New Approach to Complete Video-assisted Thoracoscopic Lobectomy in T2 and T3 Non-Small Cell Lung Cancer

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Abstract. Complete video-assisted thoracoscopic surgery (c-VATS) for lung cancer is minimally invasive because of the small incision required. c-VATS has recently become a standard procedure for treatment of stage IA/IB lung cancer. However, a long thoracic incision or extensive costal rib resection is required in patients with large lung tumors. We herein introduce an improved VATS lobectomy procedure for patients with T2 and T3 lung cancer. In this technique, resected tissue is removed through a small upper abdominal midline incision below the xiphoid through the retrosternal-extrapерitoneal pathway. Five patients who underwent this new procedure were compared against 10 control patients who underwent hybrid VATS lobectomy. Significantly fewer patients who underwent c-VATS lobectomy complained of severe postoperative pain; however, there was no significant difference in the postoperative hospital stay between the two groups. The present study demonstrates that c-VATS lobectomy can be performed with minimal operative pain and without need for a long thoracic incision or extensive rib resection, even in patients with large lung tumors (T2 and T3). These results suggest that the indications for c-VATS lobectomy in patients with T2 and T3 non-small cell lung cancer can be expanded by implementation of our approach, which involves removal of the freed lobe through an abdominal incision.

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Patients and Methods

Fifteen patients with T2 and T3 NSCLC who underwent surgical treatment at the Hamanomachi Hospital, Fukuoka, Japan, from December 2009 to December 2013 were included in the study. Five patients underwent c-VATS lobectomy, and 10 control patients underwent h-VATS lobectomy involving rib resection. The characteristics of the patients who underwent c-VATS and h-VATS are shown in Tables I and II, respectively. There were no significant differences in age, sex, or operation side between the two groups (data not shown). The tumour large perpendicular was 60 to 140 mm in the c-VATS group and 52 to 82 mm in the h-VATS group. The TNM stage was classified using the Seventh Edition of the General Rule for Clinical and Pathological Record of Lung Cancer (9). All patients were given full explanations and provided their written informed consent before treatment.

Results

Surgical procedure. The patient was placed in the lateral decubitus position under general anaesthesia. For upper lobectomy, the ports were placed in the third, fifth, and seventh intercostal spaces on the anterior axillary line for the operator and camera pole and in the sixth and eighth intercostal spaces on the infraspinacular line for the assistant (Figure 1). For lower lobectomy, the port locations were shifted down by one intercostal space. Upon completion of lobectomy, the freed lobes were placed in an endocatch bag. An abdominal skin incision of <5 cm was then created just below the xiphoid. A forceps was inserted through this incision into the intrapleural cavity through the preperitoneal cavity to remove the resected lung tissue by grabbing the endocatch bag (Figure 2A). Although the abdominal incision was not visible from the intrapleural space, the resected lung tissue was removed with the forceps through this route (Figure 2B and C). The postoperative scar is shown in Figure 2D.

Comparison between c-VATS and h-VATS groups. The number of patients who complained of severe pain and required analgesics was compared between the c-VATS and h-VATS groups. As shown in Table III, significantly fewer patients in the c-VATS than h-VATS group developed severe pain. Notably, many patients in the h-VATS group required analgesics for a long duration after operation. We also evaluated whether this extended pain affected the duration of the postoperative hospital stay. However, no significant difference in the postoperative hospital stay was noted between the two groups (Figure 3).
Discussion

VATS lobectomy is associated with a smaller surgical wound, a lower amount of resected costal cartilage (by about half), and more rapid patient recovery than by conventional thoracotomy. Additionally, if the surgical technique is stable, VATS is very useful and safe because the field of view can be shared between the surgeon and assistants. Therefore, the indications for VATS have been extended to elderly patients, as shown in the present study (Tables I and II). We began performing h-VATS in 2001 and gradually switched to c-VATS lobectomy after having acquired experience with many c-VATS procedures. As in previous studies (10, 11), all operations were performed by the same skilled surgeon; therefore, the analyses in the present study are well-comparable.

The most novel finding in this study is that the indications for c-VATS lobectomy in patients with T2/T3 NSCLC can be expanded by the herein-described approach. Generally, the wound size in c-VATS is less than 4 to 6 cm. If the resected lobe in patients with T2/T3 cancer is removed through a thoracic wound, the wound size should be larger than 5 cm because rib resection must be performed. However, if the resected lobe in patients with T2/T3 cancer is removed through an abdominal incision, the skin incision might be less than 5 cm, and c-VATS may be possible.

Another important point is that postoperative pain is attenuated in our new procedure. Many patients who undergo rib resection experience severe pain and require analgesics for long periods of time. This increases healthcare costs and may reduce the patient’s postoperative quality of life. Reduced postoperative pain may allow for early recovery and discharge. Indeed, three out of the five patients who underwent c-VATS in the present study were discharged on postoperative day 11. However, there was no significant difference in the duration of the postoperative hospital stay. The length of stay is often determined by what is convenient for the patient. Based on our experience, we believe that hospital discharge following c-VATS using our new technique is possible after about seven days. Further comparisons of more patients undergoing the new versus the control procedure may reveal a difference in the length of hospital stay.

Among the five patients who underwent c-VATS in the present study, three developed postoperative recurrence and two died (data not shown). Therefore, our newly introduced technique did not improve these factors. These results suggest the great aggressiveness of stage II and stage III lung cancer in these patients. However, we believe that our new procedure is clinically useful because patients may undergo chemotherapy sooner. Lung cancer has an extremely poor prognosis, and we therefore should remember that we must not pursue only a smaller surgical wound technique.

In conclusion, our proposed procedure is superior to the conventional technique with respect to less invasiveness, decreased postoperative pain, a lower requirement for analgesics, and earlier recovery and rehabilitation. To our knowledge, this is the first report of the removal of lung cancer specimens from an abdominal incision below the xiphoid. We expect that this new procedure will be helpful for patients with large, resectable lung tumors.

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*Calculated by the Chi-squared test.
Conflicts of Interest

The Authors declare no conflict of interest in regard to this work.

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References


