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DIAGNOSTIC UTILITY OF COMPUTED TOMOGRAPHY GUIDED FINE NEEDLE ASPIRATION CYTOLOGY IN LUNG LESIONS.

Pathology

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ABSTRACT

Introduction: Lung is a common site for many infectious, benign and malignant lesions and they can be accurately diagnosed using CT guided FNAC. It is not only complement the tissue biopsies in the diagnosis of lung lesion, but also comparable. Moreover, it is safer, economical and provides quick results and patient can get relived from apprehension in a case of non malignant lesion.

Aims & Objectives: 1. To study the spectrum of cytomorphology of the lung lesions 2. Toevaluate the effectiveness of CT-guided FNAC in the diagnosis of lung lesions.

Material and methods: A cross-sectional and observational study was carried out over a period of one year in the Department of Pathology, NRS Medical College, and Kolkata. It involved 97 patients who had undergone CT guided FNAC for lung lesions and the cytology smears were stained with MGG stain and Pap stain. The cytological diagnosis was compared with subsequent histopathology report of 78 cases .Results were analyzed using standard statistical formula.

Results: Among the study population , 74.2% were males. 46.4% were in the age group of 61-70 years . Cough was the most common presenting symptom (36.08%); Mass lesion (55%) was the most common radiological findings . Among72 malignant lesions, adenocarcinoma was the most common malignancy(43.29 %), In 78 cases histological reports were compared with cytology which had 97.50% sensitivity,98.75% specificity, 98.73% positive predictive value , 97.53% negative predictive value and 98.12% accuracy for CT guided FNAC as a diagnostic procedure and Fleiss Kappa coefficient is 0.48. between cytology and histology. **Conclusion:** CT guided FNAC is a safe, effective , relatively simple procedure with a good sensitivity, specificity, high accuracy rate and moderately fair agreement with biopsy in diagnosing pulmonary lesions .

KEYWORDS

Computed tomography scan, Fine needle aspiration cytology, lung lesions.

INTRODUCTION:

Among the various lung lesions-the most ominous one is Lung cancer which accounts 17.8% of all cancer deaths worldwide[1]. Early diagnosis of lung cancer plays a pivotal role in reducing lung cancer death rate. Recent developments in molecular study of lung cancer along with subsequent targeted therapy have given us a new ray of hope[2]. Understanding this new concept, lung cancer diagnosis in cytology and small biopsies, become utmost important to facilitate early management. With the advent of Computed Tomography (CT) scan, CTguided FNAC has become a very useful diagnostic modality because of real time visualization of the approaching needle and the target lesion .As lung is a very common site for various infectious lesions and sometimes it is very difficult radiologically to differentiate these lesions from neoplastic one. Where CTguided FNAC plays a prime role in rapid diagnosis of these lesions with quick amelioration of apprehension of patients and prevention of surgical intervention. Its use has been extended in categorizing lung malignancy into different cytopathological types, which aids in proper management of the patients.[3] It has become an established diagnostic procedure with excellent results worldwide and although pneumothorax is the most common complication it can be readily managed.[4]

AIMS AND OBJECTIVES :

1. To study the spectrum of cytomorphology of the lung lesions
2. To evaluate the effectiveness of CT-guided FNAC in the diagnosis of lung lesions.

MATERIALS AND METHODS:

This cross-sectional and observational study was conducted in the Department of Pathology in association with Department of Respiratory medicine NRS Medical College and hospital, Kolkata .A total of 97 thermodynamically stable patients having pulmonary lesions, underwent CT-guided fine needle aspiration during the study period of 1 year (01.07.2018-30.04.2019) were included in our study. Patients other than primary lung malignancy were excluded from the study. After taking detailed clinical history, radiological information and proper informed consent FNAC was performed from the pulmonary lesions using a 22-gauge spinocan needle .The smears were stained with the Papanicolaou stain after wet fixation and May-Grunwald-Giemsa (MGG) stain following dry fixation. Histopathology confirmation was done in 78 cases. The tissues were processed as per standard procedure and stained with hematoxylin and eosin (H&E).results was analyzed using standard statistical formula.

