Case report

Non-malignant tracheo-gastric fistula following esophagectomy for cancer

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Abstract

Two cases of neoesophago-tracheal fistula are described. After esophagectomy for cancer a fistula developed between the trachea and the pulled-up stomach probably because of the ischaemic effect of the tracheostomy tube. At single stage repairs, the fistulae were divided and the gastric defects were closed directly. In one case, tracheal resection and anastomosis was necessary. The defect on the membranous trachea in both cases was patched with an autologous fascia lata graft. A left pectoralis major muscle flap was interposed between the suture lines to prevent recurrence of the fistula. Treatment of this potentially life-threatening and rare condition yielded excellent results. © 2000 Elsevier Science B.V. All rights reserved.

Keywords: Tracheal surgery; Tracheo-gastric fistula; Complications of esophagectomy

1. Introduction

Reconstruction of the esophagus is associated with many complications. One of the most dangerous, a benign respiratory-neoesophageal fistula is rare [1,2]. In our series of 350 esophagectomies between 1993 and 1999 the presented two cases have occurred. The main causes of this fistula are tracheal erosion by the gastric staple line [3], gastric erosion by the tracheostomy tube, overinflation of the endotracheal tube balloon [4], preoperative radiotherapy [5], gastric-tube ulcers [6], anastomotic insufficiency and any local inflammatory process of the trachea, mediastinum or the neoesophagus.

2. Case 1

A 53-year-old male patient with a middle third esophageal cancer underwent transthoracic en-bloc esophagectomy, two-field lymphadenectomy and gastric pull-up with cervical anastomosis. The patient needed ventilatory support in the postoperative period. On the 5th day clinical signs of anastomotic insufficiency necessitated reoperation. The disintegrated anterior wall of the esophago-gastric anastomosis was redone and a formal tracheostomy was performed. After discharge from the intensive care unit the tracheostomy tube was removed. Attempts at oral feeding were started, but failed because the patient regularly had coughing attacks during swallowing. Endoscopy and radiology revealed only a moderate anastomotic stricture. A series of endoscopic dilatations were performed and the patient was discharged with a thin nasogastric feeding tube. Two weeks later he was admitted with stridor and dyspnea. Emergency bronchoscopy revealed a severe tracheal stricture at the level of the preceding tracheostomy and a tracheo-gastric fistula just below the strictured segment. The patient was operated upon. Exploration via a wide collar incision confirmed the tracheal stricture at the level of the third and fourth rings and a neoesophagotracheal fistula, 2.5 cm in diameter between the pulled-up stomach and the membranous trachea. After dividing the organs at the level of the fistula, the stomach was closed directly in two layers. Using cross-field intubation, the four strictured tracheal rings were resected. After standard tracheal mobilization the cartilaginous part of the tracheal ends could be brought together and anastomosed in the usual manner with interrupted 3/0 stitches, with the knots outside, and without tension. The discontinuity of the membranous trachea was too large for the circumferential resection of the strictured tracheal rings. The missing posterior tracheal wall was replaced with autologous fascia lata. A pectoralis major muscle flap was interposed between the suture lines. A Montgomery T tube was left behind as a safety measure, because of the delayed reconstruction. The interposed pectoralis flap was wound around the trachea in the last step to strenghten the anastomosis with an additional

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layer (Fig. 1). The patient was discharged 22 days following the tracheal resection. At the 6 months follow-up the Montgomery tube was removed. The patient has done well, without any respiratory and swallowing complaints. He died one year after the tracheal operation because of brain metastases.

3. Case 2

A 46-year-old man with a middle third esophageal cancer underwent transthoracic en-bloc esophagectomy, two-field lymphadenectomy and gastric pull-up with cervical anastomosis. In the postoperative period a bronchopneumonia developed, and he required artificial ventilation via a tracheostomy. During the next 2 weeks weaning from ventilation was attempted several times with only temporary success. Bronchoscopy revealed a circumscribed defect of the membranous trachea at the point where the tracheostomy tube pressed against the wall. Through the previous collar incision the gastro-tracheal fistula was explored. A membranous tracheal defect, 1.5 cm in diameter was found. During dissection the inflamed membranous trachea was injured, and a further 1 cm tracheal tear was caused. The tear and the gastric defect were closed directly. The membranous tracheal defect was patched with autologous fascia lata. A pectoralis major muscle flap was prepared to separate the suture lines. The patient was discharged 21 days after tracheal surgery. At the 6 months follow-up he presented with normal respiratory and swallowing function.

