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eComment: Post-pneumonectomy bronchopleural fistula: covered metallic stent or Amplatzer occluder?

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Andreetti and colleagues reported their experience with the use of a conical fully covered self-expandable stent for the treatment of post-pneumonectomy bronchopleural fistula [1]. A bronchopleural fistula (BPF) is an alarming complication of pneumonectomy, which leads to significant morbidity and mortality. The incidence of BPF ranges from 4.5% to 20% and such wide variability is correlated to the patient’s condition, the pathology, the resection technique, and the experience of the surgeon.

The standard approach includes an open wound thoracostomy, skin flap, and antiseptic packing for several months. This procedure is complicated by persistent or recurrent BPF and a long hospital stay. A most recent surgical technique consists of the debridement of the pleural space followed by the suture of the bronchial stump buttressed with omentum or a muscular flap [2].

Innovative minimally invasive techniques have been proposed for the patients who are unable to tolerate major surgical procedures. Various endoscopic approaches (fibrin glue, surgical sponges, ethanol injection, etc.) seem to be effective for small BPFs with the highest success rate for fistulas of 1 mm in diameter. The use of airway stents in the management of large post-pneumonectomy BPF has been reported; silicone was initially the preferred material [3], but the use of covered self-expandable metallic stents has been reported since 2005.

Recently, Dutau and colleagues reported their experience with a custom-made self-expandable covered metallic stent in 7 patients with large post-pneumonectomy BPF (>6 mm); the air leak was stopped in all the patients after stent placement, but the mortality was still high (57%), mainly due to sepsis [4]. Although Dutau and colleagues noted two stent migrations, the technique can be positively regarded, especially for the immediate stop of the air leak. The Andreetti’s report is similar to the Dutau paper in terms of technique and number of patients but some differences must be underlined.

All patients had early BPFs (within 7 days from pneumonectomy) and pleural spaces were still spared from infection. The use of a standard-sized instead of a custom-made stent allowed its prompt positioning, which was probably the key point for Andreetti’s good results. In addition, the use of titanium helical tacks was a smart idea that prevented any stent migration.

A new technique has been proposed for treatment of post-pneumonectomy BPF. Frucher and colleagues recently published their experience with the positioning of the Amplatz atrial septal occluder in 10 patients (8 post-pneumonectomy BPF, 2 post-lobectomy BPF) [5].

The Amplatz occluder was inserted directly into the fistula. The presence of two disks, one on each side of the defect, ensured good occlusion without impairing airway patency. The device induced local granulation that resulted in the total encapsulation of the occluder. Frucher, who included a literature review in his paper, reported that the procedure had been well tolerated without side effects or complications [5].

The Amplatz occluder seems more attractive than the covered metallic stent: the occluder is easily-positioned with a flexible bronchoscope under direct vision. The occluder leaves the airway free from foreign material. The problem of the sputum retention within the covered metallic stent is avoided and the occluder does not need to be removed with a second procedure as is required by a metallic stent. All these theoretical advantages have led us to use the Amplatz occluder in a BPF after a superior right sleeve lobectomy. The procedure was simple and uneventful, the rate of flow of the air leak was dramatically reduced, the clinical condition improved and the patient was discharged within few days. Unfortunately, 31 days after the procedure a suddenly lethal hemoptysis occurred. Such previously unreported complications should be considered when a surgeon needs to choose a device for BPF treatment.

In conclusion, the covered metallic stent and the Amplatz occluder are promising devices for minimally invasive BPF treatment. Considering the low prevalence of the post-pneumonectomy BPF, a multi-institutional randomized trial is advisable to guide surgeons toward the safer procedure for the treatment of a difficult and challenging disease such as BPF.

Conflict of Interest: None declared

References


eComment. Post-pneumonectomy bronchopleural fistula

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We read with interest the article by Andreotti et al. regarding the treatment of post-pneumonectomy bronchopleural fistula (PPBPF) by self-expandable stent and we agree that this modality can be in the armamentarium of cardiothoracic surgeons. PPBPF is one of the most serious and lethal complications in thoracic surgery. There are well-known predisposing factors related to this devastating postoperative complication such as extensive bronchial devascularization, right-sided pneumonectomy, long residual bronchial stump, neoadjuvant or adjuvant chemotherapy, regional radiotherapy, diabetes mellitus, steroid therapy, prolonged mechanical ventilation, history of smoking, pre-existing empyema, incomplete resection of the bronchial margins, decreased albumin levels (less than 3.5 mg/dL), male gender, and technique of bronchial stump closure [2, 3].

From the beginning of thoracic surgery, many different methods have been used to prevent the development of PPBPF [2, 3]. Pedicled pericardial flap or pericardial fat pad, pleura, intercostal muscle, diaphragm, and azygos vein (for right pneumonectomy) have been used as an additional coverage of bronchial stump wound with very good results [2, 3].

