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The importance of determining surgical indications in cases of lung cancer and interstitial pneumonia with multiple intrapulmonary lymph nodes



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ABSTRACT

INTRODUCTION: When considering treatment for pulmonary cancer complicated by interstitial pneumonia, the greatest problem is acute exacerbation. We report two cases of pulmonary cancer complicated by interstitial pneumonia in which multiple intrapulmonary lymph nodes were noted.

CASE PRESENTATIONS: Cases 1 and 2 were 76- and 62-year-old males, respectively. Both cases were diagnosed as pulmonary cancer complicated by interstitial pneumonia, and upon chest CT, it was noted that, in addition to the primary lesions, there were multiple nodule shadows under the pleura in the lung lobe, which required identification in order to rule out lung metastasis. In Case 1, the pulmonary nodules were first resected during surgery and a swift diagnosis was made, determining them to be intrapulmonary lymph nodes, which were then operated on curatively. In Case 2, the patient underwent thoracoscopic observation during surgery, the shadows were diagnosed visually as intrapulmonary lymph nodes, and curative surgery was implemented.

DISCUSSION AND CONCLUSIONS: The greatest problem in treating pulmonary cancer complicated with interstitial pneumonia is acute exacerbation, wherein, in the absence of any surgical indications, alternative treatment is limited. Thus, contra-indicating surgery for a patient due to a diagnosis of metastasis within the lungs, based only on nodule images, should be avoided. If nodules are noted in the area of the pleura, the possibility exists that these could be intrapulmonary lymph nodes, along with metastasis within the lung, and thoracoscopic surgery should be implemented proactively while keeping these in mind.

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1. Introduction

When treating pulmonary cancer complicated by interstitial pneumonia, it is critical to determine whether or not surgery is indicated [1]. Furthermore, the greatest problem when considering treatment for pulmonary cancer complicated by interstitial pneumonia is acute exacerbation, which presents an added risk in cases of surgery, anti-cancer drug treatment and radiotherapy. At present, radiotherapy and many anti-cancer drugs are prohibited as treatments for interstitial combined pulmonary cancer [2]. As such, in cases of pulmonary cancer complicated by interstitial pneumonia, surgery is the only treatment that offers hope of a cure. In cases such as those in this study, where multiple nodules are found in other lung lobes, the authors consider how to assess the sur-

gical indications for pulmonary cancer complicated by interstitial pneumonia, and whether determination is possible using imaging diagnosis alone. The authors report their experience of two cases of pulmonary cancer complicated by interstitial pneumonia in which multiple lung nodes were identified by proactive thoracoscopy, and were subjected to simultaneous curative surgery. Herein, we report these cases along with observations from the published literature.

2. Presentation of cases

2.1. Case 1

The patient was a 76-year-old man in whom abnormal shadows were observed on a chest X-ray examination. His medical history included hypertension and hyperlipidemia. He had a smoking history of 20 cigarettes per day for the past 46 years. He worked as a doll maker. Auscultation of the chest resulted in the discovery of fine crackle sounds on both upper dorsal sides. Blood biochemistry

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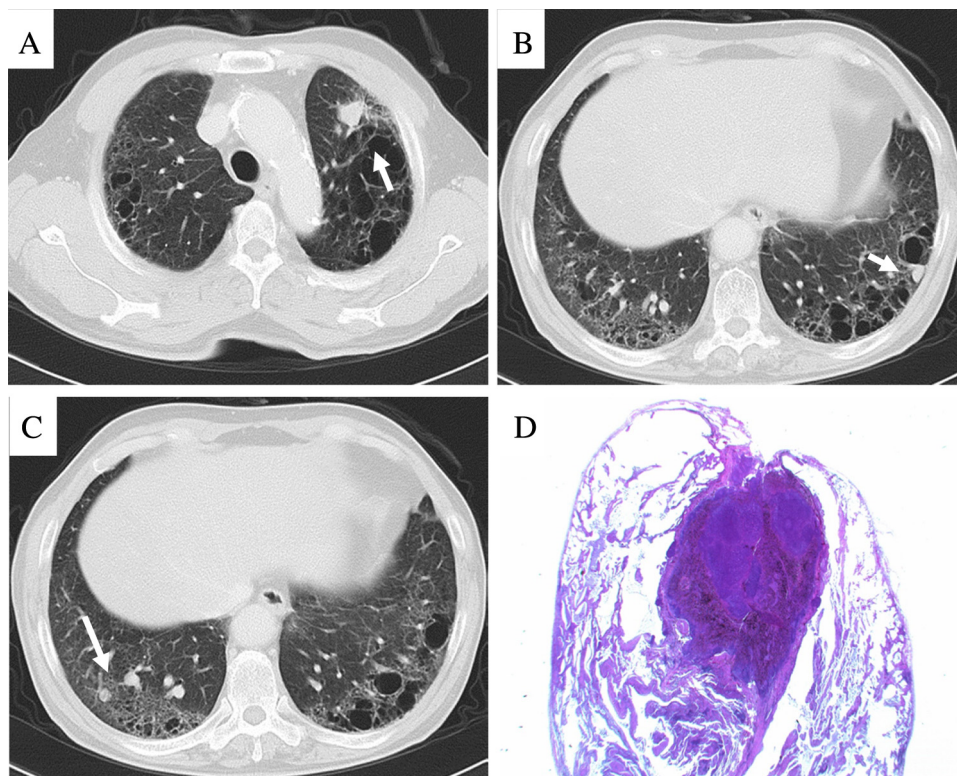


