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INTERVENTIONAL RADIOLOGY

TECHNICAL NOTE

Use of trans-biliary rendezvous technique for stenting of an impassable duodenal stricture

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ABSTRACT

Stenting of the gastric outlet is an accepted method for palliation of symptoms secondary to inoperable malignancy and is successful in most cases. Failure of stenting is most commonly due to inability to cross the stricture. We describe a rendezvous technique of duodenal stenting via transhepatic biliary access when conventional endoscopic or fluoroscopic methods fail.

Gastric outlet obstruction is a late manifestation of pancreatic carcinoma, occurring due to duodenal invasion in up to 20% of patients. Duodenal stenting is an accepted form of palliation in these patients with a technical success rate of 94%-100%, regardless of the method of insertion, that is, endoscopic or fluoroscopic.[1] In both methods, technical failure is most often due to inability to pass a guidewire across the duodenal stricture.[2] We present a novel approach to failed duodenal stenting by using the trans-biliary stent rendezvous technique in a synchronous bilioduodenal stricture.

Technique

A 63-year-old woman who had previously undergone palliative biliary stenting and chemotherapy due to an inoperable pancreatic head adenocarcinoma was admitted with fever, jaundice, and vomiting. Her computed tomography scan showed progression of the disease, with duodenal invasion and biliary stent occlusion. Endoscopic intervention in the form of combined duodenal stenting and biliary re-stenting was considered but was unsuccessful due to an impassable duodenal stricture at the D2 segment. Another attempt at endoscopic duodenal stenting was planned, but in view of ongoing biliary sepsis, she first underwent an urgent percutaneous transhepatic biliary drainage and re-stenting, with the deployment of a 10 mm self-expanding metallic stent (Bard E-Luminexx, Angiomed GmbH & Co.) within the existing metallic stent blocked by tumor ingrowth (Figure 1). A 7 F biliary catheter was retained as a precautionary measure in case of any biliary reintervention following duodenal stenting. Duodenal stenting was then reattempted 3 days later by a senior endoscopist but was again unsuccessful due to inability to negotiate the wire or ball-tip catheter across the stricture.

In view of limited survival, the option of another attempt at using a radiological approach was considered over surgical gastrojejunostomy. A multipurpose 7 F angiographic catheter (Torcon NB Advantage, Cook Medical) and hydrophilic guidewire (Radifocus guidewire, Terumo) were advanced transorally into the first part of the duodenum. Attempts were made to traverse the duodenal stricture, but they failed despite using a variety of wires and catheters, partly contributed by a significantly distended gastric lumen.

Decision was made to use the existing percutaneous biliary access for a rendezvous approach. The transoral catheter was exchanged for a 90 cm long 6 F sheath (Brite tip sheath, Cordis) and a hydrophilic guidewire (Radifocus guidewire). The wire tip was parked in the dilated D1 segment of the duodenum (Figure 2a). Next, the transhepatic biliary

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Figure 1. Cholangiogram after deployment of a second metallic stent within the obstructed Wallstent. Contrast is entering D1 segment of duodenum via a choledocho-duodenal fistula.

catheter was exchanged for a 35 cm long 6 F sheath (Brite tip sheath, Cordis), advanced to the distal biliary stent edge. Through this biliary sheath, a 5 F angiographic catheter (Ber, Cordis) and a hydrophilic guidewire (Radifocus guidewire) were negotiated retrogradely through the tight, tortuous duodenal stricture and exchanged for a 20 mm loop diameter snare (Amplatz Goose Neck snare, ev3 Inc.) (Figure 2b). The trans-biliary snare was opened in the D1 segment, with which the transoral wire was captured and pulled through the D2 duodenal stricture into the biliary sheath (Figure 2c). Maintaining this through-and-through access, the 6 F transoral sheath was exchanged for an 85 cm long 12 F sheath (Performer guiding sheath, Cook Medical) that could be easily advanced across the duodenal stricture.

