Original Article

Thoracoscopic Pleural Biopsy for Tuberculous Pleurisy under Local Anesthesia

Motoki Sakuraba, MD, PhD,[1] Kimihiko Masuda, MD,[2] Akira Hebisawa, MD,[3] Yuzo Sagara, MD,[1] and Hikotaro Komatsu, MD[1]

Objective: We directly examined the thoracic cavity by thoracoscopy under local anesthesia, performed pleural biopsy, and made a definitive pathological diagnosis in tuberculous pleurisy.
Subjects and Methods: We performed a retrospective study of 32 patients who had been bacteriologically and pathologically diagnosed with tuberculous pleurisy by thoracoscopy under local anesthesia in our hospital between January 1995 and November 2004.
Results: Bacteriological examination of pleural fluids obtained by thoracentesis before examination showed that one sample was polymerase chain reaction (PCR)-positive, and 5 samples were culture-positive. Bacteriological examination of pleural fluids obtained by thoracoscopy revealed that 2 samples were PCR-positive, and 5 samples culture-positive, including 2 preoperatively positive samples. The adenosine deaminase (ADA) levels ranged from 18.3 to 279.0 U/L, with a mean of 72.9 U/L, including 50 U/L or less in 5 patients and 35 U/L or less in 3 patients. Thirty patients (93.8%) were successfully diagnosed by pleural biopsy with pathological examination, and 21 (65.6%) of them by pathological examination alone.
Conclusion: In patients with suspected tuberculous pleurisy, thoracoscopic pleural biopsy under local anesthesia should be actively performed, because the technique has a high diagnostic rate, and can be easily and safely performed. (Ann Thorac Cardiovasc Surg 2006; 12: 245–8)

Key words: tuberculous pleurisy, thoracoscopy, local anesthesia

Introduction

It has been reported that tuberculous pleurisy accounts for approximately 10 to 30% of disease causing pleural effusion in approximately 10 to 20% of all tuberculous patients,[1)] and is one of the main causes of pleural effusion, along with malignant disease and heart failure. However, *Mycobacterium tuberculosis* is rarely demonstrated in the pleural fluid by thoracentesis or pleural drainage. In many cases, tuberculous pleurisy is clinically diagnosed by pleural fluid adenosine deaminase (ADA) levels or differential lymphocyte counts. Although ADA determination is a useful test in terms of sensitivity and specificity, there are patients who can not be diagnosed by this test alone.[2,3)] Considering the long period of treatment required, tuberculous pleurisy should be treated after the diagnosis is established by bacteriological or histological examination. In this study, we directly examined the thoracic cavity by thoracoscopy under local anesthesia, performed pleural biopsy, and were able to make a definitive pathological diagnosis in a high percentage of patients.

Subjects and Methods

We performed a retrospective study of 32 patients who had been bacteriologically and pathologically diagnosed with tuberculous pleurisy by thoracoscopy in our hospital between January 1995 and November 2004. Thoracoscopy was performed in the operating room. After establishment of a peripheral intravenous line, the pa-

From Departments of [1]Thoracic Surgery, [2]Respiratory Medicine, and [3]Division of Pathology, Kiyose, Japan

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Address reprint requests to Motoki Sakuraba, MD, PhD: Department of General Thoracic Surgery, Juntendo University, School of Medicine, 2–1–1 Hongo, Bunkyo-ku, Tokyo 113–8421, Japan.

tient was placed in the lateral decubitus position, with the side of pleural effusion facing upward. A 2-cm incision was made just above the side of pleural effusion under local anesthesia with 15 to 20 ml 1% lidocaine. The muscle layers of the chest wall were separated to expose the pleura under direct vision, and a piece of pleural tissue, at least 5×5 mm, was taken. If this was impossible, an 8-mm OLYMPUS flexible trocar was inserted, through which a flexible thoracoscope (LTF-240, Olympus Medical Systems Corp., Tokyo, Japan) was inserted to aspirate pleural fluid (Fig. 1), and aliquots of the aspirate were submitted for bacteriological, biochemical, and cytological examinations. Pleural fluid was aspirated until it became possible to observe the thoracic cavity, and pleural lesions were biopsied with biopsy forceps. We made it a rule to take at least 3 biopsies of the parietal pleura in the absence of apparent lesions, and to submit a sample of fibrin deposits, if any. After examination, the flexible trocar was removed, and the procedure was finished by inserting a 20- to 28-Fr drainage tube from the incision into the chest cavity.

