REVIEW

Training in ERCP and EUS in the UK anno 2017

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ABSTRACT

In the last 20 years, endoscopic retrograde cholangiopancreatography (ERCP) has evolved from being a diagnostic procedure to being almost exclusively therapeutic. Similarly, endoscopic ultrasound (EUS) is developing into ever-increasing therapeutic roles. Operator technique is central to diagnostic accuracy in EUS, as is effective and safer therapy for both ERCP and therapeutic EUS. Hence, effective training and robust standards for certification and revalidation are required to ensure ERCP and EUS in the UK are as effective and as safe as possible.

INTRODUCTION

Endoscopic retrograde cholangiopancreatography (ERCP) and endoscopic ultrasound (EUS) are considered to be among the most challenging procedures in gastrointestinal (GI) endoscopy. In order to achieve competence, extensive and effective training is crucial but there is no consensus on the minimum numbers required before an individual achieves competence in either procedure, and the number to achieve competence varies between endoscopists.^{1–2} The American Society for Gastrointestinal Endoscopy (ASGE) has recommended a minimum of 190 supervised EUS procedures, including 75 pancreatobiliary cases and at least 25 pancreatic fine-needle aspiration (FNA) prior to certification.³ But a US study showed that 80% of advanced trainees showed competence only after 150–200 EUS procedures with one trainee needing more training despite 400 procedures.⁴ As the range of interventions have become increasingly more complex with increasing rate of potentially significant complications, there is an increased emphasis on ensuring adequate training and competence in the UK and internationally. However, this remains a

longstanding challenge, certainly for ERCP training as recently stressed.⁵

This review will discuss training methods beyond experiential ‘on-the-job’ training and then assessment and certification for both ERCP and EUS in turn.

ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY

The clinical need for means to image the bile and the pancreatic duct led to successful cannulation by McCune in 1968, who achieved 25% cannulation rates.⁶ Thereafter, cannulation rates, now one of the quality indicators for ERCP, have improved to 95% in expert hands.⁷ The first therapeutic ERCP with the advent of sphincterotomy was performed in 1974. Today, with better quality and less invasive imaging with CT, MRCP and EUS, ERCP has become an almost purely therapeutic procedure. It remains, however, a higher risk endoscopy compared with other GI procedures.⁸ A recent study of >16 000 patients over 3 years showed 1.8% post-ERCP mortality.^{9–10} Additionally, other complications such as perforation (2%) and pancreatitis (5%–30%) can lead to severe morbidity.^{11–12}

ENDOSCOPIC ULTRASOUND

EUS systems were first developed in the 1980s by Olympus to support early detection of pancreatic cancer and was later enhanced with FNA in the 1990s. In pancreatobiliary medicine, EUS is now an important first-line modality to stage and biopsy solid pancreatic lesions and to evaluate pancreatic cysts.

Therapeutic EUS has also become mainstream, such as EUS-guided cystogastrostomy for walled-off pancreas necrosis and coeliac plexus neurolysis in chronic pancreatitis or pancreatic cancer.^{13–16} As with ERCP, concerns have been raised

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whether current training is sufficient to ensure competency in EUS. Despite the recommendations in 2004 by the UK EUS user group, EUS certification has never been defined in the UK.¹⁷ In their draft, it was recommended to assess trainees using a direct observation of procedural skills (DOPS) system which has only recently been added to JAG (Joint Advisory Group) endoscopy training system (JETS) (see <http://www.jets.nhs.uk>). In contrast to ERCP, interobserver agreement on EUS is variable which stresses the importance of high training standards and effective assessment and certification.^{18 19}

TRAINING METHODS FOR ERCP AND EUS

ERCP models

The ERCP models available are digital, ex vivo or mechanical.

Simbionix simulator

This is an electronic simulator housed within a manikin that allows scope insertion for every endoscopic modality. It contains case-based modules for training in scope handling, upper and lower GI endoscopy, ERCP and endoscopic ultrasonography.

The simulator has a definite role in scope handling for trainees learning upper and lower endoscopy, but it lacks the subtlety of the use of different ERCP devices, and the 'feel' of cannulating is quite poor. It is also costly and needs a dedicated storage room given its size.²⁰

Ex vivo models, biological models

Biological models combine plastic material and biological material in one model to mimic a real-live situation. For example, the MADA model uses vacuum

cleaner tubing to mimic the duodenum and a chicken heart serving as a 'papilla'.²¹ It allows trainees to develop skills handling a side viewer and has possibilities to perform interventions such as sphincterotomy. This would allow familiarity using additional tools such as electrocautery. It is however expensive, as it requires dedicated endoscopes in animal laboratories. Also, the combination of a chicken heart and a pig stomach is different to the human anatomy. Therefore, these ex vivo models might be better for dedicated ERCP courses than day-to-day trainee practice in hospitals.

