



ROLE OF ULTRASOUND AND CT GUIDED FNAC AND TRU-CUT BIOPSY IN THE DIAGNOSIS OF INTRA-THORACIC LESIONS.

Respiratory Medicine

Dr. Papia Mondal*	Senior Resident, Department of respiratory Medicine, NRS Medical College & Hospital, Kolkata- 700014. *Corresponding Author
(prof.) Dr. Jaydip Deb	Professor and Head of the department, Department of respiratory Medicine, NRS Medical College & Hospital, Kolkata- 700014.
Dr. Priyanka Ray	Senior Resident, Department of respiratory Medicine, NRS Medical College & Hospital, Kolkata- 700014.

ABSTRACT

Introduction: Image guided per-cutaneous trans-thoracic FNA and Tru-cut biopsy are gaining popularity since last few decades among the pulmonologists for tissue diagnosis of intra-thoracic lesions. These procedures have high diagnostic yield and are less invasive, have less complication rate in comparison to procedures like surgical lung biopsy, bronchoscopy or thoracoscopic guided lung biopsy.

Aim: The aim of this prospective observational study was to determine the diagnostic yield and complications of USG guided and CT guided Fine needle aspiration and Tru cut biopsy in cases with intra- thoracic lesions.

Materials and methods: In this observational study 49 patients were selected during the one-year study period after getting informed consent. CECT Thorax was done in all cases to evaluate the location, type of lesions. In 14 cases with peripheral pulmonary lesions abutting chest wall and pleural lesions both USG guided FNAC and Tru cut biopsy was done. CT guided FNAC and Tru cut biopsy was done in rest of the 35 cases.

Results: Diagnostic yield of USG guided FNAC was found to be 64.3% and CT guided FNAC was 62.86%. Diagnostic yield of CT guided Tru cut biopsy in this study was 91.43% and USG guided Tru cut biopsy was 92.9%. complication rate of both USG and CT guided procedures were low.

Conclusion: Both USG guided and CT guided FNAC and Tru cut biopsy are efficient diagnostic procedures for intra-thoracic lesions. Tru-cut biopsy procedure is superior to FNAC procedure for definitive diagnosis.

KEYWORDS

USG guided FNAC, USG guided Tru-cut biopsy, CT guided FNAC, CT guided Tru-cut biopsy, lung malignancy.

INTRODUCTION

With increasing number of lung malignancies the need for less invasive, rapid method for tissue diagnosis is increasing. Different modalities for biopsy include surgical lung biopsy, bronchoscopy, percutaneous trans-thoracic image guided needle biopsy. Percutaneous trans-thoracic fine needle aspiration cytology (FNAC) and Tru cut biopsy both are well-established diagnostic procedures for thoracic lesions since last few decades. Both procedures are safe, rapid, and less invasive in diagnosing thoracic mass lesions^[1-3]. The guided biopsy and needle aspiration commonly employ fluoroscopy^[4], ultrasound^[5], CT^[6], MRI imaging technique. CT guided percutaneous trans-thoracic lung biopsy is gaining its popularity due to its advantages like clear depiction of anatomical details, high spatial and contrast resolution, 3D imaging ability and access to any area of the body. Lung ultrasound has started gaining its popularity since last few decades and along with it ultrasound guided lung biopsy. USG is helpful for biopsy of pleural or mediastinal lesions, peripheral pulmonary lesions in contact with the chest wall. ultra-sound guidance is real time and without any radiation hazard. CT-guided FNAC plays an pivotal role in small thoracic mass lesions (even smaller than 1 cm) and deep mediastinal nodes in which needle placement is correctly possible by avoiding any surrounding blood vessels and adjacent cardiac structures^[7-8].