4. Discussion

Fistula formation between the respiratory and gastrointestinal tract is a potentially fatal complication requiring early intervention.

In our cases the site of the fistulae were on the membranous part of the trachea a few centimetres below the level of the tracheostomy, where the lower end of the tube touched the posterior wall. This localization suggests that the tracheostomy tube was responsible for the fistula. When a patient with a tracheostomy needs a nasogastric tube the risk of fistula formation is higher at the critical point where the mucosa of the tracheal and (neo)esophageal wall are under pressure from both sides at the same time [7]. In a ventilated patient when the connection to the ventilator or other appendages jointed to the endotracheal tube tilts the tube forward – burdening it caudal to the stoma - the inner piece of the endotracheal tube exerts especially high pressure on the posterior tracheal wall (Fig. 2). This life threatening complication can be prevented by avoiding overinflation of the endotracheal tube cuff and the concomitant use of a stiff nasogastric tube or to use low pressure or pressure controlled cuffs [7], and by avoiding situations, when the above mentioned tilting of the tube can occur with supporting any appendages jointed to the tube.

Patients usually present with a sudden increase in tracheal secretions causing dyspnea, acute respiratory distress, aspiration pneumonia or coughing attacks after drinking.

![Fig. 1. (a) Topographical sketch of the reconstruction. The tracheal anastomosis with the Montgomery T tube and the interposed pectoralis muscle flap (arrow) – anterolateral view. (b) The sutured gastric wall and the membranous trachea patched with fascia lata (arrow) – posterolateral view.](https://academic.oup.com/ejcts/article-abstract/18/3/363/474148)

![Fig. 2. Hypothetical mechanism of the tracheo-(neo)esophageal fistula formation. The curved arrow represents the tilting of the endotracheal tube caused by the weight of the appendages. The straight arrow represents the pressure exerted on the posterior tracheal wall by the tube.](https://academic.oup.com/ejcts/article-abstract/18/3/363/474148)
and coughing up gastric (bile) content. The plain chest radiograph may demonstrate a dilated, air-filled (neo)esophagus below the level of the fistula. Barium contrast studies in most cases demonstrate the fistula. Endoscopy and bronchoscopy can directly visualize the defect.

It can be difficult to differentiate between the many causes of aspiration in patients with esophageal replacement. The misdirection of fluid into the trachea may be functional due to prolonged ventilation or recurrent nerve palsy, or organic due to anastomotic stricture or an esophago-tracheal fistula. In our first case, an anastomotic stricture was the suspected cause of aspiration supported by its relatively higher occurrence, the patient’s history of anastomotic insufficiency and the endoscopic finding of mild esophago-gastric anastomosis stricture.

Once the diagnosis of a benign tracheo-esophageal fistula has been established, an early single stage repair is suggested [7]. If the patient needs mechanical ventilation, conservative approach (placing the tracheal tube balloon below the fistula, elevating the head of the bed, inserting a gastrostomy tube for drainage and a jejunostomy tube for nutrition) should be chosen, and after weaning from ventilation, an operative repair can be performed.

The keywords of repair are:

- identification and division of the fistula;
- direct closure of the (neo)esophageal defect;
- resection of the damaged portion of the trachea and anastomosis;
- separating and buttressing the suture lines with a pedicled muscle flap.

In our cases, the large defect necessitated replacing the missing membranous tracheal wall with a patch of autologous fascia lata. Other authors solved this problem by using patch of autologous pericardium [3,4], pleura [3,4] or bovine pericardium [1].

In two of the published cases, the fistula occurred at the level of the esophago-gastric anastomosis [4]. In the other cases, the body of the gastric tube was involved in the fistula formation. The respiratory part of the fistula was the membranous trachea in seven cases [8,9], and the others, the bronchus.

References