



## ROLE OF PERCUTANEOUS FINE NEEDLE ASPIRATION CYTOLOGY (FNAC) IN PULMONARY LESIONS TO EVALUATE VARIOUS DISEASES

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### ABSTRACT

**Objective:** The present study was conducted to evaluate the diagnostic efficacy of percutaneous fine needle aspiration cytology (FNAC) in various lung lesions, predominantly those suspicious of being malignant.

**Material and Method:** Over a period of 20 months, percutaneous FNAC was performed in sixty patients presenting with respiratory symptoms with localized lung lesions clinically, which were confirmed radiologically.

**Results:** Male preponderance was observed in this study with M: F ratio of 5.67:1. The most common lesion was Primary epithelial lung malignancy found in this study which constituted 78.9% of the lesions. Among malignant lesions, adenocarcinoma was the most common (44%) followed by squamous cell carcinoma (31.1%). The cytological yield of FNAC was 95.0%. Material in three cases was inadequate for interpretation. In females most common lung malignancy was adenocarcinoma. In Smokers commonest lung malignancy was poorly differentiated large cell carcinoma followed by small cell and squamous cell carcinoma while 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 carcinoma, adenocarcinoma, Squamous cell carcinoma, Small cell carcinoma.

### INTRODUCTION

Percutaneous fine needle aspiration cytology (FNAC) of the lung is usually indicated for the diagnosis of pulmonary lesions. There are various complications associated with performing thoracotomy for lung lesions. FNAC has grown to be a diagnostic tool to evaluate the nature of radiographically demonstrable lung lesions [1-4]. Infections and other benign processes may be confirmed by this method but the major indication remains the diagnosis of suspected malignant intrathoracic lesions [1].

Regardless the cause, the goal of FNAC is to yield diagnosis by causing minimum tissue trauma and producing quick results. Low cost, minimal morbidity, rapid turnover time and relatively high sensitivity and specificity of FNAC makes it, a useful method of evaluating suspicious lesions in respiratory tract in outpatient and hospital settings.

Considering the advantages of this technique and the fact that still much work is to be done in this field, an attempt is being made to evaluate the efficacy and importance of this procedure in early diagnosis of various pulmonary lesions.

### AIMS AND OBJECTIVE

The aims of proposed study are:

1. To evaluate various types of lesions in lung.
2. To determine role of FNAC in pulmonary lesions.

### MATERIAL & METHODS

The proposed study was conducted in the department of Pathology and Dr. M L Chest Hospital, GSVM Medical College, Kanpur. Detailed history, complete physical examination, radiological examination and routine laboratory tests were conducted.

A total of sixty cases were included in the study over a period of 20 months. All patients presented with respiratory symptoms with a localized lung lesion clinically, which 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. Informed consent was obtained from the patient after a brief explanation of the technique. Wet fixed cytological smears were stained by Hematoxylin and Eosin (Harris, 1990), while air - dried smears were stained by May Grunwald Giemsa Stain (Horobin, 1996). The patients were observed carefully for signs of pneumothorax and a follow-up X-ray performed four hours after the FNAC to look for any complication. The results were classified into four categories: (1) inflammatory including granulomatous lesions/tuberculosis (2) Benign (3) Highly suspicious of malignancy, (4) Positive for malignancy.

### RESULTS

Diagnostic accuracy was 100% for small cell carcinoma, 87% for squamous cell carcinoma and 83% for adenocarcinoma. Sensitivity, specificity, positive productive value and negative productive value were 80.4%, 97.0%, 84.4% and 94.4% respectively. The most common age group affected was between 50 to 60 years. Age groups in both extremes of life were affected less commonly. Of the sixty patients, fifty one were males and nine were females. A male preponderance was noted in this study with a male to female ratio is 5.67:1.

Table-1 shows the distribution of the cases.

**Table I: 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

The predominant lesion found in this study was primary epithelial lung malignancy in forty five cases (78.9%), followed by inflammatory lesion in eight (14%), (figure 1). Two cases found to be highly suspicious for malignant cells (3.5%) and one of each lymphoma and metastatic carcinoma (1.8% each). Material in three cases was inadequate for interpretation.

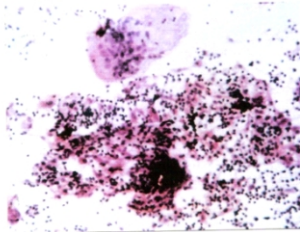
Out of forty five FNAC proven cases of primary epithelial lung malignancy, thirty nine were males (86.7%) and only six were females (13.3 %). Hence, there was a significant male preponderance in malignant cases with an M:F ratio of 6.5:1.

Table II shows the Cytological typing of primary epithelial lung malignant lesions.

