

Iatrogenic hepatic subcapsular biloma following PCNL: Diagnosis and management

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Abstract

After the first description in 1976, percutaneous nephrolithotomy (PCNL) remains the treatment of choice for large renal stones. Adjacent organ injuries are rare complications, with pulmonary and colonic representing the most common, while hepatic represents one of the rarest. We describe our case of hepatic subcapsular biloma following a subcostal PCNL, conservatively managed by percutaneous drainage and endoscopic biliary stenting.

Introduction

After the first description in 1976,¹ percutaneous nephrolithotomy (PCNL) remains the treatment of choice for large renal stones.² Gaining renal access is the most critical step for effective and efficient PCNL. Adjacent organ injuries represent rare complications with pulmonary and colonic representing the most common,³ while hepatic represents one of the rarest. We describe our case of hepatic subcapsular biloma following PCNL. To our knowledge, this complication has never previously been reported.

Case report

A 53-year-old man had a right lower pole branched calculus, while undergoing computed tomography (CT) enterography as part of follow-up for a long standing Crohn's disease. A non-contrast spiral CT showed a 2.2-cm stone at the lower pole of the right kidney with no hydronephrosis (Fig. 1). A PCNL was performed with the patient in prone position, through a subcostal approach medial to the posterior axillary line, under combined endoscopic and fluoroscopic guidance.

On postoperative day 1, the patient developed right shoulder pain with erythema surrounding the nephro-ureteral catheter. A non-contrast CT revealed a small peri-hepatic

free fluid collection. The patient went febrile on postoperative day 2, with a white blood count (WBC) 15.77 k/uL; fever resolved with acetaminophen and the nephro-ureteral catheter was removed. On postoperative day 4, the WBC count returned to normal, while his hemoglobin was 8.3 mg/dL, although urine was grossly clear, requiring blood transfusion. A repeat CT scan (Fig. 2) demonstrated a 19 × 5.8-cm right sub-hepatic fluid collection, significantly increased from the earlier study. After consultation with the general surgical team, we closely monitored the patient and decided to perform a selective embolization of a segmental hepatic vessel, if he exhibited clinical evidence for significant, active bleeding.

On postoperative day 6, the patient was discharged with normal vital signs and hemoglobin of 10 mg/dL. Three days later, during an outpatient (stent extraction) visit, the patient complained of increasingly shortness of breath, and noticeable lower extremity edema with increased weight by 5 kg compared to his preoperative weight. A chest x-ray showed a moderate to large right pleural effusion. We urgently performed a Doppler ultrasound to rule out deep vein thrombosis in the lower extremities. The patient was immediately re-admitted, and a CT chest, abdomen, and pelvis (Fig. 3) revealed expansion of the large subcapsular hepatic fluid collection – still considered a hematoma, and a large, partially-loculated right pleural effusion.

At that time, a re-examination of the CT imaging by the radiologist, including calculation of Hounsfield density of the sub-hepatic fluid, revealed a reading of 7 that was inconsistent with blood, and this raised suspicion of a possible biloma. The patient was taken to the Interventional Radiology Department for drainage; the aspiration revealed dark yellowish fluid resembling bile, a 12F pigtail catheter was left in place and connected to suction drainage. Following this, the pleural effusion was drained and connected to water seal drainage. Laboratory analysis of the fluid revealed a bilirubin level of 9.3 mg/dL, consistent with bile, while the chest fluid gave a bilirubin level of 1.3 mg/dL, as serum.



Fig. 1. Preoperative non-contrast computed tomography scans showing the right lower calyceal branched stone.



Fig. 2. Abdominal computed tomography scans showing a large subcapsular biloma anterior to the right lobe of the liver.

Over the next 3 days, the patient's condition dramatically improved with resolution of respiratory symptoms, and a significant decrease in his bilateral, lower extremity swelling. The pleural fluid drainage decreased to a minimal amount; however, the sub-hepatic fluid failed to diminish, remaining at 250 mL/24 hours.

General surgery recommended endoscopic retrograde cholangiopancreatography with placement of both pancreatic and biliary stents to help dry up the bile leak; this was done on the same day and would be removed after 4 days and 8 weeks, respectively. The chest tube was removed and the biliary drain was repositioned, and it was scheduled to be removed in the office by general surgery in another 1 to 2 weeks. The patient was ultimately discharged on the 12th day of this re-hospitalization. One month later, a non-contrast CT revealed the sub-hepatic collection had fully resolved.

