# ADVANCES IN ENDOSCOPY

Current Developments in Diagnostic and Therapeutic Endoscopy

Section Editor: Todd H. Baron, MD

## Peroral Endoscopic Myotomy for the Management of Esophageal Disorders

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**G&H** What is the evolution of peroral endoscopic myotomy as a treatment option for esophageal disorders?

**IG** The evolution of peroral endoscopic myotomy (POEM) involved a confluence of several simultaneous developments, including work on natural orifice transluminal endoscopic surgery at Johns Hopkins Hospital, research on third-space (submucosal) endoscopy at the Mayo Clinic, and advances in endoscopic submucosal dissection (ESD) in Japan. In 2007, Dr Pankaj J. Pasricha and Dr Anthony N. Kalloo performed the first oral esophagomyotomy on a pig. The following year, Dr Haruhiro Inoue, a thoracic surgeon in Tokyo, capitalized on this development and performed the first endoscopic Heller myotomy on a human. He later coined the term POEM and has been helping to disseminate the technique around the world.

**G&H** What are the indications for POEM?

**IG** POEM is indicated for achalasia; it is effective in patients of all ages and in every stage and subtype of the condition. POEM is also successful after failure of, or relapse from, all other treatments for achalasia (eg, endoscopic botulinum toxin injection, pneumatic dilation, laparoscopic Heller myotomy; Figure), as well as in patients who have relapsed from a prior POEM. Additionally, good results have been obtained in end-stage sigmoid achalasia, a condition previously considered to require a total esophagectomy. Unlike laparoscopic Heller myotomy, POEM is indicated in spastic disorders of the esophagus, such as type III achalasia, jackhammer esophagus, and distal esophageal spasm. These conditions all require a long myotomy, which cannot be easily accomplished by the laparoscopic transabdominal approach. Other situations in which POEM is preferable to laparoscopic Heller myotomy include in patients who have had prior esophagogastric surgery or in patients who may be anticipated to need bariatric surgery in the future.

**G&H** How is POEM performed?

**IG** POEM is performed entirely by mouth, with a regular upper endoscope. It is traditionally performed under general anesthesia, and it can be completed in a standard endoscopy suite. The procedure begins with a simple submucosal saline injection in the midesophagus. The fluid bleb is then incised using a small electrosurgical knife to expose the submucosa. After extending the mucosotomy incision to approximately 2 cm, the endoscope is maneuvered into the narrow submucosal space, which is subsequently expanded using saline injections. A longitudinal tunnel is then developed by dissection of the submucosal fibers with electrocautery. By staying very close to the proper muscle layer of the esophagus, with care taken to avoid injury to the overlying mucosa, the tunnel is taken down past the lower esophageal sphincter and extended

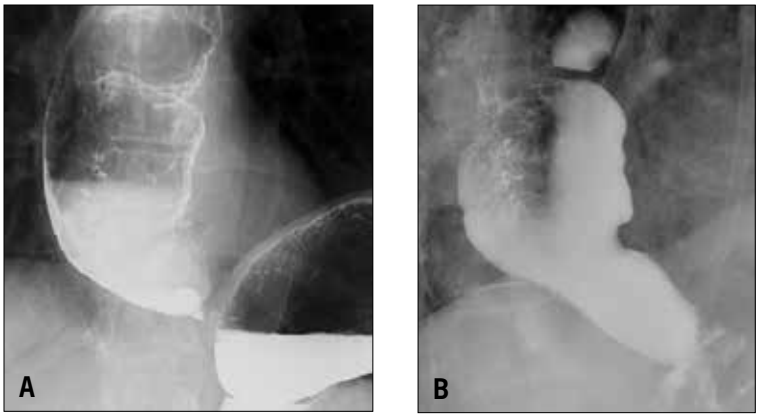


**Figure.** A 62-year-old female patient who had undergone a thoracic Heller myotomy for achalasia 40 years earlier underwent peroral endoscopic myotomy (POEM). Pre-POEM (**A**) and immediate post-POEM (**B**) swallowing studies demonstrated a marked improvement in the obstruction at the lower esophageal sphincter.

several centimeters into the upper stomach. After verifying that the tunnel is of sufficient length, a myotomy of the circular muscle is then created at the oral end of the tunnel. Selective incision of the circular fibers is carried distally to the end of the tunnel, again avoiding injury to the overlying mucosa. The final step involves closure of the mucosotomy, either with clips or sutures.

