Volume-6, Issue-1, January - 2017 • ISSN No 2277 - 8160 IF : 3.62 | IC Value 80.26

Original Research Paper Radiology

–"CT GUIDED FNAC OF CHEST LESIONS"

DR. AMITOJ SINGH	Resident, Department of Radiodiagnosis. M.M. Institute of Medical Sciences and Research, Mullana, Ambala, Haryana, India
DR. HARNEET NARULA	Associate Professor, Department of Radiodiagnosis. M.M. Institute of Medical Sciences and Research, Mullana, Ambala, Haryana, India
DR.AMIT MITTAL	Professor and Head, Department of Radiodiagnosis, Department of Radiodiagnosis. M.M. Institute of Medical Sciences and Research, Mullana, Ambala, Haryana, India
DR.SAMEER SINGHAL	Professor and Head, Department of Respiratory Medicine, MMIMSR,Mullana
DR. ADITI VOHRA	Associate Professor, Department of Radiodiagnosis. M.M. Institute of Medical Sciences and Research, Mullana, Ambala, Haryana, India

ABSTRACT **Aims:** To find out the accuracy, diagnostic efficacy and complications of CT guided FNAC of chest lesions. Material and method: This was a prospective study performed on 50 patients (38 males and 12 females) who presented with respiratory complaints, were found to have lesions on CT chest and underwent a CT guided FNAC. **Results:** In this study 74% of the lesions were malignant and 26% benign, with 30 cases of lung carcinoma, 2metastatic nodal deposits, one germcell tumor, 3 cases of mediastinal lymphoma, one Pleural malignancy, seven Bacterial pneumonia, five tuberculosis, and one Fungal infection. CT proved to be an effective tool to select and guide FNAC procedures and thus give a cytological correlation. Sensitivity and Specificity of malignant and benign diagnosis made on CT was high and came out to be (92%) and (85%) respectively. **Conclusion:** In addition to characterizing the type of thoracic lesion, CT is an important tool in guiding FNAC. CT guided FNAC is relatively safe procedure, especially with development of finer needles.

KEYWORDS : CT, FNAC, biopsy, malignancy

INTRODUCTION:

In the attempt to determine the nature of pulmonary nodule/mass (benign versus malignant), clinical data alone do not allow a definite diagnosis. Therefore, radiological (morphological) evaluation with CT plays an important role in diagnostic algorithm. Characteristics such as lesion size, location, contour, edge and density (with presence or absence of calcifications or fat) are evaluated. Unfortunately none of these features alone helps in establishing benignity or malignancy and significant overlap exists among various lesions. However, specific combinations of features are more likely to be associated with either malignant or benign disease.[1]

Percutaneous transthoracic FNAC/Biopsy is a well established diagnostic method used in the cytological evaluation of thoracic mass lesions for the last three decades. Nowadays, computed tomography (CT) – guided FNAC/Biopsy of lesions of the lung and the mediastinum is widely practiced. This procedure provides a safe, rapid and accurate diagnosis in patients having thoracic mass lesions.[2,3,4]

Technologic advances in both needle design and imaging equipment have broadened the range of lesions that are accessible to needle biopsy. [5]

Moreover, CT- guided FNAC/Biopsy plays an extremely vital role in small thoracic mass lesions and deep mediastinal nodes in which, needle placement is correctly possible by avoiding any surrounding blood vessels and adjacent cardiac structures[6]

Aims: To find out the accuracy, diagnostic efficacy and complications of CT guided FNAC of chest lesions.

Material and methods

The study was conducted in the department of Radiodiagnosis and imaging, Maharishi Markandeshwar Institute of Medical Science and Research Hospital, Mullana Ambala. A total of 50 patients presenting with respiratory complaints, found to have lesions on CT chest underwent a CT guided FNAC. Patients excluded were those with Bleeding diathesis, INR > 1.5, Platelet count <50000, Contralateral pneumonectomy, severe emphysema/bullae vascular structure in anticipated biopsy pathway.

A detailed history and Basic lab investigations like Hb, TLC, DLC, sputum examination, were recorded in all cases. Chest x-ray (PA) view was taken for all cases.

All patients were fasting for 4-6 hours prior to CT examination. Written consent about adverse contrast reactions was taken. Detailed history of previous allergic disorders was taken prior to the contrast injection. Emergency drugs were always available. To reduce the artifacts due to patient motion sedation was given to patients of pediatric age group & uncooperative elderly patients.

Scanning Procedure

CT Scan were done on 64 multidetector CT Ingenuity(Philips Medical Systems). A topogram was followed by few NCCT slices through the area of interest depending upon findings in chest x-ray and topogram. Then CECT area covered was from the apex of the

lung to the dome of the diaphragm and slices were taken with Pitch 0.765,Collimation 64x0.625, 5mm thicknes,5mm increment at 120 KV and 200 MAS , after injecting 80 ml of non ionic contrast(Iohexol,300 mg % Iodine) as a single bolus through i/v line. Reconstructed images were viewed in detail with 2 window settings primarily lung and mediastinal window.

