Clinical Policy Title: GERD (gastrointestinal reflux disease): anti-reflux devices

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Next Review Date: February 2017

Policy contains:
- GERD.
- Anti-reflux devices

Related Policies:

None

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Coverage policy

AmeriHealth Caritas District of Columbia considers the use of the following anti-reflux devices to treat gastrointestinal reflux disease to be investigational and, therefore, not medically necessary.

I. Transesophageal endoscopic therapies and procedure not medically necessary:
   A. Implantation of inert polymers or polymethylmethacrylate (PMMA) beads; or
      1. Durasphere (Carbon Medical Technologies).
      2. Gatekeeper™ Reflux Repair System (Medtronic, Inc.).
      3. The Plexiglas (polymethylmethacrylate microspheres [PMMA]) (e.g., Röhm GmbH & Co. KG, Darmstadt, Germany).
      4. Enteryx® Procedure Kit (Boston Scientific Corporation).
      5. LINX Reflux Management System sphincter augmentation device (e.g., Torax Medical).
Note: CMS has medical necessity benefits guidance for the LINX Reflux Management System. See the Regulatory Status/CMS/LCD section, national coverage determination for endoscopic implantation of anti-gastroesophageal reflux device (100.9).

B. Endoscopic plication or suturing
   1. Transesophageal endoscopic gastroplasty or endoluminal gastric plication (i.e., the Bard EndoCinch, Endoscopic Suturing System).
   2. Endoscopic Suturing Device (ESD).
   4. Transoral fundoplication device (i.e., EsophyX™ System with SerosaFuse™ Fastener).

C. Radiofrequency energy
   1. Transesophageal radiofrequency to create submucosal thermal lesion of the gastroesophageal junction (i.e., Stretta system procedure).

Limitations:

All other uses of antireflux devices for the treatment of GERD are not medically necessary.

Relative contraindications include:

- Atypical GERD symptoms.
- Other associated foregut pathology (specifically, gastroparesis).
- Psychoemotional disorders.
- Functional esophageal disease.
- Bleeding disorders.
- Esophageal strictures/varices.
- High-grade dysplasia or cancer.

Note: The following CPT/HCPCS codes are not listed in the District of Columbia Medicaid fee schedule:

- C9724 - Endoscopic full-thickness plication of the stomach using endoscopic plication system (EPS); includes endoscopy
- C9737 - Laparoscopy, surgical, esophageal sphincter augmentation with device (e.g., magnetic band)

Alternative covered services:

H2 blockers, such as cimetidine (Tagamet HB), famotidine (Pepcid AC), nizatidine (Axid AR), and ranitidine (Zantac 75), decrease acid production. These medications are available in both over-the-counter and prescription strengths. H2 blockers provide short-term or on-demand relief and are effective for many people with GERD symptoms. They can also help heal the esophagus, although not as well as proton pump inhibitors (PPIs).

PPIs include (Prilosec, Zegerid), lansoprazole (Prevacid), pantoprazole (Protonix), rabeprazole (Aciphex), Omeprazole and esomeprazole (Nexium), which are available by prescription. Omeprazole and lansoprazole also come in over-the-counter strength. PPIs are more effective than H2 blockers, and can relieve symptoms and heal the esophageal lining in most people.

Prokinetics, which include bethanechol (Urecholine) and metoclopramide (Reglan), help make the stomach empty faster. However, both bethanechol and metoclopramide have side effects that often limit their use, including nausea, diarrhea, tiredness, depression, anxiety, and problems with physical movement. Prokinetics
can interact with other medications, so people taking prokinetic agents should tell their health care providers about all medications they are taking.

**Antibiotics**, including one called erythromycin, have been shown to improve gastric emptying. Erythromycin has fewer side effects than bethanechol and metoclopramide; however, like all antibiotics, it can cause diarrhea.

All of these medications work in different ways, so combinations of medications may help control symptoms. People who get heartburn after eating may take antacids and H2 blockers. The antacids neutralize stomach acid, and the H2 blockers stop acid production. By the time the antacids stop working, the H2 blockers have stopped acid.

