



FIBEROPTIC BRONCHOSCOPE IN PATIENTS WITH LUNG CANCER

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ABSTRACT

Background: Lung cancer is the leading cause of cancer deaths and its incidence is rising. The determination of histopathology and stage of primary lung carcinoma is crucial to develop appropriate treatment approach that affects morbidity and mortality. Fiber optic bronchoscope techniques for early detection of lung cancer are a promising tool as they might allow to visualize changes of early lung cancer and also permit sampling for histological confirmation. **Objective:** This study was intended to compare the fiberoptic bronchoscopy findings and their anatomical locations with the histopathology types in patients with lung cancer. **Patient and Methods:** A cross section study was conducted during the period from 1st February 2012 to the 31th of July 2013, a 49 patients with clinical and radiological findings suggesting primary lung cancer and diagnose later by bronchoscope samples as cases of primary lung cancer chosen for analysis of their bronchoscope findings, at Baghdad teaching hospital / respiratory clinic. **Results:** Patients with squamous carcinoma (31%) had (67%) visible mass and (13%) presented invisibly as external compression. Patients with adenocarcinoma (41%) had (40%) visible mass and (35%) presented invisibly as external compression while normal bronchoscope was seen in (30%) of those patients so that adenocarcinoma mostly invisible. Patients with small cell carcinoma (28%) had (50%) visible mass and (21%) presented invisibly as external compression. The location of finding in (27%) of the patients with squamous carcinoma was in the right main bronchus and (20%) in right upper lobe bronchus while the main carina affected in (47%). Patients with adenocarcinoma have vocal cord affected in (25%) and left upper lobe bronchus lesion in (25%) while the right upper lobe bronchus was affected in (15%). In small cell carcinoma the location of bronchoscope finding was seen in the right upper lobe and middle lobe bronchus in (29%) of the patients. In squamous carcinoma patients the right lung was affected in (60%). Adenocarcinoma patients have right and left lung equally affected (35%). In patients with small cell carcinoma the right lung was affected in (71%). **Conclusion:** There was no relationship between the fiberoptic bronchoscope findings and their anatomical locations with the histological types of lung cancer.

INTRODUCTION

Lung cancer is the leading cause of cancer deaths and its incidence is rising.^[1] It accounts for an estimated 1.4 million deaths globally that is, 18.4% of all cancer deaths.^[2]

Lung cancer is the most prevalent malignant tumor in the world. It was reported that one third of death related to cancer was result of lung cancer in America and Europe for a year.^[3] In spite of all treatments including surgery about 16% of lung cancer cases could survive for 5 years.^[4]

The determination of histopathology and stage of primary lung carcinoma is crucial to develop appropriate treatment approach that affects morbidity and mortality.^[5,6] There has been a lot of screening tests for

detection of early lung cancer using sputum cytology and chest radiograph have been used with limited success and also Low dose spiral computerized tomographic scan.^[7]

Bronchoscope techniques for early detection of lung cancer are a promising tool as they might allow to visualize changes of early lung cancer and also permit sampling for histological confirmation.^[8]

Invasive methods widely using in histopathology diagnosis of lung cancer are bronchoscope mucosal biopsy, bronchial washing, bronchial brushing and transthoracic needle aspiration.^[6] While the diagnostic rate of bronchoscope forceps biopsy alone in central tumor is from 65% to 82%, this rate may be increased to around 90% with forceps biopsy combined with bronchial wash and / or bronchial brushing.^[9]

Factors that affect the success of diagnostic modality are diameter and localization of the mass and visibility at endobronchial tree with bronchoscope.

