Study of histopathological spectrum of non-neoplastic lesions of the lung in autopsy specimen

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ABSTRACT

Background: Lungs are the major organ involved in infectious and occupational diseases almost secondarily involved in all forms of terminal diseases. Autopsy plays an important role in identifying and understanding the pathology of various respiratory diseases and lung lesions to find out the parenchymal pathology. **Aims and Objectives:** This study aims to study the histopathological spectrum of non-neoplastic lung lesions in medicolegal autopsy and to assess the frequency of spectrum of lung lesions. **Materials and Methods:** The present retrospective study was carried out in the Department of Pathology, Shyam Shah Medical College, Rewa, M.P., for a period of 18 months from July 2020 to January 2022. All 98 consecutive specimens of medicolegal autopsy were included with age from newborn to 70 years irrespective of gender and cause of death. The results were analyzed based on gross and microscopic findings. **Results:** Among the 98 cases studied, 82 cases (84%) were of diseased and 16 cases (16%) were of non-diseased lung. The most common age group affected was 30–39 years with 30% of affected cases followed by 20–29 years with 21% of affected cases. Among 82 cases, the most common pulmonary lesion was pneumonia in 46% (45/98) of the total cases followed by congestion and edema seen in 22% (21/98) of the cases. **Conclusion:** Histopathological study of lung autopsy helps in providing information for clinical diagnosis of non-neoplastic lung lesions that act as a tool for better clinical assessment and help to establish a correct prophylactic measure. The histopathological examination (HPE) helps in establishing the final cause of death. The HPE helps in establishing the final cause of death. Therefore, autopsy study is very helpful in refining the vision and diagnostic setup for better evaluation.

Key words: Autopsy; Histopathology; Lungs; Pneumonia

INTRODUCTION

Autopsy is a procedure that helps to determine the cause and time of death by identifying the changes that occur in the organs, by thorough examination of the body after death. It also helps in the study of antemortem and postmortem aspects of death.[1] Autopsy is followed by histopathological examination (HPE) to look for any undiagnosed or untreated disease process, which did not show any clinical sign and symptoms and remained unknown during his or her lifetime. HPE can also draw attention toward incidental findings.[2]

Examination of the lungs is the most important part of autopsy, as the lungs are a vital organ in the human body and are directly and constantly exposed to the surrounding atmosphere.[3] Respiratory diseases progress rapidly and are particularly common in extremes of ages such as neonates, old ages, and immunocompromised individuals. There has been a rapid increase in respiratory morbidity in the current population due to increase in air pollution, smoking, and chemical substances that lead to preventable chronic respiratory diseases affecting millions of people all over the world.[4] They are vulnerable to develop various kinds of inflammatory, infectious, and neoplastic conditions.[3] HPE

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done on lung specimens after autopsy can help identifying the cause of death and correlate these findings with the clinical features.[3,5] Therefore, it is important to determine the leading causes of death to establish correct prophylactic actions, which is the least expensive strategy for preventing further pulmonary dysfunction and avoiding the need for lung biopsies. Clinical and autopsy diagnoses have been found to differ significantly in major and minor ways in few studies.[6]

Aims and objectives

The aim of the present study was to find out the spectrum of various histopathological findings in autopsy specimens of lung and its prevalence.

MATERIALS AND METHODS

The current retrospective study was carried out in the Department of Pathology, Shyam Shah Medical College, Rewa, Madhya Pradesh, for a period of 18 months from July 2020 to January 2022. After taking ethical clearance from the Institutional Ethical Committee, departmental records were checked, and all the details of the medicolegal autopsies conducted were included in the study. A total of 98 consecutive cases that underwent medicolegal autopsy in this period were taken irrespective of age, gender, and followed by HPE to identify the cause of death were included in this study. These specimens were received in 10% formalin and were studied grossly. In all the cases, available clinical details (age, gender, and clinical diagnosis) were collected and details regarding the gross findings of the lung specimens, including the type of specimen, size, and weight were noted. The characteristics of the lesions seen grossly were also noted in terms of size, site, consistency, and distribution were also noted. Later, sections from the lung tissues measuring 4–5 mm in thickness were taken and after routine processing and paraffin embedding, blocks were prepared. Slides for HPE were prepared by taking 4–5 micron thick serial sections of the prepared blocks and stained by hematoxylin and eosin stain. All the histopathological blocks were reviewed from the department archives and the microscopic findings were noted.

