Original Research

Computed tomography guided fine needle aspiration cytology of lung mass with histological correlation: A study in Rajasthan

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Received: 12 March, 2023 Accepted: 2 April, 2023 Published: 20 April, 2023

Abstract

Introduction: Fine needle aspiration cytology (FNAC) is a diagnostic modality which is simple, rapid and relatively safe. It is used to assess the nature of pulmonary lung lesion particularly with the help of Computer tomography (CT) scan. The present study was conducted to know spectrum of lung lesions, to correlate cytological findings with histological findings and analyse and compare data with published data

Method: The study consists of CT guided FNAC aspirates of lung lesions of 56 patients. This was a retrospective study conducted in department of Pathology in National Institute of Medical sciences and research, Jaipur, Rajasthan over the period of 1 years(December 2021- November 2022).

Result: Cytological diagnosis were made into four major categories - unsatisfactory (3.57 %), Inflammatory/ Benign (25.9%) and malignancy (74.1%). Cytological examination showed 41 cases as malignant and 15 cases as benign.

Histological examination was done On received biopsies.

All the cases corroborated histopathologically except one case which was diagnosed as squamous cell carcinoma on cytology, was later proved to be an adenosquamous carcinoma.

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

Conclusion: Computed tomography guided FNAC is a safe, simple, minimally invasive and reliable procedure with more diagnostic accuracy for the diagnosis and subtyping of lung mass lesions. It also avoids unnecessary thoracotomy for diagnostic procedure

Keywords – FNAC, Histological correlation, Lung mass, Cytology

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Introduction:

Fine needle aspiration cytology (FNAC) is a diagnostic modality which is simple, rapid and relatively safe. It is used to assess the nature of pulmonary lung lesions particularly with the help of Computer tomography (CT) scan.

FNAC was first used as diagnostic tool by Martin and ELLIS.¹ In 1986 Menbriel introduced this technique as diagnostic lung puncture for detection of infection, benign and malignant conditions of lung.²

FNAC distinguishes between benign and malignant as well as helps in tumor typing of lung lesions. It helps in detecting lymphomas and small cell carcinoma which are more appropriately treated with chemotherapy then surgery Therefore cytological diagnosis by CT guided FNAC leads to initiation of specific therapy without unnecessary delay.^{3,4} The present study was conducted to know spectrum of lung lesions, to correlate cytological findings with histological findings and analyse and compare data with published data.

Material and Method:

The study consists of CT guided FNAC aspirates of lung lesions of 56 patients. This was a retrospective study conducted in department of Pathology in National Institute of Medical sciences and research, Jaipur, Rajasthan over the period of 1 years(December 2021- November 2022). Inclusion criteria-Patients having radiological detected lung lesion which could be approached by transthoracic route and person who could hold their breath during the procedure. Exclusion criteria- Patients with history of bleeding disorder, severe chronic obstructive pulmonary disease, pulmonary arterial hypertension, uncontrollable coughing, suspected hydatid cyst, who did not consent or were uncooperative.

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

Before performing FNAC clinical history was taken and clinical examination was done. CT scan was done to establish exact position of lesion and to be certain that needle tip was inserted within the mass. FNAC was performed in the pulmonary lesions by using a 22-gauge disposable lumbar puncture needle and aspirate was taken. Aspirate was smeared on few 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. Airdried slides smear were stained with Leishman and Gemsia stain, whereas alcohol-fixed slide smears were stained with conventional Papanicolaou (Pap) stain. Special stain like 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 1 case and this was managed conservatively. Histopathological examination was done on the received biopsies.

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

Results:

Total 56 cases of lung mass lesions were included in the present study, out of which 40 were males (71.5%) and the rest 16 were females (28.5%) with Male to female ratio as 2.5. Demographic details are given in table 1.

The age of the patients ranged from 30-80 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 cavity lesion (10%).

| Subject | | Total Number | Percentage |
|----------------|-------|--------------|------------|
| Age of patient | | | |
| < 40 yrs | | 3 | 5.3 |
| 40-50 yrs | | 7 | 12.5 |
| 51-60 yrs | | 25 | 44.9 |
| 61-70 yrs | | 17 | 30.4 |
| > 71 yrs | | 4 | 7.1 |
| Sex | | | |
| Male | | 40 | 71.4 |
| Female | | 16 | 28.6 |
| Side of Lesion | | | |
| | Right | 31 | 55.3 |
| | Left | 25 | 44.6 |
| Total | | 56 | |

