

Histomorphological Spectrum of Lung Lesions at Autopsy- A Tertiary Care Centre Experience

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Abstract

Background and aims: A wide variety of pathological conditions involve the lungs. In autopsy, the lungs are examined for disease, injury and other findings suggesting cause of death or related changes. **Aims & Objectives:** The present study aimed to study the histomorphological spectrum of lung lesions at autopsy and to assess the frequency of different types of lesions; and to associate histomorphological changes with cause of death. **Material and Methods:** It was a one-year observational study conducted in the Department of Pathology, Govt. Medical College, Jammu. Lung tissue pieces from all medicolegal autopsies received were fixed, examined grossly, processed; paraffin embedded sections obtained were stained with Hematoxylin and Eosin stain and examined under microscope. Findings were recorded and tabulated. **Results:** Out of 264 cases, males were predominantly affected (84%); median age was 38 years. The various changes observed were congestion (68%), edema (45.4%), pneumonia (5%), granulomatous inflammation (3%), diffuse alveolar damage (1.5%), haemorrhage (14.4%), interstitial changes (60%), malaria (0.4%) and malignancy (0.4%). Natural deaths were the commonest cause (75, 28%) followed by asphyxial deaths (65, 24.6%). **Conclusion:** Histopathological examination of lung autopsies highlights many incidental findings, establishes underlying cause of death, serves as a learning tool and also holds scope for detection of newer diseases.

Keywords

Lung, Autopsy, Histopathology

Introduction

A wide variety of pathological conditions involve the lungs.^[1] Also, the lungs are secondarily involved in terminal events of cardiovascular disease.^[2] Autopsy refers to the systematic examination performed on a body after death for medical, legal and / or scientific purposes. Autopsies are carried out to establish the identity, cause and manner of death; and approximate time since death.^[3] Autopsy reveals the condition of internal organs and is often followed by histopathological examination of tissues from various organs. It relates the cause of death to the

associated pathologies and the interaction between the two.^[4]

In autopsy, the lungs are examined for disease, injury and other findings suggesting cause of death or related changes.^[5] Histopathological examination of lung autopsy helps to study the disease process, detects many incidental findings and enhances our knowledge about lung histology in health and disease.^[1,2,6,7]

The present study aimed to study the histomorphological spectrum of lung lesions at autopsy and to assess the

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frequency of different types of lesions; and to associate histomorphological changes with cause of death.

Material and Methods

It was a one-year observational study conducted in the Department of Pathology, Govt. Medical College, Jammu w.e.f. 1st June 2020 to 31st May 2021. Lung tissue pieces from all medicolegal autopsy cases received in the department for histopathological examination during this period were included in the study.

Relevant details of the cases were noted from the requisition forms. Lung tissue pieces received were fixed in 10% formalin, examined grossly and representative sections were taken. The sections were processed; paraffin embedded sections obtained were stained with Hematoxylin and Eosin (H&E) stain and mounted. Special stains like Ziehl Neelsen (ZN) stain and Periodic Acid Schiff (PAS) stain were used wherever required. Stained sections were examined under light microscope and histomorphological features were studied. Findings were recorded and tabulated.

Results

A total of 264 autopsy lung cases were included in our study. Out of these, 221 were males (84%) and 43 were females (16%) with Male: Female ratio of 5.1:1. Median age of the cases was 38 years with age range from 1 day to 94 years.

The various histopathological changes seen in autopsy lung specimens are as shown in *Table 1*. Congestion was the most common finding (180, 68%). There were 13 cases (5 %) of pneumonia in our study. There was one case of aspiration pneumonia. Granulomatous lesions comprised 3% of the cases; out of these, tuberculosis was confirmed in 6 (2.3%) cases. ZN stain for AFB was positive in these 6 cases. There was 1 case of disseminated tuberculosis involving lung, liver, spleen and kidney in a known case of HIV infection.

Maximum cases were in the age group of 30-39 years (66, 25%) followed by 40-49 years (48, 18%). Maximum cases of pneumonia were observed in 20-29 years age group. 3 cases of tuberculosis were seen in 50-59 years age group, 2 cases in 20-29 years age group and 1 case in 30-39 years age group (*Table 2*).

The histopathological changes in lung specimens and associated cause of death were studied (*Table 3*). Deaths due to natural causes were the commonest cause in our study (75, 28%) followed by asphyxial deaths (65, 24.6%). Deaths due to natural causes included

cardiovascular causes like sudden cardiac death, coronary artery disease; pulmonary causes like tuberculosis, Coronavirus disease -19 (COVID-19); and other conditions like prematurity, chronic liver disease, chronic kidney disease, heat stroke, septicemia, malaria, HIV infection and malignancy.

