



Laparoscopic Treatment for Gastroesophageal Reflux in Children: Open Spects

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Abstract

Introduction: Gastroesophageal Reflux (GER) is a common problem in infants and children. Fundoplication is the surgical treatment of GERD and consists of a partial (less than 360 degrees) or complete wrap or plication (i.e. folding) of the fundus of the stomach around the esophagus. This surgery can be performed using either traditional open techniques or minimally invasive techniques. The purpose of this communication is to explain the most popular techniques and to report the clinical and surgical outcomes in the pediatric population.

Materials and Methods: A review of the current literature was performed focusing on paper about clinical indications and surgical treatment of GER in pediatric age. Most popular techniques used were compared after showing steps.

Results: At present many different fundoplication techniques are used: patients are selected for surgery only if their medical treatment failed and if they show esophagitis and stricture or Barrett esophagus. Other indications to surgery are pulmonary symptoms, specifically asthma with persistent symptoms and reflux despite medical management and recurrent pneumonia associated with GER.

Conclusion: At present there is not the gold standard technique but in the different cases reported in literature it is possible to identify some elements that may represent a “gold standard” for any type of fundoplication: crural closure, well mobilized esophagus, floppy wrap, and the use of non-absorbable sutures.

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Keywords: Children; Laparoscopic treatment; Gastroesophageal reflux

Introduction

Gastroesophageal Reflux (GER) is a common problem in infants and children. Physiologic vomiting is common during the first 6 months up to 1 year of life. Infants and small children usually have regurgitation, vomiting and irritability while heartburn, epigastric/substernal pain, and dysphagia are more common in older children or adolescents. Pathologic Gastroesophageal Reflux Disease (GERD) can develop during childhood; it is reflux with associated complications including failure to thrive, aspiration, laryngospasm and esophagitis. Neurologically impaired children show higher rates of GERD than neurologically normal children and may require treatment for GERD at the time of placement of a feeding tube. GERD initially requires medical treatment, with surgery used as a secondary option after failure of the medical management [1-8]. Patients are selected for surgery only if previous medical treatment failed and if they show esophagitis and stricture or Barrett esophagus. Other indications to surgery are pulmonary symptoms, specifically asthma with persistent symptoms and reflux despite medical management and recurrent pneumonia associated with GER [2-8]. Fundoplication is the preferred surgical treatment of GERD and consists of a partial (less than 360 degrees) or complete wrap or plication (i.e. folding) of the fundus of the stomach around the esophagus. Complications include dysphagia and gas bloat. Recurrent reflux can occur in 1.7% to 14% of surgically treated cases. Toupet fundoplication involves a partial posterior 270-degree wrap: first the posterior hiatal opening is closed, and then the fundus of the stomach is sutured to the right crus and the right side of the esophagus, followed by the left side of the fundus which is sutured to the esophagophrenic ligament. The complications related to this procedure can include recurrence of reflux (2% to 6.1% of cases) and, less commonly, dysphagia. Anterior partial wraps include the Thal procedure. A Thal is performed by moving and then suturing the hiatus posteriorly to the esophagus. Next, the fundus is anteriorly sutured to the esophagus and the diaphragm. Recurrence rates for this procedure range from 5% to 20% [9-18].

Nissen Fundoplication

The Nissen fundoplication was first described in 1954. In 1991 Dallemagne et al. [3-9] reported laparoscopic Nissen fundoplication in adults. In 1993 Georgeson and Lobe et al. [4,7] separately reported laparoscopic Nissen fundoplication in children. Since then laparoscopic antireflux surgery has shown many benefits to patients such as reduced hospital stay and improved cosmesis, while being at the same time highly effective with low morbidity and mortality rates. There are no absolute contraindications to this technique, however relative contraindications include previous abdominal surgery or cardiac or pulmonary dysfunction.

Toupet Fundoplication

André Toupet described the technique of posterior fundoplication in 1963. The technique remained in anonymity until the 1980s, when it gained popularity in the United States. Clinical indications to this approach are the following: severe gastroesophageal reflux, esophageal dysmotility, esophageal peptic stricture and Heller procedure's complement [19-23].

