Disconnection of giant tracheoesophageal fistula using musculocutaneous flap of greater pectoral muscle

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ABSTRACT

A 68 years old female patient, was admitted with the diagnosis of postoperative tracheoesophageal fistula after long-time artificial lung ventilation. 1.5 years ago the patient had an operation – removal of trigeminal ganglion neurinoma. She had also right-side hemiparesis, sensor-motor aphasia, gastrostoma fistula, chronic abscess of inferior lobe of right lung. Gastrroduodenoscopy has shown a tracheoesophageal fistula, whose upper part was located at the anterior wall of esophagus 18 cm from the incisors, lower part - at the distance 25 cm. On 15th day of hospitalization the patient underwent an operation of disconnection of tracheoesophageal fistula with trachea membranous wall grafting using musculocutaneous flap from greater pectoral muscle. The patient was discharged in satisfactory condition on 20th day. At the check in 3 month the tracheal anastomosis was normal, there were no signs of a stenosis.

Key words: tracheo-esophageal fistula

1. Introduction

Treatment of extensive tracheoesophageal fistulas is one of many challenges of thoracic surgery. At the moment of diagnosis, most patients already have or had severe infectious complications of lungs, mediastinum and pericardium. Long-time clinical course of fistula results in rigid fibrous capsule around the fistula between trachea and esophagus, this capsule complicates local flaps grafting. Finally, the operation is usually carried out at chronic inflammatory process that results in considerable deterioration of wound healing and in increase in risk of repeated complications. The purpose of the publication is a demonstration of importance of giant tracheoesophageal fistula reconstruction using musculocutaneous flap of greater pectoral muscle.

2. Case report

A 68 years old female patient, was hospitalized for the first time to the thoracic surgery department with the diagnosis: Postoperative tracheoesophageal fistula. Tracheostome. Right-side hemiparesis, sensor-motor aphasia. Gastric fistula. Chronic abscess of inferior lobe of right lung. Anamnesis: 1.5 years ago the patient had an operation – removal of trigeminal ganglion neurinoma. The postoperative period was complicated by hematoma in cervical area and long-time artificial lung ventilation for 25 days. In a month the patient developed tracheoesophageal fistula that required establishment of gastrostoma and tracheostoma. At the moment of admission to the clinic the patient’s condition was medium-grave. Due to expressed weakness the patient could not walk. Examination has shown skin pallor, unpleasant smell from tracheostome cannula, purulent exopertoration from the tracheostome. There was also mild pyrexia - 37.3°C and anemia – Hb - 90 g/l. Gastrroduodenoscopy has shown a tracheoesophageal fistula, whose upper part was located at the anterior wall of esophagus 18 cm from the incisors, lower part - at the distance 25 cm. The mucous tunic in the area of fistula was pink, smooth, without any signs of inflammation. Tracheostome tube with a cuff was visible through the fistula opening. Fiber-optic bronchoscopy has shown, that lower end of tracheostome tube was located 0.5 cm above carina. Examination after removal of intubation tube has shown mobility of vocal cords. Internal opening of tracheostoma channel was located on 4 cm from the chords. Trachea lumen above and below the tracheostome opening was not narrowed. Tracheoesophageal fistula was located at the level of the lower part of tracheostome opening at the posterior wall of trachea. Due to absence of membranous
part, the length of connection between trachea and esophagus was 7 cm. The distance from the lower part of the fistula to carina has made 1.5 cm. Mucous tunic of trachea and bronchial tubes was moderately edematous and hyperemic. During ingestion the saliva was flowing to the tracheal lumen.

Computed tomography below the throat level has shown a defect with dimensions 6.5 cm x 3.2 cm between the posterior wall of trachea and anterior wall of esophagus. The defect affected whole posterior wall of suprathoracic part of trachea (Fig. 1). The volume of right lung was reduced. The projection S6 of the right lung had plural dry cavities, diameter up to 5 mm, residual infiltrative changes, thickening of visceral and parietal pleura.

The sputum inoculation in preoperative period has shown hospital strain of Pseudomonas aeruginosa. After antibacterial therapy (ceftazidim 4 gr/day) the temperature has normalized, purulent expectoration has considerably decreased, radiological picture has improved. Intensive nutritive support and neurotropic therapy resulted in stabilization of general condition of the patient and decrease in neurologic deficit. The situation was complicated because in 1988 the patient had radical Halsted's mastectomy concerning ductal carcinoma of the right mammary gland (T2N0M0). Examination has not shown any progression of the disease. Besides in 2006 for correction of intracranial hypertension the patient had an operation – ventricular-peritoneal shunt through the left part of thorax.

