freezing up to 3 straws is requisite for prevention of lack of motile spermatozoa on the day of IVF–ICSI in cryptozoospermia patient with similar pregnancy rate using fresh sperm.

Keywords: Sperm freezing, IVF–ICSI, Cryptozoospermia
NP-095

남성호르몬 보충요법의 치료 유지 영향 인자 비교

김진욱, 지병훈, 장인호, 명순철, 문영태, 김경도, 김태형
중앙대학교병원 비뇨기과학교실

Introduction: Despite Testosterone replacement therapy (TRT) gaining widespread use, it remains controversial in its indications, principally because the diagnosis of Late onset hypogonadism (LOH) remains ill defined, as what constitutes low serum testosterone and the unreliability of symptom scores in predicting testosterone levels, The current study reexamines the definition of LOH by assessing which definition helps maintain patient persistence of TRT.

Materials and Methods: A cohort of patients with LOH were prospectively recruited and give the choice of TRT. Inclusion required serum testosterone levels below 5 ng/ml and ADAM questionnaire positive. Serum free Testosterone, DHEA, DHEAS and AMS scores were also assessed on entry. Patients received Testosterone Enanthate IM injection 250 mg (TE) once a month. Observation period was determined over when patients requested termination of testosterone medication, and drop outs were queried by phone calls to assess whether TRT improved their ADAM 1, 7 answers. Patients were divided into tertiles of serum measurements and AMS questionnaire scores and submitted for survival analysis.

Results: Initially, 128 patients were started. Overall median duration of treatment was 198 days. Patients who maintained treatment at 1 year was overall 41.8% (56/134 patients). No serum parameters were significant for persistence of treatment by Cox analysis, with serum Testosterone, while not significant, showing that patients with higher levels (>4 ng/ml) maintained longer treatment. However, maintenance was significantly related to initial low AMS scores (p=0.011) On termination of treatment patients reported that they terminated treatment primarily due to failure to improve erectile function than their libido.

Conclusion: Overall 41.8% of patients receiving TRT maintained their treatment at 1 year, with median dosing duration at 198 days. Patients who maintained treatment tended to have low AMS, while patients who quit treatment reported disappointment in failure to improve sexual functions.

Keywords: Testosterone replacement therapy, Late onset hypogonadism
고환 통증 동반 유무에 따른 정계정맥류 환자의 특성 차이

백승룡, 박현준, 이경영, 박민정, 박남철
부산대학교병원

배경 및 목적: 고환 통증은 정계정맥류의 주요 증상 중 하나이지만 일부 환자에서만 통증을 호소한다. 정계정맥류에 의한 고환통증은 약물 치료가 잘 되지 않고, 수술을 해도 일부에서 잔존하는 경우가 있어 임상의들에게 어려움을 안겨주는 증상 중 하나이다. 그러나 고환 통증을 느낀 환자는 그렇지 않은 환자에 비해 일찍 진단을 받게 되어 수술을 받을 수 있어 향후 불임의 가능성을 줄일 수 있는 여지도 있다. 본 연구에서는 통증을 동반한 정계정맥류 환자와 무증상 정계정맥류환자 의 특징을 비교하고자 한다.

대상 및 방법: 이번 연구는 1997년부터 2016년까지 연구자의 병원에서 정계정맥류 절제술을 시행 받았던 환자 954명을 대상으로 병력조사를 통한 후향적으로 진행되었다. 고환 통증의 유무와 각 정계정맥류의 관련 지표와의 관련성을 조사하였으며, 내원 시 나이, 체질량지수, 양측 고환용적차이, 정액지표, 혈중 총 테스토스테론, 정계정맥류의 grade 및 위치, 증상 기간 등의 관련 지표가 포함되었다.

결과: 조사가 이루어졌던 총 954명의 환자 중 통증 및 무통증인 경우는 각각 404례(42.3%) 및 550례(57.3%)였다. 통증유무에 따른 각 지표의 결과는 다음과 같았다. 통증 및 무증중군에서 나이(24.29±9.72 vs 27.76±9.66세), BMI (21.96±2.80 vs 22.96±3.51 kg/m²), 양측 고환차이(2.41±2.16 vs 2.32±2.25 cc), 정자농도(18.84±17.57 vs 14.14±13.86 mil/ml), 정자 운동성(50.81±22.16 vs 47.66±29.53%) 및 혈중 총 테스토스테론(469.90±163.24 vs 426.55±163.40 ng/dl)로 나이, BMI, 정자농도에서 유의한 차이가 있었다. 통증군에서 정계정맥류의 grade가 높았으며 유병기간이 짧았다.

결론: 통증성 정계정맥류 환자는 통증으로 인해 일찍 자각을 하게 되어 병원을 찾았으며 grade가 높은 경향을 보였다. 또한인지가 더 낮고, BMI가 낮고 정자의 농도 감소가 많았으며 나타나 통증이 있는 경우 초기에 정계정맥류가 진단되어 치료를 받게 되는 경향을 확인할 수 있었다. 비록 정계정맥류로 인한 고환통증이 완치가 어려운 증상이나 환자가 초기 진단과 치료를 받을 수 있은 기회를 제공하는 증상으로 생각된다.

Keywords: Varicocele, Pain
NP-097

무증상 남성갱년기증후군 환자: 남성호르몬 보충요법이 필요한가?

박현준, 이경민, 박민정, 박남철
부산대학교병원

**Objectives:** Testosterone replacement therapy (TRT) is effective for treating the symptoms and ameliorating the metabolic consequences of hypogonadism. TRT improves muscle mass, bone mineral density, mood, and sexual performance. However, a significant number of patients have low serum levels of testosterone without any subjective symptoms or complaints. We evaluated the suitability of TRT for patients with non-symptomatic late-onset hypogonadism.

**Materials and Methods:** Seventy patients whose initial serum levels of testosterone were <300 ng/dL without any symptoms or complaints were consecutively enrolled and followed for 30 weeks. All patients received 1,000 mg parenteral testosterone undecanoate on day 1, followed by additional injections on weeks 6, 18, and 30. Serological tests (for total testosterone, lipid profile, glucose, and prostate-specific antigen [PSA]) were performed and Body Mass Index (BMI), International Index of Erectile Function (IIEF) score, International Prostate Symptom Score (IPSS), the Aging Males’ Symptoms (AMS) questionnaire, and the Global Assessment Questionnaire (GAQ) were performed at baseline and at the end of the study.

**Results:** Mean patient age was 56.2±10.5 years. The total IIEF score increased from 44.9±12.9 at baseline to 54.8±13.0 on week 30 (p<0.001). The AMS score improved from 37.9±11.5 at baseline to 24.6±13.2 on week 30 (p<0.001). Baseline and 30-week total testosterone levels were 272.2±48.2 and 598.2±52.5 ng/dL, respectively (p<0.0001). No significant changes were detected in the IPSS, lipid profiles, glucose, BMI, or PSA level. The percentage of patients reporting improvement in the GAQ was 58.6%. Improvements in the sexual desire domain of the IIEF, sexual subscale of the AMS, and change in total testosterone (>300 ng/dL) were significantly correlated with a positive GAQ response. The majority of adverse events were mild, reversible, and of short duration.

**Conclusions:** Although a patient may not complain of any subjective symptoms at the initial visit, TRT can be considered in patients with low testosterone levels and decreased sexual desire and function. It is postulated that patients with low testosterone levels may not recognize their symptoms. Thus, more specific screening is needed for such patients.

**Keywords:** Testosterone replacement therapy, Hypogonadism
무자녀 상태에서 시행된 정관복원술 20례의 임상적 특성

박지훈, 김경환, 이경, 백승룡, 임미영, 류장현, 박민정, 박현준, 박남철
부산대학교병원 비뇨기과학교실, 한국공공정자은행연구원

Introduction: 난임 치료를 위해 내원하는 환자들이 증가되는 현실에서 미혼이나 자녀가 없는 상태에서 영구 피임수술인 정관절제술을 시행 받는 경우도 꾸준히 증가되고 있는 실정이다. 적절한 수술 및 피임 상담과 정자은행 시스템의 부재 속에서, 정관절제술의 무계획적인 시술은 한국사회의 심각한 저출산 문제를 심화시키는 의료적 요인임이 되고 있다. 본 연구는 미혼이나 무자녀인 상태에서 정관절제술을 시행한 증례 분석을 통해 정관절제술의 시술 현황과 인식도를 조사하고자 한다.

Material & Methods: 2006년에서 2017년까지 부산대학교병원 비뇨기과에서 정관복원술을 시술을 위해 내원한 396례 중 미혼 혹은 무자녀 상태에서 정관절제술을 받은 39례(9.8%)에서 설문조사에 응답한 20례(응답률 51.3%)를 대상으로 하였다. 설문조사는 외래, 입원 및 퇴원 후 대면조사 혹은 전화 인터뷰로 시행하였다.

