Peroral endoscopic myotomy

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Policy contains: Achalasia; dysphagia; esophageal diverticula; gastroparesis; laparoscopic Heller myotomy; peroral endoscopic myotomy; pneumatic dilation.

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Coverage policy

Peroral endoscopic myotomy is clinically proven and, therefore, may be medically necessary for treatment of esophageal achalasia, when all of the following criteria are met (American Gastroenterological Association [Yang, 2024]; Society of American Gastrointestinal and Endoscopic Surgeons [Calabrese, 2025]; American College of Gastroenterology [Vaezi, 2020]; International Society for Diseases of the Esophagus [Zaninotto, 2018]):

- A comprehensive diagnostic workup has been completed, including upper endoscopy, high-resolution manometry, and timed barium esophagram. (Functional luminal impedance planimetry may be used as an adjunct if the diagnosis is equivocal) (Yang, 2024).
- Either treatment-naïve or recurrent/persistent achalasia following pneumatic dilation, laparoscopic Heller myotomy, or previous peroral endoscopic myotomy (Vaezi, 2020; Yang, 2024).
- Diagnosis of esophageal achalasia type I, II, or III based on high resolution manometry.

Gastric peroral endoscopic myotomy is clinically proven and, therefore, may be medically necessary for treating members ages 18 years or older with medically refractory gastroparesis, who meet all of the following criteria (American College of Gastroenterology [Camilleri, 2022]; American Gastroenterological Association [Khashab, 2023; Staller, 2025]):

- Esophagogastroduodenoscopy confirms no mechanical gastric outlet obstruction.

- A solid-phase gastric emptying scan confirms delayed gastric emptying, defined as ≥20% retention at four hours during a standardized four-hour Eggbeaters meal study for gastric peroral endoscopic myotomy candidacy (Staller, 2025)..
- Moderate-to-severe symptoms exist for at least six to 12 months, preferably with nausea, vomiting, and/or postprandial fullness as the dominant symptoms, which generally corresponds to a Gastroparesis Cardinal Symptom Index total score > 2 (Staller, 2025).
- The member has medically refractory disease, defined as failure of at least two medical treatments, including at least three months of a prokinetic agent and at least one antiemetic agent (Staller, 2025).

Peroral endoscopic myotomy is investigational/not clinically proven and, therefore, not medically necessary for treatment of:

- Esophageal diverticula (Mandavdhare, 2021).
- Gastroparesis in pediatric populations (< age 18 years) (Staller, 2025).

Limitations

Contraindications to any peroral endoscopic myotomy procedures include (Calabrese, 2025; Camilleri, 2022; Staller, 2025;; Vaezi, 2020):

- Uncorrected coagulopathy.
- Presence of liver cirrhosis.
- Pregnancy at the time of treatment.
- Severe erosive esophagitis.
- Cardiac pacemaker
- Severe pulmonary disease.
- Not a candidate for an endoscopic examination or anesthesia.

Additional contraindications to peroral endoscopic myotomy for esophageal achalasia include (Vaezi, 2020):

- Diagnosis of secondary achalasia or other organic causes of dysphagia, such as esophageal varices, Barrett's esophagus, esophageal stricture, malignant or premalignant esophageal lesions, or an extremely dilated esophageal body (> 6 cm).
- Prior therapy that may compromise the integrity of the esophageal mucosa or lead to submucosal fibrosis, such as recent esophageal surgery, radiation, endoscopic mucosal resection, or radiofrequency ablation.

For gastric peroral endoscopic myotomy, additional contraindications include an absent pylorus, prior gastrointestinal surgery that alters the stomach, and postinfectious gastroparesis (Khashab, 2023).

Alternative covered services

- Open or laparoscopic esophagomyotomy with or without fundoplication.
- Endoscopically-guided pneumatic dilation.
- Botulinum toxin injection.
- Oral pharmacologics (e.g., calcium channel blockers, long-acting nitrates, anticholinergics, β-adrenergic agonists, and theophylline).
- Gastric electrical stimulator therapy.

