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Case report
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Gallbladder injury after blunt abdominal trauma: Imaging clues for diagnosis

Künt abdominal travma sonrası safra kesesi hasarı; Teşhis için görüntüleme ipuçları

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Abstract
Traumatic gallbladder injuries are rare and difficult to diagnose. Even if imaging methods including ultrasonography, computed tomography (CT) and magnetic resonance imaging (MRI) are used, it is highly challenging to detect a defect in the gallbladder wall. In a patient with blunt abdominal trauma, these clues should raise suspicion of gallbladder rupture: Hepatic laceration extending to the gallbladder area, increased abdominal distention and abdominal pain in physical examination, unfilled gallbladder and intra-abdominal increased fluid in imaging. Free fluid sampling should be performed in such patients. We herein presented the diagnostic processes of a 33-year-old woman who underwent laparotomy due to gallbladder rupture with hepatic laceration after a traffic accident.
Keywords: Blunt abdominal trauma, Gallbladder rupture, Imaging clues

Öz
Travmatik safra kesesi yaralanmaları nadirdir ve teşhis edilmesi zordur. Ultrasonografi, bilgisayarlı tomografi (BT) ve manyetik rezonans görüntüleme (MRI) gibi görüntüleme yöntemleri kullanılsa bile safra kesesi duvarındaki defektleri tespit etmek oldukça zordur. Ameliyattan önce safra kesesi rüptürünün teşhisi genellikle güçtür. Künt karın travması olan bir hastada, klinik takipte, sayılan ipuçları safra kesesi rüptüründen şüphelendirmelidir: Görüntülemesinde safra kesesi bölgesine uzanan hepatik laserasyon, takiplerinde artmış abdominal distansiyon ve abdominal ağrı, takip görüntülemelerinde hiç dolmayan safra kesesi ve karın içi artmış sıvı. Bu tür hastalara serbest sıvı örneklemesi yapılmalıdır. Burada, laparotomi uygulanan 33 yaşında trafik kazası sonrası karaciğer laserasyonu bulunan bir kadın hastanın safra kesesi rüptürü tanısı ve tanıya götüren ipuçları takdim edildi.
Anahtar kelimeler: Künt karın travması, Safra kesesi rüptürü, Görüntüleme ipuçları

Introduction

Blunt injuries to the gallbladder are exceedingly rare, while penetrating gallbladder traumas occur more frequently, because the gallbladder is protected by peripheral organs such as liver, intestines, omentum, and ribs. The diagnosis of gallbladder rupture before surgery is generally difficult. Specific symptoms are not observed, and accompanying organ injuries are frequently seen [1,2]. Gallbladder rupture is usually diagnosed in patients who are taken to emergency laparotomy due to accompanying additional organ injuries. However, even in isolated gallbladder rupture that does not require an urgent operation, early diagnosis of rupture is difficult due to the absence of specific symptoms [2]. Even if imaging methods including ultrasonography, computed tomography (CT) and magnetic resonance imaging (MRI) are used, it is highly challenging to detect the defect in the gallbladder wall. In this paper, we presented a case and discussed which clinical and imaging findings should raise suspicion for gallbladder rupture.

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Case presentation

Emergency radiology trauma records and abdomen computed tomography (CT) images obtained between 1 August 2019 and 31 January 2020 were scanned for cases of gallbladder rupture after blunt abdominal trauma and clinical-radiological findings. Abdominal CT examination was performed by using the 64-MDCT scanner (multi-slice CT Aquillion 64, Toshiba). The enhanced CT images were obtained during the portal venous phase after intravenous administration of nonionic contrast material. Enhanced CT with oral or rectal contrast was not performed, since this method was not commonly used in our radiology unit.

Only one patient who underwent laparotomy showed gallbladder rupture with hepatic laceration after a traffic accident. She was 33 years old. Medical records were examined in terms of how and when the ruptured gallbladder diagnosis was made. On admission to our emergency department, her vital signs were stable, and she was alert. Physical examination revealed right upper quadrant tenderness without signs of defense. Complete blood count revealed a white blood cell count of 21,800/mm^3 and a hemoglobin level of 12.0 g/dl. Enhanced abdominal CT suggested a liver laceration in hepatic segment 5 and a small amount of hemorrhagic ascites around the liver. The tentative diagnosis was liver injury with WSES classification grade I [3]. Since the patient's clinical and laboratory findings were stable, emergency surgery was not considered and remained conservative. However, abdominal pain increased, and distention developed over time on the 2nd and 3rd days of admission. It was noteworthy that the gall bladder was never full, including the 1st day of control abdominal tomography images. The gall bladder was contracted in 3 consecutive abdominal tomography images obtained on the 1st, 2nd and 3rd days of admission, and intraabdominal free fluid gradually increased in tomographic images. Percutaneous drainage of the ascites was performed, and the aspirated fluid was bloody and almost purely bilious. When gallbladder rupture was suspected at this stage and the CT images of contracted gallbladder was examined at magnification, a wall defect was detected (Figure 1). The patient was taken to emergency laparotomy, which showed biliary ascites in the upper right abdominal quadtrant with the gallbladder covered by edematous greater omentum. After isolating the gallbladder, a rupture was seen in the gallbladder body, as suggested by CT. Standard cholecystectomy was carried out. The postoperative course was uneventful. The consent was obtained from the patient.