Discussion

Autopsy is the gold standard for quality check of discrepancies in clinicopathological studies.^[8] Histopathological examination of lung autopsy provides an insight into the histology of varying stages of different diseases.^[9] The present study was done on autopsy lung specimens received in the department of pathology. A total of 264 cases were included in our study. There was male predominance in our study (84%); similar distribution was observed in many other studies.^[1-5,9]

On histopathological examination, congestion / edema / interstitial inflammation accounted for maximum number of cases. These findings are comparable with studies by Sathawane *et al*,^[1] Kurawar *et al*,^[10] Chauhan *et al*,^[11] and Jhaveri *et al*.^[12] There were 13 cases (5 %) of pneumonia in our study. There were 5 cases (8.7 %) of pneumonia in a study by Khare *et al*.^[13] Pneumonia cases were higher in other studies.[1-4,9,10] Granulomatous inflammation accounted for 8 cases (3%). There were 6 cases (2.3%) of tuberculosis, comparable to studies by Kurawar *et al*^[10] (32, 2.53%), Chakma *et al*^[14] (8, 1.87%) and Selvam *et al*^[15] (3, 2.8%). ARDS cases in our study are comparable to studies by Shetty *et al* [9] (1.9%) and Momin *et al* [16] (1.1%). Malarial pigment was seen in 2 (0.15%) cases by Kurawar *et al*^[10] while it was seen in 1 case in our study.

Most of the deceased in our study were in the age group of 30-39 years; similar to studied by Patel *et al*,^[2] Chakma *et al*^[14] and Dhruw *et al*.^[17] Maximum cases of pneumonia in our study were in the age group 20-29 years; similar to studies by Kurawar *et al*^[10] and Momin *et al*.^[16] Tuberculosis cases were highest in 50-59 years age group, similar to study by Goswami *et al*.^[18]

Deaths due to natural causes accounted for maximum cases in our study. The most common cause of death was RTAs (53 cases, 44%) in a study by Jagadish *et al*.^[8] In a study by Chakma *et al*,^[14] the commonest cause of death observed was shock and haemorrhage in 45.53% of the cases followed by head injury cases in 22.77%. Deaths due to natural diseases accounted for 10.56% cases in their study. Road traffic accident (RTA), 28 cases

Table 1. Distribution of Histopathological Changes in Autopsy Lung Specimens

Histopathological changes in lung	Number of cases	Percentage
Autolysed	43	16.3%
Congestion	180	68 %
Edema	120	45.4%
Pneumonia	13	5 %
Granulomatous inflammation	8	3%
Tuberculosis	6	2.3%
Foreign body	2	0.7%
Acute Respiratory Distress Syndrome (ARDS)/ Diffuse Alveolar Damage (DAD)	4	1.5%
Haemorrhage	38	14.4%
Interstitial changes		
Hemosiderin laden macrophages	29	11%
Non specific inflammation	159	60.2%
Fibrosis	2	0.75%
Malaria	1	0.4%
Malignant- Adenocarcinoma	1	0.4%

Table 2. Age-Wise Distribution of lung lesions

Histopathological changes in lung	0-9 years	10- 19 years	20- 29 years	30-39 years	40-49 years	50-59 years	>60 years	Age not known	Total
Autolysed	-	3	3	12	13	5	7	1	43
Congestion	3	10	38	47	29	30	17	6	180
Edema	2	6	31	33	19	17	10	2	120
Pneumonia	1	1	5	2	2	-	2	-	13
Granuloma									8
Tuberculosis	-	-	2	1	-	3	-	-	6
Foreign body	-	-	1	-	1	-	-	-	2
ARDS	1	-	-	-	-	2	1	-	4
Haemorrhage	1	3	10	7	7	7	3	-	38
Interstitial changes									
Hemosiderin laden Macrophages	1	-	5	8	6	7	1	1	29
Non specific inflammation	3	8	32	40	25	28	18	5	159
Fibrosis	-	-	-	-	1	-	-	1	2
Malaria	-	-	-	1	-	-	-	-	1
Adenocarcinoma	-	-	-	-	1	-	-	-	1

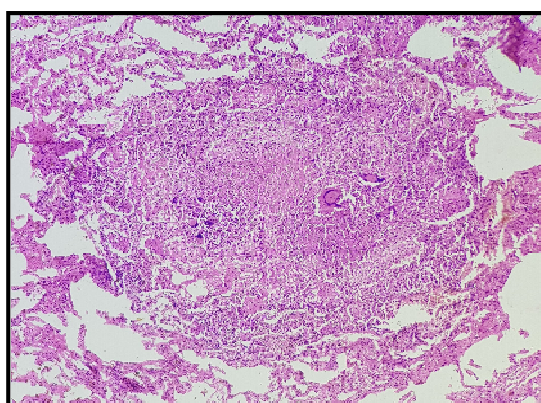
(26.2%) was the most common cause of death followed by sudden death (15.9%) in a study by Sumaya *et al.*^[19] Congestion, edema and non specific inflammation were associated with all types of causes of death. Pulmonary edema was the frequent non-specific autopsy finding associated with all type of cause of death.^[14] Pneumonia was associated finding in deceased who were admitted for trauma (5 cases) and died during their stay in hospital;

