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Laparoscopic antireflux surgery at an outpatient surgery center

C. R. Finley, J. B. McKernan

Department of Surgery, Advanced Surgery Center of Georgia, 220 Hospital Rd., Canton, GA 30114 USA

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Abstract

Background: Laparoscopic fundoplication (LF) procedures have been shown to be safe and effective for the control of gastroesophageal reflux disease (GERD). Preliminary reports suggest that LF can be performed safely in an ambulatory surgery center. We report on our extensive experience with outpatient LF.

Methods: Since May 1995, we have performed laparoscopic antireflux procedures in 557 consecutive patients at a freestanding outpatient surgery center. All patients had esophageal manometrics and esophagogastroduodenoscopy (EGD) within 1 year of their surgical procedure. This series included 16 patients with large paraesophageal hernias (mostly type III) and 22 patients with prior antireflux procedures. Most patients (n = 494) underwent Nissen fundoplication.

Results: Patients were typically given clear liquids 6 hs postoperatively and discharged home in <23 hs. None of the 557 patients required conversion to an open procedure. There was one de ath 2 weeks postoperatively secondary to myocardial infarction. The overall complication rate was 3.6%. The transfer rate to an inpatient setting was 1.25%. The readmission rate was 1.1%. Two patients (0.4%) were returned to the operating room the same day, one for trochar site bleeding and one for crural disruption secondary to vomiting. The average operative time was 58 mins, and the average operating room time was 101 mins.

Conclusions: The results of this large series suggest that the outpatient setting is a safe, cost-effective, and patient-friendly location for the performance of laparoscopic antireflux procedures.

Key words: Laparoscopic fundoplication — Ambulatory surgery — Nissen fundoplication — Gastroesophageal reflux disease — Antireflux procedures

Correspondence to: C. R. Finley

Over the last decade, there has been a significant shift in the role of surgery for the treatment of gastroesophageal reflux disease (GERD) [20]. Once reserved for patients with severe disease refractory to all forms of medical therapy, antireflux surgery is now considered appropriate for many symptomatic patients without mucosal complications [7, 22]. Several factors have contributed to the growing acceptance of surgery for reflux disease. One is an appreciation that abnormal gastroesophageal reflux can result in serious esophageal complications such as ulcerations, strictures, and the development of Barrett's metaplasia in as many as 20% of patients [12]. A second factor is the recognition that many of the extraesophageal symptoms observed in patients with GERD, including laryngitis, erosion of dental enamel, and pulmonary disorders (i.e., asthma, chronic cough, and bronc hitis), are due to refluxed gastric material entering the oropharyngeal cavity and lungs [9, 12, 19]. Although pharmacologic therapy with proton pump inhibitors and histamine H_2 receptor antagonists are effective in treating heartburn and esophagitis, they are less useful for controlling these extraesophageal symptoms [22].

Advances in our understanding of the pathophysiology underlying GERD, and in particular the role of the lower esophageal sphincter (LES), have also contributed to the rise in antireflux procedures. Available evidence suggests that treatments directed toward restoring normal competence of the LES will be more effective than those aimed at controlling acid secretion [16, 24]. This hypothesis has been supported by findings from two controlled trials, both of which demonstrated the superiority of surgical treatments over conventional medical therapy for GERD [2, 23]. Finally, the introduction of safe and effective minimally invasive antireflux procedures has also contributed to the shift in the role of surgery for treating GERD. Laparoscopic antireflux procedures are comparable to their open counterparts in terms of high rates of symptom relief coupled with low rates of complic ations, but they offer advantages in terms of shorter hospital stay, quicker recovery, and cost savings [3, 6, 23].

Thus, for many patients, operative therapy has become an alternative rather than a last resort to treat their abnormal reflux and prevent the development of complications asso-

ciated with GERD. The laparoscopic technique has replaced the open procedure as the method of choice. Recently, there have been several reports of laparoscopic antireflux procedures performed on an outpatient basis [5, 14, 15]. These reports were modest in size, each comprising between 22 and 59 patients. This article describes our more extensive experience in performing outpatient laparoscopic fundoplication surgery in >550 patients with documented GERD.

