Invited commentary: Videothoracoscopy-assisted surgical lung biopsy for interstitial lung diseases

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Interstitial lung disease (ILD) refers to a group of lung diseases with diverse etiology, pathological features, treatment, and prognosis. Diagnosis and classification of ILD have been based on histological examination of surgical lung biopsy (SLB) specimens since publication of the international multidisciplinary consensus classification of ILD by the American Thoracic Society (ATS) and the European Respiratory Society (ERS) in 2002 [1], which defined seven specific entities and provided standardized terminology and diagnostic criteria. This classification was updated in 2013 [2]. A number of studies have reported on the contributions of SLB to the definitive diagnosis and appropriate treatment of ILD.

In the early 2000s, the indications for SLB had not been clearly defined, and some high-risk patients with idiopathic pulmonary fibrosis (IPF) or respiratory failure underwent SLB. As a result, some studies reported 30-day mortality rates after SLB as high as 4–6 % (Table 1). Low vital capacity, low PaO₂, low diffusion capacity, IPF, pulmonary hypertension, mechanical ventilation, immunocompromised

state, and prolonged air leakage were reported to be risk factors for SLB-related death. In the late 2000s, development of high-resolution computed tomography (CT) enabled pulmonologists and radiologists to diagnose IPF based on the radiological pattern of usual interstitial pneumonia (UIP), without SLB. The recent joint statement by ATS, ERS, the Japanese Respiratory Society (JRS), and the Latin American Thoracic Association (ALAT) recommends that patients with UIP on high-resolution CT should not undergo SLB [9].

The study by Sonobe et al. used the following indications for SLB for ILD: age <70 years, vital capacity at least 60 %, and diffusion capacity at least 40 %. Patients with UIP on chest CT were not eligible. Using these strict indications, a relatively small proportion (19 %) of patients who underwent SLB were diagnosed with IPF, and there were no SLB-related deaths (Table 1). At our institute, the proportion of patients undergoing SLB for IPF has decreased year by year since 2000 (Fig. 1). SLB is performed less commonly for UIP, which is diagnosed using multiple modalities including high-resolution CT and clinical presentation.

To improve the safety of SLB, it is important to achieve agreement among pulmonologists, radiologist, and pathologists regarding the indications for the procedure. SLB tends to be indicated in patients with slowly progressive clinical courses or atypical radiological presentations of UIP, and less pulmonary compromise. Operative mortality and morbidity are reduced as the indications become more limited. When patients with IPF and other risk factors were excluded, the overall 90-day mortality rate after SLB was reported to be 1.5 % [3]. Obtaining biopsy specimens by the less invasive procedure of video-assisted thoracoscopic surgery may also decrease the mortality rate [10].

Prolonged air leakage is one of the major complications of SLB, and may result in acute respiratory distress or

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Table 1 Comparison of previous studies: mortality after surgical lung biopsy for interstitial lung disease, and proportions of patients with idiopathic pulmonary fibrosis (IPF)

Author	Year	Patient number	Age	IPF rate (%)	30-day mortality (%)
Lettieri et al. [3]	2005	83	57.3	50	4.8
Park et al. [4]	2007	200	58	35	4.3
Bando et al. [5]	2009	113	59	30	2.1
Luo et al. [6]	2013	32	52.2	13	3.0
Fibla et al. [7]	2013	311	60.9	39	9.0
Blackhall et al. [8]	2013	103	58	44 ^a	4.9
Sonobe	2014	64	57	19	0

^a Including nonspecific interstitial pneumonia

Fig. 1 Proportion of patients with interstitial pulmonary fibrosis (IPF) each year, among 113 patients who underwent surgical lung biopsy (SLB) for diffuse lung disease at Jichi Medical University [5]. Note that fewer IPF patients underwent SLB after 1999

acute exacerbation of IPF requiring mechanical ventilation [5]. Prolonged air leakage or pneumothorax after discharge occurred in six patients (9 %) in the reviewed study. Pneumothorax was associated with lower vital capacity and intraoperative steroid administration. Management of air leakage is more difficult in patients with lower vital capacity or lower lung compliance. When the biopsy site extends into a peribronchiolar area, prophylactic reinforcement is performed to prevent bronchopleural fistula. Intraoperative steroid administration increases the risk of pneumothorax in ILD patients and is reported to be ineffective as prophylaxis against acute exacerbation, and is now contraindicated during the perioperative management of SLB [11].

When performing SLB, samples should be collected from at least two sites in different lobes [12], but not from the right middle lobe or left lingular lobe where there may be nonspecific inflammatory changes. SLB was usually performed on the left side in the reviewed study, but is generally performed more often on the right side. The number of biopsy samples taken was one in 8 patients, two in 53 patients, and three in 3 patients, which is fewer than in previous studies. However, a definitive diagnosis was obtained for all patients. Biopsy sites should be selected

after careful clinical evaluation by pulmonologists and radiologists, to maximize the diagnostic rate.

The paper discusses the appropriate management of ILD after SLB including steroid treatment, immunosuppressive treatment, antifibrotic treatment, and finally lung transplantation, as recommended by the above-mentioned joint statement [9]. Thoracic surgeons, pulmonologists, radiologists, and pathologists should discuss inter-observer difference and agree on the indications for SLB and the optimal timing, and subsequent treatment should be based on the definitive diagnosis. The study results do not resolve the question of whether optimal treatment based on definitive diagnosis after SLB benefits overall survival. The survival benefits of performing SLB in ILD patients should be clarified by a further randomized controlled study.

Conflict of interest No conflict of interest exists.

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