Video Thoracoscopic Lung Biopsy in Diffuse Interstitial Lung Diseases

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Abstract

The present study examined the use of video thoracoscopic lung biopsy (VTLB) in diffuse interstitial lung disease, in comparison with open lung biopsy (OLB). Twenty and fifteen patients underwent VTLB and OLB, respectively, from 1987 to 1997 at the Central Chest Hospital, Thailand. Data in mean (SD). The mean age was 39 years in both groups. VTLB yielded equivalent size of lung tissues, 4.7 (2.32) cm^3, and was as diagnostically useful as OLB. Estimated blood loss, 60 (37) mls, and length of pleural drainage, 2.8 (0.5) days, were comparable in either technique. As OLB had been in practice for decades, it took shorter operative time, 64 (11) mins, than VTLB, 105 (30) mins, ($p = 0.005$). Both VTLB and OLB approaches were safe and not associated with major postoperative complications.

Diffuse interstitial lung diseases (DILD) represent a heterogenous group of disorders with common clinical, radiologic, and pathophysiologic manifestations[1,2]. The differential diagnosis encompasses over 100 different clinical entities, ranging from infectious, inflammatory, industrial or malignant causes[3,4]. With few exceptions, the definite diagnosis requires a histopathologic examination in conjunction with clinical information[5].

Transbronchial lung biopsy is diagnostically useful in the presence of granuloma, infection, and malignancy. In the majority of DILD, however, transbronchial lung biopsy often yields inadequate alveolar tissue for the purposes of diagnosis and histologic staging[5,6]. Open lung biopsy is, therefore, usually required as the final diagnostic procedure.

The advent of new endoscopic devices has revolutionised the surgical approach to procedures traditionally performed by open thoracotomy or laparotomy[7]. Video thoracoscopic lung biopsy (VTLB) has been shown to be safe, and potentially

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offers adequate lung tissues when compared with lung biopsy *via* open thoracotomy (OLB)[8,9].

Based on accumulating experiences at our institution, the current study was aimed to 1) determine the efficacy and safety of VTLB in DILD, and 2) compare the results of VTLB with those previously obtained *via* OLB at the same hospital.

MATERIAL AND METHOD

Patients and study design :

This study examined patients with DILD who were referred for lung biopsy between January 1987 and February 1997 at the Central Chest Hospital, Thailand. In all cases, detailed history taking, clinical evaluation including roengenography, high-resolution computed tomography of the chest in some cases, pulmonary function testing, and immunologic investigations were completed. OLB was performed in fourteen patients with DILD from January 1987 to December 1993. From January 1994 to Febuary 1997, however, VTLB was practiced at our hospital and was undertaken in the subsequent twenty patients with DILD.

Technical aspects :

Video thoracoscopic lung biopsy (VTLB) was performed under general anesthesia and appropriate monitoring as formally described[10,11]. A left-sided double-lumen endobronchial tube was preferred and the patient was placed in the lateral decubitus position. With the use of one-lung ventilation, the operated lung was collapsed and the thoracoscope was placed in the fifth to seventh intercostal space in the mid- to posterior axillary line. The site and side of lung biopsy was chosen according to the extent of lung involvement evident on HRCT features. Two additional access sites were created at least 10 cm apart in the anterior axillary line and the posterior axillary to mid-scapular line.

The margin of the lung was grasped with endoscopic lung clamp through the access site without use of the thoracoscopic port. The endoscopic stapler was introduced *via* another access site when the biopsy was obtained. The biopsy was removed through one of the access sites and submitted for histopathological and microbiological examinations. Saline solution was instilled to detect air leakage along the suture line. Adequate hemostasis was checked and a chest tube inserted into the pleural cavity through the lowest access site connected to a water-sealed drainage. The incisions were then closed.

Main outcome variables :

1) size of lung tissues obtained.
2) estimated blood loss.
3) operative time.
4) length of postoperative pleural drainage.
5) length of postoperative fever, if present.
6) presence of surgical wound infection.
7) contribution to final diagnosis.

