

# Evaluation of Fine Needle Aspiration Cytology in the Diagnosis of Lung Lesions

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## Abstract:

**Background:** Fine needle aspiration (FNA) is a technique of taking cytology sample by means of a fine needle attached to a syringe. CT guided FNAC is a widely accepted method for differentiating lung lesions. It has been used to distinguish lung lesions into benign, malignant and inflammatory types. It has turned into an established discriminating procedure with excellent results worldwide.

**Aim:** To evaluate the diagnostic efficacy and safety of image guided percutaneous fine needle aspiration cytology(FNAC) in various neoplastic and non-neoplastic lung lesions.

**Material and Methods:** A prospective study was carried out in Department of Pathology, GRMC Gwalior. Fifty CT-guided fine needle aspirations were done over a period of one year and cytological diagnosis were made after staining them with May Grunwald Giemsa (MGG) stain and Pap stain.

**Results:** In the present study group of 10-72 year old, definitive diagnosis was given in 41 cases, out of which benign lesions were 12%, in which the most common were Non Specific Inflammatory lesions(8%) followed by TB(4%), malignant lesions were 70% in which Adenocarcinoma was seen in 48% cases followed by Squamous Cell Carcinoma in 20% cases and Small Cell Carcinoma in 2% cases.

**Conclusion:** CT-guided FNAC is a generally widely accepted, simple-to-perform, accurate, safe, and cost-effective strategy for diagnosing a lung lesion with low morbidity rates. A cytological diagnosis is considered provisional in numerous cases, but it helps the clinician in handpicking the best course of action for the patient.

**Index terms:** Fine needle aspiration cytology, lung lesions, benign lesions, malignant lesions.

## INTRODUCTION:

Fine needle aspiration (FNA) is a technique of taking cytology sample by means of a fine needle attached to a syringe<sup>[1]</sup>. Using a needle and syringe to aspirate material from a lesion has been known for a long time but Fine Needle Aspiration Cytology (FNAC) for diagnosis of lesions was first used by Martin and Ellis in the 1930s.<sup>[2]</sup> It's a simple and safe examination, which gives considerably trustworthy results quickly and helps in early clinical intervention. With the arrival of the Computed Tomography(CT) examination, FNAC has become a truly better modality because of real-time visualization of the approaching needle and the target lesion. Computed Tomography( CT) guided fine needle aspiration cytology( FNAC) is a widely accepted method for differentiating lung lesions. It has been used to distinguish lung lesions into benign, malignant and inflammatory types. Moreover, its use has been extended in distinguishing lung lesions into different cytopathological types which aids in the proper handling of the malignant lesion. One of the major advantages of FNAC is the discovery of neoplasm types like small cell carcinoma and lymphoma which can be treated by chemotherapy rather than surgery<sup>[3]</sup>. The diagnostic accuracy is reported to be more than 80% in benign lesions and more than 90% in malignant lesions.<sup>[4]</sup> It has turned into an established discriminating procedure with excellent results worldwide and although pneumothorax is the most common complication, it can be readily managed.<sup>[5]</sup> The ensuing study was done over a one year period in 50 patients, with single or multiple lung lesions with respiratory symptoms to assess the utility of CT-guided FNAC in the diagnosis of lung lesions.

## AIM:

To evaluate the diagnostic efficacy and safety of image guided percutaneous fine needle aspiration cytology (FNAC) in various neoplastic and non-neoplastic lung lesions.

## MATERIAL AND METHODS:

The study was carried out at Gajra Raja Medical College in the city of Gwalior, Madhya Pradesh. A total of 50 cases were studied for a period of 1 year. A detailed informed consent was procured from every case. All pertinent clinical history and former investigations were properly noted. Any history of bleeding disorders, vascular anomalies, pulmonary hypertension, severe chronic obstructive pulmonary disease, or severe intractable cough was ruled out in all the cases undergoing the procedure.

All precautions were followed while cleaning the required area with povidone-iodine. Furthermore, a 22-Gauge spinal needle was introduced percutaneously and its approach was tracked by CT scan. When the target was reached, the stylet was removed and a 20 mL syringe was attached to the needle. By applying negative suction, aspirate was acquired by to and fro and rotating movements of the needle within the lesion. The needle was then removed from the site and the material collected was spread over 3 to 5 slides. However likewise, the procedure was repeated, if the aspirated material was judged to be insufficient. A maximum of two needle

passes was allowed in a case. All patients were observed for 1 hour. The slides were stained with May Grunwald Giemsa (MGG) stain following dry fixation and Pap stain following wet fixation. Smears were examined under a microscope and cytological diagnosis were made.

