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Unveiling Pulmonary Lesions through Autopsy: A Histopathological Study in a Tertiary Care Centre in North India

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Abstract

Background: Respiratory diseases contribute significantly to global mortality, particularly in low- and middle-income countries. Despite diagnostic advances, autopsy remains indispensable in uncovering the complete spectrum of pulmonary lesions, especially those missed or undiagnosed ante-mortem.

Aim: To study the histopathological spectrum of lung lesions in autopsy cases at SMS Medical College, Jaipur.

Materials and Methods: This observational study analyzed 698 autopsy lung specimens using H\&E staining to identify histopathological patterns. Data were statistically analyzed to assess associations with clinical parameters and causes of death.

Results: Lung congestion (90.83%) and pulmonary edema (34.96%) were the most common histopathological findings. Spongy consistency was the predominant gross feature. No malignancies were identified. Age and gender showed distributional variations.

Conclusion: This study analyzed 698 lung autopsy specimens and found congestion (90.83%) and pulmonary edema (34.96%) as the most common lesions. Most cases were in males aged 30–39 years. Findings highlight the significance of autopsy in identifying undiagnosed lung pathologies and terminal events like edema, infection, and inflammation. Lung autopsies revealed congestion and oedema as most common findings, emphasizing their role in understanding respiratory-related deaths.

Keywords: Lung autopsy, histopathology, pulmonary lesions, diffuse alveolar damage, pneumonia, pulmonary edema.

Introduction

Respiratory diseases account for a significant global mortality burden, with histopathological evaluation of lungs during autopsy playing a pivotal role in elucidating disease patterns and causes of death.[1,2] despite technological advancements, autopsy remains an irreplaceable tool to assess undiagnosed or misdiagnosed pulmonary conditions. This study aims to explore the histopathological spectrum of lung lesions in autopsy cases conducted at SMS Medical College, Jaipur.

The lungs, due to their continuous exposure to environmental agents and systemic diseases, are susceptible to a broad range of pathological processes including inflammation, infection, neoplasia, vascular disturbances, and fibrosis. The study highlights the prevalence and types of common lesions such as diffuse alveolar damage, pulmonary edema, emphysema, pneumonia, fibrosis, thromboembolism, granulomatous inflammation, and neoplasms. Findings emphasize that lung pathology contributes significantly to morbidity and mortality, often serving as the final common pathway in systemic or cardiac disorders.[3]

This autopsy-based study provides crucial insights into the histomorphological patterns of pulmonary diseases, reinforcing the value of postmortem examination in diagnostic confirmation, epidemiological surveillance, and the formulation of targeted public health strategies.

Materials and Methods

This hospital-based, descriptive, observational study was conducted in the Department of Pathology, SMS Medical College, Jaipur, after obtaining ethical clearance from the institutional research review board. The study period spanned from September 2022 to August 2023, with an additional two months for data analysis and report compilation.

A total of 698 formalin-fixed lung specimens received for autopsy were included, based on a calculated sample size assuming a 33.8% prevalence of common lung lesions, with 95% confidence level and 0.05% relative error. Poorly fixed, autolyzed, or necrotic tissues were excluded.

Clinical data were collected from requisition forms. All specimens were processed using standard paraffin embedding technique. Sections (2–4 µm thick) were stained with Hematoxylin and Eosin (H&E). Special stains were applied when necessary. Detailed gross and microscopic evaluations were performed.

The H&E staining protocol involved fixation in 10% formalin, dehydration through graded alcohols, clearing with xylene, embedding in paraffin, section cutting, and staining. Harris hematoxylin and eosin-phloxine solutions were prepared as per standard protocols.

Data were collected using a structured, pre-validated proforma and entered in MS Excel. Statistical analysis was performed using t-tests for quantitative data and Chi-square tests for qualitative variables. A p-value $\leq$ 0.05 was considered statistically significant.

Results

Table 1: Age wise distribution of lung autopsy cases/ specimen

Age group	N	%
Below 10yr	7	1.00
10-19yr 20-	52	7.43
29yr 30-	148	21.29
39yr 40-	180	25.71
49yr 50-	124	17.57
59yr Above	127	18.14
60yr Total	60	8.57
	698	100

Table 2: Gender wise distribution of lung autopsy cases/ specimen

Gender	N	Percent	Age
Female	151	21.6%	40.4
Male	547	78.2%	33.12
Total	698	100.0%	38.8

Figure 1: microscopic image of pneumonia (neutrophils)