- Pyloric stenting, surgical pyloroplasty, or partial gastrectomy.

Background

Achalasia is an esophageal motility disorder of the esophageal smooth muscle layer and the lower esophageal sphincter. Incomplete lower esophageal sphincter relaxation, increased lower esophageal sphincter pressure, and aperistalsis of the distal one-third of the esophageal body characterize the disorder (Friedel, 2013). Achalasia is rare in the pediatric population and even less so in children younger than five years of age (Franklin, 2014). The majority of cases are idiopathic, but the disorder can be associated with malignancy (especially involving the gastro-esophageal junction) and as a part of the spectrum of Chagas disease. In rare cases, achalasia is transmitted genetically (Franklin, 2014; Friedel, 2013).

The Eckardt scoring system is most frequently used for the evaluation of symptoms, stages, and efficacy of achalasia treatment. It attributes zero to three points to each of the four symptoms of the disease (dysphagia, regurgitation, chest pain, and weight loss). Point totals range from 0 to 12, with a higher score indicating more severe symptoms. Scores of 0-1 correspond to clinical stage 0, 2-3 to stage I, 4-6 to stage II, and greater than 6 to stage III (Laurino-Neto, 2018).

The diagnostic standard for esophageal achalasia is esophageal manometry. Chicago Classification criteria based on high-resolution manometry define achalasia syndromes according to different patterns of esophageal contractility that accompany impaired esophagogastric junction (Kahrilas, 2015):

- Type I indicates 100% failed peristalsis.
- Type II, 100% failed peristalsis and panesophageal pressurization in at least 20% of swallows.
- Type III, no normal peristalsis and premature/spastic contractions in at least 20% of swallows.

Other tests include barium contrast radiography and endoscopic assessment of the gastroesophageal junction and gastric cardia, as recommended, to rule out pseudoachalasia and mechanical obstruction (Kahrilas, 2015).

Achalasia is an incurable chronic condition that requires lifelong follow up. Treatment goals are to relieve symptoms, improve esophageal emptying, and prevent further esophageal dilation. Current non-surgical treatment options are oral pharmacologic interventions, botulinum toxin injection, and pneumatic dilation. Surgical options are open or laparoscopic esophagomyotomy (also known as Heller myotomy), with or without an antireflux procedure, and esophagectomy, which is reserved for the most severe, end-stage disease. Surgical treatments aim to decrease the resting pressure in the lower esophageal sphincter, but each is associated with varying efficacy and risk. No intervention significantly affects esophageal peristalsis, but despite initial success of these interventions, lower esophageal sphincter hypertonicity returns over time, often requiring repeat interventions (Vaezi, 2020).

Peroral endoscopic myotomy is a hybrid technique derived from natural orifice transluminal endoscopic surgery and advances in endoscopic submucosal dissection to perform a myotomy. Developed in Japan, it involves an esophageal mucosal incision, followed by creation of a submucosal tunnel crossing the esophagogastric junction and myotomy before closure of the mucosal incision. Peroral endoscopic myotomy represents a novel, minimally invasive, and potentially effective endoscopic treatment for achalasia (Friedel, 2013).

Variations of the procedure have emerged to treat other esophageal conditions. Gastroparesis is a debilitating gastrointestinal disorder characterized by delayed gastric emptying in the absence of a mechanical obstruction. The condition presents a spectrum of clinical symptoms ranging from mild to severe. Several therapeutic interventions directed to the pylorus for treatment for refractory gastroparesis have been developed over the last decade but have achieved limited success. These options include intra-pyloric injections of botulinum toxin, transpyloric stenting, and surgical pyloroplasty. An application of peroral endoscopic myotomy to the pyloric

valve called gastric peroral endoscopic myotomy or gastric peroral endoscopic pyloromyotomy, has emerged as a potential treatment for refractory gastroparesis (Khoury, 2018).

Esophageal diverticula are herniations of the esophagus typically resulting from an increased intraesophageal pressure or periesophageal chronic inflammation (Yam, 2024). There is emerging interest in the use of the peroral endoscopic myotomy procedure to treat esophageal diverticula, particularly Zenker's diverticula.

