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Study of Histopathological Spectrum of Lung Lesions in Autopsy Cases at Tertiary Care Hospital, KIMS, Koppal

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ABSTRACT

Lungs are paired intrathoracic organs that are vital for life as they play a major role in human body by exchanging gases between inspired air and blood. Lung being the principal site of respiration, is vulnerable to many toxic agents, microbial and circulatory disturbances. Lungs are secondarily involved in almost all forms of terminal events in cardiovascular diseases and are frequently involved in metastatic spread of malignancies from most parts of the body. Most of these lesions don't present with any signs or symptoms and remain undetected. Hence, these diseases are observed as incidental findings on autopsy examination. The present study aims to find out the frequencies and pattern of various lung diseases based on the histopathological analysis of lung tissues in autopsy cases. This retrospective study of two years consists of 87 lung autopsy cases. Lung specimen retrieved during autopsy were grossed, processed and examined microscopically to lead to a final diagnosis. There were total of 87 cases. The male to female ratio was 2.35:1. Majority of the cases 28.73% were found in 4th decade followed by 24.13%in 3rd decade .The commonest pathological finding was pulmonary edema with congestion(33.33%) followed by anthracotic pigment deposition (11.49%) and Pneumonia (8.04%). In this series we found 1 case of pulmonary tuberculosis, 6 cases of emphysema and 3 cases with vegetative material in lung. There were two cases each of pulmonary embolism and metastatic deposits in lungs. This study highlights the frequencies of various lung lesions on autopsy with respect to gender and age. Clinicians as well as pathologists must be aware of the wide spectrum of possible pathologies in the lungs to prevent morbidities due to lung disease.

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Key Words
Autopsy, pneumonia, emphysema, carcinoma

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INTRODUCTION

Autopsy is an essential legal procedure in all medicolegal deaths and is regarded as the gold standard for determining the cause of death and confirming or refuting pre-mortem diagnosis. It is also an important tool for retrospective quality assessment of the clinical diagnosis and serves as an educational tool to the clinician[1]. Autopsy study reveals many undiagnosed histopathological lesions which are not clinically detected. Many lung lesions produce no functional derangement and are detected for the first time at autopsy. Lungs are paired intrathoracic organs that are vital for life as they play major role in human body by exchanging gases between inspired air and blood. Development of the lung resembles the unfolding of a flower as a mass of cells proceeds in a deliberate fashion to form a complex conglomeration of air spaces, blood, connective tissue and nerves to provide a unique framework for gas exchange[2]. The segmental anatomy of the lung is important for radiologists, bronchoscopists and pathologists in defining the location of lesions[3]. The tracheobronchial mucosa is subjected to many forms of damaging agents, including inhaled chemical toxins, viruses and bacteria. Prolonged or repeated damage to the respiratory epithelial cells leads to their replacement by squamous epithelium. Lung tumors often develop from these areas of squamous metaplasia. Viral infections kill epithelial cells thus, lungs become vulnerable to secondary bacterial infections. Repeated damage to the mucosa leads to a state called chronic bronchitis. It is commonly associated with asthma and emphysema[4]. Surfactant production occurs late in gestational period and if the infant is born prematurely, it can result in respiratory distress syndrome of the newborn. The lymphatics can carry bacteria and tumor cells into the pleural cavity from the lung, producing infected pleural effusions and malignant pleural effusions, respectively. Most of these lesions don't present with any signs or symptoms and remain undetected during lifetime. Hence , these diseases are observed as incidental findings on autopsy examination. Post-mortem examination of diseased lung offers a chance to establish the diagnosis and thus help in confirming an uncertain antemortem diagnosis. It will be an important learning tool for pathologists as well as to the clinicians to characterize the most common entities which are prone to clinical under diagnosis. Lung autopsy study can thus improve clinical and diagnostic approach towards various lung disorders. Despite pitfalls like delay in carrying out autopsy procedure, improper preservation, delayed transport and non-availability of representative samples, autopsy examination is still very useful for studying the disease process in situ, thus enriching knowledge.

Aims and Objectives:

- To analyze the histopathological spectrum of lung diseases in autopsy cases.
- To assess the frequencies of different types of lung lesions with respect to age and sex.
- To correlate pathological findings with clinical findings wherever available.

MATERIALS AND METHODS

A 2 years retrospective observational study was conducted in the department of Pathology during the period from May 2022 to April 2024 .

Ethical Clearance: All procedures performed were in accordance with the ethical standards of the institution.

This study includes cases which were brought dead under different circumstances like accidents, suicide, homicide, foeticide, hanging, drowning, burns, electrocution, snake bite, cases with suspicion of foul play, abandoned dead bodies and those with history of sudden death due to unknown cause.

All autopsy cases in which lungs were received, irrespective of age, sex and cause of death were included in this study and autolyzed specimen were excluded from the study.

