

ORIGINAL ARTICLE

Histopathological Spectrum of Autopsy Cases: A One Year Retrospective Observational Study in a Tertiary Care Centre in Mumbai

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ABSTRACT

Introduction: Autopsy continues to play a significant role in understanding disease processes and identifying clinically silent pathological lesions that may remain undetected during life. Several of these lesions remain clinically silent throughout life and are detected only during autopsy. The present study was undertaken to evaluate incidental neoplastic and non-neoplastic lesions detected on histopathological examination of medicolegal autopsies.

Aims and Objectives:

1. To evaluate histopathological lesions detected during autopsy and assess their association with the cause of death.
2. To classify the cause of death according to the various organ systems.
3. To classify the cause of death according to age and gender.

Materials and Methods: A retrospective observational study was carried out in the Department of Pathology at a tertiary care centre over a period of one year from February 2024 to January 2025. The study included all the medicolegal autopsy specimens and viscera received for histopathological examination during

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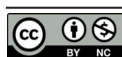
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the study period. A total of 303 cases were evaluated. Representative tissue sections from organs including brain, heart, lungs, liver, spleen, and kidneys were routinely processed and stained using hematoxylin and eosin stain. Microscopic examination was performed to identify pathological lesions and correlate findings with the clinical and autopsy details.

Results: The present study consisted of a series of 303 autopsy cases from the Department of Pathology in a tertiary care hospital conducted over a period of one year. The internal organs of a total of 303 autopsies were sent for histopathological examination. The most commonly involved age group was 30-40 years, with a male preponderance. Neoplastic lesions were identified in 4.95% of cases.

Conclusion: This study has contributed valuable insights to the spectrum of both neoplastic and non-neoplastic lesions, encompassing incidental as well as clinically significant findings. Routine autopsy histopathology facilitates identification of clinically unsuspected lesions and contributes valuable information regarding disease patterns and cause of death.

KEYWORDS

• Autopsy • Histopathology • Lesions • Medicolegal

INTRODUCTION

Postmortem examination remains an essential component of medical science for determining the cause and manner of death and for identifying underlying pathological processes.^{1,2} Histopathological evaluation of autopsy specimens contributes significantly to understanding disease patterns, incidental lesions, and clinically silent conditions that may remain undetected during life.³ In medicolegal practice, autopsies not only assist in establishing the cause of death but also provide valuable epidemiological and academic information regarding both neoplastic and non-neoplastic diseases.^{4,5} Routine microscopic examination of organs can reveal unsuspected pathological findings, thereby improving understanding of disease progression and population health trends.⁶

MATERIALS AND METHODS

A retrospective observational study was carried out in the Department of Pathology at a tertiary care centre over a period of one year from February 2024 to January 2025. The study included all the medicolegal autopsy specimens and viscera received for histopathological examination during the study period. A total of 303 cases were evaluated. Representative tissue sections from organs including brain, heart, lungs, liver, spleen, and kidneys were routinely processed and stained using hematoxylin and eosin stain.

Microscopic examination was performed to identify pathological lesions and correlate findings with the clinical and autopsy details.

Sampling method: All cases were included using a consecutive sampling method, wherein all medicolegal autopsy cases received during the study period were included without selection bias.

Statistical analysis: Collected data were compiled using Microsoft Excel and statistically evaluated using SPSS software. Descriptive statistical analysis was performed and categorical data was summarised as percentages and frequencies. Where applicable, Chi-square test was used to assess associations between variables such as age, gender, and organ involvement.

Software: Statistical analysis was performed using SPSS software.

Inclusion criteria:

A total of 303 cases comprising pathological postmortems (24 cases) and viscera received from medicolegal cases (279 cases) in the Department of Pathology during the study period.

Exclusion criteria:

Cases received outside the defined study period.

Ethical approval:

As this was a retrospective study based exclusively on postmortem specimens with no direct patient involvement, separate ethical

clearance was not required according to institutional guidelines.

Conflict of Interest:

The authors declare that there is no conflict of interest.

RESULTS

A total of 303 autopsy cases were included in the study. Histopathological examination was performed on internal organs received from medicolegal and pathological autopsies. The majority of cases belonged to the 31-40 year age group, with males constituting most of the study population.

