



Closing a Tracheal Defect with an Omental Pedicled Gastric Flap; A Technical Note

Holger Rupprecht¹, Marius Ghidau¹, Katharina Gaab^{1*}

¹Clinical Center Fuerth, Bavaria, Germany

*Corresponding author: Katharina Gaab
Address: Clinical Center Fuerth, Bavaria, Germany.
Tel: +49 911 7580 1201; Fax: +49 911 7580 1890
e-mail: katharina@gaab-web.de

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► ABSTRACT

Due to an adenocarcinoma of the right upper lobe with infiltration of the main bronchus a 49-years-old female patient underwent an upper bilobectomy with sleeve resection. After two completed chemotherapy bouts and signs of sepsis another thoracotomy was inevitable. As a complicating factor a supracarinal, necrotic and perforating lesion of the trachea appeared. The defect can be initially repaired with a suture and covered with azygos vein material. However surgical revision showed an enlargement of the tracheal necrosis. Then the lesion was occluded with a diaphragmatic pedicled flap. Nevertheless after the operation a tracheal insufficiency with massive ventilation leakage was observed. It was generated by the death of the diaphragmatic flap. As an ultimate therapeutic measure a transplantation of a pedicled omental gastric flap was performed, which in case of a failure of the conventional operative techniques, is an additional option in closing tracheal defects caused by infections. Especially in cases of massive infected thoracic cavity and tracheal necrosis omentum majus is, compared to muscle flaps, the better biological tissue to close and heal the tracheal defect. This case report firstly describes a successfully closure of a tracheal defect using the technique mentioned above.

Keywords: Pedicled flap; Surgical flap, Tracheal necrosis, Bronchial stump fistula.

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Introduction

The appearance of a pleural empyema after lung resection surgery, in the most cases as the result of a fistula of the bronchial stump, is a vital threat and implies a high morbidity and mortality [1]. The technique of a gastric flap on an omental pedicle was firstly described in an animal assay in 1977 by Papachritou *et al.*, [2]. The first

human thoracic use of a gastro omental patch was successfully accomplished in three cases in 1994 by Kamei Y *et al.*, [3]. We describe a case of a massive infected thoracic cavity with supracarinal necrotic lesion of the trachea, which was finally closed with a pedicled gastro omental flap. Our case report firstly describes a successfully closure of a tracheal defect with an omental pedicled gastric flap.

Case Presentation

Due to an adenocarcinoma of the right upper lobe with infiltration of the main bronchus a 49-years-old female patient underwent an upper bilobectomy with sleeve resection. An implantation of the lower lobe bronchus onto the main bronchus was necessary. The postoperative development was downright with a primary wound healing. Due to stage of the disease (G3, pT4 N0 pM0 L1 V0) adjuvant chemotherapy was performed. Dyspnea, fever and massive suppurative cough occurred after two completed chemotherapy bouts. Progressive aggravation of the general state of health with signs of sepsis made an anew thoracotomy inevitable. The pleural cavity was filled with about 2 liters of pus. Additionally a complete necrosis of the lower lobe (Figure 1) was shown. In regard to these intraoperative findings a pneumonectomy of the remaining lung on the right side was necessary. As a complicating factor a supracarinal, necrotic and perforating lesion of the trachea appeared. The defect was repaired with a non-resorbable, felt reinforced suture and covered with azygos vein material. Also suction-irrigation drainage was applied. Thanks to these measurements, the medical condition of the patient changed fairly for the better.

