

# A REVIEW OF LAPAROSCOPIC SURGERY OF THE ESOPHAGUS

CONSTANTINE T. FRANTZIDES, M.D., F.R.C.S., F.R.C.P.  
MARK A. CARLSON, M.D.

Minimally Invasive Surgery Center  
Medical College of Wisconsin  
Milwaukee, Wisconsin

## SUMMARY

The laparoscopic antireflux procedure, especially Nissen fundoplication, has evolved into the surgical treatment of choice for gastroesophageal reflux disease. The goal of laparoscopic operation is to duplicate the technique and result of open operation. Paraesophageal hernia also may be treated with a laparoscopic approach. Minimally invasive Heller myotomy is the procedure of choice for achalasia. Minimally invasive esophageal tumor resection is not far past the case report stage.

## REVIEW

**Treatment of gastroesophageal reflux disease.** Laparoscopic Nissen fundoplication was first reported in 1991 (13,19). It has evolved into the procedure of choice in most centers when operative treatment of gastroesophageal reflux disease (GERD) is elected. This change has occurred without the benefit of controlled trials, similar to the change which occurred in the treatment of symptomatic cholelithiasis. The improvement in patient related factors has been such (see below) that a controlled trial probably will not be performed. Laparoscopic Nissen fundoplication will be the main topic in this review.

**Indications.** The indications for open operative treatment of GERD have been complicated disease (ulcer, bleeding, stricture, dysplasia) and noncompliance with or refractoriness to medication. The indications for minimally invasive treatment of GERD are in evolution and are not standardized, but in general more patients are choosing operative treatment now that laparoscopic surgery is available. Many uncomplicated GERD patients who have their symptoms controlled by but are dissatisfied with taking medication undergo laparoscopic intervention. The synergistic effect of duodenogastroesophageal reflux on epithelial dysplasia of the esophagus, though still under investigation, may be another indication for early operation on GERD. (7,42).

**Contraindications.** The relative contraindications to both an open and laparoscopic Nissen fundoplication include previous gastric surgery (including proximal gastric vagotomy 23), esophageal shortening, esophageal motor disorder, and severe epithelial dysplasia. Additional relative contraindications to laparoscopic Nissen include those common to other laparoscopic procedures such as portal hypertension, bleeding disorders, and intraabdominal adhesions.

**Preoperative evaluation.** The preoperative evaluation (20,22,30,43) for Nissen fundoplication is the same as it is for open fundoplication and should include: esophagram (to evaluate for stricture, shortened esophagus and hiatal hernia; endoscopy (to evaluate the esophageal epithelium and to rule out concomitant gastroduodenal

lesions); and manometry (to evaluate for motor disorder). Ambulatory pH monitoring may be performed if the diagnosis of acid reflux is in question.(43).

**Operative technique.** The objective in performing laparoscopic Nissen fundoplication is duplication of the open operation. The goal of the open operation, which has evolved over the past 40 years, is to create a short (3 cm), loose fundal wrap around well-mobilized intraabdominal length (5 cm) of esophagus inside of which a large (50-60 Fr) bougie has been placed (16). Often a hiatal hernia is present, requiring reduction of the stomach and lower esophagus into the abdomen. The esophageal hiatus of the diaphragm is narrowed with interrupted sutures to prevent herniation of the wrap into the chest. Most authors divide the proximal short gastric vessels which mobilizes the fundus so a loose wrap may be created (which lessens the chance for postoperative dysphagia)(4,9,18,21,27,32). Some authors suture the wrap to the esophagus (to prevent slippage (9, 16,27) others suture the wrap to the diaphragm (to prevent herniation 18).

**Other procedures.** Other antireflux procedures which have been performed with a minimally invasive approach include the Hill (1), Toupet (10,27), Collis-Nissen (40), Rossetti (6,30) and other procedures. The laparoscopic Collis-Nissen, indicated for shortened esophagus, has been performed by placing the laparoscopic stapler-cutter transthoracically across the fundus.

