Original Article

Role of image-guided fine needle aspiration cytology of lung lesions in patients visiting Gandaki Medical College

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ABSTRACT

Background: Computed Tomography guided Fine needle aspiration cytology of lung mass is an effective modality to diagnose lung cancer. Its use has been extended in differentiating lung tumors into various cytomorphological types so that it becomes easier for further treatment. The study is aimed to study the morphological features of various types of lung lesions, correlate with histopathology wherever possible and evaluate the sensitivity, specificity, and accuracy of fine needle aspiration cytology procedure.

Materials and Methods: It is an observational cross-sectional study conducted in the Department of Pathology of Gandaki Medical College and Teaching hospital from April 2018 to December 2020 and 109 cases were included.

Results: In the study, 109 cases were included, female were 61(56%) while males were 48(44%) with an M: F ratio is 1:1.2. The maximum number of cases was seen in the age >70 years (45.9%), mean age being 68.4years. Smoking was seen in 66(60.6%) cases. Squamous cell carcinoma (SCC) 32(29.4%) was the most common cytological finding followed by adenocarcinoma 20(18.3%). Similarly, SCC was the most common histopathological finding which comprised 30(53.5%) followed by adenocarcinoma 14(25%). Fine needle aspiration cytology and histopathological diagnosis are significantly associated with a p-value <0.001. The sensitivity, specificity, and accuracy of fine needle aspiration cytology were 76%,80%, and 76.6% respectively.

Conclusions: Computes tomography-guided fine needle aspiration cytology is a relatively safe, inexpensive, and accurate procedure in the diagnosis of different lung lesions for early diagnosis & appropriate treatment.

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INTRODUCTION

In today's world cases with consolidation in the lungs are seen in increasing numbers and our main aim is to differentiate where the lesion is benign, malignant, or inflammatory. Computed tomography (CT) guided fine needle aspiration cytology (FNAC) is a well-known modality of investigation for lung lesions.[1] Furthermore, apart from differentiating whether the lesion is benign or malignant it helps in the typing of the lung cancer so the specific therapy such as chemotherapy or surgery can be started without much delay.[2,3] CT guided FNAC is a less

invasive diagnostic method of relatively low cost, negligible mortality, and limited morbidity.[1] In 1976 Haaga and Alfidi reported CT-guided biopsy and since then this procedure has been shown to be effective and accurate. The diagnostic accuracy is reported to be more than 80% and 90% in benign and malignant diseases respectively.[4]

In a small percentage of cases, there has been post-procedural complication which includes pneumothorax, hemoptysis, and pulmonary hemorrhage. Pneumothorax has been observed in 22%-45% of cases.[5] Some conditions like severe chronic obstructive pulmonary disease, bleeding diathesis, and pulmonary arterial hypertension are relative contraindications for FNAC. [6,7]

The purpose of this study was to evaluate the pathological spectrum of disease and determine the accuracy and efficacy of image-guided FNAC in the diagnosis of various lung lesions in the inpatient and outpatient departments of Gandaki Medical College - Teaching Hospital.

MATERIALS AND METHODS

The present study was conducted in the department of pathology at Gandaki Medical College from April 2018 to December 2020. The institutional review committee of Gandaki Medical College and Teaching Hospital provided ethical approval (reference number 09-12-074). It's an observational cross-sectional study involving 109 patients. Clinical assessment and pre-procedure preparations were done before the procedure. After obtaining informed and written consent, under aseptic precaution, a transthoracic image-guided procedure was done where fine needle aspiration was done followed by biopsy whenever possible in the same setting. The biopsy specimen was carefully transferred to a container containing 10% formalin. 4-5 slides were prepared with fine needle aspiration and immediately fixed with isopropyl alcohol for 5 minutes. Then they were allowed to air dry, labeled, and sent for cytological examination. The biopsy container was also labeled and sent to the pathology department for a histopathology examination.

Air-dried smears were stained with May-Grunwald-Giemsa (MGG) and alcohol-fixed smears were stained with modified Papanicolaou (PAP) stain for cytological examination of the lesions. Biopsy slides were stained with Hematoxylin and Eosin stains. Special stains (ZN and PAS stain) were used wherever indicated and all the slides were evaluated by two experienced pathologists. All the statistical analysis was done using SPSS 23.0.

RESULTS

The study was conducted at the Gandaki Medical college and hospital from April 2018 to December 2020. A total of 109 patients with lesions in the lung were analyzed out of which a total number of female were 61(56%) while male 48(44%) Table 1 with F: M ratio is 1.2:1. The age of the patients in the study ranged from 45 years to 89 years with a mean age of 68.4 years. A maximum number of cases were seen in the age group >70 years (45.9%) followed by 61-70 years (35%). Cough was the most common clinical presentation. Among all the patients 66(60.6%) gave a history of active cigarette smoking for a variable period of time and 43 (39.4%) were non-smokers.

Table1: Demographic distribution of patients with lung lesions

Variables Female		Sex		Total
		Male		
Age group	**< 50yrs**	2(1.8)	2(1.8)	4(3.7)
	51-60yrs	10(9.2)	10(9.2)	20(18.3)
	61-70yrs	17(15.6)	18(16.5)	35(32.1)
	>70yrs	32(29.4)	18(16.5)	50(45.9)
Smoking habit	**Smoker**	35(32.1)	31(28.4)	66 (60.6)
	Non-smoker	26(23.8)	17(15.6)	43(39.4)

The most common FNAC finding was squamous cell carcinoma accounting for 32(29.4%) cases followed by adenocarcinoma 20(18.3%) cases, benign lesions 18(16.5%) cases, positive for malignancy 10(9.17%)cases and suspicious for malignancy 5(4.5%) cases. 2(1.83%) cases showed granulomatous inflammation with hemorrhage in the background.19(17.43%) cases were non-diagnostic because the sample was hemorrhagic. (Table 2)

