

Laparoscopic Paraesophageal Hernia Repair. How I do it

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Abstract

Introduction The approach to paraesophageal hernias has changed radically over the last 15 years, both in terms of indications for the repair and of surgical technique.

Discussion Today we operate mostly on patients who are symptomatic and the laparoscopic repair has replaced in most cases the open approach through either a laparotomy or a thoracotomy. The following describes a step by step approach to the laparoscopic repair of paraesophageal hernia.

Keywords Paraesophageal hernia · Hiatal hernia · Gastroesophageal reflux disease · Mesh repair · Laparoscopic fundoplication

The approach to paraesophageal hernias has changed radically over the last 15 years, both in terms of indications for the repair and of surgical technique.

During the 1970s surgeons advocated the elective repair of any paraesophageal hernia regardless of the presence of symptoms. The rationale for this approach was to avoid life-threatening complications such as obstruction and strangulation, and the risk of emergent surgery.^{1,2} Today a more conservative approach has been taken by most surgeons, as

they are reluctant to operate in the absence of symptoms.^{3–5} Recently, in an elegant study using a Markov Monte Carlo decision analytic model, Stylopoulos and colleagues from the Massachusetts General Hospital showed that currently available data do not support any longer the routine elective repair of paraesophageal hernias.⁶ They confirmed the recent belief that in patients who are asymptomatic and in whom the hernia has been an incidental finding, a “watchful waiting” approach is a reasonable alternative to the routine elective repair for the majority of patients. Therefore, today we operate only on symptomatic patients who experience symptoms due to gastroesophageal reflux disease (GERD; heartburn, regurgitation, cough), incarceration (pain, perforation), or obstruction (dysphagia, bleeding from venous stasis, dyspnea).

The advent of minimally invasive surgery has also brought a shift in the operative management of patients with a paraesophageal hernia, as the open approach through either a laparotomy or a thoracotomy has been almost universally replaced by a laparoscopic repair.^{7–9} While the operation is more complex and has a longer learning curve than a fundoplication performed for GERD, it is still associated with a simpler and shorter postoperative course, a shorter recovery time, and a faster return to regular activity, even in elderly and high risk patients.⁸

The following describes a step by step approach to the laparoscopic repair of a paraesophageal hernia.

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Positioning and Trocar Placement

The patient is placed in a steep reverse Trendelenburg position with the legs extended on stirrups. The surgeon stands between the patient's legs. Five trocars are used for the operation, as for a regular fundoplication done for GERD (Fig. 1).¹⁰

The first port is placed in the midline, 14 cm distal to the xiphoid process. It is used for the camera (30° scope). The second port is placed in the left mid-clavicular line at the same level of port 1. It is used for inserting a Babcock clamp for traction on the gastroesophageal junction, and for inserting an instrument to take down the short gastric vessels. The third port is placed in the right mid-clavicular line at the same level of port 1 and 2. A fan retractor is used through this port to lift the left lateral segment of the liver to expose the gastroesophageal junction. This retractor is held in place by a self-retaining system fixed to the operating table. The last two ports are placed under the right and left costal margin, about 6 cm from the midline so that their axes form an angle of about 120°. This angle between the two ports located under the costal margins, allows easy dissecting and suturing. These ports are used for the insertion of graspers, electrocautery, and suturing instruments.

A common mistake is to place the trocars too low. If this happens, both the dissection and the suturing become very difficult, as the instruments might not reach. If the angle between ports 4 and 5 is $<60^\circ$, suturing becomes almost impossible.

Dissection of the Hernia Sac and Mobilization of the Esophagus

We start by gently pulling the herniated stomach out of the posterior mediastinum down into the abdomen using a

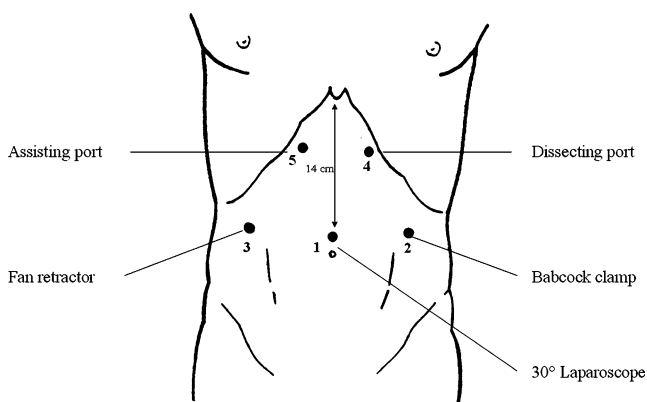


Figure 1 Position of trocars for laparoscopic paraesophageal hernia repair.