For the diagnosis, staging and management of thoracic lesion both cytology and histopathology play crucial roles. FNAC is simple, safe, rapid, reliable, painless, cost-effective, relatively non-invasive and easy procedure, which can be done as an out-patient department procedure without any special equipment or preparation. Practically, there is no contraindication to FNAC as it can be done in pregnant women, children and high-risk patients without any severe complication. FNAC can provide excellent material for ancillary studies such as immunochemistry, cytogenetics, fluorescence *in situ* hybridization (FISH), ultrastructural examination, cell culture preparations, and molecular studies. The need of the hour is to obtain more information from less and less material obtained through minimally invasive procedures such as FNAC^[9]. FNAC of small pulmonary lesions helps in earlier diagnosis, improved staging and to formulate immediate effective management of thoracic mass lesions^[10].

Biopsy on the other hand is removal of part or whole of the tissue for the purpose of pathological and/or microbiological investigations. It is

considered as the gold standard for the diagnosis of lung carcinoma and also crucial for confirmatory diagnosis of many benign thoracic lesion. It can differentiate between in-situ from infiltrating carcinoma and can evaluate depth of invasion. Histopathological specimen is also essential for immunohistochemical examination for initiation of targeted therapy in lung carcinoma specially in case of adenocarcinoma lung. Documented complications following the procedure include pneumothorax (4%–60%), haemoptysis (10%), pneumothorax requiring chest drain (4%–10%), haemothorax, hemopneumothorax, pain, air embolism, atrial fibrillation, tumour seeding through the needle tract, chest infection, cardiac tamponade, and on rare occasions, death (0.5%).^[11-13]

MATERIALS AND METHOD:

Inclusion criteria- patients with radiologically visible intrathoracic lesions attending OPD/IPD of dept of respiratory medicine, NRSMCH, Kolkata with sputum for AFB report being negative.

Exclusion criteria-

- Patients who did not give consent
- Patients with suspected vascular tumors.
- Patients with bleeding diathesis or taking anticoagulants
- Patients with hemodynamic instability, respiratory failure. Patients with pulmonary arterial hypertension
- Patients with sputum positive or CBNAAT positive or BAL fluid CBNAAT positive reports where indicated.
- Patients with active hemoptysis
- Patients with lesions smaller than 2 cm in diameter.

This observational study was done after getting approval from the Ethical committee of the institution and it was conducted in department of Pulmonary Medicine, N.R.S.M.C & H.

49 patients who presented with clinical and radiological evidence of intra- thoracic lesions during the study period (Jan2019 to June 2020) were selected after getting informed consent.

CECT Thorax was done in all cases to evaluate the location, type of lesions. In selected cases with peripheral pulmonary lesions abutting chest wall and pleural lesions USG guided FNAC and Tru cut biopsy was done. CT guided FNAC and Tru cut biopsy was done in rest of the cases. In every case FNAC and Tru cut biopsy both done consecutively on same day. (Fig 1 and Fig 2)



Fig 1: CT guided Fine needle aspiration from left lung mass

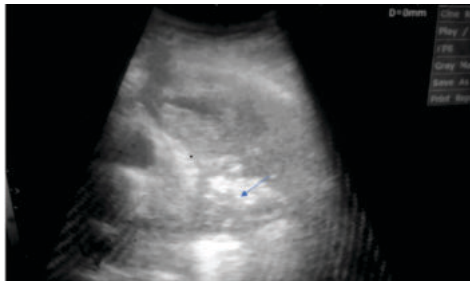


Fig 2: USG thorax showing peripheral lung mass abutting chest wall

In some situations where detail pathology was necessary from diagnostic or therapeutic points of view, Immunohistochemistry of tissue, microbiological study of tissue, special stain of the histopathology specimen, pleural fluid study, fiberoptic bronchoscopy, CBNAAT of cytology or biopsy sample were performed as needed.

After the procedure patients kept under observation for at least 4-6 hours to check for any signs and symptoms of pneumothorax.

CXR was done in every case post procedure.

Patients were monitored for haemoptysis, respiratory distress, other vital signs.

For management of any complications oxygen delivery systems, resuscitation kits were kept handy.

Analysis:

Statistical analysis was performed using help of Epi info (Tm) 7.2.2.2 EPI INFO is a trademark of the centre for disease control and prevention (CDC).

