

ESOPHAGOGASTRODUODENOSCOPY (EGD) CORE CURRICULUM – June 2004

Draft submitted by
ASGE Committee on Training

PREAMBLE

This document, prepared by the ASGE Committee on Training, was undertaken to describe recommendations for upper endoscopy training and written primarily for those endoscopists involved in teaching endoscopy to fellows/trainees. This core curriculum was developed as an overview of techniques currently favored for the performance and training of upper endoscopy and serve to as a guide to published references, videotapes and other resources available to the trainer. By providing information to endoscopy trainers about the common practices utilized by experts in performing the technical aspects of the procedure, the Committee on Training hopes to improve the teaching and performance of upper endoscopy.

I. INTRODUCTION

Acquiring the skills to perform upper endoscopy safely, effectively, and comfortably requires an understanding of the indications, risks, and limitations of the procedure. It also requires competence in maximizing visualization of the esophagus, stomach, and duodenum, minimizing patient discomfort, ensuring the appropriate identification normal and abnormal findings and performs therapeutic techniques. A recently updated ASGE guideline entitled “Principles of Training of Gastrointestinal Endoscopy” and the section of the Gastroenterology Core Curriculum developed by the Task Force in Gastrointestinal Endoscopy review the overall objectives of endoscopic training, the requirements for endoscopic trainers, and the training process itself. The evolving issue of competency assessment in endoscopy training is also reviewed. These core documents are pertinent and are recommended to endoscopic trainers and trainees alike.

II. PERI-PROCEDURE MANAGEMENT

A. Pre-procedure Management

Training in the techniques of upper endoscopy must go hand-in-hand with the development of expertise in the wide variety of upper gastrointestinal disease confronted by the endoscopist. A thorough knowledge of indications, contraindications, complications and issues of informed consent, patient education, antibiotic prophylaxis, and anticoagulation management are essential and should be taught to all trainees. Ideally, these issues should be addressed with the trainee during the initial patient encounters before the procedures are scheduled. Full reviews of these topics are beyond the scope of this document but are covered in ASGE guidelines referenced, and are also available on the ASGE website (<http://www.asge.org>).

The critical importance of preparation for optimal visualization, safety and ease of upper endoscopy examination must be taught to all trainees. In general, an upper endoscopy is

performed when the patient has been fasting for solids and nonclear liquids for 6 to 8 hours or since midnight and for 2 to 3 hours for clear liquids prior to the procedure (Anesthesiology 1996; 84:459-71).

B. Patient Management and Physician Behavior during Upper Endoscopy

Maintenance of patient comfort, dignity and privacy are of paramount importance during upper endoscopy; these are skills best taught by example, supplemented with feedback and constructive criticism to the trainee. During the procedure itself, communication and feedback between the endoscopist, assistant and patient are essential for patient comfort and safety, but these skills may be underdeveloped by the early trainee focused on the technical aspects of the procedure. In particular, good patient communication is extremely important in relieving patient anxiety and limiting discomfort, and should be an important part of upper endoscopy training. The art and science of conscious sedation must also be mastered to trainees of endoscopy with ASGE documents and other published guidelines very helpful in the teaching process.

Finally, a positive teaching environment must be maintained in the procedure room at all times, and interruptions kept to a minimum. Individual teaching styles vary, but the trainer must foster a positive, professional learning environment by offering constructive comments.

C. Post-procedure Management

Following upper endoscopy, communication of findings, therapeutic results, and plan for follow-up must be emphasized to the trainee as an extremely important phase of the procedure. This involves both discussions with the patient and effective communication to the referring health professional. The importance of complete procedure reporting cannot be overemphasized, and the need to utilize accepted nomenclature to describe findings must be imbued in the trainee. Trainers and trainees alike should utilize the accepted minimum standard terminology (MST) in their computerized procedure reporting system or dictated reports, to foster standardization of reporting and data collection throughout the endoscopic community.

