Case report

Bronchoscopic gluing for post-lung-transplant bronchopleural fistula

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Abstract

A 44-year-old female patient diagnosed as pulmonary lymphangioleiomyomatosis with respiratory failure underwent bilateral sequential lung transplantation using an entire left lung and a post-lower-lobectomy right lung due to pneumonia. Persistent air leakage during cough was noted and bronchoscopy 12 days after transplantation demonstrated post-lobectomy bronchial stump dehiscence with a large bronchopleural fistula. We applied twice tissue glue instillation on the dehiscent bronchial stump through flexible bronchoscopy. The air leak improved and the patient was discharged 3 months after transplantation uneventfully. Two months after discharge, bronchoscopy showed complete healing of the dehiscent bronchial stump. Now, she lives independently without oxygen support.

Keywords: Fistula; Transplantation, lung; Lobectomy; Glue, biologic; Bronchoscopy

1. Introduction

Bronchopleural fistula (BPF) after lung transplantation with a post-lobectomy lung graft is rare, and the management of such condition is difficult and complicated. Many endoscopic closure techniques with various tissue glues have been performed in the treatment of BPF, especially in high-risk patients. This minimally invasive procedure is recommended for initial therapy in patients who would not tolerate a thoracotomy or with severe adhesions.

2. Case report

A 44-year-old woman was diagnosed to have pulmonary lymphangioleiomyomatosis at an outside hospital in 1999, with the initial presentation of progressive dyspnea and generalized edema. Progressive bilateral lung fibrosis led to bi-level positive airway pressure support since 2001. Due to progression of the underlying lung disease, she was elected for lung transplantation. The patient underwent bilateral sequential lung transplantation in May 2005. Infection of the right lower lobe (RLL) of the donor lung with consolidation was noted at the time of harvest, so an RLL lobectomy was performed. The RLL bronchus was closed with a stapling device (Endopath®, ETS45 4.1 mm, Ethicon Endo-Surgery, Inc., Cincinnati, OH, USA). The post-operative course was smooth and extubation carried out on the seventh post-operative day (POD 7). Air leak of chest tube during cough was noted and an RLL stump dehiscence, 8 mm × 4 mm in estimation, with staple wires exposure was also confirmed in bronchoscopy on POD 12 (Fig. 1A). Tissue glue of enbucrilate (Histoacryl®, B. Braun Medical AG, Melsungen, Germany) instillation on the RLL stump was performed through flexible bronchoscopy twice. Because of the large fistula in our patient, we instilled tissue glue into the staple wires in the base of the fistula and then coated with more tissue glue in layers. Mild air leak persisted but resolved gradually. Bronchoscopy 1 month later showed no air leakage from the RLL stump (Fig. 1B). She was discharged home in stable condition 3 months after transplantation. One month after discharge, the tissue glue embolus was blown out in coughing. The follow-up bronchoscopy 1 month later showed complete healing of the dehiscent bronchial stump with granulation tissue (Fig. 1C). Nowadays, she lives independently without oxygen support and presents as NYHA functional class I.

3. Discussion

BPF remains the most serious complication after anatomic lung resection and occurs with an incidence of 0—12% [1]. The etiologies of BPF are usually different in early or late phase.

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As early as 1-2 days after resection, BPF may occur because of a technically poor closure of the bronchial stump. When the bronchial leak occurs later in the post-operative course, it may be caused by failure of healing because of inadequate viable tissue coverage of the stump or as the result of infection of the fluid within the space and rupture of the empyema through the bronchial stump [2].

BPF after a lobectomy is rare [2,3], especially in a lobectomized lung graft. To our knowledge, no previous similar case has been reported in the English literature. Marginal donors have to be used in certain circumstances in Taiwan because the number of cadaver donor is far less than the number of waiting list for transplantation. Bronchial ischemia is thought to be a significant contributing factor to the development of this complication in this patient. Unlike other organ transplantation, the systemic bronchial artery circulation is lost during the harvest of the donor lungs. The viability of the donor bronchus is initially dependent upon collateral flow derived from the pulmonary artery [4]. Furthermore, this is not the same physiologically as using a living donor lobe as a transplant. It is essentially an experiment in avascular bronchial healing, as it has no bronchial blood supply. And this is an experiment that failed, leading to a wide-open BPF.

Many methods have been proposed to treat BPF, from antibiotics management with tube drainage to surgical intervention. The key points of BPF management consist of empyema drainage and infection control, fistula closure and reinforcement, and pleural space obliteration. The choice of management depends on timing, size of the fistula, extent of space contamination, and patient's general condition [5]. Surgical closure includes chronic open drainage, direct stump closure with flap reinforcement, transsternal bronchial closure, and thoracoplasty with or without extrathoracic chest wall muscle transposition. Since the appearance of video-assisted thoracoscopy, this technique has been also used in attempts to treat BPF. In high-risk surgical patients, endoscopic procedure may serve as a temporary bridge until the patient clinical status is improved. In other patients deemed nonsurgical candidates, the procedure may be the only option [6].

Reoperation for the bronchial stump repair and coverage with a vascularized pedicle was not indicated in our patient because of her critical post-operative condition. Therefore, we applied tissue glues bronchoscopically on the dehiscent bronchial stump. Occlusion with tissue glue allows successful closure of BPF. Tissue glues can be applied using minimally invasive techniques, e.g., bronchoscopy, and may be ideal in patients who would not tolerate a thoracotomy or with severe adhesions [7]. Glue closure of BPF should be considered when the fistula is small, particularly if the patient is not fit for general anesthesia. In most previous reports, the upper limit of fistula size that can be sealed with glue successfully is 3 mm in diameter [5]. In larger fistulae treated with tissue glue alone, the emboli are highly likely to be blown away in coughing.

The size of the fistula in our patient is 8 mm × 4 mm in estimation. It is special that we successfully treated the large BPF with bronchoscopic tissue glue instillation. Because of the large fistula in our patient, we instilled tissue glue into the base of the fistula entirely and then coated with more
tissue glue in layers. These exposed stapling wires on the dehiscent bronchial stump enabled tissue glue sealed well. Bronchoscopic tissue gluing was performed twice, and the air leak became very mild without reoperation. Although the embolus of tissue glue was blown out eventually, the patient avoided a high-risky operation and had enough time for the BPF healing with granulation tissue development.

References


