Evaluation of lung cancer patterns and bronchoscopic presentations in patients admitted to Abbasia Chest Hospital

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Background Lung cancer is the most common cause of cancer-related death worldwide, accounting for more cancer-related deaths compared with colon, breast, and prostate combined.

Aim The aim of this work is to detect the predominant bronchoscopic presentations and anatomical sites for all histopathological types of lung cancer.

Patients and methods This study was conducted prospectively in the bronchoscopy units in Abbasia Chest Hospital. It included 132 patients suspected clinically and radiologically to have lung cancer and admitted to the hospital during the period from July 2016 to March 2017. Of them, 81 patients were pathologically diagnosed as having primary lung cancer.

Statistical analysis χ^2 test was used to examine the relationship between the two qualitative variables. Student's *t* test was used to assess the statistical significance of the difference between the two study group means. McNamara test was used assess the statistical significance of the difference between a qualitative variable measured twice for the same study group.

Results A total of 81 patients (73 males and eight females) with primary lung cancer were included in the study; most of them were in the sixth decade of life. The main anatomical sites of bronchogenic carcinoma were main bronchi and lower lobe bronchi equally (24% each), followed by lower lobe bronchi (20%). Most common macroscopic bronchoscopic presentations of bronchogenic carcinoma were end bronchial lesion (46.91%) followed by external compression (12.35%) and then mucosal infiltration and external compression (9.88%).

Conclusion Persistent pulmonary complaints like productive cough, dyspnea, chest pain, and hemoptysis should be investigated immediately. Proper screening and early diagnostic methods should be applied on a large scale to find out suspected patients who at risk to develop lung cancer.
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Introduction

Worldwide Lung cancer is associated with high incidence of morbidity and mortality with 5-year survival rate 17% after diagnosis. Actually, poor prognosis occurred in many patients, owing to being diagnosed at a late stage [1].

Globally, lung cancer is a predominant cancer among women and has the third highest incidence overall and the second highest mortality rate after breast cancer. In men, regarding incidence and mortality, it represents the most widespread cancer, as it accounted for 1.82 million new cases and 1.56 million deaths in 2012, representing 19.4% of all deaths owing to cancer [2].

Bronchoscopic technologies can be considered the most safe and most accurate tools to estimate both central and distal airway mucosa, as tissue biopsy represents the main standard for diagnosing malignant/premalignant airway disease, and some techniques are still under research [3].

Smoking accounts for 85% of lung cancer deaths [4]. Interestingly the consumption of tobacco is not the only cause of this malignant tumor. Other factors are associated that affect the incidence of this disease, such as exposure to arsenic, chromium, nickel, and asbestos; posttuberculosis lesions; and familial history of lung cancer [5]. The plan of treatment should consider factors like histology, molecular pathology, age, comorbidities, and the patient's preferences. Treatment plan should be overviewed with tumor board physicians, who can assess and modulate management plans like recommending additional investigations and changes in treatment options [6].

Patients and methods

The present study was conducted prospectively at the bronchoscopy unit in Abbasia Chest Hospital. It included 132 patients suspected clinically and radiologically to have lung cancer, admitted to the hospital, during the period from July 2016 to March

2017. Of them, 81 patients were pathologically diagnosed as having primary lung cancer.

All the included patients underwent the following: detailed medical history taking with special emphasis on smoking history, including smoking index (pack-years), and demographic data, thorough clinical examination, laboratory investigations (complete blood count, coagulation profile, and liver and kidney profile), computed tomography (CT) scan of the chest, and fiber-optic bronchoscopy (FOB), which was done according to the standard criteria for detailed bronchoscopic study:

(1) Presentations in FOB (end bronchial lesion, mucosal infiltration, luminal narrowing, or external compression).
(2) Anatomical sites in the tracheobronchial tree (trachea, right main bronchus, right upper lobe bronchus, bronchus intermedius, middle lobe bronchus, right lower lobe bronchus, left main bronchus, left upper lobe bronchus, and left lower lobe bronchus).

Sampling was done with either biopsy, transbronchial needle aspiration, or bronchial lavage, and the samples were sent for histopathological patterns regarding squamous cell carcinoma, small cell carcinoma, adenocarcinoma, and large cell carcinoma.

