

## Airway Obstruction Caused by Loculated Mediastinal Effusion after Ivor Lewis Operation

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Airway obstruction after esophageal surgery is quite rare, and few such cases have been reported. A 57-year-old woman who underwent the Ivor Lewis procedure for esophageal carcinoma complained of a sudden onset of severe dyspnea on postoperative day 3. Chest computed tomography scan revealed that the collection of a large volume of mediastinal fluid caused marked luminal compression on the trachea and the gastric conduit. Explorative thoracotomy revealed a clear serous fluid in the space between the trachea and the gastric conduit, and all respiratory symptoms were relieved after the fluid was drained. The possibility of tracheal compression by loculated effusion, such as chyloma, should be considered in a patient who complains of respiratory deterioration after esophageal surgery.

Key words: 1. Airway obstruction  
2. Mediastinum  
3. Effusion  
4. Esophagectomy  
5. Chylothorax

### CASE REPORT

A 57-year-old woman presented with dysphagia that had lasted for two months. Fifteen years earlier, she had undergone left modified radical mastectomy for infiltrating ductal carcinoma of the breast (pathologic staging of T1N0M0, according to the American Joint Committee on Cancer [AJCC] tumor-node-metastasis [TNM] classification for breast cancer). Thereafter, she received chemotherapy twice and underwent radiation therapy (RT, 55 Gy) for recurrence at the cervical, axillary, and internal mammary lymph nodes. A thorough work-up for dysphagia revealed squamous cell carcinoma at the mid-thoracic portion of the esophagus 26 to 30 cm from the upper incisor. Transthoracic esophagectomy with media-

stinal lymphadenectomy and reconstruction using a gastric tube according to the Ivor Lewis procedure was performed in the usual manner with hand-sewn anastomosis. Because the apical portion of the right upper lobe was fibrotic and tightly attached to the parietal pleura, it was injured during dissection and wedge resection was done. It was suspected to be radiation fibrosis and pneumonitis. The final pathologic report cited moderately differentiated squamous cell carcinoma that had invaded to the adventitia without metastasis to mediastinal (0/12) or perigastric lymph nodes (0/30); pathologic staging of T3N0M0 (stage IIB) according to the 7th edition of the AJCC TNM classification for esophageal cancer. In the wedge-resected portion of the lung, atrophy and diffuse sclerosis was noted.

