Advanced esophageal cancer with tracheobronchial fistula successfully treated by esophageal bypass surgery

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**Abstract**

**INTRODUCTION:** When esophageal cancer infiltrates the respiratory tract and forms a fistula, a patient’s quality of life falls remarkably. Abstinence from oral feeding is necessary to prevent respiratory complications including pneumonia. Surgery is sometimes necessary to maintain quality of life. The aim of this study was to examine clinical outcomes of esophageal cancer complicated by tracheobronchial fistula.

**PRESENTATION OF CASE:** Twelve patients who underwent esophageal bypass between 2006 and 2011 in our hospital were studied. Patient characteristics, therapeutic course, outcome, and operation type were compared. Six patients among 8 who could not tolerate oral feeding could do so after bypass surgery. Ten patients were able to enjoy oral intake up until the last few days of life. Three patients survived for more than 10 months. In spite of undergoing an operation, 1 patient survived for only 2 months and another for 4 months. The only complication was postoperative delirium in 1 patient.

**DISCUSSION:** While surgical bypass is more invasive than procedures such as endoscopic stenting, we had few complications after operative intervention and were able to maintain quality of life in our patients.

**CONCLUSION:** This bypass procedure is a treatment option for patients with tracheobronchial fistula from advanced esophageal cancer.

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1. Introduction

Since both the esophagus and trachea are organs of foregut origin, the thoracic esophagus is in contact with the trachea through much of its course in the thoracic cavity. Due to this close anatomical spatial relationship, advanced esophageal cancer can directly invade into the respiratory tract. As the ability to tolerate oral feeding is compromised in many patients with advanced esophageal cancer, the quality of life (QOL) in these patients is often times markedly reduced.

Treatment of tracheobronchial fistula includes both endoscopic stent therapy and surgical bypass [1,2]. Stent therapy, which has in recent years become a more widely used modality, includes placement of a covered, self-expanding metallic stent overlying the fistulous connection [3,4]. This modality is minimally invasive, effective, and can lead to fistula closure. Stents are not effective, however, in cases in which the tumor infiltrates the lung. On the other hand, surgical bypass, while invasive, may allow for administration of postoperative chemoradiation, thus increasing long-term survival. We herein report 12 patients with respiratory tract fistulae successfully treated by esophageal bypass surgery.

1.1. Patients

Twelve patients who underwent esophageal bypass between 2006 and 2011 at Nagoya City University were studied. All patients had squamous cell carcinoma. There were 8 men and 4 women and the mean age was 65.8 years (range, 50–78 years). The majority of tumors were located the middle third of the esophagus (Table 1). There were 5 cases in which only the lung was infiltrated, 3 cases involving only the bronchus, and 4 cases involving both the lung and the bronchus.

1.2. Operation

Five cases were started via a right thoracotomy for the purpose of esophagectomy but converted to a bypass procedure. Seven cases were approached as bypass operations from the beginning. Mean operative time was 327 min and mean blood loss was 286 g (Table 2).

2. Methods

An upper midline abdominal incision was made and a Kocher maneuver performed. At a safe distance from the right gastroepiploic artery and vein, the omentum was divided. As the spleen was approached, the left gastroepiploic vessels were carefully ligated, and the short gastric vessels were divided.
Table 1
Clinical characteristics of the studied group.

| Clinical characteristics | Gender | Age, mean (range) | Main tumor site | PNI, mean (range) |
|--------------------------|--------|-------------------|----------------|------------------|
|                          | Male   | 65.8(50–78)       | Upper third    | 2                |
|                          | Female |                   | Middle third   | 9                |
|                          |        |                   | Lower third    | 1                |
|                          |        |                   |                | 37.2(29.5–48)    |

Table 2
Operation and complications.

| Variable | Outcome |
|----------|---------|
| Operative time, median (range) | 327(237–433) min |
| Blood loss, median (range) | 286(83–553) g |
| Thoracotomy, n (%) | 5 (42) |
| Postoperative complications, n (%) | 1 (8.7) |
| Delirium | 0 (0) |

Fig. 1. Change in the amount of meals before and after bypass operation.

Table 3
Chemoradiation therapy.

| Variable | Chemotherapy | Radiotherapy |
|----------|--------------|--------------|
|          | Low-dose CF(pre-operation) | 4 |
|          | Low-dose CF(post-operation) | 4 |
|          | Standard CF(pre-operation) | 1 |
|          | Standard CF(post-operation) | 3 |

3.2. Chemoradiation therapy

In all cases, chemoradiotherapy was carried out before and/or after the operation. Radiotherapy was performed in a total of 10 cases, 5 preoperatively and 5 postoperatively (Table 3). Timing and strength of radiation varied from case to case.