**Background**

GERD is one of the most common health problems for adults. GERD affects about 20 percent of the U.S. population (El-Serag 2004). Up to 50 percent of patients with GERD may require chronic pharmacologic therapy. Long-term GERD pharmacotherapy is exceedingly expensive, with an estimated annual cost in the U.S. of $11 billion. The most powerful and commonly prescribed acid suppression medications are PPIs. PPIs have been linked via retrospective studies to increased risk of enteric infections, including *Clostridium difficile*-associated diarrhea, community-acquired pneumonia, bone fracture, nutritional deficiencies, and interference with metabolism of antiplatelet agents. It is estimated that as many as 40 percent of patients with GERD fail to respond symptomatically to aggressive acid suppression therapy. It is also one of the most important in terms of its chronicity, overall cost, adverse impact on quality of life, and potential for complications, such as Barrett’s esophagus and esophageal adenocarcinoma.

Gastroesophageal reflux disease results when the lower esophageal sphincter — the muscle that acts as a valve between the esophagus and stomach — becomes weak or relaxes when it should not, causing stomach contents to rise up into the esophagus. Abnormalities in the body, such as hiatal hernias, may also cause GERD. Hiatal hernias occur when the upper part of the stomach moves up into the chest. The stomach can slip through an opening found in the diaphragm. The diaphragm is the muscle wall that separates the stomach from the chest. Hiatal hernias may cause GERD because of stomach acid flowing back up through the opening; however, most produce no symptoms. People of all ages can develop GERD, some for unknown reasons.

Other factors that can contribute to GERD include obesity; pregnancy; certain medications, such as asthma medications, calcium channel blockers, many antihistamines, pain killers, sedatives, and antidepressants; smoking, or inhaling secondhand smoke.

The main symptom of GERD is frequent heartburn, though some adults with GERD do not have heartburn. Other common GERD symptoms include:

- A dry, chronic cough.
- Wheezing.
- Asthma and recurrent pneumonia.
- Nausea.
- Vomiting.
- A sore throat, hoarseness or laryngitis — swelling and irritation of the voice box.
- Difficulty swallowing or painful swallowing.
- Pain in the chest or the upper part of the abdomen.
- Dental erosion and bad breath.
Lifestyle changes and medications are often the first lines of treatment for suspected GERD. If symptoms improve with these treatment methods, a GERD diagnosis often does not require testing. However, to confirm a diagnosis, a person may need testing if symptoms do not improve. People with possible GERD who have trouble swallowing also may require testing. A completely accurate test for diagnosing GERD does not exist. However, several tests can help with diagnosis.

**Diagnostic test:**

**Upper GI series.** While a gastroenterologist does not use an upper GI series to diagnose acid reflux or GERD, the test can provide a look at the shape of the upper GI tract. An X-ray technician performs this test at a hospital or an outpatient center, and a radiologist—a doctor who specializes in medical imaging—interprets the images. This test does not require anesthesia. No eating or drinking is allowed before the procedure, as directed by the health care staff. People should check with their gastroenterologists about how to prepare for an upper GI series. During the procedure, the person will stand or sit in front of an X-ray machine and drink barium, a chalky liquid. Barium coats the esophagus, stomach and small intestine so the radiologist and gastroenterologist can see these organs' shapes more clearly on X-rays. The barium shows problems related to GERD, such as hiatal hernias. While an upper GI series cannot detect mild irritation, the test can detect esophageal strictures — narrowing of the esophagus that can result from GERD — as well as ulcers, or sores.

A person may experience bloating and nausea for a short time after the test. For several days afterward, barium liquid in the GI tract causes white or light-colored stools. A health care provider will give the person specific instructions about eating and drinking after the test.

**Upper endoscopy.** A gastroenterologist may use an upper endoscopy, also known as an esophagostroduodenoscopy, if a person continues to have GERD symptoms despite lifestyle changes and treatment with medications. An upper endoscopy is a common test used to evaluate the severity of GERD. This procedure involves using an endoscope—a small, flexible tube with a light—to see the upper GI tract. A gastroenterologist performs this test at a hospital or an outpatient center. The person may receive a liquid anesthetic that is gargled or sprayed on the back of the throat.

**Esophageal pH monitoring.** The most accurate test to detect acid reflux, esophageal pH monitoring measures the amount of liquid or acid in the esophagus as the person goes about normal activities, including eating and sleeping. A gastroenterologist performs this test at a hospital or an outpatient center as a part of an upper endoscopy. The person can remain awake during the test. Sedation is not required for the test; however, it can be used if necessary.

**Esophageal manometry.** Esophageal manometry measures muscle contractions in the esophagus. Evaluates the key anatomic zone treated by the endoscopic device. Supports device efficacy. Is an important marker of device success, however, the clinical relevance is unclear. May be a surrogate marker, but should not be the primary end point.

