Case report - Thoracic general

Closure of a bronchopleural fistula using a fibrin–glue coated collagen patch

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Abstract

Bronchopleural fistulas can occur as a life-threatening sequelae after pulmonary resection. Two bronchopleural fistulas more than 3 mm in diameter were successfully treated by using a fibrin–glue coated collagen patch at the site of bronchopleural fistula under flexible bronchoscopic observation. This is the first report of the bronchoscopic closure of bronchopleural fistulas by using a fibrin–glue coated collagen patch. This treatment would be recommended for patients with a postoperative bronchopleural fistula with an orifice that is more than 3 mm in diameter.

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1. Introduction

Although the incidence of bronchopleural fistulas after pulmonary resection for the treatment of lung cancer is generally reported between 4.5 and 20% after pneumonectomy and 0.5% after lobectomy, modern stapling techniques have succeeded in reducing the incidence of bronchopleural fistulas to 1%, indicating that pulmonary resection still has a high incidence of this life-threatening complication [1]. The use of a fibrin sealant (FS) has been reported for closure of bronchopleural fistulas. Although found to be useful in fistulas smaller than 3 mm, FS has not been effective in occluding larger bronchopleural fistulas [2]. This report describes the successful closure of bronchopleural fistula with an orifice that is more than 3 mm in diameter using a fibrin–glue coated collagen patch (TachoComb H, Nycomed Pharma AS, Denmark) through a flexible bronchofiberscope. This procedure could be recommended as a closure of postoperative bronchopleural fistula more than 3 mm in diameter.

2. Material and methods

The trachea was intubated via the oropharynx with an endotracheal tube over a fiberoptic bronchoscope (2T20; Olympus; Tokyo, Japan) in order to secure the airway, and to facilitate the introduction and removal of the fiberoptic bronchoscope. A fibrin-glue coated collagen patch was easily cut into sections slightly larger then the size of the fistula opening. Placement of a fibrin-glue coated collagen patch was achieved with the use of forceps. At the end of a fibrin-glue coated collagen patch was grasped with the forceps positioned beyond the end of the fiberoptic bronchoscope, and the fragment was then dragged through the endotracheal tube to the site of the bronchopleural fistula. Under direct visualization, a fibrin–glue coated collagen patch fragment was packed within the fistula, and the fragment grasped with the forceps was kept in this position for approximately a minute, a time during which a fibrin–glue coated collagen patch becomes adhesive, and the patch fragment was released. The patient was checked the for the outcome of the treatment once every 3 weeks.

2.1. Case reports

Characteristics for patients treated by fibrin–glue coated collagen patch are summarized in Table 1.
A 58-year-old man complained of bloody sputum, and bronchopleural fistula was diagnosed 6 months after pneumonectomy for squamous cell carcinoma of the lung. The bronchoscopy demonstrated a fistula of 5 mm in diameter at the surgical stump. This patient was treated with a fibrin-glue coated collagen patch. The patient was also treated with tube thoracotomy and pleural irrigation. The patient expected the fibrin-glue coated collagen patch fragment on the 21st day after the procedure. This patient was repeatedly treated with fibrin-glue coated collagen patch at the site of the fistula. Bronchoscopic findings showed that the fistula was completely closed with scar formation 9 weeks after the patient underwent the treatment. The patient was treated for empyema with antibiotics for 2 months, and it took 6 months for a persistent empyema to be completely cured. The patient is alive without recurrences of the fistula and tumor for about 12 months.

A 61-year-old man complained of fever on the 20th day subsequent right upper lobectomy for large cell carcinoma of the lung. The bronchoscopy demonstrated a fistula of 4 mm in diameter at the surgical stump. Single bronchial closure was performed, which was then covered with pedicled omentum. Air leakage through the intercostal drain was found on the fourth day subsequent to omentoplasty. The bronchoscopy demonstrated a fistula of the same size at the surgical stump. Tracheotomy was performed and this patient was treated with a fibrin-glue coated collagen patch three times at the site of the fistula. The patient was treated for empyema with antibiotics 4 weeks later and the fistula disappeared after 3 months. The patient is alive without recurrences of the fistula and tumor for about 8 months.

3. Discussion

Empyema by bronchopleural fistula was treated with tube thoracotomy and pleural irrigation, and operative closure for fistula. Recently, bronchoscopy using FS is possible and therefore has been recommended. Fibrin and its derivatives have been widely used to close the bronchopleural fistula [3]. The effectiveness of FS in the closure of fistulas measuring less than 3 mm has been well documented. Fistulas more than 3 mm are difficult to treat owing to the patient’s expectoration of the fibrin plug. Since the omentum has bacteriocidal and volume effects, filling an empyema cavity with an omental pedicle flap has been frequently used to cure empyema. But the procedure was not successful in 24% of the patients with bronchial fistulas [4]. In case 2, the omentoplasty did not succeed because of leakage of the bronchial closure covered with pedicled omentum. After the failure of bronchial closure by omentoplasty, a fibrin-glue coated collagen patch was effective in occluding the bronchopleural fistula. Fibrin-glue coated collagen patches were cut squarely 8 x 8 mm in case 1 and 6 x 6 mm in case 2, and those were slightly larger than the size of the fistula opening. The patch fragment was packed at the fistular end, and it was sufficient to close the bronchopleural fistula. Even if multiple patches were tried to pack at the fistula, the thick patches were easily taken off owing the patient’s expectoration. The fibrin-glue coated collagen patch expected to be happened by migration in our case and broncholubercobic treatments were performed twice in case 1 and three times in case 2. Two patients treated with a fibrin-glue coated collagen patch were cured without recurrence. A fibrin-glue coated collagen patch was widely used for bleeding and alveolar leakage in thoracic surgery, but the use of a fibrin-glue coated collagen patch has not been described as a closure of bronchopleural fistula. This is the first report to close fistulas by using a fibrin-glue coated collagen patch under flexible bronchoscopy observation. Two patients may not be enough to evaluate this procedure and further studies may be necessary. But this procedure could be recommended as a closure of postoperative bronchial fistula more than 3 mm in diameter, where FC has not been effective.

References