

Evolution of Gastro-esophageal Fundoplication

MA RATHORE

Correspondence to Dr. Munir Ahmad Rathore, Specialist Registrar in Gastro-intestinal Surgery, NI UK. munirrathore@yahoo.com

Fundoplication has evolved from 360° total wraps to now 120° partial wraps. These are the second commonest laparoscopic procedures at present. Esophageal lengthening procedures have re-entered the debate since the days of open surgery.

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Fundoplication has been used as a surgical option in the treatment of gastro-esophageal reflux disease (GERD) when the conservative treatment has failed. It is also part of the repair for the rolling or paraesophageal hernia. With the advent of laparoscopic surgery lap-fundoplication has become commoner and is now the second most common laparoscopic procedure in digestive surgery. It is bordering at controversy in terms of the extent of its application – all the more in the presence of effective medicines like H₂ blockers and proton pump inhibitors.

Belsey and Nissen methods are the examples of total fundoplication and have been in practice for many decades. The near-total wraps were the modifications described after Belsey and Nissen procedures. They were Toupet (270°), Guarner (240°) and Cheec (200°). The leading complications remained post-fundoplication dysphagia, gas-bloat and inability to vomit. The extent of the wrap was reduced even further and in 1962 Dor described anterior partial fundoplication as an adjunct to Heller's operation. Watson described the (120°) anterior partial wrap in 1970's. It was a modification of the Dor type. The short gastric vessels were not divided. The fundoplication stitches also passed through esophageal muscle. The successful results of laparoscopic Watson method were published in 1991. The post-fundoplication dysphagia was 2% and the gas bloat was nearly absent.

First laparoscopic Nissen was done by Dallemagne in Belgium in 1991. Mid 1990's were spent improving the laparoscopic technique. The issue of esophageal shortening also entered the debate. Swanstorm in 1996 described the earliest results of laparoscopic esophageal lengthening¹. It was well known in the days of open surgery. Esophageal lengthening procedures date back to such times. With the advent of laparoscopic surgery it has now become a heavily discussed issue.

Fundoplication is combined with the repair of the diaphragmatic crura. Tension free repair of the crura is a prerequisite for success. It may require mesh – either bridging or buttressing. Laparoscopic cruroplasty currently lacks the accuracy and point-to-point crural matching seen in the open repairs. A pitfall is a tendency to over-repair the hiatus behind the esophagus. In larger defects this may lead to forward angulation of the gastro-esophageal junction resulting in postoperative dysphagia. To prevent

this, additional hiatal stitches should only be applied anteriorly after the initial three or four posterior ones. It is possible that some of the fundoplication 'strictures' were in fact acute angulation of the intra-abdominal esophagus. However said that, Watson (2001) in a prospective trial demonstrated equivalent short-term results when the hiatal closure was mainly anterior as opposed to posterior².

The incidence of post-fundoplication reflux after more than four to eight weeks tends to be low and is 3-10%³⁻⁶. Recurrent post-fundoplication reflux affects 3.7% of patients and requires revisional surgery in 0.7%⁷. The incidence of early post-fundoplication dysphagia (resolving within three to six months) is 11-20%^{7,8}. It has been reported to be as high as 67%³. Persistent dysphagia is seen in a variable figure of 2.5-24%^{3,7,9-13}. Persistent dysphagia after dilatation is encountered in 3.5% and, after revisional operation, in 1%⁷. The Dutch randomized trial had to be terminated when 7/57 patients with laparoscopic Nissen fundoplication developed persistent dysphagia as compared to the open method (0/46)¹¹. Disorder of esophageal motility does not appear to be a cause. The length of fundoplication was the source of debate and short 1.5cm wrap length has been recommended. The benefit is uncertain. However esophageal intubation (with 56F bougie) has been shown in a prospective trial to be protective towards long-term dysphagia¹⁴.

The concept of esophageal foreshortening has crept in from the days of open surgery. GERD is believed to lead to chronic transmural submucosal inflammation and fibrosis. The acquired shortening therefore is true and not just 'spasm'. Collis gastroplasty is an esophageal lengthening procedure. It has not yet been accepted fully in laparoscopic surgery. Swanstorm in 1996 described the earliest results of laparoscopic esophageal lengthening¹. Some studies have demonstrated its efficacy. Others, especially more traditional surgeons are not entirely convinced. It is believed the modern effective medical treatment of GERD may have reduced the incidence of esophageal shortening¹⁵. There is some evidence that lack of gastroplasty may lead to a higher re-operation rate⁹. Laparoscopic Collis gastroplasty may use Swanstorm method (linear stapler 1996) or Hunter's technique (circular and linear staplers 1998). The disadvantages of the procedure include suture-line leak from the

gastroplasty and acid-secreting mucosa in the neo-esophagus. The neo-esophagus is non-motile. Improper technique may result in stricturing or dysphagia. And revisional surgery is difficult. The stomach may not always be in a condition to be used as it may be scarred from prior.

