

## Medical Policy Manual

**Topic:** Magnetic Esophageal Ring to Treat Gastroesophageal Reflux Disease (GERD) **Date of Origin:** January 2014

**Section:** Surgery

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### IMPORTANT REMINDER

Medical Policies are developed to provide guidance for members and providers regarding coverage in accordance with contract terms. Benefit determinations are based in all cases on the applicable contract language. To the extent there may be any conflict between the Medical Policy and contract language, the contract language takes precedence.

PLEASE NOTE: Contracts exclude from coverage, among other things, services or procedures that are considered investigational or cosmetic. Providers may bill members for services or procedures that are considered investigational or cosmetic. Providers are encouraged to inform members before rendering such services that the members are likely to be financially responsible for the cost of these services.

### DESCRIPTION

A laparoscopically implanted ring composed of interlinked titanium beads with magnetic cores has been developed for the treatment of gastroesophageal reflux disease (GERD). The device is placed around the esophagus at the level of the gastroesophageal junction and is being evaluated in patients who have GERD symptoms despite maximum medical therapy.

### Background

Gastroesophageal reflux disease (GERD) is defined as reflux of stomach acid into the esophagus that causes symptoms and/or mucosal injury. GERD is a common medical disorder, with estimates of 10-20% prevalence in developed countries. The severity of GERD is widely variable. Many patients have mild, intermittent symptoms that do not require treatment or only require episodic use of medications. Other patients have chronic, severe GERD that can lead to complications such as Barrett's esophagus and esophageal cancer. For patients with severe disease, chronic treatment with acid blockers is one option. For some patients, medications are not adequate to control symptoms, and other patients prefer to avoid the use of indefinite, possibly lifelong medications. Surgical treatments are available for these patients, primarily a Nissen fundoplication performed either laparoscopically or by open surgery.

The LINX™ Reflux Management System (Torax Medical®) is composed of a small flexible band of 10 to 18 interlinked titanium beads with magnetic cores. Using standard laparoscopic techniques, the band is placed around the esophagus at the level of the gastroesophageal junction. The magnetic attraction between the beads is intended to augment the lower esophageal sphincter to prevent gastric reflux into the esophagus, without compressing the esophageal wall. It is proposed that swallowing food or liquids creates sufficient pressure to overcome the magnetic bond between the beads, allowing the beads to separate and temporarily increase the size of the ring. The target population is patients who have GERD symptoms despite maximum medical therapy (e.g., proton pump inhibitors) but who do not want to risk the adverse effects of a surgical procedure like Nissen fundoplication. Adverse events of the LINX™ Reflux Management System may include dysphagia or odynophagia. The device can be removed by a laparoscopic procedure if severe adverse events occur or if magnetic resonance imaging (MRI) is needed for another condition.

## Regulatory Status

The LINX™ Reflux Management System was approved by the U.S. Food and Drug Administration (FDA) in 2012. The LINX™ device is indicated for patients diagnosed with GERD, as defined by abnormal pH testing, and who continue to have chronic GERD symptoms despite maximum therapy for the treatment of reflux. The FDA has required 5-year follow-up of 100 patients from the investigational device exemption (IDE) pivotal study to evaluate safety and efficacy of the device.

## MEDICAL POLICY CRITERIA

An implantable magnetic esophageal ring is considered **investigational** as a treatment of gastroesophageal reflux disease (GERD).

## SCIENTIFIC EVIDENCE

In order to determine the safety and effectiveness of implantable magnetic esophageal rings for the treatment of gastroesophageal reflux disease (GERD), large, well-designed randomized controlled trials (RCTs) that compare this therapy to both laparoscopic Nissen fundoplication and standard medical treatment (intensified drug therapy) are needed.

