ELSEVIER

Techniques in Gastrointestinal Endoscopy

EUS-Guided Cholangio Drainage and Rendezvous Techniques

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Percutaneous transhepatic cholangiography (PTC) has been classically used in cases of biliary obstruction where endoscopic retrograde cholangiopancreatography (ERCP) is unsuccessful. However, the complications of PTC are significant and include cholangitis, peritonitis, empyema, fistula, hematoma, and liver abscesses. With the development of endoscopic ultrasonography (EUS) and the ability to direct the needle within the field of intervention, EUS-guided cholangio drainage (ECD) is increasingly being used in tertiary care centers as an alternative to PTC. The studies that have been published thus far indicate that ECD has acceptable success and complication rates, such that it could be considered as a first-line therapy in centers offering expertise in EUS and ERCP. EUS-guided drainage may be either transhepatic or extrahepatic, depending on the most easily accessible region for drainage. Intrahepatic access to the biliary system appears safer than the extrahepatic approach. This review discusses the techniques, efficacy, and complications of ECD.

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Endoscopic retrograde cholangiopacnreatography (ERCP) with biliary drainage has become the gold standard procedure for decompression of obstructed biliary ducts.[1-3] Skilled endoscopists, are expected to achieve successful drainage in 90% to 95% of cases.[4] However, anatomic variation, periampullary diverticulum, tumor invasion, and surgical diversions[5,6] are all situations that may result in failure. In cases where such failure occurs, the available options include repeat ERCP at a tertiary care center,[7] percutaneous transhepatic drainage,[8,9] and surgery.[10] PTC has a complication rate of up to 32%, with possible fistula formation, cholangitis, peritonitis, empyema, hematoma, and liver abscesses.[11,12] Surgery, although definitive, is associated with increased morbidity and mortality.[13]

The last decade has seen dramatic improvement in endoscopic ultrasonography (EUS), which has become an important tool in the evaluation of pancreatico-biliary pathology.[14-17] A decade ago, EUS was used to opacify the biliary tract in cases where ERCP was not successful and to guide further therapy.[18] The next logical step was to combine EUS-assisted cholangiography and ERCP, to allow a complete intervention.[19-22] Publications that report the development of this drainage technique are summarized in Table 1.

This review describes the instruments, devices, and preparation required for these procedures and analyzes the major techniques currently available.

Instruments and Materials

Preparation Before the Procedure

A clear understanding of the pancreaticobiliary anatomy of the patient and the level of obstruction should be available before a decision is made to proceed with ECD. This requires use of sophisticated diagnostic modalities such as MRI-MRCP or spiral CT. In all patients, a conventional ERCP should be initially attempted. Indeed, the majority of cases that are referred to a tertiary level institution can be successfully managed by ERCP; in our experience, only 2% of patients with obstructive jaundice eventually require an ECD. This includes patients in whom an ERCP has previously failed or patients with persistent biliary obstruction due to incomplete drainage.

Patients should receive a course of antibiotics before the intervention. The procedure should be performed only by endoscopists who are skilled in both therapeutic ERCP and EUS.

Echoendoscopes

Linear array echoendoscopes offering a working channel of at least 3 mm should be used; this includes the FG38UX (Hitachi/Pentax, Japan), the EG38UT (Hitachi/Pentax, Japan), and

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Table 1 Evolution of EUS-Guided Cholangiography

Year	Author	Patients (*n*)	Technique	Results	Complications
1996	Wiersema et al. (18)	10	Transduodenal	7 of 10 opacification guiding therapy.	1 case of pancreatitis.
2003	Burmester et al. (20)	4	2 Transduodenal; 1 Transjejunal; 1 Transgastric.	Successful drainage in 3 of 4.	1 bile leak.
2004	Mallery et al. (21)	2	Transduodenal	Successful drainage in 2 of 2.	Passage of wire outside bile duct lumen.
2005	Puspok et al. (23)	6	5 Transduodenal; 1 Transjejunal.	Successful drainage in 5 of 6.	None
2006	Kahaleh et al. (27)	23	18 Transgastric; 5 Duodenal.	Successful drainage in 21 of 23.	2 pneumoperitoneum; 1 bile leak; 1 minor bleeding.

the GF-UCT140 (Olympus, Japan). The EG38UT and the GF-UCT140, have working channels of 3.8 and 3.7 mm, respectively, and allow placement of a 10-French stent. On the other hand, the FG38UX has a working channel of 3.2 mm, which only permits placement of an 8.5-French stent. These instruments are coupled with an ultrasound processor such as the Aloka (Tokyo, Japan) or the EUB6000 from Hitachi (Tokyo, Japan).