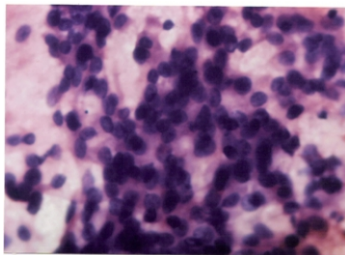
**TABLE II : DISTRIBUTION OF CASES ACCORDING TO CYTOLOGICAL TYPING OF PRIMARY EPITHELIAL LUNG MALIGNANCY**

Cytological Diagnosis	No. of Cases	Percentage
Squamous Cell Carcinoma	14	24.6
Adenocarcinoma	20	35.0
Small Cell Carcinoma	08	14.0
Poorly Differentiated Large Cell Carcinoma	03	5.3
Total	45	78.9

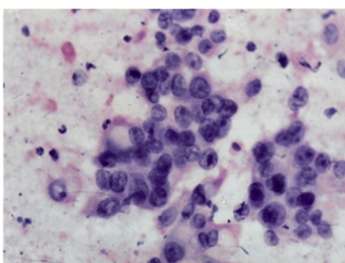
The most common lung epithelial malignancy was adenocarcinoma in twenty cases (35%) (Figure 2,3). Squamous cell carcinoma was diagnosed in fourteen cases (24.6%) (Figure 4), while eight cases found to be of small cell carcinoma (14%) (Figure 5,6) and three of poorly differentiated large cell type (6.7%) (Figure 7).



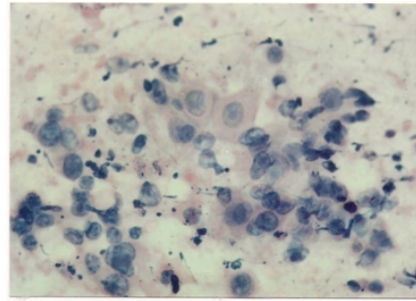
**Figure 1: Inflammatory lesion –Granulomatous, showing giant cell with granuloma formation (H & Ex400)**



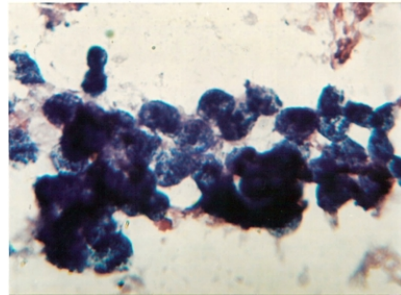
**Figure 2: Adenocarcinoma –Neoplastic cells having round to oval hyperchromatic nucleus arranged in cell clusters and glandular pattern(H&Ex400)**



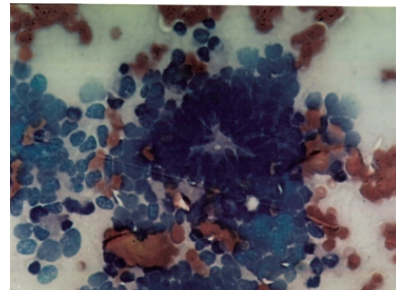
**Figure 3: Adenocarcinoma- Neoplastic Cells with delicate cytoplasm and single prominent nucleoli; cells are seen to forming acini (H&Ex600)**



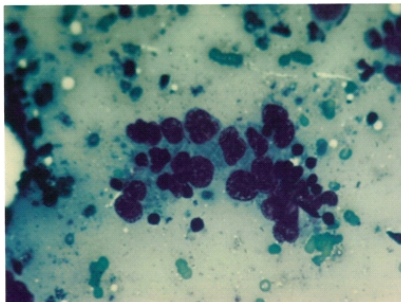
**Figure 4: Squamous cell carcinoma –Polygonal keratinizing malignant cells with necrotic background (H&EX600)**



**Figure 5: Small cell carcinoma- Neoplastic cells showing nuclear moulding along with rosette formation (H&Ex400)**



**Figure 6: Small cell carcinoma –Neoplastic cells having scanty cytoplasm with salt and pepper chromatin (H&EX1000)**



**Figure 7: Poorly differentiated large cell carcinoma- Highly pleomorphic undifferentiated dyshesive cell cluster (MGGx600)**

Adenocarcinoma was the most common malignancy seen in females. Four out of six females positive for malignancy were diagnosed as adenocarcinoma. However, adenocarcinoma was still more common in males overall with a M: F ratio of 4:1. Thirty eight (84.4%) of lung carcinoma found to be associated with smoking. Thus there is strong predisposition of lung carcinoma among smokers. Among squamous cell carcinoma cases, M:F ratio is of 13:1.

Table 3 shows the association of various lung malignancies with smoking.

