RESEARCH ARTICLE

# Bronchoscopic and Histologic Features of Patients with Lung Cancer

**Dainer Rogelio Acosta Sánchez\*, Miriannis Abad Ferrer, Eduardo Castillo Varona, Nancy Nápoles Smith, Adriana Cabo García**

University of Medical Sciences, Cuba

**Abstract: Introduction:** Lung cancer refers to a group of diseases resulting from the abnormal growth of cells of the breathing tract, in particular of the lung tissue. **Objectives:** To determine the bronchoscopic and histologic features useful in the confirmation of the diagnosis of these malignant neoplasms. **Methods:** We carried out a descriptive and cross-sectional investigation of 346 patients with lung cancer treated in the Pulmonology Service of Dr. Juan Bruno Zayas Alfonso Teaching General Hospital in Santiago de Cuba during 2016 and 2017, to whom a bronchoscopy was performed. The variables included age, sex, diagnostic technique used, histopatologic diagnosis and most frequent localization. **Results:** Patients prevailed in the ages between 56 and 75 (66.1%), as well as the male sex (65.0%). The bronchial biopsy was the procedure that mostly revealed the presence of cancer (61.3%) and the most frequent histologic type was squamous cell carcinoma (67.8%). **Conclusions:** The importance of bronchoscopy and its diagnostic procedures was demonstrated to confirm the existence of the morbid process.

**Keywords:** Lung cancer, Squamous cell carcinoma, Adenocarcinoma, Bronchoscopic findings, Fiberoptic bronchoscopy

**\*CORRESPONDING AUTHOR**
Dainer Rogelio Acosta Sánchez
E-mail: dcosta@infomed.sld.cu

## 1. Introduction

When cells are immature and abnormal in morphology and function, and may invade adjacent normal tissues and spread far away, they are called cancer[1,2].

In this order, lung cancer refers to a series of diseases caused by the abnormal growth of respiratory cells, especially lung tissue. It is one of the most common malignant tumors in the world[3,4].

Lung cancer is the tumor with the highest mortality rate, with 1.18 million deaths every year. It exceeds the total number of deaths from colon, prostate and breast cancer. At the time of diagnosis, more than 40% of patients had locally advanced diseases, the chance of cure was very small, and the 5-year survival rate was only 15%. Lung cancer remains a medical challenge because despite progress in diagnostic techniques and treatment resources, treatment outcomes remain poor and cure rates are low compared to the number of patients treated[5,6].

According to the Cuban statistical yearbook, in 2016, 5,544 people died of lung cancer in Cuba, while in 2017, 5,720 people died of lung cancer in the clinic, of which 3,617 were men, 64.6 per 100,000 people died of lung cancer, 2,103 were women, and 37.3 per 100,000 people died of lung cancer; in other words, 1.7 men died per woman. The main age group of men and women is 60–79 years old[7].

The incidence rate in Santiago, Cuba, increased from 24.8‰ in 2008 to 25.6‰ in 2014. During 2014–2015, 105 patients died of lung cancer and more than 100 new cases were diagnosed[8].

On the other hand, bronchoscopy is an upper and lower airway display technology, which can be used to diagnose inflammation, infection, tumor, bleeding and foreign body localization process, or for therapeutic purposes[9,10].

In 1966, Shigetoikeda, in cooperation with Machida Endoscoc and Olympus optical co., designed a flexible bronchoscope model (fiberoptic bronchoscope) made of glass fiber, which was put forward at the ninth international conference on lung diseases held in Copenhagen, which aroused widespread expectations[11].

At present, bronchoscopy is used for the diagnosis and staging of lung cancer. In this regard, due to the high incidence of this situation in Cuba, especially in the province of Santiago, Cuba, it is necessary for the pulmonary department of Dr. Juan Bruno Zayas Alfonso Teaching General Hospital to continuously describe the performance of this method in recent years.

In theory, the study provided scientific knowledge about the characteristics of malignant tumors in the territory and assessed some factors related to the quality of early care for patients with lung cancer from a practical perspective, thereby improving the quality and life expectancy of patients with lung cancer and improving the level of medical care in Cuba.

## 2. Methods

Dr. Juan Bruno Zayas Alfonso Teaching General Hospital in Santiago, Cuba, conducted a descriptive and cross-sectional study, from January 2016 to December 2017, to determine the bronchoscopic and histological characteristics of lung cancer patients undergoing diagnostic fiberoptic bronchoscopy.

The whole universe consists of 346 patients from lung and geriatric services, lung shadow counseling and internal medicine, with a sample of 227; among them, 155 cases showed consistent results with lung tumors in different histological types, and 72 cases showed nonspecific cell changes.