The most prevalent diagnostic tool in the central and endobronchial lesion is bronchoscopy. Among these methods, bronchial wash alone was reported as the lowest success rate in diagnosis of central lesion 48%.^[6]

Central carcinoma of the tracheobronchial tree can generally be localized after a single inspection with the fiberoptic bronchoscope.^[10] It has been reported to provide histologic diagnosis in between 60% to 80% of cases with no serious or rare complications.^[11,12,13]

Lung cancer is divided into non-small cell lung cancer (NSCLC) and small cell lung cancer (SCLC) according to World Health Organization (WHO) for histological classification of lung cancer for therapeutic planning.^[14,15,16]

The four main histological types include: adenocarcinoma, squamous cell carcinoma, SCLC and large-cell carcinoma.^[17]

Small cell lung cancer

Tumors are typically white-tan, soft, friable perihilar masses that show extensive necrosis and frequent nodal involvement. Within the lung the tumor typically spreads along bronchi in a sub mucosal and circumferential fashion, often involving lymphatic. A proximately 5% of SCLC present as peripheral coin lesions.^[18]

Squamous cell carcinoma

Most are located centrally in the larger bronchi of the lung. The tumors are usually white or grey and depending on the severity of fibrosis, firm with focal carbon pigment deposits in the center and star-like retractions on the periphery. The tumor may grow to a large size and may cavitate. Central tumors form intraluminal polypoid masses and / or infiltrate through the bronchial wall into the surrounding tissues and may occlude the bronchial lumen resulting in stasis of bronchial secretions, atelectasis, bronchial dilatation, obstructive lipoid pneumonia and infective bronchopneumonia. A minority of cases may arise in small peripheral airways. This may be changing since a recent study reported 53% of squamous cell carcinomas were found in the peripheral lung.^[18]

Adenocarcinoma

The most common histologic subtype in many countries and sub classification of adenocarcinoma is important (bronchi alveolar cell carcinoma). One of the biggest problems with lung adenocarcinoma is the frequent histologic heterogeneity.

Pulmonary adenocarcinomas may be single or multiple and have a wide range in size. The vast majority of pulmonary adenocarcinomas present with one of six

macroscopic patterns and these all have corresponding radiologic correlates. Combinations of these patterns may also occur.

The most common pattern is a peripheral tumor. Gray-white central fibrosis with pleural puckering may be apparent. The central area underlying pleural puckering is often a V-shaped area of desmoplastic fibrosis associated with anthracotic pigmentation. Invasion, when present histologically, is identified in areas of fibrosis and may be accompanied by necrosis, cavitation, and hemorrhage.

The edges of the tumor may be lobulated or ill-defined with stellate borders. In small tumors with a contiguous non mucinous (BAC) pattern some alveolar structure may be grossly apparent at the edge of the solid portion of the nodule corresponding to the ground glass opacity noted radiological in these lesions. Some peripheral adenocarcinomas may have a gelatinous quality due to abundant mucin production.

A second pattern of adenocarcinoma is a central or endobronchial tumor. The neoplasm may grow as a plaque or in polypoid fashion with preservation of the overlying mucosa. With increasing degrees of bronchial luminal obstruction, the distal parenchyma may show obstructive "golden" (lipoid) pneumonia. The third pattern is a diffuse pneumonia like, lobar consolidation with preservation of underlying architecture, typical of mucinous (BAC). A fourth pattern consists of diffuse bilateral lung disease. In some cases this manifests as widespread nodules (varying from tiny to large) involving all lobes, in other cases the appearance suggests an interstitial pneumonia due to widespread lymphangitic spread of carcinoma.

In the fifth pattern, the tumor preferentially invades and extensively disseminates along the visceral pleura, resulting in a rind-like thickening mimicking malignant mesothelioma (pseudo mesothelioma carcinoma).

Finally adenocarcinoma may develop in the background of underlying fibrosis, either a localized scar or diffuse interstitial fibrosis. Adenocarcinoma arising in association with a focal scar is quite rare, in contrast to the relatively common central secondary scarring that develops in localized peripheral adenocarcinomas.^[18]

Large cell carcinoma

Large cell carcinomas typically present as large, peripheral masses, frequently identified on chest radiographs, but which may also involve sub segmental or large bronchi. The tumor often invades visceral pleura, chest wall, or adjacent structures. Sectioning reveals a soft, pink-tan tumor with frequent necrosis, occasional hemorrhage and rarely, cavitation. In contrast basaloid carcinomas characteristically show exophytic bronchial growth.^[18]

Neuroendocrine tumors

Histologically high grade of NSCLC with very poor prognosis similar to that of SCLC. It is firm, well demarcated, tan to yellow tumors. Typically is associated with bronchi and are frequently endobronchial tumor. The overlying mucosa may be intact or ulcerated. Squamous metaplasia may be seen. Other bronchial carcinoids push down into the adjacent lung parenchyma.^[18]

Aims of the study

The objective of the study is to compare the fiberoptic bronchoscopy findings and their anatomical locations with the histopathology types in patients diagnosed with lung cancer to determine the relationship between these findings.

