



Case report

Hemorrhagic cholecystitis from isolated gallbladder injury following blunt abdominal trauma: An unusual case report

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ABSTRACT

Introduction and importance: Gallbladder contusion after blunt abdominal trauma is a rare event that presents with diagnostic challenges. There is no clear evidence supporting conservative or surgical management of gallbladder contusion injuries, especially when they present in isolation. Here, we report the first case of an isolated gallbladder contusion injury after blunt abdominal trauma resulting in hemorrhagic cholecystitis that was successfully managed non-operatively.

Case presentation: A 22-year-old male patient presented with a 3-day history of severe right upper quadrant pain, leukocytosis, and elevated bilirubin after suffering blunt abdominal trauma from being kicked in the abdomen during a soccer game. The patient was evaluated using computed tomography (CT), ultrasound (US), and magnetic resonance cholangiopancreatography (MRCP). His imaging findings were consistent with cholecystitis without cholelithiasis. His bloodwork and imaging were initially concerning for cholelithiasis, but were later determined to be blood products within the common bile duct (CBD). Through conservative management, which included antibiotics, bed rest, and bowel rest, he had complete resolution of symptoms and normalization of bloodwork after four days of admission and remained symptom free at 1-year.

Clinical discussion: This case serves to highlight isolated gallbladder contusion as a potential outcome of blunt abdominal trauma. We re-affirm the diagnostic inconsistencies between CT and US in the work-up of cholecystitis and other biliary pathology. Furthermore, we describe the role of non-operative management in the treatment of traumatic cholecystitis, in the absence of gallstones.

Conclusion: Gallbladder contusion and hemorrhagic cholecystitis after blunt abdominal trauma can be managed with non-operative interventions.

1. Introduction

Hemorrhagic cholecystitis following gallbladder injury is rare, occurring in approximately 2% of blunt abdominal trauma cases [1]. Given its relatively protected location, shielded by the liver and rib cage and its small size, it is seldomly injured [2]. A previous review found only 14 gallbladder injuries in a cohort of 1288 patients who underwent laparotomy for blunt or penetrating abdominal trauma and found no cases of isolated gallbladder injury [3].

Gallbladder injuries are classified by three types: laceration, avulsion, and contusion injuries. Lacerations or perforations are the most frequently reported injuries, followed by avulsion injuries, and contusion injuries are the least common [4]. Given the rarity of all gallbladder injuries at baseline, the possibility of an isolated contusion injury to the

gallbladder is unlikely in the extreme. Furthermore, making this diagnosis on imaging alone is challenging because there is no obvious constellation of findings demonstrating contusion [1]. The most common finding of gallbladder contusion is an irregular and ill-defined gallbladder wall, which is neither sensitive nor specific to gallbladder trauma [1,2]. Management of gallbladder injuries is typically guided by the other associated injuries. Here, we report a unique case of a 22-year-old male with isolated gallbladder injury after blunt abdominal trauma, who presented with hemorrhagic cholecystitis and hyperbilirubinemia, and was successfully managed non-operatively. This work has been reported in line with the SCARE criteria [5].

