Tailoring Therapy for Achalasia

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Abstract: Achalasia is a rare esophageal motility disorder with impaired lower esophageal sphincter (LES) opening and aperistalsis. The disease cannot be cured and aperistalsis cannot be corrected, but good long-term symptom relief results from some degree of destruction to the obstruction of the LES. The presence of multiple treatment options with excellent scientific efficacy now offers the opportunity to tailor therapy for patients with achalasia. Drug therapy, especially botulinum toxin A, should be reserved for elderly patients with short life expectancy. Pneumatic dilation and surgical myotomy are equally effective for patients with types I and II achalasia. Pneumatic dilation offers a less morbid, cheaper outpatient procedure, especially for older patients and women, but redilation may be needed. Surgical myotomy is effective across all groups, especially young men. Laparoscopic Heller myotomy with fundoplication is preferred in patients with megaesophagus, diverticulum, or hiatal hernia. Peroral endoscopic myotomy is the treatment of choice for patients with type III achalasia, but requires advanced endoscopic skills, and the risk of gastroesophageal reflux disease is high. This article reviews the various treatments currently available for achalasia and discusses how to tailor therapy for patients.

Achalasia is a rare esophageal motility disorder presenting with symptoms of dysphagia, regurgitation of undigested food, nocturnal respiratory symptoms (eg, aspiration pneumonia), chest pain, and weight loss.[1] Loss of intrinsic inhibitory innervation by nitric oxide results in impaired lower esophageal sphincter (LES) relaxation and absence of peristalsis. The key abnormality is the lack of distensibility of the LES, resulting in impaired flow of ingested food and liquids and subsequent stasis of these products in the esophagus, potentially causing megaesophagus. The aperistalsis cannot be corrected; therefore, all successful treatments are directed at relieving the LES obstruction without complicating the situation further by causing severe gastroesophageal reflux disease

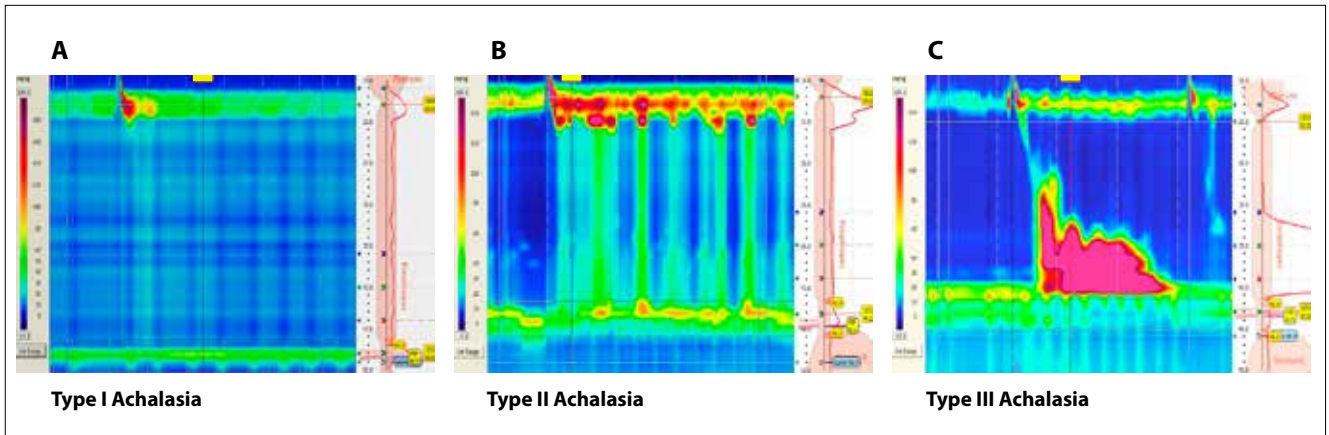**A** Type I Achalasia   **B** Type II Achalasia   **C** Type III Achalasia

Figure 1. High-resolution manometry of the 3 phenotypes of achalasia based on the Chicago Classification. Type I is classic achalasia with no evidence of panesophageal pressurization (**A**), type II is achalasia with panesophageal pressurization (**B**), and type III is vigorous achalasia with 2 or more spastic contractions of the distal esophagus (**C**).