RESULTS:

A total of 97 cases of pulmonary lesions were included in the present study, of which 72 were males (74.2%) and the rest 25 were females (25.8%).male female ratio is 3:1. The age of the patients range from 31 to 78 years. The majority of the patients 45(46.4%) were in the age group of 61-70 years. About 54 (55.7%) lesions were localized in the left lung and 43 (44.3%) in the right. As per as the presenting symptoms were concerned, cough was the most common respiratory symptoms (36.08%) followed by weight loss, fever, dyspnea, hemoptysis and chest pain. Mass lesion(55%) was the most common radiological findings in our study and most of the inflammatory lesion presented with consolidation(16%).Other findings were mass with collapse&consolidation and mass with pleural effusion. Cytological diagnoses were broadly classified into 4 groups–1. **inconclusive** 6(6.2%) 2. **inflammatory** lesions 16(16.5%), 3.**benign** lesions 3(3.1%). and 4.**Malignant** lesions 72(74.2%). Among the inflammatory lesions, maximum cases belong to chronic nonspecific inflammation 8(8.24%) followed by tuberculosis 4(4.12%), abscess 3(3.09%)and Aspergillosis 1(1.03%) respectively. 3 benign lesions include 2(2-06%)carcinoid tumor and 1(1-03%) pulmonary hamartoma.

Among72 malignant lesions, adenocarcinoma was the most common malignancy42(43.29%) followed by squamous cell carcinoma17(17.52%) , small cell carcinoma 10(10.30%), adeno-squamous carcinoma 1(1.38%), neuroendocrine carcinoma 1(1.38%), adenoid cystic carcinoma 1(1.38%),large cell carcinoma 1 (1.38%)respectively.[Table-1]

Out of total 97 cases, 78 cases which include 3benign lesions,72 malignant lesions and 3 radiologically suspected lesion but cytologically diagnosed as inflammatory condition were undergone surgical intervention and histologically evaluated . 3 benign lesions in cytology, histological also prove as benign .Among 72 malignant cases, only one case was misinterpreted as malignancy by cytology, which was reactive atypia (1false positive case).out of 3 resected inflammatory lesion ,2 cases were diagnosed as malignancy which were missed at cytology,(2 false negative cases) 1case was diagnosed as inflammation in histology also. So the final diagnosis after histology- 2 inflammatory lesions, 3 benign lesions ,73 malignant lesions.[Table-2]

Hence there were 97.50%**sensitiovity**, 98.75%**specificity**, 98.73%, **positive predictive value**, 97.53% **negative predictive value**, 98.12% **accuracy** for CT guided FNAC as diagnostic procedure.

Fleiss Kappa coefficient=0.48.So,the agreement in terms of diagnostic procedure between, cytology and histology is **moderately fair**.

Table no 1: Distribution of Cytomorphological diagnosis of pulmonary mass lesions (n=97)

Cytological Diagnosis	Subtype	No of Cases	Percentage
A. Inconclusive		06	6.2
B. Inflammatory lesions		16	16.5
1.	Chronic non specific inflammation	08	8.24
2	Tuberculosis	04	4.12
3	Abcess(acute inflammation)	03	3.09
4.	Aspergillosis	01	1.03
C. Benign lesions		03	3.09%
1.	Carcinoid	02	2.06
2.	Pulmonary Hamartoma	01	1.03
D. Malignant lesions		72	74.3%
1	Adenocarcinoma	42	43.29
2	Squamous cell carcinoma	17	17.52
3	Small cell carcinoma	10	10.30
4	Adeno squamous Carcinoma	01	1.03
5	Adenoid Cystic Carcinoma	01	1.03
6	Large cell Carcinoma	01	1.03

Table No. 2: Distribution of lung lesions according to Cytology and Histology

Category	Cytological Diagnosis	Histological Diagonosis
Inflammatory lesions	03	02
Benign lesions	03	03
Malignant lesions	72	73
Total	78	78

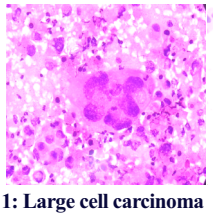

Figure 1: Large cell carcinoma lung in CT guided FNAC(H&E, 400 X)

