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Case Report

Esophageal Bypass Using a Gastric Tube for a Malignant Tracheoesophageal/ Bronchoesophageal Fistula: A Report of 4 Cases

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Tracheoesophageal/bronchoesophageal fistulas are often caused by locally advanced esophageal cancer and lung cancer, and result in life-threatening conditions such as severe cough and dyspnea due to pneumonia. We herein report the clinical characteristics of 4 patients with tracheoesophageal/bronchoesophageal fistulas. All patients were men, and ranged in age from 40–69 years. Three patients had esophageal cancer and 1 had lung cancer. All 4 underwent esophageal bypass using a gastric tube with tube drainage of the distal side of the esophagus. Three patients died at 3, 4, and 5 months after surgery. However, these patients were allowed to enjoy food orally up until the last few days of life. One patient who underwent esophageal bypass and chemoradiotherapy has remained well for 5 years without any evidence of recurrence. This bypass procedure is therefore considered to be a feasible treatment choice for patients with tracheoesophageal/bronchoesophageal fistulas.

Key words: Esophageal cancer – Lung cancer – Esophageal bypass – Tracheoesophageal fistula – Bronchoesophageal fistula

Tracheoesophageal/bronchoesophageal fistulas are divided into congenital or acquired based on their origin. Generally, adults have acquired tracheoesophageal/bronchoesophageal fistulas, because it is rare for a congenital fistula to remain asymptomatic until adulthood.[1] The most common etiology of benign acquired fistula is trauma, a cuff-related tracheal injury, or stent-induced complications of the treatment of benign esophageal stenosis.[2,3] The development of a fistula due to malignancy is mainly caused by locally advanced esophageal cancer or lung cancer. The current standard of

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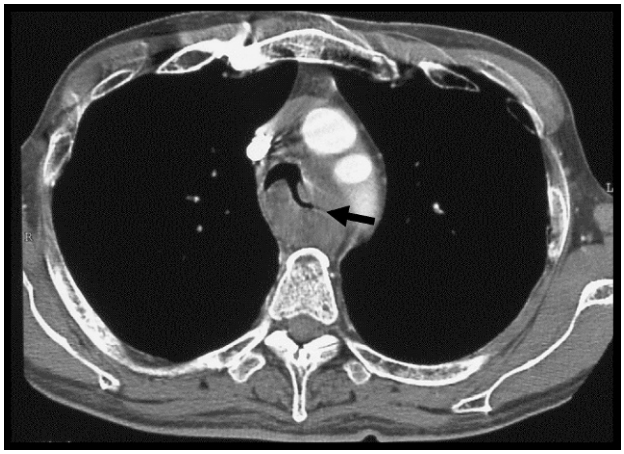

Fig. 1 The findings of the chest CT scan (case 1). The CT scan showed an esophageal tumor with a tracheoesophageal fistula (arrow).

palliative therapy for patients with malignant tracheoesophageal/bronchoesophageal fistulas is the endoscopic or radiologic placement of covered self-expanding metallic stents, which allow closure of the fistula.[4] An esophageal bypass using a gastric tube is a less common treatment option that can be used for selected patients, but the bypass operation can provide good palliation and allow for the use of subsequent therapeutic options. We herein reported 4 patients with esophageal bypass using a gastric tube for the repair of a malignant tracheoesophageal/bronchoesophageal fistula.

Case 1

A 56-year-old man was diagnosed with type 2 advanced esophageal cancer (squamous cell carcinoma) in the upper and middle thoracic esophagus by a primary care physician. He was referred to our hospital because of high fever, coughing, and difficulty in swallowing. The laboratory data showed a white blood cell count of 11,600/μL, and a C-reactive protein (CRP) level of 20.1 mg/dL. A computed tomography (CT) scan showed an esophageal tumor with a tracheoesophageal fistula (Fig. 1). Radiotherapy was administered, as a radical resection could not be performed because of the presence of tracheal invasion. Although the radiotherapy (32 Gy) was effective, thus leading to some tumor reduction, the tracheoesophageal fistula was not improved. Therefore, an esophageal bypass using a gastric tube through the subcutaneous route with tube drainage of the distal side of the esophagus was performed (Fig. 2). No severe complications were observed after the operation. Oral intake was started on the 13th postoperative day, and the patient was discharged from the hospital on the 26th postoperative day. He underwent postoperative chemoradiotherapy (40 Gy of radiation, with nedaplatin + fluorouracil); however, he died due to carcinomatous pleuritis 3 months after the surgery.