A gastroenterologist may order this test when considering a person for anti-reflux surgery. The gastroenterologist performs this test during an office visit. A person may receive anesthetic spray on the inside of the nostrils or back of the throat.
## Pharmacotherapy

### Common classes of medications used in the treatment and management of GERD

<table>
<thead>
<tr>
<th>Class</th>
<th>Major effects</th>
<th>Generic/Trade Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antacids</td>
<td>Neutralize gastric acidity, inhibit pepsin proteolytic activity, and increase lower esophageal sphincter tone.</td>
<td>aluminum hydroxide/Amphojel magnesium carbonate and sodium alginate/Gaviscon Liquid simethicone/Maalox Regular Strength Liquid/Mylanta Regular Strength Liquid aluminum magnesium hydroxide sulfate/Riopan mesalamine/Pentasa olsalazine/Dipentum balsalazine/Colazal sulfasalazine/Azulfidine</td>
</tr>
<tr>
<td>H2-receptors</td>
<td>Reversible competitive blockers of histamine at the H2-receptors, including receptors on the gastric parietal cells.</td>
<td>cimetidine/Tagamet HB ranitidine/Zantac 75 nzatidine/Acid AR famotidine/Pepcid AC</td>
</tr>
<tr>
<td>Proton pump inhibitors (PPIs)</td>
<td>Suppress gastric acid secretion by specific inhibition of the H+/K+ ATPase enzyme system of the gastric parietal cell, and therefore suppress gastric acid production.</td>
<td>omeprazole/Prilosec, Losec, omeprazole with sodium bicarbonate/ Zegerid pantoprazole /Protonix rabeprazole /AcipHex esomeprazole/Nexium lansoprazole/ Prevacid dexlansoprazole/ Dexilant</td>
</tr>
<tr>
<td>Prokinetics</td>
<td>Help the stomach empty faster.</td>
<td>Bethanechol/ Urecholine Methcolopramide/ Reglan</td>
</tr>
<tr>
<td>Antibiotics</td>
<td>Help empty the stomach faster. Erythromycin has fewer side effects than prokinetics; however, it can cause diarrhea.</td>
<td>erythromycin</td>
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</table>

During the past 10 years, a multitude of endoscopic therapies have emerged to try to fill this particular need. These therapies can be categorized mechanistically into four groups: (1) radiofrequency energy delivery to the esophagogastric junction (EGJ), (2) endoluminal suturing of the proximal stomach and/or distal esophagus, (3) injection of non-absorbable inert material into the luminal wall in the region of the EGJ, and (4) plication techniques attempting to simulate fundoplication. All four therapy methods are intended to bolster the anti-reflux properties of the EGJ to reduce the occurrence of reflux (Pandolfino et al. 2013).
Various endoscopic procedures and devices are: (A) the Stretta effect on the EGJ highlighting the focal thermal injury; (B) the Endocinch device illustrating the plication technique; (C) the NDO plicator using a single plication to recreate a flap valve; (D) the effect of the Esophyx illustrating circumferential plications and the resulting flap valve.

The Stretta procedure (Mederi Therapeutics Inc, Norwalk, CT) was first approved by the Food and Drug Administration in 2000, and was one of the earliest endoscopic devices conceived to treat reflux. The ultimate goal of the procedure was to augment the tone and integrity of the LES. Conceptually, however, this procedure would do very little to improve the intrinsic LES function because the mechanism of action is focused on inducing fibrosis in the submucosa and muscle. Hence, this would lead to a less-compliant distal esophagus and not impact the muscular function of the LES.

The device consists of an ablation catheter and an electrical generator unit. The catheter is 20F and has a soft-tip bougie configuration. The tip of the bougie contains a balloon that is encased by a basket. The basket has needle electrodes that are used to deliver the radiofrequency energy deep into the submucosa. The device is rotated to allow for circumferential therapy and the catheter continuously irrigates the esophageal lumen to minimize mucosal thermal injury. In animal models, the Stretta device was able to increase gastric yield pressure, and reduce transient LES relaxation.

