비뇨기계 영상검사

박병관

성균관의대 삼성서울병원 영상의학과
Content

- Radiographic studies
- Ultrasonography (US)
- Computed Tomography (CT)
- Magnetic resonance imaging (MRI)
- Thermal ablations (RFA & CA)
Radiographic studies
KUB

- Kidney, Ureter, Bladder
- Unenhanced CT

**Indication**
- Stone
- Post-catheterization
- Following CECT

- Stone
  - Calcium
  - Number, size, location
Cystography

- Urethra catheterization
- Indication
  - Bladder injury
  - Leakage
  - Fistula
- Bladder capacity
Voiding cystourethrography

- VCUG
- Posterior urethra
- Indication
  - Vesicoureteral reflux
  - Bladder capacity
  - Residual volume
  - Urethra diverticulum
VUR grade

Grade I

Grade II

Grade III

Grade IV

Grade V
Grade III VUR

60YM
Neurogenic bladder

71YF
Retrograde urethrography

- RUG
- Anterior urethra
- Indication
  - Urethral stricture
  - Urethral injury
  - Urethral tumor
- Urethral stricture
- RUG + VCUG
Antegrade pyelography

- AGP
- Ureter
- Percutaneous nephrostomy

Indication
- Tumor
- Stricture
- Injury
- Obstruction
Retrograde pyelography

- RGP
- Intraoperative study
- Ureter obstruction
- Indication
  - Urothelial tumor
  - Before catheterization
- Ureter cancer
  - Goblet sign
  - Coiling sign
Ultrasonography
Kidney US

- Kidney size, echo, perfusion, and tumor
- RCC
  - Hyperechoic tumor
  - Intratumoral cyst
  - Peritumoral halo
  - Vein thrombosis
- AML
  - More hyperechoic
  - Posterior shadowing
Transrectal ultrasound

- TRUS
- Prostate, seminal vesicle
- Role
  - Not cancer screening
  - Prostate volume
  - Guiding biopsy
- Prostate volume
  - 가로 x 세로 x 높이 x 0.523
Prostate cancer: TRUS

- Gray-scale features
  - Hypoechoic lesion in the PZ
  - 60% cancer: hypoechoic lesions
  - 40% cancer: iso or hyperechoic

- Cancer mimickers
  - BPH nodule
  - Inflammation
  - Infarction
Transition cancer
Acute prostatitis
Testis and scrotum US

- Testis and epididymis
  - Size and echogenicity
  - Vascularity
- Testis torsion
  - No vascularity
  - Swelling or not
  - Normal or hypoechoic
- Acute epididymits
  - Swelling & hypervascular
  - Hypoechoic
Epididymo-orchitis
Varicocele
Varicocele

Rest

Stress
Seminoma
Computed tomography (CT)
Kidney CT

- Solid tumor
  - More than 20HU
- AML vs RCC
  - Fatty tissue (+/-)
  - Less than -30HU
- Cystic RCC
  - Bosniak III or IV cyst
Angiomyolipoma (AML)
RCC with vein thrombosis
Bosniak classification

- **Category I** Simple cyst
- **Category II** Category I + septa + Ca\(^{2+}\)
- **Category IIF** Category II + ↑ wall/septa/ Ca\(^{2+}\)
- **Category III** Grossly thickened & irregular
- **Category IV** Category III + solid mass

Benign

RCC
Cystic RCC
Pseudoaneurysm
CT urography

- Unenhanced CT
- Two post-contrast CT
  - 60 sec CT
  - 7-12 min CT
- Saline infusion
- Furosemide
- Hematuria
- Urothelial cancer, RCC, stone, anomaly
CT angiography

- Vascular evaluation of kidney donor
- Renal artery and vein
  - Number
  - Course
  - Size
  - Branches
- Stone, tumor, obstruction, extrarenal diseases
Bladder cancer
Pelvocalyx cancer
Magnetic resonance imaging (MRI)
Kidney MRI

- Indeterminate on CT
- AML vs RCC
  - Chemical shift (+/-)
  - Fat suppression (+/-)
- Vein thrombosis
- Tumor invasion
AML
Prostate MRI

- Biopsy-proven cases
- Preoperative staging
- Extra-capsular extension
- Seminal vesicle invasion
- Functional MRI
## PI-RADSv2.1: Assessment categories

<table>
<thead>
<tr>
<th>PI-RADS</th>
<th>Assessment categories</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Very low (clinically significant cancer is highly unlikely to be present)</td>
</tr>
<tr>
<td>2</td>
<td>Low (clinically significant cancer is unlikely to be present)</td>
</tr>
<tr>
<td>3</td>
<td>Intermediate (the presence of clinically significant cancer is equivocal)</td>
</tr>
<tr>
<td>4</td>
<td>High (clinically significant cancer is likely to be present)</td>
</tr>
<tr>
<td>5</td>
<td>Very high (clinically significant cancer is highly likely to be present)</td>
</tr>
</tbody>
</table>

*Biopsy*
PI-RADS 4 PZ
Thermal ablations:

1. Radiofrequency ablation (RFA)
2. Cryoablation (CA)
3. Microwave ablation (MWA)
RFA of RCC

- Poor general conditions
- CT-guided RFA
  - Radiofrequency
  - Electrode
- Good outcome
- Hereditary RCC
RFA of VHL

Before RFA  After RFA
RFA of adrenal mass

30YM with VHL and recurrent pheochromocytomas
Cryoablation: freezing and thawing

Planning  Targeting  Monitoring  Post-survey
Conclusion

- Being familiar with basic imaging features helps you to be excellent throughout the resident training.
- Feel free to contact radiologists when you have any questions.