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ADVANCES IN SURGERY

Endoscopic Myotomy for Achalasia

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Keywords

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Key points

- POEM requires advanced endoscopic skills (predicate ESD) and general surgical knowledge of the anatomy of the distal esophagus and stomach.
- A unique and possible beneficial aspect of POEM is its division of only the circular muscle layer of the distal esophagus, LES, and proximal stomach. This affords a layer of protection between the energy source and mediastinal structures and may have some physiologic function that may partly explain the extraordinary results of POEM.
- Outcomes of POEM are excellent with more than 2-year follow-up reported. They are equivalent or slightly better than laparoscopic Heller/fundoplication with regards to dysphagia relief but it has a slightly higher GERD rate, although the GER tends to be mild and easily treated.

BACKGROUND

Benign disorders of esophageal outflow classically present with progressive dysphagia to solids and liquids, chest pain, regurgitation, and sometimes weight loss [1,2]. Achalasia, a rare disorder with an estimated incidence of 1 in 100,000 [3], is the quintessential example of such disorders. Patients with achalasia often demonstrate the classic "bird's beak" appearance on barium esophagram and the diagnosis is confirmed manometrically by absent peristalsis of the esophageal body most often in conjunction with the presence of a poorly relaxing lower esophageal sphincter (LES).

Therapeutic options for patients presenting with symptoms, such as dysphagia and volume regurgitation, caused by neurologic dysfunction of

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the LES and associated lack of effective peristaltic propulsion of bolus are aimed at relieving the functional outflow obstruction seen at the distal esophageal high-pressure zone. They focus on destruction of the LES. Functional or mechanical disruption of the disordered LES results in palliation of symptoms but does not restore normal peristaltic function to the esophageal body. Endoscopic Botox injection transiently inhibits the resting tone of the LES, whereas balloon dilation and surgical myotomy physically disrupt the muscle fibers comprising the sphincter. Endoscopic Botox injection is safe and effective for most patients in the short term but symptom relief is only 29% on intermediate follow-up [4]. Additionally, Botox injection is quite user dependent because it relies on accurate injection into the invisible, physiologic LES and provides only temporary relief often making repeat procedures necessary. These characteristics make Botox an acceptable choice for patients who are too frail to undergo the more definitive but relatively more risky alternatives.

Endoscopic balloon dilation is another option for achalasia. This technique uses a specially designed, relatively rigid balloon inflated from 3 to 4 cm in diameter across the LES. This aggressive dilation results in physical tearing of the muscle fibers in the distal esophagus. Often, the procedure needs to be repeated one to three times to achieve the desired effect. Initial dilation with a balloon of smaller diameter (3 cm) is safer than starting with a larger 4-cm balloon. The risk of esophageal perforation increases with increasing balloon diameter and overall is between 2% and 5% [5].

Surgical myotomy, first described by Dr E. Heller in 1913, involved transthoracic division of the longitudinal and circular muscle fibers of the distal esophagus extending from approximately 6 cm proximal and 2 cm distal to the gastroesophageal junction (GEJ) and performed twice 180 degrees opposite. The procedure has been modified from Heller's original description in that it currently most commonly involves a single, anterior myotomy performed laparoscopically with the addition of a partial fundoplication to decrease the risk of resultant reflux. A recent randomized controlled trial comparing laparoscopic myotomy with concurrent anterior fundoplication with one to three balloon dilations demonstrated equivalent results between the two techniques [5]. Relief of dysphagia was approximately 85% and resultant gastroesophageal reflux (GER) symptoms were seen in about 20% of both groups. Because surgical myotomy results in a consistent and persistent improvement in dysphagia through a single minimally invasive procedure with a low rate of morbidity it has become a popular first choice in the United States and elsewhere around the world [6].

Little had changed in the treatment of esophageal achalasia for nearly two decades until the recent development of the peroral endoscopic myotomy (POEM) technique. POEM represents a revolutionary technical advancement in surgery by enabling surgeons to complete an esophageal myotomy without incisions. Although a version of an endoscopic esophageal myotomy was first reported in 1980 [7], it failed to gain acceptance likely because of the fear of clinical perforation given the described technical detail, which included the