Brewer et al. in 1993 were the first ones who reported on their experimental and clinical work on the use of pedicled pericardial fat graft for reinforcement of bronchial closure in patients with pulmonary resection [4].

Taghavi et al. in 2005, in their retrospective study of 96 patients who underwent pneumonectomy (89.2% for primary lung cancer) and had covered bronchial stump with a pedicled pericardial flap, did not notice any evidence of PPBPF during the perioperative and postoperative period (mean follow-up 15 ± 21.2 months) [2]. Sfyridis et al. in 2007, in their prospective randomised trial of 70 patients with diabetes mellitus who underwent pneumonectomy and were randomised to have their bronchial stump covered with an intercostal muscle flap or not, found that the group with the covered bronchial stump had a lower incidence of PPBPF (0% versus 8.8%; p = 0.02) and of empyema (0% versus 7.4%; p = 0.05) compared with the group not covered, at a mean follow-up of 18 ± 9.2 months [3].

Endobronchial valves have also been used to good effect in patients with persistent pulmonary air leaks (refractory to other therapy) secondary to alveolopleural fistula and to bronchopleural fistula as well [5].

In conclusion, in high risk patients the consideration of an effective method for covered bronchial stump for the prevention of the development of PPBFL is very important. Therefore, the multidisciplinary approach for the ideal treatment of patients with PPBPF should be on an individual basis and is of paramount importance.

**Conflict of Interest:** None declared

**References**


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**eReply. Re: Post-pneumonectomy bronchopleural fistula covered metallic stent or Amplatzer occluder**

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I read with interest the eComment by Nosotti et al. [1] on our article [2]. I do not know the Amplatzer occluder directly, but I am absolutely convinced about the use of minimally-invasive approaches to treat bronchopleural fistulas (BPFs), where possible. I use silver-human albumin complex to treat small BPFs (5 mm in diameter), but the result is not immediate because local granulation begins after 48 h. Instead, I get an immediate stop of the air leak with a fully-covered, self-expandable stent. The time saved makes a difference.

**Conflict of Interest:** None declared

**References**


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**eComment. Post-pneumonectomy empyema with bronchopleural fistula**

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In this article by Andretti and colleagues [1], the authors described a modification in the implantation of a tracheobronchial stent to exclude a bronchopleural fistula (BPF) by anchoring it to the tracheal mucosal surface using titanium helical fasteners. The conical-shaped, fully-covered and self-expandable stent (Tracheobronxane Silmet, Novatech SA, France) was successfully used in six patients with post-pneumonectomy BPF. Early identification of the BPF and urgent (within few hours of fistula occurrence) endoscopic implantation and anchoring of the Silmet silen ensured excellent results in all patients without distal migration of the stent.

What is remarkable in their report is that none of their patients presented with empyema. We would like to ask the authors if they are disposed to implanting the Silmet stent in patients with post-pneumonectomy empyema?

Traditionally in the case of post-pneumonectomy empyema, the BPF must be deburred and the bronchial stump closed and reinforced by an intrathoracic transposition of omentum or muscle flaps [2]. However, isolation of the hilar element and identification of the fistula could be difficult due to mediastinal edema and fibrosis. In the latter case, surgical management consists of an open window thoracotomy and involves daily changes of the intracavitary wound dressings over a long period of time.

Negative pressure wound therapy (NPWT) such as the vacuum assisted closure (VAC) therapy device (KCI Inc, San Antonio, TX) has been adopted as an alternative method to classic wound dressings, owing to the accelerated wound healing process [3]. VAC promotes healing through the enhancement of granulation tissue formation, the removal of exudates and oedema, increased tissue perfusion and oxygenation, and wound volume reduction [4]. One major drawback in the application of VAC therapy in the thoracic cavity is the presence of air leaks. To ensure adequate functioning of the VAC system placed inside the chest, the deployment of the Silmet stent in case of a large fistula is an appropriate technique to stop air leaks.

Passera et al. [5] recently published a case report concerning a patient with a large bronchopleural fistula and empyema. The surgical strategy consisted of an open window thoracotomy, surgical deb blistering of the bronchial stump and the deployment of an Amplatzer septal occluder device (AGA Medical Corp, Plymouth, MN) to close the BPF. Thereafter, the thoracocyst rapidly and spontaneously closed with VAC therapy.

The combination of endoscopic occlusion of the PBF in the setting of post-pneumonectomy empyema (by using the Silmet stent plus anchoring system or Amplatzer septal occluder device) and application of VAC therapy through the open window thoracotomy seems not only to be safe and effective but also appears to accelerate the healing process and reduce the hospital stay. Future studies with larger numbers of patients will be required to validate the efficacy of the procedure and to draw definitive conclusions.

**Conflict of Interest:** None declared

**References**