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Lung Luminescence: Unravelling the tapestry of Cancer Cases by Bronchoscopic biopsies in Tertiary Care Hospital

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A B S T R A C T

Background: Lung cancer, often diagnosed late, is a leading cause of death worldwide. Bronchoscopic biopsies are crucial for early detection, especially in smokers. In Pakistan, where smoking is prevalent, understanding lung cancer patterns is essential. This study examines the types and locations of lung cancers diagnosed via bronchoscopic biopsies in a tertiary care hospital, providing insights for better diagnosis and treatment.

Objectives: To determine the prevalence of different types of lung malignancies by using bronchoscopic guided endobronchial biopsies.

Methodology: It was a retrospective cross-sectional study conducted in in-patient of Department of Pulmonology, department Nishtar Medical University Multan study of 43 patients enrolled between June 2022 to Oct 2023 by using consecutive non probability sampling method. All were smokers more than 20 pack year.Data analysis was done by using SPSS 23 version.

Results: Out of 43 patients 34 (79%) were male and 9 (21%) were female. Bronchoscopic biopsy result showed small cell carcinoma being the most common tumour in our study 15 (34.88%) cases followed by Squamous cell carcinoma 14 (32.55%), Adenocarcinoma 6(13.95%), invasive carcinoma with hepatoid features 1 (2.32%), carcinoid tumour 1(2.32%), organizing Pneumonia 1(2.32%) and in biopsy was inconclusive in 5 (11.62%) cases. Tumour involvement by the location was also assessed in the present study. Most common site of origin was found to be Left main bronchus 11 (25.58%) followed by Right Main bronchus 9 (20.93%), Left upper lobe 9 (20.93%), Right upper lobe 5(11.62%), Left lower lobe 4 (9.30%), Lingular lobe 3 (6.97%), Right lower lobe 2(0.86%).

Conclusion: This study revealed that small cell carcinoma is the most prevalent type of lung cancer diagnosed via bronchoscopic biopsies among smokers with over 20 pack-years of smoking history. These findings highlight the critical role of bronchoscopic biopsies in the early detection of lung cancer in high-risk populations, underlining the need for targeted screening and tailored treatment approaches to improve patient outcomes in regions with high smoking prevalence.

Keywords: Small Cell Carcinoma; Squamous Cell Carcinoma; Bronchoscopy; Left Main Bronchus; Right Main Bronchus

Introduction

Currently, the most common cause of death from neoplastic illnesses globally is lung cancer. In the years prior, it was the most prevalent type of cancer. Lung cancer is the most prevalent and deadliest malignant disease, with an expected 2 million new cases and 1.7 million deaths from the disease in 2020, according to Globocan. Nearly 9000 new instances of lung cancer were diagnosed in Greece in 2020. Despite the fact that lung cancer is the most common cause of death worldwide, incidence rates vary greatly throughout nations due to factors such as smoking behaviours, socioeconomic level, and cultural variations that change over time.[1,2] Globally, lung cancer stands as a leading cancer type among women, ranking third in incidence and second in mortality, just behind breast cancer. Among men, it is the most prevalent in both incidence and mortality, with 1.82 million new cases and 1.56 million deaths recorded in 2012, constituting 19.4% of all cancer-related fatalities.[3] When it comes to estimating the central and distal airway mucosa, bronchoscopy technologies are thought to be the safest and most reliable methods available, since tissue biopsies serves as the primary diagnostic criteria for identifying airway diseases that are malignant or premalignant, with several methods now being studied.[4]

Smoking is the cause of 85% of fatalities from lung cancer.

It's interesting to note that this malignant tumour has other causes besides tobacco smoking. There are other related factors that influence this disease's incidence. such as a family history of lung cancer, post-tuberculosis lesions, exposure to arsenic, chromium, nickel, and asbestos [5,6]

There are two primary categories of lung cancer, which have an impact on treatment and management choices.[7] Seventy to eighty percent of lung cancer cases are non-small cell lung cancer (NSCLC). The most prevalent histological kind of cancer is squamous cell carcinoma. On CXR, it typically appears as a mass. Squamous cell carcinoma is particularly common in patients with hypercalcemia. Another form that may not always be connected to smoking is adenocarcinoma. It can happen in fibrosis or scar tissue. Rarely occurs alveolar cell carcinoma. Twenty to twenty-five percent of lung cancers are small cell lung tumours. It reacts to radiation and chemotherapy. Generally speaking, surgery is not necessary. The median survival time for untreated widespread small cell lung carcinoma is six weeks, and it advances quickly.

