



TO STUDY THE CYTOHISTOLOGICAL CORRELATION OF FNAC IN LUNG CARCINOMA CASES AND TO EVALUATE ITS DIAGNOSTIC ACCURACY

Arti Gupta*	M.D. (Pathology), Assistant Professor, Department of Pathology, S.S. Medical College, Rewa, Madhya Pradesh, India. *Corresponding author
Abhishree Geda	D.N.B. (Radiodiagnosis), Senior Resident, MGMMC, Indore, Madhya Pradesh, India.
Pankaj Kumar Gupta	D.M. (Neurology), Consultant Neurologist, BIMR Hospital, Surya Mandir road Gwalior (M.P.) India

ABSTRACT

Aim: Our aim is to determine the diagnostic accuracy of percutaneous fine needle aspiration cytology (FNAC) in various lung carcinoma cases with its histopathological correlation as gold standard.

Material and Method: We performed percutaneous FNAC in sixty patients which are presenting with respiratory symptoms and having localized lung lesions as confirmed radiologically.

Results: In our study, the M: F ratio of 5.67:1 in 78.9% of the lesions, we found primary epithelial lung malignancy, in FNAC finding. Among malignant lesions, twenty two cases were subjected and correlated with histopathological finding and diagnostic accuracy of FNAC is found to be 100% for small cell carcinoma, 87.5% for squamous cell, 83.3% for adenocarcinoma and 66.7% for poorly differentiated large cell carcinoma. The cytological yield of FNAC was 95.0%. Material in three cases was inadequate for interpretation. Adenocarcinoma was the commonest malignancy seen in females. Commonest malignancy seen among smokers was poorly differentiated large cell carcinoma followed by small cell and squamous cell carcinoma and the least common was adenocarcinoma. Sensitivity for diagnosing small cell and non small carcinoma was 100% and 89.5% respectively. Specificity was 100% for each.

Conclusion: Percutaneous transthoracic FNAC is a quite safe, simple and reliable procedure in the diagnosis of lung lesions with a high degree of accuracy, sensitivity and specificity. FNAC should be used frequently to shorten the diagnostic interval and prompt therapy for persistent lung lesions.

KEYWORDS : Fine needle aspiration Cytology, Primary epithelial Lung malignancy adenocarcinoma, squamous cell carcinoma.

Introduction

In the recent years with the emerging revolution of new targeted therapies in the treatment of lung lesions, the role of the pathologist has been affected dramatically. The utility of cytology in a precise diagnosis of lung lesions has also emerged as the subject of controversy.[1] This is especially important as recently International Association for the Study of Lung Cancer, American Thoracic Society and the European Respiratory Society has provided a standardized classification for lung cancer diagnosis considering small biopsies and cytology.[2] Although the cytological diagnosis in lung lesions may be limited due to potential sampling error but its importance cannot be underestimated as majority of lung tumors present in advanced unresectable stage. Therefore, the present study was conducted to assess the role of cytology in the diagnosis of lung lesions and to compare it with histopathological diagnosis.

Materials and Methods

The study included cases of lung lesions which were diagnosed on cytology followed by histopathology over a period 20 months. Cases in which histopathology was not available were excluded from the study. The method for cytological diagnosis is fine needle aspiration cytology (FNAC) was done in the presence of pathologist in the procedural room wherever possible. Smears which showed only hemorrhage, necrosis or mucoid material were considered inadequate and were subjected to re-aspiration instantaneously. All patients presented with respiratory symptoms with a localized lung lesion clinically, was confirmed radiologically. Patients were placed in the supine, prone, right lateral or left lateral position depending on the location of the lesion so that the lesion was nearest to the aspirator. Wet fixed cytological smears are to be stained by Hematoxylin and Eosin (Harris, 1990), while air – dried smears will be stained by May Grunwald Giemsa Stain (Horobin, 1996). The patient was observed carefully for signs of pneumothorax and a follow-up X-ray performed four hours after the FNAC to look for any complication.

