Left Thoracoabdominal Incision

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The left thoracoabdominal incision provides excellent exposure for operations dealing with the distal esophagus or proximal stomach. It is particularly useful for complex reoperations in this region, which are typically quite difficult due to the presence of significant adhesions involving the stomach, diaphragm, and liver. The left thoracoabdominal incision is indicated for (1) resection of carcinomas of the lower third of the esophagus or esophagogastric junction; (2) resection of middle third esophageal carcinomas, where the tumor is located below the carina; and (3) complex esophageal repairs, notably reoperative antireflux surgery. In complex reoperations at the esophageal hiatus or in primary repairs of massive hiatal hernias, a left thoracotomy incision alone with division of the periphery of the diaphragm may be sufficient. However, the left thoracoabdominal incision is a useful extension of this approach to facilitate superior exposure and safer conduct of the surgery.

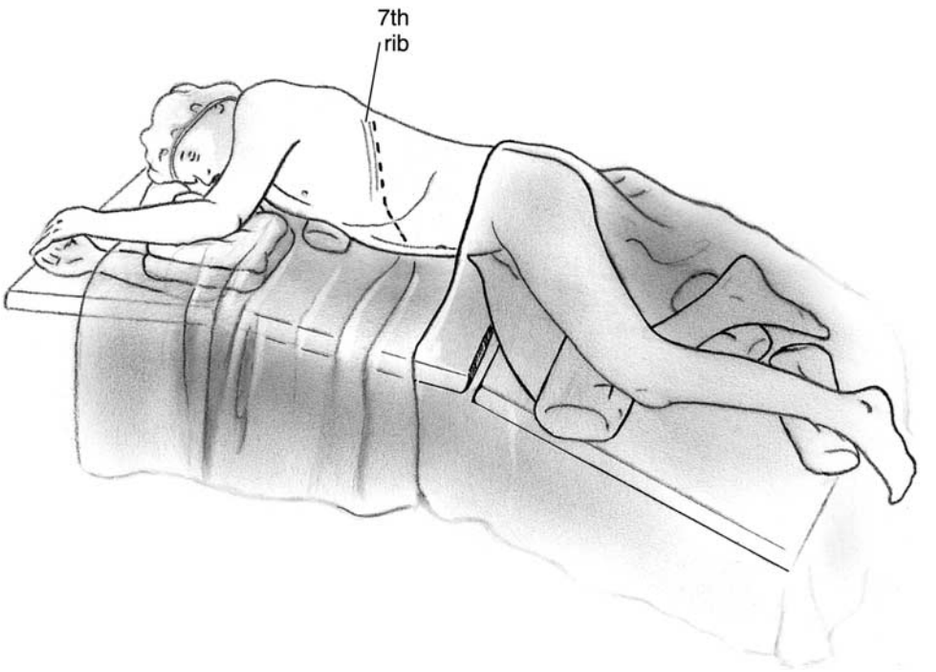
The left thoracoabdominal incision can also be combined with a left neck incision to perform total esophagectomy with cervical esophagogastrostomy. With slightly caudal extension of the lower end of the incision, the left colon may be mobilized for use as a replacement conduit for the esophagus using this approach. Finally, the left thoracoabdominal incision provides superb exposure for performance of total gastrectomy. The incision easily facilitates Roux-en-Y reconstruction to the distal esophagus.

The left thoracoabdominal incision is not an ideal approach when access is needed to the esophagus at or above the carina because the arch of the aorta obscures access to the esophagus at this level. Relative contraindications to this incision include a prior left thoracotomy, and prior right pneumonectomy because left lung deflation is necessary to achieve satisfactory exposure.

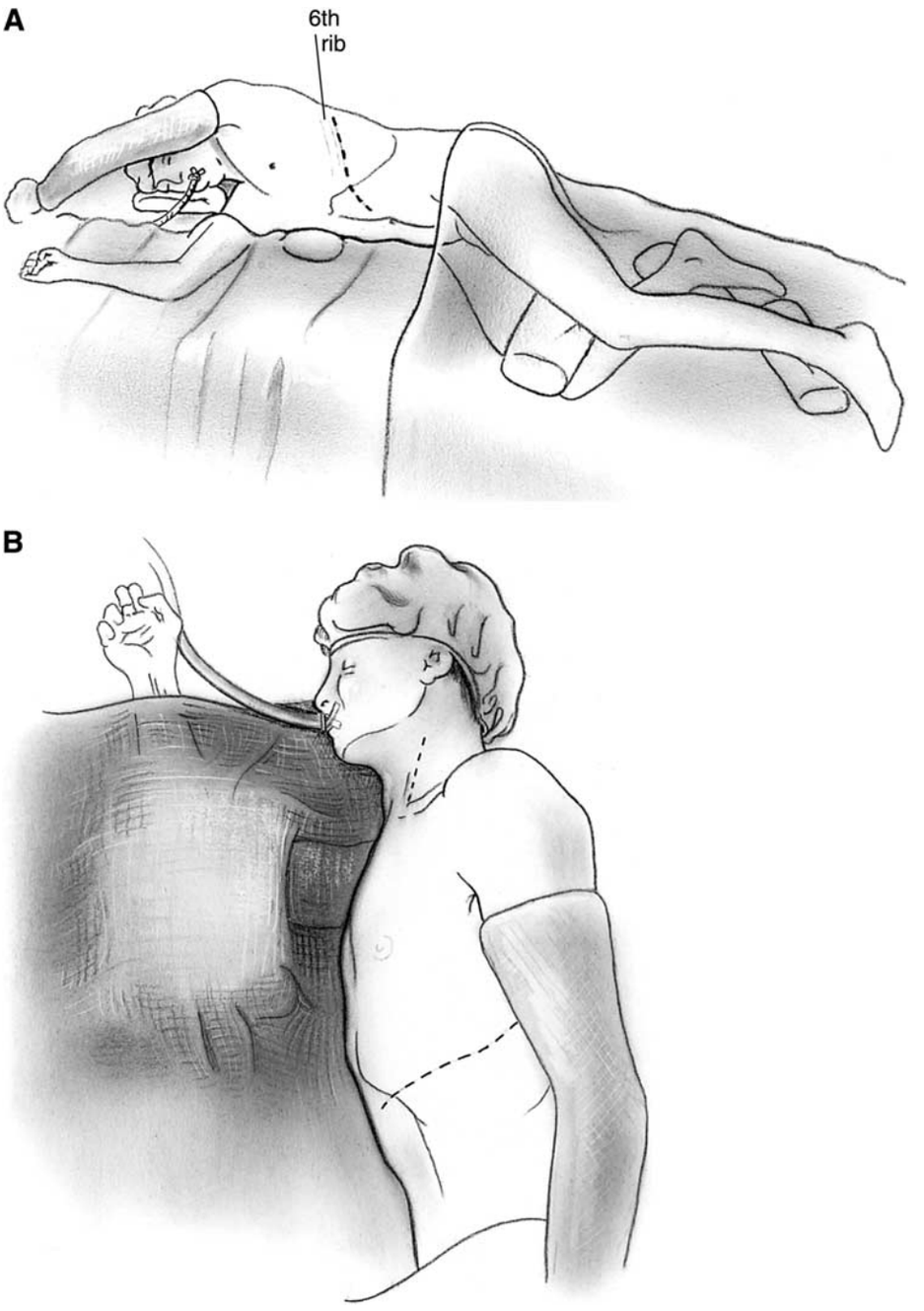
It is essential to conduct an appropriate work-up of the patient preoperatively. In the case of esophageal resection for cancer, the barium swallow and endoscopy are critically important to determine the upper limit of the esophageal access necessary. Computerized tomography is also useful for this assessment and for evaluating the extension of tumor to surrounding mediastinal structures. Preoperative assessment for complex operations or reoperations for benign esophageal disease should include a careful history, barium swallow, endoscopy, and esophageal manometry, possibly combined with extended pH monitoring.

