

Histopathological spectrum of Pulmonary Lesions: An Autopsy based study

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ABSTRACT

CONTEXT: Autopsy is a medical practice where post mortem examination of the body is performed to determine the cause of death. Internal organs are studied by gross evaluation and correlated with histopathological findings. Lung pathologies include a wide range of infectious, inflammatory, neoplastic, and occupational diseases. Determining the cause of death helps in future patient management and also helps to adopt prophylactic measures to prevent pulmonary dysfunction.

AIM: This study evaluates the histopathological spectrum of pulmonary lesions in autopsies, which were the direct cause of death or incidental findings.

SETTINGS AND DESIGN: This was a retrospective study conducted on lung autopsies, in the department of pathology, for a period of 4 years.

MATERIALS AND METHODS: After gross examination, formalin fixed paraffin-embedded lung sections were stained, histopathological evaluation was performed, and findings were recorded and tabulated. Statistical analysis based on frequency was done.

RESULTS: This study includes a total of 240 cases. The most common age group was between 41 to 50 years, followed by 31 to 40 years. Also, a male predominance of 74.58% was noted in the study. On histopathological evaluation, 7.5% of cases were autolyzed, and 4.16% had normal histomorphology. The most common finding was mild pulmonary congestion, followed by pulmonary edema. These findings can occur secondary to a terminal event. Hence the most common finding that can cause mortality is acute pneumonia. Other common findings were emphysema, diffuse alveolar damage, intra-pulmonary hemorrhage, and pulmonary vein thrombosis.

CONCLUSION: Infectious pathologies are the main pulmonary lesions that lead to death. Early diagnosis and treatment can reduce these preventable causes of mortality.

KEY MESSAGES: Acute pneumonia is the most common pathology that accounts for mortality. Pulmonary tuberculosis also contributes a fair number to mortality. Early diagnosis and treatment can reduce these preventable causes of mortality. Public awareness about these diseases can reduce morbidity and mortality to a greater extent.

Keywords: Autopsy; Lung diseases; Pulmonary edema; Pneumonia; Emphysema.

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INTRODUCTION

An autopsy is a medical practice where post mortem examination of the body is performed to determine the cause of death.¹ Internal organs

are studied by gross evaluation and correlated with histopathological findings to establish the cause and manner of death. Post-mortem and antemortem injuries can be differentiated based on these findings. The histopathological evaluation also helps to identify diseases of which a person was unaware during the lifetime and the progression of a disease process, and study numerous incidental findings, contributing immensely to medical knowledge.²

Evaluation of the cause of death or a disease process involves inspection and dissection of the cranium, thorax, and abdomen. In the thorax, lung examination is of utmost importance in most cases.³ Lung pathologies include infectious, inflammatory, neoplastic, and occupational diseases. Also, the lungs are secondarily involved in almost all terminal events. Determining the cause of death or disease process helps in future patient management and helps adopt prophylactic measures to prevent pulmonary dysfunction.^{4,5}

Pathologic examination of the lung includes gross findings and histopathology findings. Lung collapse, hyperinflation, bullae, fibrosis, cavitation, and consolidation are common findings on gross examination. The status of the airways and pleura is also important to determine the cause of death.^{4,6} This study aims to evaluate the histopathological spectrum of pulmonary lesions in autopsies, which were the direct cause of death or incidental findings.

MATERIALS AND METHODS

This was a retrospective study conducted on all autopsy cases received for histopathological examination of lungs, in the department of pathology, for four years, from May 2018 to June 2022. Demographic details of the cases were collected. Lung specimens were fixed in 10% neutral buffered formalin. After careful gross examination, findings were recorded. Tissue bits from representative areas were obtained and processed. Formalin fixed paraffin embedded sections were stained with hematoxylin and eosin. Histopathological evaluation was performed, and findings were recorded and tabulated. Statistical analysis based on frequency was done.

RESULTS

This study includes a total of 240 lung specimens received for histopathological evaluation. The most

common age group was between 41 to 50 years (60/240 = 25%), followed by 31 to 40 years (57/240 = 23.75%). Table 1 depicts the age wise frequency distribution. Also, a male predominance of 74.58% (179/240) was noted in the study.

