

## Case Report

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# An uncommon case of blunt traumatic rupture gallbladder: A diagnostic challenge

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## Abstract

Gallbladder injury secondary to blunt abdominal injuries is extremely rare and less than 2% of such cases have been reported. It is usually difficult to perform a clinical diagnosis due to absence of specific clinical symptoms. We present a case of a 31-year-old man with a history of drunk driving leading to a road traffic accident coming to our emergency department with mild pain in the periumbilical region. An accurate diagnosis was made by ultrasound (US) and computed tomography (CT). CT also revealed an injury to the adjacent hepatic segment. The patient was successfully treated with laparotomy and cholecystectomy. Here we discuss the conditions which may predispose to a gall bladder injury and the need for early radiological diagnosis before the signs of biliary peritonitis set in. Timely intervention carries a good prognosis.

**Keywords:** Bilio-hemoperitoneum, Blunt trauma, Cholecystectomy, Gallbladder rupture, Hepatic laceration.

## Introduction

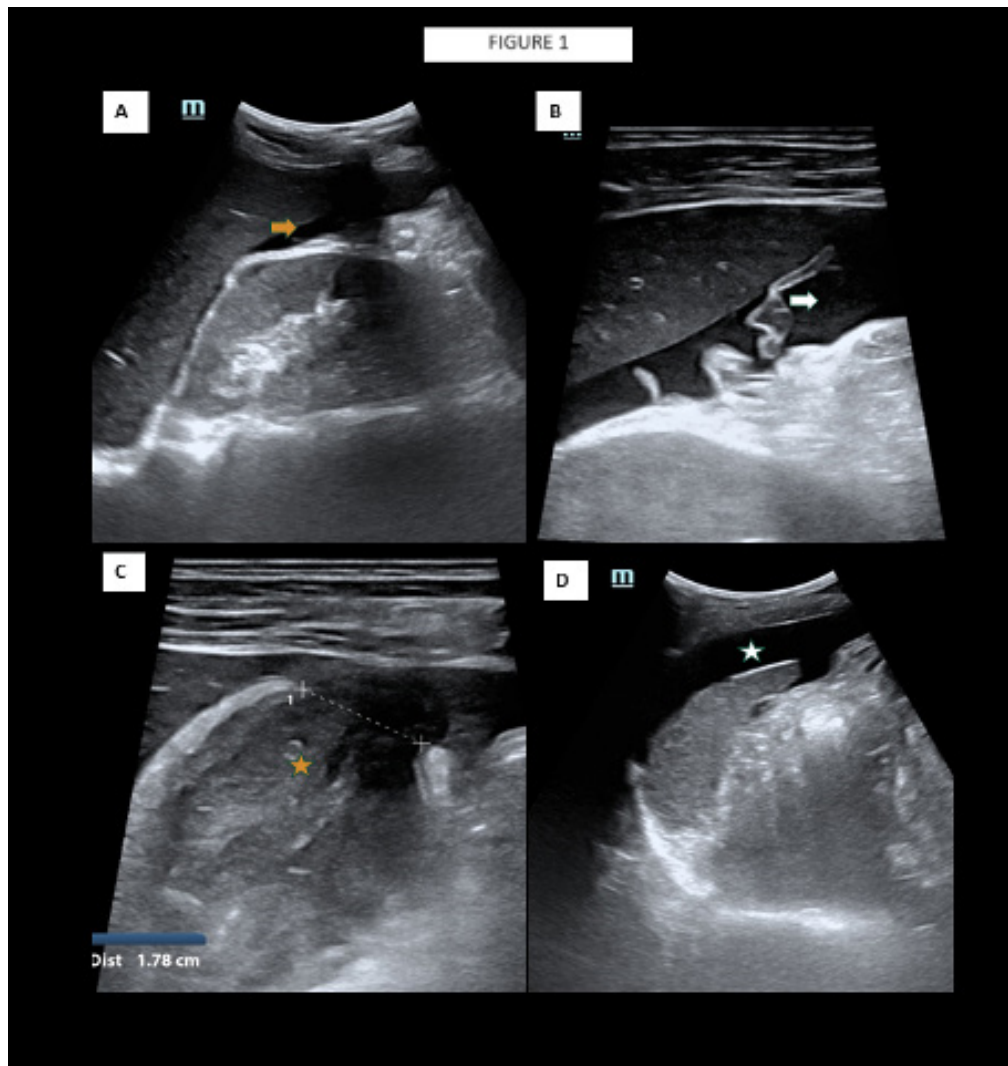
The gallbladder (GB) is a pear-shaped fibromuscular structure carefully nestled within and well protected by the surrounding structures such as ribs, the liver, the omentum and the intestine. In a collected 5,670 cases of blunt abdominal trauma, Penn has reported an incidence of 1.9% [1]. Injury to the GB most commonly occurs secondary to penetrative injuries [2]. Prompt clinical diagnosis is often challenging due to lack of specific clinical symptoms in such cases [3]. We present a case of traumatic GB laceration and associated injury to the inferior surface to the liver with an accurate preoperative diagnosis successfully managed by laparotomy and cholecystectomy.

