

## PEDIATRIC BLUNT ABDOMINAL TRAUMA: A CASE SERIES

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### ABSTRACT

Blunt abdominal trauma is a major cause of morbidity in children and commonly results from road traffic accidents, falls, and direct impacts. Because of anatomical factors such as thinner abdominal walls, reduced protective fat, and relatively larger solid organs, children are more susceptible to significant intra-abdominal injury even when external signs are minimal. Clinical presentation is often subtle, making early diagnosis challenging and emphasising the importance of careful examination and timely imaging. Focused Assessment with Sonography for Trauma (FAST) serves as a rapid bedside tool to detect intraperitoneal free fluid, while contrast-enhanced computed tomography remains the standard for defining the type and grade of injury and guiding management. Treatment is determined by haemodynamic status: hollow viscus perforation and active bleeding require urgent surgical intervention, whereas most solid organ injuries in stable children can be managed non-operatively with close monitoring. High-grade liver injuries may need damage-control measures such as packing, followed by observation, and pancreatic injuries with ductal involvement can often be treated conservatively with serial clinical, biochemical, and imaging assessment. Early recognition, stability-based decision-making, and adherence to current paediatric trauma guidelines are key to reducing complications and improving outcomes. This case series describes five children with blunt abdominal trauma, highlighting their clinical presentation, imaging findings, management strategies, and outcomes at our centre.

## INTRODUCTION

Trauma is a major cause of morbidity and mortality in children, and blunt abdominal trauma accounts for a large proportion of paediatric abdominal injuries.<sup>[1,2]</sup> Road traffic accidents, falls, and accidental impacts are common mechanisms in both urban and rural settings.<sup>[1,3]</sup> Children are more prone to intra-abdominal injury due to thinner abdominal walls, less protective fat, and relatively larger solid organs than adults.<sup>[1]</sup> The presentation is often subtle, and significant internal injury can occur even when external signs are minimal.<sup>[1,4]</sup> Early diagnosis and careful clinical evaluation are essential to reduce complications and mortality in paediatric trauma. Focused Assessment with Sonography for Trauma (FAST) and contrast-enhanced CT are reliable imaging methods for detecting intra-abdominal injuries and guiding treatment decisions.<sup>[1,5]</sup> Many hemodynamically stable children with blunt abdominal trauma can be treated, while bowel

perforation, active bleeding, or instability require urgent surgical management.<sup>[6,7]</sup> This case series describes the range of clinical presentations, imaging findings, and management outcomes of blunt abdominal injuries in five children treated at a tertiary care centre in Salem.

### CASE PRESENTATION

#### Case 1:

A 12-day-old male child presented with a history of a road traffic accident while travelling with the family. The baby developed multiple episodes of vomiting and abdominal distension. On examination, the baby showed poor cry and activity, was on mechanical ventilator support, had dehydration, tachycardia with a heart rate of 168 beats per minute, abdominal distension with absent bowel sounds, and faecal staining on per rectal examination. These findings suggested severe intra-abdominal injury, peritonitis, and shock. After initial resuscitation with intravenous (IV) fluids and continued ventilatory support, a plain radiograph confirmed the diagnosis

of pneumoperitoneum (Figure 1). Emergency exploratory laparotomy revealed a gastric perforation (Figure 2). Primary repair of the perforation was also performed.



**Figure 1: Plain radiograph showing pneumoperitoneum**



**Figure 2: Intraoperative view of gastric perforation.**

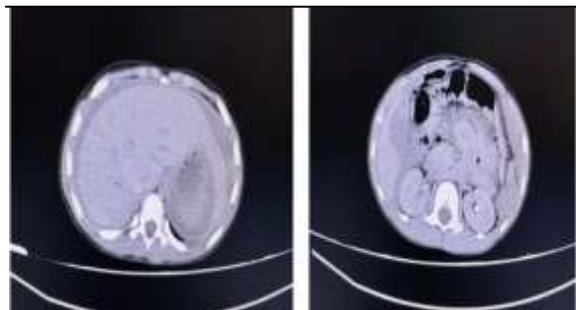
**Case 2:**

A 9-year-old boy presented with a history of an accidental fall over a stone after lunch. The patient developed abdominal pain with distension since the incident and had one episode of vomiting. On examination, the general condition was fair, with no signs of dehydration. The heart rate was 126 beats/min. The abdomen was distended, and bowel sounds were absent. A per-rectal examination revealed faecal staining. An emergency FAST scan revealed moderate free fluid in the pelvis with echogenic material (Figure 3). Contrast-enhanced computed tomography (CECT) of the abdomen and pelvis was performed to further evaluate the injury

(Figure 4). Emergency exploratory laparotomy was performed, which confirmed a perforation 10 cm distal to the duodenojejunal (DJ) flexure (Figure 5). Primary repair of the perforation was also performed.