Mechanical models

A simplified mechanical ERCP model (The ERCP trainer, Cook Medical, Limerick, Ireland), for training endoscopists in scope handling, wheel manoeuvres, cannulation, stent insertion and electrocautery was recently validated.²² It is a non-biological model from Italy and the small size of this model makes it transportable and facilitates its use in every type of endoscopy unit (figure 1) with the unit's normal endoscopes. Additionally, the costs are lower compared with biological models. Currently, a multicentre prospective trial is validating the ERCP trainer model under trainees from different centres in the Netherlands.

EUS models

Simbionix simulator

The Simbionix simulator also has modules for EUS, including radial views, which is of use in appreciating the fundamentals of endosonographical views of upper abdominal anatomy. As for ERCP, the cost and storage do limit its usage.

Figure 1 Non-biological endoscopic retrograde cholangiopancreatography model and setting in Rome, Italy, designed by Dr Ivo Boskoski. Pictures received from Dr Boskoski.

Ex vivo models, biological models

A pig model to perform EUS was validated in 1998 and was found suitable for practising therapeutic procedures.²³ The model led to increased competence in both diagnostic and therapeutic procedures.²⁴ More recently, Fukushima Medical University has published data on a model using pig stomach and chicken tenderloin as target lesions to train endoscopists to do FNA.²⁵ The model proved to be valuable and cheap. Unfortunately, it does not allow for training in difficult scope position or puncture lesions that are more challenging to find, and in many countries, dedicated 'animal' endoscopes are required.

Mechanical models

Currently, companies are expanding non-biological models for EUS training. Olympus has a hands-on model using silicone blocks mimicking different human organs, such as the liver and pancreas. Others, such as Boston scientific, have a phantom model using latex block (unpublished data). It is likely that these models are cheaper without the requirement of animal laboratories.

Formal training courses

JAG accredits ERCP courses at a number of sites in the UK (<http://www.jets.nhs.uk>). These courses run for 3 or 4 days and are aimed at either novice ERCP trainees, an up-skilling course for more experienced endoscopists and train-the-trainers ERCP courses. All the courses are small groups with an expert faculty and entail a combination of topic discussions and closely supervised hands-on training in live ERCP cases and ERCP models. Feedback on these courses is excellent and trainees credit the basic course for improving their fundamental understanding of ERCP topics and to increase their confidence in practicing safer ERCP (UCLH, unpublished data).

There are far fewer EUS courses, but since 2014 there has been a regular JAG-approved basic hands-on course, as well as a train-the-trainers course (<http://www.jets.nhs.uk>) with excellent feedback (UCLH and Freeman, unpublished data).

Assessment and accreditation

Continuous assessment using validated assessment tools has been well established by JAG for performing colonoscopy, flexible sigmoidoscopy and gastroduodenoscopy in the UK.^{26 27} Since 2009, every trainee is expected to use JETS e-portfolio which is subsequently used for certification.²⁸ DOPS and their variations have been validated as a reliable and acceptable way to assess a trainee's competence in a procedure.²⁹

For ERCP and EUS, newly developed DOPS were launched on JETS in July 2016. The new DOPS forms are likely to be more reliable as the judgements are based on the degree of supervision required by the trainee and also incorporate important aspects of

endoscopic practice such as non-endoscopic technical skills, such as teamwork, which are key aspects in safe and effective ERCP and EUS.³⁰

National audits in colonoscopy showed a massive improvement in the performance of UK colonoscopy between 1999 and 2011 which was put down to JAG defining the training, acceptable standards and accreditation process for a trainee colonoscopist.³¹ The process for ERCP and EUS accreditation, using the evidence provided by the new DOPS as well as successful completion of formal courses and summative assessments will be published in 2017.

This JAG certification pathway for ERCP and EUS, including the definition of acceptable key performance indicators, is in the process of being agreed. JAG has temporarily suspended applications for ERCP from the certification process as the JAG Quality Assurance for Training Working Group decided that the assessment tools previously available were inadequate at testing competency at these procedures. EUS has never had a certification process defined by JAG.

