



Trauma and reconstruction

## Nephrobiliary fistula resulting from a gunshot wound in a young healthy male: A case report

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## ABSTRACT

Biliary fistulas are most commonly caused by cholelithiasis. Other causes include malignancies and peptic ulcer disease. A biliary fistula caused by a penetrating trauma is a rare entity, and a post-traumatic biliary fistula to the renal collecting system is extremely uncommon. We present an extremely rare case of a post-traumatic nephrobiliary fistula incurred after penetrating trauma that was successfully treated with endoscopic retrograde cholangiopancreatography (ERCP), biliary stents, and percutaneous drainage.

## Introduction

Biliary fistulas are rare complications that occur due to infection, inflammation, injury, or surgery and are most commonly caused by cholelithiasis. Yamashita et al. reported 33 cases of biliary fistulas; 94% were from cholelithiasis, and 6% from malignancy.<sup>1</sup> Rarely is trauma a cause. The post-traumatic biliary fistulas that are reported are often broncho-biliary. We add to the scant literature with a case of a nephro-biliary fistula (NBF) secondary to a gunshot wound (GSW) that was successfully treated with ERCP and percutaneous drainage.

## Case presentation

A healthy 21-year-old male presented to the emergency department (ED) with GSWs to the chest, abdomen, and extremities. He was hemodynamically unstable with peritoneal signs. Focused assessment with sonography for trauma (FAST) was negative for free fluid. After a chest tube was inserted for hemothorax, he was taken emergently to the operating room for exploratory laparotomy.

Upon insertion of a urinary catheter, gross hematuria was noted which prompted intra-operative urologic consultation. A cystoscopy with bilateral retrograde pyelograms revealed no evidence of bladder injury or upper tract urinary extravasation. Upon exploration, a large liver laceration and a right diaphragm injury were primarily repaired. There was no evidence of retroperitoneal bleed, so the retroperitoneum

was left unexplored. At the conclusion of the case, two peri-hepatic drains were placed to bulb suction.

Post-operative computed tomography (CT) urogram revealed an American Association for the Surgery of Trauma grade 3 laceration of the medial and superior pole of the right kidney and a large right hepatic lobe intracapsular hematoma (Fig. 1). The patient was placed in intensive care for close observation. Urinary catheter was removed on post-operative day (POD) 2 after hematuria resolution. The patient developed moderate bilious output from his drains and a fever on POD 4. On POD 5, an 11.4 × 11.7 cm hepatic fluid collection was found on CT scan (Fig. 2). Interventional radiology (IR) inserted a percutaneous hepatic drain into the collection. Intravenous Piperacillin-Tazobactam and Vancomycin were initiated empirically but discontinued once blood and urine cultures showed no growth. An ERCP with common bile duct stent procedure was performed due to high outputs from the hepatic-collection drain, raising concern for a bilious leak. Following this procedure, hepatic-collection drain output remained high, while peri-hepatic drain output diminished greatly. The patient subsequently had an unremarkable hospital course. The peri-hepatic drains were removed on POD 15 and 16. He was discharged on POD 17 with the hepatic-collection drain.

One week after discharge the patient presented to the ED with significant biliary fluid leakage around his percutaneous drain and worsening abdominal pain. A CT of the abdomen and pelvis with IV contrast demonstrated a fistulous connection between the hepatic collection

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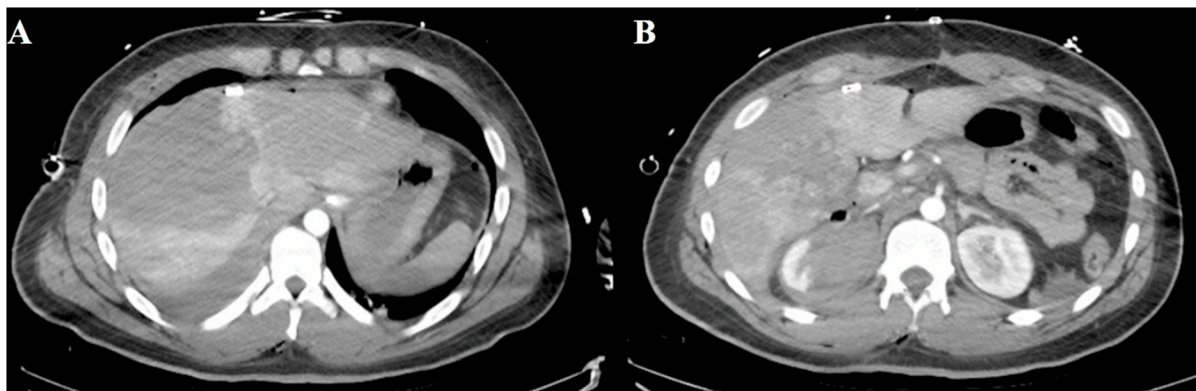