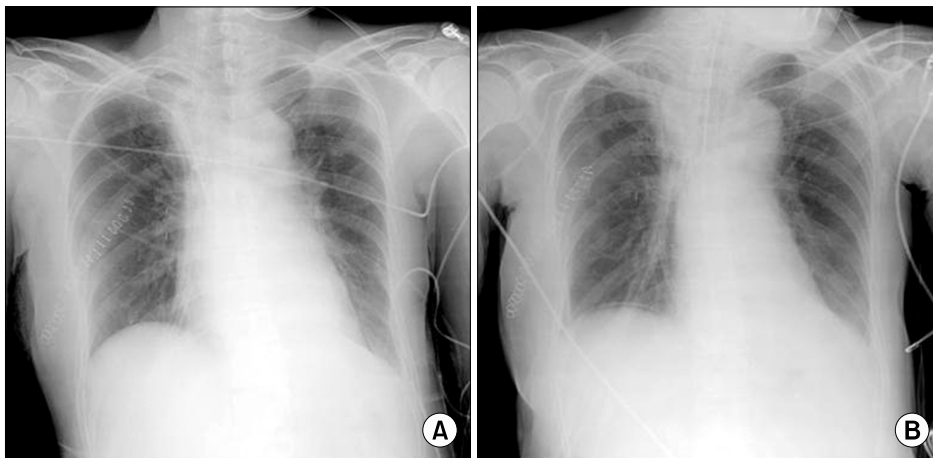
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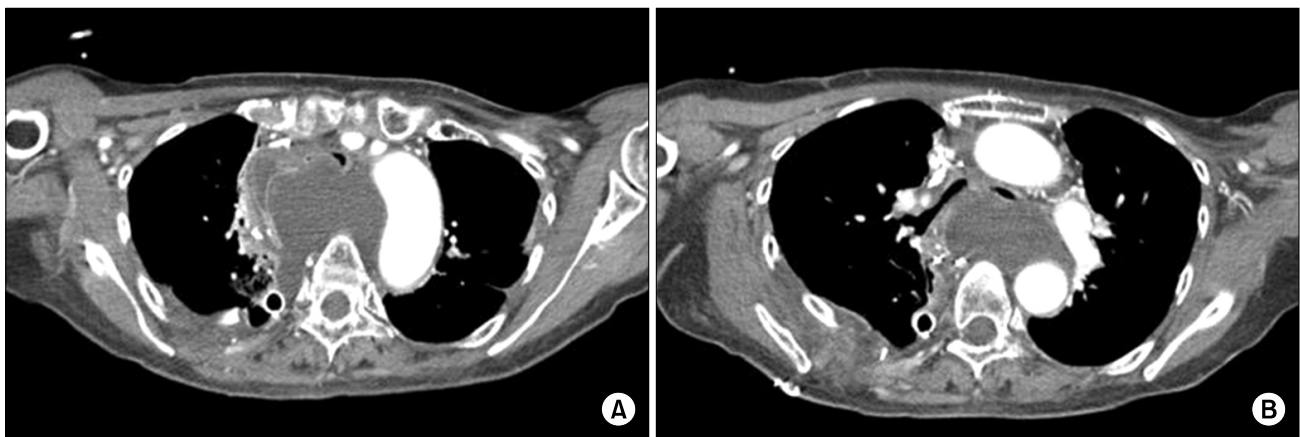
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**Fig. 1.** Chest X-ray (chest anteroposterior view, portable). (A) The left film was checked immediately after Ivor Lewis operation before the patient complaint respiratory distress. The upper mediastinum was widened due to the transposed gastric tube. (B) The right film was checked after endotracheal intubation was performed because of tracheal compression. The widened mediastinum was not changed comparing to the left film.



**Fig. 2.** Chest computed tomography scan with intravenous contrast before explorative thoracotomy. (A) The left film was at the aortic arch level, just below the distal end of endotracheal tube. (B) The right film was at the carinal level. Trachea, both main bronchi, and gastric conduit were all compressed by loculated mediastinal effusion. Extravasation of contrast was not detected.

The immediate postoperative course of the patient was uneventful. Serous fluid was drained through a chest tube at the rate of approximately 300 to 400 mL/day. On postoperative day 3, the patient complained of a sudden onset of dyspnea and continuous cough with a marked inspiratory and expiratory wheezing sound. On the chest X-ray, upper mediastinal widening was detected, but it was first thought to be related to the gastric conduit and was not different from the chest X-ray checked before. Because respiratory distress was aggravated remarkably, endotracheal intubation followed by mechanical ventilation was applied, but her respiratory symptoms did not improve much in spite of the fact that the endotracheal tube was placed appropriately (Fig. 1). A chest com-

puted tomographic (CT) scan (Fig. 2) with intravenous contrast demonstrated a large mediastinal fluid collection from the thoracic inlet to the inferior pulmonary vein level that caused marked luminal compression on the trachea and the gastric conduit. Extravasation of the contrast was not detected. Mediastinitis with abscess formation due to leakage at the anastomosis site was first considered, but leakage was not detected through a chest tube by using the methylene blue dye swallowing test. On explorative thoracotomy, inflammatory signs were not prominent in the pleural cavity. While mobilizing the gastric conduit, the clear serous fluid spilled out from the space between the trachea and the gastric conduit. Even after draining the fluid completely, the space

was not obliterated, which was assumed to be caused by RT-induced thickened and fibrotic mediastinal pleura. The esophagogastric anastomosis portion and the gastric conduit were preserved well without any infection or dehiscence. No leakage from the mediastinum was found after instillation of 100 mL of milk through a Levin tube. Upon placing the chest tube into this space, we considered the operation completed. The patient's respiratory-related symptoms all improved, and she was ready to be transferred to the general ward the next day.

