Histopathological Patterns of Endobronchial Specimen in Lung Cancer Along with Clinicoradiological Correlation in Chattogram, Bangladesh

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Abstract: *Introduction*: Lung cancer is one of the commonest lethal cancers known till date. Along with the typical symptomatic clinical presentation, it is appropriately detected by various radiographic evaluation methods sometimes initiated for an unrelated problem. Great interest has now been developed in the histological characterisation of lung cancer in view of newer histology guided therapeutic modalities and genomic classification of lung carcinoma. *Objective*: To explore histopathological patterns of lung cancer in relation to clinicoradiological features. *Methods*: This prospective study was an observational study conducted in the Department of Respiratory Medicine, Ibn Sina Diagnostic & Consultation Center, Chattogram, Bangladesh from January to December 2023. Total 60 patients of suspected lung cancer over a period of one year, to study clinical features, radiological manifestations and histological types of lung cancer. The study was done following a standard study protocol which included a clinical history regarding the onset and progress of the disease, smoking habits, detailed physical examination of the respiratory system, chest roentgenogram, computed tomography of thorax, fiberoptic bronchoscopy and others. *Results*: Patients mean age was 59.9 years, 85.0% males and 15.0% females. The smoker to non-smoker ratio was 7.8:1. Cough was the most common presenting symptom (86.6%). The most common radiological finding was mass lesion (86.6%), followed by collapse consolidation in 36.25%. Squamous cell carcinoma presented more commonly as hilar mass (58.3%), while adenocarcinoma as peripheral mass lesion (66.7%). The most common finding on histopathological examination was Squamous cell carcinoma (50%), followed by small cell carcinoma (15%) and adenocarcinoma (3.3%). *Conclusion*: Endobronchial lung biopsy and histopathological examination is an extremely useful method for establishing diagnosis of lung cancer in patients suspected to have malignancy by clinical or radiological criteria.

Keywords: Lung Cancer, Radiological Patterns, Histopathological Types.

INTRODUCTION

Lung cancer is the most common cancer worldwide since 1985, both in terms of incidence and mortality. Globally, lung cancer is the largest contributor to new cancer diagnoses (1,350,000 new cases and 12.4% of total new cancer cases) and to death from cancer (1,180,000 deaths and 17.6% of total cancer deaths [1]. According to the latest WHO data published in 2020 Lung Cancers Deaths in Bangladesh reached 12,174 or 1.70% of total deaths. According to World Health Organization (WHO), classification formulated in 1999; there are six major types of malignant epithelial Non-Small Cell Lung Carcinoma (NSCLC) and Small Cell Lung Carcinoma (SCLC) [2]. Smoking is the cause

for more than 85% of the bronchogenic carcinoma cases [3]. Squamous cell carcinomas and small cell carcinomas shows significant association with smoking [4]. Occupational exposures and air pollution approximately accounts for 2% to 9% of lung cancers. Approximately 85% patients with lung cancer are symptomatic at presentation. In remaining patients, lung cancer is diagnosed by various radiological methods initiated for an unrelated health problem and histopathological examination [5]. Occupational exposures and air pollution approximately accounts for 2% to 9% of lung cancers. Approximately 85% patients with lung cancer are symptomatic at presentation. In remaining patients, lung cancer is diagnosed by various radiological methods

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initiated for an unrelated health problem and histopathological examination [6]. The clinical features of carcinoma lung result from the local growth and regional growth of the tumor as well as lymphatic invasion, haematogenous distant metastatic spread and remote para-neoplastic effects from tumour products or immune cross- reaction with tumour antigens [7]. The clinical features of carcinoma lung result from the local growth and regional growth of the tumor as well as lymphatic invasion, haematogenous distant metastatic spread and remote para-neoplastic effects from tumour products or immune cross- reaction with tumour antigens [8]. More interest has been developed in the histological characterisation of lung cancer in recent years in view of newer histology guided therapeutic modalities and genomic classification of lung carcinoma [9, 10]. At present more than 50% of lung adenocarcinomas and about a third of squamous cell carcinomas can be characterised based on the mutation profile. Epidermal growth factor receptors (EGFR) mutation explain the therapeutic importance of molecular classification [11]. The present study explored histopathological patterns of lung cancer in relation to clinico-radiological features.

