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EDITORIAL

Endoscopic ultrasound-guided biliary drainage using electrocautery-enhanced lumen-apposing metal stent for malignant biliary obstruction: A promising procedure

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Abstract

In this editorial, we comment on the article by Peng *et al*. Palliative drainage for biliary obstruction resulting from unresectable malignant lesions includes internal and external drainage. The procedures of biliary drainage are usually guided by fluoroscopy or transcutaneous ultrasound, endoscopic ultrasound (EUS), or both. Endoscopic retrograde cholangiopancreatography (ERCP) has been primarily recommended for the management of biliary obstruction, while EUS-guided biliary drainage and percutaneous transhepatic biliary drainage (PTBD) are alternative choices for cases where ERCP has failed or is impossible. PTBD is limited by shortcomings of a higher rate of adverse events, more reinterventions, and severe complications. EUS-guided biliary drainage has a lower rate of adverse events than PTBD. EUS-guided biliary drainage with electrocautery-enhanced lumen-apposing metal stent (ECE-LAMS) enables EUS-guided biliary-enteric anastomosis to be performed in a single step and does not require prior bile duct puncture or a guidewire. The present meta-analysis showed that ECE-LAMS has a high efficacy and safety in relieving biliary obstruction in general, although the results of LAMS depending on the site of biliary obstruction. This study has highlighted the latest advances with a larger sample-based comprehensive analysis.

Key Words: Malignant biliary obstruction; Biliary drainage; Percutaneous transhepatic biliary drainage; Electrocautery-enhanced lumen-apposing metal stents; Transcutaneous ultrasound; Endoscopic ultrasound; Endoscopic retrograde cholangiopancreatography

Core Tip: Some malignant distal biliary obstructions require drainage for palliative treatment, and endoscopic retrograde cholangiopancreatography (ERCP) with placement of a stent has been a first choice. However, ERCP can fail or may not be suitable for some challenging cases. Endoscopic ultrasound (EUS)-guided biliary drainage with electrocautery-enhanced lumen-apposing metal stent can be an alternative choice for ERCP, with the strength to perform biliary-enteric anastomosis under EUS guidance in a single step without the need for prior bile duct puncture or a guidewire. In this editorial, the efficacy and safety of it have been discussed, and the latest advances are highlighted.

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INTRODUCTION

Jaundice caused by biliary obstruction is common in the adult population in clinical practice. The locations of biliary obstruction include intrahepatic biliary duct, perihilar duct, and distal biliary duct. The underlying diseases that can lead to this condition include stones in the bile ducts, bile duct carcinoma, chronic cholangitis, periampullary adenocarcinoma, pancreatic head carcinoma infiltration, tumoral compression, trauma, other conditions affecting the bile ducts, and iatrogenic diseases. The treatment of obstructive jaundice includes radical cure and palliative treatment. Currently, there are several procedures for the palliative treatment of obstructive jaundice through biliary drainage, including internal drainage and external drainage. Internal drainage mainly refers to endoscopic retrograde cholangiopancreatography (ERCP) with the placement of a stent, as well as endoscopic ultrasound (EUS)-guided biliary duct drainage. External drainage procedures include percutaneous transhepatic biliary drainage (PTBD), endoscopic nasobiliary drainage, and postoperative T-tube drainage.