In the bronchoscopy unit of Abbasia Chest Hospital, the study was conducted using a FOB with an imaging system video processor (Olympus BF-160, New Orleans, LA, United States, bronchoscope with EVIS EXERA III CV-190 video system center).

All the patients who were diagnosed as having nonbronchogenic carcinoma were excluded from the study. The study was approved by the Research and Ethical Committee of the Chest Department, Faculty of Medicine, Ain Shams University in June 2016. All the data were collected and statistically analyzed.

Statistical analysis

The collected data were revised, coded, tabulated, and introduced to a PC using statistical package for the social sciences (SPSS, version 15.0.1 for Windows, 2001; SPSS Inc., Chicago, Illinois, USA).

Descriptive statistics

(1) For quantitative data, mean±SD, minimum and maximum values (range) were used.
(2) For nonquantitative data, frequency and percentage were used.

Analytical statistics

(1) Qualitative variables were tested by χ^2 test.
(2) Student's t test was used to test the statistical significance of the difference between two study group means.
(3) McNemar test was used to show the statistical significance of the difference between a qualitative variable measured twice for the same study group.
(4) Kappa statistic was used to count the measure of matching between two investigational methods.

The correlations were considered significant (S) when P value is less than 0.05, not significant (NS) when P value is more than 0.05, and highly significant (HS) when P value is less than 0.01.

Results

This study was done on 81 patients (73 males and eight females) with primary lung cancer. Their ages ranged from 19 to 85 years, with a mean±SD age of 61±12.319 years, as shown in Table 1. Of the 81 patients, 66 patients were smokers and exsmokers, whereas 15 patients were nonsmokers, as shown in Table 2.

The results of this study demonstrated that most common complaints of the studied patients were productive cough and dyspnea (20.09%) followed by chest pain (16.05%) and then hemoptysis (13.58%), as shown in Table 3. Our study revealed that the main anatomical sites of bronchogenic carcinoma in the studied patients were main bronchi and lower lobe bronchi equally (24% each), followed by lower lobe bronchi (20%), as shown in Table 4.

It was found that the most common macroscopic bronchoscopic presentations of bronchogenic carcinoma during bronchoscopic procedure of the studied patients were end bronchial lesion (46.91%)

Table 1 Description of age of studied patients with lung cancer

	Descriptive statistics	
	Range	Mean±SD
Age	19–85	61.605±12.319

Table 2 Description of smoking history of studied patients with lung cancer

Smoking habits	*n* (%)
Nonsmoker	15 (18.52)
Smokers and exsmokers	66 (84.48)
Total	81 (100.00)

followed by external compression (12.35%) and then mucosal infiltration and external compression (9.88%), as shown in Tables 5 and 6.

The existing study showed that there was a nonsignificant statistical difference between different histopathological types of lung cancer and the following smoking status, different anatomical sites of bronchogenic carcinoma, and macroscopic bronchoscopic presentations during bronchoscopic procedure, as evidenced in Tables 7–9, respectively.

Discussion

More than 28% of all cancer deaths every year are owing to lung cancer [7]. Lung cancer represents the main reason of cancer mortality all over the world, with ~1.4 million deaths each year owing to lung cancer [8].

According to the WHO statistics, Egypt has the highest mortality rate, prevalence, and incidence in North Africa [9].

In the present study, diagnostic FOB was done for 81 patients. Most of the patients presented with lung cancer in the sixth decade of life, which reflects the morbidity in higher age groups.

Table 3 Description of the complaints of the studied patients

Complaints (>2 weeks)	*n* (%)
Chest pain	13 (16.05)
Symptoms of mediastinal compression	5 (6.17)
Toxic manifestations	5 (6.17)
Hemoptysis	11 (13.58)
Productive cough	3 (3.70)
Dyspnea	1 (1.23)
Toxic manifestations – chest pain	5 (6.17)
Toxic manifestations – hemoptysis	5 (6.17)
Toxic manifestations – symptoms of mediastinal compression	2 (2.47)
Chest pain – hemoptysis	9 (11.11)
Hemoptysis – dyspnea	5 (6.17)
Productive cough – dyspnea	17 (20.99)
Total	81 (100.00)