Materials and methods

Patient population

Between June 9, 1995 and December 16, 1999, we performed minimally invasive antireflux procedures in 557 patients at an outpatient surgical center. The outpatient center is freestanding and is not physically attached to a hospital. A transfer agreement is in place with a tertiary care facility ~35 miles from the center. A single surgical team that included one or both of us performed all procedures.

All patients had symptomatic GERD and were refractory to or intolerant of medical therapy or were not desirous of lifelong treatment. There was an equal distribution of men (n = 271, 49%) and women (n = 286, 51%). Patients ranged in age from 16 to 80 years, with an average of 50 years; 99 patients (18%) were ≥65 years of age. Body weight ranged from 100 to 310 lb and averaged 180 lb. Most patients were classified as American Society of Anesthesiologists (ASA) class II (n = 480, 86%); 64 (12%) were ASA class III. ASA class IV was the only medical condition that excluded patients from undergoing the laparoscopic fundoplication procedure at the outpatient clinic, although there were a minority of patients who required inhospital surgery because of demands by their insurance carrier.

Preoperative evaluations

Esophagogastroduodenoscopy (EGD) and esophageal manometry were performed within 1 year prior to surgery in all patients, with the exception of those who had an associated stricture or paraesophageal hernia that did not permit passage of a manometry catheter. Twenty-four–hour pH monitoring, barium swallow, and gastric emptying studies were used selectively in our series. A 24-hpH monitoring study was indicated only in the absence of esophagitis upon EGD. A barium swallow was performed in patients who had a stricture, patients in whom foreshortened esophagus was suspected, patients with large paraesophageal hernias, and patients who had suspected underlying additional pathology. A gastric emptying study was performed where there was a history of gastric disease, frequent vomiting, recurrent GERD, or findings on EGD suggestive of gastric stasis. Intraoperative EGD was performed on all patients who were undergoing redo fundoplication procedures or who had a paraesophageal hernia.

Operative approaches

We employ a selective approach to treating GERD, tailoring the antireflux procedure to each patient's underlying anatomic and functional defect. Details of the operative procedures have been described in detail elsewhere [13]. The types of outpatient laparoscopic antireflux procedures performed in this series of patients included Nissen fundoplication (n = 494), modified Toupet fundoplication (n = 53), and Collis-Nissen fundoplication (n = 10). Sixteen patients were surgically treated for a paraesophageal hernia; 15 of them underwent a Nissen repair and one underwent a Collis-Nissen fundoplication. Twenty-two patients had undergone prior antireflux surgery; thus, the present outpatient laparoscopic fundoplication represented a redo fundoplication.

In addition to the primary antireflux procedure, 22% of our patients underwent an ancillary procedure (Table 1). The most common ancillary procedure was a cholecystectomy followed by esophageal myotomy. Esophageal myotomy was performed either for achalasia or nutcracker esophagus.

The anesthesia protocol in use at the ambulatory surgical center was developed to minimize the occurrence of postoperative nausea and vomiting (PONV). Patients are admitted to the outpatient surgery center 1 hr prior to induction of anesthesia. Preoperative famotidine (Pepcid) 20 mg and metoclopramide (Reglan) 10 mg are administered prophylactically; patients with a history of PONV are also given ondansetron (Zofran) 4 mg. Anesthesia is induced with intravenous propofol and is maintained using isoflurane or sevoflurane in combination with ~50% nitrous oxide. Intermittent doses of fentanyl (50–350 μg)are administered if needed to supplement the inhaled anesthetics. Muscle relaxation is induced by succinylcholine followed by vecuronium or rocuronium; if indicated, neostigmine (0.04–0.08 mg/kg) with glycopyrrolate (0.01 to 0.02 mg/kg) is given for neuromuscular reversal. To prevent PONV, ondansetron 4 mg (or droperidol 1.25 mg) is administered toward the end of the operation. Patients who experience nausea or vomiting in the postanesthesia care unit are treated aggressively.