Variables of interest include:
• Age at diagnosis
• Gender
• Most frequent localization (according to the anatomical location of the lesion)
• Histopathological diagnosis of lung cancer (defined as positive if diagnosed as a tumor; defined as negative if not; in addition, non-specific cellular changes were considered)
• Bronchoscopy results (macroscopic changes described by the bronchoscope examiner)
• Diagnostic techniques (bronchial biopsy, bronchial brush, exfoliative cytology, alveolar lavage)
• Histological type (according to the anatomical and pathological results, the samples from patient were identified as epidermoid carcinoma (squamous cell carcinoma), large cell carcinoma, adenocarcinoma and small cell carcinoma).

## 3. Results

The suspected cases of 56–65 years old and 66–75 years old accounted for 66.1%; males were dominant, accounting for 57.5% and 54.2% in each group, respectively. The results showed that men were 1.8 times more likely to suffer from the disease than women (**Table 1**).

**Table 1.** Patients according to age group and sex

| Age group (years) | Gender | | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| | Female | | Male | | Total | |
| | No. | % | No. | % | No. | % |
| Less than or equal to 35 | 1 | 25.0 | 3 | 75.0 | 4 | 1.2 |
| 36–45 | 6 | 37.5 | 10 | 62.5 | 16 | 4.6 |
| 46–55 | 19 | 33.3 | 38 | 66.7 | 57 | 16.5 |
| 56–65 | 45 | 42.5 | 61 | 57.5 | 106 | 30.6 |
| 66–75 | 44 | 35.8 | 79 | 64.2 | 123 | 35.5 |
| 76–86 | 5 | 12.5 | 35 | 87.5 | 40 | 11.6 |
| Total | 120 | 35.0 | 226 | 65.0 | 346 | 100.0 |

Source: Records of the Department of Pathological Anatomy

44.8% of the patients (115 cases) were diagnosed as malignant tumors by bronchoscopy, and 119 cases were negative, accounting for 34.4%. It is important to mention that nonspecific cellular changes were found in 72 cases (20.8%).

In the anatomical position analysis, the frequency of the right lung was higher, especially in the upper and lower lobes, 35% and 20.6% respectively, and 4.5% in the middle lobe. There were no lesions in both lung fields.

The main manifestation of bronchoscopy was redness of bronchial mucosa, accounting for 85.8%, followed by irregular mucosa and bronchial infiltration, accounting

for 84.5% respectively. It is worth noting that there is more than one finding in the same patient.

Among the patients diagnosed with malignant tumors, the positive rate of biopsy was 61.3%; however, the positive rates of exfoliative cytology and bronchoalveolar lavage were low, 50.3 and 27.1, respectively. There is a non-negligible percentage (1.9), which has proved useless (**Table 2**).

**Table 2.** Positive diagnosis rate of cancer patients

| Diagnosis | Bronchial biopsy | | Exfoliative cytology | | Bronchoalveolar lavage | |
|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % |
| Positive | 95 | 61.3 | 78 | 50.3 | 42 | 27.1 |
| Negative | 57 | 36.8 | 75 | 48.4 | 110 | 71.0 |
| Useless | 3 | 1.9 | 2 | 1.3 | 3 | 1.9 |
| Total | | | 155 | | | |

Source: Nursing patient database

Among the patients diagnosed as malignant tumors, 105 cases (67.8%) were epidermoid carcinoma, mainly male. while 15.5% were only diagnosed as non-small cell carcinoma with unclear histological changes; men accounted for 69.6% (**Table 3**).

**Table 3.** Patients according to the histopathological type of the disease and gender

| Histologic type | Gender | | | | Total | |
|---|---|---|---|---|---|---|
| | Female | | Male | | | |
| | No. | %* | No. | %* | No. | %** |
| Epidermoid carcinoma | 29 | 27.6 | 76 | 72.4 | 105 | 67.8 |
| Non-small cell carcinoma | 14 | 58.3 | 10 | 41.7 | 24 | 15.5 |
| Adenocarcinoma | 7 | 30 4 | 16 | 69.6 | 23 | 14.8 |
| Small cell carcinoma | 1 | 33.3 | 2 | 66.7 | 3 | 1.9 |
| Total | 51 | 32.9 | 104 | 67.1 | 155 | 100.0 |

Source: Department of Pathological Anatomy
*Calculated according to histological type.
**Based on the total number of cases.

## 4. Discussion

The results of age and gender are consistent with the results of a study conducted by Pacheco Gutiérrez *et al.*[12] in 2017, in which patients in the same age groups were predominant, and with the results of a study conducted by Savón Plutín *et al.*[13], who obtained a predominance of patients aged 61 to 70 years and of the male sex, in a ratio of 2:1 with respect to the female sex. This is also consistent with the results of Pino Alfonso *et al.*[14], of which samples are mainly men over the age of 60; the authors mentioned that, with regard to the preponderance of the male sex, that the sex ratio is 2.5 men for every woman in the world, 3.6 in Europe and 9 in Spain (i.e. for every 9 male lung cancer patients there is 1 female).

