01-91000-03

Original Effective Date: 06/15/01

Reviewed: 10/22/26

Revised: 11/15/26

Subject: Minimally Invasive Procedures for the Treatment of Gastroesophageal Reflux Disease (GERD), Achalasia and Dysphagia

THIS MEDICAL COVERAGE GUIDELINE IS NOT AN AUTHORIZATION, CERTIFICATION, EXPLANATION OF BENEFITS, OR A GUARANTEE OF PAYMENT, NOR DOES IT SUBSTITUTE FOR OR CONSTITUTE MEDICAL ADVICE. ALL MEDICAL DECISIONS ARE SOLELY THE RESPONSIBILITY OF THE PATIENT AND PHYSICIAN. BENEFITS ARE DETERMINED BY THE GROUP CONTRACT, MEMBER BENEFIT BOOKLET, AND/OR INDIVIDUAL SUBSCRIBER CERTIFICATE IN EFFECT AT THE TIME SERVICES WERE RENDERED. THIS MEDICAL COVERAGE GUIDELINE APPLIES TO ALL LINES OF BUSINESS UNLESS OTHERWISE NOTED IN THE PROGRAM EXCEPTIONS SECTION.

Position Statement	Billing/Coding	Reimbursement	Program Exceptions	Definitions	Related Guidelines
Other	References	Updates			

DESCRIPTION:

Gastroesophageal reflux disease (GERD) is a common disorder characterized by heartburn and other symptoms related to reflux of stomach acid into the esophagus. The pathophysiology of GERD involves excessive exposure to stomach acid, which occurs for several reasons. There can be an incompetent barrier between the esophagus and stomach, either due to dysfunction of the lower esophageal sphincter or incompetence of the diaphragm. Another mechanism is an abnormally slow clearance of stomach acid. In this situation, delayed clearance leads to an increased reservoir of stomach acid and a greater tendency to reflux. Treatment options for GERD include weight loss, smoking cessation, head of the bed elevation, elimination of food triggers, and proton pump inhibitors.

Esophageal achalasia is characterized by reduced numbers of neurons in the esophageal myenteric plexuses and reduced peristaltic activity, making it difficult to swallow food and possibly leading to complications such as regurgitation, coughing, choking, aspiration pneumonia, esophagitis, ulceration, and weight loss. Treatment options for esophageal achalasia include pharmacotherapy (eg, injections with botulinum toxin), pneumatic dilation, and laparoscopic Heller myotomy.

Surgical options investigated for treating GERD and dysphagia caused by achalasia include transoral incisionless fundoplication (ITIF), transesophageal radiofrequency to create submucosal thermal lesions of the gastroesophageal junction, endoscopic submucosal implantation of a biocompatible polymer, endoscopic submucosal implantation of a prosthesis or injection of a bulking agent, magnetic sphincter augmentation, and peroral endoscopic myotomy (POEM). Variations of peroral endoscopic myotomy (POEM) include diverticular peroral endoscopic myotomy (D-POEM), gastric peroral endoscopic myotomy (G-POEM), and zenker peroral endoscopic myotomy (Z-POEM).

Summary and Analysis of Evidence: In an update of the clinical practice from the American Gastroenterological Association (AGA), Kahrilas et al (2017) described a place for per-oral endoscopic myotomy (POEM) among the currently available robust treatments for achalasia. The recommendations outlined were based on expert opinion and on relevant publications from PubMed and Embase. The Clinical Practice Updates Committee of the AGA included the following recommendation: “if the expertise is available, POEM should be considered as primary therapy for type III achalasia.”

UpToDate review “Overview of the treatment of achalasia” (Spechler, Pandolfino; 2025) states that “POEM is an effective submucosal endoscopic technique for performing myotomy of the LES and more proximal esophageal muscle. In addition, good results for POEM have been reported in patients with achalasia conditions that often do not respond well to conventional therapies, such as type III (spastic) achalasia and "end-stage" achalasia (markedly dilated, sigmoid esophagus), and in patients who have failed prior endoscopic and surgical achalasia treatments. The role of POEM in the treatment of achalasia continues to evolve, although there is a consensus that POEM is the procedure of choice for the treatment of type III achalasia. It has been suggested that patients undergoing POEM should be counseled regarding the increased risk of post-procedure reflux compared with other treatments.”

Tan et al (2021) examined the safety and efficacy of POEM in achalasia patients with failed previous intervention. These investigators searched the Medline, Embase, Cochrane, and PubMed databases using the queries "achalasia", "peroral endoscopic myotomy" and related terms in March 2019. Data on technical and clinical success, AEs, Eckardt score and lower esophageal sphincter (LES) pressure were collected. A total of 15 studies with 2,276 achalasia patients were included. Overall, the pooled technical success, clinical success and AE rate of rescue POEM were 98.0 %, 90.8 %, and 10.3%, respectively; 7 studies compared the clinical outcomes of POEM between previous failed treatment and the treatment naïve patients. The RR for technical success, clinical success, and AEs were 1.00 (95 % CI: 0.98 to 1.01), 0.98 (95 % CI, 0.92 to 1.04), and 1.17 (95 % CI: 0.78 to 1.76), respectively. Overall, there was significant reduction in the pre- and post-Eckardt score and LES pressure for achalasia patients with failed previous intervention after POEM. The authors concluded that POEM appeared to be a safe, effective and feasible treatment for individuals who had undergone previous failed intervention.

Zhong et al (2021) stated that peroral endoscopic myotomy (POEM) is a novel minimally invasive intervention, which has shown to be effective and safe for treating achalasia in adults. The authors conducted a study to explore the clinical outcomes of POEM for pediatric achalasia. A systematic literature search in PubMed, Embase, and Cochrane databases was performed, which covered the period from January 2009 to June 2020. A total of 11 studies with 389 children were identified in the final analysis. Pooled technical success of POEM treatment achalasia was achieved in 385 children (97.4%), and the pooled clinical success was achieved in 348 children (92.4%). After POEM, the Eckardt score was significantly decreased by 6.76 points, and the lower esophageal sphincter pressure was significantly reduced by 19.38 mmHg. The pooled major adverse events rate related to POEM was 12.8% and the gastroesophageal reflux rate was 17.8%. The authors stated “our study demonstrated that the POEM was an effective and safe technique for treating achalasia in children”, however, “further randomized comparative studies of POEM and other therapeutic methods are warranted to determine the most effective treatment modality for achalasia in children.”

Yang et al (2019) conducted a study to report on a multicenter experience with the diverticular peroral endoscopic myotomy (D-POEM) technique in the management of esophageal diverticula. It was an international, retrospective study involving three centers. D-POEM was performed using the principles of submucosal endoscopy. A total of 11 patients with an esophageal diverticulum (Zenker's 7, mid-esophagus 1, epiphrenic 3) were included. The mean size of the esophageal diverticula was 34.5 mm. The overall technical success rate of D-POEM was 90.9 %, with a mean procedure time of 63.2 minutes. There were no adverse events. Clinical success was achieved in 100 % (10 /10), with a decrease in mean dysphagia score from 2.7 to 0.1 during a median follow-up of 145 days. The authors concluded that “endoscopic management of esophageal diverticula using the novel technique of D-POEM appears promising. This first case series on D-POEM suggests that the procedure is feasible, safe, and effective in the management of esophageal diverticula. D-POEM offers the distinct advantage of ensuring a complete septotomy. Larger studies are needed to confirm these intriguing results.”

Maydeo et al (2019) stated that “submucosal tunneling diverticular septotomy by diverticular peroral endoscopic myotomy (D-POEM) has emerged as an alternative to surgery for symptomatic esophageal diverticula, but its medium to long-term outcomes are currently unexplored.” The authors prospectively studied D-POEM for patients with symptomatic esophageal diverticula to assess its safety and the 12-month outcomes. Twenty-five patients (72 % male; median age 61 years [range 48 - 88]) with a Zenker's diverticulum (n = 20) or epiphrenic diverticulum (n = 5) were included. Major indications were dysphagia, recurrent bronchoaspiration, and foreign body sensation in 20 patients (80 %), with a mean symptom duration of 2.5 years. Complete submucosal tunneling septotomy was achieved in a mean of 36 minutes,

with 100 % technical success. The median hospitalization was 5 days. The mean (standard deviation) Eckardt Score improved significantly from 13.2 (1.0) at baseline to 3.2 (1.4) at 12 months with clinical success in 19/22 patients (86 %) and no long-term adverse events. The authors concluded “D-POEM appears safe and durable in patients with esophageal diverticula. Further multicenter studies with a larger patient cohort are warranted.” Sato et al (2019) stated that “esophageal diverticula are rare conditions that cause esophageal symptoms, such as dysphagia, regurgitation, and chest pain. They are classified according to their location and characteristic pathophysiology into three types: epiphrenic diverticulum, Zenker’s diverticulum (ZD), and Rokitansky diverticulum.” The authors set out to review the pathophysiology of each type of diverticulum and the current state-of-the-art treatment based on their own experience. They concluded that the relative proportion of pulsion-type esophageal diverticula (epiphrenic and ZD) is increasing, while that of the traction-type (Rokitansky) is decreasing. Minimally invasive endoscopic treatment is indicated for pulsion-type diverticula and is being increasingly adopted owing to lower complication rates and equivalent efficacy to surgery. However, no randomized controlled trials comparing the difference between endoscopic treatment and surgery, or among the different endoscopic techniques have been performed. They stated “studies of long-term follow-up results, including esophageal motility outcomes, are required to decide the best intervention modality for esophageal diverticulum.”

Zeng et al (2020) reported on their experience with the use of diverticular POEM (D-POEM) technique in the management of esophageal diverticulum. This retrospective study included 10 consecutive patients with symptomatic esophageal diverticulum (Zenker's 2, mid-esophagus 5, and epiphrenic 3) who visited their endoscopy center between April 2014 and January 2019. D-POEM was performed based on the principles of submucosal endoscopy. A new symptomatic scoring system was introduced to evaluate the severity of diverticular symptoms. The overall technical success rate of D-POEM was 100%, with a mean procedure time of 38.9 ± 20.5 minutes. No serious complications occurred. Clinical improvement was achieved in 90% (9/10) of patients. The symptomatic score was significantly decreased from 2.5 to 1.0 during a median follow-up period of 11.0 months. The authors concluded their “preliminary data and experience put forwarded D-POEM as a safe and effective technique for esophageal diverticulum.” The study limitations included small size.

Kahaleh et al (2018) stated that “gastroparesis is a difficult-to-treat motility disorder with a poor response to medical therapy. Gastric peroral endoscopic pyloromyotomy (G-POEM) has been offered as a novel therapy in the treatment of refractory gastroparesis.” The authors conducted an international multicenter case series of patients who underwent G-POEM for the treatment of gastroparesis. The severity of gastroparesis was assessed by delayed gastric emptying scintigraphy (GES) and an elevated gastroparesis cardinal symptoms index (GCSI). Patients then underwent G-POEM using the submucosal tunneling technique. The primary endpoint was improvement in the GCSI score and improvement in gastric emptying on repeat scintigraphy. Secondary endpoints were technical success, complication rate, procedure duration, and length of hospital stay post-procedure. They stated “G-POEM was technically successful in all 33 patients. Symptomatic improvement was seen in 28/33 patients (85 %), with a decrease in symptom score by GCSI from 3.3 to 0.8 at follow-up. The mean procedure duration was 77.6 minutes (37 - 255 minutes). Mean GES improved significantly from 222.4 minutes to 143.16 minutes. Complications were minimal and included bleeding (n = 1) and an ulcer (n = 1) treated conservatively. The mean length of hospital stay post-procedure was 5.4 days (1 - 14 days). The mean follow-up duration was 11.5 months (2 - 31 months).” They concluded that G-POEM is a technically feasible, safe, and successful procedure for the treatment of refractory gastroparesis, noting “a further multicenter comparative study should be performed to compare this technique to laparoscopic pyloromyotomy.”

Myint et al (2018) stated “gastroparesis is a complex, debilitating dysmotility disorder with challenging symptom management.” The authors noted that pharmacologic therapies are limited by significant side effects, including extrapyramidal effect and tachyphylaxis. Electrical stimulation and gastric pacing have been used, with small studies noting improved symptoms and gastric emptying. Botulinum toxin injection into the pylorus has shown some efficacy in small trials. Novel endoscopic treatment options such as G-POEM have shown some efficacy in small trials. They concluded “further investigation is warranted to identify new and effective treatment options to address the substantial morbidity of gastroparesis.”

Tao et al (2019) noted that gastric peroral endoscopic pyloromyotomy (G-POEM or POP) is a feasible and effective procedure for the treatment of refractory gastroparesis. G-POEM is a technically demanding

endoscopic procedure. As of yet, there is no consensus on the technique. A variety of techniques have been reported in published studies. The essential technical steps of the procedure are (1) establishment of submucosal tunnel in gastric antrum, (2) identification of the pyloric muscular ring, (3) selective circular myotomy, and (4) a 2.5-cm to 3.0-cm length of myotomy. There are still some technical questions unanswered, and more studies are needed to establish standardized techniques and possible improvement of outcomes.

Zhang et al (2019) assessed the efficacy and safety of gastric peroral endoscopic myotomy for the treatment of gastroparesis. PubMed, Embase, Cochrane Library and Web of Science databases were searched from their earliest records to May 2018. The evaluation of clinical efficacy and safety was based on gastric emptying scintigraphy normalization, the improvement in clinical symptoms and adverse event rate. Fourteen studies with a total of 276 patients were included in this systematic review. The mean Gastroparesis Cardinal Symptom Index score improvement rate was about 90.2% at one month follow-up, 83.3% at three months, 70.3% at six months, 52.4% at twelve months and 57.1% at eighteen months. The authors stated that their systematic review "demonstrates that gastric peroral endoscopic myotomy is a safe and effective treatment for gastroparesis. Though the short-term outcomes are promising, prospective, randomized, controlled studies with large sample size and long-term follow-up are required to further confirm these results."

UpToDate review "Treatment of Gastroparesis" (Camilleri, 2025) states, "G-POEM may improve symptoms and gastric emptying in individuals with refractory gastroparesis. In a randomized trial of 41 patients with refractory gastroparesis, G-POEM resulted in a higher likelihood of treatment success (defined as a decrease in Gastroparesis Cardinal Symptom Index (GCSI) score of ≥50 percent) than a sham control (71 versus 22 percent). It appeared particularly effective in those with diabetic gastroparesis. A meta-analysis of 20 observational studies with 797 participants also found that G-POEM was associated with improved post-procedure GCSI scores and high rates of technical success." The review further stated, "endoscopy and laparoscopic interventions directed at the pylorus should be reserved for individuals with refractory gastroparesis. Interventions include laparoscopic (pyloroplasty) and endoscopic approaches (gastric peroral endoscopic myotomy [G-POEM], transpyloric stent). Although observational studies suggest that these procedures may improve symptoms in patients with refractory gastroparesis, these findings await confirmation by randomized, sham-controlled trials."

Zhang et al (2022) conducted a meta-analysis to estimate the safety and efficacy of Z-POEM for Zenker's diverticulum (ZD) and compare the feasibility and effectiveness of Z-POEM with that of flexible endoscopic septotomy (FES). The authors conducted a comprehensive literature search in PubMed, EMBASE, Web of Science, and Cochrane Library databases to query for studies that assessed the safety and efficacy of Z-POEM for ZD. All articles published from inception to July 31, 2021 were included. Eleven studies involving 357 patients undergone Z-POEM were included. The overall pooled technical success rate for Z-POEM was 96.3. The total pooled clinical success rate for Z-POEM was 93.0%. The pooled incidence of adverse events for Z-POEM was 12.4%. The pooled clinical recurrence rate for Z-POEM was 11.2%. The clinical success for Z-POEM was significantly better than that of FES, while there were no significant differences in technical success, adverse events, and clinical recurrence between Z-POEM and FES. They concluded "Z-POEM could be an effective and safe therapeutic modality for ZD, and even has a slightly higher clinical success rate than FES. However, comparative studies with long-term follow-up will be needed to further confirm our finding.

