



Thoracic- Abdominal Trauma

3rd Edition

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Thoracic-Abdominal



• Objectives

- Describe major signs and symptoms, pathophysiology, and initial management of pediatric thoracic trauma
- Compare the clinical presentation of massive hemothorax and tension pneumothorax
- Identify indications for emergency needle decompression of the chest in children

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• Objectives

- Describe how undetected abdominal trauma can lead to shock and death
- Discuss why abdominal trauma in children is usually associated with other injuries
- Describe the assessment and management of a child with abdominal trauma

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• Case Study Scenario

- A 2-year-old child was backed over by the family van in the driveway
- The driver (the child's father) immediately stopped and found child under car



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• You arrive on the scene

- How would you approach this patient?
- What are the concerns about the mechanism of injury?
- Is this patient in shock?
- Is this a priority patient?
- What interventions should be performed?



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• Pediatric vs. Adult Thoracic Trauma

- Energy is the same
- "Target" is different
 - Much more compact
- Energy absorption is different
- Blood loss triggers shock more easily in children



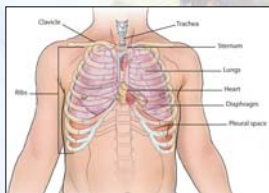
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• Pediatric Anatomy and Pathophysiology

- Ribs smaller, incompletely calcified
- Liver, spleen often project below ribs
- Thinner chest and abdominal walls
- Abdominal muscles less developed
- Mediastinum more mobile



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• Prehospital priorities

- Scene Size-Up
- Airway with LOC and spinal motion restriction
- Anticipate and recognize respiratory distress
- Anticipate and recognize early signs of shock
- Proper spinal motion restriction and packaging
- Rapid transport
- Ongoing Exam

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• Scene Size-Up

- Note mechanism of injury, restraints
- Subtle scene clues



• Initial Assessment

- Airway with LOC and spinal control
 - Modified jaw thrust, oral airway
 - Maintain open airway
 - BVM with 100% oxygen, saturation above 95%
 - Intubate only if you cannot oxygenate or maintain airway
 - Capnography if available

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- **Recognize respiratory distress**

- Tachypnea – rate is age-specific
- Grunting, retractions, paradoxical movement
- Close the open pneumothorax
- Decompress tension pneumothorax
- Stabilize mobile chest wall segments



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- **Recognize early signs of shock**

- Tachycardia – rate is age-specific
- Compare central and peripheral pulses
- Skin temperature, color, capillary refill

Weight and Vital Signs by Age Group

Age	Weight in kg (lb)	Respirations (breaths per minute)	Pulse (beats per minute)	Systolic Blood (mmHg) Pressure
Newborn	3-4 kg (6-9 lb)	30-50	120-160	60-80
6 mo-1 yr	8-10 kg (16-22 lb)	30-40	120-140	70-80
2-4 yr	12-16 kg (24-34 lb)	20-30	100-110	80-95
5-8 yr	18-26 kg (36-55 lb)	14-20	90-100	90-100
8-12 yr	26-50 kg (55-110 lb)	12-20	80-100	100-110
>12 yr	>50 kg (110 lb)	12-16	60-90	100-120

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- **Thoracic Trauma “Deadly Dozen”**

- Life-threatening injuries
- 6 detected during ITLS Primary Survey:
 - Airway obstruction
 - Open pneumothorax
 - Tension pneumothorax
 - Massive hemothorax
 - Flail chest and rib fracture
 - Cardiac tamponade



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• Thoracic Trauma “Deadly Dozen”

– 6 that may be detected during ITLS Secondary Survey:

- Traumatic aortic rupture
- Tracheal or bronchial tree disruption
- Myocardial contusion
- Diaphragmatic tear
- Esophageal injury
- Pulmonary contusion



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• Open pneumothorax

- Caused by penetrating injury
- Sucking chest noise
- Respiratory distress

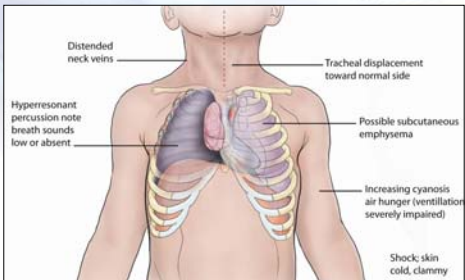


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• Tension Pneumothorax



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• Tension Pneumothorax

- Caused by chest injury
- Increasing pressure in the pleural space impairs blood return to the heart, decreasing stroke volume and cardiac output
- Indicators
 - Airway compromise
 - Severe respiratory distress
 - Signs of circulatory collapse
 - Hypotension, cyanosis, traumatic cardiopulmonary arrest
 - Shock
 - Subtle changes
 - JVD

