



Single-step EUS-guided jejunojejunostomy with a lumen-apposing metal stent as treatment for malignant afferent limb syndrome

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Afferent limb syndrome (ALS) is a well-recognized delayed adverse event after subtotal gastrectomies and other gastrojejunostomies. ALS is defined as a chronic, mechanical obstruction of the afferent limb (AL), resulting in pancreatobiliary problems. It is more common in long-term survivors (≥ 2 years) who have undergone pancreaticoduodenectomy (PD) for cancer and adjuvant chemoradiation.¹ In fact, among those patients, ALS is more likely to occur because of the long period of time for the radiation effects and cancer recurrence to develop. The cause of ALS can be benign (radiation enteritis, compression by postoperative adhesions, or internal hernias) or malignant (cancer relapse). In patients with previous PD for cancer, the overall incidence of ALS has been reported to be 13%, with a 33% rate of malignant obstruction of the AL.¹ An optimal treatment strategy for ALS has not been established.

We describe the case of a 65-year-old woman who presented with recurrent episodes of abdominal pain, fever, and jaundice (total bilirubin 2.5 mg/dL, alkaline phosphatase 528 U/L, gamma-glutamyl transferase 195 U/L, white blood cells 14,000/ μ L). Four years earlier the patient had undergone a pylorus-preserving PD because of ampullary cancer (T1N1M0 G2) and subsequent chemoradiotherapy. A CT scan revealed retroperitoneal tumor recurrence with vascular invasion causing kinking of the AL, which was markedly dilated, together with the biliary tree (Fig. 1). The jejunal efferent loop (EL) was normal. These findings

were consistent with ALS, and EUS-guided drainage of the AL was then planned to promote drainage of pancreatobiliary secretions. The procedure was performed with the patient under general anesthesia, and antibiotic prophylaxis was given (piperacillin/tazobactam 4.5 g intravenously). With a linear echoendoscope (GF-UCT180; Olympus, Tokyo, Japan) the dilated AL was visualized from both the stomach and the EL. Even though a gastrojejunostomy (EUS-GJ) was technically feasible, we instead intended to create an anastomosis between the AL and the EL to decrease bile reflux into the stomach. The AL was then directly accessed from the EL by use of the electrocautery-enhanced delivery system of a 20-mm lumen apposing metal stent (LAMS) (Axios-EC; Boston Scientific, Marlborough, Mass, USA) in a single-step freehand fashion (Fig. 2). The stent was then released under EUS and fluoroscopic control, and a large amount of bile drained through the LAMS into the EL (Video 1, available online at www.VideoGIE.org) (Fig. 3). A CT scan performed 24 hours later confirmed jejunal and biliary decompression (Fig. 4); the patient resumed an oral diet and eventually died 3 months after the procedure with no pancreatobiliary symptoms.

Neoplastic ALS has traditionally been treated by a palliative surgical bypass or a percutaneous approach, although with suboptimal outcomes.² The success rate of palliative surgical revision is low because of the general conditions of the patients, which are usually poor, and because of



Figure 1. Contrast-enhanced CT scans. **A**, Dilated jejunal afferent loop (*) close to the jejunal efferent loop (**) and some diffuse intrahepatic bilomas. **B**, Hypodense solid lesion with mild contrast enhancement (arrows) in proximity to the pancreaticobiliary anastomosis, compressing the afferent loop (*).

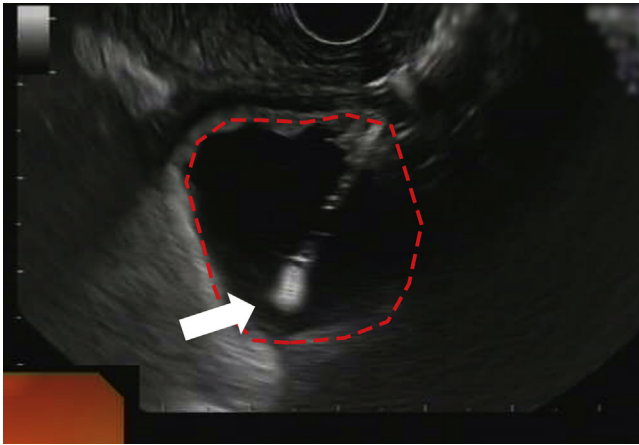


Figure 2. EUS view showing the dilated afferent loop (red dashed line) with the lumen-apposing metal stent electrocautery-tipped delivery catheter inside (arrow).

