Role of Computed Tomography in Fine Needle Aspiration Cytology of Thoracic Mass lesions

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Abstract
Fine needle aspiration cytology (FNAC) under the guidance of Computed Tomography (CT) for evaluation of thoracic mass lesions has been found to be a safe, rapid and fairly accurate procedure. To evaluate the role of CT guided FNAC in thoracic mass lesions, to analyze the observations and to compare our results with other studies. One hundred and seventy one patients having thoracic masses were studied for a period of four years for age, sex, topographic distribution of the mass lesions and the cytological diagnosis. Out of the 171 cases, 130 were males (76.02%) and 41 were females (23.97%). Age range varied from 30 to 75 years, with a peak in 6th decade. 150 were lung masses, 12 were mediastinal masses and one case was pleura based mesothelioma. In 8 cases no definite diagnosis could be made. Commonest primary Lung tumour found was squamous cell carcinoma (64.28%), followed by small cell carcinoma (21.42%) and adenocarcinoma (10.71%). Metastatic lung tumor was seen in 3.57% cases. Amongst the 12 mediastinal mass, 6 cases were of NHL, 3 lipomas, 1 thymoma, 1 thymic cyst and 1 ganglioneuroblastoma. One patient had post procedural hemoptysis while another had pneumothorax for which a chest tube had to be put in place. CT guided FNAC of the thoracic masses is a safe diagnostic procedure with minimal complications. It helps in providing definitive cytological diagnosis in majority of cases.

Key Words
Computed Tomography, FNAC, Thoracic masses

Introduction
The diagnostic evaluation of thoracic mass lesions by transthoracic FNA has been in use for almost 2 to 3 decades. However CT guided FNA is nowadays being commonly performed in those centers where the cytopathology and latest imaging techniques are available. This procedure is safe and in expert hands helps in providing rapid and accurate diagnosis in patients having thoracic mass lesions. (1, 2) Also, the image guided FNA helps in reaching the deep seated lesions in thorax without causing any damage to the surrounding viscera and vascular structures (3, 4). Wallace et al. (5) in their study have shown that CT guided FNA of small thoracic mass lesions (<1cm) can provide a high diagnostic accuracy rate approaching those of larger lesions. In lung cancer, examination of CT guided FNA material offers a quick and specific diagnosis, thereby helping the clinicians to start measures like radiations and chemotherapy (6). On the contrary very few post procedural complications like pneumothorax, pulmonary hemorrhage and hemoptysis have been seen in some cases (7). Contraindications for the procedure include bleeding diathesis, pulmonary artery hypertension and the obstructive airway lung disease (8). Aim of our study was to analyze the age, sex, size, topographic distribution and cytological diagnosis of thoracic mass lesions by CT guided FNAC.

Material and Methods
Present study included 171 cases of thoracic mass lesions suspected to be of neoplastic nature by routine chest X- rays and CT scans. CT guided FNA was performed on the lung and mediastinal mass lesions under all aseptic precautions by using a 21 G, 88mm long spinal needle. Before aspiration, exact localization of the lesions and measurement of distance between the skin surface and lesion were done along with a slice of CT scan to see if needle tip was within the lesion or not. The aspirated material was immediately spread on the
slides. Alcohol fixed smears were stained with PAP stain while air dried smears were stained with May-Grunwald-Geimsa.

Repeat CT scan had to be done in one patient who suffered from pneumothorax and chest tube drainage was put in place.

**Results**

Out of the 171 cases in the present study, 130 (76.02%) were males and 41 (23.97%) were females. The oldest patient was a female aged 75 years while the youngest patient was a male aged 30 years. Overall mean age of all patients was 59.4 years. Parenchymal lung lesions consisting of 150 cases constituted a majority of the lesions (87.72%), while mediastinal masses constituted 7.01% of all cases. Of the 150 lung masses, 90 were found in the left lung and 60 were seen in right lung. Overall, 88 cases (51.46%) were situated in upper zone, 45 cases (26.31%) were in parahilar region, 10 cases (5.8%) were in lower zone, 2 cases involved upper and mid zones (1.16%) while in 5 cases entire lung showed tumor infiltration (2.92%).

As per the CT findings the size of the lung lesions varied from 2.5 to 14.8 cm, while the mediastinal masses varied from 6.0 to 12.0 cm in size. Amongst the lung masses, pleural infiltration was seen in 13 cases.

Out of the 171 cases included, a definitive cytological diagnosis was obtained in 163 cases. In remaining 8 cases, no definite diagnosis could be made and only a descriptive report was provided.

Amongst the 163 cases diagnosed cytologically, 140 were lung tumours, 12 were mediastinal masses and one case was pleura based mesothelioma (Fig 4). 10 cases showed granulomatous inflammation which was consistent with tuberculosis. Majority of the small cell carcinomas (n=30) and squamous cell carcinoma (n=90) in the present study were centrally located lesions, though in some larger tumours peripheral dissemination was also noticed. Of 15 adenocarcinomas, 10 were peripherally located while 5 were in central location.