Results: 정관절제술 시술 당시 평균 나이는 30.2세(IQR 27.0-35.0세)였고, 미혼 및 기혼상태가 각각 26례(67%) 및 13례(33%)였다. 정관복원술 받을 당시 평균 나이 38.3세(IQR 34.0-43.0세)였다. 정관절제술 후 정관복원술 시행까지 기간은 7.2년(95% CI: 5.7-8.8년)이었다. 설문조사가 수행된 20례에서 정관절제술에 대해 알게 된 계기는 인터넷과 신문(55%)이 가장 많았고, 상식(20%), 지인(15%), 보건소(5%), 군대(5%) 순이었다. 정관절제술을 결정하게 된 이유로 독신주의(70%)가 가장 많았고, 배우자 피임 거부(20%), 결혼 전 안전한 성관계(5%), 심리적 스트레스(5%) 순이었다. 피임을 위해 정관절제술을 다시 받겠느냐는 질문에 받지 않겠다는 대답이 약 3/4을 차지하였고, 정관절제술 결정 시 문제점으로는 의료진과의 상담이 부족했다는 답변(85%)이 가장 많았다.

Conclusions: 정관절제술 및 복원술 그리고 가입력 보존 방법에 대하여 일반인을 위한 대국민 홍보와 의료진에 대한 생애 학습 교육의 지속적 수행과 함께 무자녀인 정관절제술을 원하는 환자에게는 시술에 앞서 심층적 평가가 요구된다. 특히 저출산이 심화되고 있는 심정에서 가입력 보존을 위한 공공정자은행의 설립과 운영이 시급한 것으로 판단된다.

Keywords: Vasovasostomy, Childless, Vasectomy
Purpose: Benign prostatic hyperplasia (BPH) is a common disease that requires treatment in elderly. For many years, Transurethral Resection of Prostate (TURP) has been the definitive treatment of BPH. Many studies report an association between diabetes mellitus, (DM) and the BPH. Therefore, we evaluate the treatment outcomes of TURP according to the presence of DM.

Material & Methods: From January 2011 and March 2015 123 patients with BPH were analyzed, retrospectively. Baseline characteristics were collected. Patients with DM were assigned to Group 1 and patients without DM were in Group 2. After TURP, we followed up the patients at three months. And we analyzed the treatment outcomes at that time.

Results: Table 1 showed baseline characteristics of patients. We identified BPH in 123 patients and confirmed BPH with DM in 48 patients. There were no significant differences in baseline characteristics, statistically. The IPSS values before and after TURP in group 1 were 16.86±7.49 and 12.79±8.65 and the values in group 2 were 15.58±6.84 and 11.87±6.82 (P=0.069, 0.01). Postoperative Qmax were determined as 10.77±3.67 and 11.82±6.22 for the two groups, respectively (P<0.05).

Conclusions: We suggest that TURP shows a tendency for improvement of storage symptoms & Qmax in BPH patients with DM as an underlying disease. Further well-designed prospective, randomized studies with larger cohorts are needed to confirm the findings of this study.

Keywords: Alpha blocker, Benign prostatic hyperplasia, Metabolic syndrome, Transurethral resection of prostate, Diabetes mellitus.
NP-100

HoLEP시 전립선암 우연종의 발견률 및 술 전 위험인자에 대한 고찰

김명, 안태영
울산대학교 서울아산병원 비뇨기과학실

Objectives: To identify incidence and its predictors of incidental prostate cancer following Holmium laser enucleation of the prostate (HoLEP).

Methods: We retrospectively analyzed 317 consecutive patients who underwent HoLEP. Patients with preoperative prostate specific antigen (PSA) >3 ng/dL or palpable lesion on digit rectal exam (DRE) were routinely underwent systemic prostate biopsy. Incidence of incidentaloma during HoLEP was assessed. Logistic regression analysis was performed to determine the predictive factors.

Results: Mean age was 71.8 (±6.9) years. Mean preoperative PSA and total prostate volume were 4.9 (±5.5) ng/mL and 65.7 (±27.6) mL. Of all patients 104 patients received preoperative systemic prostate biopsy. A total of 12 patients (3.8%) were incidentally diagnosed with prostate cancer. The incidence of prostate cancer was not significantly different between the two groups (biopsy group vs. non-biopsy group: 3.8% vs 3.8%, p=0.968). Using multivariate analysis, any of preoperative parameters such as age, body mass index, prostate size, PSA, PSA density, previous history of negative biopsy, DRE findings and TRUS findings could not independently predict the incidental prostate cancer after HoLEP (p range: 0.105-0.999).

Conclusions: Prior negative prostate biopsy does not rule out the possibility of prostate cancer after HoLEP, but no preoperative parameter independently predicted the incidental cancer. Patients should be warned about their potential risks for incidentaloma, preoperatively.

Keywords: Prostate cancer, Benign prostatic hyperplasia, HoLEP
NP-101

전립선침생검시 만성염증 양성코어 수의 임상적 의의
강수환, 서원태, 강필문, 최성, 류현열, 김택상
고신대학교 의과대학 비뇨기과학과

Objectives: For investigation of the clinical significance of the number of positive cores of chronic inflammation in prostate needle biopsy specimen, we look into several clinical characteristics and the number of positive cores of chronic inflammation in twelve core prostate biopsy specimen.

Materials and Methods: Between March 2015 to February 2017, total 256 patients underwent transrectal ultrasound guided twelve core prostate needle biopsy. Except the patients with prostate carcinoma, we reviewed medical records of 142 patients including prostate specific antigen (PSA), prostate volume, total IPSS score, QoL score, IPSS question 1 to 7, IPSS voiding subscore, IPSS storage subscore and the numbers of cores with chronic inflammation. For evaluation of the clinical effect of the chronic inflammation in prostate biopsy, simple and multiple regression analyses were done. We excluded the patients who underwent prostate surgery, diagnosed symptomatic chronic prostatitis, and had alpha blockers, antiinflammatory drugs, antibiotics, diuretics, antimuscarinic agents, and 5 alpha reductase inhibitors within 4 weeks.

Results: The patients with complete medical records and not relevent with exclusion criteria were 97 patients. The mean age, PSA, prostate volume was 66.5±9.5, 8.38±14.2, 53.3±19.8, respectively. The mean total IPSS score, QoL score, IPSS voiding subscore, IPSS storage subscore was 11.9, 3.3, 6.6, 5.2 respectively. The mean each IPSS question 1 to 7 was 1.9, 1.9, 1.4, 1.6, 2.1, 1.2, 1.9, respectively and the mean numbers of cores with chronic inflammation was 5.0. By simple regression analysis, the numbers of cores with chronic inflammation had a positively related trend with PSA (p=0.072), IPSS question 2 – frequency (p=0.072), and IPSS question 3 – intermittency (p=0.069). After multiple regression analysis (R2=0.146), PSA (p=0.028, B=0.71) and IPSS question 2 – frequency (p=0.045, B=1.575) were statistically significant.

Conclusion: PSA and urinary frequency were increased with the number of cores with chronic inflammation in the prostate biopsy. However, total IPSS score, voiding and storage IPSS subscore were not related.

Keywords: Prostate biopsy, Chronic inflammation, Postive core number
NP-102

홀뮴 레이저 전립선 절출술 후 전립선 이행대에서 우연히 발견된 전립선암의 특성

김상훈1, 이규원2, 조수연1, 김현우1
가톨릭대학교 1성바오로병원, 2서울성모병원

목적: 홀뮴 레이저 전립선 절출술(HoLEP)은 결제된 조직을 세절제거율을 통해 적출하여 조직검사를 시행함으로써, 전립선암이 우연히 발견되는 경우가 있다. 저자들은 HoLEP 후 발견된 전립선암의 특징을 분석하였다.

대상 및 방법: 2011년 12월부터 2017년 4월까지 HoLEP을 시행 받은 834명의 환자 중 전립선암이 발견된 34명의 환자를 대상으로 하였다. 이들에게 술 전 전립선 비대증 지표 및 술 후 조직 검사 결과를 분석하였고, 전립선암 진단 후 치료 유형 및 조직 검사 결과를 살펴보았다.

결과: 총 834명의 환자 중 34명에서 전립선암이 발견되어 4.1%의 발견률을 보였다. HoLEP만 시행한 환자는 14명이고, HoLEP과 초음파 유도 경직장 전립선 조직검사를 동시에 시행 후 전립선 이행대에서만 전립선암이 발견된 환자는 20명이었다. 평균 나이는 72.3±6.6세였으며, 평균 전립선 크기는 45.2±22.4ml, 평균 PSA는 4.0±2.6ng/ml였다(Table 1). Gleason 점수는 4점(2+2) 2명(6%), 6점(3+3) 22명(65%), 7점(3+4) 10명(29%)이었고, 임상적 병기상 cT1a (65%)가 cT1b (35%) 보다 많았다(Table 1). 34명의 환자 중 15명에서 근치적 전립선절제술을 시행하였고, 이들 중 2명의 환자에서 Gleason 점수가 6(3+3)에서 7점(3+4)으로 상승되었으며 13명은 잔여 종양이 발견되지 않았다. 근치적 수술 후 조직 검사에서 perineural invasion 소견이 2명에서 관찰되었다. 수술을 시행하지 않은 19명 중 3명은 active surveillance를 시행하였으며, 2명은 남성호르몬 박탈요법을 시행하였다.

결론: HoLEP 후 비교적 높은 반도로 전립선 이행대에서 우연히 전립선암이 발견되었다. 이 들 전립선암은 낮은 Gleason 점수를 보였으며, 근치적 수술 이후에도 낮은 병기로 관찰되었다. 그러나 드물지만 병기가 상승되는 경우도 있어 추가 치료를 결정함에 있어 좀 더 신중하게 접근해야 할 것으로 사료된다.