RESULTS

The present study was conducted on 98 consecutive lung specimens received in the pathology department of a tertiary care institution in Central India, for the HPE following medicolegal autopsy. Age-wise distribution of these autopsy cases is shown in Table 1. The age of the deceased ranged between neonates and 70 years old, with most of the samples belonging to the age between 30 and

39 years of age (31%) followed by 20–29 years (19%). The least common age group in the current study was 0–9 years (9%). The lung pathology was seen in 82 cases (84%). The most common age group affected is between 30 and 39 years (30%) (Table 1). Out of the total 98 cases, 63% of cases were male and 37% were female with a male-to-female ratio of 1.7:1.

Following the HPE, these specimens were divided on the presence of histopathological changes suggestive of any lung disease contributing to the cause of death or histologically unremarkable. In the present study, 16% of the cases were histologically unremarkable, whereas 84% of the cases showed significant histological changes and were classified as diseased lungs. The cases with significant histopathological changes were further subclassified based on the type of the lesion encountered, as shown in Tables 2 and 3.

The most common lesion observed in the present study was pneumonia showing patchy discoloration and consolidation grossly and microscopic picture showing bronchioles and peribronchiolar alveoli filled with inflammatory exudates and intra-alveolar exudates of polymorphonuclear cells and red cells seen in 46% of cases (45/98) (Figure 1a). The next common lesion was congestion and edema seen in 22% (21/98) of the cases, characterized by congested blood vessels and eosinophilic edema fluid present in intra-alveolar

Table 1: Demographic variable of all the lung specimens

	Diseased lung	Non-diseased lung
Age-wise distribution		
Age groups		
0–9 years	7	2
10–19 years	11	1
20–29 years	17	2
30–39 years	25	5
40–49 years	9	3
>50 years	13	3
Gender distribution		
Males	53	09
Females	29	07
Total	82 (84%)	16 (16%)

Table 2: Frequency of various histopathological findings of lung specimens

Histopathological findings	No. of cases	Percentage
Pneumonia	45	46
Tuberculosis	04	04
Congestion and edema	21	22
Diffuse alveolar damage	05	05
Chronic bronchitis	03	03
Emphysema	04	04
Normal lung	16	16
Total	98	100

Table 3: Distribution of various histopathological lesions of lung according to age and gender

| LESIONS	0–09 Years	10–19 Years	20–29 Years	30–39 Years	40–49 Years	>50 Years	Total	M	F
Infective etiology									
Pneumonia	02	02	09	16	07	09	45	28	13
Granuloma	01	00	01	02	00	00	04	01	03
Congestion and edema	01	03	07	05	02	03	21	14	08
Diffuse alveolar damage	02	02	00	01	00	00	05	05	02
Chronic bronchitis	00	01	02	00	00	00	03	03	01
Emphysema	00	02	00	01	00	01	04	02	02
Total	07	11	17	25	09	13	82	53	29
Normal lung	02	01	02	05	03	03	16	09	07
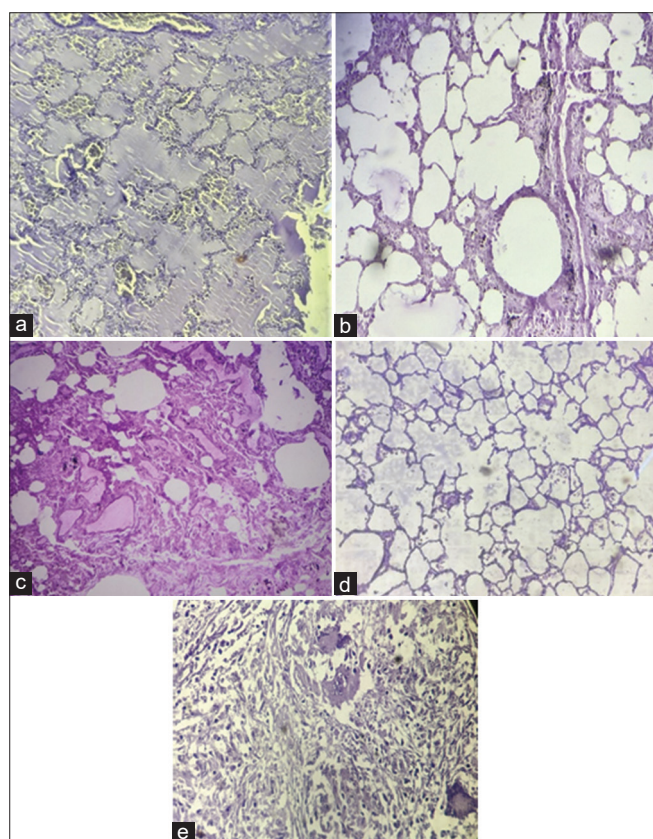
Figure 1: H and E stained sections of various histopathological lesions noted on autopsy of lung. (a) Pneumonia: A 49-year-old male, lung specimen showing inflammatory exudate and red cells infiltrating the alveoli and interstitium (×10), (b) Congestion and edema: A 36-year-old female, lung specimen showing congested blood vessels and eosinophilic edema fluid (×10), (c) Diffuse alveolar damage: A 1-day-old male, edema and eosinophilic hyaline membrane formation (×10), (d) Emphysema: A 52-year-old male, large alveoli separated by thin fibrous septa with broken alveoli (×10), (e) Pulmonary tuberculosis: A 34-year-old male, granuloma formation with Langhans giant cells (×40)

