Endoscopic Ultrasound-Guided Enteroenterostomy for Afferent Limb Syndrome

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ABSTRACT

Afferent limb syndrome (ALS) is a rare complication of duodenopancreatectomy, resulting from the mechanical obstruction of the afferent limb usually after local malignancy recurrence. Management of ALS (ie, surgery and palliative therapy) is often unsatisfactory. We present 5 cases of endoscopic ultrasound-guided internal drainage of the afferent limb using lumen-apposing metal stents. All procedures were successful, with no related complications; 2 patients had a complete regression of their symptoms, one experienced cholangitis recurrence, and 2 patients died after some weeks because of their malignancies. Endoscopic ultrasound-guided enteroenterostomy offers a convenient and safe palliative solution for patients presenting ALS.

INTRODUCTION

Afferent limb syndrome (ALS), also called afferent loop syndrome, is a late postoperative complication of duodenopancreatectomy defined as the dilatation of the afferent limb with accumulation of biliopancreatic fluid, which can be easily identified on abdominal computed tomography (CT) scan.¹ ALS is due to the mechanical obstruction of the afferent limb, which can be caused by adhesions, loop kinking, internal hernia or anastomotic stenosis, and most often because of local cancer recurrence.² The accumulation of biliopancreatic fluid can induce pancreatitis, abdominal pain, vomiting, and most of all reflux cholangitis through the bilioenteric anastomosis. We present 4 cases of ALS treated by endoscopic enterointerostomy by lumen-apposing metal stents (LAMS).

CASE REPORT

The aim of the technique was to obtain an internal drainage of the afferent limb through the stomach or jejunum by creating an endoscopic anastomosis. The gastroenterostomy or enterointerostomy was created under endoscopic ultrasound (EUS) and fluoroscopic guidance; after endosonographic identification of the dilated afferent limb, the latter was accessed using either a 19-gauge needle, followed by electrocautery-enhanced lumen-apposing metal stent (ECE-LAMS) (2-step procedure) or ECE-LAMS in a single-step procedure (HotAXIOS, 15 × 10 mm; Boston Scientific, Marlborough, MA). A guidewire was advanced into the afferent limb before ECE-LAMS release. Contrast was injected under fluoroscopy after stent release to confirm the correct placement of the stent and observe contrast reflux into the biliary tree (Figure 1).

Patient 1: A 72-year-old woman presented in a degraded condition with biliary sepsis. She had a history of hepatectomy and common bile duct resection with Roux-en-y anastomosis for a Bismuth III cholangiocarcinoma. CT showed ascitis, peritoneal abscesses, and a dilation of the afferent limb measured up to 70 mm in diameter. We performed an
endoscopic gastroenterostomy to drain the afferent limb by using a 15-mm HotAXIOS stent. There was no postprocedure complication. The patient resumed oral feeding within 24 hours and some activities for a few days. However, disease progression led to the patient’s death 15 days later, although without any recurrence of digestive intolerance, sepsis, or biliary symptoms.

**Patient 2:** A 67-year-old woman who underwent pancreaticoduodenectomy 1 year earlier for cholangiocarcinoma was referred for cholangitis and dilated intrahepatic bile ducts. CT scan showed peritoneal carcinomatosis nodules. Attempts to reach the afferent limb with standard endoscopes (duodenoscope and pediatric colonoscope) were unsuccessful because of jejunal stenosis between the gastrojejunal and the hepaticojejunal anastomoses. Percutaneous drainage and transhepatic cholangiography showed afferent limb dilation with a patent biliary anastomosis. We subsequently performed an gastroenterostomy using a 15-mm HotAXIOS LAMS. After stenting, the patient recovered without complications, oral feeding was well tolerated, and the sepsis subsided for a couple of weeks. However, sepsis resumed 2 months later because of the extension of carcinomatosis between the LAMS and the biliary anastomosis. External drainage allowed control of the sepsis, but mild cholestasis persisted. The patient died 3 months after LAMS insertion from fresh cholangitis and disease progression.

