Single-stage video-assisted thoracoscopic surgery: Right upper lobectomy and left lower lobectomy for synchronous bilateral lung cancers

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ABSTRACT

INTRODUCTION: Single-stage bilateral radical surgery for synchronous bilateral multiple lung cancers (SBMLCs) has strong advantages; however, it is considered highly invasive. We have therefore adopted video-assisted thoracoscopic surgery (VATS) as a minimally invasive surgical maneuver for bilateral lung resection. Although there have been a few reports concerning bilateral lung resection, the safety and appropriate operative indications remain unclear, especially for bilateral VATS-lobectomy. A case of single-stage bilateral radical lobectomy with a good result is reported.

PRESENTATION OF CASE: A 58-year-old man was found to have abnormal opacities in the right upper zone and left lower zone at a health checkup. Double primary bilateral lung cancers was suspected, and surgical resection was considered. Consequently, right upper lobectomy with D2 lymph node dissection and left lower lobectomy with D2 lymph node dissection as radical resection were performed under VATS. The lesions were finally diagnosed to be double primary adenocarcinomas of the right upper lobe (pT1N0M0, stage IA) and left lower lobe (pT1N0M0, stage IA). The patient’s postoperative course was uneventful, and he was discharged on postoperative day 6. The patient is doing well with no evidence of recurrence for 9 years.

CONCLUSION: While careful consideration of the surgical options is needed, if properly done, bilateral VATS-lobectomy for SBMLC has advantages for selected patients.

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1. Introduction

Currently, while there have been some reports regarding bilateral pulmonary diseases that could successfully undergo single-stage operations via a minimally invasive approach [1], it is unclear whether a single-stage operation for synchronous bilateral multiple lung cancers (SBMLCs) could be a feasible option as a curative tool, especially bilateral lobectomy. Owing to advances in computed tomography (CT) and increasing awareness of screening for lung cancers, there has been a higher rate of detection of synchronous bilateral multiple pulmonary nodules. However, it is clinically difficult to distinguish a second primary lung cancer from a metastatic lesion arising from the first cancer. Therefore, there are still no therapeutic guidelines for such cases, and the surgical strategy has remained controversial. Furthermore, such treatment is considered rather highly invasive, and its safety has been questioned [2,3], especially in bilateral lobectomy. However, we believe that, if properly done, single-stage bilateral surgery for SBMLCs could be the ideal treatment for appropriate cases. In this report, a case of single-stage bilateral lobectomy under VATS for SBMLCs is described, with consideration of the operative indications and safety management.

2. Presentation of case

A 58-year-old man was found to have abnormal lung opacities in the right upper zone and left lower zone at a health checkup. At the time of presentation, he was in good condition with no complaints. The chest CT showed a ground-glass nodule measuring 26 mm in diameter in the right upper lobe (Fig. 1a) and an irregularly shaped, spiculated nodule measuring 27 mm in diameter in the left lower lobe (Fig. 1b). Preoperative PET-CT showed moderate accumulation [maximum standardized uptake value (SUVmax) 1.7] in the right upper lobe and significant accumulation (SUVmax 4.4) in the left lower lobe. On this examination, no lymphadenopathy or distant metastatic lesion was identified.

Adenocarcinoma was proven by transbronchial biopsy of the lesion of the right upper lobe. However, no diagnosis of the left side lesion could be made.

Provisionally, these lesions were diagnosed as adenocarcinoma of the right upper lobe (cT1N0M0, stage IA) and suspected lung cancer of the left lower lobe (cT1N0M0, stage IA), which was suspected to be more aggressive on the left than on the right, and then single-stage surgical resection was considered.
The patient’s vital capacity (VC) was 4.22 L (103% of predicted capacity), with a forced expiratory volume in 1 s (FEV1) of 2.87 L (68% of predicted volume). The predicted FEV1 after bilateral lobectomy was 1.87 L, which was calculated based on his lung scintigraphy (Fig. 1c). Based on the respiratory examination, the patient was thought to have good tolerance to undergo right upper lobectomy and left lower lobectomy simultaneously. A bilateral thoracoscopic approach was planned to minimize the invasiveness as much as possible.

