EUS Guided Biliopancreatic Drainage: Today and Future Indications

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Introduction

Over the last 20 years, endoscopic ultrasound (EUS) has evolved from a noninvasive diagnostic tool to a combined diagnostic and therapeutic modality. The use of EUS complementary to endoscopic retrograde cholangiopancreatography (ERCP) has made possible biliary and pancreatic drainage in situations where conventional ERCP is unsuccessful or unlikely to be feasible. I will deal with the current indication of EUS guided biliopancreatic drainage by evidence based approach and discuss about the problems to be solved in the future.

EUS-Guided Biliary & Gallbladder Drainage

1. EUS-guided biliary drainage (EUS-BD)

ERCP for biliary access and drainage is successful in 90% to 95% of cases. In cases of failure of ERCP to achieve biliary drainage due to difficult cannulation or abnormal anatomy, the alternative has been percutaneous transhepatic biliary drainage (PTBD). EUS-guided cholangiography was first described in a series of 7 patients in 1996. A case report of EUS-guided biliary drainage was published in 2001. EUS-guided ERCP can be performed in a number of ways depending on the route of access and route of drainage. If the papilla is accessible, a rendezvous technique (RT) can be adopted wherein EUS is used to puncture the bile duct and a wire is negotiated through the papilla and further therapy is carried out through ERCP. If the papilla is not accessible, EUS is used to access the bile duct and create a fistula for placement of a stent called the transmural technique. Access to the bile duct can be obtained through puncture of the extrahepatic bile duct from the duodenal bulb (extrahepatic or transduodenal approach) or through puncture of the intrahepatic ducts in the left lobe of the liver from the stomach (intrahepatic or transgastric approach). Similarly, drainage of the bile duct can be performed through creation of a fistula and transmural stenting through the duodenum into the extrahepatic duct (choledochoduodenostomy) or through the stomach into the intrahepatic duct within the left lobe of the liver (hepaticogastrostomy). EUS-guided ERCP using a rendezvous approach was reported in 2004. The largest study published to date involving 240 patients with an intrahepatic approach in 60% and extrahepatic approach in 40% showed an overall technical success rate of 87%. The overall complication rate was around 30% with bile leak and/or peritonitis occurring in 10%, bleeding in 11%, cholangitis in 5%, and pneumoperitoneum in...
The comparative outcome data about PTBD and EUS-BD are essential to decide whether patients who failed ERCP are best managed with PTBD or EUS-BD. Artifon et al. published the comparative trial between EUS-BD and PTBD in 25 patients with malignant biliary obstruction and failed ERCP. This study showed that EUS performed via the transluminal approach (choledochoduodenostomy) had a similar success rate, complication rate, cost, and quality of life as compared to PTBD. Recently, the retrospective study was published that a total of 73 patients with failed ERCP subsequently underwent EUS-BD (n = 22) or PTBD (n = 51). This study concluded that EUS-BD and PTBD are comparably effective techniques for treatment of distal malignant biliary obstruction after failed ERCP. However, EUS-BD is associated with decreased adverse events rate and is significantly less costly due to the need for fewer reinterventions. A large randomized controlled trial comparing the two techniques would be necessary and ideal.

2. EUS-guided gallbladder drainage (EUS-GBD)

Percutaneous transhepatic gallbladder drainage (PTGBD) is the most established salvage therapy for gallbladder drainage in patients unresponsive to medical treatments or who are at high risk for cholecystectomy. EUS-GBD was first described in 2007. The perceived advantages of EUS-GBD are the avoidance of external drainage, unlike PTGBD, and the potential for no risk of post ERCP pancreatitis or cholangitis, unlike transpapillary drainage. EUS-guided transmural nasogallbladder drainage can be used as a bridge to surgery in patients unsuitable for emergent cholecystectomy. A 5-Fr nasobiliary drainage tube was coiled into the gallbladder through the echoendoscope, thus obviating the need for a large fistulous tract. In a randomized trial that compared EUS-GBD with PTGBD, no significant difference existed in terms of efficacy and safety. In high-risk surgical candidates, a plastic stent or self-expandable metallic stent (SEMS) can be used for palliation as a definitive treatment. EUS-GBD by SEMS is recently gaining favor as an attractive alternative for managing acute cholecystitis in high-risk patients. Several kinds of fully covered metal stents were developed such as AXIOS stent, BONA-AL stent, Niti-S Spaxus stent for EUS-GBD and the comparative study is necessary for choosing the ideal stent.

