A Postmortem Analysis of Embalmed Lungs, a Human Cadaver Study.

Merdian, Frederick S., PCOM South Georgia (Presenting Author) Peterman, Matthew, PCOM South Georgia Osigwe, Odinaka, PCOM South Georgia Patel, Vikash, PCOM South Georgia Arya, Savita, MD (Principle Investigator)

PCOM South Georgia

ABSTRACT

Human cadaveric study is vital to furthering our understanding of systemic pathologies. This study aimed to examine respiratory histopathology in a cohort of lung sets belonging to a sample of 20 cadavers at Philadelphia College of Osteopathic Medicine, South Georgia. Cadaveric lung studies undertaken by medical students frequently demonstrate epidemiologically common diseases and pathologies and are instrumental in medical education. (Zhang et al. 2015). Cadaveric lungs (n= 20 pairs; 38 individual lungs) were inspected grossly, and potentially pathological tissue samples were prepared and analyzed under microscopy. Histopathological findings were analyzed by the medical student study authors and verified by a pathologist.

Histopathology findings demonstrated significant diversity in pathology present in the (32) lungs studied over both cadaver cohorts. Typical findings include metastatic calcific nodules, hemorrhagic pleural cavities, anthracotic streaks, and diffuse tissue texture changes across different lobes. The most common findings among the 2022 cohort were signs indicative of inflammation (88.8%), obstructive lung disease, including emphysema (44.4%), pulmonary edema, and congestion (66.6%). Among the 2023 samples, the findings were similar with higher prevalences of inflammation (100%), edematous changes (90.9%), and anthracosis (90%).

Most lung specimens are well preserved in cadavers used for medical school education, and they provide an opportunity for medical students to study lung histology and histopathology.

INTRODUCTION

The human cadaveric study provides valuable opportunities for medical students to get hands-on histopathological experience during their physician training. (Rae et al., 2018). Lung histopathology is commonly studied and provides further opportunities to observe and analyze standard disease states and their associated histopathological findings. Typical findings include emphysema, chronic bronchitis, neoplasms, pneumonia, and interstitial lung disease. (Rae et al.,2018). The anatomical makeup of the lungs necessitates tremendous exposure to the environment, providing ample opportunity for environmental pathogens and contaminants to embed themselves in lung tissue. (Rae et al.,2018). These contaminants can result in anthracotic streaks, common findings in cadaveric studies. Malignant neoplasms are also common histopathological findings among cadaveric lung biopsies, and adenocarcinoma is found in a large proportion. (Yokose et al., 1999).

MATERIAL AND METHODS

Cadaveric lungs (n= 20 pairs; 38 individual lungs) were isolated, and gross observations were performed of the parietal surface of both lungs. These samples were part of a collective of over two years' worth of cadaveric specimens from the Gross Anatomy laboratory at Philadelphia College of Osteopathic Medicine, South Georgia. Each lung was grossly inspected for suspicious lesions. Lesions were analyzed for prevalence and recorded photographically. The following are the core actions this study performed:

1. Criteria for lesions for the purpose of this study:
   a.   Visible hyperpigmentation compared to surrounding external surface lung tissue
   b.   Be at least 2 mm in diameter on at least one axis.
   c.   Flat or raised appearance contrasted with surrounding lung tissue.
1. Photograph a compendium of each donor's lungs from various approaches. Photos included a clear metric ruler for reference in a standardized approach.
2. Statistical analysis for this cadaveric lung population contrasted with existing epidemiologic data will be performed.
3. Tissue samples from representative lung lesions were sent to the Colquitt Regional Medical Center for processing. Histopathology slides were stained by hematoxylin and eosin stains. Medical students initially viewed the slides, and a pathologist later confirmed the findings.
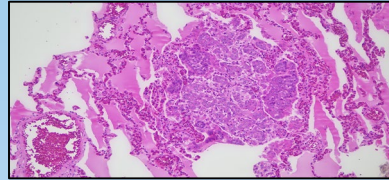
RESULTS (YEAR 1 CADAVERS)

Figure 1.1 A 65 y/o Female left lung shows tumor cells infiltrating surrounding tissue. Morphology shows glandular structures with well-differentiated adenocarcinoma and edema. High power showing malignant tumor cells with hyperchromatic nuclei and prominent nucleoli
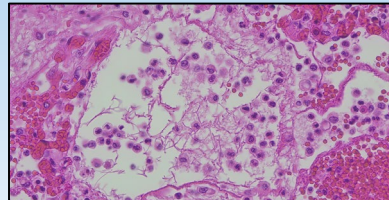

Figure 1.2 An 88 y/o Male who had Alzheimer's disease. Histology revealed fungal hyphae and macrophages within alveolar spaces.
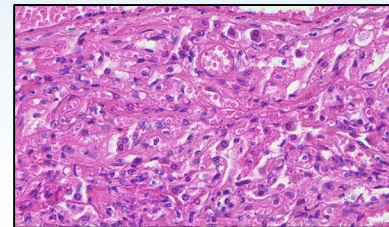

Figure 1.3 An 82 y/o Female with dementia. Gross observation shows dark streaks with hepatization of left lungs. Histology above shows dilatation of alveolar spaces pointing to bronchopneumonia.
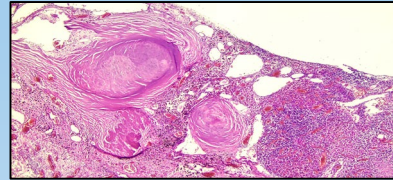
RESULTS (YEAR 2 CADAVERS)

Figure 2.1 A 78 y/o Female with chronic inflammation, fibrocalcific nodules, and anthracosis. Grossly observation revealed solitary whitened plaque on left lung.
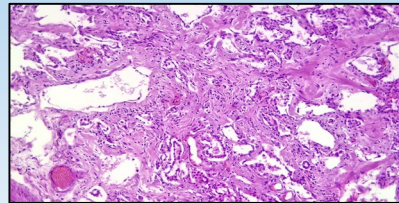

Figure 2.2 A 76 y/o Male who died of acute respiratory failure with hypoxia. Diffuse alveolar damage w/ extensive fibroblastic proliferation in the interstitium and remnants of hyaline membranes
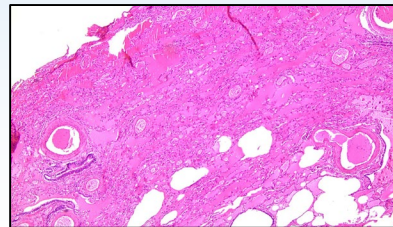

Figure 2.3 An 83 y/o female who died of intracerebral hemorrhage. Histology shows pleural fibrosis and reactive mesothelial cell hyperplasia with simple, linear, and tubular structures arranged parallel to the pleural surface.

CONCLUSION

Most lung specimens are well preserved in cadavers, allowing medical students to study lung histology and histopathology. Pathological findings in cadaveric lungs are common findings, either incidental or directly related to the cause of death. Inflammatory conditions in the form of pneumonia are the most frequent cause of death as a terminal complication, and our observations matched the expected prevalence.

REFERENCES

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ACKNOWLEDGEMENT