Laparoscopic Transhiatal Esophagectomy for Barrett's Esophagus with High Grade Dysplasia

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ABSTRACT

Background: A number of case reports have described the application of minimally invasive surgical techniques to accomplish esophagectomy. However, most reports have employed thoracoscopic or laparoscopic techniques to perform esophagectomy in addition to an "access" incision which often approaches a standard laparotomy or thoracotomy.

Case Report: This report describes a total laparoscopic transhiatal esophagectomy in a 55 year old female with Barrett's esophagus and high grade dysplasia.

Conclusions: The patient had an uneventful recovery and was discharged home on the fourth day after a total laparoscopic esophagectomy. This report demonstrates the technical feasibility of this complex procedure by a minimally invasive approach.

Key Words: Esophagectomy, Minimally invasive surgery, Laparoscopic surgery.

INTRODUCTION

Conventional esophagectomy can be performed from a variety of surgical approaches including laparotomy, thoracotomy, or combined thoraco-abdominal approach. These conventional operations are associated with significant morbidity, prolonged hospital stay and mortality.[1] Recently, a number of centers have reported on laparoscopic or thoracoscopic assisted esophagectomy.[2-6] Most of these operations have included a standard laparotomy with thoracoscopic esophageal mobilization or laparoscopic gastric mobilization and periesophageal dissection with a mini-laparotomy. We report our technical approach to a totally laparoscopic transhiatal esophagectomy in a patient with Barrett's esophagus and high-grade dysplasia.

CASE REPORT

A 55 year old white female with known Barrett's esophagitis was found to have high-grade dysplasia on routine endoscopic surveillance. Endoscopic ultrasound, computed tomography of the chest and abdomen showed no evidence of invasive cancer, and she was scheduled for esophagectomy. The patient was placed in the supine position with the neck turned to the right. Five ports were placed on the anterior abdominal wall **(Figure 1)**. These included two 10 mm ports, placed to the right and left of the midline between the umbilicus and the xiphoid for the camera and working port. Three 5 mm ports were placed, one on the left costal margin, one on the right costal margin and one near the inferior aspect of the right costal margin for placement of the self-retaining liver retractor. The left lobe of the liver was retracted upward to expose the esophageal hiatus using the Mediflex self-retaining retractor system. The gastrohepatic ligament was divided, thus exposing the right crus of the diaphragm. The esophagus was mobilized circumferentially at the level of the hiatus. The periesophageal dissection continued into the mediastinum by retracting downward on the stomach and dividing the aortoesophageal branches. Working circumferentially this dissection was carried cephalad on the esophagus up to the level of the left main stem bronchus. Next, the short gastric vessels were divided using the Harmonic scalpel (Ethicon, Cincinnati, Ohio). The dissection continued on the greater curvature of the stomach preserving the right gastroepiploic arcade. The stomach was retracted superiorly and the left gastric vessels were isolated and divided using an endo-

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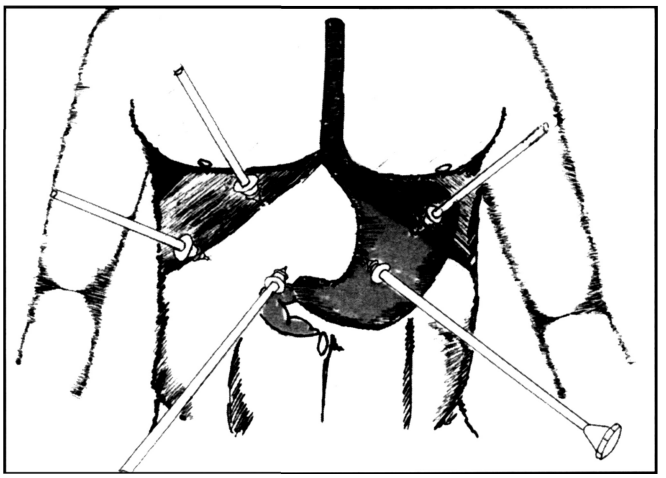

Figure 1. Abdominal trocar position for total laparoscopic esophagectomy.