**Results.** There are not controlled trials comparing open versus laparoscopic Nissen fundoplication. In most uncontrolled comparisons patients undergoing the laparoscopic procedure have quicker resumption of alimentation, less postoperative pain, a shorter hospitalization, and a quicker return to full activity compared to allowed the laparoscopic operation to replace the open operation. Operative time initially is longer with the former, but the time shortens as the "learning curve" is surmounted.

The available reports of laparoscopic Nissen fundoplication contain short term follow up. (2,4,9,18,21,30,41,45). It has been shown with long term (10-20 years) follow up of open Nissen fundoplication that a good to excellent result (Visick I-II) persists in about 80-90% of patients(4,26). It seems that the short term result with laparoscopic Nissen fundoplication (80-95% Visick I-II) will approximate the result obtained with open operation. An excellent (Visick I) result is absence of reflux symptoms with no dysphagia, bloating, or diarrhea. A good (Visick II) result is improvement in condition but with mild reflux, dysphagia or other symptom present but not severe enough to be treated.

**Complications.** Complications related to the performance of the fundoplication include pleural injury with pneumothorax(10,21), esophageal perforation (0.5-1%)(6,10,21),

stomach perforation (18), esophageal stenosis(22,34,44) and gastric necrosis (4). Splenic injury is rare(10). A general consensus is that the laparoscopic view of the hiatus is better than the open view: this may make injury such as splenic laceration less common compared with laparoscopic operation (18). Other complications include pneumonia (4), trocar site hernia (4,9), and pulmonary embolism (9). Conversion, although not a complication, occurs in less than 5% of patients and usually is due to bleeding or technical difficulties (4,10,18,21).

**Failure.** A poor (Visick III-IV) result has been noted in less than 10% of patients (22,30,34). Operative failure implies recurrent reflux, bloating, or dysphagia which severely impacts on the patient's lifestyle (21,22,30,34,37,38). Recurrent reflux may be secondary to breakdown of the wrap or recurrence of the hiatal hernia. The integrity of the fundoplication may be protected by using non-absorbable suture, anchoring the wrap to the diaphragm, and performing posterior cruroplasty. Dysphagia usually is secondary to a tight fundoplication; this may be prevented by creating a floppy fundoplication around the esophagus (not the stomach body) (16,32,33).

**Treatment of paraesophageal hernia.** Most surgeons would agree that paraesophageal hernia should be repaired promptly after diagnosis, because even the asymptomatic hernia can present with strangulated gastric volvulus. Elective laparoscopic paraesophageal herniorrhaphy is safe and feasible (8,11,12,29,35). The hernia may be repaired with posterior cruroplasty (simple sutures); prosthetic mesh repair of the hernia also has been described (5,17,24). It is controversial whether or not to perform an antireflux procedure in conjunction with the herniorrhaphy. Paraesophageal hernia repair requires extensive dissection at the esophageal hiatus which can destroy the physiologic antireflux mechanism; an intraabdominal fundoplication prevents reflux and also may be a buttress against recurrent hernia.

**Treatment of achalasia.** Minimally invasive operation is now the preferred operative approach for achalasia. Heller myotomy may be performed either laparoscopically or thoracoscopically with excellent results (28,31,39). There is a tendency to perform an antireflux procedure in addition to the myotomy if done laparoscopically, because the dissection at the esophageal hiatus necessitated by this approach may ablate the physiologic antireflux mechanism.

**Treatment of esophageal tumors.** Thoracoscopic enucleation of benign esophageal tumors has been described, and appears to be a logical treatment for this type of lesion (3). Thoracoscopic and laparoscopic transhiatal esophagectomy for malignancy has been performed in small numbers (15,25). This procedure should be considered experimental.