(GERD). The primary focus of this article is to review treatments for achalasia, including botulinum toxin A (BTX), pneumatic dilation (PD), laparoscopic Heller myotomy, and peroral endoscopic myotomy (POEM), and to discuss how to tailor therapy for patients with achalasia.

Epidemiology and Pathophysiology of Achalasia

The incidence of achalasia is 1 in 100,000 individuals, and due to the chronicity of symptoms and normal life expectancy, the prevalence approaches 10 in 100,000 individuals.[2] Recent research suggests that the incidence may be double this rate with the widespread availability of high-resolution manometry (HRM).[3] Achalasia occurs equally in men and women and is without racial predilection. The peak incidence is between 40 and 60 years of age.

Histologic studies have consistently shown that myenteric neurons are decreased or even absent in esophageal resection specimens obtained from achalasia patients.[4,5] These neurons are essential for the coordination of peristalsis and LES relaxation via the neurotransmitter nitric oxide.[1] The current speculation is that a viral infection, in particular herpes simplex virus 1 (HSV-1), triggers an autoimmune reaction to esophageal neurons, leading to chronic ganglionitis with eventual disappearance of the myenteric neurons.[6] The fact that HSV-1 is a neurotropic virus with a predilection for squamous epithelium may explain the exclusive involvement of the LES and esophageal body. The aberrant immune reaction against the myenteric ganglia is characterized by an infiltration of cytotoxic T lymphocytes within the ganglia.[7] Additionally, antineuronal antibodies may contribute

and are especially detected in patients with specific human leukocyte antigen genotypes—those carrying the DQA1*01303 and DQB1*0603 alleles.[8,9]

Diagnosis of Achalasia

The most sensitive and specific diagnostic test for achalasia is HRM. Both endoscopy and radiology are less sensitive than HRM and will only identify approximately half of achalasia patients. In early stages of achalasia, both endoscopy and radiology may be completely normal.[10]

By incorporating 36 or more pressure sensors spaced 1 cm apart, HRM allows detailed pressure recordings of the entire esophagus. With the introduction of HRM, new criteria have been introduced to define esophageal peristalsis and LES function and are summarized by the Chicago Classification.[11] Three clinically relevant groups have been defined based on the pattern of contractility in the esophageal body: type I is classic achalasia with no evidence of panesophageal pressurization, type II is achalasia with panesophageal pressurization, and type III is vigorous achalasia with 2 or more spastic contractions of the distal esophagus (Figure 1).[12] Barium esophagram correlates well with these subtypes. Type I has a markedly dilated, often distorted, esophagus, whereas type II has a dilated but relatively straight esophageal body, and both types have a single point of obstruction (bird beak) at the esophagogastric junction (EGJ). Type III has multiple sites of potential narrowing in a nondilated esophagus with marked tertiary contractions.

Additionally, a new parameter to quantify LES relaxation has been introduced with HRM: integrated relaxation pressure (IRP), which calculates the mean postswallow LES pressure of a 4-second period during

Table. Comparison of Different Nonpharmacologic Treatment Options for Patients With Naive Achalasia Based on the Chicago Classification

Type I or II Achalasia			Type III Achalasia
Pneumatic Dilation	Heller Myotomy	Peroral Endoscopic Myotomy	Peroral Endoscopic Myotomy
• Outpatient procedure • Less morbidity and cost • Repeat dilations needed over years • Equal to Heller myotomy in RCT • Older patients and women have the best results • Minimal risk of GERD • Increasingly less available in the community setting	• Equal to pneumatic dilation in RCT • Effective across all ages and sexes, but especially in young men • Preferred in patients with megaesophagus, diverticulum, or hiatal hernia • Increased risk of GERD • Widely available in the community setting	• Highly effective in short-term RCT • Minimal pain and short recovery • High risk of GERD (>50%) • Risk of Barrett esophagus and esophageal cancer • Insurance issues	• Only procedure to adequately cut the length of the spasms and obstruction • Avoids chest operation • Superior to pneumatic dilation and Heller myotomy • Requires at least 100 procedures for best outcome • Insurance issues

GERD, gastroesophageal reflux disease; RCT, randomized, controlled trial.

which the LES pressure is lowest, skipping periods of crural contractions.[11] The upper limit of normal for IRP is 15 mm Hg for the Medtronic system, but normal values are different for each catheter type and can be as high as 28 mm Hg.[13] Initial research found an IRP greater than 15 mm Hg to have 93% accuracy for identifying patients with achalasia.[14]

