Urethral Injuries: Realignment vs. Delayed Reconstruction

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Disclosures

• None
26 y/o male impaled by board while surfing
Urethra: Anterior vs. Posterior

- Posterior Urethra fixed at both urogenital diaphragm and puboprostatic ligaments, bulbomembranous junction vulnerable to injury.
- Straddle: compression of bulb with pubic bone
Urethra: Epidemiology/Etiology

Posterior vs. Anterior

• **Posterior**: PFUI occurs with multisystem trauma associated with MVC, falls or industrial accidents
  • Occurs in 10% of males and 6% of females with pelvic fracture

• **Anterior**: Straddle injury by motorcycle, bicycle, horse, surf board
Anterior Urethral Injury: Management

• Surgeons should perform prompt surgical repair in patients with uncomplicated penetrating trauma of the anterior urethra. *(Expert Opinion)*

• Clinicians should establish prompt urinary drainage in patients with straddle injury to the anterior urethra. *(Recommendation; Evidence Strength: Grade C)*

• Delayed stricture formation after straddle injury → EPA repair NOT DVIU
Posterior Stricture Etiology

- Iatrogenic
- Endoscopy
- Radiation
- Surgery

Trauma

“Pelvic fracture urethral injury”
aka PFUI
Presentation: Clinical Indicators of Injury

- Blood at meatus
- Inability to urinate
- Palpable bladder
- High-riding prostate
- Butterfly perineal hematoma
- PERFORM Retrograde Urethrogram before Foley attempt
Urethra: Imaging

• RUG Technique
  • If possible, position patient 45 degree oblique
  • Bottom leg flex 90 degree at knee, top leg straight
  • 12 fr foley with 1-2ml balloon or gauze
  • Gentle traction and 20-30 ml contrast
Site of Extravasation – Above and Below the Perineal Membrane

Presumed Incomplete Injury

Presumed Complete Injury
PFUI: Management

• Clinicians should establish prompt urinary drainage in patients with pelvic fracture associated urethral injury. (*Recommendation; Evidence Strength: Grade C*)

• Clinicians *may* perform primary realignment (PR) in hemodynamically stable patients with pelvic fracture associated urethral injury. (*Option; Evidence Strength: Grade C*)

• Clinicians should not perform prolonged attempts at endoscopic realignment in patients with pelvic fracture associated urethral injury. (*Clinical Principle*) ie. > 45 min
Bony anatomy
Bony anatomy
It’s not the fracture that matters, its disruption of the pelvic ring
## Reported Incidence of PFUI

<table>
<thead>
<tr>
<th>Study</th>
<th>Number of patients</th>
<th>Isolated urethral injury</th>
<th>Isolated bladder injury</th>
<th>Bladder and urethral injury</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wilkinson, 1961</td>
<td>224</td>
<td>140 (63)</td>
<td>70 (31)</td>
<td>14 (6)</td>
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<tr>
<td>Levine &amp; Crampton, 1963</td>
<td>127</td>
<td>68 (53)</td>
<td>41 (32)</td>
<td>18 (14)</td>
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<tr>
<td>Kaiser &amp; Franklin, 1965</td>
<td>22</td>
<td>10 (45)</td>
<td>10 (45)</td>
<td>2 (9)</td>
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<tr>
<td>Mitchell, 1968</td>
<td>54</td>
<td>31 (57)</td>
<td>17 (31)</td>
<td>6 (11)</td>
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<tr>
<td>Andrich et al, 2007</td>
<td>24</td>
<td>13 (54)</td>
<td>6 (25)</td>
<td>5 (21)</td>
</tr>
</tbody>
</table>
Primary Repair for PFUI

• Urgent indications
  – Bladder neck injuries - extravasation
  – Associated ano-rectal injuries
  – Perineal degloving injuries

• Early indications
  – Female patients
  – ‘Pie-in-the-sky’ bladder
Subsequent Developments