Keywords: Benign prostatic hyperplasia, HoLEP, Prostate cancer

<table>
<thead>
<tr>
<th>Table 1. Preoperative data and pathological findings</th>
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<tbody>
<tr>
<td>Age (years)</td>
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<td>TRUS (ml)</td>
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<tr>
<td>PSA (ng/ml)</td>
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<td>T1a</td>
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NP-103

홀뮴 레이저 전립선 적출술(HoLEP) 후 초기에 나타나는 발기능 변화

김상훈1, 이규원2, 조수연1, 김현우1
가톨릭대학교 1성바오로병원, 2서울성모병원

목적: 홀뮴 레이저를 이용한 전립선종 절제술(Holmium laser Enucleation of the Prostate; HoLEP)은 현재 전립선 비대증의 치료에 널리 사용되는 레이저 술식이다. 저자들은 HoLEP 직후 단기간 동안의 발기능의 변화를 알아보고자 하였다.

대상 및 방법: 2012년 5월부터 2016년 12월까지 HoLEP을 시행 받은 환자 중 3개월 시점에서 IIEF-5 기록이 완성된 141명을 대상으로 하였다. 술 전 IIEF-5 점수에 따라 I군(7점 이하, n=90), II군(8-16점, n=36), III군(17점 이상, n=15)으로 분류하였다. 각 군에서 술 전, 술 후 3개월의 IIEF-5 점수를 평가하였고, 모든 환자의 나이, 전립선 크기, PSA, 수술 전 IPSS, 요송검사, 전뇨기, 적출시간, 세질시간, 사용된 에너지량을 비교 분석하였다.

결과: 각 군의 평균나이는 I군 70.6±6.5세, II군 68.9±5.0세, III군 67.3±6.3세로 차이를 보이지 않았으며, 수술 전 전립선비대증 지표에서도 차이가 없었다(Table 1). 수술 중의 사용된 레이저 에너지량 및 적출시간, 세질 시간에서도 세 군간의 유의한 차이가 관찰되지 않았다(Table 1) 술 후 3개월 시점에서의 IIEF-5 점수는 I군에서는 유의하게 증가하였고, II군에서는 유의하게 감소하였으며, III군에서는 차이를 보이지 않았다(Table 2).

결론: 발기능이 정상인 경우, HoLEP 이후 초기 시점에서 발기능의 변화는 없으나, 중등도의 발기부전이 있는 경우에는 술 후 초기에 발기능의 감소가 나타날 수 있으므로 술 전에 이에 대한 고려가 필요하다고 생각된다.

Keywords: Erectile dysfunction, Benign prostatic hyperplasia, HoLEP

<table>
<thead>
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<th>Table 1. Baseline demographic and patient characteristics</th>
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<tbody>
<tr>
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<td>Age (yr)</td>
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<td>Prostate size (mg)</td>
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<td>Enucleation time (min)</td>
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<td>Microlization time (min)</td>
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<th>Table 2. Comparison of IIEF-5 score after HoLEP</th>
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<td>Group I</td>
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<td>Group II</td>
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<td>Group III</td>
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NP-104

하부요로증상/전립선비대증 환자에서 urethral pressure profile의 유용성에 대한 재조명

박송철1, 김병수2, 윤민영2, 오승준2
1Department of Urology, YanBian University Hospital, China, 2서울대학교병원

목적: LUTS/BPH 환자에서의 UPP와 다른 임상척도들을 비교하여 UPP가 BOO를 진단하는데 도움이 되는지를 알아보고자 하였다.

대상 및 방법: 2011년 5월부터 2014년 5월까지 요역동학검사를 시행한 45세 이상 LUTS/BPH 환자들을 대상으로 연구하였다. UPP parameter는 maximum urethral pressure (MUP), maximum urethral closure pressure (MUCP) 그리고 functional urethral length (FUL)을 포함하였다. 연속형 자료와 rank자료에 대해서는 Pearson과 Spearman 상관계수를 이용하여 분석하였다. BOO를 진단하는 UPP parameter의 실험적인 가치를 연구하기 위해서 ROC 곡선을 사용하였다.

결과: 총 1,134명 환자들의 평균나이는 67.6세(±7.5,SD)이었고, TPV와 PSA는 각각 57.1 (±34.0) ml와 3.1 (±3.9) ng/ml 이었다. IPSS-total, IPSS-storage, IPSS-emptying, IPSS-QoL은 각각 17.9 (±8.1), 7.2 (±3.6), 10.7 (±5.6), 4.0 (±1.2) 이었다. 평균 BOO index는 40.1 (±26.8)이었고 468명(42.8%)의 환자가 BOO로 분류되었다. TPV, TzV, PSA, Qmax, PVR, bladder contractility index (BCI) 모두 BOO군에서 유의하게 높았다(p<0.05). Pearson 상관계수결과 각각의 UPP parameter들은 나이, PSA, PdetQmax와 유의한 관계가 있었으나 total IPSS, Qmax, voided volume와의 관계가 없었다. 또한 FUL은 TzV, PVR, BOO와 명백한 유의한 관계를 보였으나 각각 p<0.01, p=0.001, p<0.01). UPP parameter들과 total IPSS 사이에는 유의한 관계가 없었다. BOO 진단에 있어 UPP지표들 ROC 곡선에서 FUL의 BPH환자의 BOO진단과 상관관계가 있었다(p<0.001). FUL ≥74.5 mm가 BOO standard으로 가장 의미있는 기준값이었다(sensitivity 53.2%, specificity 63.2%) (Figure).

결론: LUTS/BPH 환자에서의 UPP상의 FUL은 BOO 정도를 평가하는데 상관관계가 있었으나 그 유용성은 낮았다. 전반적으로 LUTS/BPH 환자들에 있어서 UPP의 의의는 크지 않다고 판단된다.

Keywords: Prostatic hyperplasia, Urethral pressure profile, Urodynamics

Figure 1. ROC Curves of UPP parameters in diagnosing BOO
A novel vaporization-enucleation technique for benign prostate hyperplasia by using 120-W HPS GreenLight™ laser: seoul technique II

유상준, 강순호, 박주현, 조성용, 조민철, 정현, 손환철
서울특별시립 보라매병원

Introduction: We developed a novel vaporization-enucleation technique (Seoul II), which consists of vaporization-enucleation of the prostate using 120-W HPS GreenLight laser, and enucleated prostate resection using bipolar devices for tissue removal. We compared the outcomes of the Seoul II with vaporization and a previously reported modified vaporization-resection technique (Seoul I).

Materials and Methods: Among patients with benign prostate hyperplasia who underwent transurethral surgery using GreenLight laser at our institute, 347 patients with prostate volume ≥40 ml were included. The impact of surgical techniques on efficacy and postoperative functional outcomes were compared.

Results: No difference was found in baseline characteristics, although the prostate volume was marginally greater in Seoul II (p=0.051). Prostate volume reduction per operation time (p<0.001) and lasing time (p=0.016) were greater in Seoul II. At postoperative 12-months, the International Prostate Symptom Score (I-PSS) was lower (p=0.011), and the decrement in I-PSS was greater in Seoul II (p=0.001) than other techniques. In multivariate analysis, postoperative 12-month I-PSS for Seoul II was significantly superior to vaporization (p<0.001), although it was similar to Seoul I. The maintenance of immediate postoperative I-PSS decrement, until postoperative 12-months was superior in Seoul II compared with vaporization (p=0.014) and Seoul I (p=0.048).

Conclusions: Seoul II showed improved efficacy and voiding functional maintenance over postoperative 12-months in patients with prostate volume ≥40 ml compared with vaporization and Seoul I. This technique could be easily accepted by clinicians who are familiar with GreenLight lasers and add flexibility to surgery without additional equipment.

Keywords: Lasers, Prostatic hyperplasia, Transurethral resection of prostate
NP-106

증상 평가만으로 저활동성 방광과 방광 출구 폐쇄 남성 환자 구별 진단이 가능한지에 대한 연구

김아람, 박영진, 최우석, 박형근, 백성현, 김형곤
건국대학교병원 비뇨기과, 건국대학교 의학전문대학원

Purpose: To perform differential diagnosis between DUA and BOO based on symptom assessment without invasive pressure flow study.

Material and Methods: Signs and symptoms of the men with DUA were analyzed and compared with those of men with BOO according to 8 questions. The questions were selected based on large scale study about distinctive symptoms of DUA [1]. Patients with DUA should have bladder contractility index (BCI) lesser than 100 and patients with BOO should have BOO index (BOOI) more than 40 in urodynamic study (UDS). One urologist reviewed the patients’ medical records and responded the 8 questions without information of UDS.

Results: A total of 157 men who underwent UDS were included in this analysis. Signs and symptoms were compared in patients classified as having DUA without BOO (n=98), BOO without DUA (n=59). The characteristics of the 2 groups were listed in Table 1. The mean age of the men with DUA was significantly older than that in the BOO groups (69.5 vs. 67.5, p=0.002) and mean prostatic volume in the BOO group was significantly larger than DUA groups (40.6 cc vs. 78.4 cc, p=0.008). Variables in UDS were also significantly different from DUA and BOO groups (BCI 73.1 vs. 134.2, pp=0.002; BOOI 16.1 vs. 77.4, p<0.001). Mean scores of No. 1, 2, 4, 5, 6 and 7 questions were significantly different from 2 groups, moreover sum of mean scores except No. 3 and 8 were also significantly different.