CT guided FNAC was performed in all the patients. The cytologist was consulted prior to performing the FNAC. Informed consent was obtained. A platelet count or Prothrombin (PT) time /International normalized ratio (INR) was performed within 3 days of the scheduled FNAC.

Materials used for FNAC were Xylocaine 2%, Betadine solution, Aspiration set,20 CC syringe10 CC syringe, Lumbar puncture needle No. 20 Slides & fixatives Franzen handle, Sterile gloves, and Spirit as skin disinfectant

FNAC Procedure

The site of the lesion was determined, the shortest route was chosen for passage of needle avoiding vascular structures, tissues and bullae. Whenever vertical pathway to the lesion was not possible, a non vertical approach was taken. The lesion was localized on scan obtained through the lesion at normal end expiration. A grid on the CT Console was superimposed on the image at the level of anticipated needle entry. Once the exact entry site was chosen from the CT image, the point was then located on the patient skin. After cleansing the needle entry site with povidone iodine solution and anaesthetizing the subcutaneous tissue with 2 % solution of xylocaine, a 20 gauge LP needle was introduced. After CT scan confirmation of adequate needle tip position the material was aspirated from the lung nodule or opacity by LP needle and the sample was obtained by creating suction and piercing the lesion repeatedly.

Post FNAC procedure: Chest x-ray / CT images (single expiratory scan through lower chest) were obtained after FNAC to rule out post procedure pneumothorax or hemorrhage.

The diagnosis obtained from cytological analysis was considered specific when it was possible to establish a definitive diagnosis (benign or malignant) with no further examination.

RESULTS

The age ranged from 11 to 88 years with the mean age of 64.5 years, with 38 male and 12 female patients. The majority of patients (70%) presented with cough. Other complaints were of fever, expectoration, hemoptysis, dyspnea etc. On CT, 84% were intrapulmonary lesions, 12% mediastinal and 4% pleural/chest wall lesions. Lesions were central in 34% and peripheral in 28 %. The most common CT finding was mediastinal lymphadenopathy (25 patients). Among the parenchymal findings, mass lesion (n=20) was the commonest findings followed by nodular densities (n=18). Among the pleural pathologies effusions were the most commonly encountered finding (n=18) followed by diffuse pleural thickening (n=8) and pleural cap thickening (n=3). Rib destruction and vertebral destruction were detected in 7 and 6 patients respectively. Provisional diagnosis of benign lesions based on imaging was given in 9 patients (18%), malignant pathology was suspected in 36 patients (72%). The results were equivocal/inconclusive in 5 patients (10%), where the benign/malignant differentiation could not be made. FNAC results are shown in Table 1

TABLE 1- FNAC RESULT (N=50)

FNAC Result	No. of Cases
Benign lesions	13
Malignant lesions	
Bronchogenic ca	(30)
· Sq. cell carcinoma	15
· Adenocarcinoma	13
· Pancoast tumor	2
Mediastinal masses	(6)
· Germ cell tumour	1
	3
· Lymphoma	2
· Metastasis	
Malignant pleural disease	(1)
· Mesothelioma	1
	37

Out of the 9 benign lesions diagnosed on CT, eight turned benign on FNAC. Two of the malignant diagnosed on CT were established as benign on FNAC. Five lesions which remained inconclusive on CT, FNAC provided the final diagnosis with two of them being malignant and rest three being benign. Table 2

Table 2- COMPARISON OF CT WITH FNAC FINDINGS

	CT Diagnosis	FNAC Diagnosis	
		Malignant	Benign
Benign lesions	9	1	8
Malignant lesions	36	34	2
Indeterminate	5	2	3

Sensitivity and Specificity of diagnosis made on CT came out to be (92%) and (85%) respectively on comparison with FNAC diagnosis.

Post procedure 2 patients(4%) developed pneumothorax . In both cases the lesions were situated deep within the thoracic cavity and had surrounding emphysematous lung parenchyma. Patients were treated conservatively with high flow oxygen and improved symptomatically, no obvious need for chest tube insertion was seen. 1 patient developed hemoptysis (2%) which subsided conservatively.

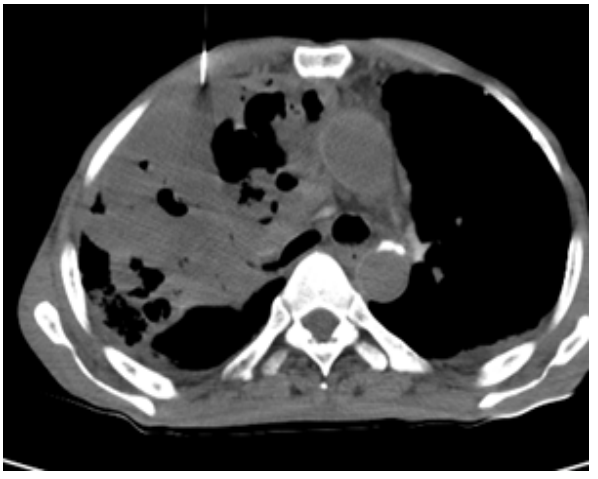

Figure1. Mass like cavitatory consolidation in right upper lobe. Possibility of infective aetiology was given on CT. It proved Squamous Cell Carcinoma on FNAC.