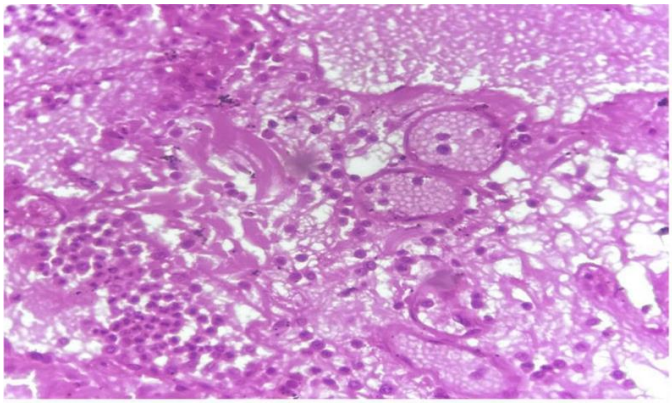
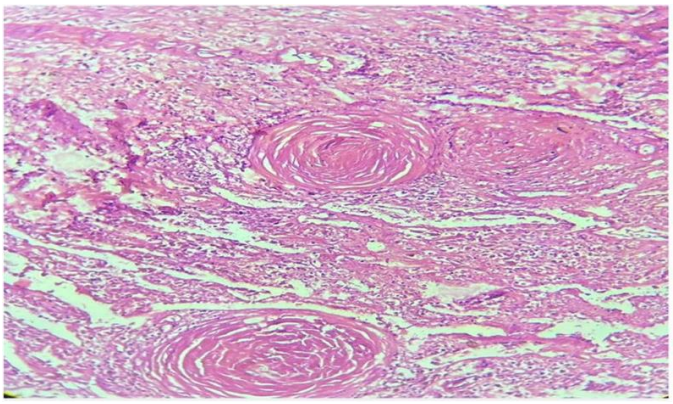


Figure 2: microscopic image of silicotic nodules



This study included 698 lung autopsy specimens collected at SMS Medical College, Jaipur, over a one-year period. Specimens were analyzed both grossly and microscopically, and findings were categorized by age and gender.

On gross examination of the external lung surface, pleura was present in 100% of specimens, indicating completeness of the lung tissue samples. On cut surface evaluation, the most common feature across all age groups was spongy consistency, noted in 58.88% to 64.86% of specimens, suggesting relative preservation of normal lung texture in a large proportion of cases. Congestion was the second most common gross finding, ranging from 24.93% to 29.13% across age groups, indicating frequent vascular involvement. Other notable gross findings included firmness (6.3% to 11.67%), foci of fibrosis, autolysis, and occasional soft foci and gray-white areas. Blackish discoloration and unremarkable features were rare.

Microscopically, congestion was the most prevalent finding, observed in 634 of 698 (90.83%) cases, with slightly higher prevalence in females (95.36%) compared to males (89.58%). Pulmonary edema was these cond most frequent histopathological finding, seen in 34.96% of cases, again more common in females. Pneumonia (5.73%), pigment-laden macrophages (4.15%), tuberculosis (1.86%), and occupational lung diseases (2.15%) were also noted. A single case (0.14%) of emphysema was identified, and no malignant lesions were detected in any case. A small proportion (2.44%) showed lungs within normal histological limits.

Age-wise analysis revealed that congestion remained the predominant finding across all age groups, ranging from 54.5% in children under 10 years to 69.1% in adolescents. Pulmonary edema showed a variable distribution, highest (36.4%) in those under 10 years and decreasing with age. Pigment-laden macrophages and occupational diseases were more common in older age groups, reflecting cumulative environmental and occupational exposures. Pneumonia was relatively consistent across all ages (2.3% to5.9%). Tuberculosis and emphysema were uncommon but noted sporadically.

The study reveals a predominance of vascular and inflammatory changes in the lungs at autopsy, with congestion and pulmonary edema as the leading findings. The absence of malignancy and low rates of emphysema may reflect regional disease patterns or limitations in sampling advanced clinical cases. Age and gender-wise distributions provide valuable insights for epidemiological correlation and underline the importance of autopsy in assessing silent or undiagnosed pulmonary pathology.

Discussion

Lung diseases contribute significantly to global mortality, accounting for up to one-fifth of deaths. High-income countries report 16.5% mortality due to respiratory diseases, while the rate varies between 18–23% in other regions, and is only 8.1% in low-income countries. The burden of chronic respiratory diseases such as COPD, asthma, interstitial lung diseases, and pneumoconioses is exacerbated by environmental pollutants and occupational exposures. Autopsy studies remain crucial for identifying the full spectrum of pulmonary lesions, especially when clinical or imaging-based diagnoses are in conclusive or unavailable.