**Figure 3: Plain radiograph of the abdomen.**



**Figure 4: Axial sections of CECT abdomen and pelvis**

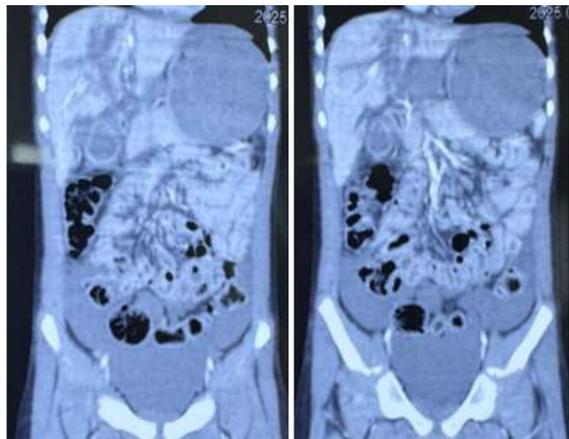


**Figure 5: Intraoperative photograph demonstrating jejunal perforation 10 cm distal to the DJ flexure**

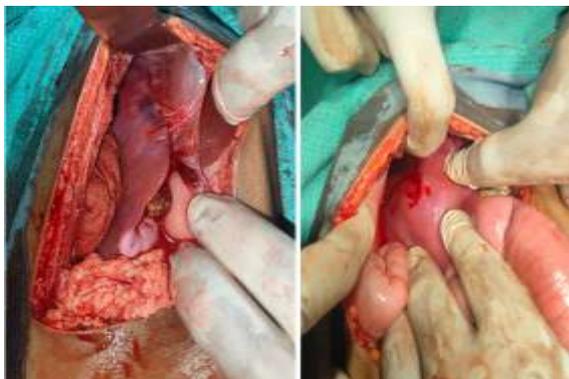
**Case 3:**

A 7-year-old girl presented following a road traffic accident in a mass casualty event. The patient developed epigastric abdominal pain. There was no history of abdominal distention, nausea, or vomiting. On examination, the general condition was fair. The heart rate was 134 bpm, and oxygen saturation was

99%. Abdominal examination revealed soft tenderness in the epigastric and right hypochondrial regions with bowel sounds. A per-rectal examination revealed faecal staining. Emergency FAST scan revealed moderate free fluid in Morrison's pouch and the pelvis. Emergency CECT of the abdomen and pelvis confirmed a grade 5 liver laceration (Figure 6). Intraoperatively, active bleeding from the grade 5 liver laceration was observed (Figure 7). Packing was applied to control the haemorrhage, and once bleeding was minimised, coagulation was achieved. After surgery, the child was monitored using an ultrasound to identify any intra-abdominal free fluid. The patient remained hemodynamically stable without further intervention and was discharged in good condition.



**Figure 6: Emergency CECT abdomen and pelvis showing grade 5 liver laceration**

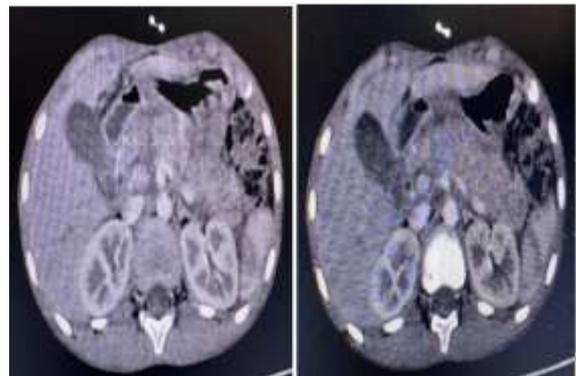


**Figure 7: Intraoperative views of the liver injury and packing.**

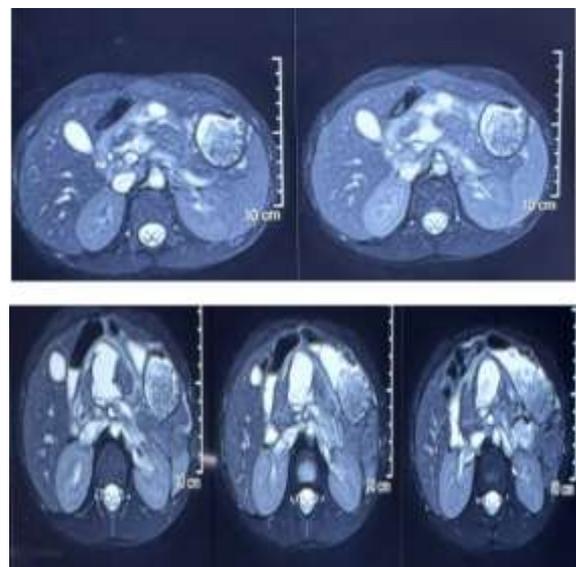
#### Case 4:

