



Video-assisted Endoscopic Esophagectomy with Stapled Intrathoracic Esophagogastric Anastomosis

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Abstract: Thoracic esophagus was usually removed through the transhiatal approach or via an open thoracotomy. The long incision and spreading of the ribs usually resulted in much pain and interference with chest wall mechanics. Today, with the development of a video-assisted endoscopic procedure, many intrathoracic lesions can be removed through small incision. Since March 1992 we have attempted 20 esophagectomies and reconstruction using a right thoracoscopic approach in 16 males and 4 females whose average age was 56 years. Indications for its use were esophageal cancer in 17 patients (squamous cell carcinoma in 12 patients, adenocarcinoma in 5) and caustic stenosis in 3. It is our impression that video-assisted endoscopic esophagectomy and reconstruction potentially causes less trauma, less postoperative discomfort, and a rapid functional recuperation. Our initial experiences showed that it is a feasible, effective procedure.

Several surgical techniques are used for reconstruction of the esophagus. Minimizing the morbidity and mortality rates due to surgical approach remains one of the main goals for most surgeons. Recently, endoscopy (thoracoscopy) has been used as a diagnostic and therapeutic adjunct to many intrathoracic lesions include esophageal disease [1-5]. We report on our experiences with the endoscopic resection of 20 esophagectomies and reconstruction.

Material and Methods

Patients

Between March 1992 and October 1993 a total of 20 patients with severe dysphagia underwent esophagectomy and reconstruction using endoscopic techniques. The average age of the patients was 56 years, and there were 16 males and 4 females. Seventeen patients were clinically proved to have advanced stage (stage III, AJCCS) esophageal cancer (12 squamous cell carcinomas, 5 adenocarcinomas) and 3 were corrosive in origin.

Techniques

The operation is carried out in two stages. The first stage consists of midline laparotomy with mobilization of the stomach. The

second is resection and reconstruction of the thoracic esophagus, which is carried out through a right thoracoscopic approach. All the procedures were carried out under general anesthesia with a double-lumen endotracheal tube.

The patient was placed in supine position, and the preparation and draping were done as for a usual procedure. A midline incision was made between the xiphoid process and the umbilicus. An isoperistaltic gastric tube nourished by the right gastroepiploic and right gastric vessels was made. The hiatus was defined and enlarged with blunt dissection and diathermy. The lower end of the esophagus was freed from the mediastinum by sharp dissection. An umbilical tape was passed around the lower esophagus and was tied and left behind within the hiatus for traction during endoscopic esophageal dissection. The Kocher maneuver was routinely carried out to improve mobilization of the gastric tube. When the abdominal portion of the procedure was completed, the abdominal wound was closed in layers.

The patient was then turned to the left lateral decubitus position, and the entire right side of the chest was prepared and draped. A 2 cm incision was made on the midpoint of the scapula and vertebra in the seventh intercostal space for insertion of the scope (Fig. 1). Another two small incisions (2 cm) were made in the third and seventh intercostal spaces at the anterior axillary line. Conventional ring forceps (Foerster sponge holding forceps) were passed through these incisions to retract the upper and lower lobes of the lung ventrally so the exposure of the entire posterior mediastinum could be clearly displayed on the monitor screen. After adequate lung retraction, two "manipulation" incisions were created in the fourth and seventh intercostal spaces at the posterior axillary line. These two incisions (2 and 4 cm) were usually extended so conventional instruments and a stapler could be passed through easily for dissection and reconstruction of the esophagus. Ring forceps or conventional right-angle hemostats (Meeker forceps) were used for countertraction, and dissection was carried out simultaneously with electrocautery. The procedure began with opening the mediastinal pleura along the lowest part of the esophagus. The previously tied umbilical tape was identified and grasped with the ring forceps. With traction of the tape and visualization by video-thoracoscopy the paraesophageal