MATERIAL AND METHODS

This prospective study was an observational study conducted in the Department of Respiratory Medicine, Ibn Sina Diagnostic & Consultation Center, Chattogram, Bangladesh from January to December 2023. A total of 60 patients suspected of lung cancer were studied. Study material included all endobronchial lung biopsy specimen received in the histopathology section of Department of Pathology. Detailed medical history of the patient regarding the onset and progression of the disease and smoking habits and other risk factors was taken. The patients were thoroughly examined for general physical examination with a detailed clinical examination of the respiratory system. Suspected lung cancer cases were subjected to radiological evaluation. Radiological findings were evaluated based on distribution, location, number and involvement of adjacent structures if any. All the biopsy specimen submitted were grossed meticulously and after proper tissue processing sections of [4, 5], micron thickness were prepared from the specimen submitted. The sections were stained routinely with H & E. Staining procedures were done as described by Bancroft and Stevens [12]. The histopathological patterns were based on the WHO classification of lung tumours [13]. Statistical analysis was done using the software IBM-SPSS (Statistical Package for the Social Sciences) version [24]. Categorical variables were expressed in percentage and continuous in mean and standard deviation. A Chi-square test was used to determine the association in different categorical variables. A p value of <0.05 was considered statistically significant.

RESULTS

A total of 60 patients suspected of lung cancer were studied. Out of 60 cases, 51 (85.0%) were males and 9 (15.0%) were females. Male to female ratio was 5.6:1. There were 36.6% and 35% of patients who belonged to age between 51-60 year and 60-70 year respectively. Majority of the cases, 48 (79.93%) were between 50 to 80 years. The mean±SD age of the patients was 59.9 59.57 ± 10.41 years. 53 (88.75%) patients were smokers. The smoker to non-smoker ratio was 7.5:1. Most common presenting symptom was cough in 52 (86.6%) cases followed by chest pain in 28 (46.6%) cases (Table 1). Two (3.3%) out of 60 patients had a history of antitubercular treatment. Right lung was most commonly involved 32 (64.0%) followed by hilar region involved in 27 (52.0%) cases. Upper zone was involved in 11 (22.0%) cases, lower zone in 7 (16.0%) cases and mid zone in 5 (10.0%) cases. Mass lesion was the most common radiological finding in 33 (66.0%) cases followed by collapse in 10 (20%) cases. Combined presentation was observed in 7 (14.0%). Pleural effusion was observed in 11 (22.0%) cases, most of them having squamous cell carcinoma. Evidence of metastasis to liver, bone, adrenal, ipsilateral chest wall and pulmonary metastasis was present in 5 (10.0%) cases all of which had squamous cell carcinoma (Table 2 & 3).

Table 1: Baseline characteristics of the study subjects (n=60)

Characteristic	N	%
Sex		
Male	51	85.0
Female	09	15.0
Age(years)		
≤40	044	6.66
41-50	08	13.3
51-60	22	36.6
61-70	21	35.0
≥71	05	8.33
Mean ± SD	59.57 ± 10.41	
Smoking status		
Smoker	53	88.75
Non smoker	12	11.25

Table 2: Chief presenting complaints (N=60)

Chief complaints	N	%
Cough	52	86.6
Fever	14	23.33
Expectoration	12	20
Haemoptysis	21	35
Breathlessness	21	35
Chest pain	28	46.6
Loss of weight/Loss of appetite	4	6.6
Hoarseness of voice	3	5
K/c/o CA lung	1	1.6

Table 3: Radiological findings in the various histologic types of lung cancer patients

Radiological findings	Squamous cell carcinoma No. (%)	Small cell carcinoma No. (%)	Adenocarcinoma N (%)	Total N (%)
No. of patients	36 (72)	11 (22)	3 (6)	50 (100)
Site of tumours				
Right lung	27 (75.0)	4 (36.3)	1 (33.3)	32 (64)
Left lung	7 (19.4)	7 (63.7)	2 (66.7)	16 (32)
Bilateral	2 (5.5)	0	0	2 (4)
Location				
Hilar	21 (58.3)	5 (45.4)	1 (33.3)	27 (52)
Upper zone	6 (16.6)	3 (27.2)	2 (66.7)	11 (22)
Mid zone	4 (11.1)	1 (9.1)	0	5 (10)
Lower zone	5 (13.8)	2 (18.1)	0	7 (16)
Lesions				
Mass lesion	23 (63.8)	9 (81.8)	1 (33.3)	33 (66)
Collapse	6 (16.6)	2 (18.2)	2 (66.7)	10 (20)
Combinations	7 (19.4)	0	0	7 (14)
Associated Pleural effusion	9 (25)	0	2 (66.7)	11 (22)
Special features				
Metastasis	5 (13.8)	0	0	5 (10)