Results

The patients consisted of 25 males and 7 females, ranging in age from 21 to 83 years, with a mean age of 47. The right side was involved in 18 patients, and the left side in 14 patients. The operation took 14 to 84 min, with a mean of 41 min (Table 1). No complications occurred during the examination.

Bacteriological examination of pleural fluids obtained by thoracentesis before examination showed that one sample was polymerase chain reaction (PCR)-positive, and 5 samples were culture-positive. Bacteriological examination of pleural fluids obtained by thoracoscopy revealed that 2 samples were PCR-positive, and 5 samples culture-positive, including 2 preoperatively positive samples (Table 2).

The ADA levels ranged from 18.3 to 279.0 U/L, with a mean of 72.9 U/L, including 50 U/L or less in 5 patients and 35 U/L or less in 3 patients. All patients were successfully diagnosed by pleural biopsy (Table 3).

Thirty patients (93.8%) were successfully diagnosed by pleural biopsy with pathological examination, and 21 (65.6%) of them by pathological examination alone. Two patients (cases 6 and 7) could not be diagnosed by pleural biopsy with pathological examination, but bacteriologically culture-positive (Table 3).

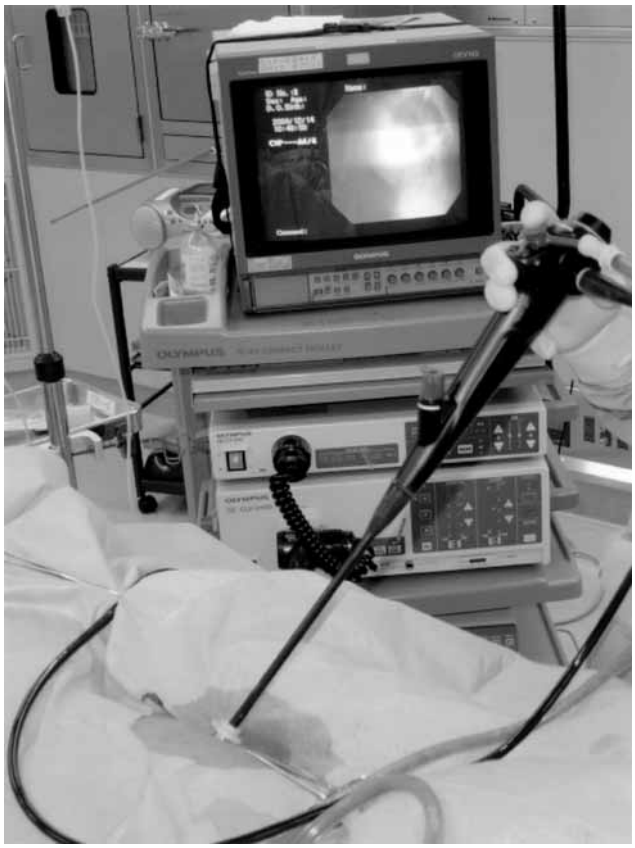

Fig. 1. Thoracoscopic procedure.

Discussion

In many cases, tuberculous pleurisy is clinically diagnosed by pleural fluid ADA levels or differential lymphocyte counts. However, considering the long period of treatment required, tuberculous pleurisy should be treated after the diagnosis is established by bacteriological or histological examination. Sugiyama et al. reported that the diagnostic rate of thoracoscopic pleural biopsy was 90.1%.[1] Thoracoscopic pleural biopsy had a high diagnostic rate of 93.8% (30 patients), and 21 patients (65.6%) were successfully diagnosed by pathological examination alone, but not by bacteriological examination, indicating the usefulness of pleural biopsy, as reported by other investigators.[4–6]

Determination of pleural fluid ADA levels has been reported to be useful in terms of sensitivity and specificity.[7–9] However, some patients have low ADA levels. In this study, 5 patients had an ADA level of 50 U/L or less, and 3 patients an ADA level of 35 U/L or less. None of these

Table 1. Background of patients

Age (yr)		
	Mean±SD	47±20
	Range	21–83
Gender (M/F)		25/7
Location (R/L)		18/14
Time of operation (min)		
	Mean±SD	41±16.9
	Range	14–84

yr, year; M, male; F, female; R, right; L, light; SD, standard deviation.

Table 2. Bacteriological findings of pleural effusion

	Smear-positive	PCR-positive	Culture-positive
Thoracentesis	0	1	5
Thoracoscopy	0	2	5

PCR, polymerase chain reaction.

