

A study on clinical, radiological, and cytologic features of lung cancer



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ABSTRACT

Background: Lung cancer is the most common cancer in the world today and the most common cause of cancer death in developing countries. In clinically suspected cases of lung cancer, if histologic confirmation is not there, cytologic confirmation is suffice. Pulmonary cytology has reached a high level of accuracy in diagnosing various subtypes of lung carcinomas. It must be emphasized that cytological diagnosis of lung cancer is a clinicopathological interpretation and correlation with clinical and radiographic findings is mandatory. The present study was conducted to assess the cytological patterns of lung cancer. **Aims and Objectives:** The study was conducted to describe the cytological patterns of lung cancer, to correlate the cytological diagnosis with clinical and radiological findings in lung cancer and also to evaluate the risk factors of lung carcinoma in local settings. **Materials and Methods:** Study material was collected in cytology laboratory from the clinically suspected lung carcinoma patients. Using a proforma, a detailed history including smoking habits and other associated risk factors and radiological findings were collected. We used PAP and Giemsa stain for slide preparation. Cytological patterns of the samples were identified. Fifty cytologically diagnosed cases of lung malignancy were included in the study. **Results:** 75% of the cytology samples obtained were from the lung lesion through guided fine-needle aspiration (FNA). Next most frequent samples were FOB imprint (19%) smears, followed by FOB wash (3%) smears and FNA from lymph nodes. The most common cytomorphological subtype of lung cancer was adenocarcinoma. Lung cancer showed a peak incidence in the age group of 60–69 years and a male preponderance with male: female ratio 15:1. In the present study, 90.9% of squamous cell carcinoma were centrally located lesions and 58% of adenocarcinoma were peripherally located. **Conclusion:** CT-guided FNA can be used as a first-line investigation in cases of lung lesions so that thoracotomy for diagnostic purposes can be avoided.

Key words: Lung cancer; Fine needle aspiration cytology; Adenocarcinoma; Squamous cell carcinoma; Radiology; Papanicolaou staining; Giemsa staining

INTRODUCTION

Lung cancer is the leading cause of cancer-related deaths across the developed world. Despite tremendous efforts to treat this cancer, the overall 5-year survival for all stages is dismally low at 15%.¹ Even in India, though the incidence of oral, breast, and cervix cancer is higher, lung cancer accounts for the highest number of cancer deaths among men.² About 85–90% of patients with

lung cancer have had direct exposure to tobacco. The strongest associations are with small cell and squamous cell carcinoma.³ An estimated 2–9% of lung cancers are related to occupational exposures. An inherited genetic predisposition has epidemiologic support as a risk factor.⁴ Although the majority of patients present at an advanced stage, those with early-stage lung cancer can be treated with a potentially curative intent. Although clinical data, location, and radiological findings can narrow down the

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diagnostic possibilities, a definitive diagnosis confirming lung cancer by microscopic examination is indicated before therapy.⁵ In clinically suspected cases of lung cancer, if histologic confirmation is not there, cytologic confirmation is suffice.⁶ Fine needle aspiration (FNA) provides a safe, simple, and rapid method for accurate diagnosis in patients having mass lesions. In patients with lung cancer which is inoperable owing to local factors or the patient's general condition, FNA cytology confirms the diagnosis and reveals the tumor type.⁷ It must be emphasized that cytological diagnosis of lung cancer is a clinicopathological interpretation and correlation with clinical and radiographic findings is mandatory. The purpose of the present study was to know the pathological spectrum of lung lesions and to correlate the clinical and radiological findings with cytological findings and also to assess the risk factors.

Aims and objectives

The study was conducted to describe the cytological patterns of lung cancer, to correlate the cytological diagnosis with clinical & radiological findings in lung cancer and also to evaluate the risk factors of lung carcinoma in in local settings.

MATERIALS AND METHODS

A prospective study was conducted over a period of 15 months between July 2015 and October 2016, in patients, with a high clinical and radiological suspicion of lung malignancy, referred to GMC, Kottayam. Of these, 50 cytologically diagnosed cases of lung malignancy were included in the study. Cases with cytologically insufficient material, cases without proper data, and cases whose radiology was not available were excluded from the study. The study protocol included a detailed history taking and smoking habits and other associated risk factors and radiological findings using a proforma, after getting informed consent from the patient at the time of collection of study material. Fixation of study material was done by two methods – air drying and using 85% isopropyl alcohol. The smears were stained – Papanicolaou and Giemsa method and visualized under microscope in scanner, low power and high-power field. The cytological pattern/features of the samples were identified.

