

Case Report

Complex tracheal lesion: correction with an intercostal muscle pedicle flap*

Lesão complexa da traqueia: correção com retalho pediculado de músculo intercostal

Hylas Paiva da Costa Ferreira, Carlos Alberto Almeida de Araújo, Jeancarlo Fernandes Cavalcante, Ronnie Peterson de Melo Lima

Abstract

Esophageal reconstruction is one of the most complex types of gastrointestinal surgery, principally when it is performed using minimally invasive techniques. The procedure is associated with various complications, such as anastomotic dehiscence, chylothorax, esophageal necrosis and fistulae. We report the case of a patient diagnosed with epidermoid carcinoma in the distal third of the esophagus. The patient was submitted to esophagectomy by video-assisted thoracoscopy and laparoscopy. During the operation, the left main bronchus was injured, and this required immediate surgical correction. In the postoperative period, the patient presented with acute respiratory failure and profuse air leak through the thoracic drains and through the cervical surgical wound. The patient underwent a second surgical procedure, during which a large lesion was discovered in the membranous wall of the trachea. The lesion was corrected with an intercostal muscle pedicle flap.

Keywords: Trachea; Esophageal fistula; Respiratory tract fistula; Intercostal muscles; Esophagectomy.

Resumo

A reconstrução esofágica é uma das mais complexas cirurgias do aparelho digestivo, principalmente quando realizada por técnicas minimamente invasivas. Esse procedimento está associado a inúmeras complicações, como deiscência de anastomose, quilotorax, necrose do tubo gástrico e fistulas. Relatamos o caso de um paciente com o diagnóstico de carcinoma epidermoide no terço distal do esôfago que foi submetido à uma esofagectomia por videotoracoscopia e laparoscopia. Durante o ato operatório, houve lesão do brônquio principal esquerdo, sendo necessária a correção cirúrgica imediata da lesão. No pós-operatório, o paciente evoluiu com insuficiência respiratória aguda e grande escape aéreo pelos drenos de tórax e pela ferida operatória cervical. Foi submetido à nova intervenção cirúrgica, através da qual se observou uma grande lesão na parede membranosa da traqueia, que foi corrigida com um retalho de músculo intercostal.

Descritores: Traqueia; Fístula esofágica; Fístula do sistema respiratório; Músculos intercostais; Esophagectomia.

Introduction

Esophagectomy is a procedure that has high morbidity and mortality, despite the better selection of patients for surgery, the advances in the surgical techniques and the intensive care treatment.^(1,2) Some complications associated with this procedure include stenosis or dehiscence of the esophagogastric anastomosis, fistulae, chylothorax, esophageal necrosis and cardiopulmonary complications.⁽³⁾

Esophageal reconstruction is one of the most complex types of gastrointestinal surgery, principally when it is performed using minimally invasive techniques.⁽²⁾ Fistulae involving the trachea, the bronchi and the neoesophagus are extremely rare, constituting one of the most feared complications of esophagectomy.⁽⁴⁾ The patient who presents with this type of complication can have acute respiratory failure, recurrent

* Study carried out in the Department of Thoracic Surgery, Onofre Lopes University Hospital, Federal University of Rio Grande do Norte, Natal, Brazil.

Correspondence to: Hylas Paiva da Costa Ferreira. Rua Raimundo Chaves, 2231, apto 201, Candelária, CEP 59064-390, Natal, RN, Brasil.

Tel 55 84 4009-2030. E-mail: hylasferreira@gmail.com

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bronchopneumonia or mediastinitis.^(4,5) Signs suggestive of tracheal lesion include significant air leak through the thoracic drains and through the cervical surgical wound, as well as subcutaneous emphysema.⁽⁶⁾ Chief among the etiologies described in the literature is tracheal erosion caused by gastric juices, derived from the fistula, in the esophagogastric anastomosis, associated with tracheal tube cuff overinflation and neoadjuvant radiotherapy as possible causes.⁽⁷⁾ Here, we report the case of a patient diagnosed with epidermoid carcinoma in the esophagus. The patient was submitted to esophagectomy by video-assisted thoracoscopy and laparoscopy.

Case report

A 56-year old male patient diagnosed with poorly differentiated epidermoid carcinoma in the distal third of the esophagus was referred to the Onofre Lopes University Hospital. He had been a marathon runner for 20 years and he smoked a pipe for 40 years, having stopped 2 years prior.

Upper digestive tract endoscopy revealed a vegetative lesion measuring 1.5 cm. A CT scan of the chest and abdomen revealed no signs of advanced disease.

