

# Endoscopic ultrasound-guided gallbladder drainage by transduodenal lumen-apposing metal stent in a patient with Roux-en-Y reconstruction

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## Abstract

Endoscopic ultrasound-guided gallbladder drainage (EUS-GBD) is increasingly recognized as an effective and safe treatment option in patients with acute cholecystitis (AC) who are deemed unfit for cholecystectomy. Recent studies suggest that an endoscopic approach to biliary decompression may reduce patient discomfort and procedure-related costs compared with the standard percutaneous transhepatic GBD, while maintaining high rates of technical and clinical success. Here we present a case of a EUS-GBD in an elderly patient with AC and with altered anatomy due to a previous partial gastrectomy with Roux-en-Y reconstruction for gastric cancer. The linear array echoendoscope was carefully advanced within the afferent limb until EUS gallbladder visualization was achieved. Transmural GBD was then performed by placement of an electrocautery-enhanced lumen-apposing metal stent. If alternative treatments are precluded, EUS-GBD in patients with AC and altered anatomy is a feasible and effective therapeutic option when performed by experienced endoscopists.

**Keywords** Endoscopic gallbladder drainage, endoscopic ultrasound, altered anatomy, lumen-apposing metal stent

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## Introduction

Acute cholecystitis (AC) is one of the most prevalent gastrointestinal diseases in clinical practice. The optimal

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Conflict of Interest: None

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treatment is well established and is based on initial supportive care, antimicrobial therapy, and early cholecystectomy [1]. However, given the advanced age of many patients and the presence of multiple comorbidities, many subjects are deemed unfit for surgery and urgent non-surgical gallbladder drainage (GBD) is usually preferred. [2]. Recently, the feasibility, efficacy and safety of endoscopic ultrasound (EUS)-guided GBD have been confirmed in a systematic review, with an overall technical success rate of 95.8% and a clinical success rate of 93.4% [3]. EUS-GBD is, however, traditionally considered technically unfeasible in patients with altered anatomy following surgical resection of the upper gastrointestinal tract. Here we present a case of EUS-GBD by transmural placement of a lumen-apposing metal stent (LAMS) in a patient with Roux-en-Y reconstruction. To the best of our knowledge this is the first such case to be described in the literature.

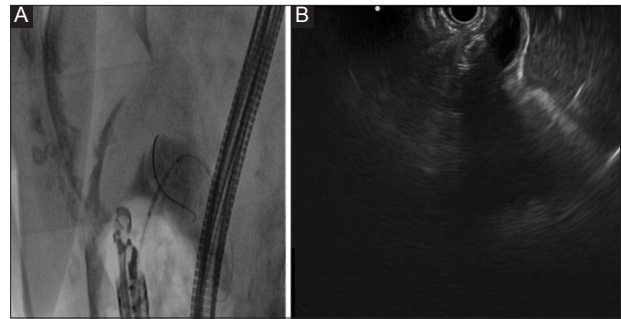
## Case report

An 86-year-old woman with previous partial gastrectomy and Roux-en-Y reconstruction for gastric cancer presented with AC and cholangitis without clinical response to medical treatment. Because of her multiple comorbidities, the patient

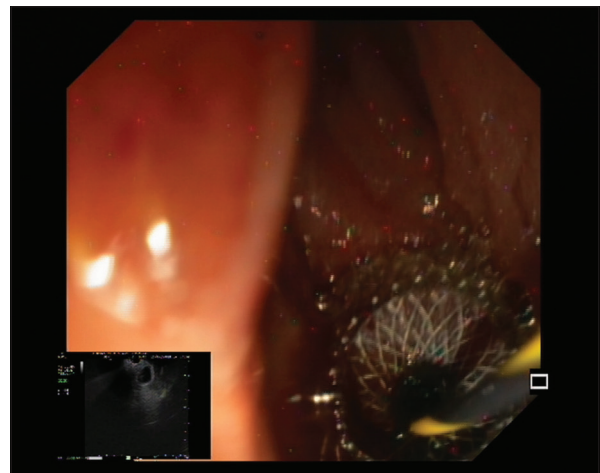
was deemed unfit for cholecystectomy. Transpapillary GBD by double-balloon enteroscopy was attempted in a referral hospital, but was unsuccessful. Percutaneous transhepatic GBD (PTGBD) was not considered because of concern over complications and the patient's quality of life [4]. The patient was therefore referred to our Unit to attempt an EUS-GBD. EUS evaluation through the gastric remnant demonstrated normal intrahepatic bile ducts and failed to visualize the gallbladder. The linear array echoendoscope was therefore gently advanced under endoscopic and radiologic control as far as the enteroenteric anastomosis, then further on within the afferent limb until the gallbladder was located ultrasonographically. To facilitate progression, the echoendoscope was advanced over a 0.035-inch guidewire that was pushed forward under fluoroscopic visualization. Transmural gallbladder access was gained with a 19 G needle and bile was aspirated to confirm the correct position. A cholecystogram was then performed and a 0.035-inch guidewire was coiled in the lumen under fluoroscopic control. Under EUS guidance and fluoroscopic assistance, over-the-wire GBD was then performed by transmural placement of an electrocautery-enhanced (EC)-LAMS (Hot Axios, 8 × 8 mm, Boston Scientific, MA, USA; Fig. 1,2). The following day, a control computed tomography scan documented pneumobilia and confirmed an adequate stent position (Fig. 3). Laboratory findings and symptoms promptly resolved. No adverse events occurred either during the procedure or during the subsequent follow up, extended until 3 months.