Fig. 1. Post-operative CTAP showed a (A) large right intracapsular hematoma and laceration involving most of the right hepatic lobe and an (B) intracapsular hematoma and laceration of the medial and superior pole of the right kidney.



Fig. 2. CTAP on post-operative day 5 showed a large intrahepatic complex collection measuring 11.4x11.7 cm.

cavity and the right kidney (Fig. 3). This was corroborated with elevated urine bilirubin levels. IR placed a right percutaneous nephroureterostomy (PCNU) tube. A urinary catheter was inserted to facilitate maximal drainage. The hospital course was uneventful but prolonged

due to a migrating biliary stent which was replaced on hospital day 10. The patient was discharged on hospital day 23 with the hepatic-collection drain, PCNU, and a Foley catheter.

The patient presented one week later with abdominal pain. His urinary catheter had been removed without urologic consultation at an outside hospital. He was voiding without complaint. He was found to have an occluded hepatic-collection drain. During replacement of his drain, the NBF appeared resolved on an antegrade pyelogram. The patient was discharged after a stent exchange and lost to follow-up. He presented to the urologic clinic after 4 months. After repeat antegrade pyelogram redemonstrated the resolution of the fistula, the PCNU was converted to a percutaneous nephrostomy tube (PCN). The patient was lost to follow-up again. The PCN was left to gravity drainage for 2 months before the patient re-presented. Fluoroscopic fistula studies showed no evidence of fistula, and the peri-hepatic and PCN drains were removed. In two years follow-up time, he remains well without any further hospital visits or clinical evidence of recurrence.

In total, the patient had a hepatic drain for 281 days, PCNU for 214 days, PCN for 54 days, and a urinary catheter for 30 days with complete resolution of his NBF.

