

A study of relative value of percutaneous fine needle aspiration cytology and bronchoscopy in pulmonary lesions

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Abstract

Percutaneous fine needle aspiration cytology (FNAC) is a useful additional method for establishing a diagnosis of intrathoracic lesions without a thoracotomy. **Aims and Objective:** To study the comparative role of FNAC. 1) In establishing the diagnosis of intrathoracic solid lesions. 2) Its role in improving the diagnostic yield. **Material and Methods:** All the patients, irrespective of their age and sex, who presented with space occupying lesions in thorax, large nodular shadows and consolidation on clinico-radiological ground, were included in the study and subjected to FNAC and other procedures like fiberoptic bronchoscopy (FOB) etc. **Results:** 44 patients were enrolled in the study. 56.8% cases were diagnosed as primary carcinoma lung and 6.8% as benign lesions, while 36.4% cases could not be diagnosed by any means. 28 cases were diagnosed either by means of FNAC and / or by other methods of investigation like FOB and sputum cytology. Overall diagnostic yield of FNAC was 54.5%, with positivity more in central lesions (66.7%) than in peripheral lesions (46.2%). Diagnostic yield of FNAC for malignancy was 84%. Overall diagnostic yield by bronchoscopy was 17/44 (38.6%). FNAC was also effective to pick up diagnosis in 13 (29.5%) but failed in 4 cases which were diagnosed by bronchoscopy. Overall 6.8% patients developed minor complications. **Conclusion:** Considering its simplicity, safety, rapidity, cost effective and high diagnostic accuracy FNAC can be and should be performed as an initial diagnostic measure, preceding bronchoscopy, mediastinoscopy and thoracotomy whenever exfoliative sputum cytology has failed to establish the diagnosis of the entire peripheral and selected intrathoracic lesion.

Key words: Fine needle aspiration cytology, FNAC, Fiberoptic bronchoscopy, FOB

Introduction

Percutaneous transthoracic fine needle aspiration (FNA) was developed in 1930s to examine peripheral lung lesions beyond the reach of the bronchoscope and for investigating patients who were a poor surgical risk [1]. Out of the two FNA methods, percutaneous transthoracic approach is usually preferred over transbronchial approach for obtaining the cytology material [2]. Percutaneous fine needle aspiration cytology (FNAC) is a useful additional method for

establishing a diagnosis of intrathoracic lesions without a thoracotomy when simple non-invasive technique has failed [3]. Aspiration biopsy with cytological interpretation has a high diagnostic yield with few adverse effects. While actual invasion of the thoracic cavity is minimal, its outcome is quite substantial. For radiologically demonstrable pulmonary lesions, it produces the necessary morphologic diagnosis [3].

Sensitivity of FNAC in diagnosis of pulmonary lesions varies according to the size and site of lesions and the experience of the pathologist [4, 5].

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Aims and Objective

To study the role of percutaneous fine needle aspiration cytology (FNAC)

1. In establishing the diagnosis of intrathoracic solid lesions.
2. Its role in improving the diagnostic yield.

Material and Methods

The study was conducted in the Department of Tuberculosis & Respiratory Diseases, Ganesh Shanker Vidyarthi Memorial (GSVM) Medical College, Kanpur. The study duration was 18 months. The study group comprised of patients attending Department of Tuberculosis and Respiratory Diseases, GSVM Medical College, Kanpur. All the patients, irrespective of their age and sex, who presented with space occupying

lesions in thorax, large nodular shadows and consolidation on clinico-radiological ground, were included in the study population. Cases picked up were subjected to routine clinical history and examination for making a clinical diagnosis. They were subjected to routine, hematological, biochemical, radiological, microbiological and histopathological investigation for establishing the diagnosis.

Exclusion Criteria

1. Unconscious and uncooperative patients.
2. Patients with severe emphysema and bullous changes within the region of lung to be aspirated.
3. Patients with respiratory failure.
4. Patients with hemorrhagic disorder.
5. Patients with intractable coughing.
6. Patients on medication affecting coagulation profile.

Results

The study has been done to study the comparative role of FNAC in the diagnosis of intrathoracic lesions.

Table-1: Distribution of cases according to location on chest radiography.

Total number of cases – 44

Lesions	Number of cases	Percentage (%)
Central	18	41.0
Peripheral	26	59.0
Total	44	100.0

Out of the 44 cases selected for the study, 41.0% patients had central lesions while rest 59.0% lesions were peripheral in location. The central lesions were those which were located in or near the mediastinum whereas rest of the lesions was considered as peripheral.

Table 2: Distribution of cases in which diagnosis was established by FNAC.

Total number of cases – 44

Total number of cases diagnosed by FNAC – 24

Total number of undiagnosed cases – 20

Diagnosis	Number of cases diagnosed	Percentage (%)
Primary carcinoma lung	21	87.4
Granulomatous lesion (Tuberculosis)	1	4.2
Paravertebral tubercular abscess	1	4.2
Cryptococcosis	1	4.2
Total	24	100

Out of the 44 cases selected for the study, overall (25/44) 56.8% cases were diagnosed as malignant lesions and (3/44) 6.8% as benign lesions, while (16/44) 36.4% cases could not be diagnosed by any means. Among the cases diagnosed by FNAC, 87.4% cases were primary carcinoma. Granulomatous lesion (tuberculosis), tubercular paravertebral abscess and cryptococcosis were diagnosed in one case each.

