Anti-Reflux Surgery

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Abstract

The surgical management of gastro-oesophageal reflux involves a variety of techniques and is associated with many different approaches depending on the underlying problem. As a result the associated complications which arise require to be managed according to the initial underlying condition. The key areas which will be addressed here relate to the decision for surgery and the type of surgery required; the different underlying problems for which surgery is indicated; and the identification and management of the potential complications.

Keywords

Gastro-oesophageal reflux · Surgery · Post-operative complications

32.1 Introduction

Over the last 20 years, there has been a seismic shift of antireflux surgery from open to laparoscopic, which in turn has made the thoracic approach, at least for primary procedures, almost extinct. Patients can now undergo fundoplication as a day case, or at least within a 23-h stay, without the need for several days in hospital and a painful and often protracted recovery. Not surprisingly this has resulted in more patients being considered for surgery and more being referred from medical gastroenterologists. However the risks remain [1], and one must never forget the

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disastrous consequences of oesophageal or gastric perforation, especially if such injuries go unnoticed at the first operation. Meticulous attention to detail, gentle and careful dissection at all times and careful inspection of the result at the end of the procedure, is essential if the risks are to be kept to a minimum and patients to gain the most benefit from what is still a 'major' procedure.

32.2 Selection for Surgery

32.2.1 Gastro-Oesophageal Reflux Disease (GORD)

Careful assessment includes a good history to make sure the symptoms are actually reflux and not a possible underlying motility disorder or malignant dysphagia. Particular caution should be exercised in patients who might have gastric emptying problems and those with primarily extra-oesophageal symptoms. It is vital to ensure that the priorities and expectations of the patient match those of the surgeon; reflux is a common symptom and if other functional symptoms predominate, these might well be exacerbated by fundoplication.

Examination should assess potential difficulties of surgery (such as scars from previous surgery, obesity, etc.). A high-quality gastroscopy is essential—to exclude Barrett's oesophagus, to assess the size of any underlying hiatus hernia, to observe any oesophagitis/strictures and to make sure there is no other pathology which might take precedence (such malignancy or gastro-duodenal ulceration). If Barrett's is present, multiple biopsies are required to assess for underlying dysplasia, and this must be treated before a decision can be taken to proceed with antireflux surgery [2]. All patients being considered for antireflux surgery should undergo manometry studies to exclude other motility disorders such as achalasia (for which fundoplication is a disaster!). Although not essential in those with erosive oesophagitis, pH and increasingly impedance studies are useful to confirm the underlying diagnosis and severity of the reflux, particularly in patients with atypical symptoms. They are also useful in the postoperative period in patients who develop recurrent symptoms or have a less than an excellent result after surgery. If there is a history of previous peptic ulcer surgery, in particular vagotomy and pyloroplasty, a history of reflux, oesophagitis and elevated acid exposure time may all be due to decreased gastric motility. In these patients gastric emptying studies may be required.

As in all areas of surgery, the best results are achieved by selecting the right patient for the right operation at the right time.

32.2.2 Giant Hiatus Hernia/Intrathoracic Stomach with Gastric Volvulus

A large para-oesophageal hiatus hernia is relatively common, particularly in the elderly, and is increasingly being identified on imaging for other cardiorespiratory problems (Fig. 32.1). Patients with troublesome mechanical symptoms (chest pain, dysphagia and regurgitation) or acute attacks of volvulus should be considered for surgery [3]. Although shortness of breath will often improve following

Fig. 32.1 Routine chest X-ray demonstrating a large retrocardiac air fluid level from an intrathoracic stomach

surgery, care should be taken to exclude other cardiorespiratory diagnoses, particularly in those patients without other symptoms warranting surgery. Iron deficiency anaemia is not uncommon secondary to Cameron's lesions at the hiatus and is another factor that needs to be considered when making a decision for surgery. Despite the small potential risk of life-threatening gastric volvulus with ischaemia, the authors would not recommend routine repair of totally asymptomatic radiological findings in elderly patients, and this would be supported by the literature and long-term observational studies [4]. Our experience is that patients who have required an emergency admission with an obstructed stomach and have settled with nasogastric decompression nearly always represent with identical symptoms if surgery is not undertaken. If this is to be performed during the acute admission, it is advisable to decompress the stomach with a nasogastric tube for a period of 48 h to reduce the resulting gastric oedema and increase the chance of a successful laparoscopic repair.

