Video-Assisted Thoracoscopic Sterilization for Exacerbation of Chronic Empyema Thoracis*

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Study objective: To investigate the efficacy of video-assisted thoracoscopic sterilization to treat patients with exacerbation of chronic empyema thoracis.
Design: Case reports and literature review.
Setting: Academic department of surgery.
Patients: Two elderly, debilitated patients with worsening, chronic empyema thoracis as diagnosed by radiographs, CT, and thoracentesis. Both patients had a history of therapeutic pneumothorax for tuberculosis without bronchopleural fistulas.
Interventions: Video-assisted thoracoscopic sterilization of the thoracic cavity.
Measurements and results: There was no recurrence of empyema during a 6-year follow-up period for one patient and a 2.5-year follow-up period for the other patient.
Conclusions: Video-assisted thoracoscopic sterilization is a minimally invasive useful treatment for elderly or debilitated patients with exacerbation of chronic empyema thoracis.

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Key words: chronic empyema thoracis; therapeutic pneumothorax; video-assisted thoracoscopic surgery

Abbreviations: CRP = C-reactive protein; VATS = video-assisted thoracic surgery

Many reports have stated that acute empyema thoracis can be successfully treated by thoracoscopic procedures.1–6 However, for the treatment of chronic empyema or organization stage of empyema, it has been confirmed that fenestration (open drainage) or decortication is necessary.4,6 Decortication under thoracotomy is a major operation that sometimes cannot be tolerated by aged or debilitated patients.7,8 Open drainage requires further surgery to close the window, or the fenestration is kept open. We treated two patients with exacerbations of chronic empyema who had a history of therapeutic pneumothorax. As these patients were elderly or severely debilitated, decortication under thoracotomy was thought to inflict high risk. Therefore, video-assisted thoracoscopic surgery (VATS) sterilization involving debridement and irrigation was performed, and it achieved favorable results. This procedure could thus be an alternative to open drainage.

Case Report 1

A 74-year-old man was admitted to our hospital with complaints of chest pain and productive cough. Pyrexia, which developed after admission, did not resolve despite the use of antibiotics. Chest radiography and chest CT revealed a large amount of effusion in the left thoracic cavity and a shift of the mediastinum to the right (Fig 1). A bronchopleural fistula was not found. Thoracentesis disclosed that lactate dehydrogenase was 5,370 U/L and the WBC count was 155,200 cells/μL; however, the analysis for bacteria was negative. The patient had a history of therapeutic pneumothorax for left pulmonary tuberculosis when he was 27 years old. He received a diagnosis of exacerbation of chronic empyema thoracis. As the patient was lean and aged, major surgery was thought to inflict a high risk. Therefore we...
chose VATS therapy, rather than more complete, but more invasive, surgical therapies such as pleuropneumonectomy or decortication. An alternative fenestration was not undertaken because it would necessitate prolonged time for therapy. On the 12th day of admission, VATS sterilization was performed under tracheal intubation and general anesthesia. Thoracoscopy disclosed pus and debris over the peel. Curettage of the inner wall of the peel and irrigation of the thoracic cavity with saline solution was repeated through the two trocars. The thickened peel was scrubbed but not resected. \textit{Streptococcus viridans} and \textit{Bacillus cereus} were detected in the operative specimen. Following daily irrigation with saline solution, the chest tube was removed without instillation of antibiotics. The number of chest tube days was 38 days. No recurrence of empyema thoracis was found in the 2.5-year postoperative follow-up period (Fig 2).

**CASE REPORT 2**

A 65-year-old man complaining of productive cough and high fever was admitted. Thoracentesis performed previously by his personal physician had revealed a purulent discharge, but the bacteriologic culture finding was negative.