• Suprapubic catheter alone – minimalist approach
  – Mitchell 1968
  – Morehouse 1972

• Endoscopic primary realignment
  – Gelbard 1989
Endoscopic Primary Realignment
Comparative Studies on PFUI

8 published studies but…

- Few cases and no randomization of any sort
- Milder injuries get realignment; more serious injuries get SPT (and urethroplasty)
- Failed realignment get SPT and urethroplasty

(e.g. Mouraviev et al, 2005)
Endoscopic Primary Realignment

Against ePR

• Does not realign
• Results no better than open
• Makes straddle injuries worse
• Partial injuries will heal anyway
• Complete injuries will not heal anyway
• Makes matters worse

For ePR

• Stenosis rate is lower
  BUT……..
• Urethroplasty rate is lower
My preferred approach

- SPT
- Delayed urethroplasty 3-6 months after
Incision
The urethra is freed from the bulbocavernous muscle.
Urethral Mobilization
Transection at Site of Stricture
Distraction Epicenter

Crus

Crus
Excising the Scar

Cystoscopically assisted

Van Buren sound
Bridging the Distraction Defect
Gaining Length

1. Mobilize the distal urethra
2. Split the corpora
3. Inferior pubectomy
4. Corporal re-routing
Length gained from each maneuver:

1. Mobilize the distal urethra: 3 cm
2. Split the corpora: 4-5 cm
3. Inferior pubectomy: 1-2 cm
4. Corporal re-routing: 2 cm
Spatulating the Proximal Urethra

End-to-End Anastomosis
The 2nd Step - Separating the Crura 51%
The 3rd Step - Inferior Pubectomy 11%
The 4\textsuperscript{th} Step - Rerouting the Urethra \textbf{29\%}
# Frequency of Need of Ancillary Maneuvers

<table>
<thead>
<tr>
<th>Reference</th>
<th>Sample Size</th>
<th>Mobilization only</th>
<th>Corporal Splitting</th>
<th>Inferior Pubectomy</th>
<th>Corporal re-routing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Singh et al. Urology Annals. 2010. 2 (2): 53-57.</td>
<td>172</td>
<td>53%</td>
<td>31%</td>
<td>15%</td>
<td>1%</td>
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<tr>
<td>Indian cohort</td>
<td>81</td>
<td>9%</td>
<td>6%</td>
<td>81%</td>
<td>4%</td>
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<tr>
<td>Italian cohort</td>
<td>78</td>
<td>27%</td>
<td>41%</td>
<td>31%</td>
<td>1%</td>
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<tr>
<td>Flynn et al. J Urol. 2003. 179: 1877-1880.</td>
<td>122</td>
<td>8%</td>
<td>34%</td>
<td>12%</td>
<td>38%</td>
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<tr>
<td>Urethral Trauma</td>
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<td>19. Clinicians should perform retrograde urethrography in patients with blood at the urethral meatus after pelvic trauma. (Recommendation; Evidence Strength: Grade C)</td>
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<td>20. Clinicians should establish prompt urinary drainage in patients with pelvic fracture associated urethral injury. (Recommendation; Evidence Strength: Grade C)</td>
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<td>21. Surgeons may place suprapubic tubes (SPTs) in patients undergoing open reduction internal fixation (ORIF) for pelvic fracture. (Expert Opinion)</td>
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<td>22. Clinicians may perform primary realignment (PR) in hemodynamically stable patients with pelvic fracture associated urethral injury. (Option; Evidence Strength: Grade C) Clinicians should not perform prolonged attempts at endoscopic realignment in patients with pelvic fracture associated urethral injury. (Clinical Principle)</td>
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<td>23. Clinicians should monitor patients for complications (e.g., stricture formation, erectile dysfunction, incontinence) for at least one year following urethral injury. (Recommendation; Evidence Strength: Grade C)</td>
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Thank You
Questions?