

## Case Report

# Inscrutable Bile Duct Injury Presenting as Delayed Biliary Peritonitis: A Rare Sequela of Blunt Abdominal Trauma

Dr Akhilesh Dalal\*, Dr Shilpi Bhattacharya, Dr Riddhi Sharma, Dr Shashank Rai, Prof. Dr Kuldeep Raj Sarangal, Prof. Dr Jagdish Mutreja and Dr Jaya Malviya

Department of General Surgery, SMS&R, Sharda University, Greater Noida, India

## Abstract

Blunt trauma-induced rupture of the bile duct is exceptionally rare. Diagnosis poses challenges due to minimal peritoneal irritation from aseptic bile. We discuss the case of a 35-year-old gentleman who developed a bile duct leak post-road traffic accident. Initially treated for polytrauma, he later presented with abdominal fullness, initially managed for ascites by frequent aspirations. Further evaluation revealed bile-rich ascitic fluid, prompting referral to our institution. Signs of biliary peritonitis led to emergency surgery 40 days post-injury, with intraoperative suctioning of approximately 3 litres of bile. No active bile leakage was identified. Postoperatively, persistent bile drainage necessitated emergency endoscopic retrograde cholangiopancreatography revealing a contrast leak at the cystic duct-common hepatic duct confluence. Papillotomy and stent placement resolved the leakage. Discharged 10 days post-surgery, he remained asymptomatic during follow-up.

**Keywords:** Blunt trauma abdominal; Cystic duct injury; CBD injury; Biloma; Exploratory laparotomy

## Introduction

The clinicopathological entity of traumatic rupture of the common bile duct followed by jaundice, was first reported by Fizeau [1]. It is characterized by an initial phase of shock which is followed by an interval of no symptoms and then followed by the onset of abdominal pain, vomiting, and jaundice [2]. Despite its characteristic presentation, this syndrome is not always considered in cases of abdominal trauma, potentially leading to complications such as biliary peritonitis. Typically, injury of the CBD (Common Bile Duct) is attributed to sharp instrument injury or iatrogenic causes, making blunt trauma an unlikely aetiology [3]. Our case underscores the importance of a thorough evaluation of the biliary system during surgery for biliary peritonitis.

## Case Presentation

A 35-year-old gentleman was referred to our hospital with abdominal pain. He had a positive history of blunt trauma to the abdomen 40 days ago, sustained during a motorcycle accident. During the RTA he suffered a left distal femur fracture, along with fractures of the 5<sup>th</sup> and 6<sup>th</sup> ribs on the left side. Post-trauma, his abdominal ultrasound was unremarkable. His chest CT was suggestive of a fracture 5<sup>th</sup> and 6<sup>th</sup> ribs on the left side accompanied by mild

pneumothorax which was managed conservatively. He underwent Open Reduction and Internal Fixation (ORIF) for the femur fracture at another hospital and was discharged after a 4-day hospital stay. One week later, he experienced increasing abdominal distension, and fever, prompting readmission elsewhere. Ascites was noted on ultrasound, with suspicion of infective or traumatic aetiology. Empirical Anti-Tubercular Therapy (ATT) was initiated after tapping, and he was discharged upon resolution of fever, although symptoms persisted. Despite conservative management at multiple hospitals, he continued to experience recurrent abdominal distension and mild pain and underwent therapeutic ascitic tapping twice at different hospitals. His symptoms were moderate and were managed conservatively throughout this period. Around the 38<sup>th</sup> day post-injury, he developed severe abdominal pain with guarding, and distension, along with multiple episodes of vomiting leading to readmission. Ascitic tap revealed elevated bilirubin levels, raising suspicion of biliary peritonitis, prompting referral to our hospital. Upon arrival at our hospital, he presented with generalized abdominal pain and exhibited signs of abdominal guarding on physical examination, necessitating further evaluation.

## Investigation

He was hemodynamically stable on admission, with a blood pressure of 100/64 mm Hg, heart rate of 110 beats/min, respiratory rate of 23 breaths/min, and SpO<sub>2</sub>-100% (on O<sub>2</sub> support of 6L). He was conscious, alert, and oriented. His laboratory results revealed a White Blood Cell (WBC) count of  $8.91 \times 10^9/L$  and elevated Alkaline Phosphatase (ALP) levels at 592 U/L. However, serum amylase level was not elevated and was within the reference range. Haemoglobin level was 8.0 g/dL, and there was no evidence of jaundice (Table 1). An ascitic tap at the outside hospital revealed elevated bilirubin levels along with raised ALP, we suspected Bile Duct injury.