In our study period, we received total 98 lung specimen for autopsy examination out of which 11 specimen were autolysed. Thus a total of 87 cases were taken up for this study. Clinical history and diagnosis were elicited from the records wherever available. Lung specimen were grossly examined for any focal or diffuse changes. Sections from representative areas were submitted, fixed in 10% formalin for tissue processing. Processed tissues were sectioned and stained using Hematoxylin and Eosin. Special stains were used wherever required. Prepared slides were subjected to microscopic examination.

Final diagnosis was given after correlating clinical findings with gross and microscopic findings. Results were expressed in terms of spectrum of lung diseases and their frequencies in different sex and age groups. Data was analyzed using Microsoft Excel and Statistical package for social sciences (SPSS) software.

RESULTS AND DISCUSSIONS

In present study, we examined lung specimen in total of 87 autopsy cases . We found that there was male predominance i.e, number of males were 61 (70.11%) and number of females were 26(29.8%) with a male to female ratio of 2.35: 1[Graph 1].

Age of the autopsy cases ranged from 8 days to 80 years with majority of the cases seen in 4th decade of life (28.73%) followed by 3rd decade (24.13%)[Table 1].

We observed that out of 87 cases, the microscopic findings were close to normal histology in 27 cases (31.03%) and significant histopathological findings were found in 60 cases (68.96%).

Among these, Pulmonary edema with congestion was the most common abnormal finding seen in 29 cases(33.33%) followed by presence of Anthracotic pigment deposition in 10 cases(11.49%).Pneumonia changes were seen in 7 cases (8.04%). We diagnosed a single case of pulmonary tuberculosis (1.14%)(Fig-2,3). Emphysematous changes were observed in 6 cases(6.89%) of which, 4 cases showed features of emphysema aquosum with history of drowning (Fig-6).

In our study there were 3 cases(3.44%) of aspiration of vegetative material and we found 2 cases(2.29%) of embolism. One of which showed multiple thromboemboli in pulmonary vessels (Fig-4) associated with large thromboembolus in pulmonary trunk and another case with postmortem finding of multiple rib fractures showed bone marrow emboli in pulmonary vessels Fig-5).

We diagnosed 2 cases(2.29%) of metastatic tumors in lung. One was from solid pseud opapillary neoplasm of pancreas (Fig-7) and the other was from osteosarcoma of unknown origin (Fig-1,8)[Table 2].

Fig- 6 3zgFig- 4g-66Emphysema aquosum of lung with areas of pulmonary edema, microbubbles of emphysema and intraparenchymal hemorrhages.

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The term autopsy is derived from the Greek word “autopsies” meaning auto (oneself) and opsis (eye) which is “to see for self.” Medico-legal autopsies are a mandatory specialized surgical procedure conducted on the corpse to determine the cause of death. Even in the era of high-tech medicine, the autopsy remains an important tool for the quality assessment of clinical diagnosis[1].Various findings, unrelated to the cause of death may be noticed during histopathological examination of various organs and tissues retrieved during autopsies. The aim is to determine, clarify or confirm medical diagnosis that remained unknown or unclear prior to the patient’s death[5].

Our series of 87 cases had 70.11% males and 29.8% females. Goswami[6s] in their retrospective series on medico-legal autopsies had 90% males and 10 %females. Sumaya[7] found 77.4% of lesions in males and 22.6% lesions in females. Dhruv D[8] also noted male predominance (73%) in their study.

In our study, majority of the cases were found to be in 4th decade of life (28.73%) followed by in 3rd decade (24.13%).This is in concordance with study conducted by Dhruv D[8]in which most affected age group was 30-39 years followed by 20- 29 years. Study by Patel CB[9] also found the maximum number of cases in fourth decade.

In current analysis of 87 cases, the microscopic findings were close to normal histology in 27 cases(31.03%).Significant histopathological findings were found in 60 cases (68.96%).

Among these, Pulmonary edema with Congestion was the most common abnormal finding seen in 29 cases(33.33%) . Studies done by Dhruv D[8], Khare[10]and Manga[11] showed pulmonary edema with congestion in 352 cases(74.25%) , 24 cases (42.86%) and in 1325 cases (77.26%) respectively. As a normal postmortem change, hypostasis occurs in which congestion is observed in the dependent regions of the lung. In contrast, an asymmetrical and segmental increase in lung density along with other pathological findings like inflammatory cell infiltrates indicates a pathologic lesion.

Anthracotic pigment deposition was observed in 10 cases(11.49%).Anthracosis is defined as, the asymptomatic, milder type of pneumoconiosis as caused by the accumulation of carbon in the lungs due to repeated exposure to air pollution or inhalation of smoke or coal dust particles[12]Biomass smoke has been mostly reported as a risk factor for anthracosis in India[13].

Pneumonia changes were seen in 7 cases(8.04%).Gunja RS[14] and Kaur B[15] found Pneumonia to be the second most common pathological finding in their studies which suggests that infections of lungs are common preventable causes of mortality. Hence, early detection and treatment can reduce deaths due to lung disease.

