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Case Report

Usefulness of Thoracoscopic Debridement for Chronic Empyema after an Extrapleural Pneumonectomy

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We present the case of a 65-year-old Japanese man diagnosed with chronic empyema (without a bronchopleural fistula) that occurred 7 months after he underwent an extrapleural pneumonectomy for right malignant pleural mesothelioma (MPM). Following thoracic drainage and irrigation for 1 month, we performed surgery by a thoracoscopic approach, in light of his general condition. We performed debridement and removal of the Gore-Tex polytetrafluoroethylene (PTFE) patch that had been used for the reconstruction of the diaphragm and the pericardium. The empyema had not relapsed when he died from recurrence of the MPM at 4 months after the thoracoscopic surgery. This patient's case suggests that thoracoscopic debridement and patch removal can be a therapeutic option for not only early-stage (exudative or fibrinopurulent) empyema but also late-stage (organized and chronic) empyema without a bronchopleural fistula, particularly for patients in poor general condition.

Key words: empyema, chronic, extrapleural pneumonectomy, thoracoscopic debridement, patch removal

Empyema is one of the potential complications following an extrapleural pneumonectomy, which is currently considered the treatment of choice for selected patients with resectable malignant pleural mesothelioma (MPM) [1]. Empyema is a major event in the postoperative course, with a substantial mortality rate. In cases of an apparent bronchopleural fistula (BPF), it is usually conceded that an aggressive surgical treatment such as a re-thoracostomy is required for closure of the fistula, with lavage and drainage of the pleural space [2].

However, some reports have suggested that thoracoscopy can be a valuable approach for patients presenting with early-stage (*i.e.*, exudative or fibrinopurulent) empyema [3,4] or even post-pneumonectomy empyema (PPE), with or without a minor bronchopleural fistula [5,6]. It has also been reported that a thoracoscopic approach can be effective for late-stage (*i.e.*, organized and chronic) PPE [6]. Here we describe the successful treatment of our patient with late-stage empyema, for whom we used a thoracoscopic approach following an extrapleural pneumonectomy.

Case Report

A 65-year-old Japanese man with a history of cholelithiasis was diagnosed with right MPM, sarcomatoid type, cT3N0M0 stage III, and a right extrapleural pneumonectomy was performed in 2013 (Fig. 1), with reconstruction of the diaphragm and the pericardium with a Gore-Tex® polytetrafluoroethylene (PTFE) patch through the fourth intercostal thoracotomy. The postoperative course was uneventful except for wound dehiscence that was treated with debride-

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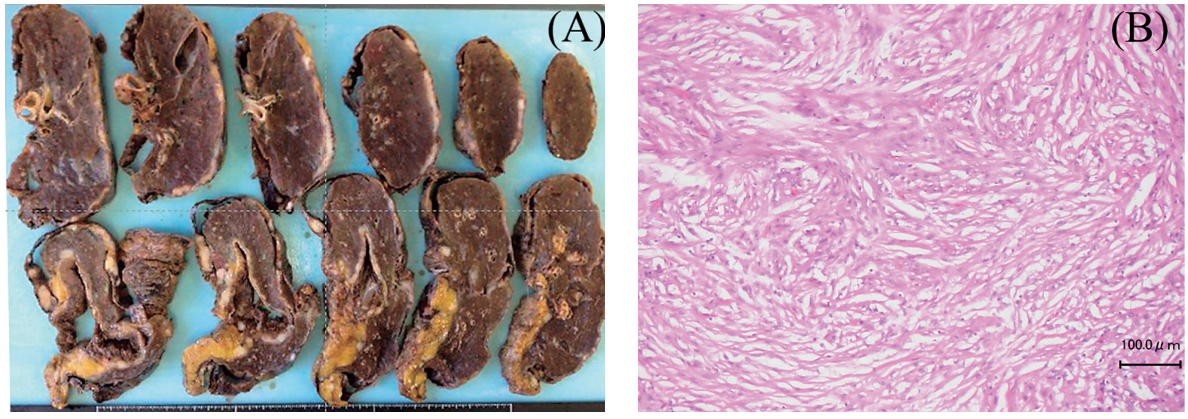

Fig. 1 Pathological findings of a surgical specimen. **A**, The gross appearance showed pleural thickening and encasement of lung parenchyma of the right lung; **B**, The microscopic findings showed proliferation of spindle-shaped cells with elongated nuclei.

