

Case Report

Postoperative Development of a Tracheogastric Fistula at a Site Different from the Site of Tracheal Injury During Esophagectomy : A Case Report

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ABSTRACT

We report on a 71-year-old man in whom a tracheogastric fistula developed at a site different from the site of a tracheal injury sustained during transthoracic esophagectomy for esophageal cancer. Bulky lymph nodes were observed in the upper paraesophageal region during esophagectomy and involved the membranous portion of the trachea. A 4.0×1.5-cm portion of the muscle layer of the membranous trachea was excised with the involved lymph nodes. A laceration of the membranous trachea within the muscle defect was closed primarily, and a gastric tube was placed to cover and reinforce the damaged trachea. A tracheogastric fistula developed 12 days postoperatively and was manifested by postprandial coughing. Bronchoscopy revealed that the site of the tracheal portion of the tracheogastric fistula was different from the site of the tracheal injury. Because the symptoms were not severe, the tracheogastric fistula was successfully managed without surgical intervention. If mediastinitis and its clinical manifestations can be controlled, intraoperative airway injury and postoperative tracheogastric fistula can be treated conservatively.

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Key words : tracheogastric fistula, airway injury, esophagectomy, esophageal cancer, surgical complication

INTRODUCTION

Recent improvements in surgical techniques and in management after esophageal surgery have helped minimize perioperative complications after extended lymphadenectomy or salvage operations following chemoradiotherapy for esophageal cancer. However, these expanded surgical indications and extended lymphadenectomy for esophageal cancer may result in a higher incidence of injury to adjacent organs, which, in turn, might lead to severe postoperative complications. The rate of one such intraoper-

ative complication, airway injury, during esophagectomy has been reported to be 1% to 1.6%^{1,2}. Most injuries to the major airways occur during dissection of bulky tumors or lymph nodes that are adherent to the membranous portion of the trachea or a bronchus. On the other hand, tracheodigestive tract fistulas are the main cause of such complications after esophagectomy. Both perioperative airway injuries and tracheodigestive tract fistulas are difficult to treat and can be life-threatening. We report a case of postoperative tracheogastric fistula in which the site of the tracheal portion of the fistula was

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different from the site of a tracheal injury that had occurred during esophagectomy.

CASE REPORT

A 71-year-old man presented at a local hospital with substernal discomfort during meals that he had first noticed 2 months earlier. He had received a diagnosis of a tumor of the thoracic esophagus and was referred to our hospital for treatment. The medical history was remarkable for heavy use of tobacco and alcohol for more than 40 years. There was no history of any other diseases, such as heart disease or lung disease. Preoperative evaluation revealed an elevated hemicircumferential tumor of the esophagus 29 to 32 cm from the incisors. Biopsy revealed a well-differentiated squamous cell carcinoma. Enlarged lymph nodes in the upper paraesophageal region were detected with computed tomography and ultrasound esophagoscopy, and although the lymph nodes were close to the subtracheal region (Fig. 1), we believed they could be resected without injuring the trachea.

We performed a right-sided transthoracic subtotal esophagectomy with 3-field lymphadenectomy and feeding jejunostomy. There were no

metastatic lesions or pleural dissemination, but there was slight adhesion between the apex of the right lung and the thoracic wall. After division of the azygos vein, however, the enlarged mediastinal lymph nodes detected preoperatively were found to involve the right bronchial artery. Because the lymph nodes were tightly adherent to the membranous portion of the trachea, lymph node dissection resulted in a 4.0×1.5 -cm defect of the muscle layer of the membranous trachea that extended from 1 cm above the carina to the mid-portion of the trachea. Also, a 1.0×0.5 -cm

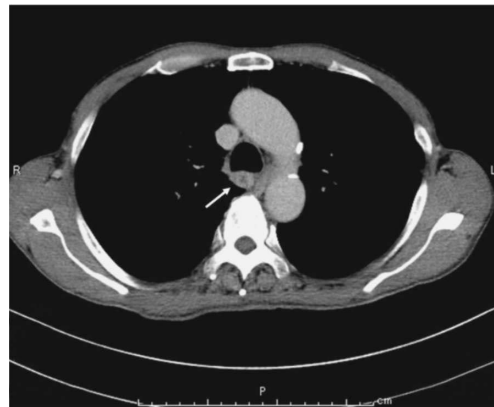


Fig. 1. Enlarged lymph nodes at the upper paraesophageal region were located close to the posterior wall of the trachea.



Fig. 2. A 4.0×1.5 -cm section of the muscle layer of the membranous trachea was excised during lymph node dissection; a small laceration of the mucosa is visible in its center.

mucosal tear was identified in the center of the muscle defect of the membranous trachea (Fig. 2). A laceration of the trachea was repaired with 3 interrupted 4-0 absorbable monofilament sutures and was covered with a gastric tube that was pulled up through the posterior mediastinum. A hand-sewn esophagogastrostomy was performed in an end-to-end fashion, and a feeding jejunostomy was placed.