III. BASIC/DIAGNOSTIC TECHNIQUES

A. Esophageal Intubation

A most difficult challenge in upper endoscopy, especially for beginning trainees, is the intubation of the esophagus. In general, trainees should be taught the principles of intubating the esophagus under direct visualization. The principles of intubating the esophagus under direct visualization go hand in hand with the most basic endoscopic principle: the endoscope should never be advanced blindly or forcefully. All trainees should not only be taught the landmarks that will guide them to the upper esophageal orifice but that, despite good endoscopic techniques, the esophagus may be difficult to intubate in some patients. These patients may have inadequate sedation, a prominent cervical spine that interferes with the passage of the endoscope, a Zenker diverticulum, or

a tumor. Understanding the potential reasons for inability to intubate the esophagus and using appropriate alternative diagnostic modalities is an important part of training. While the majority of upper endoscopies are performed with patients lying in the left lateral position, trainees should become familiar with intubating the esophagus with patients lying in the supine position. Familiarity in intubating the esophagus of supine patients is often essential in the performance of upper endoscopy in ICU patients. Several general book chapters cited address this issue, and excellent demonstrations of these techniques exist in the ASGE instructional videos.

B. Pyloric Intubation

Pyloric intubation is achieved in almost all patients with modern endoscopes in expert hands. The beginning trainee may be anxious in his or her ability to intubate the pylorus. Once it has been intubated, the trainee may be equally anxious that the endoscope will return to the stomach unintentionally. The basic endoscopic principle that the endoscope should not be advanced blindly is equally valid in pyloric intubation. The pylorus is easiest to intubate when it is well visualized. The endoscopist in training should be taught the technique of examining the duodenal bulb immediately beyond the pylorus carefully and effectively, since pathology in this area can easily be missed. Furthermore, therapeutic maneuvers in the duodenal bulb are often needed in the treatment of bleeding duodenal ulcers.

C. Retroflexion in the Stomach

When the endoscope is pulled back into the stomach to the level of the angularis, retroflexion is performed in order to view areas that otherwise would be seen only tangentially upon initial entry into the stomach: the angulus, fundus, and cardia. Trainees should be taught this routine to ensure that the entire upper gastrointestinal tract is examined thoroughly, effectively and efficiently using ante and retroflexion maneuvers.

D. Identification of normal and abnormal findings

Interpretation of endoscopic findings is one of the core aspects of endoscopic training. It begins by understanding the anatomical relationship between the oropharyngeal structures, esophagus, stomach, and duodenum, and the surrounding organs. An atlas of endoscopic findings should be available and used on a regular basis. In addition, understanding of pathologic and radiologic correlates is essential. It is suggested that regular clinicopathologic-radiologic and endoscopic conferences should be available as part of the training. Program directors should strongly encourage all their trainees to actively participate in such conferences. Interpretation of normal and abnormal endoscopic findings requires a broad-based and repetitious exposure to a range of endoscopic findings and is best learned when they are complemented by clinical, pathologic and, radiologic findings.

E. Use of alternative endoscopes

The endoscopist in training must be taught the importance of proper endoscope selection according to the clinical situation being addressed. Specific recommendations for all clinical situations are beyond the scope of this document, but some important examples of proper endoscope selection are noted below.

i. Limitation of forward-viewing endoscope in the evaluation of the second portion of the duodenum

The wall of the second portion of the duodenum can be difficult to examine effectively. Trainees must be taught that the ampulla and its surrounding structures cannot be well studied using the forward-viewing endoscope alone. The importance of using a side-viewing endoscope in selected cases must be emphasized. The ASGE recommends that patients with familial adenomatous polyposis undergo screening examination for ampullary adenomas or adenocarcinomas using both end-viewing and side-viewing endoscopes.

ii. Use of Alternative endoscopes

a. Smaller diameter or double channel endoscope

Smaller diameter endoscopes present an alternative to the regular endoscope when faced with a stricture. Recent advances in charged coupled device technology have allowed the development of ultrathin endoscopes with outer diameters of approximately 6 mm or even less. While transnasal upper endoscopy appears promising, the technique is currently not available for widespread use.