RESULTS:

A total of 49 patients were included in this study as per inclusion and exclusion criteria. Among the 49 patients 37 patients were male (75.5%) and 12 patients were female (24.5%). The mean age of the patients was 54.44 ± 16.59 years with the range from 16 to 79 years. Most of the patients (51%) were aged 60 years or above. 45 patients (91.8%) presented with pulmonary lesions, 3 patients presented with mediastinal lesion and the remaining 1 patient presented with pleural lesion. 13 patients who had peripheral pulmonary lesion abutting to chest wall and 1 patient with pleural lesion were selected for USG guided FNAC and Tru cut biopsy and rest of the 35 patients were selected for CT guided FNAC and Tru cut biopsy. FNAC followed by Tru cut biopsy were done in all the cases on same occasion. During reporting of diagnostic yield of any procedure, only conclusive or concordant result in respect to the more sensitive investigation reported as positive diagnostic yield. In some situations where detail pathology was necessary from diagnostic or therapeutic points of view, Immunohistochemistry of tissue, microbiological study of tissue, special stain of the histopathology specimen, pleural fluid study, fiberoptic bronchoscopy, CBNAAT of cytology or biopsy sample were performed as needed.

Diagnostic yield:

Majority of patients (89.8%) were finally diagnosed as having neoplastic malignant lesions and among them adenocarcinoma of lung was the commonest type of histological diagnosis (52.3%). Diagnostic yield of USG guided FNAC was found to be 64.3% and CT guided FNAC was 62.86%. Diagnostic yield of CT guided Tru cut biopsy in this study was 91.43% and USG guided Tru cut biopsy was 92.9%. (Table 1 and chart 1)

COMPLICATION:

In our study as both FNAC and Tru cut biopsy were done consecutively on the same occasion, we were unable to detect the complication of FNAC and Tru cut biopsy separately. We reported the complications as post CT guided procedure and post USG guided procedure. Most of the patients did not have any complications. Only complication found in USG guided procedure was one case of chest pain (7.2%). Complications in CT guided procedure were Haemoptysis (2.86%), Pneumothorax (5.71%) and chest pain (2.86%). (Table 2 and Chart 2)

DISCUSSION:

Per-cutaneous image guided trans-thoracic FNAC and Tru cut biopsy are gaining its popularity day by day, as both these procedures are less invasive, rapid, cost-effective in respect to their alternatives like surgical lung biopsy. Among the 50 patients 14 patients underwent USG guided FNAC and Tru cut biopsy and the remaining 36 patients underwent CT guided FNAC and Tru cut biopsy. Most of the patients (78.0%) were above 40 years of age. Male patients were significantly higher in number than female patients. Male to female ratio was 2.8:1. The cases were divided as per position of lesions based on CXR and CT scan. Among the total 50 cases, 90% were pulmonary, 6% were mediastinal, 2% were pleural and remaining 2% were chest wall lesion. Among the pulmonary lesion 34% were peripherally located, 46% were centrally located and in remaining 10% cases there were multiple lesions situated both in periphery and central. In this study 92% cases were diagnosed with neoplastic disease. Neoplastic-Malignant lesions were found in 88% case. Neoplastic benign lesions were lowest in proportion (4%). Non-neoplastic lesions were reported in 8% patients. Adenocarcinoma of lung was the most common diagnosis (46%) followed by squamous cell carcinoma of lung (16%) and small cell lung carcinoma (12%).

The diagnostic yield of USG guided Tru cut biopsy was 92.9% in this study, which is supported by Khosla R et al^[14]. Al-Damegh SA^[15] found in their study that USG guided FNAC can secure adequate sample in 86.8% lung problems. We succeeded in gaining positive diagnostic yield in 64.3% cases with USG guided FNAC. Cytological diagnosis was made in 62.86% cases who underwent CT guided FNAC in this study. Though in many studies it was quite high like van Sonnenberg E et al^[16] found it to be near 82.7% in their study, 94.7% was obtained in the study by Saha A et al.^[17] Overall yield in cytology including both USG and CT guided cases was 63.27%. The probable reason may be insufficient aspirate, bloody material, scanty cellularity, improper site of aspiration, expertise of pathologist. Positive yield with CT guided Tru cut biopsy was 91.43% in our study which is similar to the finding by Gardner D et al^[18] in their study. With biopsy the overall diagnostic yield was much higher compared to FNAC, which is comparable to many studies.^[19-21] (Table and chart 1)

