

Recurrent Bacteremia and Cholangitis From Eroded Hepatic Artery Pseudoaneurysm Coil Into the Common Hepatic Duct: A Rare Indication for Liver Transplantation

Mark C. Wang, MD¹, Aileen Bui, MD², Supisara Tintara, MD², Kambiz Etesami, MD³, and Brian Kim, MD²

¹Department of Medicine, Keck School of Medicine, University of Southern California, Los Angeles, CA

²Department of Medicine, Division of Gastrointestinal and Liver Diseases, Keck School of Medicine, University of Southern California, Los Angeles, CA

³Department of Surgery, Division of Hepatopancreaticobiliary Surgery and Abdominal Organ Transplantation, Keck School of Medicine, University of Southern California, Los Angeles, CA

ABSTRACT

Liver transplant may be necessary to manage infectious complications from severe structural biliary disease. In this report, we describe a 71-year-old woman with history of coil-embolized hepatic artery pseudoaneurysm who subsequently developed biliary obstruction resulting from coil erosion into the common hepatic duct. Resultant complications included recurrent cholangitis, bacteremia, and numerous hepatic abscesses. Because of lack of improvement with medical management, the patient underwent liver transplantation and coil removal as the definitive treatment modality. Altogether, this report explores a unique case of liver transplantation as source control for a patient with an active disseminated infection.

KEYWORDS: liver transplant; cholangitis; hepatic abscess; hepatic artery pseudoaneurysm coil

INTRODUCTION

Patients with structural biliary disease have a high risk of bacterial cholangitis and bacteremia, leading to high morbidity.¹ Given that patients with severe biliary tree damage have limited medical therapies and can develop serious infectious sequelae, liver transplantation (LT) is considered a viable treatment option with excellent post-transplant outcomes.^{1,2} With approval from the National Liver Review Board, model for end-stage liver disease (MELD) exception points can help prioritize patients on the transplant waitlist,³ as the calculated MELD score may not adequately capture the morbidity and potential mortality for these patients.¹ In this report, we focus on a case of successful LT that provided source control for an active disseminated infection caused by an unusual, structural biliary injury.

CASE REPORT

A 71-year-old woman with history of hepatic artery (HA) pseudoaneurysm status post coil embolization one year earlier presented with epigastric pain and chills. On admission, she was found to have elevated liver enzymes (alkaline phosphatase [ALP] 169 IU/L, aspartate aminotransferase [AST] 324 IU/L, and alanine aminotransferase [ALT] 701 IU/L) with hyperbilirubinemia (total bilirubin 4.6 mg/dL and direct bilirubin 3.1 mg/dL), coagulopathy (prothrombin time 22.1 and international normalized ratio [INR] 2.0), and sepsis (white blood cells [WBC] $20.9 \times 10^3/\mu\text{L}$ and heart rate 110 bpm). Calculated MELD-Na was 25. Computed tomography showed innumerable hepatic abscesses and dilatation of intrahepatic bile ducts (Figure 1). Ultrasound-guided biopsy of one lesion revealed fibrinopurulent fluid consistent with abscess. Cultures from both blood and biopsy grew *Escherichia coli*, vancomycin-resistant *Enterococcus*, and *Klebsiella* species. Given concerns for acute cholangitis, endoscopic retrograde

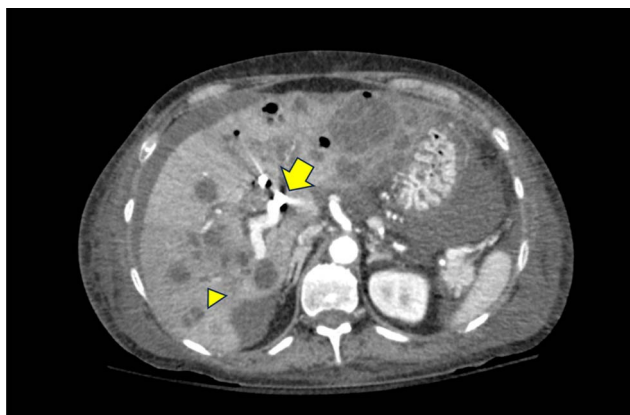


Figure 1. Transverse computed tomography image showing innumerable hepatic abscesses, hepatic artery embolization coil (full arrow), and intrahepatic duct dilations (arrowhead).