Anesthetic treatment of patients undergoing left thoracolaparotomy includes the preoperative placement of a thoracic epidural catheter. This is important for postoperative pain relief and can be retained for up to 5 days. Other routine aspects of monitoring include insertion of a radial arterial line in the right arm and Foley catheter. Either a left-sided double lumen tube, or standard endotracheal tube with left bronchial blocker may be used to deflate the left lung during the operation. Of note, if the left thoracolaparotomy is to be combined with a left neck incision for total esophagectomy, the left arm will need to be free draped. In this scenario, no intravenous or arterial lines should be placed in the left arm.

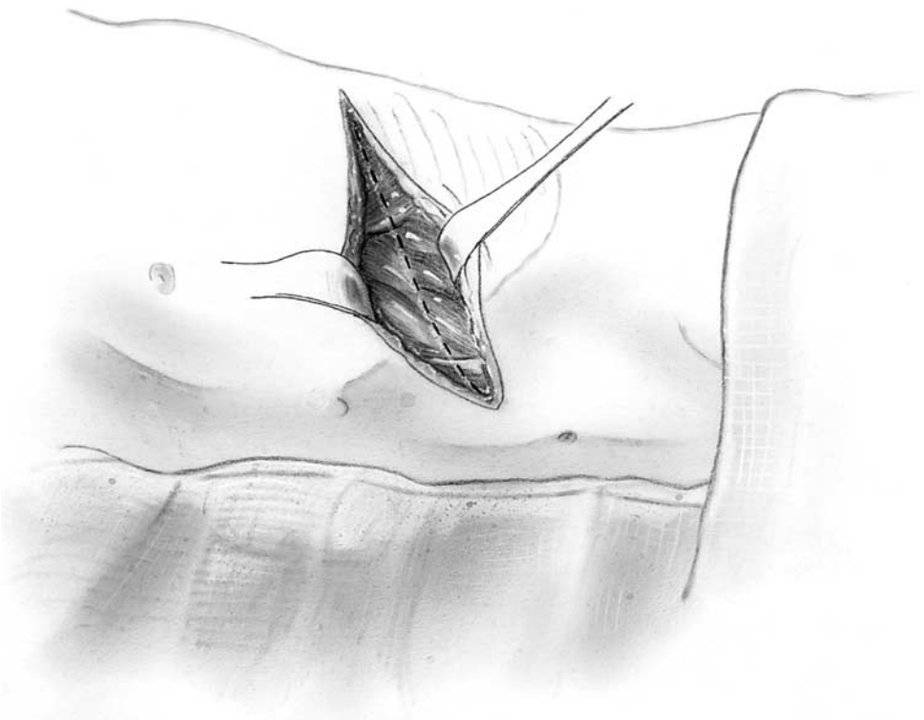
SURGICAL TECHNIQUE



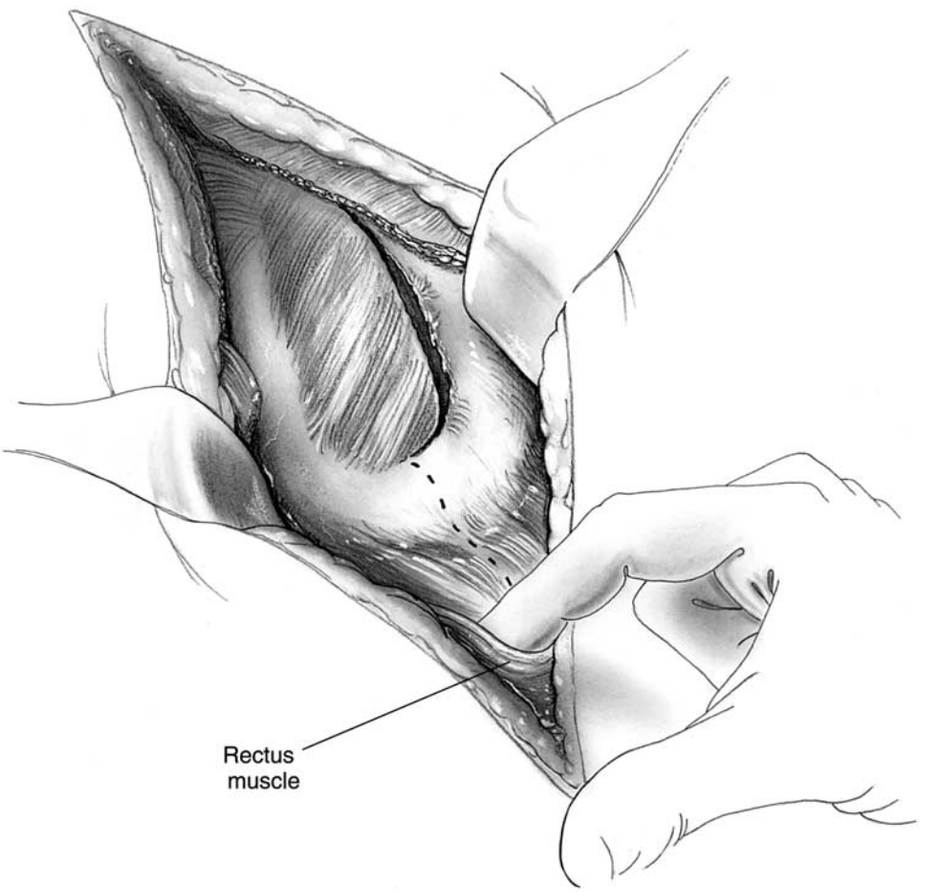
1 The patient is positioned in full right lateral decubitus position, with left side up. The hips are kept perpendicular to the operating table without any tilt. Proper protection from compression includes the use of an axillary roll and pillows between