Table 1. Ancillary surgical procedures

Laparoscopic fundoplication plus ancillary procedure[a]	No. of patients
Cholecystectomy	47
Esophageal myotomy (EM)	43
Highly selective vagotomy (HSV)	18
Pyloroplasty	12
Biopsy (liver, lung, or ovary)	9
Herniorrhaphy (ventral or inguinal)	5
Liver resection	1
Laser ablation of the prostate	1
Cataract surgery	1

[a] Some patients had more than one ancillary surgical procedure in addition to the laparoscopic fundoplication; thus, patients may have been counted more than once

Results

The average operative time for all procedures was 58 min; the operating room time was 101 min. None of the patients required conversion to an open procedure. Patients were typically started on clear liquids within 6 h postoperatively, and almost all patients (99%) were discharged from the ambulatory surgery center <23 h after the surgery. A registered nurse was responsible for patient care the night of surgery; the patient-to-nurse ratio was 2:1. A physician remained on site until the patients were completely recovered and considered stable. Patients were discharged with instructions to observe a liquid diet on day 1 and a mechanical soft diet for the first 3 weeks. Most patients resumed a regular diet 3 weeks postoperatively.

Seven patients (1.25%) were transferred to an acute care facility (i.e., hospital) following surgery due to a postoperative complication, including inability to ambulate (n = 1), hypoxemia (n = 3), and to rule out a myocardial infarction (MI) (n = 3).

The operative mortality rate was 0.2%. One patient, a 47-year-old man, died 2 weeks postoperatively as the result of a transmural MI despite a complete cardiac workup, including a negative stress test, prior to surgery.

Overall, the complication rate in this series of 557 patients was 3.6%. Short-term complications are summarized in Table 2. The readmission rate in our series was 1.1% (six patients). Two patients returned to the operating room the same day as the laparoscopic antireflux procedure. One patient experienced bleeding at the trochar site, and a second patient had crural disruption secondary to emesis; both cases required surgical intervention. These two patients

Table 2. Postoperative complications in 557 patients undergoing ambulatory laparoscopic fundoplication

Complication	No. patients	Transfer to hospital	Hospital readmission
Postoperative hypoxia secondary to atelectasis	3	yes	no
Gastric distention	2	no	yes in 1
Esophageal leak	2	yes in 1	yes in 1
Subphrenic abscess	2	no	yes
Postoperative EKG changes requiring cardiac evaluation	2	yes	no
Chylous ascites	1	no	yes
Ulnar nerve paresis	1	no	no
Cardiac arrest at insufflation	1	yes	no
Postoperative subendocardial MI	1	yes	no
Mediastinal abscess	1	no	yes
Splenic injury	1	no	no
Crural disruption	1	no	no
Death due to postoperative transmural MI	1	no	no
Trochar site bleed	1	no	no

MI, myocardial infarction

were released from the ambulatory surgical center within 23 h of the original antireflux procedure.

Four additional patients were admitted to an acute care facility within 7 days of the laparoscopic antireflux procedure—one for chylous ascites, one for an esophageal leak, one for a mediastinal abscess, and one for gastric distension. The first patient requires additional comment. This patient had undergone a routine Nissen fundoplication for a type I hernia. The patient was readmitted 4 days later with massive abdominal distention and diagnosed with chylous ascites. Injury to the thoracic duct is the presumed etiology for this complication. The patient underwent paracentesis, had a laparoscopic drain inserted, and was sent home on total parenteral nutrition. The episode resolved without further complications within ~3 weeks.

One of the patients who had been transferred to acute inpatient care because of the length of the surgical procedure (635 min) developed an esophageal leak. This patient had undergone surgical repair of a paraesophageal hernia (type IV) in conjunction with a laparoscopic Collis-Nissen fundoplication. The patient was placed on total parenteral nutrition, and the leak resolved. There was a second esophageal leak in our series of 557 patients. This patient had undergone a routine Toupet fundoplication. After he had returned home, the patient fell and sustained abdominal trauma. A leak developed, so the patient was rehospitalized and a drain was inserted. Neither of the patients who developed an esophageal leak required a thoractomy with drainage.

