Pediatric Sports Emergencies

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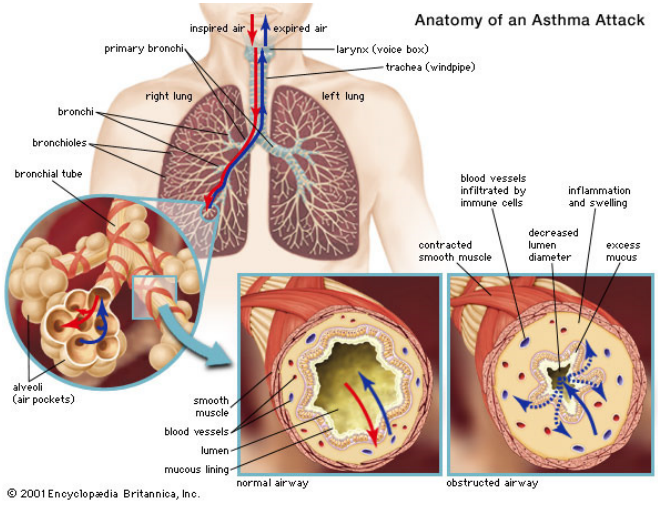
Asthma

- 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 used MDI, with spacer, or nebulizer
  - Make sure med 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

Initial Response

- 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

Formal evaluation of asthma exacerbation severity in the urgent or emergency care setting

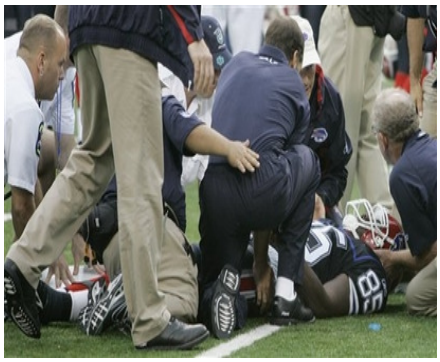
	Mild	Moderate	Severe	Subset: Respiratory arrest imminent
Symptoms				
Breathlessness	While walking	While at rest (infant - softer, shorter cry, difficulty feeding)	While at rest (infant - stops feeding)	
	Can lie down	Prefers sitting	Sits upright	
Talks in	Sentences	Phrases	Words	
Alertness	May be agitated	Usually agitated*	Usually agitated*	Drowsy or confused
Signs				
Respiratory rate	Increased	Increased	Often >30/minute	Poor respiratory effort, appears exhausted
		Guide to rates of breathing in awake children:		
		Age	Normal rate	
		<2 months	<60/minute	
		2 to 12 months	<50/minute	
		1 to 5 years	<40/minute	
		6 to 8 years	<30/minute	
Use of accessory muscles; suprasternal retractions	Usually not	Commonly	Usually	Paradoxical thoracoabdominal movement
Wheeze	Moderate, often only end expiratory	Loud; throughout exhalation	Usually loud; throughout inhalation and exhalation	Absence of wheeze (silent chest)
Pulse/minute	<100	100 to 120	>120	Bradycardia
		Guide to normal pulse rates in children:		
		Age	Normal rate	
		2 to 12 months	<160/minute	
		1 to 2 years	<120/minute	
		2 to 8 years	<110/minute	
Pulsus paradoxus	Absent to <10 mmHg	May be present 10 to 25 mmHg	Often present >25 mmHg (adult) 20 to 40 mmHg (child)	Absence suggests respiratory muscle fatigue
Other				Cyanosis
Functional assessment				
PEF percent predicted or percent personal best	≥70 percent	Approximately 40 to 69 percent or response to inhaled beta-agonists lasts <2 hours	<40 percent	<25 percent Note: PEF testing may not be needed in very severe attacks
PaO_2 (in room air)	Normal (test not usually necessary)	≥60 mmHg (test not usually necessary)	<60 mmHg: possible cyanosis	
PCO_2	<42 mmHg (test not usually necessary)	<42 mmHg (test not usually necessary)	≥42 mmHg: possible respiratory failure	
SpO_2 percent (in room air) at sea level	>95 percent (test not usually necessary)	90 to 95 percent (test not usually necessary)	<90 percent	
	Hypercapnia (hypoventilation) develops more readily in young children than in adults and adolescents.			
BP	Hypotension			

