May 2014 Case Study

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Chief Complaint: Abdominal pain

HPI:

22 year old collegiate football tight end presents to the athletic training room for soreness of the right abdomen since a game 2 days ago. Pain is dull in nature, worse with movement and tender to the touch. Overall pain is “tolerable” and localized to right abdominal musculature both laterally and mid abdomen. No worse or better over the past 2 days. Patient does recall a hit to his right lateral abdomen during the game when questioned.

Further questioning reveals “dirty brown” urine the evening of the football game. The dark color decreased with each void and cleared the day prior to presentation. Patient denies any further discolored urine, severe abdominal pain, chest pain, difficulty breathing, palpitations, other muscle pain, dysuria, unprotected intercourse, masses, swelling, flank pain, diarrhea, nausea, vomiting, constipation, fevers.

Past medical history, surgical history, medications, and allergies are otherwise unremarkable.

Physical Exam:

BP 120/70, P 68

General: No acute distress


Back: No ecchymosis. Mild tenderness to palpation over right flank with +right CVA tenderness. No midline or paraspinal muscle tenderness

Chest: Clear to auscultation bilaterally. No chest wall tenderness, no rib tenderness

CVS: Regular rate and rhythm, no murmurs

GU: Normal appearing male. No testicular tenderness. No hernia.

Differential Diagnosis:

Renal contusion
Abdominal wall contusion
Exercise induced hematuria
Rib fracture
Liver contusion or laceration
Athletic Pubalgia
Transverse Process Fracture
Urinary tract infection (lower or upper)
Sexually transmitted infection
Nephrolithiasis

Labs:

Urinalysis (with micro): blood 3+, LE trace, bacteria rare
RBCs 21-50/HPF
WBCs 6-10/HPF

Chem 139, 3.8, 102, 27, 16, 1.08, 121

CXR negative

CT abdomen with contrast: 1cm laceration to inferior pole of right kidney. Does not appear to involve the collecting system or vascular supply. Perinephric hematoma extending caudally into the pelvis. Normal liver and left kidney.
Final diagnosis:
Right Kidney Laceration, grade III

Outcome:
Patient was pain free with complete resolution of microscopic hematuria and CVA tenderness at 2 weeks and returned to noncontact practice. In consultation with urology, he was allowed full return to play at 6 weeks post-injury when it was felt the kidney would be no longer be at a higher risk for injury. Follow up imaging was unnecessary given the relatively lower-grade of the laceration. He finished the season wearing a flak-jacket for kidney protection. His recovery at 2 weeks is on the shorter end of the ranges of recovery found in the literature.

Discussion:
Blunt abdominal trauma is common in all contact sports. While most of these are soft tissue injuries, one must always consider the broad yet important differential diagnosis of intra-abdominal trauma. Although rare, kidney injury has been linked to both contact and noncontact sports with football the most common at 62%. However, non-sport related kidney injuries are much more common. In a National Football League study during an 18 year review period, 52 kidney injuries were identified. Children have higher rates of renal injury after blunt abdominal trauma than do adults. Some of the suggested reasons include larger kidney size in relation to the body, decreased perirenal fat to act as a cushion, weaker abdominal muscles, and less protection from the rib cage.

As with all trauma, evaluation begins with circulation, airway, and breathing. In children, blood pressure may not be a reliable marker of hypovolemia. History and physical should focus on mechanism of injury, sport, and position played. Symptoms are nonspecific and include abdominal, flank, or pelvic pain with or without a history of gross hematuria. Objective signs that indicate renal injury may include muscle guarding, flank hematoma or ecchymosis, abdominal or flank tenderness, rib fractures, associated penetrating injuries, and peritoneal signs. Formal urinalysis should be performed, as 80-95% of renal injuries will show microscopic hematuria. Any patient with gross hematuria should undergo further imaging with contrast CT scan. Additionally, adults with microscopic hematuria >50 RBC/hpf and SBP <90, or those with high risk mechanism should be imaged. In children, these parameters are more controversial, and there is generally a much lower threshold to image pediatric patients. A 3 phase “trauma” scan with delayed images is recommended to fully evaluate the vasculature, parenchyma, and collecting systems. In experienced hands, ultrasound may be useful for smaller patients, but sensitivity for evaluating vasculature is low and therefore not recommended in the acute evaluation. Additional workup for abdominal trauma should include complete blood count, chemistry with creatinine, liver function tests, pancreatic enzymes, and HCG testing in females. Radiographs can help identify bony injury.

The Organ Injury Severity Scale (table 1), developed by the American Association for the Surgery of Trauma (AAST), has been validated multiple times for kidney injury. Higher grades correlate with increasing morbidity and mortality.
<table>
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<tr>
<th>Grade</th>
<th>Description</th>
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<tbody>
<tr>
<td>I</td>
<td>Contusion OR subcapsular hematoma, nonexpanding. Microscopic or Gross Hematuria</td>
</tr>
<tr>
<td>II</td>
<td>Laceration &lt;1 cm without urinary extravasation, nonexpanding hematoma contained within retroperitoneum</td>
</tr>
<tr>
<td>III</td>
<td>Laceration &gt;1 cm without collecting system involvement or extravasation</td>
</tr>
<tr>
<td>IV</td>
<td>Laceration extending through collecting system and/or vascular injury with contained hemorrhage</td>
</tr>
<tr>
<td>V</td>
<td>Shattered kidney, avulsion of renal hilum</td>
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Immediate management is largely supportive, with monitoring of blood pressure and serial abdominal exams until patient is stabilized. Operative indications include hemodynamic instability, grade V injuries, many penetrating injuries, or associated injuries that require operative exploration. In the absence of surgical indication, a trial of conservative management is supported by the literature for injury grades I-IV.²

Nonoperative management consists of bed rest until gross hematuria resolves, then avoidance of heavy activity, analgesics, and hydration until resolution of microscopic hematuria.³⁵

Current consensus for follow-up imaging is reserved for grade IV-V injuries and selected grade III lacerations with persistent hemodynamic instability.² Renal function should be documented with radionuclide scintigraphy in these higher grade injuries.²

There are no evidence-based guidelines for return to play after kidney injury. Recommendations are currently based on expert opinion. Most renal injuries in sport are Grade I lacerations or contusions where the athlete may return to play once pain and microscopic hematuria resolve, which may take 2-6 weeks.⁴ Higher grade injuries can take up to 6-12 months to resolve. Some older recommendations suggest waiting the full 6 weeks to allow the kidney to fully heal prior to putting it at risk again.⁶ Brophy et al. evaluated kidney injuries in the NFL in an 18 year case series. 52 players suffered kidney injury, of which 42 were contusions and 6 were lacerations. Mean RTP for contusions was 15 days while mean RTP for lacerations was 60 days. 34% required initial hospitalization and none required surgery.³

The current AAP recommendation for athletes with a solitary kidney playing contact or collision sports is “qualified yes,” with discussion of the risks involved with each individual athlete.⁷ Physician questionnaires show that >50% would advise against contact sports.⁸ Some authors are challenging these restrictions, citing higher risks of serious kidney injury from MVC and bicycle injuries, and much higher rates of injury to other unpaired organs, such as the brain.⁸ Protective equipment may reduce the risk enough for involvement in most, if not all sports.⁷⁹

References