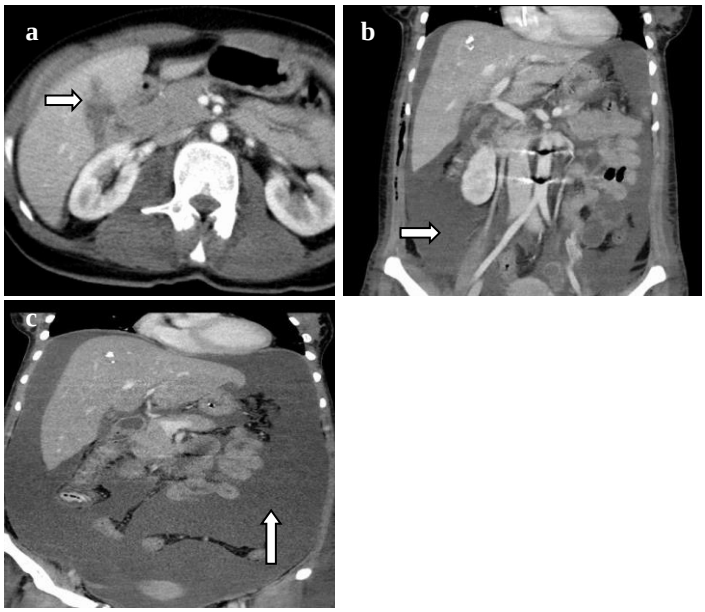

Figure 1: a: 1st day CT, enhanced abdominal CT revealed liver injury with WSES classification grade I. b: 2nd day CT, intraabdominal free fluid was gradually increasing. c: 3rd day CT, an abdominal distention developed, the gall bladder was never full.

Discussion

Gallbladder injury is most commonly caused by a penetrating wound [4]. Blunt traumatic gallbladder injury is rare, the most common causes being accidents associated with motor vehicles, falls, blows, kicks, or industrial work [4,5]. Blunt gallbladder injury is classified into three types: contusion, avulsion, and laceration (rupture or perforation), and lacerations are the most common after blunt injury [5,6]. Diagnosis of gallbladder rupture before surgery is generally difficult.

The use of imaging methods such as CT and sonography are beneficial for early diagnosis of gallbladder perforation. Sonography is a first-line modality for evaluation of intra-abdominal trauma, so awareness of sonographic findings related to gallbladder perforation are crucial for early diagnosis. These findings include a complex echogenic pericholecystic fluid collection, a thickened-edematous gallbladder wall, a collapsed gallbladder lumen despite prolonged fasting, and break of the gallbladder wall with focal loss of its reflectivity [7].

CT scan is the most useful examination when diagnosing abdominal injuries and avulsion gallbladder injuries can easily be diagnosed by CT because the gallbladder is torn from the liver and hemorrhage is obvious. However, no specific signs are revealed on CT for laceration in gallbladder injuries [6,8]. Despite the substantial leakage of bile into the peritoneal cavity in our case, we could not determine whether it was caused by a gallbladder injury or liver laceration, and further examinations and treatments were required because of the persistent high-volume bile leakage [4].

On CT images, hepatic laceration extending to the gallbladder area, unfilled gallbladder, and intra-abdominal increased fluid should raise suspicion of gallbladder rupture. Free fluid sampling should be performed in such patients when compatible with clinical findings.

A swollen postprandial gallbladder is at increased risk for a trauma, as an increased truncation force is produced between the fluid-filled gallbladder and the hepatic parenchyma [9]. Paradoxically, a chronically diseased gallbladder with a thickened wall has a preventive effect against gallbladder injury.

High serum ethanol can also raise the risk for a gallbladder injury in trauma. Tone of Oddi Sphincter is increased by alcohol, which causes gallbladder dilatation [9,10].

Laparoscopic cholecystectomy is advised as a safe and effective operation in the diagnosis and cure of traumatic gallbladder injuries [11,12]. In our patient, exploratory laparotomy and cholecystectomy were performed due to the delay in the identification.

Conclusion

Diagnosis of gallbladder rupture before surgery is generally difficult. In a patient with blunt abdominal trauma, the following clues should raise suspicious of gallbladder rupture: Hepatic laceration extending to the gallbladder area, increased abdominal distention and abdominal pain in follow-up clinical evaluation, unfilled gallbladder and intra-abdominal increased fluid in follow-up imaging. Free fluid sampling should be performed in such patients.

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