“Early Show” Top Ten Pearls of Pediatric Trauma

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I have no financial disclosures.
Objectives: Pediatric Trauma Nuances

Anatomy

Injury Patterns

Evaluation

Management
Background
Trauma:

#1 Cause Death & Disability in Children

Tracy et al. 2013
Mechanism of Injury

Age 0-9: Falls

Age 10-18: MVC
Not Just Small Adults
#1: Big Heads, Small Body
Injury Pattern: Waddell’s Triad

Typical pattern of injuries affecting upper leg (1), chest/abdomen (2), and head (3)
#2: Large % of Surface Area
Triad of Death

- Coagulopathy
- Acidosis
- Hypothermia
#3: Airway Differences
Adult upper airway

Pediatric upper airway

Larger tongue in proportion to mouth

Larger and floppier epiglottis

Larynx is more anterior and superior

Trachea is narrow and less rigid
Head Positioning

Sniffing Position or “Ear to Sternal Notch”

Infant  Small child  Older child/adult
Intubation
#4: Head Trauma Common

#1 Cause Death
PECARN Pediatric Head CT Rule

**Younger than 2 years**
- AMS or GCS < 15 or Palpable skull fx
  - None
- LOC > 5 sec or Non-frontal hematoma or Not acting normally or Severe mechanism*
  - None
- No CT Required!

**2 years or older**
- AMS or GCS < 15 or Signs of basilar skull fx
  - None
- History of LOC or History of vomiting or Severe headache or Severe mechanism*
  - None
- No CT Required!

*SEVERE MECHANISMS:
- helmet
- falling
- car accident
- 3 ft
- > 5 ft

Kupperman et al. 2009
#5: Cervical Spine Injuries
Uncommon
C1-C3: < 8 yo
C3-C5: 8-12 yo
C5-C6: > 12 yo
### Imaging Criteria

<table>
<thead>
<tr>
<th>NEXUS</th>
<th>PECARN</th>
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<tbody>
<tr>
<td><strong>Validated by Vicello</strong></td>
<td><strong>Leonard et al. 2010</strong></td>
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<tr>
<td>Hoffman et al. 2000</td>
<td>Prospective &lt;18yrs 4091 participants</td>
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<tr>
<td>Prospective &lt;18yrs 3065 participants</td>
<td>Any one of the following factors is associated with CSI in children...</td>
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<tr>
<td>Low risk for C spine injury with all of...</td>
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<tr>
<td>✅ Absence of posterior midline cervical spine tenderness</td>
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<tr>
<td>✅ Absence of a neurological deficit</td>
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<tr>
<td>✅ Absence of intoxication</td>
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<td>✅ Normal level of alertness</td>
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<tr>
<td>✅ Absence of distracting pain</td>
<td></td>
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<tr>
<td>Sensitivity 100% Specificity 19.9%</td>
<td>Sensitivity 90.5% Specificity 45.6%</td>
</tr>
<tr>
<td>❌ Cannot be applied reliably to children &lt;8yrs</td>
<td>Underpowered to establish definitive rule</td>
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SCIWORA (Spinal Cord Injury Without Radiological Abnormalities)
#6: Chest Trauma is RARE
Imaging

#7: Abdominal Trauma Patterns
#8: Keep Normotensive!
Permissive Hypotension
Low SBP (5%) = 70 + (Age x 2)
#9: Blood Transfusions
PRBC 10mL/kg
Massive Transfusion Protocol

40mL/kg of Any Blood Product in first 24 hours

PRBCs : Plasma : Platelets

1:1:1

TEG
#10: Child Life
Summary

#1: Big Heads, Small Body
#2: Large % of Surface Area
#3: Airway Differences
#4: Head Trauma Common
#5: Cervical Spine Injuries Uncommon
#6: Chest Trauma is RARE
#7: Abdominal Trauma Patterns
#8: Keep Normotensive!
#9: Blood Transfusions: 10mL/kg
#10: Use Child Life
Thank you!