Babcock clamp. Rather than starting the dissection by opening the gastro-hepatic ligament, we prefer to divide initially the short gastric vessels and reach the left pillar of the crus as suggested by Horgan and colleagues.⁴ Subsequently we open the hernia sac at the junction with the left crus and start the mobilization of the esophagus. This “left crus” approach reduces the risk of injuring a replaced or accessory left hepatic artery, with resultant bleeding which may be difficult to control if the proximal stump of the artery retract above the diaphragm. We position a Penrose drain early around the esophagus as it facilitates subsequent exposure and dissection. We try to resect the entire sac but when it extends high in the mediastinum we prefer to transect it at the level of the esophageal hiatus. In our experience, we have never encountered a postoperative mediastinal fluid collection. For this reason, we do not feel that a mediastinal drain is necessary. Over time we have learned to extend the dissection more proximally in order to have 3 to 4 cm of esophagus below the diaphragm. With this more extensive dissection in the posterior mediastinum, it is quite rare to see a “short esophagus”. However, if the gastroesophageal junction goes back above the diaphragm as soon as traction is removed, a lengthening procedure (Collis gastroplasty) will be necessary. Even though we have not used this technique in our own experience, we recognized that some of the recurrences we had might have been due to a shortened esophagus.¹¹ Of the different techniques available, we feel that a wedge gastroplasty with a linear stapler is probably the easiest to perform.^{12–14} A bougie must be placed inside the esophagus to avoid narrowing of the lumen. Even though a small gastric pouch is left above the wrap with some acid-producing parietal cells, this can be easily controlled by proton pump inhibitors.

Closure of the Esophageal Hiatus

This is one of the critical steps of the operation. As many patients are elderly and the hiatus is quite enlarged, the pillars of the crus can be quite thin or the closure behind the esophagus can be under tension. Rather than starting at the bottom of the hiatus and moving upward, we prefer to place the first stitch just 1 cm posterior to the esophagus, securing it with an extracorporeal jamming knot (a capstan knot in nautical terminology, Fig. 2) to overcome the tension (Fig. 3).¹¹ This step makes the closure simpler. It is usually done under tension if it is started at the bottom of the left and right pillar of the crus. Subsequent intra-corporeal stitches are placed below the first one. Sometimes 1 or 2 additional stitches are placed anterior to the esophagus to further narrow the hiatus. We do not use pledgets or mesh.

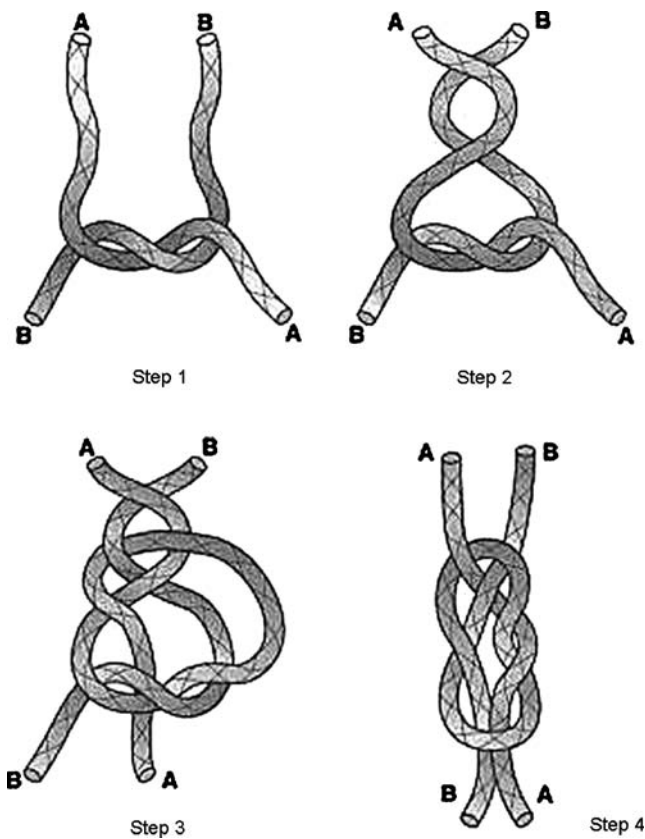


Figure 2 Capstan knot.

