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Delayed bile leak in a patient with grade IV blunt liver trauma: A case report and review of the literature

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ABSTRACT

INTRODUCTION: Delayed bile leak following blunt liver trauma is not common.
PRESENTATION OF CASE: We presented a case report and literature review of delayed bile leak in a young male patient who presented with grade IV blunt liver injury following a motor vehicle collision; he was a restrained driver who hit a fixed object. Physical examination was unremarkable except for revelaed tachycardia, right upper quadrant abdominal tenderness, and open left knee fracture. A diagnosis of grade IV multiple liver lacerations with large hemo-peritoneum was made and urgent exploratory laparotomy was performed. The patient developed a biloma collection post- operatively. He underwent endoscopic retrograde cholangiopancreatography (ERCP) and common bile duct stenting. His recovery was uneventful, and he was discharged home after 1 month.
DISCUSSION: This is a rare case with no intra or extra hepatic biliary radicle injury seen on magnetic resonance cholangiopancreatography (MRCP) and no evidence of leak by ERCP. A review of the literature to highlight the incidence of delayed bile leak revealed only few reported cases.
CONCLUSION: Our findings demonstrate the need for prompt diagnosis and treatment of delayed bile leak in blunt liver injuries. When these principles are followed, a successful outcome is possible.

1. Introduction

The incidence of major bile leak after blunt liver trauma is low [1]. Unlike iatrogenic bile duct injuries, bile leak after blunt trauma is more complex. The main cause of non- iatrogenic injury to the biliary system is trauma. Bile leaks can result from penetrating injury, such as gunshot or knife wounds, or from blunt trauma such as motor vehicle accidents or falls [2]. The incidence of bile leaks following liver trauma ranges from 0.5–21% depending on the criteria and methods used to diagnose the bile leak [3]. Therefore, timely recognition and management of bile leak is essential for patient recovery. This requires a high index of clinical suspicion and appropriate diagnosis and treatment [4].

Liver related complication rates are more common in high grade liver injuries. Herein, we present a case report of delayed bile leak in a young male who presented with grade IV blunt liver injury following a motor vehicle collision. This case is unique because no documented intra or extra hepatic biliary radicles injury is seen on MRI; and there is no evidence of leak by endoscopic retrograde cholangiopancreatography (ERCP). PubMed and Google Scholar were used to search similar cases published in the literature. There were very few cases of delayed bile leak in high grade blunt liver trauma, with no intra or extra hepatic biliary radicles injury seen on magnetic resonance Imaging (MRI); and no evidence of leak by ERCP.

2. Presentation of case

A 33-year old previously healthy male, presented to the trauma room following a motor vehicle collision. He was a restrained driver who hit a fixed object. On examination, the patient was in pain and confused state. Glascow coma scale (GCS) was 14/15, pulse 110 beats/min and regular, blood pressure 130/80 mmHg, respiratory rate 24/min, and temperature 37.3 °C. Airway was clear and patent, breathing was adequate with tenderness on the right side. Abdominal examination revealed tenderness in the right upper quadrant with guarding. Rest of the examination was significant for a left open knee fracture.

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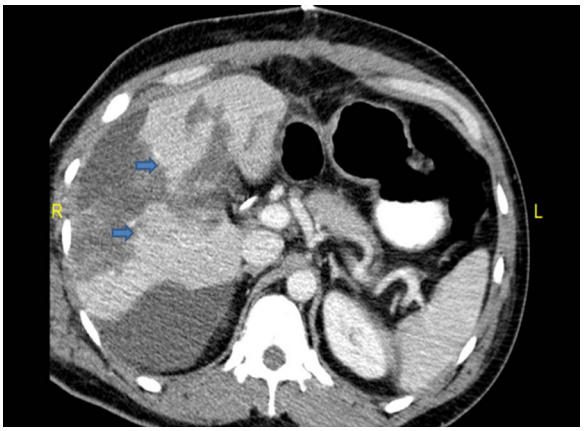

Fig. 1. CT scan showing grade 4 multiple liver lacerations.

