Genitourinary Trauma in Sports Medicine

Special thanks to Stephen Shaheen
ATPC Dec 2016
Genitourinary Trauma in Sports Medicine

Objectives

- Review the epidemiology of genitourinary pathology in athletes
- Discuss additions to the literature with regard to these injuries
- Outline genitourinary trauma and emphasize its importance in sports medicine
- Elaborate on take-home points and areas for further research
Genitourinary Issues in Sports Medicine

Overview

- Hematuria and Proteinuria are the most common complaint
  - Between 10-90% of athletes, dependent on sport
- Renal trauma is rare
  - Contusions to laceration and rupture
  - Individual > team sports
    - Bicycle riding is the highest
- Acute renal failure, also rare
  - Typically multi-factorial
Sports-related Genitourinary Injuries Presenting to United States Emergency Departments

Herman S. Bagga, Patrick B. Fisher, Gregory E. Tasian, Sarah D. Blaschko, Charles E. McCulloch, Jack W. McAninch, and Benjamin N. Breyer
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- 2002-2010 - 137.5 thousand patients in US EDs
  - NEISS: approximately 100 hospitals, both pediatric and adult
- 34% of all GU injuries = sport
  - 1/3 = bicycling
    - 50% injuries from “top tube”
    - ...baseball/softball, football
- Type
  - Majority were penoscrotal
  - Female external genitalia around 20%
  - Kidney 10%
  - Bladder, urethral, ureteral <1%
- The GU system comprises a moderate percentage of ED visits for sport-related injuries

# Table 2

Most common sports-related genitourinary injuries presenting to US emergency departments between 2002 and 2010, stratified by age range

<table>
<thead>
<tr>
<th>Rank</th>
<th>Age, 2–3 Y</th>
<th>Age, 4–7 Y</th>
<th>Age, 8–11 Y</th>
<th>Age, 12–15 Y</th>
<th>Age, 16–18 Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bicycle</td>
<td>1345</td>
<td>Bicycle</td>
<td>12,596</td>
<td>Bicycle</td>
</tr>
<tr>
<td>2</td>
<td>Exercise equipment</td>
<td>285</td>
<td>6.6%</td>
<td>Exercise equipment</td>
<td>1805</td>
</tr>
<tr>
<td>3</td>
<td>Horseback riding</td>
<td>145</td>
<td>3.3%</td>
<td>Gymnastics</td>
<td>654</td>
</tr>
<tr>
<td>4</td>
<td>Gymnastics</td>
<td>83</td>
<td>1.9%</td>
<td>Soccer</td>
<td>494</td>
</tr>
<tr>
<td>5</td>
<td>Baseball</td>
<td>410</td>
<td>1.6%</td>
<td>Exercise equipment</td>
<td>920</td>
</tr>
<tr>
<td>6</td>
<td>Basketball</td>
<td>407</td>
<td>1.6%</td>
<td>Sport vehicles</td>
<td>487</td>
</tr>
</tbody>
</table>

Total (95% CI) 4332 (2750–5913) 25,507 (18,609–32,404) 24,996 (19,972–30,019) 20,261 (16,251–24,270) 12,632 (10,179–15,084)

<table>
<thead>
<tr>
<th>Rank</th>
<th>Age, 19–28 Y</th>
<th>Age, 29–45 Y</th>
<th>Age, 46–65 Y</th>
<th>Age, ≥66 Y</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bicycle</td>
<td>4478</td>
<td>21.2%</td>
<td>Bicycle</td>
<td>3701</td>
</tr>
<tr>
<td>2</td>
<td>Baseball</td>
<td>2660</td>
<td>12.6%</td>
<td>Baseball</td>
<td>2986</td>
</tr>
<tr>
<td>3</td>
<td>Sport vehicles</td>
<td>2265</td>
<td>10.7%</td>
<td>Sport vehicles</td>
<td>1952</td>
</tr>
<tr>
<td>4</td>
<td>Basketball</td>
<td>1867</td>
<td>8.8%</td>
<td>Exercise equipment</td>
<td>1086</td>
</tr>
<tr>
<td>5</td>
<td>Exercise equipment</td>
<td>1729</td>
<td>8.2%</td>
<td>Basketball</td>
<td>863</td>
</tr>
<tr>
<td>6</td>
<td>Football</td>
<td>1345</td>
<td>6.4%</td>
<td>Horseback riding</td>
<td>829</td>
</tr>
</tbody>
</table>

