

# Endoscopic Treatment of Biliary Leak Following Gunshot Injury: A Case Report

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## Abstract

This report describes the endoscopic treatment of a biliary leak following a gunshot injury in a young Saudi female. She was admitted to the emergency unit having sustained an accidental gunshot on the upper part of her right shoulder when her spouse was maintaining his gun sitting on a higher level chair. She was intubated and immediately taken for exploratory laparotomy, which revealed right liver lobe laceration and significant hemoperitoneum. Bleeding was controlled surgically, and two peritoneal lavage catheters were inserted for drainage. However, about 300–400 ml of bile drainage was observed daily. Accordingly, endoscopic retrograde cholangiopancreatography (ERCP) was performed, which demonstrated a biliary leak. Sphincterotomy was performed and a stent was inserted, following which bile drainage gradually reduced, and stopped after 5 days. A follow-up ERCP was performed 10 weeks later, and no further leak was observed. This is the first case report of a successful endoscopic treatment of traumatic biliary injury due to a gunshot in Saudi Arabia. ERCP is a valuable method in the treatment of a traumatic bile leak.

**Keywords:** Endoscopic retrograde cholangiopancreatography, gunshot, Saudi Arabia, traumatic biliary injury

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## INTRODUCTION

Biliary leaks can be due to blunt, penetrating (e.g., gunshot wound) or iatrogenic (e.g., post-cholecystectomy or hepatobiliary surgery) traumas. Traumatic biliary injury due to blunt trauma to the right upper quadrant causes biliary disruption, and subsequently, bile peritonitis, leading to intrahepatic biloma and intraperitoneal bile leak. Of all abdominal injuries, traumatic biliary injury is one of the rarer events.<sup>[1,2]</sup> Biliary injuries can be due to motor vehicle crashes, shortfalls or, in rare cases, gunshot injury.<sup>[3,4]</sup>

This report describes a successful endoscopic treatment of a biliary leak following a gunshot injury in a young Saudi female, which, to the best of the author's knowledge, is the first such case report from Saudi Arabia.

## CASE REPORT

A 28-year-old Saudi female was admitted to the emergency unit of Aseer Central Hospital after having sustained an accidental gunshot on the upper part of her right shoulder when her spouse was maintaining his gun sitting on a higher level chair. Her medical and family history were unremarkable. On examination, she

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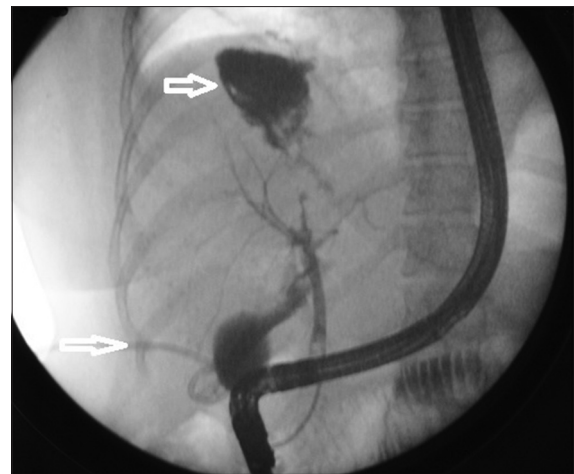
was conscious, distressed and complained of pain in her chest and right arm as well as had difficulty in breathing. She was a febrile and tachypneic, with a respiratory rate of 25/min and a blood pressure of 100/64 mm Hg. The patient was unable to flex her elbow or extend her wrist. A bullet entry wound was observed on her right upper shoulder and an exit wound at the level of L2. Chest examination showed decreased air entry on her right side and the trachea deviated to the left.

Abdominal examination revealed distended abdomen with tenderness on the right upper quadrant. The patient's oxygen saturation was 85%, hemoglobin 6 mg/dL, platelets  $95 \times 10^9/L$ , alanine transaminase 350 IU/L, aspartate transaminase 306 IU/L, bilirubin 3 mg/dL, creatine phosphokinase 3000 U/L, lactate dehydrogenase 400 IU/L, albumin 3 mg/dL, white blood cell  $11 \times 10^3/uL$ , urea 20 mg/dL and creatinine 1 mg/dL.

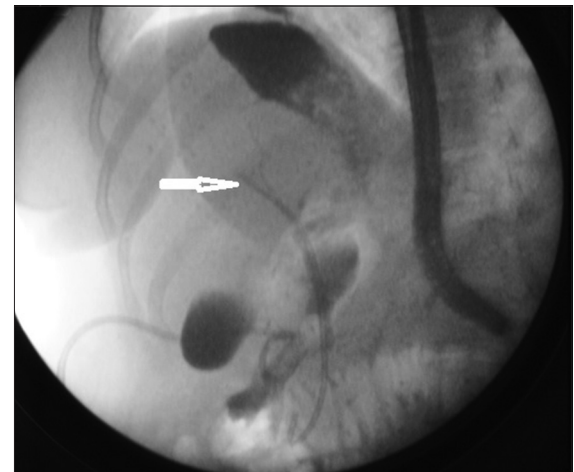
Chest X-ray and computerized tomography scan of the chest and abdomen showed right-sided hemothorax, right lung contusion, significant large sub-diaphragmatic posterior and superior fluid collection. There was no evidence of a spinal cord injury. The patient was immediately started on intravenous fluids, multiple packed red blood cell transfusions, fresh frozen plasma and inotropic support. A chest tube was inserted on the right side to relieve the pneumothorax and drain the blood. She was intubated and immediately taken for exploratory laparotomy, which revealed right liver lobe laceration and significant hemoperitoneum. Bleeding was controlled surgically and two peritoneal lavage catheters were inserted for drainage. Injuries to the axillary and brachial arteries were repaired by interposition venous graft.