Results

The cytological examination was done in total 60 cases of various lung lesions and out of these cyto-histopathological correlations was available in 22 cases. Figure 1 shows rounded mass in right lower lobe in a patient of Adenocarcinoma. Transthoracic FNAC was done and the material was adequate in 94.5% cases (57 cases). Among these cases we have done second attempt of aspiration in 5 cases as Table 1. On second attempt material found adequate in all 5 cases. Three cases were not consented for the second attempt. Table 2 shows the broad categorization of the various lung lesions on cytological examination. Primary epithelial Lung Malignancy was the most common broad category comprising of 78.9% of total cases. Table 3 shows the diagnostic accuracy of cytology and histology of the malignant cases who underwent for histological confirmation. Table 4 shows statistical evaluation of lung aspirations. It shows that diagnostic accuracy of cytology for squamous cell carcinoma (SCC) (87.5%) and adenocarcinoma (83.3%). Two cases which were highly suspicious for malignant cells on cytology were found to be one case of each squamous cell carcinoma and adenocarcinoma respectively. Three cells of small cell carcinoma were subjected for histology and showed 100% diagnostic accuracy. Least diagnostic accuracy was found for poorly differentiated large cell carcinoma that is 66.7%.

Table 1
YIELD OF ADEQUATE MATERIAL

No. of Attempt of Aspiration	No. of cases	No. of case with adequate material	percentage yield of adequate material
One	55	52	94.5
Two	5	5	100
Total	60	57	95.0

Table 2
DISTRIBUTION OF CASES ACCORDING TO CYTOLOGICAL DIAGNOSIS OF PULMONARY LESIONS

Cytological Diagnosis	No. of Cases	Percentage
Inflammatory Lesion	8	14.0
Benign	0	0
Highly suspicious for malignant cells	2	3.5
Malignant -	45	78.9
Primary	1	1.8
Epithelial Lung Cancers	1	1.8
Lymphoid malignancies (NHL)		
Metastatic (Adenoid Cystic carcinoma)		
Total	57	100

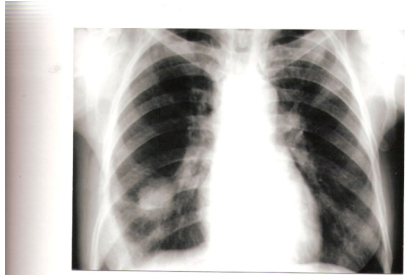


Fig-1 :- Photograph of X-Ray Chest (P-A view) showing rounded mass in right lower lobe in a patient of adenocarcinoma lung.

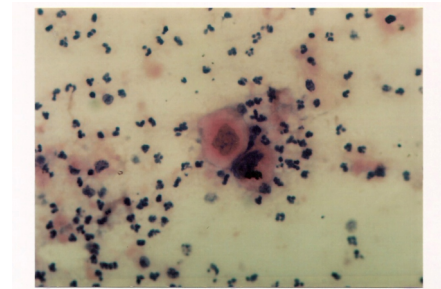


Fig-2 Photomicrograph of FNA smear lung showing dispersed atypical squamous cells and inflammatory cells in a patient of cavitating squamous cell carcinoma (H&Ex400)

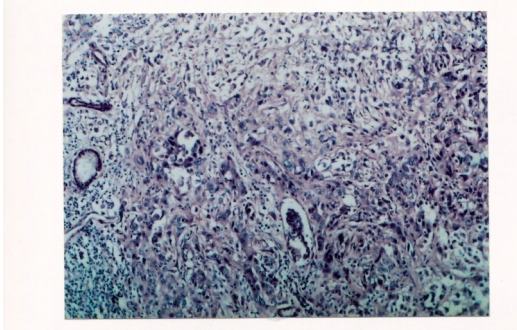


Fig-3 Histopathological section of squamous cell carcinoma Bronchogenic. (H&Ex400)

