# Diagnosis of pulmonary malignant lesions by computed tomography guided FNAC & its histomorphological correlation

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## Abstract

**Introduction:** Lung cancer is the most common amongst the malignancies in the world. In India the exact incidence of lung cancer is not known due to lack of formal epidemiological data across the country. However there is likely to be an estimated increase of 10% new cases/ year in next five year.

**Aims & objectives:** To find out diagnostic accuracy of CT guided FNAC in lung cancer patients. The findings were further correlated with the histopathological examination.

**Materials & Methods:** 56 patients clinically diagnosed to have lung mass were subjected to CT guided FNAC. After aspiration, slides were smeared and stained with PAP & MGG staining. Later on confirmation was done by histopathological findings.

**Results & Observation:** In this retrospective observational hospital based study maximum patients were in the age group of 6th to 7th decade with M:F of 3.67:1. Histopathological correlation was available in 49 cases out of 56 cases. 47 cases were reported as malignant on FNAC hence diagnostic accuracy was 96%.

**Conclusion:** FNAC of lung is simple, safe & highly yielding method for diagnosis of lung tumor & is an outdoor procedure with minimal complications.

**Keywords:** Lung cancer, CT guided FNAC.

## Introduction

Malignant thoracic disease, such as lung cancer, has increased significantly.[1,2] The rise in incidence of bronchogenic carcinoma throughout the twentieth century, related to smoking ensured that FNAC plays important role in all routine cytology for examination of malignant cells. It is very important to diagnose the subtypes of lung cancer rapidly and accurately as the therapy is different. FNAC complements other diagnostic methods.[3] The sensitivity of FNB in the diagnosis of malignant pulmonary neoplasm varies according to both the size & the site of the mass[4] as well as the experience of the radiologist[5] and pathologist. Lung cancer can be mainly classified into small cell carcinoma and non small cell carcinoma (squamous cell carcinoma, adenocarcinoma, and other subtypes.)[2]

Fine-needle aspiration cytology (FNAC) is a simple, relatively safe, rapid, reliable technique for the diagnosis of pulmonary mass lesions, particularly with the aid of computed tomography (CT) scan. FNAC not only distinguishes between benign and malignant lesions but also helps in classifying lung carcinoma which helps in initiation of specific therapy like chemotherapy or surgery is possible without unnecessary delay.

The present study was undertaken to know the pathological spectrum of pulmonary malignancy; to correlate cytological findings with histopathological features; and to assess the accuracy of FNAC in evaluation of lung masses.

## Materials & Methods

A retrospective study was carried out in the department of pathology of SRMS-IMS Bareilly for a period of one year (August 2013 to August 2014). In this study patients attending OPDs of different departments like chest, medicine, and oncology who were clinically diagnosed to have pulmonary mass were included. All patients were subjected to undergo chest radiograph, CT scan and subsequently CT guided FNAC. In this study total number of patients were 56 out of which histopathological examination was done in 49. This study was approved by the hospital ethical committee.

CT guided FNAC of pulmonary mass from each case were performed by our senior pathologist as OPD procedure and also in presence of experienced radiologist after explaining the risks and benefits. From each patient, informed consent was taken. The skin surface was cleaned with povidone iodine, and then 21 G-88 mm long spinal needle was introduced through percutaneous or transthoracic approach localizing the exact position by CT scan after the measurement of the site and angle of entry of the needle, route of the needle, and the distance between the skin and lesion on the CT scan monitor.[6]

A guided needle makes aiming of the aspiration needle easier, reduces the risk of bending of flexible needle & prevents contamination of the aspirate with chest wall tissues with better cell yeild.[7] Non-aspiration techniques often yield adequate material & may be particularly useful in haemorrhagic lesion.[8,9]

Following placement of the needle, a CT scan slice was taken to ascertain whether the tip of the needle was within the mass. The aspirate was obtained by to and fro movements of the needle within the lesions and smears were prepared immediately from the sample in the CT scan room. Air-dried smears were stained with May Grunwald-Giemsa (MGG) stain, whereas alcohol-fixed smears were stained with Papanicolaou (PAP) stain for cytopathological evaluation of the lesions.

Subsequently biopsy (bronchoscopic/trucut biopsy) specimens were then examined in pathology department for histopathological examination (HPE). The sections were stained with routine hematoxyline and eosin (H and E) stain and examined under light microscope.

## Results & Observation

In this retrospective observational hospital based study maximum patients were in age group of 6th to 7th decade of life with 44 cases (78.57%) were male and 12 (21.42%) were female, hence M:F ratio is 3.67:1. General demographic findings of the study and common disease pattern have been given in Table 1.

History of smoking was present in 34 cases followed by smoking with tobacco chewing in 9 cases. Right sided lesion was 2.1 times more common than left side.

**Table-1 Demographic description of the study**

| Subject | Total | Percentage |
|---|---|---|
| **AGE** | | |
| 21-30 | 02 | 3.57% |
| 31-40 | 01 | 1.78% |
| 41-50 | 08 | 14.28% |
| 51-60 | 14 | 25.00% |
| 61-70 | 21 | 37.50% |
| 71-80 | 09 | 16.07% |
| 81-90 | 01 | 1.78% |
| **Sex** | | |
| Male | 44 | 78.57% |
| Female | 12 | 21.43% |
| **Side of lesion** Right | 38 | 67.86% |
| Left | 18 | 32.14% |
| **Habits** Smoker | 34 | 60.71% |
| Smoker & tobacco chewer | 09 | 16.07% |
| Non smoker | 13 | 23.21% |