The triple-phase CT scan revealed a large ascitic collection filling the entire abdominal cavity (Figure 1A). The gallbladder exhibited distension with linear air streaks within its lumen, and poorly defined

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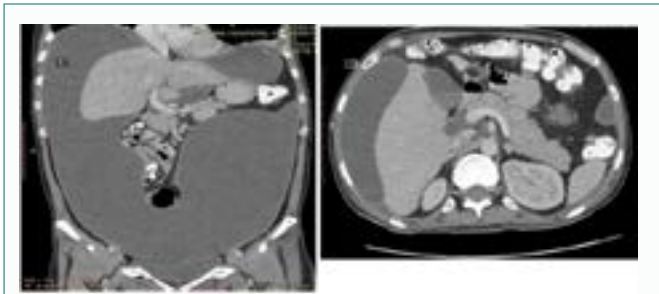
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\***Corresponding author:** Dalal Akhilesh, Department of General Surgery, SMS&R, Sharda University, Greater Noida, India, Tel: +917834823668

outlines in non-contrast, contrast, and early post-contrast studies. An outpouching in the gallbladder was noted (Figure 1B), indenting the liver. Additionally, a small focal area in the liver adjacent to the gallbladder bed showed hypodensity, extending continuously with the gallbladder wall. These findings suggested biliary leak, biliary ascites, and gallbladder trauma with an adjacent liver contusion. However, due to the lack of documentation regarding the ORIF procedure implant, MRCP was deferred.



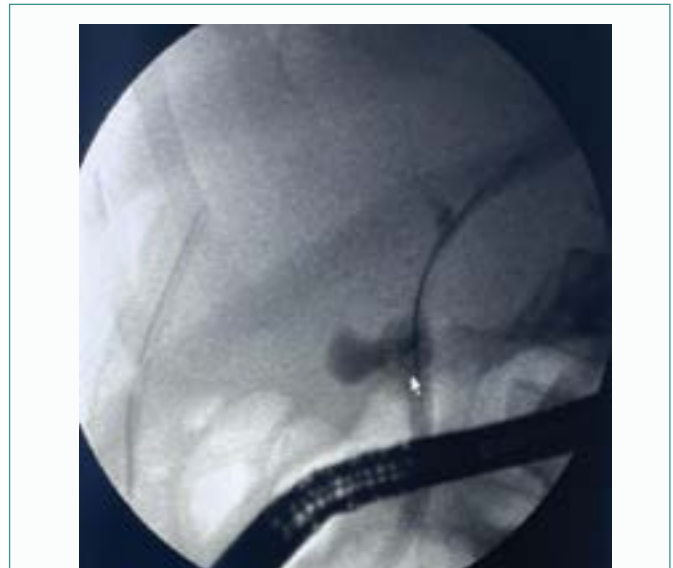
**Figure 1:** (A). CT scan revealing a large ascitic collection filling the entire abdominal cavity. (B). The gallbladder exhibiting distension with linear air streaks within its lumen, and poorly defined outlines in non-contrast, contrast, and early post-contrast studies. An outpouching in the gallbladder, indenting the liver seen. Additionally, a small focal area in the liver adjacent to the gallbladder bed shows hypodensity, extending continuously with the gallbladder wall.

### Treatment

Based on CT findings indicating biliary peritonitis and bile duct injury, and considering the patient's deteriorating vital signs, an Emergency Exploratory Laparotomy was performed. Intraoperatively (Figure 2), approximately 3 litres of bilious ascites was present in the peritoneal cavity, along with severe dense adhesions of the omentum with the peritoneum and bowel. No evidence of solid organ injury or gallbladder perforation was found. Despite efforts to locate the leak, it remained elusive due to the frozen Calot region. Two abdominal drains (subhepatic and pelvic) were placed, and the surgery lasted 160 minutes. Post-surgery, persistent bile drainage, approx. 350 ml - 400 ml was observed via subhepatic drain on days 1 and 2. Subsequently, Endoscopic Retrograde Cholangiopancreatography (ERCP) was performed, revealing no injury to the main pancreatic duct. Successful bile duct cannulation and cholangiography confirmed contrast agent leakage (Figure 3) from the confluence of the cystic duct and common hepatic duct, with associated narrowing at the common hepatic duct level. Papillotomy (Figure 4) and stent placement followed.



**Figure 2:** Showing bilious ascites in the peritoneal cavity.



**Figure 3:** Cholangiography confirming contrast agent leakage from the confluence of the cystic duct and common hepatic duct.

