VIDEOTHORACOSCOPIC TREATMENT OF POSTPNEUMONECTOMY EMPYEMA

Peter H. Hollaus, Franz Lax, Peter N. Wurnig, and Nestor S. Pridun, Vienna, Austria

Postpneumectomy empyema without bronchopleural fistula is a rare complication in thoracic surgery. If bronchopleural fistula is present, treatment varies but an aggressive surgical approach is appropriate. In recent years videothoracoscopy has enriched our surgical armamentarium. We report our experience of videothoracoscopic debridement of the pleural space in isolated postpneumectomy empyema.

Methods. The charts of patients treated for isolated postpneumectomy empyema were retrospectively reviewed and the following parameters were recorded: age, sex, interval between operation and empyema diagnosis (days), duration of thoracic drainage (days), duration of hospital stay (days), operating time (minutes), suction volume (milliliters), the postoperative course, and follow-up (days). Pneumectomy was performed under antibiotic prophylaxis with a second-generation cephalosporin. Routinely the bronchial stump was resected tangentially to the trachea. The chest tube was removed on the day after resection.

Treatment consisted of immediate pleural drainage after diagnosis of empyema, and cultures were taken from the drainage fluid. After a fistula had been ruled out bronchoscopically, the patients underwent video-assisted debridement. With the patient in the supine position, a camera port and a working port were inserted cranial to the thoracostomy scar. Intrathoracic debris was mobilized and removed with a long plastic suction tube, endoscopic forceps, a swab on a stick, or with a sharp spoon. Again samples for bacteriologic cultures were taken. At the end of the procedure the thoracic cavity was irrigated with 1000 mL chloramine 0.1%; the ports were closed, and a chest tube was inserted at the most caudal point of the thoracic cavity. In the ward, the empty hemithorax was irrigated with antibiotics according to culture sensitivity. After instillation was completed, the drain was clamped for 3 hours. Cultures were obtained twice each week. After 3 consecutive sterile cultures, the infection was considered eradicated, and the drain was removed. Thereafter, the patients were kept in the hospital for another week, C-reactive protein and white blood cell count being monitored regularly. If there were no clinical signs of infection and the blood results were within normal levels, the patient was discharged.

Results. Between April 1996 and January 1998, 5 patients (4 male) who had undergone an operation for malignancy were treated. Age ranged from 57 to 69 years (mean, 61.75 years). In one patient who had adenoid cystic carcinoma histologic evidence revealed invasion of the lymphatic vessels of the bronchial stump with carcinoma.

The interval between the operation and the diagnosis of empyema ranged from 7 to 436 days (mean, 144 days; SD, 177.4 days). Two patients had clinical signs of infection during their initial hospital stay; however, aspiration of the postpneumectomy space revealed no bacterial colonization. With parenteral antibiotic treatment, C-reactive protein and white blood cell count dropped to normal levels, allowing discharge. They were readmitted 8 and 13 days after discharge from the hospital. Empyema developed in another patient 7 days after operation during hospital stay, and a chest drain had to be reinserted. Operating time ranged from 75 to 165 minutes (mean, 114 minutes; SD, 40.5 minutes). Suction volume (consisting of pus and blood) was 400 to 1000 mL (mean, 820 mL; SD, 249 mL). The chest drain was removed after 18 to 35 days (mean, 26 days; SD, 7.2 days). The average interval between videothoracoscopy and removal of the drain was 15 to 31 days (mean, 21.6 days; SD, 7.3 days). After endoscopic treatment, the patients stayed in the hospital for 22 to 42 days (mean, 28.8 days; SD, 7.7 days). There was no postoperative death. One patient required 2 blood units in the postoperative course; another one experienced the development of antibiotic colitis, which was treated with vancomycin. The follow-up period was 349 to 825 days (mean, 620.8 days; SD, 217.8 days). During this time no recurrence of empyema was observed. All patients are alive and well without signs of tumor recurrence.

Discussion. Postpneumectomy empyema without bronchopleural fistula is a well-known postoperative complication. Its incidence ranges from 2% to 13%, resulting in a rise of the associated perioperative mortality rate up to 25%, even if no fistula is present.¹ Initial therapy consists of immediate pleural drainage followed by a routine search for associated bronchopleural fistulas, found in approximately 40% of patients. Isolated postpneumectomy empyema is quite uncommon, occurring 1 week to even 25 years after operation.¹ Management depends on the patient's general condition on admission; options include fenestration, reinforcement of the bronchial stump even if no fistula is present, the Clagett procedure, muscle flap closure of the postpneumectomy space, or, in rare cases, thoracoplasty. In an earlier publication, we demonstrated that the danger of aspiration does not depend on fistula size.² As a consequence, we regard even minor fistulas as an urgent indication for reoperation.

