

A Case of Post-upper Lobectomy Empyema Treated by Serratus Anterior Muscle and Pedicled Latissimus Dorsi Musculocutaneous Flaps Plombage via Open-window Thoracostomy

Akihiko Kitami, MD,¹ Takashi Suzuki, MD,² Shuichi Suzuki, MD,²
and Sumiya Noriyoshi, MD³

A 62-year-old male was admitted to our hospital for operation for *Aspergillus* empyema with a fungus ball in the right upper lobe. We performed a right upper lobectomy and decortication of the middle and lower lobes through a standard posterolateral thoracotomy with dissection of the latissimus dorsi and serratus anterior muscles, in October 2000. Twenty-one days postoperatively (POD), he developed an empyema and a bronchopleural fistula. We performed open-window thoracostomy through the axilla with removal of the third and fourth ribs at 41 POD, and sterilized the open drainage cavity in the out-patient clinic 11 months after discharge. Although the condition of the bronchopleural fistulas was not improved, and methicillin-resistant *Staphylococcus aureus* (MRSA) was found in the purulent discharge, the discharge decreased. Finally, a pedicled latissimus dorsi musculocutaneous and serratus anterior muscle flap plombage was performed 11 months after initial operation. The patient is now well and works as a driver 21 months after discharge. We conclude that muscle flaps of the pedicled latissimus dorsi and serratus anterior muscles can be useful for plombage of the cavity in cases of post-standard thoracotomy. (Ann Thorac Cardiovasc Surg 2004; 10: 183–6)

Key words: *Aspergillus* empyema, post-upper lobectomy, musculocutaneous flaps plombage

Introduction

Pleural infection with *Aspergillus fumigatus* is a rather infrequent disease, reports of only 30 cases were found in an exhaustive review of the literature.¹⁾ The treatment of *Aspergillus* empyema presents one of the most challenging situations in general thoracic surgery because of the precarious health status of patients with this condition, and the high risk of postoperative major complications.²⁾ We presented a case of *Aspergillus* empyema with aspergilloma in the right upper lobe, in which we per-

formed right upper lobectomy and decortication, at the initial operation, and open-window thoracostomy followed by plombage using pedicled serratus anterior muscle and latissimus dorsi musculocutaneous flaps, for the postoperative non *Aspergillus* empyema.

Case Report

A 62-year-old male was admitted to Showa University Fujigaoka Hospital in November 2001 for closure of the open-window thoracostomy for post right upper lobectomy empyema. He had a past history of pleuritis and pneumonia. He had smoked three quarters of a pack of cigarettes per day for 15 years, but had quit 20 years before. He suffered from hemoptysis and his chest X-ray film revealed a fungus ball in the right upper lung field in August 1999 (Fig. 1). Chest computed tomography (CT) revealed a fungus ball in the right upper lobe, and an *Aspergillus* empyema space surrounded by thickened parietal and visceral pleura with extensive calcification

From ¹Division of Chest Surgery, Respiratory Disease Center, Showa University Northern Yokohama Hospital, Kanagawa, and Departments of ²Thoracic and Cardiovascular Surgery and ³Plastic Surgery, Showa University Fujigaoka Hospital, Kanagawa, Japan

Received September 25, 2003; accepted for publication January 6, 2004. Address reprint requests to Akihiko Kitami, MD: Division of Chest Surgery, Respiratory Disease Center, Showa University Northern Yokohama Hospital, 35-1 Chigasaki-chuo, Tuzuki-ku, Yokohama-shi, Kanagawa 224-8503, Japan.



Fig. 1. Chest roentgenogram on first admission showing a fungus ball in the right upper lung field.

(Fig. 2). Right upper lobectomy and decortication of the middle and lower lobes was carried out through a standard posterolateral thoracotomy with dissection of the latissimus dorsi and serratus anterior muscles in October 2000. Although the chest drainage tube was removed on the 12th postoperative day (POD), re-insertion of the chest tube was required nine days later because of collapse of the right remnant middle and lower lobes on chest X-ray. Air leakage from the chest drainage tube continued, and

coagulase negative staphylococcus (CNS) infection was found in the pleural culture. A culture of *Aspergillus fumigatus* was negative. Open-window thoracostomy was performed through the axilla with removal of the third and fourth ribs for preservation of the pectoralis major muscle at 41 POD. After discharge, the open drainage cavity was sterilized at the out-patient clinic. Although the condition of the bronchopleural fistulas was not improved, and methicillin-resistant *Staphylococcus aureus* (MRSA) was found in the purulent discharge, the discharge decreased. Gauze of the cavity was partially stained with pus for two days. We decided upon an operation for closure of the open drainage cavity about 11 months after the open drainage thoracostomy.