Fig. 1. Image data from Case 1: (A) Left lung S1 + 2 lung cancer (arrow); (B) Left lung S9 nodules; Biopsied nodule; (C) Right lung S10 nodule; (D) Left lung S9 nodule from the pathological specimen. Inside, anthracosis can be seen alongside the intrapulmonary lymph nodes.

tests showed KL-6: 622 U/ml, SPD: 79.4 ng/ml, LDH: 215 IU/l, CEA: 6.9 ng/ml, SCC: 1.8 ng/ml, and CYFRA: 4.0 ng/ml. Blood gas analysis showed pH 7.419, pCO₂: 36.2 mmHg, and pO₂: 71.6 mmHg, sO₂: 93.9%. Respiratory function testing demonstrated VC: 3.27 l, %VC: 111, FEV1: 2.70, % FEV1: 135, and FEV%: 82.8. A chest X-ray examination showed a shadow with pale nodules measuring 20 mm in size with unclear margins in the left upper lung. Both lower pulmonary areas exhibited reticular shadows. A chest contrast CT examination indicated a node shadow measuring 19 mm in size in the left upper lobe S3. Both lower lobes had five nodules measuring from 6 to 12 mm in size. Both pulmonary areas had emphysematous lesions. Dorsal interstitial lesions were also identified in the lower lobes (Fig. 1A–C). Bronchoscopic examination including exfoliative cytodiagnosis from the B3c area resulted in a positive finding for non-small cell lung cancer (NSCLC). Based on the findings of the above examinations, the patient was diagnosed as having pulmonary cancer complicated by interstitial pneumonia, cT1aN0M0, Stage IA or cT4N0M0, Stage III B. In order to determine the surgical indications, nodules from the left lung lower lobe were thoracoscopically biopsied and a swift diagnosis was thus obtained during surgery, based on the policy that if the findings did not indicate lung metastasis, curative surgery would be performed; whereas, if they did indicate metastasis, surgery would not be performed. As blood gas analysis indicated a low pO₂ level, reduction surgery was performed. Thoracoscopic observations of the lungs confirmed that the intrapulmonary lymph nodes were located directly below the lower lobe pleura. The nodules observed on CT images were biopsied after S9 pulmonary wedge resection, and were immediately examined to afford a swift diagnosis; which showed that they were intrapulmonary lymph nodes with no malignancy. Upper division segmentectomy of the left lung and mediastinal lymph node dissection were subsequently performed. The surgery took 201 min and 50 g of blood were lost. Ultimately, the pathological results demonstrated adenocarcinoma, pT1bN0M0,

Stage IA. A left S9 nodule shadows indicated no malignant intrapulmonary lymph nodes (Fig. 1D). The post-surgical progress was good, with the patient leaving the hospital eight days after surgery. At 25 months following surgery, the patient is alive and has had no recurrence.