### G&H How effective is this treatment option?

**IG** POEM has had an excellent record of efficacy and safety. Clinical and physiologic outcomes have been comparable to those of the traditional laparoscopic Heller myotomy. A large meta-analysis recently reported an initial success rate of 98%, although this number will likely decrease slightly over time, as is the case with all treatments for achalasia. Long-term results are awaited.

### G&H What are the benefits and limitations of this procedure?

**IG** POEM combines the main benefits of the laparoscopic Heller myotomy with the ease of a minimally invasive endoscopic procedure. Unlike the laparoscopic Heller myotomy, POEM does not include an antireflux procedure; thus, there are concerns regarding the development of gastroesophageal reflux disease as a result of the myotomy. However, POEM does not require disruption of the natural antireflux barriers that are taken down during the dissection performed during a laparoscopic Heller myotomy. The need for patients to undergo an antireflux operation after POEM is extremely uncommon; therefore, it is difficult to conclude that all patients undergoing an esophageal myotomy require a simultaneous antireflux procedure.

### G&H What complications are associated with this procedure?

**IG** Bleeding, barotrauma, and mucosal injury are typically minor events that are easily managed intraprocedurally. Delayed bleeding and delayed barrier failure are uncommon, but they may require a repeat endoscopy. A very small number of patients have required surgery to manage perforation. Serious adverse events occur in less than 1% of POEMs, but these are rarely life-threatening.

### G&H How should a patient be followed up after undergoing POEM?

**IG** Patients with achalasia should have ongoing follow-up in order to detect and forestall any adverse consequences of gastroesophageal reflux disease. Postprocedure esophageal pH studies and regular endoscopic surveillance are recommended, as reflux in these patients can be asymptomatic.

### G&H Are there any patients in whom this procedure is contraindicated?

**IG** Contraindications to this procedure include severe cardiac or pulmonary disease and uncorrectable coagulopathy. Severe submucosal fibrosis that is encountered during tunnel creation can make a POEM difficult or impossible; thus, patients with this condition may require pneumatic dilation instead of a myotomy.

### G&H How does POEM compare to pneumatic dilation and laparoscopic Heller myotomy?

**IG** All 3 treatments are effective, but all are associated with a modest decrease in efficacy over time. Pneumatic dilation is the least expensive and the least invasive procedure, but it often requires repeated treatments. Fear of perforation, which occurs at a rate of about 2% per procedure, has reduced its popularity, but it should still be considered in certain situations. Until recently, laparoscopic

Heller myotomy has been considered the most effective and the most durable option, although POEM is challenging this procedure for those claims. Laparoscopic Heller myotomy is also the most invasive and the most expensive of the 3 options, and it is associated with a longer recovery time and a higher risk of complications. The primary argument in favor of laparoscopic Heller myotomy over POEM is that it is performed in conjunction with an antireflux procedure, typically a partial fundoplication. Because POEM is less invasive than a laparoscopic Heller myotomy, patients find it intuitively appealing. The advent of POEM has been compared to the introduction of laparoscopic cholecystectomy—a novel alternative that patients actively sought in preference to the time-honored open cholecystectomy.

### **G&H** What training is necessary to perform POEM? How significant is the learning curve?

**IG** POEM is technically demanding and requires seasoned endoscopic skills. Because POEM is derived from ESD, training in ESD is the most logical starting point for learning this procedure. Estimates regarding the number of cases required to achieve competence range from 15 to 60 procedures.

### **G&H** What are the priorities of research in this field?

**IG** The most persistent question is whether gastroesophageal reflux disease developing after a POEM is any more problematic than it is following a laparoscopic Heller myotomy. Prospective trials comparing the 2 procedures are experiencing challenges with enrollment, as patients are often unwilling to be randomized to the surgical arm. Research is also needed to determine whether performing an anterior vs a posterior myotomy makes a significant difference in the incidence of postoperative gastroesophageal reflux disease.

*Dr Grimm has no relevant conflicts of interest to disclose.*

## Suggested Reading


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