Conclusions: Male patients with DUA and BOO might be distinguished based on assessment of signs and symptoms before invasive evaluation.

Keywords: Detrusor underactivity, Bladder outlet obstruction, Symptom
The predictive factor for favorable outcome after surgical treatment of benign prostate hyperplasia performed by beginner urologist - is surgical modality important in young urologists?

Kim Gi-hong, Yang Hee-jo, Kim Doo-sang, Jeon Yun-su

순천향대학교 천안병원 비뇨기과학학교실

**Introduction and Objective:** To identify predictor for favorable outcome at 3 months after surgical treatment which were performed by beginner urologists in benign prostate hyperplasia (BPH), we retrospectively evaluated outcomes after holmium laser enucleation of the prostate (HoLEP) and transurethral resection of prostate (TURP) which were undergone by two young urologists, respectively.

**Methods:** Of 80 patients who were treated with HoLEP or TURP, 31 (HoLEP) and 36 (TURP) patients who were followed up to 3 months were enrolled in this study. Preoperative and perioperative variables were evaluated to identify predictive factors for favorable outcome after surgical treatment for BPH.

**Result:** At postoperative 3 months of HoLEP or TURP, median decreased AUA-SI value were 13.0 (range: 6.0–19.0). Patients that AUA-SI values were decreased over 13 were defined as favorable response group after HoLEP or TURP. Univariate and multivariate logistic regression analysis were performed for identifying predictor of favorable outcome at 3 months after HoLEP or TURP, and preoperative AUA-SI score was identified as an independent predictor for favorable outcome (OR=1.307, P<0.001).

**Conclusion:** When young urologists plan to perform surgical treatment for BPH, they should consider that the severity of symptom is the most important factor for favorable outcome. The type of surgical modality for managing BPH is less important.

**Keywords:** Benign prostatic hyperplasia, Holmium laser enucleation of the prostate, Transurethral resection of prostate

<table>
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NP-107
NP-108

갑상선 호르몬과 하부요로증상/전립선비대증상과의 상관 관계

이준호, 최기복, 박연원
국립경찰병원 비뇨기과

목적: Thyroid hormones play an important role in cell differentiation, growth, and metabolism. Several investigators have documented the role of thyroid hormones in the development of prostate cancer. However, to date there are only limited data available regarding thyroid hormone levels in benign prostatic hyperplasia (BPH).

대상 및 방법: A total of 5708 men were included. Lower urinary tract symptoms (LUTS)/BPH were assessed by international prostate symptom score (IPSS), prostate volume, maximal flow rate (Qmax), and a full metabolic workup. Serum levels of thyroid-stimulating hormone (TSH) and free thyroxine (FT4) were measured using chemiluminescence immunoassay by commercial kits. We divided participants into quartiles based on their TSH and FT4 levels: first quartile, Q1; second quartile, Q2; third quartile, Q3; and fourth quartile, Q4. We then investigated their relationship using the chi-squared test, the Cochran–Armitage trend test and, logistic regression analyses.

결과: The mean age of the study group was 51.1±5.2 years, and the mean FT4 and median TSH were 1.05±0.14 and 1.44 (0.96–2.13) ng/mL, respectively. TSH was not significantly related to IPSS, Qmax, and total prostate volume in univariate and multivariate analyses. However, there was a significant increase in the percentage of men with IPSS>7, Qmax<10 mL/sec, and prostate volume≥30 mL, with increase of FT4 quartile (IPSS>7(%): Q1:57.2, Q2:56.7, Q3:60.3, Q4:62.5, P=.001; Qmax<10 mL/sec(%): Q1:3.5, Q2:3.2, Q3:4.1, Q4:4.8, P=.038; total prostate volume≥30 mL (%): Q1:15.2, Q2:16.4, Q3:18.0, Q4:19.3, P=.002). After adjusting for age, body mass index, testosterone, and metabolic syndrome, the odds ratio for prostate volume≥30 mL of FT4 Q3 and FT4 Q4 were significantly higher than FT4 Q1 (odds ratio: 5–95 percentile interval, P value; Q1:0.000 (references); Q2:1.140 (.911–1.361), P=.291; Q3:1.260 (1.030–1.541), P=.025; Q4:1.367 (1.122–1.665), P=.002]. After adjusting for age, body mass index, testosterone, metabolic syndrome, and prostate volume, the odds ratio for IPSS>7 of FT4 Q4 were significantly higher than that of FT4 Q1 (odds ratio: 5–95 percentile interval, P value; Q1:0.000 (references); Q2:969 (.836–1.123), P=.677; Q3:1.123 (.965–1.308), P=.133; Q4:1.221 (1.049–1.420), P=.010).

결론: We found a potential role of thyroid hormone in developing LUTS/BPH.

Keywords: Thyroid hormone, Benign prostatic hyperplasia
로봇 보조 복강경하 단순 전립선 절제술의 초기경험
문경태, 조희주, 조정만, 강정윤, 유탁근
울지병원

목적: 거대 전립선 비대증의 치료로 시행한 로봇 보조 복강경하 단순 전립선 절제술의 초기경험 및 이의 안정성과 유효성에 대해 알아보고자 한다.

대상 및 방법: 2010년 10월 이후 거대 전립선 비대증으로 로봇 복강경하 단순 전립선 절제술을 시행한 환자 중 3개월 이상 추적 관찰이 진행된 15명의 환자를 의무 기록을 통해 조사하였다. 수술 전 환자 상태 및 수술과 관련된 합병증 여부, 수술 전 및 수술 후 3개월째 국제전립선증상점수(IPSS)와 요속 검사 결과를 분석하였다.

결과: 나이는 71.9±6.5세, 총 전립선용적(TPV)은 113.7±22.5 cc 및 이행대용적(TZV) 68.5±21.6 cc였다. 4명의 환자는 수술 전 재발성 요폐로 카테터를 유지하였으며 이 중 1명은 요도수정으로 인해 치골 상부 카테터를 유지하고 있었다. 나머지 11명의 환자는 급한 하부 요로 증상으로 상기 수술을 시행하였고 이중 2명의 환자들은 방광 결석이 동반되어 있었 다. 수술시간(console time)은 평균 166.2±33.8분이 소요되었으며, 적발된 adenoma의 평균용적은 56.8±15.5 cc이었다. 로봇수술 경험이 적었던 초기 2례에서 수술 중 출혈로 인한 수술을 중단하였고 다른 수술 중 합병증은 발생하지 않았다. 수술 후 요도 카테터의 유치는 평균 8.0±1.6일이었으며 수술 후 추적관찰 기간에 1명의 환자에게 방광 경부 협착이 발생되어 수술 후 4개월째 내시경 방광 경부 절개술을 시행하였으며 다른 수술 후 합병증은 발생하지 않았다. 모든 환자에서 수술 후 3개월째 시행한 요속 검사 및 IPSS의 의미 있는 개선이 관찰되었다(Table 1).

결론: 내시경 기구의 발전으로 전립선 비대증에서 침습적인 전립선 절제술의 필요성은 많이 감소하였으나 거대 전립선 비대증, 방광 결석의 동반, 요도 수정 및 요도 협착이 있는 환자의 경우에는 여전히 침습적인 전립선 절제술이 필요하다. 수술 관련 합병증, 술 후 결과 및 미용적인 측면에서 로봇 전립선 절제술은 기존의 개복 전립선 절제술을 대체 할 수 있을 것으로 생각한다.

Keywords: Robotic prostatectomy, Huge BPH

<table>
<thead>
<tr>
<th>Table 1. Comparison of parameters before and after robotic simple prostatectomy</th>
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</thead>
<tbody>
<tr>
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<tr>
<td>Max. urine flow (ml/sec)*</td>
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<tr>
<td>Residual urine volume (ml)*</td>
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<tr>
<td>IPSS total score</td>
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<tr>
<td>IPSS voiding score</td>
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<tr>
<td>IPSS storage score</td>
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<td>IPSS QOL score</td>
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</table>

*: excluded 3 patients with acute urinary retention at preoperatively
*: paired t-test
Objectives: To evaluate the successful surgical outcome using the patient–centered goals in benign prostatic hyperplasia (BPH) patients who underwent Holmium Laser Enucleation of the Prostate (HoLEP).

Methods: From April 2009 to June 2010, 230 consecutive BPH patients scheduled for HoLEP were enrolled and listed their treatment goals for surgery outcomes. On the 3 postoperative months of follow-up, the patients reviewed their original goals and graded its achievement using 5–point goal attainment scale (GAS; −2 to +2; +1 and +2 was defined as goal achievement). They also completed postoperative satisfaction (0–100%), and quality of life (0–6 points) questionnaire.

Results: Of the 182 (79.1%) patients who completed this study, the most common goal was the loss of weak urinary stream (62.6%), followed by the loss of residual urine sense (16.5%). The goals were achieved in 140 patients (76.9%), mean postoperative satisfaction rate was 74.6±19.5%, and mean QoL scale was 1.8±1.1 points. Postoperative satisfaction and QoL were correlated to the GAS significantly (r=0.775, p<0.001; and r=-0.725, p<0.001 respectively).

Conclusions: The patients who underwent HoLEP presented successful surgical outcomes according to the patient–centered goal attainment scale which was significantly correlated to postoperative satisfaction and QoL.