However, the IRP can be less than 15 mm Hg in up to 20% of patients with achalasia, especially those with type I achalasia with persistent symptoms posttreatment. Therefore, better tests are needed to assess esophageal emptying and measure distensibility of the EGJ. Of these potential tests, the timed barium esophagram is the simplest, cheapest, and least invasive. Patients are given 8 oz (200 mL) of barium to drink in the upright position with 2-on-1 spot films obtained at 1 and 5 minutes to assess liquid emptying, followed with a 13-mm tablet.[15] Barium column height of 5 cm at 1 minute and 2 cm at 5 minutes has excellent accuracy in defining achalasia when compared to EGJ outflow obstruction and nonachalasia dysphagia.[16] Retention on the timed barium esophagram correlates closely with distensibility of the EGJ as measured by the newer endoluminal functional lumen imaging probe (EndoFLIP, Medtronic).[17] With this system, a catheter incorporating impedance planimetry is positioned endoscopically across the EGJ and gradually inflated. Calculation of the diameter and measurement of intraballoon pressure allow determination of the ease of opening the EGJ (distensibility index), which is significantly impaired in patients with achalasia compared to healthy controls.[18] This test has recently become commercially available, is expensive, and requires endoscopy and

nonreusable catheters. In addition, limited data are available for healthy controls. Both timed barium esophagram and EndoFLIP complement each other and are superior to using IRP for the assessment of esophageal emptying and distensibility. Either timed barium esophagram or EndoFLIP should be routinely performed when evaluating patients with suspected achalasia before and after treatment.

Treatment Options for Achalasia

There are no curative options for achalasia. All treatments are directed at improving quality of life, attempting to preserve esophageal function, and preventing esophageal stasis. Current treatments reduce the obstruction at the EGJ by some degree of disruption to the LES while trying not to worsen symptoms with a new disease—GERD. As shown in the Table, treatments for achalasia have advantages and disadvantages. I propose that patients with achalasia are currently best treated by a multidisciplinary team of specialists, particularly in multispecialty esophageal centers of excellence, where the team can select the best treatment based on age, type of achalasia, and comorbid diseases, rather than using the same treatment approach for all patients.

Smooth Muscle Relaxants
In the past, the 2 most commonly used pharmacologic drugs were nitrates and calcium channel blockers. Both drug classes relax the LES and, when given before meals, may improve bolus passage. Clinical results are marginal, and no well-designed randomized studies are available.[19]

Moreover, side effects such as hypertension, headache, and dizziness are reported by up to 30% of patients, and drug tolerance develops with time. Although popular in the 1980s, the use of nitrates and calcium channel blockers for symptomatic relief of achalasia is not recommended in current guidelines.[20]

Botulinum Toxin A

A more commonly used pharmacologic treatment for achalasia is BTX, a neurotoxin that blocks the release of acetylcholine from the nerve terminals. This counterbalances the loss of inhibitory neurons, allowing prolonged reduction of LES pressure.[21] However, over months, the original synapses are regenerated, which causes clinical relapse and need for retreatment. BTX is directly injected into the LES through a sclerotherapy needle during routine upper gastrointestinal endoscopy; 100 units of toxins are injected in 25-unit aliquots in 4 quadrants. The immediate response to BTX is high, in the range of 80% to 90%, but over half of patients are symptomatic at 1 year.[22] Furthermore, improvement in esophageal emptying does not parallel symptom improvement.[23] The patients who are most likely to respond to BTX are older patients (>50 years) and those with types II and III achalasia associated with an IRP greater than 15 mm Hg.[24] In the first case, there is slower regeneration of acetylcholine synapses in older patients, and in the second case, acetylcholine plays a more prominent role in contractile pressures, especially in type III achalasia.