Table 1: Age Wise Distribution of Cases

Age Group (Years)	Number of Cases	Percentage
0-10	19	6.3%
11-20	16	5.3%
21-30	36	11.9%
31-40	67	22%
41-50	59	19.5%
51-60	49	16.2%
61-70	35	11.6%
71-80	18	5.9%
81-90	4	1.3%

Most cases were observed in the age group of 31-40 years, comprising 67 cases (22%), followed by 41-50 year age group with 59 cases (19.5%). Lowest frequency was observed in the age group of 81-90 years, accounting for only 4 cases (1.3%). (Table 1)

Sex Wise Distribution of Cases:

In the present study, 79% deaths occurred in males and 21% in females, showing male preponderance.

Distribution of Cases According to Organs Involved

Out of 303 cases, 211 (70%) cases showed involvement of brain, 244 (81%) cases showed involvement of heart, 252 (83%) cases showed involvement of lung, 233 (77%) cases showed involvement of kidney, 237 (78%) cases showed involvement of liver, 193 (64%) cases showed involvement of spleen.

Table 2: Brain-Distribution of Cases According to Pathology observed

Pathology Observed	Number of Cases	Percentage
Incidental/Agonal Findings		
Congestion	156	74%
Edema	7	3.3%
Structural Diseases		
Meningitis	55	26%
Encephalitis	23	11%
Intraparenchymal hemorrhage	6	2.8%
Arteriosclerosis	3	1.4%
Subarachnoid hemorrhage	2	0.9%
Glioblastoma	2	0.9%
Sickle cells	1	0.5%
Thrombus	1	0.5%
Leukocytoclastic vasculitis	1	0.5%

Among the cerebral lesions identified, congestion was the predominant finding present in 156 cases (74%), followed in occurrence by meningitis in 55 cases (26%), encephalitis in 23 cases (11%), and cerebral edema in 7 cases (3.3%). Additionally, there was one case each of leukocytoclastic vasculitis and sickled red blood cells noted within the cerebral vessels. (Table 2)

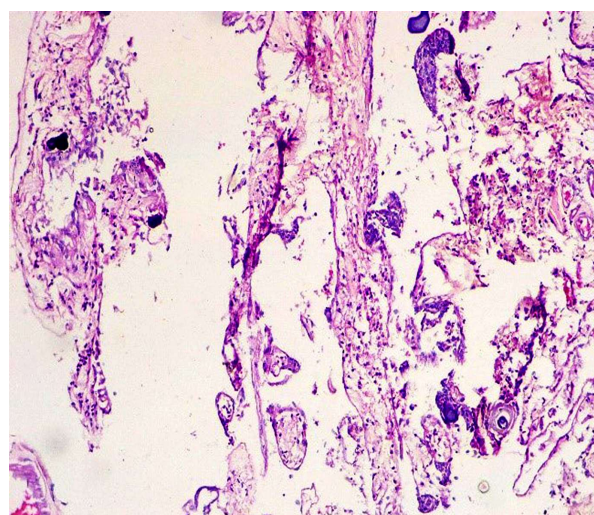


Figure 1: Photomicrograph showing meningitis (H&E, 20x): Inflammatory infiltrate comprising of lymphocytes and plasma cells within meninges

Table 3: Heart-Distribution of cases according to age and pathology observed

Pathology Observed (No of Cases)	Age Groups (Years)										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
Atherosclerosis	0	1	4	6	25	48	30	29	15	13	171 (70%)
Lumen obliteration/calcification	0	1	3	5	2	28	22	24	11	10	124 (51%)
Myocardial hypertrophy	0	0	2	6	18	25	15	17	4	8	95 (39%)
Myocarditis	1	1	4	7	14	15	9	12	6	7	76 (31%)
Pericarditis	0	0	2	5	12	16	10	9	4	3	61 (25%)
Myocardial infarction	0	0	1	2	10	12	4	8	2	4	43 (18%)
Rheumatic heart disease	0	0	0	0	1	0	0	0	0	0	1 (0.4%)
Thrombus	0	0	0	0	0	1	0	0	0	0	1 (0.4%)
Pericardial hemorrhage	0	0	0	0	0	0	0	1	0	0	1 (0.4%)

Among the total cases with cardiac involvement, the most frequently observed pathology was atherosclerosis, present in 171 cases (70%). Subsequently, coronary artery lumen obliteration was seen in 124 cases (51%), myocardial hypertrophy in 95 cases (39%), and myocarditis in 76 cases (31%). Additionally,

a single case of rheumatic heart disease was identified. The most commonly affected age group for atherosclerosis, myocardial infarction, myocardial hypertrophy and myocarditis was 51-60 years and the least affected was 1-10 years age group where 1 case of myocarditis was noted. (Table 3)