Discussion

Our findings provide further support for the excellent outcome associated with laparoscopic fundoplication procedures in treating GERD. Importantly, our results indicate that these procedures can be performed safely in an outpatient surgical setting where patients are released within 23 h of surgery. In our series, the presence of comorbid disease and old age did not preclude safe outpatient surgery. The low postoperative complication rate (3.6%) in our series of laparoscopic antireflux procedures is consistent with that reported in three other large series involving >600 patients undergoing laparoscopic antireflux procedures in a hospital setting [1, 6, 13, 27]. Additionally, our findings documenting the safety of outpatient laparoscopic fundoplication procedures in 557 patients confirm and expand on the observations of minimal complications made by other surgical groups in much smaller series of fundoplications done on an outpatient basis [5, 14, 15].

Among our perioperative complications was a case of chylous ascites. Chylous ascites, the accumulation of lipoproteins and chylomicrons within the peritoneal cavity due to trauma or obstruction of the lymphatic system, is a rare complication of abdominal surgery [18]. A search of the world literature revealed only one other report of this complication subsequent to a laparoscopic fundoplication procedure [21]. Although chylous ascites can be associated with significant morbidity and even death, our patient was managed successfully with paracentesis and total parenteral nutrition.

Postoperative nausea and vomiting are common problems among patients undergoing laparoscopic surgery; along with excessive pain and drowsiness, they are the key determinants of the length of postoperative stay among ambulatory surgical patients [4]. Side effects from anesthesia were minimized by our standard protocol, which included the administration of famotidine and metoclopramide (or ondansetron) preoperatively, induction with intravenous propofol, maintenance with inhalational isoflurane (or sevoflurane) in combination with 50% nitrous oxide, and the administration of ondansetron or droperidol at the end of surgery. Preoperative metoclopramide or ondansetron prior to a propofol/isoflurane anesthetic has been shown to decrease the incidence of postoperative nausea and vomiting by $\leq$50% [26]. Propofol has mild antiemetic effects, and isoflurane and sevoflurane are associated with lower rates of nausea and vomiting than other inhal ational anesthetics, such as desflurane [8, 11]. None of the 557 patients in our series required transfer to an acute care facility because of protracted postoperative nausea and vomiting, one patient had a crural disruption secondary to postoperative vomiting that required immediate operative repair.

For 22 of the patients in this series, the laparoscopic antireflux procedure represented a reoperation for a failed prior procedure. Although the average procedural time was somewhat longer for reoperations (107.4 min) than the overall average operative time (58 min), the postoperative results of these 22 reoperations did not differ from that for the primary procedure. Of the seven patients who required transfer to an inpatient facility, only two had undergone a reoperation. This indicates that even laparoscopic redo fundoplications can be accomplished in an outpatient setting. Our findings are in agreement with those of others who report that laparoscopic reoperative antireflux surgery is associated with excellent postoperative results [17, 25].

Our experience shows that an outpatient surgery center is an appropriate setting for the performance of laparoscopic antireflux procedures by an experienced surgical team. The safety of outpatient laparoscopic fundoplication was assured and consistent with that reported for the same procedure performed in a traditional hospital setting. In addition to the

patient's ability to return home within 23 h of surgery, there are advantages associated with parking, minimal bureaucracy, and a better patient:nurse ratio (2:1 at the Advanced Surgery Center). Subsequent to the close of this study, three patients have been discharged home the day of surgery. We believe that this time frame will become much more common in the future. The team approach, which we currently utilize in performing laparoscopic fundoplications, is not available in our current inpatient setting. The only patients who are treated in the tertiary facility are those who request the facility, those whose insurance plan requires it, and those wh ose comorbid status dictates inpatient care.

In conclusion, the results of this extensive series of 557 patients suggest that the outpatient setting is a safe and patient-friendly location for the performance of laparoscopic antireflux procedures.

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