

# Laparoscopic heller's cardiomyotomy in achalasia, is intraoperative endoscopy useful, and why?

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## **Abstract**

**Aim :** The aim of this study was to investigate whether intraoperative endoscopy (IOE) helps to identify the gastroesophageal junction, thereby reducing the frequency of suboptimal distal myotomy extent during laparoscopic Heller's cardiomyotomy. To this end, laparoscopic and endoscopic criteria for localization of the cardia were compared. Then surgical outcomes in two consecutive groups of patients treated without and with IOE were assessed. Inappropriate length of the myotomy incision along the stomach, the most common technical fault during Heller's cardiomyotomy, is related to the difficulty of identifying the gastro-esophageal junction, in particular during laparoscopic surgery. The goal of this study was to evaluate the contribution of endoscopy to gastro-esophageal junction identification during laparoscopic Heller's cardiomyotomy.

**Methods:** From the literature a group of patients with intraoperative endoscopy with laparoscopic Heller's cardiomyotomy, surgical and endoscopic criteria for gastro-esophageal junction identification have been assessed. Then postoperative results of this group were compared with those of another group of patients previously operated on without intraoperative endoscopy.

**Results:** Endoscopic and laparoscopic criteria for gastroesophageal junction identification were discordant in the patients. The cardia was in all these cases at a more distal site with endoscopic criteria. Complications ascribable to suboptimal technique were more frequent in the group without intraoperative endoscopy than in the other group.

**Conclusions:** Endoscopy during laparoscopic Heller's cardiomyotomy is of great assistance in identifying the cardia, and thereby could improve surgical outcomes.

Most failures and postoperative complications seen with Heller's procedure are due to technical faults, of which the most common is inappropriate length of the gastric end of the myotomy due to the difficulty of identifying the gastroesophageal junction. A short myotomy is associated with an increased risk of persistent or recurrent dysphagia, and a long myotomy with an increased risk of gastroesophageal reflux.

## ***Surgical technique***

The patient was supine, with the arms by the sides. The surgeon stood between the patient's legs. A nasogastric suction tube was inserted in all patients. Pneumoperitoneum was established slowly via the umbilical route using a Veress needle until a pressure of 12 mmHg was obtained. A 10-mm cannula for the wide-angle 0° viewing telescope was introduced at the junction of the upper third and lower two thirds of the xypho-umbilical line. Four 5-mm cannula were placed under endoscopic control. The left lobe of the liver was elevated by a self-retaining retractor. Only the anterior half of the circumference of the hiatus was approached. The pre-esophageal peritoneum was opened, and the two edges of the esophagus were dissected from the crura of the diaphragm. The anterior surface of the esophagus was dissected as high as possible in the posterior mediastinum. The anterior vagal trunk was located and separated from the esophageal muscular layer. The gastro-esophageal junction was further mobilized by severing the cardiac blood vessels previously cauterized using bipolar electrocautery. The myotomy was begun using scissors at the abdominal esophagus, and was extended upward for about 8 cm, passing under the anterior vagal trunk. The efficacy of the myotomy was assessed based on bulging of the esophageal mucosa along 40% of the esophageal circumference. For the group 1 patients without IOE, the gastric end of the myotomy was carried for about 10–15 mm distal to the cardia, which was identified based on the following laparoscopic criteria: cardiac blood vessels, change in muscle fiber direction and thickness, and adherence of the mucosa to the muscular layer. In the patients of group 2, the endoscopic and laparoscopic criteria for cardia identification were compared. Endoscopic criteria were changes in the appearance and color of the mucosal folds. When a discrepancy was noted, the endoscopic criteria were used. The endoscopically determined site of the cardia was identified by transillumination, and the myotomy was not extended more than 15 mm below the cardia. All patients had an antireflux procedure which was routinely a Dor anterior fundoplication except in the 3 patients (group 1, 1, and group 2, 2) with hiatal hernias, who had a Toupet partial posterior fundoplication after full dissection of the esophagus. An early postoperative esophagogram was not done routinely. After removal of the nasogastric tube on day 1, the patients were given oral liquids followed by a soft diet. Foods with a potential for injuring the esophagus were prohibited for 21 days. All patients were reevaluated at our clinic, and those with the longest follow-ups were contacted by telephone. Investigations were performed as indicated by the patients' symptoms. Outcomes were compared in group 1 and group 2.

