Communication from the ASGE Technology Committee

TECHNOLOGY STATUS EVALUATION REPORT

Per-oral endoscopic myotomy (with video)

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This document was reviewed and approved by the Governing Board of the American Society for Gastrointestinal Endoscopy (ASGE).

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BACKGROUND

Per-oral endoscopic myotomy (POEM) has emerged as a natural orifice transluminal endoscopic surgery (NOTES) procedure for the treatment of achalasia. The POEM procedure evolved from submucosal endoscopy with a mucosal protective flap in porcine models and the clinical experience with endoscopic submucosal dissection (ESD). In 2007, Pasricha et al[1] first described a novel approach for the endoscopic treatment of achalasia by creation of a submucosal tunnel followed by myotomy of the circular muscle of the lower esophageal sphincter in a porcine survival model. Inoue et al[2] subsequently performed the first successful human POEM procedure in 2008 and reported a case series in 2010. In the relatively short timeframe since, POEM has gained widespread adoption, with some centers reporting an experience of >200 cases.[3-5] The American Society for Gastrointestinal Endoscopy (ASGE) recently published a white paper summary[6] and a preservation and incorporation of valuable endoscopic innovations (PIVI) document[7] on POEM; both documents concluded that although there is a paucity of controlled data, the short-term to medium-term favorable outcomes reported in large series suggest that POEM is a promising alternative to surgery, with a similar safety and efficacy profile. This manuscript reviews the technology and currently practiced techniques for POEM.

TECHNOLOGY UNDER REVIEW

Preprocedure assessment and patient selection

Comprehensive preprocedure assessment of the patient is an essential prerequisite to a successful POEM procedure.[8] Foremost, an accurate clinical and manometric diagnosis of achalasia should be established. This usually involves clinical assessment, endoscopic evaluation of the

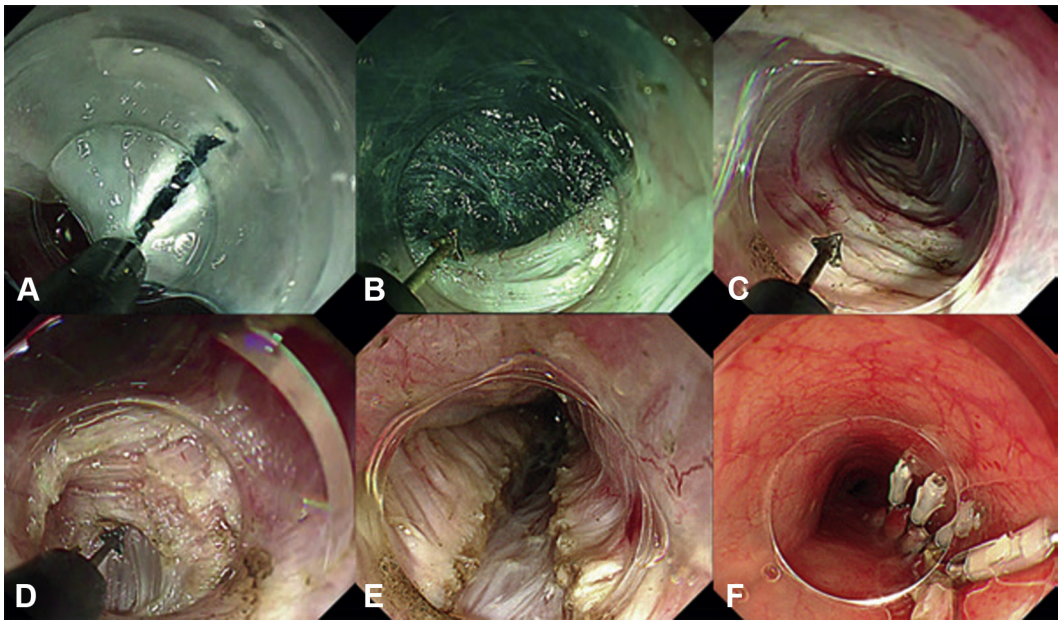

Figure 1. Steps of per-oral myotomy procedure. Mucosal incision **(A)**, submucosal dissection **(B)**, submucosal tunneling **(C)**, myotomy **(D, E)**, and mucosal closure **(F)**. Republished with permission.[12]

gastroesophageal junction (GEJ) to exclude pseudoachalasia, high-resolution manometry to identify the nature and subtype of the esophageal motor disorder, and a contrast esophagogram.[8,9] A CT scan of the chest may also provide additional information on esophageal configuration, relationship to adjacent structures, and the presence of ectopic varices.[9] Many centers also objectively validate symptoms by using a dysphagia questionnaire, usually the Eckardt score, to establish a preprocedure baseline.[10] Comorbidities such as prior thoracoabdominal radiation therapy, cirrhosis with portal hypertension, and prior endoscopic therapy for esophageal diseases (eg, ablation of Barrett's esophagus, EMR and/or ESD for esophageal neoplasia) may be contraindications to the procedure.[6]

Overview of the procedure

The POEM procedure generally involves 4 sequential steps: (1) mucosal incision, (2) submucosal tunneling, (3) myotomy, and (4) closure of the mucosal flap (Fig. 1), (Video 1, available online at www.giejournal.org).[2,6,11,12] A diagnostic endoscopy often is performed 2 to 3 days before the actual procedure to evaluate for retained food or mucosal pathology. Patients are placed on a liquid diet for a variable period of 1 to 5 days before the procedure.[8,12] Prophylactic antibiotics, most commonly a second-generation cephalosporin,[8] are administered routinely, and some centers administer preprocedure empiric antifungal therapy.[8,12]

The patient is positioned supine, and general anesthesia with endotracheal intubation is used. A cap-fitted, high-definition, diagnostic gastroscope, preferably with a dedicated water jet, is used for the procedure. Carbon dioxide (CO_2) is used for insufflation throughout the procedure. Before mucosal incision, the esophagus is lavaged with sterile saline solution, which, at some centers, is mixed with antibiotics or topical antimicrobial agents.[9] The site of mucosal entry usually is 10 to 15 cm proximal to the GEJ. After a submucosal cushion is created by using saline solution mixed with a dye (preferably indigo carmine), an approximately 2-cm longitudinal mucosal incision is made to facilitate entry into the submucosal space. Subsequently, a submucosal tunnel is created by using techniques similar to those of ESD. The plane of dissection is maintained close to the muscularis propria, and care is taken to avoid mucosal injury during the dissection. The submucosal tunnel is extended approximately 3 cm distal to the GEJ to ensure complete myotomy of the lower esophageal sphincter (LES). Once a submucosal working space has been created, a 6 to 10–cm long myotomy is performed, usually proximal to distal. Most commonly, only a selective myotomy of the circular muscle is performed. Subsequently, a careful inspection of the mucosa is performed to detect inadvertent mucosal tears. Endoscopic hemostatic clip closure or other endoscopic closure methods are then used to seal the site of mucosal entry.

A follow-up esophagogram that uses water-soluble contrast material is obtained the following day to evaluate for leaks and to guide timing of initiation of a liquid or pureed diet. Many centers routinely perform a second-look endoscopy 24 to 72 hours after the procedure.[8] The average length of hospital stay for postprocedure observation is 4 days in Japan and 1 to 2 days in the United States and Europe.[12]