TRANSTHORACIC FINE NEEDLE ASPIRATION CYTOLOGY IN DIAGNOSING NON-RESOLVING PNEUMONIAS - A STUDY OF 170 CASES

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ABSTRACT

Role of transthoracic fine needle aspiration cytology (FNAC) in diagnosing 170 patients of non-resolving pneumonias was studied. There were 117 males and 35 females in the age range of 3 to 72 years. The neoplastic lesions diagnosed by FNAC included 51 primary lung cancers, 6 metastatic deposits, 1 malignant mesothelioma of pleura, 1 Hodgkin's disease and 4 thymomas. Benign lesions included 56 pneumonias and abscesses of bacterial and chemical origin, 35 pulmonary tuberculosis, 2 fungal granulomas and 1 sarcoid granuloma. Aspiration cytology was inconclusive in 13 cases. The sensitivity of FNAC was 95.5 per cent in diagnosing malignant lesions accurately while the accuracy of cytological characterization was 95.3 per cent. There were no false positive reports. FNAC also helped in diagnosing sputum-negative pulmonary tuberculosis. Minor complications like syncopal attacks and haemoptysis of less than 5 mL occurred in 8.2 per cent of patient.

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KEYWORDS : Biopsy; Cytodiagnosis; Thoracic neoplasms; Pneumonia.

Introduction

Diagnosing cases of non-resolving pneumonias on the basis of clinical examination, chest radiography or CT scan, do frequently pose a dilemma. Fine needle aspiration cytology (FNAC) has proved to be a reasonably safe, simple, fast and accurate procedure [1-6]. It has been used in the past mainly to define malignant tumours [7]. In some instances, however, FNAC has also helped in clinching diagnoses of benign tumours and various types of inflammatory diseases of lung and pleura [5,8].

This paper presents findings in 170 consecutive patients with non-resolving pneumonias who were subjected to transthoracic FNAC.

Material and Methods

FNAC was done in 170 cases of non-resolving pneumonias (143 patients in Army Hospital Delhi Cantt from May 1992 to July 1993 and 27 patients in 5 Air Force Hospital from August 1993 to July 1995). All patients had lung disease of more than 3 weeks duration and a demonstrable lesion in the chest radiogram, with no diagnosis established by

conventional methods such as sputum cytology, bronchoscopic washing or brushings. Majority (97%) of the patients were in-patients while the remaining (3%) were referred directly from the outpatient department. A high percentage of cases (88%) had already received either broad spectrum antibiotics or anti-tubercular therapy without significant response.

Posteroanterior and lateral chest radiography was done routinely to assess the size and location of the lesion. The approach and the needle length were selected according to the site of the lesion. The lesions were peripheral in 84 per cent and central in 16 per cent of patients. Small central lesions, or those close to the cardiac border, were not selected for FNAC.

A 22-gauge needle fitted with a 10 mL plastic disposable syringe held in a Cameco syringe pistol was utilized. The subject was asked to hold his breath after a full expiration while aspiration was performed. Smears and histological preparations were made from the material obtained. The air-dried smears were stained by Leishman-Giemsa stain while wet fixed slides (fixed in 95% ethanol)

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were stained by Papanicolaou and haematoxylin and eosin stains. Special staining with stains like periodic acid Schiff, Grocott's, Gram's and Ziehl-Neelsen stain were performed on some fresh or destained smears and histological sections. Tissue histopathology was performed on 86 surgical specimens (24 endobronchial, 19 Trucut needle biopsy and 43 thoracotomy) and 2 autopsy materials. The results were compared with FNAC findings. All the patients were observed frequently during the first 24 hours for evidence of respiratory distress, haemoptysis and air embolism. The patients were followed-up for a period of 6 months after institution of specific therapy.

Results

The age of patients ranged from 3 to 72 years. The subjects comprised of 117 males and 53 females. The details of age and sex-wise distribution pattern is shown in Table 1. A total of 204 aspirations were performed on 170 subjects with 2 attempts in 24 patients and 3 in another 5 patients.

TABLE 1

Age and sex-wise distribution of cases

Age (years)	Males	Females	Total
1-10	2	—	2
11-20	6	4	10
21-30	14	5	19
31-40	26	10	36
41-50	32	14	46
51-60	27	10	37
> 61	10	10	20
Total	117	53	170

Sixty six were diagnosed by FNAC as neoplastic lesions of the lung, pleura and mediastinum. The details are summarized in Table 2. Histopathological confirmation of FNAC diagnosis was possible in 51 of these cases (Fig 1-6). In 1 patient the diagnosis of large cell carcinoma was changed to poorly differentiated squamous cell carcinoma. In 12 patients with malignant lesions diagnosed by FNAC, histopathological confirmation was not possible because 10 of these patients were physically unfit to undergo thoracotomy due to advanced disease while 2 patients took early

Fig. 1 : FNAC. Squamous cell carcinoma (200 X).

