

Abdominal Injuries in Children

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Paediatric Trauma Guidelines

Abdominal injuries

Background

Abdominal contents in children are very susceptible to injury. Compared to adults:

- Abdominal wall is thin and ribs are elastic, offering little protection.
- Liver and spleen lie lower and more anteriorly.
- Kidneys are more mobile
- Bladder is intra-abdominal, not pelvic

However, children have better vasoconstrictive responses so **bleeding tends to be self-limiting.**

Blunt trauma causes the majority of abdominal injuries in children:

- High impact / deceleration injuries
- Direct blows to the abdomen (consider **non-accidental injury**)
- Seat-belt injuries (duodenum or pancreas)
- Bicycle handlebar injuries to upper abdomen (duodenum or pancreas)
- Straddle injuries (perineum, vagina or urethra)

Penetrating injuries (stabbing, foreign bodies, gunshot wounds) are rare but can cause life-threatening injuries

- Never remove penetrating objects in the ED
- Urgent Paediatric Surgery assessment is indicated

In infancy, **non-accidental injuries** remain an important cause. If senior clinician has concerns that injury may have been inflicted (you do not have to be certain) – discuss with social care / police as soon as possible, **EVEN IF CHILD IS RETRIEVED.**

The Named / Designated Doctor should be informed for all suspected non-accidental abdominal injuries, whether admitted to RACH or retrieved.

Common treatment principles

The majority of children with abdominal injuries are managed conservatively with:

- Fluid resuscitation
- Analgesia
- Observation, continuous monitoring and frequent reassessment

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- Immediate availability of a Paediatric Surgeon should the child require operative intervention.

Consider the need for operative intervention – in consultation with the Paediatric Surgery team in cases with:

1. Refractory shock
2. Penetrating injuries
3. Signs of bowel perforation.

Children with a history of significant trauma or high impact trauma should be admitted for observation even in the absence of examination findings.

Some children with multiple injuries may require secondary transfer to a Paediatric MTC. The decision will lie with the Paediatric Surgery team, in conjunction with the Paediatric HDU Consultant.

Management

On arrival to the ED, assess and deal with airway, breathing, circulation and disability as per APLS guidelines.

Airway (c-spine) and breathing

- protect C-spine if mechanism of injury suggests the possibility of cervical spine injury. Start with manual in-line stabilisation. If this is not possible, use head block and strapping. Get patient off spinal board ASAP. Nurse flat with spine in alignment. Log-roll to move patient.
- If spontaneously breathing, administer high flow oxygen
- Intubate and ventilate if:
 - Severe respiratory distress
 - Haemodynamic instability
 - Depressed conscious state
- Measure oxygen saturations, respiratory rate, and blood gas

Circulation

- Assess and monitor heart rate, blood pressure and capillary return
- Insert large bore intravenous cannula (ideally x 2). If unable, gain I.O access.

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- Take blood for FBC / U&Es / lipase or amylase / LFT / clotting screen / cross-match / blood gas
- If circulation is inadequate give fluid bolus(es)
 - 10 ml/kg crystalloid in first instance then warmed blood in 10 ml/kg aliquots. Assess response after each aliquot
 - The Paediatric Surgical team must be involved as soon as it is clear that 20 ml/kg has not stabilised the child
 - Activate the massive haemorrhage protocol if 40 ml/kg has not stabilised the child
- If signs of circulatory compromise, especially if history consistent with abdominal injury, examine abdomen during primary survey. Otherwise, leave to secondary survey.

Disability

- Assess and monitor GCS, pupils and blood sugar
- Check core temperature
- Analgesia

Strongly consider insertion of a nasogastric or orogastric tube as acute gastric dilatation from air swallowing may compromise respiratory function and mimic intra-abdominal pathology.

Abdominal examination

Ensure the child is calm and relaxed (presence of carers) and provide appropriate explanation, reassurance and analgesia.

Inspection

- Bruising (seatbelt or handlebar), lacerations, penetrating wounds
- Distension – suggests blood or fluid, intestinal perforation, gastric distension
- Urethral meatus for blood and perineum for bruising.

