ORIGINAL RESEARCH ARTICLE

Role of Computed Tomography Guided Fine Needle Aspiration Cytology in Assesment of Intrathoracic Mass Lesions

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A B S T R A C T

Introduction: Computed tomography guided FNAC provide a safe, rapid, and accurate diagnosis in patients having thoracic mass lesions. It provides exact cytodiagnosis for various pulmonary lesions for instituting specific treatment it also helps to plan appropriate
chemotherapy options for lung cancer and metastatic lesions. It can also be used as initial approach to diagnose small lesion less than 20mm size to provide early diagnose and treatment. Current research was done with the objectives to study the diagnostic accuracy of CT guided fine needle aspiration cytology in intra thoracic mass lesions, to pathologically confirm if t he disease is benign, malignant or Infective, to classify malignant tumors and to evaluate complications.

Material and methods: The study was carried out in 40 patients who had intra thoracic lesions which are confirmed by conventional studies or CT attending the radiology department, Vydehi institute of medical sciences from January 2015 to September 2016.All patients were subjected to CT guided FNAC.CT was used to accurately localize the lesion and measure its density. All patients were aspirated using 20G disposable needle. The samples were obtained by cytopathologist . The smears were air dried for May-Grünwald-Giemsa staining and fixed in methanol for hematoxylin and eosin staining.

Results: Out of 40 cases, 30 were male and 10 were female. The age range varied from 21 to 90 years with the peak in the fifth decade. There were 37 parenchymal tumors and the remaining three tumor cases were mediastinal. Thirty patients had malignant lesions and eight had benign lesions. Squamous cell carcinoma and non-small carcinoma were most commonly seen. Post procedural complications were noted in only 5% of patients.

Conclusion: CT-guided FNAC of thoracic mass lesions is a safe, rapid, and reliable procedure with minimal complications. It provides very early diagnosis and exact sub-classification of various lung tumors on the basis of cytomorphology. Benign non neoplastic lesions like tuberculosis can also be diagnosed with certainty by this technique. The early and accurate diagnosis obtained by CT-guided FNAC helps to formulate immediate and effective management of thoracic mass lesions.

Keyword: Computed Tomography, Fine Needle Aspiration Cytology, Thoracic Lesions. Parenchymal Lesions, Mediastinal Lesions

INTRODUCTION

Fine-Needle Aspiration Cytology (FNAC) is a simple, relatively safe, rapid, reliable technique for the diagnosis of pulmonary mass lesions, particularly with the aid of computed tomography (CT) scan. FNAC not only distinguishes between benign and malignant lesions but also helps in tumor typing of lung cancer, so initiation of specific therapy like chemotherapy or surgery is possible without unnecessary delay.[1] The most obvious advantages of fine needle aspiration cytology over surgical and large needle biopsy (Tru-cut or drill) are that it is quicker to report and perform, less painful, less technically demanding, and easily repeatable. In short, it is far more convenient and may be set up in any clinical situation.[2]

The study was done for evaluating diagnostic accuracy of Fine Needle Aspiration Cytology of intrathoracic lesions under CT guidance and to pathologically confirm if the disease is benign, malignant or infective.

MATERIAL AND METHODS

A total of 40 patients underwent CT-guided FNAC between January 2015 to September 2016. CT was done before the FNAC to measure the density of the lesion, to accurately localise it and to plan the approach. Patients underwent CT without contrast enhancement in either prone or supine position. Patient positioning was based on the shortest distance from the lesion to the visceral surface, except when there were overlying skeletal structures or large pulmonary vessels to be crossed.

Images were obtained through the region of interest by using a section thickness of one mm. All the patients were aspirated

using a 20G disposable spinal needle. The depth from the skin to the lesion periphery was measured by using the CT images and the appropriate length was inserted. After needle insertion, CT was used to confirm the adequacy of needle position. Breath holding was limited to when the needle was being inserted and normal breathing was encouraged at other times. All patients were subjected to CT guided Fine Needle Aspiration Cytology and 20 gauge spinal needle was used. Skin entry point was marked with skin marker and local anesthesia was given with 2% lidocaine.The same needle was left for reference and a single axial scan obtained and the exchanged with FNAC needle.