Fundoplication

This is the last step of the operation. The rationale for a fundoplication is the following: (1) it corrects reflux in most patients, if it was present preoperatively; (2) it prevents the development of reflux due to the extensive dissection; and (3) it is a very good form of gastropexy, which helps keeping the stomach below the diaphragm.¹⁵ We do prefer a total fundoplication, adding extra stitches to secure the wrap to the pillars and to the crus (Fig. 4).¹⁶

Figure 3 Technique for closure of the esophageal hiatus. The first stitch is placed just posterior to the esophagus.

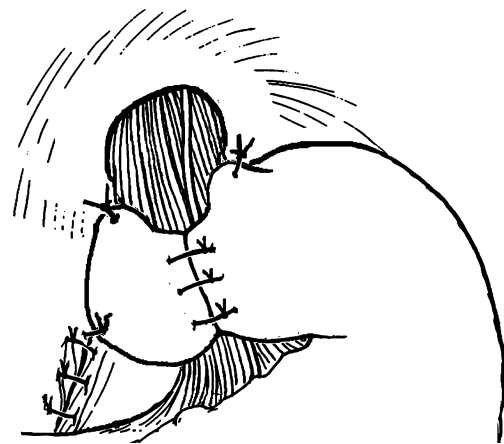
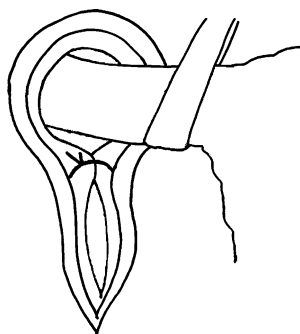


Figure 4 Total fundoplication.

Postoperative Course

Patients are fed the morning of the first postoperative day. They are instructed to avoid meat or bread for about 3 weeks. About 80% of patients are discharged within 48 h. The hospital stay of the remaining 20% is usually prolonged 1 or 2 days because of comorbid conditions often present in this patients. Most patients are able to resume their regular activity within 2 to 3 weeks.

Comments

After the initial enthusiasm with the laparoscopic repair, it became clear that this approach was associated with a higher than expected incidence of hiatal hernia recurrence.^{17,18} For instance, Hashemi and colleagues compared the outcomes of laparoscopic and open repair of large type III hiatal hernia, using both symptomatic assessment and a barium study.¹⁷ They found that re-herniation was present in 42% of the patients in the laparoscopic group but in 15% only in the open group. This problem was mostly blamed on the failure of the diaphragmatic closure, and even though some of these recurrent hernias were small and asymptomatic, it raised the question of reinforcing the hiatal closure by using mesh. The basic idea was to accomplish a tension-free repair, trying to reproduce the experience of mesh repair of inguinal and ventral hernias. In a prospective randomized trial comparing simple cruroplasty versus polytetrafluoroethylene patch (PTFE) repair, Frantzides et al. showed a recurrence rate of 22% in the former and 0% in the latter group.¹⁹ These results were confirmed by others.^{18,20} However, while it has become widely accepted that the use of mesh decreases recurrences, some concern has arisen about placing non-absorbable

material next to the esophagus, recreating the problems due to the use of the Angelchik prosthesis for treatment of GERD.²¹ For instance, in a recent report, Tatum et al. reported two cases in which PTFE mesh had either eroded into the gastroesophageal junction requiring a total gastrectomy, or had caused an esophageal stricture requiring reoperation for removal of the mesh.²² For this reasons, the use of a biological prosthesis has gained momentum, with the goal of reinforcing the hiatal closure by creating a scaffold containing extracellular collagen which serves as a temporary matrix, while avoiding the complications mentioned above. In a prospective, multicenter and randomized trial, Oelschlager et al. analyzed the outcome in 108 patients with paraesophageal hernia who were divided into two groups based on the type of hiatal closure: 57 patients underwent primary crural repair and 51 patients has the crural repair reinforced by the placement of a U-shaped mesh derived from porcine small intestinal sub-mucosa.²³ At 6-month follow-up, a barium swallow showed a recurrent hernia (>2 cm) in 24% of patients in the primary closure group but in 9% only when mesh was used. There were no cases of narrowing of the esophagus or erosion into the lumen. Very good results have also been obtained with onlay reinforcement of the crural closure by human acellular dermal matrix.²⁴ However, longer follow-up is needed to determine the efficacy and the safety of these synthetic prostheses.

Conclusions

Laparoscopic repair of paraesophageal hernia is a challenging operation with a long learning curve. Refinements in the technique have determined a better outcome, suggesting that the laparoscopic repair should be considered today the primary form of treatment of patients with symptomatic paraesophageal hernia.

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