This hospital-based observational study, conducted at the Department of Pathology, SMS Medical College, Jaipur, analyzed 698 lung autopsy specimens to determine the histopathological patterns of pulmonary disease. The study population predominantly comprised males (78.37%), a statistically significant gender disparity, consistent with previous literature. Age-wise, the majority of specimens were from the 30–39 year age group (25.71%), followed by 20–29 years (21.29%) and 50–59 years (18.14%).Lower representation of elderly and pediatric cases may be due to fewer medico-legal autopsies in natural or clearly diagnosed deaths.

Gross examination revealed that 100% of specimens retained pleura. The most frequent cut surface appearance was spongy (58.88%), followed by congestion (24.93%) and autolysis (5.44%). Similar findings have been reported in previous studies by Pratima Khare4, Bal MS5, and others, where congestion and edema were the predominant gross changes.

Histopathological examination (HPE) showed that lung congestion was the most frequent microscopic finding, seen in 90.83% of cases, followed by pulmonary edema (34.96%) and pneumonia (5.73%).Other findings included pigment-laden macrophages (4.15%), occupational lung disease (2.15%), tuberculosis (1.86%), and emphysema (0.14%). No malignant lesions were identified. These observations align with prior studies by Tahir et al.[6], Chauhan et al.[7], and Mangal et al.[8], which also documented high rates of congestion and edema as terminal or secondary events in fatal conditions like cardiovascular diseases, ARDS, infections, or trauma.

Lower emphysema prevalence in this study compared to others may be due to regional factors such as lesser industrial pollution, reduced smoking prevalence, or differences in hospital catchment demographics. Additionally, variability in diagnostic and histological classification across studies may explain the differences.

Pneumonia, observed in 5.73% of cases, was the most common infectious lesion, consistent with findings by Rupali et al[.9] and Bhavneet Kour, who highlighted its role as a terminal pulmonary event. Multiple lesions often coexisted, such as pulmonary edema with congestion, reinforcing the complex interplay of pathology at the time of death.

Overall, the findings reaffirm the value of lung autopsy in identifying histopathological patterns, especially in medico-legal and undiagnosed cases, and in understanding environmental and demographic influences on pulmonary disease prevalence.

Conclusion

This hospital-based observational study conducted at SMS Medical College, Jaipur, over one year, examined 698 lung autopsy specimens to evaluate the histopathological spectrum of lung lesions. The majority of cases were males aged 30–39 years. Gross examination revealed that most lungs were spongy and congested. Histopathologically, lung congestion

(90.83%) and pulmonary oedema (34.96%) were the most frequently observed findings across all age groups, indicating their significant contribution to morbidity and mortality and occupational disease (silicosis). Other notable lesions included pneumonia, tuberculosis, and pigment-laden macrophages. The study highlights the vital role of autopsy in detecting undiagnosed or unsuspected lung pathologies and reinforces its continued relevance in modern pathology practice for understanding terminal events and disease mechanisms.

References

1. Practical Approach to Lung Health: Manual on Initiating PAL Implementation. Geneva: World Health Organization; 2008. 2, estimating the burden of respiratory diseases. Available from:https: //www. ncbi. nlm.nih.gov/ books/NBK310631/.
2. Udayashankar SK, Shashikala P, Kavita GU, Pruthvi D. Histomorphological pattern of lung in medicolegal autopsies. Internat J Sci Res 2015;4:1937-9.
3. K Mangal P Dhakar A Yadav K Gupta S Gandhi Magnitude of pulmonary diseases - Incidentally diagnosed on autopsy-At largest hospital &Medical college of RajasthanInt J Cur ResRev2016883743
4. Pratima Khare et al., Prevalence of Lung Lesions at Autopsy: A Histopathological Study. Journal of Clinical and Diagnostic Research. 2017 May, Vol-11(5): EC13-EC16
5. Manjit S. Bal, P. S. Sethi,Anil K. Suri, Vijay K. Bodal Dr. G. Kaur Histopatholigical pattern in lung autopies JPAFMAT 2008; 8(2). ISSN 0972-5687:29-31
6. Tahir TM, Rehman F, Anwar S, Kamal F. Patterns of Pulmonary Morphological Lesions Seen At Autopsy. Biomedica. 2013;29:64–8.
7. Chauhan G, Agrawal M, Thakkar N, Parghi B. Spectrum of histopathological lesions in lung autopsy. J Res Med Dent Sci. 2015;3(2):109–12
8. Mangal K, Dhakar P, Yadav A, Gupta K, Gandhi S. Magnitude of pulmonary diseases - Incidentally diagnosed on autopsy-At largest hospital &Medical college of Rajasthan. Int J CurRes Rev. 2016;8(8):37–43.
9. Rupali RamraoKurawar, Maya Suresh Vasaikar. Spectrum of histomorphological changes in lungs at autopsy: A 5 year study. JMSCR. 2017; Vol 5. Issue 12 : pp 31304- 30308.