Case 2

A 69-year-old man presented with a 2-month duration of dysphagia for solid foods. He had no significant past medical history. A laboratory examination showed the elevation of inflammatory parameters: white blood cell count of 20,100/μL and a C-reactive protein level of 31.1 mg/dL. Endoscopic examination of the esophagus revealed a stenotic lesion in the middle thoracic esophagus

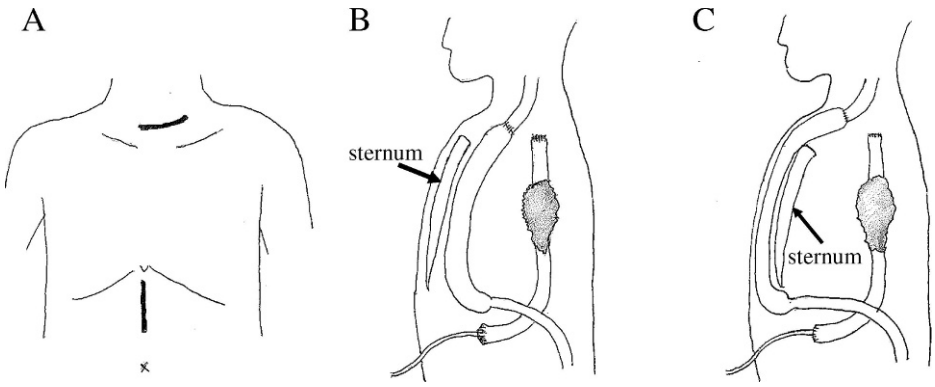

Fig. 2 A schematic diagram of the esophageal bypass in the present cases. (A) The skin incision is indicated; a cervical collar incision and median incision of the upper abdomen were made. (B) The gastric tube is brought up to the neck through a retrosternal route. (C) The gastric tube is brought up to the neck through a subcutaneous tunnel.

Fig. 3 The findings of esophagography (case 2). (A) The barium esophagography at the initial visit showed a cancerous lesion with irregular stenosis (arrow) and deep excavation (arrowhead). (B) The esophagography with diluted water-soluble contrast medium (Gastrografin) revealed a bronchoesophageal fistula at the left main bronchus (arrows) 2 months after the first diagnosis.

28 cm from the incisors. A histopathologic examination of biopsy-obtained tissue showed the presence of squamous cell carcinoma. A CT scan was suggestive of an ill-defined enhancing soft tissue density mass lesion at the level of the carina measuring approximately 7.0 cm, which was associated with right pleural effusion and pneumonia. On the basis of a clinical diagnosis of empyema due to pleural perforation of esophageal cancer, thoracic mediastinal drainage was performed through a right thoracotomy. After improvement of the empyema and pneumonia, regional radiotherapy was started. However, worsening of symptoms (severe cough and fever) was observed rapidly at 24 Gy of radiotherapy. Bronchosopy and esophagography revealed a bronchoesophageal fistula at the left main bronchus (Fig. 3). Because of the severe esophageal stenosis, it was impossible to insert an esophageal stent. Therefore, the patient underwent an esophageal bypass using a gastric tube through

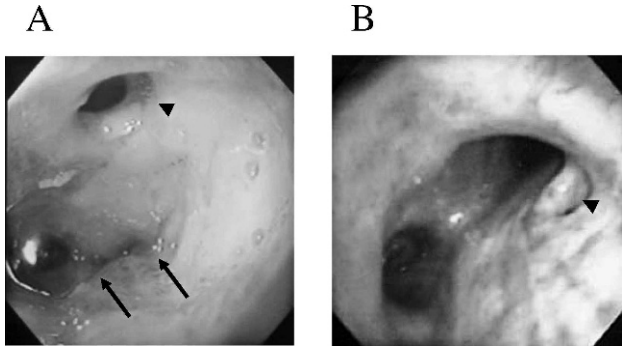

Fig. 4 Endoscopic examination of the esophagus and trachea (case 3). (A) A severe stenotic lesion in the middle thoracic esophagus was observed 27 cm from the incisors (arrows). A tracheoesophageal fistula was noted (arrowhead). (B) A tracheoesophageal fistula was observed on the oral side of the tracheal carina (arrowhead).

the retrosternal route, with tube drainage of the distal side of the esophagus. He gradually showed an improvement in his general medical condition. On the 16th postoperative day, oral intake was started, and he was discharged from the hospital on the 30th postoperative day. He underwent 43 Gy of postoperative radiotherapy, but nevertheless, died due to hemoptysis 4 months after the surgery.

Case 3

A 62-year-old man underwent a left pneumonectomy for lung squamous cell carcinoma (T2 N2M0 stage IIIA). At 13 months from the primary surgery, local recurrence at the carina of the trachea was diagnosed by bronchoscopy. Therefore, concurrent chemoradiotherapy (64 Gy of radiation with carboplatin + paclitaxel) was administered. Twenty months after the primary surgery, he visited our hospital again with a chief complaint of dysphagia for solid food that had lasted for 1 month. He had also suffered from an escalating cough and sputa for 1 week. Endoscopic examination of the esophagus and trachea showed a tracheoesophageal fistula and a severe stenotic lesion in the middle thoracic esophagus 27 cm from the incisors (Fig. 4). An esophageal bypass using a gastric tube through the subcutaneous route with tube drainage of the distal side of the esophagus was performed. On the 13th postoperative day, oral intake was started, and he was discharged from the hospital on the 30th postoperative day. He died due to an intrathoracic hemorrhage 5 months after the surgery.