Total (95% CI) 21,162 (16,210–26,114) 14,526 (11,683–17,370) 6250 (3975–8525) 1049 (313–1785) 130,726 (103,184–158,269)

Abbreviations as in Table 1.

Numbers represent projected estimates during the study period. Percentages are the proportion of injuries within respective age groups.
4.4 million athlete-exposures from 1995 – 1997

- Only 18 kidney injuries
  - None catastrophic

- 1 in 1500 individuals born with unilateral renal agenesis

- AAP recommendations are currently “qualified yes” for contact sports

Kidney injuries are rare - so inform your patients and don’t discourage sport
### Table 1: Athlete Exposures and Organ-Specific Injuries by Gender and Sports

<table>
<thead>
<tr>
<th></th>
<th>Athlete-Exposures</th>
<th>Injuries</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All</td>
<td>Kidney</td>
</tr>
<tr>
<td><strong>Boys</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseball</td>
<td>311285</td>
<td>861</td>
</tr>
<tr>
<td>Basketball</td>
<td>444358</td>
<td>1553</td>
</tr>
<tr>
<td>Football</td>
<td>1300466</td>
<td>10557</td>
</tr>
<tr>
<td>Soccer</td>
<td>385443</td>
<td>1765</td>
</tr>
<tr>
<td>Wrestling</td>
<td>522608</td>
<td>2910</td>
</tr>
<tr>
<td>Total</td>
<td>2894150</td>
<td>18026</td>
</tr>
<tr>
<td><strong>Girls</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basketball</td>
<td>394143</td>
<td>1748</td>
</tr>
<tr>
<td>Field hockey</td>
<td>136073</td>
<td>510</td>
</tr>
<tr>
<td>Softball</td>
<td>258754</td>
<td>910</td>
</tr>
<tr>
<td>Soccer</td>
<td>335512</td>
<td>1771</td>
</tr>
<tr>
<td>Volleyball</td>
<td>358547</td>
<td>701</td>
</tr>
<tr>
<td>Total</td>
<td>1486029</td>
<td>5640</td>
</tr>
<tr>
<td>Combined Total</td>
<td>4450159</td>
<td>23686</td>
</tr>
</tbody>
</table>

*Explanation: Athlete needs individual assessment for contact, collision, and limited-contact sports.*

Qualified yes

Kidney, absence of one

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MEDICAL CONDITIONS AFFECTING SPORTS PARTICIPATION
Bicycle-related genitourinary injuries in the USA from 2002–2010

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²Department of Urology, University of California, San Francisco, San Francisco, California, USA
³Department of Epidemiology and Biostatistics, University of California, San Francisco, San Francisco, California, USA

- NEISS. 2002 – 2010. GU complaints from patients on bicycles
- Estimated 43 000 injuries per year (1600 observed)
- 448 per 100 000 annual incidence (children)
- Admissions: Adult > children
- Pad the top bar of your bike.