Findings

The following findings, drawn from extensive systematic reviews and meta-analyses, substantiate the guideline recommendations for peroral endoscopic myotomy. For achalasia, the evidence confirms robust long-term efficacy and explores comparative outcomes against traditional surgical and endoscopic alternatives, focusing on operational efficiency and safety. The data also addresses the nuanced challenge of post-procedural reflux and the procedure's utility in special populations. Finally, the analysis extends to emerging applications, evaluating outcomes for refractory gastroparesis and esophageal diverticula.

Guidelines

Esophageal achalasia

Peroral endoscopic myotomy is firmly established across multiple organizational guidelines as a primary, effective treatment for esophageal achalasia in adults. Current guidance from the Society of American Gastrointestinal and Endoscopic Surgeons (Calabrese, 2025), the American Gastroenterological Association (Yang, 2024), the American College of Gastroenterology (Vaezi, 2020), and the International Society for Diseases of the Esophagus (Zaninotto, 2018) uniformly supports its use. A comprehensive diagnostic evaluation is required before intervention, which the American Gastroenterological Association specifies should include upper endoscopy, high resolution manometry, and a timed barium esophagram, using functional luminal impedance planimetry as an adjunct when the diagnosis is uncertain (Yang, 2024).

Treatment choice depends on the manometric subtype. For type III (spastic) achalasia, peroral endoscopic myotomy is consistently preferred over laparoscopic Heller myotomy because it allows a longer tailored myotomy (Calabrese, 2025; Yang, 2024; Vaezi, 2020). For types one and two achalasia, peroral endoscopic myotomy, laparoscopic Heller myotomy with fundoplication, and pneumatic dilation are all effective options. The Society of American Gastrointestinal and Endoscopic Surgeons conditionally suggests peroral endoscopic myotomy over pneumatic dilation because of greater efficacy and lower need for repeat intervention (Calabrese, 2025). The society also provides a conditional option for either peroral endoscopic myotomy with appropriate proton pump inhibitor use or Heller myotomy with fundoplication for types I and II, emphasizing shared decision making, patient preference, and local expertise (Calabrese, 2025; Yang, 2024).

Because gastroesophageal reflux disease is more frequent after peroral endoscopic myotomy, recent guidance stresses early prevention and ongoing monitoring. The American Gastroenterological Association recommends initiating acid suppression immediately after the procedure, continuing for three to six months, and performing objective reflux testing and long term surveillance since many patients with post myotomy reflux have no symptoms (Yang, 2024).

Non-achalasia spastic disorders

The role of peroral endoscopic myotomy in non-achalasia spastic esophageal disorders remains limited and requires careful patient selection. The American Gastroenterological Association addresses conditions such as

esophagogastric junction outflow obstruction, diffuse esophageal spasm, and hypercontractile esophagus, noting that the evidence is scarce. Peroral endoscopic myotomy should be considered only case by case after less invasive approaches such as medical therapy, endoscopic dilation, or botulinum toxin injection have failed, and only when symptoms correspond with objective findings. For suspected esophagogastric junction outflow obstruction, the diagnosis must meet Chicago Classification version 4.0 criteria and be supported by additional testing such as a timed barium esophagram or reduced distensibility on functional luminal impedance planimetry, with exclusion of secondary causes (Yang, 2024).

Gastroparesis

Recent guidance reflects a shift toward highly selective use rather than routine application of gastric peroral endoscopic myotomy for gastroparesis. The 2025 American Gastroenterological Association guideline issues a conditional recommendation against routine initial use of the procedure, reserving it for select adults with medically refractory symptoms after failure of medical therapy (Staller, 2025). Diagnosis requires a standardized four-hour gastric emptying scintigraphy. Delayed emptying is defined as greater than ten percent retention at four hours with the Eggbeaters test meal or greater than 25 percent retention with a real egg meal. A moderate delay, with about 20% retention at four hours, has been used in cohort studies to predict response to the procedure but is not the diagnostic cutoff (Staller, 2025).

