

## Gastrotracheal fistula: Treatment with a covered self-expanding Y-shaped metallic stent

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### Abstract

A 67-year-old man had a severe cough and pulmonary infection for 1 wk before seeking evaluation at our hospital. He had undergone esophagectomy with gastric pull-up and radiotherapy for esophageal cancer 3 years previously. After admission to our hospital, gastroscopy and bronchoscopy revealed a fistulous communication between the posterior tracheal wall

near the carina and the upper residual stomach. We measured the diameter of the trachea and bronchus and determined the site and size of the fistula using multislice computed tomography and gastroscopy. A covered self-expanding Y-shaped metallic stent was implanted into the trachea and bronchus. Subsequently, the fistula was closed completely. The patient tolerated the stent well and had good palliation of his symptoms.

**Key words:** Gastrotracheal fistula; Y-shaped metallic stent; Esophageal cancer; Gastroesophageal surgery

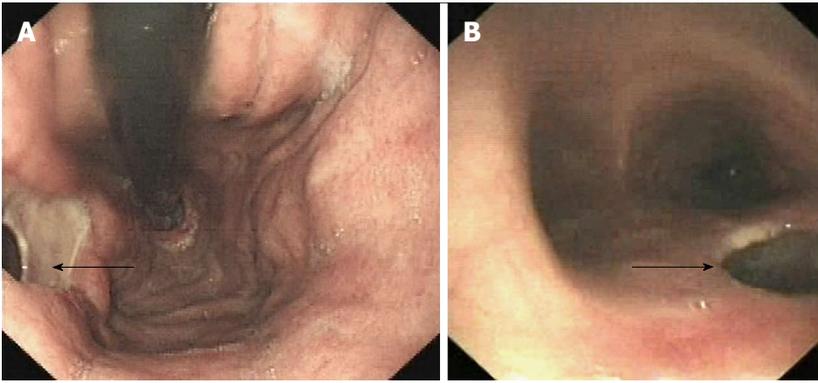
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**Core tip:** Gastrotracheal fistula (GTF), the fistula between the tracheobronchial tree and stomach after gastric pull-up surgery, is an extremely rare complication of esophagectomy and the condition is life-threatening. For these patients, the goal of therapy is palliative rather than curative. During the past decade, metallic airway stents have been used in patients with GTFs. However, fistulas close to the carina often require the placement of Y-shaped stents for successful palliation. We report a patient post-esophagectomy with a GTF near the carina that was successfully treated with a covered self-expanding Y-shaped metallic stent.

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### INTRODUCTION

A gastrotracheal fistula (GTF), the fistula between the tracheobronchial tree and stomach after gastric



**Figure 1** Gastroscopy revealed a fistula (arrow, A) in the upper body of the stomach, bronchoscopy confirmed the presence of a fistula (arrow, B) in the lower trachea near the carina.

pull-up surgery, is an extremely rare complication of esophagectomy and the condition is life-threatening<sup>[1]</sup>. If a malignant GTF is untreated, the patient will suffer continued tracheobronchial soilage, develop pulmonary sepsis rapidly and die. The average survival of patients with this complication is 1-6 wk with supportive care alone<sup>[2]</sup>. For these patients, the goal of therapy is palliative rather than curative. During the past decade, metallic airway stents, such as covered self-expandable metal stents (SEMS), have been used in patients with GTFs. Various studies<sup>[3,4]</sup> involving the use of covered SEMS or partially covered SEMS for malignant fistulas have proved that 87%-91% of patients acquire successful fistula closure. Inserting a covered metallic airway stent into the trachea or bronchus has proven to be an effective method to seal off the fistula<sup>[5]</sup>. However, fistulas close to the carina often require the placement of Y-shaped stents for successful palliation<sup>[6]</sup>. We report a patient post-esophagectomy with a GTF near the carina that was successfully treated with a covered self-expanding Y-shaped metallic stent.

## CASE REPORT

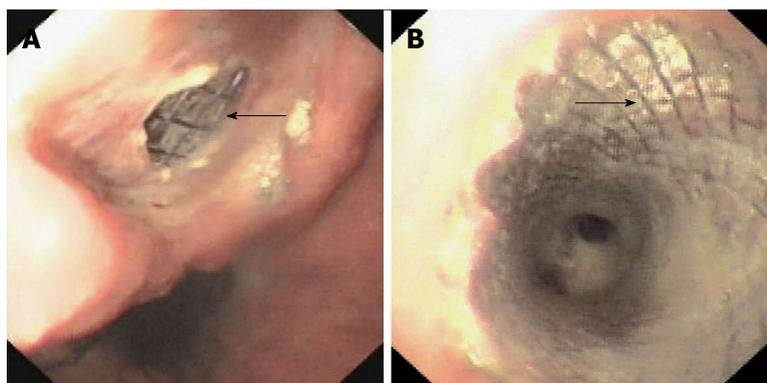
A 67-year-old man had a severe cough and pulmonary infection for 1 wk before admission to our hospital. He had undergone esophagectomy with a gastric pull-up and radiotherapy for esophageal cancer 3 years previously. After admission to our hospital, gastroscopy revealed a fistula in the upper body of the stomach (Figure 1A) and bronchoscopy confirmed the presence of a fistula in the lower trachea near the carina (Figure 1B). We measured the diameter of the trachea and bronchus and determined the site and size of the fistula using multislice computed tomography (CT) and gastroscopy. A covered self-expanding Y-shaped metallic stent (body, 30 mm × 70 mm; right limb, 14 mm × 30 mm; left limb, 18 mm × 40 mm, Changzhou New District Garson Medical Stent Apparatus Co., Ltd, Changzhou, Jiangsu province, China) was implanted into the trachea and bronchus. Stent insertion was performed fluoroscopically, controlled by flexible bronchoscopy under general anesthesia and jet