BTX injection is the most common endoscopic therapy for achalasia, especially in the community setting, due to its ease of administration, high initial response rate, and excellent safety profile. A survival analysis suggests that BTX injections, repeated as needed, can approximate the benefits of PD in patients with a life expectancy of less than 2 years.[25] BTX can also be used to resolve diagnostic dilemmas and bridge the time until surgery. Of some concern are the recent reports of mediastinitis, pseudoaneurysm of the thoracic aorta, and 2 deaths after BTX.[26,27] One set of authors speculated that these complications may have been from needles longer than the 4- to 5-mm sclerotherapy needles usually used.[27]

Pneumatic Dilation

PD is performed using noncompliant air-filled balloons of increasing diameter (30, 35, 40 mm) to stretch and disrupt the LES circular muscle fibers. Under fluoroscopic or endoscopic guidance, the balloon is positioned across the LES and gradually inflated until the waist (due to the nonrelaxing LES), is flattened, and then is held for 15 to 60 seconds. This procedure adds 5 to 10 minutes to a routine endoscopy and is performed in an outpatient setting. The patient is discharged after 1 to 2 hours of observation and a barium esophagram showing no perforation. Subsequent dilations are spaced over 2- to 4-week intervals based on symptom relief and improvement in esophageal emptying.[28]

Across multiple series worldwide, PD has good to excellent symptom relief in 74%, 86%, and 90% of patients treated with 30-, 35-, and 40-mm balloons, respectively.[29] Consistently across these studies, approximately one-third of patients have symptom relapse after 4 to 6 years. However, these patients respond well to redilation, with success rates of up to 97% even after 8 years of follow-up.[30] This approach of on-demand redilation is particularly popular in Europe[31] and Australia[32] among centers very experienced in PD that have an economic model that lacks monetary incentive to pursue surgical myotomy. In the author's experience, a single PD has been successful in several women for up to 15 years and in 1 man for 22 years.[28] The most cost-effective treatment for achalasia over the 5- to 10-year period after the patient is treated is PD.[33]

Predictive factors for a poor clinical response include age less than 40 years, male sex, single dilation with a 30-mm balloon, posttreatment LES pressure greater than 10 to 15 mm Hg, and poor esophageal emptying.[34-36] Based on subsequent reanalysis of the European Achalasia Trial,[37] types I and II achalasia have the best outcomes with PD and surgical myotomy, which have equivalent success. PD does not interfere with subsequent Heller myotomy or POEM. The success rates of surgical myotomy or POEM after failed PD are comparable to those reported in naive or untreated patients.[34] Patients with recurrent symptoms after Heller myotomy respond to PD, but success rates are lower, around 50%.[38,39]

Esophageal perforation is the most serious complication following PD, with an overall rate of 2% in an experienced center.[40] In the past, most patients who developed an esophageal perforation went to surgery for closure of the perforation and myotomy on the opposite wall. However, most patients (except those with large tears with mediastinal contamination) can now be managed with immediate clipping of the laceration or placement of an esophageal stent in combination with antibiotics and nutrition support. Most perforations occur during the initial dilation, with difficulty in keeping the balloon in position as a potential risk factor.[1] No other predictors for perforation have been identified, but the European Achalasia Trial[36] did report 4 perforations, mostly in older patients, when the first PD was done with a 35-mm balloon compared to a 30-mm balloon. Severe GERD is infrequent after PD, but 15% to 35% of patients have heartburn that improves with proton pump inhibitors (PPIs).[29,36]

Laparoscopic Heller Myotomy

Surgical myotomy of the muscle layers of the distal esophagus and LES, known as Heller myotomy, is the traditional treatment for achalasia. The operation has been performed laparoscopically since 1992, allowing for better visualization of the distal esophageal muscle layers and the sling fibers of the gastric fundus, resulting in a shorter operation and better results. Two tenets are key to the operation. The myotomy should extend 6 cm onto the esophagus, but the critical component is extending the myotomy at least 2 to 3 cm onto the stomach to eliminate the gastric sling fibers' contribution to the LES pressure zone.[41] As a result, the antireflux barrier is eliminated, and most experts now agree that an antireflux fundoplication is required. This was conclusively shown in a randomized, controlled trial in 2004[42] and supported by a large meta-analysis that found a significant reduction of GERD symptoms when a fundoplication was added to Heller myotomy (31.5% vs 8.8%; P=.01).[43] A partial fundoplication (either Dor or Toupet), rather than a complete fundoplication, is preferred to minimize postoperative dysphagia. A multicenter, randomized trial found comparable control of GERD after either of these partial fundoplications.[44]