The patient was monitored in the intensive care unit for 4 days and 300–400 ml of bile was drained daily. Subsequently, she developed fever ( $38.7^\circ C$ ), following which broad-spectrum antibiotics were maximized.

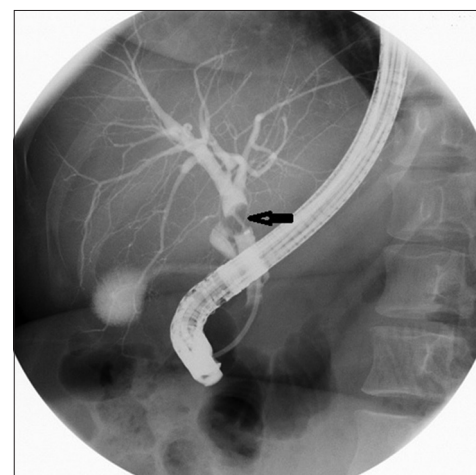
Endoscopic retrograde cholangiopancreatography (ERCP) was performed, which showed the presence of contrast extravasation from one of the tributaries of the right hepatic duct with evidence of bile collection, while other ducts were normal [Figure 1]. Endoscopic sphincterotomy was performed, followed by insertion of a plastic stent (7 Fr 12 cm) across the major papilla of Vater to the right intrahepatic duct close to the point of the leak [Figure 2]. There were no complications after ERCP. Bile drainage gradually reduced, and stopped after 5 days. The fever



**Figure 1:** The initial cholangiogram showing extravasation of contrast from one of the tributaries of right hepatic duct with evidence of bile collection (upper arrow; the lower arrow shows the presence of percutaneous subhepatic drain)



**Figure 2:** The subsequent cholangiogram showing the presence of plastic stent deployed to the right intrahepatic duct (arrow)



**Figure 3:** Cholangiogram taken 10 weeks after the initial intervention showing no further biliary leak (a balloon was used to create pressure to visualize any trivial biliary leak)

subsided, after which the surgical drain was removed and the patient was discharged in good condition.

Ten weeks later, she was electively readmitted for a second ERCP, which showed that the stent was in place, and consequently it was removed. A subsequent cholangiography showed no further leak [Figure 3].

The patient was seen 6 months later in the outpatient clinic, and she was in good health with no complaints. Her liver function tests and upper abdominal ultrasound were normal.

## DISCUSSION

Traumatic biliary injury is a challenging problem for both surgeons and hepatobiliary physicians. Its management is comparatively more difficult than that of iatrogenic biliary injuries because of the frequently associated major organ injuries.<sup>[5,6]</sup> It is a rare event, accounting for 1%–3.5% of all abdominal injuries.<sup>[7]</sup> In a recent case report series of 14 traumatic biliary injuries over a period of 5 years treated at University of Texas Health Science Center, Houston, Texas, USA, only 3 cases were due to gunshot injuries.<sup>[8]</sup>

Traumatic biliary injuries often result in high morbidity and prolonged hospital stay, and may result in intrahepatic biloma, intraperitoneal leakage of bile, hemobilia and intra-abdominal abscess.<sup>[7,8]</sup> Management of these cases often requires a surgeon experienced in biliary reconstruction.<sup>[7]</sup> In the present case, the patient underwent laparotomy, following which a surgical drain was inserted. However, the patient continued to have a persistent biliary leak and fever. Therefore, it was decided to refer the patient for endoscopic management.

Few earlier reports have demonstrated ERCP to be useful for the diagnosis and treatment of post-traumatic bile leaks, but data on outcome after therapeutic ERCP are limited.<sup>[9]</sup>

Endoscopic biliary treatment with stenting has been reported to be safe and effective for persistent bile leakage and may eliminate the need for difficult operations in high-risk postoperative cases.<sup>[8,10]</sup> In our patient, endoscopic sphincterotomy with stent insertion across the major papilla of Vater to the right intrahepatic duct close to the point of the leak resulted in relieving the pressure gradient between the bile ducts and duodenum. The physiological background of performing endoscopic

sphincterotomy and common bile duct (CBD) stenting is to allow the reduction of the pressure gradient between the bile duct and the duodenum by passing the sphincter of Oddi. Therefore, bile preferentially flows down the path of least resistance and this allows for spontaneous healing of the bile leak. This may be accomplished by stenting of the bile duct, sphincterotomy or combining both,<sup>[11,12]</sup> which was the preference in the reported case.

## CONCLUSION

This is the first case report of a successful endoscopic treatment of traumatic biliary injury due to a gunshot in Saudi Arabia. The author concludes that ERCP is a valuable method in the treatment of a traumatic bile leak.

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## Conflicts of interest

There are no conflicts of interest.

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