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Bladder Neck Trauma: 14 Years of Experience Managing a Rare and Significant Injury at a Level 1 Trauma Center

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Introduction

- External trauma rarely results in injuries involving the bladder neck (AAST Grade 5 injuries)
  - Risk of functionally devastating consequences without early identification
- Early cystorrhaphy with bladder neck repair is standard of care
  - Goal to prevent long-term stress urinary incontinence
- Little is known regarding the clinical presentation, methods of surgical repair, and outcomes in patients suffering bladder neck injuries

Objective

> To describe the injury mechanisms, concomitant injuries, and surgical interventions utilized to manage bladder neck injuries at a single high-volume Level 1 trauma center serving a large and diverse catchment area

Methods

- Retrospective review of all patients evaluated and managed for a bladder neck injury at one academic referral center
  - April 2005 – April 2019
- Inclusion criteria
  - Bladder neck injury identified at surgical exploration
    - If surgical intervention not performed, injury identified on post-trauma imaging
  - Any age
  - Any duration of follow-up

Results: Patient Demographics and Associated Injuries

- 24 total cases
  - Median age 37 years (IQR 24 – 51), 3 cases age <18 years
  - 67% male, 80% blunt mechanism
  - Median Injury Severity Score 42 (IQR 37 – 50)
- Trauma mechanisms
  - 63% (15/24) road traffic accidents (7 MVC, 4 motorcycle collision, 4 pedestrian vs. auto)
  - 21% (5/24) gunshot wounds
  - 13% (3/24) crush injuries (bull, heavy machinery)
  - 4% (1/24) fall from height

Table 1a: Associated Injuries

	N (%) or Median (IQR)
Number of Patients	24
Mechanism	
Blunt	19 (79.2%)
Penetrating	5 (20.8%)
Injury Severity Score (ISS)	42 / 42
Obturator Ring Fracture	18 (75%)
Pubic Diastasis	16 (66.7%)
Measured Diastasis (cm)	2.9 / 3.3
Angioembolization for Pelvic Bleeding	8 (33.3%)
Associated Urinary Tract Injuries	
Bladder (separate additional laceration)	13 (54.2%)
Urethra	5 (20.8%)
Vaginal Injury	6 (75%)
Rectal Injury	4 (16.7%)

Table 1b: Bladder Injury and Management

	N (%) or Mean / Median
Number of Patients	24
Injury Location on Bladder Neck	
Anterior	14 (58.3%)
Posterior	2 (8.3%)
Multifocal	2 (8.3%)
Circumferential Avulsion	5 (20.8%)
Lateral	1 (4.2%)
Laceration Size (cm)	5.3 / 4.5
Surgical Approach	
Transabdominal Cystorrhaphy	19 (79.2%)
Transvaginal Cystorrhaphy	1 (4.2%)
Bladder Neck Closure	1 (4.2%)
Supravesical Urinary Diversion	2 (8.3%)
Repair Deferred	1 (4.2%)

Table 2: Outcomes

- Among 20 cases treated with primary cystorrhaphy:
  - 6 (30%) with urine leak on postoperative cystogram
    - 3 with confirmed healing by 25, 50, or 69 days postoperatively
    - 3 had insufficient follow-up
  - 14 without leak had negative cystogram at median 17 (IQR 14 – 23) days
  - 8 had documented follow-up symptom evaluation
    - 3 with de novo stress urinary incontinence after recovery from trauma
    - Unable to assess severity of incontinence from available records

Limitations

- Retrospective study, small series
- Trauma population with limited follow-up
  - Very limited available long-term functional evaluation
- Heterogeneous population requiring various unique repairs, limiting direct comparison of available outcomes

Conclusions

- Up to 1 in 5 bladder neck injuries may require alternative management (including supravesical urinary diversion)
  - May be due to extensive damage to the bladder or severe associated injuries
- Even with early cystorrhaphy, up to 30% have a urine leak requiring prolonged drainage
- There is a need for further study of long-term outcomes (including urinary incontinence) after bladder neck injury