Patients and methods

Patients

Type of study

A cross sectional study.

Time and site of study

The study was conducted during the period from 1st February 2012 to the 31th of July 2013, a forty nine patients with clinical and radiological findings suggestive of primary lung cancer and diagnose later by bronchoscope samples as cases of primary lung cancer chosen for analysis of their bronchoscope findings, at Baghdad teaching hospital / respiratory clinic.

Inclusion and Exclusion criteria

Patients include in this study who were clinically and radiological suspected of having lung cancer with cytological and / or histopathology results for cancer were positive. Exclusion criteria include any patients with incomplete bronchoscope procedures, patients for whom cytological and histopathology results for lung cancer were negative, patient with results diagnosis other than lung cancer.

Methods

On the basis of these criteria we collect forty nine patients where Bronchoscope procedures performed for all of them and the samples as bronchial washing, post bronchoscope sputum, bronchial brushing, bronchial biopsy and bronchoalveolar lavage were taken. The bronchoscope findings were categorized according to the classification of Ikeda et al, together with some of the criteria used by the Japan Lung Cancer Society in order to classify mucosal injury and secretion findings.

Bronchoscope findings were also classified according to their location in the tracheobronchial tree (trachea, vocal cord, main carina, right main bronchus, right upper lobe bronchus, right middle lobe bronchus, and right lower lobe bronchus, left main bronchus, left upper lobe bronchus, lingula and left lower lobe bronchus).

Data collection

We collected data such as name, bronchoscope morphologic findings, anatomical location of endobronchial lesion, cytological and histopathology results.

All specimens collected during the procedures were analyzed by the four pathologist from Baghdad college of medicine at laboratory department of Oncology teaching hospital at Baghdad medical city. The cytological and histopathology findings were classified as being negative for, inconclusive for, suggestive of, or positive for malignancy. The findings that were classified as inconclusive were considered negative, whereas those classified as being suggestive of malignancy were considered positive. The histological and cytological classification of tumors was based on the criteria used by the World Health Organization.

Statistical analysis

Statistical package for social sciences version (20) was used for data input and analysis. Discrete variable presented as number and percentages. Chi square test for independence couldn't be used in statistical analysis due to small expected value in all the tables (<1).

RESULTS

The (49) patients were evaluated for tumor histological type, and the results as follow: adenocarcinoma found in 20 patients (41%), squamous carcinoma in 15 patients (31%) and small cell carcinoma in 14 patients (28%).

The Comparison between the fiberoptic bronchoscopy findings with histological tumor types is seen in (Table 1). Patients with squamous carcinoma had (67%) visible mass and (13%) presented invisibly as external compression while internal narrowing had seen in (13%). Patients with adenocarcinoma had (40%) visible mass and (35%) presented invisibly as external compression while normal bronchoscope was seen in (30%) of those patients so that adenocarcinoma mostly invisible. Patients with small cell carcinoma had (50%) visible mass and (21%) presented invisibly as external compression while nodular mucosa had seen in (21%).

The location of tumors or the abnormality as seen by the fiberoptic bronchoscope compared with histological tumor types in (Table 2). The location of finding in (27%) of the patients with squamous carcinoma was in the right main bronchus and (20%) in right upper lobe bronchus while the main carina affected in (47%). Patients with adenocarcinoma have vocal cord affected in (25%) and left upper lobe bronchus lesion in (25%) while the right upper lobe bronchus was affected in (15%). In small cell carcinoma the location of bronchoscope finding was seen in the right upper and middle lobe bronchus in (29%) of the patients.

