

Laparoscopic Treatment of Gastro-Esophageal Reflux Disease

PROF. JACQUES PERISSAT, M.D.
CHIEF, DEPARTMENT OF DIGESTIVE SURGERY
UNIVERSITY HOSPITAL OF BORDEAUX
BORDEAUX, FRANCE

PROF. DENIS COLLET, M.D.
CONSULTANT SURGEON
UNIVERSITY HOSPITAL OF BORDEAUX
BORDEAUX, FRANCE

Gastro-esophageal reflux disease (GERD), with or without hiatal hernia, is the consequence of a functional disturbance of the lower sphincter of the esophagus. This dysfunction is more and more often seen in populations with Western eating habits. According to recent reports, 10 percent of the patients suffer from constant heartburn, 30 percent from discontinuous heartburn demanding active treatment. Finally, a great number of non-digestive symptoms, either pulmonary, E.N.T., or cardiac, are also connected with GERD.

In the early 1970s, medical treatment was not very effective, hence the popularity of open surgery. Although the results were satisfactory, postoperative sequelae, in particular parietal ones, could not be avoided. The reason is that a large laparotomy is necessary to gain access to the esophageal hiatus, which always involves potential risks of postoperative incisional hernia.

In the years 1985 to 1990, new drugs appeared on the market (anti H₂ inhibitors, Omeprazol), which led to a fewer number of indications for surgery. These drug treatments are effective and well tolerated, with no serious consequences, although long-term prescription still meets with some reluctance. The treatments do not

entail any neuro endocrinal proliferation, and even if the gastrinemia increases, no complications appear.

This medical treatment, however, is purely symptomatic and simply makes GERD tolerable without curing it. Only surgical treatment can suppress its cause.

