

A case report as a novel technique in the management of liver injury combined with common hepatic duct avulsion in pediatrics

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Liver trauma in pediatrics one of the challenged condition especially if associated with biliary injury because of difficulty in control the hepatic bleeding and repair of biliary duct injury. Life saving and try to decrease postoperative morbidity and mortality. Child 10 years old with blunt abdominal trauma submitted for laparotomy with control of hepatic bleeding and repair of avulsed hepatic duct with stenting. Uneventful postoperative course improvement of child with monthly follow-up for later on removal of stent. Repair of injured biliary ducts with stenting is the best method for management. *Ann Pediatr Surg* 14:98–100 © 2018 Annals of Pediatric Surgery.

Introduction

Liver laceration with accompanying bile duct injury and subsequent bile peritonitis is a rare finding after blunt abdominal trauma in pediatric patients. First-line management in hemodynamically stable patients includes endoscopic retrograde cholangiography (ERC) with endobiliary stenting to allow leak sealing and prevent the progress of peritonitis. The Hepatic Organ Injury Scale is a useful tool for classifying patients following blunt abdominal trauma, with a grading system from I (subcapsular injury, <1 cm deep) to VI (hepatic avulsion) [1,2]. Mortality rates from severe liver injuries, grades IV and V, are significant, ranging from 35 to 80% [3]. Over the past two decades, there has been a shift in the management of isolated hepatic blunt trauma in pediatrics toward nonoperative management, likely due to the advancements in imaging techniques [4,5]. The American Pediatric Surgical Association Trauma Committee established consensus guidelines for standardized management of pediatric patients in isolated hepatic and splenic trauma [6]. While the nonoperative techniques have shown to be quite successful, it is still important to recognize which patients warrant a surgical solution. This case report presents an exceptional approach for bile duct decompression in pediatric patients.

Case presentation

A 10-year-old man with no past medical problems was hospitalized after a road traffic accident. On arrival at the Emergency Department, he was found to have right flank abdominal pain. He was hypotensive with a blood pressure of 90/50 mmHg and tachycardic with a pulse rate of 110/min.

Trauma series radiographs showed no abnormalities. Trauma (focused assessment by sonography in trauma) showed the possibility of free intra-abdominal fluid in the Morrison's space and mild to moderate free fluid collection.

The patient was sent for a computed tomography scan of the thorax, abdomen, and the pelvis. This showed that

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the patient had grade 3 lacerations in liver segments 4, 5, and 8 with perihepatic hematoma and hemoperitoneum.

The liver lacerations were treated nonoperatively. The initial serum total bilirubin was 3 dl/l; aspartate aminotransferase was 750; allanine aminotransferase was 640.

This patient had persistent fever refractory to intravenous antibiotics with increasing of abdominal distention and a repeat computed tomography scan of the abdomen was performed 5 days after admission, which demonstrated increasing fluid collection.

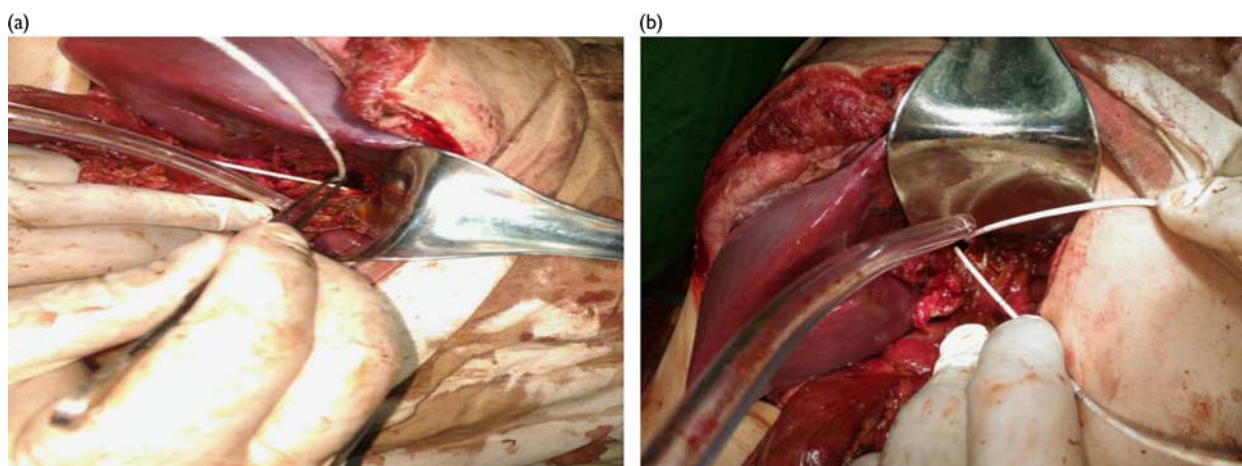
As the patient remained septic peritonitis, he eventually underwent a laparotomy 6 days after admission. Intraoperatively, a large amount of bilious, purulent peritoneal fluid was found mainly in the left subdiaphragmatic area, right subdiaphragmatic area, and in the root of the transverse mesocolon, interloop and the pelvis. A total of ~2500 ml of bilious, purulent fluid was drained.

