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Cholecystorrhaphy in a school child with a gallbladder perforation following blunt abdominal trauma: a case report.

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Abstract

Gallbladder injuries following blunt abdominal trauma commonly occurs when the liver or spleen is also injured. Usually, a thin-walled normal distended gallbladder is injured when significant compression and shearing forces are applied to the abdomen from motor vehicular crashes, falls from heights and direct blows to the abdomen. The case of an 11-year-old male primary four pupil who sustained laceration of the gallbladder fundus and splenic laceration involving the hilar vessels following a fall in which he landed on a wooden bench with his abdomen while playing with a classmate was retrospectively reviewed. The diagnostic approach and treatment as well as relevant literature were reviewed. Contrary to the more favoured cholecystectomy intervention, a simple absorbable suture repair (cholecystorrhaphy) was done for the gallbladder laceration as it was intact within its bed in the liver. The patient had a good recovery and has no record of cholelithiasis after 3 months of follow-up. We recommend that cholecystorrhaphy should be done for simple lacerations of the gallbladder which is intact in its bed and that surgeons should have a high index of suspicion for gallbladder injuries in blunt abdominal trauma associated with liver and splenic injuries.

Keywords: Gall bladder, Perforation, Blunt abdominal trauma, Cholecystorrhaphy.

Introduction

Blunt abdominal trauma is physical injury to the abdomen and/or intra-abdominal organs resulting from an external forceful impact on the abdomen without penetration of the body's surface. It is a leading cause of morbidity and mortality among all age groups. The spleen, liver, bowel, kidneys, and pelvic organs can be injured in blunt abdominal trauma with the spleen and liver, the most commonly injured organs. They are most commonly caused by a motor vehicular crash, falls and blows to the abdomen[1]

The occurrence of gallbladder injury following blunt abdominal trauma is very rare and tends to occur in association with another viscera injury, usually the liver or sometimes the spleen.[2–5] It is the latter injury that necessitates a laparotomy in which the gallbladder injury is detected. Isolated gallbladder injury usually go undiagnosed until an exploratory laparotomy is done; hence it manifests significant mortality and morbidity since the treatment is delayed [6–7] .The low incidence of injuries to the gall bladder is due to its anatomic location. It is protected by the liver and the ribs. However, in the instance of a localized forceful blow or impact from rapid shearing acceleration-deceleration forces, the gallbladder becomes prone to injuries.[4,6,8,9] The predisposing factors include a thin-walled normal gall bladder, gall bladder distension (associated with an empty stomach) and alcohol ingestion before the blunt trauma (increases the tone of the Oddi's sphincter thus raising the biliary tract pressure).[4,6,9,10]

The classification of gallbladder injuries was described in detail by Losonaff and Kjossev as shown below:[11]

Type 1A: Contusion with intramural hematoma

Type 1B: Contusion with hematoma

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Type 2: Rupture
Type 3A: Avulsion with partial detachment
Type 3B: Avulsion with complete detachment of the liver but with attachment to the structures of hepatoduodenal ligament (so-called near total cholecystectomy)
Type 3C: Torn only from the hepatoduodenal ligament
Type 3D: Completely torn from all attachments (traumatic cholecystectomy)
Type 4A: Traumatic cholecystitis, secondary to haemobilia
Type 4B: Acute acalculous cholecystitis
Type 5: Mucosal tear with leakage of bile

Case

An 11-year-old male primary four pupil who resides with his grandmother presented to the accident and emergency room on account of generalized abdominal pain which started 8hoursbefore presentation following a fall in which he landed on a wooden bench with his abdomen while playing with a classmate in his classroom.

He immediately felt a sharp abdominal pain in the periumbilical region which subsequently became generalised after a few hours, aggravated by movement and relieved by lying still. There was associated dizziness and generalized weakness, there was no vomiting, abdominal distension, haematochezia, haematurialoss of consciousness, craniofacial bleeding, limb deformity and no other obvious injuries.

He did not take his breakfast before heading for school on that day. There was no history of any known comorbidity.

On physical examination, he was pale with tachycardia. He had abdominal distension, generalized abdominal tenderness with rebound tenderness and guarding, hypoactive bowel sounds and anterior rectal wall bogginess and tenderness. There was no other abnormal sign in other regions/systems.

Haematocrit was 21% and abdominal ultrasound confirmed haemoperitonium but did not reveal specific organ injuries. Other investigation reports were not remarkable.

A diagnosis of haemoperitoneum secondary to blunt abdominal trauma was made and he subsequently had an emergency exploratory laparotomy with intraoperative findings of: 1.3litres haemoperitoneum, actively bleeding spleen with laceration involving the hilar vessels(grade IV splenic injury) and 5cm long laceration (rupture) in the fundus of the gallbladder (figure 1); while other organs were grossly normal.

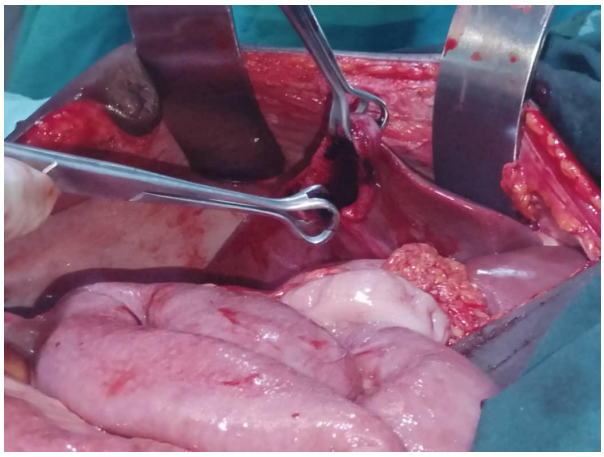

Figure 1: The edges of the lacerated gallbladder fundus are held with two Babcock forceps

The gallbladder injury was repaired in two layers with Vicryl 4/0and splenectomy was done (figure 2).