Keywords: Holmium lasers, Prostate, Goal
Holmium laser enucleation of the prostate (HoLEP) can be one of the modality for treatment of benign prostatic hyperplasia (BPH) in young urologists

김기홍, 양희조, 김두상, 전윤수
순천향대학교 천안병원 비뇨기과학교실

Introduction and Objective: Most of beginners have been hesitant to embrace HoLEP because this technique has been known to require further endoscopic technique. The aim of this study is to identify that HoLEP as well as transurethral resection of prostate (TURP) can be considered as one of the modality for treatment of BPH in not only experts but also for beginner urologists.

Methods: We retrospectively evaluated the efficacy and the safety of HoLEP (40 cases) and transurethral TURP (40 cases) that had been undergone by two young urologists who had never undergone surgical treatment for BPH before. Perioperative and postoperative data were compared by Mann–Whitney and chi-square tests.

Results: HoLEP was significantly superior to TURP in resected volume (gm) (median 31.0 vs 16.0, p=0.012), resected ratio (%) (median 70.5 vs 53.0, p=0.036) and duration of catheterization (days) (median 2.0 vs 3.0, p=0.043). However, retrieval rate was no significant difference between two groups (p=0.413). Operative time (min) was significantly shorter in TURP (median 115.0 vs 70.0, p<0.001). At 3 months after operation, there was no significant difference between urodynamic results between two groups. However, anticholinergics were significantly more used in HoLEP group (52.3% vs 4.0%, p<0.001). Nevertheless, there was no uncontrolled urgency in both groups. There was no significant difference of complication rates between two groups.

Conclusions: HoLEP can be considered as one of the modality for treatment of BPH in young urologists. Careful consideration should be focused on operative time and postoperative urgency in HoLEP.

Keywords: Benign prostatic hyperplasia, Holmium laser enucleation of the prostate, Transurethral resection of prostate

<table>
<thead>
<tr>
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<th>HoLEP (N=40)</th>
<th>TURP (N=40)</th>
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<td>23.0 (16.0 – 33.0)</td>
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<tr>
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<td>4.0 (4.0 – 5.0)</td>
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<tr>
<td>Max urine flow, ml/sec</td>
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<td>6.6 (5.0 – 8.8)</td>
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<tr>
<td>PVR, ml</td>
<td>115 (70.0 – 210.0)</td>
<td>138 (53.0 – 660.0)</td>
<td>180 (50.0 – 370.0)</td>
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<td>Prostate size, ml</td>
<td>65.5 (50.0 – 98.0)</td>
<td>59.0 (46.0 – 84.0)</td>
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<td>4.8 (3.7 – 5.0)</td>
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<td>Hemoglobin, g/dl</td>
<td>13.9 (12.0 – 14.9)</td>
<td>13.6 (12.3 – 14.7)</td>
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<td>Body mass index, kg/m²</td>
<td>24.3 (22.0 – 26.4)</td>
<td>24.0 (22.4 – 26.4)</td>
<td>0.620</td>
</tr>
</tbody>
</table>

Efficacy

| Operative time, min                 | 115.0 (86.3 – 156.0) | 70.0 (51.0 – 91.0) | <0.001 |
| Resected tissue, gm                 | 31.0 (13.5 – 44.0) | 16.0 (10.0 – 30.0) | 0.012 |
| Retrieval rate                      | 0.24 (0.15 – 0.32) | 0.24 (0.16 – 0.30) | 0.413 |
| Enucleation ratio, %                | 70.5 (58.5 – 81.8) | 51.0 (39.0 – 71.0) | 0.036 |
| Catheterization duration, days      | 2.0 (1.0 – 2.0) | 3.0 (2.0 – 4.0) | 0.043 |
| Hospital days                       | 3.0 (1.0 – 3.0) | 4.0 (3.0 – 5.0) | 0.043 |
| ALA-SI at 3 months after operation  | 12.0 (7.0 – 18.0) | 12.0 (7.0 – 16.0) | 0.462 |
| QoL at 3 months after operation     | 3.0 (2.0 – 4.0) | 3.0 (1.0 – 4.0) | 0.409 |
| Max urine flow at 3 months after operation, ml/sec | 14.3 (11.1 – 23.7) | 13.5 (20.5 – 20.5) | 0.225 |
| PVR, ml                            | 40.0 (15.0 – 82.0) | 68.5 (34.5 – 88.0) | 0.129 |
택시 운전사에서 야간운전이 남성 하부 요로 증상에 미치는 영향

박지윤, 정준세, 배상락, 박봉희, 이용석, 강성학, 한창희
가톨릭대학교 의과대학 의정부성모병원 비뇨기과학학교실

**Objectives:** Long-time driving and occupational driving is adverse effect to lower urinary tract symptom. We investigate the effect of night time driving and continuous driving without rest on lower urinary tract symptom on occupational taxi driver.

**Materials and Methods:** The lower urinary tract health examination was done in 107 occupational taxi drivers. All drivers were underwent IPSS, OABSS questionnaire and serum PSA and urinalysis was done and post-voiding residual urine volume was checked and all performed the transrectal ultrasonography. Medical interview and physical examination was done. All drivers was done a health-related questionnaire. Working years, night-time driving, the number of duty-on and duty-off time, average driving time during a day/week and average duration of night time driving was identified. Statistical analysis was done by SPSS ver 18.0.

**Results:** Drivers mean age was 62.9 years old. Mean BMI was 25.39 and mean PSA was 1.40. Mean residual volume was 55.71 cc and mean prostate volume was 71.50 cc. Average career of taxi driving was 20 years. Mean 48.2 hours per daytime driving was performed and 2.25 days spent for duty-off. There were significant different in whether night-time driving was performed. In night-time driver, storage domain score in IPSS was higher than non-night-time driver (4.36 vs. 3.84, p=0.012). On OABSS questionnaire, 1, 4, total score was higher in night-time driver (0.28 vs. 0.39, p=0.022, 0.30 vs. 0.77, p=0.00, 2.96 vs. 4.07, p=0.004). NTD was longer career on taxi driving and longer day-time driving (19.46 vs. 20.94, p=0.049, 44.43 vs. 51.61, p=0.029).

**Conclusions:** Night-time driving was negative effect to storage symptom. Duration of driving career was also had adverse effect on lower urinary tract symptom especially on storage symptom.

**Keywords:** LUTS, Taxi driver, Night
척수이형성증으로 인한 신경인성 방광에서 요로감염의 발생과 유발요인

박관진, 송원훈, 임영재
서울대학교병원 비뇨기과

목적: 척수이형성증으로 인한 신경인성방광에서 청결간헐도뇨(CIC)를 시행하는 경우 대부분에서요검사결과 농뇨나 세균뇨가 보이고 일부에서는 요실금이나 항변증상증이 발생하며 그 중 일부는 열성 요로감염이 발생한다. 이를 예방하기 위해 도뇨횟수를 증가시키고 청결도뇨를 강조하며 예방항생제나 urinary antiseptics를 처방하거나 그 효과에 대해서는 알려져 있지 않다. 본 연구는 이들에서 요로감염의 빈도와 가장 효과적이었던 치료방식을 조사하였다.

대상 및 방법: 1991년부터 2016년까지 신경인성 방광으로 도뇨를 시행하며 사춘기가 지날때까지 추적결과가 존재하는 158명의 자료를 분석하였다. 요로감염은 농뇨(WBC>10/HPF), 항변증상증 또는 요실금의 증가를 보이지만 열이 없었던 하부요로감염과 38.5도이상의 발열이 관찰되었던 상부요로감염으로 구분하였다. 요로감염의 연령별 발생빈도를 기술하고 하부요로감염과 상부요로감염에 영향을 미칠 것으로 예상되는 임상적 인자들의 유의성을 검정하였다.

결과: 대상환자 중 하부요로감염을 1회이상 경험한 경우는 89 (56%)였고 반복적인 경우는 54 (34%)였습니다. 반복적인 하부요로감염을 경험하는 경우는 초등학교시절을 포함한 사춘기이전에 그 이후보다 더 흔했다. 홍미롭게도 사춘기이후 도뇨횟수는 유의하게 감소하였다. 상부요로감염은 16명(10%)에서 나타났으며 전 연령에서 고르게 분포하였다. 반복적인 하부요로감염을 보이 경우 그렇지 않은 경우에 비해 단순촬영에서 mean rectal stool length가 길고 변지림의 빈도가 더 높았다(p<0.05). 다변량분석에서 주요인자로 조절안되는 변지림의 존재(OR=3.6)와, mean rectal stool length >7 cm (OR=6.8)가 주요 인자로 확인되었다. 상부요로감염의 주요인자로는 요역동학검사에서의 악화소견(OR=5.5)과 mean rectal stool length >7 cm (OR=2.7)이었다.

결론: 신경인성 방광에서 도뇨를 시행하는 경우 요로감염을 예방하기 위해 대변의 관리가 중요하며 갑작스러운 상부요로감염의 발생은 비뇨기계의 구조/기능적 악화를 의미하는 신호일 수 있으므로 이에 대한 검사가 필요하다.

Keywords: Urinary tract infection, Neurogenic bladder, Spinal dysraphism
NP-115

Tubularized incised plate 수술 시 사용한 카테터 크기에 따른 장기 추적 요속의 비교

허지은1, 이초녕2, 김상운1, 이용승1, 한상원1

1연세대학교 의과대학 비뇨기과학教研室, 2연세대학교 세브란스병원 소아비뇨기과

목적: 요도하열에 대해 primary tubularized incised plate repair 시행한 환자에서 수술 시 사용한 카테터 크기에 따른 장기 추적 요속 검사 결과를 비교하고자 한다.