Main points

- A trans-biliary access is very helpful in crossing the gastroduodenal strictures when conventional methods fail.
- This method is particularly advantageous when the patient requires intervention for concomitant biliary obstruction.
- The "body floss" approach can help in guiding catheters and devices across tight gastric outlet strictures despite a distended stomach.

Once the 12 F sheath was across the stricture, a 450 cm long guidewire (Jagwire guidewire stiff shaft, Boston Scientific) was advanced through it into the distal duodenum, and a 22 mm × 90 mm self-expanding bare stent (WallFlex duodenal stent, Boston Scientific) was deployed across the duodenal stricture (Figure 2d). The duodenal stent was not post-dilated and allowed to expand over the next few days. A temporary transhepatic biliary access catheter and nasogastric tube were retained. A review after 2 days revealed satisfactory expansion and patency of the duodenal and biliary stents (Figure 3). Gastric aspirates were also minimal. The biliary and nasogastric tubes were removed, and the patient was discharged on oral feeds with downward trending of serum bilirubin level. In the subsequent follow-up, there was a gradual functional decline and the patient passed away after 3 months without need for any reintervention.

Discussion

Gastric outlet obstruction is commonly encountered in patients with pancreatic cancer. These patients typically present with intractable vomiting and food intolerance, leading to dehydration, electrolyte imbalance, and, at times, aspiration pneumonia. Most often, curative surgery is not possible, and palliation in the form of surgical bypass or duodenal stenting is offered to re-establish the oral intake. Although duodenal stents have poor long-term patency, they are preferred over surgery in patients with limited survival due to their fewer complications, lower mortality, rapid restoration of gastric motility, reduced hospitalization, shorter time to chemotherapy, and cost-effectiveness.[3]

The stents are inserted using either endoscopic or fluoroscopic techniques, both of which share similar technical success rates.[1] Passage of wire across the stricture is paramount for technical success in both methods, and failure to negotiate the stricture is seen in up to 3% of cases.[2] In patients with gastric outlet obstruction, duodenal strictures are particularly more challenging to cross. Due to gastric atony associated with prolonged obstruction, there is often a lack of adequate support when crossing the gastric and duodenal C-loop curvatures. As a result, there is a constant looping of the catheter–guidewire system in the distended stomach.[1,4] The use of an endoscope or a long sheath as support may help prevent the looping. But despite this, endoscopic failure can still occur due to poor visualization of stricture from food residues, markedly distended stomach, strictures that are too tight or tortuous, or beyond the reach of the endoscope.[5]

When both transoral fluoroscopic and endoscopic techniques have failed, enteral stenting via the percutaneous transgastric route is an option as it provides a straighter anatomical pathway and better torque for catheter manipulation when crossing the stricture.[6] However, this approach is more invasive, requiring creation of a percutaneous gastric access, with potential complications like bleeding, leakage, and peritonitis. It cannot be offered to patients with inaccessible stomachs, when there is tumoral involvement at the gastric access site, and in patients with gastric varices.[6] Additionally, it requires leaving a gastrostomy tube for 10-15 days to allow tract maturity and prevent intraperitoneal leak before removing it.[4]

A rendezvous trans-biliary access to duodenal stenting is an attractive alternative, as a large number of patients with pancreatic carcinoma have a concomitant biliary obstruction and would require biliary drainage/stenting as such. In a systematic review by Dormann et al.[2] 61% of patients who underwent duodenal stenting also underwent biliary stenting, either before (41%) or at the same time (18%) as duodenal stent insertion. Thus, for patients requiring simultaneous biliary and duodenal stenting, the transhepatic access used for biliary drainage can be utilized to cross duodenal obstruction deemed impassable by conventional methods. The body floss technique can help in guiding catheters and devices across tight gastric outlet strictures despite a distended stomach. By controlling both ends of the wire, sufficient propulsion and steering force could be maintained when guiding the stent delivery system through the extreme bends and gastric redundancy. It obviates the need for an extra transgastric puncture and tube insertion and can potentially be performed as a single-stage procedure along with biliary stenting.