Table-3: Diagnostic yield by fine needle aspiration cytology in malignant lesions.

Location of lesion	Number of cases	Positive diagnostic yield		Negative diagnostic yield		Diagnosis by other modalities* among negative yield by FNAC	
		n	%	n	%	n	%
Central	16	12	75	4	25	4/4	100
Peripheral	9	9	100	0	0	0	0
Total	25	21	84	4	16	4/4	100

* Bronchoscopy was contributory.

Diagnostic yield of FNAC for malignancy was 84%. It was not successful in 16% cases. Positivity for malignancy was more in peripheral lesions (100%) as compared to central lesions (75%). Other modality (FOB) was able to contribute 4 cases out of 4 cases left out by FNAC, thus contributing diagnosis by 9.1%. This contribution was only in centrally located lesions.

Table-4: Comparative diagnostic yield of percutaneous fine needle aspiration cytology and fiberoptic bronchoscopy (FOB) in relation to location of lesion.

Procedure	Central lesion n=18		Peripheral lesion n=26	
	n	%	n	%
FOB	13/18	72.2	4/26	15.4
FNAC	12/18	66.7	12/26	46.2

Out of total 44 cases, central lesions were in 40.9% cases, out of which 66.7% were detected by FNAC and 72.2% by bronchoscopy. Of remaining 59.1% cases with peripheral lesions, 15.5% were detected by bronchoscopy and 46.2% by FNAC.

Table-5: Comparative diagnostic yield of percutaneous fine needle aspiration cytology and fiberoptic bronchoscopy in central lesions.

Procedure	Diagnosis by FNAC		FNAC inconclusive		Total	
	n	%	n	%	n	%
Diagnosis by FOB	10	55.6	3	16.7	13	72.2
FOB inconclusive	2	11.1	3	16.7	5	27.8
Total	12	66.7	6	33.3	18	100

In central lesions diagnostic yield by bronchoscopy was 13 (72.2%) out of 18, while that of FNAC was 66.7%. FNAC was also effective to pick up diagnosis in 10 (55.6%) but failed in 3 cases which were diagnosed by bronchoscopy. In 5 cases even FOB was inconclusive in central lesions, but interestingly FNAC picked up 2 FOB failed cases. 3 cases at central location were picked up by FOB which were left by FNAC. Thus only 3 cases were left which could not be diagnosed by FOB and FNAC both.

Table-6: Comparative diagnostic yield of percutaneous fine needle aspiration cytology and fiberoptic bronchoscopy in peripheral lesions.

Procedure	Diagnosis by FNAC		FNAC inconclusive		Total	
	n	%	n	%	n	%
Diagnosis by FOB	3	11.5	1	3.8	4	15.4
FOB inconclusive	9	34.6	13	50.0	22	84.6
Total	12	46.2	14	53.8	26	100

In peripheral lesions diagnostic yield by bronchoscopy was 4 (15.4%) out of 26, while that of FNAC was 46.2%. FNAC was also effective to pick up diagnosis in 3 (11.5%) but failed in 1 case which was diagnosed by bronchoscopy. In 22 cases FOB was inconclusive in central lesions, but interestingly FNAC picked up 9 FOB failed cases. 1 case at peripheral location was picked up by FOB which was left by FNAC. Thus 13 cases were left which could not be diagnosed by FOB and FNAC both.

Table-7: Overall comparative diagnostic yield of percutaneous fine needle aspiration cytology and fiberoptic bronchoscopy.

Total number of cases – 44

Procedure	Diagnosis by FNAC		FNAC inconclusive		Total	
	n	%	n	%	n	%
Diagnosis by FOB	13	29.5	4	9.1	17	38.6
FOB inconclusive	11	25.0	16	36.4	27	61.4
Total	24	54.5	20	45.5	44	100

Overall diagnostic yield by bronchoscopy was 17 (38.6%) out of 44, while that of FNAC was 54.5%. FNAC was also effective to pick up diagnosis in 13 (29.5%) but failed in 4 cases which were diagnosed by bronchoscopy. In 27 cases FOB was inconclusive, but interestingly FNAC picked up 11 FOB failed cases. 4 cases were picked up by FOB which were left by FNAC. Thus 16 cases were left which could not be diagnosed by FOB and FNAC both.

Discussion

Percutaneous FNAC is one of the techniques which have been developed during the past few decades to increase the positive yield of definitive diagnosis of the radiological intrathoracic opacities without resorting to more invasive procedures like thoracotomy. Accuracy in making cytological diagnosis greatly depends upon the expertise of cytopathologist, but it is equally important to ensure that adequate amount of aspirate is obtained. Present study has been carried out to study the role of percutaneous FNAC in the diagnosis of radiological intrathoracic opacities.