Elkholy et al (2021) studied 24 patients diagnosed with Zenker's diverticulum (ZD) who underwent Z-POEM at seven independent endoscopy centers in five different countries. Mean patient age ± standard deviation (SD) was 74.3 ± 11 years. Most of the patients were males (n = 20, 83.3%); four (16.7%) were females. More than 50% of the patients (n = 14, 58.3%) had associated comorbidities. The mean size of the diverticula was 4 cm (range 2-7 cm). The Kothari-Haber Score was used to assess clinical symptoms; values ranged from 6 to 14 (median = 9). 100% technical success was achieved with a median procedure time of 61 min and no adverse events. Median hospital stay was 1 day (range 1-5 days). There is a significant reduction in the Kothari-Haber Score after Z-POEM. Technical success was achieved in 100% of the patients. Clinical success was achieved in 23/24 (95.8%) of the patients with a median follow-up of 10 months (range 6-24 months).

UpToDate review “Zenker's diverticulum” (van Delft, 2025) states “Zenker-peroral endoscopic myotomy (Z-POEM) is a newer flexible endoscopic technique for the management of ZD which is considered the endoscopic equivalent of surgical myotomy. Z-POEM relies on submucosal tunneling to completely expose and dissect the septum. Submucosal tunneling may be particularly suitable for treating small (<2 cm) ZD because the small pocket may disappear after the myotomy is performed. For larger ZDs (>2 cm), however, division of some of the mucosa is also required to create a common channel between the diverticulum and the native esophageal lumen, which ensures proper drainage of the ZD. Data comparing the efficacy of POEM with other approaches are limited and conflicting, and expertise in Z-POEM is not widely available.

UpToDate review “Peroral endoscopic myotomy (POEM) (Khashab, 2025) states “a variety of endoscopic techniques have been described for the treatment of Zenker's diverticula (ZD) with clinical success rates between 56 and 100 percent and adverse events in an average of 15 percent of cases. Clinical recurrence occurs in 10.5 percent of patients, but recurrence rates up to 35 percent have been reported. It is not possible to accurately delineate the terminal end of the diverticulum during standard endoscopic Zenker's septotomy, and recurrence has been linked to incomplete septotomy. POEM could be a promising technique to allow complete transection of ZD septum (Z-POEM), as submucosal tunneling enables complete exposure and dissection of the septum. This may result in diminishing the risk of symptom recurrence.

Rausa et al (2023) published a network meta-analysis of RCTs comparing TIF (n=188) to anterior partial fundoplication (n=322), laparoscopic Toupet fundoplication (n=1120), laparoscopic Nissen fundoplication (n=1740), and PPI therapy (N=80) in patients with recalcitrant GERD. The outcomes of interest were differences in the rate of heartburn, regurgitation, dysphagia, bloating, and PPI discontinuation. TIF did not differ significantly from the other treatments in the pooled network analysis for any outcome. Treatment failure was not included in the quantitative analysis due to the considerable heterogeneity across studies.

Testoni et al (2021) published a systematic review and meta-analysis focusing on long-term (≥3 years) outcomes of patients with GERD undergoing TIF (using either EsophyX or MUSE). Outcomes of interest included patient satisfaction, QOL, and PPI use. The mean follow-up time across studies was 5.3 years (range , 3 to 10 years). Daily PPI use was 100% in 5 studies, 97% in 1 study, and was not provided in the other 2 studies. Overall, the pooled proportion of patient-reported satisfaction before and after TIF was 12.3% and 70.6%, respectively. Additionally, the pooled rates of patients completely off, or on occasional, PPIs post-TIF was 53.8% and 75.8%. The analysis was limited by various factors including the nature of included studies, which involved only 1 open-label RCT among the 8 studies included, and the high heterogeneity across studies for patient reported overall satisfaction after the TIF procedure. Trad et al (2018) reported a 5-year follow-up for the TEMPO trial. Data were available for 44 patients, of whom 37 (86%) showed elimination of troublesome regurgitation at 5 years. Twenty (43%) patients were completely off PPIs at the 5-year follow-up, and 31 (70%) patients expressed satisfaction with the procedure, as assessed by the GERD-HRQL scores. While data on pH normalization were available for 24 patients at the 3-year follow-up, at 5 years, 22% (n=5) of these patients could not be assessed for pH normalization.

Xie et al (2021) published a systematic review and network meta-analysis of 10 RCTs that evaluated the comparative effects of Stretta, TIF, and PPIs in patients with GERD. Of the included RCTs, 5 compared Stretta to control (PPI or sham + PPI) and 5 compared TIF to control (PPI or sham + PPI). Results of the network meta-analysis revealed that improvements in the health-related QOL score induced by Stretta were not significantly different than the improvements seen with TIF; however, both Stretta and TIF were significantly superior to PPIs. Additionally, both Stretta and TIF were significantly better than PPIs at improving heartburn scores. With regard to reduction in PPI use and esophagitis incidence, no significant differences between TIF and Stretta were observed. This network meta-analysis had several limitations including a lack of assessment of long-term efficacy, the inclusion of only 10 studies with even fewer studies evaluated for each individual outcome, and lack of RCTs directly comparing Stretta and TIF. Additionally, some of the comparisons were significantly affected by heterogeneity and the evidence quality of each outcome (as assessed by GRADE) ranged from moderate to very low.

Zerbib et al (2020) published a double-blind RCT that compared Stretta plus PPI therapy (n=29) to sham plus PPI therapy (n=33) in individuals with PPI-refractory heartburn from 8 French centers. The primary endpoint was clinical success at week 24, defined as an intake of fewer than 7 PPI doses over the previous 2 weeks and adequate subjective patient-reported symptom control. Fewer patients achieved the primary endpoint in the Stretta group, but the difference was not statistically significant. Severe adverse events were more frequent in the Stretta group (7 vs. 2) and included epigastric pain (n=3), delayed gastric emptying, vomiting, headache, and 1 leiomyoma. Limitations of this RCT include that pH-impedance monitoring was not performed either at enrollment or during follow-up. Thus, baseline status of GERD diagnosis is unclear and the physiologic effects of Stretta are unknown.

Ma et al (2020) reported on a retrospective comparison of laparoscopic Toupet fundoplication with the Stretta procedure. GERD relapse was the primary endpoint. The 2 groups were comparable at baseline in demographic characteristics, body mass index, GERD family history, and comorbid hypertension, coronary disease, and diabetes. Two patients in each group were lost to follow-up and excluded from the final analyses. At 12 months, there were no statistically significant differences between the laparoscopic Toupet fundoplication and Stretta groups in GERD relapse, reflux outcomes, dysphagia, bloating, diarrhea, or chronic stomach pain. However, compared to laparoscopic Toupet fundoplication, the Stretta group had a high DeMeester score and less lower esophageal sphincter pressure. Important limitations of this study are its single-center design and short follow-up time.

The available evidence for polymethylmethacrylate beads consists of a single case series. A case series by Feretis et al (2001) evaluated transesophageal submucosal implantation of polymethylmethacrylate beads in 10 patients with GERD who were either refractory to or dependent on PPIs. While a significant decrease in symptom scores was noted at posttreatment follow-up (time not specified), the small number of patients and lack of long-term follow-up precluded scientific analysis. No additional studies have been identified evaluating this treatment option.

In 2012, the LINX® Reflux Management System was approved by the U.S. Food and Drug Administration (FDA) through the premarket approval process (P100049) for patients diagnosed with GERD, as defined by abnormal pH testing, and who continue to have chronic GERD symptoms despite maximal therapy for the treatment of reflux. The FDA initially required a 5-year follow-up of 100 patients from the investigational device exemption pivotal study to evaluate the safety and efficacy of the device, which was completed in March 2016. In 2018, the manufacturer initiated a device recall due to a possible separation of the bead component with the adjacent wire link causing a potential discontinuous or open LINX device. This recall was terminated on November 4, 2020. In March 2018, the FDA approved an update of the LINX® Reflux Management System precautions statement, stating that the use of the system "in patients with a hiatal hernia larger than 3 cm should include hiatal hernia repair to reduce the hernia to less than 3 cm and that the LINX Reflux Management System has not been evaluated in patients with an unrepaired hiatal hernia greater than 3 cm, add a hiatal hernia clinical data summary in the instructions for use, update the instructions for use section to highlight the recommendation to repair a hiatal hernia, if present, at the time of the LINX Reflux Management System implantation, and update the patient information booklet to align with the instructions for use and include 5 year clinical study results.

Asti et al (2023) published data from an observational, retrospective cohort study comparing MSA and laparoscopic Toupet fundoplication (LTF) in patients with refractory GERD at a single tertiary-care center in Italy. Patients underwent laparoscopic antireflux surgery for GERD and/or large hiatal hernias from January 2014 to December 2021 in 199 patients [130 MSA; 69 Toupet fundoplication). All patients included had persistent GERD symptoms despite PPI therapy for at least 6 months with abnormal acid exposure at the time of esophageal pH monitoring and initial hernia < 3cm. Patients with previous esophageal or gastric surgeries were excluded. Both groups had a median follow-up time of 12 months. The morbidity rate in the MSA group was 0.8% and 2.9% after LTF, with no post-operative deaths in either group. A significant decrease in GERD-HRQL score was noted in both patient groups, but when adjusted for age, sex, and baseline GERD scores no significant differences in the change from baseline were observed between groups. Patients in the MSA group had a greater incidence of grade > 2 dysphagia (35.5%) compared to the LTF group (7.7%). No significant differences were observed in the rate of severe or persistent bloating between groups or continued PPI therapy. Limitations of the study include lack of randomization and blinding and imbalance of baseline patient characteristics including

GERD-HREQL score, duration of PPI therapy, hernia size, gender, and age. It is unclear to what extent study results are generalizable to U.S. populations and broader care settings.

Callahan et al (2023) published a retrospective review of a prospective database evaluating patients who underwent LNF, Toupet, MSA, or anti-reflux mucosectomy (ARMs). Patients were followed up at 3 weeks, 6 months, 1 year, 2 years, and 5 years post-operation. A total of 649 patients had reflux surgery during the study period from 2008 to 2021 including 356 LNF, 207 LTF, 46 MSA, and 40 ARMs procedures. These groups were imbalanced on several baseline characteristics including age, BMI, gender, hypertension medication usage, pre-operative dysphagia, esophageal motility, and hernia type. Procedure time was significantly shorter in patients treated with MSA or ARM compared to fundoplication. At 3 weeks follow-up patients in the MSA group had higher reflux symptoms index scores and GERD-HRQL scores than patients in the Toupet fundoplication group, but these differences had resolved by 6 months with all four treatment groups showing similar outcomes. One-year follow-up data on GERD-HRQL showed a significant difference between the MSA group and ARM groups with the MSA group having worse symptoms; this difference was not observed at 2-year follow-up, but at 5 years MSA patients had worse GERD-HRQL scores compared to the Toupet fundoplication group. All groups had similar scores at all time points follow-up for gas bloating and dysphagia symptoms. Limitations of the study include lack of randomization and blinding, imbalance of baseline patient characteristics, and changes in secular trends over the study period which resulted in predominantly younger patients with normal manometry receiving LNF.

O'Neil et al (2023) published a retrospective cohort study of patients undergoing MSA (n=25) compared to LNF (n=45) for the management of symptomatic GERD from a single center from 2013 to 2015 with the intent of comparing long-term follow-up outcomes at 5 years. At baseline, patients were imbalanced on gender, with LNF having more females, BMI with LNF patients being more overweight, and baseline GERD-HRQL scores with LNF having worse symptoms. In the short term, both groups experienced improvements in GERD-HRQL and gastroesophageal reflux symptom scale (GERSS) scores and reductions in PPI usage from baseline levels, but no significant between-group differences were observed. The median long-term follow-up was 65 months for LNF (range, 51 to 85 months) and 68 months for MSA (range, 57 to 87 months); 5 patients in the MSA group and 4 patients in the LNF group did not have long-term outcomes reported. At the last available follow-up, between-group comparisons of outcomes were equivalent for all reported outcomes. Patients in the MSA group had a rate of PPI use of 40% compared to 33% in the LNF group. Median GERD-HRQL scores were 9 in the MSA group and 7.5 in the LNF group; median overall GERSS scores also did not vary significantly. Rates of revision were 20% in the MSA group and 7% in the LNF group. A within-group longitudinal comparison of pre-operative, to post-operative, and long-term follow-up values showed both groups had significant reductions in PPI usage, improvements in GERD-HRQL, and GERSS overall scores. Limitations of the study include lack of randomization and blinding as well as an imbalance of baseline patient characteristics.

Ayazi et al (2020) published a retrospective review of 380 patients treated with MSA with a mean follow-up duration of 11.5 ± 8.7 months. Persistent dysphagia was reported in 59 (15.5%) patients with 31% requiring at least 1 dilation for dysphagia or chest pain. The overall response rate to dilation was 67%, with 7 (1.8%) patients requiring device removal for dysphagia. Independent predictors of persistent dysphagia included the absence of a large hiatal hernia, the presence of preoperative dysphagia, and having less than 80% peristaltic contractions on high-resolution impedance manometry.

In January 2022, the American College of Gastroenterology (ACG) published a clinical guideline on the diagnosis and management of GERD. Relevant recommendations concerning surgical management of refractory GERD include: “We recommend consideration of MSA as an alternative to laparoscopic fundoplication for patients with regurgitation who fail medical management (strong recommendation; moderate level of evidence)." The guideline also notes that due to the paucity of long-term data on MSA outcomes and lack of randomized trials directly comparing MSA with fundoplication, "it is difficult to recommend one over the other at this time."

The American Foregut Society (AFS) issued a statement on appropriate patient selection and use of MSA and noted that "patient selection criteria for MSA do not differ in principle from those of any other surgical procedure for reflux disease." Indications for MSA include: "Typical GERD symptoms (i.e., heartburn, regurgitation) with break-through symptoms, intolerance to medical therapy, and/or unwillingness to take

anti-reflux medications long term; regurgitation despite optimized medical therapy and lifestyle modification; extraesophageal symptoms with objective evidence of significant reflux disease (i.e., endoscopic evidence of [Los Angeles] Class C or D esophagitis, Barrett's esophagus or positive pH study)." The statement additionally notes that "MSA candidacy largely mirrors that for laparoscopic fundoplication. Low dysphagia rates for MSA have been found when performed in patients with normal esophageal motility." The AFS also recommends that a full hiatal dissection and cruroplasty be performed prior to implantation of an MSA device. The AFS Bariatric Committee also issued a statement regarding the concurrent use of MSA at the time of primary bariatric surgery, noting that this practice "violates many basic surgical principles and is not considered judicious use by the American Foregut Society." The statement also notes that prospective trials demonstrating the safety and efficacy of concurrent MSA are needed.

The American Gastroenterological Association (AGA) issued a statement on the personalized approach to evaluating and managing individuals with GERD in 2022. The authors provided a best practice recommendation: "In patients with proven GERD, laparoscopic fundoplication and magnetic sphincter augmentation are effective surgical options, and transoral incisionless fundoplication is an effective endoscopic option in carefully selected patients."

In 2023, the National Institute for Health and Care Excellence (NICE) issued an interventional procedure guidance on laparoscopic insertion of a magnetic ring for GERD. The following recommendations were based on a comprehensive literature search and review: "Evidence on the safety and efficacy of laparoscopic insertion of a magnetic ring for GERD is adequate to support using this procedure provided that standard arrangements are in place for clinical governance, consent, and audit"; and "Patient selection and the procedure should be done by clinicians who have specific training in the procedure and experience in upper gastrointestinal laparoscopic surgery and managing GERD."

A multi-society consensus guideline on the treatment of GERD was issued by the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES), American Society for Gastrointestinal Endoscopy (ASGE), American Society for Metabolic and Bariatric Surgery (ASMBS), European Association for Endoscopic Surgery (EAES), Society for Surgery of the Alimentary Tract (SSAT), and the Society of Thoracic Surgeons (STS) in 2023. Based on a review of the available evidence the consensus panel determined the following recommendations: 1) "The panel suggests that adult patients with GERD may be treated with either MSA or Nissen fundoplication based on surgeon and patient shared decision-making" (Conditional recommendation based on very low certainty of evidence); and 2) "The panel suggests that adult patients with GERD may benefit from MSA over continued PPI use" (Conditional recommendation based on moderate certainty of evidence)."

Latorre-Rodriguez et al (2023) stated that magnetic sphincter augmentation (MSA) is an alternative surgical treatment for gastroesophageal reflux disease; however, >1.5 T magnetic resonance imaging (MRI) is contraindicated for patients who have undergone MSA with the LINX Reflux Management System. This drawback can impose a barrier to access of MRI, and cases of surgical removal of the device to enable patients to undergo MRI have been reported. To evaluate access to MRI for patients with an MSA device, the authors conducted a structured telephone interview with all diagnostic imaging providers in Arizona in 2022. In 2022, only 54 of 110 (49.1%) locations that provide MRI services had at least one 1.5 T or lower MRI scanner. The rapid replacement of 1.5 T MRI scanners by more advanced technology may limit healthcare options and create an access barrier for patients with an MSA device.