the legs. The left arm may be supported on an arm holder or on a stack of folded bath blankets between the 2 arms, which are then oriented in a "prayer position." The entire left chest and abdomen are then sterilely prepared and draped. The thoracic draping is for a full posterolateral thoracotomy. Drapes are applied to the abdomen to the right of the midline and below the umbilicus.



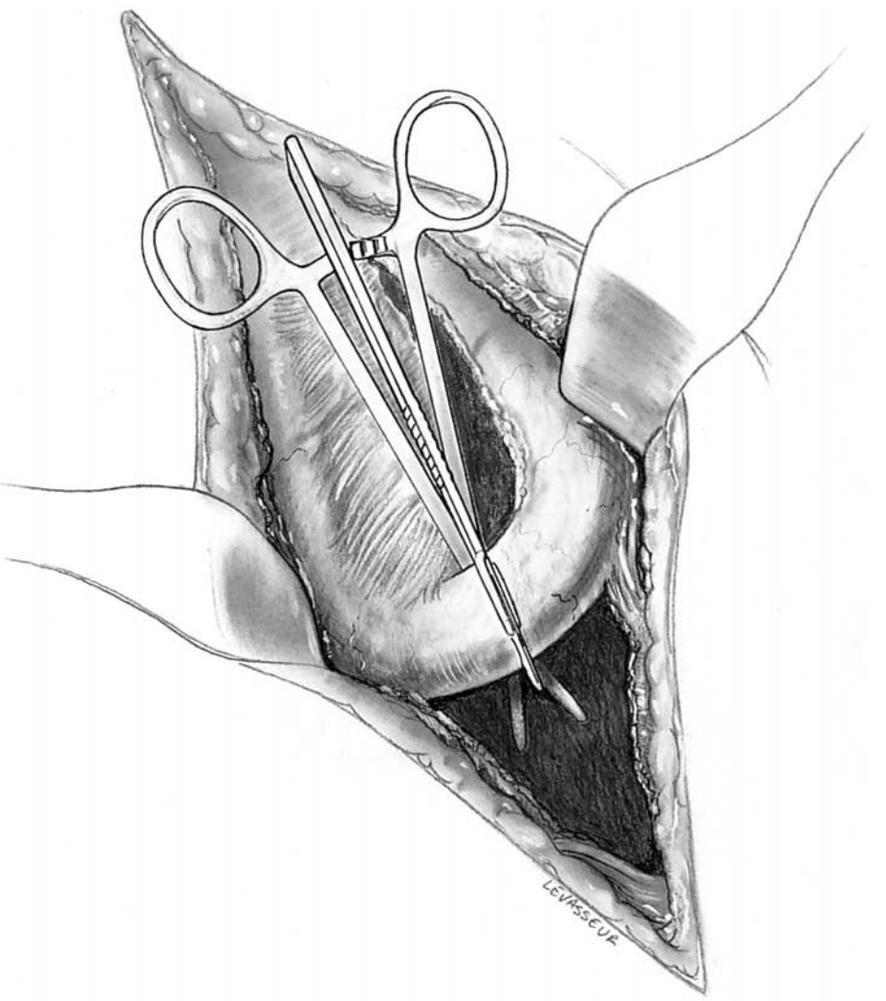
2 If total esophagectomy is planned, then the left arm is sterilely prepared and free draped by wrapping in a sterile towel and gauze. The left neck is then prepared. The sterile field now includes the left shoulder and arm, as well as the left neck. The free draped, left arm is initially retracted upward to optimize the exposure of the thoracoabdominal incision (Fig 2A); and later retracted downward, to expose the neck for isolation of the cervical esophagus and creation of the esophagogastric anastomosis (Fig 2B). Regarding this approach, a major advantage is the single positioning, which allows simultaneous access to the abdomen, chest, and neck.