Inclusion criteria

Cytologically diagnosed cases of lung carcinoma were included in the study.

Exclusion criteria

Cases with cytologically insufficient material, cases without proper data, and cases whose radiology was not available were excluded from the study.

Data management and analysis

The data were entered in Microsoft excel, and further statistical analysis was done using the SPSS software 16.

RESULTS

A total of fifty cases were included in the study, of which 94% were males. Most of the cases were in the age group of 60–69 years (40%), followed by 50–59 years (32%). The majority of the patients were manual labourers and farmers being the second common. 90% of the patients were smokers and 26% were chronic alcoholics. 94% cases had a history of exposure to smoke and 66% were exposed to dust.

Most common symptoms were cough (64%) and dyspnea (62%). Other common presentations were hemoptysis and pleuritic chest pain, loss of appetite and loss of weight were present in 40% of cases. Table 1 shows the clinical signs of the patients. 50% of the patients had clubbing. Rare signs included svc obstruction and polycythemia (3 and 2 case, respectively). Out of the three patients having svc obstruction, 2 (4%) cases were later diagnosed to have squamous cell carcinoma, whereas 1 (2%) case had small cell carcinoma. The case had polycythemia was later diagnosed to have squamous cell carcinoma. 6 (12%) cases had pleural effusion.

Among the total 50 cases, 36 patients had clinicoradiological evidence of lymphadenopathy (72%), mediastinal and supraclavicular lymphadenopathy were observed in 57% and 5% of cases, respectively.

In 98% of cases, radiological findings were a mass lesion (Figures 1 and 2), whereas 1 (2%) case showed consolidation. The case had consolidation was later diagnosed to have adenocarcinoma.

16% of cases had radiological evidence of metastatic involvement of other organs and metastasis to liver was present in 12% of cases. In the present study, right lung was affected more, comprising 56% of cases. The majority of cases (26%) had right upper lobe involvement, followed by left upper lobe (22%) and left lower lobe (18%).

In the present study, 75% of the cytology samples obtained were from the lung lesion via guided FNA. Next

Table 1: Distribution of respiratory and non-respiratory clinical signs in the patients

Signs	Number of patients
Clubbing	25
Pleural effusion	6
Lymphadenopathy	36
SVC obstruction	3
Pedal edema	1
Polycythemia	2

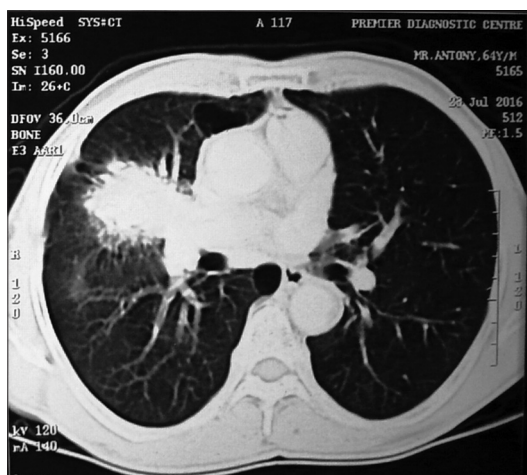


Figure 1: CT showing central lesion with spiculated margins in the right lung

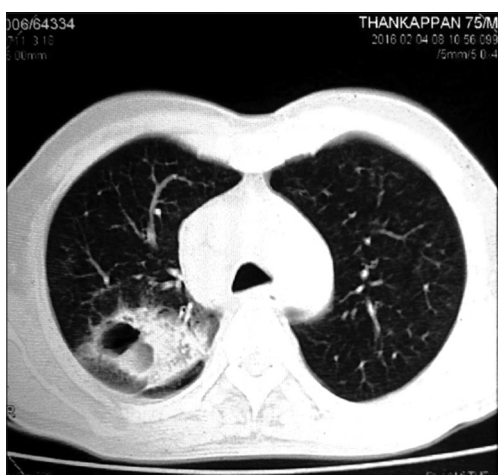


Figure 2: CT showing cavitary lesion in the right lung

most frequent samples were FOB imprint (19%) smears, followed by FOB wash (3%) smears and FNA from lymph nodes (3%) (Figure 3).

Adenocarcinoma was the most common subtype of lung cancer (28%), followed by squamous cell carcinoma (22%). Small-cell carcinoma, pleomorphic carcinoma, large cell carcinoma, and poorly differentiated carcinoma constitute 14%, 4%, 4%, and 28%, respectively (Figure 4).

Squamous cell carcinoma (90.9%) presented more commonly as a central tumor, 57% of adenocarcinoma presented as peripheral lesions, whereas 28% (4 cases) were central lesions and the remaining were pleural based lesion and consolidation (1 case each) (Table 2).