The samples were then obtained by a cytopathologist using aspiration with a 20 ml syringe in half of the cases and 10 ml syringe in the other half. Four to six short jabs were made into the mass, with care taken to biopsy the periphery as well as the centre of the lesion. Immediate cytological assessment was performed by an on-site cytopathologist, which determined the need for a second or a third pass, provided the patient remained asymptomatic and no pneumothorax or hemoptysis occurred. The smears were air dried for May-Grünwald-Giemsa staining and fixed in methanol for hematoxylin and eosin staining.

A single CT section was taken immediately after the procedure to rule out pneumothorax, hemothorax or parenchymal hematoma. After the procedure, the patients were placed on a stretcher for 1 hour in the puncture side down position, under the supervision of a nurse.

Exclusion criteria: Patients with systemic bleeding tendency, suspected vascular lesion, suspected hydatid cyst, pulmonary artery hypertension, severe emphysemaor unco-operative patients.

Institutional Review board approval and informed consent from patients was taken before the start of study.

RESULTS

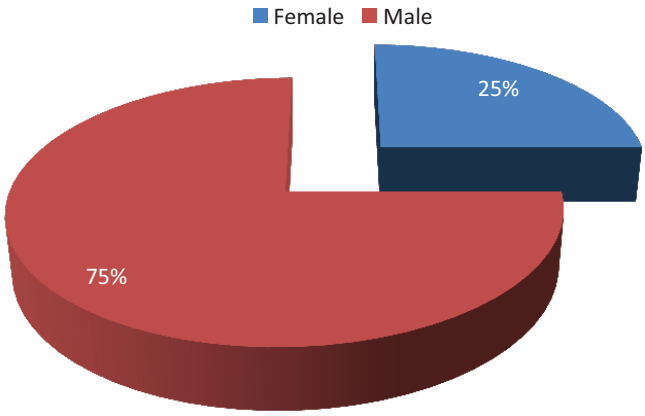
CT-guided FNAC was performed in a total of 40 patients who presented to our department with intra thoracic lesions during January 2015 to September 2016.

There were 30 males (75%) and 10 females (25%) (Graph -1), in present study, with an age range of 21 to 90 years, mean age being 54.1years.Cough was the most common symptom present in 36/40 patients (90%), followed by fever in 31/40 (77%), dyspnoea in 26/40(65%), sputum in 15/40 (37.5%), haemoptysis in 6/40 (15%), wheeze in 6/40(15%). The positive diagnostic yield in present study is noted in 38 of the 40 patients (95%); positive yield for malignancy was 75% (30 of 40 patients), benign in 20%(8/40) and undiagnosed in 2/40 (5%) .

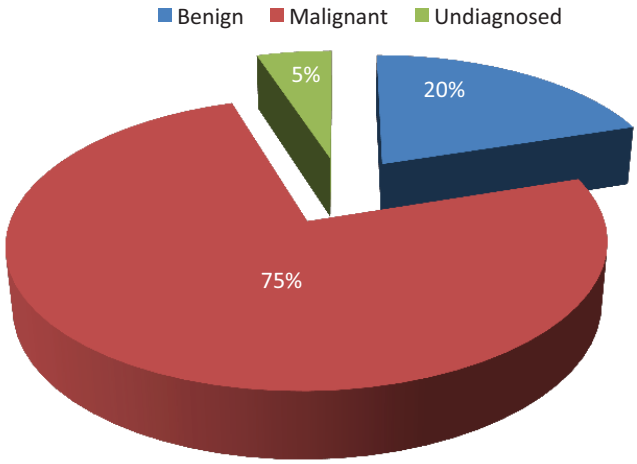
Out of 40, 37 (92.5%) were parenchymal lesions and 3(7.5%) were mediastinal lesion. Out of 37 parenchymal lesions 30/37(81%) were malignant (GRAPH 2). (Which consisted of 27.5% of non-small cell carcinoma, 27.5% squamous cell carcinoma, 10% adenocarcinoma 7.5% were metastasis and 2.5% were Non-Hodgkin's Lymphoma). Out of 37, 34 (91.8%) were primary lung malignancies and three (8.38%) were metastatic lesions, one from Adenocarcinoma of prostate, two from Adenocarcinoma of breast.