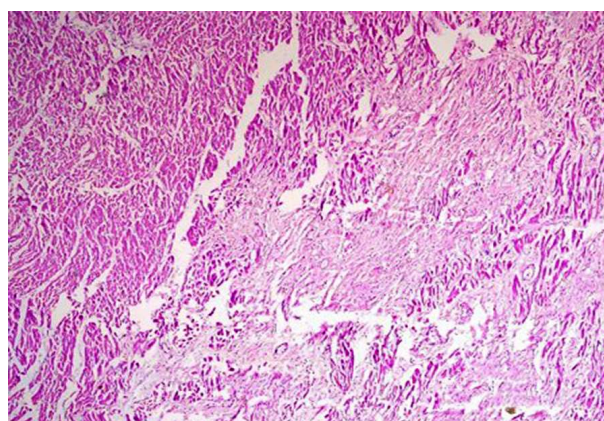


Figure 2: Photomicrograph showing Old healed infarct (H&E, 20x): Myocardial hypertrophy, myocytolysis and collagenous scar replacing necrosed myocardial tissue



Figure 3: Photomicrograph showing Atherosclerosis of coronary artery (H&E, 40x): Showing cholesterol in the fibrous cap with occlusion of lumen

Table 4: Lung - Distribution of Cases According to Pathology observed

Pathology Observed (No of Cases)	Age Groups (Years)										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
Incidental/Agonal Findings											
Pulmonary edema	12	5	14	10	18	14	15	6	5	0	108 (43%)
Congestion	8	6	15	12	20	16	17	6	5	0	99 (39%)
Structural Diseases											
Pneumonia	2	1	7	5	7	1	1	4	2	0	30 (12%)
Tuberculosis	1	2	4	2	3	2	3	0	1	0	18 (7%)
Chronic venous congestion	0	0	2	1	2	3	0	0	0	1	9 (3.6%)
Diffuse alveolar damage	0	0	0	0	0	0	4	1	0	0	5 (2%)
Emphysema	0	0	0	0	1	2	1	0	0	0	4 (1.6%)

table cont....

Pathology Observed (No of Cases)	Age Groups (Years)										Total
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
Thrombus	0	0	0	0	1	0	2	1	0	0	4 (1.6%)
Meconium aspiration	3	0	0	0	0	0	0	0	0	0	3 (1.2%)
Arteriosclerosis	0	0	0	0	2	1	0	0	0	0	3 (1.2%)
Interstitial pneumonitis	0	0	0	2	0	1	0	0	0	0	3 (1.2%)
Bone marrow embolus	0	0	0	1	1	0	0	0	0	0	2 (0.8%)
Lung abscess	0	0	0	0	1	0	0	0	0	0	1 (0.4%)
Foreign body pulmonary embolus	0	0	1	0	0	0	0	0	0	0	1 (0.4%)

The most common organ involved was the lung. Among the pulmonary pathologies observed, the most common was pulmonary edema accounting for 108 cases (43%), followed by congestion in 99 cases (39%), 30 (12%) cases of pneumonia and 18 (7%) cases of pulmonary tuberculosis. We also noted two cases of bone marrow embolus and one case of foreign

body embolus indicating IV drug abuse in the lungs. The most commonly involved age group for congestion and pulmonary edema was 41-50 years whereas it was 21-30 years for pneumonia and tuberculosis. The least commonly involved age group was 81-90 for lesions like congestion, pulmonary edema, pneumonia and tuberculosis. (Table 4).

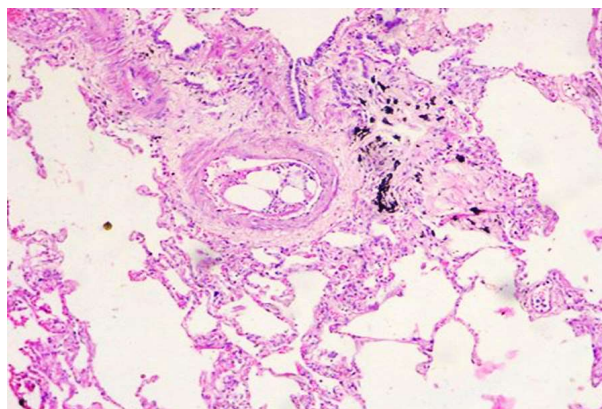


Figure 4: Photomicrograph showing Bone marrow embolus (H&E, 20x): Heterogeneous mixture of hematopoietic elements and adipose tissue in pulmonary vessels

