Case report - Thoracic oncologic

Management of a complicated pulmonary fistula caused by lung cancer using a fibrin glue-soaked polyglycolic acid sheet covered with an intercostal muscle flap

Tomohiro Maniwa*, Hiroyuki Kaneda, Yukihito Saito

Department of Thoracic Cardiovascular Surgery, Kansai Medical University Hospital, Kansai Medical University, 2-3-1 Shinmachi, Hirakata, Osaka, Japan

Received 31 December 2008; received in revised form 19 February 2009; accepted 20 February 2009

Abstract

Pulmonary fistulas caused by tumours are very fragile and difficult to suture directly. It is impossible to close pulmonary fistulas with tissue sealants when massive air leakage occurs in the low pressure of the respiratory tract. A 73-year-old man with a pneumothorax caused by lung cancer had suffered a persistent massive air leakage for more than one month. We used a fibrin glue-soaked polyglycolic acid (PGA) sheet for sealing the complicated fistula. In addition, the visceral pleura of the fistula was wrapped with the pedicle of an intercostal muscle (ICM) flap to prevent massive air leakage. The pneumothorax did not reappear after surgery. Thus, a fibrin glue-soaked PGA sheet covered with an ICM flap was effective for sealing an intractable air-leaking fistula caused by lung cancer.

Keywords: Lung cancer; Pneumothorax; Intercostal muscle flap

1. Introduction

Direct suturing cannot control pulmonary fistulas caused by malignant tumours. We often use tissue sealants such as fibrin glue, a fibrin sheet or a fibrin glue-soaked polyglycolic (PGA) sheet for such cases [1–3]. However, when massive air leaks occur in the low-pressure environment of the respiratory tract, we cannot control them simply with tissue sealants. On the other hand, intercostal muscle (ICM) flaps have been used successfully for reinforcing bronchial stumps or bronchial fistulas [4–6]. Here, we used a fibrin glue-soaked PGA sheet covered with ICM for sealing an intractable air leak caused by lung cancer.

2. Case report

A 73-year-old man was referred to Kansai Medical University Hospital for treatment of a persistent massive air leakage that had lasted for more than one month. Chest computed tomography scans revealed a mass measuring 4.8 × 4.0 cm in the right upper lung lobe (Fig. 1a), multiple small nodules on the pleura and a deflated right lung (Fig. 1b). The patient’s white blood cell count was 9.6 × 10^9/l and his C-reactive protein level was 2.46 mg/dL. Positron emission tomography using 18F-fluorodeoxyglucose uptake showed multiple lung and adrenal tumours (Fig. 1c). All cultures of pleural effusions taken from a chest tube before surgery were negative.

We considered this to be a fistula caused by ruptured lung cancer based on these findings. Thoracoscopy revealed a pulmonary fistula associated with a large lung tumour of the right upper lobe (Fig. 2a). This barely invaded the right lower lobe. Histopathology of a tumour on intercostal pleura biopsy showed a poorly differentiated adenocarcinoma of the lung by thoracoscopy. All lobes showed severe emphysema. It was impossible to perform right upper lobectomy and suture this complicated pulmonary fistula directly. We decided that the patient needed to undergo an auxiliary thoracotomy, harvesting an ICM flap to cover this complicated pulmonary fistula. The length of incision was 10 cm using a video thoracoscope. The fourth ICM was harvested from the inferior edge of the fourth rib using cautery (setting 40) and then applied to cover the fistula. First, we used a fibrin glue-soaked (Bolheal, the Chemotherapeutic Research Institute, Kumamoto, Japan) PGA sheet (Neoveil, Gunze Ltd, Kyoto, Japan) (Fig. 2b, c). In addition, we covered the visceral pleura of the fistula with the pedicled ICM flap to prevent massive air leakage (Fig. 2d). The patient’s postoperative course has been good. The patient and his family did not desire chemotherapy, and he was discharged 23 days postoperatively. There has been no recurrence of the pneumothorax for ten months.

3. Discussion

Pulmonary fistulas caused by lung tumours, with accompanying emphysema, cannot be controlled by direct sutur-
Nakamura et al. [3] used PGA sheets and fibrin glue for patients with infectious thoracopathies such as emphysema and lung abscesses, and the air leaks were controlled successfully. The patients had no complications caused by infections in either study. Thus, there is no evidence for an interrelationship between the use of fibrin glue-soaked PGA sheet and postoperative infections. On the other hand, it was reported that PGA sheets promoted fibroblast infiltration from the tissue and caused thickening of the pleura [7].

Harvesting an ICM flap is easy, and this muscle has a good blood flow. Therefore, pedicled ICM flaps have often been used for treating bronchial fistulas or for reinforcing bronchial stumps [4–6]. It takes between 45 s and 12 min to harvest an ICM flap [5, 8, 9]. Cerfolio et al. [8, 9] reported that the use of an ICM flap reduces the pain of thoracotomy, as it avoids damage to the intercostal nerves from the retractor. We also examined harvesting the ICM, and found that this procedure did not seem to increase the blood loss during surgery, or pain or chest-tube volume after surgery [5, 6]. Covering with a wide ICM graft helps to prevent re-leakage. Therefore, we conclude that harvesting ICM is not excessive surgery, and in this case grafting associated with a fibrin glue-soaked PGA sheet helped to close a complicated pulmonary fistula caused by lung cancer.

References