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2. Case

A 22-year-old previously healthy male presented to the emergency department of a tertiary care hospital with right upper quadrant (RUQ) abdominal pain after sustaining blunt abdominal trauma during a soccer game. He was kicked in the abdomen and experienced 3 days of persistent pain associated with nausea, vomiting, and post-prandial exacerbations of pain. His physical exam revealed normal vital signs, RUQ abdominal tenderness, and a positive Murphy's Sign. There were no signs of jaundice or scleral icterus. Bloodwork revealed an elevated white blood cell (WBC) count at 14,000cells/ μ L and elevated liver enzymes with alkaline phosphatase (ALP) at 115 U/L, alanine aminotransferase (ALT) at 187 U/L, aspartate aminotransferase (AST) at 183 U/L, and gamma glutamyltransferase (GGT) at 189 U/L. His total bilirubin was also elevated at 32 μ mol/L, with a direct bilirubin of 15 μ mol/L. Lipase was not significantly elevated. His past medical and surgical history were unremarkable. He denied any history of abdominal pain or biliary colic symptoms. He had no home medications or any allergies. A contrast enhanced CT revealed a distended, thick-walled gallbladder with some pericholecystic fluid (Fig. 1). There was some material of increased density noted in the gallbladder, which was presumed to be biliary sludge. In addition, the common bile duct (CBD) was dilated at 7 mm with some mild intrahepatic biliary duct dilatation without any apparent choledocholithiasis. The liver, pancreas, pancreatic duct and other intraabdominal organs and vasculature all appeared normal. Given these findings, a preliminary diagnosis of cholecystitis was made. To rule out choledocholithiasis, a focused US was performed the same day. Although the CBD was dilated, no choledocholithiasis was identified on US. It did reveal a hyperemic gallbladder with a wall thickness of 7 mm. Similar to the CT, the US reported mobile sludge in the lumen and the gallbladder neck but also reported polyps measuring up to 7 mm in size (Fig. 2a–b). There was a positive sonographic Murphy's sign and a moderate amount of pericholecystic fluid, in keeping with a presumed diagnosis of cholecystitis secondary to cholelithiasis.

The patient was admitted to the acute care service under a fellowship trained trauma surgeon at an academic hospital. In our center, patients with choledocholithiasis initially undergo ERCP followed by an inpatient cholecystectomy. Patients presenting with cholecystitis are also

recommended a cholecystectomy if they are surgically fit. However, given this patient's history of trauma and an unexplained dilatation of his CBD with hyperbilirubinemia, a preliminary plan was made to initially treat with intravenous ciprofloxacin and metronidazole, bowel rest, with serial labs and abdominal exams.

On the 2nd day of admission, the patient's total bilirubin rose to 92, which was suspicious for obstruction of the CBD, which prompted an MRCP. On the 3rd day of admission, the MRCP was performed and revealed an irregular and thickened gallbladder, which now had a wall thickness of 5 mm. There was no pericholecystic fluid identified, suggesting that the cholecystitis was resolving (Figs. 3–4). Most importantly, there was no longer any intra- or extrahepatic biliary duct dilatation nor any signs of choledocholithiasis. Like prior imaging, the MRCP revealed hyperintense intraluminal material. After discussion with the radiologist, the hyperintense material in the gallbladder lumen was now considered to be blood clots instead of sludge or polyps. Given the absence of gallstones on 3 imaging modalities, these clots were most likely the cause of temporary obstruction in the bile duct as they travelled down the biliary tree. The team did not perform a CT-angiography to detect for bleeding because there were no significant changes in the patient's hemoglobin nor any findings of a hematoma on CT or US. In addition, his bloodwork on day 3 demonstrated that his liver enzymes had plateaued, and his total bilirubin decreased to 44 suggesting that the occlusion in his bile duct had resolved. By the 4th day of admission, his pain and nausea had resolved, with continued improvement in his liver enzymes, bilirubin, and a normal WBC. A discussion was held with the patient regarding surgery. Given the complete resolution of symptoms with conservative management, and no evidence of gallstones, the patient decided to proceed with no further interventions. Surgery for cholecystectomy was offered and declined. He was discharged home on day 4 without antibiotics or dietary changes and was advised on return to care instructions. At his 12-month follow-up, he was content with the overall outcome and remained symptom free.