Assessment in the elective setting includes gastroscopy and either a CT (Fig. 32.2) or contrast swallow (Fig. 32.3) to delineate the anatomy. For patients with associated symptoms of shortness of breath or weight loss, CT is preferred to exclude other significant pathology. Oesophageal manometry or pH studies are not required.

32.3 Primary Laparoscopic Fundoplication

(a) Port placement and position of surgeon
There are basically two positions for a laparoscopic fundoplication: the surgeon on the left with the camera assistant on the right or the surgeon between the legs and the camera person either on the right or left. Port positions vary, but the majority of surgeons prefer the camera port to be on the left of the midline about half way from the costal margin and the umbilicus, depending on whether the patient is large or small. The authors all use different port positions!

Fig. 32.2 CT showing large intrathoracic stomach with volvulus

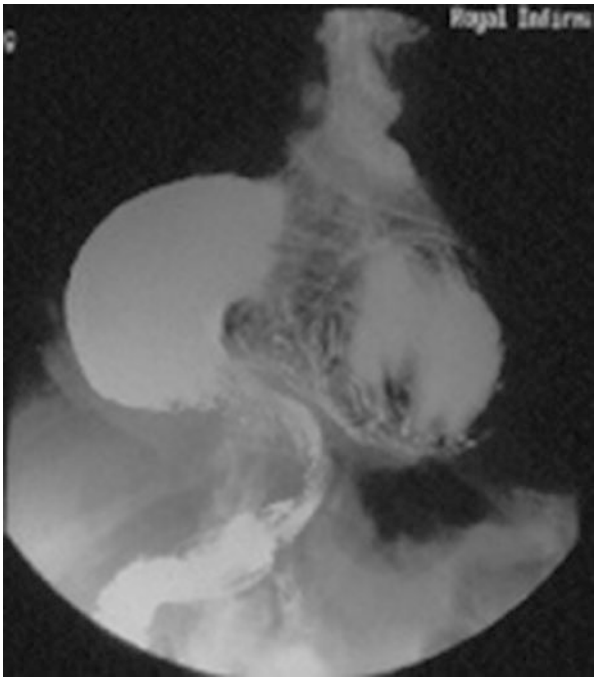

Fig. 32.3 Barium meal demonstrating a gastric volvulus within the hiatus

(b) Liver retraction
It is an essential manoeuvre, and the authors all use the Nathanson retractor which comes in a number of sizes and is anchored to a rigid structure attached to the right side of the operating table (Fig. 32.4).

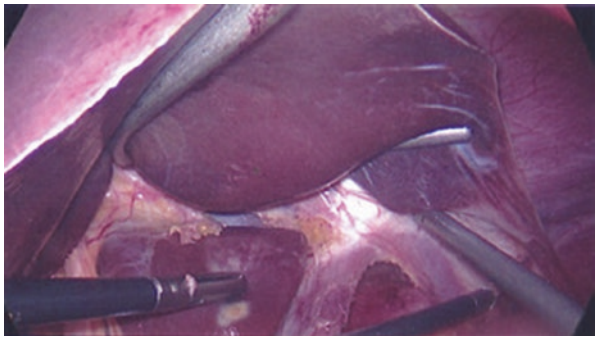

Fig. 32.4 Nathanson liver retractor

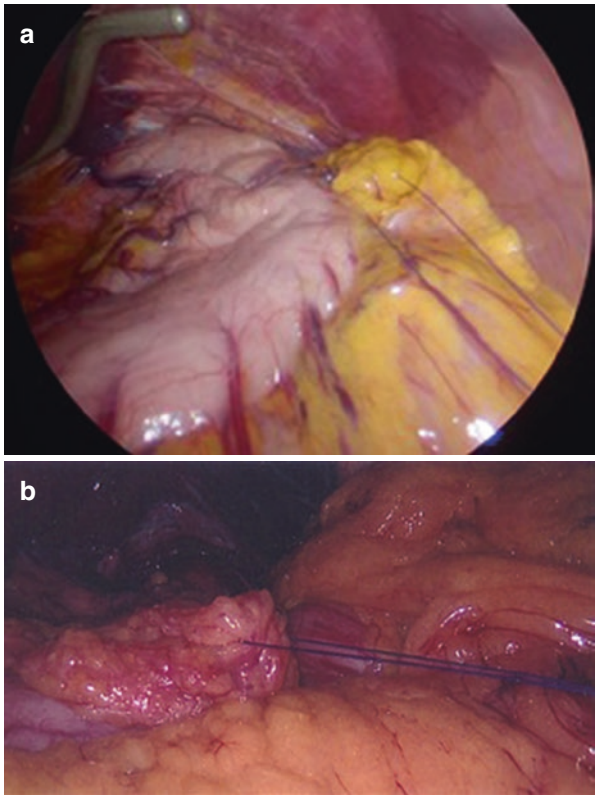

Fig. 32.5 Fat stitch retracting (**a**) the greater omentum and (**b**) the lesser omentum

(c) Fat stitches to greater and lesser omentum
They are very useful, particularly in patients with significant amounts of intra-abdominal fat. In very large patients, as many as three or four may be required (Fig. 32.5). They are generally brought out through the furthest left port and clipped at the skin edge.

