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Case report

A rare case of isolated gallbladder rupture following blunt abdominal trauma

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Abstract. Isolated gallbladder rupture are rare injuries. We present a case of gallbladder traumatic rupture in a 47-year-old patient involved in a motor vehicle collision, that presented abdominal pain with maximal intensity in the right upper quadrant.CT is the imaging technique of choice to diagnosis this entity, however the final diagnosis of gallbladder rupture is confirmed with laparoscopy. Cholecystectomy is the definitive treatment. (www.actabiomedica.it)

Key words: gallbladder rupture, trauma, CT, cholecystectomy, abdominal imaging

Introduction

Traumatic rupture of the gallbladder is a rare entity as the gallbladder is a well-protected organ due to its relatively small size and anatomic location. They have been reported to occur in approximately 2 to 3% of all blunt abdominal trauma. Most cases occur as a result of penetrating trauma (1).

The main reason for the low incidence is that the gallbladder is protected by surrounding organs, including liver, intestines, omentum, and ribs (2).

A delay in diagnosis of isolated gallbladder ruptures is not unusual as initial symptoms are not specific, before a period of clinical deterioration resulting from bile peritonitis. Delayed detection of trauma to the extrahepatic biliary system is associated with high morbidity (3,4).

Gallbladder rupture is usually diagnosed at laparotomy. It is very difficult to detect traumatic gallbladder perforations using radiographic evaluation such as ultrasonography and computed tomography (CT) (3,4).

We present a case of 47 years old man with isolated gallbladder rupture secondary to blunt abdominal trauma.

Case presentation

A 47-year-old man presented to our Emergency Department after being involved in a motor vehicle collision. The patient stated the airbag deployed during the crash.

The patient complained of diffuse abdominal pain with maximal intensity in the right upper quadrant.

On physical examination he was found to have right upper quadrant tenderness, without peritoneal signs. Admission blood tests, including routine biochemistry, coagulation profile and full blood count, were all within normal limits. No hematuria was present on urinalysis. The patient denied having any medical problems.

A computed tomography (CT) scans were performed, showing a low-density free fluid surrounding

the gallbladder and the liver, with discontinuity of the gallbladder dome. There were no injuries in other abdominal organs (Figure 1).

A conservative treatment was undertaken, but the patient's clinical conditions did not improve over the following days. He continued to have right upper quadrant pain and developed a leukocytosis and fever.

So, 7 days after trauma, another CT scan after contrast agent administration was obtained, that showed thickened walls of gallbladder and the increase of pericholecystic and subcapsular fluid collection (Figure 2).

Percutaneous drainage was performed, and the aspirated fluid was almost pure bile.