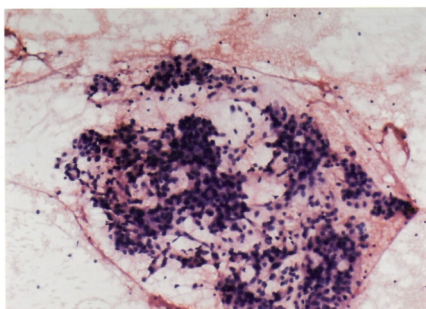


Fig-4 Adenocarcinoma - Cell clusters with mucinous background and Acini formation (H&Ex100)

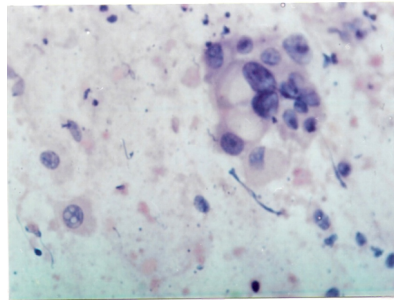


Fig-4 Adenocarcinoma - FNA smear lung showing intracytoplasmic vacuoles in a patient of adenocarcinoma (H&Ex600)

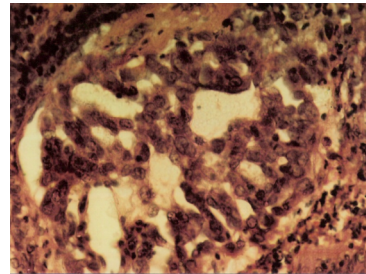


Fig-5 Adenocarcinoma - Histological section of adenocarcinoma-bronchogenic (H&Ex400)

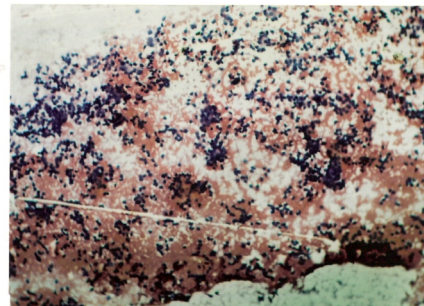


Fig-6 Small Cell carcinoma - FNA smear showing predominantly dispersed cell population scanty cytoplasm and salt & pepper" chromatin (H&Ex100)

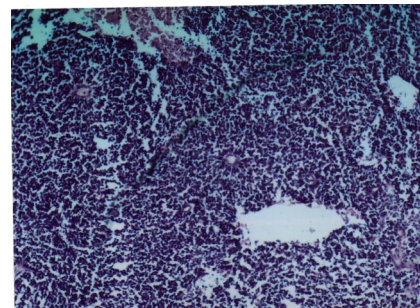


Fig-7 Small Cell carcinoma - Histological section showing small round blue cells with rosette formation (H&Ex100)

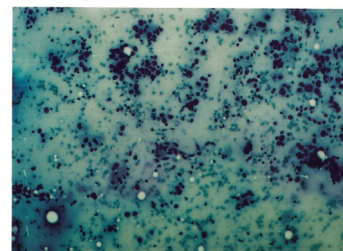


Fig-8 Poorly Differentiated large Cell carcinoma - FNA smear lung showing dispersed highly pleomorphic cells (MGGx100)

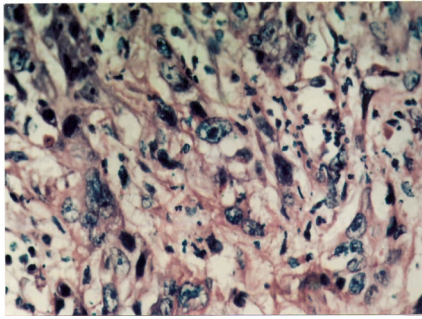


Fig-9 Poorly Differentiated large Cell carcinoma – Histologica section showing highly pleomorphic atypical cells with architectural distortion (H&Ex400)