(d) Dissection of hiatus
The key to the dissection of the hiatus is identifying either crus and then working round to the other. Identifying the phreno-oesophageal ligaments is a very useful technique to help avoid oesophageal injury and allow entry into the

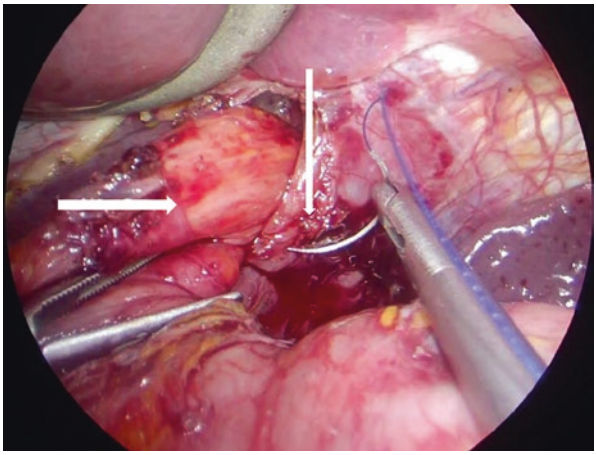

Fig. 32.6 Left phreno-oesophageal ligament (arrowed) being sutured closed before the fundoplication

avascular plane within the hiatus. There appears to be some evidence emerging that closure/repair of the left phreno-oesophageal ligament reduces the chance of revisional surgery. This can be performed with a continuous non-absorbable suture (Fig. 32.6). The authors are cautious with diathermy and preserve both vagi, incorporating the posterior vagus with the oesophagus during the mobilisation. The posterior part of the oesophagus must be dissected under direct vision, following which a retractor or sling can be passed behind to draw the oesophagus forward. This is facilitated by first mobilising the angle of His on the left side. Where possible the hepatic branch of the vagus nerve should also be preserved. If a posterior wrap is going to be used, preserving this structure helps to prevent distal slippage.

(e) Position of wrap: posterior/anterior and partial/full
There are many varieties of fundoplication, and there remains controversy regarding the best type, anterior or posterior, total or partial. Two recent meta-analyses from the same first author reached different conclusions [5, 6], but most of the problem relates to grouping all posterior and all anterior fundoplications together [7]. Overall it seems that long-term acid control is better with a Nissen than an anterior fundoplication but at the expense of more problems with dysphagia and gas bloat. What is perhaps of more importance is the expertise of the surgeon; choose your procedure and then become good at it!

(f) Management of short gastric vessels
A Nissen requires division of the short gastric vessels (SGV). A 360° wrap can be performed without division of the SGV, as in the Nissen-Rossetti procedure, although in such cases, the wrap involves the anterior part of the gastric fundus and not the greater curve, as in a Nissen. A fat stitch retracting the greater omentum greatly facilitates dissection and division of the SGV. A good tip to ensure that there is an adequate wrap with no tension when forming a posterior fundoplication is to make a good posterior window behind the oesophagus (Fig. 32.7) and then make sure that the wrap lies free after bringing it round (Fig. 32.8).

(g) Crural repair
This is most commonly carried out posteriorly, but a few anterior sutures can be useful, particularly in larger defects and where the posterior crura might start to

