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Case Report

Choleperitoneum secondary to isolated subserosal gallbladder injury due to blunt abdominal trauma – A case report

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ABSTRACT

When dealing with rare traumatic injuries, surgeons might have difficulty diagnosing them and choosing the most appropriate management when no consensus exist on the best course of action. In such circumstances, drawing on the experience of colleagues can be of great value. Traumatic injuries of the gallbladder are unusual and might not be readily identifiable neither in imaging studies nor during surgery. Retrograde cholangiography plays an important role in correctly diagnosing these injuries and guiding decision-making. We report a case of a subserosal perforation due to blunt trauma to the abdomen, which was identified intraoperatively after a trans-cystic retrograde cholangiogram was performed and managed successfully with formal cholecystectomy.

Introduction

Traumatic injuries of the gallbladder are unusual and isolated injuries are even more uncommon. Given its rarity, case reports and case series are the most common type of publication on this topic, with difficult demographic characterization. They are more frequently found associated with other intra-abdominal injuries, mostly due to penetrating mechanism (2.1 %) [1]; it can also occur due to deceleration (avulsion of the gallbladder from the hepatic bed) or contusion (1.9 %) [2]. To the best of our knowledge, two cases were found in the literature involving partial thickness gallbladder perforation with an intact serosa [3,4]. We report a case of such a perforation caused by blunt abdominal trauma.

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Case report

A 39-year-old male presented to the emergency department due to abdominal pain that had begun 24 h after having been assaulted. He reported to have received a single kick in the upper abdominal region. Of note, he had only a history of alcohol abuse, and had been drinking previously to the assault. The patient was hemodynamically stable and in antalgic posture. Upon physical examination, there were signs of peritonitis with diffuse abdominal pain, guarding, and rebound tenderness. Laboratory test results: Hb 11.3 g/dL; Hct 36.4 %; WBC 9322/mm³, with no left shift; platelets 134,000/mm³; urea 22.4 mg/dL; creatinine 0.7 mg/dL; potassium 3.9 mmol/L; sodium 140 mmol/L; total bilirubin 0.57 mg/dL; direct bilirubin 0.45 mg/dL. Computed tomography with intravenous contrast showed abundant free intraperitoneal fluid, with no contrast extravasation, blushing, pneumoperitoneum, or any identifiable injury (Fig. 1).

Due to the abdominal findings on the physical examination and the CT scan, it was decided upon performing an exploratory laparotomy, during which absence of blood was noticed. There was, however, approximately 1 L of bile and bile infiltration of the peritoneum on the entire right upper quadrant (including the right colon, proximal portion of the transverse colon and the gallbladder wall) and retroperitoneum to the right, with mild compression of the adjacent structures (right colon, duodenum, and head of the pancreas) (Figs. 2 and 3).

The gallbladder was dissected, and no obvious bile extravasation or injuries were initially noticed. We proceeded by opening and exploring the omental bursa and then performing Kocher and Cattell-Braasch maneuvers, without any injuries being observed, nor the origin of the bile leak being found.

It was then decided upon performing a cholangiogram through the cystic duct, which showed good contrast enhancing of the common and the intra-hepatic ducts, with free passage of contrast to the duodenum, without any obstruction or extravasation (Fig. 4). Next, a retrograde cholangiogram was performed with contrast inserted into the gallbladder, revealing a layer of contrast between the serosa and muscular wall layers, which was then explored to reveal a small punctiform injury on the gallbladder wall at the fundus (Figs. 5, 6, and 7).

A cholecystectomy was then performed, followed by cavity lavage with saline, and primary abdominal fascial closure, without abdominal drainage.

On the third post-operative day the patient presented with some bulging on the superior abdominal wound region and fascial dehiscence was identified. He was then resubmitted to surgery with closure of the abdominal fascia and allocation of a polypropylene mesh. During the dissection to place the mesh, a small abdominal wall hematoma was noticed between the fascia and the subcutaneous tissue on the right upper quadrant (Figs. 8 and 9). He had a good recovery and was discharged home on the fourth post-operative day.

Discussion and literature review

Gallbladder injuries are rare and usually occur in association with other intra-abdominal injuries [5]. Risk factors are conditions that lead to an increased volume of the gallbladder without thickening of its walls, like fasting, alcohol consumption, and the absence of gallbladder chronic disease [1]. In this case, the patient had a history of alcohol abuse and had been drinking prior to the trauma.

