

Paediatric Trauma



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- Trauma remains a leading cause of avoidable death in children and adolescents worldwide.
- Some of the important differences for children in ATLS are :
 - Avoid overextension of the neck which can obstruct the airway.
 - Use a Broselow tape if the weight is not known.
 - Blood pressure is often normal until >25% of the circulating blood volume is lost.
 - Cardiorespiratory arrest is usually due to hypoxia and not vascular disease.
 - Non-operative management is often possible for splenic and liver injuries.



Resuscitation

- Fluids are given intravenously for children for the following reasons:
 1. Circulatory support in resuscitating vascular collapse
 2. Replacement of previous fluid and electrolyte deficits
 3. Replacement of ongoing losses
 4. Maintenance outside neonatal period
 5. Maintenance in the neonate
- High-flow oxygen is required if there is cardiorespiratory compromise, and endotracheal intubation and ventilation are required if oxygenation is inadequate, to control a flail chest or in children with a serious head injury (Glasgow Coma Scale score ≤ 8).



- Seriously injured children require two large peripheral intravenous cannulae.
- The following veins can be used: long saphenous at the ankle, femoral, external jugular and, in babies, scalp veins.
- Central venous access should only be attempted by an expert.
- Intraosseous infusion, however, is straightforward and particularly useful in children.



- A major spinal cord injury can be present in a child without radiographic abnormalities.
- After major trauma, a cervical spine injury should be assumed and the neck immobilized until cross sectional imaging 'clears' the spine.
- Other considerations include intravenous analgesia and, in the unconscious or ventilated child or those with major abdominal injuries, a nasogastric tube and a urethral catheter (if no evidence of a urethral injury).



Secondary survey and emergency management

Chest Trauma

- Children have elastic ribs that rarely fracture but deformation causes lung contusions.
- A major thoracic injury may exist despite a normal chest radiograph. The airway is secured, oxygen is given and hypovolaemia is corrected.



- A tension pneumothorax should be suspected clinically before the chest x-ray (CXR) is requested and immediate needle thoracocentesis (second intercostal space, mid-clavicular line) performed.
- A chest drain is then placed.
- Massive haemothorax needs a chest drain.
- Cardiac tamponade may follow blunt or penetrating injury and requires emergency subxyphoid needle pericardiocentesis.
- The role of emergency department thoracotomy (EDT) in major chest trauma in children remains controversial.
- Diaphragmatic rupture after blunt abdominal trauma is detected by chest radiography or computed tomography (CT) scan; surgical repair is undertaken once the patient is stable.



Abdomen

- Blunt trauma is more common than penetrating trauma.
- The liver and spleen are more vulnerable in children, being less well protected by the rib cage.
- The abdomen is inspected for patterned bruising from seatbelts or tyres.
- Compression will have been against the rigid skeleton.
- Intra-abdominal or intrathoracic bleeding should be considered promptly in the shocked child if external bleeding has not been profuse.
- Plasma amylase levels may be normal despite pancreatic injury.



Imaging

- Focused assessment with sonography for trauma (FAST) looks for fluid in the perihepatic and hepatorenal space, the perisplenic area, the pelvis and the pericardium.
- It has a role in children but it does not detect solid organ injuries or replace CT.
- In the haemodynamically stable child a CT scan with IV contrast is required.
- Bowel perforation or deep penetrating trauma requires a laparoscopy or laparotomy.
- Isolated blunt splenic and/or liver injuries identified on a CT scan can be safely and effectively managed non-operatively in the majority of children, so avoiding surgery and the long-term risks of splenectomy.



- Ongoing intra-abdominal bleeding requires a laparotomy, though angiography and arterial embolisation can be useful in some.
- Bile leaks are uncommon and can usually be managed by an interventional radiological technique.
- Uncomplicated unoperated cases of liver/spleen trauma can be discharged after 5–7 days but activity is restricted for 3–6 weeks and contact sports avoided for 2–3 months.
- Blunt renal trauma can be managed conservatively but an acutely non-functioning kidney following abdominal trauma may need urgent exploration with a view to revascularisation.



Patterns of injury

- **Lap belts:** the small intestine or lumbar spine.
- **Bicycle handlebars:** pancreatic, duodenal, mesenteric or liver trauma.
- **Straddle injuries:** the urethra and pelvis.
- **Run-over injuries:** severe crushing of the chest and/or abdomen.