3. Discussion

This is a rare case of isolated gallbladder contusion in the setting of blunt abdominal trauma that led to hemorrhagic cholecystitis and

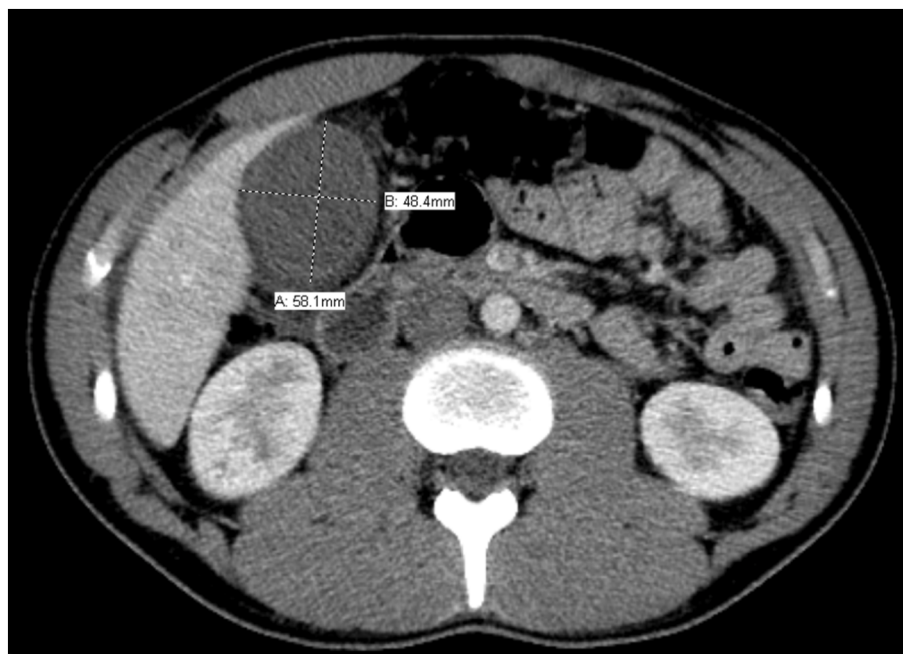


Fig. 1. Axial view of a CT scan for a 22-year-old male with traumatic cholecystitis after blunt abdominal trauma. The gallbladder appears distended, with a slightly thickened wall, and mild pericholecystic fluid. The bile duct also appears distended without any obvious gallstones.

