Efficacy and Safety of CT Guided Transthoracic FNAC of Lung Lesions of Various Sizes and Locations
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ABSTRACT: CT guided transthoracic FNAC was done in 49 cases with an intention to evaluate the efficacy and safety of CT guided transthoracic FNAC of lung lesions of various sizes and locations. We divided our cases according to site (Central/peripheral) and size (Small/ large). CT guided transthoracic FNAC diagnosed 47 out of 49 cases 95.9% cases (100% large central, 87.5% small central, 100% large peripheral and 80% small peripheral). We observed complications in 8.2% of cases. All these complications were minor in nature and responded to symptomatic and conservative treatment so considering its simplicity, safety, rapidity and high diagnostic yield and more importantly usefulness in diagnosing difficult to approach lesions and in small central lesions.

KEYWORDS: CT guided, Lung lesion, Transthoracic.

INTRODUCTION: Computed tomography (CT)-guided fine needle aspiration cytology (FNAC) of suspicious lung masses is a widely accepted and simple diagnostic method of relatively low cost.¹ The first clinical application of CT occurred in 1971, capturing a brain lesion, and applications in the lung were boosted with the1980's development of helical CT and faster acquisition times.² Transthoracic biopsy is an important diagnostic tool in those patients with peripheral pulmonary mass inaccessible by bronchoscopy thus hindering the diagnosis by transbronchial biopsy.³ Fine needle aspiration cytology is a diagnostic procedure for various ‘difficult to diagnose’ lung lesions. CT guidance procedure can be specially used for small central and ‘difficult to approach’ lung lesions. Since the days of Leyden (1883) who aspirated organisms causing pneumonia by thick needle biopsy, many scientists used different type of needles and various techniques for biopsy.⁴ Later Nordenstrom’s continued the work showing that this procedure can give high degree of accuracy in diagnosis and incidences of complications can be reduced.⁵ Amongst all the procedures like biplane fluoroscopy, ultrasonography, large intensification and CT guidance, the CT guidance became popular due to easy localization of needle. The present study was intended to establish accuracy and safety of CT guided transthoracic FNAC of lung lesions.

MATERIALS & METHODS: Computed tomography (CT)-guided fine needle aspiration cytology (FNAC) of suspicious lung masses is a widely accepted and simple diagnostic method of relatively low cost.¹ The first clinical application of CT occurred in 1971, capturing a brain lesion, and applications in the lung were boosted with the1980's development of helical CT and faster acquisition times.² Transthoracic biopsy is an important diagnostic tool in those patients with peripheral pulmonary mass inaccessible by bronchoscopy thus hindering the diagnosis by transbronchial biopsy.³ Fine needle aspiration cytology is a diagnostic procedure for various
‘difficult to diagnose’ lung lesions. CT guidance procedure can be specially used for small central and ‘difficult to approach’ lung lesions. Since the days of Leyden (1883) who aspirated organisms causing pneumonia by thick needle biopsy, many scientists used different type of needles and various techniques for biopsy.\(^4\) Later Nordenstrom’s continued the work showing that this procedure can give high degree of accuracy in diagnosis and incidences of complications can be reduced.\(^5\) Amongst all the procedures like biplane fluoroscopy, ultrasonography, large intensification and CT guidance, the CT guidance became popular due to easy localization of needle. The present study was intended to establish accuracy and safety of CT guided transthoracic FNAC of lung lesions.

**OPERATIVE PROCEDURES:** The only premedication given was 0.6 mg of atropine intramuscularly thirty minutes before the procedure. In apprehensive patients, 10 mg diazepam was given orally thirty minutes before the procedure.\(^6\)

CT guided biopsy done after making a plan and CT plain and contrast were done for contrast 76% trazograph was used, repeated scans were taken and shortest and safest paths were chosen. Angulation of CT gantry assisted in gaining access to the best biopsy path. The position of needle tip was checked by doing two or three repeated scans. After preparation of the site 5-10ml of 2% xylocaine was infiltrated into the skin, subcutaneous muscle plane, up to parietal pleura. Needle aspiration was done in a comfortable position during shallow respiration with 23G (0.65mm) eight centimeters long lumbar puncture needle. The needle was inserted perpendicularly into the lesion close to the upper border of the rib to avoid damage to neurovascular bundle. Following this we inserted needle’s point into the lesion with a 20ml disposable syringe attached. After retraction of the piston the needle was moved to and fro and in various durations within the lesion, then the piston was released and needle was withdrawn. The aspirated material was put on glass slides and smears were made. The wet smears were fixed immediately in 95% alcohol for 30-40 minutes the aspirated material also inoculated into the culture tubes. In the event of inadequacy of the aspirate, the aspiration procedure was repeated up to maximum number of three times from different part of the lesion until apparently adequate material had been obtained. After the procedure each patient was reexamined and x-rayed to rule out pneumothorax and kept under observation for 24
hours. The aspirate was examined for AFB and other organisms by staining, culture and sensitivity and other cytological and histopathological examination.

