

How to avoid esophageal perforation while performing laparoscopic dissection of the hiatus

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Abstract. An increasing number of surgeons attempt advanced laparoscopic procedures, involving the distal esophagus such as Nissen fundoplication, truncal vagotomy, and Heller's myotomy. At this time, there are probably as many techniques as there are surgeons. The authors have tried to provide a "ready to use" universal strategy that details how to approach the distal esophagus while avoiding the dangerous pitfalls of surgery in that area.

Key words: Laparoscopic Nissen fundoplication — Oesophageal perforation

Improved postoperative comfort, decreased parietal morbidity, and a shorter hospital stay are obvious advantages after laparoscopic procedures involving access to the esophageal hiatus [1, 3]. These improvements are thanks to the avoidance of a large laparotomy incision and of a sustained retraction of the costal arch. However there have been reports of dramatic complications [2] due to esophageal perforations, most likely caused by the use of very rigid and sharp instruments instead of the delicate fingers of a surgeon. A technique is proposed to avoid these perforations.

Patients

Between May 1991 and December 1993, 161 consecutive patients with gastroesophageal reflux disease (GERD) (101 males and 60 females) with ages ranging from 17 to 77 years (median 46) were treated by the first author by means of Nissen fundoplication via a laparoscopic approach

One hundred forty-one patients had an American

Society of Anesthesiology scale I (ASA I) status, 18 patients an ASA II, and 2 patients an ASA III status. Sixty-nine patients had a history of previous abdominal surgery. One hundred twenty-four patients had a hiatal hernia as diagnosed by endoscopy and radiologically.

Technique

The patient is put under general anesthesia with endotracheal intubation. A nasogastric sump tube (Salem No. 18) is inserted. The patient lies supine, thighs fully abducted and slightly bent. The operation table has a 20° reversed Trendelenburg tilt. The surgeon stands between the patient's legs. The first assistant is standing on the patient's left side, the second assistant on his right side. Five trocars (Ethicon, Inc., Somerville, MA) are needed for the operation (Fig. 1): a 10-mm trocar well above the umbilicus, a 5-mm trocar in the right subcostal area, a 5-mm trocar in the left subcostal area, a 10-mm trocar between the first and the third one, and a 10-mm trocar under the xiphoid appendix. They allow the introduction of a 30° laparoscope (Olympus optical, Tokyo, Japan), a liver retractor, a coagulation hook, and a second grasping forceps. The second assistant retracts the left hepatic lobe and thus exposes the esophageal hiatus. From here on, our strategy is (Fig. 2):

1. The lesser omentum is widely opened at the cost of extragastric vagal branches if necessary for exposure. The right pillar of the hiatus can now be seen.
2. The peritoneal sheet covering the phreno-esophageal ligament is incised. This ligament is not entirely transected, so as to escape the risks of damaging the anterior wall of the esophagus. Indeed, the correct plane of division ligament and esophagus is not yet visible at this stage.
3. The incision is taken to the left where the phrenogastric ligament is reached and severed. This latter dissection is facilitated by the 30° angled laparoscope. Once this peritoneal layer has been incised, mobilization of the esophagus can be performed without further dissection of the immediate perioesophageal surroundings.
4. The right pillar of the crus is dissected from top to bottom, until the lowermost part of the left pillar is reached. This, again, can only be done if the previously performed incision of the lesser omentum is wide enough. A forceps coming from the top trocar is now inserted in the angle between the right crus and the esophagus. The stomach is pulled caudally and laterally. By way of this maneuver, the left pillar is now dissectable. Localizing the left pillar is essential before any further dissection of the retro-

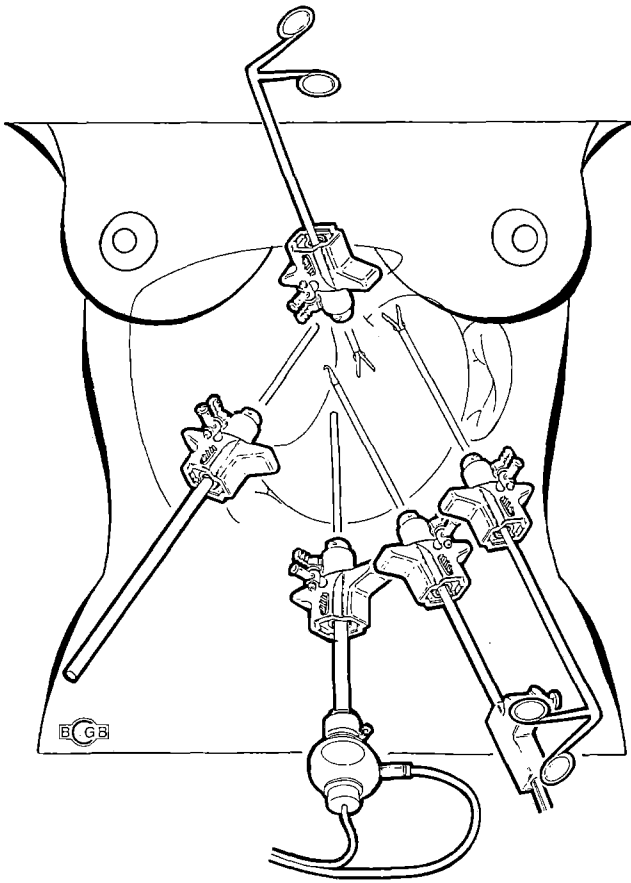


Fig. 1. Display of trocars and instruments for performing dissection of the esophageal hiatus.