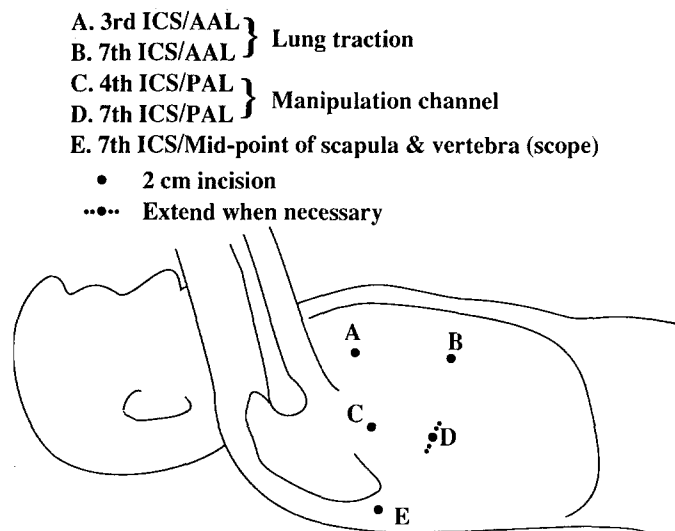


Fig. 1. Incision sites.

tissues were separated and dissected free from the esophagus using conventional instruments. Sizable vessels were ligated or secured with hemoclips. Paraesophageal lymph nodes along the way were all removed. By interchanging conventional instruments through different manipulation wounds, the esophagus with the lesion was dissected with an adequate margin (usually close to the thoracic inlet), and the gastric tube was delivered into the chest. Care was taken to avoid subsequent rotation of the gastric tube. A stapler (proximate RLG 60; Ethicon, Somerville, NJ, USA) was then applied obliquely across the cardia, and the stomach was divided with diathermy. A site was chosen near the fundus (usually posterior aspect of the stomach) for esophagogastric anastomosis. Four traction sutures were placed on the distal end equidistantly after transection of the esophageal lesion. The purse-string instrument (Autosuture; USSC, Norwalk, CT, USA) or hand sewn purse-string suture with 2-0 Prolene (Ethicon) was placed just distal to the edge of the transection. An intraluminal stapler (proximate ILS 25 mm; Ethicon) without anvil was introduced through the "manipulation" channel (7th ICS) and into a gastrotomy incision. An anvil was then placed on the center rod and inserted into the esophagus with traction on the sutures. The purse-string suture was tied, and the intraluminal stapler was closed and fired. The "donuts" within the cartridge of the intraluminal stapler were checked for its continuity. Stapler lines were carefully examined and hemostasis ensured. A nasogastric tube (16 F) was placed within the gastric tube for decompression. After completion of the esophagogastric anastomosis, the gastrotomy was closed endoscopically using conventional suturing technique, and the pleural cavity was irrigated with saline solution. A chest tube was inserted, and the lung was inflated. All the incision wounds were closed with interrupted sutures. The patient was sent to the intensive care unit (ICU) for postoperative care. A routine postoperative esophagogram was obtained 14 days after the reconstruction (same time as the open procedure). Oral feeding started when no leakage was confirmed after the esophagogram study (usually on the 15th postoperative day).

Results

Twenty esophagectomies were successfully accomplished using video-assisted endoscopy. All the diseased esophagus were mobilized and resected to an adequate length through the "manipulation incisions." The reconstructions were all achieved using a gastric pull-through performed endoscopically. All the anastomoses were made in the thoracic chest. The average time of the endoscopic dissection and reconstruction was 280 minutes (excluding laparotomy), and the average blood loss was 250 ml. All the patients have an uneventful postoperative course, and their mean hospital stay was 19 days. There was no postoperative morbidity or mortality during the mean follow-up period of 11.5 months.

Discussion

Several techniques are currently used for reconstruction of the esophagus after esophagectomy [6-9]. Controversy persists regarding the optimal method of such reconstruction. The two most common techniques used today are the thoracoabdominal approach (Ivor Lewis method) and transhiatal esophagectomy with cervical anastomosis. When using the thoracoabdominal technique, one frequently encounters significant cardiopulmonary alteration, which increases postoperative morbidity and mortality. Transhiatal resection of the esophagus was thus developed to avoid the pulmonary complications [7-10]. This technique, however, is not without risks. The procedure carried the possibilities of increased intraoperative blood loss due to mediastinal trauma and tracheobronchial or vascular tear [11-13]. The "blind" method thus also entailed increased risks of postoperative morbidity and mortality.