scopic stapler (Endo-GIA, USSC) with a vascular load. Pyloromyotomy was performed using the endoscopic scissors (Endoshear, USSC) and electrocautery. Gastroduodenoscopy with insufflation showing a bulging mucosa confirmed the completion of the myotomy and demonstrated no evidence of leak. The esophagus with a cuff of normal gastric cardia was divided from the remaining stomach using the 4.5 mm stapler (Autosuture Endo-GIA, U.S. Surgical Corporation). The distal esophagus was attached to the gastric fundus using a 2-0 Endostitch (Autosuture, U.S. Surgical Corporation). A 4 cm horizontal neck incision was placed one fingerbreadth above the suprasternal notch and extended towards the left sternocleidomastoid muscle. The mediastinoscope was inserted through this neck incision along the periesophageal plane to facilitate circumferential dissection of the upper esophagus until the dissection plane achieved during laparoscopic mobilization was encountered. Once the entire esophagus was mobilized, it was removed through the neck incision pulling the attached gastric fundus transhiatally. An esophagogastric anastomosis was performed using a 25 mm end-to-end stapler (Autosuture EEA stapler, U.S. Surgical Corporation) placed through a small gastrotomy. The nasogastric tube was directed through the anastomosis and placed down into the distal stomach. The remaining gastrotomy site was closed with a stapler (TA-30, U.S. Surgical Corporation). A laparoscopic feeding jejunostomy tube was performed by attaching a loop of proximal jejunum to the anterior abdominal wall. A seldinger technique was used to place the feeding tube into the efferent limb. Catheter position in the jejunum was confirmed using intraoperative fluoroscopy.

The final pathology showed Barrett's esophagus with glandular dysplasia. There was no evidence of invasive carcinoma in the specimen. Periesophageal and perigastric lymph nodes were all negative for carcinoma. There were no operative complications with 150 ml blood loss. The operative time was 438 minutes. The intensive care stay was 1 day. The nasogastric tube was kept in place until a barium swallow was done on postoperative day 3 which showed no leaks. The patient was discharged home on the fourth postoperative day on a soft diet. Jejunal feeds were not necessary, and the jejunostomy tube was removed at 3 weeks postoperatively. She is doing well clinically at one year follow-up.

DISCUSSION

As technology and expertise improve, more advanced minimally invasive surgical procedures are being successfully performed. Established procedures include laparoscopic Nissen fundoplication, video-assisted thoracoscopic (VATS) lobectomy, laparoscopic esophageal myotomy and many others. The application of minimally invasive surgical techniques to resect esophageal carcinoma has been recently investigated.

There are multiple series in the literature reporting the use of laparoscopy or video-assisted thoracoscopy to complete esophagectomy.[2-7] Jagot et al. report nine patients that underwent laparoscopic mobilization of the stomach for esophageal replacement (6 patients with abdominal laparoscopic approach combined with right thoracotomy and 3 with transhiatal laparoscopic esophagectomy). All three patients with transhiatal approach required a right upper quadrant mini-laparotomy for resection of the lesser curvature and pyloroplasty.[2] Many other studies have demonstrated the feasibility of thoracoscopic esophageal mobilization: Dexter et al. reported 24 patients, Law et al. reported 22 patients and McAnena et al. reported 9 patients that underwent thoracoscopic dissection of the esophagus in conjunction with a laparotomy and cervical anastomosis.[3-5] Robertson et al. reported 17 patients who underwent thoracoscopic assisted Ivor-Lewis esophagectomy, with 5 patients requiring open thoracotomy.[6] All of these studies demonstrated significant complications and no benefit over standard procedures. DePaula et al. from Brazil were the first investigators to report their experience with laparoscopic transhiatal esophagectomy.[7] In their study, the laparoscopic procedure was performed on 12 patients through five abdominal wall trocars with the surgeon standing between the patient's legs. Gastric mobilization, transhiatal esophageal mobilization and pyloromyotomy was accomplished using videolaparoscopy in all except one patient who required conversion to open surgery. A feeding tube was not placed. Postoperative complications included pleural effusion (n=3), anastomotic leakage (n=1),

transitory dysphonia (n=3) and dumping (n=1). Long-term follow-up has not been reported.

In this report, we describe a case of total laparoscopic transhiatal esophagectomy. The laparoscopic technique accomplishes the same objective as the open procedure. The key elements of transhiatal esophagectomy, including esophageal hiatus mobilization, gastric mobilization, division of short gastric vessels, blunt periesophageal dissection, pyloromyotomy, esophagogastric transection, and transhiatal gastric pull-up, can all be performed using laparoscopic techniques. The cervical anastomosis can be performed in the conventional fashion through a limited cervical incision. There are several important points we have learned in performing laparoscopic transhiatal esophagectomy. First, the camera port and the operating ports must be placed near the costal margin to provide adequate reach and visualization during the transhiatal dissection. Second, a self-retaining device is helpful to elevate the left lobe of the liver to expose the gastro-esophageal hiatus. Third, the harmonic scalpel provides excellent hemostasis during division of the short gastric and aorto-esophageal vessels. Lastly, a mediastinoscope can help to facilitate upper esophageal dissection.

In summary, laparoscopic transhiatal esophagectomy is a complex but feasible approach to esophagectomy. Selected patients with high-grade Barrett's esophagus, carcinoma in-situ or early esophageal cancer could potentially benefit from a minimally invasive esophagectomy. Further studies are required to determine advantages over open esophagectomy.

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