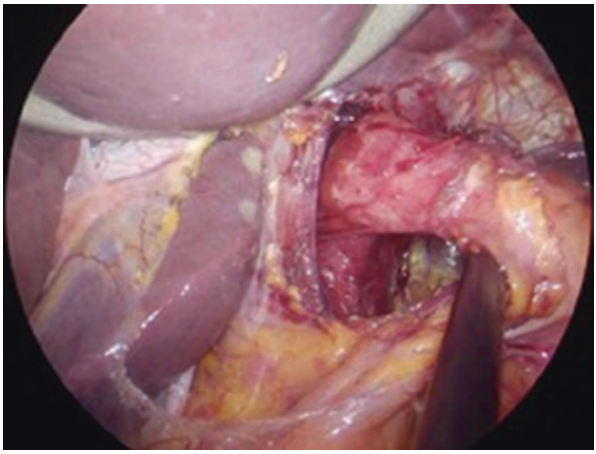

Fig. 32.7 Good posterior window behind the oesophagus

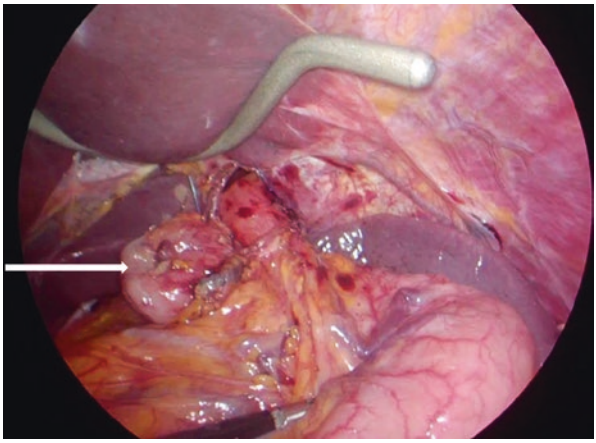

Fig. 32.8 Posterior wrap (arrow) lying with no tension behind oesophagus

'tear'. The authors recommend large bites using zero gauge non-absorbable sutures (either monofilament or braided). The hiatus should be calibrated so there is about 1 cm gap around the oesophagus. This can be measured using an instrument or over a bougie. Although some report that a bougie provides better consistency particularly with a Nissen, this must be balanced against the very small risk of iatrogenic oesophageal injury. The role of meshes (or not) is discussed in the section on giant hiatus hernia repair.

32.4 Revision Fundoplication

32.4.1 Assessment for Revisional Surgery

These patients require careful assessment as the risks of revisional surgery are higher and the results are less certain (around 70% good outcomes compared to 90% for primary fundoplication). It is important to determine whether patient's recurrent

symptoms are related to recurrent reflux and whether there is an anatomical abnormality to correct. Endoscopy should be performed by the operating surgeon and combined with contrast studies, pH and manometry and if indicated gastric emptying studies. Outcome is variable, but good results can be obtained both laparoscopically and after open surgery. Results are better for recurrent reflux than dysphagia [8].

The basic principle is to take down the existing fundoplication, repair any hiatal defect and reconstitute a new wrap, but in certain situations a more tailored approach can be used.

(a) After previous open abdominal fundoplication
Key tips—The left lobe of the liver is often adherent to the stomach or wrap and should be fully mobilised before commencing dissection. Both the right crus and left crus must be identified to delineate anatomy and reduce the risk of oesophageal injury. A soft flexible bougie or endoscope inserted across the OGJ can help identify the oesophagus in difficult cases but must be inserted carefully. Conversion to open surgery is often required.

(b) After previous thoracotomy
Difficulties here are found within the hiatus and the trans-abdominal approach can usually be carried out relatively easily laparoscopically. The decision on what type of wrap will obviously depend on the previous thoracic procedure which will have often been one of the many varieties of 'Belsey' operations.

(c) After previous laparoscopic Nissen (i.e. with Division of SGV) or other types of posterior wrap
The underlying problem here is often either a slipped wrap, which must then be dissected free from its position within the hiatus, or disruption of the wrap, which will require to be taken down, re-formed or converted to some other wraps. Previous division of the SGV can make revisional surgery difficult as the right side of the wrap will usually be densely adherent to the left lobe of the liver and the right crus. In such cases if the anatomy cannot be identified with careful dissection, the surgeon can either convert to open surgery (when dissection is often not much easier) or leave the right side of the wrap in situ, mobilising the left side and refashion it as it lies on the assumption that the OGJ and right crus are likely to be fixed. If the two edges of the wrap are difficult to identify, an endoscopic stapler can be used to divide the wrap anteriorly if a safe window can be created between the oesophagus and wrap.

(d) After previous anterior fundoplication
The defect is often a para-oesophageal hernia on the left side or anteriorly. It is usually reasonably straightforward to take the wrap down, reduce the hernia sac and then repair the defect in the diaphragmatic hiatus. Biological meshes again may have a role here to help improve healing but remain controversial. Again synthetic non-absorbable meshes have no role to play anywhere around the oesophagus.