Gallbladder rupture is the most frequent injury, and it may be classified according to its cause, in agreement to the Estêvão-Costa Classification (Table 1) [1,12], or according to the morphology of the injury, in agreement to the Losanoff and Kjossev Classification (Table 2) [1,5,6]. The case reported above consisted in a Type II and 5 injury, respectively.

When in isolation, the diagnosis can be delayed due to the absence or lateness of the beginning of the symptoms, with possible delayed peritonitis caused by the presence of bile in the peritoneal cavity [7,8]. Other possible presentations depend on the type of injury, like massive bleeding from the hepatic bed after gallbladder avulsion; acute cholecystitis can occur due to gallbladder wall hematoma, or cystic or common bile duct obstructions caused by blood clots; jaundice can ensue once biliary pigments from a bile leak start to be reabsorbed through the peritoneum.

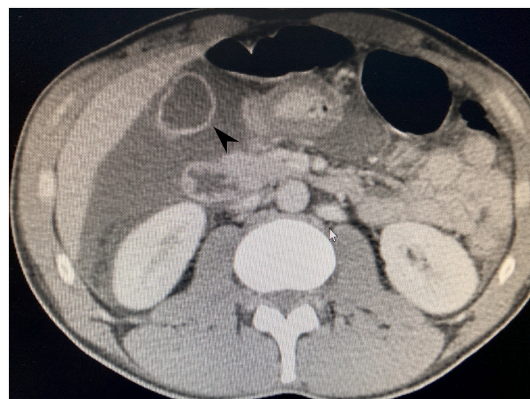


Fig. 1. Computed tomography showing intraperitoneal free fluid on the right side and around the gallbladder (black arrow).

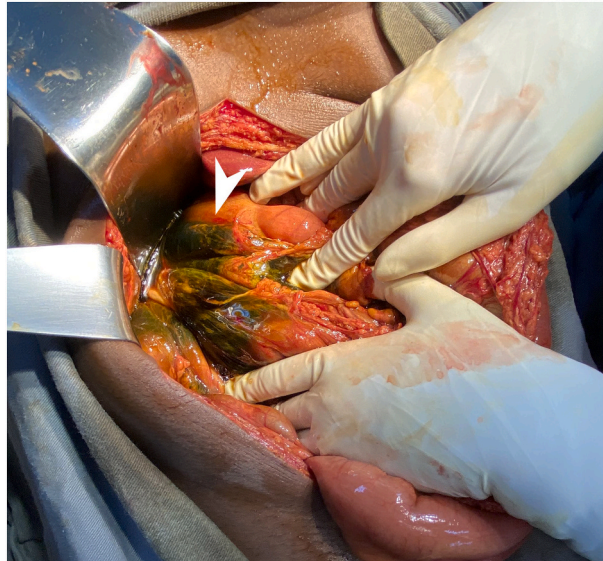


Fig. 2. Bile impregnation of the peritoneum (white arrow).

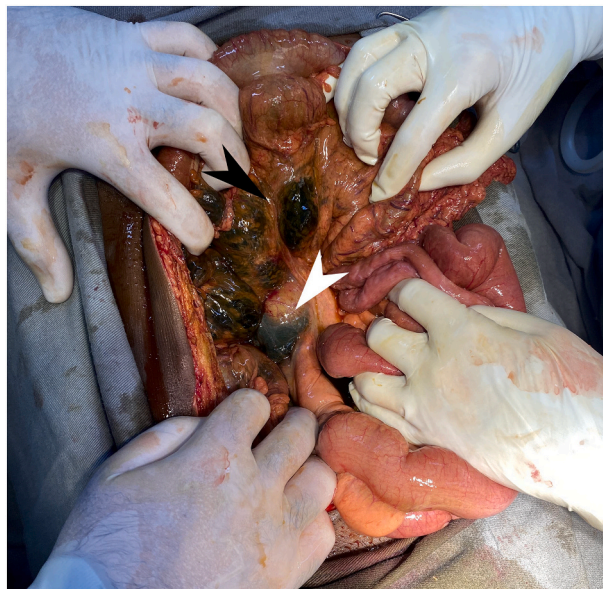


Fig. 3. Bile impregnation of the peritoneum (black arrow) and retroperitoneum (white arrow).

Abdominal ultrasound imaging might be helpful. It can suggest an injury upon identification of gallbladder mobility (after avulsion from the liver bed), presence of hyperechogenic material inside the gallbladder (which might correspond to blood clots), gallbladder wall thickening (when hematoma is present), and pericholecystic fluid (either from bile or blood collection). Some of these findings can also be found on CT scan, including contrast extravasation, when cystic artery injury is present, and free fluid [9–11]. Diagnostic peritoneal aspirate containing bile might also raise an index of suspicion [7].

