POEM, the Prototypical "New NOTES" Procedure and First Successful NOTES Procedure

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KEYWORDS

- Peroral endoscopic myotomy (POEM)
- Natural orifice transluminal endoscopic surgery (NOTES) • Achalasia
- Diffuse esophageal spasm • Jackhammer esophagus • Hypercontractile esophagus

KEY POINTS

- Peroral endoscopic myotomy (POEM) is the first clinically successful natural orifice transluminal endoscopic surgery (NOTES) procedure that has achieved surgical efficacy with a safety profile comparable with endoscopic therapy.
- For the treatment of achalasia, there are now long-term data that demonstrate sustained clinical efficacy after POEM.
- POEM for diffuse esophageal spasm and hypercontractile esophagus should include the lower esophageal sphincter to prevent symptom development secondary to ineffective esophageal motility.
- The incidence of reflux after POEM is comparable with that after laparoscopic Heller myotomy.
- Infection-related adverse events with POEM have been rare, which should support further development of transesophageal mediastinal/peritoneal NOTES.

Disclosure Statement: The authors have nothing to disclose.
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Gastrointest Endoscopy Clin N Am 26 (2016) 237–255
http://dx.doi.org/10.1016/j.giec.2015.12.002 **giendo.theclinics.com**
1052-5157/16/$ – see front matter

Video content accompanies this article at www.giendo.theclinics.com

EVOLUTION OF PERORAL ENDOSCOPIC MYOTOMY

The first report of myotomy for achalasia was in Germany in 1914 by Ernest Heller. Heller performed 2 parallel myotomies along the anterior and posterior distal esophagus that extended to the gastric cardia.[1] Subsequently, in Holland in 1921, Johannes Henricus Zaaijer[2] reported performing a single anterior myotomy without compromise in efficacy. This procedure was eventually named the Heller myotomy and was performed by surgeons worldwide for achalasia. In Minnesota in 1958, Ellis and colleagues[3] reported the first successful transthoracic approach of the modified Heller myotomy. The first report of an endoscopic myotomy for achalasia was in Venezuela in 1980 by Ortega and colleagues[4] where they performed two 1-cm myotomies through the mucosa to a depth of 3 mm at the lower esophageal sphincter (LES). However, because of the limitation in myotomy length, poor efficacy, and safety concerns, the procedure was not adopted. In the 1990s, minimally invasive surgery was evolving; the laparoscopic and thoracoscopic myotomies were introduced in 1991 and 1992 by Shimi and colleagues[5] and Pellegrini and colleagues,[6] respectively. In the 2000s, advanced endoscopists became interested in using natural orifices as alternate routes for carrying out procedures in the peritoneum and mediastinum. In 2004, Kalloo and colleagues[7] performed the first transgastric peritoneoscopy in a porcine model. Subsequently in 2007, the first cases of human transluminal cholecystectomy were reported by Marescaux and colleagues[8] and Zorrón and colleagues.[9] In the same year, Pasricha and colleagues[10] described an endoscopic myotomy in a porcine model whereby a mucosal incision was made 5 cm above the gastroesophageal junction (GEJ) and a biliary dilating balloon was placed into the submucosal space to create a tunnel down to the GEJ where a selective circular muscle myotomy was performed using a needle knife. In 2008, the authors' team performed the first human peroral endoscopic myotomy (POEM); in 2010, Inoue and colleagues[11] published the first series of POEM. Since then, more than 5000 POEM procedures have been performed worldwide; it is arguably becoming the preferred treatment of achalasia. Currently, POEM and its offshoot peroral endoscopic tumorectomy remain the only thriving natural orifice transluminal endoscopic surgery (NOTES) procedures that rival or even surpass conventional surgical treatment.

ADVANTAGES OF PERORAL ENDOSCOPIC MYOTOMY

POEM offers benefits for the patients, physician, and health care system. POEM is at least as effective as laparoscopic Heller myotomy (LHM); however, it is performed endoscopically and, therefore, is associated with a shorter hospital stay, quicker recovery, and less blood loss.[12–14] From a procedural perspective, POEM provides the ability to tailor the length and position of the myotomy to patients. Procedural freedom allows a myotomy to be performed in patients with previous surgical myotomy with a modest increase in technical difficulty while preserving efficacy, by easily avoiding the area of previous surgical manipulation.[15–17] Moreover, because the myotomy is performed without disruption of the diaphragmatic hiatus and suspensory ligaments, reflux rates are comparable with that of LHM with partial wrap.[12,18]

ACCESSORIES AND EQUIPMENT FOR PERORAL ENDOSCOPIC MYOTOMY

The endoscopic accessories and electrosurgical unit (ESU) settings used in POEM are variable among centers and are selected from among the armamentarium of standard