EUS-guided pancreatic drainage

1. Peripancreatic drainage

Endoscopic drainage can be achieved internally by cystogastrostomy or cystenterostomy through direct puncture using ERCP or through EUS guidance. Prior studies have shown comparable success rates using either approach when pseudocysts with visible luminal compression were targeted; however, EUS-guided drainage of pseudocysts is technically more successful and likely safer, especially in the setting of portal hypertension and nonbulging pseudocyst. Plastic stents have been used for drainage of fluid collection because they are safe and effective. Usually one or three 7Fr/10Fr double pigtail plastic stents are deployed but 10Fr stents are more difficult to deploy by usual linear EUS. Recently, a novel large diameter, lumen apposing, self-expanding metal stents were introduced for peripancreatic drainage instead of plastic stents such as NAGI stent, BONA-Soo stent, AXIOS stent, and Niti-S Spaxus stent. What remains controversial and yet to be determined are the
appropriate period for stent placement and the optimal stent diameter. Prolonged transluminal stent placement has been adopted as a strategy to prevent the recurrence, that is, the stent remaining in its proper position reduces the recurrence rate. On the contrary, the appropriate duration of stent placement is recommended to be short (7 to 10 days) because of a significant risk of stent migration if the stents were left in place longer than 10 days. Recently, prospective comparative study using plastic stents and newly designed metal stents was published. This study concluded that metal stents did not offer any clinical advantage over multiple plastic stents and were certainly comparable in terms of technical feasibility, efficacy, and safety.

Endoscopic management of infected walled-off pancreatic necrosis is increasingly being performed. For successful endoscopic management, the feasibility of endoscopic drainage is assessed with EUS. After determining the optimal puncture site, the collection is punctured under EUS guidance with either a 19-gauge EUS needle. The tract is dilated with either a 10 Fr cystotome, a balloon (8-15 mm), or both. Finally two double pigtail stents and a naso-cystic catheter are inserted into the collection. Recently, several types of novel fully covered biflanged metal stent can be used, all of which were fully covered and braided. In a recently published systematic review, complications occurred in 36% of patients (163/455 patients). The most common complication was bleeding, which occurred in 18% of patients. The majority of bleeding episodes (93%) could be treated endoscopically by coagulation, epinephrine injections, or clips. More than 80% of patients were treated successfully with endoscopic management alone. This was associated with a mortality rate of 6% and complication rate of 36%. It is not established whether novel fully covered biflanged metal stent has better outcome than traditional plastic stents. Recent retrospective study demonstrated that both stent are and effective for the treatment of walled-off necrosis. However, metal stent placement appeared to be preferable for initial EUS-guided drainage and additional re-intervention such as direct endoscopic necrosectomy.

2. Pancreatic duct drainage

EUS has also been used more recently to obtain access to a dilated pancreatic duct in an attempt to bypass the obstruction, when conventional ERCP fails. EUS-guided pancreatic duct drainage can be accomplished by a RT, creation of a fistula for placement of an antegrade transpapillary stent, or transmural stent upstream to the site of obstruction for direct drainage into the stomach or duodenum. The largest single-center study published to date utilized RT or transluminal stenting in 45 patients (2 patients had removal of previous surgically placed pancreatic duct stents) and showed a technical success of 73%, clinical success rate (follow-up>12mo) of 69%, and a complication rate of 5.8% including 1 patient with acute pancreatitis, 1 patient with peripancreatic abscess, and 1 patient with sheared off retained guide wire sheath in the retroperitoneum. EUS-guided pancreatic duct drainage is still at a preliminary stage with data obtained from small studies showing varying technical success and complication rates depending on the level of available expertise and the technique used.

Conclusions

EUS-guided interventions as in biliary and pancreatic duct drainage have evolved into feasibility when conventional ERCP has failed or is not possible. Although certain aspects of EUS-guided intervention have transformed the current practice of medicine, others have yet to evolve. However, the complication rates associated with EUS-guided ERCP are still high (30%). This is in part related to the lack of dedicated equipment, tools,
and standardized technique for performing these procedures. EUS-guided ERCP using a rendezvous approach may be considered as a less invasive option in cases of failed ERCP at the present time.

EUS-GBD is comparable with PTGBD in terms of the technical feasibility and efficacy for patients with acute cholecystitis and EUS-GBD with a special metal stent has excellent long-term outcomes and may represent a potential definitive treatment in patients unsuitable for cholecystectomy. EUS-guided pancreatic duct drainage is still at a preliminary stage with data obtained from small studies showing varying technical success and complication rates depending on the level of available expertise and the technique used. EUS-guided intervention will continue to evolve as an indispensable tool offering effective therapeutic options in a minimally invasive manner.

References