Blunt Abdominal Trauma

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Disclosures

None
Sport-Related Abdominal Trauma

- 1-10% of all abdominal injuries are due to sport-related trauma
- Sports at greatest risk: any contact sport, winter sports (downhill skiing and snowboarding), motor sports
- May occur with any sport
- Have the potential to be life-threatening

National Pediatric Trauma Registry (NPTR) Survey of Blunt Abdominal Sport Injuries:

- NPTR survey 1990-1999 of 50 participating pediatric trauma centers
- Study population: children ages 5-18
- 5439 of 81,923 injuries were sport related
- Abdominal injuries occurred in 459 pts (0.56%); 191 cases (38.6%) were from contact sports
  - 42% were in ages 15-18.
National Pediatric Trauma Registry (NPTR)
Survey of Blunt Abdominal Sport Injuries:

<table>
<thead>
<tr>
<th>Sport</th>
<th>%</th>
<th>Organ Injured</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Football</td>
<td>49.7%</td>
<td>Spleen</td>
<td>50.3%</td>
</tr>
<tr>
<td>Baseball</td>
<td>13.6%</td>
<td>Kidney</td>
<td>22.0%</td>
</tr>
<tr>
<td>Soccer</td>
<td>13.1%</td>
<td>Liver</td>
<td>6.8%</td>
</tr>
<tr>
<td>Ice hockey</td>
<td>10.5%</td>
<td>Pancreas</td>
<td>11.8%</td>
</tr>
<tr>
<td>Basketball</td>
<td>9.4%</td>
<td>Other NOS</td>
<td>14.7%</td>
</tr>
</tbody>
</table>

Blunt Trauma in Sport: General Principles

- Initial signs of injury are often subtle (Injuries are internal and hidden)
- Abdominal injury may not necessarily result from an obvious major hit
- Symptoms of abdominal pain should prompt removal from play and prompt evaluation
- Athletes with suspected abdominal injuries should be transported to hospital and evaluated with appropriate imaging (usually CT scanning)
Sports Related Abdominal Injuries
When to Watch Out

- Direct abdominal blow (spearing, hit into boards or door to bench)
- C/O abdominal pain or tenderness
- CVA tenderness and/or hematuria
- Chest wall injury resulting in rib fractures

Sports Related Abdominal Injuries
When to Watch Out

- Signs or symptoms of shock
  - Symptoms of lightheadedness, dizziness, associated tachycardia/hypotension
- Nausea/vomiting in setting of any abdominal complaints
Abdominal Sports Trauma: Imaging

- CT: preferred modality, provides more details re injury, iv contrast necessary for accurate diagnosis
- US: Operator dependent. FAST (focused abdominal ultrasound trauma) exam for unstable pt
- Plain abdominal films: show pneumoperitoneum in < 30% of pts with visceral perforation

Differential Diagnosis

- Diaphragm: “wind knocked out”
- Abdominal wall: contusions, hematomas
- Intra-abdominal solid organs: spleen, liver, pancreas
- Hollow viscera: Small bowel, colon
- Retroperitoneum: kidney
- Pelvis: pelvic fracture/hematoma
Getting the “Wind Knocked Out”

• Most common abdominal injury in sport; usually involves hit to epigastrium
• Dyspnea occurs temporary spasm of diaphragm
• Symptoms are transient; relieved by hip flexion, loosening restrictive equipment
• Return to play once symptoms resolved

Abdominal Wall Injury

• Most commonly are contusions, less commonly hematomas
• Mechanism usually a direct blow but sudden violent contraction can cause indirect injury
• Sx: Pain with trunk flexion/rotation, local tenderness
**Rectus Sheath Hematoma**

- Result from injury to epigastric or large intramuscular vessels.
- May mimic acute abdomen (CT to evaluate).
- Presentation: sudden pain, swelling, tender mass (below umbilicus).
- Rx: ice, rest, analgesics; avoid trunk flexion, rotation, stretching of abd muscles; may occas. require surgical drainage.

**Splenic Injuries**

- Most frequently injured abdominal organ in sport.
- Most common cause of death in athletes due to abdominal trauma.
- Injuries include laceration, intra and subscapular hematomas, infarction.
- Usually due to direct trauma to left upper quadrant or left lower chest.
**Splenic Injuries: Clinical Presentation**

- Dull left sided abdominal ache
- Left shoulder pain (due to diaphragmatic irritation)
- Nausea, vomiting (from peritoneal irritation)
- Exam (unreliable): left upper quadrant tenderness, guarding, tenderness over left 10\textsuperscript{th}-12\textsuperscript{th} ribs

**Splenic Injury: Case History**

- 27 year old NHL forward developed abdominal pain 1 ½ hours after Game 7 of playoffs
- Player asymptomatic at end of game; no unusual hits or trauma during the game
- Abdominal pain developed while at restaurant post game
- Player evaluated in local ER; exam showed left upper quadrant abdominal pain and tenderness with some guarding
- Hemoglobin slightly decreased, hemodynamics were stable
CT of Splenic Injury

