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Correlation of Bronchoscopy Visualization With Cell Type in Lung Cancer Patients at Haji Adam Malik Hospital Medan 2023

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ABSTRACT

Introduction: Lung cancer is defined as a tumor that originates in the lung parenchyma or is located around the bronchi. The two main types are Non Small Cell Lung Carcinoma (NSCLC) and Small Cell Lung Carcinoma (SCLC). When carrying out the procedure, several bronchoscopy visualizations are assessed, such as the bronchial lumen, bronchial mucosa, secretions and bronchial anatomy. Timely bronchoscopic intervention is important for rapid and accurate diagnosis. To determine the relationship between bronchoscopic visualization and carcinoma cell type characteristics from histopathology.

Method: This study was conducted with an observational analytic design conducted in a cross-sectional manner, from October 2023 to May 2024. The subjects of this study were taken from the population of lung cancer patients who were hospitalized and outpatient in the hospital, were found to be 67 samples of Non Small Cell Lung Carcinoma (NSCLC). Data included bronchoscopic visualization with lung carcinoma cell type from histopathology, were analyzed univariately and bivariately to assess the relationship between bronchoscopy visualization and lung carcinoma cell type.

Results: All patients had Non Small Cell Lung Cancer (100%) are Adenocarcinoma as much as 63% and Squamous Cell Carcinoma as much as 37%. Bronchoscopy visualization shows a central location (62%), partially closed lumen (65%), smooth mucosa (64.5%), mucoid secretion (83.8%), and most often in the right main bronchus (32.2%).

Conclusion: There was a significant relationship between bronchoscopy location and type of lung cancer cell (P value 0.001), as well as between mucosa and cell type (P value 0.001).

Keywords

Lung carcinoma, Bronchoscopy, Histopathology, Non small Cell lung larcinoma, Small cell lung carcinoma.

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INTRODUCTION

All malignant diseases of the lung, including those that originate in the lung itself and those that spread to other parts of the lung (lung metastases), are collectively referred to as lung cancer.[1]

One of the most prevalent types of cancer is lung cancer.[2] According to the 2020 Global Burden of Cancer (GLOBOCAN) data, there were 2,206,711 new cases of lung carcinoma in 2020. There are two primary forms of lung cancer: Small Cell Lung Carcinoma (SCLC) and Non Small Cell Lung Carcinoma (SCLC). Meanwhile, the NSCLC type of lung cancer, which is known to be more aggressive and can

develop and spread quickly to other areas of the body, accounts for 10% to 15% of cases reported to the Indonesia Cancer Care Community (ICCC) the most common habit is smoking.[3,4]

In Indonesia, lung carcinoma is the third most common malignancy after breast and cervical cancer. Lung cancer is the cause of 30,843 or 13.2% of cancer related deaths in Indonesia. Data from simply North Sumatra show that in 2019, the Haji Adam Malik Medan Hospital saw 278 patients with lung cancer, more men than women, and 68 of them were declared dead.[5] Bronchoscopy was first used by Shigeto Ikeda in 1967, and since then, it has been an essential diagnostic and treatment tool for lung conditions, especially lung cancer. A bronchoscopy is a medical procedure where a bronchoscope is sent via the trachea, larynx, and throat into the bronchus to observe the thorax. By a process known as biopsy, it can be used to obtain tissue or mucus samples in addition to diagnosing and treating an illness.[6]

Lung cancer diagnosis is important for two main reasons: it makes treatment choices more appropriate and provides an accurate estimate of how well a patient will respond to treatment. The first step is to accurately determine the histological type of the tumor.[7,8] Next, precisely determine stage.[9] Adenocarcinoma and squamous cell carcinoma may be distinguished from one another by knowing the patient's smoking history and lifestyle choices.[10] A 2017 study by Vishak Archaya et al, found that on a bronchoscopic examination, a common endoluminal lesion image 70% of patients showed squamous cell carcinoma (SCC). Furthermore, Vishak et al. concluded that the most important intervention for a quick and accurate diagnosis of lung cancer may actually be an early bronchoscopy. However, one limitation of Vishak's work was that no correlation study was performed to look at the association between the type of lung cancer and the images obtained using bronchoscopic visualization.[11] A 2016 review by Andolfi et al. found that white light bronchoscopy (WLB) is only useful for diagnosing 29% of cases of carcinoma in situ and 69% of cases of microinvasive tumors. However, this has improved with the introduction of high magnification broncho videoscopy (HMB), narrow band imaging (NBI), and autofluorescence bronchoscopy (AFB). Even with these advancements, Andolfi stresses in his evaluation the need to understand and being proficient in the traditional bronchoscopy techniques, finishing with a quotation from Dr. Shigeto Ikeda that says, Hope is higher with bronchoscopy.[12]