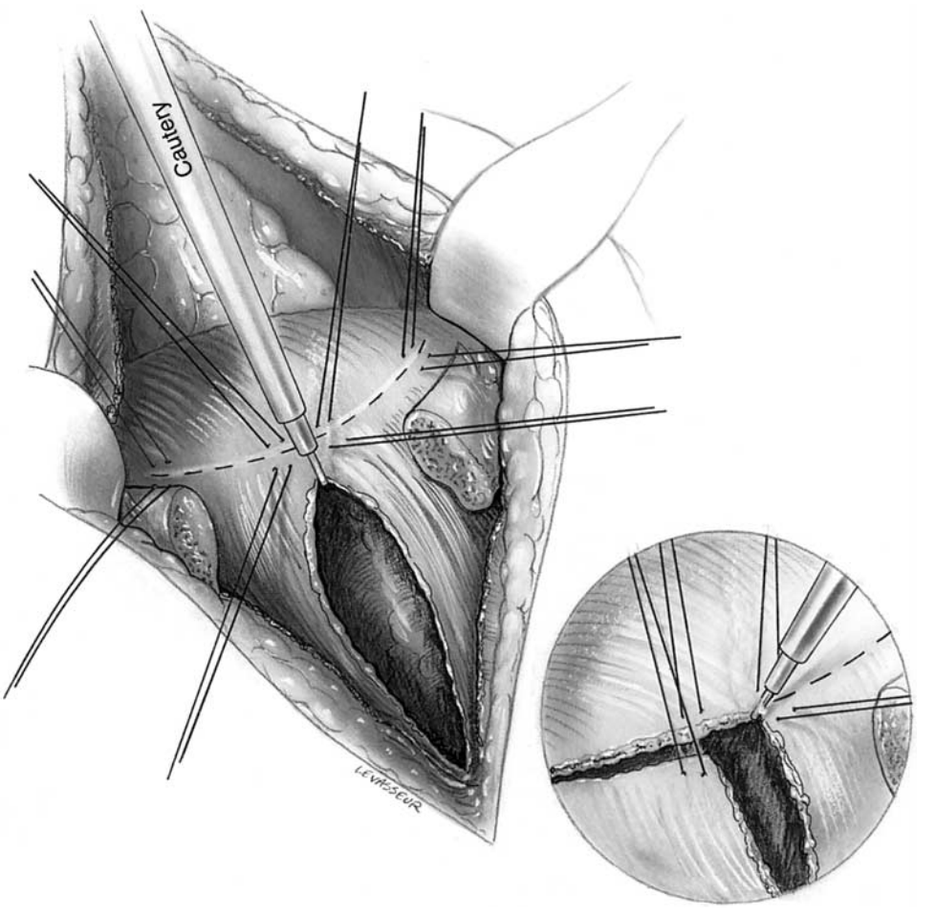
3 An oblique incision is used starting 2 finger breadths below the scapular tip. This is brought parallel to the ribs and crosses the costal arch approximately one third the distance from the xiphisternum to the end of the costal arch. There is a slight inferior curvature of the incision as it approaches the midline of the abdomen. The incision is deepened to the chest wall with division of the latissimus dorsi and serratus anterior muscles.



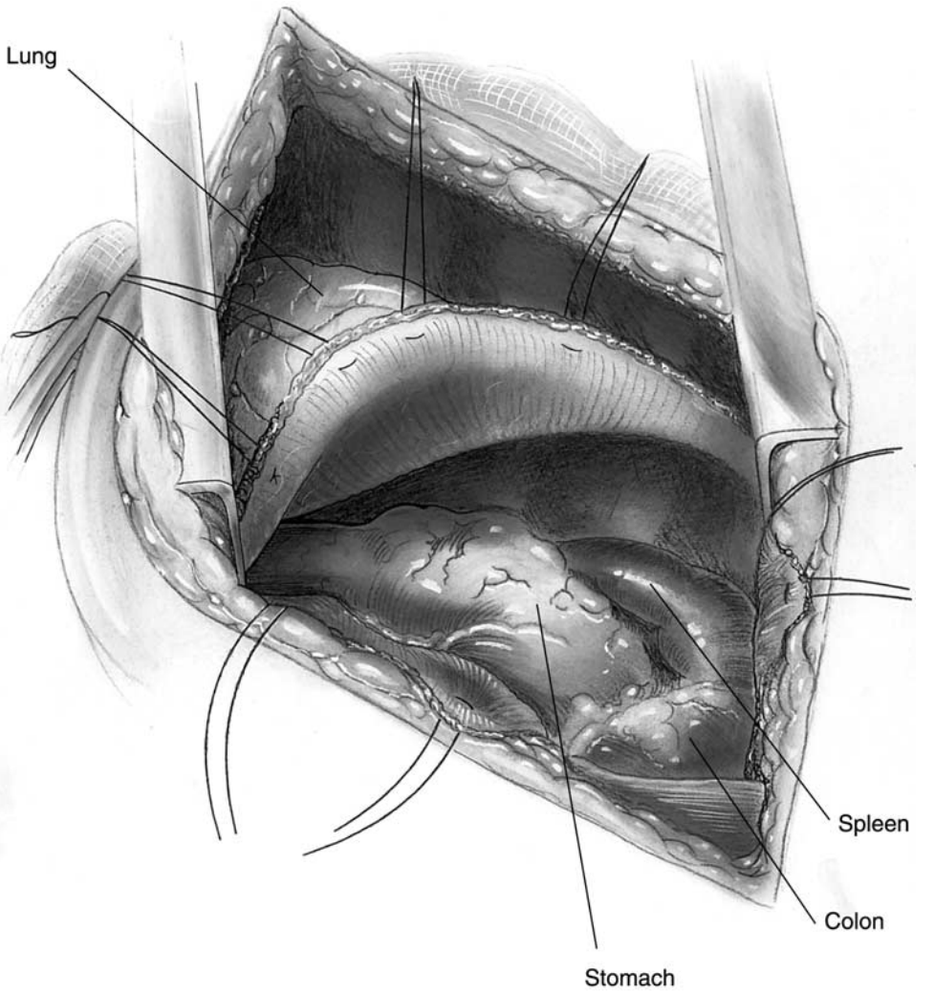
4 The chest is entered in the seventh intercostal space by dividing the intercostal muscles flush along the upper border of the eighth rib. The abdomen is entered by dividing the obliques along the inferior border of the costal margin. The anterior and posterior layers of the rectus sheath are divided, although the rectus muscle is preserved and simply retracted towards the abdominal midline.