2.2. Case 2

The patient was a 62-year-old male who worked in the transportation field. Abnormal shadows were identified during a chest X-ray examination. His medical history included surgery for stomach cancer. He had a smoking history of 20 cigarettes per day for the past 43 years. Regarding his family history, his father had suffered from pulmonary fibrosis, and his mother had a history of stomach cancer and stroke. Chest auscultation revealed the presence of bilateral fine crackle sounds on the upper dorsal sides. Blood biochemistry findings indicated KL-6: 832 U/ml, SPD: 189 ng/ml, LDH: 228 IU/ml, CEA: 5.2 mg/ml, SCC: 1.4 ng/ml, and CYFRA: 1.8 ng/ml. Blood gas analysis showed pH 7.453, pCO₂: 39.0 mmHg, pO₂: 98.9 mmHg, and sO₂: 97.2%. Respiratory function testing indicated VC: 4.20, %VC: 119.3, FEV1: 2.96, %FEV1: 106, FEV%: 72.3, and %DLCO: 129.7. A chest X-ray examination showed increasing density in the area overlapping the pulmonary artery in the right lung. Both sides showed reticular shadows in the lower pulmonary area. Chest contrast CT examination demonstrated the presence of a shadow measuring 29 mm in size and the presence of nodules with a cavity located directly below the right lung lower lobe S6 pleura. Within the same lung lobe, seven nodule shadows measuring between 2 and 3 mm in size were noted on the other side. Lymph node #11i had expanded to 16 mm. Both sides indicated reticular shadows in the lower dorsal lobe, with interstitial lesions (Fig. 2A–C). Bronchoscopic examination with exfoliative cytodiagnosis demonstrated a positive finding for NSCLC. Based on the above findings, the patient was diagnosed as having pulmonary

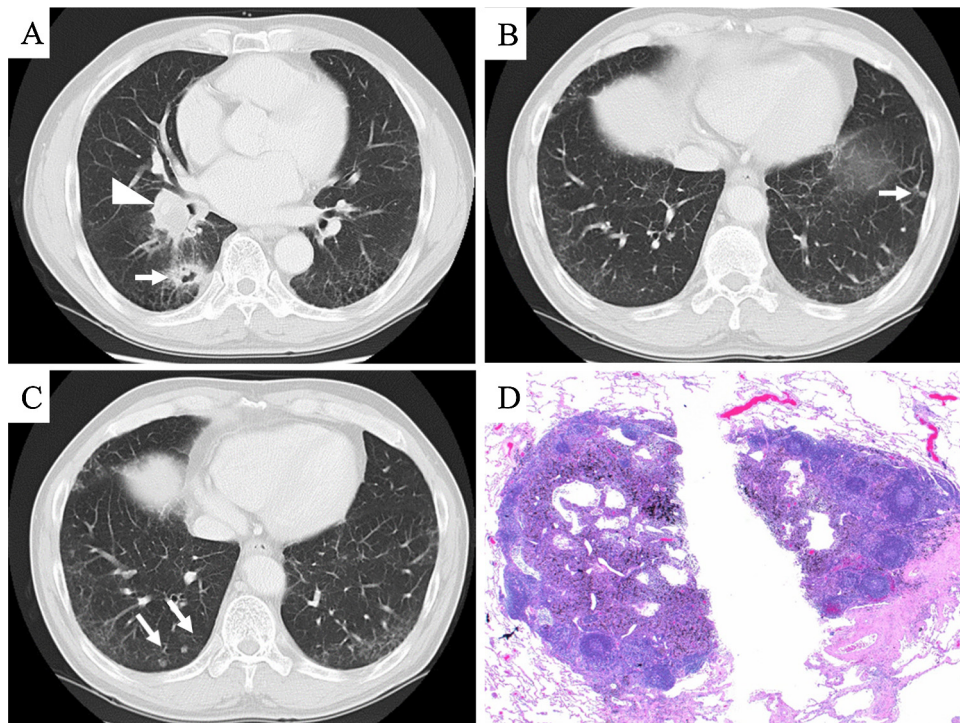


Fig. 2. Image data from Case 2: (A) Right lung S6 lung cancer (arrow) and #11i metastasized lymph node (head of arrow); (B) Left lung S9 nodule; (C) Right lung S10 nodules (2); (D) Right lung S9 nodule from the pathological specimen. Anthracosis can be seen alongside the intrapulmonary lymph nodes. The center of the lymph node was damaged during surgery.

