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KOREA UNIVERSITY MEDICINE

Prevention and management of Urethro-cavernous fistula after penile (implant) surgery

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Prevalence of urethral complication of PPI

- Annually 20,000 ~ 25,000 penile prostheses are placed in United States
- Urethral complication reported between 0.1% ~ 3% \approx 20~750 cases ¹
- 국내: approximately 2500 penile prostheses are placed annually
- Prevalence of urethral complication in Korea is unknown

Preceding clinical scenario resulted in urethral complication

- Urethral injury
- Others situations associated with erosion/extrusion such as constant pressure in semi-rigid rod implants; in pts with spinal cord injury

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- **Urethral injury ; m/c**
- **Others situations associated with erosion/extrusion such as constant pressure in semi-rigid rod implants; in pts with spinal cord injury**

Penile Prosthesis Complications focusing urethral injuries :

Planning, Prevention, and Decision Making

Urethral injury associated surgical procedure

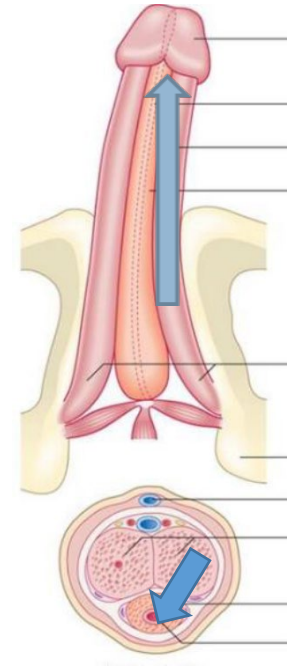
- Recent Survey on urologist experience with penile prosthesis implantation¹ :

During corporal dilation (71.1%) , m/c

Corporal dissection (12.5%)

Penile straightening maneuvers (7.0%)

- It can be caused by...²
 - Misdirection of the dilator : medially dilatation
 - Oversized cylinder
 - Inadequate protection of the glans
 - Whether vigorous modeling is performed



1. Sexton SJ, et al. J Sex Med 2018

2. Nickolas DS, et al. Sex Med Rev 2019

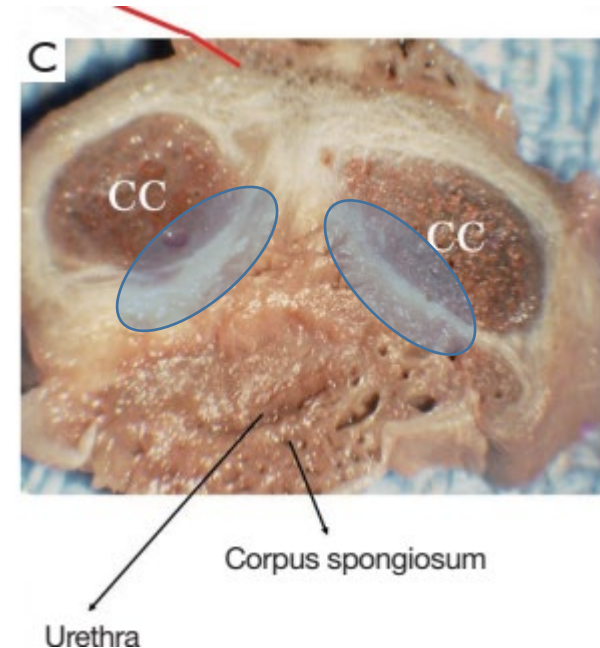
Consideration issues in each steps

- Pre-operative :
 - Anatomic considerations
 - Identifying high risk patients
- Intra-operative
 - Corporal fibrosis
 - Modeling for Peyronie's Disease
 - Management intraoperative urethral injuries
- Post-operative or delayed
 - Urethral catheterization
 - Management of a urethral erosion/extrusion

Anatomic consideration

- Tunica albuginea; inner circular and outer longitudinal layers
- Outer coat : **incomplete and absent** between the 5-o'clock and 7-o'clock
- Where each corpus cavernosum abuts the corpus spongiosum.