The revised literature shows that the risk of this disease increases with age and is internationally accepted as the risk age over 45[15].

When analyzing the diagnosis of malignant tumors, the results were similar to those of Pacheco Gutiérrez *et al.*[12] Among them, the positive rate of 251 patients incases was 51.4%, and the negative rate was 31.5%; in addition, they stressed that 13.2% of the samples were insufficient to determine the diagnosis.

Considering the topographic location, the previously cited author[12] found that the frequency of right lung injury (62.02%) was higher than that of left lung (35.66%), and the proportion of both lungs was the smallest (2.33%). Similarly, a study by Pino Alfonso *et al.*[16] found that the lesion mainly occurred in the right lung. García Quero *et al.*[17] pointed out that the location of upper and middle lobe lesions is a factor related to diagnostic performance; lung injury in the upper lobe indicates a high risk of tumor.

The most common location is the right lung, as described above, because it is different from the anatomical structure of the left lung.

As for the results of bronchoscopy, no other literature similar to this situation was found during bronchoscopy, so it is impossible to compare them; however, the authors of this article believe that the description of these features is crucial because it guides bronchoscopy to some extent into the areas where malignant cells are most likely to appear; therefore, the selection and sampling quality of cytological research have been improved.

Considering the positive rate of the diagnostic technique used, the results were similar to those of García Quero *et al.*[17] emphasized the high cost-effectiveness of biopsy in the diagnosis of lung cancer and those of Vargas Gutiérrez and Ruiz Jorge[18], who obtained a higher positive rate and sensitivity in

exfoliative cytology, although alveolar lavage did not occur. Recent researchers believe that the low sensitivity of these two cytological methods is related to the high false negative rate.

With regard to the histological type of the lesion, it is consistent with García Quero *et al.*[17] because epidermoid carcinoma is more common in their study. However, this is different from the results of Cabo García *et al.*[19], in which the histological types of cases of adenocarcinoma accounted for the largest proportion. Savon Plutín *et al.*[13] also found that adenocarcinoma was dominant.

Based on the above, Acosta[4] concluded that squamous cell carcinoma is more likely to be associated with smoking than other forms of non-small cell carcinoma. In recent years, the incidence of lung squamous cell carcinoma has shown a downward trend; in contrast, adenocarcinoma is a common histological subtype in many countries.

In this study, the male advantage can be explained by the higher prevalence of epidermoid carcinoma in the investigated cases.

It is worth noting that, just as in bronchoscopy, the accumulation of experience and skills is essential to ensure adequate sampling, and considering that the care of such patients must be multidisciplinary, the authors of this study recognize that histopathological techniques must be carried out by personnel with relevant capabilities and performance, ensure that the final diagnosis is fully determined.

In conclusion, this study shows the importance of bronchoscopy and its procedures in the diagnosis of lung cancer. The most common histological change was identified as epidermoid carcinoma, with the highest incidence in men. Lung biopsy is a histological examination, which mainly shows whether there is a malignant process.

## References

1. Sánchez J, 2017, Carcinoma broncogénico epidemiologia, factores, etiología y manifestaciones clínicas [Epidemiology, Factors, Ctiology and Clinical Manifestations of Bronchial Lung Cancer]. In: Álvarez-Sala Walther JL, Casan Clarà P, Rodríguez de Castro F, *et al*. (eds.) *Neumología clínica* [*Clinical Pulmonary Disease]* (2nd edn.). Barcelona: Elsevier, pp.466–93.

2. Puente J, de Velasco G, 2019, ¿Qué es el cáncer y cómo se desarrolla? [What Is Cancer and How Does It Develop?]. Madrid: SEOM. Available from: https://seom.org/informacion-sobre-el-cancer/que-es-el-cancer-y-como-se-desarrolla.

3. MedlinePlus, Enciclopedia Medlineplus [Lung Cancer]. Available from: https://www.nlm.nih.gov/medlineplus/spanish/lungcancer.html.

4. Acosta SC, 2017, Cáncer de Pulmón [Lung Cancer]. In: Noya Chaveco ME, Moya González NL (eds.) *Roca Goderich. Temas de Medicina Interna* [*Roca Goderich. Topics in Internal Medicine*] (5th edn.). La Habana: Editorial Ciencias Médicas, pp.250–64.

5. World Health Organization, 2018, Health Statistics and Information Systems. Disease Burden and Mortality Estimates. Geneva: WHO. Available from: https://www.who.int/healthinfo/global_burden_disease/estimates/en/.