대상 및 방법: 2006년 1월부터 2014년 12월까지 본원에서 요도하열에 대해 단일 술자(HSW)에게 primary tubularized incised plate repair을 시행 받은 환자를 후향적으로 조사하였다. 신경학적 혹은 요도하열 외 다른 비뇨기과적 질환이 있는 경우와 요도누공, 제거, 협착의 합병증이 발생한 경우를 제외하였고, 수술 당시의 나이가 24개월 미만인 환자를 대상으로 하였다. 이 중 요속검사가 아직 시행되지 않은 환자들을 제외한 총 277명을 대상으로 하였다. 최종 추적 시 요속검사 결과와 카테터 크기에 따른 차이를 분석하였다.

결과: 카테터 크기에 따라 6 Fr (group I), 7.5 Fr (group II), 9 Fr (group III)의 세 군으로 나누었을 때 가장 많이 사용된 카테터는 7.5 Fr로 205명(74%)이었으며 다음으로는 6Fr 카테터의 사용이 많았다(20.9%). 수술 당시 환자 나이의 중위값 (9 vs. 8 vs. 11개월, p=0.564)과 최종 요속검사 시행 당시 나이의 중위값(69 vs. 54 vs. 54.5개월, p=0.248)과 follow up 기간의 중위값(48 vs. 45 vs. 40개월, p=0.459) 그리고 환자 수는 차이가 없었다. 최종 요속 검사 시 배뇨량(101.9 vs. 105.9 vs. 108.7, p=0.022)과 잔뇨량(7.5 vs. 11 vs. 7, p=0.692) 역시 3군 간에 차이는 없었다. 최종 검사 시의 전체 환자에서 최대 요속 중위값은 5.4 ml/sec였고 최대 요속을 이용한 flow index 중위값은 0.28였었다. 최종 검사 시의 전체 환자에서 최대 요속 중위값은 5.4 ml/sec였고 최대 요속을 이용한 flow index 중위값은 0.28이었다. 최대 요속은 group I과 group II에서 통계적으로 차이를 보이지 않았으며(4.6 vs. 5.5, p=0.053), flow index 역시 군간의 차이를 보이지 않았다(0.24 vs. 0.28, p=0.19). 세 군간의 비교에서는 유일하게 group III가 group I에 비하여 최대 요속(4.6 vs. 7.9, p=0.036)과 flow index가 높았다(0.24 vs. 0.41, p=0.045).

결론: Primary TIP 시 카테터로 6 Fr를 사용한 환자와 7.5 Fr를 사용한 환자에서 장기 추적 시 요속 검사 결과에서 최대 요속에 차이는 없었으며, 9 Fr 사용 시에는 6Fr와 비교하여 우위를 확인할 수 있었다.

Keywords: Hypospadias, TIP

<table>
<thead>
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<th>Table 1. Uroflowmetry findings after TIP</th>
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<tr>
<td>N</td>
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<td>Age (month) at measuring last UF</td>
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<td>Followup months</td>
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<td>Qmax (ml/s)</td>
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<td>PVR (ml)</td>
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<td>Qmax flow index</td>
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* p Value = 0.036
** p Value = 0.045
방광 요관 역류가 동반된 신우 요관 협착: 치료 순서 결정 인자와 치료 경과 분석

한재현, 이상민, 이종필, 안동현, 김회우, 송상훈, 김건석
울산대학교 서울아산병원 비뇨기과학실

목적: 심한 방광 요관 역류(VUR)에서 신우 요관 이행부 폐색이 동반이 의심되는 경우 어느쪽을 먼저 치료할 것인가를 결정하는 것이 쉽지 않다. 본원에서 중등도 이상의 VUR 및 UPJO가 동반된 경우의 치료 순서 결정 및 경과에 대해서 분석하여 보고자 한다.

대상 및 방법: 본원에서 2007년 1월부터 2017년 5월까지 20세 미만의 환아중 UPJO를 진단받은 환자를 대상으로 본원의 환자 연구 시스템인 ABLE (Asan Biomedical Research Environment)를 이용하여 분석하였다. 이중 VUR 3등급 이상의 중등도 및 이상 신장 스팟(diuretic MAG3 renal scan)로 의미 있는 UPJO를 진단받은 환아 7명을 대상으로 의무기록을 분석하였다.

결과: 배뇨 방광 요도 조영술로 요관 역류(3등급 이상) 및 배설성 신주사 검사(diuretic MAG3 renal scan)에서 동측의 UPJO를 보이는 환아는 총 7명으로 평균나이는 4세(1세-8세)로 6명이 남아있다. 모든 환아가 산전 수신증을 진단받았다. 대상환자는 평균 VUR 4등급(3등급-5등급)을 보였고 3등급의 환자에서 양측성 VUR이 확인되었다. 시행한 배설성 신주사 검사에서 환아의 평균 환측 상대신기능은 중위값 47.4% (24.2-48.2%)이며 신주사 배설 반감기는 모두 20분 이상이었다. 환아들의 치료는 첫째로 신우 성형술을 먼저 시행한 후 요관 방광 문합술을 시행한 환아가 3명이었으며 수술 후 시행한 배설성 신주사 검사에서 배설 반감기는 2명에서 8분, 2.5분으로 향상되었다. 상대신기능은 40.6%에서 40.3%로 큰 차이가 없었다. 심한 VUR은 모든 환자에서 호전되었다. 신우 성형술을 먼저 시행한 후 경과 관찰중인 3명의 환아는 VUR 3등급(2명), 4등급(1명)이었고 배설성신주사 검사에서 20분이상의 신 주사 반감기를 보였다. 1명의 환아에서 신우성형술 시행시 VUR 3등급의 환측 요관부에 디플럭스 주사를 시행하였다. 양측성 환아를 제외한 2명의 환아에서 상대신기능은 47.6%이었으며 수술 후 49.5%로 호전을 보였다. 둘째, 방광요관 문합술을 먼저 시행한 환아는 1명으로 5등급의 심한 방광요관역류 및 24%의 낮은 상대신기능을 보이는 신우요관폐색으로 수술후 방광요관역류는 4등급으로 호전되었고, 수술 후 배설성 신주사검사에서도 반감기 14분, 상대신기능도 26.2%로 호전을 보였다.

결론: 중등도 이상의 VUR에 심하지 않은 UPJO가 동반된 경우 요관 방광 문합술만 시행해도 폐색을 해결할 수 있으나 폐색이 심할 때는 신우성형술을 시행한 후 요관 방광 문합술을 시행하는 것이 필요하다.

Keywords: Vesicoureteral reflux, UPJ obstruction, Pyeloplasty, Ureteroneocystostomy
NP-117

중복 신장에서의 동시 요관 재이식: 단일 기관 경험이

신정현, 안동현, 이상민, 이종필, 김휘우, 송상훈, 김건석
울산대학교 서울아산병원, 울산대학교 의과대학 비뇨기과학실

Objectives: We aimed to investigate the clinical outcomes of patients who received common sheath reimplantation for duplicated kidney.

Materials and Methods: We retrospectively reviewed the medical records of patients who underwent common sheath reimplantation (CSR) for duplicated kidney from 2001 to 2016. We analyzed baseline characteristics and surgical outcomes of patients including postoperative urinary tract infection (UTI), dysfunctional voiding and persistent vesicoureteral reflux (VUR).

Results: Total number of 37 patients was finally included. Mean age was 55.6 months with mean follow-up of 43.2 months. Duplication (either complete or incomplete) laterality was 29.7% right, 40.6% left and 29.7% bilateral. Mean episodes of febrile UTI before surgery was 1.8 times. Twenty-four patients (64.9%) were on prophylactic antibiotics but breakthrough UTI occurred in 41.7%. Combined anomalies were 13 ureteroceles (35.1%) and 8 ectopic ureters (21.6%). Dilating VUR was found in 27 patients (81.8%). Ten patients (76.9%) had previous TUI for ureterocele and 2 patients underwent previous endoscopic injection. Hydronephrosis improved in 29 patients (78.4%) after CSR. Mean preoperative difference of renal function between affected kidney and contralateral kidney was -13.27±27.94% and mean postoperative renal function difference was -10.12±36.09%. Postoperative UTI occurred in four patients (10.8%) and percentage of prophylactic antibiotics was significantly higher (p=0.022) than in none UTI patients. Previous endoscopic surgery showed tendency to associated with postoperative UTI (p=0.054). Three patients (8.1%) had voiding dysfunction (overactive bladder: 1, detrusor underactivity: 1, urinary incontinence: 1) and they tended to have comorbidity than normal voiding group (p=0.050). Among the 24 patients with postoperative VCUG, persistent VUR was observed in two patients. However, both of them had no evidence of UTI and had improvement in hydronephrosis postoperatively.

Conclusion: CSR showed low incidence of postoperative UTI and voiding dysfunction. In addition, patients had no significant deterioration in renal function and aggravation of hydronephrosis, CSR might be a good solution for duplicated kidney even after endoscopic ureterocele puncture.

