CASE REPORT
Turk J Surg

Delayed diagnosis of isolated common bile duct injury in an infant: Efficacy of transcystic duct catheter in staged surgical management

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ABSTRACT

Isolated common bile duct (CBD) injuries following blunt abdominal trauma are exceptionally rare in infants and often present a diagnostic challenge. Due to the retroperitoneal location of the CBD and the potentially mild peritoneal response to bile leakage, early symptoms may be subtle or absent. As a result, diagnosis is frequently delayed. We present a case of a 2-year-old child who was diagnosed on the 14th day after blunt trauma caused by a falling television unit. Imaging and surgical findings confirmed an isolated CBD injury. The patient was treated with the two-stage surgical approach using transcystic duct catheter drainage followed by delayed reconstruction. The initial procedure involved damage control surgery, including biliary drainage via a transcystic duct catheter and thorough peritoneal irrigation. Four months later, the definitive reconstruction was performed with a Roux-en-Y hepaticojejunostomy. This case emphasizes that isolated CBD injuries, though rare in infants, can follow blunt abdominal trauma and may present with delayed symptoms due to bile's low peritoneal irritancy. This case underscores the rarity and novelty of the transcystic duct catheter approach when managing bile leakage in an infant prior to definitive surgical reconstruction.

Keywords: Excision, gastrointestinal surgery, laparotomy

INTRODUCTION

Isolated injuries of the common bile duct (CBD) following blunt abdominal trauma are exceedingly rare in the pediatric population, especially among infants. The retroperitoneal location and the protective anatomical position of the CBD reduce its susceptibility to direct injury. When such injuries do occur, they are typically associated with concomitant damage to adjacent structures such as the liver, gallbladder, or duodenum. Furthermore, bile leakage into the peritoneal cavity may not provoke a strong inflammatory response in infants, potentially masking clinical signs and delaying diagnosis. This subtle presentation underscores the difficulty in early recognition of extrahepatic biliary tract injuries in young children. Prompt identification of bile duct injuries is essential to prevent serious complications, including biliary peritonitis, sepsis, and long-term stricture formation. However, in the setting of non-specific symptoms or minor liver trauma, isolated CBD injuries may go unrecognized until significant clinical deterioration occurs (1-3).

We report a rare case of an isolated CBD injury in a 2-year-old girl following blunt abdominal trauma from a falling television unit. The delay in diagnosis was attributed to the initially unremarkable imaging findings and the absence of peritoneal signs. The patient was successfully treated using a two-stage surgical approach, in which a transcystic duct catheter provided effective external biliary drainage until definitive reconstruction could be performed under optimal conditions.

CASE REPORT

A 2-year-old girl was admitted to a medical center in her hometown with blunt abdominal trauma sustained after being struck by a falling television unit. The patient was reported to be hemodynamically stable at the initial presentation. The physical examination was within normal limits, and laboratory investigations were

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unremarkable except for moderate elevations in liver enzymes. Abdominal computed tomography (CT) demonstrated preserved solid organ integrity and no evidence of free intra-abdominal fluid. Subsequently, the patient was discharged on the second day based on the decline in liver enzyme levels and the absence of further clinical findings.

The patient was readmitted with complaints of vomiting after three days. A repeat CT scan revealed new free intraperitoneal fluid. Liver function tests worsened, bilirubin levels were elevated, and hemoglobin levels decreased. Progressive deterioration in the patient's clinical condition necessitated transfer to another center. Right upper-quadrant tenderness, acholic stools, and fever were documented in the medical record. Complaints developed after the resumption of oral feeding. Magnetic resonance cholangiopancreatography (MRCP) performed seven days after her transfer demonstrated a 2×1 cm preportal cystic lesion, located near the porta hepatis and ductal cutoff sign (Figure 1A, B). A bile duct injury was diagnosed fourteen days after the trauma.

The patient was subsequently referred to our institution. An exploratory laparotomy was performed, revealing bile staining throughout the peritoneal cavity, including the mesentery, omentum, and porta hepatis. During exploration, a choledochal injury with bilious leakage was identified in the distal portion of the hepatobiliary ligament. An external transcystic biliary drainage catheter was placed via the cystic duct into the CBD. The peritoneal cavity was thoroughly irrigated, and drains were placed to ensure adequate drainage. Postoperative recovery was uneventful. Four months later, definitive biliary reconstruction was performed via a Roux-en-Y portoenterostomy. The transcystic duct catheter, which had been used as a guide, was removed intraoperatively. An anastomosis was constructed between the proximal bile duct near the liver and the dilated common hepatic duct (Figure 1C, D). The patient resumed oral intake on postoperative day 7 and was discharged in good condition. At follow-up, laboratory parameters remained within normal limits. Serial imaging studies, including abdominal ultrasound and MRCP, revealed no abnormalities. The patient has remained asymptomatic and healthy for the past four years.