Palpation

- Tenderness
- rigidity / generalised guarding – peritonitis, usually from massive bleeding or perforation

PV or PR examination is rarely required. If performed, should be by operating Surgeon.



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Always perform urinalysis

Specific injuries

Liver injuries

- Contusion, haematoma, laceration, haemorrhage
- Posterior segment at right lobe at site of ligament attachment
- CT scan diagnosis

Treatment

Majority can be managed conservatively

- Decision will lie with Paediatric Surgical team.
- Fluid resuscitation and close observation with bed rest
- If admitted to RACH, nurse on HDU
- Analgesia is extremely important – consider PCA / NCA
- May require transfer to Paediatric MTC.

Persistent bleeding requiring Interventional Radiology necessitates secondary transfer, as IR for children is not available at BSUH.

Splenic injuries

- Contusion, haematoma, laceration, haemorrhage, shattering, rupture
- CT scan diagnosis

Treatment

Majority can be managed conservatively

- Decision will lie with Paediatric Surgical team.
- Fluid resuscitation and close observation with strict bed rest.
- If admitted to RACH, nurse on HDU with continuous monitoring and repeated clinical examination
- Analgesia is extremely important – consider PCA / NCA
- Give pneumococcal vaccination and start penicillin prophylaxis

Length of stay related to clinical stability and resolution of signs and symptoms.

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Indication for laparotomy

- Haemodynamic instability despite resuscitation

Bowel injuries

- Uncommon. Mechanisms
 - Rapid deceleration injuries causing shear
 - Abdominal crush injuries e.g. lap seat belt
 - Penetrating injuries
 - Bicycle handlebar injuries (duodenum with associated pancreas injuries) and seat belt
- Intramural haematoma without perforation, or acute or delayed perforation
- Requires high index of suspicion of intestinal injury. Diagnosis is often delayed.
- CT findings: unexplained free fluid, wall thickening, dilated bowel loops, free air

Treatment

- Decision will lie with Paediatric Surgical team.
- If admitted to RACH, nurse on HDU with continuous monitoring and repeated clinical examination
- Analgesia is extremely important – consider PCA / NCA

Intramural haematoma:

- Conservative management with NGT, bowel rest – consider TPN

Perforation:

- Urgent laparotomy
- Perforation can be delayed if there is an area of devascularisation with the trauma.

Renal injuries

- Rarely isolated injury
- Mechanisms
 - Direct blow: parenchymal contusion or hematoma
 - Rapid deceleration: collecting system injury
 - Renal artery injury: urgent operative repair
- Bruising in the renal area, frank or microscopic haematuria

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Treatment

Majority can be managed conservatively

- Decision will lie with Paediatric Surgical team.
- Fluid resuscitation and close observation with bed rest
- If admitted to RACH, nurse on HDU with continuous monitoring and repeated clinical examination
- Analgesia is extremely important – consider PCA / NCA
- May require transfer to Paediatric MTC.

Length of stay related to clinical stability and resolution of signs and symptoms.

Indication for laparotomy

- Haemodynamic instability despite resuscitation
- Massive transfusion requirement

Bladder and Ureteric injuries

- Mechanisms
 - Deceleration injury
 - Blow to lower abdomen when bladder full
- Bruising in suprapubic region, blood at the external urethra
- Extraperitoneal extravasation or intraperitoneal rupture
- Failure to pass urine
- Contrast enhanced CT and delayed plain film

Treatment

- Decision will lie with Paediatric Surgical team.
- If admitted to RACH, nurse on HDU with continuous monitoring and repeated clinical examination
- Analgesia is extremely important – consider PCA / NCA
- May require transfer to Paediatric MTC.

Pancreatic injuries

- Uncommon
- Compression against vertebra or blow to flank

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Treatment

Majority can be managed conservatively

- Decision will lie with Paediatric Surgical team.
- If admitted to RACH, nurse on HDU with continuous monitoring and repeated clinical examination
- Analgesia is extremely important – consider PCA / NCA
- May require transfer to Paediatric MTC.