Thoracoscopic Lung Biopsy for Diffuse Infiltrative Lung Disease

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Summary: Thoracoscopic lung biopsy is becoming the procedure of first choice for the diagnosis of many localized and diffuse lung diseases. We have performed thoracoscopic lung biopsy for 17 patients with diffuse infiltrative lung disease, in Kurume University Hospital. There were 13 females and 4 males with a mean age of 48 years (range: 19-71 years). Thoracoscopic surgical biopsy was performed in the right lung in 12 and in the left lung in 5. Adequate lung tissue from each case was obtained for pathological examination. The mean surgical biopsy time was 49 min (range: 25-72 min) and bleeding was negligible. The mean duration for chest tube drainage was 2.6 days. No postoperative complication such as prolonged air leakage occurred. A specific diagnosis from the biopsy was achieved in 13 (76.4%) of the 17 cases. In only 6 (35.2%) of the 17 cases, the pathological diagnosis was the same as that from the thoracoscopic biopsy. In these 6 cases, the same diagnosis was obtained only in those with idiopathic interstitial pneumonitis or diffuse panbronchitis. Thoracoscopic lung biopsy was safe and useful for diagnosis for diffuse infiltrative lung disease.

Key words thoracoscopic lung biopsy, diffuse infiltrative lung disease

INTRODUCTION

Open lung biopsy has been considered the best method for diagnosing parenchymal lung disease [1-5]. While thoracoscopic surgery is rapidly replacing standard thoracotomy in the evaluation and management of many pleuropulmonary diseases, thoracoscopic lung biopsy is now becoming the procedure of first choice for the diagnosis of many localized and diffuse lung diseases and an adjunct to conventional bronchoscopic evaluation [6,7]. Here we have reviewed a consecutive series of thoracoscopic lung biopsies and compared their diagnostic yield with that prior to instituting thoracoscopic lung biopsy.

PATIENTS AND METHODS

Seventeen consecutive patients were referred to the Section of General Thoracic Surgery, Kurume

University Hospital, for lung biopsy to evaluate a lung abnormality suggested by chest roentgenogram and computed tomography (CT). The surgical approach for the thoracoscopic procedure has been previously described [8,9]. There were 13 females and 4 males with a mean age of 48 years (range 19 to 71 years). All 17 patients received transbronchial lavage and biopsy, before the thoracoscopic biopsy, for diagnosis of parenchymal lung disease. General anesthesia with double-lumen endotracheal tube is necessary for the thoracoscopic procedure because collapse of the ipsilateral lung is necessary for visualization of the pleural cavity. The biopsy site in each case was selected on the basis of a preoperative chest roentgenogram and CT. One or two stapled wedge excisions of the lung parenchyma were taken in each case.

Each specimen was serially sectioned and examined grossly in the fresh state before fixation in

formalin. Routinely stained hematoxylin and eosin sections were reviewed in each case. Each biopsy sample was assessed histologically, and a final clinicopathologic diagnosis was rendered in correlation with the clinical findings.

RESULTS

Thoracoscopic surgical biopsy was performed in

TABLE 1.
Sites of lung biopsies

Right lung (16 in 12 cases)	Left lung (7 in 5 cases)
S1 : 1	S3 : 1
S2 : 1	S6 : 2
S3 : 2	S8 : 4
S4 : 1	
S5 : 1	
S6 : 4	
S8 : 4	
S9 : 1	
S10 : 1	

TABLE 2.
Diagnosis for pre- and post-thoracoscopic biopsy

Pre-thoracoscopic diagnosis	Post-thoracoscopic diagnosis
IIP : 9	IIP : 5 BOOP : 1 HP : 1 DIP : 1 Non-specific : 1
BOOP : 3	IIP : 1 EG : 1 Non-specific : 1
DPB : 2	DPB : 1 Non-specific : 1
HP : 1	DPB : 1
PIE : 1	EG : 1
LAM : 1	Non-specific : 1

IIP: idiopathic interstitial pneumonia; BOOP: bronchiolitis obliterans organizing pneumonia; HP: hypersensitivity pneumonitis; DIP: desquamative interstitial pneumonia; PIE: pulmonary infiltration with eosinophilia; EG: eosinophilic granuloma; DPB: diffuse panbronchitis; LAM: pulmonary lymphangioleiomyomatosis; Non-specific: non-specific inflammation/change

the right lung in 12 and in the left lung in 5 patients. A total of 23 specimens were obtained from 17 patients; 16 from the right lung in 12, and 7 from the left lung in 5 patients (Table 1). Adequate lung tissue from each case was obtained for pathological examination. The mean surgical biopsy time was 49 min (range: 25-72 min), and the mean loss of blood was 15 ml (range: 1-48 ml). The mean duration for chest tube drainage was 2.6 days (range: 1-5 days). No postoperative complication such as prolonged air leakage occurred. A specific diagnosis was achieved in 13 (76.4%) of 17 cases. In only 6 (35.2%) of the 17 cases, the same pathological diagnosis was the same as that by thoracoscopic biopsy. A same diagnosis was obtained only in those cases with idiopathic interstitial pneumonitis or diffuse panbronchitis (Table 2). Consequently, therapeutic course was changed in 8 (47.0%) of 17 cases in consideration of pathologic diagnosis by the thoracoscopic procedure.