Demographic description

Cytological diagnosis were made into four major categories - unsatisfactory (3.57 %), Inflammatory/ Benign (21.4%), suspicious of malignancy (7.1 %), and malignancy (67.93%).

| Cytological category | Number of Cases | Percentage |
|---------------------------|-----------------|------------|
| Unsatisfactory | 2 | 3.57 |
| Inflammatory/ Benign | 12 | 21.4 |
| Suspicious for malignancy | 4 | 7.1 |
| Malignancy | 38 | 67.93 |
| Total | 56 | 100 |

| Cytological Diagnosis | | Number of Cases | Percentage |
|-----------------------|--------------------------|-----------------|------------|
| Inflammatory/ Benign | | | |
| | Granulomatous lesion | 6 | 10.7 |
| | Acute suppurative | 4 | 7.1 |
| | inflammation | | |
| | Tuberculosis | 4 | 7.1 |
| | Aspergillosis | 1 | 1 |
| Malignant | | | |
| | Adenocarcinoma | 12 | 22 |
| | Small Cell Carcinoma | 8 | 14.2 |
| | Non Small Cell Carcinoma | 7 | 12.5 |
| | NOS (Not otherwise | | |
| | specified) | | |
| | Squamous Cell Carcinoma | 9 | 16.0 |
| | Metastatic deposit | 5 | 9 |
| Total | | 56 | 100 |



Fig 1: 400X -Cytology smear showing ill formed granuloma- Epithelioid granuloma



Fig 2; 400X – Cytology smear showing clusters of epithelial cells arranged in acini. Cells have prominent nucleoli suggestive of Adenocarcinoma

In our study, cytological diagnosis in malignant category showed maximum number of cases of adenocarcinoma (22%) followed by squamous cell carcinoma (16%), small cell carcinoma (14.2%), Non Small Cell NOS(12.5%) and Metastasis(9%). In Benign/ Inflammatory category maximum number of cases were of granulomatous inflammation(10.7%).

Ziehl-Neelsen stain and periodic acid Schiff stain were used to confirm tuberculosis and fungal infections respectively.

Cytological examination showed 41 cases as malignant and 15 cases as benign. Provisional diagnosis on radiological examination was 51 cases as malignant and 5 cases as benign.

Histological examination was done in received biopsies.

All the cases corroborated histopathologically except one case was diagnosed as squamous cell carcinoma, later proved to be an adenosquamous carcinoma on biopsy.

Out of 7 cases of non-small cell carcinoma, we received biopsies of 4 cases only. On histopathology1 cases was diagnosed as poorly differentiated adenocarcinoma, 2 cases as high grade squamous cell carcinoma and 1 case as adenosquamous carcinoma.

Discussion:

Fine needle aspiration cytology (FNAC) is usually applied to localized lesions of lung. FNAC helps in

differentiating between benign,malignancy (small cell and non- small cell carcinoma of the lung) and infections like Tuberculosis⁵, which is possible in more than 95% of cases diagnosed by FNAC. CT guided FNAC is a less invasive procedure and also avoids surgical intervention.

We included 56 cases , out of which 15 (25.9 %) were benign and 41 (73.7 %) were malignant. The reason for high malignancy cases may be due to increase incidence of malignancy as FNAC was mainly used for diagnosis for neoplasm.Mukherjee et al.⁶carried 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 72.7 % cases were malignant with predominance of males (71.4%).

Our study showed malignant lesion as a denocarcinoma (22 %) as most commonlesion which was similar to Tan et al^7 study.

Various studies reveal 70% of lung cancers are diagnosed as non-small cell carcinomas, and 20% as Small cell carcinomas.in our study also we found the same pattern i.e. 50.5 % of the cases were diagnosed as non small cell carcinoma and 14% were small cell carcinomas.⁸Gangopadhyay et al⁵. 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.

Mondal et al.⁹ 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.

There are no definite cytological criteria for differentiating primary or secondary adenocarcinomas, but there are features indicative of a particular organ of origins.¹⁰

All cases included in this study were adults. The peak age of incidence were 51-60 years (44.9%), which is similar to other studies.^{5,11,12,13}

There were some discrepancies between histological diagnosis and cytological diagnosis, but almost 95% cases were accurately diagnosed with FNAC which is similar to various studies.^{14,15} 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 immunocytochemistry.

Conclusion:

Computed tomography guided FNAC is a safe, simple, minimally invasive and reliable procedure with more diagnostic accuracy for the diagnosis and subtyping of lung mass lesions. It also avoids unnecessary thoracotomy for diagnostic procedure.

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