Fadel et al (2023) conducted a systematic review and meta-analysis to assess efficacy, quality of life and safety in patients that underwent MSA, with a comparison to fundoplication. A literature search of MEDLINE, Embase, Emcare, Scopus, Web of Science and Cochrane library databases was performed for studies that reported data on outcomes of MSA, with or without a comparison group undergoing fundoplication, for GERD from January 2000 to January 2023. Meta-analysis was performed using random-effect models and between-study heterogeneity was assessed. Thirty-nine studies with 8,075 patients were included: 6,983 patients underwent MSA and 1,092 patients had laparoscopic fundoplication procedure. Ten of these studies (7 retrospective, 3 prospective) directly compared MSA with fundoplication. A higher proportion of individuals successfully discontinued proton-pump inhibitors and had higher patient satisfaction following MSA when compared to fundoplication. Functional outcomes were better after MSA than after fundoplication including ability to belch and emesis, and bloating. MSA

had higher rates of dysphagia when compared to fundoplication. The overall erosion and removal rate following MSA was 0.24% and 3.9% respectively, with no difference in surgical re- intervention rates between MSA and fundoplication. The authors concluded “MSA is a safe and effective procedure at reducing symptom burden of GERD and can potentially improve patient satisfaction and functional outcomes. However, randomized controlled trials directly comparing MSA with fundoplication are necessary to determine where MSA precisely fits in the management pathway of GERD.”

Jefferies et al (2024) conducted a comparative analysis of MSA and subtotal gastrectomy with Roux-en-Y reconstruction (SGRY) for post-sleeve gastrectomy (SG) GERD to evaluate postoperative outcomes. A retrospectively maintained prospectively gathered database from 2018 to 2023 was used to identify patients who underwent MSA or SGRY for the indication of GERD after SG. Differences among patient characteristics; GERD assessments, including the health-related quality of life (HRQL) questionnaire and the reflux symptom index (RSI); and procedure outcomes were collected and analyzed according to surgery type. A total of 92 patients (85 females and 7 males) met the inclusion criteria. The study included 17 patients in the MSA group, 71 patients in the SGRY group, and 4 patients who underwent both procedures. The average preoperative body mass index (BMI) of all patients was 33.3. Compared with patients who underwent MSA, those who underwent SGRY presented with higher BMI, preoperative GERD-HRQL, and RSI. Postoperatively, patients who underwent SGRY demonstrated a higher decrease in mean postoperative DeMeester score than those who underwent MSA, with 22 patients (50%) in the SGRY group vs 10 patients (20%) in the MSA group achieving normalization. The authors stated that although MSA remains a viable surgical alternative, “our study indicated that SGRY can produce better symptom control and decrease acid exposure compared with MSA in patients with post-SG GERD.”

UpToDate review “Surgical treatment of gastroesophageal reflux in adults” (Sachwaitzberg, 2025) states that transoral incisionless fundoplication (TIF) with or without hiatal hernia repair, magnetic sphincter augmentation (MSA), laparoscopic Hill gastropexy, laparoscopic partial fundoplication and laparoscopic Nissen (complete) fundoplication “vary by efficacy and durability on one hand and adverse effect profiles on the other. At one end of the spectrum, laparoscopic Nissen fundoplication is highly effective in relieving GERD symptoms and is the most durable amongst all the procedures; however, it is also associated with the greatest potential for adverse effects, such as dysphagia, difficulty in vomiting, and gas bloating. At the other end of the spectrum, endoscopic procedures such as Stretta and TIF are least likely to be associated with adverse effects. However, their efficacy and durability are not as good as those of a complete fundoplication. Partial fundoplications, Hill procedure, and MSA generally fall in the middle of the spectrum balancing both efficacy/durability and adverse effect profile.” The review further states, “Fundoplication remains the standard treatment for patients with GERD complicated by hiatal hernia >2 cm, severe (Los Angeles class C or D) erosive esophagitis, peptic stricture, and/or Barrett's esophagus. Newer procedures such as c-TIF or LINX have been attempted in patients with hiatal hernias >2 cm, but long-term results are not yet available.”

UpToDate review “Magnetic sphincter augmentation (MSA)” (Louie, Prakash; 2025) states “compared with fundoplication, MSA has some clear advantages and disadvantages. Patients with early gastroesophageal reflux disease (GERD) should choose among all available surgical or endoscopic antireflux procedures based upon the efficacy/durability and potential adverse effects/perturbation to gastrointestinal physiology associated with each procedure. This shared decision-making process also sets the correct expectation for surgical outcomes. Based on symptom improvement, cessation of proton pump inhibitors (PPIs), and reinterventions, especially when using the current implantation technique, MSA functions similarly to Nissen (complete) fundoplication. It does so with less bloating and preserves the ability to belch and vomit, which are functions patients strongly value. MSA has similar outcomes in terms of GERD control and side effects compared with Toupet (partial) fundoplication. MSA, even with its current implantation technique, is less invasive than fundoplication because it does not alter the gastric fundus. This has allowed nearly all MSA procedures to be performed as outpatient surgery and nearly all patients to resume a normal, albeit small, meal the day after surgery. By comparison, fundoplication has more dietary restrictions in the early postoperative period. MSA also generates fewer ongoing concerns for nausea and emesis than fundoplication. Dysphagia is the most common side effect of MSA and early on appeared to have a higher rate of dysphagia than fundoplication. However, a long-term comparison study reported similar rates of dysphagia at baseline and at five years of follow-up. Patients must be

made aware of the risks of implanting a foreign body. Although the risk of erosion is exceptionally small, it is not zero."

Bloomsburg et al (2025) conducted a single-institution retrospective review of patients who underwent MSA placement and device removal between 2014 and 2024. Radiographic and endoscopic images and operative reports were reviewed for the presence of pre-operative and post-operative hiatal hernia or device malposition. They also conducted a comprehensive review of existing literature on MSA explantation, with particular attention to device slippage, malposition, and hiatal hernia. Forty-two patients underwent MSA placement at their tertiary academic institution. Twelve of these, plus one patient who had MSA placed elsewhere, underwent device removal for symptoms of dysphagia and/or recurrent reflux (28%) with a median follow-up of 41.1 months. Ten of these 13 patients showed evidence of MSA slippage and/or hiatal hernia. In comparison, literature review revealed explant rates of 0-12.6% (median 4.7%) with overall shorter terms of follow-up. Similarly, the most common reason for explantation was dysphagia, followed by recurrent or persistent reflux. Device migration/hiatal herniation was a rare finding. The authors concluded that in long-term follow-up of MSA patients with dysphagia or recurrent reflux, a pattern of device slippage or migration was observed. This pattern mirrors the failure pattern of the 360-degree fundoplication. An under-appreciation of device slippage or migration as the etiology for these symptoms was suspected. The authors stated "while MSA is effective, continued improvements on implantation technique, coupled with careful patient selection and lifestyle counseling, may increase its long-term success rate.

Daus et al (2024) performed a retrospective propensity-matched cohort study of patients with GERD undergoing magnetic sphincter augmentation (MSA) or Nissen fundoplication (NF) between 2012 and 2018. Patients were matched on age, sex, body mass index, size of hiatal hernia, length of Barrett esophagus, and motility in a 1:1 fashion. A total of 523 patients (177 MSA, 346 NF) underwent surgery and after matching 177 MSA and 177 NF cases were analyzed. At 1 year, GERD quality of life scores improved (22 to 5 MSA vs 24 to 5 NF, P = .593). Proton pump inhibitor use was 14% vs 5% (P = .010). pH testing demonstrated improved DeMeester scores (42 to 21 vs 46 to 7, P < .001). At 5 years, GERD quality of life scores were stable (5 to 5 vs 5 to 4, P = .208). Proton pump inhibitor use was 31% vs 26% (P = .474). The incidence of endoscopic dilation was similar between MSA and NF (7% vs 10%, P = .347). Reoperation rates were higher for MSA (10% vs 4%, P = .022) and recurrent hiatal hernias were found in 18% vs 7% (P = .007). Compared to NF, MSA undergoing complete dissection showed no difference in dilation (5% MSA vs 7% NF, P = .527), reoperation (8% MSA vs 6% NF, P = .684) or hernia recurrence (10% MSA vs 6% NF, P = .432). The authors concluded "MSA achieves similar improvements in quality of life and freedom from medical therapy compared to NF, especially with complete hiatal repair", also noting that while long-term, single-arm studies show durable outcomes, but there is limited comparative data to Nissen fundoplication (NF)."

POSITION STATEMENT:

Peroral endoscopic myotomy (POEM) **meets the definition of medical necessity** when **ALL** of the following are met:

- Age 18 or older
- Primary idiopathic achalasia confirmed by esophageal manometry
- Eckardt symptom score (ESS)* is greater than 3
- No previous history of open surgery of the stomach or esophagus

The following procedures are considered **experimental or investigational**:

- Diverticular peroral endoscopic myotomy (D-POEM)
- Gastric peroral endoscopic myotomy or pyloromyotomy (G-POEM)
- Zenker peroral endoscopic myotomy (Z-POEM)
- Transoral incisionless fundoplication (TIF) (e.g., Esophyx)

- Transesophageal radiofrequency to create submucosal thermal lesions of the gastroesophageal junction (e.g., the Stretta procedure)
- Endoscopic submucosal implantation of a prosthesis or injection of a bulking agent (e.g., polymethylmethacrylate beads, zirconium oxide spheres)
- Magnetic sphincter augmentation (e.g., LINX™ Reflux Management System) for the treatment of GERD

There is a lack of clinical scientific evidence published in peer-reviewed literature to permit conclusions on safety and net health outcomes associated with the procedures listed above.

*Eckardt Symptom Score (ESS)

Each symptom is graded on a score of 0 to 3, with a maximum score of 12.

Score	Recent weight loss (kg)	Dysphagia	Chest pain	Regurgitation
0	None	None	None	None
1	< 5kg	Occasional	Occasional	Occasional
2	5-10kg	Daily	Daily	Daily
3	> 10kg	Each meal	Several times per day	Each meal

BILLING/CODING INFORMATION:

CPT Coding:

43210	Esophagogastroduodenoscopy, flexible, transoral; with esophagogastric fundoplasty, partial or complete, includes duodenoscopy when performed **(Investigational)**
43257	Esophagogastroduodenoscopy, flexible, transoral; with delivery of thermal energy to the muscle of lower esophageal sphincter and/or gastric cardia, for treatment of gastroesophageal reflux disease [Stretta] **(Investigational)**
43284	Laparoscopy, surgical, esophageal sphincter augmentation procedure, placement of sphincter augmentation device (i.e., magnetic band), including cruroplasty when performed **(Investigational)**
43285	Removal of esophageal sphincter augmentation device **(Investigational)**
43497	Lower esophageal myotomy, transoral (i.e., peroral endoscopic myotomy [POEM])

REIMBURSEMENT INFORMATION:

Refer to section entitled **POSITION STATEMENT**.

PROGRAM EXCEPTIONS:

Federal Employee Program (FEP): Follow FEP guidelines.

State Account Organization (SAO): Follow SAO guidelines.

Medicare Advantage products: No National Coverage Determination (NCD) and/or Local Coverage Determination (LCD) was found at the time of the last guideline review date.

If this Medical Coverage Guideline contains a step therapy requirement, in compliance with Florida law 627.42393, members or providers may request a step therapy protocol exemption to this requirement if based on medical necessity. The process for requesting a protocol exemption can be found at Coverage Protocol Exemption Request.

DEFINITIONS:

Achalasia: a disorder of the esophagus characterized by reduced numbers of neurons in the esophageal myenteric plexuses and reduced peristaltic activity, making it difficult to swallow food and possibly leading to complications such as regurgitation, coughing, choking, aspiration pneumonia, esophagitis, ulceration, and weight loss.

Dysphagia: Difficulty in swallowing.

Eckardt symptom score: a grading system most frequently used for the evaluation of symptoms, stages and efficacy of achalasia treatment. It attributes points (0 to 3 points) for four symptoms of the disease (dysphagia, regurgitation, chest pain and weight loss), ranging from 0 to 12.

Gastroesophageal junction: The lower part of the esophagus that connects to the stomach.

Myotomy (i.e., Heller myotomy): a surgical procedure in which the muscles of the lower esophageal sphincter (LES) are cut, allowing food and liquids to pass to the stomach; used to treat achalasia.

Nissen fundoplication: A surgical procedure in which the upper portion of the stomach is wrapped around the lower end of the esophagus and sutured in place as a treatment for GERD.

Odynophagia: Pain produced by swallowing.

Proton pump inhibitor (PPI): Any of a group of drugs (e.g., omeprazole) that inhibit the activity of proton pumps and are used to inhibit gastric acid secretion in the treatment of ulcers and gastroesophageal reflux disease.

RELATED GUIDELINES:

Endoscopic Radiofrequency Ablation or Cryosurgical Ablation for Barrett's Esophagus, 01-91000-10

OTHER:

NOTE: The use of specific product names is illustrative only. It is not intended to be a recommendation of one product over another and is not intended to represent a complete listing of all products available.

Other names used to report minimally invasive procedures for treating gastroesophageal reflux disease:

- Angelchik anti-reflux prosthesis
- ARD Plicator
- Bard Endoscopic Suturing System (BESS)
- Durasphere®
- EndoLuminal gastroplication
- Endoscopic Plicator™ System
- EsophyX™ System
- Gatekeeper™ Reflux Repair System
- Implantable magnetic esophageal ring
- LINX™ Reflux Management System
- Magnetic sphincter augmentation (MSA)
- Mechanical sphincter augmentation (MSA)
- MUSE™ System

- OverStitch Endoscopic Suturing System
- Plexiglas polymethylmethacrylate (PMMA) microspheres
- SRS™ Endoscopic Stapling System
- StomaphyX™ System
- Stretta® System

REFERENCES:

1. AGA Clinical Practice Update on the Diagnosis and Management of Extraesophageal Gastroesophageal Reflux Disease: Expert Review. Chen, Joan W. et al. Clinical Gastroenterology and Hepatology, Volume 21, Issue 6, 1414 - 1421.e3
2. Agency for Healthcare, Research and Quality (AHRQ) (2011). Comparative Effectiveness Review #29. Management Strategies for Gastroesophageal Reflux Disease: An Update. Executive Summary (Updated 09/23/11).
3. Aiolfi A, Asti E, et al. Early results of magnetic sphincter augmentation versus fundoplication for gastroesophageal reflux disease: Systematic review and meta-analysis. Int J Surg. 2018 Apr; 52:82-88. Doi: 10.1016/j.ijsu.2018.02.041. Epub 2018 Feb 20.
4. Alicuben ET, Bell RCW, Jobe BA, et al. Worldwide Experience with Erosion of the Magnetic Sphincter Augmentation Device. Journal of Gastrointestinal Surgery (2018). https://doi.org/10.1007/s11605-018-3775-0.
5. American College of Gastroenterology. Practice Guidelines: Updated guidelines for the diagnosis and treatment of gastroesophageal reflux disease (01/05)
6. American College of Gastroenterology, Guidelines for the Diagnosis and Management of Gastroesophageal Reflux Disease. Am J Gastroenterol advance online publication (02/19/13).
7. American College of Gastroenterology. ACG Clinical Guidelines: Diagnosis and Management of Achalasia. The American Journal of Gastroenterology: September 2020 — Volume 115 — Issue 9 — p 1393-1411. Doi: 10.14309/ajg.0000000000000731.
8. American Foregut Society. Letter to Insurance Carriers Regarding: Insurance coverage for the LINX® Reflux Management System procedure for gastroesophageal reflux disease. Accessed at https://www.americanforegutsociety.org.
9. American Gastroenterological Association Position Statement on the Management of Gastroesophageal Reflux Disease. Gastroenterology 2008; 135:1383-1391. (Updated 07/26/10)
10. American Gastroenterological Association Medical Position Statement on the Management of Gastroesophageal Reflux Disease (10/2008).
11. American Gastroenterological Association Position Statement on the use of Endoscopic Therapy for Gastroesophageal Reflux Disease. Gastroenterology 2006; 131:1313-1314.
12. American Gastroenterological Association Technology Coverage Statement on Minimally Invasive Surgical Options for Gastroesophageal Reflux Disease (April 2016).
13. American Society for Gastrointestinal Endoscopy (ASGE) Technology Assessment Committee. Endoscopic anti-reflux procedures. Updated 03/01/09.
14. American Society for Gastrointestinal Endoscopy (ASGE). Role of endoscopy in the management of GERD. Gastrointest Endosc 2007 Aug;66(2):219-24 (reaffirmed 2011).
15. American Society for Gastrointestinal Endoscopy (ASGE). Role of endoscopy in the management of GERD. Gastrointestinal Endoscopy Vol. 81 No. 6: 2015.