**Table 1:** Investigation

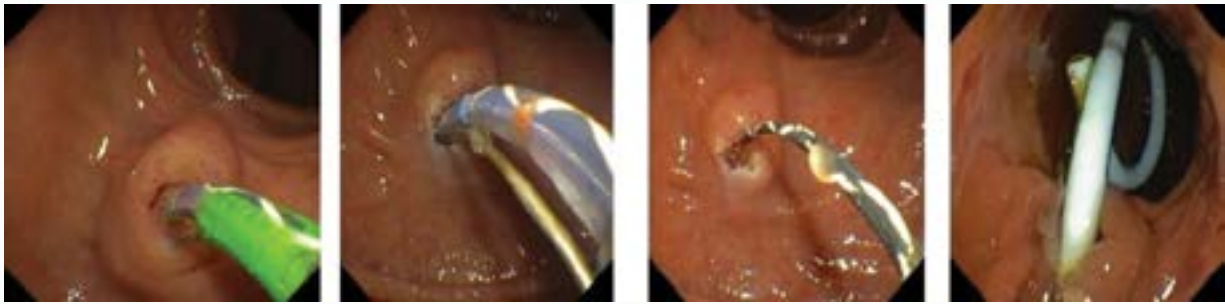
Hb	8.00 g/dL	Urea	16.40 mg/dl
Total Leucocyte	$8.91 \times 10^9/L$	Creatinine	0.50 mg/dl
Hematocrit	26.60 L	Potassium	2.3 mEq/L
Platelet	$434 \times 10^3/cmm$	Sodium	128 mEq/L
Bilirubin Total	1.34 mg/dl	Chloride	86 mEq/L
Bilirubin Direct	0.78 mg/dl	Prothrombin Time	21.8
Bilirubin Indirect	0.56 mg/dl	INR Value	1.59
SGOT	16.70 U/L		
SGPT	8 U/L		
Alkaline Phosphatase	592 U/L		

### Outcome and Follow-up

In the postoperative period post ERCP and stenting no complications were observed, and there was the absence of bile in abdominal drains. Consequently, our patient was discharged on the 10<sup>th</sup> postoperative day. Subsequent follow-up assessments at 2 weeks, 4 weeks, and 6 weeks at stent removal post-surgery revealed a favorable recovery trajectory, without any notable complaints.

### Discussion

The earliest documented case of common bile duct rupture dates back to 1806, as reported by Fizeau [1]. While most cases are attributed to injuries from sharp instruments or iatrogenic causes, the chances of common bile duct injury resulting from blunt trauma are extremely rare [3]. According to Posner and Moore [4] common bile duct injury comprises less than 1% of all abdominal injuries. Additionally, Rydell [5] noted that among 91 reported cases of common bile duct injuries spanning 80 years, only 25 were identified as cases of duct rupture. The mechanism of injury in this case was considered from various perspectives, including compression, elevation of pressure in the bile duct, and extension. It can be hypothesized that during the accident, the impact caused the motorbike handle to crash into the upper abdomen, compressing the liver upwards. Additionally, the deceleration force resulting from the collision may have forced the bile duct injury. This mechanism of injury has been reported in similar cases by Mohardt [6] and Ito, et al. [7], often involving the rupture of the common bile duct at the transitional zone of the pancreas or injury to the extrahepatic duct [7].



**Figure 4:** ERCP intraoperative papillotomy and stent placement.

Symptoms following injury to CBD are usually subtle initially, with spontaneous pain or fullness in the right hypochondrium improving within a few days [8]. However, jaundice and abdominal fullness due to bilious peritonitis may gradually develop within about a week post-injury [8,9]. Diagnosis of biliary system injury is challenging due to the minimal peritoneal irritation caused by bile leakage. Delayed diagnosis is common in up to 50% of the cases as reported by Michelassi [10], with cases reported to take up to 18 days from symptom onset to surgical treatment [11]. In our case, the definitive diagnosis of bilious peritonitis was confirmed by ascites aspiration 40 days post-injury, with surgery performed the same day. Diagnostic imaging such as cholangiogram, and triple phase CT played a crucial role in evaluating the extent of bile duct injury.

Bile duct injury management usually depends on the extent and location of the injury. Primary closure is often difficult if the injury exceeds half the diameter of the bile duct [12]. Choledochojejunostomy and hepaticojejunostomy are safe reconstruction methods, particularly in cases with extensive destruction [13]. In our case, deteriorating patient condition and hemodynamic status due to peritonitis support emergency surgical exploration but the site of the leak could not be detected intraoperatively, making ERCP appropriate for supporting the treatment.

## Conclusion

Blunt trauma-induced common bile duct rupture is exceedingly rare. Initial symptoms may be mild, escalating gradually. Diagnostic modalities such as MR cholangiopancreatography, endoscopic retrograde cholangiopancreatography and drip-infusion-cholangiography-CT are instrumental. Surgical interventions like choledochojejunostomy and hepaticojejunostomy are often necessary. Bile Duct Injury following blunt trauma abdomen is very rare but manageable, delayed diagnosis is very common due to non-specific and delayed symptoms. Endoscopic retrograde cholangiopancreatography is a great tool for the diagnosis and management of such cases. ERCP greatly reduces complications and mortality.

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