cholangiopancreatography (ERCP) was performed, demonstrating hemobilia and erosion of the previous HA pseudoaneurysm embolization coil into the common hepatic duct (CHD). Papillotomy was performed, and a plastic stent was placed spanning both the CHD and common bile duct (CBD). The patient's condition continued to decline after stent placement with persistent transaminase elevation (AST 73, ALT 66, and ALP 506), hyperbilirubinemia (total bilirubin 8.0), and sepsis (WBC 23.95) requiring vasopressors. She also had continued melena, presumed because of the arteriobiliary fistula, requiring blood transfusions. Abdominal computed tomography angiogram revealed an increase in the number and size of liver lesions and worsening intrahepatic and extrahepatic biliary ductal dilatation (Figure 2). Repeat ERCP was performed. There was persistent hemobilia, and the embolization coil was again seen eroding into the CHD just below the hilum (Figure 3). The plastic stent was replaced with 2 overlapping fully covered metal stents to sufficiently tamponade the source of bleeding and relieve the biliary obstruction. After the procedure, the patient's transaminase elevation improved, blood cultures cleared, and hemoglobin remained stable without further melena. She was discharged home on a prolonged course of intravenous antibiotics. However, given the persistent hepatic abscesses and continued risk of recurrent bacteremia, it was determined that LT would be the only option for sustained source control. Surgical resection with hepaticojejunostomy was not feasible because the fistula was located near the hilum. The patient was discussed and approved for LT listing, and an application for a MELD exception of median MELD at transplant minus 3 was approved by the National Liver Review Board. On the day of LT listing, laboratory test results were notable for AST 43, ALT 51, ALP 688, total bilirubin 2.6, INR 1.3, and calculated MELD-Na 16.

Approximately 3 weeks later, the patient was readmitted with chills, jaundice, abdominal discomfort, and dark stools, and she was found to have recurrent vancomycin-resistant *Enterococcus* bacteremia with anemia and worsening hyperbilirubinemia. Laboratory test results were significant for WBC

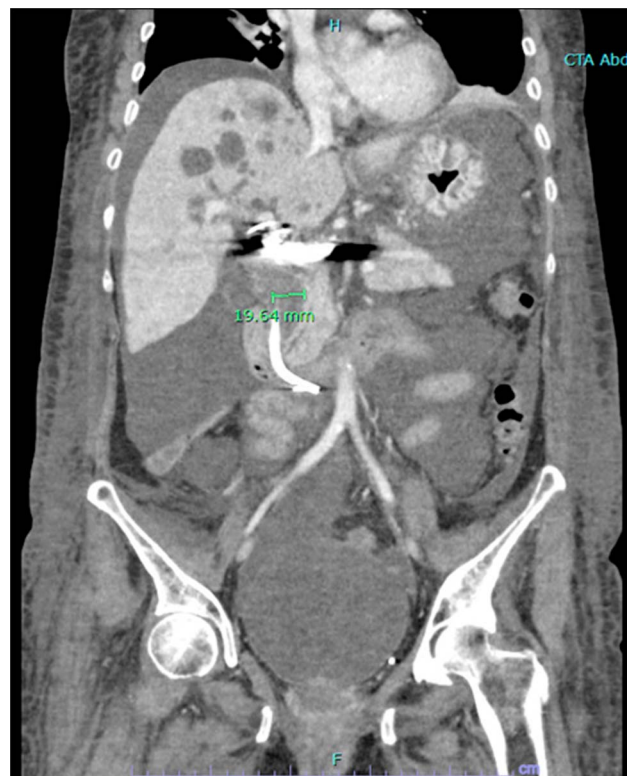


Figure 2. Coronal computed tomography image showing dilated extrahepatic duct with previous biliary stent and innumerable hepatic lesions.