**Patient 3:** A 67-year-old man, who underwent child reconstruction for a pT3N1M0 cholangiocarcinoma 2 years earlier, was referred for cholangitis because of an ALS associated with liver and peritoneal metastasis. Percutaneous transhepatic cholangiography found no biliary anastomotic stenosis. We performed an endoscopic gastrojejunoscopy using a 15-mm HotAXIOS LAMS. The patient did well after the procedure. No cholangitis recurrence was noticed. A percutaneous drain initially placed was removed after 1 month, and the patient was able to undergo chemotherapy without any recurrence of the ALS.

**Patient 4:** A 54-year-old man, who underwent pancreato-duodenectomy 3 years earlier for pT3N1, R1 cholangiocarcinoma, was referred for acute cholangitis with afferent limb dilatation because of local recurrence. A diverting jejunojejunostomy was created using a 15-mm HotAXIOS LAMS; the patient has been doing well after the procedure, with no recurrence of cholangitis until the most recent news, 12 months after the procedure.

**Patient 5:** A 56-year-old man, who underwent hepatectomy and bile duct resection with Roux-en-y anastomosis 1 year earlier for cholangiocarcinoma and recurrence surgery 3 months earlier, was referred for vomiting and acute cholangitis. CT showed local recurrence with afferent limb dilatation. A diverting gastrojejunoscopy was created using a 15-mm HotAXIOS LAMS. There was no postprocedure complication. However, the patient died after 1 week of acute kidney failure.

**DISCUSSION**

Although symptoms associated with the ALS are not uncommon, with one study reporting delayed GI problems in 13%
This particular capability to create a tight apposition of cure and efficacy with limited risk of leakage and migration, thus providing aseptic section, fully covered with silicon, allows stent anchoring of stent misplacement. The puncture site should be carefully chosen, including the absence of bowel of omentum interposition between the afferent limb and the gastroenteric wall and the shortest possible distance to the biliary Anastomosis. The latter is important to avoid ALS recurrence such as in our reported case 2 and the former not to exceed the AXIOS saddle section length, which could induce stent migration or anastomotic bile leak. The tract should be chosen to have no adjacent vascularization to prevent acute and delayed bleeding as reported in pancreatic pseudocyst drainage.

Compared with other LAMS devices, HotAXIOS delivery system allows a single step stent insertion, in which guidewire placement is only optional, making the procedure particularly expeditious and safer than when device exchanges are required for tract cautery or dilation.

For optimal outcomes, a thorough assessment of the disease stage of evolution and ALS etiology maybe mandatory because some patients may not experience a sustained benefit from the procedure when their malignancy comes to a terminal evolution. As seen in some of our cases, despite a successful procedure with no related complication, 2 patients died after a short time because of their malignancy. By contrast, a third patient, after primary clinical success, presented persistent mild cholestasis and subsequent recurrent cholangitis because of the progression of peritoneal carcinomatosis (Table 1). In conclusion, provided technical proficiency and carefully selected indications, EUS-guided enterenterostomy by LAMS offers a convenient and safe palliative solution for patients presenting ALS because of progressive malignancy after duodenopancreatectomy.

Table 1. Procedures and patients characteristics

| Patient no | Sex, age | Symptoms | Tumor type and surgery | Stent type | Procedure-related adverse events | Cholangitis recurrence | Survival |
|------------|----------|----------|------------------------|------------|----------------------------------|-----------------------|----------|
| 1          | F, 72 yr | Cholangitis Ascites Liver abscess | CholangioCa Roux-en-Y | HotAXIOS, 15 × 10 mm | No | No | 2 wk |
| 2          | F, 67 yr | Cholangitis | CholangioCa, W + C | HotAXIOS, 15 × 10 mm | No | Yes, at 2 mo | 3 mo |
| 3          | M, 67 yr | Cholangitis | CholangioCa, W + C | HotAXIOS, 15 × 10 mm | No | No | 6 mo |
| 4          | M, 54 yr | Cholangitis | CholangioCa, W + C | HotAXIOS, 15 × 10 mm | No | No | Alive 12 mo after procedure |
| 5          | M, 56 yr | Cholangitis Vomiting | CholangioCa Roux-en-Y | HotAXIOS, 15 × 10 mm | No | No | 1 wk (kidney failure) |

W + C, Whipple resection + Child reconstruction.
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