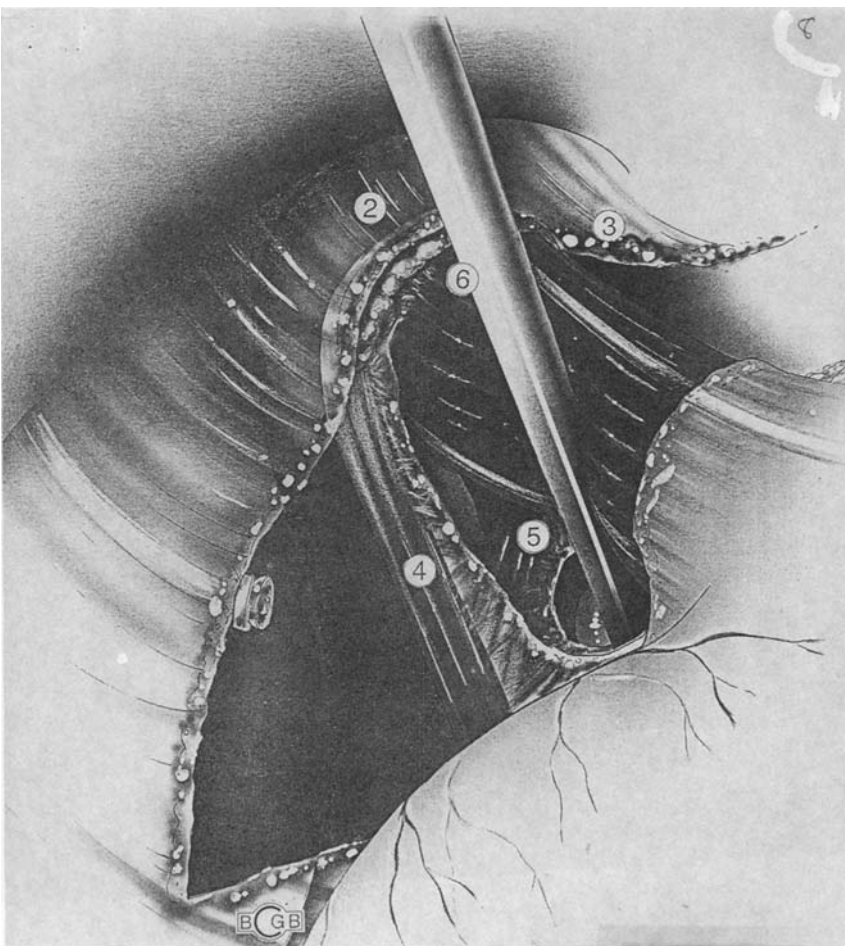


Fig. 2. Suggested sequence of steps for optimal dissection of the esophageal hiatus.

esophagus is undertaken, since it marks the limit between mediastinal and abdominal esophagus. Intramediastinal dissection has to be forcefully resisted at this stage if one does not want to injure either the posterior wall of the mediastinal esophagus or the left pleura. The posterior vagus nerve is identified at this time. The retro-esophageal area is dissected well inside the abdomen, and, by doing this, the lowermost portion of the phrenogastric ligament is severed.

5. The left pillar is dissected going upward, care being taken not to injure the vagus nerve. While the esophagus is retracted away from the left pillar, dissection is carried out under direct vision.
6. As soon as the esophagus has been well isolated, the phreno-esophageal ligament is now entirely transected, without endangering the integrity of the esophageal wall.

Results

There have been no deaths. No cases of esophageal perforation occurred. Three conversions to laparotomy were necessary, two of which were due to poor exposure of the hiatus because of a hypertrophic left liver lobe. In one case of a very voluminous hiatal hernia, the left pleura as well as the fundus of the stomach were lacerated and had to be treated by intracorporeal suturing technique. In two other patients, a pneumothorax appeared on the left side, despite cautious dissection. Chest tube drainage treated all three pneumothoraces.

Conclusion

We believe that our technique of dissection helps avoid the classical hazards involved in laparoscopic dissection of the esophagus.

Three principles have to be respected:

1. Do not start dissecting the esophagus itself, but rather dissect the hiatus at a distance from the esophagus, the reason being that a poorly visualized esophagus is at too great a risk for instrumental injury.
2. Always get good exposure before any dissection is performed.
3. Only start dissecting close to the esophagus once it has been fully liberated from all attachments.

References

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