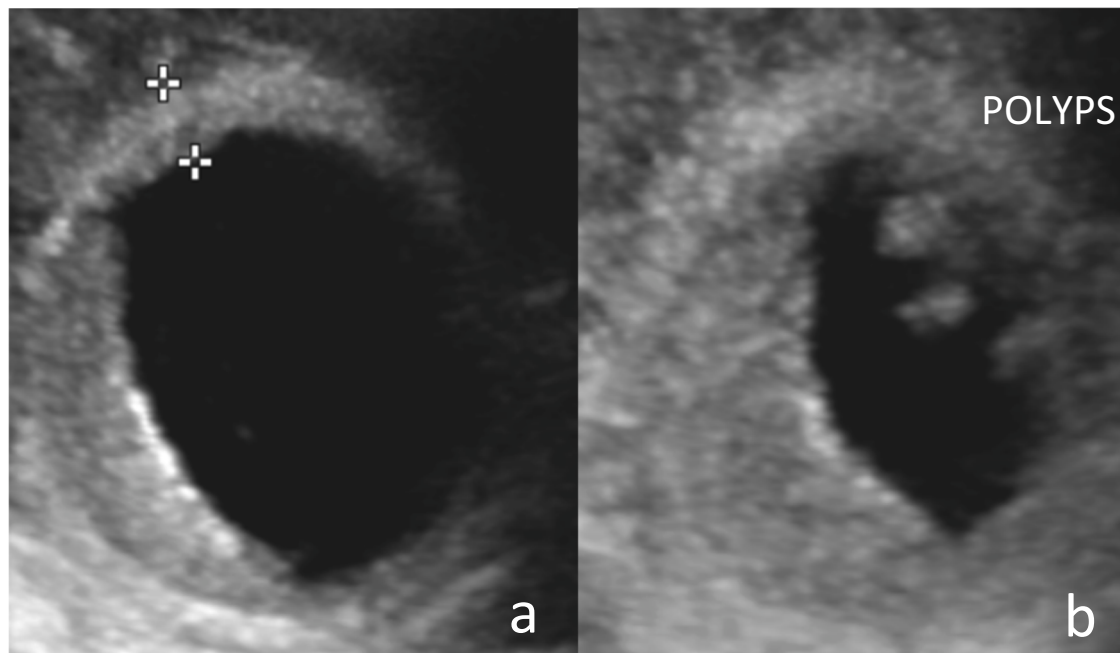


Fig. 2. a–b. (a) Transverse view on US for a 22-year-old male with traumatic cholecystitis. The image demonstrates a hyperemic gallbladder, with a wall of 7 mm, and possible mobile sludge in the lumen and neck of the gallbladder. (b) The image demonstrates lesions presumed to be polyps in the gallbladder lumen.

common bile duct obstruction in an acalculous gallbladder. This patient had no prior history of gallstones or biliary colic-like symptoms, and thus his only risk factor for gallbladder contusion would have been a thin-walled gallbladder [4,6,7].

The imaging in this case is of interest given the inconsistent findings between different modalities. He initially underwent CT that revealed signs of cholecystitis, high-density sludge, and CBD dilation, followed by an ultrasound that reported findings of sludge and polyps. His eventual diagnosis of hemorrhagic cholecystitis with blood clots causing biliary obstruction was confirmed by MRCP. Ordinarily, CT is extremely accurate in diagnosing intraabdominal solid and hollow organ injury in trauma, especially in the presence of blood as a high-density fluid [2]. In our patient, the lack of associated injuries on CT obscured the initial diagnosis and shifted the suspicion towards occult cholelithiasis associated cholecystitis. Furthermore, the US suggested sludge and polyps within the gallbladder lumen with other secondary findings of cholecystitis, along with intra- and extrahepatic bile duct dilation. In our institution, we rely on US as the main modality for diagnosing cholecystitis and use MRCP when the diagnosis is equivocal or unenlightening [8]. In this case, the presence of T1 and T2 hyperintense intraluminal material on MRCP confirmed the presence of blood clots. These findings along with the spontaneous improvement of his liver enzymes without surgery or an endoscopic retrograde cholangiopancreatography (ERCP) led us to the eventual diagnosis of gallbladder contusion, an unusual explanation for his elevated bilirubin.

We propose the “polyps” noted on US and the high density “sludge” on CT represent blood clots from gallbladder hemorrhage. These clots, as they travel along the biliary tree, can obstruct the common bile duct causing elevated bilirubin. This pathology is so rare that a recognized pattern for diagnosis has yet to be proposed. In cases where a trauma laparoscopy or laparotomy are performed, the gallbladder is directly examined to assess for injury. However, in an isolated injury of the gallbladder, where exploratory surgery is not warranted, we rely on imaging to guide management, and in this patient, we proceeded with non-operative management, given the absence of other abdominal injuries. Additionally, an unnecessary cholecystectomy could propagate further hemorrhage, and the recent trauma might affect visualization of critical structures putting the patient at higher risk for biliary and

duodenal injuries. A possible risk of non-operative management would include delayed gallbladder rupture from necrosis [4,6]. In our imaging, we had no signs of perforation or necrosis, but we still discussed this exceedingly low risk with our patient.

In this case, we weighed the following features: the resolution of symptoms and biochemical findings with non-operative management, the absence of gallstones on multiple imaging modalities, a plausible, though rare, proposed mechanism for hyperbilirubinemia that did not necessarily pose any ongoing risk, and a higher-than-normal risk of propagating further injury with surgery. With this rationale, we offered both laparoscopic cholecystectomy and non-operative management as equally reasonable treatment alternatives. The patient elected for non-operative management and was treated without surgery. One limitation of this case is the absence of follow-up imaging, which could have confirmed resolution of blood clots but given that the patient remained symptom free, additional imaging was not indicated.