## REFERENCES

1. AYE RW, HILL LD, KRAEMER SJ et al. Early results with the laparoscopic Hill repair. *Am J Surg* 167:542-546, 1994.
2. BITTNER HB, MEYERS WC, BRAZER SR et al. Laparoscopic Nissen fundoplication: operative results and short-term follow-up. *Am J Surg* 167:193-200, 1994
3. BONAVINA L, SEGALIN A, ROSATI R et al. Surgical therapy of esophageal leiomyoma. *J Am Coll Surg* 181:257-262, 1995.

4. CADIÈRE GB, HOUBEN JJ, BRUYNS J et al. Laparoscopic Nissen fundoplication: technique and preliminary results. *Br J Surg* 81:400-403, 1994.
5. CARSON MA, FRANTZIDES CT. Prosthetic reinforcement of posterior cruroplasty during laparoscopic hiatal herniorrhaphy. *Surg Endosc*, in press.
6. CHAMPAULT G. Gastroesophageal reflux: treatment by laparoscopy, 940 cases [French]. *Ann Chirurg* 48:159-164, 1994.
7. CHAMPION G, RICHTER JE, VAEZI MF et al. Duodenogastroesophageal reflux: relationship to pH and importance in Barrett's esophagus. *Gastroenterology* 107:747-754, 1994.
8. CLOYD DW. Laparoscopic repair of incarcerated paraesophageal hernias. *Surg Endosc* 8:893-897, 1994.
9. COLLARD JM, DE GHELDERE CA, DE KOCK M et al. Laparoscopic antireflux surgery: what is real progress? *Ann Surg* 220:146-154, 1994.
10. COLLET D, CADIÈRE GB, et al. Conversions and complications of laparoscopic treatment of gastroesophageal reflux disease. *Am J Surg* 169:622-626.
11. CONGREVE DP. Laparoscopic paraesophageal hernia repair. *J Laparoendosc Surg* 2:45-48, 1992.
12. CUSCHIERI A, SHIMI S, NATHANSON LK. Laparoscopic reduction, crural repair, and fundoplication of large hiatal hernia. *Am J Surg* 163:425-430, 1992.
13. DALLEMAGNE B, WEERTS JM, JEHAES C et al. Laparoscopic Nissen fundoplication: preliminary report. *Surg Laparosc Endosc* 1:138-143, 1991.
14. DEMEESTER TR, BONAVINA L, ALBERTUCCI M. Nissen fundoplication for gastroesophageal reflux disease: evaluation of primary repair in 100 consecutive patients. *Ann Surg* 204:9-20, 1986.
15. DEPAULA AL, HASHIBA K, FERREIRA EA et al. Laparoscopic transhiatal esophagectomy with esophagogastroplasty. *Surg Laparosc Endosc* 5:1-5, 1995.
16. DONAHUE PE, SAMELSON S, NYHUS LM et al. The floppy Nissen fundoplication: effective long-term control of pathologic reflux. *Arch Surg* 120:663-668, 1985.
17. EDELMAN DS. Laparoscopic paraesophageal hernia repair with mesh. *Surg Laparosc Endosc* 5:32-37, 1995.
18. FRANTZIDES CT, CARLSON MA. Laparoscopic versus conventional fundoplication. *J Laparoendosc Surg* 5:137-143, 1995.
19. GEAGEA T. Laparoscopic Nissen's fundoplication: preliminary report on ten cases. *Surg Endosc* 5:170-3, 1991.
20. HINDER RA, FILIPI CJ. "Laparoscopic Nissen fundoplication", in Frantzides CT (ed), *Laparoscopic and Thoracoscopic Surgery*. St. Louis: Mosby Year-Book Inc., 1995.
21. HINDER RA, FILIPI CJ, WETSCHER G et al. Laparoscopic Nissen fundoplication is an effective treatment for gastroesophageal reflux disease. *Ann Surg* 220:472-483, 1994.
22. JAMIESON GG, WATSON DI, BRITTEN-JONES R et al. Laparoscopic Nissen fundoplication. *Ann Surg* 220:137-145, 1994.
23. KENNEDY T, MAGILL P, JOHNSTON GW et al. Proximal gastric vagotomy, fundoplication, and lesser-curve necrosis. *Br Med J* 1 (6176):1455-1456, 1979.
24. KUSTER GG, GILROY S. Laparoscopic technique for repair of paraesophageal hiatal hernias. *J Laparoendosc Surg* 3:331-338, 1993.
25. LIU HP, CHANG CH, LIN PJ et al. Video-assisted endoscopic esophagectomy with stapled intrathoracic esophagogastric anastomosis. *World J Surg* 19:450-747, 1995.
26. LUOSTARINEN M. Nissen fundoplication for gastroesophageal reflux disease: long-term results. *Ann Chir Gynaecol* 84:115-120, 1995.
27. MCKERMAN JB, CHAMPION JK. Laparoscopic antireflux surgery. *Am Surg* 61:530-536, 1995.