Laparoscopic Heller myotomy is a remarkably safe operation with a mortality rate of less than 0.1%. The most common complication is esophageal perforation (at a rate 2-3 times higher than that of PD), but most perforations are recognized during the myotomy and immediately repaired without further complications.[1] In a large systematic review, the mean success rate was 89% (range, 76%-100%) at a median follow-up of 35 months (range, 8-38 months).[43] Over time, the success rate decreases to 65% to 85% at 5 years, likely because of disease progression.[1,45]

Predictors of success for Heller myotomy include young age (<40 years); LES pressure greater than 30 mm Hg; and a straight, not tortuous sigmoid esophagus.[1] Types I and II achalasia patients do equally well with Heller myotomy because the site of obstruction at the LES is easily eliminated. Type III achalasia patients with multiple sites of obstruction do less well, but better than with PD due to the extension of the myotomy at least 6 cm onto the esophagus. Prior PD has minimal effect on surgical myotomy, but BTX interferes with dissection of the tissue planes.[37] Heller myotomy is the first-line treatment option in achalasia patients with sigmoid esophagus, compared to POEM or esophagectomy.[20]

Following laparoscopic Heller myotomy, 10% to 20% of patients will relapse in the mid to long term and need further treatment.[1] The main factors are incomplete myotomy (usually on the gastric side where the dissection is more difficult), tight or dysfunctional antireflux wrap, and late scarring of the myotomy.[46] Current multidisciplinary guidelines encourage PD, compared with repeat myotomy or POEM, as the first option for a failed Heller myotomy.[20] Despite the fundoplication, GERD does worsen over time after laparoscopic Heller myotomy in the range of 10% to 32%, but these results are 2- to 3-fold less than with POEM.[20] Over 30 cases of Barrett esophagus (9 with dysplasia and 6 with adenocarcinoma) have been reported 6 to 37 years after surgical myotomy.[47]

Peroral Endoscopic Myotomy

POEM is a relatively new endoscopic procedure in which the endoscopist creates a submucosal tunnel through a small mucosal incision.[48] The tunnel is dissected down to the EGJ and 2 to 3 cm onto the cardia. Once access is made to the circular layer of the LES, the myotomy can be extended as high on the esophagus as desired and 2 cm below the EGJ. This technique is similar to that of laparoscopic Heller myotomy, but, importantly, no fundoplication is performed. The patient has no scar, pain is minimal, and the procedure can be done on an outpatient. Serious adverse events are rare after POEM. They occur at a rate of less than 0.1%, with the most serious events being perforation, bleeding, and pneumothorax.[49] The procedure requires high-level endoscopic skills, and the learning curve is steep, estimated to be 20 to 40 procedures to achieve competency and 60 for mastery.[50] A recent study found that at least 100 cases are required to decrease the risk of technical failure, adverse events, and clinical failure.[51] This procedure is being performed by both gastrointestinal endoscopists and surgeons, with an expanding presence in the community setting. Currently, most commercial insurance companies do not pay for POEM.

In 2010, Inoue and colleagues published a series of 17 patients undergoing POEM with significant reduction in symptoms and LES pressure.[48] Over the last 10 years, this procedure has changed the treatment of achalasia across the world, with over 5000 cases having been performed.[52] Case series with more than 100 patients report success rates of dysphagia relief in the range of 92% to 97%.[52] However, similar to other achalasia treatments, success may be reduced over time. For example, Werner and colleagues reported a reduction of success to 79% over 2 years,[53] but, with over 500 cases, Inoue and colleagues had a success rate of 89% after 3 years of follow-up.[54] Results from a multicenter, randomized trial from Europe were recently published comparing laparoscopic Heller myotomy with Dor fundoplication to POEM in over 100 patients in each group. Clinical success at 2 years was 83.0% in the POEM group and 81.7% in the laparoscopic Heller myotomy group. At 2 years, the rate of esophagitis was 2-fold higher in the POEM group (44%) than in the laparoscopic Heller myotomy group (29%).[55]