The advent of flexible fiber optic bronchoscopy by Ikeda in 1964 revolutionized diagnostic and therapeutic options in pulmonary medicine, largely replacing the rigid or open tube bronchoscope. Histopathological analysis of bronchial tissue is the definitive method for diagnosing bronchogenic cancer, particularly for endobronchial lesions. This minimally invasive procedure offers a high diagnostic yield, with studies showing that 60% of peripheral lung lesions can be diagnosed using transbronchial biopsy.[8,9]

Given the high prevalence and mortality rates of lung cancer, and the significant role of bronchoscopic biopsies in its diagnosis, this study aims to explore the efficacy and diagnostic yield of bronchoscopic biopsies in a tertiary care hospital setting. By examining a diverse patient population, the study seeks to enhance our understanding of lung cancer detection and improve diagnostic methodologies, ultimately contributing to better patient outcomes and advancements in pulmonary oncology.

Objectives

To determine the prevalence of different types of Lung malignancies by using bronchoscopic guided endobronchial biopsies.

Methodology

It was a retrospective study of 43 patients enrolled between June 2022 to Oct 2023 by using consecutive non probability sampling method. All were smokers more than 20 pack year. Total duration of study was 17 months. Study was conducted in inpatient of Pulmonology department Nishtar Medical University Multan. Data analysis was done by using SPSS 23 version.

Prior to undergoing bronchoscopic biopsy, all patients had a CT chest scan with intravenous contrast to accurately locate the position of the mass. Endobronchial biopsies were performed using an Olympus bronchoscope, model number not specified. The criteria for biopsy included a platelet count greater than 100,000 and normal prothrombin time (PT) and activated partial thromboplastin time (aPTT).

Results

Out of 43 patients 34 (79%) were male and 9 (21%) were female. Bronchoscopic biopsy result showed small cell carcinoma being the most common tumour in our study 15 (34.88%) cases followed by Squamous cell carcinoma 14 (32.55%), Adenocarcinoma 6 (13.95%), invasive carcinoma with hepatoid features 1 (2.32%), carcinoid tumour 1 (2.32%), organizing Pneumonia 1 (2.32%) and in biopsy was inconclusive in 5 (11.62%) cases (Table 1).

Tumour involvement by the location was also assessed in the study. Most common site of origin was found to be Left main bronchus 11 (25.7%) followed by Right Main bronchus 9 (20.9%), Left upper lobe 9 (20.9%), Right upper lobe 5 (11.7%), Left lower lobe 4 (9.30%), Lingular lobe 3 (6.97%), Right lower lobe 2 (4.6%) (Table 2).

No major complication was seen during endobronchial biopsy. Bleeding was minor and controlled by instillation

Table 1. Frequency of Malignant lesions by the type of Cancer

Histopathologic diagnosis	No. of cases	Percentage (%)
Small cell Carcinoma	15	34.9
Squamous Cell Carcinoma	14	32.6
Adenocarcinoma	6	13.9
Invasive Carcinoma with Hepatoid features	1	2.3
Organizing Pneumonia	1	2.3
Inconclusive result	5	11.7
Carcinoid	1	2.3
	43	100.0

of cold saline, injection adrenaline on biopsy site.

Discussion

Lung cancer remains one of the most formidable challenges in modern oncology, with its complex etiology and varied presentation making early and accurate diagnosis a critical yet challenging task. In the ever-evolving landscape of medical diagnostics, bronchoscopic biopsies have emerged as a pivotal tool in the identification and characterization of pulmonary malignancies. This technique, with its minimally invasive approach, allows for direct visualization and tissue sampling from the respiratory tract, providing crucial insights that guide therapeutic decisions.

In a tertiary care hospital setting, where advanced medical resources and specialized expertise converge, the application of bronchoscopic biopsies plays a significant role in managing lung cancer cases. The term "Lung Luminescence" aptly captures the essence of this procedure, highlighting its ability to illuminate the hidden intricacies of cancer within the lungs. By meticulously unraveling the histopathological tapestry of these cases, bronchoscopic biopsies not only enhance diagnostic accuracy but also contribute to personalized treatment strategies, thereby improving patient outcomes. Lung cancer accounts for over 28% of all cancer deaths annually.[10] It is the leading cause of cancer-related