Laborotory investigations revealed a white cell count of 14×10^3 (normal: 4–11 $\times 10^3$/uL), hemoglobin of 13.8 (normal: 12–15 g/dL), platelet count of 264×10^3/uL (normal: 140–440 $\times 10^3$/uL), serum lactate of 2.83 (0.5–2.2 mmol/L), international normalized ratio of 1.0, billirubin 9 (normal: 3.5–24 μmol/L), alanine transaminase 525 (normal: 0–55 U/L), aspartate transaminase 490 (normal: 5–34 U/L), lipase 85 (normal: 8-78 U/L), amylase 74 (8–51 U/L), and alkaline phospatase 241 (40–150 U/L). Chest X-ray demonstrated multiple right-sided rib fractures. Focused assessment with sonography for trauma (FAST) was positive. Pan computerised tomography (CT) scan (head, neck, chest, abdomen and pelvis) was performed which revealed right ribs fractures (ribs 2–10), lung contusions, and grade IV multiple liver lacerations with extravasation of contrast from the anterior and inferior liver surfaces in the venous and delayed phases, associated with a large hemoperitoneum. Other findings included a thickening in jejunal loops with wall hypoperfusion, mesenteric fat stranding and inter loop fluid suggestive of mesentric or bowel injury.

The patient was resuscitated with intravenous fluids. Urgent exploratory laparotomy revealed grade IV multiple liver lacerations (Fig. 1A). predominantly in segments VII/VIII with active oozing, colonic hepatic flexure seromuscular tear, proximal transverse colonic contusion and hematoma extending to the peripancreatic and duodenal areas. No frank bile leak was identified at the intial surgery. Damage control surgery was done, with local application of hemostatic agent and packing to the liver, together with repair of the colonic serosal tear.

On the next day, a second look was done with pack removal, insertion of J-vac drain, and closure of the abdomen.The J-vac drain showed non bilous fluid with minimal output which was removed eventually.

A follow-up CT scan was performed 1 week post operatively and revealed a collection around the liver (Fig. 1A). At that time, bile leak was suspected and so then magnetic resonance cholangiopancreatography (MRCP) was performed. It showed a biloma with no intra or extra hepatic biliary radicles injuries (Fig. 2A).

A CT guided aspiration was done with a drain insertion at the biloma site (Fig. 2B). The ERCP findings showed no biliary leak, but revealed multiple common bile duct (CBD) filling defects (mostly air bubbles). Therefore, CBD stenting was deployed (Fig. 3A and B). The follow-up abdomen CT scan showed resolution of the collection (Fig. 4). CBD stent was removed safely with unevental hospital course and he was discharged home after 1 month of admission with complete recovery.

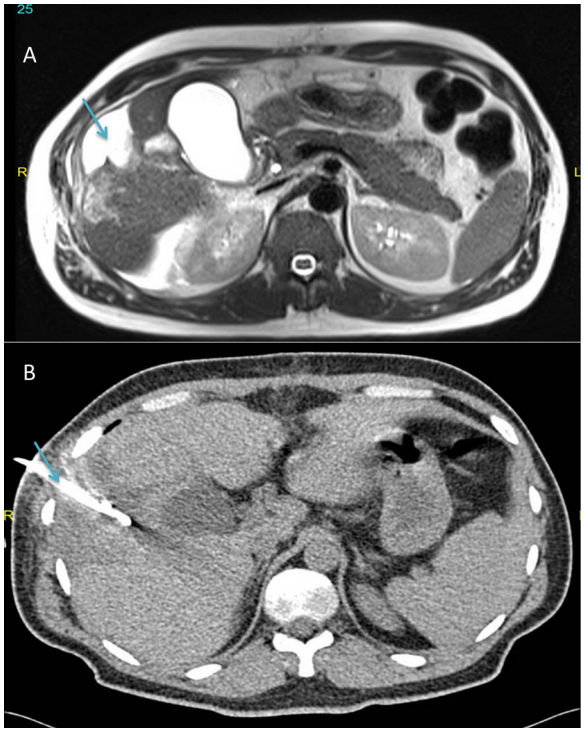

Fig. 2. (A) MRCP showing a biloma with no intra or extra hepatic biliary radicles injuries, (B) CT showing drain insertion at the biloma site.

Fig. 3. CBD stent in-place.

Fig. 4. Follow up CT abdomen showing resolution of the bile collection.

3. Discussion

We report an unusual case of delayed bile leak in a young male who presented with grade IV blunt liver trauma following a motor vehicle collision.

Although, no evidence of major bile duct injury was seen initially, the patient, later on, developed a biloma that required drainage and stenting. This could be explained by a delayed bile leak. The management of this case was based on the drainage of the biloma and ERCP stenting. Liver related complication rates in high grade liver injuries ranged between 11 and13%; these complications could be predicted by accurate grading of the liver injury [5]. Bile leak, liver abscess, and ischemic necrosis of the liver and gallbladder are some of these complications.

