Role of image-guided fine needle aspiration cytology of lung lesions in diagnosis and primary care of patients: Experience in a Government Medical College of Eastern India

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ABSTRACT

Context: Lung cancer is the most common cancer affecting males worldwide. Its incidence in females is also on an increasing trend. Other conditions affecting lung-like tuberculosis are on a rise in middle-east countries due to overcrowding and poor living conditions. In developing countries, image-guided fine-needle aspiration cytology (FNAC) of lung lesions is a cost-effective method for early detection and apt treatment of patients by physicians. Aim: The main aim of this study is to identify the importance of computed tomography (CT) guided FNAC as an accurate and cost-effective tool in early diagnosis of lung lesions. Settings and Design: It was prospective and retrospective study done in a government medical college of West Bengal, India. Material and Methods: Over a period of two years, 42 cases were included in the study. These were further subjected to evaluation of pulmonary mass lesions by CT guided transthoracic fine needle aspiration cytology. Results: Out of these 42 cases majority were males with cough being most common clinical presentation. On CT guided FNAC of pulmonary lesions 69% of cases were malignant. Cytoradiological correlation in this study was 90.4%. Conclusion: CT guided FNAC of lung lesions is an accurate, cost effective and quick technique for early diagnosis, referral and appropriate treatment of patients in developing countries.

Keywords: CT-guided FNAC, lung lesion

Introduction

Guided fine-needle aspiration cytology (FNAC) is often an effective and safe way to obtain the diagnostic material of lesions located in lung. FNAC plays an integral part in recognizing benign and malignant lesions and aids in typing of lung cancers so as to start particular treatment like chemotherapy or surgery immediately.⁴ Due to its high diagnostic accuracy rate along with simpler methods to treat its complications like pneumothorax, it has gained popularity among physicians, radiologists and pathologists.⁵ The entire process involves teamwork approach. The presence of pathological staff at the time of procedure may increase the overall sensitivity and accuracy of tumor typing by reducing the number of needle passes and thereby easing patient pain or trauma. The whole process is waste if proper processing of the aspirated material is not done.⁴,⁶

With the modern day technique, there is decline in complication rate. The most common complications encountered are pain, hemorrhage, nausea, and vomiting. However, due to cost effectiveness and less-time consumption, these procedures are increasing in trends.⁶ The purpose of this study was to

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assess the utility of cytological method assisted by radiological technique in diagnosing lung lesions. Our objectives were to study the cytomorphological features and to classify them as benign, malignant, suspicious, and inflammatory and to assess the clinicoradiological correlation with computed tomographic (CT)-guided FNAC of different lung lesions for any early detection and treatment.

Materials and Methods

A prospective and retrospective study was undertaken involving 42 patients who underwent CT-guided transthoracic fine needle aspiration from pulmonary mass lesions at tertiary care center between January 2017 and January 2019. Date of approval of ethics committee: 28-07-17. Detailed clinical and radiological data were obtained and noted. Informed consent from each patient was taken after explaining risks and benefits. The exact location of the lesion was determined by CT scan and 22-gauge lumbar puncture needle was used to perform FNAC. The smears were stained with May Grunwald Giemsa (MGG) following dry fixation and hematoxylin and eosin following wet fixation. All the patients were kept under observation for 2 hours; and a repeat scan was done if indicated in case any complication developed. The smears were then examined under microscope and cytological diagnosis was made.

Results

A total number of 42 cases were included in the study, of which 30 (71.5%) were male and the rest 12 (28.5%) were female. The age range was from 27 to 88 years with mean age of 58.36 years. Maximum number of cases included were in the sixth and seventh decade. Cough was the most common clinical presentation followed by weight loss. We also observed the right lung was more frequently affected than the left lung.

Radiologically, we observed that space occupying lesion (SOL) was present in 42.86% of cases followed by consolidation and fibrotic nodule in 14.29% cases each [Table 1]. The results were then classified into following categories: 1) Benign specific, 2) Benign non-specific, 3) Malignant, 4) Suspicious, 5) Inflammatory, 6) Inadequate [Table 2].

Cytological diagnosis on CT-guided FNAC showed 8 (19.04%) cases with benign pathology, all of which were inflammatory in nature and 29 (69%) cases to have malignancy while results were inconclusive in 2 cases.

