Pediatric Sports Emergencies

Michele Kirk, MD
JPS Sports Medicine Fellowship
TCU Team Physician

Asthma

• Two underlying factors:
  – Inflammation
    • Chronic
    • Leads to structural changes
      – Increase in airway smooth muscle
      – Airway narrowing
  – Bronchoconstriction
    • From above changes
    • Reversible
Asthma

Detecting an Exacerbation: Symptoms

- Coughing, persistent
- Wheezing
- Chest tightness
- Shortness of breath
- Decreased performance
- Increased respiratory rate
- Retractions
Focused History

• Cause
• Time of onset
• Meds
• Use of beta agonists, recency
• Risk factors for severe, uncontrolled dz
  – ER visits, hospitalizations, intubation hx,
    rapid progression of sx

Focused Examination

• Vitals and pulse ox
• Level of consciousness, anxiety, agitation
• Assess for breathlessness, wheezing,
  retractions, air entry
Initial Treatment

• Short-acting beta agonist
  – 2-4 puffs of albuterol, 1.25-2.5 mg
  – Administer each puff separately
  – May use MDI, with spacer, or nebulizer
  – Make sure medication is not expired or inhaler empty
  – Reassess in 10-20 mins

Initial Response

• Good
  – If symptoms resolve (for 4 hours) and peak flow improves, continue watching and with current treatment
  – Oral steroids not generally recommended
  – Remove stimulus, if possible
  – Consider quadrupling dose of inhaled steroid, if on one
Initial Response

- Incomplete
  - Initiate oral steroids (early)
  - Continue short-acting beta agonists
    - Up to every 2 hours for 6-8 hours after initiating oral steroids
  - Remove stimulus, if possible

- Poor response
  - Immediate referral to ED
    - Severe symptoms
    - High risk for severe/fatal attacks
  - Continue administering short-acting beta agonists
  - Initiate oral/IV steroids asap
Asthma Pearls

- Know who has asthma
- Know the severity of your athlete’s asthma
- Know their triggers
- Know how to use an inhaler correctly and how to teach someone to use it
- Make sure they carry their meds with them (and their peak flow meter if possible)
- Have a copy of the action plan (if they have one)
- Best treatment plan for exacerbation is Prevention!
Cervical Spine Injuries

• Cause of trauma by age:
  – Birth-vaginal deliveries in breech
  – Birth to 8 yo-MVCs and falls
  – 8 yo and up-MVCs and sports
    • Football, hockey, wrestling
• Mechanism of Injury:
  – Hyperflexion: most common
  – Hyperextension
  – Axial loading
  – Rotation
  – Chin trauma
Symptoms

- Pain
- Muscle spasm
- Decreased ROM
- Weakness
- Paresthesia
- Asymptomatic or cannot voice/explain their sx

Physical Exam

- Vital Signs
- Neck exam
  - TTP (location), deformities, spasm
- Neuro exam
  - Tone
  - Strength: wrist dorsiflexion (C6), elbow extension (C7), knee extension (L2-4), great toe dorsiflexion (L5)
  - Sensation-isolated deficit most common finding with cervical spine injury
  - Reflexes-areflexia indicates spinal cord injury
C-spine Immobilization

• Head and neck in neutral position
  – Do NOT reduce obvious deformities
  – Apply rigid cervical collar
    • Appropriate size
    • Should not interfere with airway

• Special considerations
  – Large head size
  – Prominent occiput in younger children
    • Special backboards to accommodate
C-spine Immobilization

- Log Roll-prone

- Lift and slide-supine

C-spine Immobilization

- Do NOT remove the helmet
  - Football, ice hockey, lacrosse
  - Unless remove helmet and shoulder pads together
  - Remove face mask only

- Minimize head motion during transport
  - Towels, foam rollers/pads, tape
Blunt Abdominal Trauma

• Children at greater risk
  – Compact torsos
  – Smaller anterior-posterior diameter
  – Larger viscera, less fat, and weaker musculature

• Low risk in sports; higher from MVCs, falls
Blunt Abdominal Trauma

• Must have high degree of suspicion
  – Pay close attention to hx and PE
• ABCs first
• Abdomen: secondary survey
  – Pain, distention, bruising, abrasions,
    referred pain, rigidity, masses

Splenic Blunt Trauma

• Anatomy
  – Lateral and posterior to the stomach
Splenic Injuries

- Types of injuries
  - Contusion
  - Hematoma
  - Laceration
    - (grades I-V)
  - Rupture-Mono!

- Signs and symptoms
  - Left flank/upper quadrant pain
  - Referred pain to left shoulder with palpation and/or inspiration
  - Increased HR and diastolic BP
  - Rebound and/or guarding on abdominal palpation
Splenic Injuries

• Treatment
  – Send to ED
  – Labs, imaging
  – Definitive tx depends on grade of injury/hemodynamic stability

Hepatic Abdominal Trauma

• Anatomy
Hepatic Injuries

- Types of injuries
  - Contusion
  - Hematoma
  - Laceration

- Signs/sx
  - Referred pain to right shoulder, RUQ pain
  - Rebound and/or guarding
  - Increased HR, decreased BP

Grading System

<table>
<thead>
<tr>
<th>Grade</th>
<th>Type of Injury</th>
<th>Description of Injury</th>
<th>AIS-90</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Hematoma</td>
<td>Subcapsular, &lt;10% surface area</td>
<td>2</td>
</tr>
<tr>
<td>II</td>
<td>Laceration</td>
<td>Capsular tear, &lt;1 cm parenchymal depth</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Hematoma</td>
<td>Subcapsular, 10% to 50% surface area; intraparenchymal &lt;10 cm in diameter</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Laceration</td>
<td>Capsular tear 1-3 cm parenchymal depth, &lt;10 cm in length</td>
<td>2</td>
</tr>
<tr>
<td>III</td>
<td>Hematoma</td>
<td>Subcapsular, &gt;50% surface area or expanding; ruptured subcapsular or parenchymal hematoma; intraparenchymal hematoma &gt;10 cm or expanding</td>
<td>5</td>
</tr>
<tr>
<td>IV</td>
<td>Laceration</td>
<td>Parenchymal depth &gt;5 cm</td>
<td>3</td>
</tr>
<tr>
<td>V</td>
<td>Laceration</td>
<td>Parenchymal disruption involving 25% to 75% hepatic lobe or 1-3 Couinaud's segments</td>
<td>4</td>
</tr>
<tr>
<td>V</td>
<td>Laceration</td>
<td>Parenchymal disruption involving &gt;75% of hepatic lobe or &gt;3 Couinaud's segments within a single lobe</td>
<td>5</td>
</tr>
<tr>
<td>V</td>
<td>Vascular</td>
<td>Infrarenal venous injuries (i.e., retrohepatic vena cava/central major hepatic veins)</td>
<td>5</td>
</tr>
<tr>
<td>VI</td>
<td>Vascular</td>
<td>Hepatic avulsion</td>
<td>6</td>
</tr>
</tbody>
</table>

*Advance one grade for multiple injuries up to grade III.
AIS, Abbreviated Injury Score.
Renal Abdominal Trauma

• Anatomy

Renal Injuries

• Types of Injuries
  – Contusion
  – Hematoma
  – Laceration

• Signs/Sx
  – Flank pain
  – Hematuria
  – Rebound/guarding
  – Increased HR, decreased BP

• Grading system
Renal Injuries

• Treatment
  – Send to ED
  – Labs, imaging
  – Definitive tx depends on grade of injury/hemodynamic stability