

Laparoscopic Anti-Reflux Surgery in the Community Hospital Setting: Evaluation of 100 Consecutive Patients

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ABSTRACT

Background: Laparoscopic anti-reflux surgery has been shown to be superior to medical management for treatment of complicated gastroesophageal reflux disease (GERD). This study encompasses 100 consecutive patients undergoing laparoscopic Nissen-Rossetti or Toupet funduplications for GERD refractory to medical management.

Study Design: All 100 patients had failed maximum medical management (behavioral and dietary modifications, antacids, and H₂ and acid PUMP blockers). All patients underwent esophagogastroduodenoscopy with biopsy prior to surgery. Ninety-eight patients had esophageal manometry to evaluate the lower esophageal sphincter pressures and determine the amplitude of contractions of the body of the esophagus. Twenty-four hour pH studies were used selectively when the preceding studies were equivocal.

Results: All 100 patients' surgeries were accomplished laparoscopically. The mortality rate was zero. The post-operative complication rate was 2%. The average hospital stay was 1.85 days. Follow-up was achieved in 98%. The mean follow-up was 17.6 months. All patients had significant improvement of their symptoms. No patients have long-term dysphagia.

Conclusions: The study demonstrates that laparoscopic anti-reflux surgery can be safely and effectively accomplished in the community hospital setting.

Key Words: Laparoscopic, Surgery, Fundoplication, Nissen, Toupet, Esophagitis, GERD.

INTRODUCTION

The application of a laparoscopic approach to anti-reflux surgery was inevitable after the obvious success of laparoscopic cholecystectomy. As equipment and technique became more refined, minimal access surgery was applied to appendectomy, hernia repair, colon and small bowel surgery. Initial publications showed good results and a safety record that encouraged surgeons in community hospitals to learn and apply these approaches. My initial approach was to use the laparoscopic Nissen-Rossetti and Toupet fundoplication for the treatment of gastroesophageal reflux disease (GERD) refractory to medical management. This report describes the experience and the results of treatment of 100 consecutive patients who underwent laparoscopic Nissen-Rossetti or Toupet fundoplication in a community hospital.

MATERIALS AND METHODS

Laparoscopic anti-reflux surgery was performed on 30 male and 70 female patients with symptomatic GERD between May 1994 and October 1996. Follow-up was achieved on 98% of patients. The length of follow-up ranged from 4 to 33 months with a mean follow-up of 17.6 months. All operations were accomplished by myself in three community hospitals in the Pensacola, Florida region: Gulf Breeze Hospital (n=5), Santa Rosa Medical Center, (n=62), and Columbia West Florida Regional Medical Center (n=33). All patients had significant symptoms from GERD, which were affecting their family life, work performance and sense of well-being. All patients had failed maximum medical management.¹⁻⁶ Several had advanced GERD: strictures (n=5), Barrett's esophagus (n=16). Six patients also had adult onset asthma as one of their significant symptoms⁷⁻⁹ (**Figure 1**). Prior to consideration for surgery, all patients had been treated with antacids, H₂ or acid pump blockers, pro-motility agents, behavior and dietary modifications.¹⁻³ Patients ranged in age from 14 to 73 years with a mean age of 48.8 years, and in weight from 114 to 289 pounds with a mean weight of 181.6 pounds. All patients underwent a thorough history and physical examination. Duration of symptoms ranged from 18 months to life-long. All patients underwent upper gastrointestinal

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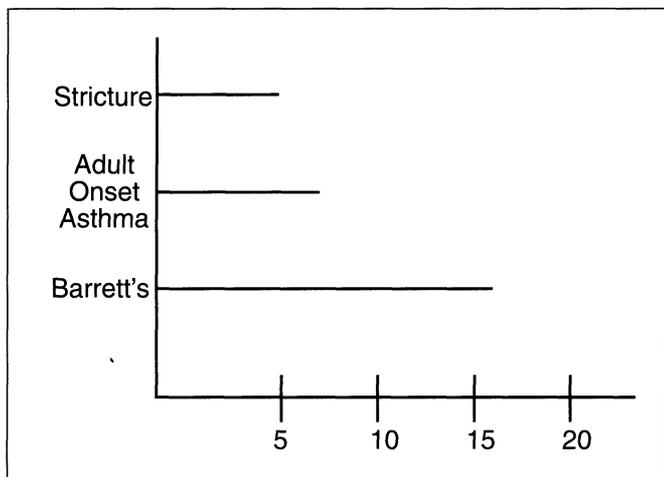


Figure 1. Advanced symptoms.

endoscopy with biopsies, and 98 patients underwent esophageal manometry. All esophageal manometries were accomplished by gastroenterologists using Norcan water perfusion catheters and standard technique. Two patients were unable to tolerate esophageal manometry.