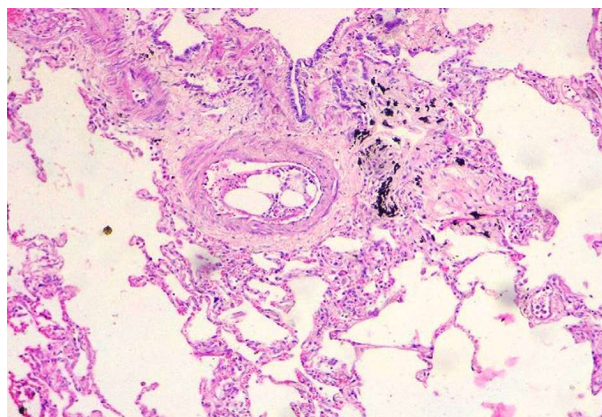


Figure 5: Photomicrograph showing Diffuse alveolar damage (H&E, 20x): Pulmonary edema with congestion and interstitial inflammatory infiltrate with hyaline membrane formation in alveolar septa

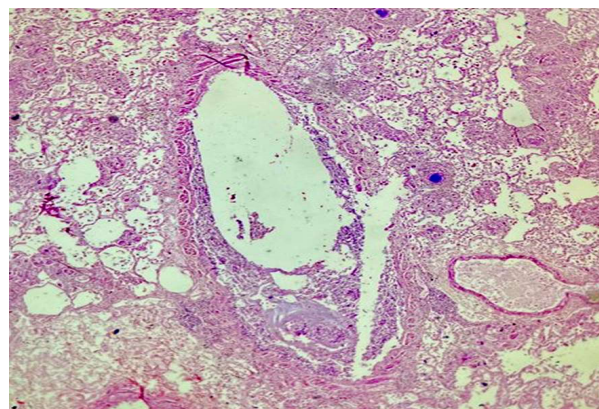


Figure 6: Photomicrograph showing Foreign body pulmonary embolus (IV drug abuse) (H&E, 20x): Foreign body granuloma comprising of foreign body giant cells and lymphocytes surrounding foreign body pale blue rod like material around perivascular areas and basophilic material within vessels

Table 5: Liver-Distribution of Cases According to Pathology observed

Pathology Observed	Number of Cases	Percentage
Portal triaditis	95	41%
Fatty change	72	31%
Congestion	39	16.7%
Cirrhosis	11	4.7%
Hepatitis	9	4%
Chronic venous congestion	7	3%
Tuberculosis	7	3%

table cont....

Pathology Observed	Number of Cases	Percentage
Extramedullary hematopoiesis	6	2.6%
Hemosiderosis	1	0.4%
Cavernous hemangioma	1	0.4%
Hepatocellular carcinoma	1	0.4%

The liver showed a range of pathological findings, highest being portal triaditis, identified in 95 cases (41%). This was followed by fatty change in 72 cases (31%), hepatic congestion in 39 cases (16.7%), and cirrhosis in 11 cases (4.7%). Rare findings included a single case each of hemosiderosis and cavernous hemangioma. (Table 5)

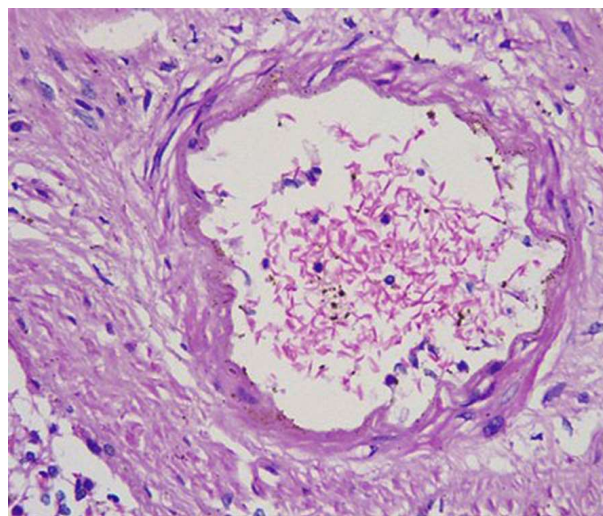


Figure 7: Photomicrograph showing Sickled shaped RBCs (H&E, 40x): Sickled shaped RBCs in lumen of hepatic vessels