(e) After failed revisional surgery
In a few patients hiatal breakdown and troublesome reflux will develop despite revisional surgery. These are few and far between, and if further surgery is required, a further attempt can be made at revising the fundoplication and repairing any recurrent hiatus hernia. However this is often extremely difficult and as a

result hazardous. However if symptoms justify a further operation and some form of revision looks to be too difficult or dangerous, a subtotal gastrectomy with Roux-en-Y reconstruction is one solution. In these revisional patients, adhesions around the hiatus have essentially 'fixed' the OGJ within the hiatus and reducing the gastric reservoir and hence the volume of refluxate, by a subtotal gastrectomy Roux-en-Y usually solves the problem. In many of these patients, the SGVs will have previously been divided. It is therefore important not to ligate the left gastric artery in order to ensure adequate blood supply to the stomach remnant; otherwise a near total gastrectomy will be required.

(f) The short oesophagus
The authors believe that with adequate dissection, it is extremely rare to encounter a true 'short oesophagus' and do not believe in the practice of Collis gastroplasty. In the unusual situation where adequate oesophageal length cannot be obtained, such as a patient who has undergone multiple procedures for reflux as a child, then the option lies between creating a wrap that could lie above the diaphragm or performing a more definitive procedure such as a subtotal gastrectomy.

32.5 Giant Hiatus Hernia and Gastric Volvulus

(a) It is important to fully dissect the entire peritoneal sac, ignoring the contents. Multiple fat stitches may be required to help expose the hiatus and contents. Care must be taken where possible to preserve both vagus nerves, although damage to either is not uncommon. The fat pad is a good guide to the gastro-oesophageal junction at the base of the right crus. It is important to fully reduce the posterior sac, which is also present.
(b) Approximation of crura usually requires several sutures both anteriorly and posteriorly. A biological mesh can be used to help support the sutures but should not be used to 'bridge' any defect. Such a policy is doomed to failure. In such occasions when the crura cannot be adequately approximated, some form of fixation of the fundoplication around the hiatus will help prevent recurrence. Buttressing of the sutures with Teflon pledgets can help when the quality of the crus is poor. In difficult cases conversion to open surgery may be required, but access and closure may not be any easier. The main objective in such patients is the reduction of the stomach from the mediastinum and prevention of it returning. Controlling reflux is very much a secondary aim. The authors routinely perform either an anterior or posterior fundoplication, and in these cases the fundus is usually very mobile. In our experience, some patients never regain normal gastric function and retain a degree of gastric stasis. It is unclear whether this results from chronic twisting/stretching of the stomach within the chest or from vagal damage during what is often a very extensive dissection.
(c) Use of biological meshes
There is increasing interest in using biological meshes to help encourage fibrosis formation around the crural repair and reduce recurrent defects. They are

often made of some form of porcine or other such material which provides a matrix where fibrosis can occur and which are 'reabsorbed' over a period of a few months. Recurrence rates are high with or without meshes, but there does appear some evidence to suggest it is lower with biological meshes [9]. What is clear is that synthetic non-absorbable meshes have no role to play anywhere around the oesophagus and should **not** be used to 'bridge' any defects in the hiatus between the crura after attempted closure. The mesh is placed over the approximated crura and sutured into position, using with the same sutures which are used to carry out the fundoplication if an anterior wrap is used (Fig. 32.9).

Note—*Be wary of the oesophagus particularly in elderly females when it can be at risk of tearing when stripping the hernia sac. In these cases it might be that leaving the lower 1–2 cm of sac on the anterior oesophagus is preferable to risking injury.*

32.6 Postoperative Complications

Early

(a) Slipped wrap—rarely if ever after anterior fundoplication but a potentially life-threatening early complication after Nissen fundoplication. It is less likely after a Toupet as this is usually sutured around the hiatus. Acute epigastric/retrosternal pain with dysphagia is the hallmark. Immediate endoscopy, contrast swallow and re-exploration are essential to prevent ischaemic necrosis of the OGJ/wrap. The wrap should be taken down and assessed. If viable, a careful decision then needs to be made as to what to do: nothing, a fixation of the posterior wrap below the hiatus or formation of an anterior wrap. Obviously if frankly ischaemic and non-viable, resection and reconstruction will be required, perhaps in two stages depending on the viability of the underlying tissue (returning after 24 h makes assessment of the underlying tissue much clearer).