Notes:
- The presence of several parameters, but not necessarily all, indicates the general classification of the exacerbation.
- Many of these parameters have not been systematically studied, especially as they correlate with each other. Thus, they serve only as general guides (Cham et al 2002; Chey et al 1999; Gorelick et al 2004b; Karras et al 2000; Kelly et al. 2002b and 2004; Keogh et al 2001; McCarren et al 2000; Rodrigo and Rodrigo 1998b; Rodrigo et al 2004; Smith et al 2002).
- The emotional impact of asthma symptoms on the patient and family is variable, but must be recognized and addressed and can affect approaches to treatment and follow-up (Ritz et al 2000; Strunk and Mrazek 1986; von Leupoldt and Dahme 2005).

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



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

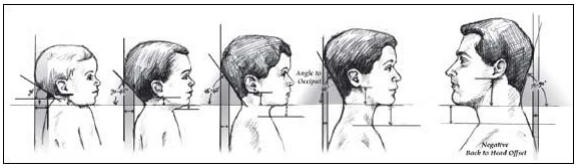
- Pain
- Muscle spasm
- Decreased ROM
- Weakness
- Paresthesia
- Asymptomatic or cannot voice/explain their sx

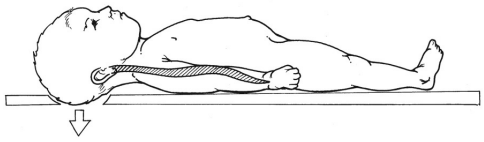
Physical Exam

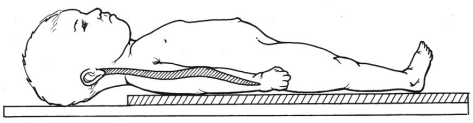
- Vital Signs
- Neck exam
  - TTP (location), deformities, spasm
- Neuro exam
  - Tone
  - Strength: wrist dorsiflexion (C6), elbow extension (C7), knee extension (L2-4), great toe dorsiflexion (L5)
  - Sensation-isolated deficit most common finding with cervical spine injury
  - Reflexes-areflexia indicates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

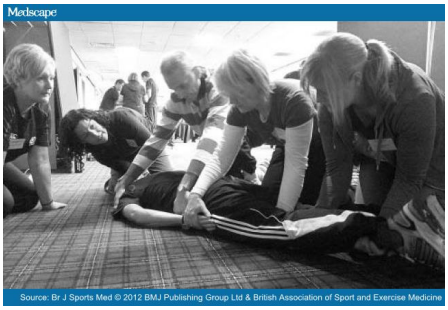






C-spine Immobilization

- 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

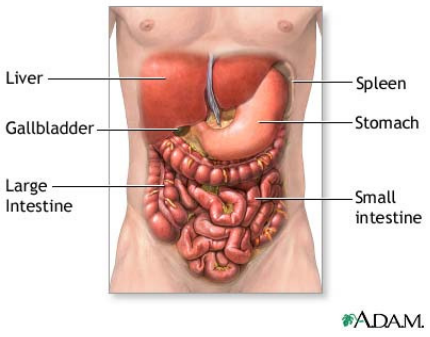
- Children at greater risk
  - Compact torsos
  - Smaller anterior-posterior diameter
  - Larger viscera, less fat, and weaker musculature
- Low risk in sports; higher from MVCs, falls