In a randomized sham-controlled trial published in 2003, endoscopic application of radiofrequency energy was used in 35 gastroesophageal reflux patients vs. sham endoscopy in 29 similar patients. After six to 12 months, there was significant improvement in heartburn symptoms and quality of life in the active treatment group. However, there were no significant post procedure differences between treatment and control groups for objective measures, such as exposure of the esophagus to acid, lower esophageal sphincter (LES) pressure, esophagitis, or use of medication to control symptoms. In addition, a significant portion of patients in the control group also experienced symptomatic improvement (Corley DA, et al. 2003).

Per the American College of Gastroenterology (ACG, 2013) radiofrequency therapy was returned to the U.S. market in 2010 and remains available. In stating that the therapy had been removed from the marketplace, the authors of the Guidelines neither implied nor intended to imply that there was any health, efficacy, or safety reasons for the removal.

In summary, the lack of well-designed, randomized controlled trials provides little convincing data as to the following: selection guidelines for determining which patients might benefit from this procedure; validation of long-term benefit and freedom from risk; and the ability to confirm improvement in objective vs. solely symptomatic components of reflux and esophageal exposure to acid.

Enteryx (Boston Scientific, Natick, MA) is a biodegradable ethylene-vinyl-alcohol copolymer that is used as a sphincter bulking agent. It is injected directly into the LES using a sclerotherapy needle. Initial animal models showed relative tolerability of the Enteryx injection in the LES; however, manometric characteristics were not sufficiently different after injection.
A European group (Dieviere J, et al. 2003) performed a single-blind, prospective, sham-controlled investigation of Enteryx. This group randomized 32 patients to Enteryx and 32 to sham (endoscopy without intervention). At the three-month time point, 81 percent of Enteryx-treated patients achieved the primary end point of a 50 percent reduction in PPI use compared with 53 percent of sham-treated patients. Sixty-eight percent of Enteryx-treated patients had discontinued all PPI use compared with 41 percent of sham-treated patients.

The Endoscopic plication system (EPS; NDO Surgical, Inc., Mansfield, MA) is similar to the Endocinch procedure in that the goal is to form a gastric plication to tighten the EGJ. Unlike Endocinch, it is a full-thickness plication with serosa-to-serosa healing. The device contains a channel in which a pediatric gastroscope fits to view the plication under retroflexion. The goal is plication of the stomach to the distal EGJ. The first pilot investigation enrolled seven patients with reflux. Six of the seven patients were able to undergo the procedure. GERD symptoms improved at three months and six months and no major complications were reported.

A sham-controlled RCT was performed with the EPS. In total, 78 patients were randomized to full-thickness plication and 81 underwent a sham procedure (defined as undergoing placement of the endoscopic device without deploying the plication suture). At the three-month follow-up evaluation, GERD symptom scores were significantly better in the treatment group compared with the sham group, and comparable with baseline scores on PPI. In an intention-to-treat analysis, complete PPI cessation was seen in 50 percent of the treatment group compared with 24 percent of the sham group. The percentage of AET was improved significantly with 23 percent achieving normalization of percentage of AET in the treatment arm, compared with the sham arm, in which 15 percent achieved normalization. Significantly more patients in the treatment arm reported adverse events, although these were mild and self-limited.

Although the RCT showed promising symptom scores, the improvement in objective measures was only modest. As such, there has been a follow-up investigation using multiple plications in each patient in an attempt to improve reflux parameters. In a multicenter investigation, 41 patients with two or more plications were evaluated with six-month follow-up data. Although clinical symptoms improved, median percentage of AET only decreased from 11 to 9, with only 31 percent achieving complete normalization of the percentage of AET.

The data from the RCTs was encouraging and the finding of better results with multiple plications without an increase in adverse events supported that this device could have clinical utility. However, the company ceased operations in 2008 and the device is no longer clinically available.

Similar to the EPS plicator, transoral incisionless fundoplication (TIF) with Esophyx (EndoGastric Solutions, San Mateo, CA) creates serosa-to-serosa plications. The main difference is the ability to perform circumferential, transmural plications with Esophyx. The device consists of a flexible catheter that contains a tissue retractor and fasteners. The endoscope fits within this catheter. It is placed orally, and with the endoscope retroflexed in the stomach, the tissue retractor facilitates apposition of the gastric cardia to the distal esophagus.