**OBSERVATION AND RESULTS:** The CT guided trans thoracic FNAC was done in 49 cases and diagnosed 47 cases with 95.5% success rate. It diagnosed 100% of large central, 87.5% of small central, 100% of large peripheral and 80% of small peripheral lesions.

Complications occurred in four cases around 8.2% cases of CT guided transthoracic FNAC. These included hemoptysis 4.1% and minor chest pain 4.1% which responded to symptomatic treatment

**DISTRIBUTION OF CASES:**

|                          | Large central | Small central | Large Peripheral | Small Peripheral | Total |
|--------------------------|---------------|---------------|------------------|------------------|-------|
| Total cases in which CT  | 13            | 8             | 23               | 5                | 49    |
| guided biopsy was done    |               |               |                  |                  |       |
| Diagnostically Positive   | 13            | 7             | 23               | 4                | 47    |
| results in               |               |               |                  |                  |       |
| Percentage               | 100           | 87.5          | 100              | 80               | 95.9  |

Table 1

Distribution of cases according to the complication occurred during CT guided transthoracic FNAC.

| Total No. of Cases       | 49         |
|--------------------------|------------|
| Complications occurred in| 4          |
| Percentage               | 8.2%       |
| Hemoptysis               | 2(4.1%)    |
| Chest pain               | 2(4.1%)    |

Table 2

**Distribution according to final Diagnosis:**

| Diagnosis                          | Number | Percentage |
|------------------------------------|--------|------------|
| 1. Squamous cell carcinoma         | 24     | 51.06      |
| 2. Small cell carcinoma            | 11     | 23.4       |
| 3. Adenocarcinoma                  | 5      | 10.6       |
| 4. Pulmonary Tuberculosis          | 2      | 4.25       |
| 5. Large Cell Carcinoma            | 1      | 2.12       |
| 6. Positive for Malignant Cell     | 2      | 4.25       |
| 7. Lymphoma                        | 1      | 2.12       |
| 8. Cryptococcosis                  | 1      | 2.12       |

Table 3
DISCUSSION: There was a diagnostic yield of 95.9% in CT guided transthoracic FNAC. There was no significant difference in diagnosis in central and peripheral lesion. This may be due to CT guided transthoracic FNAC is more precise to diagnose central lesions because these type of lesions are difficult to reach without CT guidance. Diagnostic yield by central lesion is better than peripheral if adequate material is obtained. Higher diagnosis yield was due to precise sample collection from central lesions specially small central lesions. Complications were very few and trivial in nature and responded to symptomatic treatment. This may be due to lesser number of smaller lesions and lesser number of attempts and also due to use of smaller 23G needles. Complications occurred in only 8.2% cases and they also responded to symptomatic treatment with no case of pneumothorax. There was no case of tumor cell implantation occurred in needle track.

We observed more cases of malignancy as we included mostly cases not responding to conventional treatment in our study and this was due to the fact that benign cases were diagnosed easily by other methods.

Pneumothorax remains the most frequent complication of and a tube thoracostomy is occasionally required for treatment. The reported frequency of pneumothorax for CT-guided procedures varies from 8% to 64%. In our study the complications were minimum as we used 23 G needle. From our study it can be concluded that that CT guided transthoracic FNAC is very safe, sensitive and accurate procedure with high sensitivity and specificity side effects are very few and trivial in nature.

CONCLUSIONS: CT guided biopsy is specially important for diagnosis of small central lesions. CT guidance became popular due to easy localization of needle and accuracy of the procedure. The present study establishes the fact that CT guided transthoracic FNAC of lung lesions yields accurate result and is quiet safe, simple and well tolerated method. Hence, it can be concluded that CT-guided transthoracic needle biopsy is useful and safe diagnostic tool for the determination of different lung lesions.
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