Table 2. Frequency of endobronchial lesion by site of origin

Location of Endobronchial lesion	No. of Cases	Percentage (%)
Right Main Bronchus	9	20.9
Left Main Bronchus	11	25.7
Right Upper Lobe	5	11.7
Right Lower Lobe	2	4.6
Left Upper Lobe	9	20.9
Lingular Lobe	3	6.9
Left Lower Lobe	4	9.3
	43	100.0

Table 3. Relation between histopathological types of lung cancer and anatomical site of tumour

Anatomical site	Histopathological pattern							
	Small Cell CA n(%)	Squamous cell CA n(%)	Adenocarcinoma n(%)	Invasive CA with hepatoid features n(%)	Organized pneumonia n(%)	Carcinoid n (%)	Inconclusive N (%)	Total N (%)
Left Main Bronchus	5 (33.33)	4 (28.57)	1 (16.66)	1 (100.00)	0 (o.oo)	0 (o.oo)	0 (o.oo)	11 (25.58)
Right Main Bronchus	3 (20.00)	4 (28.57)	2 (33.33)	0 (o.oo)	0 (o.oo)	0 (o.oo)	0 (o.oo)	9 (20.93)
Right Upper Lobe	1 (6.66)	3 (21.42)	0 (o.oo)	0 (o.oo)	0 (o.oo)	1 (100.00)	0 (o.oo)	5 (11.62)
Right Lower lobe	2 (13.33)	0 (o.oo)	0 (o.oo)	0 (o.oo)	0 (o.oo)	0 (o.oo)	0 (o.oo)	2 (4.65)
Left Upper Lobe	4 (26.66)	3 (21.42)	1 (16.66)	0 (o.oo)	0 (o.oo)	0 (o.oo)	1 (20.00)	9 (20.93)
Lingular Lobe	0 (o.oo)	0 (o.oo)	1 (16.66)	0 (o.oo)	0 (o.oo)	0 (o.oo)	2 (40.00)	3 (6.97)
Left Lower Lobe	0 (o.oo)	0 (o.oo)	1 (16.66)	0 (o.oo)	1 (100.00)	0 (o.oo)	2 (40.00)	4 (9.30)
Total	15 (100.00)	14 (100.00)	6 (100.00)	1 (100.00)	1 (100.00)	1 (100.00)	5 (100.00)	43 (100.00)

mortality worldwide, responsible for approximately 1.4 million deaths each year.[11]

In the present study fiberoptic bronchoscopy was done in 43 cases, majority of which found out to be malignancy. Only 5 cases were inconclusive that may be due to inadequate tissue or processing technique fault. Small cell carcinoma, squamous cell carcinoma and adenocarcinoma were the top three tumours found in our study. A study conducted by Safwat et al. at the Faculty of Medicine, Ain Shams University, examined the presentation and localization of lung cancer in patients undergoing fiberoptic bronchoscopy (FOB). The study included 36 patients who underwent bronchoscopy to confirm the presence of malignancy. Out of these 36 cases, 31 patients were identified as smokers, while five were non-smokers. The study found a significant correlation between smoking and specific types of lung cancer. Squamous cell carcinoma was notably prevalent among smokers, accounting for 94.44% of cases in this group. Additionally, small cell carcinoma was exclusively observed in smokers, representing 100% of the cases with this subtype. Adenocarcinoma was present in both smokers and non-smokers; however, it was more common among smokers, with eight out of twelve cases (66.67%) occurring in individuals with a smoking history.[12] we only included the smokers in our study.

