An alternative method for the removal of thoracic esophagus without thoracotomy

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Resection of the esophagus without thoracotomy can be achieved by blunt finger dissection. The esophagus is mobilized from both ends, with dissection performed somewhere in the middle through areolar tissue, a procedure that usually encounters difficulty. As an alternative, everting stripping of the thoracic esophagus requires gastrostomy or esophagostomy to facilitate vein stripper fixation. However, in perforation or severe stenosis of the esophagus, the stripper is more difficult to apply. To simplify the esophagectomy procedure, we present a new approach.

Clinical Summary

A 54-year-old man had a history of perforated peptic ulcer status post subtotal gastrectomy 30 years previously. He was admitted to our hospital with massive hematemesis. On arrival at the emergency room, shock was noted, and a Sengstaken-Blakemore tube was inserted empirically. He underwent emergent angiography, which showed active left gastric artery bleeding. Unfortunately, chest radiograph examination showed mediastinal air behind the heart. A diagnosis of esophageal rupture was highly suspected upon computed tomography of the chest (Figure 1). Total gastrectomy, splenectomy, and jejunostomy were performed by general surgeons. An ulcerative mass at the previous subtotal gastrectomy site was found. Intraoperative upper gastrointestinal endoscopy showed a long linear laceration with active bleeding over the lower third of the esophagus. Thoracic surgeons were consulted for esophagectomy.

Later, the cervical esophagus was mobilized through a supraclavicular incision and was held on a sling. Although transhiatal dissection was performed, the abdominal wound was already closed, so everting stripping of the esophagus seemed not to be the method of choice for the esophagectomy. Even with transcervical mediastinal dissection, the esophagus was still fixed to some degree. Finally, we used a 32F chest tube, slashed at the midline, close to the esophagus. We kept traction on the esophagus and then gently advanced the tube distally (Figure 2). The esophagus was

Figure 1. Computed tomography of the chest shows a huge hyperlucent zone within the mediastinum and bilateral pleural effusion compatible with a Sengstaken-Blakemore tube inducing esophageal rupture.

readily mobilized for division. One Jackson-Pratt drain was deeply placed for adequate local drainage of the mediastinum. The patient had no postoperative complications. Pathologic examination of the removed specimens revealed gastric carcinoma, esophageal ulcer, and esophageal perforation. After intensive care for 35 days, he was discharged.

Discussion

Numerous attempts have been made by scholars to show esophagectomy without thoracotomy. Usually, a technique of using a stripper has been applied in the removal of the esophagus. This technique is contraindicated in the irradiated esophagus because of the presence of periesophageal sclerosis.¹ However, the use of a vein stripper may contaminate the viscous lumen through (1) gastrostomy, (2) the cervical wound into the esophagotomy, and (3) the everted esophageal mucosa delivered through the gastrostomy and the abdominal wound. Most importantly, in malignancy, tumor cells may be delivered into these positions. This may be why general surgeons do not often use this technique.²

Blind dissection with transhiatal esophagectomy requires the surgeon's full hand within the mediastinum, with adverse effects on circulation. This causes a significant decrease in the mean arterial pressure and cardiac index of -46% from the baseline value.³ In addition, myocardial infarction and acute myocardial dilatation have been reported.⁴ Furthermore, failure to keep on the right plane can cause damage to surrounding structures, pneumothorax, and excessive bleeding.²

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Figure 2. A, The slashed chest tube encases the cervical esophagus to facilitate thoracic dissection. B, A 5-cm linear laceration is noted over the lower third of the detached esophagus. The slashed chest tube as a dissector is also demonstrated.

An esophageal dissector, consisting of a metal ring with a long handle and used instead of the surgeon's hand, has been designed to achieve dissection of the esophagus within the chest. However, pneumothorax, recurrent laryngeal nerve palsy, and thoracotomy for postoperative bleeding from the tumor bed occur in some cases with this instrument.² Moreover, this metal dissector can damage the back of the trachea if excessive force is mistakenly applied.

A function similar to that of the metal esophageal dissector has been achieved more efficiently through our modification. Our modification specifically facilitates atraumatic dissection of the esophagus. The encasement of the esophagus with a slashed chest tube creates avulsion of the fine vascular bundles of the esophageal wall and pushes away larger vessels. This technique may be particularly useful in patients with advanced cardiac dysfunction, who might not tolerate transhiatal esophageal resection, as in our case.

Although other current techniques, including video-guided thoracoscopic esophagectomy or endoscopy, may affect esophageal surgery, difficulty in thoracoscopic dissection of the lower thoracic esophagus due to incomplete lung collapse makes exposure of the posterior mediastinum difficult.⁵ We conclude that this esophageal dissection method makes mobilization of the thoracic esophagus easier and faster. Its use is also associated with a marked reduction in mediastinal bleeding and pneumothorax.

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