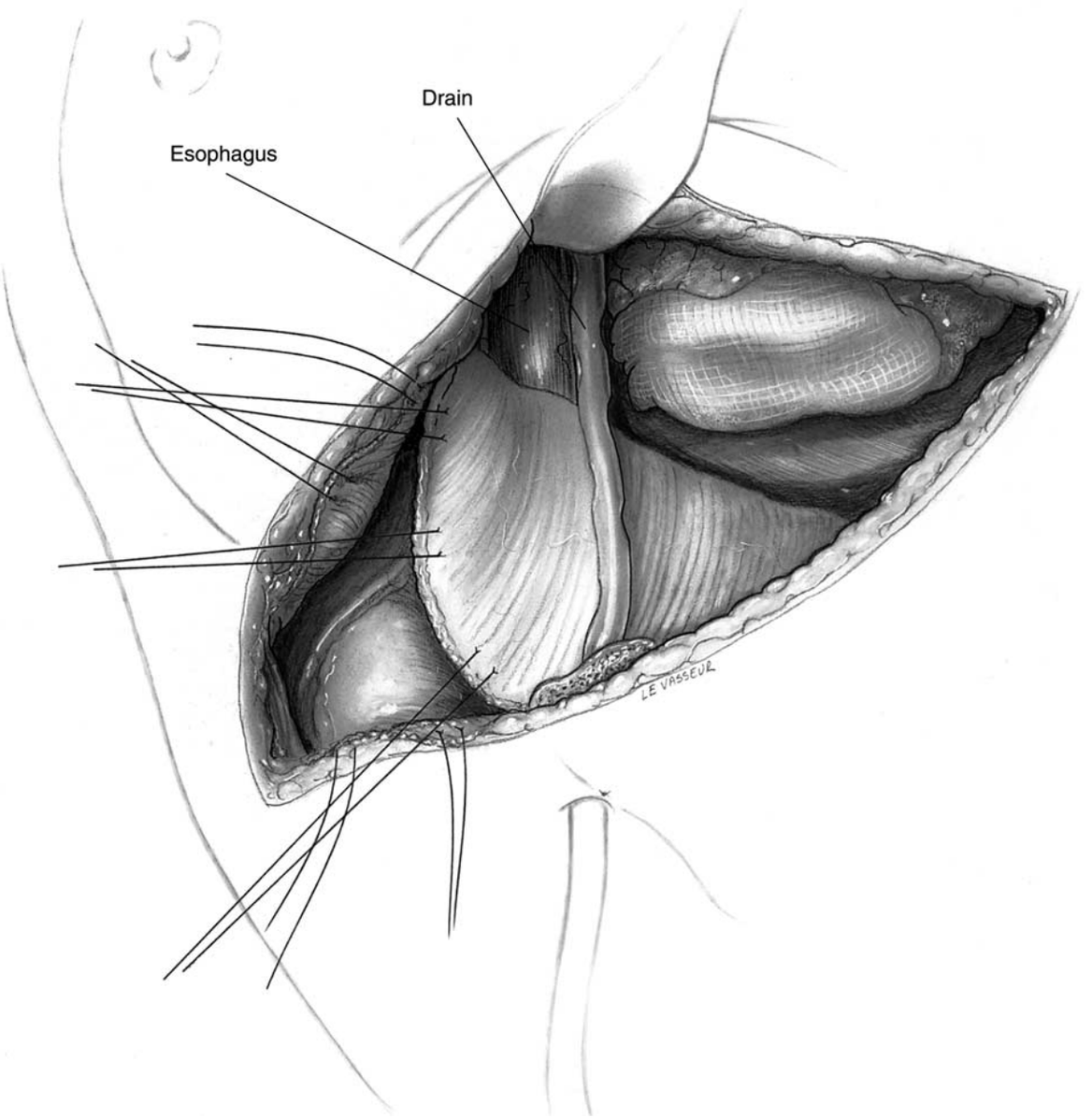
5 A large Kelly clamp is then passed immediately deep to the costal margin. A knife is used to sharply divide the cartilage at this point. This maneuver often also divides the musculophrenic archery (ie, one of the terminal branches of the internal mammary artery). The musculophrenic artery should be securely ligated at this point.