Patients with free intra-abdominal fluid with no hypovolemic shock or peritonitis might be managed non-operatively and closely observed for the late developing or worsening of symptoms. In the presence of hemodynamic instability, peritonitis or other injuries that require surgery, the treatment can be tailored according to the specific injury [1,2]. When partial avulsion is noted, the gallbladder can be sewn back onto the liver bed (cholecystopexy). When a small perforation is observed, it can be oversewn (cholecystorrhaphy). Gallbladder wall hematomas can be managed conservatively with or without abdominal drainage.

It is our understanding, however, that these options should be reserved for when other injuries that demand more urgent addressing are present, and precious time should be saved if damage control is required. In other circumstances, any injury to the gallbladder



Fig. 4. Transcystic cholangiogram with good passage of the contrast to the duodenum (black arrow) and enhancement of the intra-hepatic bile ducts (white arrow).

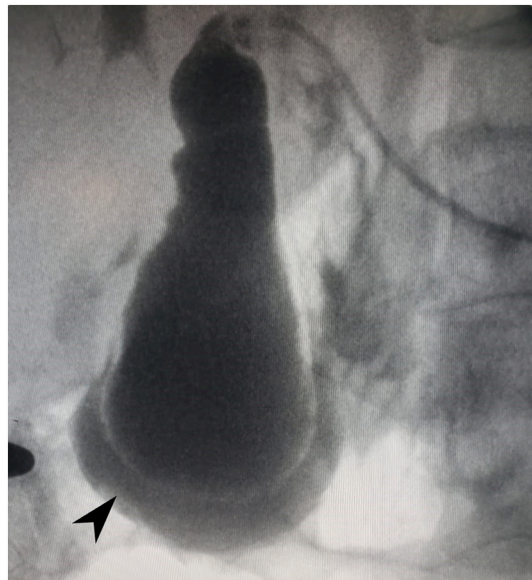


Fig. 5. Transcystic retrograde cholangiogram revealing the subserosal contrast extravasation (black arrow).

should be treated with formal cholecystectomy (with open surgery or laparoscopy), seen that it is a relatively simple procedure and that other types of management have the potential risk of failure, leading to further complications, morbidity, and need for reoperation. When technical difficulty is encountered, however, subtotal cholecystectomy is also acceptable and safe [7–11].

Once the cholecystectomy is done, the need for drainage should be guided according to the presence of other injuries, with no need for drainage when an isolated gallbladder injury is the sole lesion, except when subtotal cholecystectomy is performed. In these cases, abdominal drainage is advised due to the risk of bile leak.

In the present case, after taking into consideration the clinical conditions of the patient and both the laparotomy and cholangiogram findings, it was decided upon performing a cholecystectomy. In similar cases, when antegrade cholangiogram is not conclusive, we recommend performing it either in a transcystic retrograde fashion or by needle puncture, through the fundus of the gallbladder, in

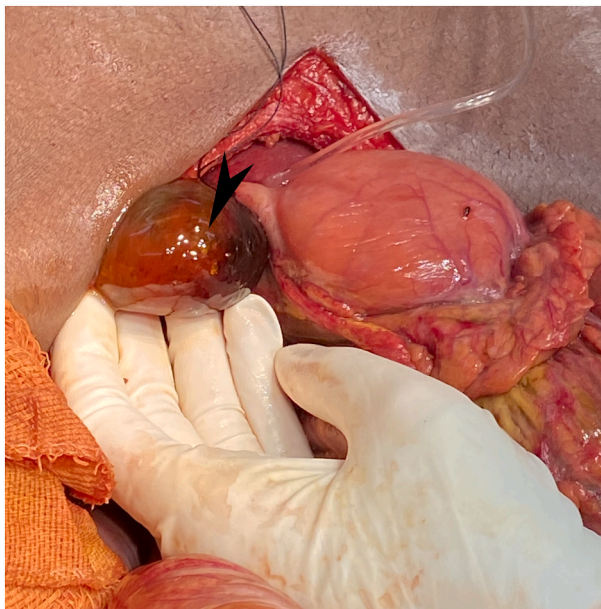


Fig. 6. Punctiform injury of the gallbladder fundus revealing contrast infiltration between the subserosal and the mucosal layers (black arrow).

