A Postmortem Case Study on the Pathology of Lung Cancer Tissue taken from a Human Cadaver at PCOM South Georgia

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Background

Lung cancer is the most commonly diagnosed cancer in both men and women.[1] In the United States alone, lung cancer is the second most commonly diagnosed cancer and is the most prevalent cause of deaths due to cancer.[3] Furthermore, lung cancer is responsible for 18.4% of the total cancer deaths.[1] While there are many risk factors associated with the development of lung cancer, tobacco smoking is the main one, causing approximately 80-90% cases.[1] Rural populations have a higher incidence of lung cancer and mortality compared to urban populations, making them important target populations for low-dose computed tomography screening.[4] Of malignant tumors, lung cancer is the leading cause of death worldwide.[2] The overall 5-year survival rate for metastatic lung cancer is approximately 17% and this rate has failed to significantly improve within the past 25 years despite advances made in diagnosis, imaging, staging, and treatment.[5] Primary carcinomas involving the lung are classified as small-cell lung cancer (SCLC) or non-small cell lung cancer (NSCLC).[5] Non-small cell lung cancers account for nearly 80% of all primary lung cancers with adenocarcinoma, squamous cell carcinoma, and large cell carcinoma making up the major histological types.[5] Conversely, large-cell carcinoma accounts for nearly 3% of all lung carcinomas and is primarily diagnosed through exclusive mechanisms.[5] Lung cancer can be difficult to diagnose, as well as classify early on. 75% of lung cancer patients are not diagnosed until it is too late, leaving them with a low 5-year survival rate.[6] This study will further clarify our current understanding of lung cancer and the histopathology associated with it.

Methods

A donor cadaver was dissected at the gross anatomy lab of PCOM South Georgia. The skin, fascia, and connective tissue layers overlying the thoracic cavity were excised to expose the chest wall and ribs. Then, the anterior thoracic wall was reflected to expose the heart and lungs, which were removed from the chest cavity for gross observation. Examination of bilateral outer lung layers, as well as the pulmonary blood vessels and bronchi were performed. The lungs were measured and weighed using a ruler and scale, respectively, and evaluated for abnormalities. Sections were taken from each lung and sent to Colquitt Regional Medical Center for histological sectioning and staining with Hematoxylin and Eosin stain. A pathologist examined the histological sections.

Results

Histopathological analysis of the lungs demonstrated a non-small cell carcinoma of the adenocarcinoma type with acute bronchopneumonia, pulmonary edema, and congestion.

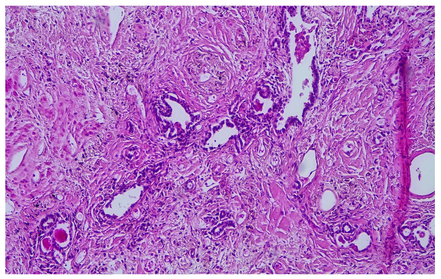

Figure 1: Adenocarcinoma: Malignant cells forming glands amidst areas of fibrosis

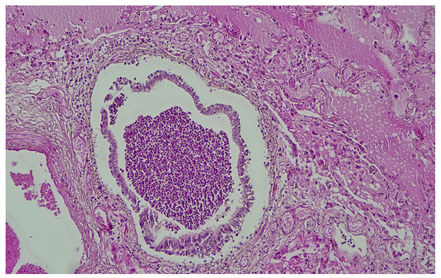

Figure 2: Bronchopneumonia: Alveoli and bronchiole filled with neutrophils

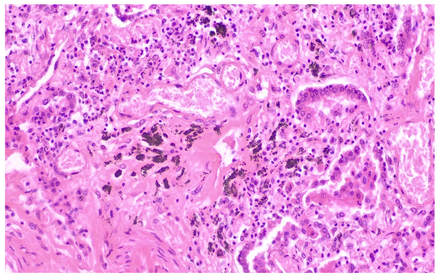

Figure 3: Dust cells (macrophages) with anthracotic pigment

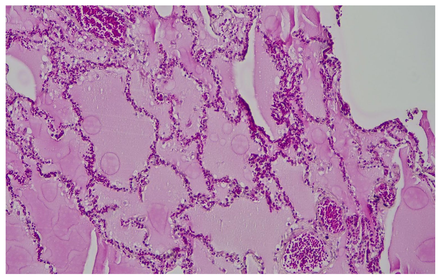

Figure 4: Pulmonary edema within the alveoli

Acknowledgements

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Discussion & Conclusion

Gross observation of the lungs revealed brown to black linear streaks confirmed to be carbon pigment present in alveolar macrophages (representing dust cells), suggesting that the patient was a smoker. Microscopic study of the lung sections revealed a low-grade adenocarcinoma with well-formed glands. Bronchopneumonia was seen as patchy neutrophilic infiltrate in and around the bronchi and alveoli. The patient's reported cause of death was cardiorespiratory failure and lung cancer, which potentially contributed to the secondary diagnosis of pneumonia. Based on the lung pathology of bronchopneumonia and the gross atrophy of lower extremities, we believe that the patient underwent chemotherapy. It can be hypothesized that the lung cancer lowered the patient's immunity and allowed for a secondary infection to arise such as bronchopneumonia. So, the cause of death is pneumonia secondary to lung cancer due to immune suppression. This patient had a pacemaker so there is the possibility that he had an underlying heart issue that could have required a coronary bypass surgery. The main limitation of this study is that medical records were not available, so we do not know if this cancer was recurrent that previously received treatment. Surgery, chemotherapy, and/or radiation would have further contributed to suppression of his immune system and development of pneumonia.

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