Postoperatively, there were no signs of an air

leak from the injured trachea or of anastomotic leakage. However, postprandial coughing suddenly developed on postoperative day (POD) 12, and esophagoscopy revealed flattening of the gastric mucosa 1 cm below the esophagogastric anastomosis during inspiration. On the basis of the symptoms and endoscopic findings, we strongly suspected the formation of a tracheogastric fistula, and bronchoscopy on POD 18 revealed well-healed granulation and sutures 1 cm

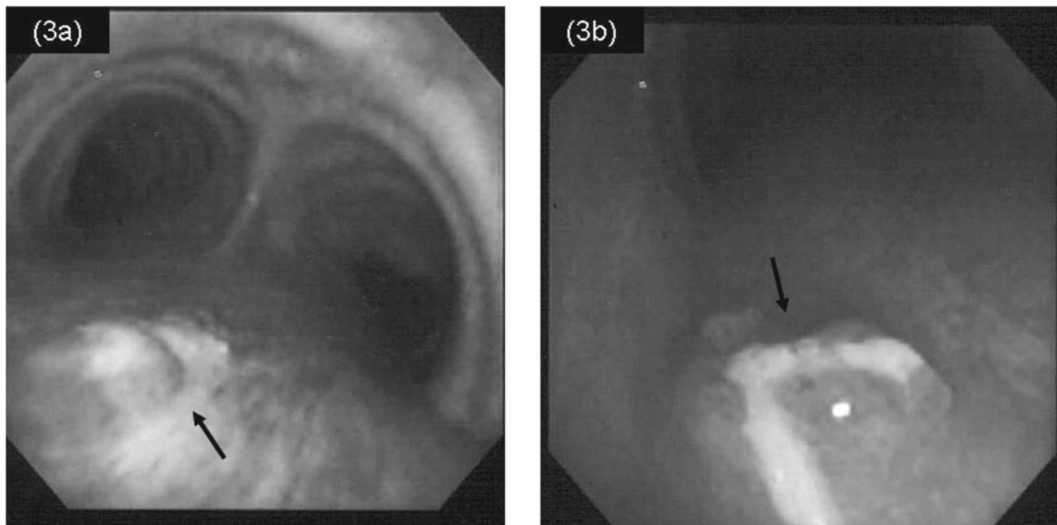


Fig. 3. Bronchoscopic examination at 18 days after surgery. A granulation with visible sutures that correspond to the injury site of the membranous trachea was located 1 cm above the carina (Fig. 3a). Proximal to the repaired tracheal injury, a flat, elevated bulge with a central concavity accompanying mucus spillage was found approximately 10 cm above the carina and 2 cm below the vocal cords (Fig. 3b).

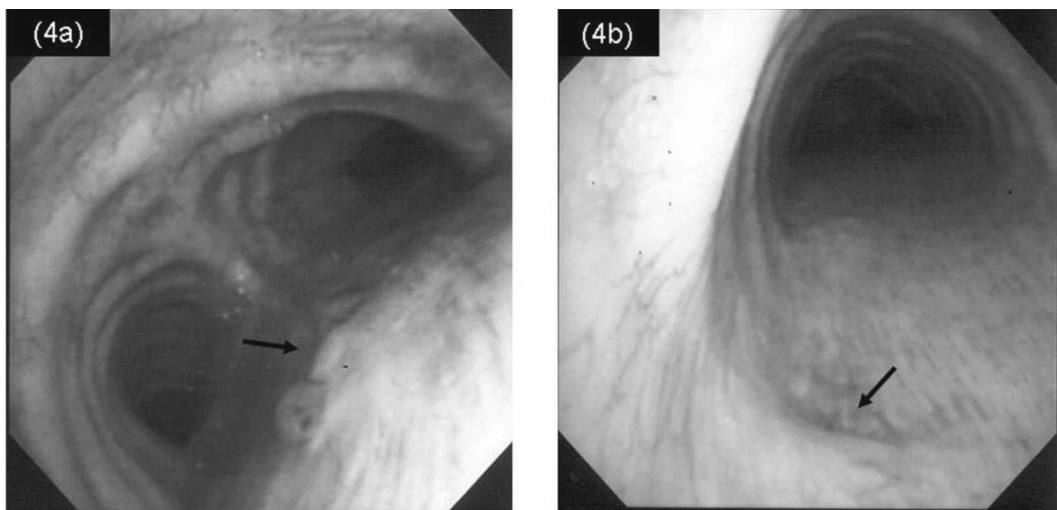


Fig. 4. Bronchoscopic examination at 50 days after surgery. The repaired membranous trachea showed healthy granulation (Fig. 4a). Good epithelization at the site of the tracheogastric fistula without any stricture or spillage of gastric contents was observed (Fig. 4b).