16. American Society of General Surgeons (ASGS). Position statement: Transoral fundoplication. 2011; http://www.theasgs.org/aboutus/ASGS-Transoral-Fundoplication.pdf.

17. American Society of General Surgeons (ASGS) Position Statement Transoral Fundoplication. Accessed at https://theasgs.org/position-statements/american-society-of-general-surgeons-asgs-position-statement-transoral-fundoplication/.

18. American Society of General Surgeons (ASGS). LINX Statement of Support from ASGS (2014). Accessed at https://theasgs.org/.

19. Andreae T, Elshafei M, Gossage JA, Kersting T, Bell R. Current Clinical Evidence for Magnetic Sphincter Augmentation: A Scoping Review. Foregut. 2024 Jul 27:26345161241263051.

20. Arts J, Bisschops R, Blondeau K, Farré R, Vos R, Holvoet L, Caenepeel P, Lerut A, Tack J. A double-blind sham-controlled study of the effect of radiofrequency energy on symptoms and distensibility of the gastro-esophageal junction in GERD. The American journal of gastroenterology. 2012 Feb;107(2):222. PMID: 22108449.

21. ASGE Standards of Practice Committee; Desai M, Ruan W, Thosani NC, et al. American Society for Gastrointestinal Endoscopy guideline on the diagnosis and management of GERD: summary and recommendations. Gastrointest Endosc. 2025 Feb;101(2):267-284.ASGE Standards of Practice Committee; Desai M, Ruan W, Thosani NC, Amaris M, Scott JS, Saeed A, Abu Dayyeh B, Canto MI, Abidi W, Alipour O, Amateau SK, Cosgrove N, Elhanafi SE, Forbes N, Kohli DR, Kwon RS, Fujii-Lau LL, Machicado JD, Marya NB, Ngamruengphong S, Pawa S, Sheth SG, Thiruvengadam NR, Qumseya BJ; ASGE Standards of Practice Committee Chair. American Society for Gastrointestinal Endoscopy guideline on the diagnosis and management of GERD: methodology and review of evidence. VideoGIE. 2024 Dec 18;10(2):81-137. doi: 10.1016/j.vgie.2024.10.001.

22. Asti E, Milito P, Froiio C, Milani V, Bonavina L. Comparative outcomes of Toupet fundoplication and magnetic sphincter augmentation. Dis Esophagus. 2023 Jun 15;36(Supplement_1):doac090. doi: 10.1093/dote/doac090. PMID: 36544397.

23. Ayazi, S., Zaidi, A.H., Zheng, P. et al. Comparison of surgical payer costs and implication on the healthcare expenses between laparoscopic magnetic sphincter augmentation (MSA) and laparoscopic Nissen fundoplication (LNF) in a large healthcare system. Surg Endosc 34, 2279–2286 (2020). https://doi.org/10.1007/s00464-019-07021-4.

24. Ayazi S, Zheng P, Zaidi AH, et al. Magnetic Sphincter Augmentation and Postoperative Dysphagia: Characterization, Clinical Risk Factors, and Management. J Gastrointest Surg. 2020;24(1):39–49. Doi:10.1007/s11605-019-04331-9.

25. Aziz AM, El-Khayat HR, Sadek A, Mattar SG, McNulty G, Kongkam P, Guda MF, Lehman GA. A prospective randomized trial of sham, single-dose Stretta, and double-dose Stretta for the treatment of gastroesophageal reflux disease. Surgical endoscopy. 2010 Apr;24(4):818.

26. Aziz M, Gangwani MK, Haghbin H, Dahiya DS, Sohail AH, Kamal F, Lee-Smith W, Adler DG. Gastric peroral endoscopic myotomy versus surgical pyloromyotomy/pyloroplasty for refractory gastroparesis: systematic review and meta-analysis. Endosc Int Open. 2023 Apr 4;11(4):E322-E329. Doi: 10.1055/a-1980-9942.

27. Bell RC, Freeman KD. Clinical and pH-metric outcomes of transoral esophagogastric fundoplication for the treatment of gastroesophageal reflux disease. Surg Endosc 2011; 25(6):1975-84.

28. Bell RC, et al. A Prospective Multicenter Registry of Chronic Gastroesophageal Disease Receiving Transoral Incisionless Fundoplication. J Am Coll Surg. 2012 August 2012.

29. Bell RC, et al. Univariate and multivariate analyes of preoperative factors influencing symptomatic outcomes of transoral fundoplication. Surg Endosc. 2014 May 31.

30. Bell RC, Hufford RJ, Fearon J, Freeman KD. Revision of failed traditional fundoplication using EsophyX transoral fundoplication. Surg Endosc. 2013 Mar;27(3):761-7.

31. Bell RCW, Barnes WE, Carter BJ, Sewell RW, Mavrelis PG, Ihde GM, Hoddinott KM, Fox MA, Freeman KD, Gunsberger T, Hausmann MG, Dargis D, Gill BD, Wilson EB, Trad KS. Transoral Incisionless Fundoplication: 2-year results from the prospective multicenter U.S. study. Am Surg, 2014 Nov; 80(11):1093-1105.

32. Bell RCW, Freeman K, Heidrick R, Ayazi S. Transoral incisionless fundoplication demonstrates durability at up to 9 years. Therap Adv Gastroenterol. 2021 Apr 16; 14:17562848211004827. Doi: 10.1177/17562848211004827.

33. Bell R, Lipham J, Louie B, et al. Laparoscopic magnetic sphincter augmentation versus double-dose proton pump inhibitors for management of moderate-to-severe regurgitation in GERD: a randomized controlled trial. Gastrointest Endosc. 2019 Jan;89(1):14-22.e1. doi: 10.1016/j.gie.2018.07.007. Epub 2018 Jul 18.

34. Bell R, Lipham J, Louie BE, et al. Magnetic Sphincter Augmentation Superior to Proton Pump Inhibitors for Regurgitation in a 1-Year Randomized Trial. Published: September 10, 2019 DOI: https://doi.org/10.1016/j.cgh.2019.08.056.

35. Bloomsburg SJ, Duncan AJ, Chen S. The failure pattern for the magnetic sphincter augmentation device: a single-institution case series with literature review. Surg Endosc. 2025 Aug;39(8):4956-4964. doi: 10.1007/s00464-025-11842-x. Epub 2025 Jun 26.

36. Blue Cross Blue Shield Association. Technology Evaluation Center (TEC). Transesophageal Endoscopic Therapies for Gastroesophageal Reflux Disease. TEC Assessments 2003, Volume 18, No. 20.

37. Blue Cross Blue Shield Association. 2.01.38 - Transesophageal Endoscopic Therapies for Gastroesophageal Reflux Disease, 01/26.

38. Blue Cross Blue Shield Association. 2.01.91 - Peroral Endoscopic Myotomy for Treatment of Esophageal Achalasia and Gastroparesis, 12/25.

39. Blue Cross Blue Shield Association. 7.01.137 - Magnetic Esophageal Sphincter Augmentation to Treat Gastroesophageal Reflux Disease, 12/25.

40. Bona D, Saino G, Mini E, Lombardo F, Panizzo V, Cavalli M, Bonitta G, Campanelli G, Aiolfi A. Magnetic sphincter augmentation device removal: surgical technique and results at medium-term follow-up. Langenbecks Arch Surg. 2021 Nov;406(7):2545-2551. Doi: 10.1007/s00423-021-02294-7. Epub 2021 Aug 30.

41. Bonavina L, et al. Laparoscopic sphincter augmentation device eliminates reflux symptoms and normalizes esophageal acid exposure: one- and 2-year results of a feasibility trial. Ann Surg. 2010 Nov;252(5):857-62.

42. Bonavina L, et al. LINX (®) Reflux Management System in chronic gastroesophageal reflux: A novel effective technology for restoring the natural barrier to reflux. Therap Adv Gastroenterol. 2013a; 6(4):261-268.

43. Bonavina L, et al. Magnetic augmentation of the lower esophageal sphincter: results of a feasibility clinical trial. J Gastrointest Surg. 2008 Dec;12(12):2133-40.

44. Bonavina L, Saino G, et al. One Hundred Consecutive Patients Treated with Magnetic Sphincter Augmentation for Gastroesophageal Reflux Disease: 6 Years of Clinical Experience from a Single Center. J Am Coll Surg 2013.

45. Bonavina L, Horbach T, Schoppmann SF, et al. Three-year clinical experience with magnetic sphincter augmentation and laparoscopic fundoplication. Surg Endosc (2020). https://doi.org/10.1007/s00464-020-07792-1.

46. Bortolotti M. Magnetic challenge against gastroesophageal reflux. World J Gastroenterol. 2021 Dec 28;27(48):8227-8241. Doi: 10.3748/wjg. v27.i48.8227.

47. Buckley FP, Havemann B, Chawla A. Magnetic sphincter augmentation: Optimal patient selection and referral care pathways. World J Gastrointest Endosc. 2019;11(8):472–476. Doi:10.4253/wjge.v11.i8.472.

48. Buckley III FP, Bell RCW, et al. Favorable results from a prospective evaluation of 200 patients with large hiatal hernias undergoing LINX magnetic sphincter augmentation. Surg Endosc. 2018; 32(4): 1762–1768.

49. Cadiere GB, Buset M, Muls V et al. Antireflux transoral incisionless fundoplication using EsophyX: 12-month results of a prospective multicenter study. World J Surg 2008; 32(8):1676-88.

50. California Bankruptcy Blog. Curon Medical Inc. of Fremont California shuts down and files for Chapter 7 Bankruptcy (11/17/06).

51. Cammarata F, Novia M, Aiolfi A, Damiani R, Manara M, Giovanelli A, Berta RD, Anselmino M, Ogliari C, Bona D, Bonavina L. Magnetic Sphincter Augmentation for Gastroesophageal Reflux After Sleeve Gastrectomy: A Systematic Review. Obes Surg. 2024 Nov;34(11):4232-4243. doi: 10.1007/s11695-024-07523-8. Epub 2024 Oct 15.

52. Canto MI, Diehl DL, Parker B, et al. Outcomes of transoral incisionless fundoplication (TIF 2.0): a prospective multicenter cohort study in academic and community gastroenterology and surgery practices (with video). Gastrointest Endosc. 2025 Jan;101(1):90-102.e1.

53. Centers for Medicare and Medicaid Services (CMS). Local Coverage Determination (LCD): Endoscopic Treatment of GERD (L34659) (10/01/15) (Revised 08/29/24).

54. Centers for Medicare and Medicaid Services (CMS). Local Coverage Determination (LCD) Lower Esophageal Magnetic Sphincter Augmentation (L39780) (07/14/24).

55. Centers for Medicare and Medicaid Services (CMS). Local Coverage Determination: Noncovered Procedures — Endoscopic Treatment of Gastroesophageal Reflux Disease (GERD) (L33296) (10/01/15) (Retired 02/14/20).

56. Centers for Medicare and Medicaid (CMS). Local Coverage Determination (LCD): Noncovered Services (L33777) (10/01/15) (Retired 07/01/20).

57. Centers for Medicare and Medicaid Services (CMS). Local Coverage Determination (LCD): Select Minimally Invasive GERD Procedures (L35080) (IL, MN, WI, CT, NY, ME, MA, NH, RI, VT) (10/01/15) (Revised 02/10/22).

58. Centers for Medicare and Medicaid Services (CMS). National Coverage Determination (NCD) for Implantation of Anti-Gastroesophageal Reflux Device (100.9) (Retired 04/10/23).

59. Chang KJ, Bell R. Transoral Incisionless Fundoplication. Gastrointest Endosc Clin N Am. 2020 Apr;30(2):267-289. Doi: 10.1016/j.giec.2019.12.008. Epub 2020 Feb 13.

60. Chen KY, et al. Seasonal Variation in the Incidence of Gastroesophageal Reflux Disease. The American Journal of the Medical Sciences • Volume 338, Number 6, December 2009.

61. Chen NY, Huang DY, et al. Efficacy of Magnetic Sphincter Augmentation versus Nissen Fundoplication for Gastroesophageal Reflux Disease in Short Term: A Meta-Analysis. Can J Gastroenterol Hepatol. 2017; 2017:9596342. Doi: 10.1155/2017/9596342. Epub 2017 Mar 30.

62. Chen YK, Raijman I, Ben-Menachem T, Starpoli AA, Liu J, Pazwash H, Weiland S, Shahrier M, Fortajada E, Saltzman JR, Carr-Locke DL. Long-term outcomes of endoluminal gastroplication: a U.S. multicenter trial. Gastrointest Endosc. 2005 May; 61(6): 659-67.

63. Chen YK. Endoscopic suturing devices for treatment of GERD: too little, too late? Gastrointest Endosc. 2005 Jul; 62(1): 44-7.

64. Christodoulidis G, Tsagkidou K, Koumarelas KE, Kouliou MN. Advances and challenges in peroral endoscopic myotomy: Safety, precision, and post-procedure management. World J Gastroenterol. 2025 Feb 7;31(5):97574. doi: 10.3748/wjg.v31.i5.97574.

65. Clapp B, Dodoo C, Harper B, Kim J, Castro C, Hamdan M, Grasso S, Davis B. Magnetic sphincter augmentation at the time of bariatric surgery: an analysis of the MBSAQIP. Surg Obes Relat Dis. 2021 Mar;17(3):555-561. doi: 10.1016/j.soard.2020.10.024. Epub 2020 Oct 24. PMID: 33272856.

66. ClinicalTrials.gov. NCT04695171: LINX Reflux Management System or Fundoplication Clinical Study in Patients with Hiatal Hernia >3 cm. Foregut Research Foundation (January 2021).

67. ClinicalTrials.gov. NCT04253392: RETHINK REFLUX Registry. LINX Reflux Management System. Ethicon Endo-Surgery (May 2021).

68. ClinicalTrials.gov. NCT07093359: LINX vs Fundoplication (GOLF). University of Oxford (August 2025).

69. Ferrari D, Asti E, Lazzari V, et al. Six to 12-year outcomes of magnetic sphincter augmentation for gastroesophageal reflux disease. Sci Rep 10, 13753 (2020). https://doi.org/10.1038/s41598-020-70742-3.

70. LINX Reflux Management System (NCT01624506).

71. LINX Reflux Management System Clinical Study Protocol (NCT00776997).

72. ClinicalTrials.gov. “Evaluation of the Efficacy of Radiofrequency in the Treatment of Gastroesophageal Reflux Disease”; Identifier # NCT00200642 (05/20/08).

73. ClinicalTrials.gov. Randomized EsophyX Versus Sham / Placebo Controlled TIF Trial: The RESPECT Study (RESPECT). March 2019.

74. ClinicalTrials.gov. NCT01940185: A Post-Approval Study of the LINX® Reflux Management System (Torax Medical) (September 2016).

75. ClinicalTrials.gov. NCT00776997: LINX Reflux Management System Clinical Study Protocol (Torax Medical) (November 2013).

76. ClinicalTrials.gov. NCT02935881: STRETTA, Radio Frequency Ablation (RFA) v/s Sham Therapy for the Treatment of Refractory GERD (STRETTAGERD) (October 2016).

77. ClinicalTrials.gov. NCT01512719: POEM- Peroral Endoscopic Myotomy for Esophageal Motility Disorders (POEM) (April 2016).

78. Comay D, Adam V, da Silveira EB, Kennedy W, Mayrand S, Barkun AN. The Stretta procedure versus proton pump inhibitors and laparoscopic Nissen fundoplication in the management of gastroesophageal reflux disease: a cost-effectiveness analysis. Can J Gastroenterol. 2008 Jun;22(6):552-8.

79. Corley DA, Katz P, Wo JM, Stefan A, Patti M, Rothstein R, Edmundowicz S, Kline M, Mason R, Wolfe MM. Improvement of gastroesophageal reflux symptoms after radiofrequency energy: a randomized, sham-controlled trial. Gastroenterology. 2003 Sep; 125 (3): 668-76.