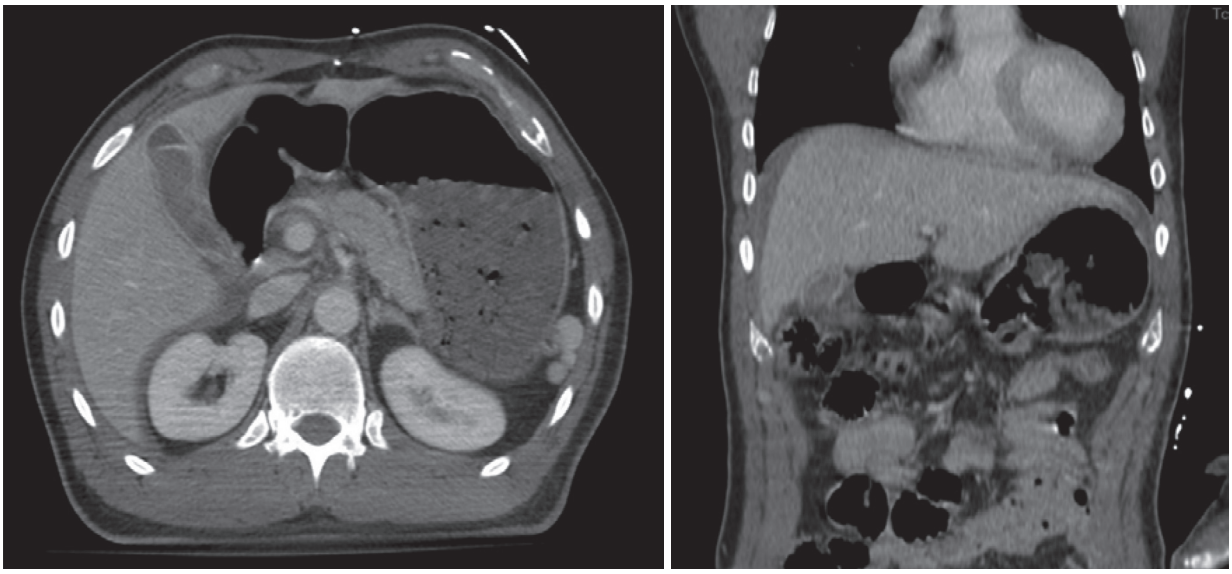

Figure 1. Axial (on the left) and coronal (on the right) CT scan after contrast agent administration after an abdominal blunt trauma show free fluid in the perihepatic and perihepatic space. Loss of definition at the dome of the gallbladder is evident.

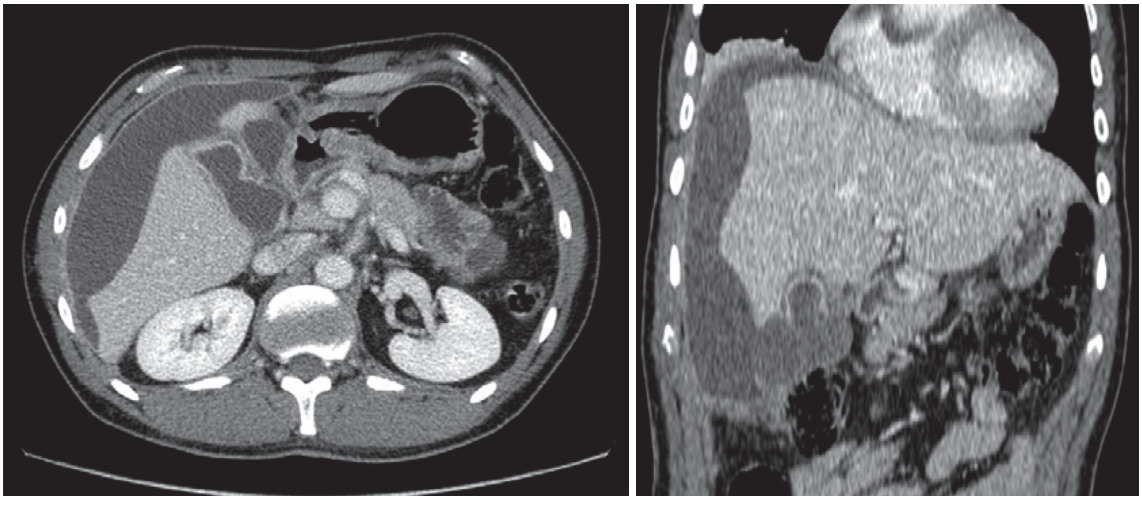

Figure 2. Axial (on the left) and coronal (on the right) CT scan after contrast agent administration 7 days after trauma show gallbladder with thickened walls and with intense contrast enhancement. The presence of subcapsular biloma is also documented.

Figure 3. Axial CT scan after contrast agent administration 7 days after trauma and 5 days after the introduction of a drainage tube in the subcapsular space: it is evident the reduction in size of the biloma.

5 days after the drainage, another CT scan was performed, that showed reduction in size of the biloma (Figure 3).

At this time, cholecystectomy was performed. The patient had a good postoperative course and was discharged home after 5 days.

Discussion

Blunt injuries to the gallbladder are rare. Isolated injuries are even more uncommon (4).

The mechanism of gallbladder injury in blunt trauma involves compression and shearing forces. There seem to be some factors that increase the risk for injury of the gallbladder (5).

Gallbladder injuries can be classified as contusion, perforation, or avulsion (6).

Contusion is defined as an intramural hematoma. It is most often diagnosed at the time of laparotomy. The contused area can result in local ischemia leading to necrosis and perforation or so-called "delayed rupture" (3).