Anapum Saha et al	90%
JP Singh et al	85.3%
Santosh kumar mondal et al	95%
Gangopadhya et al	85%
Santambrogio et al	81%
Basanet et al	82.6%
Prashanth et	81.2%
Ratan konjenghan	92%
Present study	95%

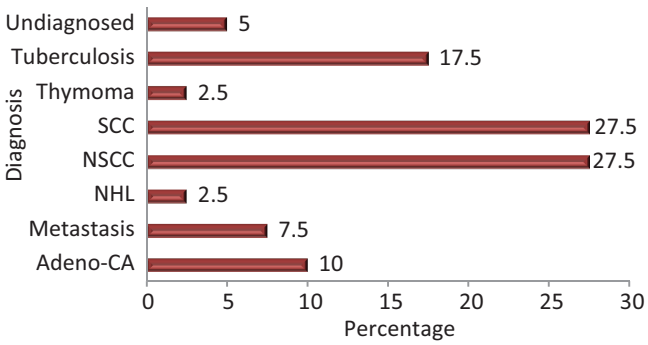
Table-1: Comparision of accuracy rate in various studies with present study



Graph-1: Showing the sex distribution of the lesions



Graph-2: Showing the distribution od the lesions based on the pathology.



Graph-3: Showing the distribution of the lesions based on etiology.

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There were 3 Mediastinal lesions, out of which 2(66%) were malignant and 1 was undiagnosed. Malignant lesions comprised one of thymoma and other was non-hodgkins lymphoma.

Fine needle aspiration cytology was performed with 23 gauge spinal needle in all the 40 subjects under CT-guidance. The pathological spectrum of lesions on cytological examination is as shown in the Graph 3.

Diagnosis was possible in 38 (95%) cases and complication rate were 5% with pneumothorax occurring in 2 patients which resolved spontaneously. No procedure - related mortality was observed in our study.

DISCUSSION

Transthoracic fine needle aspiration cytology (FNAC) of thoracic lesion using CT guidance is a relatively safe and accurate means of diagnosing benign and malignant lesions of the chest with negligible mortality.

In majority of the studies, FNAC confirmed its place as a diagnostic tool in the diagnosis of malignant and benign lesions and differentiation of metastatic malignancy, thereby helping selection of specific treatment options.It can be indicated in severely ill patients and who are high risk candidates for surgical interventions like open lung biopsy, thoracotomy, thoracoscopy etc. CT-guided FNAC allows precise localization of the lesions and also aids in the needle aspiration technique, thereby reducing the incidence of morbidity and mortality.

CT-guided FNAC becomes the first line indication when ultrasonography or conventional chest radiographs do not correctly visualize the lesion or position of the needle during the procedure. In present study, the emphasis was on evaluating diagnostic accuracy of Fine needle aspiration cytology of intrathoracic lesions and its attendant complications, performed under CT-guidance.

Diagnostic accuracy and the size of the lesions

Present study showed a positive cytodiagnosis in 38 of 40 patients, with a diagnostic accuracy of 95%. In our study the size of the thoracic lesions ranged from 1.1 to 5.8 cms Aspiration samples were adequate for diagnosis in 38 out of 40 of our patients.

The success rate of sample yield ranged between 80 to 100% and its diagnostic accuracy is described to be high between 80 to 95 per cent in various studies (TABLE-1).

Pathological spectrum of lesions

In present study, CT-guided FNAC was performed in 40 patient's yielded overall accuracy of 95%. Of these, a cytological diagnosis of malignancy was made in 30 of 40 (75%) patients and 8 were of definite benign etiology (20%) and inconclusive in two cases (5%).

Of the 40 subjects, 37 were parenchymal lesions and 3 were Mediastinal lesions.