Having at one's disposal surgical

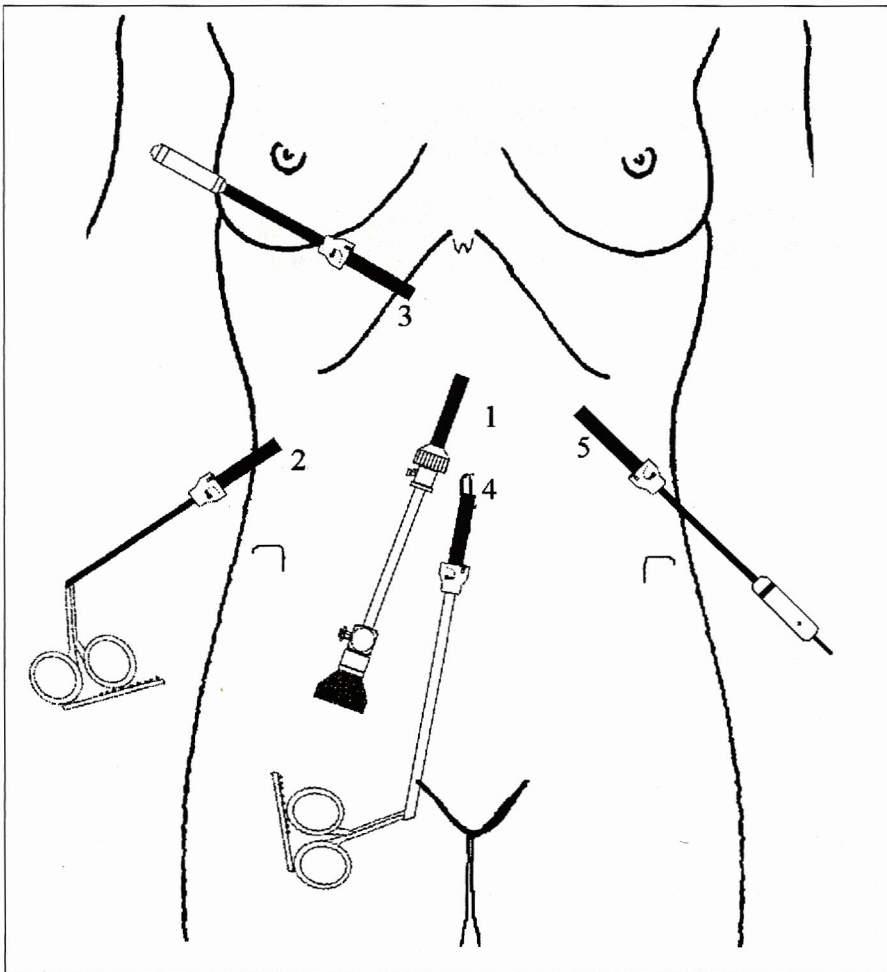


Figure 1. Trocar Sites For Fundoplication: 1) Laparoscope, 2) Grasping Forceps, 3) Liver Retractor, 4) Babcock Clamp, 5) Hook Dissector, Scissors, Needle Holder, etc.

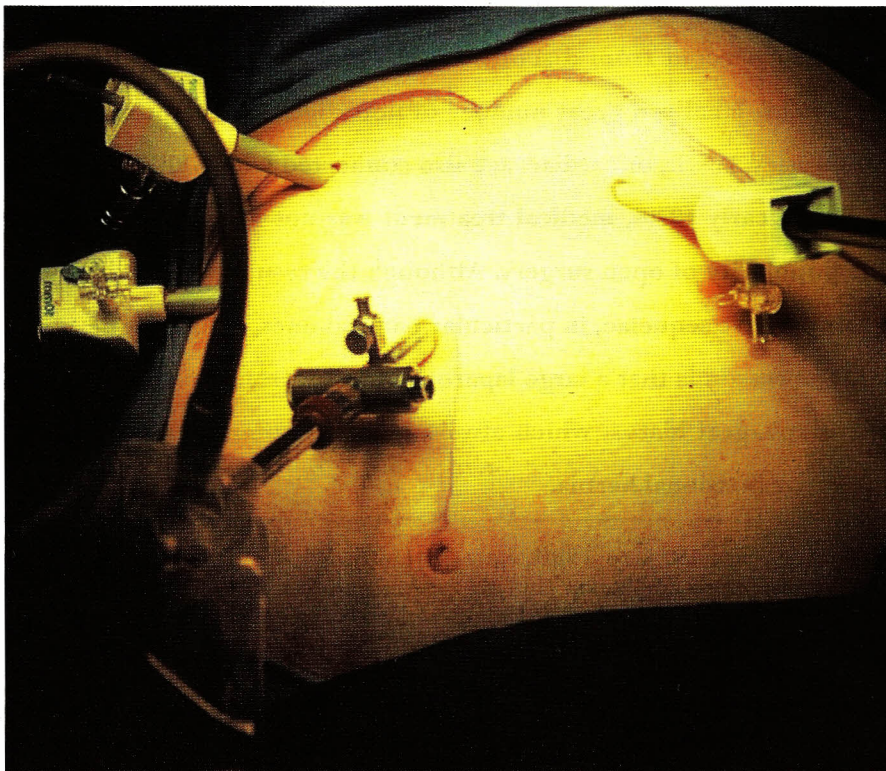


Figure 2. External view of the abdomen.

techniques identical to those already in use, but which do not demand an abdominal opening, appeared to be the ideal solution. A laparoscopic approach of GERD treatment was contemplated as early as 1991 by the pioneers of laparoscopic surgery in digestive surgery. T. Geageat¹ and B. Dallemagne² were the first to carry out a fundoplication. We operated on the first patient in November 1991.³ After a short-lived attempt to revive the procedure of tying the gastro-esophageal junction with the ligamentum teres, surgeons reverted to an adaptation of laparoscopy already validated in open surgery, namely the 360° Nissen fundoplication, its alternative version, the Nissen-Rossetti fundoplication, and the 270° Toupet fundoplication.

INDICATIONS

They are the same as open surgery, namely an invalidating GERD, which forces the patient to sleep in a sitting position, long spells of acidity measured in the lower esophagus, and grade II esophagitis, all of which resists medical treatment or recurs immediately after treatment ends. The results of manometric and motility assessment of the esophagus led to our choice of a 360 or 270° fundoplication.