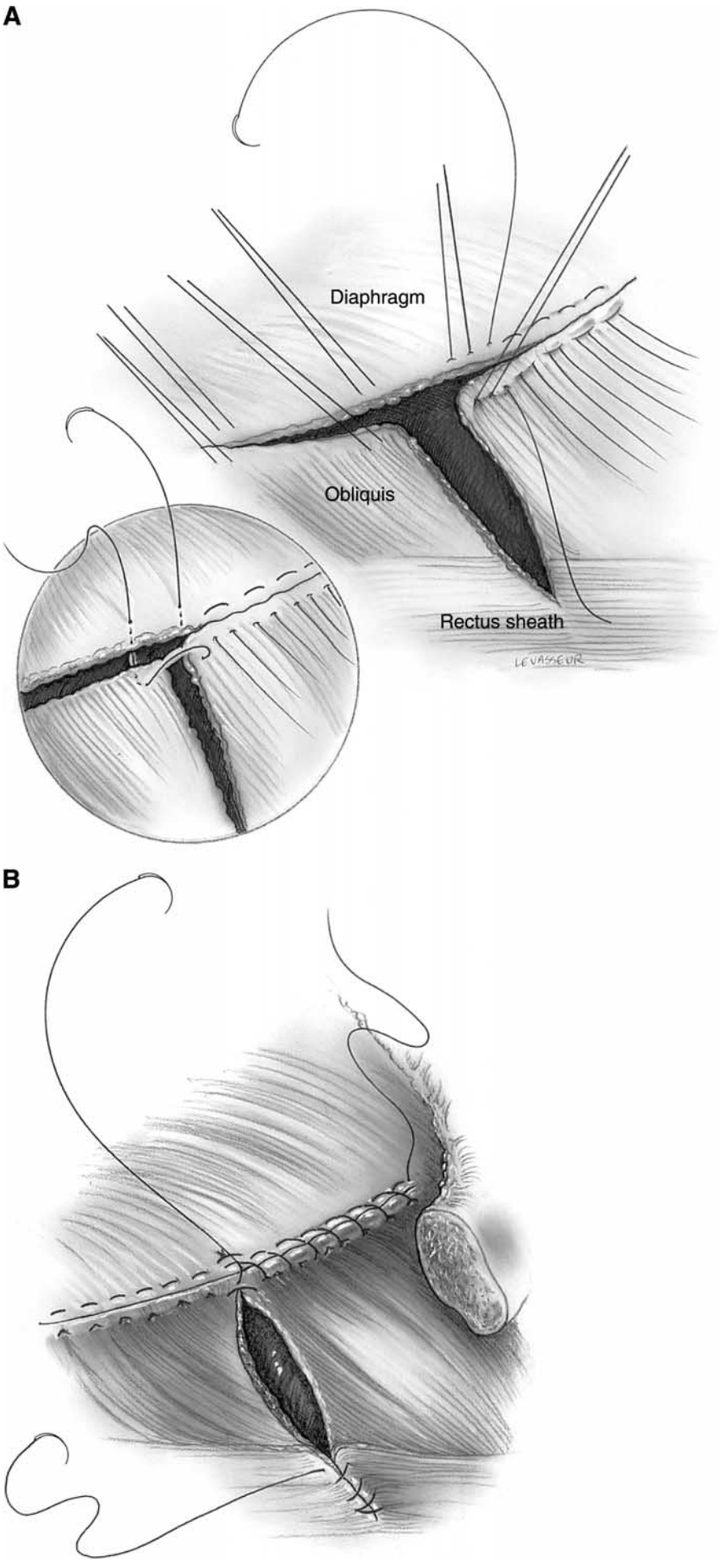
6 The left lung is then deflated and packed cephalad and anteriorly using moist laparotomy sponges. A series of O-silk (Ethicon, Johnson & Johnson, New Brunswick, NJ) stay sutures are then placed in the periphery of the diaphragm. These stay sutures orient the diaphragm properly to facilitate accurate closure later. They are also useful for retracting the divided edges of diaphragm sequentially to optimize exposure of the abdomen or the chest. Electrocautery is then used to divide the diaphragm, staying within the path outlined by the stay sutures. A 1-in attachment of diaphragm must be left inserted to the chest wall to allow the secure closure of the diaphragm at the conclusion of the operation. The total length of this phrenotomy is approximately 15 cm, and it joins the apex of the line of incision in the abdominal obliques in the shape of the letter "T."



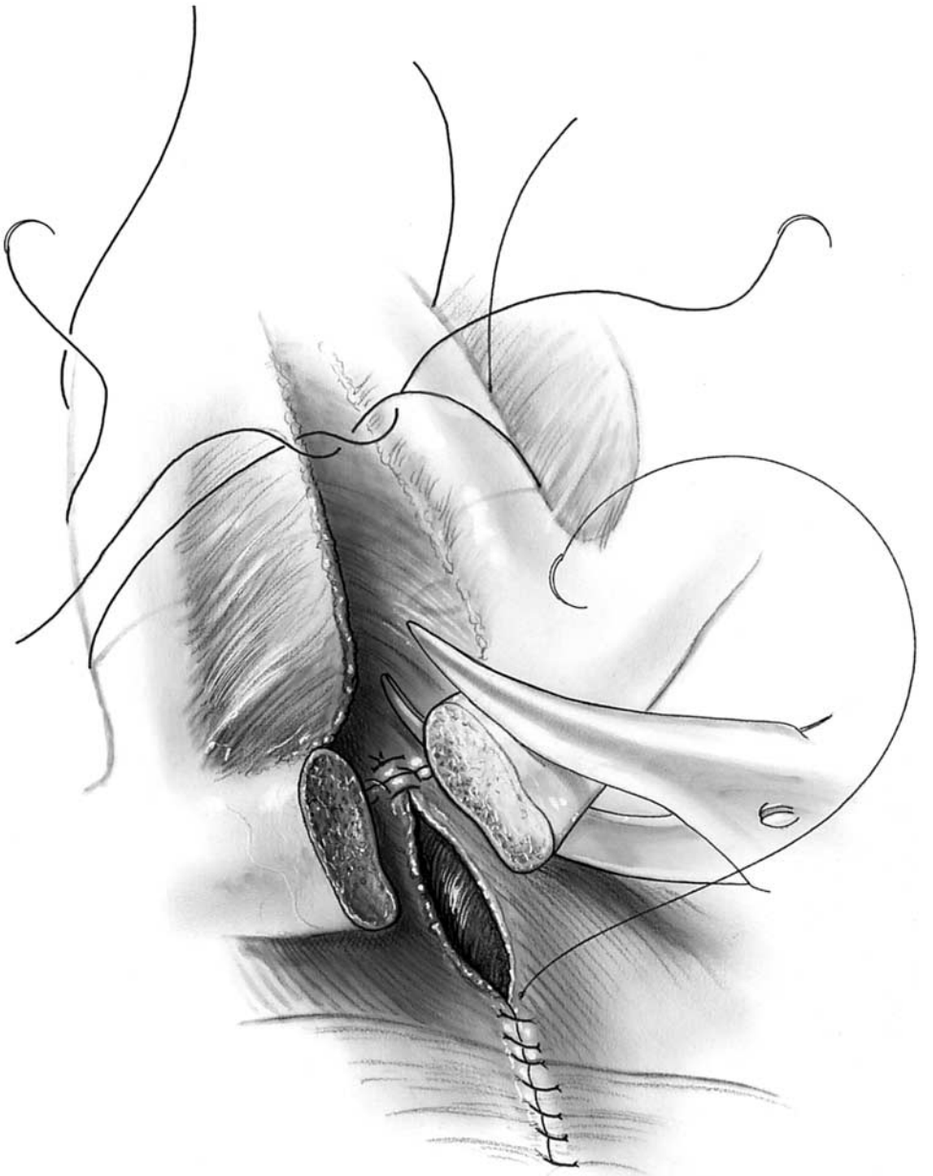
7 Upward retraction of the stay sutures provides superb access to the left upper quadrant of the abdomen. The esophagogastric junction and entire stomach are easily accessible. The triangular ligament can be divided, allowing the left lateral segment of the liver to be mobilized and retracted towards the right. This exposure permits the creation of either a pyloroplasty or pyloromyotomy, and even Kocher maneuver if needed. The transverse colon, splenic flexure, and upper descending colon are also well exposed. A slight caudal extension of the incision provides further exposure of the descending colon to permit full, left colonic mobilization for colonic interposition if desired.