The ERCP procedure can be used to investigate the structures and lesions of the extrahepatic bile duct, pancreatic ducts, and ampulla, and can also be used to perform some interventional treatments[1]. Despite having various complications such as post-procedure pancreatic inflammation, bleeding, infection, and perforation of the intestines, ERCP with placement of stent in the tumor remains the primary choice for bile drainage in the palliative treatment of patients with distal malignant obstructive jaundice[1,2]. However, the initial failure rate of ERCP is reported to be as high as 10% to 20%[1]. The main reasons for failures include inaccessibility of the papilla due to tumor infiltration of the duodenum or papilla, aberrant regional anatomy due to previous procedures of cephalic duodenopancreatectomy and gastrectomy, or other surgeries, prior intervention and stenting of the ampulla, and cannulation failure[1]. For cases where ERCP fails, alternative techniques such as PTBD and EUS-guided biliary drainage are considered[1-3]. In terms of technical and clinical success, the two procedures have shown comparable effectiveness[4]. However, EUS-guided biliary drainage performed in expert centers frequently shows substantially better clinical success, fewer adverse events, and fewer reinterventions[4]. Compared to patients undergoing EUS-guided biliary drainage, PTBD patients using different routes of drainage (trans-hepatic or extra-hepatic) undergo considerably additional reinterventions (4.9 *vs* 1.3), experience more pain (4.1 *vs* 1.9), and encounter more delayed adverse events (53.8% *vs* 6.6%)[5]. In another study, it was found that 205 of the 331 patients (61.9%) who underwent PTCD developed complications, including infections in 91 patients (40.6%) and non-infectious complications in 114 of the 331 patients (34.4%)[6]. Patients undergoing PTBD often have a poor quality of life, and the procedure is inconvenient for most patients due to the associated external ducts and bags. On the other hand, EUS-guided biliary drainage using conventional procedure and stents involves multiple steps, which can significantly increase the rate of adverse events[7].

EUS and ERCP can be combined for biliary drainage. A clinical trial showed that ERCP and EUS in combination exhibited significantly lower rates of recurrent biliary obstruction at 3 months and 6 months compared to bilateral PTBD, with similar rates of adverse events and no significant difference in mortality. The lower morbidity is associated with a significantly reduced risk of biliary reintervention[1,8].

PTBD and ERCP used to be fluoroscopy-guided procedures, and later both procedures were introduced with US-guided imaging or a combination of both. All imaging guidance techniques allow for visualization of the duct lumen, helping to avoid blind operations. Biliary puncture under US guidance has been shown to be safe and effective due to its low complication rate and high success rate[9]. Additionally, fluoroscopy-guided PTBD (F-PTBD) increases the exposure of patients and operators to radiation. A comparative study of 195 patients, including 207 F-PTBDs and 44 ultrasound-guided PTBDs (US-PTBDs), showed a higher success rate for F-PTBD from the biliary ducts in the right lobe of the liver compared to US-PTBD (91.9% *vs* 75%; $P = 0.033$), and a trend of a higher success rate for US-PTBD from the biliary ducts in the left lobe of the liver (82.9% *vs* 95.8%; $P = 0.223$). F-PTBD appears to be superior to US-PTBD for the drainage of biliary obstruction in the right liver lobe. However, major complications occur more frequently with F-PTBD. There was no significant difference between the two procedures in regard to overall procedure success (90% *vs* 86.4%), overall interventional complication rates (10.6% *vs* 9.1%), fluoroscopy times, intervention times, or sedative dosages[10].

Biliary duct puncture per se is not a difficult procedure but is associated with a potential risk of higher bleeding complications. Performing biliary duct drainage under imaging guidance or with the aid of an endoscope can enhance the clinical success rate, reduce adverse events, and save time. US-guidance includes transcutaneous US-guidance and EUS-

guidance. Apart from being free of ionization and radiation, both methods can display dilated bile ducts and associated lesions, visualize structures beyond the intestine and bile duct lumen, scan the region of interest from multiple dimensions, and allow for repeated scanning. These features are advantageous for performance and can increase the operator's confidence. The combined use of fluoroscopy and US-guided PTBD is safer and more effective for puncture and guidewire insertion in the PTBD procedure, significantly reducing fluoroscopy time and radiation doses. One of the shortcomings of US-guidance is its inability to display a wide field in a single scan and difficulty in showing small-sized bile ducts due to limited spatial resolution[9]. EUS allows clear visualization of previously inaccessible anatomical regions of the pancreatic and biliary ducts, as well as some structures adjacent to the gastrointestinal tract. With the aid of a biopsy device, it also enables the acquisition of tissue for histological diagnosis and access to regional fluid collections and other abnormalities[11]. The endoscope provides an advantage in obtaining an acute and detailed view of the region of interest and the capability to acquire target tissues for histological study. Radiocontrast agent-enhanced X-ray radiography can display a large field of the biliary tree, pancreatic ducts, and small-sized bile ducts. However, it cannot detect detailed structures outside the lumen of bile ducts, pancreatic ducts, and the gastrointestinal tract. On the other hand, it has side effects of ionization and radiation, and the use of iodine-based radiocontrast agents may not be suitable for patients who are allergic to iodine or have concomitant renal failure. Both PTBD and ERCP can be used for the drainage of distal bile duct obstruction, but ERCP is usually not used for hepatic perihilar biliary obstruction.