## **Discussion**

The development of endoscopic surgery has allowed converting the classic open Heller's myotomy to a closed procedure for the treatment of primary achalasia. A study compared the open and closed methods, using a retrospective design and found that postoperative pain, ileus duration, and time spent on sick leave were significantly reduced in the laparoscopic group. After 6 months, results on the dysphagia were identical in the two groups. Rates of occurrence of mucosal perforation range across studies of laparoscopic myotomy from 5.8% to 24%. This complication is less common in patients treated via a laparotomy, with a rate of only 1.1% in a series of cases. In some studies, the higher rate of mucosal perforation in patients treated laparoscopically may be ascribable to the use of IOE with insertion of a balloon that was inflated and deflated several times to check that there were no residual muscle fibers at the myotomy site. From the literature study IOE was not associated with an increased risk of mucosal perforation, suggesting that it is intraoperative balloon dilatation that is potentially hazardous, rather than the IOE. As in other published series, the cases of mucosal perforation recorded to be operated on laparoscopically. Starting the myotomy with scissors proximal to the gastro-esophageal junction and using a bipolar electrocautery for the myotomy edges decreases the risk of mucosal injury. Mucosal perforations can be closed laparoscopically. Gastro-esophageal reflux is the most common delayed complication of cardiomyotomy via laparotomy, with a rate of occurrence of

about 8%. Risk factors for gastroesophageal reflux may include absence of an anti-reflux procedure and a myotomy incision that extends too far down on the gastric body. It has been suggested that when the thoracic route is used the myotomy should not be carried for more than 1 cm on the stomach. Nevertheless, after open myotomy via the abdominal route, esophageal pH abnormalities have been demonstrated even in asymptomatic patients, suggesting that an antireflux procedure should be done routinely. Partial anterior fundoplication leaving intact the structures that anchor the cardia posteriorly, is effective and adequate. The other complication of Heller's myotomy is persistent or recurrent dysphagia due to a myotomy incision that is too small, usually in length rather than in depth. Extension of the myotomy onto the stomach is a crucial part of the technique. Although stage IV esophageal dilatation is also associated with poorer outcomes, incomplete myotomy, in particular at the distal end of the incision, is the reason for 50% of repeat surgical procedures. An esophageal manometry study done before the reoperation can demonstrate the persistence of circular muscle fibers at the cardia. It can be difficult to identify the gastroesophageal junction precisely, especially with closed surgery, during which the surgeon is deprived of tactile sensations. Thoracoscopic myotomy seems to raise similar problems. The change in direction of muscle fibers from circular at the esophagus to oblique at the stomach is the most reliable criterion for locating the cardia, although it may lead to a myotomy incision that extends too far downward. Changing direction of the muscular fibers could better be visualized following esophagoscopy transillumination and mild pneumatic distension of the cardia, but there was a high risk of perforation by attempts to stop bleeding. Endoscopically, the gastro-esophageal junction is seen as a change in mucosal fold direction and color. This criterion, is especially reliable in the absence of a hiatal hernia, IOE has been performed in other studies of closed myotomy for achalasia, all of which used thoracoscopy, with the goal of checking mucosal integrity and the absence of residual circular muscle fibers at the level of the myotomy.

We believe that the main contribution of IOE is accurate identification of the gastro-esophageal junction, which ensures that the length of the myotomy on the gastric body is optimal.

“In conclusion, the study data provide further evidence that Heller's myotomy followed by an anti-reflux procedure can be successfully performed using laparoscopy. IOE, which requires the presence in the operating room of a senior endoscopist, assists in the diagnosis of mucosal injury, and, more important, in identification of the gastro-esophageal junction, without increasing operative time or the risk of mucosal perforation. Accurate identification of the gastroesophageal junction avoids the most common technical faults, namely, a myotomy incision that is too short at its gastric end to provide adequate relief or, on the contrary, that is carried too far down on the stomach, increasing the risk of gastro-esophageal reflux, a difficult-to-treat complication. Our series suggests that intraoperative endoscopy should be recommended as part of every laparoscopic or thoracoscopic cardiomyotomy procedure.

**Conclusions:** Endoscopy during laparoscopic Heller's cardiomyotomy is of great assistance in identifying the cardia, and thereby could improve surgical outcomes. Most failures and postoperative complications seen with Heller's procedure are due to technical faults, of which the most common is inappropriate length of the gastric end of the myotomy due to the difficulty of identifying the gastroesophageal junction. A short myotomy is associated with an increased risk of persistent or recurrent dysphagia, and a long myotomy with an increased risk of gastroesophageal reflux.

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