PENETRATING LIVER INJURIES IN CHILDREN

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Aims

Guidelines for blunt solid organ injury are well described for children. There is a paucity of evidence for the management of penetrating solid abdominal organ injury (PSAOI) in children. We present our experience in the management of penetrating liver injury in children.

Methods

A retrospective review of patients aged <16 years who sustained PSAOI was carried out using a prospectively maintained database of major trauma activations at our centre between 2007 and 2016. Data collected included: patient demographics, mechanism of injury (MOI), concurrent injuries, investigations, management, outcome, complications, length of stay and mortality.

Results

99 children sustained penetrating injuries to the abdomen over the last 10 years. 11 patients suffered penetrating liver injury (other PSAOI include 4 renal, 0 spleen). 10 (91%) were male, median 15 years (range 2-15). MOI: stab (10/11; 91%) and gunshot wound (1/11; 9%). Median ISS 9.5 (range 4-29). Median grade of liver injury AAST 3 (range 1-4). All patients suffered concurrent injuries and most patients (n=9; 82%) required surgical intervention. 1 (8%) patient required laparotomy for active bleeding from liver injury (Figure 1). 1 suffered pre-hospital traumatic cardiac arrest and died in ED (mortality rate 1/11; 8%). 5 (50%) required PICU admission with median length of stay 2 days. Median length of total inpatient stay was 6 days (3-46). 1 patient developed a bleeding pseudo-aneurysm (found on routine follow-up CT day 7 post injury), which required 2 episodes of angio-embolisation. No patients developed bile leak.

Conclusion

The liver is a commonly affected solid organ in penetrating abdominal injuries. Concurrent injuries may require operative intervention, however liver injuries with stable physiological parameters can successfully managed conservatively. Injury may be complicated with pseudo-aneurysm formation for which follow up imaging is recommended.

Figure 1. Penetrating Liver Injury in Children (ALTERNATIVE REPRESENTATION OF DATA BELOW)

Patient	Sex	Age (years)	MOI	CT abdo	Liver AAST Grade	ISS	Concurrent injuries	Surgical intervention	ITU (days)	Total LOS	Outcome/ complications
1	M	15	Stabbing: Chest, abdomen	N	-	29	Cardiac tamponade, ventricular injury	N	-	-	Died in ED
2	M	14	Stabbing: Epigastrum	Y	2	4	Bleeding from abdominal wall	Exploratory laparotomy D1 post-injury for peritonism: haemoperitoneum, active bleeding from abdominal wall, no active bleeding from liver laceration	2	7	Alive
3	M	14	GSW: Multiple	Y	3	8	Multiple pellets within: kidney, rectal wall, spinal canal, soft tissue/ bony structures of pelvis/ lower limb. Upper limb fracture	Sigmoidoscopy + removal of rectal wall pellets	4	12	Alive
4	F	11	Stabbing: Chest, abdomen	Y	1	10	Bowel evisceration, perforation of stomach, small bowel. Renal laceration (grade 3). Haemothorax.	Exploratory laparotomy, repair of perforations, closure of wounds	2	46	Alive
5	M	15	Stabbing: Abdomen, upper/ lower limbs	Y	3	18	Renal lacertation (grade 4), rib fracture, upper limb tendinous/ muscle injury and lower limb laceration	Repair of upper limb tendons/ muscles. Exploration/ closure of lower limb wound	-	7	Alive
6	M	15	Stabbing: Abdomen, upper limb	N	2	4	Bowel evisceration	Exploratory laparotomy, intraoperative finding of liver laceration, closure of wounds	-	5	Alive
7	M	15	Stabbing: Epigastrum	Y	3	5	Abdominal wall wound, forearm laceration	Local exploration and closure of abdominal wall and forearm wound	-	3	Alive
8	M	15	Stabbing: Back, upper limb	Y	2	19	Haemopneumothorax, forearm laceration	Chest drain insertion (in ED). Local exploration and closure of trunk/ forearm wound	1	5	Alive
9	M	14	Stabbing: Abdomen	Y	4	25	Bowel evisceration, haemopneumothorax	Exploratory laparotomy, packing of liver, closure of wounds, chest drain insertion	-	8	Pseudo-aneurysm (embolisation x2)
10	M	12	Stabbing: Chest/ abdomen	Y	2	13	Omental evisceration, haemothorax	Exploratory laparotomy, closure of wounds	-	9	Alive
11	M	2	Stabbing: Epigastrium	Y	4	25	Haemothorax	N	1	4	Alive

Figure 2. Summary of concurrent injuries and indications for operation

Associated injury	No. of patients
Cardiac tamponade	1
Gunshot pellets lodged in rectal wall, spine, other bony structures and soft tissue	1
Evisceration of bowel/ omentum	3
Renal injury	3
Haemo/ pneumothorax	5
Rib fracture	1
Limb fracture	1
Limb tendon/ muscle injury	1