3.3. Postoperative complications and progress

Postoperative delirium occurred in 1 case. Anastomotic leak occurred in 1 case. Transition to oral feeding was not possible in 2 cases, while the remaining 10 enjoyed oral intake until their last days. In one case, pneumonia worsened rapidly after the operation. In another case, the respiratory status worsened secondary to rapidly infiltrating cancer. There were 3 cases surviving beyond 10 months. Despite undergoing operation, one patient survived for only 2 months and another for 4 months. However, in most cases ability to tolerate oral feeding improved, respiratory symptoms did not occur, and a good quality of life was maintained. Cases with survival of more than 10 months are described below:

3.3.1. Case 1

A 78-year-old woman was admitted to our hospital complaining of bloody stools. She underwent esophagoscopy and was diagnosed with esophageal cancer. A type 1 tumor with 80% circumferential loss of the esophageal wall was observed in the middle thoracic esophagus. She tolerated food without emesis. Computed tomography revealed the tumor to abut the inferior pulmonary vein and aorta, but nonetheless was deemed resectable and she underwent right thoracotomy. Intraoperatively, the tumor was noted to invade the lower lobe of the right lung and thus was deemed unresectable. We elected to perform bypass surgery. Postopera-
In an advanced case, we chose the method which Postlethwait devised, the utility of which achieves external esophageal drainage [8]. Alternatively, we have found that the method is clearly more invasive compared with stent treatment. In some cases, invasion separates the passage of food and the respiratory tract. This is the most suitable way.

Delight to take orally. When limiting a patient, bypass surgery is chosen for patients with respiratory tract fistulae, with many patients able to resume oral feedings [9]. Advantages of PEG are the thing which can be made easily and a thing capable of nutritional management. But since putting a PEG tube requires endoscopy, it is irreplaceable and a thing that markedly decrease a patient's quality of life. These patients are generally quite ill and have a poor prognosis.

Degree of invasion, efficacy of medical treatment, prognosis, and the general condition of the patient must all be considered when weighing surgery as an option. Stents are now commonly employed in cases of esophageal cancer complicated by respiratory tract fistulae, with many patients able to resume oral feedings within a few days after stent placement [7]. Complications of stents include incomplete covering of the fistula, stent migration, and perforation of the esophagus after chemoradiation. The latter case creates a situation in which chemoradiation must be prematurely stopped. Finally, fistulae involving the lung cannot be treated with stents. Another option for advanced esophageal cancer with tracheobronchial fistula is percutaneous endoscopic gastrostomy (PEG). Advantages of PEG are the thing which can be made easily and a thing capable of nutritional management. But since putting it for the patient with esophago-respiratory tract fistulae, a possibility which causes aspiration pneumonia is high. It's irreplaceable delight to take orally. When limiting a patient, bypass surgery is the most suitable way.

Therefore, we sometimes elect to perform bypass surgery, which separates the passage of food and the respiratory tract. This is clearly more invasive compared with stent treatment. In some cases, invasion into the lung became clear only after carrying out the thoracotomy, forcing an intraoperative shift to bypass surgery.

Regarding other surgical options, tube esophagostomy can achieve external esophageal drainage [8]. Alternatively, we have chosen the method which Postlethwait devised, the utility of which includes the fact that it does not lead to complications including leakage. The problem with medical treatment is that, unless it is dramatically successful, once complications occur in a patient with an already dismal prognosis, quality of life rapidly declines, making an operation unfeasible.

Critical to the bypass operation is a gastric tube with sufficient blood flow and a technically sound esophago-gastric tube anastomosis. For this reason, the surgeon must be mindful of the width of the gastric tube. If a gastric tube is too thin or too long, the blood flow to the gastric wall will be insufficient, leading to necrosis and failure of the sutures. While variable depending on the individual shape of the stomach, the width of the gastric tube should be at least 3 cm, enlarging to around 4 cm moving towards the left gastroepiploic artery domain. Anastomosis of the esophagus is carried out to the back wall of the gastric tube. We have had no leaks using this method. Regarding the reconstruction route, the subcutaneous route is preferred in order that, should a leak occur, it does not cause as serious a systemic illness as it would had the leak occurred within the thoracic cavity.

In patients with prolonged pneumonia before an operation, inflammation often improves within a few days postoperatively. Oral feeding is typically started on the 7th day after the operation. Upon discharge, pending the patient’s overall general condition, chemoradiation therapy is performed to improve prognosis, which in our series exceeded 10 months in some patients [9,10]. This bypass procedure is therefore considered to be a feasible treatment choice for patients with respiratory tract fistula.

**Conflicts of interest**

None.

**Funding**

None.

**Ethical approval**

This paper is a case report. We have informed consent from the patient.

**Consent**

We have written informed consent from the patients.

**Authors contribution**

Masahiro Kimura, Hideyuki Ishiguro, Tatsuya Tanaka, Hiromitsu Takeyama contributed with the study design, data recollection, data analysis, and writing the paper.

**Guarantor**

Masahiro Kimura.

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