Therefore, the patient was submitted to a total (three-field technique) esophagectomy with mediastinal and celiac lymphadenectomy, as well as esophageal reconstruction, associated with a jejunostomy, which was performed by the gastrointestinal surgery team of the hospital mentioned above. During the mediastinal lymphadenectomy, the medial wall of the left main bronchus was injured approximately 1.5 cm from the tracheal carina, and bronchial suture was performed. On postoperative day 7, the patient presented with dyspnea and an increased output rate through the drains (right drain output rate: 2,500 mL/24h of an opaque liquid, and chylothorax was confirmed). Pulmonary auscultation revealed absent breath sounds on the right, with air leak through the ipsilateral tube. Chest X-ray confirmed a right pneumothorax, and, subsequently, bronchoscopy revealed bronchial suture dehiscence.

A right posterolateral thoracotomy was performed together with bronchial suture and bronchial protection with an intercostal muscle pedicle flap, followed by thoracic duct ligation during the same operation. In the immediate

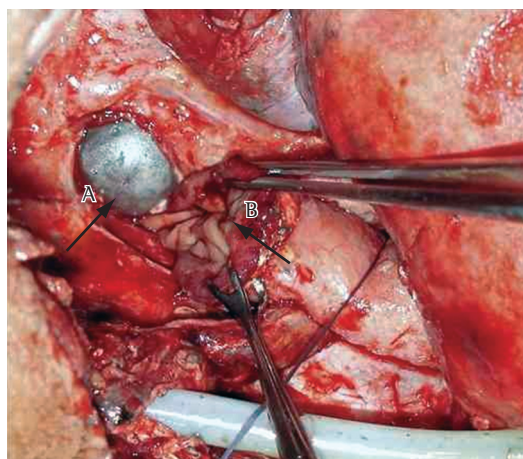


Figure 1 – Tracheal lesion. Initial aspect of the tracheal lesion (tracheal cuff herniation; arrow a). Gastric tube (with dehiscence) on the lesion area (arrow b).

postoperative period, a second bronchoscopy showed that the bronchial lesion had resolved completely.

On the day following extubation, the patient presented with dyspnea and signs of respiratory failure and was reintubated. On postoperative day 14, when the patient was moved, it was observed that there was a profuse air leak through the thoracic drain and through the cervical surgical wound. In addition, it was observed that, when the tracheal tube was advanced to the distal position close to the tracheal carina, the air leak ceased.

A second thoracotomy revealed a large lesion involving approximately 4 cm of the membranous wall of the trachea, where the orotracheal tube cuff, herniated by the tracheal lesion, and

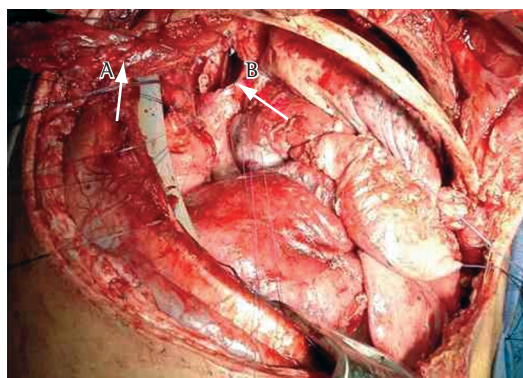


Figure 2 – Tracheal lesion. Intercostal muscle pedicle flap (arrow a). Exposure of the tracheal lesion with suture preparation for the muscle flap (arrow b).

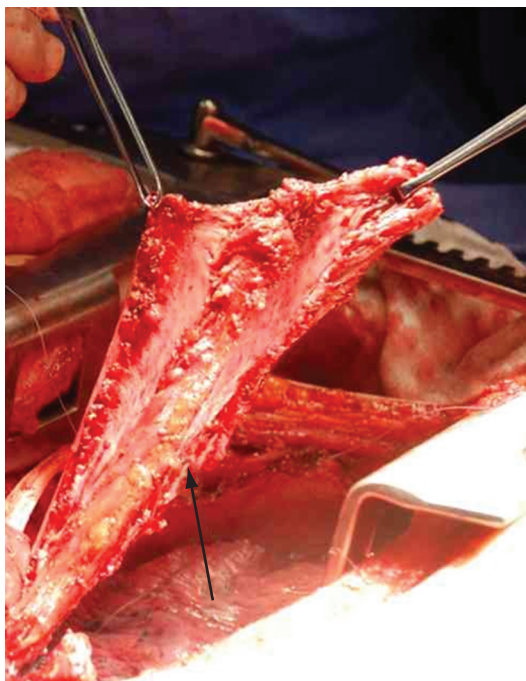


Figure 3 – Intercostal muscle pedicle flap (arrow: two costal arches).

esophagogastric anastomotic dehiscence were observed (Figure 1). The lesion that had been surgically corrected in the left main bronchus was found to be whole.

Due to the poor sutural status of the membranous wall of the trachea and the severity of the patient's condition, tracheostomy was not possible, and we chose to perform the correction with the use of an intercostal muscle pedicle flap (two intercostal segments; Figures 2 and 3), which was anchored in the cartilaginous walls of the trachea, correcting the defect of its membranous wall. An indwelling gastric tube was inserted into the pleural cavity, and cervical esophagostomy was performed.