Statistical analysis :

Data are presented as group mean (standard deviation, SD). Normal distribution of the data was not assumed, hence non-parametric tests were employed for the significant testing of the group means[12]. Mann-Whitney U test was used for comparison of means of continuous variables[13]. Chi-squared test was used for categorical variables. Statistical significance was accepted at 5 per cent level. All statistical analyses were performed using a standard software programme (Minitab, U.S.A.).

RESULTS

Clinical characteristics of all the patients are summarised in Table 1. The two groups did not differ in terms of age and pulmonary function status. The mean age was 39 years in both groups. Forced expiratory volume in one second (FEV1) was 1.36 (0.56) L in VTLB and 1.59 (0.64) L in OLB group. Forced vital capacity (FVC) was 1.54 (0.59) L in VTLB and 1.91 (0.57) L in OLB group. FEV1/FVC ratios were 88 (6.9)% and 80 (10.3)%.

Female : male ratios were 17 : 3 and 7 : 8 in VTLB and OLB group, respectively

Both VTLB and OLB techniques yielded sufficient amount of lung tissue [4.7 (2.32) cm^3 in VTLB and 5.2 (2.12) cm^3 in OLB group] (Table 2). However, the operative time was longer in the VTLB group [105 (30) mins] than the OLB group [64 (11) mins] ($p = 0.005$). The mean estimated blood loss was 60 mls in both groups. The length of postoperative pleural drainage was relatively similar in both groups [2.8 (0.5) days in VTLB and 2.6 (1.0) days in OLB]. Period of postoperative fever was unremarkable in either group [1 (0.5) days in VTLB and 1.2 (0.6) days in OLB]. No major wound infection was observed in either group.

Table 1. Clinical profiles and lung function data.

	VTLB (n = 20)	OLB (n=15)
Age, yrs	39 (12.5)	39 (10.2)
Female : Male	17 : 3	7 : 8
FEV1, L	1.36 (0.56)	1.59 (0.64)
% predicted	54 (19.4)	59 (18.9)
FVC, L	1.54 (0.59)	1.91 (0.57)
% predicted	50 (18.7)	61 (11.5)
FEV1/ FVC, %	88 (6.9)	80 (10.3)

VTLB denotes video thoracoscopic lung biopsy,
OLB denotes lung biopsy *via* open thoracotomy.

Table 2. Main outcome variables.

	VTLB (n=20)	OLB (n=15)
Size of lung tissues, cm^3	4.7 (2.32)	5.2 (2.12)
Operative time, mins	105 (30)	64 (11) #
Estimated blood loss, mls	60 (37)	60 (14)
Days of pleural drainage	2.8 (0.5)	2.6 (1.0)
Days of post-operative fever	1 (0.5)	1.2 (0.6)
Number of wound infection	0	0

p = 0.005

Table 3. Final diagnosis.

	VTLB (n=20)	OLB (n=15)
Desquamative interstitial pneumonitis	5	2
Usual interstitial pneumonitis	6	2
Interstitial fibrosis	3	1
Tuberculosis	2	1
Sarcoidosis	0	1
Pulmonary haemosiderosis	1	2
Intraalveolar haemorrhage	1	0
Bronchiolitis obliterans organizing pneumonia	0	1
Bronchiolitis	0	1
Pulmonary alveolar proteinosis	1	0
Silicosis	0	1
Asbestosis	0	1
Interstitial fibrosis due to carbon particles	1	0
Carcinomatosis	0	1
Cryptococcosis	0	1

Table 3 shows the final diagnosis reached by either methods in conjunction with clinical information. The contributions to definite diagnosis approached 100 per cent in both groups.

DISCUSSION

The present study has attempted to define the safety and efficacy of video thoracoscopic lung biopsy (VTLB) in diffuse interstitial lung disease. The procedure proved safe and diagnostically helpful. In comparison with biopsy *via* open thoracotomy, VTLB provided equivalent amount of lung tissues with comparatively minimal blood loss. The postoperative care was uneventful in either method.