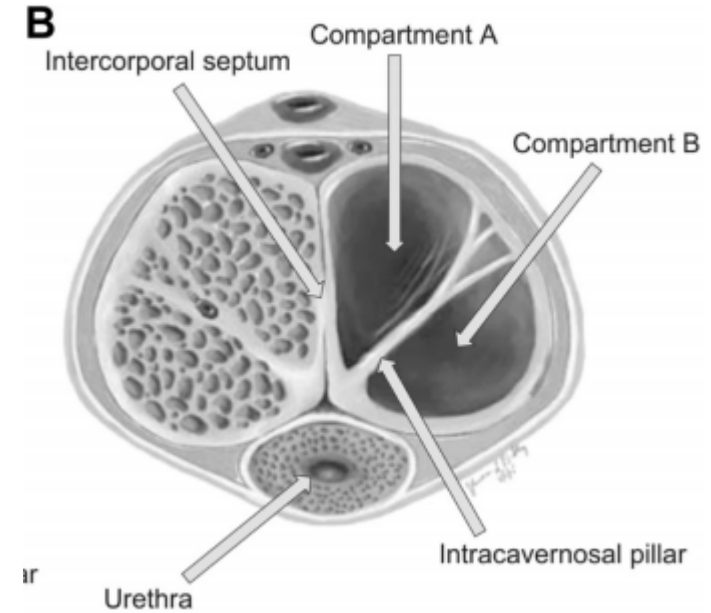
→ Dilator's tip pointed dorsolaterally.



Anatomic consideration

- Intracavernosal pillars
; divide the corpora cavernosum into dorsomedial “Compartment A” and ventrolateral “Compartment B” sections

→ Careful cavernosal dilation that is directed dorsally into “Compartment A”



Corporal fibrosis

- m/c cause of urethral perforation secondary to challenging corporal dilation
- **Fibrosis is more likely in patients with**
 - Removal d/t previous infection without immediate salvage.
 - Priapism
 - Penile fracture or trauma
 - Peyronie's disease
 - Use of intra-cavernosal injection (ICI)
 - Diabetes

Corporal fibrosis; How to reduce urethral injury

- When **resistance is encountered** during blunt corporal dilation, **additional overly aggressive bending** can cause a urethral perforation.
- Adjunct maneuvers with cavernotomes ; Uramix (Lansdowne, PA, USA) or Carrión-Rossello (Coloplast, Minneapolis, MN, USA)



Corporal fibrosis; How to reduce urethral injury

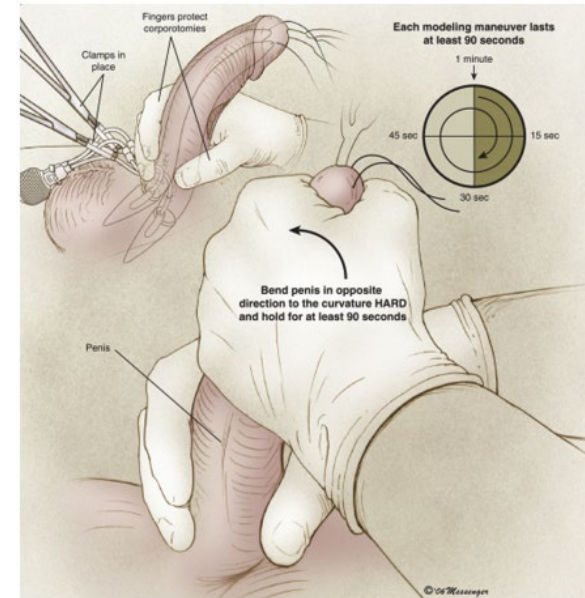
- **Metzenbaum or reverse-cutting scissors** : incise dense intracorporal plaques.
- Implanting a smaller diameter device
; **Coloplast Titan Narrow Base , AMS 700 CXR**



Initial blunt dilation and adjunct maneuvers fail
→ consider placement of a more **narrow inflatable implant**
rather than continuing with over-aggressive dilation

Modeling for Peyronie's Disease

- Often distal and are more likely to occur with oversized cylinders and distal calcified plaques.
- Considered $20^{\circ} \sim 30^{\circ}$ residual curvature to represent successful modeling
- Regular prosthesis use continue to straighten for more than a year.²



→ **Avoid overly aggressive bending**

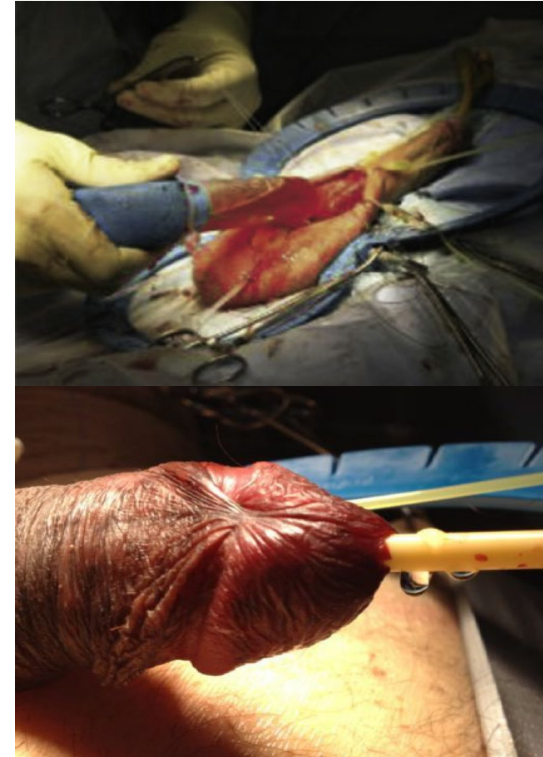
To place the bending hand **on the shaft of the penis, not the glans**¹

