

1 cm

CT

:

1

: 1 cm

CT

: 1 cm

23

76

(

56.8

)

35

(

22

, 13)

CT

. 15

18G

21G

19.5G

20G

6

‘ fanning - out ’

: 35

가

. 15

(43%)

6

fanning - out

17 가

18

16 ,

0,

18 ,

1

97%

94%

100%

100%

95%

94% (16/17),

83% (15/18),

89% (31/35)

5 (14%)

1

(3%)

: 1 cm

CT

(1 - 3).

, 1 cm

(CT

(4 - 6).

fluoroscopy,

CT

)

CT

가

가

가

, 1 cm

CT

CT

1 cm

(7 -

2005
2005

10 25

2006 3 23

9).

Westcott (10)

(11)

: 1 cm CT

15 mm 95% 10 mm 20 6

, mm

, 14 가 , 6 mm 가

15 mm 가

CT HiSpeed CTi Pro (GE, Milwaukee, WI, U.S.A.)

Sytec 3000 (GE, Milwaukee, WI, U.S.A.)

6 - 10 mg Valium 30

Demerol 50 mg

(12) 가

CT 1 cm Fig. 1 CT

St. Paul, MN, U.S.A.) Skin Marker Set (Scalap, 1 mm

Skin Marker Set CT

2% Lidocaine 38 mm, (hub) 2

1997 2003 1 cm 35

CT 가 22 , 가 13 23

76 (56.8) 15

(7 , 21G hub removable needle (Cook, Bloomington, IN, U.S.A.)

1 , 1 , 1 , - 4 , (,) 17G

1), 11 4 21G (Fig. 1B). 17G

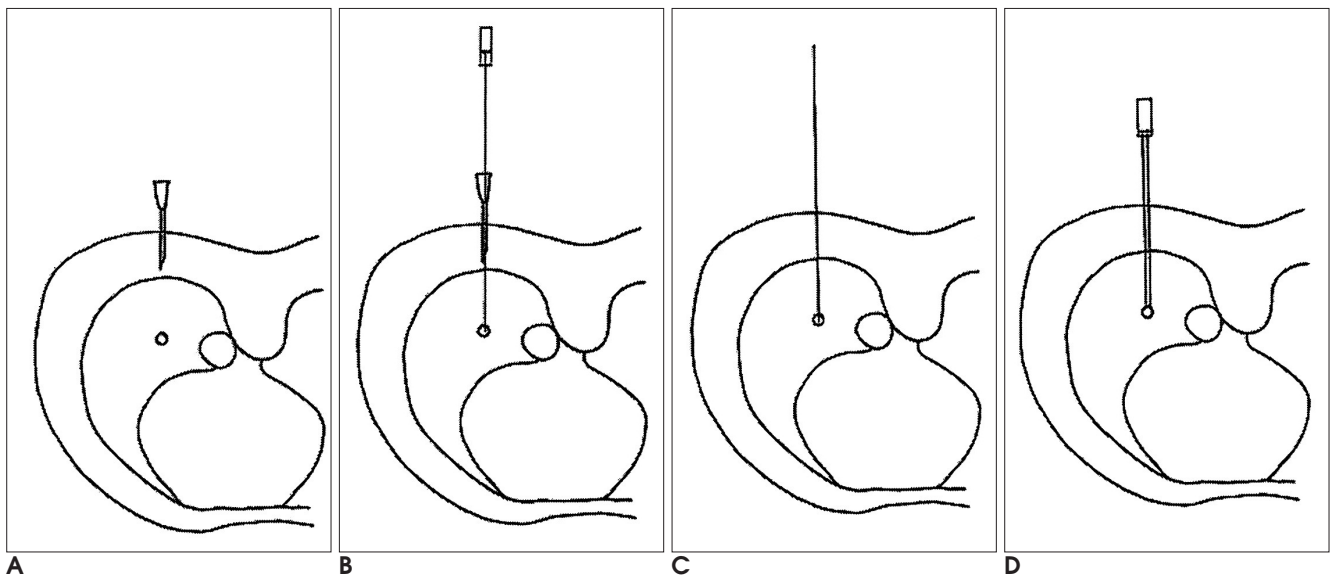


Fig. 1. Sequential procedure of needles and cannula insertion in modified coaxial technique.
A. A 17G short needle is inserted in the chest wall and correctly aiming at the small lung lesion.
B. A 21G hub-removable special needle is precisely introduced to the small lung lesion via the lumen of 17G short needle.
C. The special needle is transformed into a 'guidewire' after hub removal.
D. The final feature of modified coaxial technique is achieved when an 18G guiding cannula is coaxially introduced to the border of the small lung lesion (the 'guidewire' is already removed).

