EFFICACY AND SAFETY OF PERCUTANEOUS TRANSTHORACIC NEEDLE ASPIRATION BIOPSY UNDER SOME LIMITATIONS: A PROSPECTIVE STUDY IN 109 PATIENTS

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ABSTRACT

Percutaneous transthoracic needle biopsy was performed in 109 patients during April 1992 - April 1995. Diagnostic yield was slightly lower than the foreign reports due to different types of the needles used and the lack of immediate cytology reports. The incidence of hemoptysis was similar to other reports but the occurrence of the pneumothorax was less due to less repetition of the needle puncture. Considering socioeconomic and lack of medical-personnel-power in this country, this procedure as practised by us is quite practical.

INTRODUCTION

Percutaneous transthoracic needle biopsy (PTNB) has long been accepted as the reliable, and low complicated procedure for establishing the diagnosis of the intrathoracic mass. Few articles concerning PTNB were published from Thailand. They were different from those reported in other countries which were the retrospective ones (2,3,4).

The purpose of this study was to compare the diagnostic yield and rate of complications, compared with the foreign reports. Limitation of our procedures was the type of the needles used, the re-use of the needles and the lack of prompt interpretation of the obtained tissue or fluid.

PATIENTS AND METHODS

A prospective study of PTNB in the patients with the intrathoracic masses was performed during 1992-1995. The patients were in and out patients of Ramathibodi Hospital and Prince of Songkla University Hospital. The following data were obtained and recorded in the prepared sheet-forms:

1. Age, sex, in or out patient.
2. Important clinical data such as the indication for the biopsy, the chronic illness, pulmonary disease, smoking, previous treatment, previous bronchoscopy, any disease that increases the risk for biopsy.
3. Data concerning the nodule or mass from the diagnostic images, the lungs-background.
4. Technical aspects of PTNB, the types of the needle, the site and the number of passing the needle, the imaging used.
5. Clinical symptoms or signs during, immediately after and 4 hours after the biopsy.
6. The time and the severity that the pneumothorax occurred, duration of retained tube drain (ICD).
7. The appearance of the tissue or fluid obtained, the result of cytology, histology, staining and culture.

The planning, the chosen instruments and the PTNB was performed by the same radiologist in every case. The technique used was the standard one (5). All of the informations were recorded by the computer for statistic analysis.

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RESULTS

There were 109 patients, 79 of them were male and 30 were female. Age ranged was 18-86 years old, the average age was 59 years old. Forty-nine cases were outpatients and 60 cases were in-patients. The indications for PTNB were 1) to diagnose the primary bronchogenic carcinoma in 62 cases (56.9 percents) 2) to diagnose the type of metastatic nodules in 17 cases (15.5 percents) 3) to differentiate between cancer and tuberculosis in 16 cases (14.7 percents) 4) to establish the infectious nodules in 14 cases (12.9 percents). Bronchoscopy was performed in twenty patients but pathological results were not informative.

Twenty patients (19.3 percents) had pulmonary emphysema or hyperaerated lung and 13 cases (12 percents) had risk factors for pneumothorax e.g. previous PTNB at the same site and history of heavy smoking.

Ninety patients (90 percents) had nodules in the lungs, 11 patients (10 percents) had nodules at other sites i.e. pleura and mediastinum. Right upper lobe nodules were seen in 38 cases, left upper lobe nodules were seen in 25 cases, right lower lobe nodules in 11 cases, left lower lobe nodules in 10 cases, right middle lobe nodules in 7 cases and at hilar region in 4 cases. The size of the nodules ranged from 1.5 to 2.0 cm, average size was 5.4 cm. The depth from the skin to the nearest part of the nodule was 2.5 to 12 cm, average distance was 5.7 cm.

Anterior approach of PTNB was done in 58 cases (53.2 percents), posterior approach was performed in 42 cases (38.5 percents) and lateral approach in 9 cases (8.3 percents). The method used for localization was fluoroscopy in 96 cases (88 percents), ultrasonography in 11 cases (10 percents) and X-ray computed tomography in 2 cases (2 percents).

Spinal needles were used in 82 patients (75.2 percents), cutting needle e.g. Franseen (Cook, Australia) or True-cut (Cook, Australia) in 18 cases (16.5 percents) and aspiration needle, e.g. Chiba needle (Cook, Australia) in 6 case (7.3 percents). More than half of the needles (55.5 percents), were re-used at least once. 21-G needles were used in 39 patients (35.8 percents), 20-G size in 25 cases (23 percents), 18-G needles in 22 cases (20.2 percents), 23-G size in 18 cases (16.5 percents), 22-G size in 5 cases (4.6 percents).

The puncture was performed only once in 65 cases (58.7 percents), twice in 40 cases (37.6 percents) and thrice in 4 cases (3.7 percents).