80. Coron E, Sebille V, Cadiot G, Zerbib F, Ducrotte P, Ducrot F, Pouderoux P, Arts J, Le Rhun M, Piche T, Bruley DV. Clinical trial: Radiofrequency energy delivery in proton pump inhibitor-dependent gastro-oesophageal reflux disease patients. Alimentary pharmacology & therapeutics. 2008 Nov 1;28(9):1147.

81. Daus KE, Farivar AS, Bograd AJ, White PT, Aye RW, Louie BE. Long-Term Outcomes of Magnetic Sphincter Augmentation: A Comparative Study to Nissen Fundoplication. Ann Thorac Surg. 2024 Dec;118(6):1207-1214. doi: 10.1016/j.athoracsur.2024.09.010. Epub 2024 Sep 19. PMID: 39306063.

82. Dell'Anna G, Fasulo E, Fanizza J, Barà R, Vespa E, Barchi A, Cecinato P, Fuccio L, Annese V, Malesci A, Azzolini F, Danese S, Mandarino FV. The Endoscopic Management of Zenker's Diverticulum: A Comprehensive Review. Diagnostics (Basel). 2024 Sep 27;14(19):2155. doi: 10.3390/diagnostics14192155.

83. Delshad SD, Almario CV, Chey WD, Spiegel BMR. Prevalence of Gastroesophageal Reflux Disease and Proton Pump Inhibitor-Refractory Symptoms. Gastroenterology. 2020 Apr;158(5):1250-1261.e2. doi: 10.1053/j.gastro.2019.12.014. Epub 2019 Dec 19.

84. DeMarchi J, Schwiers M, Soberman M, Tokarski A. Evolution of a novel technology for gastroesophageal reflux disease: a safety perspective of magnetic sphincter augmentation. Dis Esophagus. 2021 Nov 11;34(11): doab036. Doi: 10.1093/dote/doab036.

85. DeVault KR, Castell DO, American College of Gastroenterology. Updated guidelines for the diagnosis and treatment of gastroesophageal reflux disease. Am J Gastroenterol. 2005 Jan; 100(1): 190-200.

86. Dughera L, et al. Durability of Stretta Radiofrequency Treatment for GERD: Results of an 8-Year Follow-Up. Gastroenterol Res Pract. 2014; 2014:531907.

87. Dunn C, Bildzukewicz N, Lipham J. Magnetic Sphincter Augmentation for Gastroesophageal Reflux Disease. Gastrointest Endosc Clin N Am. 2020;30(2):325–342. Doi: 10.1016/j.giec.2019.12.010. PMID: 32146949.

88. ECRI Clinical Evidence Assessment. EsophyX (EndoGastric Solutions, Inc.) for Treating Gastroesophageal Reflux Disease. (August 2021).

89. ECRI Custom Hotline Response. Endoluminal Gastroplication (Endocinch) for Gastroesophageal Reflux Disease. Plymouth Meeting, PA: ECRI. Updated 04/18/08.

90. ECRI Emerging Technology Report. Magnetic Sphincter Augmentation (Linx Reflux Management System) for Treating Gastroesophageal Reflux Disease (09/13/13).

91. ECRI Endoluminal gastroplication [EndoCinch I] for gastroesophageal reflux disease (GERD). Plymouth Meeting, PA: ECRI, 2003:17, (updated 04/18/08).

92. ECRI Forecast. Boston Scientific recalls Enteryx for acid reflux (10/07/05).

93. ECRI Stretta System (Mederi Therapeutics, Inc.) for Treating Gastroesophageal Reflux Disease; Hotline Article (06/05/2012).

94. ECRI The Stretta™ procedure for gastroesophageal reflux disease [GERD]. Plymouth Meeting, PA: ECRI, 2003:32, (updated 04/18/08).

95. ECRI Product Brief. Stretta System (Mederi Therapeutics, Inc.) for Treating Gastroesophageal Reflux Disease (March 2014).

96. ECRI Product Brief. OverStitch Endoscopic Suturing System (Apollo Endosurgery, Inc.) for Placing Full-thickness Surgical Sutures (Dec 2013).

97. ECRI Health Technology Forec—st - PerOral Endoscopic Myotomy (POEM) for Treating Esophageal Achalasia (8/12/13)

98. Edriss H, El-Bakush A, Nugent K. Esophgeal Perforation and Bilateral Empyema Following Endoscopic EsophyX Transoral Incisionless Fundoplication. Clin Endosc. 2014 Nov;47(6):560-3.

99. Elkholy S, El-Sherbiny M, Delano-Alonso R, Herrera-Esquivel JJ, Valenzuela-Salazar C, Rodriguez-Parra A, Del Rio-Suarez I, Vargas-Madrigal J, Akar T, Günay S, Houmani Z, Abayli B, Elkady MA, Alzamzamy A, Wahba M, Madkour A, Mahdy RE, Essam K, Khashab MA. Peroral endoscopic myotomy as treatment for Zenker's diverticulum (Z-POEM): a multi-center international study. Esophagus. 2021 Jul;18(3):693-699. doi: 10.1007/s10388-020-00809-7. Epub 2021 Jan 2. PMID: 33387150.

100. EndoGastric Solutions® Clinical Dossier: Transoral Incisionless Funcoplication (TIF®) for the Treatment of Gastroesophageal Reflux Disease Disease (GERD).

101. EndoGastric Solutions® Executive Summary: Endoscopic Treatment of Reflux Disease.

102. EndoGastric Solutions®: Transoral Incisionless Fundoplication (TIF® 2.0) w/ the EsophyX® Device For Gastroesophageal Reflux Disease (GERD) (June 2019).

103. Endogastric Solutions press release. “10,000th Patient in the United States Treated with Transoral Incisionless Fundoplication (TIF®) Using EsophyX® Technology from EndoGastric Solutions”, Redwood City, CA, September 6, 2012.

104. Endogastric Solutions press release. “EndoGastric Solutions Completes Patient Enrollment in Clinical Trial Comparing TIF Procedure to PPI Therapy for the Treatment of GERD”, Redwood City, CA, October 2, 2012.

105. Fadel MG, Tarazi M, Dave M, Reddy M, Khan O, Fakih-Gomez N, Ashrafian H, Fehervari M. Magnetic sphincter augmentation in the management of gastro-esophageal reflux disease: A systematic review and meta-analysis. Int J Surg. 2024 May 9. doi: 10.1097/JS9.0000000000001558. Epub ahead of print.

106. Falk GW, Fennerty MB, Rothstein RI. AGA Institute medical position statement on the use of endoscopic therapy for gastroesophageal reflux disease. Gastroenterology. 2006 Oct; 131(4): 1313-4.

107. Fass R, Cahn F, et al. Systematic review, and meta-analysis of controlled and prospective cohort efficacy studies of endoscopic radiofrequency for treatment of gastroesophageal reflux disease. (2017).

108. Feng J, Ali RW, Hao JY, Kong GX, Yang LH, Huang XJ. Peroral endoscopic myotomy for esophageal motility disorders. Esophagus. 2020 Jan;17(1):11-18. doi: 10.1007/s10388-019-00693-w. Epub 2019 Oct 12.

109. Feretis C, Benakis P, Dimopoulos C, Dailianas A, Filalithis P, Stamou KM, Manouras A, Apostolidis N. Endoscopic implantation of Plexiglas (PMMA) microspheres for the treatment of GERD. Gastrointest Endosc. 2001 Apr;53(4):423-6. doi: 10.1067/mge.2001.113912.

110. Ferrari D, Siboni S, Riva CG, Guerrazzi G, Lovece A, Bonavina L. Magnetic Sphincter Augmentation Outcomes in Severe Gastroesophageal Reflux Disease. Front Med (Lausanne). 2021 Nov 2; 8:645592. doi: 10.3389/fmed.2021.645592.

111. First Coast Service Options (FCSO). Local Medicare Coverage Determination Noncovered Procedu—es - Endoscopic Treatment of Gastroesophageal Reflux Disease (GERD) (L32485) (01/01/13).(Retired 09/30/15).

112. Franciosa M, et al. Stretta Radiofrequency Treatment for GERD: A Safe and Effective Modality. Gastroenterol Res Pract. 2013; 2013:783815.

113. Funk LM, Zhang JY, Drosdeck JM, Melvin WS, Walker JP, Perry KA. Long-term cost-effectiveness of medical, endoscopic, and surgical management of gastroesophageal reflux disease. Surgery. 2015 Jan 1;157(1):126-36. PMID: 25262216.

114. Galmiche JP, et al. Laparoscopic Antireflux Surgery vs Esomeprazole Treatment for Chronic GERD. The LOTUS Randomized Clinical Trial. JAMA, May 18, 2011—Vol 305, No. 19.

115. Ganz RA, Peters JH, Horgan S, et al. Esophageal sphincter device for gastroesophageal reflux disease. N Engl J Med; 368(8):719-27. (2013)

116. Ganz RA, Edmundowicz SA, et al. Long-term Outcomes of Patients Receiving a Magnetic Sphincter Augmentation Device for Gastroesophageal Reflux. Clinical Gastroenterology and Hepatology 2016; 14:671–677.

117. Gawron AJ, Bell R, Abu Dayyeh BK, et al. Surgical and endoscopic management options for patients with GERD based on proton pump inhibitor symptom response: recommendations from an expert U.S. panel. Gastrointest Endosc. 2020 Jul;92(1):78-87. e2. doi: 10.1016/j.gie.2020.01.037. Epub 2020 Jan 31.

118. Gensthaler L, Schoppmann SF. New Developments in Anti-Reflux Surgery: Where Are We Now? Visc Med. 2024 Oct;40(5):250-255. doi: 10.1159/000538117. Epub 2024 Apr 9.

119. Gerson L, Stouch B, Lobonţiu A. Transoral Incisionless Fundoplication (TIF 2.0): A Meta-Analysis of Three Randomized, Controlled Clinical Trials. Chirurgia (Bucur). 2018;113(2):173–184. doi:10.21614/chirurgia.113.2.173. PMID: 29733015.

120. Gisi C, Wang K, Khan F, Reicher S, Hou L, Fuller C, Sattler J, Eysselein V. Efficacy, and patient satisfaction of single session transoral incisionless fundoplication and laparoscopic hernia repair. Surg Endosc. 2020 Jul 20. doi: 10.1007/s00464-020-07796-x. Epub ahead of print. PMID: 32691205.

121. Gregory D, Scotti DJ, Buck D, Triadafilopoulos G. Budget Impact Analysis to Estimate the Cost Dynamics of Treating Refractory Gastroesophageal Reflux Disease with Radiofrequency Energy: A Payer Perspective. Managed care (Langhorne, Pa.). 2016 May;25(5):42.

122. Guidozzi N, Wiggins T, et al. Laparoscopic magnetic sphincter augmentation versus fundoplication for gastroesophageal reflux disease: systematic review and pooled analysis. Dis Esophagus. 2019 Nov 13;32(9): doz031. doi: 10.1093/dote/doz031. PMID: 31069388.

123. Hailey D. Endoscope-based treatments for gastroesophageal reflux disease. Ottawa: Canadian Coordinating Office for Health Technology Assessment (CCOHTA), 2004.

124. Hakansson B, Et al. Randomised clinical trial: transoral incisionless fundoplication vs. sham intervention to control chronic GERD. Aliment Pharmacol Ther 2015. John Wiley & Sons Ltd.

125. Hawasli A, et al. Laparoscopic management of severe reflux after sleeve gastrectomy using the LINX® system: Technique and one year follow up case report. Int J Surg Case Rep. 2016 Nov 29; 30:148-151.

126. Hayes, Inc. HAYES Medical Technology Directory. Endoscopic Therapy for Gastroesophageal Reflux Disease. Lansdale, PA: Hayes, Inc. October 2007.

127. He S, Xu F, Xiong X, Wang H, Cao L, Liang N, Wang H, Jing X, Liu T. Stretta procedure versus proton pump inhibitors for the treatment of nonerosive reflux disease: A 6-month follow-up. Medicine (Baltimore). 2020 Jan;99(3): e18610. doi: 10.1097/MD.0000000000018610.

128. Heidelbaugh J, Nostrant T. Medical and surgical management of gastroesophageal reflux disease. Clin Fam Pract. 2004 Sep; 6(3); 547.

129. Herman RM, Berho M, Murawski M, Nowakowski M, Ryś J, Schwarz T, Wojtysiak D, Wexner SD. Defining the histopathological changes induced by nonablative radiofrequency treatment of faecal incontin—ce--a blinded assessment in an animal model. Colorectal disease: the official journal of the Association of Coloproctology of Great Britain and Ireland. 2015 May;17(5):433.

130. Hopkins J, Switzer NJ, Karmali S. Update on novel endoscopic therapies to treat gastroesophageal reflux disease: A review. World J Gastrointest Endosc. 2015 Aug 25;7(11):1039-44.

131. Hunter JG, Kahrilas PJ, Bell RCW, Wilson EB, Trad KS, Dolan JP, Perry KA, Oelschlager BK, Soper NJ, Snyder BA, Burch MA, Melvin WS, Reavis K, Turgeon DG, Hungness ES, Diggs BS. Efficacy of transoral fundoplication vs. omeprazole for treatment of regurgitation in a randomized controlled trial. Gastroenterology. 2015 Feb;148(2):324-333.

132. Ihde GM. The evolution of TIF: transoral incisionless fundoplication. Therap Adv Gastroenterol. 2020 May 21; 13:1756284820924206. doi: 10.1177/1756284820924206.

133. Ip S, Bonis P, Tatsioni A, Raman G, Chew P, Kupelnick B, Fu L, DeVine D, Lau J. Comparative Effectiveness Strategies for Gastroesophageal Reflux Disease. Evidence Report/Technology Assessment No. 1. (Prepared by Tufts-New England Medical Center Evidence-based Practice Center under Contract No. 290-02-0022) Rockville, MD: Agency for Healthcare Research and Quality. AHRQ Publication No. 06-EHC003-EF. December 2005.

134. Ip S, Chung M, Moorthy D, Yu WW, Lee J, Chan JA, Bonis PA, Lau J. Comparative Effectiveness of Management Strategies for Gastroesophageal Reflux Disease: Update. Comparative Effectiveness Review No. 29. (Prepared by Tufts Medical Center Evidence-based Practice Center

under Contract No. HHSA 290-2007-10055-I.) AHRQ Publication No. 11-EHC049-EF. Rockville, MD: Agency for Healthcare Research and Quality. September 2011.

135. Jaccard M, Marx M, Romailler E, Dalex M, Phillipart M, Caillol F, Mantziari S, Godat S. Gastric peroral endoscopic myotomy improves chronic diarrhea in patients with refractory gastroparesis. Ann Gastroenterol. 2025 May-Jun;38(3):255-261. doi: 10.20524/aog.2025.0956. Epub 2025 Apr 28.

136. Jaber F, Ayyad M, Ayoub F, Patel KK, Makris KI, Hernaez R, Skef W. Concomitant hiatal hernia repair with transoral incisionless fundoplication for the treatment of refractory gastroesophageal reflux disease: a systematic review. Surg Endosc. 2024 Oct;38(10):5528-5540. doi: 10.1007/s00464-024-11201-2. Epub 2024 Sep 13. PMID: 39271515.

137. Janu P, Shughoury AB, et al. Laparoscopic Hiatal Hernia Repair Followed by Transoral Incisionless Fundoplication with EsophyX Device (HH + TIF): Efficacy and Safety in Two Community Hospitals. Surg Innov. 2019 Dec;26(6):675-686. doi: 10.1177/1553350619869449. Epub 2019 Aug 20.

138. Jefferies RS, Ward MA, Shabbir R, Farias DA, Ogola GO, Leeds SG. Magnetic sphincter augmentation vs subtotal gastrectomy with Roux-en-Y reconstruction for the treatment of postsleeve gastrectomy gastroesophageal reflux disease. J Gastrointest Surg. 2024 Aug 15:S1091-255X(24)00546-8. doi: 10.1016/j.gassur.2024.07.016. Epub ahead of print. PMID: 39152086.

139. Kahaleh M, Gonzalez JM, Xu MM, Andalib I, Gaidhane M, Tyberg A, Saumoy M, Baptista Marchena AJ, Barthet M. Gastric peroral endoscopic myotomy for the treatment of refractory gastroparesis: a multicenter international experience. Endoscopy. 2018 Nov;50(11):1053-1058. doi: 10.1055/a-0596-7199. Epub 2018 Apr 12.

140. Kahn F, et al. Utilisation of surgical fundoplication for patients with gastro-oesophageal reflux disease in the USA has declined rapidly between 2009 and 2013. Aliment Pharmacol Ther © 2016 John Wiley & Sons Ltd.