Table 4 Description of the anatomical sites of bronchogenic carcinoma of the studied patients

Anatomical site	*n*	%
Main bronchi	24 (right: 10, left: 14)	29.63
Lower lobe bronchi	24 (right: 9, left: 15)	29.63
Upper lobe bronchi	20 (right: 10, left: 10)	24.7
Bronchus intermedius	11	13.58
Right middle lobe bronchus	2	2.47
Total	81	100.00

The results of the present study revealed that the incidence of squamous cell carcinoma, small cell carcinoma, adenocarcinoma, and large cell carcinoma was higher in smokers and exsmokers than nonsmokers. This matched with the study of Safwat *et al.* [10] who studied lung cancer presentations and sites in FOB in Faculty of Medicine, Ain Shams University. A total of 36 patients underwent bronchoscopy to confirm malignancy. Among the 36 cases with malignancy, 31 patients were smokers and five were nonsmokers. Squamous cell carcinoma was common in smokers (94.44%). Small cell carcinoma was seen only in smokers (100%), and adenocarcinoma was seen in eight (66.67%) smokers in their study.

This matched also with the study of Kshatriya *et al.* [11] who found among 25 cases of malignancy, 19 smokers and six nonsmokers. Squamous cell carcinoma was found more in smokers.

Our study matched also with the study of Mazhar and Jehanzeb [12] who studied outcome and complications of the FOB on 60 patients with central lung opacities and found that most patients had a long history of smoking. A total of 41 (68%) patients were smokers, with a range of 1–80 pack-years of smoking. Moreover, 19 (32%) were lifetime nonsmokers, including five females. They found squamous cell carcinoma in 28 (70%) cases, small cell in 10 (25%) cases, adenocarcinoma in two (5%) cases, squamous metaplasia in three (5%) cases,

Table 5 Description of macroscopic bronchoscopic presentations during bronchoscopic procedure of the studied patients

Macroscopic picture	*n* (%)
End bronchial lesion	38 (46.91)
Luminal narrowing	2 (2.47)
Mucosal infiltration	7 (8.64)
External compression	10 (12.35)
Luminal narrowing and external compression	3 (3.70)
Luminal narrowing and mucosal infiltration	4 (4.94)
Mucosal infiltration and external compression	8 (9.88)
End bronchial lesion and external compression	4 (4.94)
End bronchial lesion and mucosal infiltration	4 (4.94)
End bronchial lesion and luminal narrowing	1 (1.23)
Total	81 (100.00)

Table 6 Description of histopathology of studied patients

Histopathological patterns	*n* (%)
Adenocarcinoma	19 (23.46)
Squamous cell carcinoma	34 (41.98)
Small cell carcinoma	24 (29.63)
Large cell carcinoma	4 (4.94)
Total	81 (100.00)

Table 7 Relation between histopathological types of lung cancer and smoking history

Smoking habits	Histopathological patterns					χ^2	
	Squamous cell carcinoma [*n* (%)]	Small cell carcinoma [*n* (%)]	Adenocarcinoma [*n* (%)]	Large cell carcinoma [*n* (%)]	Total [*n* (%)]	χ^2	*P* value
Nonsmokers	4 (11.76)	5 (20.83)	5 (26.32)	1 (25.00)	15 (18.52)	1.990	0.574
Smokers and exsmokers	30 (88.24)	19 (79.17)	14 (73.68)	3 (75.00)	66 (81.48)		
Total	34 (100.00)	24 (100.00)	19 (100.00)	4 (100.00)	81 (100.00)		

Table 8 Relation between histopathological types of lung cancer and anatomical bronchoscopic locations of the lesions

