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Histopathological spectrum of lung lesions on autopsy in a tertiary care Centre of western Ahmedabad: A retrospective observational study

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Abstract
Background: Autopsy is a highly specialized surgical procedure consisting of a thorough examination of a dead body. An autopsy is often followed by a histopathological examination which gives valuable information about the cause of death. The aim of this study is to find out the frequency of various lung lesions about age and sex and analyze the histopathological spectrum of lung lesions.
Materials and Methods: This was a non-interventional record-based retrospective observational study conducted in GMERS Medical College, Sola, Ahmedabad on 226 autopsies throughout one and a half years starting from January 2022 to June 2023. All the autopsy cases whose lung was received by the pathology department irrespective of age, sex and cause of death were included in the study. Both gross and microscopic examination was conducted on these lung specimens. Descriptive statistics were calculated and presented as frequency and percentage.
Results: In the present study of a total of 226 autopsies with lungs, the majority of autopsies had Pulmonary edema with mild inflammatory cell infiltrate (64.15%) as the histopathological finding, followed by Lobar Pneumonia (23.00%), Chronic Venous Congestion (6.63%), Tuberculosis (2.65%), Fibrosis and xanthogranulomatous changes (0.88%). Still, further, there was one case (0.44%) for each of the following incidental lesions: (1) Interstitial pneumonia (2) Bronchiectasis (3) Sarcoid Granuloma (4) Bronchioalveolar Adenocarcinoma.
Conclusion: Thus, Histopathological examination of the lungs helps to highlight many incidental findings and establishes the underlying cause of death.

Keywords: Autopsy, histopathology, lung lesions

Introduction
Autopsy, also known as a post-mortem examination, is a highly specialized surgical procedure consisting of a thorough examination of a dead body to (i) determine the cause and manner of death and (ii) evaluate any disease or injury that may be present [1]. Autopsy is often followed by histopathological examination of various organs. Histopathological examination of the autopsied specimen helps to highlight many incidental findings that provide important learning tools for both pathologists and forensic experts [2, 3].
The lungs are one of the most vital organs in the human body. Lung disorders have varied complex presentations ranging from the most commonly observed pathology of inflammation, infections, occupational diseases, and neoplasms [4]. Lungs are also involved secondarily by terminal events of cardiovascular disorders [5]. Therefore, histopathological examination of the lungs gives valuable information about the cause of death and also improves clinical diagnosis. It is with this backdrop; that the present study has been conducted to evaluate the common histopathological findings of lung lesions on autopsy so that a prophylactic plan can be prepared for the prevention of such lung lesions-induced mortality.

Materials and Methods
A non-interventional retrospective record-based observational study was conducted on 226 autopsies in the Department of Pathology, GMERS Medical College Sola, Ahmedabad for one and a half years starting from January 2022 to June 2023.
Inclusion Criteria: All the autopsies whose lung was received by the Pathology department

during above mentioned period were included in the study irrespective of age, sex and cause of death.
Exclusion Criteria: Autopsy organs received in an autolyzed state were excluded from the study.
Information regarding the patient's age, sex and history of illness was collected from the requisition form. 10% buffered formalin was used to fix the lung specimens. Both gross and microscopic examination was conducted on these specimens. Weight, Volume, color, consistency, looking for consolidation, fibrosis, scarring, infarction and congestion formed a part of the gross examination. Representative tissue sampling was done from grossly abnormal areas, was processed according to standard protocols and paraffin blocks were made. Sections of four-micron thickness were obtained and subjected to Haematoxylin and Eosin staining. Special stains like Ziehl Neelsen stain were applied in indicated cases.

Statistical Analysis: The data collected was entered in a Microsoft Excel worksheet and descriptive statistics were calculated and presented as frequency and percentage.

Results

In total 333 autopsies were received in one and half years in the Department of Pathology of GMERS Medical College Sola, out of which 87 autopsies were devoid of lungs; of the remaining 246 cases, sixteen cases were excluded as the received lung tissue was found to be in autolyzed state; further four cases were excluded as lung tissue morphology did not reveal any significant lesion. Therefore, the remaining 226 autopsies were included in the study and analyzed for various gross and histopathological features.
In our study distribution of lung lesions in accordance to age group is in the following descending order (i) 57 autopsies with histopathological findings in the 40-49 years age group (ii) 51 autopsies with histopathological findings in the 30-39 years age group and (iii) 46 autopsies in 50-59 years age group (Table 1). Males constituted 73% (n=165) of the total number of cases while the remaining 27% (n=61) cases were females.