## Case summary

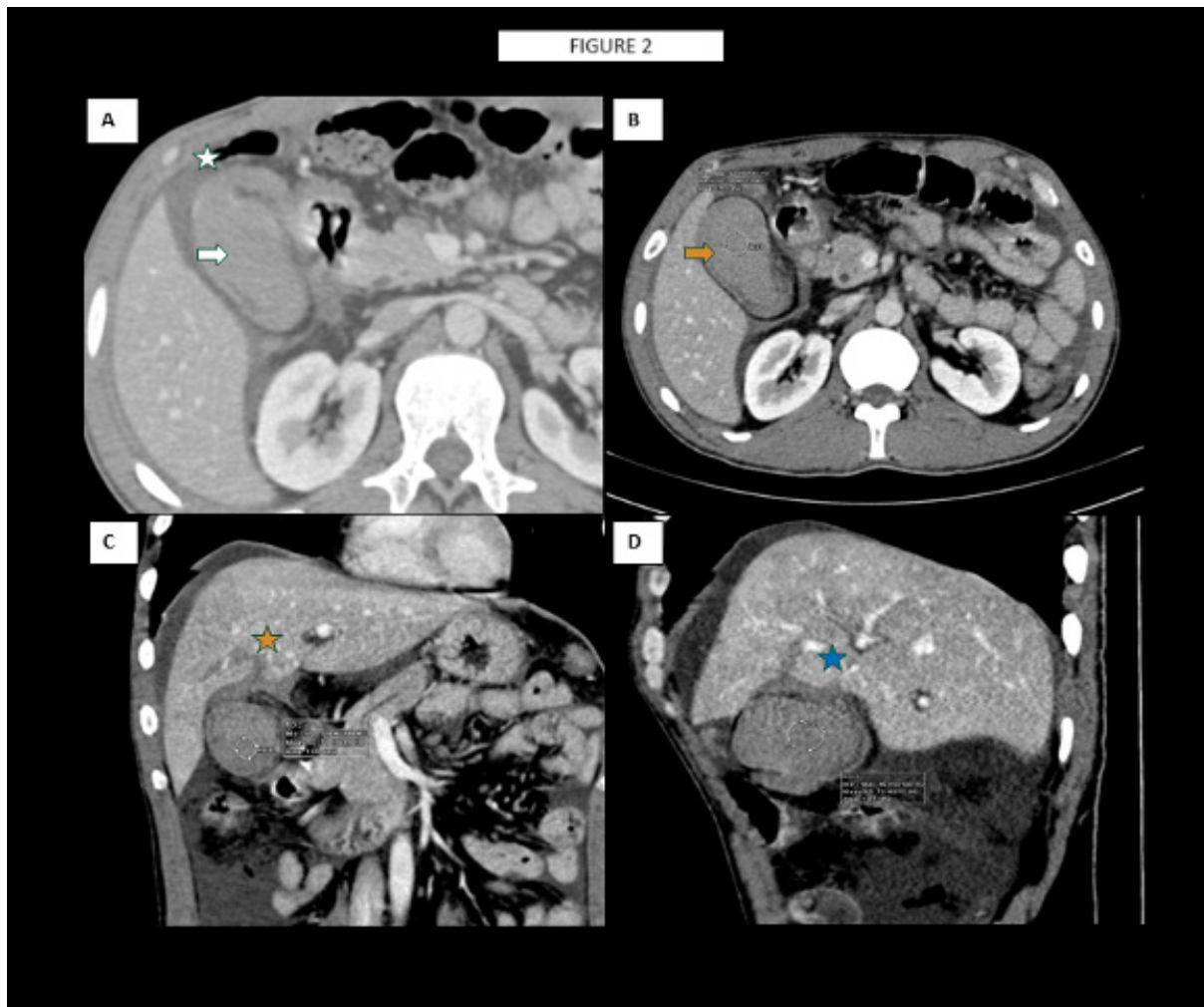
A 31-year-old man driving a car collided with another vehicle. He was under the influence of alcohol when brought to the emergency department of our hospital and complained of mild pain in the umbilical region and the left elbow. The patient was conscious but disoriented and drowsy. There was no history of loss of consciousness, seizure or vomiting. The clinical parameters were Glasgow Coma Scale (GCS) – 14/15. Blood Pressure (BP) - 158/103 mm Hg. Pulse – 82 bpm, normal in rhythm, volume and character. Respiratory Rate (RR) - 20/min and Saturation of Peripheral Oxygen (SpO<sub>2</sub>)- 98 % in room air. On examination, the abdomen was soft and revealed diffuse tenderness but no guarding or rigidity. There was no superficial abrasion. Bowel sounds were present. The examinations of respiratory, cardiovascular and central nervous system were unremarkable.