Patients with Grades II to III esophagitis were vigorously treated and rescoped to document healing at least to Grade I esophagitis prior to surgery, decreasing the chance of esophageal perforation. Esophageal manometry showed an abnormally low lower esophageal sphincter (LES) pressure (<20) in 97 patients.¹⁰⁻¹²

Amplitude of esophageal contractions and progression of waves were carefully noted and used as criteria for selection of Toupet fundoplication.¹³⁻¹⁷ If the amplitude of contraction was 60 or less with poor progression of waves, the patient was considered to have a secondary esophageal motility disorder and was selected for a Toupet partial fundoplication. Patients unable to tolerate esophageal manometry or those with a history of lupus erythematosus or other connective tissue disorder were offered Toupet fundoplication because of possible future deterioration of esophageal function.

Twenty-four hour pH was used selectively in patients who were not clearly diagnosed by history, endoscopy and manometry (n=19).¹² DeMeester scores ranged from 14.8 to 290 with a mean score of 46.6.

Nissen-Rossetti fundoplications were performed on 70 patients and Toupet fundoplications on 30 patients.

LAPAROSCOPIC SURGICAL TECHNIQUE

The patient is requested to void immediately prior to laparoscopic anti-reflux surgery so that no Foley catheter is necessary. A standard peripheral vein IV access is placed, and the patient undergoes general endotracheal anesthesia. Antibiotics are not routinely used. An 18 Fr NG is now placed and removed prior to extubation. Bilateral sequential pneumatic anti-embolic stockings are placed on all patients and removed once the patient is ambulatory, usually two to three hours after surgery.

Pre-emptive analgesia is used on all patients.¹⁸ All trocar sites are marked out and then infiltrated with 0.25% Marcaine with 1/200,000 Epinephrine. With the surgeon to the right and the assistant to the left of the patient, the scrub nurse stands on the right side, passes instruments and operates the Welch-Allen Omni-View scope, which gives an adjustable view in four directions from 0 to 90 degrees. A Hasson open technique is used to access the abdominal cavity in the infraumbilical position. Thereafter, the 5 and 10 mm trocars are placed under direct vision. Sixty-five patients had undergone previous abdominal surgery and many required lysis of adhesions.

An exploratory laparoscopy is completed, then the patient is placed in slight flexion and in reverse Trendelenburg position. The fundus is identified and pulled inferiorly and laterally reducing the hiatal hernia present in the majority of patients (n=79). Now, the subhiatal fat pad is grasped and pulled inferiorly and to the left. The "window" in the gastrohepatic ligament is identified.

The window is infiltrated, and the underlying hiatus, caudate lobe and right crus are sprayed with 1% Xylocaine 1/100,000 epinephrine. The peritoneal reflection and phrenoesophageal ligament over the anterior border of the esophagus is identified and elevated. This subperitoneal space is infiltrated with Xylocaine, which dissects the tissue plane laterally left and posteriorly down over the left crus. This is done as an extension of the pre-emptive analgesia, which blocks the sensory nerves prior to stimulation, helps dissect the proper tissue planes, and significantly reduces intraoperative bleeding. The window in the gastrohepatic omentum is now divided using an L-hook electrocautery up to the hiatus. The peritoneal reflection over the anterior portion of the esophagus is divided from right to left and down on to the left crus. The left crus is well dissected, as this greatly

decreases the difficulty and time spent on the retroesophageal dissection. Now, the peritoneal reflection over the right crus is opened, then the right crus is dissected away from the esophagus and the junction of the posterior esophagus and right crus identified. The right crus is dissected down to its junction with the left crus. The subhiatal fat pad is now pulled anteriorly, and dissection of the retroesophageal connective tissue is accomplished using blunt bowel grasping clamps. Points of reference are the posterior gastric fundus caudad and the left crus superiorly. Once the left side has been accessed, a large vessel loop is passed from the left to the right and held by an endoloop 1 cm from the anterior esophagus. The vessel loop is grasped and used to manipulate the esophagus; at no time is the esophagus grasped by an instrument.