On physical examination at admission, the patient was thin, and his temperature was 36.8°C. His height was 161 cm, and his body weight was 46 kg. The right side breath sound was weak. Laboratory studies on admission revealed a slightly elevated C-reactive protein level (0.7 mg/dl), and positives for *Aspergillus* antibody and hepatitis C virus antibody. Other blood chemistry, a complete blood count, and blood gas analysis were all normal. The culture of a discharge from the cavity revealed MRSA (4+), but was negative for *Aspergillus fumigatus*. A chest X-ray showed a cavitory space in the right upper field. For one week before the operation, Vancomycin hydrochloride (0.5 g × 2/day) had been administered daily.

Operation was performed on November 13, 2001. Under the left lateral decubitus position, we reopened the previous right posterolateral skin incision. The pedicled latissimus dorsi musculocutaneous and serratus anterior muscle flaps were prepared, and both flaps were dissected under the existing dissection line. Although a

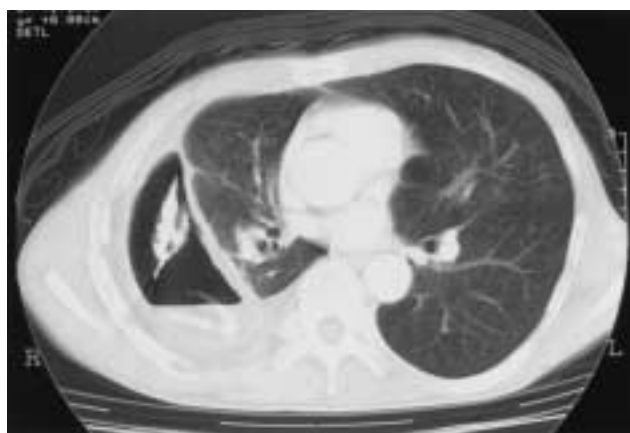
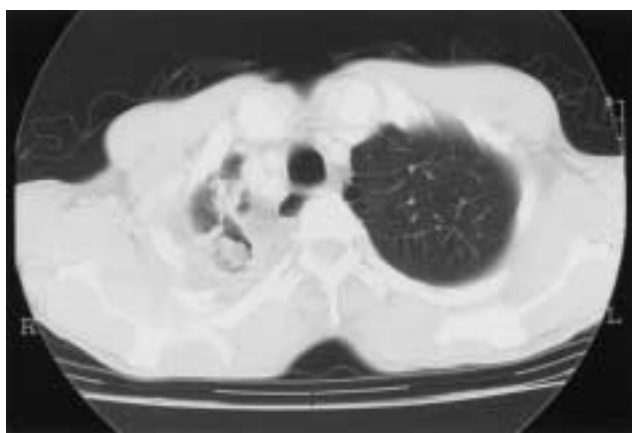


Fig. 2. Chest CT showing a fungus ball in the right upper lobe (a), and an *Aspergillus* empyema space surrounded by thickened parietal and visceral pleura with extensive calcification (b). a | b



Fig. 3. Chest X-ray film at 12 months after discharge showing an air space between the muscles.

bronchopleural fistula was identified at operation, no procedure was carried out on the fistula itself.

As much epithelial tissue as possible on the surface of the cavity was removed with scissors and ultrasonic scalpel with care, to prevent damage to the lung tissue. The pedicled latissimus dorsi musculocutaneous and serratus anterior muscle flaps were transposed to the thoracic cavity. These muscle flaps obliterated the cavity. The postoperative course was uneventful and the patient was discharged at 21 POD. However, a chest X-ray at discharge showed an air space between the muscles. This X-ray finding was unchanged at 21 months after discharge (Fig. 3). The patient continues to do well and now works as a driver.

Discussion

Pleural infection with *Aspergillus fumigatus* is a rather infrequent disease. Pleural *Aspergillus* is clinically divided into acute and late empyema. Acute *Aspergillus* empyema usually develops during the immediate postoperative course. Late *Aspergillus* empyema presents similarly to pulmonary aspergilloma as a chronic process of the saprophytic type, as in the present case.²⁾ In either acute or late *Aspergillus* empyema, the health status of the patient is poor; Krakowka et al. reported five deaths

during treatment in a series of 10 patients.³⁾ Therefore, appropriate management of this condition, especially with regard to operation methods, remains controversial.

In the present case we performed right upper lobectomy and decortication of the middle and lower lobes at the initial operation, because we had, preoperatively, judged that the middle and lower lobes could be expandable after decortication. However, postoperative empyema caused by a bronchopleural fistula presented as a complication; therefore, we should have performed an additional procedure to fill the residual space; either thoracoplasty or muscle flap transfer or both at the initial operation.

