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# Isolated rupture of extrahepatic bile duct following blunt abdominal trauma

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*Isolated rupture of the extrahepatic bile duct due to blunt abdominal trauma is rare. Such injuries are usually serious enough for the patient to be taken to hospital, but the diagnosis is not frequently made initially. A case of isolated rupture of the common hepatic duct following blunt abdominal trauma in a 2-year-old boy is presented. There was a nonspecific clinical picture with progressive ascites. The CT scan, cholangiogram and DISIDA scan are presented. Low periportal density on CT scan, which has been previously reported as assosiated with hepatic injury, is discussed.*

**Key words :** *Rupture common bile duct, Blunt abdominal trauma.*

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**อัจฉรา มหายศนันท์, จันทร์ทิพย์ แสงธรรมรัตน์, สมบูรณ์ ฤกษ์วิบูลย์ศรี. ท่อน้ำดีรวมนอกตับรั่ว โดยไม่พบการบาดเจ็บต่ออวัยวะอื่นในเด็กที่ถูกกระแทกท้องโดยวัตถุไม่มีคม. จุฬาลงกรณ์เวชสาร 2544 ก.ย; 45(9): 795 -801**

*ภาวะท่อน้ำดีรวมนอกตับรั่วที่เกิดจากการกระแทกท้องโดยวัตถุไม่มีคม และไม่พบการบาดเจ็บต่ออวัยวะอื่น มีอุบัติการณ์น้อยมาก รายงานผู้ป่วยเด็ก 1 ราย ได้รับบาดเจ็บจากการถูกถังแก๊สล้มทับท้องและเกิดภาวะท่อน้ำดีรั่วอย่างเดียว กลไกการบาดเจ็บ อาการ และอาการแสดงภายหลังการบาดเจ็บมีลักษณะจำเพาะซึ่งอาจช่วยในการวินิจฉัย ผู้รายงานนำเสนอ ลักษณะที่ปรากฏในเอ็กซเรย์-คอมพิวเตอร์ และการวินิจฉัยโดยเวชศาสตร์นิวเคลียร์*

**Case report**

A 2 year - old boy was admitted with complaints of increasing abdominal distension after blunt abdominal trauma resulting from a gas tank which had fallen on his abdomen 1 month previously.

At that time, he was admitted to a provincial hospital. He had normal vital signs and ultrasonography at that time showed no abnormality. After a 3 day admission with conservative treatment, he was discharged and was asymptomatic until seven days later, when abdominal distension developed. He also had abdominal pain after meals with occasional vomiting, deep yellow urine and pale stool. He was admitted to a second hospital. Abdominal tapping was performed but the nature of fluid was not officially reported. He was treated for presumed intraabdominal infection with intravenous antibiotics for 4 days and observed for another few days.He had increasing abdominal distension, poor appetite and cachexia. His mother decided to take him to our hospital. On admission, the physical examination showed a chronically ill, cachexic boy with mild pallor. Marked abdominal distension with dilated superficial veins and a positive fluid thrill, compatible with ascites were also noted.

Initial laboratory examinations including complete blood count and BUN/creatinine were normal. The liver function test was as follows; serum bilirubin 4.3 (total) and 2.5 (direct) mg/dl; alkaline phosphatase 2,642 U/L; SGOT 45 U/L, SGPT 17 U/L; albumin 2.8 g/dl; globulin 2.7 g/dl; lipase 31 IU/L and amylase 64 IU/L; PT 24.4 minutes (control 11.2 minutes), PTT 35.7 minutes (control 38.8 minutes).

He was treated conservatively with intravenous fluid, FFP, vitamin K and diuretics. On the second day of admission, he developed fever and dyspnea. Abdominal paracentesis was performed. The ascitic fluid was yellow and turbid, having numerous WBC, but the gram stain and AFB were negative for organisms. He was treated with intravenous antibiotics, albumin replacement and diuretics.