suggesting the role of hospital acquired pneumonia as a contributing factor leading to death in these patients. Hospital-acquired infections are the predominant contributors of fatality in patients surviving after the initial few days of trauma.^[9] Prolonged hospitalization increase chances of pneumonia, was the reason sighted for higher prevalence of pneumonia in study by Goswami *et al.*^[18] There were 2 COVID positive deceased whose lung

Table 3. Cause of death and associated histopathological changes in lung

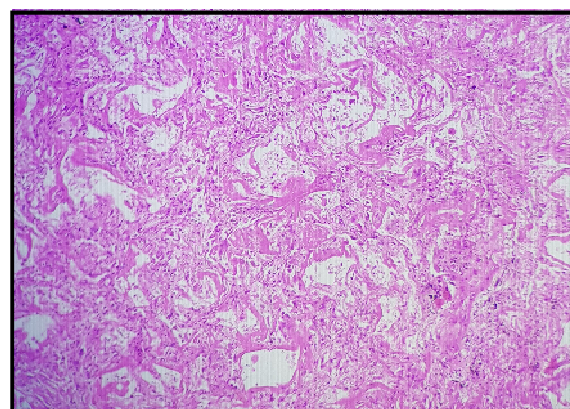
Cause of death	Histopathological changes in lung													Total
	Granuloma						Interstitial changes							
	Autolysed	Congestion	Edema	Pneumonia	Tuberculosis	Foreign body	ARDS	Hemorrhage	H S macrophage	Inflammation	Fibrosis	Malaria	Adenocarcinoma	
Asphyxia														65
Hanging	3	30	20	-	-	-	-	6	2	25	-	-	-	34
Drowning	11	12	12	-	-	-	-	5	4	08	-	-	-	26
Others (strangulation, choking, etc.)	-	5	02	-	-	-	-	-	-	04	-	-	-	05
Haemorrhagic shock														23
Trauma-RTA, fall, etc.	3	10	5	4	-	-	-	6	1	7	-	-	-	19
Firearm injury	1	3	1	-	-	-	-	2	1	3	-	-	-	04
Head injury	3	5	2	1	-	-	-	1	1	5	-	-	-	09
Burns	-	4	3	-	-	-	-	-	-	4	-	-	-	05
Electrocution	-	2	2	-	-	-	-	-	-	-	-	-	-	02
Poisoning	2	31	21	-	1	1	-	6	5	26	-	-	-	36
Drug abuse	-	4	4	3	-	1	-	2	1	5	-	-	-	9
Alcohol intoxication	1	6	5	-	-	-	-	1	1	6	-	-	-	7
Natural														75
Cardiac causes	4	38	20	3	1	-	-	6	7	35	1	-	-	48
Pulmonary causes	-	3	3	1	2	-	4	1	2	4	-	-	-	11
Others	2	7	7	1	2	-	-	-	-	6	-	1	1	16
Unknown	13	20	10	-	-	-	-	2	4	18	1	-	-	33

Fig 1. Photomicrograph from lung section showing well formed epithelioid cell granuloma with langhans giant cells and central caseous necrosis (H&E, 10X)



autopsy revealed features of Acute Respiratory Distress Syndrome (ARDS)/ Diffuse Alveolar Damage (DAD). Carsana *et al*^[20] analysed lung tissues from 38 patients who died from COVID-19 in hospital. All cases showed

Fig 2. Photomicrograph from lung section showing diffuse alveolar damage with hyaline membranes (H&E, 10X)



features of diffuse alveolar damage. The main histologic pattern seen at autopsy in COVID-19 lung injury is DAD.^[20,21]

Conclusion

The present study documents histopathological spectrum of lung lesions at autopsy. The pattern of findings of our study are comparable to many other studies. Infectious diseases of lung still remain an important cause of mortality. Pneumonia, tuberculosis were findings that remained undetected during lifetime, contributing to the cause of death directly or indirectly. Autopsy study reveals their true prevalence and also suggests implementation of measures to prevent hospital acquired infections; early diagnosis and treatment to reduce mortality due to these diseases. Histopathological examination of lung autopsy has also highlighted pattern of lung injury in severe coronavirus disease adding to our knowledge about this recently discovered disease. Thus, histopathological examination of lung autopsy specimens helps to highlight many incidental findings, establishes underlying cause of death, serves as a learning tool and also holds scope for detection of newer diseases.

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Conflicts of Interest

There are no conflicts of interest.

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