Perforation, also referred to as rupture or laceration, is the most common gallbladder injury reported (7.8). Most perforations occur in the dome and neck of the gallbladder. Structurally, these are the weakest points in response to direct blows. A sudden increase in intraluminal pressure may explain perforations occurring at this location (5).

Avulsion injuries are divided into three subtypes (7, 8). In partial avulsion, the gallbladder is partially detached from the liver bed. In complete avulsion, the gallbladder is completely detached from the liver bed, but the cystic duct and artery remain intact. Total avulsion is when the gallbladder is free in the abdomen without any attachments. Cystic artery avulsions may lead to major hemorrhage (6).

Most perforations occur in the dome and neck of the gallbladder. Structurally, these are the weakest points in response to direct blows (1, 9). A sudden increase in intraluminal pressure may explain perforations occurring at this location, since according to LaPlace's Law, the area of greatest diameter has the greatest wall tension. Commonly reported causes of blunt trauma resulting in gallbladder injury include motor vehicle crashes, falls from heights, and direct blows to the abdomen (4).

Predisposing factors for blunt gallbladder trauma are:

- thin-walled, normal gallbladder,
- distended gall bladder after a meal
- alcohol ingestion (3, 10).

The clinical presentation of gallbladder injuries highly depends on the symptoms of accompanying injury to other organs. If there are no associated lesions, the gallbladder lesions usually follow a very insidious course in which symptoms can be subtle and limited to slight pain in the upper (right) abdomen (11, 12). Normal uninfected bile may not cause peritonitis and thus patients may not manifest clinical symptoms until weeks later. In case of intraluminal bleeding of the gallbladder wall because of laceration or contusion, haemobilia can occur (11, 12).

The diagnosis of this entity is often challenging and is rarely made preoperatively (1).

Radiographic evaluation is often not decisive for diagnosing traumatic gallbladder perforations.

The diagnosis can be made by detection of blood in the gallbladder lumen with ultrasound and CT. Free fluid in the peritoneal cavity and fluid in pericholecystic distribution are nonspecific signs. Although loss of

definition of the contour of the organ is highly suggestive of gallbladder injury, this appearance does not mean perforation or avulsion (13).

CT is the imaging modality of choice for detecting gallbladder injury (8, 14).

With CT, high-density fluid within the lumen, thickening or indistinctiveness of the gallbladder wall, and active arterial extravasation into the lumen suggest gallbladder injury and haemobilia are suggestive for gallbladder rupture (8, 15). If bile demonstrates a high density on CT, haemobilia is strongly suspected. Other causes of high-density bile should be excluded (5).

Delayed imaging can be useful in differentiating between relatively benign gallbladder processes, such as cholelithiasis, and true gallbladder injuries. An increasing amount of dense fluid in the gallbladder on delayed images is consistent with true gallbladder trauma; with more benign processes, the dense fluid remains stable (15).

A collapsed gallbladder in a fasting patient with pericholecystic fluid might represent perforation, while a hydroptic gallbladder with an inhomogenic fluid mass intraluminally is suggestive for intraluminal clots (16-18).

If active bleeding is suspected or melaena is present, an abdominal CT should be performed (19). On CT intravascular contrast will be extravasal at the site of the cystic artery transection. Selective angiography offers the advantage of the possibility to treat active hemorrhage directly by performing embolization (16-20).

The final diagnosis of gallbladder rupture can be confirmed with laparoscopy, with a delay in diagnosis between 1 to 6 weeks.

A cholecystectomy is the definitive management for gallbladder trauma (7, 8, 15).

Conclusion

Isolated gallbladder injuries are uncommon and difficult to diagnosis.

The close collaboration between emergency physicians, radiologists and trauma surgeons is also key for accurate and prompt diagnosis of traumatic injuries.

CT is the most helpful imaging techniques to confirm the diagnosis.

Isolated gallbladder injury allows conservative treatment if no perforation or traumatic cholecystitis is present, while in these cases cholecystectomy is the preferred treatment.

Prompt intervention significantly affects the patient's prognosis, that remains favorable.

Informed consent: Written informed consent was obtained from the patient concerned.

Conflict of Interest: Each author declares that he or she has no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article.

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