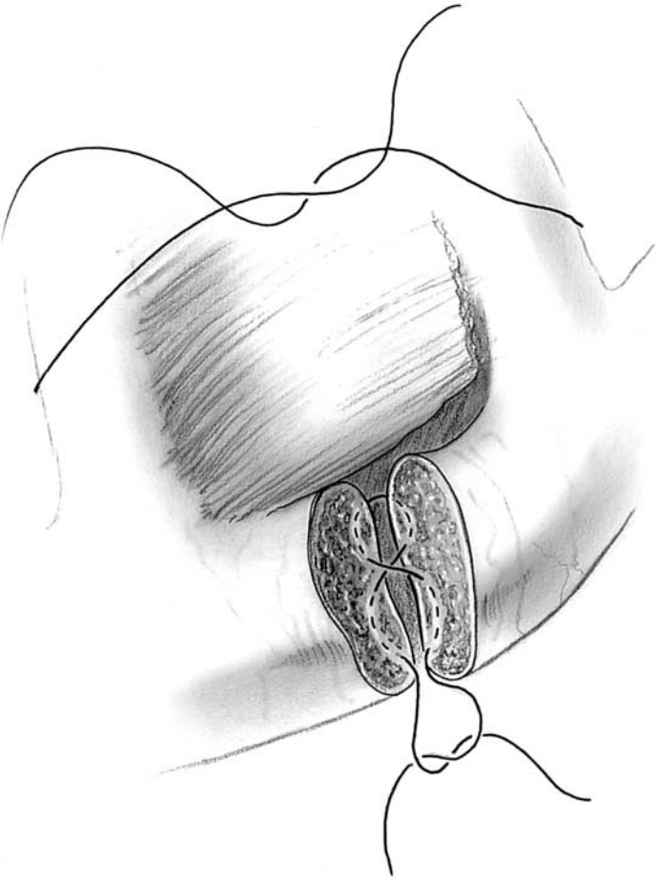
8 Before commencing closure, a 28-F chest tube is advanced posteriorly and apically along the course of the esophagus. This tube is brought out through a separate stab wound inferior to the main incision, secured to the skin, and connected to a drainage apparatus.



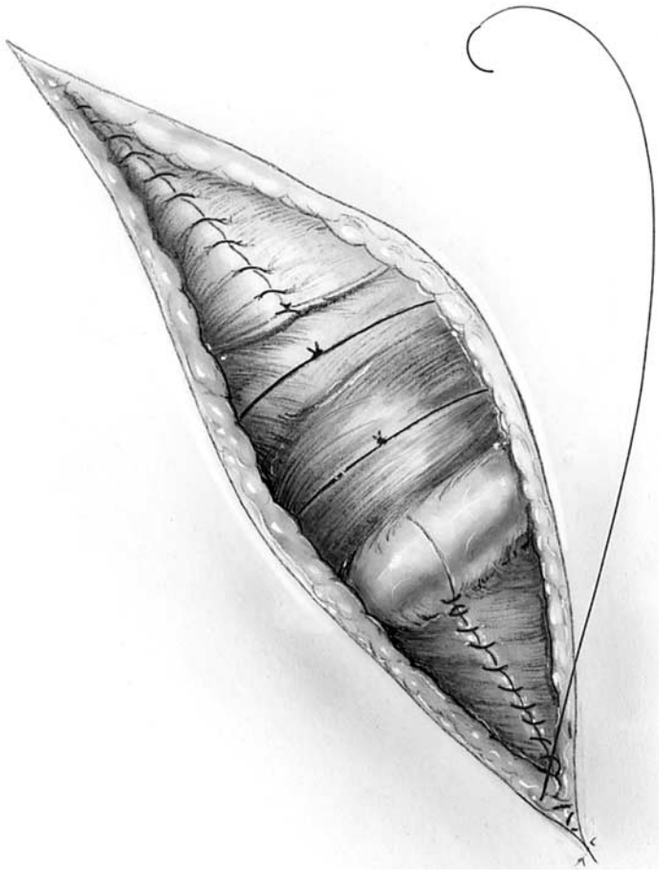
9 Closure of the diaphragm is facilitated using the previously placed stay sutures. The divided margins of the diaphragm are approximated with a series of horizontal mattress 0-polyprolene sutures (Fig 9A). A second layer of continuous 0-polyprolene sutures is then used to approximate securely the diaphragm. A U-stitch is used at the confluence of the lines of division of the diaphragm and abdominal obliques (see insert). The rectus sheath is closed with continuous 0-polyglactin 910 sutures in the anterior and posterior layers (Fig 9B). A continuous 0-polyglactin 910 suture is used to close the peritoneum and abdominal obliques in one layer.