Anatomical site	Histopathological patterns					χ^2	
	Squamous cell carcinoma [*n* (%)]	Small cell carcinoma [*n* (%)]	Adenocarcinoma [*n* (%)]	Large cell carcinoma [*n* (%)]	Total [*n* (%)]	χ^2	*P* value
Right main bronchus	3 (8.82)	3 (12.50)	3 (15.79)	1 (25.00)	10 (12.35)	32.389	0.057
Right upper lobe bronchus	5 (14.71)	2 (8.33)	2 (10.53)	1 (25.00)	10 (12.35)		
Bronchus intermedius	4 (11.76)	6 (25.00)	0 (0.00)	1 (25.00)	11 (13.58)		
Right middle lobe bronchus	0 (0.00)	2 (8.33)	0 (0.00)	0 (0.00	2 (2.47)		
Right lower lobe bronchus	1 (2.94)	1 (4.17)	6 (31.58)	1 (25.00)	9 (11.11)		
Left main bronchus	9 (26.47)	2 (8.33)	3 (15.79)	0 (0.00)	14 (17.28)		
Left upper lobe bronchus	3 (8.82)	3 (12.50)	4 (21.05)	0 (0.00)	10 (12.35)		
Left lower lobe bronchus	9 (26.47)	5 (20.83)	1 (5.26)	0 (0.00)	15 (18.52)		
Total	34 (100.00)	24 (100.00)	19 (100.00)	4 (100.00)	81 (100.00)		

Table 9 Relation between histopathological types of lung cancer and macroscopic bronchoscopic presentations during bronchoscopic procedure

Macroscopic picture	Histopathological patterns					χ^2	
	Squamous cell carcinoma [*n* (%)]	Small cell carcinoma [*n* (%)]	Adenocarcinoma [*n* (%)]	Large cell carcinoma [*n* (%)]	Total [*n* (%)]	χ^2	*P* value
End bronchial lesion	22 (64.71)	8 (33.33)	7 (36.84)	1 (25.00)	38 (46.91)	36.306	0.109
Luminal narrowing	0 (0.00)	1 (4.17)	0 (0.00)	1 (25.00)	2 (2.47)		
Mucosal infiltration	2 (5.88)	2 (8.33)	3 (15.79)	0 (0.00)	7 (8.64)		
External compression	5 (14.71)	3 (12.50)	1 (5.26)	1 (25.00)	10 (12.35)		
Luminal narrowing and external compression	0 (0.00)	2 (8.33)	0 (0.00)	1 (25.00)	3 (3.70)		
Luminal narrowing and mucosal infiltration	1 (2.94)	2 (8.33)	1 (5.26)	0 (0.00)	4 (4.94)		
Mucosal infiltration and external compression	1 (2.94)	3 (12.50)	4 (21.05)	0 (0.00)	8 (9.88)		
End bronchial lesion and external compression	0 (0.00)	2 (8.33)	2 (10.53)	0 (0.00)	4 (4.94)		
End bronchial lesion and mucosal infiltration	2 (5.88)	1 (4.17)	1 (5.26)	0 (0.00)	4 (4.94)		
End bronchial lesion and luminal narrowing	1 (2.94)	0 (0.00)	0 (0.00)	0 (0.00)	1 (1.23)		
Total	34 (100.00)	24 (100.00)	19 (100.00)	4 (100.00)	81 (100.00)		

nonspecific inflammation in seven (10%) cases, chronic noncaseating granulomatous inflammation in two (3.3%) cases, and caseating granuloma (tuberculosis) in one (1.7%) case.

In our study, we found that of 81 patients enrolled in the study, 34 (41.98%) patients were diagnosed as having squamous cell carcinoma, 24 (29.63%) patients were diagnosed as having small cell carcinoma, 19 (23.46%) patients were diagnosed as having adenocarcinoma, and four (4.94%) patients were diagnosed as having large cell carcinoma.

Rabahi *et al.* [13] found that among 212 patients, tumor pathology was assessed in 199 patients, which revealed 39% squamous carcinoma, 21% adenocarcinoma, 12% small cell carcinoma, and 1% large cell carcinoma.

Safwat *et al.* [10] found among 36 patients in their study, 18 (50.00% of cases) patients were diagnosed having as squamous cell carcinoma, 12 (33.33% of cases) patients were diagnosed as having adenocarcinoma, whereas six (16.6% of cases) patients were diagnosed as having small cell carcinoma.