Treatment: Open Splenectomy

Splenic Injury Classification

<table>
<thead>
<tr>
<th>Grade</th>
<th>Injury Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Hematoma Subcapsular, nonexpanding, &lt; 10% surface area</td>
</tr>
<tr>
<td></td>
<td>Laceration Capular tear, nonbleeding, &lt; 1 cm parenchymal depth</td>
</tr>
<tr>
<td>II</td>
<td>Hematoma Subcapsular, nonexpanding, 10 to 50% surface area; intraparenchymal, nonexpanding, &lt; 5 cm in diameter</td>
</tr>
<tr>
<td></td>
<td>Laceration Capular tear, active bleeding; 1 to 3 cm parenchymal depth which does not involve a trabecular vessel</td>
</tr>
<tr>
<td>III</td>
<td>Hematoma Subcapsular, &gt; 50% surface area or expanding; ruptured subcapsular hematoma with active bleeding; intraparenchymal hematoma &gt; 5 cm or expanding</td>
</tr>
<tr>
<td></td>
<td>Laceration &gt; 3 cm parenchymal depth or involving trabecular vessels</td>
</tr>
<tr>
<td>IV</td>
<td>Hematoma Ruptured intraparenchymal hematoma with active bleeding</td>
</tr>
<tr>
<td></td>
<td>Laceration Laceration involving segmental or hilar vessels producing major devascularization (&gt; 25% of spleen)</td>
</tr>
<tr>
<td>V</td>
<td>Laceration Completely shattered spleen</td>
</tr>
<tr>
<td></td>
<td>Vascular Hilar vascular injury which devascularizes spleen</td>
</tr>
</tbody>
</table>

*Advance one grade for multiple injuries up to Grade III.*

MDCT of Splenic Injury

GRADE 3 SUBCAPSULAR HEMATOMA MANAGED SURGICALLY

SBP 80, HR 130 + femur fracture

Spleen Injury with Contrast Extravasation
MDCT of Splenic Injury
Grade 5 Splenic Pedicle Avulsion—Active Extravasation

Splenic Injuries: Management Options

- Nonoperative with observation, serial Hcts
- Angiography and embolization – success rates of >80% in some series (general trauma pts)
- Surgery/splenectomy indicated for any unstable patient, ongoing bleeding or rebleeding
- Consider surgical Rx of Grade III or higher injuries in athletes (? Role of laparoscopic approach)
Splenic Injuries: Follow-up

- No consensus on guidelines
- Follow-up CT in first week, then monthly till resolution
- Any change in clinical course should prompt imaging with contrast enhanced CT
- Up to 3 months of activity restriction for nonoperative Rx

Liver Injuries

- Most commonly injured organ in blunt abdominal trauma
- Mechanisms: deceleration or direct blow
- Presentation: RUQ pain, shoulder pain, tenderness of overlying ribs, abdominal guarding
Left Hepatic Laceration (with Caudate Lobe Contusion)

- Most liver injuries (80-90%) in sport are minor (Grade I or II) and are managed nonoperatively. 50-80% stop bleeding spontaneously.
- Follow-up CT only as clinically indicated.

Pancreatic Injury

- Rare from sports related trauma (few reported cases).
- Occur in 2-12% of blunt trauma cases but has high assoc morbidity (42%) and mortality (16.6%).
- Mechanism: compression of pancreas between spine and external force.
- Most due to MVA or handlebar injuries from bicycles.
Pancreatic Injury

- Initial presentation nonspecific: abdominal pain, tenderness, abdominal wall bruising
- Delay in diagnosis assoc w increased morbidity
- Lab work unreliable; normal amylase/lipase does not exclude an injury
- Dx: CT scan w contrast

Renal Trauma

- Suspect in any athlete with hematuria
- Mechanisms: direct blow, rapid deceleration, rib fracture
- Incidence higher in children than adults
- Risk of kidney loss: 0.4 per million/yr in kids; cycling most common cause
- Diagnosis: CT with iv contrast
Renal Trauma: Return to Play Criteria

- 80% managed conservatively
- Mild injuries: 2-4 weeks
- More severe injuries may require 6-8 weeks to resolve
- Return to sport: no hematuria, CT evidence of full resolution

Acute Injuries: Pelvic Fracture with Pelvic Hematoma
Acute Injuries: Pelvic Fracture with Pelvic Hematoma

- ABC’s, stabilize fracture, assess for associated injuries (GU)
- Serial hemoglobin, monitor hemodynamics
- Pain management

Pelvic MRI

Summary

- Intra-abdominal injuries are rare in sport, including ice hockey and other contact sports
- Symptoms and signs of intra-abdominal injury may be subtle, high index of suspicion is necessary to avoid missed injuries
- Suspected injuries should be evaluated with contrast enhanced CT scanning and should be observed in the hospital setting if clinical suspicion is high
References