CT scan of the whole abdomen was performed to exclude traumatic pancreatitis with complications. The study showed marked ascites and periportal low

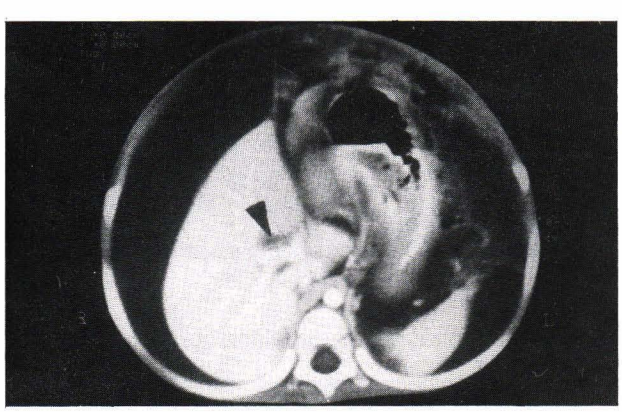

**Figure 1.** a)Post- contrast CT scan showed periportal low density (arrow) and massive ascites. The liver parenchyma appeared normal.

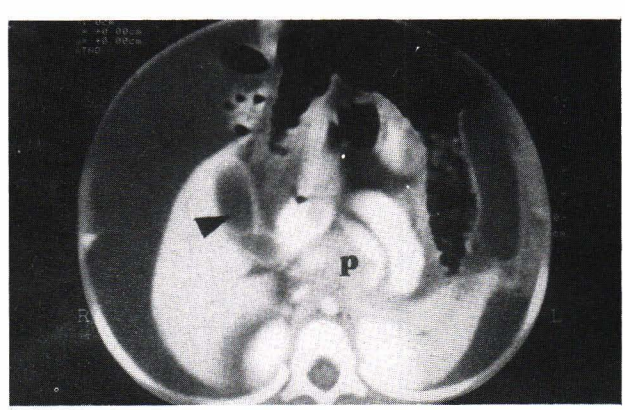


**Figure 1.** b) The gall bladder (arrow) and pancreas (P) were normal.

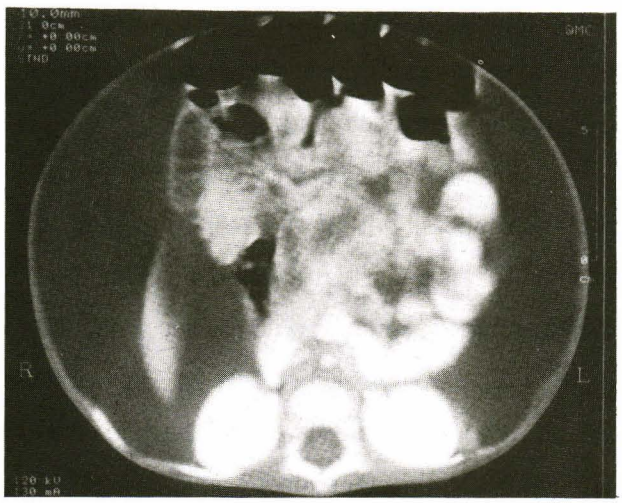

**Figure 1.** c)Massive ascites with centrally-placed bowel loops. Both kidneys were normal.

density at the portal triad without evidence of organ injury (Figure 1). The pancreas was visualizied and appeared normal.

A few days after admission, he developed tachypnea and then abdominal paracentesis was repeated to reduce abdominal distension. The ascitic fluid was bile-like in color and positive for bilirubin. At that time, biliary tract injury was suspected.

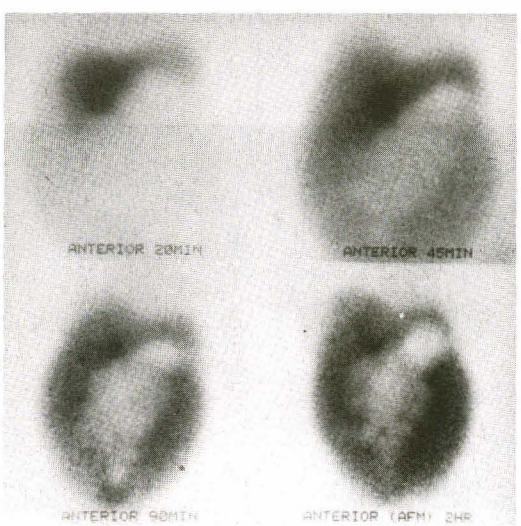


**Figure 2.** Tc-99 m DISIDA scan showed radiotracer uptake in the ascitic fluid compatible with bile leak.

A hepatobiliary scan was performed and showed evidence of bile leakage into the peritoneal cavity (Figure 2).