DISCUSSION

Isolated extrahepatic bile duct injuries are exceedingly rare in infants. These injuries typically result from high-energy blunt trauma and are often accompanied by damage to other intra-abdominal organs. Due to the anatomical protection provided by the liver and gallbladder, the CBD is relatively shielded, making isolated injuries particularly uncommon. In our case, the CBD injury occurred in isolation, without solid-organ damage, and with an initially unremarkable abdominal CT scan. The absence of free intraperitoneal fluid and non-specific early findings contributed to a delay in diagnosis. While most reported pediatric cases of extrahepatic biliary injury involve gallbladder rupture (2), our patient had an intact gallbladder and no obvious intra-abdominal fluid was detected during the initial assessment. Liver enzyme levels normalized rapidly during the early period. However, symptoms such as vomiting and fever developed only after oral feeding was reintroduced. This clinical course, marked by early normalization of transaminases followed by a delayed rise in bilirubin, indicates that bile duct injury in infants may not cause significant hepatocellular damage during the initial post-traumatic phase. MRCP in our patient demonstrated a cystic lesion near the hepatic hilum, despite an intact gallbladder, which likely represented a localized bile collection secondary to transection of the CBD. Similar imaging features—such as the "ductal cutoff sign" or abrupt termination of bile duct continuity—have been reported in the literature as indirect indicators of bile duct injury (4-7). In our case, the cystic configuration likely resulted from bile extravasation tracking either along the hepatoduodenal ligament or into the lesser sac via the foramen of Winslow. Recognizing such subtle imaging clues in the appropriate clinical context is critical for diagnosis.

A distinctive feature of this case was the successful placement of a 4-Fr transcystic duct catheter for external biliary drainage, which significantly contributed to the patient's clinical stabilization. To

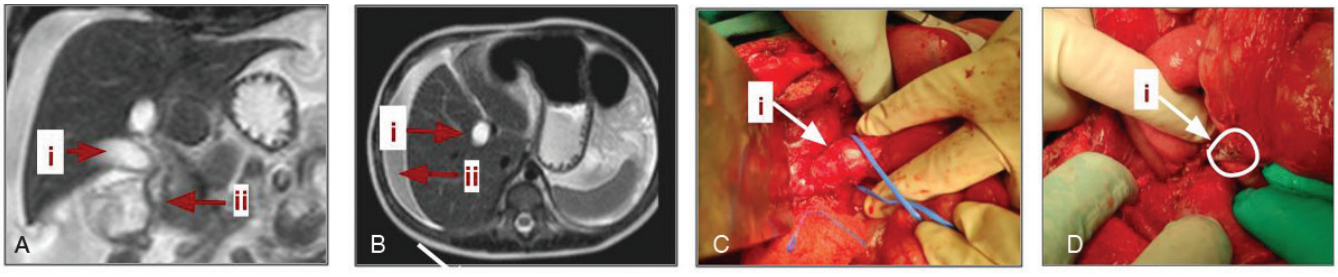

Figure 1A-D. A) Intact gallbladder, ii: ductal cut-off sign on MRI, B) Preportal cystic lesion located near the porta hepatis, ii: bile collection on MRI, C) Dilated extrahepatic biliary ducts, D) Roux-en-Y hepaticojejunostomy and the orifice of the transcystic duct catheter.

MRI: Magnetic resonance imaging

the best of our knowledge, transcystic catheter placement has been described in a limited number of adult cases; this is the first reported instance in the infant population in which such an approach was successfully used for prolonged external drainage following complete transection of the CBD (8-10). In our case, the transcystic catheter provided a minimally invasive and well-tolerated method for temporary biliary drainage. It remained functional for four months, allowing local inflammation to resolve, biliary continuity to be assessed, and definitive reconstruction to be planned under optimal conditions.

CONCLUSION

This case highlights the diagnostic challenges of isolated extrahepatic bile duct injury in infants following blunt abdominal trauma. The absence of free intraperitoneal fluid on initial imaging and the lack of peritoneal signs contributed to a delayed diagnosis. Vomiting was the predominant clinical symptom, which may reflect the lower irritant effect of bile in infants than in older children or adults. A notable radiologic finding was the accumulation of bile within the foramen of Winslow, seen as a localized cystic area near the hepatic hilum on MRCP. This may serve as an indirect indicator of CBD disruption, particularly in the absence of gallbladder injury. Use of a temporary transcystic duct catheter provided safe and effective external biliary drainage. It enabled clinical stabilization, minimized intra-abdominal bile accumulation, and allowed for delayed definitive reconstruction under optimal surgical conditions.

Ethics

Informed Consent: Written informed consent was obtained from the patient's parents. The patient's identity has been protected, and no identifying information is included in this report.

Footnotes

Author Contributions

Concept - M.A., T.K.; Design - M.A., T.K.; Data Collection or Processing - M.A., T.K.; Analysis or Interpretation - M.A.; Literature Search - M.A., D.T.; Writing - M.A., D.T.

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