We selected open-window thoracostomy followed by muscle transfer, to fill the residual space, for management of postoperative empyema. The intrathoracic transposition of extrathoracic skeletal muscle flaps is well known to be an effective procedure for the obliteration of an empyema cavity.⁴⁻⁶⁾ It is important that plenty of muscle flap be transposed into the empyema cavity so that no dead space remains. The latissimus dorsi muscle is the largest and most reliable for this application, provided that the patient has not undergone a posterolateral thoracotomy, having already once divided this muscle.

Kadokura et al. reported a successful case of post-upper lobectomy empyema treated by plombage with a pedicled latissimus dorsi muscle flap that had already been divided at the initial operation. In that case good circulation of the transposed latissimus dorsi had been confirmed by postoperative angiography.⁷⁾ Nomori et al. recommended that an intrathoracic transposition of a pectoralis major and pectoralis minor muscle flap be performed instead of a latissimus dorsi muscle that has already been divided at the initial operation.⁸⁾ We selected the pedicled latissimus dorsi musculocutaneous and serratus anterior muscle flaps, which comprised the portion proximal to the dissected line of the previous operation, because scar formation of the dissected line of both muscles was prominent, and the proximal portion of both muscles were sufficient in volume for plombage of the cavity space. Although omentopexy is also a useful therapeutic option in the case of post-standard thoracotomy, it was not suitable for this case because of an insufficient volume of omentum to fill the cupula of the pleura. We presumed that pedicled latissimus dorsi muscle and serratus anterior muscle flaps would be useful for plombage of the cavity in a case, like ours, of post-standard thoracotomy.

Timing, namely closure of the open thoracotomy, has been discussed. However, a prerequisite optimum is a

negative bacterial culture in the cavity. Resistant bacteria like *Pseudomonas aeruginosa* or MRSA, will not disappear despite sterilization of the cavity wall or systemic and local administration of antibiotics. Pairolero et al. stated that pleural space tissue cultures were not used to determine the timing of chest wall closure, when healthy granulation tissue was present throughout the pleural space with no evidence of gross exudates. However, in their patients who had multiple organisms cultured from the pleural space, the chest wall never closed in about 40% of cases.⁵⁾

We decided to undertake the curative operation about 11 months after the open drainage thoracostomy, because purulent discharge had decreased. We assumed that complete disappearance of bacteria in the cavity was not necessary, as long as the muscle or omentum flap could obliterate the empyema cavity, and proper antibiotics had been administered perioperatively.

References

1. Kearon MC, Power JT, Wood AE, Clancy LJ. Pleural aspergillosis in a 14 year old boy. *Thorax* 1987; **42**: 477–8.
2. Massard G, Wihlm JM. Tuberculous and fungal infection of the pleura. In: Shields TW, Locicero III J, Ponn RB eds.; *General Thoracic Surgery*. Philadelphia: Lippincott Williams & Wilkins, 2000; pp 722–5.
3. Krakowka P, Rowinska E, Halweg H. Infection of the pleura by *Aspergillus fumigatus*. *Thorax* 1970; **25**: 245–53.
4. Miller JI, Mansour KA, Nahai F, Jurkiewicz, Hatcher CR. Single-stage complete muscle flap closure of the postpneumonectomy empyema space: a new method and possible solution to a disturbing complication. *Ann Thorac Surg* 1983; **38**: 227–31.
5. Pairolero PC, Arnord PG, Trastek VF, Meland NB, Kay PP. Postpneumonectomy empyema. The role of intrathoracic muscle transposition. *J Thorac Cardiovasc Surg* 1990; **99**: 958–68.
6. Regnard JF, Alifano M, Puyo P, Fares E, Magdeleinat P, Levasseur P. Open window thoracotomy followed by intrathoracic flap transposition in the treatment of empyema complicating pulmonary resection. *J Thorac Cardiovasc Surg* 2000; **120**: 270–5.
7. Kadokura M, Kataoka D, Yamamoto S, et al. A case of post-upper lobectomy empyema treated by thoracoplasty with the pedicled latissimus dorsi muscle flap plombage. *Ann Thorac Cardiovasc Surg* 1997; **3**: 417–20.
8. Nomori H, Horio H, Hasegawa T, Suemasu K. Intrathoracic transposition of a pectoralis major and pectoralis minor muscle flap for empyema in patients previously subjected to posterolateral thoracotomy. *Surg Today* 2001; **31**: 295–9.