CASE REPORT – OPEN ACCESS

International Journal of Surgery Case Reports 9 (2015) 115–118

Contents lists available at ScienceDirect

International Journal of Surgery Case Reports

journal homepage: www.casereports.com

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

Masahiro Kimura*, Hideyuki Ishiguro, Tatsuya Tanaka, Hiromitsu Takeyama

Gastroenterological Surgery, Nagoya City University Graduate School of Medical Sciences, 1 Kawasumi, Mizuho-cho, Mizuho-ku, Nagoya 467-8601, Japan

ARTICLE INFO

Article history:
Received 6 January 2015
Received in revised form 28 February 2015
Accepted 28 February 2015
Available online 4 March 2015

Keywords:
Bronchoesophageal fistula
Bypass surgery
Esophageal cancer

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.

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.

* Corresponding author. Tel.: +81 52 853 8226; fax: +81 52 842 3906.
E-mail address: mkimura@med.nagoya-cu.ac.jp (M. Kimura).

http://dx.doi.org/10.1016/j.ijscr.2015.02.053

Table 1
Clinical characteristics of the studied group.

Clinical characteristics	
Gender	
Male	8
Female	4
Age, mean (range)	65.8(50–78)
Main tumor site	
Upper third	2
Middle third	9
Lower third	1
PNI, mean (range)	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* (%)	
Delirium	1(8.7)
30-day mortality, *n* (%)	0(0)

We transfixed the entire wall of the stomach to the antrum 5 cm from the pylorus using a 21-mm intraluminal stapler, creating a ring surrounded with staples. Next, we created a tube which measured 3 cm in diameter using a linear stapler. Four to six staple applications were needed. The part corresponding to the lesser curvature serves to drain the distal esophagus in relation to the tumor, and the greater curvature makes up the tube.

A neck incision, 10–12 cm long, was made along the inner border of the sternocleidomastoid muscle. The platysma muscle was divided. After dissection and division of the cervical esophagus, the distal end was amputated using a linear stapler. A pursestring was fashioned for positioning the head of a 25-mm intraluminal stapler in the stump of the proximal esophagus.

After the subcutaneous tunnel was formed, the gastric tube end was brought into the neck. We then proceeded with the anastomosis of the proximal stump of the cervical esophagus to the proximal end of the terminolateral gastric tube using a 25-mm intraluminal stapler. The excess tubing was sectioned using a linear stapler. Recently, the method of starting separation from cardia of having improved the Postlethwait method is performed [5].

2.1. Postoperative course

A nasogastric tube was kept in place for 5 days postoperatively. If the patient was clinically stable, esophagography was performed on the seventh postoperative day, and oral feeding was started if there was no leak. Liquid diet was initiated and advanced to regular solid food by time of discharge.

3. Results

3.1. Pre-operative nutrient state

In eight of 12 cases, oral intake was not tolerated preoperatively because of esophageal stenosis or tracheobronchial fistula (Fig. 1). Nutrition was therefore poor in our patients and the mean value of prognostic nutritional index (PNI) was 37.2. The mean PNI in the patients who were not eating was 33.9 versus 43.8 in those who were.

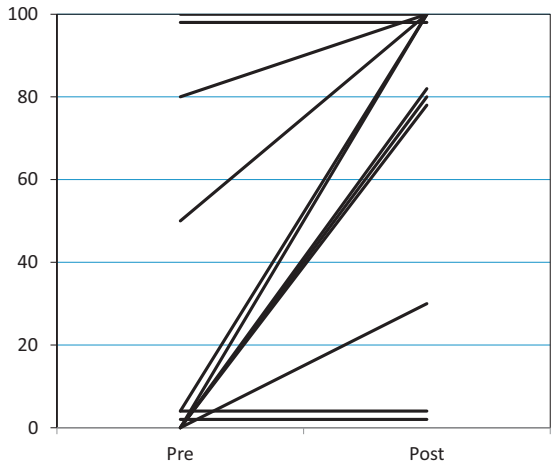

Fig. 1. Change in the amount of meals before and after bypass operation.

Table 3
Chemoradiation therapy.

Variable	
Chemotherapy	
Low-dose CF(pre-operation)	4
Low-dose CF(post-operation)	4
Standard CF(pre-operation)	1
Standard CF(post-operation)	3
Radiotherapy	
Pre-operation	5
Post-operation	5

3.2. Chemoradiation therapy

In all cases, chemotherapy 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-

tively the patient convalesced well and adjuvant chemotherapy (cisplatin + fluorouracil:CF) was initiated. Radiotherapy was not performed given her advanced age. She had no respiratory symptoms and died 11 months after the bypass.