OPERATING TECHNIQUE

We describe here the Nissen technique: 360° posterior fundoplication, 4 cm high. The operation is performed under general anesthesia. The patient lies supine, with legs splayed out. The operator is between the patient's legs, facing the patient's shoulders.

After a 12-mm Hg pneumoperitoneum has been created through insufflation of the peritoneal cavity with CO₂, five 10-mm trocars are inserted as follows (Figures 1 and 2):

- Site #1: 5 cm above the umbilicus for the laparoscope.
- Site #2: for a grasping forceps.
- Site #3: for the clip applicator, which is also used to lift up the left liver.
- Site #4: in the umbilicus for a Babcock clamp.
- Site #5: for the hook-dissector, scissors, needle-holder, etc.

The procedure is monitored on two television screens placed above the patient's shoulders. Image magnification allows extremely precise dissection of the hiatal area. Moreover, all the team

members have the same view of the operating field as the operator himself.

The first stage consists of dissecting around the abdominal esophagus after the hiatal hernia has been reduced by pulling at the anterior aspect of the stomach. This dissection is performed as follows:

- opening the peritoneum of the higher part of the lesser omentum, and, if necessary, tying a branch of the upper gastric artery leading to the left liver.
- opening the pre-esophageal peritoneal leaf.
- dissecting the right side of the esophagus, using as a landmark the anterior edge of the right diaphragmatic crus. It is extremely important to follow this landmark with a blunt instrument and smoothly dilacerate the connective tissue as far down as possible (Figure 3).
- the gastric branch of the posterior vagus nerve becomes visible, and it is left in contact with the esophagus (Figure 4).
- dissection of the connective tissue between the foot of the right crus and the posterior aspect of the esophageal-gastric junction helps to locate the foot of the left crus. Proceed along it to the left.
- the left lateral-esophageal space is reached without any risk of damage to the posterior aspect of the esophagus.
- a string is slipped around the esophagus in order to pull it up to the left.

A methylene blue test is carried out to detect a possible unnoticed esophageal leak. It is important to create a floppy fundoplication without traction so as to prevent postoperative invalidating dysphagia. Freeing of the great curvature makes enough gastric tissue available. To achieve this, the short vessels linking the great curvature to the spleen hilum must be tied up and severed one after the other, beginning with the lower one. While this step may be fairly long, it is mandatory to create a valve without any traction involved. Once the great gastric curvature is freed, it is pulled to the right posteriorly from the stomach (Figures 5 and 6). It is then sutured to the anterior aspect of the stomach with 4 stitches of non-absorbable thread, which will secure the repair. The tension of the fundoplication suture is set by introducing a fibroscope into the esophagus. It also allows control of the Gastro-esophageal mucosae. The fibroscope is

then removed and replaced by a nasogastric tube.

The crura of the diaphragm are sutured if they are widely spaced out. However, one must leave a 2-cm long retro-esophageal space, which is measured with a graduated probe. A suction drain is left in the left hypochondrium for 48 hours whenever there has been bleeding during the operation. The mean operative dissecting time is 150 mm.

POSTOPERATIVE COURSE

The naso-gastric tube is left *in situ*, until bowel movements start again, which usually happens within 48 hours. We usually carry out an upper GI series to check the quality and efficiency of the repair. As soon as the tube has been removed, the patient can eat normally. Immediately after the operation, the patient often experiences slight dysphagia, due to postoperative peri-esophageal