On the histopathological evaluation, 18 (7.5%) cases were found to be autolyzed, and 10 (4.16%) cases were found to have normal histomorphology. The most common finding was mild pulmonary congestion (49/240 = 20.41%), followed by pulmonary edema (46/240 = 19.16%). These findings can occur secondary to a terminal event. Hence the most common finding that can cause mortality is acute pneumonia (43/240 = 17.91%). Chronic venous congestion was found in 7.08% (17/240) cases, and pulmonary tuberculosis accounts for 5.83% (14/240). Fig. 2 shows the gross appearance of pulmonary tuberculosis with cheese-like caseous necrotic material. Other common findings were emphysema (10/240), diffuse alveolar damage (8/240), intra-pulmonary hemorrhage (6/240), and pulmonary vein thrombosis (5/240). A case of neonatal death due to an immature lung was confirmed by histopathology. The rare lesions include chronic interstitial lung disease, aspiration pneumonitis, atelectasis, and hemorrhagic infarct. Fig. 1 shows the histopathological spectrum of lung lesions in the study. The study also includes two primary neoplastic lesions and a case of metastatic adenocarcinoma. The primary neoplastic lesion consists of a case of aggressive small cell carcinoma and another case of non-small cell carcinoma with morphology favoring adenocarcinoma. Fig. 3 shows the case of non-small cell carcinoma lung. Tumor cells are seen invading the lung parenchyma.

On correlating the histopathological diagnosis with the age range, pulmonary vein thrombosis was mainly found among the 21 to 30 age range, aspiration pneumonitis was common among the 61 to 70 age range, and chronic venous congestion (CVC) was commonly seen among 31 to 50 age range. Fig. 4 shows a case of CVC lung with numerous hemosiderin laden macrophages. Intrapulmonary hemorrhage was mainly found among the 31 to 40 age range. Emphysematous changes were noted in patients who were above 40 years. All three neoplastic lesions were noted in cases who were above 50 years. Table 2 shows the age range distribution of histopathological diagnosis.

Histopathological Spectrum

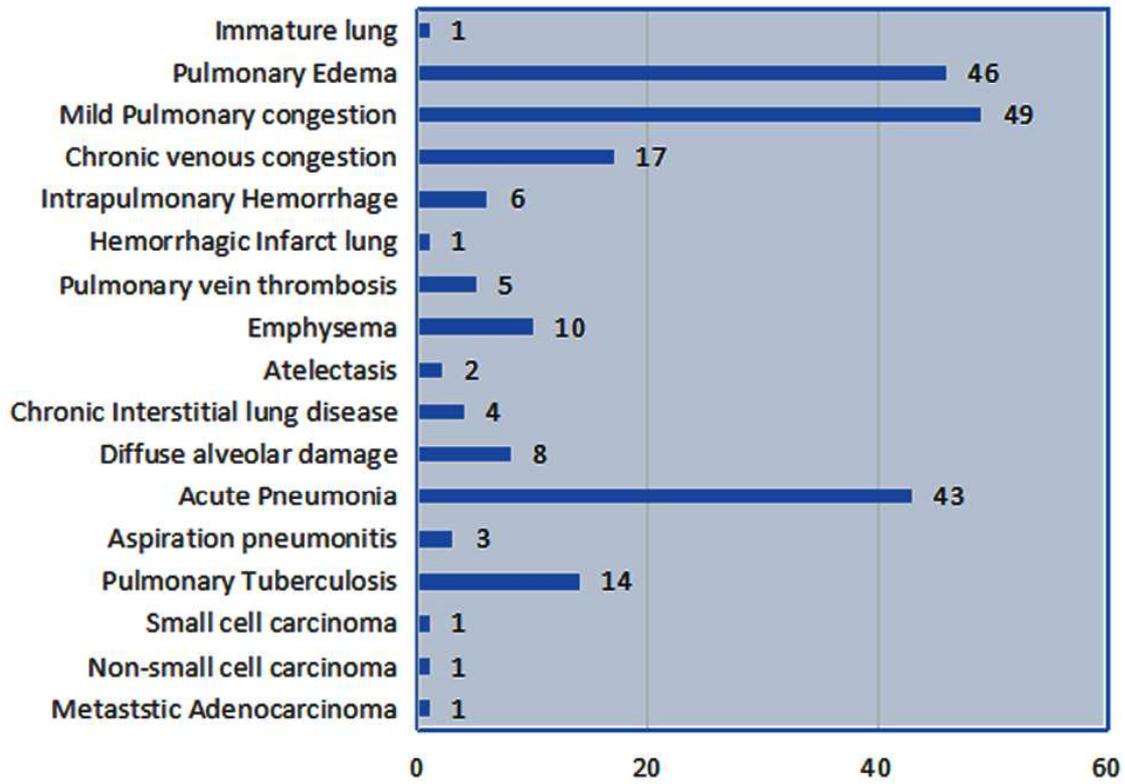


Fig. 1: Histopathological spectrum of pulmonary lesions.