A similar rendezvous technique has been described earlier in 2 case reports.[7,8] However, in both cases, the stricture was well above the ampulla that

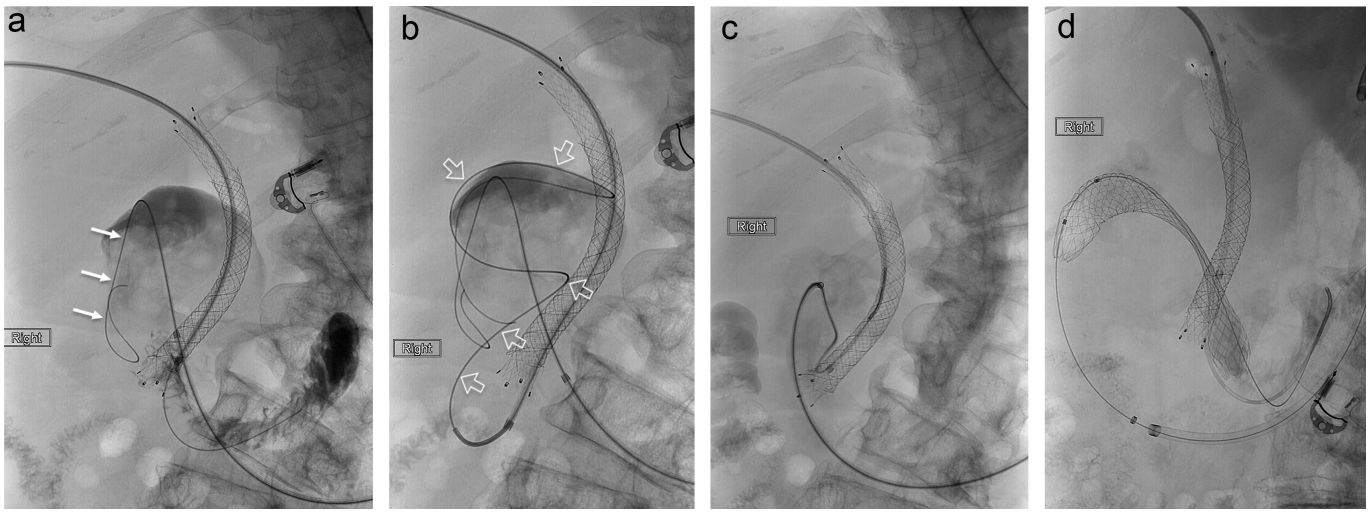

Figure 2. a–d. Trans-biliary rendezvous approach: **(a)** Transoral wire (*arrows*) was parked in dilated D1 segment of the duodenum. **(b)** Trans-biliary catheter and wire (*blank arrows*) were negotiated retrogradely through the duodenal stricture into the D1 segment. **(c)** The snare was used to capture the transoral wire and it was pulled through the duodenal stricture along with its sheath. **(d)** The duodenal stent was advanced through the stricture and deployed.

Figure 3. Subsequent review revealed satisfactory expansion and patency of both duodenal and biliary stents.

allowed a constant through-and-through access when advancing the stent delivery system and deploying the stent. Our technique required a modification as the stricture involved the second part of the duodenum near the ampulla of Vater. To ensure adequate stent coverage across the stricture, the distal edge of the stent should cross the ampulla, and hence, the same flossing guidewire could not be used for stent deployment. Instead, we used the body floss technique to advance the transoral supporting sheath through the stricture; this allowed some degree of straightening of the entire transoral system across the gastroduodenal region. With the sheath maintained in this position, the stent could be advanced effortlessly across the stricture and deployed.

Conflict of interest disclosure

The authors declared no conflicts of interest.

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