In 2013, a new technology of EUS-guided biliary drainage with placement of electrocautery-enhanced lumen-apposing metal stent (ECE-LAMS) was introduced. This technology allows for the performance of EUS-guided biliary-enteric anastomosis in a single step and is free from prior bile duct puncture or the use of a guidewire[12]. The ECE-LAMS significantly simplifies the procedure and is particularly suitable for frail patients or those with other conditions that make them intolerant to other procedures. A retrospective study demonstrated that both expert operators (4 out of 12) and non-expert operators (8 out of 12) achieved similar satisfactory success rates in performing ECE-LAMS[13]. Another retrospective multicenter study showed that ECE-LAMS has high technical and clinical success rates for various indications of interventional EUS. This suggests that it can be considered as an alternative treatment method for cases where ERCP has failed, as well as for other challenging cases. The procedure was found to be reproducible and generalizable[12]. However, it is important to note that these studies have a retrospective design with small sample sizes, which may limit the generalizability of the conclusions. Further investigation is necessary to validate these findings.

UPDATED EVALUATION OF EUS-GUIDED BILIARY DRAINAGE WITH ECE-LAMS

Peng *et al*[14], address the progress in recent years by conducting an updated meta-analysis to assess the efficacy and safety of EUS-guided biliary drainage with placement of ECE-LAMS for the palliation of distal biliary obstruction. In this meta-analysis, two prospective studies and 12 retrospective cohort studies were included after an extensive and intensive search of databases and data curation. This meta-analysis is an updated and comprehensive systematic review, as the quality of the included studies was independently evaluated, details of the procedures and methods in each study were thoroughly reviewed and curated, and adequate statistical analyses were performed. In this meta-analysis, a total of 620 participants from 14 eligible studies were included, which is more than twice the number of patients included in previous analyses. These findings highlight the efficacy, safety, adverse events, and other new discoveries[14]. The pooled rates of technical success, clinical success, adverse events, and overall reintervention were 96.7%, 91.0%, 17.5%, and 7.3%, respectively. The main limitation of the meta-analysis was that most of the enrolled studies were of retrospective design, which may have introduced selection bias. Moving forward, more randomized trials and well-designed prospective studies are needed to further investigate, confirm, and validate the previous findings.

CLINICAL IMPLICATIONS

The results of this study indicate that ECE-LAMS has a favorable success rate with acceptable adverse events in biliary drainage for malignant distal biliary obstruction, especially indicative for those who have failed using ERCP or not suitable to perform ERCP. ECE-LAMS cannot be used for the biliary drainage of intrahepatic or hepatic perhilar biliary obstruction. The consistent body of evidence across most subgroups suggests that ECE-LAMS is a reproducible and generalizable approach, giving the procedure great technical implementation and widespread application. Future studies are needed to improve the clinical success and safety rate of EUS-guided ECE-LAMS implantation and to expand its application to other indications.

CONCLUSION

Increased evidence supports that EUS-guided biliary drainage using ECE-LAMS for the palliative treatment of malignant distal biliary obstruction after ERCP failure or when ERCP is not feasible has shown high efficacy and safety. In the future, well-designed prospective studies with larger sample sizes are needed to further understand EUS-guided biliary drainage with ECE-LAMS.

FOOTNOTES

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