Discussion

Liver injury occurring during PCNL is a rare complication usually unnoticed at the time of surgery.⁴ The rate of injury ranged from 0% to 0.4% in series with >1000 patients.^{5,6} The diagnosis can be elusive due to the variability of symptoms and signs. Accesses through the 10th intercostal space and/or anterior to the posterior axillary line are major risk factors for adjacent organ injury.⁷

In 2008 EL-Nahas and colleagues⁵ published the first case report regarding conservative management of liver injury in

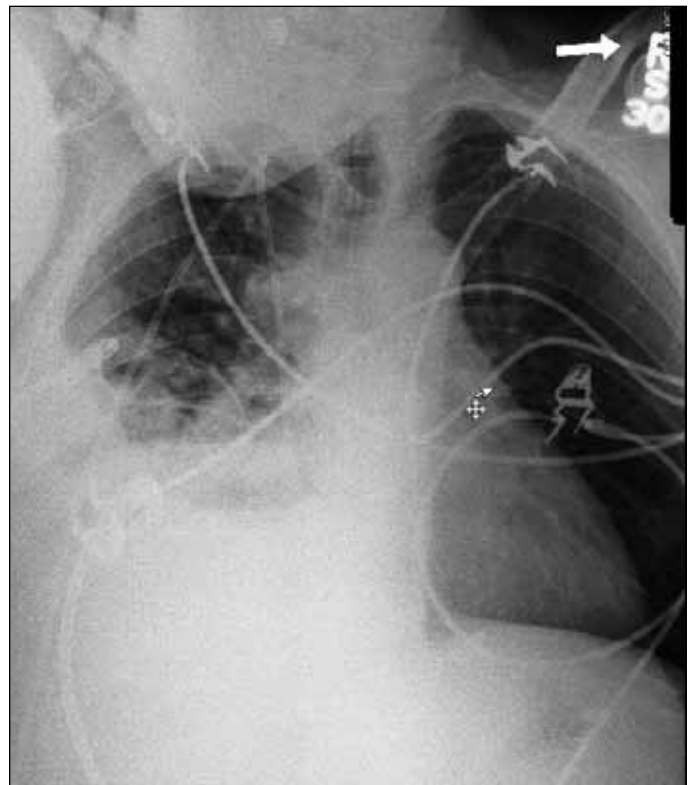


Fig. 3. Chest X-ray showing very-elevated right hemi-diaphragm, and moderate to large right pleural effusion.



Fig. 4. Abdominal computed tomography scans revealing expansion of the large subcapsular hepatic fluid collection.

conjunction with percutaneous nephrolithotomy. In a study by Robert and colleagues⁸ to determine the visceral risk secondary to a direct percutaneous puncture of the upper renal calyx utilizing magnetic resonance imaging, the authors reported that liver or spleen injury was unlikely to happen in the case of classical punctures below the 12th rib, particularly in the absence of organomegaly. Our approach was well below the 12th rib targeting a lower pole calyx containing the stone, but his liver span measured 20 cm.

Pombo and colleagues⁹ observed a significantly greater distance between the liver and the right kidney (hepato-renal space) when normal volunteers were positioned in the prone position (3.93 ± 0.37 cm) in comparison with supine position (1.98 ± 0.20 cm). Accordingly, they concluded that right percutaneous access to the inferior right renal pole had a significantly lower risk of both hepatic and biliary injuries when performed in the prone position compared to the supine position. We retrospectively measured the distance between the right kidney and liver in the supine position, this distance was (0.83 ± 0.6 cm) (Fig. 4) less than half the hepato-renal distance in the above-mentioned study, significantly reducing any advantage of the prone position in our case.

Again, retrospectively, the attenuation level of the subcapsular hepatic fluid in our patient was 7 ± 3 and not consistent with a hematoma, but unfortunately it was not

immediately recognized. It should be noted that fluids with about the same density as water (e.g., bile, urine, and intestinal contents) ranged from 0 to 15 HU, while blood, because of its high protein content, generally had an attenuation of 30 to 45 HU.¹⁰

Conclusion

Sub-capsular biloma after PCNL is an unusual complication, but can be successfully managed in a hemodynamically-stable patient using conservative measures.

Competing interests: The authors declare no competing financial or personal interests.

This paper has been peer-reviewed.

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