Fig. 2 : Tru-cut needle biopsy of Fig 1 case (60 X).

Fig. 3 : FNAC. Bronchioloalveolar cell carcinoma showing cell balls and presence of intranuclear cytoplasmic inclusions (200 X).

discharge from the hospital and were lost to follow-up. However all these 12 patients were being treated for malignancy on the basis of FNAC report. In 3 patients FNAC was inconclusive but histopathology revealed the presence of malignant tumours.

Fig. 4 : Biopsy of Fig 3 case (240 X).

TABLE 2

Composition of the case material : neoplastic lesion (66 cases)

Lesion	With histopath confirmation	Without histopath confirmation
Primary malignant neoplasms		
<i>Lung</i>		
Squamous cell carcinoma	11	2
Small cell carcinoma		
Oat cell type	6	1
Intermediate cell type	2	—
Combined cell type	1	—
Adenocarcinoma		
Acinar papillary carcinoma	8	9
Bronchioalveolar carcinoma	2	—
Large cell carcinoma	9*	—
<i>Pleura</i>		
Malignant mesothelioma	1	—
<i>Mediastinum</i>		
Thymoma	4	—
Hodgkin's disease (Mixed cellularity)	1	—
Metastatic		
Multiple myeloma	2	—
Adenocarcinoma - Ovary	2	—
Adenocarcinoma - Colon	1	—
Adenocarcinoma - Gall bladder	1	—
Inconclusive	—	3 +

*Histopathology confirmed one case as having poorly differentiated squamous cell carcinoma and not as large cell carcinoma.
+ Histopathology detected malignancy in them.

FNAC diagnosis in the remaining 104 patients is detailed in Table 3. Of the 35 patients of pulmonary tuberculosis diagnosed by FNAC acid fast bacteria could be demonstrated in 22 cases in smears. Diagnosis was confirmed by histopathology in 25 patients. The 10 patients also showed

Fig. 5 : FNAC. Large cell carcinoma. Giant cells showing emperipolesis (240 X).

Fig. 6 : Tru-cut needle biopsy of Fig 5 case (200 X).

TABLE 3

Composition of case material : non-neoplastic lesions (104 cases)

Lesions	No of cases
With histopathological confirmation (31)	
Pulmonary tuberculosis	25
Pulmonary abscess	3
Sarcoidosis	1
Sacculated pleurisy/empyema	2
Without histopathological confirmation (63)	
Pulmonary tuberculosis	10
Fungal granuloma	2
Inflammatory process, not otherwise specified, of lung	51
Inconclusive in FNAC (10)	
Histopathology proved as benign	3
No Histopathology done but responded to antibiotics	7
Total	104

significant remission of the disease with antitubercular therapy. One case of sarcoidosis was diagnosed clinically on the basis of presence of

non-caseous epithelioid granulomas, non-responsiveness to antitubercular therapy (ATT) and the radiological distribution of lesions. Later, histology confirmed the same. Gram's staining of cytology smears in 3 cases of pulmonary abscess and 2 cases of empyema revealed Gram-positive cocci in 3 and Gram-negative rods in 2 cases. These were proved in subsequent bacterial cultures and histology.

In 13 patients FNAC remained inconclusive and histopathological examination was done in 6. Two subjects were found to have poorly differentiated squamous cell carcinoma with massive areas of necrosis, one had solid mucus secreting adenocarcinoma, and 2 patients were diagnosed as interstitial pulmonary fibrosis and 1 as benign fibrous mesothelioma of pleura. The 7 patients, where no histological examination was done, resolved with continued administration of antibiotics. In 51 cases of pneumonitis - not otherwise specified, no histology was done. These included 2 patients with chemical pneumonitis while the remaining 49 pneumonias resolved with the instituted therapy.

On the basis of histopathological findings and therapeutic correlation, diagnostic accuracy of FNAC was calculated. In the present series, the accuracy of diagnosis of malignancy of lung, pleura and mediastinum was 95.5 per cent (63/66 cases). The accuracy of exact cytologic categorization of the neoplastic lesions was 95.3 per cent (61/64 cases) excluding 2 cases who were lost to follow-up. There were no false positive reports. No major complications were encountered. Syncopal attacks and haemoptysis of less than 5 mL were noted in 14 cases.