(Fig. 1C), 10 cm 2 cm 18G
guiding cannula (Cook, Bloomington, IN, U.S.A.) 가

(Fig. 1D) 21G
95% , Turner
19.5G Autovac (Angiomed, Karlsruhe, Germany)
Tru-Cut 20G Acecut (TSK, Tokyo, Japan)
10%
6

‘fanning - out’

3 12

가

가

, 12

가

, 가



Fig. 2. A 60-year-old man with a tiny lung nodule in the left upper lobe confirmed as adenocarcinoma. Because a guiding cannula (open arrow) hit the central portion of the 7-mm lung nodule (arrow), multiple core tissues of the tiny lung lesion were easily and promptly obtained through the lumen of the guiding cannula.

11 , 9 , 4 9 , 2 ,
7 mm 가 7 , 8 - 10 mm 가 28 5 -
11 , 24
16 ,
19 . 35

17G

, 80% (28/

35)

17% (6/35)

, 3% (1/35)

6

57% (20/35) (Fig. 2)

43% (15/35)

(Fig. 3) fanning - out

17 ,

18 가

17

5 ,

12

18

Table 1. Pathologic Results of Percutaneous Biopsy for Small (1-cm) Lung Lesions in 35 Patients under CT Guidance

Pathologic Results of Biopsy	No.	Final Dx
Malignant (n = 16)		(n = 17)
Adenocarcinoma	13	TP
Squamous cell carcinoma	2	TP
Small cell carcinoma	1	TP
Benign (n = 19)		(n = 18)
Specific cell type (n = 15)		
Tuberculosis, acid-fast bacilli (+)	3	TN
Consistent with tuberculosis, acid-fast bacilli (-)	4	TN
Granuloma	2	TN
Chronic inflammation	2	TN
Cryptococcosis	1	TN
Hamartoma	3	TN
Nonspecific negative result (n = 4)		
Totally necrotic cores	1	TN
Neutrophils and macrophages, no malignant cells	1	TN
Scattered inflammatory cells with focal fibrosis	1	TN
Fibrotic tissues with hyperplasia of alveolar cells	1	FN
Total	35	

TP: true positive, TN: true negative, FN: false negative

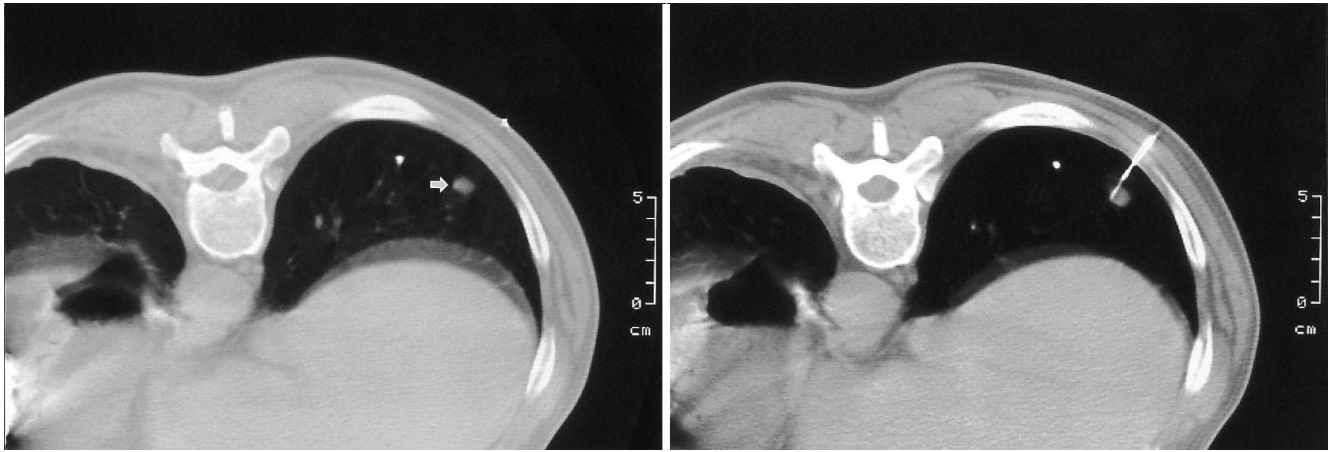


Fig. 3. The usefulness of fanning-out technique in a 74-year-old dyspneic man with a tiny lung lesion confirmed as metastatic squamous cell carcinoma.