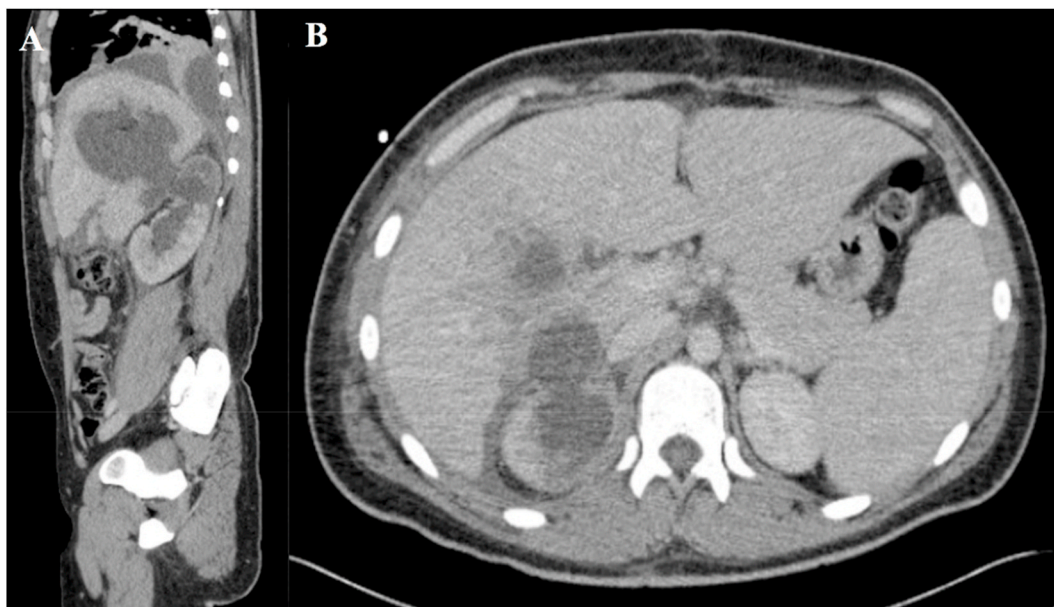


Fig. 3. CTAP shows the right hepatic lobe biloma communicating with the upper pole of the right kidney in (A) sagittal and (B) axial view.

## Discussion

Penetrating trauma is a rare and unusual cause of a biliary fistula, and a post-traumatic NBF has only been reported once.<sup>2</sup> The biliary-genitourinary cases in the literature are mostly caused by cholelithiasis. This case illustrates the challenges in managing trauma patients. They are often treated for complex, life-threatening injuries with unpredictable complications. Compounded in this case is evidence of devascularization of renal tissue, which is commonly associated with higher complication rates.<sup>3</sup> Successful management in this case is consistent with the reported high success rate of 90–100% in treating traumatic biliary leaks with ERCP, sphincterotomy, and biliary stenting.<sup>4</sup> One retrospective review showed that patients with biliary fistulas from penetrating injuries, who underwent exploratory laparotomy at presentation, had an average of 2.2 ERCPs to treat their biliary fistulas.<sup>5</sup> Our patient underwent 4 ERCPs.

Management of biliary fistulas depends on the etiology and type. The most common types of biliary fistulas are choledocho-duodenal, followed by cholecysto-duodenal, cholecysto-choledochal, and cholecystocolonic fistulas.<sup>1</sup> These are commonly treated with ERCP and biliary stenting. Our patient presented with a NBF, which required temporary urinary diversion.

To our knowledge, only one case report exists describing a NBF secondary to penetrating trauma. In that case, the NBF was treated with a double-J ureteral stent, PCN, and percutaneous embolization.<sup>2</sup> Our case complements this report, as it was also successfully treated with endoscopic and percutaneous management. In addition to ERCP, biliary stenting, and hepatic drainage, we successfully diverted the urine by

placing a PCNU and a urinary catheter. Although there is no standard time the drains should be left in place, our patient's NBF showed radiographic resolution within one month.

## Conclusion

Our case report adds to the literature of post-traumatic biliary fistulas, as it highlights a rare instance of penetrating trauma causing a NBF. This patient was successfully treated conservatively using principles of hepato-biliary and urologic drainage to allow for spontaneous closure of a NBF in an otherwise healthy individual.

## References

1. Yamashita H, Chijiwa K, Ogawa Y, Kuroki S, Tanaka M. The internal biliary fistula—reappraisal of incidence, type, diagnosis and management of 33 consecutive cases. *HPB Surg.* 1997;10(3):143–147. <https://doi.org/10.1155/1997/95363>.
2. Ryu R, Novak Z, Coldwell D. Percutaneous embolization of a posttraumatic nephrobiliary fistula. *J Trauma.* 1998;44(2):389–391. <https://doi.org/10.1097/00005373-199802000-00029>.
3. Santucci RA, Wessells H, Bartsch G, et al. Evaluation and management of renal injuries: consensus statement of the renal trauma subcommittee. *BJU Int.* 2004;93(7):937–954. <https://doi.org/10.1111/j.1464-4096.2004.04820.x>.
4. Bridges A, Wilcox CM, Varadarajulu S. Endoscopic management of traumatic bile leaks. *Gastrointest Endosc.* 2007;65(7):1081–1085. <https://doi.org/10.1016/j.gie.2006.11.038>.
5. Anand RJ, Ferrada PA, Darwin PE, Bochicchio GV, Scalea TM. Endoscopic retrograde cholangiopancreatography is an effective treatment for bile leak after severe liver trauma. *J Trauma.* 2011;71(2):480–485. <https://doi.org/10.1097/TA.0b013e3181efc270>.