above the carina which corresponded to the site of intraoperative tracheal injury (Fig. 3a). Proximal to the repaired tracheal injury, a flat elevated bulge measuring 1.0×0.8 cm having a concave center accompanied by mucus spillage was found, approximately 10 cm above the carina and 2 cm below the vocal cords (Fig. 3b). On the basis of these findings, a tracheogastric fistula was judged to have developed postoperatively at a site different from the site of the intraoperative tracheal injury. Because the patient did not exhibit any symptoms specific to tracheogastric fistula, such as aspiration of saliva or gastric tube contents, we chose conservative management with jejunal tube feeding. Follow-up bronchoscopy was performed on POD 50. Although a slight concavity of the tracheal mucosa was present, bronchoscopy showed good epithelization of the tracheogastric fistula, with no stricture or spillage of gastric contents, and good granulation of the membranous trachea that had been repaired intraoperatively (Fig. 4a, b). On the basis of these endoscopic findings and the absence of any respiratory distress after oral ingestion, the tracheogastric fistula was concluded to have healed completely, and the patient was discharged on POD 54. The patient received 3 cycles of adjuvant chemotherapy, and the tracheogastric fistula has not recurred.

DISCUSSION

Airway injury is a rare complication that usually occurs during thoracic surgery requiring blunt dissection of bulky tumors or lymph nodes that have adhered to the trachea³. Some airway injuries are iatrogenic, such as those occurring during differential lung ventilated anesthesia⁴⁻⁶. Most perioperative airway injuries can be successfully repaired with simple closure, a pericardial patch, or a pedicle muscle flap (intercostal or latissimus dorsi)^{3,6-8}. However, in some cases, most often airway injuries that occur during esophagectomy, closure can be difficult for the following reasons: 1) the surgical stress of esophageal resection is much greater than that of other thoracic or mediastinal operations; 2) the viability of the trachea or bronchus or both is reduced after extended

posterior mediastinal lymph-node dissection; and 3) the damaged area of the trachea or bronchus or both is difficult to cover tightly with a reconstructed conduit or a muscle flap because the adjacent tissue has been resected with the esophagus. Despite the extensive muscle defect in the membranous trachea of our patient, use of a gastric tube to repair the injured trachea was considered appropriate, because the gastric tube was well-vascularized, and the mucosal laceration was small.

Tracheogastric fistula has also been reported as a rare complication that develops at various times after esophagectomy⁹⁻¹⁴. When tracheogastric fistula occurs after esophagectomy, patients are usually in serious condition and require surgical treatment. Anastomotic leaks, gastric ulcer, and postoperative radiation therapy have been suggested as factors contributing to the development of tracheogastric fistulas⁹⁻¹⁴. All of these factors may cause local inflammation in both the airway and the structure replacing the resected portion of the esophagus, which sometimes induces penetration to adjacent tissue. Unlike tracheogastric fistula, independent airway injury during operation is not contaminated, and viability of the damaged airway justifies restoration. Therefore, the development of a tracheogastric fistula by means of independent airway injury is hard to explain. Thus, the tracheogastric fistula in our patient probably occurred owing to an ischemic stapled suture line proximal to the gastric tube where vascularization can be compromised.

To our knowledge, there have been no reports of intraoperative airway injury and postoperative tracheogastric fistula occurring at different sites in the trachea. We can assume that a patient would become critically ill if both airway injury and tracheogastric fistula occurred. In our patient, however, the following factors suggested that conservative treatment could be applied without severe complications: 1) the airway injury resulted mostly in a muscle defect of the membranous trachea, and the mucosal laceration was minimal; 2) local infection from ischemic gastric tube suture line, the presumed cause of tracheogastric fistula in this patient, did not extend to the site of the tracheal injury; 3) the tra-

cheogastric fistula was small; therefore, respiratory distress had not been apparent when oral intake was regulated; and 4) enteral feeding was administered to provide an adequate level of nutrition.

Maintaining the high viability of the esophageal replacement and anastomotic integrity is an important factor in preventing the spread of airway injury or tracheogastric fistula damage. If the viability of the esophageal replacement is insufficient, a substitute for it should be pulled up retrosternally or antethoracically to the cervical space to minimize complications, and the airway injury should be covered with a muscle flap or with pericardium.

CONCLUSION

We have reported this case to heighten awareness of the uncommon complication of tracheal injury and tracheogastric fistula after esophagectomy and have discussed the possibility of treatment without surgical intervention.

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