

Non operative management of blunt bile duct injuries in children

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ABSTRACT

Bile duct injuries after blunt abdominal trauma are rare in children. This report describes 2 cases of blunt bile duct injuries in children, which were managed non-operatively. One patient sustained partial tear in the right hepatic duct, which was managed successfully by passing a stent into the injured duct during endoscopic retrograde cholangiopancreatography. The 2nd patient had intrahepatic bile duct injury associated with liver trauma and was managed with a drain placed in the sub-hepatic area percutaneously. This non-operative management in our patients allowed healing of bile duct injuries without any stricture, at 2 years follow-up. Both children are symptom free with normal liver function tests and normal liver ultrasound. With the advancement in radiological and endoscopic techniques, some of the bile duct injuries can be managed conservatively. Conservative treatment must be individualized according to the site and extent of injury.

Keywords: Bile duct injury, blunt hepatic trauma, endoscopic retrograde cholangiopancreatography, non-operative management.

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Biliary tract injuries after blunt abdominal trauma are uncommon in children. Diagnosis and management of these can pose a considerable challenge to the surgeon. Bile duct injuries are always difficult to diagnose and usually require operative treatment. However, with the advances in endoscopy and interventional radiology, some of these injuries can be managed conservatively.^{1,2} We report 2 cases of biliary tract injuries secondary to blunt abdominal trauma, which were managed conservatively with excellent results and we have suggested a management plan for such cases.

Case Report. Patient One. A 6-year-old girl involved in a road traffic accident (RTA) sustained blunt trauma to chest, abdomen, and fracture of both left tibia and fibula. She underwent laparotomy in a peripheral hospital and the finding was liver

laceration, which was sutured. No other abnormality was detected during laparotomy. The child was transferred to our hospital for further management after 20 days of injury. On examination, her hemodynamic indicators were stable. Abdomen was distended without any sign of peritonism. Notable initial laboratory values were: hemoglobin (HB) 13.8 g/dl, white blood count (WBC) $18.5 \times 10^9/L$, urea and electrolytes, liver function tests (LFTs) (total bilirubin 12umol/L) and serum amylase were normal. The initial abdominal computed tomography (CT) scan showed large subhepatic homogenous collection, suggestive of biloma (**Figure 1**). Hepatic Immo Diacetic Acid (HIDA) scan confirmed biliary leak (**Figure 2**). A CT guided percutaneous intraperitoneal puncture confirmed bile collection and a drain was placed in the sub-hepatic area. Endoscopic retrograde

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Figure 1 - Axial computed tomography scan cut at the lower aspect of the right lobe of the liver, demonstrating a huge right subhepatic well encapsulated cystic lesion, in keeping with biloma.



Figure 3 - Plain abdominal x-ray demonstrating both the external draining tube and biliary stent extending to the right hepatic duct.

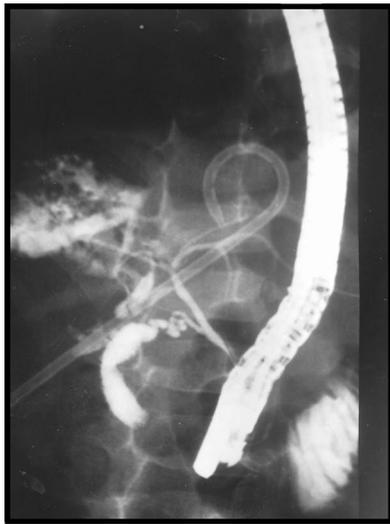


Figure 2 - Endoscopic retrograde cholangiopancreatography examination showing extravasation of contrast peripherally on the right side with intact common hepatic, cystic and common bile duct. Note the external draining tube in the subhepatic region.



Figure 4 - Computed tomography scan of abdomen demonstrating presence of bi-lobed subhepatic fluid collection in keeping with biloma with proximal intrahepatic dilatation.

