ADVANCES IN ENDOSCOPY

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Endoscopic Ultrasound–Guided Biliary Drainage for Palliation of Malignant Obstructive Jaundice

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G&H What treatment modalities are currently available for palliation of malignant obstructive jaundice?

SV There are 4 main modalities for establishing biliary drainage for palliation of malignant obstructive jaundice. Endoscopic retrograde cholangiopancreatography (ERCP) involves placement of a transpapillary stent in the bile duct via an endoscopic procedure. Percutaneous transhepatic biliary drainage is performed by an interventional radiologist who drains the intrahepatic bile duct. A hepaticojejunostomy is a surgical technique in which an anastomosis is created between the liver and the intestine. Lastly, biliary drainage can be achieved via endoscopic ultrasound (EUS) guidance.

G&H What are the various approaches to the EUS-guided biliary drainage procedure?

SV EUS-guided biliary drainage can be performed 4 ways. The first approach is a choledochoduodenostomy, in which stents are placed to connect the extrahepatic bile duct to the duodenum. The hepaticogastrostomy approach uses stents to connect the liver and intrahepatic ducts to the stomach. A third option is antegrade stenting, in which a stent is passed through the stomach (intrahepatic biliary access) or the duodenal bulb (extrahepatic biliary access) to bypass the biliary stricture and drain via the ampullary orifice. The fourth method is rendezvous access, in which a guidewire is passed through the intrahepatic or extrahepatic bile ducts (via the stomach or the duodenal bulb, respectively) into the major duodenal papilla. The guidewire can then be used as access to perform a conventional ERCP and place a stent.

G&H How are these EUS-guided biliary drainage procedures performed?

SV The first step for any of the EUS-guided procedures is to assess the biliary ductal system from the stomach or the duodenal bulb. If the intrahepatic or extrahepatic bile duct is dilated, it should be punctured with a 19-gauge fine needle. The ducts are then opacified by injecting contrast, and a guidewire is advanced in the desired direction. For a hepaticogastrostomy, the guidewire is passed through the intrahepatic system and coiled in the liver hilum. The transmural tract is dilated using cautery, bougie, or small balloon dilators (4 mm), and a fully or partially covered metal stent is then deployed between the liver and the gastric lumen to facilitate drainage of bile from the liver into the stomach. It is important that this procedure be undertaken using sonographic guidance rather than endoscopic view, and by utilizing fluoroscopy. For a choledochoduodenostomy, the extrahepatic tract needs to be enlarged, either by cautery or with a dilating balloon. Once a fistula has been created between the duodenum and the bile duct, a fully covered metal stent is placed through the extrahepatic bile duct into the duodenum. Dedicated lumen-apposing metal stents (6 or 8 mm, tailored to the site of the bile duct) are

now available in some countries, particularly in Europe, to facilitate biliary drainage via a single-step stent delivery system. However, this technique is possible only with EUS-guided choledochoduodenostomy. The rendezvous and antegrade procedures involve steering a guidewire via the ampullary orifice after bypassing the stricture. A stent can then be advanced through the same tract, or the guidewire can be accessed using a duodenoscope to perform a standard ERCP.

G&H What aspects determine which EUS-guided biliary drainage approach is used?

SV The nature of the disease (benign vs malignant), location of biliary obstruction (distal or proximal), and endoscopic access to the major duodenal papilla determine the procedure approach. For benign diseases (eg, bile duct stone, bile leak, or benign biliary stricture) with endoscopic access to the papilla, the rendezvous approach is the most optimal and safe for undertaking biliary interventions. This approach, which can be used prior to performing an ERCP, allows patients to be managed purely by endoscopy. For malignant disease with endoscopic access to the papilla, any of the 4 approaches can be attempted. Generally, the antegrade stenting, choledochoduodenostomy, and hepaticogastrostomy approaches are intended for biliary strictures secondary to cancer; the latter 2 techniques are primarily palliative procedures. In patients with malignant disease with altered surgical anatomy or without endoscopic access to the papilla, hepaticogastrostomy and antegrade stenting are the main options. Choledochoduodenostomy is not an option in patients with proximal biliary obstruction; one of the other 3 techniques should be undertaken to facilitate biliary drainage. Antegrade stenting can be used in both operable and inoperable patients, provided the type of endoprosthesis that is placed does not preclude surgery.

G&H How does the location of a malignant obstruction within the biliary tree influence the type of EUS-guided technique that is used?

SV A distal bile duct obstruction can be managed with the choledochoduodenostomy approach, which is able to access the bile duct above the obstruction. However, a choledochoduodenostomy does not help with treating obstructions located higher in the bile duct, such as a Klatskin tumor, or hilar cancer, as the procedure drains downward. The hepaticogastrostomy approach (and, to some extent, antegrade stenting) is primarily used for hilar cancer and strictures, as it calls for the placement of a long stent through the stomach across the obstruction.

G&H Does EUS-guided biliary drainage have a role as primary palliation of malignant obstructive jaundice?