(b) Oesophageal injury—this rare but life-threatening complication can occur either early due to a 'missed' intraoperative injury or, later, due to ischaemia or a suture pulling through after retching or vomiting. In the first 48 h, it is sometimes possible to repair this laparoscopically and reconstitute the wrap. For later presentations, open surgery is often required, and if there is ischaemia, a local Thal patch of fundus can be used with drainage. Recovery in such cases is often prolonged, and therefore consideration should be given at the time of repair for the insertion of a feeding jejunostomy tube.

Late

(a) Recurrent reflux—due to disruption/loosening of the wrap.
Overall recurrence of symptoms is not uncommon in the long term, and somewhere between 30 and 50% of patients are on some form of anti-acid therapy 5–10 years after surgery. Further investigations in the form of gastroscopy and pH studies and manometry along with a barium swallow confirm the diagnosis.

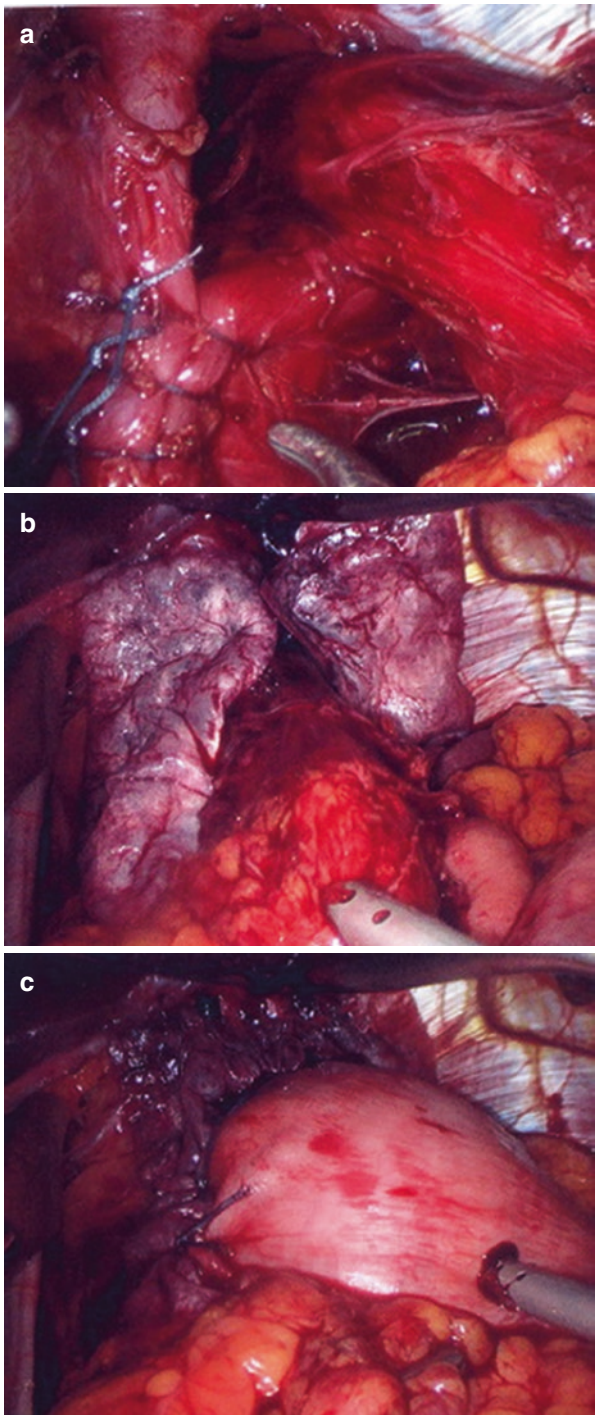

Fig. 32.9 Use of a biological mesh. (**a**) Closure of crura. (**b**) Placement of U-shaped mesh over crural repair around oesophagus. (**c**) Mesh sutured in place using the sutures for the anterior wrap. The mesh can be used either as a U or C shape depending on local anatomy and surgeon preference

In many patients these investigations do not confirm recurrent reflux, and the 'recurrent' symptoms are related to some form of motility problem. In most patients symptoms can be relatively well controlled with medical therapy, and only a few (around 5% in most studies [5]) will require revisional surgery. As mentioned earlier, recurrence does seem to be higher in those patients undergoing an anterior fundoplication, but their longer-term complications are perhaps slightly lower than for those with a posterior wrap.

(b) Dysphagia—migration of the wrap up into the hiatus or herniation of the proximal stomach 'through' the wrap. Diagnosis here requires both endoscopy and barium swallow and will almost certainly require revisional surgery.

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