Table 1

Findings		Number	%
CT GUIDED FNAC	Conclusive/Concordant	22	62.86
	Inconclusive/Discordant	13	37.14
CT GUIDED TRU CUT BIOPSY	Conclusive/Concordant	32	91.43
	Inconclusive/Discordant	3	8.57
USG GUIDED FNAC	Conclusive/Concordant	9	64.3
	Inconclusive/Discordant	5	35.7
USG GUIDED TRU CUT BIOPSY	Conclusive/Concordant	13	92.9
	Inconclusive/Discordant	1	7.1

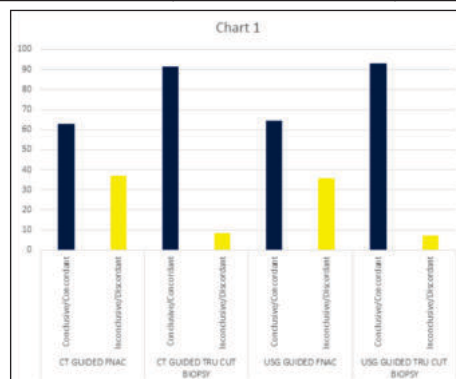


Table and Chart 1 showing yield of different procedure

Complication rate was very small in our study. Commonly encountered complications in image guided biopsy are pneumothorax, haemoptysis, pain; rare complications are tumour seeding of biopsy tract, air embolism, atrial fibrillation. In our study there were only 2 cases of pneumothorax (5.71%) post CT guided procedures, which was less than what Van Sonnenberg et al found in their study; rate of pneumothorax in their study was around 15% [16]. Both the cases of pneumothorax managed with conservative management. There was also 1 case of haemoptysis (2.86%) and 1 case of chest pain (2.86%) post CT guided procedure. In USG guided procedure there was only 1 case of post procedural chest pain (7.2%) which was comparable to other study. Khosla et al documented chest pain in 5% cases post USG guided biopsy.^[22]

Table 2

Procedure	Complication	Number	%
USG GUIDED	Hemoptysis	0	0.0%
	Pneumothorax	0	0.0%
	Chest Pain	1	7.2%
	Nil	13	92.8
CT GUIDED	Hemoptysis	1	2.86%
	Pneumothorax	2	5.71%
	Chest Pain	1	2.86%
	Nil	31	88.57%
Total		49	100.0%

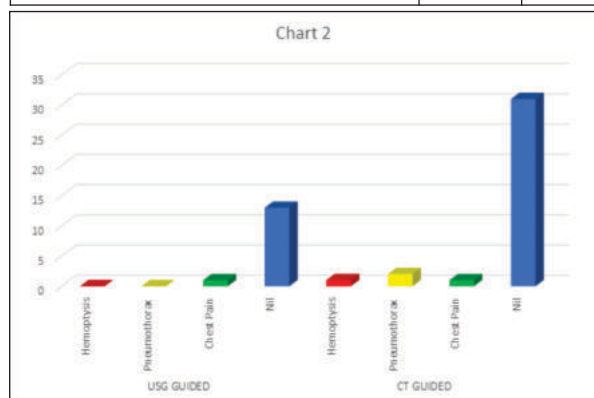


Table and chart 2 showing complications of procedures

CONCLUSIONS:

Both USG guided and CT guided FNAC and Tru cut biopsy are efficient diagnostic procedures for intra-thoracic lesions. USG guided procedures are as good as CT guided procedures for peripheral lung lesions and pleural lesions. Tru cut biopsy procedure is superior to FNAC procedure for definite diagnosis. Complication rate in both the CT and USG guided procedure are very low.

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