Table 6: Spleen-Distribution of Cases According to Pathology observed

Pathology Observed	Number of Cases	Percentage
Congestion	175	91%
Arteriosclerosis	16	8%
Tuberculosis	4	2%
Chronic venous congestion	3	1.5%
Amyloid deposition	2	1%
Splenic abscess	1	0.5%
Sickle cells	1	0.5%

In the spleen, we observed 175 (91%) cases of congestion, 16 (8%) cases of arteriosclerosis, 4 (2%) cases of tuberculosis. We also noted one case of amyloidosis and one case showing splenic abscess. (Table 6)

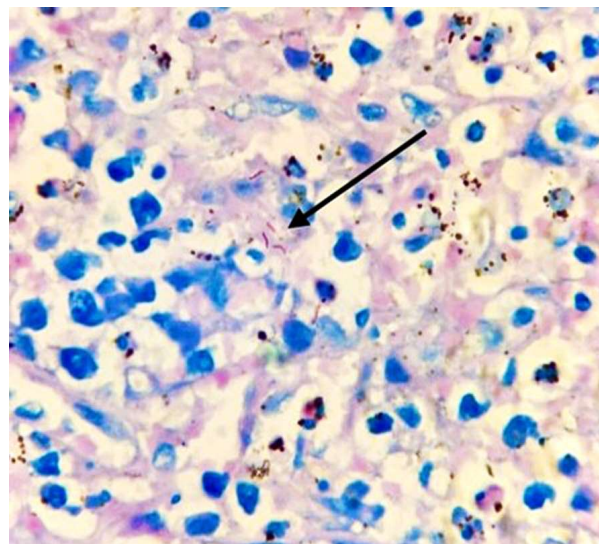


Figure 8: Photomicrograph showing Tuberculosis spleen (ZN staining, 40x): Acid fast bacilli in spleen

Table 7: Kidney-Distribution of Cases According to Pathology observed

Pathology Observed	Number of Cases	Percentage
Congestion	124	52%
Arteriosclerosis	39	16%
Chronic pyelonephritis	26	11%
Glomerulosclerosis	23	9.7%
Interstitial nephritis	21	9%
Acute glomerulonephritis	12	5%
Simple cyst	7	3%
Tubular necrosis	5	2.1%
Diabetic nephropathy	3	1.3%
Cloudy change	2	0.8%
Nephrosclerosis	2	0.8%
Tuberculosis	2	0.8%
Fibrin thrombi	1	0.4%
Sickle cells	1	0.4%

Out of the total 237 cases (78%) showing renal lesions, congestion was the most common finding, observed in 124 cases (52%). The second highest was arteriosclerosis seen in 39 cases (16%), chronic pyelonephritis in 26 cases (11%), and glomerulosclerosis in 23 cases (9.7%). Additionally, there were 7 cases of simple renal cysts (3%) and 3 cases of diabetic nephropathy (1.3%). (Table 7)

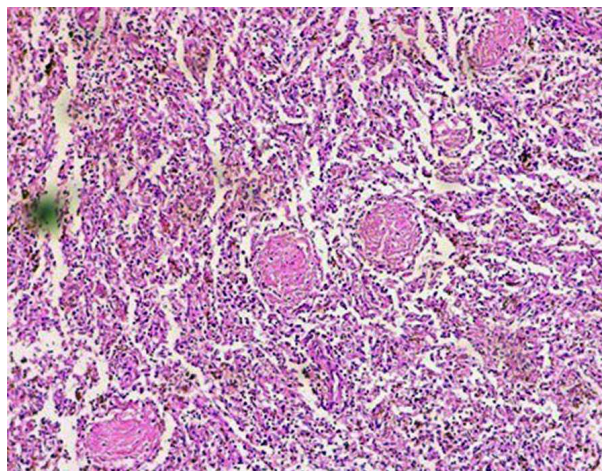


Figure 9: Photomicrograph showing Amyloidosis kidney (H&E, 20x): Extracellular deposition of amyloid in glomeruli