A 9-year-old male child presented with pain in the epigastric region due to an accidental hit on a standing bike. The patient had a history of nausea, and there was no history of fever, vomiting, abdominal distension, melena, or constipation. On examination, the general condition was fair. Heart rate was 94 bpm. Abdominal examination showed soft tenderness over the epigastric region with no guarding, rigidity, or palpable mass. Per-rectal examination was normal. Ultrasound revealed a focal collection near the head and body of the pancreas,

suggestive of pancreatic injury. Triple-phase CECT confirmed AAST grade 2 pancreatic injury near the head of the pancreas with a collection measuring  $3.4 \times 2.6$  cm, likely a pseudocyst (Figure 8). Magnetic resonance cholangiopancreatography (MRCP) showed an impression of AAST grade 4 pancreatic injury with contrast extravasation and pseudocyst formation measuring  $4 \times 3.2$  cm (Figure 9). During the hospital stay, he developed one episode of acute pancreatitis, which was treated with IV fluids and analgesics. Serial pancreatic enzyme profiles were monitored, and treatment was adjusted accordingly. The patient improved symptomatically and hemodynamically and was discharged in stable condition without complications.



**Figure 8: Triple-phase CECT abdomen showing AAST grade 2 pancreatic injury with collection**



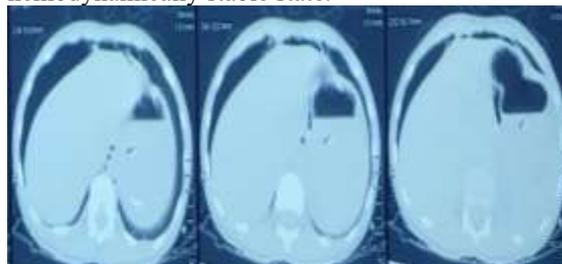
**Figure 9: MRCP images demonstrating AAST grade 4 pancreatic injury, contrast extravasation, and pseudocyst ( $4 \times 3.2$  cm).**

#### Case 5:

A 10-year-old male child came with the history of a road traffic accident one day back and showed complaints of abdominal pain and distension since the incident. There was no history of nausea, vomiting, constipation, or melena. On examination, the general condition was fair, afebrile, and hydrated. In the per abdomen examination, the abdomen was

soft with tenderness in the right hypochondrium region. There was no guarding or rigidity. Per-rectal examination was normal. Emergency FAST scan showed moderate free fluid in the right Morrison's pouch and pelvis. A CECT of the abdomen and pelvis was performed and showed a confirmed grade 3 liver laceration with mild to moderate hemoperitoneum (Figure 10). The child was hemodynamically stable throughout the hospital stay. He was managed conservatively with close monitoring, serial ultrasounds to assess for any increase in hemoperitoneum, intravenous fluids, analgesics, and bed rest. No surgical or interventional procedure was required. The patient remained stable without

complications and was discharged in a hemodynamically stable state.



**Figure 10: Axial sections of CECT abdomen and pelvis showing grade 3 liver laceration with mild to moderate hemoperitoneum**