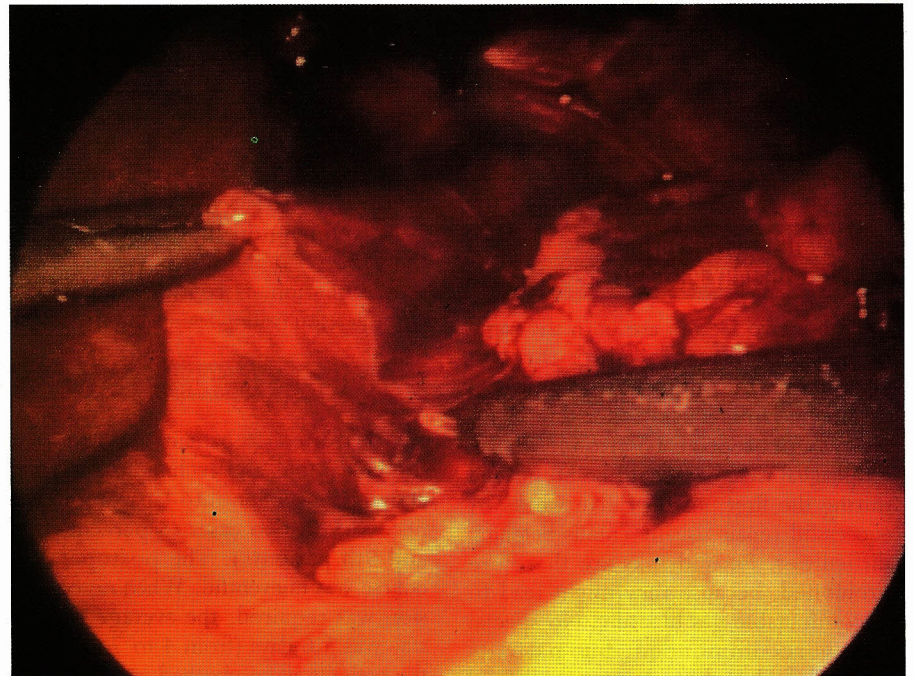


Figure 3. Freeing of the right aspect of the esophagus. The forceps is grasping the right crus. The hook is dividing the connective tissue between the right crus and the esophagus.

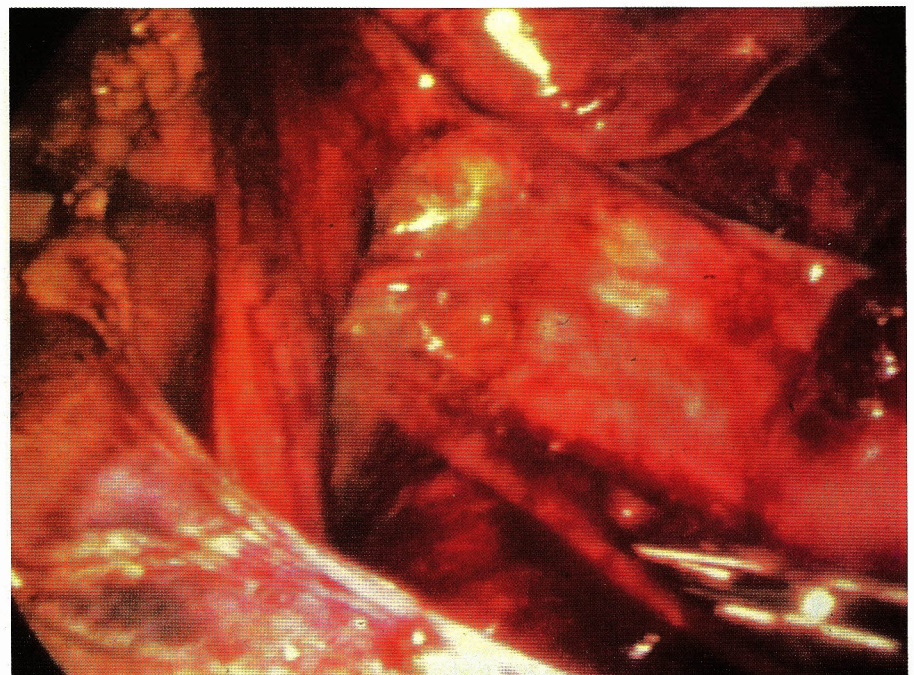


Figure 4. Skeletonization of the abdominal esophagus. The posterior vagus nerve is identified.