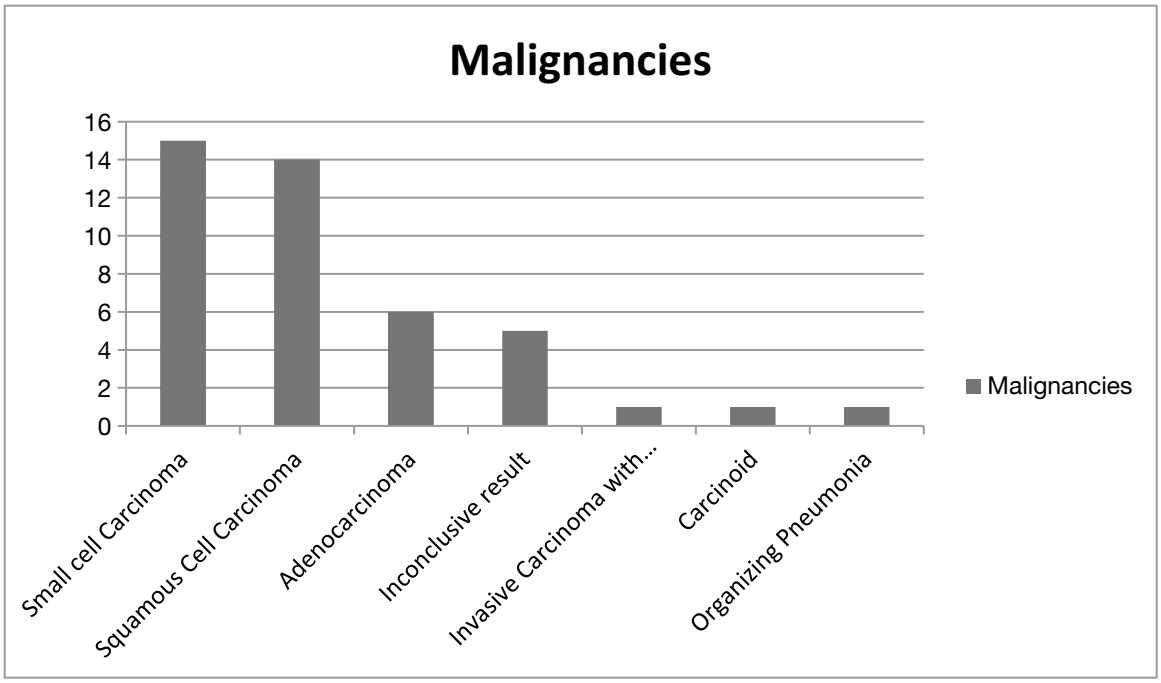

Figure 1. Frequency of Malignant lesions by the type of Cancer

Our study found different results and showed small cell carcinoma 15 (34.88%) being the most common tumour followed by squamous cell carcinoma 14 (32.55%),, Adenocarcinoma 6(13.95%), invasive carcinoma with hepatoid features 1 (2.32%), carcinoid tumour 1(2.32%), organizing Pneumonia 1(2.32%) and in biopsy was inconclusive in 5 (11.62%) cases, in contrast, a study by Mazhar and Jehanzeb investigated the outcomes and complications of fiberoptic bronchoscopy (FOB) in a cohort of 60 patients presenting with central lung opacities. Their findings highlighted a distinct distribution of lung cancer subtypes and other pathological conditions. Out of the 60 patients, squamous cell carcinoma was the most frequently diagnosed, found in 28 patients, accounting for 70% of the cases. Small cell carcinoma was the second most common, observed in 10 patients, representing 25% of the cases. Adenocarcinoma was relatively rare in this study, identified in only two patients, or 5% of the cases. The study also reported other notable findings, including squamous metaplasia in three patients (5%), nonspecific inflammation in seven patients (10%), and chronic noncaseating granulomatous inflammation in two patients (3.3%). Additionally, one patient (1.7%) was diagnosed with caseating granuloma, indicative of tuberculosis. In our study small cell carcinoma was the most common tumour followed by squamous cell carcinoma.

In our study, the most common site of origin for lung cancer was found to be the left main bronchus, with 11 cases accounting for 25.58% of the total. This was followed by the right main bronchus, which was the site of origin in 9 cases, representing 20.93%. Similarly, the left upper lobe was also a frequent site, with 9 cases (20.93%). The right upper lobe was the site of origin in 5 cases, making up 11.62% of the total. The left lower lobe was involved in 4 cases, accounting for 9.30%. The lingular lobe was the origin in 3 cases, which is 6.97%. Lastly, the right lower lobe was the least common site, with 2 cases making up just 4.65%. These findings highlight the distribution of lung cancer origins within the bronchial tree and lobes of the lung, providing valuable insights into the prevalence of tumor locations in our patient population.

This study also reveals the specific involvement of various bronchial sites by different histological types of lung cancer. Small cell carcinoma was found to most commonly involve the left main bronchus, accounting for 33.33% of cases in this category. This suggests a predilection for this site in small cell carcinoma, which is known for its aggressive nature and central location in the bronchial tree. Squamous cell carcinoma showed a more distributed pattern of involvement. It was equally common in the left main bronchus and the right main bronchus, with each site accounting for 28.57% of cases. This bilateral involvement indicates that squamous cell carcinoma has a significant presence in both main bronchi, reflecting its potential to arise in multiple central locations within the lungs. Adenocarcinoma most commonly involved the right main bronchus, with 33.33% of cases affecting this site. Adenocarcinoma, which can develop in both smokers and non-smokers, tends to occur more peripherally. However, the significant

