A Severely Injured Pediatric Trauma Patient: Case Presentation and Discussion

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10 year old female presents as a trauma alert after being transferred via helicopter from an Level II adult trauma center s/p motor vehicle collision. She was the restrained rear seat passenger with a lap belt. On presentation was lethargic and complaining of severe abdominal pain. No LOC. Prior to arrival the patient had Foley placed at which revealed hematuria. She also received 1U pRBC at the outside hospital for splenic injury and liver injury on outside CT scan.
Physical Exam

- **VS**: 97.5, HR 173, BP 78/50, RR 40, 95% RA
- **Airway**: patent
- **Breathing**: clear bilaterally
- **Circulation**: distal pulses intact
- **Disability**: GCS14 (3/5/6)
- **Adjuncts**:
  - **FAST**: positive in all 4 quadrants
  - **CXR**: negative
- **PE**: lethargic, abdominal seatbelt sign
- **CT Head/Cspine**: negative
## Pediatric Vital Signs

### General Vital Signs and Guidelines

<table>
<thead>
<tr>
<th>Age</th>
<th>Heart Rate (beats/min)</th>
<th>Blood Pressure (mmHg)</th>
<th>Respiratory Rate (breaths/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premature</td>
<td>110-170</td>
<td>SBP 55-75 DBP 35-45</td>
<td>40-70</td>
</tr>
<tr>
<td>0-3 months</td>
<td>110-160</td>
<td>SBP 65-85 DBP 45-55</td>
<td>35-55</td>
</tr>
<tr>
<td>3-6 months</td>
<td>110-160</td>
<td>SBP 70-90 DBP 50-65</td>
<td>30-45</td>
</tr>
<tr>
<td>6-12 months</td>
<td>90-160</td>
<td>SBP 80-100 DBP 55-65</td>
<td>22-38</td>
</tr>
<tr>
<td>1-3 years</td>
<td>80-150</td>
<td>SBP 90-105 DBP 55-70</td>
<td>22-30</td>
</tr>
<tr>
<td>3-6 years</td>
<td>70-120</td>
<td>SBP 95-110 DBP 60-75</td>
<td>20-24</td>
</tr>
<tr>
<td>6-12 years</td>
<td>60-110</td>
<td>SBP 100-120 DBP 60-75</td>
<td>16-22</td>
</tr>
<tr>
<td>&gt; 12 years</td>
<td>60-100</td>
<td>SBP 110-135 DBP 65-85</td>
<td>12-20</td>
</tr>
</tbody>
</table>

https://www.acls-pals-bls.com/algorithms/pals
# Pediatric Glasgow Coma Score (GCS)

<table>
<thead>
<tr>
<th>Adult</th>
<th>Pediatric</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Best Eye Opening</strong></td>
<td><strong>Best Verbal Response</strong></td>
</tr>
<tr>
<td>Spontaneously</td>
<td>Spontaneously</td>
</tr>
<tr>
<td>To verbal stimuli</td>
<td>To verbal stimuli</td>
</tr>
<tr>
<td>To painful stimuli</td>
<td>To painful stimuli</td>
</tr>
<tr>
<td>No eye opening</td>
<td>No eye opening</td>
</tr>
<tr>
<td><strong>Best Motor Response</strong></td>
<td></td>
</tr>
<tr>
<td>Obeys commands</td>
<td>Normal spontaneous</td>
</tr>
<tr>
<td>Localizes pain</td>
<td>Withdraws to touch</td>
</tr>
<tr>
<td>Withdraws to pain</td>
<td>Withdraws to pain</td>
</tr>
<tr>
<td>Flexion to pain</td>
<td>Flexion to pain</td>
</tr>
<tr>
<td>Extension to pain</td>
<td>Extension to pain</td>
</tr>
<tr>
<td>No motor response</td>
<td>No motor response</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CT Chest

- Pericardial effusion
- Right middle lobe/right lower lobe contusion
- Right 11th rib fracture
CT Abdomen/Pelvis
CT Abdomen/Pelvis

- Grade V liver injury
- Multiple lacerations to the right kidney with likely vascular compromise and possible renal vein laceration
- Partial tears of the spleen
- Decreased attenuation in uncinate process questionable for pancreatic injury
- Free air
- Jejunal hematoma
- Large amount of hemorrhagic ascites
Operative Findings

• Patient taken immediately to the operating room
  – Exploratory laparotomy
  – Trauma and pediatric surgery
Operative Findings

• Findings:
  – Active bleeding from Grade 4 liver laceration
  – Active bleeding from Grade 3 splenic laceration
  – 1cm laceration to the first portion of the duodenum
  – Serosal injury to 1st and 2nd portion of the duodenum
  – Nonexpanding right Zone 2 retroperitoneal hematoma
What Would You Do…

• Procedure:
  – Exploratory laparotomy
  – Packing of liver hemorrhage
  – Splenectomy
  – Primary repair of 1st portion of duodenum.
  – Repair of deserosalization injury to 1st and 2nd portion of the duodenum
  – Pyloric exclusion
  – Placement of Abthera vac
Post-Op Day 0

- Patient intubated and taken to Pediatric ICU
- Pediatric Critical Care Service consulted for co-management
- Transfused 1 unit FFP
- Started on Zosyn
Post-op Day 1

- Return to OR with pediatric surgery and hepatobiliary
  - Reopening of recent laparotomy
  - Removal of packs
  - Gastrojejunostomy
  - Intraoperative cholangiogram
  - Exploration of common bile duct
  - Gastropexy
  - Placement of 10 Fr T-tube
Gastrojejunostomy
Pyloric Exclusion
Duodenal Repair
Post-Op Day 2-3

• Patient extubated to nasal cannula
• Child life consulted
  – Patient would benefit from therapeutic pet visitation, caring clown visit, music therapy, and art therapy
Post-Op Day 4

- R Femoral line removed
- PICC line placed
- TPN started
- Echo: Normal appearing anatomy. No effusion
- CT Urogram
  - Fractured right kidney with extravasation of excreted urinary contrast into large right perinephric collection without visualization of the right ureter or evidence of vascular extravasation
Post-Op Day 5

- Transferred to Pediatric Stepdown Unit
- NG-tube removed
- Care transitioned from Pediatric Critical Care Team to General Pediatrics
- Zosyn stopped
Post-Op Day 6-7

• Foley and JP drains removed
• Pediatric infectious disease consulted for vaccination timing recommendations and need for prophylactic antibiotics
  – Two weeks after her splenectomy give a dose of PCV-13 and HIB vaccines
  – Four weeks after her PCV-13 and HIB, give a dose of conjugate Meningococcal vaccine
  – Four weeks after receiving the conjugate Meningococcal vaccine, give pneumovax
  – 4 weeks after pneumovax, give Meningococcal B vaccination
  – Penicillin 250 mg BID prophylaxis
Post-Op Day 8-10

- Regular diet started
- TPN stopped
- T-tube clamped after study showed anterograde flow
- Renal ultrasound: Healing renal laceration, small residual hematoma, uroma
Multidisciplinary Approach

- Trauma surgery
- Pediatric surgery
- Pediatric critical care
- General pediatrics
- Subspecialists that provide pediatric care
- Nursing
- Social work
- Child life
“There is a golden hour between life and death. If you are critically injured you have less than 60 minutes to survive. You might not die right then; it may be three days or two weeks later — but something has happened in your body that is irreparable.”

- R Adams Cowley (1975)
Acknowledgments
Questions?