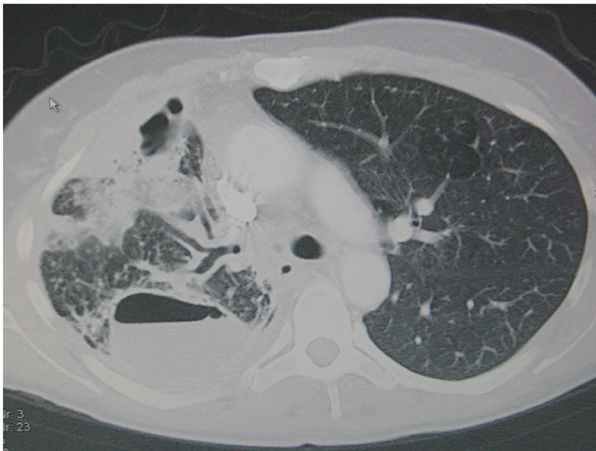


Fig. 1. Axial computed tomography (CT) scan of the thorax after the pneumonectomy demonstrating the pus filled right thoracic cavity

However after one week an afresh degradation of the health state with symptoms of sepsis and ascending catecholamine dose rate set in. The surgical revision showed an enlargement of the tracheal necrosis. The necrotic perforation was occluded, making use of a pedicled diaphragmatic flap. A vacuum assisted therapy induced another temporary closure of the tracheal defect. Another week later a tracheal insufficiency with massive ventilation leakage, which was generated by the death of the diaphragmatic pedicle flap on the tracheal lesion, was observed. As a therapeutic measure an additional upper abdominal incision with removal of an about 5×5 cm scaled great curvature sided stomach wall pedicle flap with the belonging omental sleeve, fed by the right epiploic

artery was performed (Figure 2). Therefore the right epiploic artery was exposed below the pylorus and looped with a vessel loop. Afterwards the omentum majus was dissected along the great curvature of the stomach until the upper third of the stomach. The great curvature stomach wall sleeve with the belonging omental transplant was transposed into the thoracic cavity through a diaphragmatic incision and, as a “neo- mucosa”, transplanted onto the tracheal lesion (Figure 3).

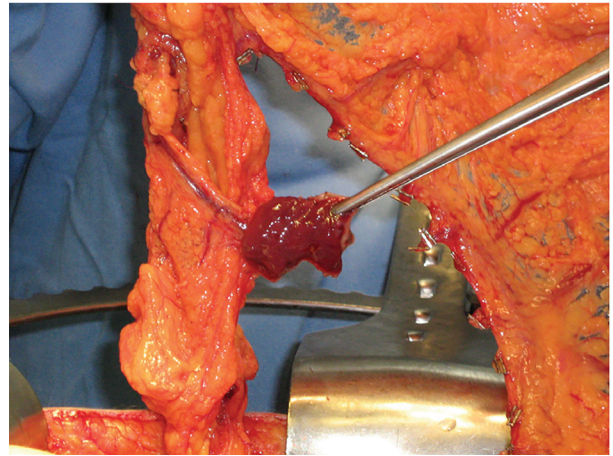


Fig. 2. Pedicled omental gastric flap before transplantation at open abdominal cavity.

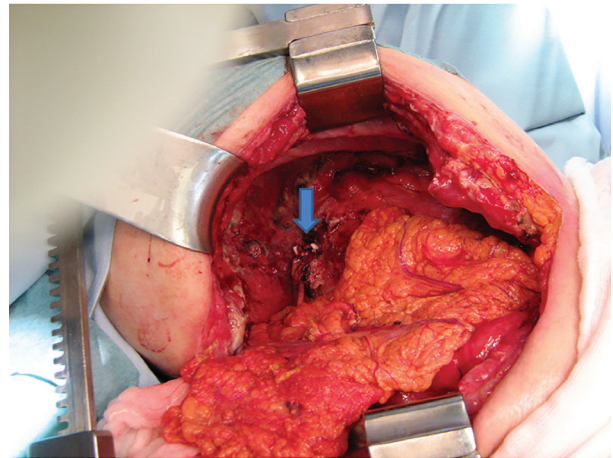


Fig. 3. Omentum transposed to thoracic cavity, tracheal necrosis marked with an arrow.