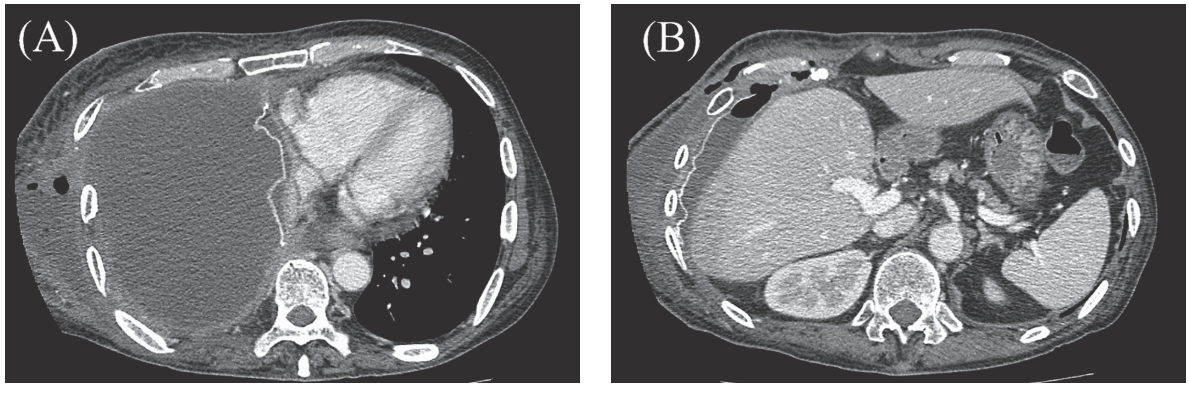

Fig. 2 Chest CT scan on readmission. **A**, A subcutaneous abscess had formed; **B**, The subcutaneous abscess drained to the thoracic cavity through the 5th intercostal fistula.

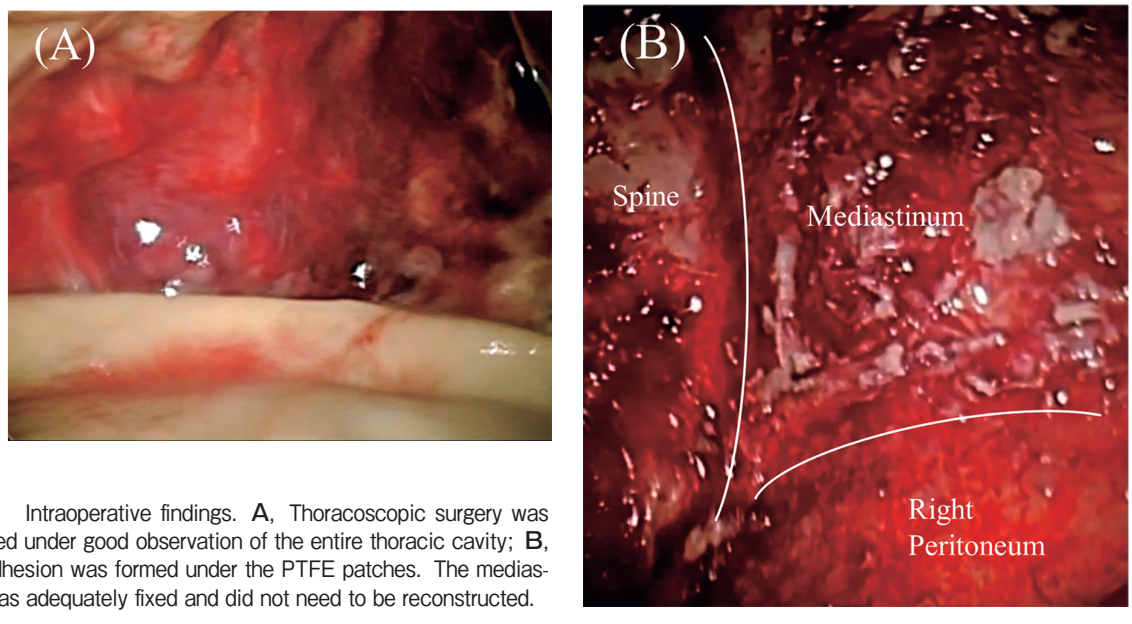

Fig. 3 Intraoperative findings. **A**, Thoracoscopic surgery was performed under good observation of the entire thoracic cavity; **B**, Tight adhesion was formed under the PTFE patches. The mediastinum was adequately fixed and did not need to be reconstructed.

ment and resuture. Adjuvant chemotherapy using carboplatin (75 mg/m^2) and pemetrexed (500 mg/m^2) had been performed subsequent to the adjuvant radiotherapy (2 Gy/day; total 54 Gy), but it was canceled after one course because his performance status declined from 1 to 2.