Complications were seen in 26 patients (24 percents) including pain at the sites of puncture in 9 cases (8.3 percents), hemoptysis in 7 cases (6.4 percents), non-blood stained cough in 6 cases (5.5 percents) and other problems in 4 cases. Immediate pneumothorax was seen in 4 cases with average degree of 7.2 percents of the pleural space. Delayed 4 hrs-pneumothorax was seen in 4 cases with average volume of 16.7 percents of that side of pleural space. One case showed pneumothorax in 48 hours post PTNB. Total cases of pneumothorax were 9 cases (8.26 percents) with range of percentage of pneumothorax from 5 to 50 (average 20) of the pleural space volume. Intercostal drainage was performed in 4 patients who had more than 30 percents pneumothorax or had tension pneumothorax which was seen in 3.7 percents of the total cases (44.4 percents of the whole cases of pneumothorax). The duration of retained ICD was 5-7 days, (average 6.2 days).

The diagnosis could be obtained from cytology, gram stain and culture in 86 cases (78.9 percents). In 23 cases, the tissue was inadequate or malignant cells were not seen. Cancer was seen in 67 cases (78 percents), infectious process in 19 cases (22 percents). Squamous cell carcinoma predominated in cancer group and was seen in 25 cases (37.3 percents of all cancer patients). Other cell types were listed in the table 1.

In the patients with infection, bacteria was shown in 8 cases (42 percents), tuberculosis in 7 cases, fungus in 1 case and unidentified specific type of infection in 3 cases.

Table 1. The result of cytology in 67 patients.

Results of cytology	No. of patients	percents of patients
Squamous cell carcinoma	25	37.3
Non small cell carcinoma	11	16.4
Positive for malignancy	8	12
Adenocarcinoma	6	8.9
Large cell carcinoma	6	8.9
Metastasis	5	7.5
Small cell carcinoma	4	6
Others	2	3
Total	67	100.00

DISCUSSION

High diagnostic yield (more than 85 percents) of the PTNB was seen in the report from abroad (1,6). This is probably due to the combined factors e.g. modern diagnostic machine, and needle (7,8), repeated study was obtained in one setting with immediate cytologic interpretation in case of inadequate specimen (9).

Lower diagnostic yield in our series (79 percents) was probably secondary to the following reasons: 1) spinal needle, though easy to obtain and cheap, was not design for cutting or sucking the tissue and the size of the internal lumen was smaller than other types of needle; besides they were used more than once 2) the specimen obtained was not examined immediately. Comparing with the diagnostic yields from other reports which had similar inferiority showed the same results (9,10).

The incidence of hemoptysis was similar to the report of others (5). The incidence of pneumothorax in our series was lower (8.3 percents) than from other reports (1) which appeared to be 30 percents. The reason behind this was probably less needle puncture (average 1.4 times) than that reported by Austin (9) which had more repetition of the puncture owing to immediate cytology interpretation.

REFERENCES

1. Fraser RS, Pare JAP, Fraser RG, Pare PD. Methods of roentgenologic and pathologic investigation in Synopsis of Disease of the chest. 2nd Ed. Philadelphia: Saunders: 1994; 132-133.
2. Thammakumpee G. Transthoracic needle aspiration biopsy of lung lesions in Songklanagarind Hospital. Songklanagarind Medical Journal 1992; 10: 219-223.
3. Sirivanichai C. Ultrasound-guided biopsy of thoracic tumors. Presented in the 32th Annual Meeting of Thai Radiological Society of Thailand. 26-28 Jan 1995, Bangkok.
4. Chonnmitri I. Fine needle aspiration biopsy of lung lesions. J Med Assoc Thai 1993; 76: 394-398.
5. The American Thoracic Society. Guideline for percutaneous transthoracic needle biopsy. Am Rev Respi Dis 1989; 140: 255.
6. Perlmut LM, Johrnston WW, Dunnick NR. Percutaneous transthoracic needle aspiration: A review. AJR 1989; 152: 451-455.
7. Zavala DC, Schoel JE. Ultrathin needle aspiration of the lung in infectious and malignant disease. Am Rev Respi Dis 1981; 123: 125.
8. Yazdi HM, Macdonald LL, Hickey NM. Thoracic fine needle aspiration biopsy versus fine needle cutting biopsy: a comparative study of 40 patients. Acta Cyto 1988; 32: 635.
9. Austin JH, Cohen MB. Value of having a cytopathologist present during percutaneous fine-needle aspiration biopsy of lung: report of 55 cancer patients and metaanalysis of the literature. AJR 1993; 160: 175-177.
10. Stevens JM, Jackman RJ. Outpatient needle biopsy of the lung: its safety and utility, Radiology 1984; 134: 301-304.
11. Fish GD, Stanley JH, Scott Miller K, et al. Postbiopsy pneumothorax: estimating the risk by chest radiography and pulmonary function tests. AJR 1988; 150: 71-74.
12. Khouri NF, Stitik, Erozan YS, et al. Transthoracic needle aspiration biopsy of benign and malignant lung lesions. AJR 1985; 144: 281-288.