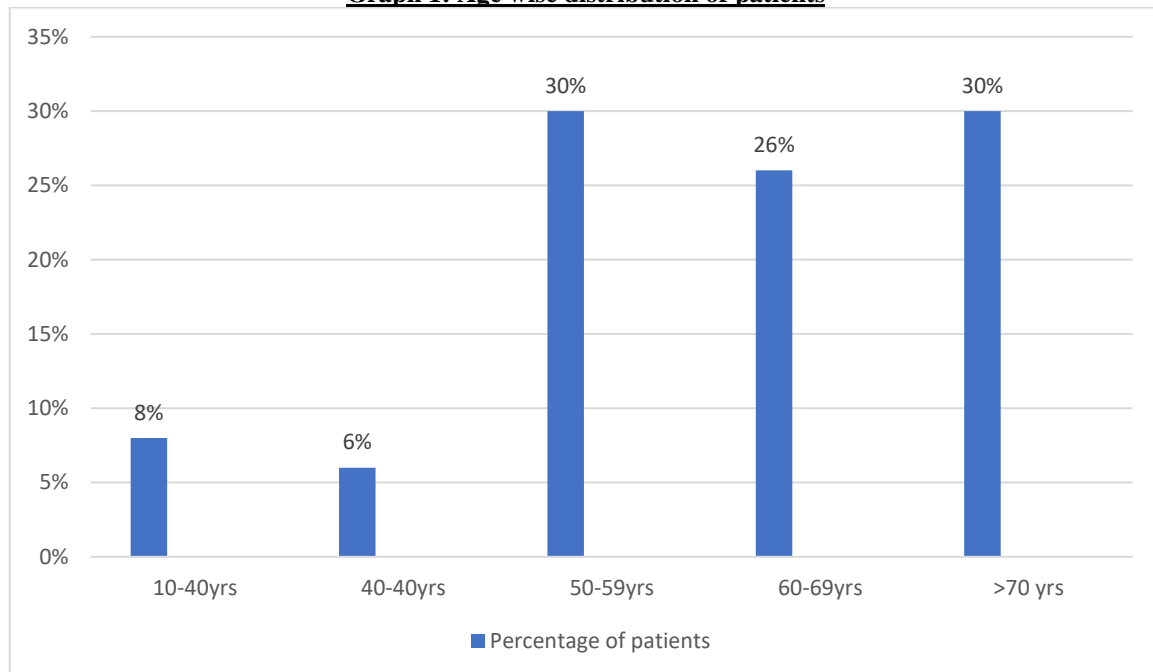
### RESULTS:

A total of 50 cases underwent CT guided FNAC of lung during the duration of the study; 31 patients were male (62%) and 19 patients were female (38%).

**Table 1: Age wise distribution of lung lesions**

Age (in years)	Number of Patients
10-40	04(8%)
40-49	03(6%)
50-59	15(30%)
60-69	13(26%)
>70	15(30%)
Total	50

**Graph 1: Age wise distribution of patients**



The youngest patient was 21 year old and oldest patient was 72 year old in our study.

### Diagnostic Accuracy:

A total of 50 patients were subjected to CT guided FNAC in our study, and out of them, a cytological diagnosis could be given in 41 cases; 9 cases (18%) could not be diagnosed either due to inadequate amount of sample or absence of diagnostic elements. The diagnostic accuracy rate was thus 82%.

### Cytological Diagnosis:

A definitive diagnosis could be given in 41 cases out of 50 patients undergoing CT guided FNAC.

Among these 41 cases, malignancy was found in 35 cases(70%), 6 were diagnosed as benign lesions and 9 were deemed inadequate. Out of 6 benign lesions, Non Specific Inflammatory lesions were seen in 4 cases and Granulomatous lesions(TB) seen in 2 cases. In malignant lesion, Non Small Cell Carcinoma (NSCC) was the most common malignancy and Small Cell Carcinoma was least common.

