

Mortality Reduction in Interstitial Pneumonitis: Key Findings from a Cadaveric Study

Tina Joshua, Edward Friedlander, MD¹
1 William Carey University College of Osteopathic Medicine



Introduction

Histologic characterization offers a framework for the understanding and diagnosis of viral interstitial pneumonitis. Moreover, due to the serious consequence in delayed diagnosis of respiratory failure, the clinical findings and physiology of viral interstitial pneumonitis are fundamental to prevent mortality. Thus, there is a need for earlier detection and treatment of viral interstitial pneumonitis. Here, human cadaver lung tissue is evaluated and characterized in a cadaver with a known cause of death of "respiratory failure." Notably, cadaveric studies are relevant due to the pathological examination of tissue microscopically and grossly remains the gold standard for most diagnoses.

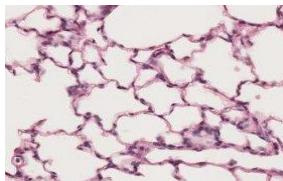


Figure 1: Normal lung tissue

Objective

The present study aims to identify histopathologic characteristics of viral interstitial pneumonitis in human cadaver lung tissue. Understanding the physiology will help to prevent delayed diagnosis and mortality of respiratory failure. Making a timely diagnosis is especially pertinent in immunosuppressed patients and those in critical condition.

Background

Traditionally, interstitial pneumonitis is diagnosed based on a combination of clinical presentation, computerized tomography imaging, and bronchoalveolar lavage. However, these approaches are limited by cell differentiation diagnostic challenges and imaging due to similarity in lung pathology. As a result, diagnosing interstitial pneumonitis is particularly challenging. Thus, there is a need for improved diagnostic methods that allow for earlier detection and treatment. Specifically, histologic evaluation is a valuable tool to accomplish this.

In health, the alveolar septa of the lungs are very thin and contain only simple epithelial cells, capillary endothelial cells, and occasional fibroblasts (Figure 1). Examination of the lungs from this body revealed widespread thickening of the alveolar septa with a dense inflammatory lymphocytic infiltrate (Figures 2 and 3). Often this is seen in viral infections, referred to as "chest colds", though there are other possibilities. The thickening interferes with oxygen diffuse from the air spaces into the bloodstream. In a few areas, there were neutrophils in the alveolar spaces, indicating secondary bacterial infection (Figure 4).

Methodology

Human lung tissue specimens were collected by dissection from a donated cadaver made available to the WCUCOM department of anatomy. All the cadavers in the lab were reviewed for suspicious lesions to determine, as far as possible, the actual cause of death. The samples were processed as standard tissue specimens to create hematoxylin and eosin stained (H&E) slides. A board-certified pathologist evaluated the slides under a light microscope to assess alveolar morphology, immune cells, and tissue architecture.

Results

The histologic slides were high quality without evidence of staining or other artifacts from the embalming process. The lung sections showed diffuse thickening of the alveolar septa with some cuboidalization of the alveolar epithelium. Furthermore, there was presence of a predominantly lymphocytic infiltrate within the lung interstitium, in the absence of bacteria. Together, these findings are highly suggestive of viral interstitial pneumonitis as the underlying mechanism of death.

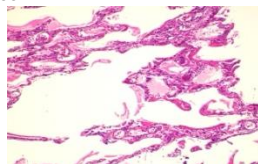


Figure 2: Slide displaying neutrophils with H&E stain

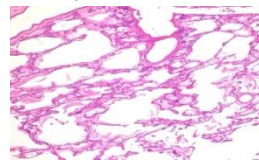


Figure 3: Specimen displaying interstitial fibrosis

Conclusion

Lung tissue from human cadavers is particularly useful to observe the histologic manifestations of lung disease. Additionally, understanding the structural and physiological changes in viral interstitial pneumonitis demonstrates the osteopathic principle that structure and function are interrelated. This cadaveric study and microscopic findings highlight the feasibility in histologic analysis to diagnose viral interstitial pneumonitis, which presents with lymphocyte-predominant interstitial inflammatory infiltrate. By leveraging lung samples, analyzing laboratory cell differentials, and histological analysis at an earlier time, physicians can more rapidly diagnose viral interstitial pneumonitis, thereby initiating appropriate therapy. This ultimately will reduce the risk of respiratory failure and prevent mortality.

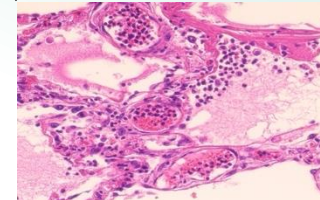


Figure 4: Lung specimen with thickened alveolar septa and lymphocyte infiltrate

Acknowledgments

Sincere thanks to Dr. Edward Friedlander and the WCUCOM cadaver lab. Special thanks to Dr. Robert Bateman and Dr. Danielle Fasring for their mentorship and guidance.

References

Zaki SR, Paddock CD. Viral Infections of the Lung. *Dall and Hammar's Pulmonary Pathology*. 2008;426-75. doi: 10.1007/978-0-387-68792-6_11. PMID: PMC7121437.