The patient was initially placed in the left lateral decubitus position. Then, VATS – right upper lobectomy, which involves a smaller resection than left lower lobe lobectomy, and the lesion on the right had already been diagnosed, was performed with D2 lymph node dissection (#4, #10, #11s, #12). The patient was then turned to the right lateral decubitus position. Needle biopsy of the tumor was performed, and the diagnosis was adenocarcinoma. VATS – left lower lobectomy with D2 lymph node dissection (#7, #8, #10, #11, #12) was performed without perioperative complications. The operation took 300 min, with 100 mL of blood loss (Fig. 2a and b). The patient’s hospital course was uneventful, and he went home on postoperative day 6. The histologic diagnosis was double primary lung cancers (adenocarcinomas), mixed subtype of bronchioloalveolar and papillary patterns of the right upper lobe (pT1N0M0, stage IA), and acinar subtype of the left lower lobe (pT1N0M0, stage IA). No evidence of recurrence has been found for 9 years.

3. Discussion

Conventionally, single-stage bilateral thoracotomy is considered highly invasive, and it is not preferred because of the potential for increased postoperative morbidity and mortality. If simultaneous bilateral lobectomy is necessary, staged operations should be considered owing to the considerable invasiveness of such surgery and the high mortality rate [4,5].

However, the greatest disadvantage of staged resection is extension of the treatment term. Generally, although the second operation is planned about 1 month after the first one, there is no assurance that the postoperative course will run smoothly. The invasiveness of the first operation causes the release of various cytokines, including some involved in the immune system [6], and extension of the treatment may increase the risk of progression of the cancers. Lobectomy is the optimal treatment for early-stage
non-small cell lung cancer. Therefore, single-stage bilateral lobectomy could be considered as a feasible option for curative resection in selected patients with SBMLCs who have good tolerance for the operation. The indication for simultaneous bilateral lung lobectomy is actually limited because of the possible invasiveness of surgery and the difficulty of management, including ventilation after contralateral lobectomy and postoperative complications. To the best of our knowledge, there have been no case reports about single-stage bilateral VATS-lobectomy for SBMLCs. Thus, the present case, in which a good result was achieved with a procedure that was adopted based on careful preoperative assessment and surgical planning, was described.

Patients who undergo single-stage bilateral lobectomy must fulfill the following conditions. First, the cases must be able to undergo the standard surgical procedure (lobectomy + ND2a–1) under VATS, which is a minimally invasive operation that provides clear quality-of-life advantages compared with open surgery [7] and preserves respiratory function by damaging the respiratory muscles less. This shortens the recovery period, which reduces postoperative complications such as pneumonia. Second, patients who have systemic underlying disease such as diabetes mellitus or who are on dialysis or steroids or have underlying pulmonary disease such as interstitial pneumonia or severe COPD must be excluded because of the increased risks in the peri- and post-operative periods. Of course, younger patients are desirable.

An important aspect is to attempt to make the pathological diagnosis before the operation. The operation should be started from the side that had a definitive diagnosis. If both sides have been diagnosed or both lack a diagnosis, the operation should be started on the side with the lesion that seems to be more aggressive. If at all possible, the side requiring the smaller resection should be done first. The criteria for abandoning single-stage surgery are cases that have to be converted to thoracotomy or take over 210 min in the first operation, as well as cases in which one-lung ventilation cannot be maintained at the beginning of the second operation.

According to the above-mentioned policies and operative procedures, single-stage bilateral radical lobectomy was completed safely with a good result. However, while some level of invasiveness could be possible for bilateral lobectomy, the peri and postoperative course depends on the operator’s skill. In addition, collaboration with the anesthesiologist is essential for such an advanced procedure.

4. Conclusions

Single-stage bilateral VATS-lobectomy could be a feasible surgical option in selected patients, with careful preoperative assessment and good collaboration with anesthesiologists.

Conflicts of interest statement

The authors have no conflicts of interest Ethic approval not required for the publication of this manuscript.

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Ethics approval

None.

Consent

Informed and written consent was obtained from the patient for publication of this case report and accompanying images.

Author contribution

Takahiro Iida wrote the manuscript. Tadasu Kohno contributed to the operation and follow-up. Takeshi Ikeda contributed in its design and coordination and helped to draft the manuscript. All authors read and approved the final manuscript.

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