Table 3: CECT Findings

CECT findings	N	%
Hilar mass	23	38.3
Right lung mass	22	36.6
Collapse/Consolidation	22	36.6
Mediastinal LAP	21	35
Pleural effusion	12	20
Left lung mass	8	13.3
Hilar LAP	8	13.3
Metastasis	4	6.6

CT thorax was done in all patients. Mass lesion was detected in 52 (86.6%) patients. Mediastinal lymphadenopathy was detected in 21 (35%). Hilar lymphadenopathy was seen in 8 (13.3%) patients. Metastasis was seen in 4 (6.6%) patients (Table 3).

Table 4: Fiberoptic bronchoscopy findings

Bronchoscopy Findings	N	%
Endobronchial mass lesion	51	85
Narrowing of bronchus	1	1.7
Vocal cord paralysis	3	5
No EB lesion	5	8.3

Endobronchial mass lesion was most common bronchoscopic finding seen in 51 (85%) patients. Vocal cord paralysis was seen in 3 (5%) patients (Table 4).

Table 5: Histologic diagnosis

Histologic diagnosis	N	%
Squamous Cell Ca	31	51.6
Small Cell Ca	9	15.0
Adenocarcinoma	2	3.3
Mod to severe Dysplasia	2	3.3
Granulomatous inflammation	2	3.3
Non-specific inflammation	5	8.3
Inadequate biopsy	9	15.0

Squamous cell carcinoma was found to be the most common type of carcinoma lung and was found in 31 (51.6%) patients, followed by small cell carcinoma which was present in 9 (15%) patients (Table 5).

DISCUSSION

Lung cancer is a serious health problem and the leading cause of cancer-related deaths worldwide. This reflects disparities in demographic variables, socioeconomic status, and geographic variations. That's why it is very much required to correlate epidemiology and clinicopathological profile for a better understanding of tumor biology, prevention, and control. Primary lung cancer cases in Bangladesh have been on the rise. There is an almost 200% rise in the country's lung cancer cases within just 3 years [14]. Despite the increasing trend in our country and worldwide, histopathological data is scant in our region. Endobronchial lung biopsy is an effective and less invasive procedure useful for diagnosis of lung cancer. In this study the mean age of lung carcinoma patients were 59.9 years. This showed that lung cancer mostly occur in older age. Age group in the present study is comparable to the study conducted by Mandal *et al.*, [15], which show that age ranged between 39 to 85 years. The average age of the lung cancer patients in the present study is also comparable to some of Indian studies [16-18]. The sex ratio reported in various Indian studies ranged from 4.2:1 to 7:1 [19-22]. The sex ratio in our study was 5.15:1. Male predominates in the present study. This showed that in India, females have still lower prevalence of smoking. In our study, 95.52% males were smokers and only 4.48% were non-smokers. This is similar with the survey conducted by WHO in 1986 in which 92- 94% lung cancer deaths were attributed to tobacco smoking in males. The smoker to non-smoker ratio in our study was 7.8:1 which is comparable with the study by Rawat *et al.*, [23], and Khan *et al.*, [24]. In the present study, the commonest symptom was cough present in 86.6% patients. This is comparable to various other studies [22-26]. Chest pain was present in 46.6% patients in over study. This is also comparable to various studies [25, 26]. Various studies have reported haemoptysis in 11% to 24% lung cancer patients [17-23]. A higher percentage of haemoptysis (69.2%) have reported in study conducted by Jindal and Behera [27]. In the present study haemoptysis was present in 35% patients. One important observation is that, 3.3% of the cases in our study were misdiagnosed as tuberculosis and treated at various other centres,