ventilation. Correct placement was ensured by inserting 2 guide wires in both main bronchi. The 2 bronchial arms of the Y-stent were introduced over the 2 guide wires. Utmost care was taken that these wires did not cross inside the trachea but ran parallel when introducing the stent over these wires. After both bronchial arms opened completely, the tracheal part was released. Subsequently, the fistula was closed completely. After stent placement, gastroscopy (Figure 2A) and bronchoscopy (Figure 2B) confirmed that the Y-stent tightly sealed the fistula. Fluoroscopy also revealed correct placement of the stent (Figure 3). The patient tolerated the stent well and the cough and pulmonary infection improved after the stent placement. However, he died of disease progression with a patent stent 1 mo later.

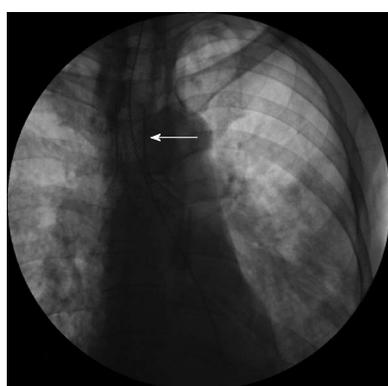
## DISCUSSION

GTF is an extremely rare complication and can most often be observed after gastroesophageal surgery<sup>[1]</sup>. GTF may develop because of dissection injury or post-operative mediastinitis in the early post-operative period. GTF occurring in the late post-operative period is most often due to tumor recurrence, radiation necrosis and tracheobronchial erosion along the gastric staple-line<sup>[7]</sup>. CT scanning can demonstrate the defect between the trachea and the residual stomach. Bronchoscopy and gastroscopy are helpful for the identification and localization of the fistula.

The treatment options for GTF include surgery, external drainage and endoscopic treatment. Surgical repair of the fistula, which includes tracheal resection, lower lobectomy or creation of a muscle flap, may impose an excessive burden on a debilitated patient<sup>[2]</sup>. Therefore, the use of covered metallic stents is a good choice in the palliative treatment of these patients. Recently, Han *et al*<sup>[8]</sup> reported that metallic stent placement for tracheobronchial diseases was technically successful in 96% of patients, with 85% of patients presenting with symptom improvement 1-7 d after stent placement. Furthermore, for the patient with a thermic effect of feeding (TEF), maintaining sufficient ventilation is



**Figure 2** Gastroscopy confirmed that the Y-stent tightly sealed the fistula (arrow, A), bronchoscopy confirmed that the Y-stent tightly sealed the fistula (arrow, B).



**Figure 3** Fluoroscopy image. Fluoroscopy revealed the correct placement of the stent (arrow).

difficult. Passing the fistula with the bronchoscope and ventilating the patient through the bronchoscope lying distally to the fistula is usually possible without problems in a high TEF. However, in a fistula at the level of the tracheal bifurcation or near the carina, it is not feasible. Thus, jet ventilation is necessary. In our case, stent insertion was performed under general anesthesia with jet ventilation.

However, choosing a stent that will fully cover the fistula and allow sufficient tolerance compression is very important for successful stenting. For the patient described herein, the replaced stomach showed a large lumen compared with the lumen of the original esophagus. Therefore, esophageal stenting was not feasible. After consultation with specialists, we chose the covered self-expanding Y-shaped metallic stent.

The self-expanding Y-shaped metallic stents not only cover the fistula, but also have lower rates of migration because they imitate the bifurcation and attach to the main carina<sup>[9]</sup>. When the metallic stent is in place, it can expand to fill the space between the stent and the mucosa. The flexibility and radial force enable stents to fit the contours of the trachea or bronchus and make stents well-suited to prevent luminal contents from leaking<sup>[4]</sup>.

However, metallic stents are not as effective against

neoplasms and proliferating granulation tissue. One of the Y stent-related complications is the retention of secretions because the cilia cannot function when a covered metal stent is in place. Prevention of these stent-related complications remains one of the major challenges for developing new stent designs.

GTF is a rare but serious complication which is most often encountered after gastroesophageal surgery. The implantation of a covered self-expanding Y-shaped metallic stent proved to be an effective treatment for a GTF.

## COMMENTS

### Case characteristics

A 67-year-old man had a severe cough and pulmonary infection for 1 wk before seeking evaluation at our hospital.

### Clinical diagnosis

He had undergone esophagectomy with gastric pull-up and radiotherapy for esophageal cancer 3 years previously. After admission to the hospital, gastroscopy and bronchoscopy revealed a fistulous communication between the posterior tracheal wall near the carina and the upper residual stomach.

### Imaging diagnosis

The authors measured the diameter of the trachea and bronchus and determined the site and size of the fistula using multislice computed tomography and gastroscopy.

### Treatment

A covered self-expanding Y-shaped metallic stent was implanted into the trachea and bronchus. Subsequently, the fistula was closed completely.

### Experiences and lessons

The patient tolerated the stent well and had good palliation of his symptoms.

### Peer review

In this article, the authors describe the case of a 67-year-old man with a gastrotracheal fistula after an esophagectomy with gastric pull-up, which was conservatively treated by the bronchoscopic placement of a covered self-expanding Y stent.

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