Explorative laparotomy disclosed about 3 liters of bilious ascites. The intraoperative cholangiography showed a contrast leakage site near the cystic duct junction (Figure 3a). A methylene blue test was subsequently performed and evidence of leakage from the common hepatic duct just above cystic duct junction, of about 60 % of circumferential length, was detected.

Biopsy of the granulation tissue at the porta hepatis and a fibrous mass at the right hepatic duct

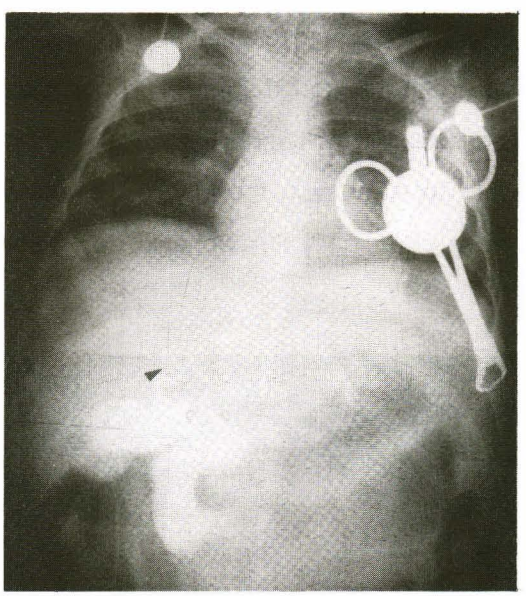

**Figure 3.** a) Intraoperative cholangiography via cholecystogram show minimal contrast leakage.(arrow) The leaking point was proved by methylene blue test to be at common hepatic duct just above cystic duct junction.

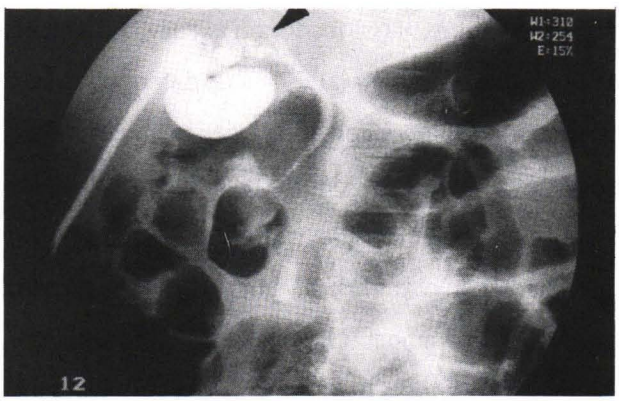


**Figure 3.** b) Follow up study after conservative treatment showed no leakage of the contrast. T-tube was placed in the common hepatic duct.(arrow)

were also performed. The pathological examination of the porta hepatis showed liver tissue with mild reaction in the portal tracts and the fibrous mass at right hepatic duct showed histologically distorted bile ducts within fibrotic tissue.

A T-tube was placed in the common hepatic duct and bypassed the area of leakage of the common hepatic duct without primary repair of the injured duct. A cholecystostomy tube was also placed in the gallbladder.

There was persistent contrast leakage from the right hepatic duct and the common hepatic duct on the second week postoperative cholangiography.

About one month after operation, a hepato-biliary study Tc-99m DISIDA was performed and evidence of bile leakage was still present.

However, the patient's condition had improved with conservative treatment. Follow up cholangiography showed no any evidence of leakage. (Figure 3b). The cholangiocystostomy tube was removed and he was discharged from hospital.