Biliary injuries in patients with hepatic trauma may be simple bile leaks into the lacerated liver, peritoneal cavity or pleural cavity or may result in various biliary-vascular fistulas [6]. Biliary tract injury after blunt abdominal trauma can be intra- or extrahepatic. Extrahepatic bile duct injury may occur in the absence of a liver parenchymal injury, whereas, intrahepatic bile duct injury is invariably associated with liver parenchymal laceration [7].

Clinical presentation of bile leaks is often insidious and symptoms may be manifested several days after trauma. Patients usually present with abdominal pain, abdominal distension and ascites. Delayed bile leaks are also reported to occur following a secondary rupture of a sub-capsular collection or due to duct ischemia [7]. Following blunt hepatic trauma, biliary complications have been reported in 2.8–7.4% of patients [8]. The presence of a biloma on CT is suggestive of the progressive growth of a well-circumscribed, low-attenuation intra-parenchymal or peri-hepatic collection [9].

Earlier reports showed that the optimal time period from injury to repeat imaging studies for high-grade liver injuries ranges from 7 to 10 days; the mean time for complications to surface. Most bile leaks are diagnosed when a CT scan shows a collection or intra-abdominal fluid [10]. Although, the presence of free fluid is sensitive, it is non-specific for bile leak. In a recent study of liver lacerated patients, CT scanning showed 98% hemoperitoneum but only 25% had bile leak [11].

The natural history of biliary cutaneous fistulae reported in the literature is spontaneous closure within 3 weeks provided that biliary drainage is maintained regardless of the type of injury.[12] Cogbill et al. [13] reported that biliary fistula required further evaluation when bilious drainage was at least 50 mL/d continuing after 2 weeks, or drainage was greater than 300–400 mL/d. Hommes et al. found that 65% of minor intrahepatic bile leaks following trauma were managed conservatively; whereas, ERCP and internal drainage were reserved for major leaks [14].

There is no consensus on the treatment of traumatic bile leaks and decisions are often based on the extent and mechanisms of injury, associated organ injuries and local expertise. However, ERCP with stenting and percutaneous drainage procedures are the main modalities in the treatment of bile leaks in liver trauma.

ERCP is considered as a useful tool for the diagnosis and treatment of post-traumatic bile leaks [6]. Endoscopic techniques used to treat bile leaks include biliary sphincterotomy alone, biliary stenting with or without sphincterotomy, and nasobiliary drainage with or without sphincterotomy. These procedures allow internal drainage of bile and reduction in intrabiliary pressure, allowing the bile duct injury to seal off [15]. Wahlet al. [16] examined bile duct injuries after blunt liver injury and found that patients sustaining high grade injury were more likely to have bile leaks. Marks et al. [17] suggested that stenting, rather than sphincterotomy was more effective in resolving biliary leaks. Bala et al. [18] have shown that continuous high output biliary drainage should be managed by ERCP and stenting to allow for healing. Early ERCP (within 24 h) is essential in the treatment of post-traumatic bile leaks. Sugimoto et al. [19] reported healing of bile leaks in 5 of 6 patients (83.3%) after therapeutic ERCP. Bajaj et al. [20] reported a similar rate of success for therapeutic ERCP (89%) for the management of post-traumatic bile leaks.

4. Conclusions

Patients with high grade liver injury are at risk of serious complications. In addition to a high grade injury; centrally located liver injuries are also significant risk factors for major bile duct injury. In such type of patients, early MRCP and ERCP may be warranted to rule out a significant bile leak. Our findings demonstrate the need for prompt diagnosis and treatment of delayed bile leak in blunt liver injuries. When these principles are followed, a successful outcome is possible.

Competing interests

The authors declare that they have no conflict of interest and no financial issues to disclose. All authors contributed, read and approved this submission.

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None.

Ethical approval

This case report was approved by the Medical Research Centre at Hamad Medical Corporation, Qatar (IRB#15109/15) with waiver consent.

Consent

As the patient data was collected from the chart review anonymously and retrospectively, this case report was approved by the Medical Research Center at Hamad Medical Corporation, Qatar (IRB#15109/15) with waiver consent.

Author contributions

A. Al-Hassani—acquisition of data, writing manuscript and critical review of manuscript.

G. Jabbour—acquisition of data, writing manuscript and review of manuscript.

M. ElLabib—acquisition of data, writing manuscript and critical review of manuscript.

A. Kanbar—acquisition of data, writing manuscript and review of manuscript.

A. El-Menyar—conception and design of the study, interpretation of data, writing manuscript and critical review of manuscript.

H. Al-Thani—acquisition of data, writing manuscript and critical review of manuscript. All authors approve final version of paper for submission.

Guarantor

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