Microscopically, squamous cell carcinoma (Fig 1), adenocarcinoma (Fig 2) and small cell carcinomas (Fig 3) showed classical cytomorphological features.

Among the 5 secondary lung tumors reported in the present study, 3 were already known cases of carcinoma breast (post chemotherapy and radiotherapy) and one case each had primary in the stomach and intestine respectively.
CT guided FNA of mediastinal mass lesions was helpful in making a diagnosis of Non-Hodgkin's lymphoma in 6 cases (4 were low grade NHL and 2 cases were high grade NHL). Cytological smears in NHL were cellular, showing monotonous population of cells with enlarged nuclei and immature chromatin with inconspicuous nucleoli in low grade NHL and prominent nucleoli in high grade NHL.

Smears from the case reported as ganglioneuroblastoma (presented with posterior mediastinal mass) showed classical ganglion like large cells with abundant eosinophilic cytoplasm with vesicular nuclei and prominent single nucleolus admixed with small lymphocyte like neuroblastic cells in a fibrillary background (Fig 5 & 6). The case diagnosed as a thymoma in the present study had presented with a mass in anteroposterior mediastinum and the cytological smears showed an admixture of small lymphocytes with atypical round to oval epithelial cells. In the post procedural period, one of our patients had developed pneumothorax for which he required hospitalization and thoracic chest tube had to be put in. In another patient, two bouts of hemoptysis had occurred but later subsided.

**Discussion**

In our study majority of the patients were adults, the age ranged between 30-75 years with a peak incidence in 52-63 years. These findings are similar to the ones reported by Shah et al. (9) The mean age (57.5 years) in our study was nearly similar (56.4 years) to the findings of Singh et al. (8) In the study by Wallace et al (5), the mean age was slightly higher (61.3 years) as compared with our results. Male patients (76.1%) showed a significant increase in number in our study as compared to females (23.9%). In two national studies from India, the percentage of male patients was slightly higher than in our series i.e. 88.0% (9) and 80.6%. (10) Study by Singh et al (8) showed a lower male incidence (52.0%). In another two studies however, the percentage of male patients was 55.7% (5) and 71.1% (11).

In the present study, lung tumor was seen more commonly in the left lung. Upper zone was the commonest site involved followed by the parahilar region. The size of the lung parenchymal lesions varied from 2.5-14.8 cm and the mediastinal masses varied from 6-12 cm. The sizes of the thoracic mass lesions in our study were larger (1.2 cm-5.6 cm) as compared to other series. (8, 12)

The post procedural complications were seen in deeper seated lesions, thus resulting in damage to large amounts of lung tissue traversed by the needle. However, pneumothorax as reported in one of the case in our study has not been reported in other studies. The overall rate of complications in this study (1.2%) is much lesser than reported in other studies varying from 6-50%. (2, 8, 10, 11) It is probably because of larger lesions in the study and also due to proper handling of the cases.

The present study could provide a definitive diagnosis in 163 cases out of total 171 cases (95.3%) and these results are similar to ones reported by Saha et al. (1) The higher number of malignant cases (86.5%) in our study is comparable to other series. (2, 8, 10, 13) Out of the primary lung tumors, the commonest was squamous cell carcinoma (n=90, 52.63%); followed by small cell
carcinoma (n=30, 17.54%) and adenocarcinoma (n=15, 8.77%). Our results differ from two recently published studies (9, 10) in showing greater incidence of small cell carcinoma as compared to adenocarcinoma. In another study by Tan et al (11), the incidence of adenocarcinoma was found higher than squamous cell carcinoma.

In the metastatic lung tumors reported in our series, all had known primaries, 3 in breast and one each in stomach and intestine. Of the 10 cases diagnosed as pulmonary tuberculosis, all had responded well to antitubercular treatment.

The overall incidence of cases which were inconclusive for any diagnosis in our study (n=8, 4.67%) was less as compared to other studies. (14, 15) Reason for no diagnosis in such cases was scanty nature of the aspirate and low cellularity of the smears. In the case diagnosed as pleural based mesothelioma in a 60 year old female having pleural effusion, the aspirate yielded hemorrhagic and thick viscous fluid, smears from which showed cytomorphological features of a mesothelioma.

Amongst the mediastinal masses, all the six cases of NHL had been put on chemotherapy and were disease free at the end of two years of follow up. Ganglioneuroblastoma and lipoma were subsequently operated upon and confirmed by histopathological examination.

The cases reported as thymic cyst and thymomas were lost in the subsequent follow up period.

Conclusion
The CT guided FNAC of chest masses is a rapid and safe procedure in expert hands and attended with minimal complications. It helps in making an early and reliable diagnosis of malignant as well as benign lesion like tuberculosis so that an immediate and definitive treatment can be planned in such cases. Our results are comparable with data available in the literature.

References
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