Therapeutic endoscopes or double channel endoscopes are often used in patients with active upper gastrointestinal bleeding and are typically available in most endoscopy unit. Double channel endoscopes are also particularly useful in the performance of endoscopic mucosal resection.

b. Pediatric colonoscope or push enteroscope

Push enteroscopy is a technique that is readily available to most endoscopists. The pediatric colonoscope or enteroscope is often used to perform push enteroscopy in the evaluation of patients with occult gastrointestinal bleeding who have a negative upper endoscopy and colonoscopy. Chak and colleagues performed push enteroscopy in asymptomatic patients with iron deficiency anemia.

Approximately 25% of the 31 patients they studied had source of blood loss in the jejunum. In the appropriate setting, trainees should be taught the performance of enteroscopy using a pediatric colonoscope or push enteroscope if available.

iii. Fluoroscopy

The endoscopist in training should be taught the importance and utility of using fluoroscopy to facilitate guidewire placement in cases where a critical stricture is encountered.

IV. THERAPEUTIC TECHNIQUES

A. TECHNIQUES FOR BIOPSY

The technique of forceps biopsy during upper endoscopy is straightforward and similar to that in colonoscopy. There is little published information outlining this basic technique. Specific biopsy recommendations for all disease states are beyond the scope of this document, but some important points are noted below.

i. Columnar epithelium-line esophagus (Barrett's esophagus)

The risk of developing adenocarcinoma in the esophagus of patients with Barrett's esophagus with specialized intestinal metaplasia is well recognized. The cancer incidence is estimated to be approximately 1 in 200 patient-years. Barrett's cancer may be microinvasive and multifocal. Extensive random biopsy of the entire Barrett's segment should be performed. One method of tissue sampling includes four-quadrant biopsies with large particle forceps taken at 2 cm intervals, starting 1 cm below the esophagogastric junction and extending 1 cm above the squamocolumnar junction. Surveillance should be performed while the patient's reflux is well controlled. The interval range of one to three years has been recommended in patients with no history of dysplasia. When dysplasia is discovered, some general guidelines have been recommended by the ASGE.

ii. Peptic ulcer disease

Biopsy adds to the accuracy of endoscopic examination of gastric ulcer and multiple biopsies should be obtained except when the ulcer is actively bleeding. Follow-up endoscopy or double contrast barium x-ray has been recommended in the majority of cases to document healing. Biopsy of a gastric ulcer should include four-quadrant biopsies from the margin of the ulcer. Biopsy of a duodenal ulcer is not indicated and endoscopy has no role in the follow-up of uncomplicated duodenal ulcer.

B. TECHNIQUES FOR NONVARICEAL HEMOSTASIS

i. Injection of epinephrine or sclerosing agent

Injection of epinephrine, saline or sclerosing agents may be used to achieve hemostasis by inducing vasoconstriction, mechanical tamponade or tissue destruction. The endoscopist-in-training must be knowledgeable of the different injection agents currently available, as well as associated indications for use and

potential adverse effects. Various techniques for injection have been described in various sited textbooks. Epinephrine injection therapy may work by causing constriction of blood vessels and/or increasing tissue pressure, producing tamponade. The location of the vessel coursing through the ulcer base is usually not obvious. Injection therapy should involve injection around a visible vessel or directly into the vessel. The technique is a safe and effective method to control bleeding immediately and should be part of standard training. The trainee must be technically adept to maintain good control of the endoscope at all times, while performing targeted injections under direct visualization, in a safe and efficient manner.

ii. **Electrocautery**

A thorough understanding of the principles of electrosurgical cautery is essential. A number of excellent texts and other reference sources are available and listed. Trainees should be introduced to the accessory used (gold-probe or heater-probe). Trainers should also provide detailed hands-on instruction for the basic operation, trouble-shooting and safety checking of their particular model of generator.