Thal Fundoplication

The Thal anterior fundoplication was originally described by Alan Thal in 1968 to patch the distal esophagus and later advocated by Ashcraft et al. [24-28] for the treatment of gastroesophageal reflux disease.

Discussion

The choice of which technique should be best used for antireflux surgery has traditionally been based on anatomic considerations and the surgeon's preference and expertise. This approach has been widely criticized in the literature since the lack of standardization makes the comparison of outcomes difficult. Recently standardization has been put forward for the Nissen procedure by implementing the following suggestions: open the phrenoesophageal ligament in a left-to-right fashion; preserve the hepatic branch of the anterior vagus nerve; dissect both crura; remember that transhiatal mobilization should be approximately 3 cm of intra-abdominal esophagus; remember that short gastric vessel division is essential to ensure a tension-free wrap; close crural space with non-absorbable sutures; create a 1.5 cm to 2 cm wrap with the most distal suture incorporating the anterior muscular wall of the esophagus; use a boogie at the time of wrap construction. This standardization has led to excellent postoperative outcomes with 2% conversion rate, 3% postoperative complication rate and a median postoperative length of stay of 2 days. Less is known about the other procedures [29-31].

Nissen vs. Partial Fundoplication

Current literature reports only 4 retrospective studies comparing the different fundoplication techniques available to treat children. In 2001 Esposito found that laparoscopic fundoplication was safe and feasible also for patients less than one year of age. In 2006 Esposito published another paper showing that there were no statistically significant differences between the three techniques described in terms of outcomes. Other authors, including Steyeart, showed that the outcomes regarding reflux control of the Nissen and Toupet procedures were comparable. Current literature reports a conversion rate ranging between 2% and 11%; the cases reported by Kubiak (Nissen vs. Thal) showed lower recurrence with Nissen (6%) than with Thal (16%) but only in patients with neurological disorders, while

no differences could be observed in patients without neurological disorders [21-30]. As for symptom management, the incidence of postoperative dysphagia was comparable in both groups, although data showed that a significantly higher number of patients treated with the Nissen procedure underwent re-surgery. Surgically, the 3-cm Toupet length wrap resulted in higher reflux rates than the 1.5 cm Toupet without differences in postoperative dysphagia. The length of the Nissen fundoplication did not influence reflux control, but at 12-month follow-up it was possible to observe a trend for higher incidence of dysphagia with the 3-cm wrap if compared to the 1.5 cm wrap. Comparison of the results of the Thal with those of the Toupet (partial fundoplications) showed that posterior fundoplication was superior to anterior fundoplication since it was possible to obtain better reflux control without increased incidence of postoperative dysphagia. In addition, higher reoperation rates and lower patients' satisfaction were reported after anterior fundoplication at long-term follow-up.

Learning Curves for Laparoscopic Fundoplication

As it happens for other surgical techniques, a period of learning is expected in order to reduce the incidence of complications. Specifically speaking of fundoplication techniques, the laparoscopic approach requires advanced skills in intracorporeal suturing and knowledge of specific dissection and mobilization techniques that adjust and improve as the surgeon's expertise expands. Meehan and Georgeson reported that their experience with pediatric patients required a learning curve (expressed as a conversion rate to the open technique) of 20-25 cases while Rothenberg reported that in their experience with Nissen they needed to perform 20-50 procedures in order to achieve the maximum level of expertise [31].

Conclusion

At present, it is not possible to demonstrate that one technique is superior to the others in terms of recurrence rate, complications and resolution of reflux due to the absence of randomized studies in the pediatric age. It is certain that the standardization of these surgical techniques, as suggested for the Nissen, would be extremely helpful to obtain comparable outcomes, especially if the standardized procedure focused on those technical aspects (i.e. maneuvers, types of dissection, and types of suture rods) which are essential for an accurate comparison of data. In the different cases reported in literature it is however possible to identify some elements that may represent a "gold standard" for any type of fundoplication: crural closure, well mobilized esophagus, floppy wrap and the use of non-absorbable sutures.

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