DISCUSSION

Lung biopsy is required for diagnosis in about one third of patients with diffuse infiltrative disease. Transbronchial biopsy is less painful, less invasive, and considerably less costly, compared with open or thoracoscopic procedure, and entails a lower incidence of mortality and of morbidity [2]. However, transbronchial biopsy has introduced new diagnostic problems for the pathologist because the specimen has all the features that open biopsy tries to avoid: it is unselected and exceedingly small, the lung tissue is crushed and it comes from regions immediately adjacent to bronchi. Thoracoscopic lung biopsy is therefore the procedure of choice for the diagnosis of diffuse lung diseases and is an adjunct to conventional bronchoscopic evaluation. Histologic artifacts related to the surgical procedure itself are common in lung biopsy specimens [10]. Gaensler and Carrington studied 502 open lung biopsy procedures in patients with chronic interstitial lung disease and found that hemorrhage and atelectasis sometimes interfered with histologic evaluation [1]. They suggested that palpation and clamps should be avoided, that the lung wedge should be delineated during full inflation, and that specimens should be fixed immediately. Lung collapse is mandatory during thoracoscopic lung biopsy for proper visualization, and therefore it is technically impossible to take the biopsy specimens with the lung fully inflated or to keep the lung inflated when the specimens are being withdrawn through the chest wall.

Despite the fact that the thoroscopic biopsy specimen commonly shows artificial changes and the effects of tissue manipulation, the real question is whether these changes actually compromise patient care. On this point, Kadokura et al. reported that a clinicopathologic diagnosis, adequate for patient management and compatible with the initial clinical suspicions, was made in every patient. The pathologic changes of margination, hemorrhage, compression/atelectasis, and overinflation have been recognizable by pathologists and separable from those changes that explain the patient's clinical disease [7].

In the present study, there was no postoperative complication such as prolonged air leakage, and the therapeutic issue was changed in 8 of the 17 cases after the thoroscopic procedure. Thoroscopic lung biopsy was safe and useful for accurate diagnosis for diffuse infiltrative lung disease.

REFERENCES

1. Gaensler EA, and Carrington CB. Open biopsy for chronic diffuse infiltrative lung disease: clinical, roentgenographic, and physiological correlations in 502 patients. *Ann Thorac Surg* 1980; 30:411-426.
2. Wall CP, Gaensler EA, Carrington CB, and Hayes JA. Comparison of transbronchial and open biopsies in chronic infiltrative lung diseases. *Am Rev Respir Dis* 1981; 123:280-285.
3. Haverkos HW, Dowling JN, Pasculle AW, Myerowitz RL, Lerberg DB et al. Diagnosis of pneumonitis in immunocompromised patients by open lung biopsy. *Cancer* 1983; 52:1093-1097.
4. Thomas JH, Farek PE, Hermreck AS, and Pierce GE. Diagnostic value of open lung biopsy in immunocompromised patients. *Am J Surg* 1987; 154:692-695.
5. Kramer MR, Berkman N, Mintz B, Godfrey S, Saute M et al. The role of open lung biopsy in the management and outcome of patients with diffuse lung disease. *Ann Thorac Surg* 1998; 65:198-202.
6. Ferson PF, Landreneau RJ, Dowling RD, Hazelrigg SR, Ritter P et al. Comparison of open versus thoroscopic lung biopsy for diffuse infiltrative pulmonary disease. *J Thorac Cardiovasc Surg* 1993; 106:194-199.
7. Kadokura M, Colby TV, Myers JL, Allen MS, Deschamps C et al. Pathologic comparison of video-assisted thoracic surgical lung biopsy with traditional open lung biopsy. *J Thorac Cardiovasc Surg* 1995; 109:494-498.
8. Miller DL, Allen MS, Trastek VF, Deschamps C, and Pairolero PC. Videothoroscopic wedge excision of the lung. *Ann Thorac Surg* 1992; 54:410-414.
9. Ferguson MK. Thoracoscopy for diagnosis of diffuse lung disease. *Ann Thorac Surg* 1993; 56:694-696.
10. Colby TV, and Yousem SA. Pulmonary histology for the surgical pathologist. *Am J Surg Pathol* 1988; 12:223-239.