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ASSESSMENT OF LAPAROSCOPIC PARTIAL POSTERIOR FUNDOPLICATION IN THE MANAGEMENT OF GASTROESOPHAGEAL REFLUX DISEASE.

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Background: Surgical correction of gastroesophageal reflux disease has been a therapeutic option for decades. Laparoscopic antireflux surgery is currently a growing and well established field in endoscopic surgery.

Methods: Between October 1997 and November 2000, nineteen patients underwent attempted laparoscopic partial posterior fundoplication. Preoperative investigations included endoscopy and barium swallow in all patients, manometry in 13 patients and PH monitoring in 9.

Results: One patient (5.3%) was converted to an open procedure. Fifteen patients were satisfied with the procedure. One patient had objective recurrence and required open revision of the wrap. Two patients developed postoperative complications (head and neck emphysema in 1 and deep venous thrombosis in the other). Two patients developed postoperative transient dysphagia, there was no incidence of persistent dysphagia or gas bloat. The mean operative time was 190 minutes and the mean hospital stay was 3.7 days.

Conclusion: Manometry could not be done routinely, especially when a partial wrap was decided to be performed. The laparoscope offers an effective option for treatment of gastroesophageal reflux disease with encouraging results. In addition to the benefits of a minimally invasive procedure.

INTRODUCTION

The "discovery" of laparoscopic techniques by non gynecological surgeons has led to a rapid expansion in the use of this treatment modality [1]. With the breakthrough of the use of the laparoscope to perform cholecystectomies, the future of minimally invasive surgery appears virtually unlimited [2].

Gastroesophageal reflux disease (GERD) is one of the most common upper gastrointestinal disorders, producing heartburn and regurgitation in symptomatic individuals [3].

Approximately 10-20% of patients develop serious complications such as ulceration, stricture and Barrett's metaplasia, even after medical therapy. Although a significant number of patients can be effectively treated medically, therapy may be required for a protracted period of time, even life long. Surgical correction of the pathophysiologic abnormality of the lower esophageal sphincter (LES) is an important therapeutic option [4,5].

The advent of laparoscopic fundoplication has revolutionized the surgical management of GERD, since it was first demonstrated to be a feasible technique for correction of this physiological disturbance by Dallemange in the early nineties [2].

With the open technique, the total (360°) fundoplication was the most successful of the evaluated techniques, but was associated with a significant degree of dysphagia and gas bloat symptoms [6]. In order to minimize these later postoperative symptoms, the techniques of partial fundoplication were developed, and these modifications have extended to the laparoscopic era [7].

The aim of this study was to evaluate the results of 19 patients with GERD who underwent laparoscopic partial

posterior fundoplication (LPPF) and to determine the efficacy, safety and complications of this technique.

PATIENTS AND METHODS

From October 1997 to November 2000, nineteen patients were studied prospectively. The patients were evaluated and operated upon for symptoms of GERD poorly alleviated by medical therapy. The patients were assessed using the standard De Meester scoring system questionnaire for heartburn, regurgitation and dysphagia. From score 0: no symptom to score 3: severe symptom for each item with total from 0-9 [8].

All patients with GERD included in the study were felt by the physician gastroenterologist to be [1] a failure of medical treatment, [2] of a young age such that prolonged usage of omeprazole was contraindicated, or [3] non compliant with ongoing effective medical treatment. Reasons for non compliance included refusal, reduced quality of life, drug dependency or side effects and mostly inability to afford the costs of long term medical therapy.

All patients underwent upper gastroduodenoscopy and biopsies of esophageal mucosa if Barrett's esophagus was suspected. The Savary-Miller classification of reflux esophagitis was used to standardize the preoperative endoscopic findings, starting from grade I: single or isolated erosive lesions to grade V: columnar epithilium in continuity with the Z line [8]. Barium swallow was performed for all patients to document the presence and size of hiatus hernia (Fig. 1,2).

Esophageal manometry was performed for 13 patients after an overnight fast using the standard water perfusion catheter passed through the nose. The catheter was connected to a low-compliance infusion system constantly perfused with distilled water at 0.5 ml/minute. The LES location and pressure were detected using the standard station pull-through technique. The catheter was then repositioned with the distal port 5 cm above the proximal border of the LES and esophageal body peristalsis was assessed using 10 swallows with 5 ml water at 30 seconds intervals. Normal values for LES resting and residual pressures are 15-45 and 8 mmHg respectively [9]. Esophageal peristaltic activity was defined as a sequential series of pressure waves in response to a wet swallow producing a contraction of 10 mmHg or more in the mid and distal parts. Esophageal dysmotility was defined as peristalsis of 50% or less [9].

