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INTERVENTIONAL RADIOLOGY

TECHNICAL NOTE

Malpositioned endoscopically inserted biliary stent causing massive hematemesis managed with vascular plug and stenting

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ABSTRACT

A 46-year-old man with a history of hepatitis B cirrhosis and hepatocellular carcinoma (HCC) status post liver transplantation two years ago complicated by HCC recurrence and biliary stenosis presented with hypovolemic shock and melena one month after endoscopic exchange of plastic biliary stents. During endoscopic retrograde cholangiopancreatography, patient was found to have hemobilia and developed uncontrollable bleeding after a common bile duct (CBD) sweep managed by insertion of a stent-graft across major papilla into presumed CBD. The bleeding continued with subsequent negative angiography, and a computed tomography angiography showed malpositioned stent-graft between major papilla and inferior vena cava (IVC). This was successfully managed by the deployment of a vascular plug inside the stent graft and excluding it by deploying a stent across the affected area in IVC.

Endoscopic retrograde cholangiopancreatography (ERCP) is the most common procedure used to diagnose and treat primary pancreaticobiliary disorders and manage postoperative complications. Overall, ERCP has a high technical success and is considered a safe procedure (1). Although with increasing operator experience and advances in technology the safety profile of ERCP is improving, it still could potentially result in severe complications (2). In liver transplant recipients, biliary complications such as biliary stenosis and Oddi sphincter dysfunction are common and can happen in 5%–20% of the patients (3, 4). With the refinement of orthotopic liver transplantation surgical technique, especially donor to recipient biliary duct-to-duct anastomosis and preserving the gastrointestinal anatomy, ERCP plays a central role for the minimally invasive management of biliary complications (5). ERCP outcomes and complications in the general population is very well understood; however, the evidence regarding post-ERCP complications in liver transplant recipients is poor, and few more recent studies suggest an overall complication rate of 9%–15% (5, 6), including a bleeding risk of 2%–3.8% (5, 6) and perforation risk of 0.6% (6), which is higher than what is reported in the general population (7).

Interventional radiology (IR) procedures such as percutaneous transhepatic cholangiography and drainage are the second line in managing biliary complications of liver transplant recipients. However, IR still plays a vital role in managing procedural complications, such as bleedings that are challenging to control. We are reporting a rare severe ERCP complication in a liver transplant recipient resulting in uncontrolled bleeding. The bleeding was due to perforation between the common bile duct and inferior vena cava (IVC) and inadvertent deployment of a stent-graft connecting the IVC and duodenum. The complication resulted in massive hematemesis and pulmonary emboli and was successfully managed by an unusual IR approach.

Technique

The patient was a 46-year-old male with a history of hepatitis B virus cirrhosis complicated by hepatocellular carcinoma (HCC) status post orthotopic liver transplantation in 2018 with recurrent metastatic HCC and biliary stricture resulting in episodes of cholangitis, which required sphincterotomy and placement of an endoscopically inserted plastic biliary stent. The plastic biliary stent was exchanged five weeks later for recurrent cholangitis. One month

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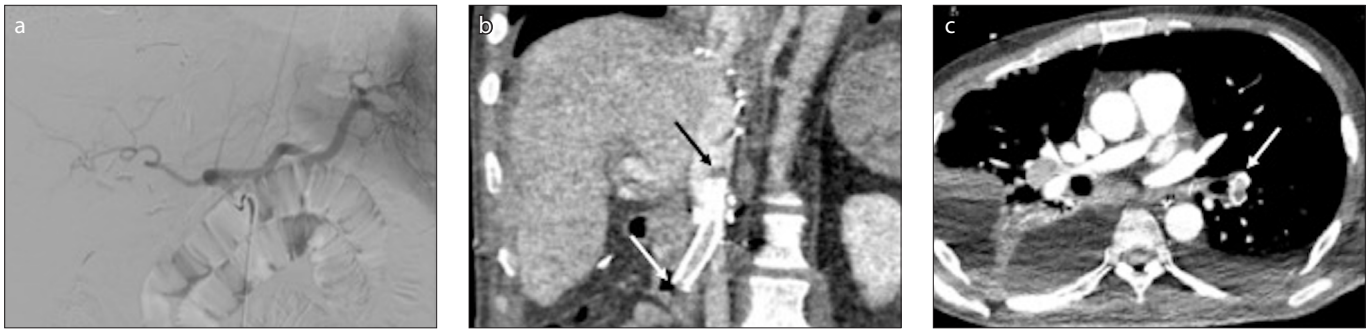

Figure 1. a–c. Angiography through celiac axis **(a)** did not show any arterial abnormality or contrast extravasation. Follow-up CT angiography the next day showed malposition of the stent graft extending from the duodenum into the inferior vena cava (IVC) **(b)** and pulmonary emboli **(c)**.

