Combined laparoscopic placement of a PTBD demonstrating multidisciplinary problem-solving in a complex patient

Shamar Young, MD; Beau Toskich, MD; and Ivan Zendejas, MD

In rare cases, biliary drainage is prevented by colonic position. When these situations arise within a critically ill patient who is not a good surgical candidate, unique solutions must be found. In this case, the solution was to use laparoscopic assistance to displace the colon while the interventional radiology team successfully accessed the biliary system.

Introduction

The role of perioperative percutaneous decompression of an obstructed biliary system remains debated (1-4). There is, however, little argument over the necessity of biliary decompression in the setting of cholangitis. Endoscopic retrograde cholangiopancreatography (ERCP) and stenting is the preferred treatment approach for common bile-duct obstructions, with a success rate of 90% in the hands of experienced operators (1-4). If ERCP fails, or there is predominantly intrahepatic obstruction, percutaneous transhepatic biliary drainage (PTBD) is the procedure of choice, with an overall success rate of 94% (5). Complications related to PTBD have been reported to be approximately 5%, the most common being biliary-instrumentation-related sepsis (5-7). A rare PTBD complication, very sparsely reported in the current literature, is bowel perforation. In the few described cases, the operator was unaware of the uncommon bowel interposition between the skin and liver. In the typical situation, the bowel position is correctly identified, and if there is concern regarding the safety of percutaneous access, the procedure is not performed. In our institution's experience with PTBDs, we have found that the prevalence of bowel interposition is greater over the left hepatic lobe, as compared to the right. To address a situation such as this, we describe a hybrid catheter-directed and laparoscopic approach to managing a patient with cholangiocarcinoma and cholangitis requiring left hepatic lobe biliary drainage with colonic interposition.

Case report

At our institution, IRB approval is not required for case report studies. Our patient was a 56-year-old Caucasian female who presented to her gastroenterologist with non-specific epigastric pain. She was subsequently found to have a 2cm intrahepatic cholangiocarcinoma infiltrating the liver hilum and resulting in right-sided biliary obstruction. The patient was initially treated at an outside institution, where a failed attempt at endoscopic biliary decompression resulted in a right-sided PTBD. The patient was then referred to us for definitive management.

Once at our institution, the patient was evaluated by the transplant surgery and interventional radiology services. She underwent a successful right-portal-vein embolization; an anticipated right-liver trisegmentectomy awaited adequate future liver remnant hypertrophy, proposed to occur approximately 1 month after embolization. Unfortunately, the patient developed cholangitis in the interim. CT demonstrated the development of left biliary system dilation, in addition to multiple new punctate peritoneal implants concerning for carcinomatosis. The colon, however, was situated in such a way that a safe window for percutaneous access was not felt to exist (Fig. 1). Consequently, the deci-
A diagnostic laparoscopic procedure was performed before opening for the trisegmentectomy to rule out carcinomatosis. The laparoscopic exploration revealed multiple peritoneal implants along the right hemidiaphragm from tumor seeding after the prior right-sided PTC placement. The implants were then biopsied, and the planned liver resection was averted. The left biliary system remained obstructed and, in the setting of elevated bilirubin and the need for systemic therapy and possible radiation, the decision was made to decompress the left side. Fluoroscopic examination revealed unchanged colonic positioning.

After discussion with the transplant surgeons, a combined approach, using laparoscopic techniques to displace the colon and provide percutaneous access for biliary drainage, was deemed the best option—especially given the clinical situation, as the patient was suffering from repetitive bouts of obstructive cholangitis.

**Technique description**

Informed consent was obtained for the individual in this study before any procedure was performed. The patient was placed under general anesthesia and prepped and draped in the typical sterile fashion. This was followed by a timeout and the administration of 2 grams of IV cefotetan as a preoperative antibiotic. A stab incision in the left upper quadrant was then made without complication, and the abdomen was insufflated. An additional 5mm trocar was then placed in the umbilical area, and the left upper quadrant trocar was upgraded to a 12mm. Exploration revealed multiple small nodules within the peritoneum, including nodules on the liver dome and within the omentum (Fig. 2). Several biopsies were taken from multiple locations. The laparoscope was used to displace the colon inferiorly. Laparoscopic ultrasound was performed, and the patient was noted to have a dilated left hepatic biliary system. The initial frozen sections from the biopsies revealed adenocarcinoma, consistent with malignant carcinomatosis. At this point, the interventional radiology (IR) team joined the surgical team in the OR.