In the benign specific (n = 4), all 4 cases showed granulomas with background necrotic material. They showed acid-fast bacilli (AFB) with Ziehl–Neelsen stain. The benign non-specific group (n = 4), included abscess and chronic non-specific inflammation in 2 cases each, respectively. Out of 29 malignant cases, the most common carcinoma as diagnosed by cytology was squamous cell carcinoma accounting for 12 (41.3%) cases, followed by adenocarcinoma in 8 (27.5%) cases [Table 3]. Three cases that were reported as suspicious for malignancy were due to paucicellularity. These cases could not be further subtyped; however, they had a strong clinical and radiological suspicion and hence were kept in a suspicion category. Out of 27 FNAC proven malignant cases, 20 were males and 7 were females. Hence, there was a significant male preponderance with male to female ratio of 2.8:1.

Cytoradiological correlation in this study was found to be 90.4%. In 4 out of 42 cases, discrepancy was noted. Out of 4 cases, 2 cases had an inadequate material and other 2 cases were misdiagnosed as malignant on radiology.

Discussion

Radiologically assisted cytology of lung lesion is not only minimally invasive but is also economical for developing countries and associated with low morbidity. It is a simple way to obtain cellular material for a quick and accurate diagnosis. The main purpose of guided FNAC is to diagnose malignancy for an early treatment, although it can also be used for benign neoplasm and infective condition such as Koch’s. In this study, male preponderance was noted over female with ratio of 2.5:1. Among the FNAC proven cases of malignancy, this
difference was even evident with male to female ratio of 2.8:1. This difference is mainly due to higher incidence of predisposing factors like chronic obstructive pulmonary disease (COPD), smoking, alcoholism in males. The mean age in this study was 58.6 years, which was similar to study done by other authors.[7,8]

Out of 42 cases, 19% were inflammatory or benign conditions and 69.04% were malignant pathology. Our findings were similar to study done by other authors.[7,8] The higher percentage of malignant lesion in this study and in other studies is probably due to treatment of inflammatory condition by antibiotics whereas malignant and tubercular cases are non-responsive to antibiotics and have chronic symptoms that comes to diagnosis by CT-guided FNAC.

In the present study, 79.5% of cases were diagnosed as non-small cell carcinoma, whereas small cell carcinoma were 21% of primary lung lesion. This is in coordination with other studies who have reported an incidence of 84% and 12% in non-small cell carcinoma and small cell carcinomas.[6] The incidence of squamous cell carcinoma [Figure 1] was higher than adenocarcinoma [Figure 2] on subtyping the non-small cell carcinoma. This was in concordance with the study done by Ahmed et al.[9] Squamous cell carcinoma among our patients can be explained due to higher prevalence of smoking in our patient group with male preponderance. However, in the study by other researchers, adenocarcinoma has overtaken squamous cell carcinoma as leading primary malignant neoplasm, which is also a current global trend.[6]

Small cell carcinoma is known to be aggressive tumor of common subtypes. Cytological diagnosis plays very crucial role in its management. In our series, 6 cases were diagnosed as small cell carcinoma by cytological examination and they responded well to treatment. Two cases were diagnosed as undifferentiated large cell carcinoma [Figure 3] in this study. As immunocytochemical study was not done, both these cases were diagnosed with no further subtyping.

An attempt to assess the degree of agreement between cytological and radiological findings was made. It was found to be 95.2% in this study. In 2 cases of cytoradiological discrepancy that were reported as malignant on radiology turned out to be granulomatous inflammatory Koch’s pathology [Figure 4] on cytology.

Figure 1: Photomicrograph showing cytological features suggestive of Squamous cell carcinoma (MGG stain, ×400 magnification)

Figure 2: Photomicrograph showing cytological features suggestive of adenocarcinoma displaying acini (MGG stain, 400 × magnification)

Figure 3: Photomicrograph of granulomatous lesion displaying epithelioid cell granulomas and giant cells (MGG stain, 400 × magnification)

Figure 4: Photomicrograph showing cytological features of large cell undifferentiated carcinoma (MGG stain, 400 × magnification)
Conclusions
This study thus concludes that CT-guided FNAC of lung lesion is accurate, cost-effective technique leading to quick and early diagnosis. Combined with CT guidance, good diagnostic material is yielded for cytological examination. This helps in early diagnosis and subclassification of malignant lesions in developing countries having extreme disease burden and resource shortage thereby avoiding more costly and invasive surgical procedures hence assisting family physicians for early management and avoidance of the complications associated with invasive procedures.

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Declaration of patient consent
The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest
There are no conflicts of interest.

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