Candidates must have moderate to severe symptoms, typically nausea, vomiting, and postprandial fullness, lasting six to 12 months. They must also have documented failure of at least two medical treatments, including one prokinetic agent and one antiemetic, after medication reconciliation and glycemic optimization when applicable (Staller, 2025; Camilleri, 2022). The American Gastroenterological Association advises against the routine use of pyloric botulinum toxin injection and gastric electrical stimulation, recommending both only for selective discussion in refractory cases after shared decision making (Staller, 2025). Evidence remains insufficient to support gastric peroral endoscopic myotomy in pediatric populations (Staller, 2025).

Evidence reviews

Achalasia

Peroral endoscopic myotomy demonstrates robust and durable effectiveness for achalasia treatment across multiple systematic reviews. Long-term clinical success rates remain high over extended follow-up, with studies reporting 91.3% success at two years, 90.4% at three years, 89.8% at four years, and 82.2% at five years (n=2,698) (Zhang, 2023). When compared directly to laparoscopic Heller myotomy with fundoplication in longer-term follow-up (≥24 months), both procedures show comparable treatment success rates of 85.3% for peroral endoscopic myotomy versus 79.6% for laparoscopic Heller myotomy (n=1,099) (Ma, 2025). The procedure maintains effectiveness across all achalasia subtypes, with pooled success rates of 86.1% for type I, 87.9% for type II, and 83.9% for type III achalasia (Zhang, 2023). It shows particular benefit for type III achalasia when compared to pneumatic dilation (North, 2024).

Peroral endoscopic myotomy consistently demonstrates operational efficiency advantages over laparoscopic Heller myotomy. Multiple meta-analyses confirm significantly shorter operative times, with reductions of approximately 36 minutes (Ma, 2025), as well as reduced hospital length of stay by 0.6-0.7 days (n=1,394 peroral endoscopic myotomy, n=3,745 laparoscopic Heller myotomy) (Sobral, 2024; Ma, 2025). Patients undergoing peroral endoscopic myotomy also experience less postoperative pain, requiring analgesic medications for 1.6 days versus 2.3 days following laparoscopic Heller myotomy (Sobral, 2024). When compared to pneumatic

dilation, however, peroral endoscopic myotomy shows longer hospital stays, though pneumatic dilation results varied across studies (North, 2024).

The safety profile of peroral endoscopic myotomy appears comparable to laparoscopic Heller myotomy, with no statistically significant differences in surgical complications, postoperative complications, or re-intervention rates (Sobral, 2024; Ma, 2025). Severe complications remain rare for both procedures, with the most serious including perforations or esophageal leakage requiring surgical intervention, sepsis, mediastinitis, and acute respiratory distress syndrome (North, 2024; Sobral, 2024; Zhang, 2023).

Gastroesophageal reflux considerations

The evidence regarding postoperative gastroesophageal reflux remains complex and somewhat contradictory. While some meta-analyses found no statistically significant differences in reflux rates between peroral endoscopic myotomy and laparoscopic Heller myotomy (Sobral, 2024), other analyses suggest higher reflux burden with peroral endoscopic myotomy. Sensitivity analysis excluding outlier studies reveals significantly higher odds of esophagitis with peroral endoscopic myotomy, and patients have 72% higher odds of requiring postoperative proton pump inhibitor use (Ma, 2025). Long-term data shows pooled incidences of symptomatic reflux and reflux esophagitis of 23.9% and 16.7% respectively following peroral endoscopic myotomy (Zhang, 2023). The comparative reflux rates across peroral endoscopic myotomy, laparoscopic Heller myotomy, and pneumatic dilation remain mixed across studies (North, 2024), though gastroesophageal reflux can generally be managed medically over time (North, 2024; Sobral, 2024; Zhang, 2023).
Peroral endoscopic myotomy serves effectively as a salvage procedure after failed previous interventions, achieving clinical success rates comparable to treatment-naïve patients with 98.0% technical success and 90.8% clinical success (Tan, 2021). However, salvage cases show higher reflux burden, with postoperative symptomatic reflux in 36.9%, esophagitis in 33.0%, and abnormal pH monitoring in 47.8% of patients (Huang, 2021).