POEM has equal efficacy to laparoscopic Heller myotomy for types I and II achalasia, where a single point of obstruction occurs.[20] However, it is type III achalasia where POEM is clearly superior, as there is the potential to extend the myotomy proximally as far as necessary to eliminate spastic obstructing contractions. For example, a retrospective study compared 49 patients undergoing POEM for type III achalasia and 26 patients undergoing laparoscopic Heller myotomy at a single center.[56] Clinical response was significantly better in the POEM group (98.0% vs 80.8%; *P*=.01), with shorter operation time and fewer adverse events, although the length of hospital stays was similar (both approximately 3 days). A recent large meta-analysis of 20 studies (1575 patients) found that the success rates for types I, II, and III achalasia were 81%, 92%, and 71% for laparoscopic Heller myotomy compared to 95%, 97%, and 93%, respectively, for POEM.[57] POEM is an appropriate treatment for laparoscopic Heller myotomy failures and may be an easier operation, as abdominal adhesions are not an issue. Recent guidelines found no evidence that previous treatment with BTX or PD reduces the technical feasibility of POEM or results in poorer outcomes.[20]

The main disadvantage with POEM is the substantial increased risk of GERD. Up to 65% of patients have esophagitis, including grades C and D. Werner and colleagues reported 2 new cases of short-segment Barrett esophagus and 1 peptic stricture in a short follow-up of 2 years.[53] In a multinational study of 282 patients followed for 10 to 24 months with careful reflux testing, 40% of patients were taking PPIs; 25% had esophagitis, of which a quarter were grades C and D; and 58% had abnormal pH studies.[58] As shown in a large systematic review and meta-analysis, the rates of GERD symptoms, esophagitis, and abnormal pH tests are 2- to 3-fold greater with POEM compared to laparoscopic Heller myotomy.[59] For this reason, a recent expert review recommended that prior to POEM, all patients be informed of the high risk of GERD and the need for indefinite PPI therapy and/or surveillance endoscopy.[52]

Pneumatic Dilation Vs Surgical Myotomy

In 2011, results from a prospective randomized comparison study were published comparing PD and laparoscopic Heller myotomy performed by physicians highly skilled in both procedures.[36] In this trial, known as the European Achalasia Trial, patients from 5 countries were randomized to PD (96 patients with 30- and 35-mm balloons for up to 3 repeat dilations based on symptom recurrence) or surgical myotomy with Dor fundoplication (104 patients). Both treatment groups had comparable success at 2 years as assessed by symptoms, LES pressure, and timed barium esophagram: 86% for PD and 90%

for surgery. Twenty-three patients had recurrence of symptoms requiring redilation, which was not successful in 5 patients. Younger age (<40 years), daily chest pain, esophageal width less than 4 cm, and poor esophageal emptying posttreatment were identified as predictors of PD failure. Later reanalysis of this study found that PD and myotomy were equivalent treatments for types I and II achalasia, whereas surgery was superior for type III.[17]

This study continues to follow both groups, with a recent report of the 5-year data (Figure 2A).[60] In the full analysis set, there was no significant difference in success rates, with 84% for laparoscopic Heller myotomy and 82% for PD. Redilation was performed in 25% of patients, most of them needing only 1 additional dilation. Four years after treatment, 76 patients had upper endoscopy. In the laparoscopic Heller myotomy group, 18% had esophagitis (3 with grade A and 4 with grade B) compared with 14% in the PD group (4 with grade A and 1 with grade C). Repeat pH test performed at the same time found that the laparoscopic Heller myotomy group had 34% abnormal acid exposure compared to 12% in the PD group (*P*=.14).

In 2019, results from a similar randomized, controlled trial comparing PD and POEM were published.[61] A total of 130 patients were assigned to POEM (64 patients) or PD (66 patients). Intention-to-treat analysis revealed a significantly higher success rate at 2 years for POEM (92%) compared to PD (54%; *P*<.001; Figure 2B). However, this study was very restrictive of the use of redilation, with failures being defined as symptoms not improving with single 30- and 35-mm balloons. No reason was given for not allowing repeat dilations, and the overall PD success rate is one of the lowest reported in the literature. The difference in reflux esophagitis rates at 2 years was striking: 41% for POEM and 7% for PD (*P*=.002).