Keywords: Duplicated kidney, Common sheath reimplantation, Febrile UTI
방광요관역류 환아에서 로봇보조 방광근 외봉수술법의 초기 경험이
송상훈, 김휘우, 이종필, 이상민, 안동현, 김건석
울산대학교 의과대학 비뇨기과학과

목적: 방광요관역류 환아에서 다양한 최소침습수술방법이 폭넓게 적용되고 있으나 아직까지 국내에서 로봇을 이용한 방광근 외봉수술법의 치료 경험이 알려진 바 없어 본 연구에서 이를 보고하고자 한다.

대상 및 방법: 2013년 8월부터 2017년 5월까지 본원에서 경복막 로봇보조 방광근 외봉수술법을 시행받은 20세 이하 환자 15명(24 요관단위)의 의무기록을 후향적으로 분석하였다. 배꼽 상부에 8 mm 또는 8.5 mm 카메라용 투관침을 삽입하여 기복을 형성한 후 2개의 5 mm 또는 8 mm 로봇 투관침을 양측 하복부에 삽입하였다. Modified Lich-Gregoir 방식으로 방광근 외봉수술법을 시행하였고 수술시간, 진통제 사용기간, 입원기간, 술 후 조기 합병증, 술 후 배뇨기능, 신장기능, 수신증 발생 여부 등의 수술결과를 조사하였다.

결과: 대상자 중 여아가 9명(60%), 양측성 역류가 9명(60%), 일측성 역류가 좌우측 각각 3명(20%)씩이었고 수술 시 중위 연령은 50개월(3~240)이었다. 수술 전 예방적 항생제 복용은 6명(40%), BBD는 2명(13.3%), 과거 항역류 내시경 수술 경험이 2명(13.3%), 수술 전 신반흔은 11명(73.3%)에서 확인되었다. 24개의 신단위 중 역류단위는 각각 5등급 5단위(20.8%), 4등급 12단위(50.0%), 3등급 3단위(12.5%), 2등급 4단위(16.7%)였다. 대상자 중 4명은 daVinci Xi 시스템을 이용하여 수술하였고 11명을 Si 시스템을 이용하였으며 3명은 5 mm 로봇투과침을 사용하였고 초기 2명을 제외한 모든 환자(86.7%)에서 하복부 로봇투과침을 서혜부에 설치하고 보조토과침 삽입을 시행하지 않아 미용적 효과를 최대화하였다. 전체 수술 시간은 평균 198.4±68.3분, 로봇 사용 수술시간은 평균 131.6±47.5분이었다. 모든 환자에서 술 후 1일부터 통증점수는 2 점 이하로 낮았고 발열은 없으며 술 후 2일부터 진통제 투여이 필요하지 않았다. 양측성 역류 환자는 술 후 2일까지 도뇨 관을 제거한 후 전방에서 자가배뇨가 가능하여 퇴원하였으며, 평균 퇴원일은 술 후 2.2일이었다. 평균 8,2개월간 추적한 결과 최장 관찰 기간 동안 6명의 환아에서 배뇨중 방광요도조영술은 드물게 관찰되었고 1명의 환아에서 2등급(술 전 4등급)의 역류가 관찰되었으며 1명(6.6%)의 환아에서 술 후 염증으로 감염이 발생하였다. 술 후 1개월에 시행한 신장초음파 검사에서 1등급 수신증이 4단위(16.7%), 2등급 수신증이 5단위(20.8%)에서 관찰되었으나 술 후 3,6개월 추적검사를 시행한 7단위(77.7%)에서 모두 수신증이 소실되었다.

결론: 소아에서 로봇을 이용한 방광근 외봉수술법은 양측성 역류 환자에서도 배뇨장에 발생 없이 방광요관역류의 교정이 가능한 효과적인 안전한 최소침습적인 수술 방법이다. 그러나, 현재까지 추적관찰 기간이 짧고 수술례가 많지 않으므로 장기 수술성공률과 비용 대비 효과 측면에 대한 후속 연구가 필요하다.

Keywords: Vesioureteral reflux, Reimplantation, Robotic surgical procedures
Pathologic analysis of the testicular remnant associated with the nonpalpable testes in children

정재민, 이승수, 이동훈, 한지연, 남종길, 박성우, 정문기, 이상돈
부산대학교 의과대학 비뇨기과학회

Purposes: There is controversy using laparoscopy of the testicular remnant associated with the nonpalpable testis. To better understand the pathology associated with the testicular nubbin, we reviewed our experience regarding the pathologic analysis of the testicular remnant.

Materials and Methods: A retrospective review was performed of all consecutive patients undergoing exploration for a nonpalpable testis at our hospital between 2009 and 2017. Patients who were found no testis in all radiologic study were included in this analysis. Patients who have performed orchiectomy due to intraabdominal testis were excluded in this analysis.

Results: Forty eight patients underwent removal of the testicular remnant. Patient age ranged from 7 to 120 months. In 40 patients (83.3%) had left side testicular remnant. In 14 of the specimens (29.2%), we identified testicular tissues. In an additional 6 patients (12.5%), we identified seminiferous tubules. In 42 of the specimens (87.5%), we identified any kinds of paratesticular structures like as 19 epididymis, 20 spermatic cord, and 13 vas deference. However, in 6 of the specimens (12.5%), we could not find any testicular tissues or paratesticular structures.

Conclusions: In our review, we identified that a more than 10% of testicular remnants have only fibrous tissue no testicular and paratesticular structure. In this situation, diagnostic laparoscopy should be considered as the procedure of choice to confirm or exclude the presence of a paratesticular structure.

Keywords: Testis, Nubbin, Pathology, Child
NP-120

**Association between lipid profiles and CKD in Kidney donors**

조신제, 성재우, 양종협, 문형우, 강성만, 이규원, 정현철, 최세웅, 배웅진, 조혁진

가톨릭대학교 서울성모병원

**Objects**: To evaluate the relationship between serum lipid profiles and residual renal function in live kidney donors 1 year post donation.

**Methods**: The patients evaluated between March 2010 to May 2016 that had living donor nephrectomy were retrospectively reviewed. 245 donors were studied, lipid parameters, systolic/diastolic blood pressure, kidney function(DTPA) were measured at baseline and 1 year. And the relationship between postoperative renal function and lipid profiles was analyzed. Recursive partitioning was applied to identify optimal cut-off values for each parameters.

**Results**: Preoperative mean serum total cholesterol, triglyceride, LDL and HDL levels were 193.1±34.1 mg/dL, 120.4±92.6 mg/dL, 115.5±31.3 mg/dL, 54.2±21.0 mg/dl, respectively. And preoperative glomerular filtration decreased from 110.8±18.2 ml/min to 70.8±14.4 ml/min. The GFR at 1 year follow-up was associated with age, preop GFR, total cholesterol and LDL. Roots node of preop GFR, age, total cholesterol in recursive partitioning was 97.7 ml/min, 50 years old, 214 mg/dL, respectively. On logistic regression analysis, preoperative total cholesterol(OR 1.03, 95% CI 1.01-1.07, p=0.036), age (OR 1.09, 95% CI 1.05-1.13, p<0.001), preop GFR (OR 0.87, 95% CI 0.81-0.92, p<0.001) were predictors of development of CKD (GFR<60 ml/min).

**Conclusions**: Age (>50 years), preop GFR (<97.7 ml/min), cholesterol (>214 mg/dl) is a prognostic factor in predicting CKD in kidney donors.

**Keywords**: Donor nephrectmy, Lipid profiles

<table>
<thead>
<tr>
<th>Characteristics of baseline and 1 year post donor nephrectomy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Characteristics</strong></td>
</tr>
<tr>
<td>Age</td>
</tr>
<tr>
<td>Male gender(n)%</td>
</tr>
<tr>
<td>BMI(Kg/m2)</td>
</tr>
<tr>
<td>Pre/post op GFR (mL/min)</td>
</tr>
<tr>
<td>Systolic Blood Pressure (mmHg)</td>
</tr>
<tr>
<td>Diastolic Blood Pressure (mmHg)</td>
</tr>
<tr>
<td>Total cholesterol (mg/dL)</td>
</tr>
<tr>
<td>Triglycerides (mg/dL)</td>
</tr>
<tr>
<td>HDL (mg/dL)</td>
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<tr>
<td>LDL (mg/dL)</td>
</tr>
</tbody>
</table>
증상의 발현으로 진단된 성인의 신우요관이행부협착에서 신우성형술 후 이뇨성신주사의 필요성

강준구, 하현, 이유진, 정재욱, 하윤석, 최석환, 김범수, 김현태, 유은상, 권태균, 정성광, 이준녕
경북대학교 의과대학 비뇨기과학교실

목적: 성인에서 신우요관이행부협착은 대부분 증상의 발현을 통해 진단되고 증상의 관해를 위해 수술적 치료인 신우성형술이 시행된다. 이뇨성신주사는 소아의 신우요관이행부협착에서 수술의 필요성을 확인하고 신우성형술 후 신기능과 폐색의 정도를 향후에 사용된다. 하지만, 증상으로 발견된 성인의 신우요관이행부협착에서 술 후 이뇨성신주사의 통상적 시행에는 의견이 있다. 본 연구는 성인기에 증상의 발현으로 진단된 신우요관이행부협착에서 신우성형술 후 증상지속여부에 따른 이뇨성신주사의 필요성에 대해 알아보았다.