Discussion

Transthoracic FNAC from malignant neoplasm of lung has been reported to carry a sensitivity of 76-97 per cent [4-6,9]. In the present series, accuracy of diagnosis of malignancy in lung and pleura was 94.5 per cent (52/55 cases) while the diagnostic accuracy in the categorization of these lesions was 92.7 per cent (51/55 cases). Of the 5 cases of mediastinal malignant tumours, the diagnostic accuracy and cytological categorisation were, however, 100 per cent.

The incidence of unsatisfactory aspirates in lung lesions ranges from 4-8 per cent [7,9,10].

This is mainly due to necrosis of tumours, poor preservation of cells, fibrotic lung disease and inflammation. In 2 patients in the present study repeated aspiration of necrotic material failed to give any specific clue to the underlying malignant disease while in 1 patients thick mucous with almost monomorphic cells arranged in acinar pattern were believed to represent a benign lesion.

Review of literature has shown that aspiration cytology is sparingly used in the diagnosis of pulmonary tuberculosis [8]. Traditionally, the examination of direct smears of sputum has been used to detect acid fast bacilli. Aspiration biopsy can overcome some of the problems associated with sputum examination like contamination by saprophytes from the oral cavity. The other advantage of FNAC is the availability of results within few hours and thus reducing the morbidity and mortality associated with thoracotomy.

Of the 2 patients with fungal granuloma, 1 had *Candida* infection while the other had *Nocardia* infection. The first patient had uncontrolled diabetes mellitus while the second was on immunosuppressive therapy for renal allograft.

In the present study complications comprised of syncopal attacks and minimal haemoptysis in 8.2 per cent (14) of subjects. Pneumothorax [11], air embolism [1], empyema [1] and tumour implants [12] have been reported earlier. Nonetheless the benefits of the procedure far outweigh its dangers.

It can be concluded that FNAC has proved to be a simple, inexpensive and safe procedure. It permits a direct approach to all kinds of non-resolving pneumonias with a high degree of accuracy. Its use shortens the duration of hospitalization and enables the early definitive therapy.

REFERENCES

1. Mondal A, Pradhan MC. Role of percutaneous fine needle aspiration cytology in detection of lung, pleural and mediastinal tumours. A study of 162 cases. *Indian J Pathol Microbiol* 1991; 34: 311-4.
2. Meyer JE, Gandhir LH, Milner LB, et al. Percutaneous aspiration biopsy of nodular lung lesions. *J Thorac Cardiovasc Surg* 1977; 73: 787-91.
3. Sargent EN, Tuner AF, Gordenson J, et al. Percutaneous pulmonary needle biopsy. Report of 350 patients. *Am J Roentgenol* 1974; 122: 758-68.
4. Munshi M, Shrivastava S, Agrawal SV, Grover S, Kher A. Cytodiagnosis of lower respiratory tract lesions by

- transthoracic needle aspiration. *Indian J Pathol Microbiol* 1995; 38: 417-21.
5. Chang A. Percutaneous intrathoracic aspiration biopsy. *Semin Surg Oncol* 1990; 6: 228-30.
 6. Rajwanshi A, Jayaram N, Behra D, Gupta SK, Malik SK. Fine needle aspiration cytology of intrathoracic lesion - a reappraisal. *Indian J Pathol Microbiol* 1989; 32: 306-9.
 7. Sinner WN. Pulmonary neoplasms diagnosed with transthoracic needle biopsy. *Cancer* 1979; 43: 1533-40.
 8. Rabicheaux G, Moinduddin SM, Lee LH. The role of aspiration biopsy cytology in the diagnosis of pulmonary tuberculosis. *Am J Clin Pathol* 1985; 83: 719-22.
 9. Poe HR, Tobin ER. Sensitivity and specificity of needle biopsy in lung malignancy. *Am Rev Resp Dis* 1980; 122: 725-9.
 10. Santaigo SM, Lehrman S, Williams AJ. Aspiration lung biopsy with ultrathin needles. *Respiration* 1986; 50: 97-101.
 11. Sinner WN. Complications of percutaneous transthoracic needle aspiration biopsy. *Acta Radiol* 1976; 17: 813-28.
 12. Sinner WN, Zajicek J. Implantation metastasis after percutaneous transthoracic needle aspiration biopsy. *Acta Radiol* 1976; 17: 473-80.