**Table III: DISTRIBUTION OF MALIGNANT CASES ACCORDING TO HISTORY OF SMOKING**

<b>Cytological diagnosis</b>	<b>No of cases</b>	<b>History of smoking</b>	<b>Percentage (%)</b>
Squamous cell carcinoma	14	12	85.7
Adenocarcinoma	20	16	80.0
Small cell carcinoma	8	7	87.5
Poorly differentiated large cell carcinoma	3	3	100
<b>Total</b>	<b>45</b>	<b>38</b>	<b>84.4</b>

85.7% squamous cell carcinoma cases and 80% of adenocarcinoma cases are associated with smoking. Association for poorly differentiated large cell carcinoma is 100% while for small cell carcinoma it is 87.5%.

No major complication was seen in our study except one case with one episode of blood tinged sputum resolved spontaneously.

**DISCUSSION**

Fine needle aspiration of intrathoracic organs is usually applied to localized lesions, and having less value in the diagnosis of diffuse parenchymal disease. Diagnosis of malignancy is the usual aim of FNAC although it can also be used for definitive diagnosis of some benign neoplasms and infectious diseases such as tuberculosis [5-7]. Our study consisted of sixty five aspirations performed on sixty patients. In five cases, repeat aspiration helped to get sufficient material as the material was inadequate in the first occasion. The aspiration was repeated in these cases as there was a strong possibility of malignancy on clinical and radiological examination. Different studies quote a repeat aspiration rate of 13% for an inadequate first aspiration. It is also stated that an unsatisfactory aspiration must be repeated, particularly when there is strong suspicion of possible malignancy [5]. In three cases (5%), the material was inconclusive but aspiration could not be repeated either because the patient was uncooperative or lost to follow up. Different studies have shown the rate of insufficient sampling to vary from 8.8% to 25.4% [2-4, 8, 9]. The causes mentioned are faulty technique, necrosis, tumor location and patient compliance [10]. There was a male preponderance in our study with a M: F ratio of 5.67:1. The ratio in lung lesions as mentioned by several authors ranges from 1.7:1 to 2.6:1. This difference is clarified on the basis of greater incidence of predisposing factors like smoking, COPD and alcoholism in males [11, 12]. Among FNAC-proven cases of malignancy, thirty nine were males (86.7%) and only six were females (13.3%). There was hence a significant male preponderance with a M: F ratio of 6.5:1.

Forty five cases were positive for primary epithelial lung malignancy (78.9%) in our study. In two cases (3.5%) of FNAC, features were highly suspicious of malignancy and found to be positive for malignancy on biopsy. Repeated aspirations aided a specific diagnosis later in five cases. Several studies depicted the incidence of malignant tumors on lung FNAC as 58-88%. The above findings associated with the observations made by various authors [11, 13, 14, and 15].

Adenocarcinoma was the most common tumor in females. Four out of six females were diagnosed as adenocarcinoma. However it was still more common in males overall with a M: F ratio of 4:1. Among Squamous cell carcinoma cases, M: F ratio was of 13:1.

Carcinoma lung is a disease of middle and elderly age group. The incidence is low in those below 35 years, increases to a peak at about 60 years and decreases slowly thereafter. In the present study, thirty eight patients out of forty five cases of lung epithelial carcinoma were smokers (84.4%). Thus smoking is found to be an important predisposing factor for all type of lung malignancy (Table- 3). These findings correlated with the results of previous authors [11, 12].

Twenty of our cases were diagnosed as adenocarcinoma (44.4%) closely followed by squamous cell carcinoma in fourteen cases (31.1%). Though squamous cell carcinoma used to be considered the most common tumor of the lung, studies indicate that adenocarcinoma may have surpassed it in incidence [11, 12].

Between 20-30% of lung carcinomas are adenocarcinomas and the proportion has increased in the last fifteen years. Adenocarcinoma is the commonest histological type in women and the increasing proportion of women in the lung cancer population is possibly a factor in the relative rise in the incidence of adenocarcinoma [11, 13].

Three cases were diagnosed as poorly differentiated large cell carcinoma in the present study (6.7%). Undifferentiated carcinoma constitutes the 7-15% of lung carcinoma. Complications were encountered in only one case having single episode of blood tinged sputum following FNAC resolved spontaneously. No fatalities were occurred in the present study. However major complications have been reported by previous workers, the commonest complication being pneumothorax [8, 13-16]. Other carcinomas of the lung i.e. giant cell carcinoma and adenosquamous carcinoma were not found in this study. The possible reason can be the relative rarity of these neoplasms. Both giant cell carcinoma and adenosquamous carcinoma constitutes less than 5% of lung malignancies.

**CONCLUSION**

Percutaneous, transthoracic FNAC is a quite simple procedure with good patient acceptance and low morbidity. It is a precise, safe and repeatable procedure in the diagnosis of difficult lung lesions. FNAC should be used earlier and more frequently to reduce the diagnostic interval and permit more prompt therapy for persistent lung lesions.

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