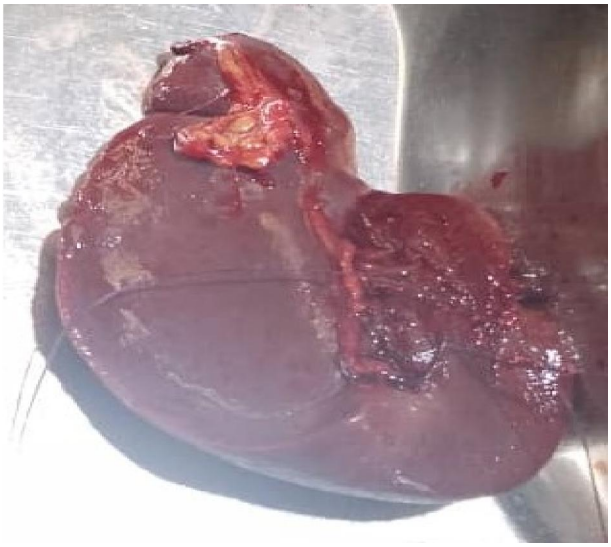

Figure 2: The resected spleen

The peritoneal cavity was lavaged copiously with warm normal saline and a wound drain was left in the subhepatic space. He received two units of blood intraoperatively.

Postoperatively, he was maintained on nil per os and received intravenous fluids, parenteral antibiotics, analgesics and omeprazole. He had a smooth recovery, was commenced on oral intake on the third postoperative day and tolerated well. The wound drain was discontinued on the 4th postoperative day and was discharged home on the 5th postoperative day.

He maintained stable health on follow-up visits to the paediatric surgical outpatient clinic and has since received two doses of pneumococcal vaccine.

Discussion

Gallbladder injuries following blunt abdominal trauma is very rare. Among all the intra-abdominal injuries following blunt abdominal trauma, its incidence has been reported as 0.5±0.6%[11]. The gallbladder is rarely injured because much of it is embedded in the liver substance, cushioned by the surrounding loops of the bowel and shielded by the rib cage.[4,6,13,15]. The spectrum of gallbladder injuries includes contusion, perforation or rupture and avulsion[15]. Gall bladder perforations are commonest, accounting for 3.2% of all the injuries[13].

The mechanism of gallbladder injury in blunt trauma involves compression and shearing forces resulting from motor vehicular crashes, falls from heights and direct blows to the abdomen[4,8,12]. Distension of a normal thin-walled gallbladder at the time of impact is a major predisposing factor to injury.[6,13] In the case presented, the localized forceful impact on landing on a bench with the abdomen must have caused rapid shearing acceleration-deceleration forces which caused the laceration of his likely distended normal gallbladder at the time. Distension of the gallbladder was expected in the patient because he last took food on the previous night before the time of the fall and such a distended gallbladder is more prone to rupture. Many other reports corroborated this mechanism.[4,6,8,9]

The onset of sharp abdominal pain following the fall on the abdomen can be explained by the bile spillage into the peritoneum resulting in biliary peritonitis.[6] However, the rapidity in the progression of intensity and generalized nature of the abdominal pain as well as the subsequent progressive abdominal distension and features of anaemia which the patient manifested are due to haemoperitoneum resulting from the associated grade IV splenic injury. This latter event is responsible for the early presentation of this patient because an isolated injury to a normal, non-infected gall bladder will cause leakage of sterile bile into the abdomen with a likely delayed presentation[4,6,13]. The associated splenic injury in this case further supports the fact that gallbladder rupture following blunt trauma in the absence of other intra-abdominal injuries is extremely rare.[6,13.]

While it has been reported that utilizing imaging modalities like abdominal ultrasound scan, computed tomogram and cholescintigraphy could be useful in identifying gallbladder perforation in some instances; the preoperative abdominal ultrasound scan done in the index case did not help, probably because of the massive haemoperitoneum or observer bias[2,9,13,14]. Plain X-rays and contrast X-rays are of little value in diagnosing gallbladder injury.[4]

While many surgeons offer cholecystectomy for gallbladder rupture and major tears, some recommend closure of simple lacerations of the gallbladder to preserve the organ for further usefulness.[4,6,9,10,14] Considering that the gallbladder was intact within its bed with just a fundal laceration, cholecystorrhaphy was done in the index case.

The spleen plays a key role against infection by encapsulated organisms like pneumococcus, hence pneumococcal vaccine was administered to the patient to prevent pneumococcal infections post-splenectomy.
The patient maintained a steady improvement on out-patient follow-up visits and at the last visit he had a very satisfactory health status. A routine ultrasound examination showed normal gallbladder with no stones.

Cholecystorrhaphy is encouraged for simple lacerations of the gallbladder which is intact in its bed. There should be high index of suspicion for gallbladder injuries in blunt abdominal trauma associated with liver and splenic injuries. Also, injuries to the gallbladder should be excluded by relevant imaging if there is no indication for laparotomy following blunt abdominal trauma. This will help to prevent fatal late presentations of gallbladder injuries.

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