Techniques for cauterizing a visible vessel should be taught as part of standard training. The techniques require application of the coaptive coagulation probe directly on and immediately adjacent to the site of the visible vessel. The probe needs to be applied with enough pressure and heat in order to stop active bleeding and obliterate a visible vessel. Appropriate coaptive coagulation will result in whitening of the area and a deeper ulcer.

Techniques for obliteration of angiodysplasia are relatively straightforward. Use of well established electrothermal devices (**Bicap and heater probes**) are effective in obliteration of angiodysplasia and should be taught to trainees.

Hot biopsy forceps have been recommended for obliteration of angiodysplasia by some, but as a monopolar device, these have the potential for deep wall injury and perforation. Thus, thermal probes such as heater probe or bicap probes may be preferable for routine use.

iii. **Endoscopic Hemoclip**

A potential drawback of thermal methods in the treatment of nonvariceal causes of bleeding is that these methods may cause excessive tissue injury, leading to necrosis and perforation. The application of a metal hemoclip to a bleeding vessel is increasingly being used. Its safety and efficacy have been reported in a number of studies. However, in the United States, hemoclippping is available only in selected centers. The trainee should be exposed to hemoclip technique if available and become familiar with the techniques for loading, deployment and positioning prior to use in the setting of active gastrointestinal bleeding.

iv. **Endoscopic Ligation and Argon Plasma Coagulator**

The technique of endoscopic variceal ligation has been used for treatment of Dieulafoy's lesion and appears to have improved efficacy compared with thermal methods. Given the urgency and severity of Dieulafoy's bleeding and the significant concern of the attending endoscopist, the trainee may find himself with limited scope time during these rare events early in his training. However, the techniques employed are similar to that used in the treatment of variceal bleeding. Given the potential severity of a bleeding Dieulafoy's lesion, trainees should be taught the potential benefits and use of non-traditional methods of its treatment, such as endoscopic ligation, and the limitations of traditional thermal methods.

The **argon plasma coagulator** (APC) has also recently been utilized for obliteration of arteriovenous malformation. It may be especially advantageous in gastric antral vascular ectasia, although bicap and heater probe can also be used, and is well accepted for treatment of this condition.

C. TECHNIQUES FOR VARICEAL HEMOSTASIS

i. Endoscopic Sclerotherapy

Similar to the injection techniques discussed for nonvariceal hemostasis, the trainee must be aware of the available sclerosing agents, recommended concentrations and volumes and associated risks and limitations of treatment. The technique for variceal sclerotherapy is operator dependent, however, the trainee should understand the basic pathophysiologic effect that is desired from the most commonly accepted techniques. Intravariceal injection of sclerosant induces thrombus formation, while paravariceal injection produces submucosal fibrosis and obliteration of feeding perforating vessels. The trainee should also be technically adept to perform targeted injections safely and efficiently, particularly when performing tangential maneuvers within the esophagus. The importance of maintaining the sclerotherapy needle in a retracted position when not in use cannot be overemphasized, as unintentional mucosal trauma and hemorrhage are potential complications when this technique is not routinely practiced. No recommendations for follow-up therapy have been firmly established. In general, the trainee should understand that frequent sclerotherapy treatments are associated with more rapid obliteration of varices, however, the risk of associated complications may be increased.

ii. Endoscopic Variceal Ligation

Efficient and safe use of the variceal ligation device requires good technical skill and ability to perform maneuvers under limited visibility. Prior to initiating the procedure, the trainee should obtain hands-on experience with appropriate and secure attachment of the ligation device onto the upper endoscope. In addition, the trainee should understand the rotational maneuver necessary to achievement successful band deployment. Although attachment of the ligating device produces unavoidable limitations to the visual field, the endoscopist-in-training

should be trained to always perform maneuvers under direct visualization. Upon entry into the esophagus, the trainee should be able to recognize and interpret variceal stigmata of recent bleeding and target these areas for treatment. In general, the trainee should understand the technical advantage of applying bands to the most distal varices first, followed by application of bands to more proximal varices. The coordinated technique of variceal suction into the channel, producing a “red out” appearance, followed by timely deployment of the ligating device cannot be overemphasized. The trainee should obtain hand-on technical skill with the endoscopic variceal ligation device to avoid inappropriate misfiring of the device in the setting of acute variceal hemorrhage.