## Discussion

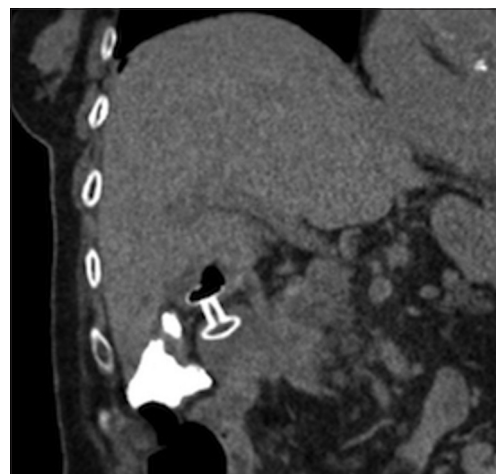
In conjunction with medical treatment, early cholecystectomy should ideally be offered to patients suffering from AC. However, in elderly and high-risk subjects with multiple comorbidities, the correct management of the disease may still be challenging [1]. In such patients, cholecystectomy is often contraindicated and their management relies on non-surgical gallbladder decompression. Cholecystostomy using PTGBD access has been extensively used to treat these patients. This approach is relatively easy under transabdominal ultrasound guidance and success rates of PTGBD are high, ranging from 95-100% [5]. In clinical practice, however, the main concerns for clinicians are the long-term management of external drainage, with a risk of tube displacement/occlusion and infections, especially in elderly patients, and the impact on quality of life. Patient consent may in fact be difficult to obtain in some instances [4]. In recent years, EUS-GBD has emerged as a safe and effective endoscopic therapy. A variety of stents have been employed to achieve gallbladder decompression, ranging from plastic stents, fully-covered self-expandable metal stents (SEMS) to newer LAMS. A recent systematic review showed an overall high technical and clinical success rate when evaluating all available stents. Interestingly, the frequency of adverse events was considerably lower with LAMS than other stents (9.9% vs. 18.2% for plastic stents and 12.3% for SEMS) [3]. The introduction of a LAMS mounted on an



**Figure 1** (A) Electrocautery-enhanced advancement of the lumen apposing metal stent (EC-LAMS) under radiological guidance before deployment of the first flange. (B) Trans-duodenal endoscopic ultrasound view of the first flange deployment of the EC-LAMS in the gallbladder lumen



**Figure 2** Final endoscopic view of the second flange of the electrocautery-enhanced lumen apposing metal stent in the duodenum after complete release of the stent



**Figure 3** Control computed tomography scan documenting the correct positioning of the electrocautery-enhanced lumen apposing metal stent between the duodenal and the gallbladder lumen, partially filled with air and previously injected contrast agent

EC delivery system (EC-LAMS; Hot Axios, Boston Scientific) allows direct transmural access to the target cavity, without



**Figure 4** Graphical representation of trans-duodenal endoscopic ultrasound-guided gallbladder drainage in a patient with a Roux-en-Y reconstruction after partial gastrectomy

the need for tract dilatation, reducing the complexity and time of the procedure and possibly improving the outcome. A retrospective multicentric study showed a technical and clinical success of 98.7% and 95.9%, respectively, when EC-LAMS were used in high surgical risk patients [6]. A few studies have compared the outcomes of PTGBD and EUS-GBD. Teoh *et al* showed comparable rates of technical and clinical success, with significantly fewer adverse events in patients treated with EUS-GBD versus PTGBD (32.2% vs. 74.6%) [7]. Similar results in terms of efficacy were demonstrated in 2 other retrospective multicentric studies. Moreover, the length of hospital stay, pain scores and the number of repeated interventions were significantly lower in the EUS-GBD group than in the PTGBD group (10% vs. 24%), with important implications for patient morbidity and procedure-related costs [4,8]. Finally, EUS-GBD with EC-LAMS has also been described in patients with coagulopathy or anticoagulation therapy without major postprocedural bleeding [10]. The long-term safety of EUS-GBD appears good; dwell time for GBD has been reported to be up to 364 days without stent-related adverse events for LAMS and up to 3 years for SEMS [9].

To our knowledge, this is the first description of transmural GBD for AC by EC-LAMS in a patient with altered digestive anatomy (Fig. 4). Biliary drainage in patients with a Roux-en-Y reconstruction remains a challenging approach that

should be attempted only by experienced endoscopists, once alternative options are excluded based on clinical judgment. In particular, the risks of stent misplacement due to suboptimal scope positioning and bowel injury due to scope progression need to be carefully weighed in each patient. Forward viewing echoendoscopes might allow better advancement and scope positioning in the near future.

EUS-GBD with EC-LAMS is a feasible and effective therapeutic option for AC in patients unfit for surgery. In such patients, this approach may also be suitable to gain anterograde access to the common bile duct for possible endoscopic interventions.

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