

ADVANCES IN GERD

Current Developments in the Management of Acid-Related GI Disorders

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Peroral Endoscopic Myotomy for Treatment of Achalasia



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G&H What is the pathophysiology of achalasia?

LLS Achalasia is an esophageal motility disorder that has an unknown etiology. Degeneration of the intramuscular neural plexus leads progressively to the loss of the esophageal smooth muscle's motility—although, paradoxically, it causes failure of the lower esophageal sphincter's ability to relax receptively to peristalsis. This neuromotor degeneration is expressed most commonly by solid food dysphagia and progressively by vomiting (or, more accurately, spitting up). A variation of achalasia involves some nonperistaltic contractions that can occasionally be experienced as severe chest pain.

G&H How is achalasia usually diagnosed?

LLS The symptoms of achalasia are frequently misdiagnosed as heartburn/gastroesophageal reflux disease, esophageal strictures, or, sometimes, cardiac angina. Diagnosis of achalasia is usually strongly hinted at by a barium swallow radiograph that shows dilation of the esophagus and slow clearance. Definitive diagnosis and classification of the type of achalasia are made only with esophageal manometry. Upper endoscopy findings are usually fairly unremarkable, except in patients with end-stage achalasia, in which large amounts of food collect due to profound esophageal stasis and dilation. However, upper endoscopy remains an important and necessary part of the diagnostic evaluation, as infiltrative adenocarcinoma of the lower esophageal sphincter is a rare cause of achalasia ("pseudoachalasia").

G&H How is achalasia usually treated?

LLS Medical treatments with smooth muscle relaxants are uniformly ineffective for dysphagia, although they can occasionally help to improve chest pain associated with vigorous achalasia. Onabotulinumtoxin A (Botox, Allergan) injections into the lower esophageal sphincter provide short-term

relief of dysphagia in up to 90% of patients. However, the effect of these injections fades within 3–9 months, usually decreases with repeated use, and can make surgical treatments less effective; therefore, this treatment is—or should be—reserved for patients with acute obstruction.

Balloon dilation with a 3–4-cm fixed-volume balloon dilator is successful in approximately 85% of achalasia patients. However, this treatment option often requires multiple interventions, tends to fade over time, and has a 1–5% risk of perforation (which occasionally requires surgery).

Laparoscopic surgery (Heller myotomy and partial fundoplication) has been used for achalasia since 1992 and likely has the highest efficacy and long-term success rates (90–95% relief of dysphagia, persisting >10 years for 85% of patients). However, laparoscopic surgery is very skill-dependent and expensive (as are all surgeries), and it involves pain, a hospital stay of 1–3 days, and a recovery time of 2–3 weeks.

The decision of whether to use balloon dilation or laparoscopic surgery to treat an achalasia patient depends on the availability and experience of laparoscopic esophageal surgeons and interventional endoscopists. In the United States, laparoscopic Heller myotomy is used in more than 80% of achalasia treatments, whereas in most of Europe, balloon dilation is the most common treatment option.

G&H Could you discuss the development of peroral endoscopic myotomy as a treatment option for achalasia?

LLS Peroral endoscopic myotomy (POEM) was an almost accidental offspring of natural orifice transluminal endoscopic surgery (NOTES), an exciting movement toward incisionless surgery performed with flexible endoscopes, which started in 2005. A group of NOTES innovators designed a submucosal tunneling technique to exit the gastrointestinal tract remote from the mucosal incision, leaving a secure, protective mucosal flap that could be closed with

standard clips. The doctors astutely noticed that this technique enabled good visualization of the distal esophageal musculature, and they examined the feasibility of dividing it in a series of survival animals in 2007. (It should also be noted that the gastroenterologist JA Ortega published a small series of endoscopic transmucosal myotomies in 1980, but this procedure was considered to be dangerous and was not adopted.) Haruhiro Inoue refined POEM by dividing the circular muscle layer of the lower esophageal sphincter and leaving the longitudinal muscle layer alone; this refinement provides a margin of safety, as well as the benefit of treating only the dysfunctioning mechanics of the disease without unnecessary disruption of the gastroesophageal anatomy.

There was not necessarily a need for a new achalasia treatment option, as balloon dilation and laparoscopic surgery are effective treatments. The excitement that POEM has engendered is due to the fact that it offers, at least theoretically, the efficacy of surgery with the cost and morbidity of a purely endoscopic procedure such as balloon dilation.

G&H How effective is this new procedure?