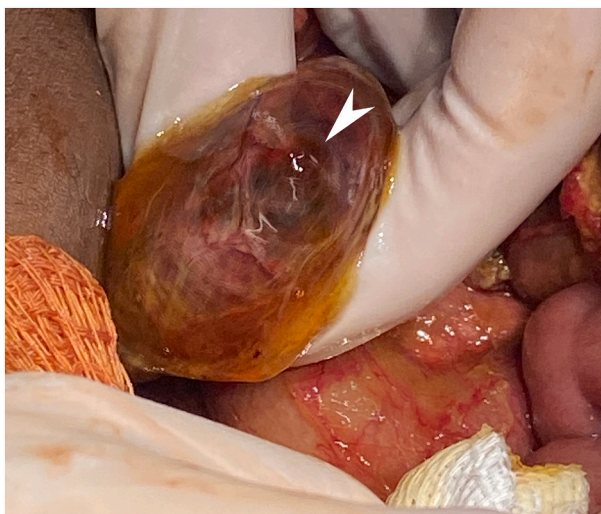


Fig. 7. Exploration of the gallbladder injury revealing a punctiform injury on the muscular layer with contrast extravasation upon opening the serosa (white arrow).

order to increase the chances of a correct diagnosis and, consequently, allow for the most appropriate management.

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Informed consent statement

Express consent in writing was duly obtained from the patient for the publication of this case, as well as its media materials. This case report was submitted for appreciation and approved by the Institutional Review Board.



Fig. 8. Subcutaneous wall hematoma on the right upper quadrant on the gallbladder topography (black arrow).

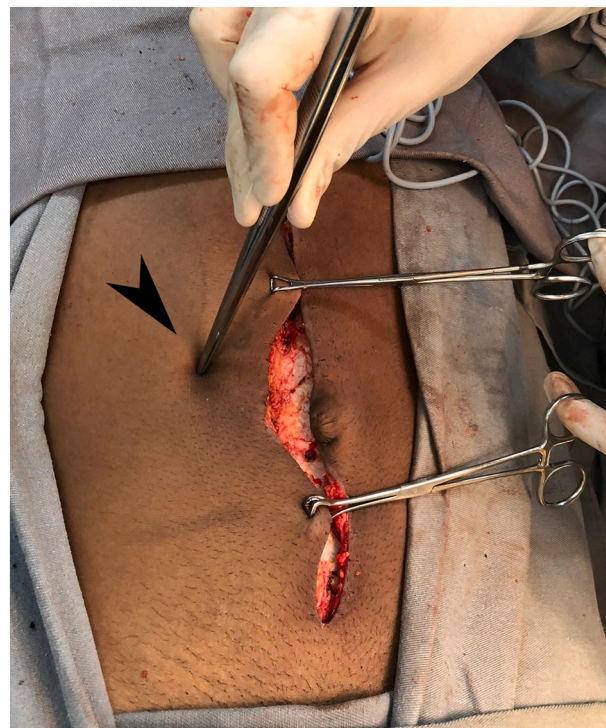


Fig. 9. Subcutaneous wall hematoma on the right upper quadrant on the gallbladder topography coinciding with the location of impact (black arrow).

Table 1
Estêvão-Costa classification of gallbladder injury.

Type	Description	
I - Spontaneous	1	Idiopathic
	2	Secondary:
		- Lithiasis - Inflammation/infection (predisposing factors: diabetes, atherosclerosis, malignancy, pregnancy) - Other (congenital obstruction, <i>Salmonella typhi</i> , anticoagulants, etc.)
II - Traumatic	1	Penetrating
	2	Blunt
III - Iatrogenic		

Table 2
Losanoff and Kjossev classification of gallbladder injury.

Type	Description	Proposed treatment
1A	Contusion + intramural hematoma	Conservative/cholecystectomy
1B	Contusion + intramural haematoma + necrosis + eventual perforation	Cholecystectomy
2	Wall rupture at injury	Cholecystectomy
3A	Partial avulsion	Conservative/cholecystopexy/cholecystectomy
3B	Complete avulsion with hepatoduodenal ligament intact	Cholecystectomy
3C	Hepatoduodenal ligament detached with liver bed intact	Cholecystectomy
3D	Total avulsion/traumatic cholecystectomy	Hemostasis/cytic duct clip
4A	Traumatic cholecystitis	Cholecystectomy + evacuation of haemobilia
4B	Acalculous cholecystitis complicating trauma	Conservative/cholecystectomy
5	Mucosal tear with gallbladder wall intact	Cholecystorraphy/cholecystectomy

Declaration of competing interest

The authors declare no conflict of interest.

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