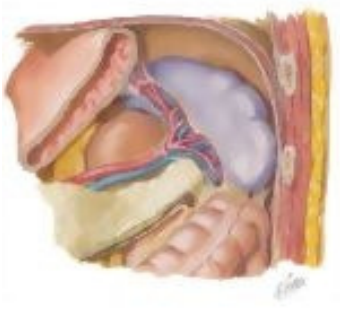
Blunt Abdominal Trauma

- 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

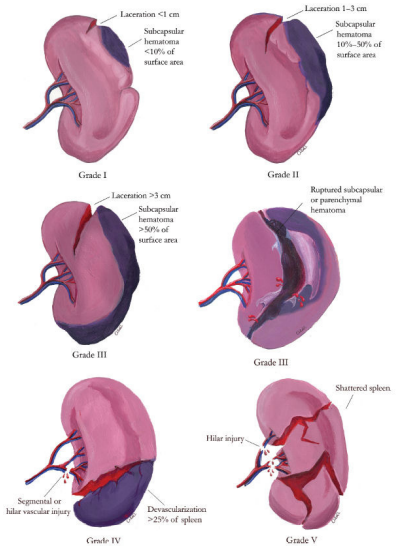
- Anatomy
  - Lateral and posterior to the stomach





Splenic Injuries

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



Splenic Injuries

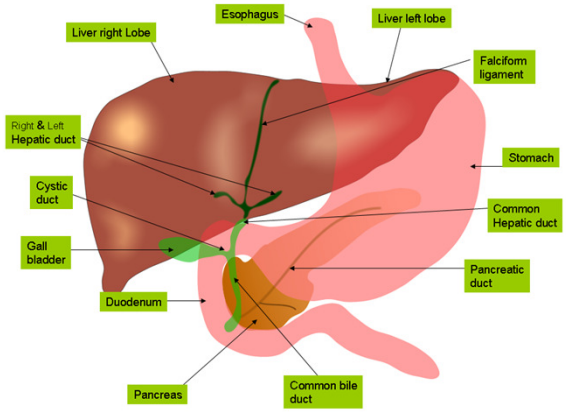
- Signs and symptoms
  - Left flank/upper quadrant pain
  - Referred pain to left shoulder with palpation and/or inspiration
  - Increased HR and diastolic BP
  - Rebound and/or guarding on abdominal palpation

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

Liver injury scale (1994 revision)

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

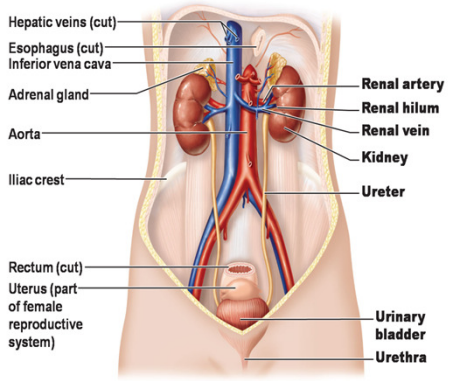
* Advance one grade for multiple injuries up to grade III.
AIS, Abbreviated Injury Score.

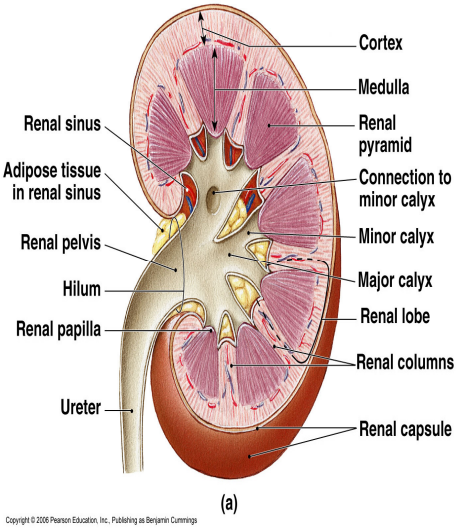
Hepatic Injuries

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

Renal Abdominal Trauma

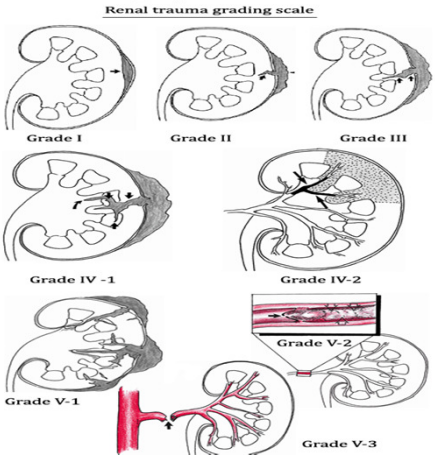
- Anatomy





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