The WBC count was 73,600 cells/\mu L, lactate dehydrogenase was 16,421 U/L, and pH was 7.1 in the pleural effusion. The patient also had a history of therapeutic pneumothorax when he was 30 years old, and he was debilitated due to a long-standing gastric ulcer. Chest radiography on admission showed a massive left thoracic effusion, which caused the mediastinum to shift to the right, and the left lung to the upper part in the left thorax. CT demonstrated thick calcification in the pleural peel (Fig 3). A bronchopleural fistula was not detected. The C-reactive protein (CRP) value was high, at 14.3 mg/dL. The status was thought to be exacerbation of chronic empyema thoracis. Chest tube drainage through the firm peel was performed, but the tube was ineffective for expelling the purulent discharge or ameliorating the pyrexia. We chose VATS sterilization due to the debilitation of the patient. VATS was performed under general anesthesia, with intubation of a one-lung ventilation tube similar to that used in the first case. Video-assisted thoracoscopy showed not only pus but also numerous humps. The humps were destroyed easily, and irrigation of the thoracic cavity was performed. Microbiological

![Figure 1](image1.png) ![Figure 2](image2.png)
examination of the pus obtained during surgery revealed Xanthomonas maltophilia. The pyrexia was temporarily ameliorated after VATS. But 2 weeks later, the patient became febrile again and CRP, which had fallen to the level of 3.3 mg/dL, rose to 9.0 mg/dL in spite of daily irrigation.

A second VATS sterilization was performed 25 days after the first procedure. Debridement of the peel was performed more deeply and extensively than during the first procedure, but the peel was not resected. No bleeding or air leakage occurred. After the second treatment, daily irrigation was continued and his general condition improved. The thoracic tube was removed on the 24th postoperative day after the instillation of kanamycin, 2.0 g, and minomycin, 200 mg. The total chest tube placement days were 63. CRP fell to 0.3 mg/dL. Neither recurrence of empyema thoracis nor inflammatory symptoms was found during the 6-year postoperative follow-up period (Fig 4).

**DISCUSSION**

Treatment strategies for empyema thoracis include various methods. The method is selected based on the status of the empyema, the general condition of the patient, and response to the therapy. Ideally, the present patients, who had old, thick pleura and did not respond to tube thoracotomy, would require early surgical therapies such as decortication or pleuropneumonectomy. However, these surgeries were thought to provoke a high risk. Kaplan and Light emphasized the risk of decortication for debilitated patients. While open drainage, advocated by Eloesser and progressed by Clagett and Geraci with instillation of antibiotics at the time of closure, is an alternative choice, the time required to sterilize the empyema cavity is long and additional surgery is necessary to close the fenestration. Virkkula et al reported that the interval between the construction of the fenestration and its closure was on average 6 months (range, 1.5 to 28 months) for postpneumonectomy chronic empyema. The present patients were in the status of exacerbation of chronic empyema thoracis, a new infection to the old tuberculous empyema cavity caused by a nontuberculous organism. We applied video-assisted thoracoscopic therapy, which was established to be effective.
for acute empyema thoracis, as the first treatment modality for these cases. Debridement of the fibrinous fragments and division of loculation for acute empyema under VATS was proposed by Hutter et al; other authors have also applied this technique. We reported 10 cases of fibropurulent stage of empyema thoracis treated by VATS sterilization. Thereafter, we successfully treated eight additional patients with fibropurulent empyema. For chronic empyema thoracis or organization stage empyema, Ferguson stated that thoracoscopic treatment was not suitable because of the difficulty of decortication. While it is true that decortication cannot be performed under thoracoscopy, perfect decortication may not always be necessary to treat patients of chronic empyema. Ashbaugh reported that parietal decortication was seldom needed for acute empyema thoracis. In the present cases, extensive curettage of debris, including the inner lining of the parietal and visceral peel, without resection of the peel, facilitated a favorable course. Major surgery such as decortication or pleuropneumonectomy, which an elderly or a debilitated patient may be unable to tolerate, could be avoided by use of this minimally invasive VATS curettage and irrigation.

On the other hand, the duration of treatment is an important problem from other viewpoints. We could not find any reports describing this problem for patients of chronic empyema exacerbation. As previously mentioned, Virkkula et al required 6 months to close the fenestration for postpneumonectomy chronic empyema. The present patients did not require the additional surgery for closure. Ashbaugh reported the mean duration of total illness and chest tube placement to be 106.1 days and 78.3 days, respectively, for patients with open drainage performed. In his series, 70% of patients were in organizing stage. In the present two chronic empyema exacerbation patients, the chest tube days were 38 days and 63 days, respectively.

Based on these successful outcomes, we consider that VATS sterilization may become a new reliable modality for exacerbation of chronic empyema thoracis, alternative to open drainage.

**REFERENCES**