However, in isolated postpneumectomy empyema, the

From the Department of Thoracic Surgery, Pulmologisches Zentrum, Vienna, Sanatoriumstraße 2, A-1140-Wien, Austria.

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Address for reprints: Peter Hollaus, MD, Pulmologisches Zentrum, Vienna, Sanatoriumstraße 2, A-1140 Wien, Austria.

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initial aggressive surgical approach has not proved to be more effective than the Clagett procedure or simple pleural rinsing.^{3,4} Additionally the Clagett procedure entails a prolonged course of irrigation before closure of the chest can be achieved. An open thoracostomy is uncomfortable for the patient, and most patients must face a second operation for closure of the thoracostomy.

A considerable number of patients cannot undergo an operation³ and thus have to await spontaneous closure of the thoracostomy, face thoracoplasty later on, or simply have to accept permanent thoracostomy for the rest of their life.

One of the main problems of all treatment modalities remains early empyema recurrence, which is usually observed within a few months. One additional major drawback of simple irrigation is the fact that debridement of the empty hemithorax is not achieved, even if infection has subsided. The remaining thoracic debris still harbors germs as a potential source for recurrence. Videothoracoscopic debridement is a simple procedure. In contrast to open window thoracostomy, a second intervention to close the thorax is unnecessary. However, the operating time can be quite lengthy. In 2 cases we initially had to create a space by digital means that allowed maneuvering of the endoscopic instruments. Although the time interval of occurrence was up to 15 months after pneumonectomy, detritus could be removed quite easily with strong suction and a sharp spoon. There was no postoperative morbidity or death, making this procedure comparable to fenestration or the Clagett procedure, removing all infected material, and opening all isolated chambers. One major drawback of this technique remains the debridement of the costodiaphragmatic recess, which is almost inaccessible at videothoracoscopy.

We start treatment as soon as a bronchopleural fistula is ruled out bronchoscopically. Fistulography is mandatory, because it may reveal minifistulas even if there is no visual sign of fistula. Videothoracoscopy alone is insufficient for excluding a fistula, because the bronchial stump is often covered with a thick layer of granulation tissue, making visual localization impossible, especially if the fistula is small.

Although the literature advises to maintain thoracic drainage until the mediastinum is fixed before irrigation is started,⁹ we did not observe any problems attributable to mediastinal shifting during treatment. Shortly after drainage, the intrathoracic debris is still soft and can easily be sucked away or peeled off the thoracic wall endoscopically. As long as no systemic signs of sepsis are present, we refrain from using sys-

temic antibiotics. Irrigation of the empty hemithorax through a single chest tube was reported by Provan,⁵ with a success rate of 50%. In our experience too, irrigation via a single chest tube was sufficient. Because there is no concomitant fistula present, aspiration, which is avoided by permanent rinsing through 2 drains, can be ruled out. After the drain is clamped, the antibiotic solution remains in the thoracic cavity for 3 hours, and the patient is encouraged to change positions or to walk to irrigate the entire thoracic cavity. However, even if the thoracic apex cannot be irrigated well, the most important part to be rinsed is the costodiaphragmatic recess, which cannot be cleared sufficiently via videothoracoscopy. We do not advocate saline irrigation, as in our experience, this may lead to massive growth of the infective organisms. During the postoperative course, we observed no case where the pleural cavity became obliterated. Serothorax developed after the patient was discharged from the hospital, leading to fibrothorax later on in most cases. Until now no recurrence has been observed. In accordance with Goldstraw¹ and Wong and Goldstraw,³ we trust in the natural organizing process of obliteration, which can be expected if the causative infection is eradicated. Therefore we refrain from surgical reduction of the postpneumonectomy space.

Conclusion. Videothoracoscopic treatment of postpneumonectomy empyema without bronchopleural fistula has proved to be an effective method in a small series of 5 patients. It is a simple technique without procedure-related morbidity and death. The fact that no early recurrence was observed is encouraging, but long-term follow-up is necessary to exclude late recurrence.

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