Eight days after esophagectomy, a Gastrografin (Berlimed SA, Madrid, Spain) swallow study revealed that minor leakage was suspected at the esophagogastric anastomosis site. Enteral feeding through a jejunostomy tube was started, and the next day, about 1,000 mL of a turbid fluid was drained, which was confirmed as chyle by a biochemical analysis of triglyceride contents. Total parenteral nutrition was started again, and ten days later, drainage of chyle was no longer observed. Esophageal choostent (M.I. Tech Co., Ltd., Pyeongtaek, Korea) was delivered for aggravated focal dehiscence at the anastomosis site on the follow-up CT scan. The patient was discharged 2 months later; then, she was eating a regular diet and had a mini pigtail drainage catheter (10FR; Uresil, Skokie, IL, USA) for empyema in the apex. Nevertheless, she died of aspiration pneumonia 6 months after discharge.

## DISCUSSION

Although airway obstruction is a well-recognized complication of the anterior mediastinal mass in infants and children whose airways are compressible [1,2], it is quite rare in the adult population after esophageal surgery, and few such cases have been reported.

Three cases of tracheal compression have developed after transhiatal esophagectomy (THE) with a gastric pull-up procedure [3-5]. The distended transposed stomach compressed the trachea in a 58-year-old male patient of achalasia [3], and another case of tracheal compression developed in a 61-year-old male patient with esophageal cancer who had undergone neoadjuvant chemoradiotherapy [4]. Ikeda et al. reported a case of tracheal compression after THE in a 66-year-old female

patient with ankylosing spondylitis, implying that the possible causes were the small distance between the sternum and the vertebrae, and the loss of flexibility of the thorax and the mediastinum [5]. Because THE is composed of blunt dissection and unintentional repositioning of the stomach within a limited space, the membranous portion of the trachea can be compressed by a transposed stomach, particularly when the space provides little capacity for them. It is more likely to occur when the mediastinal pleura around the esophagus is thickened or fibrotic. In contrast, during the Ivor Lewis operation, because the mediastinal pleura over the esophagus is dissected and the transposed gastric tube is rearranged in the space of the resected esophagus and the right pleural cavity, the trachea will not usually be compressed by the stomach, except upon the sudden onset of distension by bleeding. One case of tracheal compression after the Ivor Lewis operation was reported, which occurred due to intramural hematoma of the gastric tube in a patient of anticoagulation therapy for atrial fibrillation [6]. In addition, an airway can be compressed by mediastinitis induced by intramural perforation and a peritracheal abscess [7], and mediastinal chyloma after a successful conservative treatment of chylothorax [8,9]. In these cases, preoperative RT promoted the mediastinal adhesion and loculation of chyle. Regretfully, the author did not perform a biochemical analysis during re-operation to confirm the diagnosis, but the possibility of chyloma was very high because chylothorax developed eventually, although the volume of drainage was limited and the nature had been clear until jejunostomy feeding despite instillation of milk during the re-operation.

The chest CT scan was the most valuable test for the exact diagnosis, because the serial chest X-ray did not show tracheal obstruction even when respiratory distress developed. However, above all, the possibility of airway obstruction should always be considered when a patient with mediastinal pathology complains of the sudden onset of respiratory deterioration [7]. The decision on how to manage the obstruction should be made as soon as possible, because complete obstruction can occur suddenly despite an appropriately positioned tracheal tube and mechanical ventilation when the endotracheal tube does not pass through the narrowed portion. In the case reported here, exploration was decided upon be-

cause a long segment of the trachea was compressed and mediastinal abscess with leakage was suspected.

This case illustrates that the possibility of tracheal compression be considered in a patient who complains of respiratory deterioration after esophagectomy, even without abnormal findings on the serial chest X-ray. The author recently experienced a case of tracheal compression by loculated effusion after the Ivor Lewis operation and reports on this case along with a review of the related literature.

## CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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