28. MITCHELL PC, WATSON DI, DEVIII PG et al. Laparoscopic cardiomyotomy with a Dor patch for achalasia. *Can J Surg* 38:3445-448, 1995.

29. ODDSDOTTIR M, FRANCO AL, LAYCOCK WS et al. Laparoscopic repair of paraesophageal hernia: new access, old technique. *Surg Endosc* 9:164-168, 1995.

30. PATTI MG, ARCERITO M, PELLEGRINI CA et al. Minimally invasive surgery for gastroesophageal reflux disease. *Am J Surg* 170:614-618, 1995.

31. PELLEGRINI C, WETTER LA, PATTI M et al. Thoracoscopic esophagomyotomy: initial experience with a new approach for the treatment of achalasia. *Ann Surg* 216:291-296, 1992.

32. PELLEGRINI CA. Therapy for gastroesophageal reflux disease: the new kid on the block. *J Am Coll Surg* 180:485-487, 1995.

33. PETERS JH, HEIMBUCHER J, KAUER WK et al. Clinical and physiologic comparison of laparoscopic and open Nissen fundoplication. *J Am Coll Surg* 180:385-393, 1995.

34. PITCHER DE, CURET MJ, MARTIN DT et al. Successful management of severe gastroesophageal reflux disease with laparoscopic Nissen fundoplication. *Am J Surg* 168:547-554, 1994.

35. PITCHER DE, CURET MJ, MARTIN DT et al. Successful laparoscopic repair of paraesophageal hernia. *Arch Surg* 130:590-596, 1995.

36. RATTNER DW, BROOKS DC. Patient satisfaction following laparoscopic and open antireflux surgery. *Arch Surg* 130:289-294, 1995.

37. SIEWERT JR, STEIN JH, FEUSSNER H. Reoperations after failed antireflux procedures. *Ann Chir Gynaecol* 84:122-128, 1995.

38. SWANSTROM L, WAYNE R. Spectrum of gastro-intestinal symptoms after laparoscopic fundoplication. *Am J Surg* 167:538-541, 1994.

39. SWANSTROM LL, PENNINGGS J. Laparoscopic esophagomyotomy for achalasia. *Surg Endosc* 9:286-292, 1995.

40. SWANSTROM LL, MARCUS DR, GALLOWAY GQ. Laparoscopic Collis gastroplasty is the treatment of choice for the shortened esophagus. *Am J Surg* 171:477-481, 1996.

41. TRUS TL, LAYCOCK WS, BRANUM G et al. Intermediate follow-up of laparoscopic antireflux surgery. *Am J Surg* 171:32-35, 1996.

42. VAEZI MF, RICHTER JE. Synergism of acid and duodenogastroesophageal reflux in complicated Barrett's esophagus. *Surgery* 117:699-704, 1995.

43. WARING JP, HUNTER JG, ODDSDOTTIR M et al. The pre-operative evaluation of patients considered for laparoscopic antireflux surgery. *Am J Gastroenterol* 90:35-38, 1995.