The reduction in the extent of the wrap over the last four decades and the re-introduction of esophageal lengthening marks a possible shift in the surgical management of GERD. Others remain less entertaining to anti-reflux surgery – certainly to the extent to which it is being used in the laparoscopic era.

References:

1. Mercer CD, Velasco N, Hill LD. Paraesophageal hernia. In L. Hill, R Kozarek, R McCallum and CD Mercer, Editors, *The Esophagus: medical and surgical management*, WB Saunders, Philadelphia 1988 148-56
2. Watson DI, Jamieson GG, Devitt PG, Kennedy JA, Ellis T, Ackroyd R, Lafullarde T, Game PA. Arch Surg 2001 July 136(7):745-51
3. Rantanen TK, Salo JA, Salminen T, Kellokumpu IH. Functional outcome after laparoscopic or open Nissen fundoplication – A follow-up study. Arch Surg 1999 March 13(4):240-4
4. Khoursheed MA, Al-Asfoor M, AlShamali et al. Effectiveness of laparoscopic fundoplication for gastro-oesophageal reflux. Ann R Coll Surg Eng 2001 8(3):229-34
5. O’Riordan JM, Holland JC, Byrne PJ, Ravi N, Keeling PWN, Reynolds JV. Long term outcome following antireflux surgery in Barrett’s esophagus: the importance of pH monitoring in follow-up. Gene to Cure P2-23 <http://www.eurcancer.org/genetocure/p2-23.html> accessed 13/04/2003
6. Negre JB. Post-fundoplication Symptoms. Do They Restrict the Success of Nissen Fundoplication? Ann Surg 1983 19(6):698-700
7. Hinder RA, Smith SL, Klingler PJ, Floch NR, Branton SA. Laparoscopic Fundoplication for Gastroesophageal Reflux Disease <http://www.dcmsonline.org/jax-medicine/1997journals/september97/reflux.htm> accessed 10/04/2003
8. Coelho CU, Wiederkehr IC, Campos A, Andrigueto PC. Conversions and complications of laparoscopic treatment of gastroesophageal reflux disease. J Am Coll Surg 1999 18(9):356:-61
9. Pierre AF, Luketich JD, Fernando HC, Christie NA, Buenaventura PO, Little VR, Schauer PR. Results of laparoscopic repair of giant paraesophageal hernias: 200 consecutive patients. Ann Thoracic Surg 2002 Dec 74(6):1909-16
10. Msika S. Oesogastric complications after surgery of the backward flow gastro-oesophagien by laparoscopy [English translation] <http://www.bmlweb.org/matuchanski0111.html> published on-line 19th Jan 2001 accessed 07/04/2003
11. Brunt LM, Quasebrath MA, Dunnegan DL, Soper INIs. Laparoscopic antireflux surgery for gastroesophageal reflux disease in the elderly safe and effective? Surg Endosc 1999 1(3):838-42
12. Zaninotto G, Molena D, Ancona E. A prospective multicentre study on laparoscopic treatment of gastroesophageal reflux disease in Italy: type of surgery, conversions, complications and early results. Study Group for the Laparoscopic Treatment of Gastroesophageal Reflux Disease of the Italian Society of Endoscopic Surgery (SICE). Surg Endosc 2000 1(4):282-8
13. Herron DM, Swanstrom LL, Ramzi N, Hanses PD. Factors predictive of dysphagia after laparoscopic Nissen fundoplication. Surgical Endoscopy 1999 Dec 13(12):1180-3
14. Patterson EJ, Herron DM, Hansen PD, Ramzi N, Standage BA, Swanstrom LL. Effect of an Esophageal Bougie on the Incidence of Dysphagia Following Nissen Fundoplication. Arch Surg 2000 Sept 135(9):1055-61
15. Weiss CA, Stevens RM, Schwartz RW. Paraesophageal Hernia: current diagnosis and treatment. Current Surgery 2002 Mar-Apr 59(2):180-2