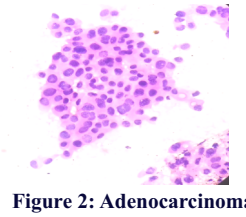

Figure 2: Adenocarcinoma lung in CT guided FNAC(H&E, 400 X)

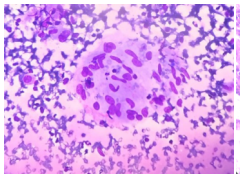

Figure 3: Tuberculous inflammation in CT guided FNAC(H&E,400X)

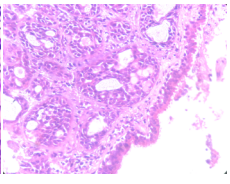

Figure 4: Adenoid cystic carcinoma lung in histology(H&E, 100 X)

DISCUSSION:

A variety of benign and malignant lesions can occur in the lung.[5]Pulmonary tissue records the highest incidence of invasive cancer in both males and females as per WHO.[6]CT guided FNAC of lung was first described in 1976[7] In diffuse parenchymal lung disease the role of FNAC is limited. FNAC plays an important part in the diagnosis of localized lung lesion[3]FNAC of these lesions can differentiate between benign and malignant lesions and also the small cell carcinoma of the lung from non small cell carcinoma of the lung which helps in early initiation of the treatment and avoid more invasive surgeries in maximum number of cases specially in patients with inoperable lesions due to patient's general condition and local factors[8]
We have seen one false positive case in our study. False positives in cytology can be reported due to cellular changes in chronic inflammatory disorders such as pneumonia (atypical histiocytes), TB, bronchiectasis, (misinterpretation of cuboidal epithelial cells as small cell carcinoma), squamous metaplasia, and alveolar cell polymorphism in lung fibrosis. False positive have very unfortunate consequences for patients; therefore, some advice "underreporting" instead of "over reporting" of suspicious cases[9]The reasons of false negatives could have been due to superadded inflammation, nonrepresentative material, or hypocellular aspirate [10].In our study two false negative cases in cytology were identified after histology.

Mukherjee et al[11] did their study on solitary pulmonary nodules and found most of the patients of malignant lesions (76%) were in the age group of 40-70 years and most were males (85%). They noticed 97.7%sensitivity and 100% specificity for CT-guided FNAC as a diagnostic procedure. These findings are comparable with our study except we have got one false positive case. Gangopadhyay et al.[12] 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,just like our findings. Kouli at al[4]found in their study that majority (77.6%) of the patients were male. The diagnostic accuracy of the procedure was 77.59%. 82.2% cases were malignant in their study. Findings are similar to ours.But Squamous cell carcinoma was the commonest malignancy (56.7%) intheir study. We got Adenocarcinoma as most common malignancy. Sengupta et al[13]also showed male predominance in lung lesion and same type of age distribution Maximum cases of benign lesions were chronic non-specific inflammation like our study. Regarding the malignant categories, non-small cell carcinoma, not otherwise specified (NOS) (13.5%; 10 cases) was the most common malignancy followed by adenocarcinoma im their study. Recently Pradhan et al[14]found sensitivity and diagnostic accuracy of CT guided FNA are84.6%and 85.18% respect tively. Gadodiya at al[15]did CT guided FNA on lung and mediastinal mass.they found Adenocarcinoma was the most common type of lung malignancy and Inflammatory lesions were seen in 13 cases. Granulomatous lesions were found in six patients. .We observed good similarities with our study. Mondal et al[3]compared the findings of CTguided FNAC of pulmonary mass lesions and subsequent histopathological diagnosis. They observed almost perfect agreement between cytological and histological diagnosis.We got moderately fair agreement.

CONCLUSION:

Based on our study findings, it may be concluded that CT guided FNAC is a safe, effective and relatively simple procedure with a good sensitivity, specificity and a high accuracy rate in diagnosing pulmonary mass lesion and morphological typing. We can say that CT guided FNAC not only complement, but in future it may replace small biopsies in the diagnosis of lung cancer. Further cytological sample of CT guided FNAC may be used for cell block preparation with subsequent immunohistochemistry(IHC) examination facilitating targeted therapy, thereby improving prognosis of a lethal malignancy.

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