

Computed Tomography Guided Percutaneous Transthoracic Fine Needle Aspiration Cytology in Chest Masses

Basnet SB,¹ Thapa GB,¹ Shahi R,¹ Shrestha M,¹ Panth R²

¹Department of Radiology, ²Department of Pathology, Shree Birendra Hospital, Kathmandu, Nepal

ABSTRACT

A retrospective, hospital based descriptive study was done to know the pathological spectrum of thoracic lesions and to correlate the radiological findings with cytological findings obtained from computed tomography guided percutaneous transthoracic fine needle aspiration of chest mass.

The clinical, radiological and cytological data of 100 patients were studied who underwent CT guided FNAC from May, 2004 to May, 2007.

Diagnostic accuracy of FNAC is 82%. Cytological examination showed that 51 cases were malignant and 31 cases were benign. Provisional diagnosis based on radiological findings were 50 and 32 cases of malignant and benign lesions respectively. Sensitivity and specificity, positive and negative predictive value of radiological findings in this study was 88%, 84%, 90% and 81% respectively. Post procedure complication were (a) pneumothorax in two cases and both the cases had to be hospitalized for active management (b) minimal perilesional hemorrhage and hemoptysis in three cases and (c) chest pain in six cases.

CT guided FNAC is a simple and safe procedure with high diagnostic accuracy in the evaluation of focal chest lesions. Pneumothorax, perilesional hemorrhage, hemoptysis and chest pain are the usually encountered complications. Very few cases of complication require active management.

Key words: chest mass, cytology, guided, percutaneous, transthoracic

INTRODUCTION

Morphological evaluation of lung lesions like size, location, contour, edge, density, calcification and enhancement pattern in contrast study can only narrow down the diagnostic possibilities. Cytological diagnosis is warranted before initiating the specific treatment for malignant disease.¹

Computed tomography guided fine needle aspiration cytology is considered a procedure of choice in the evaluation of focal chest lesions.² It is a simple and safe procedure with high diagnostic accuracy for the diagnosis and cell typing of lung cancer where Ultrasound (USG) guided procedure is not possible. Pneumothorax, hemorrhage, hemoptysis and chest pain

Correspondence:

Dr. Shiva B Basnet
Department of Radiology
Shree Birendra Hospital
Chhauni, Kathmandu, Nepal
Phone: +977-9851026809
Email: sbasnet7@hotmail.com

are usually encountered complication. Very few cases of complication require active management.^{3,4}

Fluoroscopic guided procedure in conventional X-ray is being rarely being done for biopsy purposes. Magnetic Resonance Imaging (MRI) guided biopsy is not in practice in our institute. Histopathological examination of the specimen obtained from open biopsy or postoperatively is the last option and they are a more invasive and costly procedure.⁵

Inability to hold breath, severe chronic obstructive pulmonary disease (COPD), bleeding disorders, pulmonary arterial hypertension (PAH) and contralateral pneumonectomy cases are a few absolute/relative contraindications for CT guided FNAC.^{6,7}

The purpose of this study is to know the pathological spectrum of thoracic lesions and to correlate the radiological findings with cytological findings obtained from CT guided FNAC.

MATERIAL AND METHODS

It is a retrospective, hospital based descriptive study done in Shree Birendra Hospital, Chhauni, Kathmandu, Nepal. After institutional approval the clinical, radiological and cytological information of 100 patients were obtained from the hospital data who underwent CT guided FNAC from May, 2004 to May, 2007.

Cases with chest mass and having suspicion of tumor were included in the study. Mass lesions of size more than 2 cm, which were not possible to approach by USG guided technique, were taken for CT guided procedure.

Hematological and biochemical investigations, plain chest X-rays (Postero-anterior and lateral views), pre and post contrast CT scan of the chest, USG of the chest, abdomen and pelvis were the common investigations carried out when FNAC was needed.

Exclusion criteria were patients who were not able to hold their breath, or patients having severe COPD, bleeding disorders, PAH and contralateral pneumonectomy. Though cases of tuberculosis which could be confidently diagnosed by chest x-ray were not subjected to FNAC, cases with collapse, consolidation and pleural effusion, co-existing with a mass lesion were sampled because of their possible association with non tuberculous lesion.

CT guided FNAC was carried out as an out patient procedure after explaining the risks and benefits. Informed consent was also obtained from every case. Usually a 20 gauge spinal needle was used for biopsy purpose. If the specimen sample was not adequate for cytological examination, then either the procedure was

repeated, or the patient was sent for more invasive methods of biopsy (open biopsy, bronchoscopic biopsy).

All the patients were kept under observation for four hours. A repeat scan of the area of interest was taken to look for pneumothorax or excessive bleeding in doubtful cases only. Cases of severe complication were admitted in the hospital for appropriate management. Patients were instructed to report if necessary.

Data was compiled and statistical analysis was done by using statistical Statistical Package for the Social Sciences (SPSS) version 10.0 for windows.

RESULT

A hundred cases were included in the study but cytological examination showed an inadequate cells in 18 cases. Those cases were not included in statistical analysis. General demographic findings of the study and common disease patterns have been given (Table 1, 2). Types of bronchogenic carcinoma have been shown in table number 3. There were 6 cases below 40 years of age (The youngest one is six years old) and none of them had bronchogenic carcinoma.