1. Wilson SK, et al. J Sex Med 2007
2. Wilson SK, et al. J Urol 2001

Management intraoperative urethral injuries

Diagnosing an intra-operative urethral injury

- Blood at the urethral meatus, a visible dilator or prosthesis cylinder
 - Suspicion may confirmed by
 - Flushing an antibiotic-laced saline through each corporotomy
 - If saline drains through the meatus around the catheter; confirmed



Management of distal urethral injury

- Commonly occur at the fossa navicularis
- Historically, **repair the defect and abort the implant procedure**
- Primary repair through an extended meatotomy



Sexual Medicine Society of North America, Inc.

- **On recent survey,**
 - 55% : abort the prosthesis placement
 - 18.3% : place a cylinder in the non-perforated corpora
 - 10.7% : continue implantation with bilateral insertion

Placing a cylinder? Against placing a cylinder?

If the injury occurs when the second corpus is dilated after placing cylinder in the contralateral corpora?

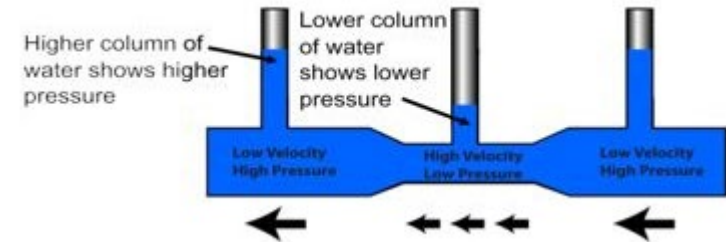
- Without leaving corporal cylinders or any other device component
- Most conservative post-injury option and standard of care
- Aborting the procedure without leaving cylinders may subject the patient to irreversible corporal fibrosis and penile shortening.
- Subsequent revision more challenging and prone to a second urethral injury.
- Placing a prosthetic cylinder in the non-injured side
- Pressure from cylinder while the catheter remained in place contributed to poor wound healing and eventual secondary contralateral fistula formation.
- suprapubic cystotomy : surprising for a patient undergoing elective penile prosthesis surgery

Injury of the urethra near the corporotomies

- Proximal urethral injury more commonly occur during corporal exposure from a penoscrotal incision
- Readily accessible and amenable to a 2-layer primary closure
- Like distal perforations, decision to proceed with prosthesis implantation is heterogeneous.
- Half of responders : abort device implantation
- 20.6% : Continue electing to place bilateral cylinders

Urethral catheterization after repair

- Long-term urethral catheterization lead to erosion of the penile prosthesis (Chronic intraurethral pressure and friction)¹
- A few days (7-10 days) of catheterization after urethral injury recommend²
- Bernoulli's principle: high speed of the urinary stream results in a decrease in the pressure from the site of injury
- Retrograde urethrograms vs Voiding cystourethrogram
(at greater-than-normal intraurethral pressures) vs (more physiologic)



Management of a urethral erosion/extrusion

- Unrecognized injuries can be subtle, particularly at the distal urethra
- Fistulous connection can form between the urethral lumen and the injured corpora – extrusion
- Glans hyperemia, burning with urination, an infection, or erosion of the implant



Management of a urethral erosion

- Prosthetic material is not exposed to the exterior
- Minimal inflammation
- Can be fixed by reseating the cylinder in a new cavity of spongy erectile tissue more dorsal or lateral



Management of a urethral extrusion

- A cylinder that has exposed into the urethra should be considered contaminated
 - Offending cylinder remove
 - Delayed device replacement is an option (6 to 8 weeks later.)
- If the erosion site can be closed
 - Malleable cylinder can be placed

Management of a urethral extrusion

- In case of malleable rod
 - Offending cylinder should be removed and the corporal space washed out
 - Contralateral component can remain: lack of tubing anatomically isolates from the contaminated cylinder
- If the urethral defect is small, patients elects for removal
 - Does not need to be primarily repaired

Conclusion

- Although acute and delayed urethral injuries are rare, their incidence is disastrous and burdensome for both patient and physician.
- Anatomical consideration of association between corpora, tunica albuginea, urethra should be kept in mind
- Corporal fibrosis and patients who receive modeling for Peyronie's disease are at increased risk for a urethral injury.
- Intraoperative distal urethral perforations are best managed by aborting the case to prevent urethral fistula.

Thank you for your attention !!