## Discussion

Isolated injury to the biliary tract (extrahepatic bile duct) following blunt abdominal trauma is rare. Only 125 cases have been reported since 1806, of which one third were found in the pediatric population.[1-3] Disruption of the hepatic ducts generally occurs near the hilum of the liver[4] while complete division of common bile duct virtually always occurs at the junction of common bile duct with the pancreas.[5] The exact mechanism of these injuries are unclear. Two hypotheses seem tenable. The first is that a widely patent cystic duct allows pressure on the gallbladder to empty it rapidly, making the common bile duct rigid and susceptible to a shearing force applied to it. The second possibility relates to simple avulsion of duct at the edge of pancreas or the edge of the liver where it is relatively fixed. Because of the fact that common bile duct is shorter than the hepatic artery and portal vein and more fixed in position it would presumbly be the first structure in the porta hepatis to be avulsed.[6]

The clinical syndrome is characterized by an insidious two phase illness. The initial course lasts from a few hours to several days and is highly deceptive. Typically, there is a transient period of shock immediately following the injury and a variable degree of pain with localized signs of peritoneal irritation in the upper abdomen. A quiescent period follows, lasting from 3 to 10 days, during which the patient feels relatively well. Jaundice with acholic stools and bile - stained urine develops between the fifth and tenth day. Upper abdominal pain returns

and is associated with nausea, vomiting, anorexia, fever and malaise. A constant feature at this stage is the progressive and sometimes massive abdominal distension due to biliary ascites. A positive peritoneal tap is an absolute indication for laparotomy. A negative peritoneal tap, on the other hand, may be misleading, as occasionally, the bile leakage may be limited to the lesser sac or confined by adhesions in the upper abdomen. [7] Because of this insidious clinical onset when rupture of the biliary tract occurs as an isolated injury, there is often a delay in diagnosis and surgical therapy.

The delay between clinical presentation and surgical intervention has been reported to average 18 days (with a range of several hours to 60 days among the cases reviewed).[8] In our case, operation was performed about 39 days after the blunt abdominal trauma.

This diagnosis must be kept in mind, especially when unexpectedly severe abdominal pain continues following blunt trauma or when jaundice appears. Jaundice has invariably been present in these patients, but is quite uncommon following isolated blunt injuries to the liver.[9]

The most efficient means of evaluating a patient with a suspected biliary tract injury is not well defined but ERCP (Endoscopic Retrograde Cholangiopancreaticography) may prove to be optimal diagnostic test. CT scan and ultrasonography of abdomen are reasonable initial test and may reveal peritoneal fluid collection or biliary tract dilatation.[10] In this patient, the CT scan gave non-specific and non-diagnostic findings. Hepatobiliary scintigraphy with Tc-99m HIDA is useful for the detection of biliary tract trauma[11] as shown in this patient.

Periportal low density on CT, characterized by areas of low attenuation around the portal vein and its branches, was described initially in a patient with an hepatic transplant.[12] The pathogenesis of periportal low attenuation appears to be multifactorial and may include (a) periportal tracking of blood (b) impaired lymphatic drainage secondary to transplantation or tumor (c) tumor infiltration and (d) periportal inflammation or bile duct proliferation.[12] Siegel et al support the opinion of Macrander et al that periportal low attenuation is a sign of subtle hepatic injury. In general, the finding of periportal low attenuation is not clinically significant and does not require specific treatment,[12] however in patients with trauma, the detection of periportal low attenuation at CT should prompt the radiologist to examine the liver carefully for other subtle injury.[12] Therefore, in patients with a history of blunt abdominal trauma with bilious ascites, if CT scan shows only periportal low attenuation without evidence of hepatic injury, a biliary tract injury should be suspected as shown by this patient.

**Summary**

In patients who have a history of blunt abdominal injury,a negative CT scan of the abdomen can exclude significant organ injury but cannot rule out occult or subtle biliary tract injury, especially injury to the extrahepatic portion of the bile duct. Early signs and symptoms of biliary tract injury are usually non-specific , however the clinical presentation of delayed onset of progressive biliary ascites should alert the physician to the possibility of this condition.

Hepatobiliary scanning Tc-99m DISIDA can confirm this condition, by revealing evidence of bile leakage into the peritoneal cavity. On CT scan,

findings are not specific and cannot detect the point of leakage.

From our observations of this clinical case, if there is periportal low density combined with biliary ascites, biliary tract injury should be considered, leading to further investigation and proper management.

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