SV EUS-guided biliary drainage can be a useful alternative to ERCP for primary palliation of malignant obstructive jaundice so long as the procedure does not preclude subsequent treatment options. My colleagues and I recently conducted a trial comparing EUS-guided biliary drainage and ERCP as primary treatment options for patients with pancreatic cancer. One of the outcome measures was whether the technique impacts surgical outcome. Patients were randomized to either EUS-guided biliary drainage or ERCP. We found that EUS-guided choledochoduodenostomy does not preclude a Whipple procedure, as the transmural tract becomes a part of the surgical specimen and, therefore, does not impact the surgical outcome. Similarly, both the rendezvous access and antegrade stenting interventions are unlikely to inhibit subsequent surgery and can be undertaken as the primary measure by expert endoscopists. However, EUS-guided hepaticogastrostomy, in which the liver, bile duct, and intrahepatic regions are drained into an opening in the stomach wall, may likely impede subsequent surgery and should not be used as primary therapy.

G&H How do the technical and clinical success rates compare between EUS-guided biliary drainage and ERCP for the relief of malignant obstructive jaundice?

SV A randomized trial that I conducted with my colleagues and a multicenter trial from South Korea have shown that EUS is not inferior to ERCP for relief of obstructive jaundice through biliary drainage. Of note, both studies only evaluated patients with distal biliary obstruction (pancreatic cancer), and not hilar tumors; however, the results show that the 2 procedures have similar technical success rates. Further, the clinical success rate, which is typically defined as how quickly the jaundice resolves (ie, decline in bilirubin level within 2-4 weeks), has shown no difference between EUS and ERCP.

G&H What have studies shown regarding the safety of EUS-guided biliary drainage, particularly as a primary therapy?

SV The safety profile of EUS-guided biliary drainage is comparable to that of ERCP for biliary ductal drainage. In the randomized trial mentioned earlier, there was no difference between the 2 procedures in rates of adverse events. The South Korean study reported that the EUS-guided approach was associated with lower rates of

adverse events (particularly postintervention pancreatitis), need for fewer reinterventions, longer stent patency, and better quality of life.

G&H What adverse events are associated with EUS-guided biliary drainage, and how can they be avoided?

SV Bile leak, bleeding, perforation, cholangitis, pneumoperitoneum, stent migration, and postprocedure abdominal pain are some of the adverse events that are encountered with EUS-guided interventions. Finding a biliary access point as close as possible to the gastrointestinal tract and performing judicious transmural tract dilation are likely to minimize risks of bile leak, bleeding, and perforation. Stent deployment should be performed under EUS and fluoroscopic guidance; in patients with difficult endoscope positioning, the endoprosthesis may have to be deployed within the biopsy channel and then delivered by slow exchange. It is also important to ascertain the ductal anatomy before stent placement so that an endoprosthesis is not mistakenly deployed in the cystic duct or does not accidentally occlude a major ductal system. Prophylactic antibiotics should be administered to minimize the risk of infection. If a stent is accidentally deployed fully within the dilated biliary ductal system, the guidewire access should be maintained so that a second endoprosthesis can be placed in the correct position. It is important to review the treatment plan beforehand with a pancreatic-biliary surgeon, particularly if surgery is being contemplated in the short term.

G&H Are there any patients in whom EUS-guided biliary drainage is not recommended?

SV The EUS-guided procedures cannot be performed safely and/or effectively in patients who have a nondilated biliary ductal system, massive ascites, extensive collateral vasculature at the intervention site, aberrant ductal anatomy, or multifocal biliary strictures or metastasis. Additionally, patients should not undergo EUS-guided biliary drainage if they have uncorrected coagulation parameters, are currently on antiplatelet therapy, or have liver failure.

G&H What training is required to perform the EUS-guided biliary drainage procedures?

SV EUS-guided biliary drainage procedures should be performed by endoscopists who are knowledgeable of the pancreaticobiliary anatomy and are comfortable performing standard EUS techniques, such as tissue acquisition. Endosonographers who are particularly proficient with biliary interventions (eg, ERCP) are most apt to undertaking EUS-guided biliary drainage, as they understand which type of stents, dilators, and guidewires to use. In general, those who are coming out of an advanced endoscopy fellowship with good experience in diagnostic EUS should be able to undergo training with advanced EUS-guided techniques, such as biliary drainage.

G&H What are the priorities of research?

SV It would be beneficial to develop dedicated, single-step stent delivery systems for performing transluminal drainage procedures as well as devices to steer guidewires in the desired direction for antegrade and rendezvous procedures. Randomized trials comparing the different EUS-guided approaches are critical to identify the optimal technique for specific circumstances. Additionally, multicenter, high-quality studies are needed comparing EUS-guided hepaticogastrostomy with ERCP and percutaneous biliary drainage approaches for the management of proximal biliary obstruction.

Dr Varadarajulu serves as a consultant for Boston Scientific, Olympus America, Creo Medical, and Covidien.

Suggested Reading

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