LLS POEM is very effective at achieving relief of dysphagia; after undergoing this procedure, achalasia patients uniformly have Eckardt scores of 0 or 1, except for patients who have chest pain. (The scores of these patients tend to improve, but not completely.) In a series that I conducted with my colleagues, timed barium swallow studies administered following POEM demonstrated complete emptying at 1 minute in 90% of patients. Lower esophageal sphincter pressures were decreased postprocedure but not as dramatically as in patients who underwent laparoscopic Heller myotomy. 24-hour pH studies have shown a 32% incidence of gastroesophageal reflux disease following POEM; however, only 50% of these patients had heartburn symptoms. Interestingly, 30% of patients complained of heartburn symptoms following POEM, but only 50% of these patients had abnormal pH studies.

G&H How long have patients been followed after undergoing this procedure?

LLS The first POEM was performed by Inoue in September 2008. At my institution, POEM was first performed in October 2010, so our longest follow-up so far is slightly under 2 years. Worldwide, just over 900 patients have undergone POEM to date, which is a respectable number for a rare disease such as achalasia.

G&H How high is the risk of mucosal damage or other complications with POEM?

LLS POEM is a safe procedure. Mucosal injuries happen frequently (20%) during the learning curve but require only an endoscopic clip for treatment. During the procedure,

40% of patients develop pneumoperitoneum or pneumothorax, and 20% of patients need decompression with either a chest tube or a peritoneal drain (Veress needle). Because full-thickness injuries may occur, it is helpful to have tools such as the OverStitch Endoscopic Suturing System (Apollo Endosurgery) nearby to facilitate closure. Eventually, a major mediastinal structure will be injured during POEM—as these structures are only 1 mm away from the working zone—and emergency surgery may be needed, but this complication has not yet occurred, as far as I know.

G&H What risks and limitations are associated with POEM?

LLS POEM does not cure achalasia, as this condition cannot be cured; the procedure only provides palliation. This is an important point to stress to patients. Patients should also be warned that laparoscopic intervention may be needed and that POEM must be performed in an operating room due to the possible need for abdominal and chest decompression. In addition, patients should be informed that there is a 32% risk of developing postoperative gastroesophageal reflux disease and that they may need to take antacid medications for the rest of their lives.

G&H Can POEM be used to manage all patients with achalasia, including those who have previously undergone surgical treatment for this disease?

LLS In the worldwide experience of 900 cases, POEM has been successfully performed in patients with a sigmoid esophagus, patients who have undergone previous surgery for achalasia, children (2 years of age), and elderly patients (>90 years of age); in addition, POEM has been successfully performed as a long myotomy. My colleagues and I recently determined that POEM has a learning curve of around 20 cases; thus, we suggest that doctors perform at least 20 cases before trying to manage advanced cases, such as those listed above. The only absolute contraindication to this procedure is the inability to tolerate general anesthesia.

G&H What postoperative care do patients need?

LLS Patients have to stay on a pureed diet for 1 week to avoid knocking off their closure clips. There are no physical restrictions. In our study, patients returned to work at a mean of 3 days. Since POEM is still a new procedure, we obtain extensive postoperative studies—including esophagogastroduodenoscopy, a timed barium swallow study, 24-hour pH monitoring, and esophageal manometry—at 6 months to better understand the outcomes of the procedure. We also recommend that achalasia patients undergo endoscopy every 5 years (due to a slightly increased risk of esophageal cancer).

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G&H What is needed before widespread adoption of this procedure can occur?

LLS More research is needed regarding the problem of gastroesophageal reflux disease following POEM; it may be possible to decrease this complication by changing the technique in some fashion; but this needs to be worked out. POEM is an advanced endoscopic surgery along the lines of endoscopic submucosal dissection, so practitioners will need to develop these skills before performing POEM. Although POEM is an endoscopic procedure, it is very much a surgical procedure as well. For some time, POEM should be performed under controlled circumstances in an operating room with surgical backup, and it should only be performed by doctors with experience and knowledge of achalasia.

Nevertheless, I think POEM will replace balloon dilation and laparoscopic Heller myotomy in 3 years, as POEM has comparable efficacy and costs, is painless, and allows patients to return to work in 3 days.

G&H Does POEM have applications for managing other esophageal diseases?

LLS POEM has frequently been used to treat other primary esophageal motility disorders such as hypertensive lower esophageal sphincter and Nutcracker esophagus. It has also been used for a long myotomy to treat diffuse esophageal spasm, although its results in this setting have not been quite as good.

G&H Are there any other promising treatments for achalasia currently under investigation?

LLS Research is currently being conducted on stem cell injections and neurotransmitter manipulations. In addition, we have been working for several years on a pacemaker for the esophagus, but this device is far from completion.

Suggested Reading

von Renteln D, Inoue H, Minami H, et al. Peroral endoscopic myotomy for the treatment of achalasia: a prospective single center study. *Am J Gastroenterol.* 2012;107:411-417.

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