4. Conclusion

Isolated gallbladder contusion is extremely rare after blunt abdominal trauma. The symptoms and imaging findings may mimic gallstone related cholecystitis and choledocholithiasis. Through this case report we describe factors in diagnosing trauma related cholecystitis and demonstrate successful non-operative management.

Source of funding

There was no funding received for this article.

Ethical approval

The study was exempt from the Research Ethics Board (REB) at the University of Saskatchewan as it is a case report written retrospectively, and the study did not influence the care of the patient.

Consent

Written informed consent was obtained from the patient for

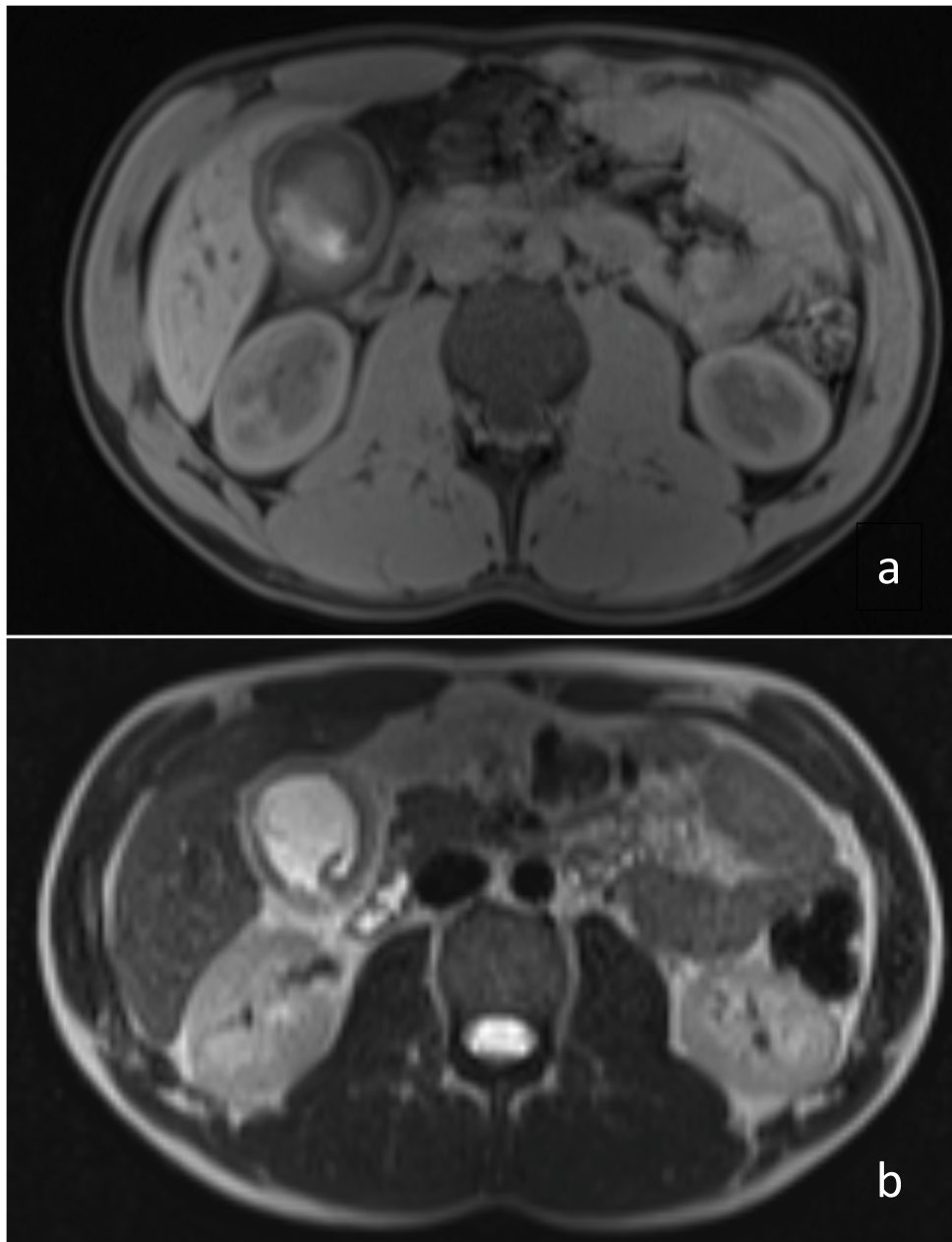


Fig. 3. a–b. (a) T1 axial view on MRI for a 22-year-old male with hemorrhagic cholecystitis. The image demonstrates hyperintense intraluminal material suspicious for blood clots. (b) T2 axial view image demonstrates a thickened wall at 5 mm, with mild pericholecystic fluid, and hyperintense intraluminal material, which was eventually determined to be blood clots.

publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Research registration