3.3.2. Case 2

A 66-year-old woman was admitted to our hospital complaining of inability to tolerate food, throat pain, cough, and hoarseness. Esophagoscopy revealed a type 2 tumor in the middle part of esophagus, and the lesion was unable to be traversed with the camera. Bronchoscopy revealed invasion of the tumor into the left main bronchus with a fistula. She spiked fever of 39 °C preoperatively. Bypass surgery was thus performed. She defervesced on the third postoperative day, and tolerated food one week after surgery. She did well for 12 months with adjuvant therapy, after which time she succumbed to pneumonia.

3.3.3. Case 3

A 78-year-old man was admitted to our hospital complaining of hematemesis. Esophagoscopy revealed esophageal cancer. He could not tolerate solids while in the hospital. We deemed resection possible and performed a thoracotomy. It was noted intraoperatively that the tumor had invaded the lower lobe of the right lung and the left mainstem bronchus, making the tumor unresectable. Bypass surgery was performed. He convalesced well and tolerated food on the 8th postoperative day, and was discharged on the 17th postoperative day. One month after discharge, he underwent 59.4 Gy of radiotherapy in addition to chemotherapy. He died from massive hemoptysis 17 months after his bypass surgery.

4. Discussion

It has been reported that esophago-respiratory tract fistulae occur in 5–15% of esophageal cancers [6]. In an advanced esophageal cancer complicated by a fistula, chemoradiation is the primary treatment modality. However, esophageal cancer that forms a tracheobronchial fistula can lead to inability to tolerate oral feeding as well as respiratory symptoms and pneumonia, all of which 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 a contributed with the study design, data recollection, data analysis, and writing the paper.

Guarantor

Masahiro Kimura.

References

[1] T. Aoki, Y. Osaka, Y. Takagi, Comparative study of self-expandable metallic stent and bypass surgery for inoperable esophageal cancer, Dis. Esophagus 14 (2001) 208–211.
[2] A.A. Conlan, N. Nicolaou, C.A. Hammond, Restrosternal gastric bypass for inoperable esophageal cancer: a report of 71 patients, Ann. Thoracic. Surg. 36 (1983) 396–401.
[3] A. Eroglu, A. Turkyilmaz, M. Subasi, N. Karaoglanoglu, The use of self-expandable metallic stents for palliative treatment of inoperable esophageal cancer, Dis. Esophagus 23 (2010) 64–70.

[4] M. Al-Haddad, C.A. Craig, J. Odell, O. Pajaro, M.B. Wallace, The use of self-expandable plastic stents for non-malignant esophago-pleural fistulas, Dis. Esophagus 20 (6) (2007) 538–541.
[5] R.W. Postlethwait, Technique for isoperistaltic gastric tube for esophageal bypass, Ann. Surg. 6 (1979) 673–676.
[6] A.G. Little, M.K. Ferguson, T.R. Demmester, P.C. Hoffman, D.B. Skinner, Esophageal carcinoma with respiratory tract fistula, Cancer 53 (1984) 1322–1328.
[7] R. Cantero, A.J. Torres, F. Hernando, Palliative treatment of esophageal cancer: self-expanding metal stents versus Postlethwait technique, Hepatogastroenterology 46 (1999) 971–976.
[8] T. Hanagiri, M. Morita, Y. Shigematsu, M. Takenaka, S. Oka, Y. Nagata, H. Shimokawa, H. Uramoto, F. Tanaka, Esophageal bypass using a gastric tube for a malignant tracheoesophageal/bronchoesophageal fistula: a report of 4 cases, Int. Surg. 96 (2011) 189–193.
[9] J. Hihara, Y. Hamai, M. Emi, Y. Aoki, J. Taomoto, Y. Miyata, M. Okada, Esophageal operation prior to definitive chemoradiotherapy in advanced esophageal cancer with tracheobronchial invasion, Ann. Thorac. Surg. 97 (2014) 290–295.
[10] Y. Aoki, J. Hihara, K. Sakogawa, J. Taomoto, Y. Hamai, M. Emi, M. Okada, Advanced esophageal cancer with an esophago-bronchial fistula successfully treated by chemoradiotherapy following esophageal bypass surgery: report of a case, Surg. Today 42 (2012) 1088–1090.