대상 및 방법: 2006년 1월부터 2016년 1월까지 증상의 발현으로 내원하여 신우요관이행부협착으로 진단받고 신우성형술을 시행받은 18세 이상의 환자를 대상으로 하였다. 양측성 병변, 대측신장의 이상, 그리고 추적관찰이 12개월 미만이거나 술 후 이뇨성신주사를 시행하지 않은 경우는 분석에서 제외하였다. 이들을 대상으로 술 후 3개월의 증상지속여부에 따른 이뇨성신주사의 필요성을 후향적으로 분석하였다.

결과: 총 45례의 환자가 연구에 포함되었고 신우성형술 당시 평균 나이는 39.0세였으며 추적관찰기간은 44.2개월이었다. 술 후 3개월에 증상이 소실된 경우는 40례였고, 이들 중 추적검사에서 술 후 수신증의 악화 혹은 분리신기능의 감소가 관찰된 경우는 없었다. 증상이 소실된 환자 중 4례는 술 후 이뇨성신주사에서 폐색성 배설양상이 관찰되었으나 이후 시행한 추적검사에서 신기능의 악화없이 배설양상의 호전이 확인되었다. 증상이 소실되지 않은 5례 중 4례는 경한 통증이 간헐적으로 지속되었으나 수신증의 호전 및 신기능의 유지로 둔성요법으로 경과관찰 중이고, 나머지 4례는 각각 증상의 지속으로 내시경적 요관확장술(2례), 신기능 감소로 신우성형술의 재시행(1례), 그리고 무기능신으로 신절제술(1례) 등의 추가적인 중재술이 필요하였다.

결론: 증상의 발현으로 진단된 성인의 신우요관이행부협착에서 술 후 증상이 소실된 환자는 양호한 임상경과를 나타내서 통상적으로 시행되는 이뇨성신주사를 필요하지 않을 것으로 생각한다. 또한, 술 후 증상이 지속되는 환자에서는 추가적인 중재술의 필요성이 높아 조기에 술 후 평가를 시행하여야 할 것으로 생각한다.

Keywords: Pyeloplasty, Renogram, UPJO
경직장 초음파 유도하 전립선 생검 후 발생한 대량 직장 출혈의 치료 사례

서원익1, 황진원2, 김완석1, 윤장호1, 민권식1, 정재일1
인제대학교 부산백병원 1비뇨기과학회, 2소화기과학회

목적: 경직장 초음파 유도하 전립선 생검 후 발생하는 직장 출혈은 자연 지혈되거나 경미한 경우가 대부분이다. 그러나 대량의 출혈이 발생하는 경우 환자의 생명에 위협을 줄 수 있다. 본 연구는 전립선 생검 후 대량의 직장 출혈이 발생하여 내시경적 치료를 성공적으로 시행한 사례를 보고하고자 한다.

대상 및 방법: 2011년부터 2016년까지 경직장 초음파 유도하 전립선 생검을 시행한 1030명의 대상자 중 직장 출혈로 내시경적 치료를 시행한 9례를 후향적으로 분석하였다. 전립선 생검은 환자를 측위자세로 하여 탐촉자를 경직장으로 삽입해 횡단면 기준으로 18-gauge 침을 장착한 생검총(TSK Laboratory, Japan)을 이용하였다. 모든 대상자는 구강용 항생제를 예방적으로 복용하였으며 항혈소판제, 항혈전제는 시술 5-7일전 중단하였다.

결과: 총 9명의 환자 중 3명의 환자는 생검 후 출혈과 함께 수축기 혈압이 90 mmHg 이하로 측정되었으며 6명의 환자는 시술 후 1시간 이상 손가락을 이용한 압박에도 지속적인 출혈로 3회 이상의 혈변이 있었다. 응급 대장 내시경은 소화기 내과 전문의에 의해 시행되었으며 응급한 환자들은 적층방의 정방부 접근을 위해 가동성이 좋은 위내시경 기구를 사용하였다. 1례에서 동맥출혈, 8례에서 지속적인 정맥출혈이 발견되었다.내시경 클립 결찰을 이용하여 지혈하였고 동맥 출혈이 확인된 1례는 점막하 Histoacryl 주입을 추가로 하였다. 평균 혈색소 감소는 4 g/dl였으며 평균 재원일수는 5.1일이었다. 4례에서 전립선암이 진단되어 3례에서 수혈을 시행하였으며 모든 환자가 내시경 지혈술 후 합병증 없이 퇴원하였다.

결론: 경직장 초음파 유도하 전립선 생검 후 발생할 수 있는 대량 직장 출혈은 소화기 전문의와의 협진을 통해 응급 대장 내시경으로 성공적인 치료가 가능하였다. 특히 위내시경 기구를 이용하여 접근이 어려운 직장내 생검부위 결찰이 효과적이었다.

Keywords: Needle biopsy, Bleeding, Colonoscopy
Factors influencing rate of testicular salvage in acute testicular torsion

오주용, 오정훈, 손수민, 류지원, 박태주, 김태희, 오성중, 김종범, 조양현, 김명수, 정호석, 황의창, 오경진, 김선옥, 정승일, 강택원, 권동득, 박광성
전남대학교 의과대학 비뇨기과학교실

Purpose: To determine the factors influencing rate of testicular salvage in acute testicular torsion.

Materials and Methods: Data was collected prospectively from a consecutive case series of patients who had scrotal exploration for acute testicular pain suspicious of testicular torsion from the January 2011 to December 2016. The main outcome measures were age, duration of symptoms prior to presentation, transfer status, time to surgical exploration, relationship between patient age and orchiectomy rate and the association between testicular torsion and cold weather.

Results: Data for 111 patients out of 120 was available for analysis. The median age of the patients was 15 (0-29) years. Testicular salvage was possible in 45.9% of patients. 48.6% of patients included in the study were transferred from another facility. Inter-hospital transfer did not affect testicular salvage rate. Time to surgery and duration of pain were higher among patients who underwent orchiectomy versus orchiopexy. Patient with primary visit, a short time to surgery, short hospital visits after pain were more likely to undergo orchiopexy than orchiectomy. On multivariate analysis, Patient with primary visit, a short time to surgery, short hospital visits after pain were associated with testicular salvage.

Conclusions: Data suggest that torsion is a time dependent event and factors that delay time to treatment lead to poorer outcomes. A number of studies, including these factors, may be needed.

Keywords: Orchiopexy, Orchiectomy, Torsion

Table 2. Patient characteristics, univariate analysis comparing testicular salvage

<table>
<thead>
<tr>
<th>Variables</th>
<th>Orchiectomy</th>
<th>Orchiopexy</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median age (IQR), years.</td>
<td>45 (13-17)</td>
<td>45 (12-18)</td>
<td>0.308</td>
</tr>
<tr>
<td>Age group</td>
<td></td>
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<tr>
<td>&lt;8 years (n=18)</td>
<td>6 (33.3%)</td>
<td>12 (66.7%)</td>
<td>0.004</td>
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<tr>
<td>8-8 years (n=93)</td>
<td>54 (58.1%)</td>
<td>19 (41.9%)</td>
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<tr>
<td>Side</td>
<td></td>
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<td>0.574</td>
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<tr>
<td>Left (n=72)</td>
<td>39 (54.2%)</td>
<td>33 (45.8%)</td>
<td></td>
</tr>
<tr>
<td>Right (n=39)</td>
<td>21 (53.8%)</td>
<td>18 (46.2%)</td>
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</tr>
<tr>
<td>Admission</td>
<td></td>
<td></td>
<td>&lt;0.001</td>
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<tr>
<td>Primary (n=57)</td>
<td>21 (36.8%)</td>
<td>35 (63.2%)</td>
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<tr>
<td>Transfer (n=54)</td>
<td>30 (72.2%)</td>
<td>15 (27.8%)</td>
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<tr>
<td>Median time to operating room (IQR), minutes</td>
<td>225 (180-300)</td>
<td>180 (120-240)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Median duration of pain prior to operating room (IQR), hours</td>
<td>72 (21-102)</td>
<td>9 (6-20)</td>
<td>&lt;0.001</td>
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<tr>
<td>Duration of pain</td>
<td></td>
<td></td>
<td>&lt;0.001</td>
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<tr>
<td>&lt;6 hours (n=39)</td>
<td>3 (7.7%)</td>
<td>36 (92.3%)</td>
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<tr>
<td>≥6 hours (n=72)</td>
<td>57 (79.2%)</td>
<td>15 (20.8%)</td>
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<th>p-value</th>
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<td>1.00 (0.99-1.03)</td>
<td>0.22</td>
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<tr>
<td>Time to operating room</td>
<td>0.91 (0.89-0.94)</td>
<td>&lt;0.001</td>
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<tr>
<td>Duration of pain</td>
<td>0.84 (0.77-0.93)</td>
<td>&lt;0.001</td>
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2017 Annual Meeting of
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발행인	천 준

발행처	대한비뇨기과학회
서울특별시 용산구 서빙고로 67 103동 1102호
(용산동5가, 용산파크타워오피스텔)
Tel: 02-573-8190, Fax: 02-573-8192
E-mail: urology@urology.or.kr
Homepage: www.urology.or.kr

편집제작	(주)더 위드인
서울특별시 마포구 만리재로 93
(공덕동 108-1) 비퍼스B/D 2F
Tel: 02-6959-5333, Fax: 070-8677-6333
E-mail: with@thewithin.co.kr