esophageal wall both in left and right pneumonectomy. This covering is performed without significant tension because of the absence of bronchial stump and requires only a small number of sutures. Thus, with this technique an adequate bronchial coverage is performed making our method safer.

4.3. The prevention of the BPF

The optimal approach to postpneumonectomy BPF is prevention. Preoperative conditions like anemia, COPD, DM and malnutrition must be first addressed and treated prior to the operation. Antimicrobial therapy is necessary for patients with infections because of the risk of empyema. Anti-tuberculosis therapy is needed in case of pulmonary tuberculosis which requires pneumonectomy.

During the operation the surgeon should be very careful to avoid the excessive bronchial devascularization or the ligation of bronchial arteries as well as the excessive use of electrocautery. Although stapling of the bronchus has the advantage of avoidance for the contamination of the pneumonectomy space, the potential injury to the microcirculation of the stump is an important issue to consider. Nonabsorbable braided sutures (silk or polyester) should be avoided in the closure of the bronchus, as granuloma formation has been reported. Vascularized tissue coverage (pericardium, omentum, pleura etc.) should be considered as a final step for the prevention of BPF at the completion of the operation [2].

As we mentioned above, there are no valid statistical data relative to which technique is the safest for the prevention of BPF. The surgeon must balance the advantages and disadvantages in order to select the most appropriate approach for the patient.

Postoperatively, early signs of infection might indicate BPF or empyema and should be treated with thoracoscopic or open drainage [15]. A prolonged drainage of a sterile hemithorax after pneumonectomy should also be avoided. The tube can function as a source of transferred skin bacteria into the pleural fluid.

In summary, the results of our study suggest that the manual closure with the formerly described posterior membranous flap technique is an excellent method for the avoidance of BPF. In accordance with the previous researchers who performed the same technique, we found no incidence of BPF, confirming in this way the effectiveness of the method.

References


eComment: Manual closure of bronchial stump during pneumonectomy: an obsolete method for only selective cases

Authors: Efstratios Apostolakis, Department of Cardiothoracic Surgery, Patras University School of Medicine, 26500 Rio Patras, Greece; Nikolaos D. Panagopoulos, Dimitrios Dougenis
doi:10.1510/icvts.2008.177782A

In your study, by using non-mechanical closure of the bronchus (‘the posterior membranous flap technique’) you reported no incidence of bronchopleural fistula development [1].

According to the literature [2] risk factors for bronchopleural fistula development are considered diabetes mellitus (only 8% in your cohort), neoadjuvant therapy (relatively high in your patients – up to 20%), right pneumonectomy (only 35% in your study), complementary pneumonectomy, residual disease on the bronchial margins after resection, preoperative infection, prolonged ventilation time, postpneumonectomy empyema formation and various technical factors. Such factors are local trauma, extensive devascularization of bronchial stump and long residual bronchial stump. Our opinion based on a cohort study of 221 patients who underwent pneumonectomy for non-small cell lung carcinoma, but according to other authors as well [3,4], suggests that manual bronchial closure is associated with an increased risk for fistula development in contrast to a mechanical type of closure used by most of the surgeons. The main disadvantages of the manual type of closure are the following: possible infection of hemithorax and eventual empyema formation, prolonged intraoperative time associated with a time-consuming method, asymmetrical closure of the stump, increased need for bronchial mobilization and devascularization, and increased risk of empyema formation at the suture line, as well as some air leaks at the site of suture insertion at the bronchial stump.

In our opinion, manual bronchial stump closure should be preserved in only selected cases, where mechanical closure is considered practically impossible or in patients with increased risks to develop complications. In such cases, flap utilization for bronchial stump reinforcement as correctly suggested [1], is essential for prevention of bronchopleural fistula development.
ment. Moreover, stump reinforcement should be routinely performed in operated patients with one or more of the characterized as “predictive” risk factors. According to our opinion these factors may be divided into preop-
erative and intraoperative. Diabetes mellitus, neoadjuvant therapy, steroid therapy, low respiratory reserves, and history of immunosuppression should be considered in the preoperative factors. As intraoperative should be considered right pneumonectomy, long bronchial stump, extensive mobili-
zation and bronchial devascularization, extended lymph node dissection around the bronchial stump, proximal tumors with possible infiltration of the bronchial margin, possible postoperative administration of chemo- or radiotherapy, and possible prolonged ventilatory support.

References


eComment: The latissimus dorsi flap surgery for bronchus stump insufficiency – an alternative?