D. TECHNIQUES FOR FOREIGN BODY REMOVAL

Ingestion of foreign bodies is a commonly encountered problem, accounted for approximately 1500 deaths per year in the United States. Although foreign body ingestion is most commonly observed in the pediatric population, unintentional foreign body impaction may occur in adults with underlying anatomical abnormalities of the oropharynx or gastrointestinal tract, psychiatric disturbances or poor dentition. The trainee should also understand the limitations of medicinal agents aimed at promoting passage of objects through the gastrointestinal tract, and be prepared to implement early endoscopic intervention. Safe removal of foreign objects necessitates a thorough history, radiographic evaluation when necessary and careful implementation of a pre-determined plan of action. Endoscopic management of foreign bodies in the gastrointestinal tract should be part of standard training. Trainee should be taught the importance of safe and effective performance of emergency upper endoscopy in the management of impacted foreign body. Foreign body impaction in the esophagus has been reported to cause aspiration pneumonia, perforation, and mediastinitis. The importance of airway protection must be emphasized. The hazard of pushing a food impaction in the esophagus as well as the different techniques used to handle the different types of foreign body should be illustrated. Teaching technique of using overtube in the management of small, slippery, sharp or pointy objects should be part of the curriculum. Prevention of the step formation between the endoscope and the overtube by preloading the overtube over an appropriate sized bougie or a therapeutic endoscope should be highlighted. The trainee should have hands-on exposure to the application of an overtube to the endoscope and safe intubation of the esophagus.

E. TECHNIQUES FOR ESOPHAGEAL DILATION

Esophageal stricture dilation is amenable to balloon dilation, with many reports documenting success using through-the-scope balloon systems. The techniques involved may not be difficult for trainees to master. Training of esophageal dilation should also include training using Maloney dilators, if available. Esophageal dilation for achalasia, however, is unique as it involves forceful disruption of the lower esophageal sphincter and is associated with a significant (1 to 4%) risk of perforation. Trainees should be acquainted with the indication, technique, risks and benefits of esophageal dilation for achalasia.

F. TECHNIQUES FOR PERCUTANEOUS GASTROSTOMY (PEG) OR JEJUNOSTOMY PLACEMENT AND REMOVAL

Prior to performing any endoscopic procedure for enteral feeding, it is essential for the trainee to understand the indications, contraindications, complications, and post procedure management of these patients, as well as the emerging body of literature on ethics and outcomes of PEG placement in the elderly and terminally ill. Techniques for routine PEG placement are well established and include the “pull” method of Ponsky and Gauderer, and the Sachs-Vine “push method”. Although most studies have shown no difference in safety and success between these basic techniques, the trainee should ideally be exposed to both, depending upon the preference of the endoscopy trainer and the availability of PEG kits in the individual institutions. Regardless of the method employed, the trainee should be taught the importance of proper technique in both roles of the procedure, the importance of good teamwork and communication, and other elements of the procedure that may prevent complications. These include prophylactic antibiotics, verification of proper transillumination and finger pressure, the use of the syringe aspiration method to identify overlying bowel, adequate skin incision length, and proper bumper positioning. The basic technique of PEG placement are usually mastered quickly by trainees with other significant experience in endoscopy, but broader experience should be provided to expose the trainee to the variety of situations where PEG placement is ill-advised to begin with, or should be aborted before completion. Finally, the importance of post procedure follow-up, patient/caregiver teaching, and evaluation of the problem PEG site must be emphasized to the trainee who may focus on the endoscopic procedure alone.