The endoscopic technique presented here provides optimal visualization of the thoracic esophagus. It does not transect any significant thoracic muscle groups and requires only minimal incision in the skin. Use of conventional instrumentation minimizes the operative incision but maximizes the extent of the resection of the esophageal lesion. This modality allows the surgeon to more completely visualize the esophageal dissection and is likely to reduce blood loss during esophagectomy. Using endoscopy, the "magnified" vascular branches can be clearly displayed on the screen of the monitor, so they can be easily identified and clipped. Esophagogastric anastomosis was performed with little difficulty through the two extended manipulation incisions, similar to the technique used for open thoracotomy. Although the operation appeared to be time-consuming, the major benefits appeared to be less chest wall disturbance, proper hemostasis, lack of trauma to mediastinal structures, adequate dissection of lymph nodes adjacent to the lesion, and maximal tumor resection.

This approach allows performance of the standard surgical procedure while avoiding the long thoracotomy incision. It is safe and offers the potential benefits of less postoperative pain and rapid functional recovery to preoperative levels of activity. At present, indications for the procedure include only benign esophageal stricture and advanced esophageal cancer (request only palliation). The endoscopic approach to late-stage esophageal cancer may offer a less invasive method for accomplishing the same palliative surgical therapy performed currently via open thoracotomy. Because the operative procedure mimics the proce-

dure done at thoracotomy, we would expect a similar outcome, but our follow-up is still too short to establish firm conclusions. It is still in its early stages of development, and so it is too early to know the benefits in terms of morbidity and survival. Nevertheless, our preliminary experiences with these 20 cases using the endoscopic approach for management of esophageal diseases have been encouraging and in many ways parallel our prior experience with open esophagectomy. Although our series is limited, these initial results indicate that endoscopic esophagectomy and reconstruction are technically feasible and can be effectively performed.

Résumé

On peut enlever l'oesophage thoracique soit par voie transhiatale soit par thoracotomie. L'incision, relativement longue, et l'écartement des côtes nécessaires sont, cependant, sources de douleurs et perturbent la mécanique de la paroi thoracique. Aujourd'hui, grâce à la chirurgie vidéo-assistée, on peut envisager l'ablation de beaucoup de lésions intrathoraciques par de toutes petites incisions. Depuis Mars 1992, nous avons effectué 20 oesophagectomies suivies de rétablissement de continuité par thoracoscopie droite chez 16 hommes et 4 femmes dont l'âge moyen était de 56 ans. Les indications ont été un cancer de l'oesophage chez 17 (cancer épidermoïde chez 12 et adénocarcinome chez 5), et une sténose caustique chez trois patients. D'après nos résultats, l'oesophagectomie suivie de rétablissement de continuité par chirurgie vidéo-assistée est associée à moins de traumatisme, moins d'inconfort postopératoire et à une meilleure récupération fonctionnelle. Notre expérience initiale montre qu'elle est réalisable et efficace.

Resumen

El esófago torácico fue reseado a través del método transhiatal o mediante toracotomía abierta. La larga incisión torácica y la separación de las costillas resultó en mucho dolor y considerable interferencia con la mecánica de la pared torácica. En la actualidad, gracias al desarrollo de los procedimientos endoscópicos video-asistidos, un número significativo de lesiones intratorácicas son susceptibles de resección a través de incisiones pequeñas. A partir de marzo de 1992 hemos intentado 20 esofagectomías con

reconstrucción utilizando un abordaje toracoscópico derecho en 16 hombres y 4 mujeres cuya edad promedio fue 56 años. Las indicaciones para la intervención fueron cáncer del esófago en 17 pacientes (carcinoma escamocelular en 12, adenocarcinoma en 5) y estenosis cáustica en 3. Es nuestra impresión que la esofagectomía y reconstrucción endoscópica video-asistida produce menos trauma y menos incomodidad postoperatoria con recuperación funcional más rápida. Nuestra experiencia inicial demuestra que el procedimiento es factible y efectivo.

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