e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2025; 17(12); 2386-2388

Original Research Article

Gross and Histopathological Lung Findings in Medicolegal Autopsies: A Spectrum Analysis

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Received: 01-09-2025 / Revised: 15-10-2025 / Accepted: 21-11-2025

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Conflict of interest: Nil

Abstract

Background: Lung pathology plays a vital role in the forensic investigation of deaths, providing critical information that aids in determining the cause and manner of death. The lungs are often affected by a diverse array of conditions, making a thorough examination essential for accurate medicolegal analysis.

Methods: This study involved a detailed examination of lung pathology in 100 medicolegal autopsies. All cases received for medico-legal autopsies throughout the research period were included in this analysis. This research did not include dead bodies in various stages of decomposition. Each autopsy case was systematically analysed to document both gross and histopathological lung findings.

Results: The cohort comprised 66 males and 34 females, with ages ranging from 1 month to 78 years. The mean age of cohort was 49.36±9.36 years. A total of 100 lungs of adult autopsies were performed. All cases showed one or other histopathological lesions in lung. The various pulmonary lesions were classified as pulmonary infection 23 cases, COPD 13 cases and pulmonary vascular diseases 64 cases.

Conclusion: Autopsy provides normal as well as diseased human tissue for morphologic studies and it may reveal the diagnosis which may not be suspected clinically or may, in some way, discredit. In present study, pulmonary haemorrhage and congestion was the most frequently encountered lesion in medicolegal autopsies.

Keywords: Lung pathology, Histopathology, Data, Autopsy.

Introduction

Lung pathology plays a vital role in the forensic investigation of deaths, providing critical information that aids in determining the cause and manner of death. The lungs are often affected by a diverse array of conditions, making a thorough examination essential for accurate medicolegal analysis. A comprehensive understanding of lung pathology can significantly impact the interpretation of autopsy findings, helping forensic pathologists to distinguish between various causes of death and identify underlying pathological processes. [1,2]

The lungs are frequently implicated in a wide range of pathological conditions, each presenting distinct features that can influence forensic outcomes. For example, trauma-related deaths often result in specific gross changes such as pulmonary contusions, lacerations, and haemorrhage, which are indicative of mechanical injury [3,4] In contrast, deaths caused by poisoning may reveal particular patterns of lung. Injury, including chemical pneumonitis or acute respiratory distress syndrome (ARDS), depending on the nature of the toxin involved. [5,6] Infectious diseases, such as pneumonia, can present with distinctive histopathological features, including inflammatory infiltrates and consolidation, which are crucial for identifying the cause of death. [7-8]

Similarly, other conditions such as pulmonary embolism or neoplastic lesions have their own characteristic patterns of damage, which must be accurately recognized and interpreted in the context of forensic investigations. [9] Previous studies have highlighted the variability in pulmonary findings based on different causes of death. For instance, research on trauma-related deaths has shown that pulmonary contusions and other mechanical injuries can be prominent features in autopsy cases,

providing insight into the nature and extent of trauma. [10] In cases of poisoning, specific histopathological changes can help differentiate between various toxic substances and their effects on the lungs. [11] Additionally, conditions like pneumonia and pulmonary embolism have been well-documented in forensic literature, with detailed descriptions of their pathological manifestations and their implications for cause-of-death determinations. [12-14]

Given the complexity and variability of lung pathology, a systematic and detailed analysis of pulmonary findings in medicolegal autopsies is essential for improving forensic accuracy. This study aims to address this need by providing a comprehensive examination of gross and histopathological lung findings in a large cohort of autopsy cases.

Materials and Methods

This study involved a detailed examination of lung pathology in 100medicolegal autopsies. All cases received for medico-legal autopsies throughout the research period were included in this analysis. This research did not include dead bodies in various stages of decomposition. Each autopsy case was systematically analysed to document both gross and histopathological lung findings.