Follow-Up of Achalasia Patients After Treatment

Achalasia is a chronic disorder that slowly progresses with time, no treatment is dependably curative, and recurrence of symptoms can be expected. There are no guidelines for follow-up, although my colleagues and I have similar approaches after PD and laparoscopic Heller myotomy as gastroenterologists in the Netherlands.[1] Since symptom improvement does not predict esophageal emptying, symptoms and timed barium esophagram are assessed 1 to 3 months after treatment. Patients with symptom relief and good esophageal emptying will do well long term and should be followed up on some type of regular basis (ie, every 2-3 years). Patients with persistent symptoms, poor esophageal emptying, or both warrant further treatment or
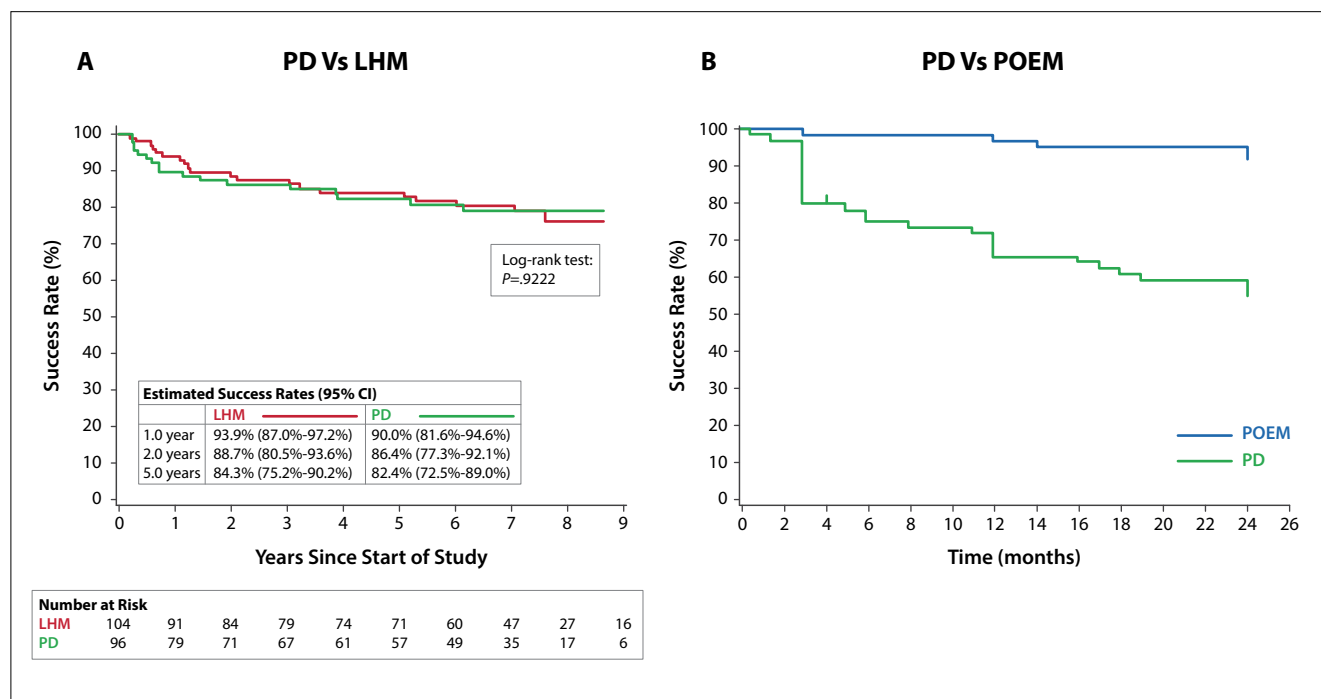
Figure 2. Kaplan-Meier curves for the rate of success after PD vs surgical myotomy. **A:** Five-year data from the European Achalasia Trial show comparable success for PD and LHM. Adapted from Moonen and colleagues[60] with permission from BMJ Publishing Group Ltd. **B:** Two-year data from a recent randomized, controlled trial comparing POEM and PD show superiority of POEM. However, repeat dilations were not allowed, as with the European Achalasia Trial. Adapted from Ponds and colleagues[61] with permission.

LHM, laparoscopic Heller myotomy; PD, pneumatic dilation; POEM, peroral endoscopic myotomy.

close follow-up at 1 year. POEM is a different issue, with the high risk of GERD and its complications. Until the risk of GERD is better understood, we perform follow-up upper endoscopy every 2 to 3 years and use this opportunity to reinforce the need to stay on PPIs. Patients with longstanding achalasia, especially those with megaesophagus and chronic stasis, have an increased risk of squamous cell carcinoma compared to the general population.[62] However, recent International Society for Diseases of the Esophagus guidelines have no recommendation regarding routine endoscopy surveillance or endoscopy intervals.[20] Nevertheless, we perform endoscopy on this small subset approximately every 5 years after being on clear liquids for 3 days.