The Comparison between location of fiberoptic bronchoscope findings in the two lungs with histological

tumor types is seen in (Table 3). In squamous carcinoma patients the right lung was affected in (60%). Adenocarcinoma patients have right and left lung equally

affected (35%). In patients with small cell carcinoma the right lung was affected in (71%).

Table 1: The distribution of cases according to fiberoptic bronchoscope findings and histological types of tumors.

Findings	Squamous cancer 15 patients (31%)		Adenocarcinoma 20 patients (41%)		Small cell cancer 14 patients (28%)		Total in 49 patients	
	Numbers	%	Numbers	%	Numbers	%	Numbers	%
Mass	10	67%	8	40%	7	50%	25	51%
External compression	2	13%	7	35%	3	21%	12	25%
Internal narrowing	2	13%	5	25%	1	7%	8	16%
Abnormal main carina	7	47%	4	20%	2	14%	13	27%
Abnormal vocal cord	1	7%	5	25%	1	7%	7	14%
Nodular mucosa	1	7%	2	10%	3	21%	6	12%
Mucosal ulcer	---	---	1	5%	---	---	1	2%
Mucosal congestion	11	73%	19	95%	13	93%	43	88%
Mucosal thickening	---	---	2	10%	---	---	2	4%
Abnormal secretions	7	47%	9	45%	3	21%	19	39%
Normal	---	---	6	30%	---	---	6	12%

Table (2): The distribution of lesions according to site of lesions in relation to airways and histological types of tumors.

Site of lesion	Squamous cancer 15 patients (31%)		Adenocarcinoma 20 patients (41%)		Small cell cancer 14 patients (28%)		Total in 49 patients	
	Numbers	%	Numbers	%	Numbers	%	Numbers	%
Right main bronchus	---	---	---	---	2	14%	2	4%
Right upper lobe bronchus	2	13%	1	5%	3	21%	6	12%
Right middle lobe bronchus	---	---	---	---	3	21%	3	6%
Right lower lobe bronchus	1	7%	2	10%	---	---	3	6%
Left main bronchus	2	13%	---	---	---	---	2	4%
Left upper lobe bronchus	2	13%	1	5%	1	7%	4	8%
Lingula	---	---	---	---	---	---	---	---
Left lower lobe bronchus	---	---	1	5%	2	14%	3	6%
Right middle & lower lobe bronchus	1	7%	1	5%	---	---	2	4%
Right main bronchus & main carina	2	13%	1	5%	---	---	3	6%
Right main & upper lobe bronchus	---	---	1	5%	---	---	1	2%
Right upper lobe bronchus, Trachea, vocal cord & main carina	1	7%	1	5%	---	---	2	4%
Right main bronchus, trachea & main carina	2	13%	---	---	---	---	2	4%
Right upper, middle, lower lobe Bronchus & main carina	---	---	---	---	1	7%	1	2%
Right middle lobe bronchus & Vocal cord	---	---	---	---	1	7%	1	2%
Left main, upper, lingual Bronchus & main carina	---	---	1	5%	---	---	1	2%
Left main bronchus, vocal cord & main carina	---	---	1	5%	---	---	1	2%
left upper lobe bronchus & vocal cord	---	---	3	15%	---	---	3	6%
left upper lobe bronchus & main carina	1	7%	---	---	---	---	1	2%
Left main bronchus & main carina	1	7%	---	---	1	7%	2	4%
Main carina	---	---	---	---	---	---	---	---
Trachea	---	---	---	---	---	---	---	---
Vocal cord	---	---	---	---	---	---	---	---
Normal	---	---	6	30%	---	---	6	12%
Total	15	100%	20	100%	14	100%	49	100%

Table (3): The distribution of cases according to location of lesion in relation to lungs and histological types of tumors.