Seven months after the pneumonectomy, he was readmitted to our hospital because of fever and wound dehiscence. An image analysis with an enhanced CT scan of the chest revealed no evidence of tumor recurrence. An infectious effusion had discharged from the wound and a subcutaneous abscess had formed (Fig. 2A); the abscess also drained to the thoracic cavity through the 5th intercostal fistula (Fig. 2B). Chest tube drainage was performed through the fistula in the subcutaneous abscess. The anaerobic Gram-positive coccus *Finegoldia magna* was detected in the pleural effusion.

Because no air leakage was observed, we made the diagnosis 'chronic empyema without a BPF.' We initiated an intravenous administration of antibiotics (tazobactam/piperacillin 4.5 g×3) and irrigation using urokinase to treat the patient's empyema [7]; however, the level of C-reactive protein and the white blood cell count did not decrease completely after 1 month's irrigation. This condition was regarded as refractory chronic empyema because the PTFE patch that was tightly sutured to the thoracic cavity was a foreign body, and its removal was mandatory to control his empyema.

Although we considered an open-window thoracotomy as the treatment of choice, considering the patient's poor general condition, we chose a thoracoscopic approach. On day 30 after rehospitalization, we performed a thoracoscopic debridement and Gore-Tex patch removal. A thoracoscopic port was placed in the 8th intercostal space on the midaxillary line, and two ports were placed in the 5th intercostal fistula and the 4th intercostal anterior axillary line. With these access ports for thoracoscopic surgery, we successfully removed the PTFE patch and the remaining infected granulation tissue under clear vision of thoracoscopy throughout the procedure. At the end of the surgery, we irrigated the cavity of the empyema with saline, and a chest tube was inserted into the pleural cavity through the thoracoscopic wound.

The intraoperative cytology of pleural effusion showed no existence of malignant cells. He was extubated on the 5th postoperative day and treated with antibiotics intravenously until the 7th postoperative day. He was discharged 14 days after the thoracoscopic debridement.

Unfortunately, recurrence of the MPM was identified in course and the patient chose to receive the best supportive care, considering his poor general condition. The empyema had not relapsed when he died 4 months after the thoracoscopic surgery.

Discussion

Empyema of the pleural space occurs in 2–15% of patients after a pneumonectomy [8], and in 2.4% of patients after an extrapleural pneumonectomy at experienced institutions [9]. The management of PPE depends on the presence or absence of a BPF and whether it presents early or late. Some authors have stated that when a BPF is absent or only minor, early-stage PPE can be treated with thoracoscopic drainage and lavage [5,6]. However, in the case of late-stage PPE, the organization of fibrin in the thoracic cavity progresses with infectious tissue, and this requires more aggressive management such as an open-window thoracostomy [5,9].

In our patient's case, the diagnosis of PPE was made 7 months after he underwent an extrapleural pneumonectomy. We initially felt that he thus needed to undergo an open-window thoracostomy; however, his general condition was so poor that a less invasive procedure was worth considering. Studies report that in the absence of a BPF, open-window thoracostomy is a questionable option because of its high morbidity, reported to be up to 29% [10], with a recurrence rate of infection of up to 38% [11]. However, Tong *et al.* reported that thoracoscopic surgery for empyema had many advantages such as shorter hospital stays and lower rates of postoperative complications and mortality compared to conventional open thoracostomy [12]. Considering these reports, we eventually selected a thoracoscopic approach to successfully control our patient's empyema.

In his surgery, the thoracic cavity was relatively clear with a relatively small amount of infected granulation because of the irrigation using urokinase. We therefore focused on the removal of the PTFE patch because we suspected that it was probably responsible for his refractory empyema. Lambros Zellos *et al.*

reported that in early-stage empyema the patch can be left in place, but patients with late-stage empyema require patch removal to control the empyema [9].

We were able to remove our patient's PTFE patch with the thoracoscopic surgery, which makes the procedure easy under good observation of the entire thoracic cavity (Fig. 3A). Observation using a thoracoscope is very helpful, because with it the surgeon can remove not only a PTFE patch but also infectious granulation without residual materials. In addition, chronic infectious tissue is sometimes very difficult to remove, but a thoracoscopical procedure works well for this condition.

Of note, we did not need to perform a reconstruction to prevent herniation of the abdominal contents, cardiac herniation, or mediastinal shift, because 7 months had passed since the initial surgery and the adhesions that had formed under the patches were strong enough to prevent these complications (Fig. 3B).

As a limitation of this report, one case experience alone is not enough to conclude that a thoracoscopic approach is useful for the majority of cases with a similar clinical situation. However, our experience suggests that thoracoscopic debridement and patch removal should be considered for patients with a poor performance status and late-stage empyema without a bronchopleural fistula.

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