Currently, there are three plicating devices: The endoCinch (C.R. Bard’s endoscopic suturing system, the ESD, and the Full-Thickness Plicator. The first two have been approved by the FDA, and the last was not approved to date.
Endoluminal plication uses mechanical techniques to hinder reflux by approximation of tissue at or below the gastroesophageal junction. The EndoCinch (CR BARD Endoscopic technologies, Massachusetts, USA) system was the first FDA approved endoscopic sewing-machine method for treating GERD. It was developed by Swain CP et al. in London UK, in the mid-1980s. In the Bard method, an oroesophageal tube (19.7 mm in diameter and 30 cm long) is placed to facilitate passage of the suturing device. The suture capsule, which is similar to a sewing machine, is attached to an endoscope and loaded with a suture. After placing the suture capsule, under vision, over the selected site at the gastroesophageal junction, suction through the external vacuum line is applied. This pulls a fold of tissue into the capsule cavity, and the needle driver places the suture. Suction is released and the tissue is withdrawn from the capsule. The procedure is repeated on an adjoining site. Drawing two sutured sites together creates a plication.

It is reported that the procedure is technically difficult, has a steep learning curve, and the results are likely to be operator-dependent. Conscious sedation might not be sufficient and a general anesthesia may be needed. Adverse effects associated with the procedure include pharyngitis, vomiting, abdominal pain, chest pain, mucosal tear, hypoxia and bleeding.

The Bard’s Endoscopic Suturing system was FDA approved in March 2000, for the treatment of GERD. The ESD (Wilson-Cook Medical, Winston-Salem, N.C.), another endoscopically assisted endoluminal suturing device, was also approved by the FDA for soft-tissue apposition. The Full-Thickness Plicator (Ndo Surgical, Inc., Mansfield, Mass.) is another plication device that had not been approved by the FDA at time the search was made.

The Center for Devices and Radiological Health (CDRH) of the FDA approved the LINX™ Reflux Management System (LINX device) on March 22, 2012. The LINX device consists of a series of titanium beads, each with a magnetic core, connected together with titanium wires to form a ring shape. The LINX device is surgically implanted around the lower end of the esophagus. It is used to treat GERD in patients who continue to have GERD symptoms despite the use of maximum medical therapy for the treatment of their reflux. The LINX device received FDA pre-market approval (PMA) on March 22, 2012.

The device received approval for four years. Continued approval of the PMA is contingent upon the annual reporting of the number of devices sold and adverse events. In addition, the manufacturer is required to conduct two post-approval studies. These studies will evaluate the long-term effectiveness of the device and incidence of adverse events. The first study will be a five-year extension of the PMA Investigational Device Exemption (IDE) cohort, while the second will be a multi-center, prospective, new enrollment, observational study, conducted over five years. This study has not yet completed enrollment and thus long-term results are not available.

Even though the LINX device helps to prevent stomach contents from flowing back into the esophagus, it does not prevent movement of food or liquids down the esophagus into the stomach. When the patient swallows, the pressure in the esophagus increases and the magnetic beads move apart on the titanium wires. As the beads move apart, the magnetic force decreases. This separation of the beads allows food or liquids to pass normally into the stomach. After the food or liquids have passed into the stomach, the magnetic beads return to the closed position.

In the FDA Summary of Safety and Effectiveness Data (SSED) document, the FDA concludes: “The safety of the LINX Reflux Management System in the treatment of subjects with GERD was based on adverse event data from 100 subjects followed for up to 24 months. The 12-month data demonstrated 162 total adverse events reported in 76% of the subjects. Most adverse events resolved without sequelae. Dysphagia was the most
common adverse event with 76 events being reported in 68% of the subjects, with 11% of the subjects reporting ongoing dysphagia. Eighteen (18) subjects underwent esophageal dilatation and 10 continued to have dysphagia at 24 months. Furthermore, there were several subjects who experienced symptoms of odynophagia/dysphagia that started after 180 days (182 – 605) and several subjects who had odynophagia and/or dysphagia that took over 180 days to resolve (maximum time noted 447 days). Overall, the incidence of dysphagia was found to be comparable to the incidence of dysphagia that is reported in patients undergoing anti-reflux surgery, such as Nissen fundoplication. Overall, the safety data from the pivotal trial supports a reasonable assurance that the LINX device is safe.”

Methods

Searches
AmeriHealth Caritas District of Columbia searched PubMed and the databases of:
- UK National Health Services Centre for Reviews and Dissemination.
- Agency for Healthcare Research and Quality’s National Guideline Clearinghouse and other evidence-based practice centers.
- The Centers for Medicare & Medicaid Services.