6. Acosta Reynoso IM, Remón Rodríguez L, Segura Peña R, *et al.*, 2016, Factores de riesgo en el cáncer de pulmón [Risk Factors in Lung Cancer]. *CCM*, 20.

7. Directorate of Medical Records and Health Statistics, Ministry of Public Health, Cuba, 2018, Anuario Estadístico de Salud. 2017 [Yearbook of Health Statistics 2017]. La Habana: MINSAP. Available from: https://files.sld.cu/dne/files/2018/04/Anuario-Electronico-Espa%c3%b1ol-2017-ed-2018.pdf.

8. National Statistics Directorate, Ministry of Public Health, Cuba, Anuario Estadístico de Salud. 2015 [Yearbook of Health Statistics 2015]. La Habana: MINSAP. Available from: https://files.sld.cu/dne/files/2016/04/Anuario_2015_electronico-1.pdf.

9. Reyes N, Luque E, Santos J, *et al.*, 2016, Broncoscopia Diagnóstica. Requisitos sedación y técnica [Diagnostic Bronchoscopy. Sedation and Technical Requirements]. In: Soto Campos JG (ed.) *Manual de diagnóstico y terapéutica en neumología* [*Handbook of Diagnosis and Treatment of Lung Diseases*] (3rd edn.). Madrid: Ergón, pp.125–35.

10. Herth F, Beamis J, Ernst A, 2016, History of Rigid Bronchoscopy. In: Beamis JF, Mathur P, Mehta AC (eds.) *Interventional Pulmonary Medicine*, *Vol. 189*. Boca Ratón: CRC Press, pp.1–12.

11. Díaz-Agero Álvarez P, Flandes Aldeyturriaga J, 2007, *Broncoscopia diagnóstica y terapéutica Vol. 10* [*Diagnosis and treatment bronchoscopy Vol. 10*]. Madrid: Elgon. Available from: https://www.neumomadrid.org/wp-content/uploads/monog_neumomadrid_x.pdf.

12. Pacheco Gutiérrez I, López Vergara JM, Ríos Hidalgo N, *et al.*, 2017, Diagnóstico citológico pulmonar en lesiones estudiadas por broncoscopia. Hospital Clínico Quirúrgico Docente Miguel Enrique. 2011-2015 [Lung Cytological

Diagnosis of Bronchoscopic Lesions. Miguel Enrique Clinical Surgery Teaching Hospital. 2011-2015]. *Panorama Cuba y Salud*, 12.

13. Savón Plutín R, Seisdedos Romero N, Fernández Moreno A, *et al*., 2015, Perfil diagnóstico de cáncer de pulmón no pequeño cellular [Diagnostic Profile of Non-small Cell Lung Cancer]. *Rev Inf Cient*, 93:1154−62.

14. Pino Alfonso PP, Viteri Romero LE, Rodríguez Vázquez JC, *et al*., 2016, Citología aspirativa con aguja fina transbroncoscópica en lesiones endobronquiales [Transbronchoscopic Needle Aspiration Cytology in Endobronchial Lesions]. *Rev Cubana Med*, 55.

15. Álvarez Síntes R, 2014, Afecciones respiratorias [Respiratory Diseases]. In: Báster Moro JC, Hernández Cabrera G, García Núñez RD (eds) Medicina General Integral [*Comprehensive General Medicine*] (3rd edn.). Havana:Editorial Ciencias Médicas, pp.1051−112.

16. Pino Alfonso PP, Viteri Romero LE, Rodríguez Vázquez JC, *et al*., 2016, Citología aspirativa con aguja fina transbroncoscópica en lesiones endobronquiales [Transbronchoscopic Needle Aspiration Cytology in Endobronchial Lesions]. *Rev Cubana Med*, 55.

17. García Quero C, García Luján R, González Torralba F, *et al*., 2017, Rentabilidad de la broncoscopia en el diagnóstico de lesiones pulmonares focales malignas [Cost Effectiveness of Bronchoscopy in the Diagnosis of Malignant Focal Lung Lesions]. *Rev Clin Esp*, 208:551−6.

18. Vargas Gutiérrez S, Ruiz Jorge L, 2018, Valor diagnóstico de la citología del lavado y el cepillado bronquial en el cáncer de pulmón [Diagnostic Value of Bronchial Lavage and Brush Cytology in Lung Cancer]. *Rev Acta Med Cent*, 12.

19. Cabo García A, del Camp Mulet E, Rubio González T, *et al*., 2018, Aspectos clínicos y epidemiológicos en pacientes con cáncer de pulmón en un servicio de neumología [Clinical and Epidemiological Characteristics of Lung Cancer Patients]. *Medisan*, 22:394–405.