23.9, hemoglobin 6.2, sodium 124, creatinine 0.38, ALP 595, AST 156, ALT 106, total bilirubin 7.6, INR 1.7, and calculated MELD-Na 28. During this second hospital course, the patient began to develop persistent polymicrobial bacteremia despite

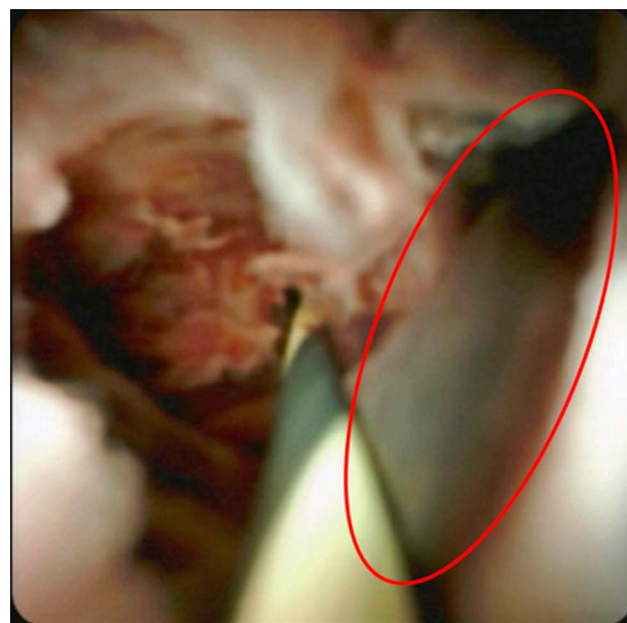


Figure 3. Cholangioscopy image showing the hepatic artery pseudoaneurysm coil erosion into the common hepatic duct (circled in red).

broad-spectrum antibiotics and upsized internal-external biliary and biloma drains. At this point, ERCP was not feasible for further biliary drainage or coil removal. Cholangiography revealed intrahepatic duct filling defects suggestive of ischemic cholangiopathy, further requiring LT as the definitive treatment. Given her worsening bacteremia despite numerous interventions to provide source control, the patient more urgently required LT and was approved for a higher MELD exception of median MELD at transplant minus two. On the day of approval, the patient's laboratory test results were significant for WBC 29.19, ALP 396, AST 40, ALT 37, total bilirubin 12.8, INR 1.3, and calculated MELD-Na 25. The patient remained hospitalized, and 60 days after LT listing, she underwent successful deceased donor LT with Roux-en-Y hepaticojejunostomy and surgical removal of the embolization coil. Her post-transplant course was first complicated by intraabdominal and subcutaneous bleeding requiring exploratory laparotomy with evacuation of the hematomas, ligation of the bleeding points, and complex abdominal wall closure with mesh. She also developed posterior reversible encephalopathy syndrome because of tacrolimus toxicity and was subsequently switched to cyclosporine for immunosuppression with resulting improvement in her mental status. Her course was further complicated by melena secondary to bleeding gastric and jejunal ulcers, which were successfully managed by multiple esophagogastroduodenoscopies and single-balloon enteroscopy with resulting hemostasis. After the resolution of these complications, the patient was discharged from the hospital one month after LT. One year after LT, the

patient has recovered well and remains robust without further complications (Figure 4).

DISCUSSION

This case illustrates a rare etiology of recurrent bacterial cholangitis, hepatic abscesses, and bacteremia that required LT for infection control. The patient had an HA pseudoaneurysm coil that eroded into the CHD, creating an arteriobiliary fistula that allowed for direct seeding of enteric bacteria from the CHD to the HA as well as recurrent hemobilia and anemia. Given the persistent hepatic abscesses, recurrent bacteremia without source control, and likely ischemic cholangiopathy, LT was decided to be the best option. Surgical resection with hepaticojejunostomy was not feasible, given that the coil erosion was located near the hilum of the bile ducts. In addition, the embolization coil could not be removed endoscopically, and the patient had failed management through ERCP twice. The patient was approved for nonstandard MELD exception points to prioritize her on the LT waiting list.

Coil erosion into the bile ducts is a rare complication of HA pseudoaneurysm coil embolization. According to case reports, affected patients experience a wide range of presentations, including pancreatitis, biliary colic, or obstructive jaundice.⁴⁻⁷ Management has been generally through endoscopic, surgical, or percutaneous transhepatic cholangioscopic coil removal.⁴⁻⁷ In most of these cases, the patient did not develop an infection. The case reports describing endoscopic and percutaneous