It is obvious from Table 3 that VTLB in our report yielded more diagnostic cases of cryptogenic fibrosing alveolitis (CFA), i.e. desquamative interstitial pneumonitis and usual interstitial pneumonitis. This is in view of the fact that we have been conducting a research project on CFA ; therefore, more cases have recently been subjected to VTLB. This research selection also accounts for the higher female to male ratio seen in the VTLB group.

The operative time spent for OLB was understandably shorter than VTLB in the current report. OLB has been in surgical service in our hospital for decades whilst VTLB has been mastered in recent years. The overall operative time

for VTLB consequently appeared longer. Nonetheless, this naturally will be shorter with be test of time in our institution. More importantly, it is of note that the longer operative time in VTLB was not associated with more intra or post operative complication, e.g. length of pleural drainage or wound infection.

Another outcome measure which should have been of interest in this type of study is the degree of pain perceived by the subject postoperatively[14]. This could be integrated in various types of pain score, e.g. visual analogue scale. An alternative approach is the amount of analgesics used postoperatively. Unfortunately, neither of these indices were systematically recorded in the present study.

The length of hospital stay is an important outcome index of economic aspect. However, the reliability of duration of hospitalisation as a reflection of good health care is a function of several socio-economic features. In a health care system with pressure on admission, some patients are not promptly admitted; conversely, some could not be discharged in due course in view of non-medical reasons. Hence, the authors opted not to include the length of hospital stay in the outcome parameters in this study.

Based on the evidence in the present report, video thoracoscopic lung biopsy has proven safe, efficacious and yields a sizable amount of lung tissue. The procedure is as diagnostically helpful as lung biopsy *via* traditional open thoracotomy.

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การใช้กล้องและวีดีโอช่วยในการตัดชิ้นเนื้อปอดเพื่อการวินิจฉัยในโรคปอด Diffuse interstitial disease เปรียบเทียบกับผลจากวิธีการเปิดผ่าตัดทรวงอก

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รายงานผลการใช้กล้องและวีดีโอ (Video thoracoscopic lung biopsy, VTLB) ช่วยในการตัดชิ้นเนื้อปอดเพื่อการวินิจฉัยในโรคปอด Diffuse interstitial disease เปรียบเทียบกับผลจากวิธีการเปิดผ่าตัดทรวงอก (Open lung biopsy, OLB). ผู้ป่วย 20 รายได้รับการผ่าตัดชิ้นเนื้อปอดด้วยวิธี VTLB และ 15 รายด้วยวิธี OLB ระหว่าง พ.ศ. 2530 – 2540 ที่โรงพยาบาลโรคทรวงอก. นำเสนอข้อมูลด้วยค่าเฉลี่ย (SD). อายุเฉลี่ยคือ 39 ปี ทั้ง 2 กลุ่ม. ชิ้นเนื้อปอดที่ได้จากวิธี VTLB มีขนาด 4.7 (2.32) ซม^3, และนำไปสู่การวินิจฉัยทางพยาธิวิทยาได้เทียบเท่ากับวิธี OLB. ปริมาณเลือดที่เสียโดยประมาณและระยะเวลาที่ใส่ท่อระบายลมและของเหลวจากทรวงอกหลังผ่าตัดไม่แตกต่างทั้ง 2 วิธี. เนื่องจาก OLB เป็นวิธีการผ่าตัดซึ่งปฏิบัติมานานหลายสิบปีแล้ว, ระยะเวลาที่ใช้ในการผ่าตัดชิ้นเนื้อปอด ในกลุ่ม OLB จึงสั้นกว่ากลุ่ม VTLB [64 (11) นาที, และ 105 (30) นาที, ตามลำดับ ($p=0.005$). พบว่าทั้ง 2 วิธีปลอดภัยและไม่มีข้อแทรกซ้อนที่สำคัญระหว่างหรือระยะหลังผ่าตัด.

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