Fig. 1



A 6-Fr silicone tube with distal perforations was placed through the mobilized cystic duct into the common hepatic duct.

Fig. 2



(a, b): Stenting of avulsed ducts into the common hepatic duct.

At laparotomy and subsequent cholecystectomy, the biliary system was visualized by cholangiography by means of the cystic duct, which showed bile duct leaks, at the common hepatic duct bifurcation. A 6-Fr silicone tube with distal perforations was placed through the mobilized cystic duct into the common hepatic duct. This shows complete avulsion of the common hepatic duct from the right and the left hepatic duct (Fig. 1).

A stenting of avulsed ducts into the common hepatic duct was done by ureteral catheter 4 Fr until the catheter reached the duodenum, with repair of avulsed ducts by polypropylene 5/0 (Fig. 2a and b).

Omental patch was fixed over the repair and also used for backing of oozed liver laceration which was at the inferior liver surface.

Our patient was noted to have persistent small amounts of bile leakage through the abdominal drains (between 100 and 150 ml of bile-stained fluid from each drain per day) most probably from the injured liver tissue, coupled with the decreased total bilirubin level.

By the 10th postoperative day the drains were nil; the total bilirubin and liver enzymes level were normal.

The patient was discharged well on the 20th postoperative day. The child had normal bilirubin (0.4 mg/dl) and γ -glutamyltransferase (8 U/l) serum levels.

Ethical considerations

The case was discussed and approved by the Ethics Research Committee of Al-Azhar University. The procedures and the aim of the operation were clearly explained to the patient's family. A written consent was obtained before enrollment into the operation.

Discussion

Bile duct injury with subsequent bile leak and bile peritonitis is a rare but serious complication after blunt abdominal trauma, with an incidence ranging from 0.5 to 21% [7–10].

The development of bile leakage or biloma may become apparent only several days after the initial trauma. As a

first-line treatment after blunt liver trauma with bile leakage in hemodynamically stable patients, ERC and endobiliary stenting of bile duct injuries are well established not only in the adult population [11–13] but also for pediatric patients [14–16].

Although ERC in children has been reported to be difficult [17], recent series have shown excellent results, with minimal morbidity [18,19]. However, technical difficulties can occur during the emergency management of liver trauma in children. In contrast to Church *et al.* [14] who reported the first successful initial ERC treatment in a pediatric patient with bile duct injury after nonoperative management of blunt liver trauma, the patient described in this article initially required explorative abdominal surgery for hemodynamic stabilization. After diagnosis of secondary bile leakage with bile peritonitis, decompression of the bile system with ERCP endobiliary stenting was technically impossible in this patient. Therefore, an exceptional approach by means of the cystic duct after cholecystectomy was used to place a catheter into the biliary tract for identification of the site of biliary duct injuries. This avoided opening of the small common bile duct, with the risk of late stricture formation.

Fabian *et al.* [10] detected a significantly greater sepsis rate in a large cohort of 482 hepatic trauma patients with a sump drainage approach as compared with closed-suction drainage. They concluded that closed-suction drainage is protective against the development of abscess formation, which in turn is associated with bile leak. This prospective study was based on their prior detection that closed-suction drainage for pancreatic trauma significantly reduced septic complications [20].

It appears reasonable that gauze packing and sump drainage promote bacterial colonization that impairs healing of bile duct lesions within the devitalized liver tissue. According to their data, closed suction should be used as the preferred type of primary drainage in liver trauma in general. However, in patients who require abdominal gauze packing and operative revisions for hemostasis of a complex liver trauma, as described in

these case reports, closed-suction drainage may not be feasible, and the mortality rate may be as high as 74%, even in experienced centers [21].

Once a secondary central bile leak in a grade IV liver trauma occurs, it remains unclear whether intraperitoneal closed suction alone is sufficient. The experience from the endoscopic treatment of bile leaks after liver transplantation suggests that intrabiliary decompression is an important adjunct to extrahepatic drainage to achieve closure of bile leaks [22]. These techniques of decompressing the biliary system described in this article may also be useful in the so-called severe hepatic cleft injuries, where bile duct injuries close to the central duct bifurcation are much more common.

Conflicts of interest

There are no conflicts of interest.

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