Searches were conducted on December 10, 2014, using the terms “GERD,” “reflux,” “anti-reflux,” “surgical devices” and “fundoplication.”

Included were:
- Systematic reviews, which pool results from multiple studies to achieve larger sample sizes and greater precision of effect estimation than in smaller primary studies. Systematic reviews use predetermined transparent methods to minimize bias, effectively treating the review as a scientific endeavor, and are thus rated highest in evidence-grading hierarchies.
- Guidelines based on systematic reviews.
- Economic analyses, such as cost-effectiveness, and benefit or utility studies (but not simple cost studies), reporting both costs and outcomes — sometimes referred to as efficiency studies — which also rank near the top of evidence hierarchies.

Findings

There is insufficient evidence to conclude that endoscopic radiofrequency energy treatment for GERD provides benefits that equal or exceed those provided by conventional pharmacologic or surgical treatment. While some data suggest this technology has acceptable safety profiles and may relieve symptoms, improve quality of life (QOL), and reduce antisecretory medication use in some patients with GERD, this evidence comes primarily from studies of small to moderate size that lack adequate control or comparison groups and provide only short-term follow-up.

According to a Hayes brief, endoscopic radiofrequency energy for the treatment of GERD has some potential advantages compared with anti-reflux surgery in that general anesthesia and inpatient hospitalization are not required. Compared with other minimally invasive endoscopic therapies for GERD, the technical complexity of this procedure lies somewhere between the most technically demanding procedure (EndoCinch™, an endoscopic suturing system) and the simplest procedure (Enteryx™, an injection technique).

The Stretta device showed promising results with early open-label trials. However, the randomized sham-
controlled trials did not support the findings of the open-label trials. Thus, high-quality evidence suggests the Stretta procedure only provides a mild subjective improvement in symptoms but no objective improvement in reflux burden, EGJ function, or reduction in PPI use. The mechanism of the symptom improvement has been postulated to be related to alteration in esophageal visceral afferent fibers resulting from thermal injury. The lack of improvement in objective parameters, along with complications noted that are not much less frequent or severe compared with fundoplication, make this approach less attractive. Further studies are unlikely to change this recommendation and thus, we would not recommend use of Stretta for the treatment of GERD.

The Enteryx procedure was relatively simple and did not require advanced endoscopic training, which made it an attractive option for most general gastroenterologists. The single Level I study showed a modest effect in terms of symptom control and PPI use. However, Enteryx was taken off the market voluntarily because of multiple serious adverse events after the FDA issued a warning on October 14, 2005, related to these complications.

Enteryx received FDA approval in 2003 through the premarket approval (PMA) process for the treatment of symptomatic gastroesophageal reflux disease. However, on September 23, 2005, Boston Scientific Corporation issued a recall of Enteryx procedure kits and Enteryx single pack injectors because of reports that improper injection procedures can lead to serious patient injury and death.

Gatekeeper, which was expected to gain FDA approval, was withdrawn in late 2005 before approval and is not expected to be marketed.

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The main alternative to medical therapy is surgery, with laparoscopic Nissen fundoplication (LNF) being the standard of care. Despite the efficacy of surgery, LNF is invasive and carries procedure morbidity, such as dysphagia, gas bloat, and modest long-term durability. Given these issues, there has been a great deal of interest in developing an intermediate option as an alternative to chronic prescription drug use, without the morbidity related to surgery.

The risks associated with laparoscopic fundoplication (LNF) are well established in both high-level clinical trials and long-term experience from prospective and retrospective evaluations of large cohorts. The mortality related to laparoscopic fundoplication is low (<1%). Complications related to LNF can be categorized as immediate post procedural, delayed post procedure, and treatment failures. Early complications included perforation (0% – 4%), bleeding (<1%), and pneumothorax (0% – 10%). The most common delayed complication is gas-bloat, which occurs to some degree in almost all patients. Roughly 25 percent of patients can experience persistent dysphagia after three months post fundoplication; however, most patients do not require significant intervention.
The LINX™ Reflux Management System is unproven and not medically necessary for the treatment of GERD. The safety and efficacy of this system has not been established in the peer-reviewed medical literature. Available studies are hampered by a number of limitations, including small study size, lack of statistical power, lack of controls or comparators, and lack of long-term follow-up.

