Introduction

EUS-guided biliary drainage (EUS-BD) comprised of several different techniques including EUS-guided rendezvous technique, EUS-guided antegrade stenting, EUS-guided hepaticogastrostomy, EUS-guided choledochoduodenostomy and EUS-guided GB drainage. These EUS-guided interventional procedures are composed of complex steps of procedures and generally requires a long time to be experienced with. For the beginners of these procedures, it is very important to learn techniques step by step from basic imaging, EUS-FNA, EUS-guided pseudocyst drainage and finally EUS-BD. It is recommended to learn these complex procedures as a part of well-organized training programs and under proper supervision. However, it is also difficult to find out centers offering well-organized training program and takes a long period of time. The learning period can be shortened by attending hands-on training courses and workshops using phantoms or animal models. It is very helpful for the beginners to understand individual steps of interventional EUS before staring EUS-BD.

Steps in learning EUS-BD

1. Linear EUS anatomy & orientation

   For interventional EUS, linear echoendoscope should be used and endosonographers should be experienced with linear EUS anatomy and orientations. Generally speaking, radial scanner offers 360 degree wide view and it is relatively easy to understand radial EUS anatomy. However longitudinal scanner offers narrow view and it takes more time to get used to this anatomy. Endosonographers should acquire the ability to manipulate the tip of echoendoscope and to trace delicate structures continuously.

2. EUS-guided fine needle aspiration technique

   EUS-guided fine needle aspiration (EUS-FNA) is a technique of acquiring tissue sample from certain targeted areas. This technique involves skills of adequate delineation, locating the target on desired position, accurate targeting, puncture & to-and-fro movement. Even though the lesion is visible on EUS, the target should be located on the left side of the screen since the needle comes from right upper top of the scanner. When the lesion is visualized in the right side of the screen, the tip of echoendoscope should be retracted a little bit to locate...
the target on the left side of the screen. When the lesion is located in the deeper part of the screen, the big wheel of echoendoscope should be used to make down-angle at the tip. Then the target can be moved from deeper part of the screen to shallower part of it. By combination of these two movement, the target can be located at the ideal zone of the screen. The technique of accurate puncture is also very important step for building self-confidence in interventional EUS. Before puncture, the sheath of needle needs to be exposed from the instrumental channel of echoendoscope and then the needle tip should be exposed through the needle sheath at the top right corner of scanner. Endosonographers need to know how to use safety bar to prevent overshooting of target. When the lesion is hard, the scope can be bounced backward at the time of puncture. So a quick jabbing movement on a safety bar is required. To get used to all these steps, it is recommended to perform more than 100 cases of EUS-FNA.

3. EUS-guided pancreatic pseudocyst drainage

Once the endosonographer becomes confident of EUS-FNA, EUS-guided pseudocyst drainage is the ideal condition to practice the technical details of EUS-BD. On top of EUS-FNA skills, several techniques are required more for pseudocyst drainage. These are guidewire manipulation, puncture site dilation over the guidewire, exchange of devices over the guidewire and finally the insertion of plastic or metal stent through the puncture site. The technical details can be variable according to the devices or stents but these techniques are essential component for EUS-BD. For pseudocyst drainage, generally the target is larger than EUS-BD and the cyst wall is attached to gastric wall or duodenal wall by inflammatory adhesion. So there is less risk of leakage and it is safer than EUS-BD. Another important skills involved in EUS-BD is how to use fluoroscopy image during interventional EUS. Nowadays, it became possible to do EUS-guided pseudocyst drainage completely under EUS view. But traditionally, pseudocyst drainage is performed under EUS view and fluoroscopic view. So endosonographers will be experienced in using fluoroscopy image for interventional procedures.

4. EUS-guided BD

If the endosonographers are experienced with all above described techniques, it is not difficult to start EUS-BD. EUS-BD is categorized as EUS-guided rendezvous, antegrade stenting, EUS-guided GB drainage, EUS-guided choledocho-duodenostomy and EUS-guided hepatico-gastrostomy. If the endosonographer is not confident, EUS-guided rendezvous is recommended first step to learn EUS-BD. This technique requires a delicate manipulation of guidewire, steering the tip of wire into distal CBD and cooperation between endosonographer and assistant. If GB is inflamed and shows adhesion to surrounding organ, it can be a good training model of EUS-guided GB drainage. Sometimes PTGDB tube needs to be changed to internal drainage and this is a good opportunity for beginner of EUS-BD to start EUS-guided GB drainage. Since PTGDB tube is in place, there will be no serious leakage problem even though EUS-guided GB drainage is failed. By selecting the case properly and step by step approach, many complications or morbidities associated with EUS-BD can be avoided.

Conclusions

EUS-BD is becoming increasingly important for the management of obstructive jaundice, cholangitis and
cholecystitis. It is composed of complex steps of procedures and it is not easy to learn all these techniques at a time. Therefore the endosonographers need to learn step by step from basic imaging technique, EUS-FNA, EUS-guided pseudocyst drainage, EUS-guided rendezvous and finally EUS-BD. The learning period can be shortened if endosonographers are confident on EUS-FNA and EUS-guided pseudocyst drainage. They can understand operational details better by attending hands-on training courses and improve their skills by repeated trials of EUS-BD.