The local effects of the tumor are what cause the symptoms of lung cancer these include paraneoplastic syndrome, kidney stones from chronic hypercalcemia, stroke-like symptoms from brain metastases, cough from the tumor compressing the airways.[13] According to histology, there are two primary types of lung cancer: non-small cell lung cancer, or NSCLC, and small cell lung cancer or SCLC.[14] Generally speaking, SCLC is a very aggressive malignancy with a short prognosis that spreads quickly. Of those with SCLC, just 5% live for five years after their diagnosis.[13]

Three main changes can be seen in the bronchoscopic picture when there are tumors, enlarged lymph nodes, or metastases. These include swelling of the main tracheal or bronchus wall and anatomical distortion due to external pressure on the bronchial trachea, which is typically caused by secondary lymphadenopathy and widens the carina angle. Intraluminal growths, which appear as dilatation or rupture of secondary lymph nodes through the bronchial wall, may be the precursor of the intralumen itself. The lumen may be entirely or partially closed by intraluminal growths.

Comparative research has not previously identified the same researchers. Most research examine histopathological features with different sampling techniques; compared washing, brushing, and impression smears, for instance. This can make this research quite meaningful. Therefore, researchers are interested in seeing how the bronchoscopic visualization images correlate in lung carcinoma patients at Haji Adam Malik General Hospital, Medan in 2023.[14]

METHOD

In order to ascertain the association between lung carcinoma cell types and bronchoscopy visualization images in patients with lung cancer at Hajj Adam Malik Hospital Medan in 2023, this study used a cross-sectional observational analytical design. The study's participants were drawn from the hospitalized and outpatient populations of lung cancer patients. All patients who have been diagnosed with lung cancer based

on a history, physical examination, and supporting examinations make up the target population. The target population that had a bronchoscopy and histopathological evaluation at Haji Adam Malik Hospital Medan includes the affordable population. The target population that satisfies the inclusion and exclusion criteria includes the sample.

Non-probability sampling, or consecutive sampling, is the method used in the study population selection approach. If a population satisfies the inclusion and exclusion criteria, it is included as a research sample. Sequential samples are gathered up until the required minimum sample size is reached. The formula above indicates that 46 patients will be the minimal sample size for this investigation; this will be increased to 62 samples. Patients with lung tumors who have received a diagnosis based on radiological and clinical criteria make up the study's sample. For every study sample, a bronchoscopy and a histopathological investigation were performed. Additionally, information on the outcomes of the histopathology and bronchoscopy tests will be collected. After that, the information will be gathered into Microsoft Excel, where it will undergo data cleaning, which involves reexamining any inaccurate or missing information to ensure its accuracy. Statistical software will next be used to process the data. In this study, univariate and bivariate data analysis were employed.

RESULTS

The demographic characteristics of the number of lung cancer patients in this study from October 2023 were 62 people (Table 1). Males were the most patients with 50 patients (80%). Most sufferers are aged 20-60 years with a total of 34 patients (54%), and the largest tribe is the Batak tribe with a total of 45 patients (73%), the most work is working outside the home as many as 27 people (44%) and the least is not working as many as 12 people (19%) then the most marital status is married 54 people (87%), and those with more education than 9 years have the highest percentage of education 45 people (72.6%).

Table 1. Demographic Characteristics

Characteristics	n	%
Gender		
Men	50	80
Women	12	20
Age		
20-60 Years	34	54
>60 Years Old	28	46
Tribe		
Batak	45	73
Jawa	11	17
Melayu	3	5
Others	3	5
Work		
Inside	23	37
Outside	27	44
Not work	12	19
Marriage status		
Married	54	87
Not Married	8	13
Education		
<9 Years	17	27,4
>9 Years	45	72,6

The results of the bronchoscopic examination based on the location are most central as many as 39 people (62%) and the least is peripheral as many as 23 people (38%), based on the lumen, the most patients are partially closed as many as 40 people (65%) and the least is totally closed as many as 22 people (35%),

based on the most mucosa is slippery as many as 40 people (64.5%), based on the most secretion is mucoid as many as 52 people (83.8%).

Table 2. Bronchoscopy Examination Results

Bronchoscopy Examination Results	n	%
Location		100
Central	39	62
Peripheral	23	38
Lumen		
Totally closed	22	35
Partially closed	40	65
Open	0	0
Mucosa		
Hyperemic	22	35,5
Slippery	40	64,5
Secret		
Mukoid	52	83.8
Bronchoscopy Examination Results		
Purulent	8	13
Hemorrhagic	2	3,2
Bronchial Anatomy		
Right Main Bronchus	20	32.2
Right Upper Lobe	8	12.9
Right Middle Lobe	10	16.1
Right Lower Lobe	3	4.9
Left Main Bronchus	9	14.5
Left Upper Lobe	9	14.5
Left Lower Lobe	3	4.9