The need for PPIs after LNF is surprisingly common, as shown by Spechler et al., with roughly 50 percent of patients needing a daily PPI 10 years after LNF. Follow-up studies have indicated that only a fraction of patients taking a PPI after fundoplication have abnormal acid reflux, with the majority taking a PPI for nonspecific dyspeptic symptoms. Perhaps the most concerning late complication is the need for revisional surgery.

The indication for revisional fundoplication typically is owing to persistent reflux symptoms, dysphagia or herniation. Symptoms usually present within two years of the initial fundoplication and herniation may be an early or late complication. The redo-fundoplication is considerably more complicated, and is associated with a higher perioperative risk. As such, it should be undertaken only by experienced foregut surgeons.

The safety and efficacy of endoscopic therapies for the treatment of GERD have not been established in the published medical literature. Current studies are generally of small to moderate size, lack adequate control or comparison groups, and provide only short-term follow-up. Well-designed clinical trials with long-term follow up are required to establish that endoscopic therapies benefit health outcomes in patients with GERD by eliminating symptoms, preventing recurrence of symptoms or progression of disease, healing esophagitis, and reducing or eliminating the need for pharmacologic therapy.

The U.S. FDA warned in 2009 that taking the PPI omeprazole (brand name Prilosec®) while also taking clopidogrel (brand name Plavix®) makes the clopidogrel less effective. Clopidogrel is a medicine that prevents heart attacks and strokes. It does this by keeping blood from clotting in the arteries of the heart or the blood vessels in the brain. These blood clots can lead to heart attack or stroke.

Future directions

Given the waning enthusiasm for endoscopic procedures, shifts toward creating alternatives for fundoplication that are less invasive and are associated with less dysphagia and gas-bloat currently are being investigated. Recently, there has been interest in the LINX (Torax Medical, Shoreview, MN) device. Although not an endoscopic device, the LINX is a ring of magnetic beads placed around the esophagus to bolster the EGJ during laparoscopy. Prospectively collected data suggest relative safety and efficacy with three-year follow-up evaluation and objective parameters improved at 12 months. These data, however, are neither randomized nor blinded. Furthermore, it is unclear from the current data whether this benefit was the result of concomitant surgical crural repair or from the device alone. As such, this data should be interpreted with caution and the device currently is limited to centers of excellence for continued post approval assessment.

Another non-endoscopic device also being investigated is the implantable EndoStim (EndoStim, St. Louis, MO) LES stimulator, which has been shown to improve LES pressure without altering deglutitive relaxation. This device was assessed in an open-label trial in 24 patients and was shown to improve both symptom score and objective parameters of reflux burden. Although the device has received the CE Mark approval, it currently is not available in the United States.
The current data support that the risk/benefit of endoluminal therapies do not favor use of these techniques in our current management paradigm for GERD. The effectiveness of these devices is mild to modest compared with sham procedures in high-quality studies and the risks have either been too great or not studied to the degree that we confidently can state that these approaches are safer than fundoplication. This is in line with the current recommendations of both the American Gastroenterological Association and the American College of Gastroenterology regarding use of endoscopic therapies in the management of GERD. In fact, two devices are no longer available and currently there is only one device (Esophyx) that has not been fully vetted in an RCT.

Clinical studies involving the LINX system were identified via a search of the PubMed/Medline database (www.ncbi.nlm.nih.gov/pubmed) conducted in December 10, 2014.

Summary of clinical evidence

<table>
<thead>
<tr>
<th>Citation</th>
<th>Content, Methods, Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAGES</td>
<td>SAGES review and consensus panel concluded:</td>
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<td></td>
<td>• The incidence of initial dysphagia following LINX implantation is high. Difficulty swallowing was more commonly reported at 12 months and 24 months following LINX implantation than at baseline. Patients should be advised about the possibility that it may be more difficult to swallow following surgery, and that this symptom may persist.</td>
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<td>• Direct comparative studies between the LINX procedure and Nissen fundoplication will be needed.</td>
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<tr>
<td>Ganz et al. (2013)</td>
<td>Treatment_LINX reflux management system.</td>
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<td>• The primary outcome was achieved in 64% of patients (95% Confidence interval [CI], 54 to 73). For the secondary outcomes, a reduction of 50% or more in the use of proton pump inhibitors occurred in 93% of patients, and there was improvement of 50% or more in quality-of-life scores in 92%, as compared with scores for patients assessed at baseline while they were not taking proton pump inhibitors.</td>
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<td>• The most frequent adverse event was dysphagia (in 68% of patients postoperatively, in 11% at one year, and in 4% at three years).</td>
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<td>• Serious adverse events occurred in six patients, and in six patients the device was removed. In this single group evaluation of 100 patients before and after sphincter augmentation with a magnetic</td>
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<td>• device, exposure to esophageal acid decreased, reflux symptoms improved, and use of proton pump inhibitors decreased.</td>
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<td>• Follow-up studies are needed to assess long-term safety.</td>
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The high prevalence of gastroesophageal reflux disease continues to encourage the development of treatment modalities to fill the gap between acid-suppression therapy and the laparoscopic Nissen fundoplication. The Magnetic Sphincter Augmentation device has been designed to augment the lower esophageal sphincter barrier using magnetic force. A multicenter feasibility trial was done to evaluate safety and efficacy.