141. Kahrilas EJ, Katzka D, Richter JE. AGA CLINICAL PRACTICE UPDATE: EXPERT REVIEW. Clinical Practice Update: The Use of Per-Oral Endoscopic Myotomy in Achalasia: Expert Review and Best Practice Advice from the AGA Institute. Gastroenterology 2017; 153:1205–1211.

142. Kalapala R, Shah H, Nabi Z, Darisetty S, Talukdar R, Nageshwar RD. Treatment of gastroesophageal reflux disease using radiofrequency ablation (Stretta procedure): An interim analysis of a randomized trial. Indian journal of gastroenterology: official journal of the Indian Society of Gastroenterology. 2017 Sep;36(5):337. PMID: 29030802.

143. Kasapoglu M, Noor Us Saba S, Hashemi A, Panchal M, Khan S. Comparative Effectiveness of Peroral Endoscopic Myotomy (POEM) Versus Traditional Treatment Modalities for Achalasia: A Systematic Review. Cureus. 2024 Oct 20;16(10):e71917. doi: 10.7759/cureus.71917.

144. Katz PO, Dunbar KB, Schnoll-Sussman FH, et al. ACG Clinical Guideline for the Diagnosis and Management of Gastroesophageal Reflux Disease. Am J Gastroenterol. 2022 Jan 1;117(1):27-56. doi: 10.14309/ajg.0000000000001538.

145. Katz PO, Gerson LB, Vela MF. Guidelines for the diagnosis and management of gastroesophageal reflux disease. Am J Gastroenterol. 2013 Mar;108(3):308-28.

146. Khashab MA, Sanaei O, et al. Peroral endoscopic myotomy: anterior versus posterior approach: a randomized single-blinded clinical trial. Gastrointest Endosc. 2020 Feb;91(2):288-297.e7. doi: 10.1016/j.gie.2019.07.034. Epub 2019 Aug 10. PMID: 31408652.

147. Kirkham EN, Main BG, Jones KJB, Blazeby JM, Blencowe NS. Systematic review of the introduction and evaluation of magnetic augmentation of the lower oesophageal sphincter for gastro-oesophageal reflux disease. Br J Surg. 2020;107(1):44–55. doi:10.1002/bjs.11391.

148. Latorre-Rodríguez AR, Aschenbrenner E, Mittal SK. Magnetic sphincter augmentation may limit access to magnetic resonance imaging. Dis Esophagus. 2023 Oct 27;36(11):doad032. doi: 10.1093/dote/doad032. PMID: 37224461.

149. Laurino-Neto RM, Herbella F, Schlottmann F, Patti M. EVALUATION OF ESOPHAGEAL ACHALASIA: FROM SYMPTOMS TO THE CHICAGO CLASSIFICATION. Arq Bras Cir Dig. 2018;31(2):e1376. doi: 10.1590/0102-672020180001e1376. Epub 2018 Jul 2.

150. Lee AY, Choi JW, Heo JH, Chung JY, Kim SH, Cho JY. The comparative study of Stretta radiofrequency and anti-reflux mucosectomy in the management of intractable gastroesophageal reflux disease: a single-center retrospective study from Korea. Clin Endosc. 2025 May;58(3):409-417. doi: 10.5946/ce.2024.163. Epub 2025 May 7.

151. Liang WT, et al. Long-term outcomes of patients with refractory gastroesophageal reflux disease following a minimally invasive endoscopic procedure: a prospective observational study. BMC Gastroenterol. 2014 Oct 10; 14:178.

152. Lipham, JC, Demeester, TR, Ganz, RA, et al. The LINX reflux management system: confirmed safety and efficacy now at 4 years. Surg Endosc; 26: 2944-9. (2012).

153. Lipham JC, et al. Safety analysis of first 1000 patients treated with magnetic sphincter augmentation for gastroesophageal reflux disease. Diseases of the Esophagus, March 2014.

154. Liu HF, et al. Improvement of clinical parameters in patients with gastroesophageal reflux disease after radiofrequency energy delivery. World J Gastroenterol. 2011 Oct 21;17(39):4429-33.

155. Lo WK, Mashimo H. Critical Assessment of Endoscopic Techniques for Gastroesophageal Reflux Disease. J Clin Gastroenterol. 2015 Oct;49(9):720-4.

156. Loh Y, et al. Is the LINX reflux management system an effective treatment for gastro-oesophageal reflux disease? Int J Surg. 2014;12(9):994-7.

157. Louie BE, et al. Short-term outcomes using magnetic sphincter augmentation versus Nissen fundoplication for medically resistant gastroesophageal reflux disease. Ann Thorac Surg. 2014 Aug;98(2):498-504; discussion 504-5.

158. Lundell LR, Dent J, Bennett JR, et al. Endoscopic assessment of oesophagitis: clinical and functional correlates and further validation of the Los Angeles classification. Gut. 1999 Aug;45(2):172-80.

159. Ma L, Li T, Liu G, Wang J, Yin Z, Kang J. Stretta radiofrequency treatment vs Toupet fundoplication for gastroesophageal reflux disease: a comparative study. BMC Gastroenterol. 2020 May 27;20(1):162. doi: 10.1186/s12876-020-01310-2.

160. Madan AK, Ternovits CA, Tichansky DS. Emerging endoluminal therapies for gastroesophageal reflux disease: adverse events. Am J Surg. 2006 Jul; 192(1): 72-5.

161. Mahmoud T, Jaruvongvanich V, Ghazi R, Abusaleh R, Abu Dayyeh BK. Complete endoscopic removal of an eroded magnetic sphincter augmentation device. VideoGIE. 2021 Sep 21;6(10):450-453. doi: 10.1016/j.vgie.2021.05.023.

162. Marano L, et al. Surgery or Peroral Esophageal Myotomy for Achalasia: A Systematic Review and Meta-Analysis. Medicine (Baltimore). 2016 Mar;95(10):e3001.

163. Maydeo A, Patil GK, Dalal A. Operative technical tricks and 12-month outcomes of diverticular peroral endoscopic myotomy (D-POEM) in patients with symptomatic esophageal diverticula. Endoscopy. 2019 Dec;51(12):1136-1140. doi: 10.1055/a-1015-0214. Epub 2019 Oct 15. PMID: 31614371.

164. Mavrogenis G, Bazerbachi F. Peroral endoscopic myotomy for Ze’ker's diverticulum without tunneling. Endoscopy. 2023 Dec;55(S 01): E946-E948. doi: 10.1055/a-2127-7402. Epub 2023 Aug 21.

165. Mavrogenis G, Maurommatis E, Koumentakis C, Tsevgas I, Zachariadis D, Bazerbachi F. Single-tunnel Ze’ker's diverticulum peroral endoscopic myotomy. Endoscopy. 2023 Dec;55(S 01):E604-E605. doi: 10.1055/a-2045-7541. Epub 2023 Apr 11.

166. McCarty TR, Itidiare M, Njei B, Rustagi T. Efficacy of transoral incisionless fundoplication for refractory gastroesophageal reflux disease: a systematic review and meta-analysis. Endoscopy. 2018;50(7):708–725. doi:10.1055/a-0576-6589.

167. McCurdy GA, Gooden T, Weis F, Mubashir M, Rashid S, Raza SM, Morris J, Cai Q. Gastric peroral endoscopic pyloromyotomy (G-POEM) in patients with refractory gastroparesis: a review. Therap Adv Gastroenterol. 2023 Mar 26; 16:17562848231151289. doi: 10.1177/17562848231151289.

168. Meier PN. Efficacy of endoscopic antireflux procedures: at least durability for radiofrequency energy delivery. Gastrointest Endosc. 2007 Mar; 65(3): 375-6.

169. Moayyedi P, Eikelboom JW, Bosch J, et al. COMPASS Investigators. Safety of Proton Pump Inhibitors Based on a Large, Multi-Year, Randomized Trial of Patients Receiving Rivaroxaban or Aspirin. Gastroenterology. 2019 Sep;157(3):682-691.e2. doi: 10.1053/j.gastro.2019.05.056. Epub 2019 May 29.

170. Mohan A, Sohail F, Saeed NA, Jameel M, Assal MW, Hasan ZW, Zafar A, Aminpoor H, Kumar V. A comparative analysis of ARMS (anti-reflux mucosectomy) and TIF (transoral incisionless fundoplication) in the treatment of gastroesophageal reflux disease (GERD). Ann Med Surg (Lond). 2025 Apr 22;87(6):3596-3609. doi: 10.1097/MS9.0000000000003311.

171. Myint AS, Rieders B, Tashkandi M, Borum ML, Koh JM, Stephen S, Doman DB. Current and Emerging Therapeutic Options for Gastroparesis. Gastroenterol Hepatol (N Y). 2018 Nov;14(11):639-645.

172. Nabi Z, Reddy DN. Endoscopic management of gastroesophageal reflux disease: revisited. Clinical endoscopy. 2016 Sep;49(5):408.

173. National Digestive Diseases Information Clearinghouse. NIH Publication No. 07–0882, Heartburn, Gastroesophageal Reflux (GER), and Gastroesophageal Reflux Disease (GERD) (05/07).

174. National Guideline Clearinghouse. Guideline Summary 008578: SAGES guidelines for the surgical treatment of esophageal achalasia (May 2011).

175. National Guideline Clearinghouse. Gastroesophageal reflux disease (GERD) (2002; revised 01/07).

176. National Guideline Clearinghouse. Guideline synthesis: Diagnosis and management of gastroesophageal reflux disease (GERD). Agency for Healthcare Research and Quality (AHRQ); 2008 May (revised 2012 Nov).

177. National Institute for Clinical Excellence (NICE). Endoscopic gastroplication for gastro-oesophageal reflux disease. London, UK: NICE; Feb 2005.

178. National Institute for Clinical Excellence (NICE). Gastroelectrical stimulation for gastroparesis. London, UK: NICE; February 2005.

179. National Institute for Health and Care Excellence (NICE). CG184: Gastro-oesophageal reflux disease and dyspepsia in adults: investigation and management (November 2014). Accessed at https://www.nice.org.uk/guidance/cg184/.

180. National Institute for Health and Care Excellence (NICE). Laparoscopic insertion of a magnetic ring for gastro-oesophageal reflux disease. Interventional procedures guidance [IPG749] (January 2023). Accessed at https://www.nice.org.uk/guidance/ipg749/.

181. Noar M, et al. Long-term maintenance effect of radiofrequency energy delivery for refractory GERD: a decade later. Surg Endosc. 2014 Aug;28(8):2323-33.

182. Noar MD, Lotfi-Emran S. Sustained improvement in symptoms of GERD and antisecretory drug use: 4-year follow-up of the Stretta procedure. Gastrointestinal endoscopy. 2007 Mar;65(3):367.

183. Nguyen AD, Spechler SJ, Shuler MN, et al. Unique Clinical Features of Los Angeles Grade D Esophagitis Suggest That Factors Other Than Gastroesophageal Reflux Contribute to its Pathogenesis. J Clin Gastroenterol. 2019 Jan;53(1):9-14.

184. O'Neill SM, Jalilvand AD, Colvin JS, Haisley KR, Perry KA. S148: Long-term patient-reported outcomes of laparoscopic magnetic sphincter augmentation versus Nissen fundoplication: a 5-year follow-up study. Surg Endosc. 2022 Sep;36(9):6851-6858. doi: 10.1007/s00464-022-09015-1. Epub 2022 Jan 18. PMID: 35041056.

185. Papaefthymiou A, Telese A, Norton B, Ramai D, Tziatzios G, Gkolfakis P, Birchall M, Mohammadi B, Mughal M, Haidry R. Comparative effect between Zenker's peroral endoscopic myotomy and alternatives in the treatment of Zenker's diverticulum: a systematic review and meta-analysis. Dis Esophagus. 2025 Jul 3;38(4):doaf047. doi: 10.1093/dote/doaf047. PMID: 40654274.

186. Parker M, et al. Comparing Effectiveness of Endoscopic Full Thickness Plication and Endoscopic Radiofrequency Treatments for Patients with GERD. Expert Review of Gastroenterology & Hepatology August 2010, Vol 4, No 4, Pages 387-390.

187. Pedersen MH, Bjerregaard NC, Hvid-Jensen F, Kjaer DW. Peroral endoscopic myotomy: a Danish single center 10-year follow-up study. Surg Endosc. 2025 Aug;39(8):4806-4814. doi: 10.1007/s00464-025-11832-z. Epub 2025 Jun 16.

188. Perry K, Banerjee A, Melvin S. Radiofrequency Energy Delivery to the Lower Esophageal Sphincter Reduces Esophageal Acid Exposure and Improves GERD Symptoms: A Systematic Review and Meta-Analysis. Surgical Laparoscopy Endoscopy and Percutaneous Techniques, August 2012; 22(4) 283-288.

189. Pleskow D, Rothstein R, Lo S, Hawes R, Kozarek R, Haber G, Gostout C, Lembo A. Endoscopic full-thickness publication for the treatment of GERD: 12-month follow-up for the North American open-label trial. Gastrointest Endosc. 2005 May; 61(6): 643-9.

190. Prado Junior FPP, Machado IFS, Prado MPLP, Leite RBC, Gurgel SM, Gomes JWF, Garcia JHP. PERORAL ENDOSCOPIC MYOTOMY FOR ACHALASIA: SAFETY PROFILE, COMPLICATIONS AND RESULTS OF 94 PATIENTS. Arq Bras Cir Dig. 2023 Dec 8;36: e1784. doi: 10.1590/0102-672020230066e1784.

191. Rabach L, Saad AR, Velanovich V. How to choose among fundoplication, magnetic sphincter augmentation or transoral incisionless fundoplication [published online ahead of print, 2019 Apr 24]. Curr Opin Gastroenterol. 2019;10.1097/MOG.0000000000000550.

192. Rausa E, Ferrari D, Kelly ME, Aiolfi A, Vitellaro M, Rottoli M, Bonitta G, Bona D. Efficacy of laparoscopic Toupet fundoplication compared to endoscopic and surgical procedures for GERD treatment: a randomized trials network meta-analysis. Langenbecks Arch Surg. 2023 Jan 21;408(1):52. doi: 10.1007/s00423-023-02774-y. PMID: 36680602.

193. Reavis KM, Perry KA. Transoral incisionless fundoplication for the treatment of gastroesophageal reflux disease. Expert Rev Med Devices. 2014 Jul;11(4):341-50.

194. Rettura F, Bronzini F, Campigotto M, Lambiase C, Pancetti A, Berti G, Marchi S, de Bortoli N, Zerbib F, Savarino E, Bellini M. Refractory Gastroesophageal Reflux Disease: A Management Update. Front Med (Lausanne). 2021 Nov 1; 8:765061. doi: 10.3389/fmed.2021.765061.

195. Reymunde A, Santiago N. Long-term results of radiofrequency energy delivery for the treatment of GERD: sustained improvements in symptoms, quality of life, and drug use at 4-year follow-up. Gastrointest Endosc. 2007 Mar; 65(3): 361-6.

196. Reynolds J, et al. Magnetic Sphincter Augmentation with the LINX Device for Gastroesophageal Reflux Disease after U.S. Food and Drug Administration Approval. The American Surgeon, October 2014.

197. Reynolds JL, et al. Laparoscopic Magnetic Sphincter Augmentation vs Laparoscopic Nissen Fundoplication: A Matched-Pair Analysis of 100 Patients. J Am Coll Surg. 2015 Jul;221(1):123-8.

198. Richards WO, Houston HL, Torquati A, Khaitan L, Holzman MD, Sharp KW. Paradigm shift in the management of gastroesophageal reflux disease. Ann Surg. 2003 May; 237(5): 638-47; discussion 648-9.

199. Riegler M, Schoppman SF, et al. Magnetic sphincter augmentation and fundoplication for GERD in clinical practice: one-year results of a multicenter, prospective observational study. Surg Endosc. 2015 May;29(5):1123-9.

200. Rodríguez de Santiago E, Albéniz E, Estremera-Arevalo F, Teruel Sanchez-Vegazo C, Lorenzo-Zúñiga V. Endoscopic anti-reflux therapy for gastroesophageal reflux disease. World J Gastroenterol. 2021 Oct 21;27(39):6601-6614. doi: 10.3748/wjg. v27.i39.6601.

201. Rosen H, Sebesta C Jr, Sebesta MC, Sebesta C. Therapeutic Management of Gastroesophageal Reflux Disease (GERD)-Is There Something Between PPI and Fundoplication? An Overview. J Clin Med. 2025 Jan 9;14(2):362. doi: 10.3390/jcm14020362.

