Introduction

Percutaneous transhepatic biliary drainage (PTBD) has been considered as the usual biliary access after failed endoscopic retrograde cholangiopancreatography (ERCP). EUS-guided biliary drainage (EUS-BD) have proposed it as an alternative to PTBD after failed ERCP. EUS-BD techniques include EUS-guided choledochoduodenostomy (EUS-CDS), hepaticogastrostomy (EUS-HGS), antegrade stenting (EUS-AGS), and rendezvous stenting (EUS-RVS). The potential benefit of EUS-BD is internal drainage instead of long-term external drainage. This procedure has been reported effective and safe when performed by experts, with 85-100% success rates. However, 5-35% complication rates was variable and high at some reports. To reduce the complication of EUS-BD, we need dedicated devices and accessories for safe EUS-BD. This article describes dedicated devices and accessories for comfortable and safe EUS-BD.

Conventional method for EUS-BD

The important issues of high success and low complication rate of EUS-BD makes it an appropriate technique for biliary access. The linear-array echoendoscope was placed in the lesser curvature of the stomach for the intrahepatic approach, and in the antrum and duodenal bulb for for the transduodenal approach. It was oriented to view the left intrahepatic system and extrahepatic bile duct. Bile duct puncture was performed with a 19-gauge needle. Bile was aspirated to confirm the correct position. Contrast media injection was performed to obtain more details on cholangiographs. And then, either a guidewire was inserted and negotiated to achieve the desired position of the guidewire. Variable dilators can be used to create the enterobiliary tract, followed by insertion of metal stents or plastic stents.

Puncture and guidewire insertion into bile duct

To puncture bile duct through transgastric or transduodenal route, usually 19 G needle can be used. Some companies have produced 19G FNA needle that is stiff, but one 19G needle is more more flexible than others. Flexibility of this needle is very important in the transduodenal route.
Guidewire insertion is one of the most important procedures during EUS-BD. Various types of guidewires are available. A 0.025-inch guidewire with a highly flexible tip, sufficient stiffness, and easy seeking ability (VisiGlide, Olympus Medical Systems, Tokyo, Japan) is preferable for the EUS guided BD.

**Devices used to dilate the fistula**

To insert the stent delivery system into the biliary tree, the bile duct and gut wall have to be dilated. This process must be rapidly performed to reduce the complication of EUS-BD such as bile leakage or pneumoperitoneum. Many studies have reported techniques and equipment used in these procedures.

The techniques for biliary access were classified into tract creation with cauterized or non-cauterized tract dilatation with graded balloon dilation. The most common cauterized devices for transmural tract dilation are the dilator (6 to 10 Fr; Soehendra biliary dilation catheters, Cook Medical), balloon catheter (Hurricane RX; Boston Scientific), and ERCP cannula ultra-tapered to 4F. If ERCP cannula ultra-tapered can be used, an 6F and 7F biliary dilator catheters for more dilatation of tract are inserted over the guidewire for dilating the tract.

Non-cauterized dilators sometimes can lead to resistance of gut wall. For resolving this resistance, cauterized dilators such as a needle-knife with a 7F shaft diameter or a cystotome may be used to dilate the tract using a brief burst of pure cutting current. One paper reported reported that the use of a needle knife for fistula dilation as the single risk factor for adverse events after EUS-BD ($P = 0.01$, HR = 12.4, 95% CI: 1.83-83.5). The needle knife can lead to accidental incision with a chance of pneumoperitoneum or bleeding. However, fistula dilation by needle knife is easier than other devices. Recently, a diathermic dilator (CystoGastro Set; Endoflex, GmbH, Voerde, Germany) has become available. This device is always coaxial with the guidewire. Hence, its use for fistula dilation may reduce the incidence of EUS-BD-related adverse events compared with those using a needle knife. The common techniques for biliary access included using a needle knife to create the tract followed by balloon dilatation with different balloon types.

**Conclusion**

Although EUS-BD has wide indications as a biliary drainage procedure to alternative PTBD, EUS-BD also has a high rate of adverse events that may be sometimes fatal. For the purpose of safe and effective these procedure, development of dedicated devices and accessories is mandatory for safe and effective EUS-BD. Studies comparing these devices are, therefore, warranted.

**References**