An Ultrasound (US) Extended Focused Assessment with Sonography in Trauma (E-FAST) revealed free fluid in the hepatorenal pouch and peri-splenic recess. The emergency team was informed and a proper ultrasound examination of the whole abdomen and pelvis was performed. The US examination revealed relatively collapsed GB lumen with echogenic contents within suggestive of hemorrhage and a focal defect near the fundus indicating perforation (Figure 1). The patient was taken for an urgent contrast-enhanced computed tomography (CECT)

abdomen which confirmed the findings of US and revealed additional findings of intraparenchymal laceration of segment IV of the liver with features of the American Association for the Surgery of Trauma (AAST) grade III injury (Figure 2).



**Figure 1.** *Ultrasound images of the abdomen revealing A - free fluid in hepatorenal pouch (orange arrow), B - free fluid with internal echoes in the subhepatic space (white arrow), C - echogenic contents within the GB lumen suggestive of hemorrhagic fluid (orange star) and a focal transmural breach in the fundus measuring up to 1.7 cm, and D - free fluid in the perisplenic region (white star).*



**Figure 2.** Contrast enhanced CT images of the abdomen illustrating A- Axial image revealing hyperdense contents inside the GB (white arrow) with a focal defect in the fundus (white star), B- Axial image revealing hyperdense contents in the GB lumen, consistent with hemorrhagic fluid (orange arrow), C- coronal reconstruction revealing hyperdense contents within the GB lumen with serpiginous hypodense lacerations in segment IVb of liver (orange star), and D- Sagittal reconstruction of the hepatic laceration (blue star).

The patient was admitted under surgical critical care (day 2). An US guided drain was placed by Radiology Department the next day (day 3) in the subhepatic region. Bilio-hemorrhagic fluid was draining measuring up to 1, 000 ml in 24 hrs. There was a fall in Hemoglobin levels with a rise in liver enzymes noted in the patient on day 3 as compared to day 1 which is depicted in Table 1.

**Table 1.** *Laboratory investigations.*

BLOOD INVESTIGATIONS	During presentation to Emergency (Day 1)	After admission (Day 3)
Hemoglobin (gm/dl)	18.8	15.4
Total Leucocyte Count (cells/microliter)	20 x 10 <sup>3</sup>	9 X 10 <sup>3</sup>
Prothrombin time/Activated partial thromboplastin time/International normalized ratio (sec)	11.3/27.1/1.01	12/31/1.2
Platelets (/ul)	310 x 10 <sup>3</sup>	250 X 10 <sup>3</sup>
Aspartate aminotransferase (IU/L)	428	993
Alanine transaminase (IU/L)	128	210
Alkaline phosphatase (IU/L)	96	243

Medical opinions were sought in view of increased hepatic enzymes. Injection thiamine, n-acetyl cysteine was given along with advice to maintain proper hydration and blood transfusion. Considering the continuous drainage from the peritoneal drainage catheter and dropping hemoglobin, the decision to perform laparotomy and cholecystectomy was made (Day 4). Per-operative findings were consistent with the imaging findings (Figure 3) and were subsequently confirmed on histopathology. The post operative course of the patient was uneventful, and he was discharged on Day 10. The patient's details were anonymized in this case report even though the patient had given his consent.