Table 2: Distribution of lung lesions according to cytological study

Diagnosis	Male (%)	Female (%)	Smoker (%)	Non-smoker (%)
Adenocarcinoma	5 (25.0)	15 (75.0)	10 (50.0)	10 (50.0)
Squamous cell carcinoma	13 (40.6)	19 (59.3)	22 (68.7)	10 (31.3)
Small cell carcinoma	3 (100)	0 (0)	3 (100)	-
Positive for malignancy	5 (50.0)	5 (50.0)	5 (50.0)	5 (50.0)
Suspicious for malignancy	2 (40.0)	3 (60.0)	2 (40.0)	3 (60.0)
Benign	9 (50.0)	9 (50.0)	9 (50.0)	9 (50.0)
Granulomatous lesion	1 (50.0)	1 (50.0)	1 (50.0)	1 (50.0)
Non- diagnostic	10 (52.6)	9 (47.4)	14 (73.7)	5 (26.3)

Table 3 shows the frequency of histopathological diagnosis of lung lesions. Among 109 cases we got a biopsy sample in only 56 cases. Out of that, the most common was squamous cell carcinoma 30(53.5%) followed by adenocarcinoma 14(25%), benign lesion 10(17.85%), and small cell carcinoma 2(3.57%)

Table 3: Distribution of lung lesions according to histopathological findings

Biopsy finding	Male	Female	Smoker	Non-smoker
Adenocarcinoma	3 (21.4)	11 (78.6)	8 (57.1%)	6 (42.9%)
Squamous cell carcinoma	11 (36.7)	19 (63.3)	21 (70.0)	9 (30.0)
Small cell carcinoma	2 (100.0)	0 (0.0)	1 (50.0)	1 (50.0)
Benign	5 (50.0)	5 (50.0)	4 (40.0)	6 (60.0%)

Table 4 showed that FNAC and histopathology are significantly associated with a p-value < 0.001. which showed that FNAC can be equally diagnostic like histopathology if samples are received from the representative area. The sensitivity, specificity, and accuracy of FNAC are 76%,80%, and 76.6% respectively. Here we considered the HPE study as the gold standard. The accuracy of FNAC was 76.6% based on the final HPE report.

Table 4: Association between FNAC and Histopathological diagnosis

FNAC	Histopathology diagnosis			P-value
	Positive, n (%)	Negative,n (%)	Total, n(%)	
Positive	35 (94.6)	2 (5.4)	37 (100)	0.001
Negative	11 (57.9)	8 (42.1)	19 (100)	
Total	46 (82.1)	10 (17.9)		

DISCUSSION

CT-guided FNAC of lung lesions is a minimally invasive and inexpensive procedure with low mortality and morbidity. It is an accurate and safe method that helps in the evaluation and categorization of various benign and malignant lesions of lung lesions. This further helps to start particular treatments like radiotherapy, chemotherapy, or surgical intervention.

In our study peak age of incidence was above 70 years however in the study done by Shah D et al[11] the age group ranged from 41-50 years and Abdulhamed T et al [12] from 45-78 years which is not concordance with our study. The mean age in our study was 68.4 years and similar findings were observed in the study by Shrestha M.K et al [13] with a mean age of 67.32 years. In a study done by Pradhan A et al[6] and Ahmed Z et al[1], the mean ages were 55.5 years and 54.34 years respectively. This shows that lung mass lesions come to medical attention in the middle to older age group. There was a predominance of females in our study which was in contrast with other studies.[14-16] Predominance of females in our study may be because lung cancer is now the cause of cancer mortality in women worldwide.[17] Among the patients (60.6%) were active smokers which is similar to the study done by Modi MB et al[18]. Our finding is supported by the study done by Gasperino J et al.[19] which stated that with the same lifetime exposure to cigarette smoke, females have a higher relative risk of lung cancer than men, which was 1.2 to 1.5 times higher.

The most common FNAC finding was squamous cell carcinoma 32(29.4%) followed by adenocarcinoma 20 (18.3%), benign lesion 18(16.5%), positive for malignancy 10(9.17%), and suspicious for malignancy (4.5%). 19 (17.43%) cases were non-diagnostic because the sample

was hemorrhagic which was similar to the study done by Ahmed Z et al[1], Shrestha M et. al[14], and Dahlstrom JE et al[20.] Squamous cell carcinoma among patients can be explained due to the higher prevalence of smoking. In contrast to our study, Shrestha MK et al [13] and Modi MB et al[18] showed the most common finding as adenocarcinoma followed by squamous cell carcinoma.

In biopsy specimens, the most common was also squamous cell carcinoma 30(53.5%) followed by adenocarcinoma 14(25%), benign lesion 10(17.85%), and small cell carcinoma 2(3.57%) which is similar to the study done by Abdulhameed T et al[12], Shrestha M et al[14] whereas in the study done by Mohanty et al [21] and Shah D et al[11]adenocarcinoma was predominant.

An attempt to assess the degree of agreement between cytological and histopathological findings was made and in our study, the sensitivity, specificity, and accuracy of FNAC in correlation with the histopathological examination was 76%,80%, and 76.6% which is relatable to the studies done by Modi MB et al [18], Shah S et al [22]. Accuracy of procedure varied in range from 64% to 97%[5]in the study done by Herman PG et al[5] too.

CONCLUSIONS

A higher incidence of lung carcinoma among females may indicate the shifting paradigm and the cause might be the increase in cigarette smoking among females. Computes tomography-guided fine needle aspiration cytology is a relatively safe, inexpensive, and accurate procedure in the diagnosis of different lung lesions for early diagnosis & appropriate treatment.

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