Twenty-four hour esophageal PH monitoring could not be performed except in 9 patients who could afford to do it on their own expense as it was not available during the period of the study. The test was performed at least 2 weeks after cessation of medical treatment. PH of less than 4 for more than 5% of the study period was considered abnormal [10].

Routine prophylactic subcutaneous fractionated Heparin and compression stockings were used, as well as a cephalosporin. Under general anesthesia, a wide bore nasogastric tube was inserted.

Technique:

The patient was positioned in modified lithotomy position (lower extremities minimally flexed at hips and knee joints), with the surgeon standing between the patient's legs. A 0° scope was used in the first 7 cases, then a 30° angled scope was used afterwards. After establishment of pneumoperitoneum using the open (Hassan) technique, three 10 mm trocars were positioned in the midline (supraumbilical), left midclavicular (subcostal) and left midclavicular (supraumbilical) positions. Two 5 mm trocars were inserted in right anterior axillary (subcostal) and right midclavicular (supraumbilical) positions (Fig. 3).

Following initial exploration, the left lobe of the liver was retracted through the right subcostal port using the fan shaped liver retractor. The gastrohepatic ligament was opened, the anterior vagus and its hepatic branch were preserved. The right then the left crura were exposed by incising the covering peritoneum. The gastroesophageal junction (GEJ) was retracted anteriorly and the crura were further delineated. The posterior vagus was identified and preserved. Anteriorly, the GEJ and the fundus of the stomach were freed by incising the phrenogastric ligament making sure that a length of at least 3 cm of the distal esophagus is placed in the abdomen without tension. This may necessitate mediastinal dissection especially when a sizable hiatus hernia was present (Fig.2). Then the esophagus could be encircled using a nylon tape for retraction through the left midclavicular (supraumbilical) port. There was no need to divide the short gastric vessels in any of the patients.

The crura were routinely approximated posterior to the esophagus using 2 or 3 stitches of non absorbable Ethibond 2-0 (Fig. 4). Then the posterior aspect of the fundus of the stomach was fixed to the right crus using 2 non absorbable stitches, all stitches were tied intracorporially. The fundoplication was then started as a 240° partial posterior wrap, using 2 rows of non absorbable sutures with the fundus at each side of the esophagus after the fundus has been withdrawn from left to right through the retroesophageal window.

Hemostasis was secured, a suction drain was routinely used. The nasogastric tube was left for 24 hours postoperatively.

In general, patients received oral fluids the first postoperative day and soft diet the next day. The drains were removed within 48 hours.

Patients were followed up as regards early postoperative complications, questioned regarding dysphagia to liquids or solids, heartburn, regurgitation, gas bloat and overall satisfaction with the procedure. Patients were then followed up on a weekly basis for 1 month, monthly for 6 months, then every 3 months. Follow up ranged from 3 to 38 months (median 25 months). Manometry was performed after 3 months in 11 patients.

The Student t test was used to verify the statistical significance of the results.

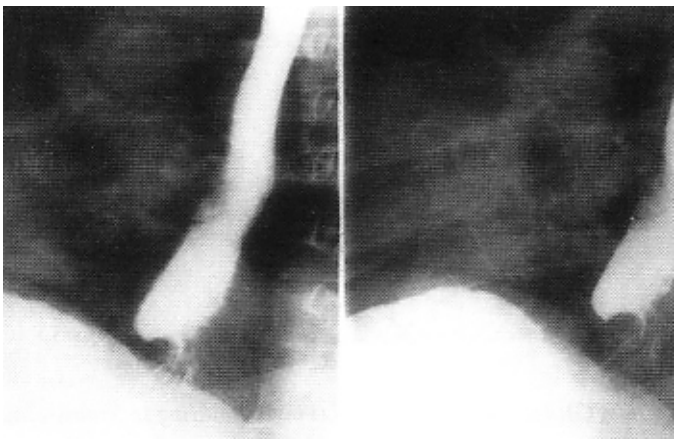

Fig. (1): Barium swallow showing small hiatus hernia.