Out of the 44 cases selected for the study, 28 cases were diagnosed either by means of FNAC and / or by other methods of investigation like fiberoptic bronchoscopy and sputum cytology. Out of the 44 cases selected for the study, 56.8% cases were diagnosed as malignant lesions and 6.8% as benign lesions, while 36.4% cases could not be diagnosed by any means (Table 2). Sarkar RN et al reported that FNAC could diagnose 64.2% cases as malignant intrathoracic mass, 35.8% as benign lesions and 5.2% cases were undiagnosed due to inadequate tissue material [6]. Fuladi AB et al reported a yield of 65/90 (72.2%) of malignant lesions by bronchoscopic procedures [7]. Penketh et al reported malignant lesions in 73.8% and benign lesions in 26.2% of the cases [8]. Johnston et al reported 31.1% benign lesions in their study. [9] We found 3 infective lesions in our study, one patient each diagnosed as granulomatous lesion (Tuberculosis), paravertebral

tubercular abscess and cryptococcosis (Table 2). 56.8% patients were diagnosed as primary carcinoma lung while in 36.4% cases diagnosis could not be established (Table 2). Pavy RD et al reported primary carcinoma lung in 85% cases as commonest intra thoracic lesion in their series [10].

Examination of sputum resulted in diagnosis in 6 out of 40 cases (15%) which were all also diagnosed by FNAC, comparable well with Pavy RD et al who observed in 12.8% cases in their series [10]. In our study 10% cases sputum was not available. Post-bronchoscopic sputum cytological examination resulted in diagnosis in diagnosis of 5 out of 44 cases (11.4%); FNAC successfully diagnosed all these 5 cases. Bronchial aspirate in 44 cases was able to establish diagnosis in 9 cases (20.5%), as compared to those of Sarkar SK et al in 25% cases [11].

In our study diagnostic yield of FNAC for malignancy was 84% (Table 3). This observation is similar to those of Gangopadhyay M et al in 75.6% [12], Dahlgren in 87% [13], Lalli AF et al in 80% [14], Jamplis RW et al in 84% [15], Singh M.M et al in 91.3% [16], Fontana RS et al in 78% [17], Johnston WW et al in 83.3% [9], Zelch JV et al in 93% [18] and Nordenstrom (1984) in 82.6% [19].

In central lesions diagnostic yield by bronchoscopy was 13 (72.2%) out of 18, while that of FNAC was 66.7%

(Table 4). Our study resulted in lower result of diagnostic yield by fiber optic bronchoscopy in central lesion (72.2%) as compared to Zavela DC et al in 94% [20] cases and Kvale PA et al [21] in 86%. FNAC was also effective to pick up diagnosis in 10 (55.6%) but failed in 3 cases. In 5 cases even FOB was inconclusive in central lesions, but interestingly FNAC picked up 2 FOB failed cases. 3 cases at central location were picked up by FOB which was left by FNAC. Thus only 3 cases were left which could not be diagnosed by FOB and FNAC both (Table 5).

In peripheral lesions diagnostic yield by bronchoscopy was 4 (15.4%) out of 26, while that of FNAC was 46.2% (Table 4). In our study diagnostic yield by fiber optic bronchoscopy in peripheral lesions was low as compared to Zavela DC et al [20] in 71% cases and Funahashi et al [22] in 61% cases. FNAC was also effective to pick up diagnosis in 3 (11.5%) but failed in 1 case which was diagnosed by bronchoscopy.

In 22 cases FOB was inconclusive in peripheral lesions, but FNAC picked up 9 FOB failed cases. Interestingly, 1 case at peripheral location was picked up by FOB which was left by FNAC. Thus 13 cases were left which could not be diagnosed by FOB and FNAC both (Table 6).

Overall diagnostic yield by bronchoscopy was 17 (38.6%) out of 44, while that of FNAC was 54.5%. FNAC was also effective to pick up diagnosis in 13 (29.5%) but failed in 4 cases which were diagnosed by bronchoscopy. In 27 cases FOB was inconclusive, but interestingly FNAC picked up 11 FOB failed cases.

4 cases were picked up by FOB which was left by FNAC. Thus 16 cases were left which could not be diagnosed by FOB and FNAC both (Table 7).

The principal reason for failure to diagnose the lesions lies in the inadequacy of the specimens. In most of our negative FNAC case, the aspirate was inadequate for cytological diagnosis, even though aspiration was repeated two to three times from different parts of the lesion until apparently adequate material had been obtained.

Conclusion

Considering its simplicity, safety, rapidity and high diagnostic accuracy fine needle aspiration cytology can be and should be performed as an initial diagnostic

measure, preceding bronchoscopy, mediastinoscopy and thoracotomy whenever exfoliative sputum cytology has failed to establish the diagnosis of the entire peripheral and selected intrathoracic lesion. This procedure is also economical.

FNAC is of definite help in diagnosing both malignant and inflammatory intrathoracic lesions, whether peripheral or central in location. Of all the diagnosed malignancies, which were peripheral in location, irrespective of the tumor type, were diagnosed by FNAC. Advantage, outweigh the negligible and minimal risk to the patients.

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