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TECHNICAL NOTES

Percutaneous Removal of a Fractured Endostent Remnant from the Portal Vein

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Abstract

We report the case of a liver transplant patient who developed a biliary stricture 3 years postoperatively which was treated with an endostent. During endoscopic removal, the stent fractured and a portion of it lodged itself within the intrahepatic portion of a portal vein branch. The endostent fragment was retrieved percutaneously using interventional radiology techniques. Risk factors for endostent fracture and migration as well as various percutaneous retrieval methods are reviewed in this article.

Key words: Liver transplant—Biliary—Stricture—Endostent—Migration—Portal vein

Stents are effective devices to palliate biliary tract obstruction, however, they are associated with a number of complications including migration and, very rarely, fracture. Stent migration can occur proximally or distally and has been associated with bowel perforation and obstruction, bleeding, and secondary biliary obstruction [1, 2]. In this article, we report proximal migration with erosion into the portal vein and percutaneous retrieval of a fractured endostent remnant in a patient who had been the recipient of an orthotopic liver transplant.

Case Report

A 61-year-old male patient with a history of orthotopic liver transplant in 1995 secondary to alcoholic cirrhosis was referred to our institution in December with ongoing fever, chills, jaundice, and right upper quadrant abdominal pain. The patient had done well until September, 1998 when a common bile duct stricture was diagnosed because of rising liver enzymes. At that time, the stricture was treated with an endoscopically placed synthetic 7 Fr Amsterdam plastic endostent (Wilson-Cook Medical, Winston-Salem, NC). The stent was removed the next day because of persistent fevers due to Pseudomonas. Subsequently, a percutaneous transhepatic biliary drain (PTBD) was placed and the patient was discharged. However, the continued to experience high fever, prompting readmission to the hospital in October, 1998. Cholangiography via the biliary drain revealed a small papillary stone, which in retrospect was believed to be the most likely cause for the common bile duct stricture. Endoscopic retrograde cholangiography (ERC) with sphincterotomy was performed in order to remove the stone. Repeat cholangiography demonstrated no residual stricture within the common bile duct and the biliary drain was removed. However, the patient's condition did not improve as he continued to have intermittent fevers following discharge.

He was placed on antibiotics (Zosyn 3 gms IV q 6 hrs) and readmitted. A CT scan of the abdomen revealed the presence of a linear foreign body, approximately 4 cm long, presumed to be an endostent remnant within the right hepatic lobe (Fig. 1). An ERC was performed in an attempt to localize and possibly retrieve the foreign body. The procedure was unsuccessful, therefore the decision was made to proceed with percutaneous removal of the endostent remnant. Percutaneous transhepatic cholangiography using a 21-gauge trochar needle showed the endostent remnant to be outside the biliary tree. Then, from a lateral approach, an 18-gauge Trochar needle (Cook Inc., Bloomington, IN) was positioned alongside the endostent remnant. When contrast was injected through the needle, it became clear that a portion of the stent was located within the portal vein (Fig. 2). A micropuncture wire was advanced through the needle into the portal vein until the wire rested alongside the long axis of the endostent remnant. The needle was removed and an angled 6.5 Fr Lieberman introducer set (model # VSSW-6.5-38-37-LBMNB (Cook) was advanced over the wire into the portal vein. A super stiff Amplatz wire (Cook) was advanced through the Lieberman catheter into the portal vein and used as a safety wire. A Rosen wire (Cook) was then advanced through the outer sheath of the Lieberman catheter and placed along side the fractured stent within the portal vein. A 35 mm Amplatz snare catheter (Microvena, White Bear Lake, MN) was advanced over the Rosen wire and the wire was removed. Then, a 35 mm Amplatz snare was advanced through this catheter past the biliary stent remnant into the portal vein, placed around the Amplatz wire (Cook) more distally within the portal vein and tightened around the wire. The snare was then loosened slightly and pulled back to the level of the endostent remnant using the guidewire as a monorail (Fig. 3). The snare was tightened again in order to grasp the proximal tip of the endostent remnant. The Lieberman catheter and snare were then retracted as a unit, dragging the endostent remnant with them. The endostent remnant was grasped with a hemostat at the puncture site immediately beneath the skin. Then, an 8 Fr pediatric feeding tube was reintroduced into the tract after which a glide angled Terumo wire (Cook) was advanced into the portal vein. A JB_1 catheter (Cook) was advanced over the wire and the wire was removed. Then, through the angled Lieberman catheter, four 5 cm $\times$ 5 mm Gianturco coils (Cook) were placed to embolize the tract and prevent bleeding. The endostent remnant was identified as a piece of the fractured endostent that had been inserted 3 months prior to this admission (Fig. 4). The endostent had broken off at the level of the flap. The patient's symptoms resolved fully within 2 days of the procedure and the patient continues to do well without any further episode of cholangitis.