<table>
<thead>
<tr>
<th>Mechanism</th>
<th>National estimate</th>
<th>95% CI</th>
<th>Weighted proportion (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall from bicycle</td>
<td>7060</td>
<td>5378 to 8741</td>
<td>26</td>
</tr>
<tr>
<td>Direct contact with bike</td>
<td>19 456</td>
<td>15 791 to 23 121</td>
<td>72</td>
</tr>
<tr>
<td>Collision</td>
<td>5226</td>
<td>3646 to 6807</td>
<td>19</td>
</tr>
<tr>
<td>Associated bicycle part</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Top tube</td>
<td>6323</td>
<td>5699 to 8064</td>
<td>46</td>
</tr>
<tr>
<td>Handlebar</td>
<td>3435</td>
<td>2396 to 4475</td>
<td>25</td>
</tr>
<tr>
<td>Seat</td>
<td>3172</td>
<td>2211 to 4132</td>
<td>23</td>
</tr>
<tr>
<td>Wheel</td>
<td>359</td>
<td>97 to 621</td>
<td>3</td>
</tr>
<tr>
<td>GU organ injured</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male external genitalia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Penis</td>
<td>5903</td>
<td>5643 to 7163</td>
<td>18</td>
</tr>
<tr>
<td>Scrotum/foresicle</td>
<td>7511</td>
<td>5665 to 9757</td>
<td>23</td>
</tr>
<tr>
<td>Female external genitalia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urethra</td>
<td>11 477</td>
<td>8836 to 14 119</td>
<td>36</td>
</tr>
<tr>
<td>Kidney</td>
<td>281</td>
<td>53 to 509</td>
<td>1</td>
</tr>
<tr>
<td>Hospital admission</td>
<td>1100</td>
<td>593 to 1607</td>
<td>3</td>
</tr>
<tr>
<td>Adults</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanism</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fall from bike</td>
<td>2310</td>
<td>1472 to 3148</td>
<td>25</td>
</tr>
<tr>
<td>Direct contact with bike</td>
<td>6459</td>
<td>4070 to 8849</td>
<td>70</td>
</tr>
<tr>
<td>Collision</td>
<td>2315</td>
<td>1047 to 3583</td>
<td>25</td>
</tr>
<tr>
<td>Associated bicycle part</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Top tube</td>
<td>2489</td>
<td>1394 to 3583</td>
<td>47</td>
</tr>
<tr>
<td>Handlebar</td>
<td>871</td>
<td>240 to 1503</td>
<td>16</td>
</tr>
<tr>
<td>Seat</td>
<td>1806</td>
<td>605 to 3007</td>
<td>34</td>
</tr>
</tbody>
</table>
| Wheel                      | 15                | 0 to 44               | <0.1%                   

No specific guidelines or algorithm for groin pain, especially chronic

Intra versus extra articular causes
  - Intra: FAI, chondrolabral injuries, loose bodies
  - Extra: muscular, fracture, osteitis pubis, sports hemia, snapping, nerve entrapment

Diagnostic hip block?

Consider diagnostic hip block when faced with groin pain
Results:
- 50% losing some amount of urine
- ~50% slightly bothered or above by symptoms
- Unchanged by temperature when controlled

Limitations:
- Previous studies showed lower rates
- Limited by specific sports

- Elite athletes, especially female (an underreported group) can suffer from genitourinary symptoms - monitor for signs
Trauma

- Complaints: flank pain, hematuria
- Diagnostics:
  - Urinalysis
  - Imaging
    - CT for kidneys, bladder, female genitalia
    - Pyelogram, Cystogram for ureters and bladder
    - Ultrasound for scrotum/testes
- Disposition
- Return to play
Blunt kidney injury typically MVC and has multiple concomitant problems

2005 - 2014 in Utah, Texas, California

of all kidney injuries, 18% were sports related

ISS 10 (30 for non-sport), AIS 3 (3)

30 of 50 were snow sports

Hypotension, tachycardia, intervention rates similar

LOS 2 days (8 days)

Limitations
relatability across geography, all sports
limited to CT visualized injury

Overall, kidney injuries are still rare (significant - even more rare), but have a high clinical suspicion because they can occur in isolation

Retrospective review of abdominal trauma, 2006-2013

- 6 patients, all stable
- CT scan for evaluation

Results:
- Hematuria and flank pain (n=3)
- Hematuria (n=2)
- One angiography, no procedure needed
- One prior atrophic kidney with later surgical intervention