Surgical procedures used for laparoscopic treatment of GERD

N=541

Procedure	N cases	Percent	N surgeons*
<i>Nissen</i>	185	34%	8
<i>Nissen Rossetti</i>	284	52%	11
<i>Toupet</i>	72	16%	8

*N surgeons doing the procedure

Table 1.

oedema, which usually disappears after two weeks. The hospital stay lasts about 4 days, and patients can resume normal physical activity, even sports, by the end of the first week.

POSTOPERATIVE TREATMENT AND DIETARY PRECAUTIONS

These two factors are both the same as an anti-reflux procedure through laparotomy: the anti-acid treatment can be stopped immediately after the operation. A protective treatment of the esophageal mucosae could be prescribed during the first postoperative weeks. A successful repair usually entails belching difficulties. Fizzy drinks are therefore prohibited, because they might lead to uncomfortable gas bloating. No special diet is recommended, but patients should be advised to observe good food hygiene, aiming more especially at reducing the amount of air swallowed

with the food: it is important that they masticate properly and eat slowly. Slight dysphagia is often caused by large mouthfuls of solid food. It is only temporary and disappears progressively after 3 or 4 weeks. Heavy dysphagia demanding a semi-liquid diet, persisting for more than 3 months and resisting endoscopic dilation, is considered a serious complication calling for surgical repair.

RESULTS

We treated 26 patients according to the indications and technique described above. Conversion into laparotomy was necessary in two cases (8 percent) (3rd and 5th patients). The postoperative course was uneventful. When no conversion was required, the average hospital stay was 5.6 days (from 4 to 7 days). All the patients were checked regularly after the operation, and all the preoperative symptoms had disappeared in all cases.

One female patient suffering from persistent postoperative dysphagia was treated with one session of endoscopic dilation. We are currently involved in a multicenter study (Table 1), which regroups 19 French-speaking surgical teams (France-Belgium: FDCL: Fondation pour le Developpement de la Chirurgie Laparoscopique) * and focuses more particularly on this type of procedure. The preliminary results on mortality, complications, and conversions are quite encouraging. Table 2 shows that the figures are similar to those obtained in open surgery. One must point out to the absence of accidental splenectomy in the laparoscopic series. The conversion rates are low and decrease as surgeons' experience increase.

COMMENTS AND CONCLUSION

It is now possible to carry out laparoscopic procedures with proven efficiency to control GERD by open surgery. Laparoscopy by-passes all the disadvantages of laparotomy.

The postoperative course is short, with little or no pain; the hospital stay lasts only a few days. Normal physical activity, even sports, can be resumed without danger, one week after the operation. Lastly, there is no risk of secondary incisional hernia, because no muscle-aponeurosis incision has been performed.

Further, the laparoscopic approach gives a better view of the elements to be dissected than the one obtained through laparotomy. The ability to

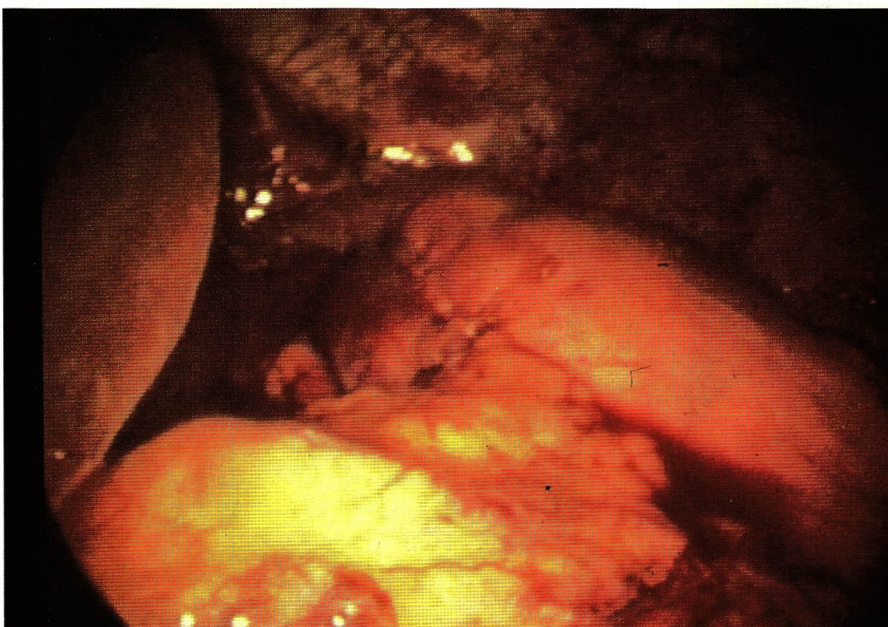


Figure 5. Photograph of completion of the 360° fundoplication.