Table 3 HISTOLOGICAL CORELATION AND DIAGNOSTIC ACCURACY OF LUNG FNAC

Cytological Diagnosis	Cases Correlated	Histological Diagnosis				Diagnostic accuracy of FNAC %
		Primary epithelial lung malignancy				
Lesions	Number	Squamous cell carcinoma	Adeno Carcinoma Bronchogenic	Small Cell Carcinoma	Poorly Differentiated large cell carcinoma	3
Highly suspicious for malignant cells	2	1	1	-	-	100
Squamous cell Carcinoma	8	7	-	-	1	87.5
Adeno Carcinoma	6	-	5	-	1	83.3
Small Cell Carcinoma	3	-	-	3	-	100
Poorly Differentiated large cell carcinoma	3	-	1	-	2	66.7

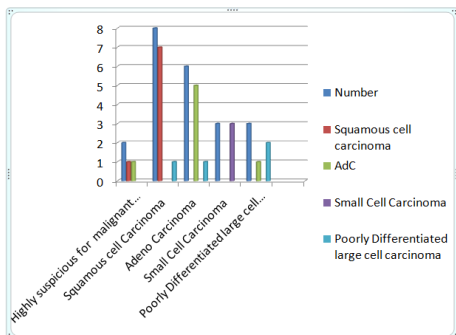
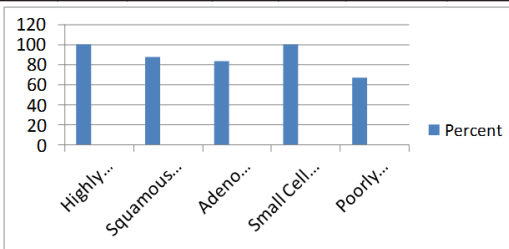
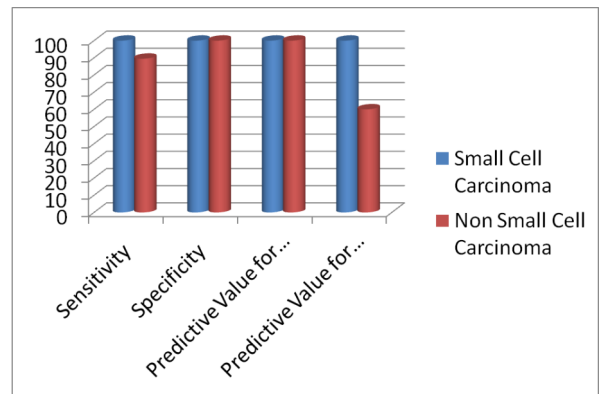


Table 4 Statistical Evaluation of Lung Aspirations

Diagnosis	Sensitivity	Specificity	Predictive Value for Positive Test	Predictive Value for Negative Test
Squamous cell carcinoma	100%	93.8%	87.5%	100%
Adeno Carcinoma	71.4%	93.8%	83.3%	88.2%
Small Cell Carcinoma	100%	100%	100%	100%
Poorly Differentiated large Cell Carcinoma	50%	94.4%	66.7%	89.5%

Table 5 Statistical Evaluation of Lung Aspirations for Differentiated Small Cell and Non Small Cell Carcinoma

Diagnosis	Sensitivity	Specificity	Predictive Value for Positive Test	Predictive Value for Negative Test
Small Cell Carcinoma	100%	100%	100%	100%
Non Small Cell Carcinoma	89.5%	100%	100%	60%



Discussion

The role of cytology in the diagnosis of various lung lesions has been subject of debate especially with the emerging role of targeted therapy in the management of lung tumors. The therapeutic advances of non small cell lung cancer (NSCLC) includes tyrosine kinase inhibitors as first line therapy in lung Adeno Carcinoma with epidermal growth factor receptor mutations and bevacizumab is contraindicated in SCC as it is associated with life threatening hemorrhage.[3,4] This implies that it is necessary to precisely classify the NSCLC into Adeno Carcinoma or SCC so as to undergo targeted therapy. It further leads to question that whether cytology may be used as an answer to the precise diagnosis of lung lesions. The advantage of cytology as minimally invasive procedure with low complication rate requires no justification, but the procurement of adequate material for cytological diagnosis may limit its role. In our study, 95% cases were considered adequate for evaluation for the yield of material. Remaining 5% cases were inadequate due to the presence of only hemorrhage, necrosis or mucoid material. The final diagnosis was given only after microscopic examination of routine conventional smears

