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Original Research Article

Computed Tomogram Guided Fine Needle Aspiration Cytology of Lung Mass Lesions with Histological Correlation in a Tertiary Care Hospital: A Study in Northern India

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Abstract:

Background: CT guided Fine-needle aspiration cytology (FNAC) is a diagnostic modality which is rapidly emerging for diagnosis of pulmonary mass lesions.

Aims: To assess role of CT-guided FNAC in lung lesions, to know Pathological spectrum of lung lesions, to correlate cytological findings with available histological findings.

Material and Methodology: This was a retrospective study consisting of CT-guided FNAC aspirates of lung lesions of 88 patients conducted in Department of Pathology in tertiary care hospital over the period of 2 years (December 2020- November 2022). Smears were evaluated and broadly categorized into unsatisfactory, benign, suspicious of malignancy and malignant lesion. The cytological diagnosis was compared with subsequent histopathology report.

Results: Total 88 cases of lung mass lesions were included in the present study, out of which 62 were males (70.4%) and the rest 26 were females (29.5%). Radiological findings in patient consolidation was commonest (97%) followed by lung mass (60%) and cavitatory lesion (10%). Cytological diagnosis in malignant category showed maximum number of cases of adenocarcinoma (21.5%) followed by squamous cell carcinoma (14.7%), small cell carcinoma (13.6%), Non-Small Cell NOS (12.5%) and Metastasis (7.9%).

Conclusion: CT guided FNAC of pulmonary masses provides simple, sensitive, and reliable method for reaching rapid diagnosis with minimal complication.

Introduction

Percutaneous transthoracic CT guided fine needle aspiration cytology (FNAC) is one of the diagnostic modalities to assess the nature of lung lesions.[1] Various studies have shown FNAC as an accurate and sensitive method to diagnose lung mass lesions.[2]

FNAC distinguishes between benign and malignant as well as helps in tumor typing.[1] Detection of tumor types like small cell carcinoma and lymphomas helps as these are more appropriately treated by chemotherapy than surgery. Therefore, cytological diagnosis by CT guided FNAC leads to initiation of specific therapy without unnecessary delay.[3]

The present study was conducted to know pathological spectrum of lung lesions, to correlate cytological findings with available histological findings and analyse and compare data with published figures.

Material and Method

The study consists of CT guided FNAC aspirates of lung lesions of 88 patients. This was a retrospective study conducted in Department of Pathology in tertiary care hospital over the period of 2 years (December 2020- November 2022). Patients having radiological detected lung lesion which could be approached by transthoracic route and person who could hold their breath during the procedure were included in the study.

Patients with history of bleeding disorder, severe chronic obstructive pulmonary disease, pulmonary arterial hypertension, uncontrollable coughing, suspected hydatid cyst were excluded from the

study. Patients who did not consent or were uncooperative were also excluded.

CT guided FNAC was performed as an outpatient procedure in the presence of a pathologist, radiologist and clinician after explaining the risks to the patients and taking consent for procedure.

Before performing FNAC clinical history was taken, and clinical examination was done. CT scan was done to establish exact position of lesion and to ascertain that tip was needle was within the mass. FNAC was performed in the pulmonary lesions using a 22-gauge disposable lumbar puncture needle and aspirate was taken. Aspirate was smeared on 5-6 slides. If first aspirate had doubtful adequacy, second aspirate was taken at maximum. Few slides were air-dried and few were fixed in 10% ethyl alcohol. Air-dried smears were stained with Leishman and Gemsia stain, whereas alcohol-fixed smears were stained with conventional Papanicolaou (Pap) stain. ZN stain and PAS stain were done wherever required.

Patients were kept for 2 hours under observation. In our cases chest pain was seen in 3 cases and this was managed conservatively.

Histopathological examination was done of the received biopsies.

Cases were reported as adenocarcinoma, squamous cell carcinoma, non- small cell lung cancer not otherwise specified (NSCLC, NOS), neuro-endocrine tumors, including small cell lung cancer (SCLC), metastasis, lymphoma, benign lesion, granulomatous inflammation or unsatisfactory.

Results

Total 88 cases of lung mass lesions were included in the present study, out of which 62 were males (70.4%) and the rest 26 were females (29.5%) with Male to female ratio as 2.3. Demographic details are given in table 1.