A follow-up bronchoscopy revealed good healing of the trachea, with no signs of fistula or intratracheal granuloma. Five months later, the general health status of the patient improved, and the gastrointestinal transit was reconstructed with colon segments.

Discussion

After esophageal resection, the food transit needs to be reconstructed, and, to that end, the colon, the jejunum or the stomach can be used, the last being the organ most commonly used

due to its good vascularization and its great capacity for movement.^(1,2)

Esophagectomy continues to have high morbidity and mortality, despite the better selection of patients, the advances in the surgical techniques and the intensive care treatment. Among the various complications are recurrent laryngeal nerve injury, mediastinal hemorrhage, tracheal lesion, esophageal necrosis, cardiopulmonary complications, chylothorax, esophagogastric anastomotic dehiscence, fistulae and gastroesophageal reflux.^(2,3) At less experienced centers, mortality after esophagectomy can reach values close to 25%.⁽²⁾ A review performed between 1980 and 1990 showed that the incidence of esophagogastric anastomotic dehiscence is approximately 12%, the incidence of cervical anastomotic dehiscence being higher than the incidence of intrathoracic anastomotic dehiscence.⁽¹⁾

Air fistulae resulting from lesions of the trachea or main stem bronchi are severe complications that frequently lead to respiratory failure and death.⁽⁴⁾ Among the causes of tracheo-bronchial lesions after esophageal resection are surgical trauma with direct injury to the structures, esophagogastric anastomotic dehiscence, peritracheal infection, orotracheal intubation with cuff overinflation and extensive upper mediastinal lymphadenectomy, which causes devascularization of the trachea and main stem bronchi.^(4,8) Among those causes, the ones most closely related to tracheal lesion are esophagogastric anastomotic dehiscence with caustic erosion of the trachea and ischemia resulting from extensive mediastinal lymphadenectomy.⁽⁴⁾

Although esophagogastric anastomotic dehiscence occurs in 6-13% of the cases and despite the strong anatomic relationship among the trachea, the bronchi and the neoesophagus, fistula formation between the gastric tube and the airways occurs in a much smaller percentage.^(5,9) One group of authors observed that, of the 383 patients submitted to esophagectomy, only 1 had this complication, which corresponds to an incidence of approximately 0.3%.⁽⁵⁾

Patients who present with a fistula between the esophagogastric anastomosis and the trachea in the postoperative period after an esophagectomy can have sudden-onset dyspnea, increased tracheal secretions, recurrent bronchopneumonia, acute respiratory failure, cough, weight

loss and mediastinitis, in addition to the possible occurrence of subcutaneous emphysema, air leak through the thoracic drains and air leak through the cervical surgical wound, these three last occurrences being highly suggestive of tracheal lesion.^(4,7,10)

An analysis of tracheobronchial lesions with formation of an air fistula after esophagectomy showed a mortality rate of 32.2% in the patients who presented with this complication. In addition, depending on the etiology of the fistula, approximately 50% of the patients with a fistula of ischemic origin died.⁽⁴⁾

In the case reported here, the lesion appeared in the membranous wall of the intrathoracic trachea, in the same place where the orotracheal tube cuff was located, suggesting that the pressure exerted by the cuff was one of the responsible factors, in view of the fact that this pressure caused local ischemia, leading to necrosis of the membranous wall segment of the trachea. In addition, there was esophagogastric anastomotic dehiscence with caustic injury (gastric juices) in the area mentioned previously. Associated with these factors, the extensive mediastinal lymphadenectomy performed during the esophageal resection probably contributed to the tracheal ischemia.

Therefore, we concluded that a series of factors, among which are the devascularization of the trachea caused by the mediastinal lymphadenectomy, the tracheal ischemia caused by the orotracheal tube and a possible caustic injury caused by the esophagogastric anastomotic dehiscence, contributed to the tracheal

lesion. Intercostal muscle pedicle flaps are an excellent alternative for the correction of complex tracheal lesions and the reinforcement of tracheal sutures.

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About the authors

Hylas Paiva da Costa Ferreira

Assistant Professor of Thoracic Surgery. Federal University of Rio Grande do Norte, Natal, Brazil.

Carlos Alberto Almeida de Araújo

Adjunct Professor of Thoracic Surgery. Federal University of Rio Grande do Norte, Natal, Brazil.

Jeancarlo Fernandes Cavalcante

Adjunct Professor. Department of Integrated Medicine, Federal University of Rio Grande do Norte, Natal, Brazil.

Ronnie Peterson de Melo Lima

Doctoral Student in Medicine. Federal University of Rio Grande do Norte, Natal, Brazil.