Fig. 2: Gross picture of pulmonary tuberculosis.

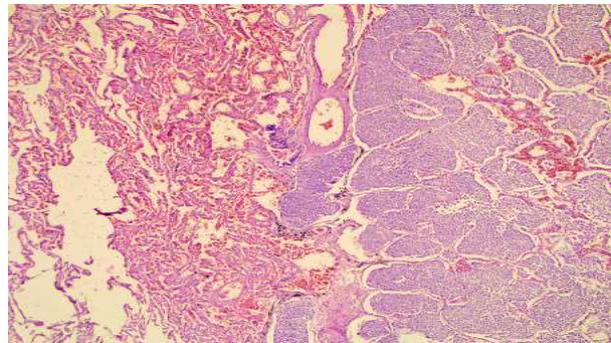


Fig. 3: Non-small cell carcinoma (H & E, 40X).

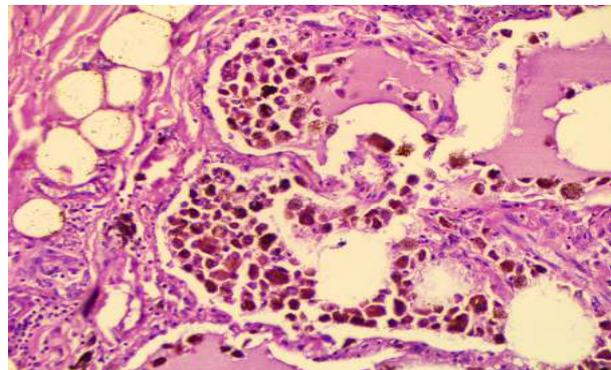


Fig. 4: Chronic venous congestion of the lung (H & E, 400X).

Table 1: Age-wise frequency distribution

Age Range	Frequency	Percentage (%)
< 1 year	4	1.67
1 - 10	13	5.42
11 - 20	7	2.92
21 - 30	35	14.58
31 - 40	57	23.75
41 - 50	60	25.00
51 - 60	34	14.17
61 - 70	23	9.58
71 - 80	7	2.92
Total	240	100.00

Table 2: Age range distribution of histopathological diagnosis

Histopathological Diagnosis	< 1 year	1-10	11-20	21 - 30	31 - 40	41 - 50	51 - 60	61 - 70	71 - 80	Total
Normal	-	2	1	3	-	-	4	-	-	10
Immature lung	1	-	-	-	-	-	-	-	-	1
Pulmonary Edema	3	3	1	9	11	8	8	-	3	46
Mild Pulmonary congestion	1	1	-	7	13	19	7	1	-	49
Chronic venous congestion	-	1	-	2	6	6	1	1	-	17
Intrapulmonary Hemorrhage	-	-	-	1	5	-	-	-	-	6
Hemorrhagic Infarct lung	-	-	-	-	1	-	-	-	-	1
Pulmonary vein thrombosis	-	-	-	3	2	-	-	-	-	5
Emphysema	-	-	-	-	-	3	3	3	1	10
Atelectasis	-	-	-	-	-	-	-	2	-	2
Chronic Interstitial lung disease	-	1	-	-	-	2	1	-	-	4
Diffuse alveolar damage	2	-	-	2	3	1	-	-	-	8
Acute Pneumonia	1	3	2	4	5	9	8	9	2	43
Aspiration pneumonitis	-	-	-	-	-	-	-	3	-	3
Pulmonary Tuberculosis	-	1	-	2	4	3	1	3	-	14
Small cell carcinoma	-	-	-	-	-	-	-	1	-	1
Non-Small cell carcinoma	-	-	-	-	-	-	1	-	-	1
Metastatic Adenocarcinoma	-	-	-	-	-	-	-	-	1	1
Autolysis	-	-	2	2	6	7	1	-	-	18
Total	8	12	7	35	56	58	34	23	7	240