The age of the patients ranged from 29 to 79 years with the mean age of 61.6 years. Cough was the most common symptom (97%) followed by weight loss (86%), fever (41%), shortness of breath (38%), hemoptysis (10%). In the present study, 61 patients (69%) out of 88 patients were smokers. Among all radiological findings in patient consolidation was commonest (97%) followed by lung mass (60%) and cavitary lesion (10%).

Table 1: Demographic description

Subject		Total Number	Percentage
Age of patient			
< 40 yrs		4	4.5
40-50 yrs		11	12.5
51-60 yrs		40	45.4
61-70 yrs		27	30.6
> 71 yrs		6	6.8
Sex			
Male		62	70.4
Female		26	29.5
Side of Lesion			
	Right	48	54.5
	Left	40	45.4

Cytological diagnoses were made into four major categories - unsatisfactory (2.2%), Inflammatory/ Benign (21.5%), suspicious of malignancy (6.8%), and malignancy (69.3%).

Table 2:

Cytological category	Number of Cases	Percentage
Unsatisfactory	2	2.2
Inflammatory	19	21.5
Suspicious for malignancy	6	6.8
Malignancy	61	69.3
Total	88	100

Table 3:

Cytological Diagnosis		Number of Cases	Percentage
Inflammatory/ Benign			
	Granulomatous lesion	12	13.6
	Acute suppurative inflammation	7	7.9
	Tuberculosis	6	6.8
	Aspergillosis	1	1.1
Malignant			
	Adenocarcinoma	19	21.5

	Small Cell Carcinoma	12	13.6
	Non Small Cell Carcinoma NOS	11	12.5
	Squamous Cell Carcinoma	13	14.7
	Metastatic deposits	7	7.9

In our study, cytological diagnosis in malignant category showed maximum number of cases of adenocarcinoma (21.5%) followed by squamous cell carcinoma (14.7%), small cell carcinoma (13.6%), NonSmall Cell NOS (12.5%) and Metastasis (7.9%). In Benign/ Inflammatory category maximum number of cases was of granulomatous inflammation (13.6%).
We used Ziehl-Neelsen stain and periodic acid Schiff stain to confirm tuberculosis and fungal infections respectively. Cytological examination showed 62 cases as malignant and 26 cases as benign. Provisional diagnosis on radiological examination was 74 cases as malignant and 14 cases as benign. Histological examination was done in received biopsies.

All the cases corroborated histopathologically except one case of cytologically diagnosed squamous cell carcinoma, which later proved to be an adenosquamous carcinoma.

Out of 11 cases of non-small cell carcinoma, we received biopsies of 7 cases 4 cases were diagnosed histopathologically as poorly differentiated adenocarcinoma, 2 cases as high grade squamous cell carcinoma and 1 case as adenosquamous carcinoma.

Discussion

FNAC is of benefit to patients as it helps to differentiate between small cell and non- small cell carcinoma of the lung, which is possible in more than 95% of cases diagnosed by FNAC[6]. CT guided FNAC is a less invasive procedure and avoids surgical intervention [7].

Evolution of highly sophisticated radiologic imaging techniques makes possible the precise visualization and localization of masses in the lungs. Among the other imaging modalities, CT is the most popular [4].

Mukherjee et al. carried out their study on solitary pulmonary nodules and found most of the patients of malignant lesions (76%) and most were males (85%) similar to our study in which 69.3% cases were malignant with predominance of males. [5]

Our study showed malignant lesion as adenocarcinoma as most common malignant lesion which was similar to the study of Stewart et aland Tan et al. [6]

Gangopadhyay et al. observed 96% sensitivity and 100% specificity in diagnosing lung tumors by CT-guided FNAC. Adenocarcinoma (54.2%) was the most common malignant tumor in their study group. [7]

Mondal et al. compared the findings of CT guided FNAC of Lung mass lesions and subsequent histopathological diagnosis. They observed almost perfect agreement between cytological and histological diagnosis and moderate agreement between radiological and histological diagnosis. [8]

There were some discrepancies between histological diagnosis and cytological diagnosis. To improve diagnostic accuracy of FNAC, especially in poorly differentiated and doubtful tumors, it might be useful to integrate morphology with validated ancillary techniques, like immune -cytochemistry.

Conclusion

CT guided FNAC is a simple, safe, minimally invasive and reliable procedure with good diagnostic accuracy for the diagnosis of lung mass lesions.

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