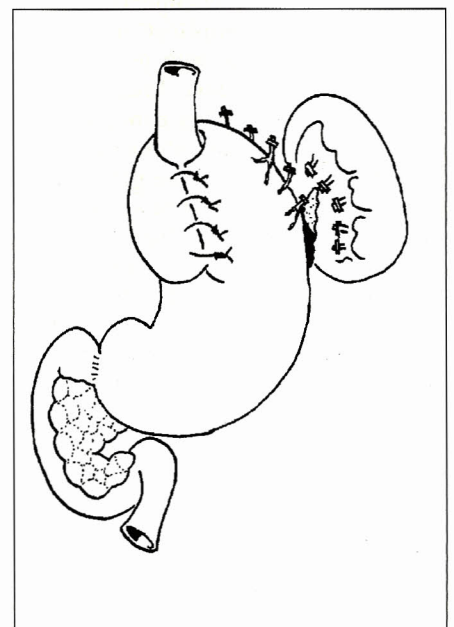


Figure 6. Illustration of completion of the 360° fundoplication.

Results of surgical treatment of GERD

OPEN SURGERY

	Year	N cases	Mortality	Morbidity	Splenectomy
Donahue(5)	1985	77	1.29%	5.19%	3.89%
de Meester(6)	1986	100	1%	13%	1%
Segol(7)	1989	52	0%	7%	1.9%
Siewert (8)	1989	94	0%	6.3%	4.2%
AFC (9)	1989	943	0.9%	18.2%	3.6%

LAPAROSCOPY SURGERY

	Year	N cases	Mortality	Morbidity	Splenectomy	Conversion
Geagea(1)	1991	10	0%	0%	0%	10%
Cuschieri*(10)	1993	116	0%	13%	0%	0.8%
Weerts & al(11)	1994	132	0%	0%	0%	3.3%
Bittner & al(12)	1994	35	0%	25.7%	0%	14.28%
F.D.C.L.	1994	541	0%	4.3%	0%	5.1%

*Multicenter studies. (Fondation pour le Developpement de la Chirurgie Laparoscopique [F.D.C.L.].)

Table 2.

bring the fibroscope closer, to turn it and reposition it, allows visual access to areas that are difficult to reach through laparotomy. Image magnification gives a detailed view of all the anatomical structures of the hiatal area. This is a valuable advantage that helps to prevent damage to the posterior aspect of the esophagus and to the left pleural cul-de-sac. It is advised to try to locate the left crus at its upper end. Image magnification is also helpful to dissect and to sever short vessels during the freeing of the upper part of the great curvature. Finally, the magnification accounts for the absence of splenectomy in the above-mentioned series. Should difficulties arise, the procedure can be continued through laparotomy, without any changes in the patient's position or in the anesthesia. The rate of conversion decreases as the operator's experience increases, as shown in a recent multicenter study. Conversion, however rare, can never be totally ruled out—the only consequence of which is to revert to the operating conditions of open surgery. Patients should, therefore, be informed of this possibility.

Nevertheless, this procedure demands sufficient experience of

laparoscopic surgery. In the hands of an experienced surgeon, it is safe, provided that a number of basic technical rules are observed.

GERD surgery is a typical example of surgery used to remedy functional trouble. It does not include resection or extraction of a big specimen, nor the repair of hollow organs. It only consists in dissection and simple sutures. It is the ideal indication for a minimally invasive approach. Certainly, laparoscopic treatment of GERD will be a "big hit," just like laparoscopic cholecystectomy. **STI**

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