The close and vigilant appreciation of morphological features according to the set criteria may be highly useful for cytological differentiation of SCC and Adeno Carcinoma.[5,7] Demonstration of keratinization and observation of acini and three dimensional clusters can be useful in this regard.

However, there were certain important limitations which were observed on cytology in the study. The large reactive endobronchial cells were misdiagnosed as malignant cells and thus giving false positive diagnosis.

As molecular analysis was not done and immunocytochemistry was also limited to few cases, so the study does not highlight the advantages of cytology for these ancillary techniques. However, studies have shown the suitability of cytological specimens in immunochemistry mutational and micro RNA analysis for lung cancer but still the authors suggest that further analysis of these techniques on cytological specimens especially in resource limited settings for lung tumor management should be done.[5,6]

Conclusion

The study concludes that cytology is comparable to histology in diagnosis of lung lesions. The advantages of cytology in addition to being minimally invasive with low complication rate has proved to be an important, easy and cost effective adjunct in this regard. A multidisciplinary approach involving pulmonologist, radiologist and cytopathologist followed by vigilant morphological examination may increase diagnostic utility of cytology for lung lesions. It is further suggested that studies involving the role of ancillary techniques in cytology may be carried out for lung tumor diagnosis and management especially in resource limited settings.

References

1. Travis WD, Brambilla E, Noguchi M, Nicholson AG, Geisinger K, Yatabe Y, et al. Diagnosis of lung cancer in small biopsies and cytology: Implications of the 2011 International Association for the Study of Lung Cancer/American Thoracic Society/European Respiratory Society classification. *Arch Pathol Lab Med.* 2013;137:668–84
2. Langer CJ, Besse B, Gualberto A, Brambilla E, Soria JC. The evolving role of histology in the management of advanced non-small-cell lung cancer. *J Clin Oncol.* 2010;28:5311–20.
3. Johnson DH, Fehrenbacher L, Novotny WF, Herbst RS, Nemunaitis JJ, Jablons DM, et al. Randomized phase II trial comparing bevacizumab plus carboplatin and paclitaxel with carboplatin and paclitaxel alone in previously untreated locally advanced or metastatic non-small-cell lung cancer. *J Clin Oncol.* 2004;22:2184–91.
4. Rosell R, Carcereny E, Gervais R, Vergnenegre A, Massuti B, Felip E, et al. Erlotinib versus standard chemotherapy as first-line treatment for European patients with advanced EGFR mutation-positive non-small-cell lung cancer (EURTAC): A multicentre, open-label, randomised phase 3 trial. *Lancet Oncol.* 2012;13:239–46.
5. Fassina A, Corradin M, Zardo D, Cappellesso R, Corbetti F, Fassan M. Role and accuracy of rapid on-site evaluation of CT-guided fine needle aspiration cytology of lung nodules. *Cytopathology.* 2011;22:306–12.
6. Fischer AH, Cibas ES, Howell LP, Kurian EM, Laucirica R, Moriarty AT, et al. Role of cytology in the management of non-small-cell lung cancer. *J Clin Oncol.* 2011;29:3331–2.
7. Mitul B Modi^{1*}, Mitesh R Rathva¹, Nupur R Shah², Manasi Trivedi¹ and Harshad Patel, Role of FNAC in Lung Carcinoma and its Histo-Cytological Correlation, *Journal of ISSN: 2376-0060 JLP RR ,Lung, Pulmonary & Respiratory Research - 2016, Volume 3 Issue 4*