The vessel loop serves to move the esophagus in an atraumatic fashion and guarantees that the fundic wrap will be above the esophagogastric junction, thus avoiding the so-called "slipped Nissen."

With the right and left crus now well identified, the posterior vagus nerve is identified visually, or by touch if it is adherent to the posterior esophagus, and preserved. The retroperitoneal gastric attachments are taken down to free the posterior fundus and enlarge the retroesophageal opening. A 52 Fr bougie is placed into the intrathoracic esophagus alongside the indwelling 18 Fr NG tube. Next, all tension is released on the esophagus as the bougie is oscillated and slowly advanced under direct vision and with continuous communication with the nurse anesthetist.

This level of cooperation is necessary to prevent esophageal perforation. The gastric body is palpated with the blunt grasping forcep to determine proper positioning of the tip of the bougie.

The esophagus is elevated using the vessel loop and is felt to be heavy and distended by the bougie and NG tube. The superior portion of the fundus is selected and grasped with a babcock and positioned near the left crus. The fundus is grasped with forceps placed from right to left posterior to the esophagus, and the fundus is pulled to the right and anterior. The fundus is then released and does not retract, indicating no tension on the wrap. If the fundus does retract, further dissection is accomplished on the posterior gastric attachments and the gastrolial ligament between the fundus and superior pole

of the spleen, which is well developed in about half of the patients. When further dissection is required, the bougie is retracted into the intrathoracic esophagus to decrease the risk of esophageal perforation.^{19,20} The right portion of the fundus is once again grasped and pulled anterior and the left anterior portion of the fundus is grasped. These are then moved right and left while the fundus slides behind the esophagus. At this point, tactile and visual assessments are made to determine the correct position of the left portion of the fundus that ensures the wrap is floppy. Now, the right and left portions of the fundus are grasped with one babcock, and a 0 Ethibond non-absorbable suture is placed seromuscular in the left fundus, muscular layer of esophagus, and seromuscular in the right fundus and tied intracorporeally using the Endo-Stitch device. The babcock is released, and two more identical sutures are placed. The Bougie is rotated 360 degrees after each suture is placed to be certain it is not incorporated in the suturing process. The Bougie and NG tube are now removed. The wrap is measured and found to be 1.5 to 2.0 cm in length. A bowel grasper is placed between the wrap and esophagus and elevated to ensure the wrap is floppy. Using this technique, no patients required division of the short gastric vessels to achieve a tension-free wrap.

The table is placed in the normal position. The instruments are removed and all 10 to 12 mm trocar sites are closed using the Exit device with 0-Vicryl suture to achieve a closure of peritoneum and fascia. The skin is closed with staples.

The patient receives Toradol 30 mg IV at the conclusion of the surgery.

TOUPET PROCEDURE

The Toupet fundoplication is accomplished with the identical port placement, dissection and bougie use, as the Nissen fundoplication. The wrap is accomplished by first suturing the seromuscular layer of gastrum to the left crus using 0 Ethibond and then to the right crus, both to close the hiatal hernia and to anchor the wrap posteriorly. Now, a 52 Fr bougie is advanced alongside the NG tube to fill the esophagus. On the right, three sutures are placed through the muscular layer of the esophagus and seromuscular layers of the stomach. Next, three identical sutures are placed on the left, with care taken to avoid the anterior vagus nerve. This completes the 200 to 220 degree wrap. The bougie and NG tube are rotat-

ed and removed. The fundoplication is measured to be 1.5 to 2 cm in length, and the wrap is checked to be certain it is floppy.

Postoperatively, the patient receives a clear liquid diet starting immediately after surgery. Pain control is accomplished with Toradol 30 mg IV immediately postoperatively, then 10 mg po qid and either percocet or Mephergan Fortis prn. The IV and the pneumatic compression hose are removed when the patient becomes ambulatory. Incentive spirometry and deep breathing are routine.

The next morning the patient receives a soft diet, and if the diet is well tolerated and pain is controlled adequately, the patient is discharged that day. Dietary restrictions are as follows: no extremely hot or cold fluids, no bread, no steak, no chicken and no carbonated beverages for three to four weeks. The majority of patients do not restrict themselves to this for more than two weeks.