This is not a first in man study. It does not require a UIN.

Guarantor

Dr. Niroshan Sothilingam and Dr. Isaac Wiebe are the guarantors of this publication and accept full responsibility for the work and/or the conduct of this study.

Provenance and peer review

Commissioned; externally peer reviewed.

CRediT authorship contribution statement

Dr. Isaac Wiebe (General Surgery Resident) is the primary author of the article. Dr. Zarrukh Baig (General Surgery Resident) formatted the images, helped interpret their findings, and edit the manuscript. Dr. Niroshan Sothilingam (General Surgeon) is the primary investigator, the primary surgeon in the care of this patient, and helped with the study concept.

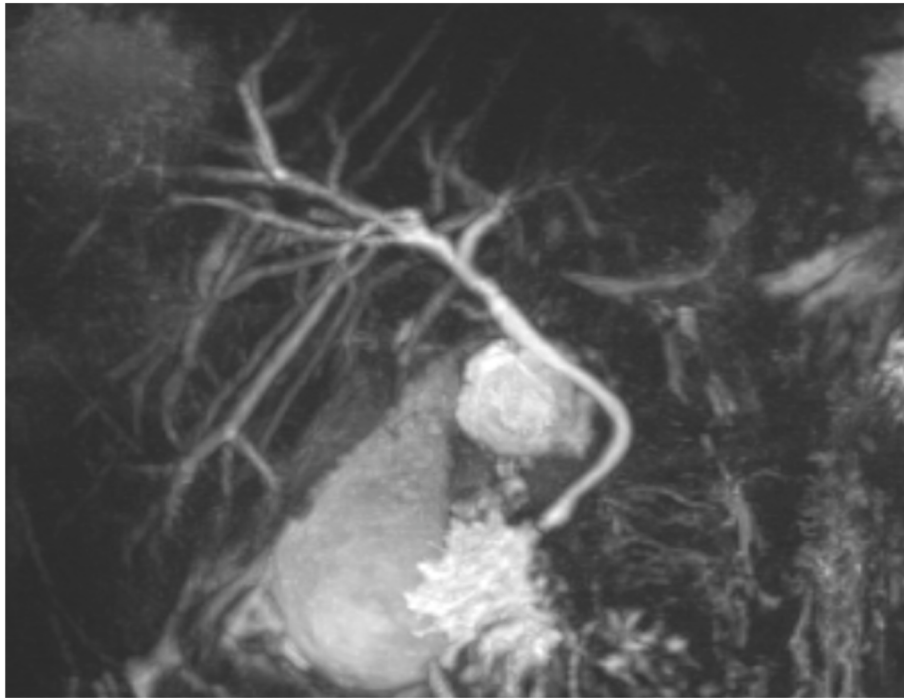


Fig. 4. Reconstruction of the biliary tree on MRI for a 22-year-old male with traumatic cholecystitis. There is no evidence of gallbladder polyps, cholelithiasis, or choledocholithiasis. The bile duct appears normal in caliber. There is evidence of high-density intraluminal material, which was determined to be blood clots.

Declaration of competing interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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