cancer complicated by interstitial pneumonia, cT2aN1M0, Stage II A, or cT4N1M0, Stage III B. In order to determine the surgical indications, the right S10 nodules were biopsied thoracoscopically, thus affording a swift diagnosis during surgery, based on the policy that if the findings did not indicate lung metastasis, curative surgery would be performed; whereas, if they did indicate lung metastasis, surgery would not be performed. Thoracoscopic observation of the lungs revealed the presence of black nodules directly below the lower pleura, leading to the determination of intrapulmonary lymph nodes. The S10 nodes depicted in the CT image also led to the diagnosis of an intrapulmonary lymph node, and consequently, biopsy was not performed. Middle and lower lobectomy of the right lung and mediastinal lymph node dissection were subsequently performed. The surgery took 231 min and 78 g of blood were lost. The ultimate pathological diagnosis was squamous cell carcinoma, pT2aN1N0, pStage II A. A S10 node lung lymph tissue specimen showed no malignancy (Fig. 2D). Thereafter, the patient made good progress and left the hospital eight days after surgery. He did not undergo any chemotherapy after surgery. At 28 months after undergoing surgery, the patient is alive and has had no recurrence.

3. Discussion

The increasing use of CT scans and improved image resolution has led to increased opportunities to discover nodule shadows. It has been reported that between 0 and 1% of nodules measuring less than 5 mm, and between 6 and 28% of nodules measuring 5–10 mm are malignant lesions, and consequently, it is necessary to be able to identify lung cancer and metastatic lung tumors, among other malignant conditions [3,4]. Yokomise et al. examined 26 cases of nodular shadows in the lungs, measuring 10 mm or less, in which resection was implemented, ultimately leading to 3 cases of primary lung cancer, 2 cases of metastatic lung tumor, 12 cases of intrapulmonary lymph nodes, 6 cases of lung hamar-

toma, and 3 cases of pulmonary tuberculosis, with intrapulmonary lymph nodes found to be the most common condition (46%) [5,6]. The two cases in this study involved intrapulmonary lymph nodes, that were characteristic in that: (1) the border was sharp in most cases; (2) IPLNs were found just under or up to several millimeters away from the pleura; (3) more than one node was sometimes observed; (4) they could cause pleural indentations; and (5) the border might be rough similar to that of lung cancer [5]. Furthermore, Fellow et al. and Kradin et al. studied intrapulmonary lymph nodes that were confirmed during open-chest biopsy, and reported that in many cases, they were between 5 and 10 mm in size, were multiple, and were present below the pleura in the lower lobe [7]. In these cases, all the nodules were also present in the pleural region, and apart from one that measured 13 mm, all measured 10 mm or less. Furthermore, the rate of positive testing for lung cancer in FDG/PET was high, 87–91%, between 21 and 30 mm, but at 15 mm or smaller this fell to 75–82%, indicating that malignancy cannot be ruled out even if the test shows negative results. This supports that observing nodules, roughly 10 mm in size, in the pleural area in CT images, whether singular or multiple, means that the possibility of intrapulmonary lymph nodes needs to be considered. As a result, if surgery is indicated, tissue diagnosis must be carried out [8,9]. Transbronchial biopsy and needle biopsy using a CT guide have low accuracy rates for lesions measuring 1 cm or less, and consequently, it is necessary to implement thoracoscopic surgery, which offers the least invasive method [10,11].

In Case 1, the largest nodule on the left lower lobe, which measured 13 mm, was resected from the lung area for diagnosis. In Case 2, the surface of the lung had multiple black nodule shadows, allowing visual diagnosis of intrapulmonary lymph nodes. In both cases, nodules also existed in the lung that were not subject to surgery; however, these were all subpleural and measured less than 10 mm, and were diagnosed as intrapulmonary lymph nodes. No change in size was noted in chest CT after surgery. The implementation of swift diagnoses during surgery allowed a reduction in the risk

of interstitial pneumonia acute exacerbation, since it allowed the diagnosis of the nodules and curative surgery of the cancer in a single process.

4. Conclusion

Observation of subpleural nodules, roughly 10mm in size, whether singular or multiple, means that the possibility of intrapulmonary lymph nodes needs to be considered, and if surgery is indicated, proactive diagnosis must be carried out. Even in cases of pulmonary cancer complicated by interstitial pneumonia, it should be implemented without hesitation if surgery is indicated,

Conflict of interest

The authors report no conflict of interest.

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Ethical approval

None.

Consent

Informed and written consent has been given by patient.

Author contributions

Yuki Nakajima carried out the operations and wrote the manuscript. Hiroyasu Kinoshita, Maiko Atari, Mitsuro Fukuhara carried out the operations. Hiroshi Sakai and Hirohiko Akiyama have contributed to the clinical management of the patient. Hide-

taka Uramoto carried out the operations and revision of the manuscript.

Guarantor

Yuki Nakajima

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