Table 1: Age Wise Distribution of Cases

Histopathology Diagnosis	10-19 Yrs.	20-29 Yrs.	30-39 Yrs.	40-49 Yrs.	50-59 Yrs.	> 60 Yrs.	Total
1. Pulmonary oedema and mild inflammatory cell infiltrate	6 (4.14%)	26 (17.93%)	36 (24.83%)	37 (25.52%)	25 (17.24%)	15 (10.34%)	145 (100%)
2. Pneumonia	2 (3.85%)	7 (13.46%)	10 (19.23%)	13 (25%)	10 (19.23%)	10 (19.23%)	52 (100%)
3. Chronic venous Congestion	0	3 (20%)	3 (20%)	2 (13.33%)	6 (40%)	1 (6.67%)	15 (100%)
4. CVC with pneumonia	0	0	0	1 (50%)	1 (50%)	0	2 (100%)
5. Interstitial Pneumonia	0	0	0	1 (100%)	0	0	1 (100%)
6. Fibrosis and Xanthogranulomatous changes	0	1 (50%)	0	0	1 (50%)	0	2 (100%)
7. Tuberculosis	0	0	2 (33.33%)	2 (33.33%)	1 (16.67%)	1 (16.67%)	6 (100%)
8. Bronchiectasis	0	0	0	1 (100%)	0	0	1 (100%)
9. Sarcoid Granuloma	0	0	0	0	1 (100%)	0	1 (100%)
10. Adenocarcinoma of Lung	0	0	0	0	1 (100%)	0	1 (100%)
Total	8 (3.54%)	37 (16.37%)	51 (22.57%)	57 (25.22%)	46 (20.35%)	27 (11.95%)	226 (100%)

A perusal of Histopathological findings obtained in the present study collected on 226 autopsies with lungs revealed 145 (64.15%) autopsies majorly having Pulmonary edema with mild inflammatory cell infiltrate, followed by 52 cases (23.00%) depicting histopathology of Lobar Pneumonia; of these two pneumonia cases showed focal granuloma formation but were negative for acid-fast bacilli on Ziehl Neelsen staining. Chronic Venous Congestion was reported in 15 (6.63%) cases and Tuberculosis was diagnosed in 6 cases (2.65%). Chronic Venous congestion along with changes in Pneumonia was reported in two cases. Further two cases (0.88%) fall in the category of Fibrosis and xanthogranulomatous changes. Still further there was one (0.44%) case of each of the following non-malignant lesions: (i) Interstitial pneumonia (ii) Bronchiectasis (iii) Sarcoid Granuloma. Only one (0.44%) case of malignancy was identified which was reported as Bronchioalveolar Adenocarcinoma. Overall, the diagnosis of histopathology of the lungs in autopsy revealed the occurrence of ten different microscopic spectrum. Pulmonary edema with mild inflammatory cell infiltrate was the most predominant finding in males forming about 47.78% of the total autopsies, while Pneumonia formed 15.48% and chronic venous congestion was seen in 4.86%. The trend was similar among females. Pulmonary, edema with mild inflammatory cell infiltrate formed the bulk of the cases (16.37%). Pneumonia (7.52%) and Chronic venous Congestion (1.76%) were the second and third most commonly seen histopathological findings among autopsied females (Table 2).

Table 2: Gender Wise Distribution of Cases

Histopathology Diagnosis	Male	Female
1. Pulmonary oedema and mild inflammatory cell infiltrate	108(74.48%)	37(25.52%)
2. Pneumonia	35(67.31%)	17(32.69%)
3. Chronic venous Congestion	11(73.33%)	4(26.67%)
4. Chronic Venous Congestion with pneumonia	2(100%)	0
5. Interstitial Pneumonia	1(100%)	0
6. Fibrosis and Xanthogranulomatous changes	1(50%)	1(50%)
7. Tuberculosis	4(66.67%)	2(33.33%)
8. Bronchiectasis	1(100%)	0
9. Sarcoid Granuloma	1(100%)	0
10. Adenocarcinoma of Lung	1(100%)	0
Total	165(73.01%)	61(26.99%)

Discussion

To ascertain the cause of unnatural deaths, medicolegal autopsies play a pivotal role. Facilities for the same are available in all the districts of our country. Despite the advances made in the field of diagnostics, there is a significant prevalence of morbidity and mortality due to respiratory ailments which could be prevented to some extent [6].

