Review of recent literature:

Surgical management of GERD & POST Fundoplication complications.

1. **Laparoscopic versus Open Treatment of GERD**

Based on the available evidence that is of high quality (**Level I**), laparoscopic fundoplication should be preferred over its open alternative as it is associated with superior early outcomes (shorter hospital stay and return to normal activities, and fewer complications) and no significant differences in late outcomes (failure rates) (**Grade A**). Nevertheless, antireflux surgeons should be aware that laparoscopic fundoplication takes longer to perform and has a higher incidence of reoperations at least in the short term (**Grade A**). Further study is needed to identify ways to minimize the incidence of reoperations after laparoscopic Fundoplication. Society of American Gastrointestinal and Endoscopic Surgeons (SAGES); 2010 Feb. 46 p.

Laparoscopic fundoplication has several advantages when compared to an open. Ostlie DJ, St. Peter SD, Snyder CL, et al. A financial analysis of pediatric laparoscopic versus open fundoplication. J Laparoendosc Adv Surg Tech A 2007;17:493-496.

No significant differences in outcomes measured between the two groups robotic or laparoscopic fundoplications in children. Albassam AA, Mallick MS, Gado A, et al. Nissen fundoplication, robotic-assisted versus laparoscopic procedure: a comparative study in children. Eur J Pediatr Surg 2009;19:316-319.

approach.

2. Based on the available evidence that is of high quality (**Level I**), partial fundoplication is associated with less postoperative dysphagia, fewer reoperations, and similar patient satisfaction and effectiveness in controlling GERD compared with total fundoplication up to five years after surgery (**Grade A**). Furthermore, a tailored approach to esophageal motility appears unwarranted (**Grade B**). Nevertheless, the paucity of long-term follow-up data that compare the effectiveness of the procedures makes it hard to recommend one type of fundoplication over the other especially in an era where the long-term effectiveness of surgical treatment for GERD is questioned. It should also be noted that a body of literature suggests that anterior partial fundoplication may be less effective in the long term (**Grade B**) and retrospective data suggests that partial fundoplication may not be as effective as total in the long run (**Grade C**). Nonetheless, the evidence suggests that surgeons appropriately trained in minimally invasive techniques that perform surgery for GERD may minimize postoperative dysphagia by choosing a partial fundoplication (**Grade A**) or a short total fundoplication (1 to 2 cm) over a large bougie (56 French) (**Grade C**) and maximize the effectiveness of the procedure by choosing a total fundoplication (**Grade C**) or a longer (at least 3 cm) posterior fundoplication (**Grade C**). It should also be noted that there are regional differences in expert opinion and practice in the choice of

fundoplication type for GERD with most North American experts choosing a total fundoplication due to concerns for the long term effectiveness of the procedure. Controlled studies that take into account these guidelines are needed. Society of American Gastrointestinal and Endoscopic Surgeons (SAGES); 2010 Feb. 46 p.

No significant differences in complications in Watson wrap & Nissen Fundoplication in postoperative symptoms, or clinical outcome. Wagener S, Sudhakaran N, Cusick E. Watson fundoplication in children: A comparative study with Nissen fundoplication. J Pediatr Surg 2007;42:1098-1102

The effect of not dividing the short gastric vessels during fundoplication, in laparoscopic Nissen-Rossetti fundoplications,2.5% required esophageal dilations for dysphagia/gas bloat. Liu DC, Lin T, Slatter MB, et al. Laparoscopic Nissen fundoplication without division of short gastric vessels in children. J Pediatr Surg 2006;41:120-125

The three Fundoplication (Nissen, Toupet, and Thal) techniques are comparable, and the choice to perform one procedure over the others should be based on the surgeon's experience in children . Surg Endosc. 2006 Jun;20(6):855-8. Epub 2006 May 12.

No evidence shows significant improvement in outcome over the Nissen fundoplication. All operations are probably effective when performed by an experienced surgeon. Robotic fundoplication has similar outcomes to laparoscopic fundoplication, but a learning curve and increased set-up times should be expected.

