



## Is no drain after thoracoscopic major resection for cancer acceptable?

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Although there is a rough unified recommendation for the management of chest drainage tubes after major lung resection for lung cancer (1,2), there is no firm guideline. Therefore, in actuality, each general thoracic surgeon manages patients' chest tubes based on their experience and the results of small-scale studies (3-5).

Regarding criteria for removing the chest tube, no objections have been made to the absence of air leakage and the absence of densely bloody, chylous, or purulent pleural effusion. The standard maximum pleural fluid drainage volume that should be attained before chest tube extubation used to be strictly set at 200 mL/day (3), but some reports have described no issues even if the amount of drainage exceeds 200 mL/day (6-8). Studies concerning the early removal of chest tubes are very important because early chest tube removal reduces pain and improves the forced expiratory volume in 1 s (4), resulting in fewer complications and an earlier discharge. In this respect, the best idea would be not to place a postoperative chest tube at all, and Ueda *et al.* (9) reported that omitting chest tube drainage led to a reduction in pain, preservation of the ventilatory capacity in the early postoperative period, and preservation of the exercise capacity in the early postoperative period in patients undergoing thoracoscopic major lung resection for cancer. The report is important that it is safe without placing a chest tube after thoracoscopic major resection for cancer for selected cases such as non-smokers, good lobulation, and no lymphadenopathy.

However, although there are some merits to omitting

chest tube drainage after thoracoscopic surgery, it should be recalled that the fundamental purpose of chest tube placement is to obtain information on the postoperative thoracic cavity in order to reduce the incidence of severe postoperative complications. Information obtained via the postoperative chest tube, such as the presence of postoperative bleeding, dyspnea due to postoperative air leakage, and early detection of chylothorax, is very important for preventing serious complications that may be fatal in some cases. For patients with a good pulmonary function and no severe basic disease, it should be clarified whether or not long-term improvement in the pulmonary function and exercise capacity can be preserved by omitting the use of a chest tube rather than improving the pulmonary function right after surgery or reducing the incidence of postoperative mild complications. Notably, the incidence of serious complications may be reduced by placing a chest tube for a few days instead of omitting the chest tube entirely. Furthermore, omitting the chest tube does not seem to reduce the length of postoperative hospitalization. Patients with a poor pulmonary function, such as those with severe emphysema or heavy smokers, can benefit greatly from their pulmonary function improving immediately after the operation to reduce postoperative complications by omitting a chest tube. However, such patients are at risk of developing postoperative pulmonary fistula and need to have a chest tube placed. Therefore, how useful it is to omit a chest tube and the need to do so at the risk of overlooking serious complications is unclear.

We previously reported that early chest tube removal on the day after video-assisted thoracoscopic surgery lobectomy was a safe treatment protocol in patients without air leak or bloody, chylous, or purulent pleural effusion, regardless of the amount of pleural effusion (10). To compare the findings of our study (10) with those of a previous study omitting chest tube drainage (9), we placed a 24- or 28-F chest tube and a small 7-F backup tube to prevent pneumothorax and excessive fluid accumulation, which can be caused by the early removal of a thick chest tube. The thin tube did not cause any marked pain, and its removal the day before discharge was not difficult. We also checked the chest roentgen findings at least once after extubation in order to confirm the condition of the operative side and contralateral lung. A chest tube after thoracic surgery is necessary for intrathoracic monitoring in order to prevent severe accidental complications, and if chest tube drainage is omitted after the operation, some other method of accurately monitoring the thoracic cavity should be applied instead.

Omitting chest tube drainage resulted in a reduction in pain, preservation of the ventilatory capacity, and preservation of the exercise capacity in the early postoperative period. However, whether or not omitting chest tube drainage preserved the ventilatory capacity and exercise ability in the long-term is unclear. Furthermore, chest tube drainage is more frequently omitted in patients who are non-smokers and have a better preoperative pulmonary function. Patients who are expected to retain a sufficient ventilatory capacity and who are also expected to be able to maintain the ability to exercise in the early postoperative period normally have a chest tube put in place for drainage purposes because of the presence of air leaks in the operating room. It is necessary to consider both the advantages and the negative consequences of not performing the placement of a chest tube.

A no-drain strategy after thoracoscopic major lung resection for cancer is not expected to become a popular treatment strategy because reducing the occurrence of mild postoperative complications by reducing early postoperative pain and only slightly improving the respiratory function is considered to be less important than identifying the onset of fatal postoperative complications.

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### Footnote

*Conflicts of Interest:* The authors have no conflicts of interest to declare.

*Ethical Statement:* The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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