In order to isolate the independent contribution of the magnetic esophageal rings on health outcomes (specific effects) and properly control for nonspecific treatment effects, well-designed clinical trials with the following attributes are necessary:

- Randomization  
Randomization helps to achieve equal distribution of individual differences by randomly assigning patients to treatment or sham groups. This promotes the equal distribution of patient characteristics across the two study groups. Consequently, any observed differences in the outcome may, with reasonable assuredness, be attributed to the treatment under investigation. Random assignment is important because of the multiple potential confounders of GERD outcomes, such as diet, smoking and obesity.
- Sham control group

A comparable sham control group helps control for placebo effects as well as for the variable natural history of the condition being treated. It is common for GERD symptoms to vary over time, with exacerbations and remissions, and as a result, a control group is required to differentiate improvements in symptoms from the natural history of the disorder. In addition, a placebo control group is optimal due to the subjective nature of the patient-reported outcome measures, which are prone to bias if the patient is not blinded to treatment assignment.

- **Blinding**  
Blinding of study participants, caregivers, and investigators to the active or sham assignments helps control for bias for or against the treatment. Blinding assures that placebo effects do not get interpreted as true treatment effects.
- **Large study population**  
Small studies limit the ability to rule out chance as an explanation of study findings.
- **Adequate follow-up**  
Follow-up periods must be long enough to determine the durability of any treatment effects.

Although nonrandomized studies can demonstrate the feasibility and potential benefit of this procedure and can be used to determine rates of adverse events, they are of limited usefulness for determining treatment efficacy due to the issues previously outlined. Therefore, the focus of the evidence review for implantable magnetic esophageal rings for the treatment of GERD is on randomized controlled trials (RCTs) with the attributes noted above.

## **Literature Appraisal**

Data submitted to the U.S. Food and Drug Administration (FDA) for the LINX® Reflux Management System included 2 single-arm, nonrandomized FDA-regulated investigational device exemption (IDE) trials with a total of 144 subjects and follow-up data between 2 and 4 years.<sup>[1]</sup> The feasibility IDE study enrolled 44 subjects at 4 clinical sites (2 U.S. and 2 Europe) and has published data out to 4 years.<sup>[2,3]</sup> The pivotal IDE study included 100 subjects from 14 clinical sites (13 U.S. and 1 Europe) who had documented symptoms of gastroesophageal reflux disease for longer than 6 months (regurgitation or heartburn that responds to acid neutralization or suppression), required daily proton pump inhibitor (PPI) or other anti-reflux drug therapy, had symptomatic improvement on PPI therapy, and had a total distal ambulatory esophageal pH less than 4 for 4.5% or more of the time when off GERD medications. The primary safety endpoint measured the rate of related device and procedure serious adverse events (SAEs). Efficacy endpoints were assessed off PPI therapy and measured esophageal acid exposure, total GERD-Health Related Quality of LIFE (HRQL) scores, and PPI usage. Subjects served as their own controls.

A total of 24/44 (54.5%) subjects in the feasibility study experienced adverse events related to the device and/or procedure, and 2 subjects experienced SAEs. The most common adverse event was dysphagia (22 events in 20 subjects, which resolved in 90 days). No SAEs related to the device or procedure occurred after the first year. In the pivotal study, dysphagia was commonly observed, occurring in 68% of patients (49% mild, 16% moderate, and 5% severe), and an SAE related to the device or implantation procedure occurred in 6% (8/144) of subjects. Most cases of dysphagia self-improved or improved with endoscopic esophageal balloon dilation. Three subjects underwent device removal for severe dysphagia and/or odynophagia. Three subjects were hospitalized for nausea and/or vomiting. One subject reported the inability to vomit. No device migration was observed on

radiographs taken at 12 months.

