10.5005/jp-journals-10033-1303

REVIEW ARTICLE

LINX Magnetic Esophageal Sphincter Augmentation *vs* Laparoscopic Nissen Fundoplication for Gastroesophageal Reflux Disease

Bipin T Prasad

ABSTRACT

The LINX magnetic sphincter augmentation system is a surgical technique with short-term evidence demonstrating the efficacy in the treatment of medically refractory or chronic gastroesophageal reflux disease (GERD). Currently, the Nissen fundoplication is the gold standard surgical treatment for GERD.

Keywords: Gastroesophageal reflux disease, Magnetic sphincter augmentation, Nissen fundoplication.

How to cite this article: Prasad BT. LINX Magnetic Esophageal Sphincter Augmentation *vs* Laparoscopic Nissen Fundoplication for Gastroesophageal Reflux Disease. World J Lap Surg 2017;10(2):54-56.

Source of support: Nil

Conflict of interest: None

INTRODUCTION

Gastroesophageal reflux disease (GERD) affects approximately 25% of the population and its prevalence is increasing.[1] First-line treatment of GERD consists of lifestyle modification and medical therapy with proton pump inhibitors (PPIs). Although PPIs are efficacious in the majority of GERD patients, nearly 30% of the individuals on optimized PPI therapy have persistence of symptoms.[2-4] The main reason for PPI resistance is due to nonacid reflux of gastric contents through an incompetent lower esophageal sphincter (LES).[5] Other causes for PPI resistance or failure can be due to esophageal dysmotility disorder, paraesophageal hernia, and erosive esophagitis.[6,7]

Laparoscopic Nissen fundoplication (LNF) is the gold standard treatment for medically refractory GERD. Although the LNF provides excellent resolution of GERD, the extensive operative procedural manipulation may result in significant postoperative morbidities, which are dysphagia and bloating mainly.[8]

The LINX magnetic sphincter augmentation (MSA) is a device in the form of a ring of magnetic beads, laparoscopically placed at the distal esophagus to increase the LES tone.

This document reviews the advanced treatment of GERD, applicable to laparoscopic surgery and also a comparison study between MSA and LNF.

AIM

The aim of this study was to compare the effectiveness of the two surgical modalities, namely MSA and LNF, on a larger scale.

MATERIALS AND METHODS

The inclusion criteria are: (1) Studies that included one or more primary outcome of interest, (2) a direct comparison study between MSA and LNF.

Outcomes of Interest

- Ability to belch
- Ability to emesis
- Operative time
- Discontinuation of PPI
- Endoscopic dilation
- Dysphagia and bloating features.

Morbidities associated with both the surgical modalities are also taken into account.

Statistical Analysis

With regard to the above-mentioned outcomes of interest, MSA and LNF were compared.

DISCUSSION

It was found that MSA has similar efficacy to LNF, which is the gold standard treatment. In preserving the ability to emesis and belch and also less features of dysphagia and bloating (clinical basis), MSA holds a significant advantage over LNF.

Magnetic sphincter augmentation functions as a purely mechanical treatment for GERD, as it prevents

Assistant Professor

Department of General Surgery, Dr. Somervell Memorial CSI Medical College & Hospital, Thiruvananthapuram, Kerala, India

Corresponding Author: Bipin T Prasad, Assistant Professor Department of General Surgery, Dr. Somervell Memorial CSI Medical College & Hospital, Thiruvananthapuram, Kerala, India Phone: +919895901732, e-mail: bipin.thomas@rocketmail.com

the reflux of gastric contents into the esophagus while maintaining a physiological LES tone, allowing the passage of the food bolus.[9] Magnetic sphincter augmentation serves the surgeon and the patient with a faster, simpler, and less invasive tool to effectively treat GERD. On comparison, the LNF is a difficult procedure with the outcomes based on the skill and experience of the surgeon.[9] It eliminates the need for extensive dissection of esophagus and mobilization of gastric fundus, which is the hallmark of the LNF procedure. The long-term complications of MSA reversibility are still unclear, as in cases where the device may be removed using the minimally invasive technique.[10] The device is currently compatible with 1.5 Tesla magnetic resonance imaging.

Magnetic sphincter augmentation is not indicated in patients with large paraesophageal hernias, esophageal dysmotility, and hence considered less versatile than LNF. The notable drawback associated with MSA is dysphagia reported as more severe and lasts longer than LNF-associated dysphagia. However, a graduated modified diet and endoscopic balloon dilation have alleviated the dysphagia features in patients.

LIMITATION

This study was basically done with case series and there were no randomized controlled trials. Moreover, there were only a few studies comparing MSA and LNF with regard to the outcome on long-term basis.

RESULTS

There were two retrospective case–control studies[11,12] and a prospective control study[13] taken into consideration for the review. A total of 688 patients were identified, and 273 patients had undergone LNF; 415 patients went for LINX MSA. The mean duration of follow-up was almost the same term ranging from 8 to 18 months for both MSA and LNF groups.

Males accounted for 46% of LNF and 57% of MSA. Mean age was 50 and 58 years for LNF and MSA respectively. Both groups had similar duration of reflux disease. Hiatal hernia was present in 70% of the LNF group of patients and in 68% of MSA group.

Magnetic sphincter augmentation was superior to LNF in preserving the patient's ability to belch and to emesis, but there was no significant difference between MSA and LNF with regard to the postoperative problems, such as bloating, dysphagia, and also in discontinuing PPI drug therapy.

Six patients of the MSA group were in need of endoscopic balloon dilation, whereas LNF group required none. Major morbidity of LNF included intraoperative pleural injury,[13] formation of retropharyngeal abscesses,[12] and four cases were subjected to a revision surgery due to hiatal hernia recurrence.[12,13] The MSA group morbidity included one pleural injury, two incidences of intraoperative bleeding, one pneumothorax,[13] and one gastroesophageal obstruction.[12] Two patients had their device removed, one had treatment failure, and the other patient had dysphagia secondary to device erosion 18 months after the surgery. No mortalities were reported.

CONCLUSION

Magnetic sphincter augmentation appears to be an effective treatment for GERD, with short-term outcomes comparable to the more technically challenging and time-consuming LNF. It has a favorable side-effect profile for the majority of the morbidities associated with GERD surgery. In order to further understand the efficacy of MSA, a long-term comparative outcome data past 1 year are needed.

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