202. Ruiz-Cota P, Altolaguirre A, Fontaine-Nicola A, Broderick RC, Horgan S. More than a mechanical problem: Dysphagia and new-onset ineffective esophageal motility after LINX® placement-a case report. Int J Surg Case Rep. 2025 Aug;133:111646. doi: 10.1016/j.ijscr.2025.111646. Epub 2025 Jul 10.

203. SAGES: Society of American Gastrointestinal and Endoscopic Surgeons (SAGES). TAVAC Category: Safety and Effectiveness. LINX Reflux Management System. 2017; https://www.sages.org/publications/tavac/tavac-safety-and-effectiveness-analysis-linx-reflux-management-system/.

204. Sanaka MR, et al. Efficacy of peroral endoscopic myotomy vs other achalasia treatments in improving esophageal function. World J Gastroenterol. 2016 May 28;22(20):4918-25.

205. Sarici IS, Eriksson SE, Zheng P, Moore O, Jobe BA, Ayazi S. Impact of Change in Sizing Protocol on Outcome of Magnetic Sphincter Augmentation. Ann Surg. 2025 Mar 1;281(3):454-461. doi: 10.1097/SLA.0000000000006249. Epub 2024 Feb 23.

206. Sato H, Takeuchi M, Hashimoto S, Mizuno KI, Furukawa K, Sato A, Yokoyama J, Terai S. Esophageal diverticulum: New perspectives in the era of minimally invasive endoscopic treatment. World J Gastroenterol. 2019 Mar 28;25(12):1457-1464. doi: 10.3748/wjg.v25.i12.1457.

207. Schilling D, Kiesslich R, Galle PR, Riemann JF. Endoluminal therapy of GERD with a new endoscopic suturing device. Gastrointest Endosc. 2005 Jul; 62(1): 37-43.

208. Schizas D, Mastoraki A, et al. LINX® reflux management system to bridge “he "treatment”gap" in gastroesophageal reflux disease: A systematic review of 35 studies. World J Clin Cases. 2020 Jan 26;8(2):294-305. doi: 10.12998/wjcc. v8. i2.294.

209. Schwaitzberg S E. Surgical treatment of gastroesophageal reflux in adults. In: UpToDate, Post TW (Ed), UpToDate, Waltham, MA. (Accessed on Sept 1, 2026.).

210. Schwameis K, et al. Modern GERD treatment: feasibility of minimally invasive esophageal sphincter augmentation. Anticancer Res. 2014 May;34(5):2341-8.

211. Schwartz MP, Wellink H, Gooszen HG, Conchillo JM, Samsom M, Smout AJ. Endoscopic gastroplication for the treatment of gastro-oesophageal reflux disease25andomizedised, sham-controlled trial. Gut. 2007 Jan; 56(1): 20-8.

212. Shaheen NJ. The rise and fall (and rise?) of endoscopic anti-reflux procedures. Gastroenterology. 2006 Sep; 131(3): 952-4.

213. Shehab H, Alkady M, Fadloon I, Nafea A, Khafagy A, Gaber A. Modified diverticular peroral endoscopic myotomy with peridiverticular adhesiolysis and mucosal flap reconstruction. VideoGIE. 2024 Oct 5;10(2):140-142. doi: 10.1016/j.vgie.2024.09.016.

214. Shimamura Y. Redefining endoscopic management of refractory gastroesophageal reflux disease: the role of Stretta radiofrequency therapy and antireflux mucosectomy. Clin Endosc. 2025 May;58(3):398-400. doi: 10.5946/ce.2025.099. Epub 2025 May 8.

215. Singh S, Chandan S, Bapaye J, Brar HS, Mohammed A, Kassab LL, Bhat I, Singh S, Bapaye A, Yang D. Peroral endoscopic myotomy (Z-POEM) versus flexible endoscopic septotomy (FES) for treatment of Zenker's diverticulum: does either make the cut? A systematic review and meta-

analysis of outcomes. Ann Gastroenterol. 2025 Jan-Feb;38(1):20-27. doi: 10.20524/aog.2024.0934. Epub 2024 Dec 12.

216. Skubleny D, Switzer NJ, et al. LINX® magnetic esophageal sphincter augmentation versus Nissen fundoplication for gastroesophageal reflux disease: a systematic review and meta-analysis. Surg Endosc. 2017 Aug;31(8):3078-3084. doi: 10.1007/s00464-016-5370-3. Epub 2016 Dec 15.

217. Slater BJ, Collings A, Dirks R, Gould JC, Qureshi AP, Juza R, Rodríguez-Luna MR, Wunker C, Kohn GP, Kothari S, Carslon E, Worrell S, Abou-Setta AM, Ansari MT, Athanasiadis DI, Daly S, Dimou F, Haskins IN, Hong J, Krishnan K, Lidor A, Litle V, Low D, Petrick A, Soriano IS, Thosani N, Tyberg A, Velanovich V, Vilallonga R, Marks JM. Multi-society consensus conference and guideline on the treatment of gastroesophageal reflux disease (GERD). Surg Endosc. 2023 Feb;37(2):781-806. doi: 10.1007/s00464-022-09817-3. Epub 2022 Dec 18. PMID: 36529851.

218. Smith CD, DeVault KR, Buchanan M, Introduction of Mechanical Sphincter Augmentation for Gastroesophageal Reflux Disease into Practice: Early Clinical Outcomes and Keys to Successful Adoption. Journal of the American College of Surgeons (2014), doi: 10.1016/j.jamcollsurg.2013.12.034.

219. Smith MR, Ayazi S, Grubic AD, Shen X, Jobe BA. Swallow-induced syncope after magnetic sphincter augmentation: a case report and physiologic explanation. Clin J Gastroenterol. 2021 Oct;14(5):1318-1323. doi: 10.1007/s12328-021-01448-w. Epub 2021 May 29. PMID: 34053004.

220. Snow GE, Dbouk M, Akst LM, et al. Response of Laryngopharyngeal Symptoms to Transoral Incisionless Fundoplication in Patients with Refractory Proven Gastroesophageal Reflux. Ann Otol Rhinol Laryngol. 2022 Jun;131(6):662-670. doi: 10.1177/00034894211037414. Epub 2021 Aug 11.

221. Society of American Gastrointestinal and Endoscopic Surgeons (SAGES). Clinical Spotlight Review: Endoluminal Treatments for Gastroesophageal Reflux Disease (GERD) (May 2017).

222. Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) Position Statement on Endolumenal Therapies for Gastrointestinal Diseases (11/09).

223. Society of American Gastrointestinal and Endoscopic Surgeons (SAGES). Sages Clinical Spotlight. Clinical Spotlight Review (02/2013).

224. Society of American Gastrointestinal and Endoscopic Surgeons (SAGES). TAVAC Safety and Effectiveness Analysis: LINX® Reflux Management System (March 2017). Accessed at https://www.sages.org/.

225. Society of American Gastrointestinal Endoscopic Surgeons (SAGES). Endoluminal treatments for gastroesophageal reflux disease (GERD). Los Angeles (CA): Society of American Gastrointestinal Endoscopic Surgeons (SAGES); 2013 Feb. 22.

226. Society of American Gastrointestinal and Endoscopic Surgeons. Clinical Spotlight Review: Endoluminal Treatments for Gastroesophageal Reflux Disease (GERD) (2017).

227. Souza TF, Grecco E, Quadros LG, Albuquerque YD, Azôr FO, Galvão NM. SHORT-TERM RESULTS OF MINIMALLY INVASIVE TREATMENT OF GASTROESOPHAGEAL REFLUX DISEASE BY RADIOFREQUENCY (STRETTA): FIRST BRAZILIAN SERIES OF CASES. Arquivos de gastroenterologia. 2018 Nov;55(Suppl 1):52.

228. Sriratanaviriyakul N, et al. LINX®, a novel treatment for patients with refractory asthma complicated by gastroesophageal reflux disease: a case report. J Med Case Rep. 2016; 10: 124.

229. Stefanidis G, Viazis N, Kotsikoros N, et al. Long-term benefit of transoral incisionless fundoplication using the esophyx device for the management of gastroesophageal reflux disease responsive to medical therapy. Dis Esophagus. 2017;30(3):1–8. doi:10.1111/dote.12525. PMID: 27868281.

230. Steinway S, Zhang L, Amundson J, Nieto J, Desai P, Jacques J, Bejjani M, Pioche M, Kumta N, Hernandez-Mondragon O, Ujiki M, Khashab M. Long-term outcomes of Ze'ker's peroral endoscopic myotomy (Z-POEM) for treatment of Ze'ker's diverticulum. Endosc Int Open. 2023 Jun 29;11(6):E607-E612. doi: 10.1055/a-2067-9105.

231. Stojilkovic T, Staudinger K, Dennis J. A Systematic Review of the Long-Term Clinical Success of Gastric Peroral Endoscopic Myotomy for Refractory Gastroparesis. Cureus. 2023 May 30;15(5):e39709. doi: 10.7759/cureus.39709.

232. Stokes S, Torgerson H, Wilson K, Twardowski M, Lundy D. Dumping Syndrome Post Hiatal Hernia Repair With the LINX Sphincter Augmentation Device. Cureus. 2025 Jun 12;17(6):e85893. doi: 10.7759/cureus.85893.

233. Subramanian CR, Triadafilopoulos G. Refractory gastroesophageal reflux disease. Gastroenterol Rep (Oxf). 2015 Feb;3(1):41-53.

234. Sun GY, Sun Y, Wang XZ, Jia W, Liu J, Yang Z, Gu JN. Current status of endoscopic treatment for esophageal diverticulum based on diverticular peroral endoscopic myotomy. World J Gastrointest Endosc. 2025 Jun 16;17(6):106799. doi: 10.4253/wjge.v17.i6.106799.

235. Swei E, Pokala SK, Menard-Katcher P, Wagh MS. Comparison of Ze'ker's per-oral endoscopic myotomy (Z-POEM) with standard flexible endoscopic septotomy for Ze'ker's diverticulum: a prospective study with 2-year follow-up. Surg Endosc. 2023 Sep;37(9):6818-6823. doi: 10.1007/s00464-023-10136-4. Epub 2023 Jun 5.

236. Sui X, Gao X, Zhang L, Zhang B, Zhong C, Chen Y, Wang X, Li D, Wu W, Li L. Clinical efficacy of endoscopic antireflux mucosectomy vs. Stretta radiofrequency in the treatment of gastroesophageal reflux disease: a retrospective, single-center cohort study. Ann Transl Med. 2022 Jun;10(12):660. doi: 10.21037/atm-22-2071.

237. Tam WC, Schoeman MN, Zhang Q, Dent J, Rigda R, Utley D, Holloway RH. Delivery of radiofrequency energy to the lower oesophageal sphincter and gastric cardia inhibits transient lower oesophageal sphincter relaxations and gastro-oesophageal reflux in patients with reflux disease. Gut. 2003 Apr; 52(4): 479-85.

238. Tan J, Wu H, Yang X, Yang Y, Zhang L, Wang P, Shi J, Lu Y, Gao Q, Shi R. A long-term follow-up study of gastric peroral endoscopic myotomy (G-POEM) in a large cohort of patients with postsurgical gastroparesis. Surg Endosc. 2024 Dec;38(12):7416-7425. doi: 10.1007/s00464-024-11184-0. Epub 2024 Oct 24.

239. Tan S, Zhong C, Ren Y, Luo X, Xu J, Fu X, Peng Y, Tang X. Efficacy and Safety of Peroral Endoscopic Myotomy in Achalasia Patients with Failed Previous Intervention: A Systematic Review and Meta-Analysis. Gut Liver. 2021 Mar 15;15(2):153-167. doi: 10.5009/gnl19234.

240. Tao J, Patel V, Mekaroonkamol P, Luo H, Li B, Guan Q, Shen S, Chen H, Cai Q. Technical Aspects of Peroral Endoscopic Pyloromyotomy. Gastrointest Endosc Clin N Am. 2019 Jan;29(1):117-126. doi: 10.1016/j.giec.2018.08.012. PMID: 30396521.

241. Tatsuta T, Inoue H, Shimamura Y, Iwasaki M, Ushikubo K, Yamamoto K, Nishikawa Y, Tanaka H, Tanaka I, Abiko S, Tanabe M, Sumi K, Onimaru M, Gantuya B, Sakuraba H, Fukuda S. Peroral endoscopic myotomy in spastic esophageal disorders: Clinical outcomes and optimal approaches. Dig Endosc. 2025 Jul;37(7):758-765. doi: 10.1111/den.15008. Epub 2025 Mar 17.

242. Testoni SG, Azzolini F, Esposito D, Testoni PA. Gastric peroral endoscopic myotomy (G-POEM) for refractory gastroparesis. Minerva Gastroenterol (Torino). 2023 Jun;69(2):209-216. doi: 10.23736/S2724-5985.21.03005-9. Epub 2021 Sep 13.

243. Testoni S, Hassan C, Mazzoleni G, et al. Long-term outcomes of transoral incisionless fundoplication for gastro-esophageal reflux disease: systematic-review and meta-analysis. Endosc Int Open. 2021 Feb;9(2): E239-E246. doi: 10.1055/a-1322-2209. Epub 2021 Feb 3.

244. Testoni PA, Testoni S. Review article: Transoral fundoplication for gastroesophageal reflux disease. Ann Esophagus 2018; 1:7. doi: 10.21037/aoe.2018.08.01.

245. Testoni PA, Testoni S, Distefano G, Mazzoleni G, Fanti L, Passaretti S. Transoral incisionless fundoplication with EsophyX for gastroesophageal reflux disease: clinical efficacy is maintained up to 10 years. Endosc Int Open. 2019;7(5): E647–E654. doi:10.1055/a-0820-2297.

246. Testoni PA, Testoni S, Mazzoleni G, Vailati C, Passaretti S. Long-term efficacy of transoral incisionless fundoplication with Esophyx (TIF 2.0) and factors affecting outcomes in GERD patients followed for up to 6 years: a prospective single-center study. Surg Endosc. 2015 Sep;29(9):2770-80.

247. Thomson AB, et al. Safety of the long-term use of proton pump inhibitors. World J Gastroenterol 2010 May 21; 16(19): 2323-2330.

248. Toomey P, Teta A, Patel K, Ross S, Sukharamwala P, Rosemurgy A. Transoral Incisionless Fundoplication: Is It as Safe and Efficacious as a Nissen or Toupet Fundoplication? Presented at the Annual Scientific Meeting and Postgraduate Course Program, Southeastern Surgical Congress, Savannah, GA, February 22–25, 2014.

249. Torquati A, Houston HL, Kaiser J, Holzman MD, Richards WO. Long-term follow-up study of the Stretta procedure for the treatment of gastroesophageal reflux disease. Surgical endoscopy. 2004 Oct;18(10):1475.

250. Trad KS, Barnes WE, Prevou ER, et al. The TEMPO Trial at 5 Years: Transoral Fundoplication (TIF 2.0) Is Safe, Durable, and Cost-effective. Surg Innov. 2018;25(2):149–157. doi:10.1177/1553350618755214.

251. Trad KS, Barnes WE, Simoni G, Shughoury AB, et al. Transoral fundoplication offers durable symptom control for chronic GERD: 3-year report from the TEMPO randomized trial with a crossover arm. Surg Endosc. 2017;31(6):2498–2508. doi:10.1007/s00464-016-5252-8.

252. Trad KS, Barnes WE, Simoni G, Shughoury AB, Mavrelis PG, Raza M, Heise JA, Turgeon DG, Fox MA. Transoral Incisionless Fundoplication Effective in Eliminating GERD Symptoms in Partial Responders to Proton Pump Inhibitor Therapy at 6 Months: The TEMPO Randomized Clinical Trial. Surg Innov. 2015 Feb;22(1):26-40.

253. Trad KS, Fox MA, Simoni G, Ahmad B, Shughoury AB, Mavrelis PG, Raza M, Heise JA, Turgeon DG, Barnes WE. Efficacy of Transoral Fundoplication for Treatment of Chronic Gastroesophageal Reflux Disease Incompletely Controlled with High-Dose PPI Therapy: A Randomized, Multicenter, Open Label, Crossover Study. BMC Gastroenterol. 2014 Oct 6; 14(1):174.

254. Trad KS, et al. Transoral incisionless fundoplication: current status. Curr Opin Gastroenterol 2016, 32:000–000.

255. Trad KS, Turgeon DG, Emir D. Long-term outcomes after transoral incisionless fundoplication in patients with GERD and LPR symptoms. Surg Endosc. DOI 10.1007/s00464-011-1932-6. Published online 09/30/11.