With the purpose of evaluation of blood supply of potential flap the patient has undergone duplex scanning of subclavian artery and its branches. There were no signs of decrease in blood flow of a thoracoacromialis basin.

On 15th day of hospitalization the patient underwent an operation of disconnection of tracheoesophageal fistula with trachea membranous wall grafting using musculocutaneous flap from greater pectoral muscle. After induction anesthesia the tracheostome tube was removed and standard intubation was carried out. The skin cut was made from left clavicle to the edge of mammary gland, than the musculocutaneous flap was mobilized with anterior and lateral walls. Transversal dissection of trachea was made at the level of lower part of tracheostoma opening, after that a respiratory shunt was made, reinforced by intubation tube. The revision has shown wide tracheoesophageal fistula with dimension 7*3 cm with surrounding cicatricial tissue. The fibrous capsule around the fistula was dissected, so it was possible to expose a healthy wall of esophagus and trachea in distal and proximal directions. The esophagus defect was closed by single vicryl sutures (3.0).

Further tracheoesophageal fistula grafting required high-frequency lung ventilation. This tactics has helped to avoid hypoxia and to provide comfortable operating conditions for the operating crew. The musculocutaneous flap was passed through the subcutaneous tunnel to the posterior mediastinum and laid with skin-to-trachea between the defect of membranous wall and sutured esophagus. The musculocutaneous flap was sutured to the edges of the defect of trachea posterior wall using single vicryl sutures. One affected ring of trachea near to the tracheostoma opening was resected. Taking into account an absence of cicatricial changes and normal trachea diameter, circular trachea Anastomosis was formed by separate vicryl sutures. The wound was closed tightly with a drain in mediastinum.

In two hours after operation the patient was extubated.
On the next day after operation the patient had a stridor signs that have required establishment of tracheostoma below the tracheal anastomosis and placement of T-shaped Montgomery stent. After that, postoperative period was normal. The sutures were removed on 12th day. Radiological examination of esophagus on 14th day after operation has shown normal act of swallowing. The esophagus is well patent along the whole length. There are no traces of leakage of contrast medium. Gastrostomy was removed on 16th day after operation. The patient was discharged in satisfactory condition on 20th day. At the check in 3 month the tracheal anastomosis was normal, there were no signs of a stenosis. (Fig 2,3). T-shaped stent was removed.

3. Discussion
From our point of view the method of choice for disconnection of large tracheoesophageal fistulas is reconstruction using musculocutaneous flap from greater pectoral muscle. The musculocutaneous flap helps, on the one hand, to tampon optimally the posterior mediastinum and to make a prosthesis for the large defect of trachea. On the other hand, well vascularized muscular layer of greater pectoral muscle reliably prevents a fistula relapse.

This technique was descrited by Seyfer A.E. et al. [1, 2]. Afterwards this kind of grafting was widely used for closing defects of trachea after combined throat operations [3]. Grillo H.C. et al. [4,5] have offered other technique. The closing of fistula was carried out by suturing or by circular resection of the affected part of trachea with one-stage connection to the defect of the flap from sternocleidomastoid or scalene muscles. Other authors suggest the following grafting materials: gastric tube [6], muscle flap from the latissimus dorsi muscle [7], or intercostals muscle [8]. These techniques were effective for treatment of small defects (up to 5 cm). But due to distant location of these grafting materials, complexity of their reconstruction and less reliable blood supply, they have not found wide application for treatment of fistulas in medium-thoracic part of trachea. In case of extensive tracheoesophageal fistulas this technique is also disputable due to high probability of development of tracheal or esophageal stenosis, and in case of circular trachea resection - development of anastomosis inconsistency.

In connection to the large expansion of fistula, there was a possibility of extension of surgical approach with sternotomy or thoracotomy that would certainly make the surgical intervention more severe for the debilitated patient. Therefore the greatest possible mobilization of trachea from the cervical approach was made, that has helped to close the giant defect of thoracic part of trachea without increase in surgical aggression. In our opinion this technique requires final trachea stenting using Montgomery’s stent. The stenting is made with the purpose of asphyxia prevention due to flap edema and for prevention of corrosive stricture of trachea in the grafting zone.
Due to success of this intervention we can count on perspectivity of such operations in seriously ill patients with extensive tracheoesophageal fistulas. More detailed estimation of the operation efficiency requires additional experience.

4. References
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