In children with idiopathic achalasia (n=419), peroral endoscopic myotomy demonstrates feasibility and safety with 97.1% technical success and 88% clinical success rates. The procedure achieves significant symptom improvement with a mean Eckardt score reduction of 6.71 points. While the overall adverse event rate is 12.9%, major adverse events occur in only 4.2% of cases, though erosive esophagitis develops in 26.3% of pediatric patients (Nabi, 2022).

Gastroparesis

Gastric peroral endoscopic myotomy demonstrates consistent effectiveness for refractory gastroparesis regardless of underlying etiology, with diabetic patients showing the most substantial symptom improvement and post-surgical gastroparesis patients achieving the highest overall clinical success rates (Malik, 2024). The procedure maintains high success rates over extended follow-up periods, with clinical success (defined as ≥1 point decrease in Gastroparesis Cardinal Symptom Index) achieved in 92.8% at one year (n=713), 91.5% at two years (n=460), 100% at three years (n=270), and 100% at four years (n=102) (Stojilkovic, 2023).
When compared indirectly to surgical alternatives (pyloromyotomy and pyloroplasty), gastric peroral endoscopic myotomy demonstrates shorter procedural times and reduced length of stay, though symptom score improvements do not significantly differ between approaches (Aziz, 2023). Objective measures including gastric emptying studies and Endoscopic Functional Luminal Imaging Probe assessments show improvement post-procedure, though reporting remains inconsistent across studies (Malik, 2024).

The procedure maintains an acceptable safety profile with adverse events occurring in 7.4% of patients (n = 835) and no procedure-related deaths reported (Stojilkovic, 2023). Complications include capnoperitoneum, bleeding, perforations, and abdominal pain of varying severities (Malik, 2024; Stojilkovic, 2023). The evidence base consists primarily of moderate-to-high quality observational studies, as these procedures are typically performed in patients who have failed previous interventions including intrapyloric botulinum toxin injection, gastric stimulators, surgical pyloroplasty, percutaneous endoscopic gastro-jejunal tube insertion, and transpyloric stenting (Aziz, 2023; Malik, 2024; Stojilkovic, 2023).

Esophageal diverticula

For esophageal diverticula treatment (n=341), peroral endoscopic myotomy achieves 87% clinical success and 95.19% technical success rates with adverse events in 10.22% of cases. When compared to flexible endoscopic septum division, peroral endoscopic myotomy demonstrates superior clinical success with 13% higher relative effectiveness, while maintaining comparable technical success rates, procedure times, hospital length of stay, and recurrence rates (Mandavdhare, 2021).

In 2025, we comprehensively updated the guidelines for achalasia and gastroparesis with the latest society recommendations (Calabrese, 2025; Staller, 2025; Yang, 2024), added a new section on non-achalasia spastic disorders (Yang, 2024), and integrated a meta-analysis comparing long-term outcomes for achalasia treatment (Ma, 2025). The coverage indications for peroral endoscopic myotomy were revised to incorporate updated evidence-based guidance emphasizing a comprehensive diagnostic evaluation, standardized gastric emptying testing protocols, and symptom duration thresholds.

References

On October 16, 2025, we searched PubMed and the databases of the Cochrane Library, the U.K. National Health Services Centre for Reviews and Dissemination, the Agency for Healthcare Research and Quality, and the Centers for Medicare & Medicaid Services. Search terms were “peroral endoscopic myotomy,” "gastroparesis," and “esophageal achalasia” (MeSH). We included the best available evidence according to established evidence hierarchies (typically systematic reviews, meta-analyses, and full economic analyses, where available) and professional guidelines based on such evidence and clinical expertise.

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Policy updates

10/2015: initial review date and clinical policy effective date: 1/2016

10/2016: Policy references updated.

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