Ekkelenkamp *et al* used an objective assessment form to evaluate a trainees' learning curve in ERCP. The Rotterdam Assessment Form for ERCP (RAF-E) has been shown to be a good tool to allow determination of the progress of every individual trainee with respect to different aspects of ERCP.¹ The RAF-E records cannulation rates and other interventions such as stent removal or insertion. Historically, competence was merely based on ERCP numbers, but as van Ekkelenkamp *et al* and other studies show achieving a predefined action (eg, cannulation) is more important than procedure numbers per se.^{1 2 32 33} But when it comes to numbers, the Ekkelenkamp study showed successful common bile duct (CBD) cannulation in a virgin papilla of only 68% after 180 ERCPs. Also, only 1 trainee among 15 others reached 85% cannulation at 200 procedures. In our opinion, this study might suggest that trainees are likely to need approximately 300 ERCPs to reach the acceptable (85%) CBD cannulation rate.¹ This paper is currently the best source of evidence on what the learning curves for different ERCP actions for a population of trainees are and will largely inform the definition of how many cases trainees are required to perform before they undertake summative assessment and certification. However, the disadvantage is that the RAF-E does not cover non-technical skills such as decision-making and teamwork. Furthermore, the assessments in the paper were all done in a single training centre.

In EUS, a comparable study from the USA was published in 2013 among three tertiary care centres where five trainees were prospectively evaluated using a 'station'-based evaluation form.⁴ In this study, the majority of trainees showed a consistent need for continued supervision, including one trainee who performed 402 EUS. The overall conclusion of the study was that prospective studies are needed to define

competency and that the minimum EUS procedures should be set at >200. This is an important statement, especially in the USA where the ASGE guidelines have set the minimum at only 75 pancreatobiliary EUS which is rather low.³

Fellowships

In 2004, the NCEPOD report was highly critical on training for ERCP, mainly due to insufficient numbers of procedures in ERCP for trainees. The Ekkelenkamp paper and the US study on EUS performance prove that numbers are also important in acquiring certain competencies in ERCP and for that reason a minimum number of 300 procedures (with acceptable key performance indicators) will form part of the JAG accreditation process for ERCP and EUS. Gastroenterology programmes should also be developed such that there is a greater likelihood of trainees undertaking a sufficient number of ERCP and/or EUS cases during the standard 5 years of training. This is challenging unless novel approaches are implemented, such as foregoing colonoscopy training; and working in a 'hub-and-spoke' arrangement so that a trainee is allowed to continue with ERCP/EUS training even when they are based at a hospital that may not provide the service.

Therefore, it is increasingly likely that trainees will need to undertake a fellowship in either ERCP or EUS (or both) in a high-volume centre. The UK ERCP stakeholders working party predict 30 new consultants with ERCP accreditation are needed annually to enter the UK service, to balance the retirement of ERCP practitioners.³⁴ The numbers for EUS are not known, but the requirement is likely to expand in the UK as therapeutic possibilities of EUS grow. It is therefore increasingly likely that trainees will be required to undertake a formal ERCP and/or EUS fellowship to obtain the experience and competence that JAG are set to define for ERCP and EUS accreditation.

It may be argued as to whether endoscopists should be trained in both ERCP and EUS. Undoubtedly, EUS skills are useful to 'troubleshoot' prior to an ERCP, and there is also a move for EUS-guided biliary and pancreatic access and therapeutic techniques when ERCP is not possible. However, in a lower volume centre, a competent doctor practising ERCP should not also be required to perform EUS but trainees aspiring to practice in a high-volume-dedicated HPB service would be well advised to acquire ERCP and EUS accreditation during training.

Future perspectives and retaining quality

In keeping with ASGE and European Society of Gastrointestinal Endoscopy guidelines, pancreatobiliary trainees in the UK start EUS and/or ERCP after at least 18 months of GI training. However, with the vast majority of UK gastroenterology trainees seeking training in colonoscopy, and trainees failing to acquire

appropriate numbers of colon cases due to the distractions of other aspects of training like general medicine, few trainees will get much exposure in the first 2–3 years of specialist training. The availability of (non-) biological models and hands-on courses is a positive development to move a trainee up the learning curve quicker.

On the back of the certification pathway soon to be published by JAG for ERCP and EUS, there is the need for a UK-wide strategy for training the right number of doctors in the best way. There needs to be an accurate manpower calculation for the number of individuals needed to complete certification each year and ensure that each region is bringing the right number of trainees through. These individuals should have early exposure to ERCP and EUS (and HPB medicine training) and ensure that they attend the JAG courses at the right time.

The final challenge for UK pancreatobiliary endoscopy is to determine the methods by which existing practitioners ensure quality in EUS and ERCP. The most practical way that this is delivered is to ensure individuals and units are attaining acceptable case numbers and KPI's for ERCP and EUS, which is robustly inspected as part of the rolling JAG reporting and JAG visits programme. Evidence of dedicated continuing professional development in ERCP and EUS should also be reviewed, such as attending up-skilling courses, live endoscopy events or assisting as faculty on formal courses.

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