Site of lesion	Squamous cancer 15 patients (31%)		Adenocarcinoma 20 patients (41%)		Small cell cancer 14 patients (28%)		Total in 49 patients	
	Numbers	%	Numbers	%	Numbers	%	Numbers	%
Right lung	9	60%	7	35%	10	71%	26	53%
Left lung	6	40%	7	35%	4	29%	17	35%
Both lungs	---	---	---	---	---	---	---	---
Normal	---	---	6	30%	---	---	6	12%
Total	15	100%	20	100%	14	100%	49	100%

DISCUSSION

The main finding we observed that there was a higher incidence of adenocarcinoma, which can be higher than the incidence of squamous carcinoma. A number of groups of authors reported an increase in adenocarcinoma incidence than the incidence of squamous carcinoma.^[19,20] In a recent report studied in the kingdom of Saudi Arabia also show higher incidence of adenocarcinoma.^[21] According to Shields, show higher incidence of adenocarcinoma.^[22] In our study the incidence of adenocarcinoma was (41%) then squamous carcinoma (31%) and small cell carcinoma was (28%).

One group of authors analyzed the histological types (squamous carcinoma, adenocarcinoma, small cell carcinoma, and large cell carcinoma) and correlated them with their location and endoscopic findings. Squamous carcinoma was most commonly located in the central region, and, on endoscopy, it was most commonly visualized as a tumor mass. Adenocarcinoma was most commonly located in peripheral areas and showed indirect findings, such as bronchial obstruction and external compression, which are bronchoscopy invisible, or no findings at all.^[23]

Comparing the three histological types with their bronchoscope findings, we demonstrated that an endobronchial mass is the most common bronchoscopy finding that is suggestive of squamous carcinoma, whereas external compression and normal bronchoscope are mostly suggest adenocarcinoma. In small cell carcinoma the most common finding was mass (Table1). These findings are in agreement with those reported by other authors.^[24]

Regarding the most prevalent lung cancer location, in squamous carcinoma the most commonly affected sites are main carina, right main bronchus and right upper lobe bronchus. In small cell carcinoma the most commonly affected sites are the right upper lobe bronchus and right middle lobe bronchus.

In adenocarcinoma the most commonly affected sites are the vocal cord, left upper lobe bronchus and right upper lobe bronchus lesions (Table 2). In both squamous cell and small cell carcinoma the right lung affected more than the left one while in adenocarcinoma both lungs affected in equal percent (Table 3).

Our findings correlate with the literatures.^[23] The findings of the present study in Iraq, are in agreement with those reported in the literature and underscore the importance of a standardized description of fiberoptic bronchoscopy findings as a tool in the diagnosis of lung cancer.^[23,24,25]

CONCLUSION

- 1- The squamous and small cell carcinoma seen most commonly as visible mass whereas the adenocarcinoma may presented invisibly as external compression, normal bronchoscope or visible mass.
- 2- The location of lesion in squamous and small cell carcinoma most commonly in the right upper lobe, right main and right middle lobe bronchus with right lung affected more than the left one in both cancer. In adenocarcinoma the lesion located mostly in left upper lobe bronchus, vocal cord and right upper lobe bronchus with both right and left lungs affected equally.
- 3- There was no clear relationship between the fiberoptic bronchoscope findings and their anatomical locations with the histological types of lung cancer.

LIMITATIONS OF THE STUDY

1- The bronchoscopists can face difficulties in describing endobronchial lesions. Such lesions range from a devitalized area showing loss of natural luster to gross presentations of large exophytic masses obstructing the bronchial lumen. The description of images as seen under the cold light of the endoscope is subjective, reflecting the variability to which any scientific observation is subject. Fiberoptic bronchoscopy reports show a bias in description, the same lesion can be described with different words, and the cold light of the endoscope can cause artifacts (as it often does).

2- The intraepithelial neoplastic lesions present a challenging diagnostic problem, even for experienced bronchoscopists. The reason for this is that these lesions are only a few cell layers thick and a few millimeters in surface diameter.^[26] Because of this, they may not produce any visible abnormality on bronchoscopy. In some cases, subtle changes can be observed in carcinoma, consisting of an increase in redness, granularity, or slight thickening of the mucosa.

Unfortunately, these changes may also be seen in patients with other diseases. Despite a better understanding of the bronchoscope appearance of early lung cancer, Bechtel and coworkers found that 39% required more than one bronchoscopy for localization of the source of the cancer cells found by sputum cytology examination.^[27]

3- In addition, at best, examiners recognize endoscopic signs of malignancy, but no histopathology diagnosis can be presumed from the results of the test.^[28]

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