A. CT scan shows an 8-mm lung nodule (arrow) in the right lower lobe. Motion artifacts on the tiny lung nodule and the right diaphragm are due to shortness of breath of the patient.

B. Although a needle hit the peripheral portion of the tiny lung nodule, multiple core tissues of the lung lesion were obtained by use of fanning-out technique.

2

4

12

19

16

1

100%,

100%,

89% (31/35)

83% (29/35)

(6%)

94% (16/17)

13

2 가

83% (15/18)

7

2 가

4 (11%)

가

5 (14%)

1 (3%)

CT

2

16

0,

97%,

18

94%,

95%

(Table 1)

가

(13 - 16).

가

35

22G

(hub)가

(12).

16G

22G

18G

21 -

fanning - out

가 CT 가

. 가 가 . 5 mm CT ,
 (3, 10, 17 - 19) 가 15 mm 2 - 3
 (4, 20) . Kucuk (20) 가 10 mm 1 - 2 5 mm
 1
 가 가 3.8 cm 가 (7, 21). 가 가

. Tsukada (4) 124
 1.4

가
 30 mm
 , 2 cm 5 1
 (20%) 18 mm
 가 가
 1cm mm

Westcott (3, 10)

가 , 가 가
 , 가 ,
 , 가 ,
 , 가
 fanning - out 가 가
 (21).
 가 가 가 1 cm
 6 가 가
 1 cm CT 가
 , 가 17G

가 가 가
 CT 가 가 CT 가
 가 가 가

가 가
 , 가
 1 cm

(21, 22).

1.5 cm
Li (6) 74% 96% 가
Westcott (10) 1.5 cm 64
95% 5 3 가 2

(23) 1/3 1.5 cm
87% . 10 mm
Ohno (24)
10 mm 가 52% 14%(5/35)
16 - 20 mm 91.5% 가 (3,
11 - 15 mm 74% 10 mm 5, 25, 26).
52% 가
Wallace (25) 1 cm
88% 8 - 10 mm
92% 가
7 mm 70% 8 - 10 mm fanning - out 가
가 Westcott CT
(10) 10 mm 30 1 cm

100%
57%
97%
89%
가 43%
fanning - out
6 가
2 5
(11) 1.5 cm
가
95%
80% 43%
1 cm 가
가 가 가
가 가
가 가
가 가

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Percutaneous CT-guided Biopsy for Lung Lesions 1 cm or Smaller: The Technique, Results and Complications¹

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Purpose: The author wanted to assess the diagnostic accuracy and safety of percutaneous biopsy for lung lesions 1 cm or smaller; the biopsies were performed on the basis of the modified coaxial technique under CT guidance.

Materials and Methods: Thirty-five patients (22 men and 13 women) 23 - 76 years old (average age: 56.8 years) with lung lesions 1 cm or smaller underwent CT-guided percutaneous biopsy. Fifteen patients had underlying primary malignancies. After an 18 G guiding cannula was introduced to the border of the small lung lesion via the modified coaxial technique, fine-needle aspiration biopsy with 21 G needle and core tissue biopsies with 19.5 G or 20 G biopsy guns were performed through the lumen of the guiding cannula. The core tissue biopsies were finished after 6 macroscopic core tissue specimens were obtained. When the needle hit the eccentric portion of the small lung lesion, a 'fanning-out' technique with using the guiding cannula was applied to get multiple core tissue specimens from the small lung lesion. The diagnostic accuracy of this method was evaluated and the complications were reviewed.

Results: Both the cytopathologic and histopathologic specimens were obtained in all 35 cases. The fanning-out technique was necessary in 15 cases (43%) for obtaining six core tissue specimens from small lesions. The final diagnoses were 17 malignant lesions and 18 benign lesions. Sixteen lesions were true-positive, eighteen were true-negative, none was false-positive and one was false-negative. The overall diagnostic accuracy was 97%. The sensitivity for detecting malignancy and the specificity for benign lesion were 94% and 100%, respectively. The positive and negative predictive values were 100% and 95%, respectively. The diagnostic ability to characterize the specific cell type of the malignant lesion was 94% (16 of 17), that for the benign lesions was 83% (15 of 18), and overall diagnostic ability was 89% (31 of 35). Five patients (14%) developed a pneumothorax, and one of them (3%) received a radiologic chest catheter to relieve moderate dyspnea.

Conclusion: Percutaneous biopsy performed on the basis of the modified coaxial technique under CT guidance for lung lesions 1 cm or smaller is considered to be an accurate and safe procedure.

Index words : Lung, biopsy
Biopsies, technology
Computed tomography (CT)

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