

## Application of Vacuum-Assisted Closure Device in Management of Postpneumonectomy Empyema

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A 57-year-old man was diagnosed with lung cancer and underwent pneumonectomy and mediastinal lymph node dissection. He was discharged without acute complications, but on a regular outpatient follow-up, he was readmitted with postpneumonectomy empyema. He was successfully treated with a vacuum-assisted closure device and for 1 year period of outpatient follow-up, there was no recurrence of empyema or lung cancer.

Key words: 1. Negative-pressure wound therapy  
2. Empyema  
3. Pneumonectomy

### CASE REPORT

A 57-year-old man visited Seoul National University Hospital due to an incidentally detected hilar mass. It was a 4.2 cm mass encasing the left main pulmonary artery and involved the left main bronchus within 2 cm from the carina but not the carina itself (Fig. 1A). Bronchoscopic examination showed an exophytic mass in the left upper lobar bronchus and tumor infiltration in the left main bronchus. A hypermetabolic mass in the left hilum was identified without metastasis by a positron emission tomography-computed tomography scan. He underwent left intrapericardial pneumonectomy and mediastinal lymph node dissection by hemi-clamshell incision after mediastinoscopic lymph node biopsy in April 2007. The pericardium was resected in en bloc fashion and the pulmonary artery was divided in the pericardial cavity. The pericardial defect was reconstructed with a Gore-Tex patch. The patient was discharged on postoperative

day 15 without any complications. The final pathologic result reported a clear resection margin at the bronchial and pulmonary arterial stump; however, there was microscopic single nodal metastasis at the subcarinal lymph node.

On regular outpatient follow-up, the patient was readmitted on diagnosis of postoperative empyema with bronchopleural fistula (BPF) and received a window operation in March 2008 (Fig. 1B, C). However, for fear of exposure of the pericardial cavity externally, we did not remove the Gore-Tex patch at that time. The BPF closed spontaneously several months after the window operation; however, the remaining Gore-Tex patch caused repeated infection and continuous dirty discharge. Therefore, we removed the Gore-Tex patch in October 2009 and noted that the heart was covered with a thick peel of empyema.

Six months after removal of the Gore-Tex patch, we screened for any cancer recurrence and decided to perform a Clagett procedure. As a first step, a widening of the window

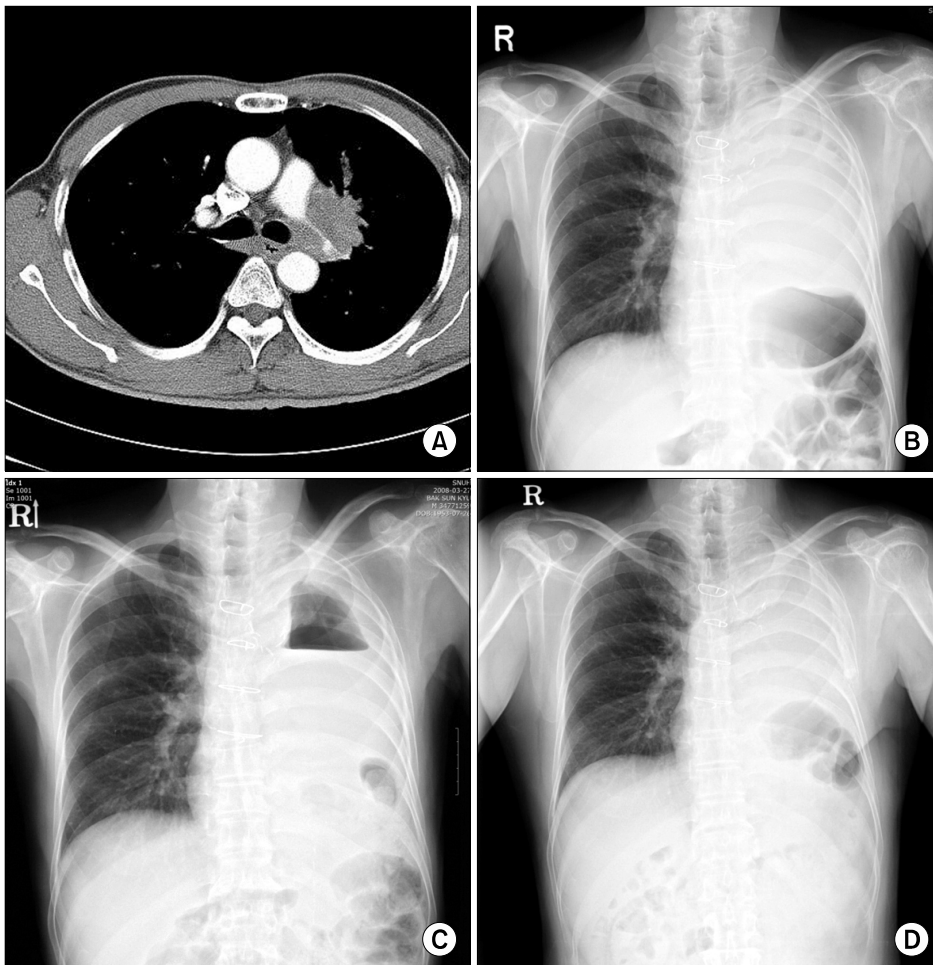
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**Fig. 1.** (A) Preoperative computed tomography scan; (B) postpneumonectomy 12-month follow-up, no evidence of empyema; (C) diagnosis of empyema (postoperative 13 months); (D) 6-month follow-up after Clagett procedure (postoperative 53 months).



**Fig. 2.** The vacuum-assisted closure device is applied to the Eloesser wound in postpneumonectomy empyema.

was performed to create enough space for the irrigation and debridement to follow. A vacuum-assisted closure (VAC) device was applied at postoperative day 1, and VAC sponge change was repeated at postoperative day 6, 9, and 12 (Fig. 2). Finally, the Clagett procedure completed by filling the pleural space with antibiotic solution at postoperative day 14 and the patient was discharged without complications (Fig. 1D).

For a 1-year period of outpatient follow-up, the cavity was fully filled with pleural effusion, and there was no recurrence of empyema or lung cancer.

## DISCUSSION

The treatment of postpneumonectomy empyema (PPE) remains a therapeutic challenge. The conventional management

of PPE is to create temporary thoracostoma, a well-known form of pleural drainage, which was first introduced in 1915 and has proven useful as a treatment for PPE [1]. It necessitates an open window, regular wound packing, frequent wound debridement, and prolonged hospitalization prior to definitive closure [2].

Currently, a new modality of treatment for PPE is emerging: VAC. Since VAC therapy was introduced, an increasing number of publications can be found describing various possible uses of the therapy; however, few reports have described an intrathoracic application after Ditterich et al. first introduced the idea in 2006 [3].

After thoracostoma was established in PPE patients, the extensive pleural secretions would require the dressings to be changed frequently; however, by using the VAC therapy system, secretions were collected in the device, so that it needed less frequent changes. In addition, the continuous removal of potentially infectious secretions from the wound and thoracic cavity supported the rapid healing of the initially septic conditions. Furthermore, if the patient was able to empty the device, he could be transferred to ambulatory care [4].

In this case, daily cleaning or dressing was not necessary, and we changed the VAC sponge only 3 times over the course of 14 days, which was very convenient for both the doctors and patient. The postpneumonectomy space became

clean enough for a Clagett procedure and the outcome was satisfactory without any short- or long-term treatment failure. It is our opinion that the VAC system might be widely used as an alternative option for the treatment of PPE in the near future.

#### CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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