Table 3. Relationship Between Bronchoscopy Visualization and Cell Type in Lung Cancer Patients

Variabel	Types of Cancer Cells		p value
	Adenocarcinoma	Squamous Cell Carcinoma	
Location			
Peripheral	0	23	0,001
Central	39	0	
Lumen			
Totally closed	17	5	0.104
Partially closed	22	18	
Mucosa			
Hiperemic	5	23	0,001
Slippery	34	0	
Secret			
Mucoid	32	20	
Purulent	6	2	0,710
Serous Hemoragic	1	1	
Bronchial Anatomy			
Right Main Bronchus	10	10	
Right Upper Lobe	5	3	
Right Middle Lobe	7	3	
Right Lower Lobe	2	1	0,488
Left Main Bronchus	6	3	
Left Upper Lobe	8	1	
Left Lower Lobe	1	2	

Based on bronchial anatomy, the most were in Right main bronchus as 20 patients (32.2%), and the least were in right lower lobe and left lower lobe many as 3 people (4.9%). Relationship Between Location, Lumen, Mucosa, Secret, and Bronchus Anatomy with Cell Type in Lung Cancer Patients.

The variables of location (p=0.001) and mucosa (p=0.001) explain that there is an association with cell types in lung cancer patients. Meanwhile, the variables of lumen (p=0.104), secretion (p=0.710), and bronchial anatomy (p=0.488) explained that there was no relationship between the variables and the type of cancer cells.

DISCUSSION

Patients with lung tumors exhibit diverse characteristics, influenced by factors such as age, histological subtype, molecular features, and prognostic factors. Based on the results of the study, it can be seen that men are the most patients with a total of 50 patients (80%).

Most sufferers are aged 20-60 years with 34 patients (54%), and the largest tribe is the Batak tribe with 45 patients (73%), the most work is working outside the home as many as 27 people (44%) and the least is not working as many as 12 people (19%) then the most marriage status is married 54 people (87%). Although lung cancer patients are often diagnosed at 70 years of age or older, there is a growing number of instances among people 40 years of age or younger.[15,16] Males are more likely than females to acquire lung cancer if they smoke more frequently and are exposed to high levels of cigarette smoke and pesticides at work or outside.[17,18] There is no evidence to support the claim that a person's marital status raises their risk of lung cancer.[19]

Another study that focused on patients between the ages of 18-40 revealed that the majority of patients with lung cancer were asymptomatic when they were first diagnosed, with a mean age of.[20] Furthermore, molecular research on lung adenocarcinoma in young patients (18-45 years old) has shown unique molecular characteristics and a major influence of important driver genes on tumor differentiation and prognosis.[21] This is consistent with the study's findings, which indicated that 34 patients, or 54% of the total, were between the ages of 20-60. In the past, men were more likely to develop lung cancer, but more and more women are developing the disease these days, which is linked to things like smoking, being around cigarette smoke, air pollution, etc.[22]

According to the findings of the histological analysis, NSCLC were discovered in 62 patients or 100% of the total of the patients. Numerous biological mechanisms, epidemiological factors and environmental factors can all contribute to this. In general, NSCLC grows more slowly than SCLC. This could make NSCLC simpler to identify as symptoms become more apparent later on, but it could also make the condition easier to detect earlier.

The study's findings indicate that there is a p-value of 0.001 correlation between the location and type of cells in lung cancer patients. For a variety of reasons pertaining to clinical manifestations, anatomical location, and detection techniques, central lung tumors are found more frequently than peripheral ones. For example, from its central placement, which is close to the trachea and main bronchus. When compared to peripheral tumors, central tumors are more frequently discovered and are linked to poorer survival rates.[23,24] Furthermore, tumors in the central region are simpler to see and access using bronchoscopy, making them easier to detect than tumors in the peripheral region. and radiologically, these core tumors typically result in more noticeable lung abnormalities including atelectasis. Furthermore, compared to SCLC, central SCLC typically exhibits increased genomic instability, and this can impact prognosis and treatment response.[25]

Additionally, studies have shown that occult mediastinal disease incidence and overall survival rate are associated with central nonsmall cell lung carcinoma (NSCLC), which calls for more aggressive preoperative staging and treatment approaches.[26,27] Overall, the location of the tumor has a significant impact on the prognosis, therapeutic strategy, and type of cancer cell in lung cancer, highlighting the need of precise tumor localization in clinical decision-making. With p values of 0.104, the research findings indicate that there is no link between lumen and cell type in patients with cancer lung. These lenses exhibit brush border, polarization, tight junction, and other enterositis characteristics that point to limited differentiation.[28,29]

Compared to other observational studies, this one is unique. This gives details on the function of bronchoscopy in cases of adenocarcinoma and other peripheral cancers. When adenocarcinoma reaches the stage of bronchus, bronchoscopy can identify the tumor mass that has invaded the lumen of the bronchus. This mass can be viewed as a lesion that either completely or partially covers a lumen's surface. This article comes after. The mass that is easily seen during bronchoscopy in patients with SCC is referred to as the bronchial mass. This tumor may restrict the bronchus lumen entirely or partially.