Commentary on Future Challenges for the Treatment of Achalasia

Despite achalasia being a relatively rare disease, interest in it, as well as the literature on it, has increased over the last 10 years. Some of this comes from new technology (HRM, EndoFLIP) as well as new treatments, such as POEM. More academic centers and even community physicians want to be involved in this surge, but there are important challenges now and for the future in the treatment of achalasia. As detailed in the Table, there are currently multiple excellent treatments for achalasia with scientific data to support their efficacy; thus, important issues are how these treatments should be used to manage patients as well as what possible risk and harm these treatments may hold in the future.

Despite the wide proliferation of HRM, many older and even recently trained gastroenterologists may have some difficulty understanding the intricacies and limitations of this new technology. Studies may be performed by support personnel with limited understanding of esophageal physiology, and emphasis is often placed on computer interpretation, rather than the physician carefully reviewing the study. Additionally, many US fellowship programs may not offer much training in esophageal function tests. Furthermore, radiologists may spend little time performing detailed barium esophagrams, and few may incorporate the timed barium esophagram into their routine evaluation.

Most alarming, in my opinion, is that PD is often not available in many academic centers and in the community. Rather, surgeons often handle these cases when many patients could do well with less-invasive PD. It is

unclear why the use of PD has decreased. The procedure is simple to perform and teach, and most complications can now be easily treated with clips or stents. As the Table shows, older patients and women can be treated for types I and II achalasia with PD as well as they can with surgical myotomy. Additionally, PD is very effective salvage therapy when laparoscopic Heller myotomy or POEM has failed. Perhaps US gastroenterologists should follow the example of gastroenterologists in Europe[31] and Australia[32] in their more frequent use of PD.

There has been a rapid proliferation of POEM surgery by endoscopists and surgeons who previously were not involved or interested in achalasia. POEM may often be seen as the only treatment for achalasia by these providers and little discussion may be given to alternative treatments and potential long-term complications. In particular, many in the surgical field have been slow to admit that potentially severe GERD is a real concern with POEM surgery. Unbridled enthusiasm for new procedures can make it easy to forget history, even if the established surgical tenet was as recent as 2004.[42] POEM surgery results in a new disease, a scleroderma-like esophagus, which has a known risk of Barrett esophagus and cancer.[63] Furthermore, the older surgical literature on achalasia supports this risk, especially many years after myotomy.[47] The real risk of Barrett esophagus and cancer is not now, but over the next 20 to 30 years, when gastroenterologists will be following these patients and will have to manage them. This can be a challenging situation, as patients are happy with the relief of their dysphagia and increasingly fearful about prolonged use of PPIs. However, the sentinel case of new Barrett esophagus and a T1a adenocarcinoma has been reported 4 years after POEM. Initial work-up at the same center found no evidence of intestinal metaplasia and a normal impedance-pH study prior to surgery.[64]

Therefore, in my opinion, achalasia patients are best managed with a multispeciality approach, such as in an esophageal center of excellence with a multidiscipline gastrointestinal and surgical team. For example, at my institution, our team for the last 8 years has consisted of 2 esophagologists and 2 general surgeons who offer all of the treatment modalities for achalasia. All patients are counseled about options and are often discussed in our weekly conference. The team has successfully managed a large volume of cases and has experience with PD, surgical myotomy (including POEM), and BTX. We attempt to follow all of these patients, routinely keep surgical patients (especially those who undergo POEM) on chronic PPIs with a detailed explanation of the rationale, and repeat endoscopy every 2 to 3 years on this latter group. We propose this management approach to be the current standard of care that all achalasia patients should receive for their chronic disease.

Summary

The treatment of achalasia now has multiple options with excellent scientific efficacy, which allows for the opportunity to tailor therapy for patients with this condition. BTX should be reserved for very elderly patients with a short life expectancy. PD and laparoscopic Heller myotomy are equally effective for types I and II achalasia, while POEM is the treatment of choice for type III achalasia. I propose that achalasia patients are best treated by a multidisciplinary team of specialists (both gastrointestinal and surgical), particularly in esophageal centers of excellence, where the team can select the best treatment option based on patient age, type of achalasia, and comorbid diseases, rather than using the same treatment approach for all patients.

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