Case 4

A 40-year-old man was admitted to a local hospital for sever cough, fever, and dysphagia for solid foods. A CT scan showed an ill-defined enhancing esophageal tumor invading surrounding organs. Endoscopic examination of the esophagus revealed a stenotic lesion in the middle thoracic esophagus 30 cm from the incisors. A biopsy-obtained tissue was diagnosed as adenocarcinoma histopathologically. Esophagography revealed a bronchoesophageal fistula at the right intermediate bronchus. Because of the severe esophageal stenosis, it was impossible to insert an esophageal stent. Therefore, the patient underwent an esophageal bypass using a gastric tube through the subcutaneous route, with tube drainage of the distal side of the esophagus. On the 10th postoperative day, oral intake was started. He underwent chemoradiotherapy (64 Gy of radiation with cisplatin + fluorouracil) followed by oral administration of TS-1. He remained well for 5 years without any evidence of recurrence.

Discussion

Tracheoesophageal/bronchoesophageal fistulas lead to a life-threatening condition with severe pulmonary sepsis due to gastrointestinal contamination of the tracheobronchial tree, and generally result in death, with a median survival between 1 and 6 weeks if untreated.[3] In addition, the patients are confronted with the inability to take in food orally. Therefore, the patients' quality of life (QOL) deteriorates quickly. The treatment options for these fistulas include esophageal bypass, and esophageal or tracheal stenting. Stenting offers a less invasive alternative, especially in debilitated patients who are unable to tolerate invasive procedures. The placement of self-expandable metallic stents is an effective method of palliating severe dysphagia and fistulas.

However, several complications caused by stent placement have been reported, including bleeding, aspiration pneumonia, tracheal compression, perforation of the esophagus, tumoral overgrowth, stent migration, gastroesophageal reflux, and failure in stent placement.[5] Furthermore, it is recommended that radiation therapy should precede stent placement for patients with locally advanced esophageal cancer with severe dysphagia, because the consequences of radiation therapy after stent placement often lead to complications such as bleeding, stent migration, and perforation of the esophagus.[6] However, previous radiotherapy and chemotherapy is often a contraindication for stent placement in patients with malignant tracheoesophageal/bronchoesophageal fistulas. On the other hand, an esophageal bypass allows for the use of subsequent therapeutic options, such as radiotherapy and chemotherapy. Recently, there have been reports that radiotherapy and chemotherapy contributed to fistula closure and improved patient survival.[7,8] Burstow *et al*[9] reported that patients (n = 23) receiving adjuvant chemotherapy or radiotherapy, in addition to stenting, survived significantly longer than those (n = 67) who received a stent alone (mean survival, 152.8 days versus 71.8 days). In the present cases, stent placement could not be performed because of severe esophageal stenosis.

The use of esophageal bypass with a gastric tube can completely separate the respiratory system from the gastrointestinal tract. The procedure is simple and safe to perform, and is thus a feasible treatment choice for patients with such fistulas. Necrotic tissue and secretions from the tumor, as well as the esophagus, are discharged through the drainage tube on the distal side of the esophagus. Seto *et al*[10] reported that the average survival time was 7 months after the bypass operation, and all patients were allowed to consume food orally up to the last moment of life. The gastric tube was brought up to the neck through a subcutaneous tunnel in cases 1, 3, and 4, whereas it was brought up through a retrosternal route in case 2. The subcutaneous tunnel was selected in 3 patients because of the presence of marked mediastinal lymph node metastases. The use of the retrosternal route can reduce the distance required to raise the tube, and is more favorable from the viewpoint of physiologic food passage compared with the subcutaneous route.

In most cases, esophageal cancer complicated with a fistula is treated palliatively with antibiotics, intravenous hyperalimentation, and analgesic agents. However, advances in stenting, chemotherapy, and radiotherapy have led to expectations of a better QOL and survival benefit. It is particularly important to improve the life expectancy of patients by obtaining an improvement of such symptoms as fever and eating disorders that are caused by esophagorespiratory fistulas. Esophageal bypass has the potential to improve both survival and QOL for selected patients who can recover from active pneumonia and malnutrition. The indications for the treatment of this condition should be carefully selected after obtaining informed consent from the patient and family, closely considering the QOL that these patients are likely to experience.

After treatment, all 4 of our patients resumed oral food intake and were discharged from the hospital. Three patients were able to eat normally until the last few days before they died of cancer and 1 patient has remained well for 5 years without any evidence of recurrence. This procedure, as one arm of multidisciplinary treatment, leads to a chance to obtain long-term survival. We believe that esophageal bypass surgery can be performed without major complications, and it should therefore be considered as a treatment option for patients with a malignant tracheoesophageal/bronchoesophageal fistula.

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