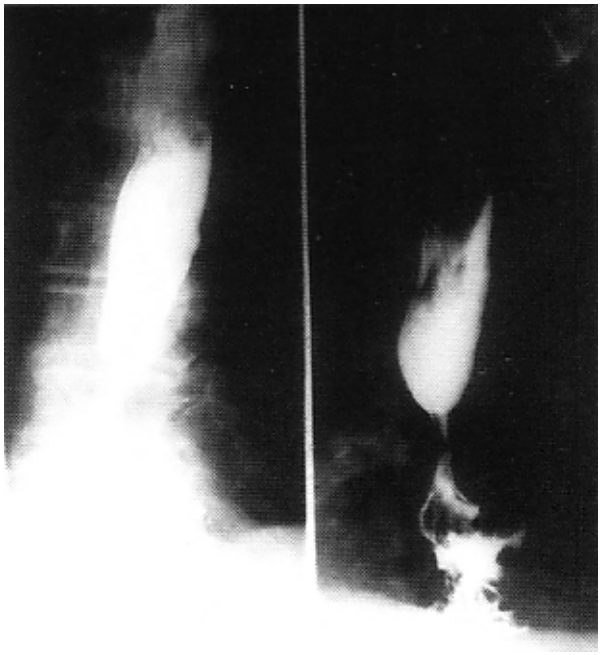

Fig. (2): Barium swallow showing large hiatus hernia.

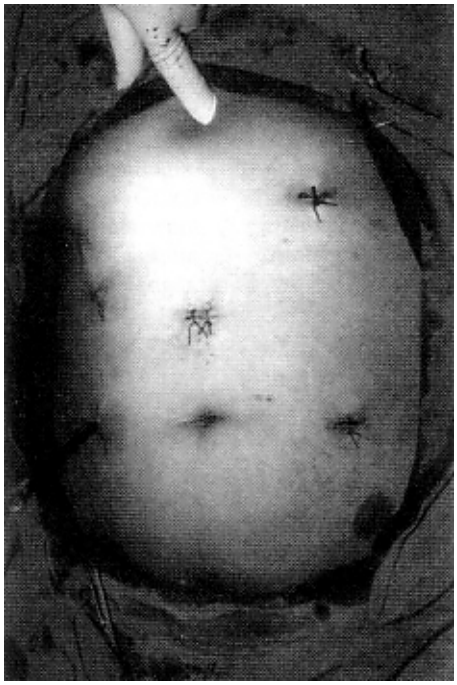

Fig. (3): Trocar sites for LPPF.(Finger Pointing to Xiphisternum)

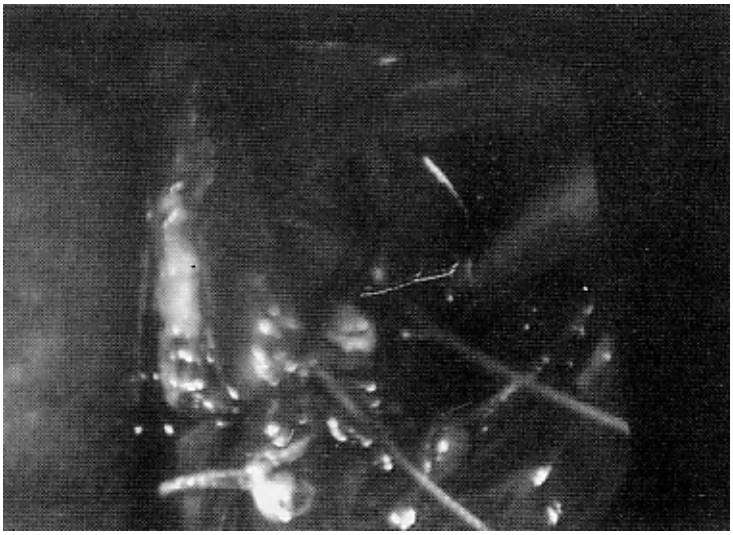

Fig. (4): Approximation of the Crura behind the esophagus.

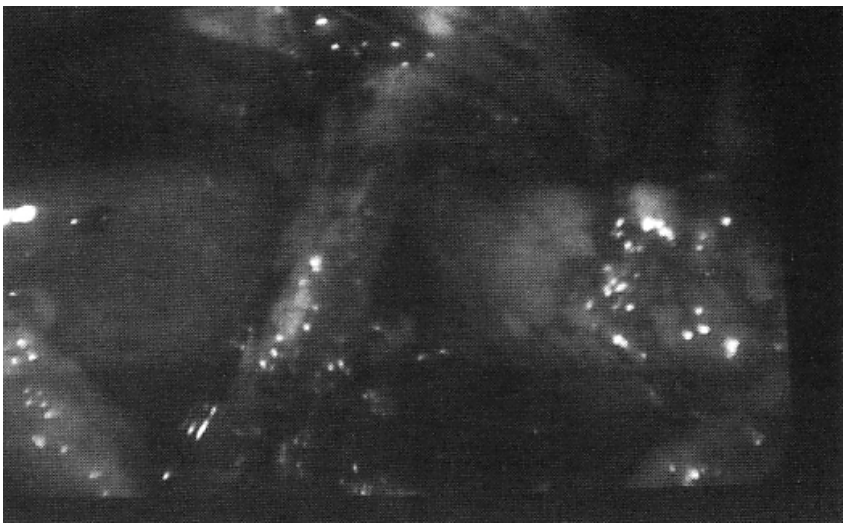

Fig. (5): Crura approximated with 4 cm of distal esophagus in the abdomen.