In our study, we found that among 34 patients with squamous cell carcinoma, 22 (64.71%) patients had endoscopic findings of end bronchial lesion, and five (14.71%) patients had external compression; among 24 patients diagnosed with small cell carcinoma, eight (33.33%) patients had end bronchial lesion and three (12.50%) patients had external compression; among four patients diagnosed as having large cell carcinoma, one (25%) patient had end bronchial lesion and one (25%) patient had external compression; and among 19 patients diagnosed with adenocarcinoma, seven (36.84%) patients had an end bronchial lesion and three (15.79%) patients had mucosal infiltration.

This nearly matches the findings of Rabahi *et al.* [13] who assessed the results of 376 bronchoscopic maneuvers done between January 2005 and December 2010 in patients seemed to have lung cancer, at the Respiratory Endoscopy Section of the Pulmonology Department of Hospital São Salvador, Brazil. They stated that among the 99 patients with squamous cell carcinoma, 58 (74%) of them had end bronchial mass; among the 52 patients diagnosed with adenocarcinoma, 20 (49%) had an end bronchial mass and 13 (32%) had mucosal infiltration; and among the 37 patients diagnosed with small cell carcinoma, 16 (64%) had an end bronchial mass.

This matches also with the study of Safwat *et al.* [10] who revealed that among the 18 patients with squamous cell carcinoma, 12 (66.67%) patients had endoscopic findings of end bronchial mass; among the 12 patients diagnosed with adenocarcinoma, nine (75%) had an end bronchial mass; and among the six patients diagnosed with small cell carcinoma, four (66.67%) had an end bronchial mass.

In addition, our study matches with Kshatriya *et al.* [11] who discovered that 13 patients had end bronchial mass and squamous cell carcinoma was dominating in eight patients.

In our study and according to the affected anatomical site bronchoscopically detected, we found that the main bronchi were affected in 24 patients [10 (12.35%) patients on the right side and 14 (17.28%) patients on the left side), the lower lobe bronchi were affected in 24 patients [nine (11.11%) patients on the right side and 15 (18.52%) patients on the left side], and the upper lobe bronchi were affected in 20 patients [10 (12.35%) patients on the right side and 10 (12.35%) patients on the left side].

Among 34 patients diagnosed as having squamous cell carcinoma, upper lobe bronchi were affected in eight (23.53%) patients, the main bronchi were affected in 12 (35.29%) patients, and the lower lobe bronchi were affected in 10 (29.41%) patients. Moreover, we found that among 24 patients diagnosed as having small cell carcinoma, upper lobe bronchi were affected in five (20.83%) patients, the main bronchi were affected in five (20.83%) patients, and the lower lobe bronchi were affected in six (25%) patients.

We found among 19 patients diagnosed as having adenocarcinoma, upper lobe bronchi were affected in six (31.58%) patients, the main bronchi were affected in six (31.58%) patients, and the lower lobe bronchi were affected in seven (36.48%) patients, and among the four patients diagnosed as having large cell carcinoma, upper lobe bronchi were affected in one (25%) patient, the main bronchi were affected in one (25%) patient, and the lower lobe bronchi were affected in one (25%) patient.

The aforementioned results did not match with Rabahi *et al.* [13] who define the site of visible tumors in 169 cases; the tumor was present in the upper lobe bronchi in 48% of cases.

In addition, this did not match with the study of Safwat *et al.* [10] who found that the most affected parts were upper lobe bronchi, as seen in 13 (36.11%) patients, the main bronchi were affected in eight (22.22%) patients, and the lower lobe bronchi were affected in nine (25%) patients.

The results of the present study revealed that squamous cell carcinoma was more common in main bronchi and small cell carcinoma and adenocarcinoma were more common in lower lobe bronchi.

In contrast to the finding of the current study, Safwat *et al.* [10] showed that squamous cell carcinoma was more common in the lower lobe and small cell carcinoma and adenocarcinoma were more common in the upper lobe bronchi.

Our study has several limitations: small number of the studied patients, the study being conducted in a single bronchoscopic unit, and it did not involve different histopathological subtypes of lung cancer.

Conclusion

Persistent pulmonary complaints like productive cough, dyspnea, chest pain, and hemoptysis should be investigated immediately.

Proper screening and early diagnostic methods should be applied on a large scale to find out suspected patients who are at risk of developing lung cancer.

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Conflicts of interest
There are no conflicts of interest.

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