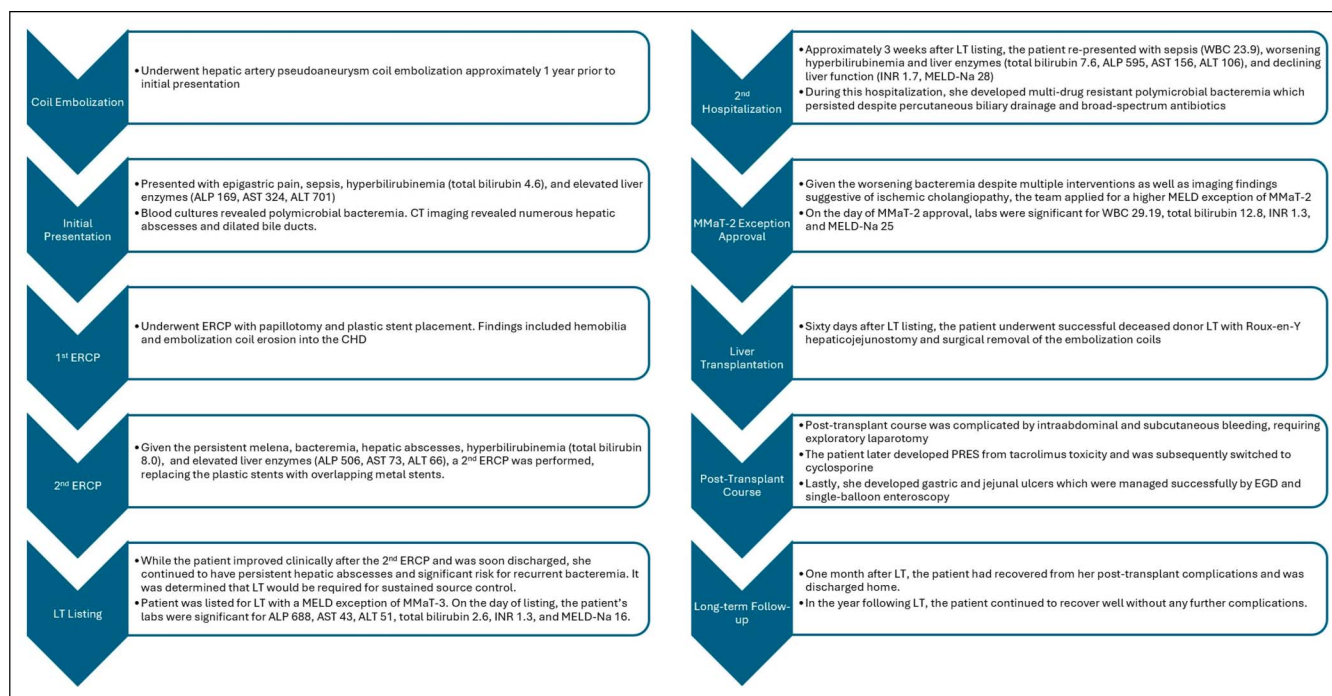


Figure 4. Timeline of the patient's clinical course from hepatic artery pseudoaneurysm coil placement to post-liver transplant outcome. ALP, alkaline phosphatase; ALT, alanine aminotransferase; AST, aspartate aminotransferase; CHD, common hepatic duct; CT, computed tomography; EGD, esophagogastroduodenoscopy; ERCP, endoscopic retrograde cholangiopancreatography; INR, international normalized ratio; LT, liver transplantation; MELD, model for end-stage liver disease; MMaT, median MELD at transplant; WBC, white blood cells.

transhepatic cholangioscopic management involved patients who developed obstructive jaundice, but not cholangitis or bacteremia, from coils that had eroded into the CBD.^{4,5} One case that underwent surgical removal of the coils from the CBD originally only presented with pancreatitis instead of hyperbilirubinemia or cholangitis.⁶ The most similar case to ours highlighted a patient who also developed cholangitis and bacteremia with enteric organisms but instead only required surgical removal of the coils.⁷ In comparison, our case describes a more severe infectious picture with recurrent multidrug-resistant bacteremia and persistent hepatic abscesses despite multiple interventions. Furthermore, given the anatomic location of the erosion near the hepatic hilum, LT was the best and only option for long-term management.