DISCUSSION

According to GLOBOCAN2012, lung cancer is the most common type of malignancy as well as the leading cause of

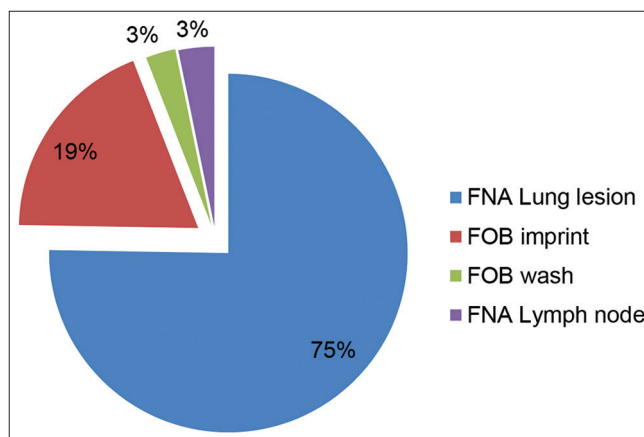


Figure 3: Distribution of types of sample in the cases

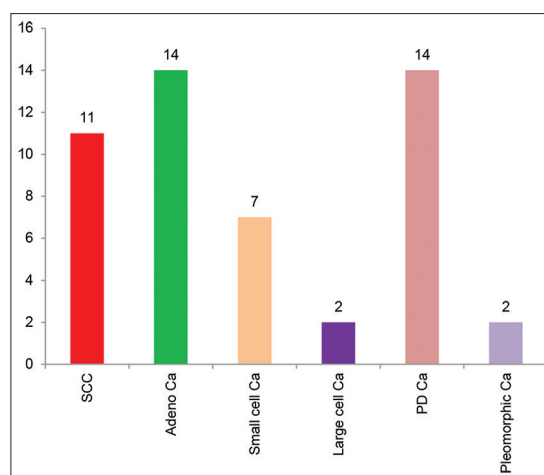


Figure 4: Distribution of cytologically diagnosed subtypes of lung cancer in the cases

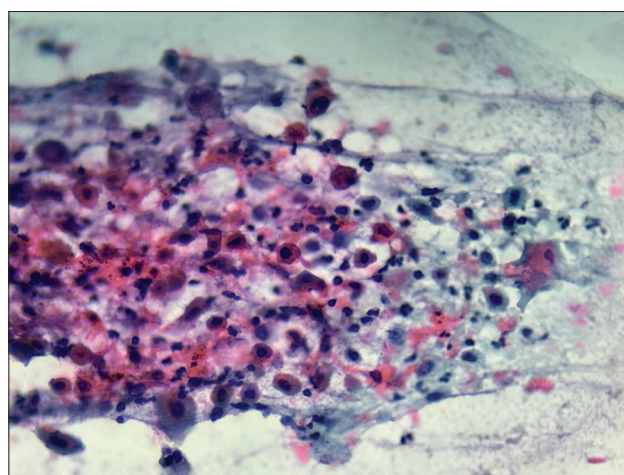


Figure 5: Photomicrograph of cytology smear of squamous cell carcinoma showing atypical squamous cells with keratinisation (Papanicolaou stain, x40)

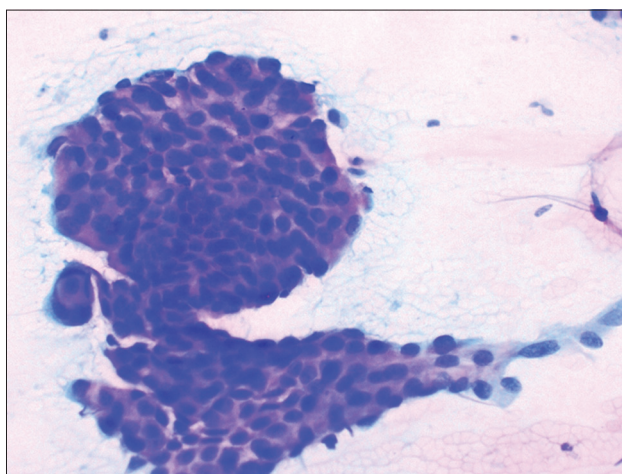
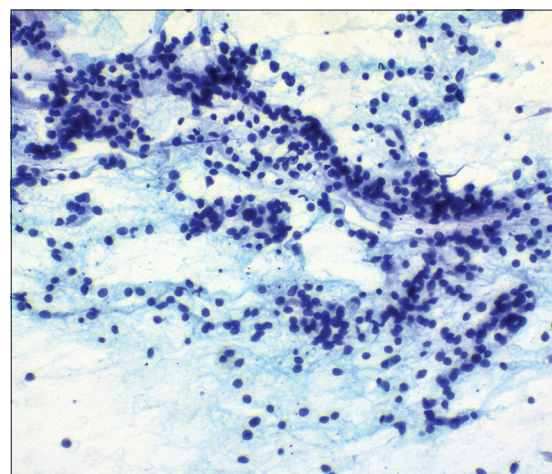
cancer death worldwide.² Pulmonary cytology has reached a high level of accuracy in diagnosing various subtypes of lung carcinomas. Cytological diagnosis of lung cancer