3. Nissen fundoplication role in neonates and young infants is unclear and is only reserved for selective infants who did not respond to medical therapy and have life-threatening complications of GERD. Paediatr Drugs. 2013 Feb ; 15(1): 19-27

4. In general, the Nissen fundoplication, which is a complete 360° wrap, best controls the symptoms of GERD but may lead to more episodes of dysphagia and gas bloat than a partial wrap. Toupet (partial 270° posterior esophageal wrap) and Thal (partial anterior 180° wrap) reportedly produce fewer complications. Selection of appropriate wrap is based on the patient's symptoms and surgeon's preference. Closure of the hiatus should be considered. Underlying associated conditions are considered when determining the type of wrap to perform. Partial wraps have fewer reported episodes of dysphagia in the short term. Recent studies suggest that Nissen fundoplication after the first 3 months has equal rate of dysphagia to the partial wrap. There is controversy in the literature regarding recurrence rates with some articles suggesting that recurrence is decreased with 360° wrap and other studies showing no difference in recurrence with partial wraps. *IPEG Guidelines Committee and was reviewed and approved by the Executive Committee of the International Pediatric Endosurgery Group (IPEG) November, 2002.*

5. Overall number of patients requiring hospital admission for aspiration pneumonia, other pneumonias, respiratory distress or apnea, and failure to thrive are similar before and after undergoing a Nissen fundoplication. . Lee SL, Shabatian H, Hsu J, et al. Hospital admissions for respiratory symptoms and failure to thrive before and after Nissen fundoplication. J Pediatr Surg 2008;43:59-65.

6. Children under four years of age should be expected to have a lower refluxrelated hospitalization rate after Fundoplication. Goldin AB, Sawin R, Seidel KD, et al. Do antireflux operations decrease the rate of reflux-related hospitalizations in children? Pediatrics 2006;118:2326-2333.

7. Dysphagia secondary to "tight" distal esophageal wraps are a well-known complication of Nissen fundoplication (NF). Retrospective monocentric study included 288 patients who had undergone Nissen fundoplication from 1998 to 2009 noted lower esophageal dilation was required by 70 patients (24%) because of postoperative dysphagia, and 45/70 were dilated within the first 6 months. The mean age at dilation was 72 months (standard deviation [SD] 65), with an average post-Nissen delay of 9 months (SD 13). Surgical revision was required by 11 patients because of LED failure (n = 10) or postdilation perforation (n = 1). Patients who required post-Nissen dilation were significantly more frequently fed orally. Postoperative lower esophageal dilation in children following the performance of Nissen fundoplication.Schneider A, Gottrand F, Sfeir R, Duhamel A, Bonnevalle M, Guimber D, Michaud L - Eur J Pediatr Surg - Oct 2012; 22(5); 399-403

8. Out of 20 esophageal strictures studied tight Fundoplication is noted in 2 cases which required ballon dilatation. J Pediatr Surg. 2002 Mar;37(3):398-402..FOUR Patients of total 17 studied for esophageal strictures were post Fundoplication requiring dilatation. One of those four patient with a tight Nissen fundoplication who did not improve after dilation required corrective surgery. Gastrointest Endosc. 1993 Mar-Apr;39(2):153-6.

9. Consider endoscopically dilating a persistently tight wrap or surgically revising the fundoplication if it is suggested by the endoscopic and radiologic evaluation. Curr Treat Options Gastroenterol. 2001 Oct;4(5):441-449.

10. Prematurity and early operation in the first year of life are risk factors for failure for antireflux surgeries. Even in children and adults without these major underlying disorders, surgery has high failure rates. Arch Dis Child 2005;90:1047–1052. doi: 10.1136/adc.2004.069674

11. Most of the literature on surgical therapy in children with GERD consists of retrospective case series in which documentation of the diagnosis of GERD and details of previous medical therapy are deficient, making it difficult to assess the indications for and responses to surgery Clin Gastroenterol Hepatol 2004;2:978–84,. Gastroenterology 2001;120:A419, Pediatrics 1998;101:419–22, Surg Endosc 2008;22:1054–9

12. The absence of systematic postoperative evaluation, including objective testing with pH or impedancestudies and endoscopy, further complicates the assessment of surgical outcomes in most series. Surg Endosc2007;21:167–74., Surg Endosc2007;21:167–74., Aliment Pharmacol Ther 2007;25:1365–72.

13. In children who were operated on, those with NEUROLOGIC IMPAIRMENT have more than twice the complication rate, 3 times themorbidity, and 4 times the reoperation rate of children without NEUROLOGIC IMPAIRMENT. J Pediatr Surg 1990;25:1169–73.

14. Fundoplication in early infancy has a higher failure rate than fundoplication performed later in childhood. Am J Gastroenterol 2005;100:1844–52, J Pediatr Surg 1999;34:295–9

15. A significant reduction in the number of adverse respiratory events was observed in the year following surgery in those operated at <4 years of age (1.95 vs 0.67 events per year). However, in older children, no benefit of surgery on the rate of hospitalization for adverse respiratory events was found. Goldin AB, Sawin R, Seidel KD, et al. Do antireflux operationsdecrease the rate of reflux-related hospitalizations in children?Pediatrics 2006;118:2326–33