**Table 1: Summary of all cases**

Case	Age/Sex	Mechanism of Injury	Main Clinical Findings	Imaging Findings	Diagnosis	Management	Outcome
Case 1	12d/M	Road traffic accident	Vomiting, distension, tachycardia (168 bpm), absent bowel sounds, faecal staining	X-ray: pneumoperitoneum	Gastric perforation	Emergency laparotomy and primary repair	Recovered, discharged stable
Case 2	9y/M	Fall over a stone	Abdominal pain, distension, absent bowel sounds, faecal staining	FAST: free fluid with echoes; CECT abdomen	Jejunal perforation (10 cm distal to the DJ flexure)	Emergency laparotomy and primary repair	Recovered, discharged stable
Case 3	7y/F	Road traffic accident	Epigastric pain, tenderness, HR 134 bpm, FAST free fluid	CECT: Grade 5 liver laceration	Severe liver injury	Laparotomy with packing and coagulation	Stable, discharged in good condition
Case 4	9y/M	Direct blow from a standing bike	Epigastric tenderness, nausea	USG: pancreatic collection; CECT: Grade 2 injury; MRCP: Grade 4 injury with duct leak and pseudocyst (4 × 3.2 cm)	Pancreatic injury with pseudocyst	Conservative (IV fluids, analgesics, enzyme monitoring)	Improved, discharged stable
Case 5	10y/M	Road traffic accident	Abdominal pain, distension, right hypochondrial tenderness	FAST: free fluid; CECT: Grade 3 liver laceration with hemoperitoneum	Liver laceration	Conservative (monitoring, IV fluids, analgesics, bed rest)	Stable, discharged without complications

## DISCUSSION

Blunt abdominal trauma causes most abdominal injuries in children.<sup>[1]</sup> Single-centre case series are useful for showing local patterns and clinical problems. We treated five children aged from 12 days to 10 years at our centre in Salem. Road traffic accidents caused three cases, falls onto stones caused one, and a bicycle impact caused one. Two children required laparotomy for perforation, while the other three received non-operative care.

A 12-day-old neonate presented with tachycardia, dehydration, abdominal distension, absent bowel sounds, and faecal staining on rectal examination. The X-ray showed pneumoperitoneum. Laparotomy confirmed gastric perforation, which was managed primarily by the surgical team. This presentation and operative primary repair match hollow viscus perforations in children, where gastric injuries remain rare but require urgent surgery for peritonitis signs, such as absent bowel sounds and faecal staining. In one of our cases, a boy fell on a stone and developed

abdominal distension and absent bowel sounds. The absence of bowel sounds and distensions are important sign of peritonitis. Laparotomy revealed jejunal perforation 10 cm distal to the duodenojejunal flexure, which was primarily repaired. Jejunal perforations in blunt trauma commonly occur near the duodenojejunal flexure and usually present with distension and free fluid on FAST.<sup>[1,7]</sup> Since the surrounding tissue was healthy enough to hold a stitch, primary repair or suturing of the hole and the contamination was managed quickly.

One of our patients had a grade 5 liver laceration after a road traffic accident. Surgery revealed active bleeding, which was controlled by packing and coagulation. Follow-up ultrasound showed no increase in free fluid, and the patient was discharged in stable condition. Children with high-grade liver lacerations (grade 5) undergo packing for haemorrhage control when active bleeding is found at laparotomy, followed by serial ultrasound monitoring and nonoperative management if stable, consistent with current guidelines.<sup>[2,8]</sup> A 9-year-old

boy with tenderness after a direct blow to the upper abdomen was diagnosed with a grade 3 liver laceration with hemoperitoneum. Imaging revealed pancreatic injury with duct disruption and a pseudocyst. Pancreatic trauma with initial CT grade 2 upgraded by MRCP to grade 4 (duct leak, pseudocyst) resolves non-operatively in stable children using serial enzyme monitoring and supportive care. The Pseudocyst is a collection of pancreatic fluid and enzymes that has leaked out and been walled off by surrounding tissue. If these enzymes become active, they can begin to digest the surrounding fat and tissue, which can cause acute pancreatitis.<sup>[1,5]</sup> Similarly, the patients developed one episode of acute pancreatitis, which was treated with intravenous fluids and analgesics, and enzymes were monitored throughout the hospital stay. Bedside signs such as distension, tenderness, absent bowel sounds, or faecal staining led to FAST ultrasound in four cases, which showed free fluid. CT helped grade the solid organ injuries, while MRCP detected the pancreatic duct injury. Management depended mainly on hemodynamic stability: perforations required primary repair, and stable solid organ injuries were treated non-operatively, in line with the APSA 2023 guidelines.<sup>[8]</sup> The 2024 review records non-operative success in most stable children. Early recognition of clinical signs, timely imaging, and stability-based decision-making were key to favourable outcomes in our series.

## CONCLUSION

Blunt abdominal trauma in children shows a varied presentation, from bowel perforation to solid organ injury. Careful clinical examination and early imaging with FAST and CT helped identify injuries in our series. Hemodynamic status guided management: perforations required surgery, while

stable liver and pancreatic injuries were treated conservatively. All five children recovered without major complications. These findings support early assessment, appropriate imaging, and individualised treatment to achieve good outcomes in paediatric blunt abdominal trauma.

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