Out of 56 cases histopathological correlation was available in 49 cases. On FNAC 47 cases were reported as positive for malignancy & 2 cases as negative with sensitivity of 96%. In our study, cytological diagnosis showed maximum number of cases belonged to squamous cell carcinoma 26, followed by adenocarcinoma 17, small cell carcinoma 08, poorly differentiated carcinoma 04, anaplastic carcinoma 01. (Fig. 1)
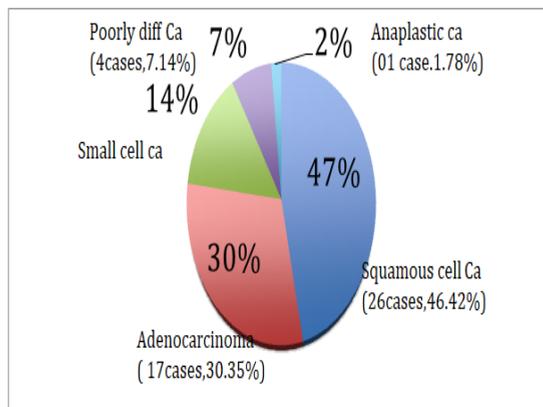


**Fig. 1: Cytological Diagnosis**

Histopathological correlation is 80.7% in squamous cell carcinoma, 80% in adenocarcinoma, 87.5% in small cell carcinoma, 75% in poorly differentiated carcinoma, and 100% in anaplastic carcinoma. (Table 2) Microscopically, most adenocarcinomas (fig 2), small cell carcinomas (fig 3), squamous cell carcinomas (fig 4), and showed classical cytomorphological features.
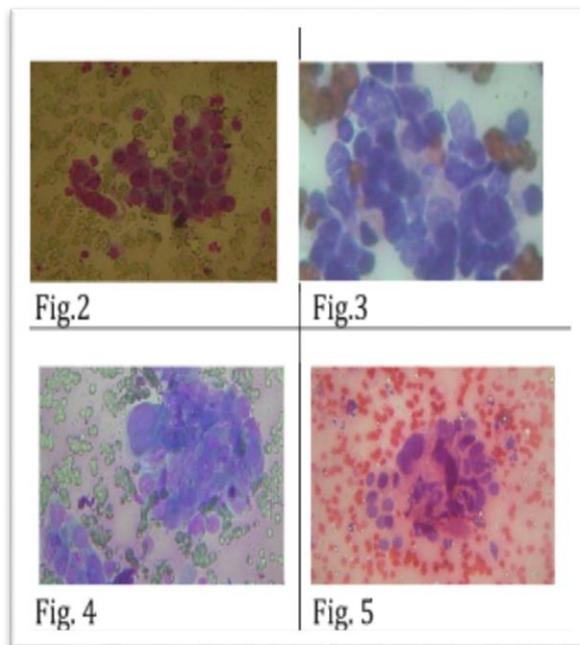


**Fig. 2. Adenocarcinoma**- prominent nucleoli (Pap Stain, 40X), Fig. 3. **Small cell carcinoma** - Nuclear molding (MGG Stain, 40X), Fig. 4.**Squamous cell carcinoma** --Irregular clump of relatively cohesive cells with variation in chromatin (MGG Stain, 10X), Fig. 5.**Poorly differentiated carcinoma** -poorly differentiated cells in loose and overlapping groups (Pap Stain, 40X)

**Table 2: FNAC findings**

| Sub-Types | Total | Cytological Diagnosis | | | | | Histopathology | |
| | | Suspicious | Positive | Definitive Diagnosis | Inconsistant with Diagnosis | Negative | Biopsy not done | Correlation |
|---|---|---|---|---|---|---|---|---|
| Sq cell ca | 26 | 03 | - | 21 | - | 02 | - | 80.7% |
| Adeno ca | 17 | - | 01 | 08 | 01(Sq cell ca) | - | 07 | 80% |
| Small cell ca | 08 | - | - | 07 | 01 (Sq cell ca) | - | - | 87.5% |
| Poorly diff ca | 04 | - | - | 03 | 01 (Sq cell ca) | - | - | 75% |
| Anaplastic ca | 01 | - | - | 01 | - | - | - | 100% |

## Discussion

CT guided FNAC is worldwide accepted & established method of choice to determine the nature of lesion. Hence it is a sensitive method for lung cancer diagnosis.

Lung cancer is the second most common cancer and is the leading cause of cancer mortality worldwide for both men & women.

Treatment of lung cancer depends on the tumor type, clinical stage and the patients overall health condition. Earlier effective treatment based on histology is much important for patients to extend their life expectancy.

Male predominance is due to greater incidence of pulmonary diseases in males because of smoking habits & occupational hazards.[10-12]

In present study diagnostic accuracy of FNAC is 96% whereas the diagnostic accuracy of lung tumors range from 82.4-90.3% in previous studies.[13,14] (Table 2)

**Table 2: Comparision with other studies**

| Author | No. of Cases | Diagnostic Accuracy |
|---|---|---|
| Mondol & pradhan(1991) | 135 | 97% |
| Sangita & kaushambi(2007) | 100 | 95% |
| Jayashankar(2010) | 60 | 90% |
| Santosh k mondol(2013) | 124 | 95% |
| Present study | 56 | 96% |

## Conclusion

FNAC of lung mass under guidance of CT scan is simplest, fast & highly yielding method for diagnosis of lung tumor preoperatively to avoid undue surgery & inconvenience caused due to biopsy. FNAC is an outdoor procedure with minimal complication & high diagnostic accuracy even in subclassification of lung tumors.

Experienced cytopathologist can reliably identify the histological type in upto 90% of primary lung tumors & approximately 80% of their predictions of tumor type are correct, these rates are similar to those achieved with bronchial biopsy.

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