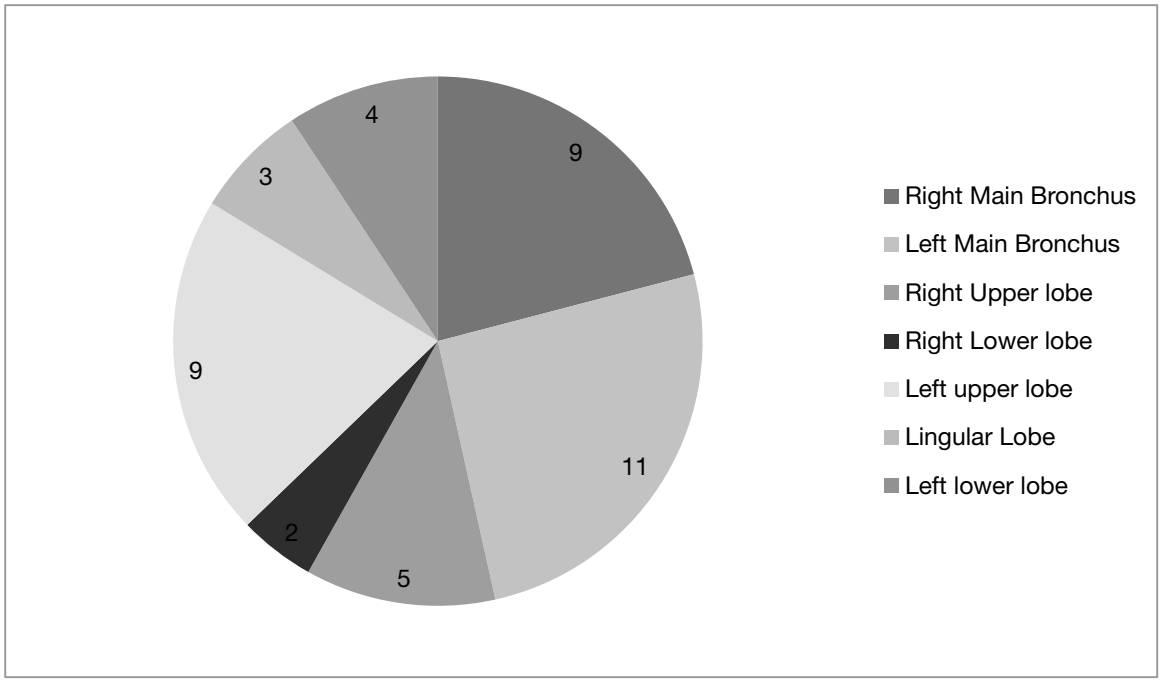

Figure 2. Showing distribution of tumor by site of involvement

involvement of the right main bronchus in our study indicates its capability to also present centrally. These findings highlight the varied anatomical preferences of different lung cancer histologies. Small cell carcinoma's central location aligns with its rapid growth and tendency for early metastasis. The bilateral main bronchial involvement by squamous cell carcinoma underscores its central origin and association with smoking. The right main bronchus predominance in adenocarcinoma cases suggests a notable site-specific occurrence, providing insights into its potential pathways of development and spread within the bronchial tree. Understanding these patterns is crucial for guiding bronchoscopic biopsy procedures and improving diagnostic accuracy.

These findings highlight the critical role of bronchoscopic biopsies in the accurate diagnosis of lung cancer within a tertiary care hospital setting. These findings underscore the importance of tailored diagnostic approaches, considering the varied anatomical preferences of different lung cancer histologies. These findings also reaffirms the reliability and diagnostic yield of bronchoscopic biopsies, facilitated by pre-procedural imaging and stringent patient selection criteria. As lung cancer continues to be a leading cause of cancer-related deaths globally, understanding the nuances of its presentation and improving diagnostic methodologies remain paramount. Future research should focus on expanding sample sizes and exploring advanced bronchoscopic techniques to further enhance diagnostic accuracy and patient outcomes. Ultimately, our study contributes valuable insights into the landscape of lung cancer diagnosis, emphasizing the need for continued innovation and precision in pulmonology to combat this pervasive and deadly disease.

Conclusion

The present study concluded that small cell carcinoma emerged as the most prevalent endobronchial tumor. Persistent pulmonary symptoms such as a productive cough, dyspnea, chest pain, and hemoptysis warrant prompt investigation. It is crucial to implement proper screening and early diagnostic methods on a large scale to identify patients at risk of developing lung cancer. Smoking cessation should be consistently emphasized during every patient interaction.

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