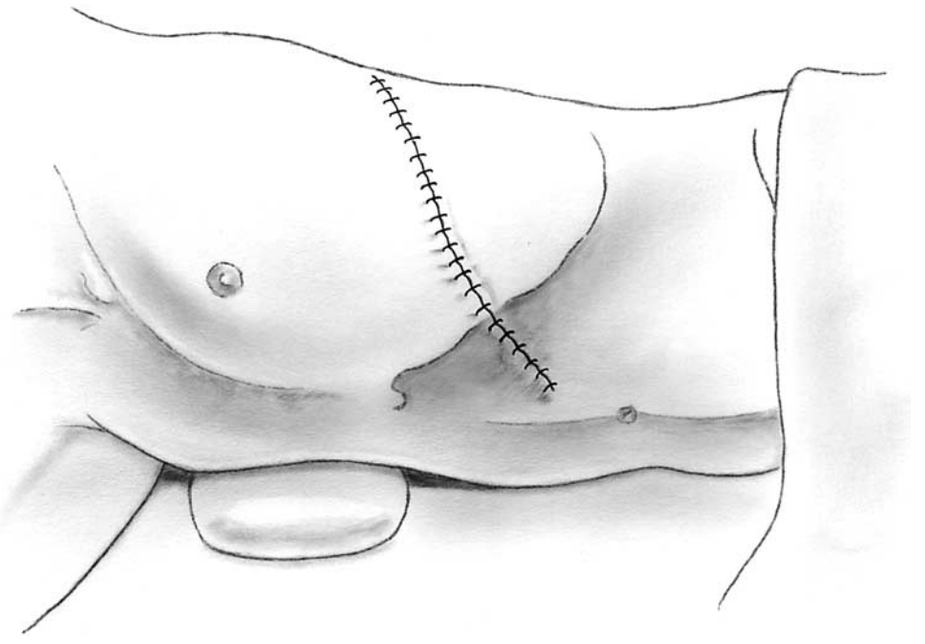
10 The ribs are approximated with a series of figure-of-eight, #2 polyglactin 910 sutures. A 1-cm segment of the cut end of the costal margin is excised to prevent any override of the cartilage after closure.



11 A single figure-of-eight, #1 polyglactin 910 suture is used to stabilize the cut margins of the costal arch once the pericostal sutures are tied.



12 The fascia of the latissimus dorsi and serratus anterior muscles are approximated with continuous 0-polyglactin 910 suture, respectively. Subcutaneous tissues are approximated with continuous 2-0 polyglactin 910 sutures.



13 Skin is approximated with staples. Sterile dressings are applied, and the drapes are taken down. The patient should be rolled supine for reintubation with a single lumen endotracheal tube if necessary.

POSTOPERATIVE CARE

The immediate postoperative care depends on the magnitude and length of the operation. In the case of a fairly straightforward operation, immediate extubation can be accomplished. Otherwise, the author prefers to ventilate electively the patient overnight with a plan for extubation the following morning. The thoracic epidural catheter is critical for the achievement of sufficient pain relief, to permit vigorous coughing, and clearing of secretions.

The chest tube is maintained on -20 cm water continuous suction. Ongoing management of the chest tube depends on the nature of the operation. In the event of esophagogastrectomy, the chest tube typically has been sutured near the esophagogastric anastomosis. The author prefers not to remove this tube until the patient has had at least 48 hours of oral intake postoperatively. This conservative approach is performed to permit satisfactory external drainage in the event of an anastomotic leak. Occasionally, small leaks are not appreciated on the initial contrast esophagogram but instead become manifest after initiating oral intake within the ensuing couple of days. Outside this scenario, the chest tube may be removed when there is no evidence of air leak and when the fluid drainage is less than 200 mL per 24 hours.

COMMENTS

The history of the left thoracoabdominal incision, its technical evolution, and its many clinical applications have been previously discussed by Heitmiller.[1,2] The left transthoracic approach for esophagogastric resection was popularized by Churchill and Sweet at the Massachusetts General Hospital more than half a century ago.[3] This approach accommodated the creation of an endothoracic esophagogastric anastomosis below the aortic arch; supra-aortic esophageal anastomosis was also possible but required making a second chest entry at the fourth intercostal space.[4] Increasing experience with esophageal resection for carcinoma has led most surgeons to perform subtotal esophagectomy with cervical esophagogastric anastomosis. The advantages of subtotal esophagectomy for cancer include a higher likelihood of a tumor-free esophageal margin, a better functional result regarding the ease of swallowing and less tendency to gastroesophageal reflux, a lower risk of septic complications with an anastomotic leak, and the placement of the anastomosis remote from mediastinal lymph node stations when postoperative adjuvant radiotherapy is necessary. Matthews and Steel popularized the combination of left thoracolaparotomy incision combined with left neck incision for subtotal esophagectomy with cervical anastomosis.[5]

The left thoracoabdominal incision provides superb exposure for esophagogastrectomy, allows en bloc dissection, and permits the very precise placement of the gastric conduit. The conduit can be carefully checked simultaneously in the chest and abdomen, and can be sutured to the pleura and peritoneum to minimize the chance of torsion or tension. Another practical advantage of this approach for esophageal resection is the single positioning and sterile field necessary to accomplish the entire operative procedure. The advantage of excellent simultaneous exposure in the abdomen and chest is also extremely useful during reoperative antireflux surgery,[6] and in total gastrectomy, where a Roux-en-Y jejunal limb originates within the abdomen but passes through the esophageal hiatus for anastomosis with the distal esophagus in the lower mediastinum.

A notable drawback of the thoracoabdominal incision is postoperative pain. The consequences of severe, incisional pain include lower lobe atelectasis and, less frequently, pneumonia. The liberal use of thoracic epidural catheters, along with retention of these catheters for up to 5 days postoperatively, has made the control of early perioperative pain in these patients much more straightforward. Other problems resulting from this incision relate to the division of the diaphragm. The potential impairment of postoperative diaphragmatic function can be minimized by keeping the phrenotomy confined to the periphery, staying within approximately one inch of the chest wall attachment. Another potential complication is delayed herniation of abdominal viscera through the site of prior diaphragm division. Once again, paying careful attention to technical detail during the closure of the diaphragm, as previously mentioned, minimizes the potential for this problem. Finally, a troublesome chrondritis at the site of division of the costal arch will develop in a small minority of patients. However, this is especially problematic if associated with suppuration, in which case reoperation for débridement and excision of infected cartilage becomes mandatory.

For these reasons, the author confines the use of the left thoracoabdominal incision to those *selected* cases in which simultaneous, extensive exposure is necessary within the chest and abdomen. It is the author's incision of choice for total gastrectomy. It is also the most reliable approach for reoperative antireflux surgery when thoracotomy and phrenotomy are insufficient, and for complex reoperations aimed at restoring esophageal-gastric continuity after catastrophic complications from prior surgery in this region.

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