DISCUSSION

In the current study, a male predominance of 74.58% was noted. Similar observations are pointed out in studies done by Goswami P R *et al*¹ and Selvambigai G *et al*.⁷

The most common age range in the present study was 41 to 50 years, followed by 31 to 40 years. These findings are comparable with studies done by Patel CB *et al*⁵ and Tahir TM *et al*.⁸

On histopathological evaluation, 7.5% of cases were autolyzed, and 4.16% exhibited normal histomorphology. Similarly, studies conducted by Shetty A *et al*⁹ and Kour B *et al*¹⁰ found autolysis percentages of 5.6% and 9.2%, respectively. But both of these studies had a higher proportion of lungs with normal histomorphology. Shetty A *et al*⁹ and Kour B *et al*¹⁰ found lungs of unremarkable histology in 9.8% and 23.2% of the cases.

Similar to studies conducted by TS A *et al*¹¹ and RS G *et al*¹², pulmonary congestion (20.41%) and pulmonary edema (19.16%) are the most common findings in the present study. But these findings can also be observed secondary to a terminal event. Hence in the present study, the most common finding that directly accounts for mortality is acute pneumonia (17.91%). Similarly, studies done by Amin NS *et al*¹³ and SK U *et al*¹⁴ found acute pneumonia accounted for mortality in 20% and 31.81%, respectively.

Studies done by Sachdev S *et al*¹⁵ and Khare P *et al*³ found diffuse alveolar damage in 0.8% of the cases each. But the current study shows a higher incidence of 3.33% cases exhibiting diffuse alveolar damage.

Emphysematous changes were seen in 4.16% of the cases in the present study. Similar findings were noted in studies conducted by TS A *et al* (4%)¹¹ and Patel CB *et al* (4.31%).⁵ But the study by Selvam VR *et al*¹⁶ shows a higher incidence of emphysema of 50%. According to RS G *et al*¹², this increase in incidence is probably due to the urban background and related factors.

Pulmonary tuberculosis accounts for 5.83% of the current study. Similarly, Chauhan G *et al*⁴ found tuberculosis in 6.26% of the cases. The study conducted by Goswami PR *et al*¹ found a higher incidence of 12.9% cases of pulmonary tuberculosis in their study. According to Akarte DS *et al*¹⁷, this increase in incidence is possibly due to the lower socio-economic status and default treatment status.

Pulmonary thrombotic events are noted in 2.08% of cases in the present study. Similarly, a study by TS A *et al*¹¹ found a 2% incidence of the same. A study by Patel CB *et al*⁵ showed only a 0.29% incidence of pulmonary thrombotic events. The current research shows that the most common age range for developing pulmonary thrombotic events is 21 to 30. Similar findings are noted in studies conducted by Patel CB *et al*.⁵ But the study by TS A *et al*¹¹ found the common age range as 60 to 69. According to Madani *et al*,¹⁸ these thrombotic events are preceded by acute medical illness within six weeks. According to Terrabuio Junior AA *et al*¹⁹, pulmonary thrombotic events are manifestations of secondary interstitial pneumonia in immunocompromised patients.

In the present study, malignant lung lesions account for 1.25%. Studies done by Amin NS *et al*¹³, Goswami PR *et al*¹, and Chauhan G *et al*⁴ found the incidence of malignant lesions as 1.7%, 5%, and 2.08%, respectively. In all the studies, malignant lesions are found in individuals who are above 50 years. The present study includes two primary malignancies and a single case of metastatic adenocarcinoma. A study by Patel CB *et al*⁵ includes a case of metastatic adenocarcinoma and a case of leukemic lung infiltration. A study by Amin NS *et al*¹³ also has a case of leukemic infiltration of lung tissue found in an adolescent female. According to Hiroko Iizuka *et al*²⁰, pulmonary leukemic infiltration can mimic severe pneumonia even without hyperleukocytosis. Hence any case of acute respiratory failure of unknown etiology, the possibility of leukemic infiltration is to be considered.

CONCLUSION

The current study documents the spectrum of pulmonary pathologies in autopsy specimens. Acute pneumonia is the most common pathology that accounts for mortality. Pulmonary tuberculosis also contributes a fair number to mortality. Hence infectious pathologies are the main pulmonary pathology that leads to death. Early diagnosis and treatment can reduce these preventable causes of mortality. Public awareness about these diseases can reduce morbidity and mortality to a greater extent.

Conflict of Interest: Nil

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Ethical clearance: Nil

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