A diagnosis of Squamous cell carcinoma was noted in 11 of 40 (27.5%) and Adenocarcinoma in 4 of 40 (10%) and Non-small cell carcinoma in 11 (27.5%). In this study three metastatic lesions, one each from breast and two from prostate were noted. We could not make diagnosis of small cell carcinoma probably because it is centrally placed which is a not rare carcinoma of lung.

The main aim is to differentiate between small cell and non-smallcell carcinoma. Differentiating between the two is importing as treatment protocol depends on it. By FNAC it is usually difficult to distinguish Squamous cell carcinoma, large cell carcinoma and adenocarcinoma from each other, though it doesn't alter the basic treatment protocols.

In a study conducted by Prashant et al,70 cases of lung lesions 43 were malignant out of which 39 were primary and 4 were metastatic among which squamous cell carcinoma were 32%, non-small cell carcinoma were 20% and adenocarcinoma and small cell carcinoma both constituted 18%(TABLE1).[4]

In the study by Sarkar et al, out of 100 patients 76 had malignant lesions out of which 29 had squamous cell carcinoma 16 had adenocarcinoma 6 had small cell carcinoma 3 had large cell carcinoma.[5]

Complications of CT-guided FNAC

Most common complication of CT guided FNAC was haemorrage, followed by pneumothorax and hemoptysis. Pneumothorax is by far most common complication reported rates range widely from 5 to 61%.In present study of 40 patients, two of our patients developed pneumothorax, which was procedure related, and managed conservatively. One of them was an elderly smoker and had no significant respiratory history and the lesion was 2.7cm other patient was young 26 year old male with history of tuberculosis and the lesion size was 1.1cms. both the lesions were more than 2cms away from the pleura and lung.

Similar observation was made in the study of 184 patients by Mohammad G Mostafa reporting only two patients developing pneumothorax.[6] Another study by Soheila Zahirifardreported 8% of pneumothorax.[7] There were no deaths in our study of 40 patients.

CONCLUSION

Fine needle aspiration cytology procedure is safe, reliable and cost effective in outpatient setting. It may be recommended as the first line indication in thoracic mass lesions because of its high accuracy in diagnosing both malignant and benign lesions. A definitive diagnosis in these thoracic lesions may help circumventing unnecessary surgical interventions. It provides early and exact cytodiagnosis of various lung tumors for instituting specific treatment protocols. Procedural complications are minor, viz., pneumothorax, which can be managed conservatively.

REFERENCES

1. Anapuma saha, Kshitishkumar, Manoj Choudhuri. CT guided fine needle aspiration cytology of thoracic mass lesions. A study of 57 cases. J Cytol. 2009; 26(2): 55–59
2. Mini Gangopadhaya,Indarani chakrabrati,Nilanjema. CT guided FNAC ofmasslesion of lung.Indian J Med Paediatr Oncol. 2011; 32(4): 192–196.
3. Santurmbrogio, Nasotti, Bellaviti. N CT guided FNAC OF SPN –A Prospective randomized study for immediate cytological evaluation. Chest. 1997 Aug; 112(2):423-432
4. Prashant, C Ramachandra, Pattibahiram. Feasibility, Safety, and Efficacy of the CT Guided Fine Needle Aspiration Cytology (FNAC) of Lung Lesions. Indian

Journal of Medical & Paediatric Oncology 2007; 28(1):23-29.
5. Sarkar A, Saxena A et al. Long-term outcome of image-ablation of lung. Am J Roentgenol 2010,185(5):466–471.
6. Mohammad Golam Mostafa. Computed tomography guided fine needle aspiration cytology in the diagnosis of thoracic lesions. J Indian Med Assoc. 2001; 99(3):550-553.
7. Soheila Zahirifard, Mehrdad BakhshayeshKaram, Foroozan Mohammadi, Lida Fadaizadeh, Mohammad Reza Masjedi. Thoracic CT-Guided Needle Biopsy: A Report of 150 Cases. Tanaffos 2002;1(3):51-55.

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