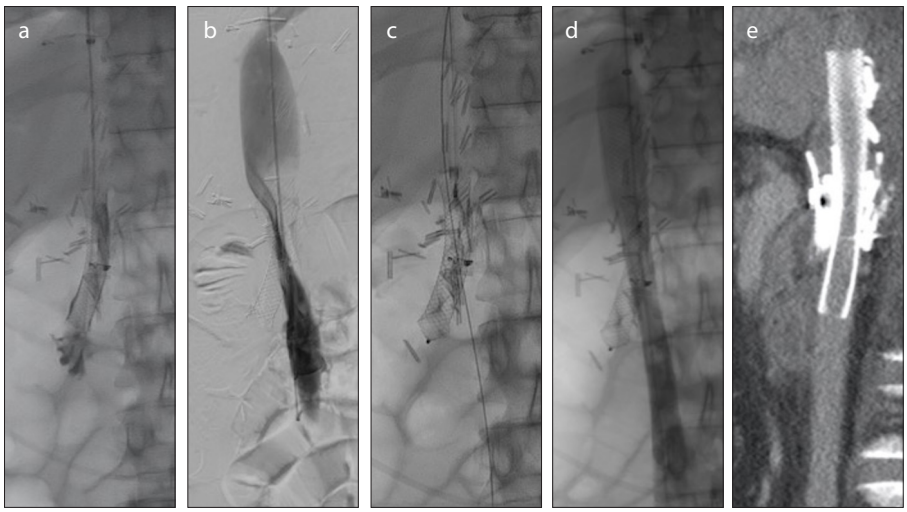

Figure 2. a–e. Fluoroscopic images of the procedure show contrast entering the duodenum after accessing the malpositioned biliary stent through right internal jugular vein access **(a)**. Cavogram **(b)** demonstrates caval stenosis and thrombus adherent to the superior end of the malpositioned biliary stent graft within the IVC. After deploying a 14 mm Amplatzer II plug inside the biliary stent graft **(c)**, a 16 mm × 9 cm Wallstent was deployed within the stenotic IVC. Final cavogram **(d)** shows improved caval diameter. Follow-up CT venogram **(e)** demonstrates patency of the IVC and successful jailing of the malpositioned biliary stent graft.

later, the patient presented to an outside hospital with hypotension, tachycardia, and melena and got transferred to our facility with subsequent upper endoscopy, which revealed severe hemobilia from the major papilla. A wire was passed into the biliary tree during endoscopy, and after sweeping the presumed common bile duct with a 12 mm balloon, the patient developed uncontrolled bleeding, which was managed by insertion of a Wallflex 10 mm × 6 cm covered stent. The patient continued to bleed after the procedure (hemoglobin dropped from baseline of about 8.4 mg/dL to 6.4 mg/dL) and was brought to IR for angiography, which did not reveal any active bleeding (Fig. 1a). The patient continued to have hematemesis and decreasing hemoglobin. A computed tomography (CT) angiography was performed the next day, which showed the biliary stent extending from the major papilla into the IVC (Fig. 1b), as well as new pulmonary emboli (Fig. 1c). Since the patient was not a surgical candidate, he was brought back to the IR angiography suite. Using a right internal jugular vein approach, the malpositioned biliary stent was cannulated with a wire and catheter, and injection of contrast confirmed duodenal filling (Fig. 2a). Next, a cavogram was performed, which showed the narrowing of the IVC at the site of the stent and acute thrombus attached to the superior end of the stent (Fig. 2b). A 14 mm Amplatzer II plug was deployed inside the malpositioned biliary stent (Fig. 2c). To contain the clot, jail the migrated stent, and address the associated IVC stenosis, a 16 mm × 9 cm Wallstent was deployed within the IVC (Fig. 2c) with good angiographic result (Fig. 2d). The patient improved hemodynamically, his hematemesis resolved, and the intensive care unit team was able to extubate him 48 hours later. A follow-up CT venogram demonstrated patency of the IVC stent and successful occlusion of the malpositioned biliary stent (Fig. 2e). Given patient's clinical status (recurrent HCC after transplantation), and since the bilirubin levels stayed around 1.1–1.2 mg/dL after the IR procedure, the primary team and patient decided not to pursue further biliary drainage.

Main points

- ERCP is considered a safe procedure but risk of complications are higher in post-liver transplant patients.
- Although post-ERCP bleeding is not very common and is often self-limited, severe bleeding unresponsive to local intraprocedural treatment requires further diagnostic and therapeutic work up.
- In severe post-ERCP bleeding and negative arteriogram, CT angiogram could be considered to rule out the possibility of uncommon complications and help to further characterize and localize the source bleeding.

Discussion

Endovascular techniques are rarely required to control bleeding after ERCP and sphincterotomy. The majority of these complications are mild or moderate in severity and are successfully managed by the endoscopist (8). In the rare event of severe or uncontrolled bleeding and failure of endoscopic methods to gain local control, endovascular intervention is the treatment of choice. Endovascular techniques used for this purpose include arteriography and embolization of the arterial branch responsible for bleeding upon visualization of contrast extravasation (9). In a case series of 10 patients with severe bleeding after ERCP and

sphincterotomy by So et al. (9), hemostasis was achieved in all patients by embolization of a total of 12 arterial branches.

In the case reported here, severe uncontrolled bleeding occurred following repeat ERCP to control hemobilia in a liver transplant recipient with remote sphincterotomy. Unlike previous reports, the source of bleeding in this patient was a connection inadvertently created between IVC and duodenum, resulting in a negative arteriogram while the patient was probably still bleeding. Additionally, the development of thrombus above the stent in IVC resulted in pulmonary emboli, further complicating the picture. Performing the CT angiography allowed us to characterize the complication and identify the source of bleeding followed by an endovascular procedure to occlude the malpositioned stent graft, jail the stent from potential migration, contain the IVC clot, and resume the patency of IVC.

In conclusion, although severe uncontrolled bleeding following ERCP and sphincterotomy is from an arterial source in most cases, physicians need to consider other possibilities in complex patients with major postsurgical changes who continue to bleed despite negative arteriography. Additional noninvasive imaging could help identify the source of bleeding and plan the appropriate treatment.

Conflict of interest disclosure

The authors declared no conflicts of interest.

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