Table 3. Bacteriological, biochemical, and pathological findings

					Thoracentesis		Thoracoscopy		
Case	Age	Gender	Location	ADA (U/L)	PCR	Culture	PCR	Culture	Pathology
1	29	M	R	67.5	+				Tuberculous pyothorax
2	27	M	R						Epithelioid cell granuloma
3	52	M	L	115.7					Epithelioid cell granuloma
4	72	M	R	279.0			+		Epithelioid cell granuloma
5	79	M	R	51.9					Fibrous exudate with granulomatous reaction
6	27	M	L	102.9		4 w			Fibrous pleuritis
7	47	M	R	64.8		4 w			Pyothorax
8	54	M	L	63.8					Epithelioid cell granuloma
9	24	M	R	50.8				16 d	Epithelioid cell granuloma
10	73	F	L	68.5					Epithelioid cell granuloma
11	33	M	R	76.7					Epithelioid cell granuloma
12	61	M	L	50.4					Epithelioid cell granuloma
13	37	M	L	119.6					Epithelioid cell granuloma AFB+
14	30	F	R	93.6		3 w		27 d	Epithelioid cell granuloma ZN–
15	41	F	R	69.3		14 d			Epithelioid cell granuloma
16	29	F	R	75.9		18 d		18 d	Epithelioid cell granuloma
17	32	F	R	57.2			+		Epithelioid cell granuloma
18	27	M	L					22 d	Epithelioid cell granuloma
19	82	M	L	33.7					Epithelioid cell granuloma AFB–
20	27	F	L	72.2					Epithelioid cell granuloma AFB–
21	48	M	R	30.6					Epithelioid cell granuloma AFB+
22	57	M	L	50.5					Epithelioid cell granuloma AFB–
23	45	M	L	61.1					Epithelioid cell granuloma AFB–
24	28	M	R	45.2					Epithelioid granuloma with necrosis AFB–
25	76	M	L	43.9					Epithelioid granuloma with necrosis AFB–
26	83	F	R	84.5				16 d	Non-caseous epithelioid cell granuloma with fibrosis
27	37	M	L	60.6					Epithelioid granuloma with necrosis AFB+
28	78	M	R	18.3					Fibrous pleuritis with granulation
29	76	M	L						Epithelioid granuloma with necrosis
30	32	M	R						Epithelioid granuloma with necrosis AFB–
31	32	M	R	59.8					Epithelioid granuloma with necrosis AFB+
32	21	M	R	72.4					Hemofibrinous pleuritis AFB+

ADA, adenosine deaminase; PCR, polymerase chain reaction; M, male; F, female; R, right; L, left; w, weeks; d, days; AFB, acid-fast bacilli; ZN, Ziehl-Neelsen stain.

patients could be diagnosed bacteriologically, and they were successfully diagnosed only after pleural biopsy.

Thoracoscopy has an advantage in that it can be performed under local anesthesia in patients with pleural effusion as easily and safely as a pleural drain insertion. Thus, it can be performed not only by surgeons but also

by physicians, who frequently encounter pleural effusion in clinical practice. However, physicians are initially reluctant to perform this procedure, and it is hoped they would perform it alongside a surgeon several times to gain experience. The second advantage of thoracoscopy is that it can determine the pathologic state of pleurisy through the direct observation of the thoracic cavity. Sugiyama et al. have classified tuberculous pleurisy into 4 stages.[10] In Stage I (the redness and swelling stage), the parietal pleura is reddened, swollen, and with tiny white nodules. In Stage II (the nodule dissemination stage), the parietal pleura is extensively reddened and swollen, with military white nodules extending diffusely and coalescing together. In Stage III (the fibrin deposition stage), white fibrin deposits extend over the pleura in a cord-like and a membrane-like fashion. With the progression of the lesion, the parietal pleura gradually become white and thickened. In Stage IV (the pleural thickening stage), the fibrin deposits become fibrous, representing a chronic stage. Part of the pleural effusion becomes encapsulated with a fibrin net, and remains multilocular. The parietal pleura becomes white, thickened, firm, and difficult to biopsy.

The thickened, firm pleura, as in Stage IV, cannot be biopsied with biopsy forceps; therefore, to ensure pleural biopsy, we make it a rule to expose the pleura under direct vision and take a sample of the pleura before thoracotomy. We consider that this method is important in the sense of preventing injury to the visceral pleura and lung.

Complications of the procedure include re-expansion of pulmonary oedema, pain during and after examination, wound infection, and subcutaneous emphysema. However, in our center, we have not encountered complications difficult to manage.

Conclusion

In patients with suspected tuberculous pleurisy, thoracoscopic pleural biopsy under local anesthesia should be performed, because the technique has a high diagnostic rate, and can be easily and safely carried out.

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