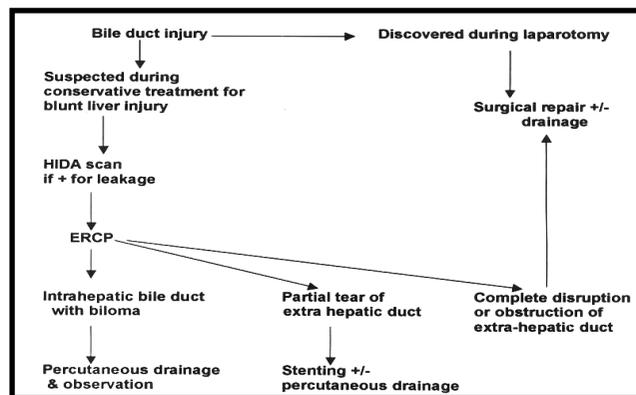


Figure 5 - Algorithmic management plan of blunt bile duct injury in children.

cholangiopancreatography (ERCP) showed tear of the right hepatic duct and a transampullary stent was placed (**Figure 3**). The drain output started decreasing gradually and dried up completely in 20 days. An HIDA scan was repeated which showed no biliary leak, percutaneous drain was removed and the child was discharged home. She remains asymptomatic at home and was readmitted after 3 months for removal of the stent. Endoscopic retrograde cholangiopancreatography showed no leak, normal bile ducts, no stricture, and stent removed. At 2 years follow-up the child remains symptom free with normal LFTs and normal hepatobiliary ultrasound.

Patient 2. An 8-year-old boy involved in RTA sustained blunt trauma of the abdomen. Emergency laparotomy was carried out in another hospital and findings was liver laceration of the right lobe, which was sutured. The child was transferred to our hospital after 2 days for further management. On examination, his vital signs were stable. Abdomen was mildly distended with tenderness all over. Bowel sound was sluggish. His blood investigation showed HB 11.2 gm/dl, WBC $10 \times 10^9/L$, urea, electrolytes, LFTs (total bilirubin $9 \mu\text{mol/L}$) and serum amylase were normal. An initial CT scan of the abdomen showed liver laceration without any intra abdominal collection. A diagnosis of paralytic ileus was made and conservative management was started. The child started improving gradually and was on full diet by the 10th day. On the 16th day, he developed abdominal pain and distention. A CT scan showed homogenous subhepatic collection, suggestive of biloma (**Figure 4**). An HIDA scan was carried out, which confirmed a biliary leak. A CT guided percutaneous drain was placed in the subhepatic area. During the next several days, bile output decreased from 100 ml to 10 ml/day and it was completely sealed on the 10th day. The subhepatic drain was removed. At 2.5 years follow-up the child remains asymptomatic with normal LFTs and normal hepatobiliary ultrasound.

Discussion. Extrahepatic biliary tract injuries are rare after the blunt trauma of the abdomen with approximately 125 cases being reported in the literature between 1806 and 1994,^{3,4} nearly one 3rd of these injuries occurred in children.⁴ The gallbladder is the most commonly injured part of the extra hepatic biliary tract, followed by common bile duct, confluence of hepatic ducts and then right or left hepatic duct.^{5,6} Isolated hepatic duct injury is extremely rare. Penetrating trauma is the main cause of these injuries in teenagers and adults. However, blunt trauma secondary to high speed motor vehicle accident, bicycle accident, assault accident or kick by a horse are the main cause of biliary tract injuries in children.^{5,6}

Clinical presentation of bile duct injuries can be divided into 2 broad categories. The first category

(early presentation) in which injury is discovered during laparotomy in patients with hypovolemic shock or acute abdomen. The 2nd category (delayed presentation), where the patients' present days, weeks or months after trauma. The clinical presentations in this category ranged between abdominal pain, abdominal distention, nausea, vomiting, jaundice, low grade fever, and weight loss.⁷⁻⁹