spaces and separated by septa (Figure 1b). Diffuse alveolar damage was seen in 5% of cases (5/98) characterized by congestion, intra-alveolar edema, eosinophilic amorphous hyaline membrane formation, inflammation, and fibrin deposition (Figure 1c). Chronic bronchitis was seen in 3% of cases (3/98) and emphysema was seen in 4% of cases (4/98) each. Chronic bronchitis is seen microscopically as

Table 4: Comparison of the prevalence of various lung lesions seen in autopsy specimens between various studies

Study and sample size	Lung pathological lesions present	Lung pathological lesions absent
Hanmante et al.,[7] 2014, n=120	91.70%	8.30%
Shweta et al.,[8] 2015, n=150	92%	8%
Amin et al.,[6] 2017, n=410	86.10%	13.90%
Khare et al.,[1] 2017, n=86	69.77%	30.23%
Momin et al.,[9] 2018, n=300	90%	10%
Kour et al.,[10] 2019, n=200	75%	25%
Gunja et al.,[11] 2019, n=35	82.80%	17.20%
Dhruw et al.,[12] 2020, n=474	93%	7%
Present study, 2022, n=98	84%	16%

hypersecretion with hypertrophy of submucosal glands with chronic inflammatory infiltrate around bronchioles. Emphysema microscopically shows abnormally large alveoli separated by thin septa with focal destruction of alveoli at places (Figure 1d). Histopathological findings suggestive of granulomatous lesions were seen 04% (4/98) of the cases characterized by granuloma formation with Langhans' giant cells (Figure 1e).

DISCUSSION

HPE of medicolegal autopsy is done to find out the disease process and cause of death. The present study was carried out to identify the histopathological changes seen in the lung specimens done after the medicolegal autopsy. The prevalence of significant histopathological changes in the present study was 84%, which was comparable to the several previous similar studies[1,6-12] (Table 4). Male predominance was observed in the present study with 63% of the cases which was comparable to the past similar

Table 5: Comparison of different lung lesions in HPE with the previous studies

Lungs findings	Present study	Goswami et al.[17]	Nazish et al.[18]	Udayshankar et al.[14]
Congestion	25.6%	30.2%	20.68%	-
Pneumonia	54.8%	33.8%	41.67%	31.81%
ARDS/diffuse alveolar damage	6.1%	-	-	-
Granuloma	4.9%	12.9%	22.22%	22.72%
Chronic bronchitis	3.7%	-	-	-
Emphysema	4.9%	15.8%	2.78%	9.09%

research.[3,4,6,11,13-16] In the present study, the most affected age group was 30–39 years followed by 20–29 years which was comparable to the results of similar studies done by Patel et al.,[3] Kurawar and Vasaikar,[4] and Dhruw et al.[12] (Table 5). In the present study, the most common histopathological lesion was pneumonia seen in 46% of cases which was comparable to Udayshankar et al.,[14] Selvambigai et al.,[16] Goswami et al.,[17] and Nazish et al.[18] Although tuberculosis is prevalent in our India as seen in study done by Amin et al.,[6] in the current study, only 4 (4%) cases were found. The reason may be attributed to early diagnosis and better cure rate and, therefore, tuberculosis being primary cause of death in only four cases.

Limitations of the study

The short coming of the study was small sample size and missed histopathological diagnosis in cases where only a part of the lung tissue was received for HPE. To reach the final cause of death, the histopathological findings of lungs should be correlated with the findings of other organs, medical and surgical history, and circumstantial evidence. This study has not considered these factors to establish the cause of death.

CONCLUSION

HPE of lung autopsy has helped to find out findings which were incidental or direct cause of death. This study concludes that the most common lung lesions include pneumonia followed by congestion. Lung lesions were more common in males as compared to females. The HPE helps in establishing the final cause of death. Therefore, autopsy study is very helpful in refining the vision and diagnostic setup for better evaluation.

ACKNOWLEDGMENT

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