**Figure 3.** Intraoperative image revealing transmurial perforation of GB (white star) with bilio-hemorrhagic fluid (white arrow), and bile-stained bowels (blue arrow).

## Discussion

Blunt trauma to the gall bladder mostly occurs secondary to motor vehicle accidents, falls, blows, kicks or industrial accidents [2, 3]. Gall bladder injuries are normally classified into four types – contusion, avulsion, laceration and traumatic cholecystitis [1]. Losanoff and Kjossev have classified gall bladder injury (Table 2) into five types [4]. Our patient sustained a type 2 injury as per this classification.

**Table 2.** *Classification of Gall bladder injury by Losanoff and Kjossev [4].*

TYPE	INJURY OF GALL BLADDER:
1A	Contusion with intramural hematoma
1B	Contusion with perforation
<b>2</b>	<b>Rupture</b>
3A	Avulsion with partial detachment
3B	Avulsion with complete detachment from the liver but with attachment to the structures of the hepatoduodenal ligament (so-called “near traumatic cholecystectomy”)
3C	Torn only from the hepatoduodenal ligament
3D	Completely torn from all attachments (so-called “traumatic cholecystectomy”)
4A	Traumatic cholecystitis, secondary to haemobilia
4B	Acute acalculous cholecystitis
5	Mucosal tear with leakage of bile

One of the conditions predisposing to a gall bladder injury is distended GB lumen secondary to an empty stomach or a prolonged fasting status [5]. Thick-walled gall bladders are less prone to rupture [5]. Our patient had his last meal around 5 hours before the accident and had also consumed alcohol in the interim. Alcohol causes increased gastrin and secretin secretion which increases bile flow and elevates the pressure in biliary system by increasing the tone of Sphincter of Oddi [6]. Alcohol also relaxes the anterior abdominal wall muscles making the distended GB more prone to injury [7]. An underlying stiff cirrhotic liver also increases the risk of GB injury [8-9]. Clinical symptoms may be apparent only if biliary peritonitis has set in which can take days to weeks. Ultrasonography is usually the first imaging modality performed in a case of acute pain abdomen in many parts of the world. In cases of a gall bladder injury, the lumen often collapses and contains echogenic fluid due to hemorrhage. Rarely is the gall bladder seen abnormally distended due to hemorrhagic fluid in the lumen. A transmural disruption of the wall can also be seen when the perforation is large. Associated low level echogenic free fluid

can also be detected suggestive of bilio-hemoperitoneum. CT has better accuracy to identify, hemoperitoneum, injury to liver, duodenum or other solid organs. In our case, the laceration in the adjacent liver parenchyma (AAST III) was managed conservatively.

Magnetic resonance imaging (MRI), endoscopic retrograde cholangio-pancreatography (ERCP), biliary isotope scintigraphy and diagnostic laparoscopy are some other investigations which can be carried out and are performed very rarely only when US or CT evaluation is suboptimal in minor or low-grade injuries presenting insidiously as bile leak. Once a diagnosis of GB injury has been established, immediate cholecystectomy is the treatment of choice [10]. Simple drainage and temporary abdominal closure are performed in patients exhibiting symptoms of physiologic fatigue due to vascular injuries and are planned for a re-exploration surgery [10]. Conservative management is generally not recommended as late complications such as necrosis or perforation have been reported [11]. Delayed xanthogranulomatous changes can be seen in a traumatic GB mimicking a carcinoma and leading to a diagnostic and therapeutic dilemma [12]. We must also be aware of other etiologies that may mimic GB hemorrhage viz, milk of calcium, hyperdense sludge or vicarious excretion of intravenous contrast material [13].

## Conclusion

As evident in our case, the early clinical signs of a gall bladder injury can be vague and even absent in some cases. An early imaging evaluation by US and CT is warranted whenever a gall bladder injury is suspected. Early diagnosis and intervention in a gall bladder injury carries a good prognosis. High morbidity is seen when the management is in delay or if conservative management is attempted. A multidisciplinary team consisting of emergency physicians, radiologists and surgeons, is critical for early diagnosis and optimal treatment of such cases.



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