Authors: Karsten Knobloch, Plastic, Hand and Reconstructive Surgery, Hannover Medical School, Hannover 30625, Germany; Andreas Gohritz, Peter M. Vogt

doi:10.1510/icvts.2008.177828

We read with great interest the recent report by Dr. Kakadellis et al. regarding the use of the posterior membranous flap for bronchial closure after pneumonectomy [1]. They used the posterior membranous flap in 45 patients after pneumonectomy. We congratulate the authors for their excel-
lent clinical results in the 45 patients. The authors report a thirty-day mortality of 6.6%, all because of cardiorespiratory insufficiency. Bronchus stump insufficiency with or without the development of the post-
 pneumonectomy empyema is one of the most serious conditions after pneumonectomy. One patient in the aforementioned study developed an empyema in the pneumonectomy cavity but no fistula was found. The empyema was treated by drainage only.

Besides the aforementioned technique, which may be used as a preventive tool, the pedicled muscle flap has been proposed as another option for closure of evident bronchus stump insufficiency. The latissimus dorsi flap has been a work horse in plastic reconstructive surgery for soft tissue coverage since its introduction by Dr. Igidio Tansini in 1906 for thoracic wall defects more than 100 years ago [2]. The use of a pedicled latissimus dorsi muscle flap to cover bronchial fistulas has been reported [3]. The latter authors stress that a de-epithelialized skin side rather than muscle is sutured to an opening of the bronchus. However, it remains unclear why de-
epithelialized skin should be superior in this occasion.

We propose a slight modification of the aforementioned technique. Since flap monitoring is essential to evaluate flap perfusion and to determine as early as possible arterial occlusion or venous congestion necessitating revision surgery, a buried flap is not approached by visual external inspec-
tion. Non-invasive laser Doppler and spectrophotometry systems, such as the oxygen-to-see system (LEA Medizintechnik, Giessen, Germany), which has been reported in buried flap monitoring up to 1 cm tissue depth [4], are not in range from the chest surface.

We report a case of a bronchus stump insufficiency after pneumonectomy in a homeless male suffering open tuberculosis. A latissimus flap was harvested with a skin isle which was sutured onto the bronchial stump. The skin perfusion was monitored by serial bronchoscopies. The additional skin isle is easy to harvest and the closure of the harvesting defect is uncomplic-
cated. The skin isle allows flap monitoring in these patients by direct visualization via bronchoscopy.

References


eComment: Pedicled pericardial flap for prevention of postpneumone-
tomy bronchopleural fistula. A safe alternative

Authors: NIKolaos Barbetakis, Department of thoracic surgery, Theagen-
io Cancer Hospital, A. Simeonidou 2, Thessaloniki 55325, Greece; Georgios Samanidis, Christodoulos TsiliKas

doi:10.1510/icvts.2008.17782C

Postpneumonectomy bronchopleural fistula (PBPF) remains the most seri-
ous complication after pneumonectomy. We would like to congratulate Kakadellis and Karfis for their very interesting paper [1]. A large number of publications have dealt with this problem in the past. Preoperative chemo-
radiation, diabetes mellitus, extensive bronchial devascularization, long residual bronchial stump, completion pneumonectomy and right-sided oper-
atons are the main well-known predisposing factors.

A safe alternative method of reinforcement of postpneumonectomy bron-
chial stump which is routinely used in our hospital is the pedicled pericardial flap. The use of pedicled pericardial flap in thoracic surgery was first described by Brewer et al. [2]. Anderson et al. have used this technique in different clinical situations, such as repair of tracheoesophageal fistulas, sleeve lobectomies, tracheal anastomosis, and extended pneumonectomies [3, 4]. Taghavi et al. presented the largest published series of patients in whom pericardial flaps were used for coverage of postpneumonectomy stumps with excellent results [5].

The bronchial stump of 29 consecutive patients who underwent pneumo-
nectomy for primary lung cancer in our institution and had one of the above mentioned predisposing factors between 2002 and 2007 was covered with a pedicled pericardial flap. Bronchial stump closure is routinely performed with commercial mechanical staplers in all patients and the reinforcement follows. The flap is mobilized from the anterolateral part of pericardium measuring approximately 4 × 10 cm. Afterwards it is attached over the bronchial stump with single mattress stitches 4-0 PDS. The pericardial defect is reconstructed with vicryl mesh or bovine pericardium. One patient died due to pulmonary embolism on the postop day 1. No case of postpneumo-
nectomy bronchopleural fistula was detected during the follow-up period. The overall morbidity was within the usual range following pneumonectomy. Pedicled pericardial flap for prevention of postpneumonectomy broncho-
pleural fistula is a safe and effective alternative method.

References