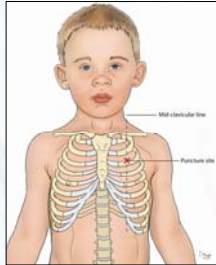
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• Needle Decompression

- Over-the-needle catheter inserted into midclavicular line in second or third intercostal space
- “Walk” needle upward on the rib until it slides off upper edge and penetrates into pleural space



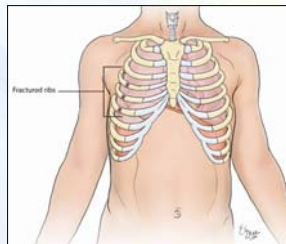
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• Rib fracture and flail chest

- Caused by blunt injury
- Respiratory distress
- Paradoxical chest wall movement

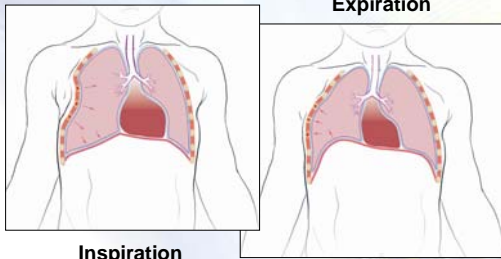


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• Paradoxical motion



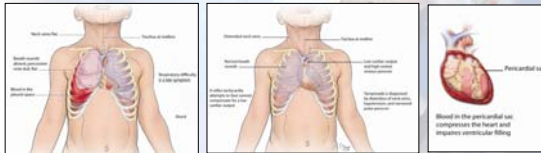
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• Hemothorax and Cardiac Tamponade

- No specific field care
- Treat for shock
 - Maintain airway with spinal control
 - Fluid resuscitation



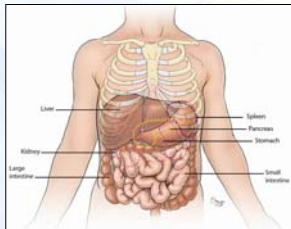
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• Abdominal injuries

- Splenic injury
- Liver injury
- Restraint-related injury
- Mechanisms may vary



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• Abdominal injuries

- Splenic injury
 - Most frequently injured organ
 - Usually blunt injury
 - Tenderness, rigidity, pain
- Liver injury
 - Second most frequently injured organ
 - Most common fatal abdominal injury
 - Second only to head injury as most common cause of traumatic death in children
 - Pain, tenderness, rigidity, shock

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• Restraint injury

- Note position of restraints during extrication
- May see external bruising
- Usually from improperly worn restraint
- Pain, tenderness, rigidity



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• ITLS Secondary Survey

- Rapid transport immediately
 - Almost all are load-and-go
 - Most management at hospital
- Assess for 2nd half of “Deadly Dozen”
- En route to hospital:
 - Initiate IV or IO
 - Continual reassessment
 - Changes can be subtle

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• Case Study Continued

- Initial Assessment:
 - Poor general impression – child unresponsive
 - Rapid, shallow, labored respirations at fast rate
 - Carotid pulse present, faintly palpable at fast rate
 - No radial pulses palpable
- Load-and-go priority patient
- Spinal motion restriction instituted
- Airway opened
- BVM ventilation started with high-flow oxygen

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• Case Study Continued

- Rapid Trauma Survey:
 - Trachea midline with neck veins flat
 - Tire marks extending to sternum on left chest
 - Crepitus in left upper chest
 - No subcutaneous emphysema present upon palpation
 - Breath sounds very diminished in left lung
 - Insufficient response to BVM with high-flow, high-concentration oxygen
 - Pulse oximetry readings persistently <90%

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• Case Study Decisions

- Child intubated in field
- Placed on long board and transported to ambulance
- 2 large-bore IVs initiated en route
- 2 fluid boluses of 20 mL/kg administered for tachycardia, poor perfusion

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• Case Study Wrap-Up

- ITLS Ongoing Exam:
 - Patent and secured airway
 - Pulse oximetry reading of 95%
 - Heart rate decreases to 130 bpm with volume resuscitations
 - Strong carotid, radial pulses upon arrival to hospital
- Child admitted to hospital with hemothorax, pulmonary contusion
- Discharged home 21 days later

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• Points to Remember

- Assessment, early identification are key in management of injuries and successful interventions
- Chest and abdominal injuries usually part of multisystem trauma
- Fewer and minimal external injuries should not prevent you from identifying underlying injuries
- ABCs remain paramount to successful outcome

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• Points to Remember

- Pediatric abdominal injury is subtle, so maintain a high degree of suspicion
- All patients exhibiting signs of shock need rapid package and transport; perform procedures en route to hospital
- Do not overlook other injuries; abdominal injuries are often associated with other injuries

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Questions?



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