The IR team performed a 21-gauge-needle and antegrade percutaneous puncture with dilute contrast into the liver parenchyma. On the second pass, a left hepatic duct was opacified. A second 21-gauge needle was used to access a more peripheral left bile duct (Fig 2). A limited cholangiogram was performed that demonstrated left peripheral biliary ductal dilation with central occlusion; however, a patent common bile duct was identified.

A 0.018-inch wire was then advanced through the left peripheral biliary duct and through the common bile duct down into the duodenum. The needle was then exchanged to a 4/6 French coaxial dilator system. The 4 French inner dilator and inner stylet were removed, and a Bentzon wire was advanced through the 6 French outer dilator into the small bowel. The 6 French dilator was then removed, and a micro wire was secured as a safety wire. The Bentzon wire was then exchanged for an Amplatz super-stiff wire with the use of a 4 French short hockey-stick catheter. Then an 8 French internal/external, Cope-loop-type, biliary catheter was placed with its peripheral side holes distal to the stricture and its tip coiled in the duodenum. The Amplatz and safety wire were removed.
and a repeat injection confirmed appropriate placement of the side holes; the catheter was then sutured into place (Fig. 3). Hemostasis was checked, and a right-upper-quadrant Jackson-Pratt drain was left. The trocars were removed, followed by suture closure of the trocar sites and suturing of the JP drain into place. The patient was then brought out of general anesthesia and recovered well.

Discussion

As a result of advancing oncologic treatment, including improved surgical techniques, the number of patients requiring biliary system drainage is rapidly growing. While the majority of patients may be treated through either ERCP or percutaneous biliary drainage, on rare occasions ERCP is not feasible and there is no available safe window for standard percutaneous drainage. In these cases, innovative solutions must be found. The patients requiring such treatment are commonly quite ill, and therefore the most minimally invasive technique is preferred. Often, this leads to the necessity of a multidisciplinary team to address the complexity of the situation and determine the best treatment strategy. This problem-solving can result in multiple different unique approaches, including ultrasound-guided techniques and possibly the use of new GPS systems. We offer a unique technique that may be considered in this relatively uncommon, yet critically ill, subset of patients.

References

1. Schumacher B, Othman T, Jansen M, Preiss C, Neuhaus. Long-term follow-up of percutaneous transhepatic therapy (PTT) in patients with definite benign anastomotic strictures after hepaticojejunostomy. Endoscopy. 2001 May; 33(5):409-15. [PubMed]
2. Jackson J, Roddie M, Yeung E, Benjamin I, Adam A. Biliary Endoprosthesis dysfunction in patients with malignant hilar tumors: Successful treatment by oercutaneous replacement of the stent. AJR. 1990 Aug; 155(2):391-5. [PubMed]
3. Fotheringham T, Abbass S, Varghese JC, Haslam P, Lyon S, Lee MJ. Displacement of occluded plastic endoprostheses into the duodenum during percutaneous biliary drainage: description of an under-reported technique. Clinical Radiology. 2002 Dec; 57(12):1113-7. [PubMed]
4. Brinkley M, Wible B, Kelvin H, Georgiades C. Colonic perforation by a percutaneously displaced biliary stent: Report of a case and a review of current practice. J Vasc Interv Radiol. 2009 May; 20(5):680-3. [PubMed]
5. Mueller PR, vanSonnenberg E, Ferrucci JT Jr. Percutaneous biliary drainage: Technical and catheter-related problems in 200 procedures. AJR. 1982 Jan; 138(1):17-23. [PubMed]
6. Yee ACN, Ho C. Complications of percutaneous biliary drainage: Benign vs malignant diseases. AJR. 1987 Jun; 148(6):1207-9. [PubMed]
7. Clark RA, Mitchell SE, Colley DP, Alexander E. Percutaneous catheter biliary decompression. AJR. 1981 Sep; 137(3):503-9. [PubMed]