Individual based return to play. Kidney injuries are rare.
Male Genital Trauma in Sports

Stanley R. Hunter, MDa, Timothy S. Lishnak, MD, CAAQSMb, Andria M. Powers, MDc, David K. Lisle, MD, CAAQSMh.d.*

- Testicular rupture: lesion of the tunica albuginea, leading to tubule extravasation
  - Typically direct blow
  - Swelling, ecchymosis, tenderness. Hematocele: often large, loss of skin rugae, will not transilluminate.
  - Doppler ultrasound. Gold standard: surgical exploration

- Testicular torsion:
  - Pain, tenderness, nausea/vomiting, fever (25%)
  - Absent cremasteric reflex (? Sensitivity), horizontal testicular lie, Prehn sign

<table>
<thead>
<tr>
<th>Condition</th>
<th>Typical presentation</th>
<th>Examination findings</th>
<th>Ultrasound findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epididymitis</td>
<td>Gradual onset of pain that occasionally radiates to the lower abdomen; symptoms of lower urinary tract infection</td>
<td>Localized epididymal tenderness that progresses to testicular swelling and tenderness; normal cremasteric reflex; pain relief with testicular elevation (Prehn sign)</td>
<td>Enlarged, thickened epididymis with increased blood flow on color Doppler</td>
</tr>
<tr>
<td>Orchitis</td>
<td>Abrupt onset of testicular pain</td>
<td>Testicular swelling and tenderness; normal cremasteric reflex</td>
<td>Testicular masses or swollen testicles with hypoechoic and hypervascular areas</td>
</tr>
<tr>
<td>Testicular torsion</td>
<td>Acute onset of pain, usually severe</td>
<td><strong>High-riding transversely oriented testis; abnormal cremasteric reflex; pain with testicular elevation</strong></td>
<td>Normal-appearing testis with decreased blood flow on color Doppler (if scanned early)</td>
</tr>
</tbody>
</table>
Testicular torsion (cont):
- Doppler ultrasound
- Surgical exploration, detorsion
  - Manual detorsion (26 – 80% success)
  - Surgical detorsion: decreases with time – 90% > 50% > 10%

Hematocèle: hemorrhage into tunica vaginalis
- Likely require drainage
- Most resorb in 1-2 months

Hydrocele: serous fluid in the tunica vaginalis
- Illuminates

Wear athletic protective gear. Monitor for signs of high-risk scrotal, penile injuries and take to proper clinical staff.
Presumed Testicular Rupture During a College Baseball Game: A Case Report and Review of the Literature for On-Field Recognition and Management

Michael T. Freehill, MD, 1,2 Ilya Gorbachinsky, MD, 3 John D. Lavender, MS, ATC, LAT, 4
Ronald L. Davis III, MD, 5 and Sandeep Mannava, MD, PhD 6

- NCAA Div II college baseball playoffs
- Foul ball to underside of athletic supporter
- Pain, swelling
- Ultrasound equivocal
- Urologic intervention: no acute rupture, but testicular hematoma
- Encourage athletes to wear protection. While rare, rapid worsening require recognition and intervention.

Testicular Rupture
- extremely rare
- Urologic emergency
- Ultrasound (100% sens, 65% spec)
- clinical diagnosis
Genitourinary Trauma in Sports Medicine

Conclusions

- While genitourinary injuries are uncommon overall, about a third of ED GU complaints are sports related.
- Bicycles are a common source, for all ages, of these injuries. Pad your top bar.
- No need to hold solitary kidney patients from sports unless there are other factors. Have a frank discussion with family.
- Consider diagnostic hip block for intra- versus extra- articular sources of groin pain.

- GU injuries in sports are rare. Even fewer are significant. However, the major ones have significant consequences if missed.
- Solitary kidney injuries can exist in the athlete population.
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