RESULTS

The study included 19 patients with GERD. They were 11 men and 8 women with mean age of 46 years (range 18-68 years). The preoperative De Meester score calculated for all patients ranged from 5 to 8 (mean 6.4), according to symptoms of heart burn, regurgitation and dysphagia. Upper gastrointestinal endoscopy was performed for all patients revealing a Savary-Miller esophagitis score ranging from grade I to V (mean 2.8). Barium swallow revealed sliding hiatus hernia in 11 patients, one of which was large (Fig. 2).

One of the 19 patients was converted to an open procedure (5.3%). This was the second patient in the series, he was suffering from liver cirrhosis, intraoperatively there was marked adhesions around the GEJ, excessive bleeding took place that necessitated conversion.

Operative time for the other 18 patients ranged from 130 - 320 minutes with a mean of 190 minutes. When the first 9 cases were analyzed against the last 9 cases, there was a diminution in the operative time from a mean of 220 minutes in the first 9 to 175 in the last 9 patients, reflecting a learning curve for the operation. The hospital stay ranged from 2 to 10 days with a mean of 3.7 days.

There was no mortality. Intraoperative complications took place in one patient, in the form of excessive bleeding due to marked adhesions (patient was converted to open fundoplication). There was no incidence of esophageal or gastric perforation..

One patient developed head and neck emphysema in the immediate postoperative period. He had a lengthy operation (290 min.) and extensive mediastinal dissection due to the presence of large hiatus hernia. The emphysema subsided spontaneously within 48 hours. Another obese female developed deep venous thrombosis inspite of antithrombotic measures, that necessitated full heparinization and prolonged hospitalization (10 days).

Two patients developed transient postoperative dysphagia for solids, which subsided 7 and 10 days postoperatively. One of these 2 patients had preoperative esophageal dysmotility proved manometrically, while the postoperative course of the second patient with dysmotility was uneventful. There was no incidence of persistent dysphagia or gas bloat

Subjectively, fifteen out of the 18 patients (83.3%) who had completed LPPF were satisfied with the procedure, completely cured of all reflux symptoms and did not require any antireflux medications. One out of the other 3 patients was a female who had a persistent atypical abdominal pain that was not relieved after fundoplication and the patient was not satisfied inspite of -endoscopic and PH monitoring-confirmation of absence of any reflux or esophagitis postoperatively. The second patient -male- had improved but not completely relieved heart burn that required occasional medications. The third patient was a male who

had a failed fundoplication and endoscopically documented recurrence of reflux 2 months after the initial surgery. Revision was planned to be done laparoscopically, but owing to the patient refusal, an open fundoplication was performed.

Preoperative esophageal manometry was performed in 13 patients and revealed esophageal dysmotility in 2 patients in the form of decreased primary peristalsis to less than 50%. The mean preoperative LES resting and residual pressures for the 13 patients were 8.3 and 2.1 mmHg respectively. Preoperative 24 hours PH monitoring was performed in 9 patients and revealed a mean percentage of PH less than 4 of 8%.

Postoperatively, only 11 patients agreed to repeat the manometry which documented a significant rise of both resting and residual pressures to 20.7 and 10.6 mmHg respectively ($p<0.05$).

DISCUSSION

Currently, the interest of endoscopic abdominal surgery is focusing on antireflux operation. This is documented by an increasing number of operations and publications in the literature [11].

Following the discovery of LES manometrically by Fyke and colleagues, there has been a surge of enthusiasm regarding its role as the physiological deterrent to the reflux of gastric contents back into the esophagus [12].

Although resting LES tone is generally considered to be the major antireflux component, the exact mechanism of reflux is a complex and multifactorial phenomenon. Despite recently recognized factors such as transient relaxation of the LES and delayed gastric emptying, the exact physiological mechanism remains elusive [13].

Surgical correction of GERD is required when [1] persistent or recurrent esophagitis is present inspite of optimal medical treatment and in association with symptoms, [2] non compliance of the patient and [3] complications of the disease [4].

The goal of surgical treatment of GERD is to relieve the symptoms and prevent progression and complications of the disease, creating a new anatomical high-pressure zone and to restore the competence of the GEJ while maintaining the patient's ability to swallow and belch normally, without dysphagia, which can occur when the outflow resistance of the reconstructed GEJ exceeds the peristaltic power of the body of the esophagus. Achievement of this goal requires an understanding of the natural history of GERD and selection of the appropriate antireflux procedure [4,14].