The results of the study show that the relationship between the mucosa and cell type of lung cancer patients has a p-value of 0.001. The type and behavior of lung cancer cells can be significantly influenced by the smoothness and prominence of the lung mucosa. For example, prominent fissure indications are often associated with lung malignancies, especially squamous cell carcinoma.[30] and indicate the presence of mass lesions that may change the appearance and function of the bronchial mucosa. Malignancies and the bronchial mucosa are tightly associated because tumors that displace the bronchial epithelium may disrupt the ciliary transport system, thereby changing the clinical presentation.[31] Moreover, generalized progressive atrophy, metaplasia, hyperplasia, and dysplasia of the bronchial epithelium are common outcomes of lung cancer, indicating that the state of the mucosa is unstable and can vary widely throughout patients.[32]

Squamous Cell Carcinoma causes anomalies in the bronchial mucosa surrounding the tumor, such as edema, ulceration, and coloration (red or hyperemic).[33] The bronchial tissue has been invaded by cancer cells, resulting in these changes. Though it may not be as evident as in more central squamous cell carcinoma, the link between the bronchial mucosa and the adenocarcinoma cell type is still important when discussing tumor invasion and dissemination. The bronchial mucosa affected by adenocarcinoma may exhibit modifications such as increased consistency and color changes (becoming redder or paler, for example).

The p-value of 0.710 for this study suggests that there is no relationship between the cell types and secretions of lung cancer patients. Thoracic empyeme-related purulent discharges have the potential to worsen lung cancer, especially after a thoracotomy, pleural drainage, or chemotherapy. Before receiving more cancer treatment, adequate infection control is required. The significance of each of the three forms of secretions hemorrhagic, purulent, and mucoid when combined draws attention to the intricate challenges associated with diagnosing and treating lung cancer. It also emphasizes the need for comprehensive clinical evaluations and customized treatment regimens.[34,35]

Adenocarcinoma can produce mucoid and purulent bronchial secretions, especially when they involve or approach the bronchus.[36,37] Purulent secretions may indicate a future infection, although mucoid secretions are often an inflammatory response to the tumor.[38,39] Bloody discharges, however, could irritate the bronchus if an adenocarcinoma spreads there. Changes in bronchial secretions can serve as a helpful marker for the diagnosis and assessment of adenocarcinoma cells, even though there isn't always a direct association between the type of secretion and the type of cancer cells.[40-42] Although the features of the sputum do not always match the kind of cancer cells, bloody or continuously purulent sputum can be an indication of squamous cell carcinoma. This is particularly true in cases where a major bronchus is around the tumor. The study's results show that there is no relationship between the sort of cells found in lung cancer patients and the bronchus's actual location, with a p value of 0.488. The placement of the bronchi does not correspond with the type of cancer cells. There is inconsistent variation in the lobar distribution of several histological types.[43-46] Several investigations have shown that the right main bronchus differs from the left main bronchus in that it is anatomically more vertical and considerably shorter.[47,48] Particles and other carcinogenic substances may enter the right main bronchus and accumulate there, leading to the development of lung cancer.[49,50]

CONCLUSION

The results of the univariate test show that men between the ages of 20-60 who are married, belong to the Batak ethnic group, work outside the home, and have completed more than nine years of education make up

the majority of lung cancer patients. It was also found that the majority of the lung cancer cells impacted were NSCLC. The majority of lung cancer cases were found to be in the central region of the lung, with partially closed lumens, slippery mucosa, mucoid secretions, and bronchial architectural anomalies in the right main bronchus, according to the results of bronchoscopy examinations for patients with lung cancer.

Meanwhile, the results of the bivariate test show that the variables related to location (p=0.001) and mucosa (p=0.001) explain the relationship between lung cancer patients and cell type. The variables related to lumen (p=0.104), secretion (p=0.710), and bronchus shape (p=0.488) accounted for the causes and types of cancer cells.

DECLARATIONS

Ethics approval and consent to participate. Permission for this study was obtained from the Ethics Committee of Universitas Sumatera Utara and Haji Adam Malik General Hospital.

CONSENT FOR PUBLICATION

The Authors agree to publication in Journal of Society Medicine.

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COMPETING INTERESTS

The authors declare that there is no conflict of interest in this report.

AUTHORS' CONTRIBUTIONS

All authors significantly contribute to the work reported execution, acquisition of data, analysis, and interpretation, or in all these areas. Contribute to drafting, revising, or critically reviewing the article. Approved the final version to be published, agreed on the journal to be submitted, and agreed to be accountable for all aspects of the work.

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