In our study lung lesions were predominantly seen among males (76%). Similar findings were reported by Bal MS *et al*., Amin NS *et al*. and Sweta *et al*. in their study which showed 80%, 79% and 88% respectively [7, 8, 9]. Most of our cases with lung pathologies were in the age group of 40-49 years similar to the study done by Udayshankar *et al*. [10], while Patel Chandani *et al*. [5] in their clinical study reported maximum cases in the 30-39 years age group. Furthermore, Gupta Chavi *et al*. in their study of 264 cases also reported the highest incidence in the 30-39 years age group [11].

Our research findings pointed towards Pulmonary oedema with mild inflammatory cell infiltrate as the most common histopathological finding accounting for 64.15% of the total number of cases. These findings were similar to the studies done by Chauhan *et al*. [12] and Rupali *et al*. [13] Thus, Pulmonary edema with mild inflammatory cell infiltrate as a common histopathological finding could be attributed to post-mortem changes or secondary involvement of lungs due to cardiovascular causes.

Pneumonia forms the second most common histopathological finding in the autopsied lungs of our cases comprising 23.00%. Anisha TS *et al*. [14] reported non-tuberculous pneumonia in 15% of her cases and it was the second most common lung lesion in her study. This is in coherence with our study. While Goswami Parth *et al*. [15] and Selvambigai G. *et al*. [16] reported 33.8% and 40% cases of pneumonia respectively which is more than what is reported in our study. It could be due to differences in the period of hospitalization as prolonged hospitalization increases the prevalence of Pneumonia. Chronic Venous Congestion formed the third major group in our study constituting 6.63% of the total number of cases which is comparatively less than what was reported by Patel Chandani *et al*. in her study [5]. This may be due to differences in study population or geographic variation and environmental factors. Tuberculosis though not a common finding was confirmed by Ziehl Nielsen staining in autopsied lungs and this constituted approximately 2.65% (n =6) cases. Pratima Khare *et al*. [17] also reported Tuberculosis in a similar proportion of her cases.

Chronic venous congestion along with concomitant changes of Pneumonia was seen in 0.88% (n=2) cases. Interstitial Pneumonia, Fibrosis and Xanthogranulomatous changes, Bronchiectasis, Sarcoid granuloma [FIGURE 1] and Bronchioalveolar Adenocarcinoma [FIGURE 2] of the lung formed the miscellaneous cases which constituted 2.65% of the total cases. It is worth noting in the case of Bronchioalveolar Adenocarcinoma that there was no antemortem history of malignancy, it was detected only on autopsy which emphasizes the insidious presentation of bronchioalveolar carcinoma.

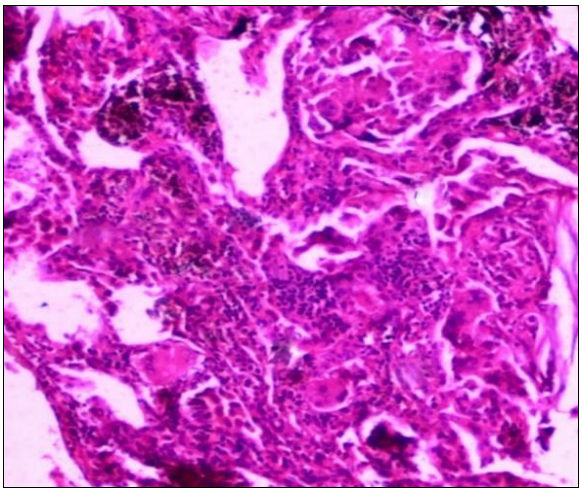

Fig 1: Sarcoid Granuloma

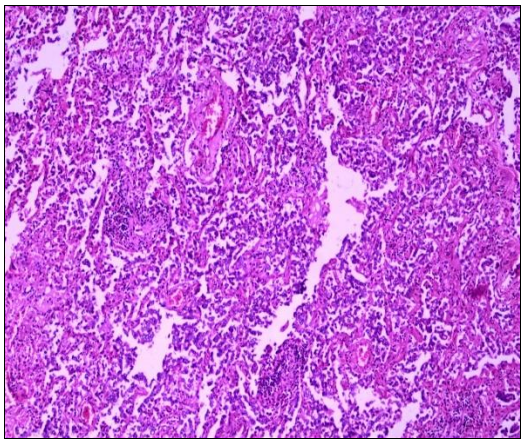

Fig 2: Bronchioalveolar Carcinoma

Conclusion

This study helps us to understand the vast spectrum of lung pathologies affecting the general population providing a deep insight into the most common lesions. The findings of our study are comparable to many other studies. Timely detection and diagnosis of these pathologies is going to substantially improve the overall morbidity and mortality related to lung diseases and thus can provide vision to plan preventive strategy to reduce mortality due to lung pathology.

Conflicts of interests: Nil.

Source of Support: Nil.

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