Success on the subject level was defined as normalization of acid (pH <4 for  $\leq 4.5\%$  of time) or reduced total time (pH <4) by at least 50% relative to baseline measurements. In the feasibility study, esophageal pH testing was performed out to 36 months in only 1 of the 4 centers. The percentage of subjects who achieved success was 79.5% (31/39) at 12 months, 90% (18/20) at 24 months, and 85% (17/20) at 36 months. The proportion of patients with reduction in PPI therapy by 50% or more was 89.7% (35/39) at 12 months, 82.9% (29/35) at 24 months, and 87.5% (28/32) at 36 months. Improvement in GERD-HRQL scores by more than 50% occurred in 97.4% (38/39) of subjects at 12 months, 88.6% (31/35) at 24 months and 96.3% (26/27) at 36 months.

Results of the pivotal trial were published in 2013.<sup>[4]</sup> In this study, the primary efficacy endpoint of pH normalization or greater than 50% reduction in acid exposure time when off PPI was met by 64% of the subjects. The mean total acid exposure time was reduced from 11.6% at baseline to 5.1% at 12 months (56% reduction). The secondary efficacy endpoints met the study success criteria. Ninety-two percent of subjects had at least a 50% improvement in GERD-HRQL symptom score (the mean GERD-HRQL total score decreased from 28.4 at baseline to 5.9 and 5.5 at 12 and 24 months, respectively), and 93% had reduced PPI use (79% and 83% of subjects were free from daily dependence at 12 and 24 months, respectively, compared with 0% at baseline). Dysphagia was observed in 68% of patients postoperatively, in 11% at 1 year, and in 4% at 3 years. Nineteen patients underwent esophageal dilation for dysphagia. Six patients (6%) experienced a serious adverse event (SAE) including severe dysphagia and vomiting. The device was removed in 4 of these 6 patients with a SAE and in 2 additional patients for persistent reflux and chest pain.

No randomized controlled trials were identified which evaluated the LINX® Reflux Management System as a treatment for GERD.

### **Clinical Practice Guidelines**

No evidence-based clinical practice guidelines were identified which recommend the LINX® Reflux Management System or laparoscopically-implanted magnetic esophageal ring as a treatment for GERD.

### **Summary**

There is insufficient evidence at present to establish the safety and efficacy of the laparoscopically-implanted magnetic esophageal ring for the treatment of gastroesophageal reflux disease (GERD). The available evidence consists of two industry-sponsored nonrandomized trials which are limited due to the lack of comparison against current gold standard treatments such as drug therapy or Nissen fundoplication surgery. High-quality data from randomized controlled trials are needed to compare the implanted magnetic esophageal ring procedure with the currently accepted treatments for GERD and to accurately assess possible adverse events associated with this procedure. Therefore, the use of laparoscopically-implanted magnetic esophageal ring is considered investigational for the treatment of GERD.

### **REFERENCES**

1. LINX™ Reflux Management System. Gastroenterology and Urology Devices Panel of the Medical Devices Advisory Committee 2012. [cited 07/2012]; Available from: <http://www.fda.gov/downloads/AdvisoryCommittees/CommitteesMeetingMaterials/MedicalDevices/MedicalDevicesAdvisoryCommittee/Gastroenterology-UrologyDevicesPanel/UCM286236.pdf>
2. Bonavina, L, DeMeester, T, Fockens, P, 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;252:857-62. PMID: 21037442
3. Lipham, JC, DeMeester, TR, Ganz, RA, et al. The LINX(R) reflux management system: confirmed safety and efficacy now at 4 years. *Surg Endosc.* 2012 Oct;26(10):2944-9. PMID: 22538694
4. Ganz, RA, Peters, JH, Horgan, S, et al. Esophageal sphincter device for gastroesophageal reflux disease. *N Engl J Med.* 2013 Feb 21;368(8):719-27. PMID: 23425164

**CROSS REFERENCES**

[Gastric Reflux Surgery](#), Medical Policy Manual, Surgery, Policy No. 186

CODES	NUMBER	DESCRIPTION
CPT	43289	Unlisted laparoscopy procedure, esophagus
HCPCS	C9737	Laparoscopy, surgical, esophageal sphincter augmentation with device (e.g., magnetic band)