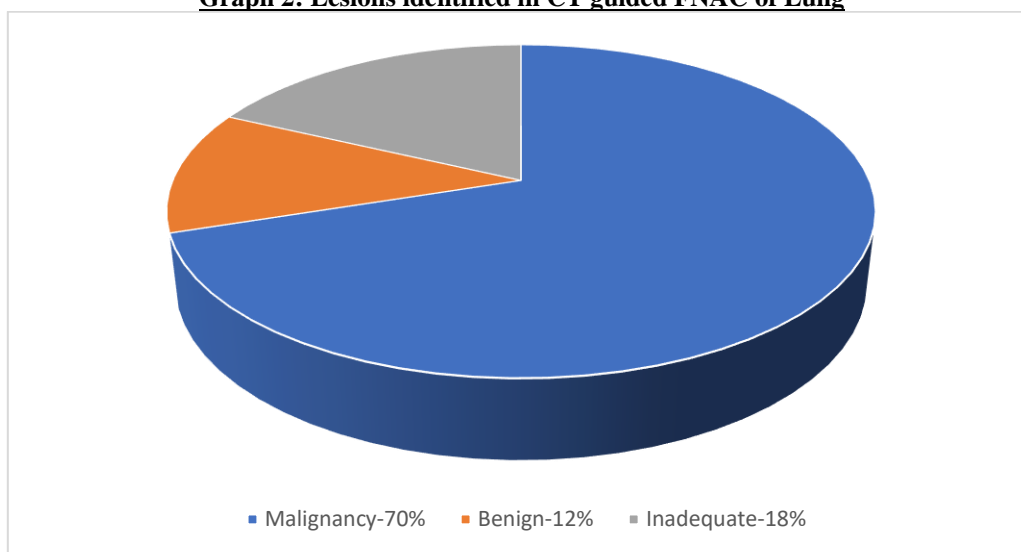
In Non-Small Cell Carcinoma, Adenocarcinoma was diagnosed in 24 cases, Squamous Cell Carcinoma in 10 cases and Small Cell Carcinoma in 1 case.

In malignant lesions, 22(62.85%) were males and 13(37.15%) were females, with male female ratio of 1.7:1.

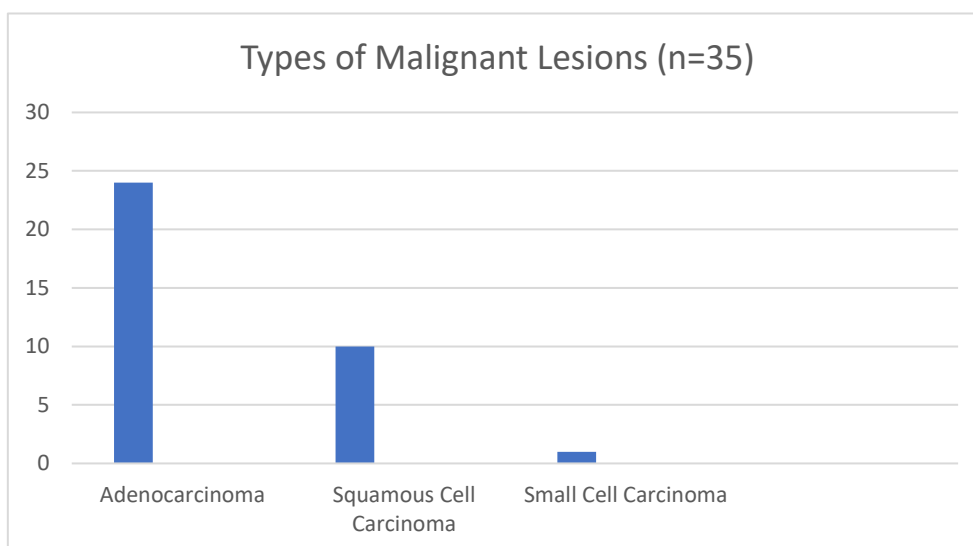
**Table 2: Types of lesions**

Type of lesions	Number of cases
Benign lesions-1)Non specific inflammatory lesion 2)Granulomatous inflammation(TB)	4(8%)  2(4%)
Malignant lesions-1)Adenocarcinoma 2)Squamous Carcinoma 3)Small Cell Carcinoma	24(48%) 10(20%) 01(2%)
Not diagnosed	09(18%)

**Graph 2: Lesions identified in CT guided FNAC of Lung**



**Graph 3: Types of Malignant lesions**



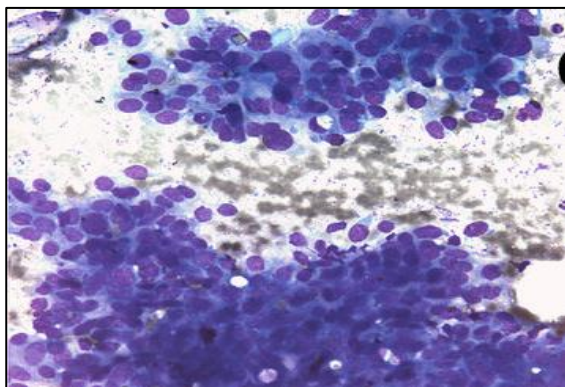


Figure 1: Giemsa- Stained Smear of Adenocarcinoma lung(400x)