DISCUSSION

With the development of modern sciences, it has become evident that CT is the most sensitive imaging method for detection and evaluation of chest pathologies.

Sensitivity and Specificity of diagnosis made on CT came out to be (92%) and (85%) respectively on comparison with CT guided FNAC diagnosis.

In case of malignancy of the lungs, cytopathological examination of material obtained by CT guided FNAC/Biopsy offers a quick and specific diagnosis which helps clinicians implement appropriate anticancer measures like chemotherapy and radiotherapy. It has also been demonstrated in literature that CT guided FNAC/Biopsy is an accurate and sensitive way of diagnosing malignancy of the lungs.[7,8,9]

Basnet et al, concluded that the diagnostic accuracy of CT guided FNAC was 82%.Sensitivity, specificity, positive and negative predictive value of provisional diagnosis was 88%, 84%, 90% and 81%.[10] In a study by Rangaswamy et al, sensitivity and specificity were 93.33% and 100%, respectively.[11]

The most common complication following FNAC is pneumothorax (4% in our study). Westcott et al contributed that development of pneumothorax after FNAC has been attributed to a number of causes including size of needle used, number of times visceral pleura is punctured and presence of obstructive lung disease. [12] Fish et al found that pneumothorax developed in 46% patients with chronic obstructive airway disease (COPD) and only 19% patients without COPD. Patients in whom pneumothorax developed, no patient without COPD required chest tube compared with 19% patients with COPD. [13]

Low complication rate in our study is attributed to careful manipulation of needle in thoracic cavity, careful selection of patients and size of needle used. Moreover there were only twelve patients with COPD, sample size was small and aerated lung was traversed in only six patients.

Conclusion

CT combined with FNAC suggests with good-reliability the nature of disease, the extent and invasion of the tumor with its cytological type. CT guided FNAC is a relatively safe procedure, especially with the development of finer needles. CT guided FNAC remains the gold standard in indeterminate lesions.

References

1. Shaham D, Guralnik L. The Solitary Pulmonary Nodule: Radiological Considerations. Seminars in Ultrasound, CT and MRI. 2000;21(2):97-115.
2. Stewart CJ, Stewart IS. Immediate assessment of fine needle aspiration cytology of lung. J ClinPathol. 1996;49(10):839-43.
3. Salazar AM, Westcott JL. The role of transthoracic needle biopsy for the diagnosis and staging of lung cancer. Clin Chest Med .1993;14(1):99-110.
4. Sanders C. Transthoracic needle aspiration. Clin Chest Med. 1992;13(1):1-16.
5. Gohari A, Haramati LB. Complications of CT scan-guided lung biopsy: lesion size and depth matter. Chest 2004 ; 126(3):666-68
6. VanSonnenberg E, Casola G, Ho M, Neff CC, Varney RR, Wittich GR, et al. Difficult thoracic lesions: CT- guided biopsy experience in 150 cases. Radiology. 1988;167(2):457-61.
7. Mullan CP, Kelly BE, Ellis PK, Hughes S, Anderson N, McCluggage WG. CT- guided fine--needle aspiration of lung nodules: Effect on outcome of using coaxial technique and immediate cytological evaluation. Ulster Med J. 2004;73(1):32-6.
8. Cox JE, Chiles C, McManus CM, Aquino SL, Choplin RH. Transthoracic Needle Aspiration Biopsy: Variables that affect risk of pneumothorax. Radiology. 1999;212(1):165-68.
9. Ko JP, Shepard JO, Drucker EA, Aquino SL, Sharma A, Sabloff B, et al. Factors influencing pneumothothorax rate at lung biopsy: Are dwell time and angle of pleural puncture contributing factors Radiology. 2001;218(2):491-96.
10. Basnet SB, Thapa GB, Shahi R, Shrestha M, Panth R. Computed Tomography Guided Percutaneous Transt. JNMA J Nepal Med Assoc. 2008;47(171):12horacic Fine Needle Aspiration Cytology in Chest Masses3-27
11. Rangaswamy M, Zacharia T, Krishnamurthy J, Chennakeshaviah G, Manjunath JV. Computed Tomography Guided Fine Needle Aspiration Cytology of Thoracic Lesions. J Cytol. 2012; 29(1):30–4.
12. Westcott JL. Percutaneous transthoracic needle biopsy. Radiology 1988; 169: 593-601.
13. Fish GD, Stanley JH, Miller KS, Schabel SI,Sutherland SE. Post biopsy pneumothorax: estimating the risk by chest radiography & pulmonary function tests. AJR Am J Roentgenol 1988; 150: 71-4.