In present study, we diagnosed a single case (1.14%) of pulmonary tuberculosis, while there were 6.26% and 2.80% cases respectively in studies by Chauhan[16] and Selvam[17]. This low incidence of death by tuberculosis could be due to the high success rate of antitubercular treatment(ATT) in India.

Emphysematous changes were observed in 6 cases(6.89%). Chronic emphysema develops over several years due to a variety of causes (e.g., senile

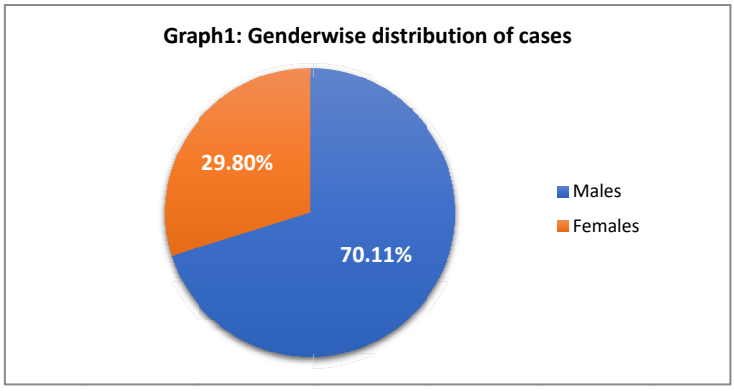

Fig.1:Gross feature of metastatic osteosarcoma deposits in lung

Fig.2: Gross feature of tuberculosis of lung showing multiple tubercular nodules with central caseous necrosis (white arrows)

Fig.3: Tuberculosis of lung showing granulomatous inflammation with central caseous necrosis(H&E -10X)

Fig. 4: Organised thrombus in lumen of pulmonary vessel(H&E -10X)

Fig.5: Medium sized pulmonary vessel with bone marrow embolus(H&E -40X)

Fig.6: Emphysema aquosum of lung with areas of pulmonary edema(asterix) and microbubbles of emphysema (arrow)(H&E -10X)

Fig.7: Metastatic deposits of solid pseudopapillary neoplasm of pancreas in lung(H&E -10X)

Fig.8: Metastatic osteosarcoma deposits in lung(H&E -10X)

emphysema, chronic obstructive pulmonary disease (COPD), alpha-1-antitrypsin deficiency, or as secondary form of other diseases). Whereas drowning asphyxia leads to acute hyperinflation and acute ruptures in the alveolar septums. In our study,4 cases with history of drowning showed features of emphysema aquosum. We observedaspirated vegetative material in lung sections of 3 cases which was comparable to studies by Dhruw D[8]and Momin[18]who found aspiration of vegetative material in 3 cases and 2 cases respectively. In current study, we found 2 cases of embolism.

Table 1-Distribution of cases according to age and gender

Age group (in years)	Number of males	Number of females	Total number of cases	Percentage
<1	3	1	4	4.59
1-10	2	2	4	4.59
11-20	4	3	7	8.0
21-30	15	6	21	24.13
31-40	17	8	25	28.73
41-50	6	2	8	9.19
51-60	7	2	9	10.34
61-70	3	1	4	4.59
71-80	4	1	5	5.74
TOTAL	61	26	87	100

Table 2-Spectrum of histopathological findings on lung autopsy

Histopathological finding	Total number of cases	Percentage
Normal	27	31.03
Pulmonary edema and congestion	29	33.33
Anthracotic pigment deposition	10	11.49
Pneumonia	7	8.04
Tuberculosis	1	1.14
Emphysema	6	6.89
Vegetative material	3	3.44
Pulmonary embolism	2	2.29
Malignancy	2	2.29
TOTAL	87	100

Onecase with multiple thromboemboli in pulmonary vessels was associated with large thromboembolus in pulmonary trunk and another case with provided history of multiple rib fractures on postmortem, showed bone marrow emboli in pulmonary vessels. Sumaya[7] reported one case of amniotic fluid embolism in a case of death due to postpartum haemorrhage.

In our series, we diagnosed two lungmalignancies, both being metastatic tumors. One of these showed metastatic depositsfrom solid pseudopapillary neoplasm of pancreas and the other case showe dosteosarcomade posits but its origin was unknown. Sumaya[7] in their study, found 1 case of metastatic undifferentiated carcinoma which on IHC study was suggestive of poorly differentiated squamous cell carcinoma. In study by Chauhan[16], there were 7 cases of malignancies, among which 1 case was metastatic carcinoma probably arising from primary choriocarcino ma.

CONCLUSION

Various findings, unrelated to the cause of death may be noticed during histopathological examination of tissues retrieved from autopsies. Pathological examination of postmortemlung specimen is very helpful to identify such silent diseases. This study highlights the prevelance of various lung lesions on autopsy with respect to age and gender. The clinicians as well as pathologists must be aware of the wide spectrum of possible pathologies in the lung to prevent morbidity due to lung disease.

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