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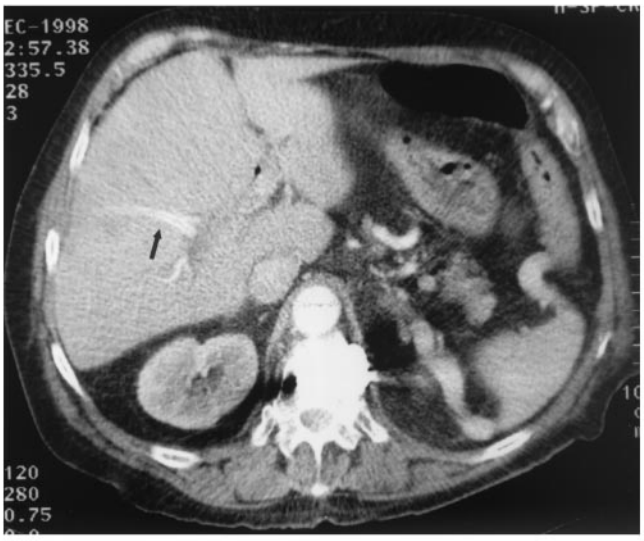

Fig. 1. Contrast-enhanced CT section of the liver demonstrating an opaque foreign body within the right lobe of the liver parenchyma (arrow).

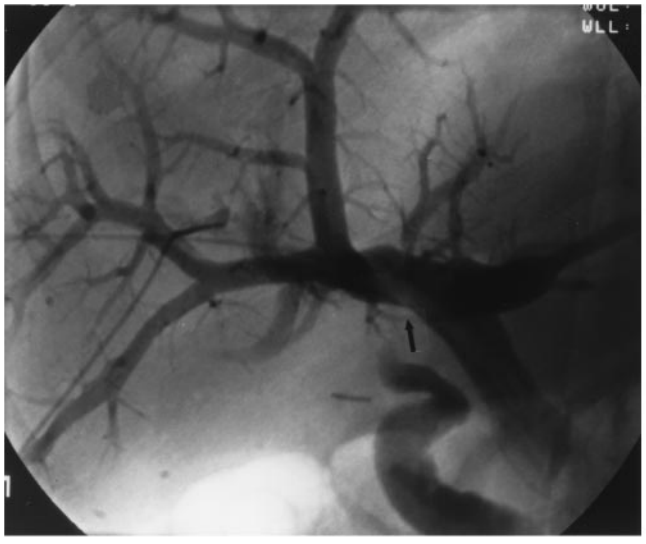

Fig. 2. Transhepatic portogram performed through a Trochar needle demonstrating the foreign body within the main portal vein (arrow).

Discussion

Biliary stents are widely and successfully used in the setting of ductal narrowing resulting from malignant, immunologic, and iatrogenic causes [3]. However, endoscopic treatment of biliary strictures is not free of complications. For example, endostent migration has been reported to occur in approximately 5% of cases and several authors have reported instances of endostent fractures [4–8]. From the literature it appears that endostent fracture is related to the duration of placement, presence of a malignant stricture, and endostent type. The length of time from endostent placement to fracture discovery ranged from 5 weeks to 3 years with the majority occurring within 9 months. In our case, the stent had been in place for less than 24 hrs prior to ERCP removal,