An intrathoracic “VAC®- sponge- plugging” facilitated the “pressing on” of the stomach mucosa to the trachea as well as the cleaning of the purulent thoracic cavity. Over the next five weeks the VAC®- seal was changed every second day. That induced a rapid granulation and volume diminishment of the cavity. Due to pneumonia of the left lung, high-pressure ventilation was necessary which caused a new, albeit small air fistula of the right bronchial stump. After implantation of a Polyflex®- Stent (Boston Scientific) through an already applied tracheostomy, the bronchial stump fistula was able to be occluded. Three weeks later it was possible to remove the stent. The accomplished bronchoscopy showed that the stomach flap was sutured well with the

tracheal wall (Figure 4). The patient was transferred to the surgery ward after a totally ICU- time of three month (1840 ventilation hours). After another two weeks she was released from the hospital. Because of a cerebral metastasis after the discharge the patient underwent another bound of chemotherapy and radiation. This adjuvant therapy initially led to a disease remission and an improvement of the life quality which enabled the patient to reconcile her family commitments and even enjoy family vacations. Two years later the patient deceased because of brain and lung metastasis.

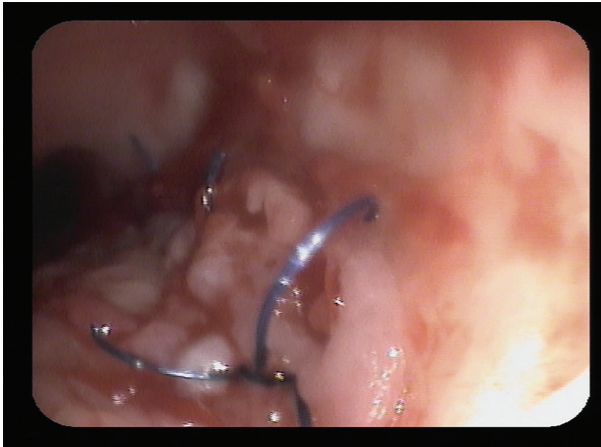


Fig. 4. Bronchoscopy view showing stomach flap being sutured well with the tracheal wall.

Discussion

During this life threatening disease pattern the conventional controlling method of the tracheal necrosis (muscle flap) was only possible for a short and limited time period. The combined utilization of a gastric flap on omental pedicle and a thoracic VAC[®] therapy eventually directed to a closure and healing of the tracheal defect. The omentum majus is a long known and versatile biological material [4] which could be effectively used for filling infected cavities, thoracic wall reconstructions or to closure bronchial stump fistulas.

Especially in case of massive infected thoracic cavity - like in the above case- omentum majus

is, compared to muscle flaps, definitely the better biological tissue. The muscle flaps have the disadvantages of debilitating the primal muscle function, cause frequently great defects of the sampling region (e.g. m. latissimus dorsi) and transplantations are often time consuming [4].

The omentum majus has a discrete blood supply and a high lymphatic potency (richness of macrophages) as well as an outstanding immune and bacteria reduction efficacy. It produces angiogenic factors (vascular endothelial growth factor) and that way stimulates an anew vascularisation, especially in ischemic tissue leading to a faster wound healing [4]. The preparation and removal of the omentum majus is short timed (about 45 minutes). Following an upper abdominal laparotomy, the omentum will be dissected along the great stomach curvature and usually pedicled on the right epiploic artery. The omentum is placed in the thoracic cavity after a tunneling (subcutaneous, transdiaphragmal, etc). In case of our patient an additional great curvature stomach wall sleeve (of about 5×5 cm), blood supplied by branches of the right epiploic artery, was left on the omental transplant.

This full wall patch of the stomach could be implanted in the tracheal defect after that. The gastro omental flap also has a well established place in the repair of the oral and facial defects. Thanks to the additional VAC[®] Therapy the omentum will respectively press the patch on the substrate and that way produce a faster healing. The VAC[®] therapy produces per se an amelioration of the blood supply, removes the unnecessary wound exudate, ergo conducting to a decreased bacterial concentration and tissue oxygenation [1, 5].

In conclusion, the described transplantation of a pedicle gastro omental flap represents, in case of a failure of the conventional operative techniques (e.g. muscle flap), an additional option in closing tracheal defects caused by infections. This case report firstly describes a successfully closure of a tracheal defect by using the technique mentioned above.

Conflict of Interest: None declared.

References

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