- **Methods:** Patients with typical heartburn (at least partially responding to proton-pump inhibitors), abnormal esophageal acid exposure, and normal esophageal peristalsis were enrolled. Patients with hiatal hernia >3 cm were excluded from the study. The device was implanted laparoscopically around the distal esophagus.
- **Results:** Over a one-year period, 38 out of 41 enrolled patients underwent this procedure in three hospitals. No operative complications were recorded. A free diet was allowed since postoperative day one, and 97% of patients were discharged within 48 hours. The mean follow-up was 209 days (range 12 – 434 days). The GERD-HRQL score decreased from 26.0 to 1.0 (p < 0.005). At three months postoperatively, 89% of patients were off anti-reflux medications, and 79% of patients had a normal 24-hour pH test. All patients preserved the ability to belch. Mild dysphagia occurred in 45% of patients. No migrations or erosions of the device occurred.
- **Conclusions:** Laparoscopic implant of the MSA device is safe and well tolerated. It requires minimal surgical dissection and a short learning curve compared to the conventional Nissen fundoplication.

**Glossary**

**Fundoplication** — A surgical procedure designed to restore the barrier function of the LES. The most common type of fundoplication procedure is referred to a Nissen fundoplication, which is typically performed laparoscopically.

**Gas-bloat syndrome** — A recognized complication of a "too-tight" fundoplication procedure that inhibits the ability to belch or vomit, with accumulation of gas in the stomach.

**Gastroesophageal reflux disease (GERD)** — A disease caused by chronic back-flow of acid from the stomach into the esophagus, causing heartburn and leading to irritation and possible damage to the lining of the esophagus.

**Lower esophageal sphincter (LES)** — The sphincter muscle separating the esophagus and the stomach. This muscle serves as a barrier to prevent the reflux of acid into the esophagus. GERD is the result of an incompetent lower esophageal sphincter.

**Medically Necessary**— A service or benefit is Medically Necessary if it is compensable under the MA Program and if it meets any one of the following standards:

- The service or benefit will, or is reasonably expected to, prevent the onset of an illness, condition or disability.
- The service or benefit will, or is reasonably expected to, reduce or ameliorate the physical, mental or developmental effects of an illness, condition, injury or disability.
- The service or benefit will assist the Member to achieve or maintain maximum functional capacity in performing daily activities, taking into account both the functional capacity of the Member and those functional capacities that are appropriate for Members of the same age.
Proton pump inhibitors (PPIs) — Group of pharmacological therapies indicated to reduce the production of gastric acid to treat GERD and peptic ulcers.

Related policies:


References

Professional society guidelines/other:


Peer-reviewed references:


Clinical Trials:


Centers for Medicare & Medicaid Services (CMS) national coverage determination (NCD):

Local coverage determinations (LCD):

LINX Reflux Management System (A53447), Effective date, 05/31/2013. States: Virginia, North and South Carolina and West Virginia. [Link](http://www.cms.gov/medicare-coverage-database/details/article-details.aspx?articleId=53447&ver=2&ContrId=229&ContrVer=1&CoverageSelection=Both&ArticleType=All&PolicyType=Final&s=All&KeyWord=LINX+system&KeyWordLookUp=Title&KeyWordSearchType=And&bc=gAAAAABABAAAAAA%3d%3d&). Accessed 12/10/2013.

Commonly submitted codes

Below are the most commonly submitted codes for the service(s)/item(s) subject to this policy. This is not an exhaustive list of codes. Providers are expected to consult the appropriate coding manuals and bill accordingly.

<table>
<thead>
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<tr>
<td>K21.9</td>
<td>Gastro-esophageal reflux disease without esophagitis</td>
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