44. WATSON DI, JAMIESON GG, MITCHELL PC et al. Stenosis of the esophageal hiatus following laparoscopic fundoplication. *Arch Surg* 130:1014-1016, 1995.

45. WEERTS JM, DALLEMAGNE B, HAMOIR E et al. Laparoscopic Nissen fundoplication: detailed analysis of 132 patients. *Surg Laparosc Endosc* 3:359-364, 1993.

#### Correspondence:

C.T. Frantzides, M.D., Ph.D., FACS  
Associate Professor, Department of Surgery  
Director, Minimally Invasive Surgery Center  
Medical College of Wisconsin  
9200 West Wisconsin Avenue  
Milwaukee, WI 53226  
Phone: (414) 454-5747  
Fax: (414) 454-0152

Α Π Ο Ψ Ε Ι Σ - Ε Π Ι Κ Ο Ι Ν Ω Ν Ι Α

## ΣΥΝΕΧΙΖΟΜΕΝΗ ΙΑΤΡΙΚΗ ΕΚΠΑΙΔΕΥΣΗ

### Δρ. ΓΕΩΡΓΙΟΣ ΠΟΤΑΜΙΤΗΣ

Πρόεδρος Επιστημονικής Επιτροπής ΠΙΣ

Ο μεγάλος αριθμός ιατρικών συνεδρίων, οι διαλέξεις και ημερίδες με αντικείμενο ιατρικά θέματα εμπίπτουν στη συνεχιζόμενη ιατρική εκπαίδευση, πλην όμως με μία μορφή μη οργανωμένη, αποτέλεσμα της προσπάθειας για ενημέρωση των μελών τους που καταβάλλει ο Παγκύπριος Ιατρικός Σύλλογος, οι Τοπικοί Ιατρικοί Σύλλογοι και οι Ιατρικές Εταιρείες.

Η ανυπαρξία όμως "φορέα" που θα αναλάβει τον συντονισμό εκπαίδευσης τόσο των ειδικών ιατρών αλλά και των ειδικευομένων, που θα μπορούσε ακόμη και κατευθυντήριο ρόλο για την έρευνα να παίξει, είναι πια οφθαλμοφανής και η δημιουργία του περισσότερο από αναγκαία.

Ο Π.Ι.Σ. με την οργάνωση και ομοιογουμένως μεγάλη επιτυχία του τελευταίου συνεδρίου της ΔΙΑΣΠΟΡΑΣ, του μεγαλύτερου πολυθεματικού συνεδρίου που οργανώθηκε ποτέ στην Κύπρο ως και την οργάνωση για τρίτη συνεχή χρονιά φροντιστηριακών μαθημάτων, απέδειξε ότι έχει την ικανότητα να διαδραματίζει σημαντικό ρόλο στη συνεχιζόμενη ιατρική εκπαίδευση.

Εξ άλλου, η πρόταση του Πανεπιστημίου για δημιουργία Ινστιτούτου Βιοϊατρικών Ερευνών, είχε θετική ανταπόκριση από τον Π.Ι.Σ. και τονίστηκε η σημασία του για ένα ξεκίνημα για δημιουργία Ιατρικής Σχολής, ίσως με ανάποδη πορεία από τις τελευταίες βαθμίδες αρχικά.

Η συρροή μεγάλου αριθμού ιατρών στο νησί μας, προερχόμενη από διαφορετικά Πανεπιστημιακά Ιδρύματα, επιβάλλει τάχιστα την δημιουργία φορέα που να συντονίζει τη συνεχιζόμενη εκπαίδευση των ιατρών, με καταλογισμό βαθμών (credits) σ'εκείνους που θα συμμετέχουν και με έργο να κατευθύνει ερευνητικά ιατρικά προγράμματα σε συνεργασία με το Πανεπιστήμιο Κύπρου, ούτως ώστε ν' αποτελέσει το προζύμι για την Ιατρική Σχολή.