Diagnosis of blunt biliary injuries is always difficult and often delayed, with an average time of 18 days.⁴ In our first case biliary tract injury was diagnosed 20 days after trauma and in the 2nd case, it was 16 days. Early diagnosis of biliary tract injuries always required a high index of clinical suspicion guided by timely utilization of diagnosis modalities including peritoneal tap, ultrasonography, CT scan, HIDA scan and ERCP.⁹ A variety of treatment options have been used for biliary tract injuries with the choice of treatment being dictated by the type and the degree of injury and general condition of patients.¹⁰ Small tears have been treated using ERCP and stenting, primary repair and patch repair with vein, serosa or jejunal patch.^{6,11,12} Choledochenterostomy and hepatico-enterostomy have been used for major injuries of the ducts including complete transection.^{4,5,12}

Progressive interventional radiology and endoscopy now permits non-operative management by establishing efficient percutaneous drainage in leak vicinity and accurate visualizing of the site of biliary injury and placing endoprosthesis to reduce the physiological intrabiliary pressure and to bridge the biliary defect.^{1,2,13} Conservative treatment of the bile duct injury must be individualized according to the site and extent of injury. The non-operative management of biliary tract injuries can be useful in the following circumstances: Intrahepatic bile duct injuries secondary to hepatic trauma; Partial extra-hepatic duct injury with or without liver injury with no distal obstruction and unstable patient who cannot stand major surgery. Our experience with these cases and previous published cases enable us to suggest a management plan for blunt bile duct injuries in children (**Figure 5**).

We conclude that with the current advancements in radiological and endoscopic techniques, some of the biliary tract injuries in children that previously would have been managed surgically can be managed non-operatively. Conservative treatment of bile duct injury must be individualized according to the site and extent of injury.

References

1. Poli ML, Lefebure F, Ludot H, Bouche-Pillion MA, Daoud S, Tiefin G. Non operative management of biliary tract fistulas after blunt abdominal trauma in children. *J Pediatr Surg* 1995; 30: 1719-1721.

2. Sanders DW, Andrews DA. Conservative management of hepatic duct injury after blunt trauma. *J Pediatr Surg* 2000; 30: 1503-1505.
3. Bar-Maov JA, Shoshany G. Traumatic rupture of the choledochus treated temporarily by roux-en-y entero-hepato-duodenal ligamentostomy. *J Pediatr Surg* 1994; 29: 1578-1579.
4. Bourque MD, Spigland N, Bensoussan AL, Garel L, Blanchard H. Isolated complete transection of common bile duct due to trauma in a child, and review of literatures. *J Pediatr Surg* 1989; 24: 1068-1070.
5. Ivatury RR, Rohman M, Hellathambi M, Rao PM, Gunduz Y, Stahl W. The morbidity of injuries of the extra hepatic system. *J Trauma* 1985; 25: 967-973.
6. Monk JS, Church JS, Agarawal N. Repair of a traumatic non circumferential hepatic duct using a vein patch. Case Report. *J Trauma* 1991; 31: 1555-1557.
7. Michelassi F, Ranson JHC. Bile duct disruption by blunt trauma. *J Trauma* 1985; 25: 454-457.
8. Dawson DL, Johansen KH, Jurkovich GJ. Injuries to the portal triad. *Am J Surg* 1991; 161: 545-551.
9. Al-Bassam A. Extrahepatic bile duct injuries in children following blunt abdominal trauma: Case Report. *Asian J Surg* 1999; 22: 296-300.
10. Yahib SB, Rabeeah A, Samarrai A. An usual bile duct injury in a child after blunt abdominal trauma. *J Pediatr Surg* 1999; 34:1161-1163.
11. Eid A, Al Mogy G, Pikasky AJ. Conservative treatment of a traumatic tear of the left hepatic duct. Case Report. *J Trauma* 1996; 41: 912-913.
12. Bade PG, Thomson SR, Hirshberg A, Robbs JV. Surgical options in traumatic injury to the extra hepatic biliary tract. *Br J Surg* 1989; 76: 256-258.
13. Moulton SL, Downey EC, Anderson SA. Bile duct injuries in children. *J Pediatr Surg* 1993; 28: 795-797.