This case highlights an unusual indication for LT as a necessary means of providing source control in the setting of an active disseminated infection. Systemic infections are usually considered to be a strong contraindication for LT,⁸ as they present high surgical risk and complicate immunosuppressive post-transplant care. However, this patient's escalating multidrug-resistant polymicrobial bacteremia and persistent hepatic abscesses despite numerous nonsurgical interventions warranted rare clinical and ethical considerations. Source control of the bacteremia was prioritized, given its greatest potential for mortality, and LT was eventually deemed to be the only feasible means of doing so. Ultimately, it was determined that the benefits of obtaining infection control through LT far outweighed the intraoperative and perioperative risks. As a result, the patient was approved for escalating MELD exception points to prioritize her on the LT waitlist. Although this indication for LT is rare, it has been previously used in the literature, albeit under different circumstances. A case report from Italy describes an LT recipient who required retransplantation for infectious source control because of recurrent bacteremia and hepatic abscesses that had failed less invasive management, similarly to our patient.⁹ However, instead of being caused by a coil erosion, the abscesses in this patient were due to HA thrombosis, a complication from his first LT.⁹

In summary, this report describes a rare case of HA pseudoaneurysm coil erosion into the CHD, resulting in recurrent cholangitis, numerous hepatic abscesses, multidrug-resistant polymicrobial bacteremia, and eventually ischemic cholangiopathy, that led to successful LT with a positive long-term outcome. This case further supports the use of LT to achieve definitive source control for severe systemic infections, especially if all other less invasive options have been exhausted. Given the unusual indication for LT in this patient, this case also highlights the importance of evaluation at an experienced

transplant center for similarly complex patients who may require LT.

DISCLOSURES

Author contributions: M. Wang: writing—original draft. A. Bui: conceptualization, writing—review and editing. S. Tintara: writing—review and editing. K. Etesami: writing—review and editing. B. Kim: writing—review and editing, supervision, and is the article guarantor.

Financial disclosure: None to report.

Previous presentation: This case was presented at the American College of Gastroenterology 2023 Annual Scientific Meeting; Vancouver, Canada; October 23, 2023.

Informed consent was obtained for this case report.

Received August 6, 2024; Accepted December 17, 2024

REFERENCES

- Gores GJ, Gish RG, Shrestha R, Wiesner RH. Model for end-stage liver disease (MELD) exception for bacterial cholangitis. *Liver Transplant*. 2006; 12(12 Suppl 3):S91–2.
- Khungar V, Goldberg DS. Liver transplantation for cholestatic liver diseases in adults. *Clin Liver Dis*. 2016;20(1):191–203.
- US Department of Health and Human Services, Health Resources and Services Administration. OPTN Policies. https://optn.transplant.hrsa.gov/media/eavh5bf3/optn_policies.pdf. Updated December 11, 2024. Accessed December 30, 2024.
- Elsayed M, Nezami N, Kokabi N, Scriver GM, Behairy MM, Majdalany BS. Percutaneous transhepatic cholangioscopy-guided lithotripsy and retrieval of vascular coils eroded into the biliary tree. *Radiol Case Rep*. 2023;18(2):444–8.
- Kao WY, Chiou YY, Chen TS. Coil migration into the common bile duct after embolization of a hepatic artery pseudoaneurysm. *Endoscopy*. 2011; 43(Suppl 2 UCTN):E364–5.
- Ozkan OS, Walser EM, Akinci D, Nealon W, Goodacre B, Guglielmi detachable coil erosion into the common bile duct after embolization of iatrogenic hepatic artery pseudoaneurysm. *J Vasc Interv Radiol*. 2002;13(9 Pt 1):935–8.
- Turaga KK, Amirlak B, Davis RE, Yousef K, Richards A, Fitzgibbons RJ Jr. Cholangitis after coil embolization of an iatrogenic hepatic artery pseudoaneurysm: An unusual case report. *Surg Laparosc Endosc Percutan Tech*. 2006;16(1):36–8.
- Farkas S, Hackl C, Schlitt HJ. Overview of the indications and contraindications for liver transplantation. *Cold Spring Harbor Perspect Med*. 2014;4(5):a015602.
- Zanus G, Romano M, Finotti M, et al. Liver retransplantation for hepatic abscess due to hepatic artery thrombosis: A case report. *Transpl Proc*. 2017; 49(4):736–9.

Copyright: © 2025 The Author(s). Published by Wolters Kluwer Health, Inc. on behalf of The American College of Gastroenterology. This is an open access article distributed under the terms of the Creative Commons Attribution-Non Commercial-No Derivatives License 4.0 (CCBY-NC-ND), where it is permissible to download and share the work provided it is properly cited. The work cannot be changed in any way or used commercially without permission from the journal.