RESULTS

Follow-up was achieved in 98 out of 100 patients. Length of follow-up ranged from 4 to 33 months with a mean follow-up of 17.6 months. Operative times ranged from 75 to 240 minutes, with a mean time of 132 minutes. No patients required conversion to an open procedure. There were no cases of esophageal, gastric or splenic injury or pneumothorax. There were no combined procedures other than umbilical herniorrhaphy when indicated at the camera port. No patients developed gas bloat syndrome. The mortality rate was zero. No patients required reoperation for reflux disease.

Major complications were limited to one patient who developed both a pulmonary embolus and a small bowel perforation and required subsequent surgery. Minor complications were limited to one patient who had atelectasis with a mild temperature elevation, which delayed discharge by one day. Ninety-six percent of patients had a hospital stay of less than two days; 99% had a hospital stay of less than three days, with a mean hospital stay of 1.85 days.

Postoperative problems included two patients with aerophagia, which improved over time. Two patients complained of dysphagia. Esophagrams were normal, and a barium tablet passed without difficulty in both patients. These patients underwent upper endoscopy and had balloon dilatation up to 54 French without any

resistance. One of these patients is under treatment for esophageal spasm, which is episodic and stress related and was present prior to surgery. A postoperative 24-hour pH showed a DeMeester score of 4.7. The other patient has become asymptomatic over time with no further treatment. One patient had early satiety and bloating. A gastric emptying study was positive for gastroparesis, and the patient is currently being treated with promotility agents. Three patients developed complaints consistent with biliary colic. Ultrasounds of the abdomen were normal. A HIDA Scan with CCK showed low ejection fractions consistent with biliary dyskinesia and these patients underwent laparoscopic cholecystectomy. All had complete resolution of their symptoms. Results of a follow-up patient questionnaire are listed in **Table 1**.

Table 1.
Patient Questionnaire Results

Are your symptoms relieved?	97% Yes (3% had biliary dyskinesia)
Rate your results.	98% Excellent or Good
Has heartburn returned?	82% No; 14% Occasionally; 4% Yes; 96% No or Occasionally
Do you have trouble burping?	91% No; 9% Yes
Number of days until normal eating?	80% at 30 days; 95% at 60 days; 100% at 90 days
Do you have trouble swallowing?	98% No; 2% Yes
Do family members have same problem?	45% Yes; 55% No
Knowing what you now know, would you have surgery?	100% Yes
Would you recommend this surgery to a family or friends?	99% Yes
Rate your satisfaction of the surgical experience and your results on a scale of 1 to 10.	mean score of 9.4

DISCUSSION

These results are consistent with previously published studies that show laparoscopic anti-reflux surgery to be a safe and effective treatment for GERD.^{19,21}

The advantages of minimally invasive surgery for this problem are reduced hospital stay, much less postoperative pain, quicker return to normal activities and improved cosmesis.^{22,23} All these advantages factor into the increased overall acceptance of patients electing to undergo surgery for reflux disease. The increased pressures of cost containment for medical care make the laparoscopic approach likely to emerge as the preferred treatment for GERD when compared to laparotomy and prolonged medical management.²⁴⁻²⁶

The adverse reaction rate of long-term medical management is approximately 4% with H2 Blockers and rises to 14% with Omeprazole. This includes drug interactions with commonly prescribed drugs such as theophylline, warfarin, phenytoin and benzodiazepines.²

With a surgical complication rate of 2% in this series, which is less than the 4% to 14% complication rate of long-term medical management, laparoscopic anti-reflux surgery becomes a much more appealing option for patients and their referring physicians.

In this series of 100 patients, none have prolonged dysphagia as a result of their surgery. The short-term dysphagia attributed to postoperative edema and esophageal irritability causing spasm passes in time, with 80% eating normally by 30 days, 95% by 60 days and 100% by 90 days.

Few studies have looked at the relationship among esophageal motility, type of operation and postoperative dysphagia.²⁷⁻²⁹

Bremner's study²⁷ shows a postoperative dysphagia prevalence of 19% and concludes that nonspecific esophageal motility disorders have no effect on postoperative dysphagia. All Bremner's patients had Nissen funduplications, and a dysphagia rate of 19% is a significant finding.

With the selective use of Toupet fundoplication for patients with less than 60 mm Hg amplitude of contractions, this series of 100 patients has no long-term postoperative dysphagia.

In conclusion, with proper selection, laparoscopic Nissen-Rossetti or Toupet fundoplication is a highly effective, safe and curative operation for patients with gastroesophageal reflux disease refractory to medical management.

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