Following standard autopsy procedures (Virchow's), the thoracic cavity was opened, and the lungs were examined in situ before being removed. After that, the organs were removed using standard dissection procedures. First, the left lung was opened. Using a big knife, an incision was created from the top of the upper lobe to the base of the upper lobe on its front surface. The second incision was made along the lateral border, passing through the lower lobe to the base from the top part of the upper lobe. The lungs' sliced surfaces were examined, and the bronchi's cross section, their associations, and the blood vessels therein were studied. Organs in their entirety or in sections exhibiting significant pathological alterations were kept in 10% formalin solution for histological analysis before being sent to the pathology department. In the pathology department, slides were made using H&E staining and seen at a 10X magnification under a microscope. The results were documented and statistically examined.

The lungs were examined macroscopically for signs of oedema, congestion, haemorrhage, and other visible abnormalities. Subsequently, lung tissue samples were processed and subjected to histopathological analysis, which included staining techniques to identify inflammatory infiltrates, necrosis, fibrosis, and neoplastic lesions. The cases were categorized based on the underlying cause of death, including trauma, poisoning, asphyxia, infectious diseases, and natural causes. Data were recorded and analysed to identify common pathological patterns and correlations with specific causes of death. This comprehensive approach allowed for a robust assessment of pulmonary pathology and its implications in forensic investigations.

Results

The cohort comprised 66 males and 34 females, with ages ranging from 1 month to 78 years. The mean age of cohort was 49.36±9.36 years. A total of 100 lungs of adult autopsies were performed. All cases showed one or other histopathological lesions in lung. The various pulmonary lesions were classified as pulmonary infection 23 cases, COPD 13 cases and pulmonary vascular diseases 64 cases. The pulmonary vascular diseases encountered were (CVC) Chronic Venous Congestion, Pulmonary Edema, Pulmonary Hemorrhage with Congestion, Acute respiratory distress syndrome (ARDS), and Pulmonary Embolism. Pulmonary haemorrhage with congestion was more frequent in cases of road traffic accident and burns. Chronic obstructive pulmonary disease includes emphysema. The pulmonary infections encountered were lobar pneumonia, Interstitial Pneumonia, Bronchopneumonia and foreign body aspiration pneumonia, Lung abscess and Tuberculosis respectively. The incidental findings in this study are each case of foreign body aspiration pneumonia and Tuberculosis.

Discussion

Autopsy is a medical procedure that consists of a thorough examination performed on a body after death, to evaluate disease or injury that may be present and to determine the cause and manner of a person’s death. [15]

Present days air pollution, environmental inhalants and chemical cum toxic substances become uncontrollable worldwide. [16] Millions Of people around the world suffer from preventable chronic respiratory diseases. [17]

The spectrum of pulmonary lesions were analysed in the present study. The distribution of pulmonary lesions vary with geographic area, age, gender, environmental, nutritional and genetic factors and socioeconomic status of the population.

The various lesions encountered were pulmonary hemorrhage with congestion, Pulmonary Edema, Pneumonia, Emphysema, Chronic Venous Congestion, ARDS, Tuberculosis, and Pulmonary Embolism. In present study, the commonest pulmonary lesions encountered were pulmonary haemorrhage with congestion in 83 cases (38%) correlating with the study conducted by

Selvambigaiet al [18] who found 28% cases. The incidence of pulmonary haemorrhage with congestion have significant association with traumatic cases in our study population as it was observed in Road Traffic Accident and Electrocution. The second commonest finding was pulmonary edema which was correlating with study conducted by Patel CB et al [19] with 26.7% cases.

Conclusion

Autopsy provides normal as well as diseased human tissue for morphologic studies and it may reveal the diagnosis which may not be suspected clinically or may, in some way, discredit. In present study, pulmonary haemorrhage and congestion was the most frequently encountered lesion in medicolegal autopsies.

The incidence of pulmonary haemorrhage was found to be 64.00%. Other lesions found were pulmonary edema, pneumonia, emphysema. This study highlights various lesions in lungs which are either incidental or direct cause of death. The incidental ndings of tuberculosis, foreign body aspiration pneumonia also highlights the importance of gross and microscopic examination of each organ in detail from each autopsy irrespective of the cause of death.

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