Until few years ago, this has been effectively done by open fundoplication. Nowadays, correction of the defective LES can be equally achieved laparoscopically, in addition to the benefits of the less invasiveness.

The Nissen procedure has clearly shown to be effective in controlling symptoms of GERD, but has been associated with a significant incidence of dysphagia and gas bloat especially in the presence of esophageal body dysmotility [6,15,16,17]. Thus various modifications were developed. A major difference in the various techniques was in the degree of wrap (total versus partial). In this study the decision to do a partial wrap routinely was based on its safety, effectiveness and less incidence of postoperative dysphagia and gas bloat even with esophageal dysmotility. Since manometry could not be done for all patients, the decision of performing a partial posterior fundoplication (Toupet) seemed safer.

One of the concerns regarding laparoscopic fundoplication is that the indications for surgical management may have become lax, with more people coming to surgery before it is indicated [14]. In this study all patients had long standing disease and had failed multiple trials of medical management by the gastroenterologist with various life style changes and drug therapy, or were non compliant to medical treatment. Heart burn and regurgitation were the most common presenting symptoms.

Patients had their diagnosis confirmed by at least 3 of the following tests: endoscopy and barium swallow for all patients, manometry in 13 patients and PH monitoring in 9.

Due to improper selection at the beginning of the study, one patient was converted to open fundoplication (5.3%). He was a male patient suffering from liver cirrhosis, the left lobe could not be properly retracted, in addition to marked adhesions around the GEJ that caused excessive bleeding during dissection. This was avoided later on and patients with marked liver cirrhosis were excluded and operated by laparotomy from the start.

This conversion rate (5.3%) is relatively high when compared to that reported by Zaninotto et al. (2.9%) and Yau et al. (0.8%). This could be explained by the early experience and the relative small number of patients in this study (19 patients) compared to the other 2 multicenteric studies (757 and 621 patients respectively) [11,18].

The mean operative time in the first 9 patients was 220 minutes, decreased to 175 minutes in the last 9 patients, which is still longer than that recorded by Yau et al. (112 min.) and Nilsson et al. (148 min.) [18,19]. This could also be attributed to the early experience, besides the Toupet procedure is a lengthy one requiring about double the number of stitches as that in the Nissen fundoplication

(performed in the other 2 studies). These intracorporially knotted stitches are the most time consuming and tedious part of the procedure. As stated by Dahlia et al. 1997, there is an important learning curve for laparoscopic antireflux surgery, longer than that for laparoscopic cholecystectomy [5].

The hospital stay (mean 3.7 days) and the postoperative complications rate (11.1%) fall in the average rates as reported in the literature [7,11]. There was no incidence of postoperative persistent dysphagia or gas bloat, even in the 2 patients with esophageal dysmotility, which is one of the merits of partial fundoplication.

Fifteen out of the 18 patients that underwent LPPF were satisfied with the procedure (83.3%). Only one out of the other 3 patients had documented objective recurrent reflux that required open refundoplication (5.3%).

Esophageal manometry was not performed on regular basis in this study. The results of the present study support the accumulating data [20,21] showing that even severe dysmotility is not a predictor of poor outcome, as the 2 patients who were proved to have esophageal dysmotility (primary peristalsis < 50%) did not develop postoperative persistent dysphagia. None of these studies supports the practice of routine manometry, especially when a partial fundoplication is decided to be undertaken as in the present study. Furthermore, esophageal manometry is expensive, time consuming and uncomfortable to the patient [22].

The technique was the same as described elsewhere in the literature stressing on the following points: [1] adequate dissection of the crura, [2] identification and preservation of vagal trunks, [3] closure of crura posteriorly, [4] non absorbable sutures should be used, [5] fixation of the fundus posteriorly to the crura to prevent sliding of the whole wrap up to the chest, [6] there was no need for division of short gastric vessels in any patient, [7] there was no need for using a bougie during making the wrap as there is no risk of a too tight wrap with the posterior partial one, [8] the wrap was a 240° posterior fundoplication and [9] antithrombotic measures are crucial.

Laparoscopic fundoplication is becoming increasingly employed on the basis of 2 facts: the recognition that surgical as opposed to medical management of GERD, and the recognition that laparoscopy can attain outcomes equivalent to those of open surgery, with the merits of a minimally invasive procedure.

It could be concluded that the operative approach outlined above, combined with strict operative indications, will enable the growth of this procedure to continue.

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