256. Trad KS, Turgeon DG, Deljkich E. Long-term outcomes after transoral incisionless fundoplication in patients with GERD and LPR symptoms. Surg Endosc. 2012 Mar;26(3):650-60. Epub 2011 Sep 30.

257. Trad KS, et al. Transoral Incisionless Fundoplication Effective in Eliminating GERD Symptoms in Partial Responders to Proton Pump Inhibitor Therapy at 6 Months: The TEMPO Randomized Clinical Trial. Surg Innov, April 2014.

258. The Merck Manual of diagnosis and Therapy, Gastroesophageal Reflux Disease, 1995 – 2001.

259. Triadafilopoulos G. Stretta: A valuable endoscopic treatment modality for gastroesophageal reflux disease. World J Gastroenterol. 2014 Jun 28;20(24):7730-8.

260. University of Michigan Health System (UMHS). Gastroesophageal reflux disease (GERD). Ann Arbor (MI): University of Michigan Health System; 2012 May.

261. UpToDate. Laryngopharyngeal reflux in adults. 2025. Accessed at uptodate.com.

262. UpToDate. Overview of the management of achalasia. 2025. Accessed at uptodate.com.

263. UpToDate. Magnetic sphincter augmentation (MSA). 2025. Accessed at uptodate.com.

264. UpToDate. Peroral endoscopic myotomy (POEM). 2025. Accessed at uptodate.com.

265. UpToDate. Radiofrequency treatment for gastroesophageal reflux disease. 2025. Accessed at uptodate.com.

266. UpToDate. Surgical treatment of gastroesophageal reflux in adults. 2025. Accessed at uptodate.com.

267. UpToDate. Surgical myotomy for achalasia. 2025. Accessed at uptodate.com.

268. UpToDate. Treatment of gastroparesis. 2025. Accessed at uptodate.com.

269. UpToDate. Zenker's diverticulum. 2025. Accessed at uptodate.com.

270. U. S. Food and Drug Administration (FDA), Center for Devices and Radiologic Health. 510(K) Summary, CSM Stretta™ System. # K000245. 04/18/00.

271. U. S. Food and Drug Administration (FDA), Center for Devices and Radiologic Health. Summary of Safety and Effectiveness Information, Bard® Endoscopic Suturing System. # K994290. 03/20/00.

272. U. S. Food and Drug Administration (FDA). Center for Devices and Radiologic Health. Summary of Safety and Effectiveness Data, Enteryx™ Procedure Kit. PMA # P020006. 04/22/03.

273. U.S. Food & Drug Administration (FDA). Premarket Approval: Linx Reflux Management System [P100049/S021]. March 15, 2018. Accessed at https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?id=P100049S021.

274. U.S. Food and Drug Administration (FDA). Class 2 Device Recall LINX Reflux Management System. May 31, 2018. Accessed at https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfRES/res.cfm?id=163589.

275. U.S. Food and Drug Administration (FDA). LINX™ Reflux Management System. Gastroenterology and Urology Devices Panel of the Medical Devices Advisory Committee 2012.

276. U.S. Food and Drug Administration (FDA). Pre-market Approval Order (PMA) P100049: LINX™ Reflux Management System (March 22, 2012).

277. Vaezi MF, Pandolfino JE, Vela MF. ACG clinical guideline: diagnosis and management of achalasia. Am J Gastroenterol. 2013 Aug;108(8):1238-49.

278. Vaezi MF, Shaheen NJ, Muthusamy VR. State of Evidence in Minimally Invasive Management of Gastroesophageal Reflux: Findings of a Scoping Review. Gastroenterology. 2020 Oct;159(4):1504-1525. doi: 10.1053/j.gastro.2020.05.097. Epub 2020 Jul 1.

279. Vakil M, et al. The Montreal Definition and Classification of Gastroesophageal Reflux Disease: A Global Evidence-Based Consensus. Am J Gastroenterol 2006; 101:1900–1920.

280. Valinoti AC, Angeramo CA, Dreifuss N, Herbella FAM, Schlottmann F. Magnetic Sphincter Augmentation Device for Gastroesophageal Reflux Disease: Effective, But Postoperative Dysphagia and Risk Of Erosion Should Not Be Underestimated. A Systematic Review and Meta-Analysis. Arq Bras Cir Dig. 2024 Mar 4;36: e1781. doi: 10.1590/0102-672020230063e1781.

281. Varghese C, Lim A, Daker C, Sebaratnam G, Gharibans AA, Andrews CN, Hasler WL, O'Grady G; BSM Consortium and GPOEM-GEMS Study Group*. Predictors of Outcomes After Gastric Peroral Endoscopic Myotomy for Refractory Gastroparesis: A Systematic Review. Am J Gastroenterol. 2024 Nov 14;120(6):1275-1284. doi: 10.14309/ajg.0000000000003213. PMID: 39733275.

282. Vespa E, Barchi A, Mandarino FV, Fasulo E, Fratto MC, Passaretti S, Azzolini F, Savarino EV, Danese S. Standard length of peroral endoscopic myotomy (POEM) for achalasia: a systematic review and meta-analysis. Dis Esophagus. 2024 Nov 28;37(12):doae069. doi: 10.1093/dote/doae069.

283. Vespa E, Pellegatta G, Chandrasekar VT, Spadaccini M, Patel H, Maselli R, Galtieri PA, Carlani E, Sharma P, Hassan C, Repici A. Long-term outcomes of peroral endoscopic myotomy for achalasia: a systematic review and meta-analysis. Endoscopy. 2023 Feb;55(2):167-175. doi: 10.1055/a-1894-0147. Epub 2022 Jul 7. PMID: 35798336.

284. Viswanath Y, Maguire N, Obuobi RB, Dhar A, Punnoose S. Endoscopic day case antireflux radiofrequency (Stretta) therapy improves quality of life and reduce proton pump inhibitor (PPI) dependency in patients with gastro-oesophageal reflux disease: a prospective study from a UK tertiary centre. Frontline gastroenterology. 2019 Apr;10(2):113.

285. Viswanath YKS, Mbarushimana S, Ammar A, Madhusudanan GP, Kourounis G, Reddy A. Role of radiofrequency STRETTA for recurrent GERD following primary anti-reflux surgery and primary STRETTA therapy. Surg Endosc. 2025 Jul;39(7):4329-4334. doi: 10.1007/s00464-025-11781-7. Epub 2025 May 27. PMID: 40425859.

286. Wang X, et al. Peroral endoscopic myotomy versus pneumatic dilation for achalasia in patients aged ≥ 65 years. Rev Esp Enferm Dig. 2016 Oct;108(10):637-641.

287. Wang XH, et al. Full thickness myotomy is associated with higher rate of postoperative gastroesophageal reflux disease. World J Gastroenterol. 2016 Nov 14;22(42):9419-9426.

288. Warren HF, Reynolds JL, et al. multi-institutional outcomes using magnetic sphincter augmentation versus Nissen fundoplication for chronic gastroesophageal reflux disease. Surg Endosc. 2016 Aug;30(8):3289-96. doi: 10.1007/s00464-015-4659-y. Epub 2015 Nov 5.

289. Wendling MR, et al. Impact of transoral incisionless fundoplication (TIF) on subjective and objective GERD indices: a systematic review of the published literature. Surg Endosc. May 2013.

290. Werner YB, Hakanson B, et al. Endoscopic or Surgical Myotomy in Patients with Idiopathic Achalasia. N Engl J Med. 2019 Dec 5;381(23):2219-2229. doi: 10.1056/NEJMoa1905380.

291. Wilson EB, et al. The Effects of Transoral Incisionless Fundoplicaton on Chronic GERD Patients: 12-Month Prospective Multicenter Experience. Surg Laparosc Endosc Percutan Tech, Feb 2014; 24(1):36-46.

292. Xie P, Yan J, Ye L, Wang C, Li Y, Chen Y, Li G. Efficacy of different endoscopic treatments in patients with gastroesophageal reflux disease: a systematic review and network meta-analysis. Surg Endosc. 2021 Apr;35(4):1500-1510. doi: 10.1007/s00464-021-08386-1. Epub 2021 Mar 1. PMID: 33650003.

293. Yadlapati R, Gyawali CP, Pandolfino JE; CGIT GERD Consensus Conference Participants. AGA Clinical Practice Update on the Personalized Approach to the Evaluation and Management of GERD: Expert Review. Clin Gastroenterol Hepatol. 2022 May;20(5):984-994.e1. doi: 10.1016/j.cgh.2022.01.025. Epub 2022 Feb 2. Erratum in: Clin Gastroenterol Hepatol. 2022 Jul 9.

294. Yan C, et al. Comparison of Stretta procedure and toupet fundoplication for gastroesophageal reflux disease-related extra-esophageal symptoms. World J Gastroenterol. 2015 Dec 7;21(45):12882-7.

295. Yang J, Zeng X, Yuan X, Chang K, Sanaei O, Fayad L, Kumbhari V, Singh V, Kalloo AN, Hu B, Khashab MA. An international study on the use of peroral endoscopic myotomy (POEM) in the management of esophageal diverticula: the first multicenter D-POEM experience. Endoscopy. 2019 Apr;51(4):346-349. doi: 10.1055/a-0759-1428. Epub 2018 Nov 19.

296. Yeh RW, Triadafilopoulos G. Endoscopic antireflux therapy: the Stretta procedure. Thorac Surg Clin. 2005 Aug; 15(3): 395-403.

297. Yew KC, Seng-Kee C. Antireflux Endoluminal Therapies: Past and Present. Gastroenterology Research & Practice (2013).

298. Youn YH, et al. Peroral Endoscopic Myotomy for Treating Achalasia and Esophageal Motility Disorders. J Neurogastroenterol Motil. 2016 Jan 31;22(1):14-24.

299. Zaninotto G, Bennett C, et al. International Society for Diseases of the Esophagus. The 2018 ISDE achalasia guidelines. Diseases of the Esophagus (2018) 31, 1–29.

300. Zeng X, Bai S, Zhang Y, Ye L, Yuan X, Hu B. Peroral endoscopic myotomy for the treatment of esophageal diverticulum: an experience in China. Surg Endosc. 2021 May;35(5):1990-1996. doi: 10.1007/s00464-020-07593-6. Epub 2020 Apr 28. PMID: 32347387.

301. Zerbib F, Sacher-Huvelin S, Coron E, Coffin B, Melchior C, Ponchon T, Cholet F, Chabrun E, Vavasseur F, Gorbatchef C, Zalar A, Mion F, Robaszkiewicz M, Le Rhun M, Leroy M, Paul Galmiche J, Bruley des Varannes S. Randomised clinical trial: oesophageal radiofrequency energy delivery versus sham for PPI-refractory heartburn. Aliment Pharmacol Ther. 2020 Aug;52(4):637-645. doi: 10.1111/apt.15936. Epub 2020 Jul 13.

302. Zhang H, Huang S, Xia H, Shi L, Zeng X, Jiang J, Ren W, Peng Y, Lü M, Tang X. The role of peroral endoscopic myotomy for Zenker's diverticulum: a systematic review and meta-analysis. Surg Endosc. 2022 May;36(5):2749-2759. doi: 10.1007/s00464-022-09021-3. Epub 2022 Jan 12. PMID: 35020054.

303. Zhang H, Zhang J, Jiang A, Ni H. Gastric peroral endoscopic myotomy for gastroparesis: A systematic review of efficacy and safety. Gastroenterol Hepatol. 2019 Aug-Sep;42(7):413-422. English, Spanish. doi: 10.1016/j.gastrohep.2019.01.008. Epub 2019 Apr 4. PMID: 30954320.

304. Zhong C, Tan S, Huang S, Peng Y, Lü M, Tang X. Clinical outcomes of peroral endoscopic myotomy for achalasia in children: a systematic review and meta-analysis. Dis Esophagus. 2021 Apr 7;34(4):doaa112. doi: 10.1093/dote/doaa112. PMID: 33316041.

305. Zhu Z, Mao J, Zhou M, Xia M, Wu J, Chen Q, Zhao F, Liang H, Wang Z. A comparative study of magnetic sphincter augmentation and Nissen fundoplication in the management of GERD. Hernia. 2024 Dec;28(6):2367-2374. doi: 10.1007/s10029-024-03172-z. Epub 2024 Oct 14.

306. Zhuang QJ, Tan ND, Chen SF, Zhang MY, Xiao YL. Magnetic sphincter augmentation in treating refractory gastroesophageal reflux disease: A systematic review and meta-analysis. J Dig Dis. 2021 Dec;22(12):695-705. doi: 10.1111/1751-2980.13063. Epub 2021 Nov 30. PMID: 34693633.

COMMITTEE APPROVAL:

This Medical Coverage Guideline (MCG) was approved by the Florida Blue Medical Policy and Coverage Committee on 10/22/26.

GUIDELINE UPDATE INFORMATION:

06/15/01	New Medical Coverage Guideline.
03/15/02	Additions to Non-Covered section/Added CPT code 0008T.
04/15/03	Medical Coverage Guideline Reviewed.
01/01/04	Annual HCPCS coding update.
04/15/04	Review and revision of guideline consisting of updated references and added information regarding endoscopic submucosal biocompatible polymer (investigational).
10/01/04	4th quarter HCPCS coding update consisting of addition of S2215 (investigational).
01/01/05	Annual HCPCS update consisting of addition of 43257 and deletion of 0057T.
04/15/05	Review and revision of guideline consisting of updated references.
01/01/06	Annual HCPCS coding update consisting of the deletion of S2215 and the addition of 0133T.
04/15/06	Review and revision of guideline consisting of updated references.
01/01/07	HCPCS update consisting of the deletion of 0008T.
04/15/07	Review and revision of guideline consisting of updated references.
06/15/07	Reformatted guideline.
07/01/07	HCPCS update consisting of the deletion of 0133T.
03/15/08	Review and revision of guideline consisting of updated references.
03/15/09	Review and revision of guideline consisting of updated references.
05/15/09	Scheduled review; added informational statements relating to Stretta and Enteryx; no change in position statements; references updated.
06/15/10	Scheduled review; position statement unchanged, references updated.
03/15/11	Review Position Statement for Stretta procedure; Position Statement unchanged. References updated.
11/15/11	Revision consisting of the addition of clarification regarding TIF and Esophyx.

11/15/12	Annual review; position statement unchanged; references updated.
11/15/13	Annual review; position statement unchanged; Coding section revised; Program Exceptions section updated; references updated.
01/01/14	Annual HCPCS coding update: added 43212 and 43266; revised 43201, 43236, and 43257.
03/15/14	Revision to add Position Statement regarding magnetic sphincter augmentation procedures; coding and references updated.
10/15/14	Annual review; add position statement for POEM; other position statements are unchanged; update Description and Definition sections; update references.
07/01/15	Quarterly CPT/HCPCS update: added codes 0392T and 0393T.
06/15/16	Unscheduled review. Revised description section, maintained position statement. Revised CPT coding, Medicare Advantage program exception, and index terms. Updated references.
01/01/17	Annual CPT/HCPCS update. Added 43284, 43285. Deleted 0392T, 0393T.
02/15/17	Scheduled review. Maintained Position Statement section. Revised Description section and index terms. Updated references.
04/20/17	Deleted code 43499.
02/15/19	Revision. Updated description section. Maintained position statement. Updated references.
05/15/19	Deleted codes 43201, 43212, 43236, 43241, and 43266.
12/15/19	Unscheduled review. Maintained position statement and updated references.
04/15/20	Unscheduled review. Maintained position statement and updated references.
11/15/20	Scheduled review. Revised description and maintained position statement. Updated references.
07/15/21	Revision. Updated references and Program Exceptions section, and maintained position statement.
09/15/22	Scheduled review. Revised description and CPT coding. Added coverage criteria for peroral endoscopic myotomy (POEM). Designated D-POEM, G-POEM, and Z-POEM as experimental or investigational. Revised definitions and updated references.
05/22/23	Update to Program Exceptions section.
08/15/23	Revision. Added Eckardt Symptom Score grid.
01/01/24	Position statements maintained.
02/15/24	Revision. Updated references and maintained position statements.
10/15/24	Scheduled review. Revised description. Deleted reference to "transesophageal endoscopic gastroplasty". Updated references.
10/15/25	Scheduled review. Revised description. Maintained position statement and updated references.
11/15/26	Review; no change to position statement. Updated references.