Devices

Some practitioners use the needle-knife catheter to gain access, but the tip can be difficult to see by endosonography. We tend to use a 19- or 22-gauge needle (EUSN-19-T or EUS-1-CS; Wilson-Cook, Winston Salem, NC). Although correct orientation of the 19-gauge needle is more challenging than the 22-gauge, it permits placement of a 0.035-inch guidewire, such as the Terumo (Boston Scientific) or the Teflon (THSF-35-480; Wilson-Cook). This wire can be more easily manipulated than the 0.018-inch guidewire (Pathfinder, Boston Scientific Corp., Natick, MA). The fistula between the GI tract and the biliary tree can be enlarged using either a 4- or 6-mm wire-guided balloon catheter (MaxForce; Microvasive), 6- or 7-French bougie (SBDC-6 or -7; Wilson-Cook) or a 6.5-French cystenterostome (EndoFlex, Voerde, Germany).

Burmester and coworkers[20] used a device that consists of a 19-gauge fistulotome with a 0.025-inch guidewire, a pusher tube (Mandel Rupp, Erkrath, Germany), and an 8.5-French, 5- to 7-cm-long plastic stent fixed with a nylon suture. Their technique for puncture of the intrahepatic or extrahepatic bile duct was a modification of the one-step method for the drainage of pancreatic cysts.

Techniques

Regardless of the devices used, the techniques currently available can be grouped in three categories.

Extrahepatic (Transenteric–Transcholedochal) Approach

The extrahepatic approach is performed with the echoendoscope in the distal antrum or duodenum, permitting imaging of the dilated choledochus. Color Doppler is used to identify regional vasculature. Bile duct puncture is then performed under fluoroscopic and endosonographic control (Fig. 1). After successful biliary access, bile is aspirated through the needle, and contrast is instilled under fluoroscopy to demonstrate biliary opacification (Fig. 2). A guidewire is introduced through the EUS needle and advanced in an antegrade fashion, with the goal being to cross the biliary obstruction and advance the guidewire into the duodenum. Care is required to avoid shearing the guidewire on the tip of the needle. Adequate orientation of the wire may require the use of a sphincterotome as a steering catheter. In some cases, the obstruction can only be traversed by impaction of a bougie into the stricture to create an anchoring point from which the guidewire can be forced across the obstruction (Fig. 3). In cases where the guidewire cannot be advanced across the obstruction, a transenteric fistula is created in an attempt to decompress the biliary tree.

If the guidewire has successfully been advanced into the duodenum, either a rendezvous procedure is performed or the procedure is completed in an antegrade fashion. The choice between the two alternatives depends on the accessibility to the ampullary orifice, the anatomy of the patient, and the ease of stent deployment.

In the situation where access to the ampullary orifice is possible, cannulation adjacent to the protruding guidewire

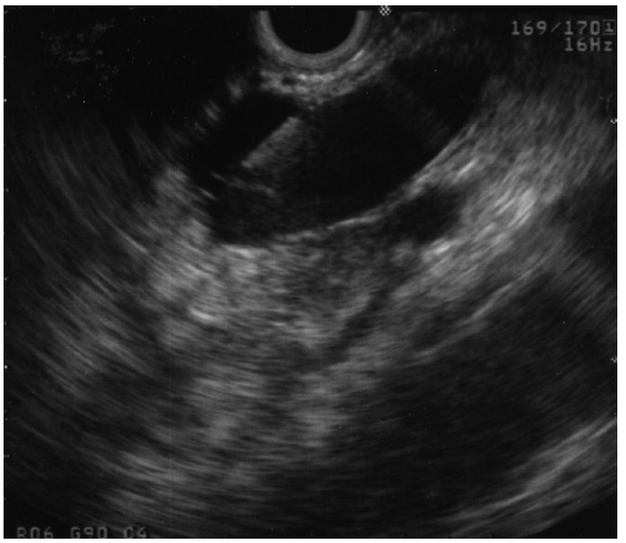

Figure 1 A 19-gauge needle puncturing the common bile duct under endosonography, extrahepatic approach.