The diagnostic accuracy of CT guided FNAC was 82%. Cytological examination showed that 51 cases were malignant and 31 cases were benign. Provisional diagnosis based on radiological findings were 50 and 32 cases of malignant and benign lesion respectively. Sensitivity, specificity, positive and negative predictive value of the provisional diagnosis was 88%, 84%, 90% and 81% respectively. No correlation could be established between age, sex and side of the lesion with cytological findings as per Pearson chi square test and Fisher's Exact test. There is however higher incidence of squamous cell carcinoma among our patients which can be explained by higher prevalence of smoking in our community.

Pneumothorax developed in two cases and both of them had to be hospitalized for active management. Minimal perilesional hemorrhage and hemoptysis developed in three cases but none of them required active management. Chest pain was noted in six cases and it was managed by oral nonsteroidal anti-inflammatory drugs and reassurance.

DISCUSSION

It has been mentioned that the diagnostic accuracy of CT guided FNAC is between 66 to 97 percent.⁸ The diagnostic accuracy of our study was 82%. Sensitivity, specificity, positive and negative predictive value of the provisional diagnosis of this study was 88%, 84%, 90% and 81% respectively. Cytological study showed

Table 1. showing the demographic description of the study

Subject	Subheadings	Total No.	Percentage
Age	Below 40 years	6	7
	40- 49 years	10	12
	50-59 years	16	20
	60-69 years	34	41
	70 years and above	16	20
Sex	Male	56	68
	Female	26	32
Type of lesions	Lung mass	75	91
	Mediastinal mass	5	6
	Paraspinal mass	2	3
Side of lesions	Right	52	63
	Left	30	37
History of smoking	Smoker	55	67
	Non-smoker	27	33
Provisional Diagnosis	Malignant	50	61
	Benign	32	39
Cytological finding	Malignant	51	62
	Benign	31	38
Sampling	Adequate	82	82
	Inadequate	18	18

Table 2. Spectrum of disease as per cytological findings

Diseases	Number	Percentage
Bronchogenic carcinoma	44	54
Mestastatic lesions	1	1
Lymphoma	2	2
Ganglioneuroma	1	1
Suggestive but not diagnostic for malignant cells	3	4
Neuroendocrine carcinoma	1	1
Bronchial Adenoma	1	1
Thymoma	1	1
Tuberculosis	4	5
Lung abscess	4	5
Hydatid cyst	1	1
Nonspecific inflammatory lesions	19	24
Total	82	100

Table 3. Different types and percentage of Bronchogenic carcinoma found in the study

Type of lung malignancy	Total no.	Percentage
Squamous cell carcinoma	22	50
Adenocarcinoma	12	28
Small cell carcinoma	5	11
Large cell carcinoma	1	2
Non-small cell carcinoma	4	9
Total	44	100

a malignant pathology in 62% cases and a benign pathology in 38% cases. The prevalence of malignancy in our study is significantly less than the 81.8% found in similar study done by Singh et al.⁹ The prevalence of squamous cell carcinoma and adenocarcinoma were similar (22%) in the study by Singh et al, but our study showed almost double the incidence of squamous cell carcinoma compared to adenocarcinoma (50% vs 28%). The higher incidence of squamous cell carcinoma among our patients can be explained by the higher prevalence of smoking in our community. The prevalence of small cell carcinoma was 11% in our study compared to the very much lower 4% in the study by Singh et al. Among the benign lesions, tuberculosis comprised 14% of our cases compared to their 33%.

In this study, bronchogenic carcinoma was found in 44 out of 82 cases (54%). Among the bronchogenic carcinoma, squamous cell carcinoma was found in 22 out of 44 cases (50%). Adenocarcinoma was seen in 12 cases (28%) and small cell carcinoma in 5 cases (11%). Large cell carcinoma was seen in only one case (2%). In our study its share is significantly low. The main reason may be the inclusion of large cells in the non small cell category because of the absence of characteristic cytological features of large cell

carcinoma. Cases belonging to this category were 4 (9%). Three cases (6%) categorized as "suggestive but not diagnostic for malignant cells" may have included some cases of large cell carcinoma but could not be labeled as such because of lack of distinctive malignant features in these cases.

Pneumothorax in two cases (4%), perilesional hemorrhage and hemoptysis in three cases (6%) and mild chest pain in six cases (12%) were noted in this study. Pneumothorax was significantly lower than the 42.7%, 29%, 20.9% and 11.8% seen in the studies conducted by Bansonnenberg et al, Stanley et al, Santambrogio et al and Singh et al respectively. It was comparable similar to the 3.1%, it was 2.7% and 1.1% of Gouliamos et al, Gupta et al and Mohammad et al.^{9,12-17} The perilesional haemorrhage and haemoptysis of 6% in our study was significantly less than the 14.5% of Singh et al, but was comparable to the 4.6% by Van Sonnenberg et al.^{9,13}

This study was a descriptive type retrospective study and data was obtained from hospital registry for analysis. Though a prospective study is always more scientific and reliable to compare results than a retrospective one, a large scale prospective or case controlled type study will be more authentic to establish a statistical significance and correlation.

CONCLUSION

CT guided fine needle aspiration cytology (FNAC) is a simple and safe procedure with high diagnostic accuracy for the diagnosis and cell typing of lung cancer where USG guided biopsy is not feasible. Though complications are rare, pneumothorax, perilesional hemorrhage, hemoptysis and chest pain are occasionally encountered, but rarely require active management.

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