Small bowel feedings via a jejunal extension tube placed through a PEG (PEG-JET, PEG-J) or direct percutaneous endoscopic jejunostomy (D-PEG) are also possible options for enteral feeding. Placement of these tubes may be indicated for those patients at high risk for aspiration, those with gastric retention, or in diseases where enteral feeding is favored, but proximal feeding may be harmful such as pancreatitis. Enthusiasm for PEG-J placement varies widely among individual endoscopists and institutions, in part due to the technical challenges inherent in their placement, and the oft-cited frequency of early clogging or retrograde migration. Techniques employed include the “drag and pull” methods where a string at the tip of the J tube is grasped and pulled into the jejunum alongside the endoscope, and multiple wire-guided methods. Each basic technique has multiple variations in the literature, bespeaking the fact that no single technique has proven superior, and none have been universally accepted. The trainee should strive to identify one or two of these methods and learn the subtleties of these techniques which will allow successful placement in a variety of situations. An excellent recent review on the techniques is available

V. ADVANCED THERAPEUTIC TECHNIQUES

A. TECHNIQUES TO LOCALIZE DYSPLASIA OR EARLY CANCER

Chromoendoscopy, or the use of topically applied contrast agents in conjunction with endoscopy, has been utilized successfully to help visualizing subtle lesions and defining their borders. In the esophagus, the use of Lugol's solution has been particularly useful for screening and in assessing tumor-extent of esophageal squamous cell carcinoma. The use of indigo-carmin solution enhances the contours and topography of flat lesions at any part of the gastrointestinal tract. The use of methylene blue has the potential to identify high-grade dysplasia or adenocarcinoma in the setting of Barrett's esophagus. Widespread use of methylene blue in screening for dysplasia in Barrett's esophagus, however, is yet to be established. With the exception of the use of methylene blue, the greatest use of chromoendoscopy has been predominantly in Japan, where the ability to detect flat neoplasms is especially important. However, these techniques are relatively easy to perform. The trainee should be aware of their development and exposed to the techniques if available.

Endoscopically placed metal clips have been developed which are released through the working channel of the endoscopes and clipped into mucosa. Endoscopically placed hemoclips may be useful for marking the margins of lesions in selected cases.

B. TECHNIQUES TO REMOVE EARLY CANCER/ENDOSCOPIC MUCOSAL RESECTION (EMR)

Recent advances in EMR of dysplasia or superficial early gastrointestinal tract cancers are truly remarkable. Long-term studies in Japan have demonstrated that the outcomes after EMR are similar to those of surgery, and have led to the acceptance of EMR as a standard procedure. In the United States, EMR has been used primarily in the resection of large sessile colon polyps. However, there is significant potential for application of EMR in the upper gastrointestinal tract. EMR has been shown to be safe and effective in the removal of a variety of subepithelial lesions. Its potential in the treatment of Barrett's dysplasia or early cancer is attractive, but will require further long-term study. Trainees should understand the indications, techniques, and outcomes of EMR.

C. TECHNIQUES FOR ESOPHAGEAL AND ENTERAL STENT PLACEMENT

The majority of esophageal cancer is incurable. The use of self-expandable metallic stents (SEMS) is an important treatment modality in the palliative management of esophageal obstruction and esophagorespiratory fistula. SEMS designed for gastric or small intestinal use are also available and can provide palliation of obstruction in selected patients. Trainee should know the indication, technique, and outcomes of use of SEMS with exposure to the techniques if possible. Placement of SEMS in esophageal, gastric or duodenal malignant stricture may be appropriate for select trainees if expert trainers and procedure volume is available.

**ESOPHAGOGASTRODUODENOSCOPY (EGD)
CORE CURRICULUM
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III. BASIC/DIAGNOSTIC TECHNIQUES

- A. Esophageal Intubation
- B. Pyloric Intubation
- C. Retroflexion in the Stomach
- D. Identification of normal and abnormal findings
- E. Use of alternative endoscopes

- i. **Limitation of forward-viewing endoscope in the evaluation of the second portion of the duodenum**

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IV. THERAPEUTIC TECHNIQUES

- A. TECHNIQUES FOR BIOPSY
- B. TECHNIQUES FOR NONVARICEAL HEMOSTASIS

- i. **Injection of epinephrine or sclerosing agent**

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