

Training of interventional endoscopic ultrasonography (EUS) in pancreato-biliary disorders: an asian perspective

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Abstract

Interventional EUS procedures are fast becoming the therapeutic option for many pancreatobiliary disorders. Learning EUS can be challenging when compared to learning standard endoscopic procedures or ERCP. Learning interventional EUS is even more challenging as the operators need to know the accessories intimately, and how to manipulate these accessories to achieve the desired result. Interventional EUS procedures also carry additional complications such as bile leak, stent migration, bleeding, and even perforation, making hands-on training in real life patients near impossible. The authors believe models are useful to help the trainee gain understanding and skill in the procedure before embarking on doing the procedures on real life patients.

Introduction

Interventional EUS procedures are fast becoming the therapeutic option for many benign and malignant pancreatobiliary disorders, including endoscopic drainage of malignant biliary obstruction. While endoscopic retrograde cholangiopancreatography (ERCP) remains the standard of care (SOC) in drainage of biliary obstruction cases, EUS-guided biliary drainage (BD) is now accepted as an alternative drainage modality when ERCP failed [1]. Thus far, interventional EUS procedures are mostly performed in expert centers or large-volume centers that have highly skilled endoscopists. In this article we aimed to describe the current progress in the training of interventional EUS for pancreato-biliary disorders in the context of the Asian countries.

Endoscopic ultrasonography: history and development in clinical practice

Endoscopic ultrasound (EUS) is the most sensitive tool in assessing the pancreato-biliary system [2]. The first scanning prototype developed was a 5 MHz sector (Olympus Co. Ltd) [3,4]. Since then, two types of echo endoscopes, which are known as radial and linear-array, have been introduced. The radial echo endoscope is routinely used for diagnostic purpose, whereas the linear-array echo endoscope is commonly used for therapeutic purpose [5,6]. Not surprisingly, the linear-array echo endoscope has become more popular as it can be used for both diagnostic and therapeutic purposes.

Nowadays, EUS has been used for a variety of injection procedures, including EUS celiac plexus neurolysis (EUS-CPN), pancreatic cyst ablation, pancreatic tumor ablation; and drainage procedures including pancreatic pseudocyst drainage, EUS guided pancreatic drainage, and EUS-guided biliary drainage (EUS-BD). The last procedure comprises three types of procedures which are EUS hepatico-gastrostomy (EUS-HGS), EUS rendezvous (EUS-RV), EUS choledoco-duodenostomy (EUS-CDS) [2,7].

Training in endoscopic ultrasound procedures

Performance of EUS procedures requires the basic skills of doing endoscopy and ultrasound imaging knowledge of human anatomy. These two skills need to be combined with the skill in orientating the cross-sectional images. A survey done in multi-countries in Asia some years ago showed the interesting finding that 49% participants were self-taught, with the remainder trained by observing their mentors. Institution's proctorship was reported by 23% participants, who preferred to have hands-on training in their own centre [8,9]. Structured EUS training was uncommon in Asian countries during the time of survey, unlike the case in Western countries, where EUS training is generally included in the GI fellowship curriculum. Based on American Society Gastrointestinal Endoscopy (ASGE), an EUS trainee should have performed at least 150 EUS cases including performing EUS fine needle aspiration (FNA) under supervision [10].

Until recently, most of Asian countries do not offer structured EUS training program and/or hands-on training as there is a concern about patient's safety and potential lawsuit. While academic hospitals do offer such training positions, such training opportunities positions are generally limited and will not be sufficient for many physicians, particularly those who work in private hospitals. Consequently, EUS proctorship has been considered as the next best method for those GI physicians who work in the private hospital. For the vast majority of GI doctors, the practical solution appears to be EUS hands-on workshops. The Asian EUS Group (AEG), which was formed in 2012, has organized many of these structured hand-on workshops. In these workshops,

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besides supervised hands-on procedures in real life patients, didactic lectures, live case demonstration, and hands-on practice on animals or phantoms have also been employed. Currently, a number of endoscopic simulators, such as Symbionix Ltd. (Tel Hashomer, Israel), and Vovel-Man Group (Hamburg, Germany) have been developed to help learn EUS. However, endoscopy simulators are not available yet in most of the centers in the world, especially in Asia, and the cost is usually very high. Therefore, home-made phantom models may be cheaper and suitable in most Asian countries. A study based on results from six workshops conducted in 6 countries showed significant improvement of the trainees' knowledge and skill after these hands-on workshops [11]. EUS proctorship has also been organized by AEG on a case by case basis [8,10-12].

Learning EUS can be challenging when compared to leaning standard endoscopic procedures or ERCP. The training has to learn a number of skills. Firstly, he/she has to learn how to insert the echo endoscope gently and place at the right position, so the images can be seen clearly. Secondly, the trainee has to learn to recognize the anatomy, the landmarks, and the target organs. Thirdly, the endosonographer should accept the possibility of altered anatomy or difficult anatomy that may result in issues with visualization or scope positioning. This is why real life practice on patients soon after observation might be stressful for most of the trainee doctors and the trainers, particularly at the beginning of the training phase.

Training in therapeutic interventional EUS procedures

As PTBD is mostly performed by well-trained interventional radiologists in most Asian countries, it is still debatable if gastroenterologists should be allowed to perform PTBD after ERCP failed cannulation [13]. This has implication in terms of the volume of cases, and the learning curve to become skillful in interventional EUS.

Training in interventional EUS procedures requires deep knowledge of the accessories used. For example, one needs to know the type of needle to be used, and how to choose the correct guide wire. The trainee needs to learn manipulation of the guidewire and stents during the therapeutic procedures. The basic technique of interventional EUS is quite similar to those of ERCP or PTBD procedures. However, interventional EUS procedures carry additional complications such as bile leak, stent migration, bleeding, and even perforation. Because of these potential risks, hands-on training of interventional EUS in real life patients has become a huge challenge. Some centers in Asia have tried to develop phantom models for purpose of training intervention procedures. One of the famous model is the Mumbai EUS 3D printing bile duct prototype. Stereolithography 3D printing technology was used to create the dilated bile duct. The model allows one to learn bile duct drainage step by step, using relatively realistic EUS and radiographic images. In that study, needle puncture and tract dilation

had been successfully done followed by guide wire manipulation and stent placement in 100% of cases. Another model has also been developed in Japan for EUS FNA procedures. Even though all of these models cannot match the experience obtained from real life practice, they do help a lot in providing better understanding of the procedure itself [14,15].

Conclusions

The performance of Interventional EUS procedures requires high skill and expertise. As they carry potential risks, non-human models might be the best training tool at this moment.

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