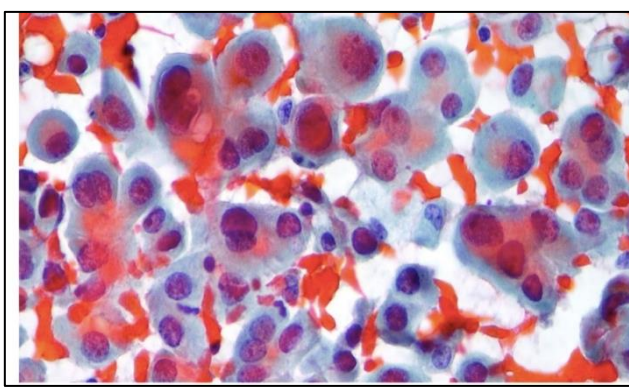


Figure 2: Pap stained smear of Squamous Cell Carcinoma lung(400x)

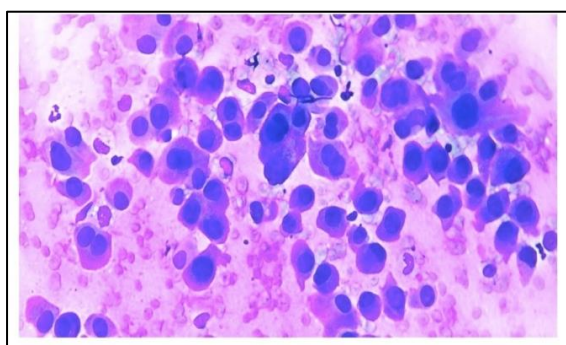


Figure 3: Giemsa-Stained smear of Squamous Cell Carcinoma lung(400x)

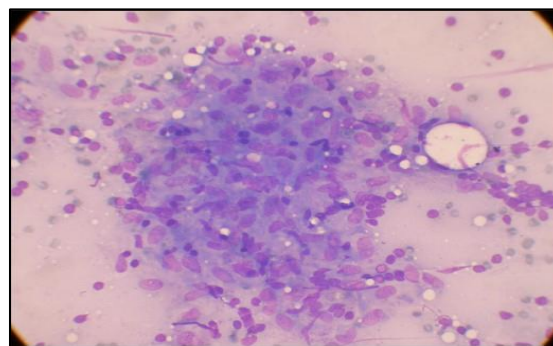


Figure 4: Giemsa-Stained smear of TB Granuloma lung(400x)

## DISCUSSION:

CT Guided FNAC is really useful because of its high sensitivity in detecting malignant lesions and classifying the lesion. A benign diagnosis reduces the chances of surgery and the consequent morbidity in numerous cases. [6] In our study, 50 cases had undergone CT-guided FNAC of lung lesions. There was male predominance (62%) as compared to female(38%) among the cases which had undergone FNAC for lung lesions. The percentage of male patients in the studies by Saha et al showed 78.9% and Tan et al 71.1% male predominance. Most patients tolerated the procedure well. The most common complaint patients witnessed was pain at the location where the procedure was done and mild bleeding at the location which subsided without pharmaceutical intervention in 2 hours. The majority of cases were seen in the fifth to seventh decade and had a mean age of 55.19 years, which agrees with the observations of recent studies done in East India[7]. FNAC was diagnostic in 41 out of 50 cases, furnishing a diagnostic accuracy of 82%, which is close to the findings of many studies. [8] whereas many other authors have found an increased rate of accuracy.[9] Malignant pathology was seen in this cytological study in 70% cases and benign pathology in 12% cases. The incidence of Adenocarcinoma (48%) was more than double of Squamous Cell Carcinoma(20%) similar to the study done by Basnet et al( 50% vs 28%) and the study done by Shrestha et al showed increased incidence of adenocarcinoma, as seen in our study. Among the benign lesions, Tuberculosis comprised 4% of our cases as compared to 19.2% in study done by Jacob et al. Inflammatory lesions were 8%.

A number of factors affect the final conclusion of FNAC, starting from the methodology of the procedure to the final interpretation by a cytopathologist. The patient-related factors include the site and size of the lesion and the degree of necrosis.[10] During the sampling, the determining factors are the size of the needle and its location within the lesion, the amount of material aspirated, the quality of the smear made and staining done. The experience and knowledge of the cytopathologist examining the smear is a major factor in reaching a diagnosis in the end.

## CONCLUSION:

Among all malignancies, lung cancer causes significant mortality and morbidity worldwide, hence its diagnosis is of utmost significance. The status of FNAC in the diagnostic workup of a lung mass is well established. CT-guided FNAC is a generally widely accepted, simple-to-perform, accurate, safe, and cost-effective strategy for diagnosing a lung lesion with low morbidity rates. Combined with CT, the aspiration needle can be guided safely into the lesion to enhance the diagnosis of the cytological material. A cytological diagnosis is considered provisional in numerous cases, but it helps the clinician in handpicking the best

course of action for the patient. Though complications are rare, pneumothorax, and hemoptysis are now and then encountered, but seldomly necessitate active management. The results of our study compare well with other studies from other regions of the world, corroborating the significance of this vital mode of investigation in our region.

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