thereby causing a delay in diagnosis and time of presentation. Rawat *et al.*, [23], reported delay in presentation of patients to their attending physician. Majority of the cases were misdiagnosed as tuberculosis and treated at various other centres, thereby causing a delay in seeking treatment which varied from 4-6 months. Dubey *et al.*, [19], also reported 23.4% cases of lung malignancy which had been misdiagnosed as pulmonary tuberculosis. Radiographic analysis of patients with lung cancer in various published studies has revealed a preponderance of right lung involvement with upper lobe as the commonest site of involvement [15-28]. This was noticed in the present study also. It is well known that squamous cell carcinoma presents mostly as a central tumour. In this study 58.3% of squamous cell carcinoma had hilar mass. This is comparable with the study conducted by Gupta *et al.*, [22]. They found that 75% of squamous cell carcinoma patients had central lesion. In present study small cell lung cancer presented most commonly as hilar mass (41.7%). Our study is also comparable to various other studies. Rawat *et al.*, [23], also observed that small cell lung cancer presented commonly as central lesion. Gupta *et al.*, [22], also found that most common location of small cell carcinoma was central (50%). Adenocarcioma most commonly manifests as peripheral mass or a malignant pleural effusion. In present study adenocarcinoma constituted 5.45% of lung cancer, mostly present in upper zone (66.7%) and most commonly associated with pleural effusion. This is comparable with the study conducted by Rawat *et al.*, [23], which observed that adenocarcinoma commonly manifested as peripheral mass or a malignant pleural effusion. Pleural effusion was observed in 11 (22.0%) cases, most of them having squamous cell carcinoma. Evidence of metastasis to liver, bone, adrenal, ipsilateral chest wall and pulmonary metastasis was present in 5 (10.0%) cases all of which had squamous cell carcinoma (Table 2 & 3). Associated pleural effusion was observed in 22.0% cases most of them having squamous cell carcinoma. Squamous cell carcinoma lung was present in 10.0% cases showing evidence of metastasis to liver, bone, adrenal, ipsilateral chest wall and pulmonary metastasis. Computed tomography of the chest and upper abdomen has already been shown to be an important tool in the diagnosis and staging of lung cancer. In our study the computed tomography of chest and abdomen (including adrenals) was done in 59 patients. Majority of patients presented with hilar mass (38.3%). Right lung mass and Collapse/

consolidation was seen in 36.6% patients each. Sharma *et al*., [23], reported mass lesion in 30.6% patients followed by collapse consolidation in 13.5% patients. Rawat *et al*., [23], also reported mass lesion in 46.13% followed by collapse consolidation 40.89%. Mediastinal lymphadenopathy was detected in 21 patients by CT chest. This is comparable to study conducted by Chhajed *et al*., [29], in which 34% patients present with mediastinal lymphadenopathy. Endobronchial mass lesion was seen in 85% patients in our study followed by vocal cord paralysis in 5% patients. Squamous cell carcinoma was most common (68.3%) histologic subtype in male smokers followed by small cell carcinoma in 25% patients. Amongst non-smokers the most common pathological diagnosis was squamous cell carcinoma. This is comparable to the study conducted by Sheikh *et al*., [30], which observed that among smokers squamous cell carcinoma was the main histological subtype 71.6% followed by small cell carcinoma 23.3%. There is changing trend of pathological pattern of lung cancer in the West. Women were increasingly diagnosed with Lung cancer having adenocarcinoma as the commonest histological type Kumar *et al*., [26]. In various Indian studies squamous cell carcinoma still being the most common histological subtype [25-29]. Lung cancer is about five times more common in smokers with airflow obstruction than with normal lung function. The high prevalence of lung cancer in COPD patients may be due to premature aging in the lungs, genetic predispositions, Oxidative stress that cause DNA damage, and inflammation which leads to numerous cytokine release associated with the development of lung cancer [31].

CONCLUSION

Thus, our analysis suggests that squamous cell carcinoma still remains the commonest histological subtype. Most of the patients were elderly with smoking as the principal risk factor. Early detection and early treatment to reduce the morbidity and mortality associated with lung cancer in addition to imparting awareness on harmful effects of smoking and how to prevent the disease in general population is the need of this region.

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