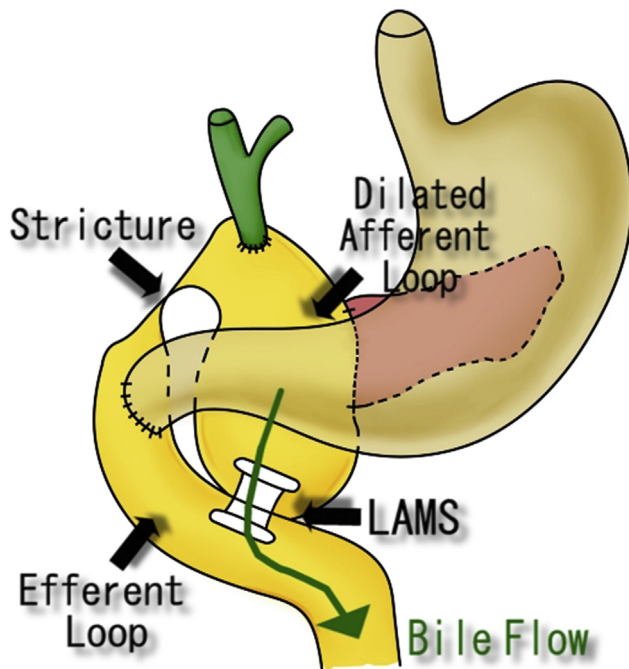


Figure 3. Schematic illustration of a pylorus-preserving duodenopancreatectomy and jejunojunostomy with a lumen-apposing metal stent between the afferent and the efferent loops.

peritoneal adhesions or disseminated tumors causing multiple intestinal kinking.³

Percutaneous transhepatic biliary drainage provides an effective resolution of symptoms but can introduce the risk of retrograde biliary infection and cause pain or discomfort. Percutaneous direct drainage of the dilated AL has been described, but with the risk of leakage of bowel gases or fluids into the peritoneum.⁴

As an alternative, endoluminal endoscopic treatments, such as balloon dilation or stent placement, can be used even if they are, when feasible, technically challenging.^{1,5}



Figure 4. CT scan 24 hours after the procedure showing the lumen-apposing metal stent correctly in place with associated decompression of both the afferent loop and the biliary tree.

An increasing number of reports about EUS-guided drainage with LAMS of an obstructed AL with promising results have been published.⁶⁻⁸ Recently a multicenter study showed that complete resolution of symptoms was higher in patients treated with EUS-guided enteroenterostomy, with less need for reinterventions, than in those undergoing enteroscopy-assisted luminal stent placement.⁹ The majority of patients have been treated with EUS-GJ in a multistep fashion. We describe a single-step EUS-guided jejunojunostomy, which avoids the need for previous steps (needle puncture, guidewire insertion, fistulotomy, balloon dilation), resulting in markedly reduced technical complexity. Furthermore, we believe that in the setting of a pylorus-preserving PD, an EUS-guided jejunojunostomy, if technically feasible, might be preferred over an EUS-GJ, allowing for an antegrade flow of drainage into the EL that results in a reduction of bile reflux into the stomach.

DISCLOSURE

All authors disclosed no financial relationships relevant to this publication.

Abbreviations: AL, afferent limb; ALS, afferent limb syndrome; EL, efferent loop; PD, pancreaticoduodenectomy; EUS-GJ, gastrojejunostomy.

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<https://doi.org/10.1016/j.vgie.2019.12.011>