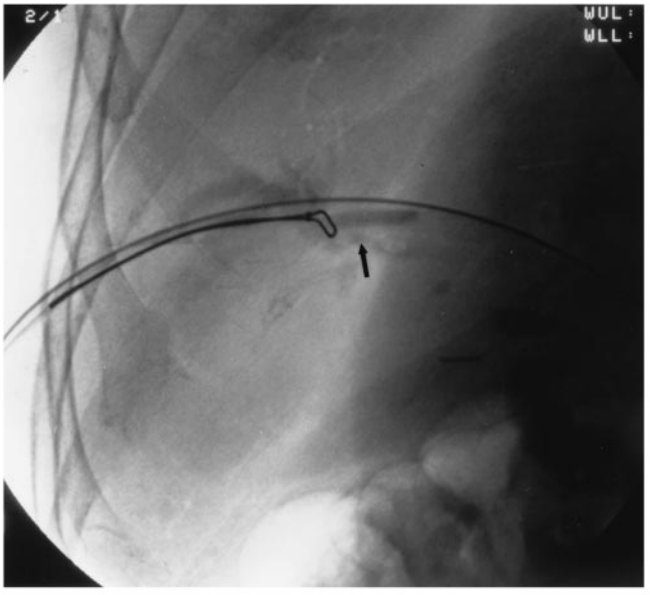

Fig. 3. Drawing illustrating the steps used during percutaneous retrieval of the fractured endostent. After having advanced the snare catheter into the portal vein over a Rosen wire (step not shown), the distal end of the Amplatz guidewire was snared to help us localize the snare within the portal vein. The snare was then loosened, pulled back, and monorailed along the wire to the distal end of the endostent fragment. The snare was tightened around the distal end of the endostent and the Amplatz wire was removed. The snare catheter was advanced slightly to dislodge the endostent from the portal venous wall and subsequently pulled back. The endostent fragment was then retracted through the tract.

although the fact that it had fractured was not realized until 3 months later. It is possible that ERCP removal contributed to its fracturing. Most endostents break at the level of the flap, as occurred in our case [5]. When endostents do fracture, their fragments typically stay confined to the biliary tree and, as a result, patients usually present with symptoms of obstructive jaundice and/or cholangitis [4–7]. Proximal endostent migration is associated with the presence of malignant stricture, larger diameter, and shorter stents (<7 cm). Only the last factor (4 cm fragment) was present in our case, although the initial stent was longer than 7 cm. Normally, stent migration has only been observed to occur within the biliary system [8].

Endoscopic retrieval remains the treatment of choice for a migrated or fractured endostent. The success rate of such a procedure varies between 80% and 90% [9, 10]. Various techniques have been used for this purpose such as direct grasp via a basket, forceps, or snare. Combinations of endoscopic and percutaneous techniques have also been reported [11]. Percutaneous retrieval of endostents have also been documented but in all of these cases, the stent fragments were confined to the biliary tree [9, 12]. In our case, the stent fragment had migrated out of the biliary tree to lodge itself into the portal vein, which in retrospect explained the failure of endoscopic retrieval techniques. Thus, in order to retrieve the stent fragment, percutaneous access into the portal venous system became necessary. In addition, the stent fragment could not be pushed into the small bowel and removal at the skin site was also necessary despite the obvious increased risk of bleeding. However, after successful retrieval of the stent fragment, embolization of the tract prevented unnecessary bleeding and the patient quickly recovered.

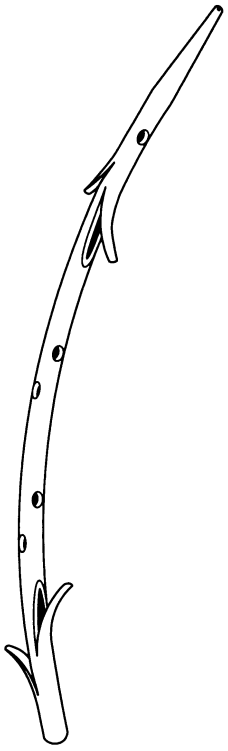

Fig. 4. Diagram of an intact biliary endostent of the same type used in this case.

This case describes the percutaneous retrieval of an endostent fragment that had migrated into the portal venous system. Although endostent fracture is associated with duration of use, it is important to realize that it may occur in endostents that have been in place for as little as 24 hr, particularly when subjected to the mechanical stress of removal. In addition, although rare, the possibility of endostent migration into a vascular structure illustrates the importance of knowing exactly where a stent is located before attempting percutaneous removal. Attempted removal of a stent located in a vascular structure without having taken or being prepared to take the necessary actions to control bleeding can result in serious complications.

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