Table 2: Radiologic findings in various cytologic subtypes of lung carcinoma

	Adenocarcinoma No (%)	Squamous cell carcinoma No (%)	Small cell carcinoma No (%)	Large cell carcinoma No (%)	Pleomorphic carcinoma No (%)	Poorly differentiated carcinoma No (%)
Number of cases	14 (28)	11 (22)	7 (14)	2 (4)	2 (4)	14 (28)
Site of tumour						
Right lung	8	6	3	1	2	9
Left lung	6	5	4	1		5
Bilateral						
Lobe involved						
Upper lobe	6	6	5	1	2	6
Middle lobe	1	1				1
Lower lobe	6	3	2			5
>1 lobe	1	1		1		2
Location						
Central	4	10	6			11
Peripheral	8		1	2	2	3
Pleural based	1	1				
Consolidation	1					

Table 3: Comparison of cytological diagnosis of carcinoma lung

	Present study	Gangopadhyay et al. ⁹ (n=127)	Mondal et al. ¹⁰ (n=124)	Piplani et al. ¹¹ (n=74)
Year	2016	2011	2013	2014
Adenocarcinoma	28%	55%	54%	45%
Squamous cell carcinoma	22%	25%	23%	40%
Small cell carcinoma	14%	8%	15%	8%
Large cell carcinoma	4%	2%	2%	4%
Pleomorphic carcinoma	4%	0	1%	0
Poorly differentiated Ca	28%	0	0	3
Others		10	5	

**Figure 6:** Photomicrograph of cytology smear of adenocarcinoma showing cells arranged in 3D clusters (Papanicolaou stain, x200)**Figure 7:** Photomicrograph of cytology smear showing small cell carcinoma lung (Papanicolaou stain, x10)

is a clinicopathological interpretation and correlation with clinical and radiographic findings is mandatory. The present study explored the clinicoradiographic spectrum of lung cancer in relation to its various cytological subtypes. In the present study, cases showed a wide range of age distribution ranging from 40 to 82 years, with a peak in the age group of 60–69 years. These findings were correlating with the study by Modi et al.⁸ In concordance with all other previous reports, in this study also, in all

age group, males outnumbered females, constituting a total of 94%.

In our study, 90% of the cases had the habit of smoking. A similar finding was observed by Gangopadhyay et al.⁹

In the present study, 56% of the lung cancers developed in the right lung. Previously, in 2013, a study by Mondal et al.¹⁰ observed that 58.06% of lung cancers developed in the right lung.

In the present study, adenocarcinoma was the most common subtype of lung cancer, comprised 28%. The second most common subtype was squamous cell carcinoma comprised 22% and this is in accordance with the studies conducted by Mondal et al.¹⁰ where it comprised 54% and 23%, respectively and Gangopadhyay et al. where it comprised 55% and 25%, respectively. In the present study, small cell carcinoma comprised 14% and this is in accordance with the study conducted by Mondal et al. where small-cell carcinoma comprised 15% (Table 3).

Limitations of the study

The histopathologic correlation could not be included in the study as many of the biopsy samples were scanty, inadequate for an opinion and diagnosed as poorly differentiated carcinomas. The sample size was relatively small as the study period was only about one and half year.

CONCLUSION

Based on the present study, it is concluded that commonest cytomorphological subtype of lung cancer is adenocarcinoma and lung carcinoma shows a male preponderance with male:female ratio 15:1 and CT guided FNA can be used as a first line investigation in cases of lung lesions, so that thoracotomy for diagnostic purposes can be avoided.

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Authors' Contributions:

PRL- Concept, design, literature survey, prepared first draft of manuscript, implementation of study protocol, data collection, data analysis, manuscript preparation and submission of article; **NTD**- Definition of intellectual content, manuscript preparation, editing, and manuscript revision; **AKM**- Statistical analysis, Literature survey and Interpretation; **SSF**- Statistical analysis literature survey and review manuscript.

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