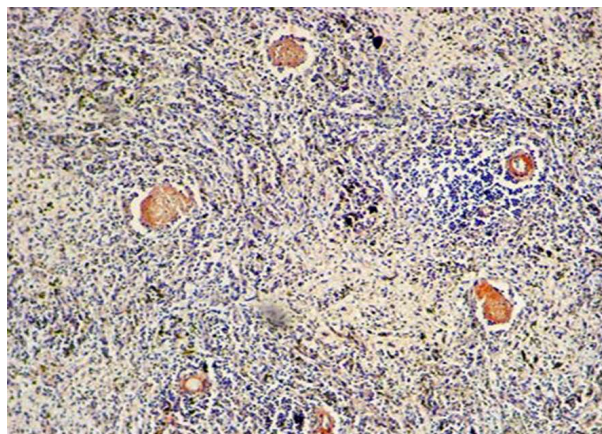


Figure 10: Photomicrograph showing Amyloidosis kidney (Congo red stain, 20x)

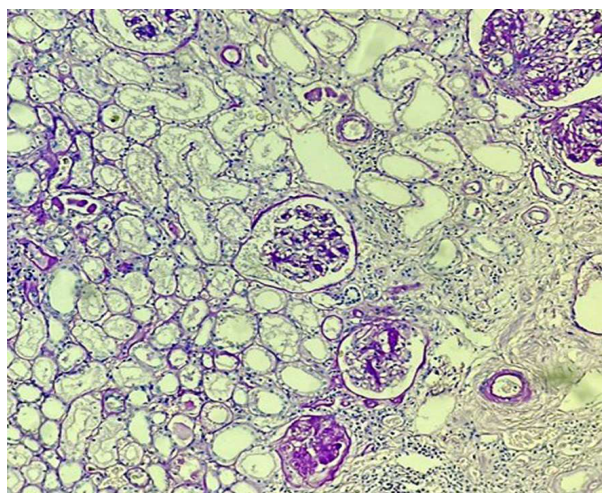


Figure 11: Photomicrograph showing Diabetic nephropathy (PAS stain, 20x): Kimmelstiel-Wilson nodules, glomerular basement membrane thickening, arteriolar hyalinosis, tubular atrophy and interstitial

fibrosis in kidney

Table 8: Neoplastic lesions encountered:

Pathology Observed	Number of Cases	Percentage
<i>Malignant Lesions</i>		
Glioblastoma	2	13.3%
Hepatocellular carcinoma	2	13.3%
Diffuse large B-cell lymphoma	1	6.7%
Adenocarcinoma of uterus	1	6.7%
Seminoma testis	1	6.7%
Well differentiated squamous cell carcinoma of lung	1	6.7%
Renal cell carcinoma	1	6.7%
Intestinal adenocarcinoma	1	6.7%
<i>Benign Lesions</i>		
Leiomyoma	2	13.3%
Cavernous hemangioma	2	13.3%
Lipoma	1	6.7%

Out of total 303 autopsy cases, we encountered 15 cases incidentally showing neoplastic lesions (4.95%). The most frequent benign lesion observed was cavernous hemangioma and leiomyoma with 2 cases each (13.3%) and the most frequent malignancy seen was Glioblastoma and hepatocellular carcinoma with 2 cases each (13.3%). (Table 8)

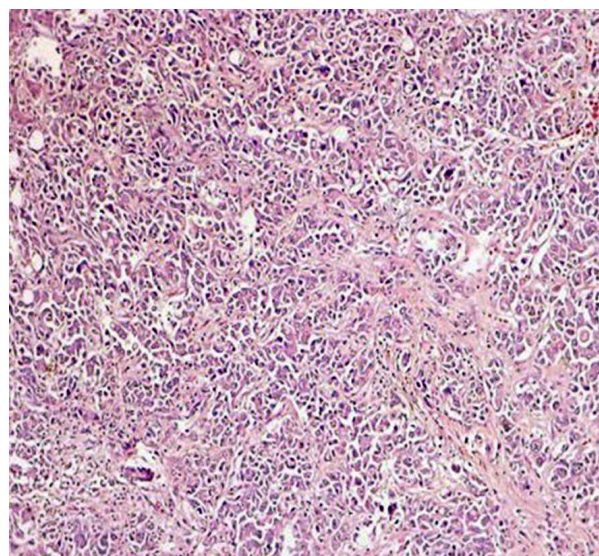


Figure 12: Photomicrograph showing Hepatocellular carcinoma (H&E, 20x): Malignant hepatocytes arranged in cords and trabeculae

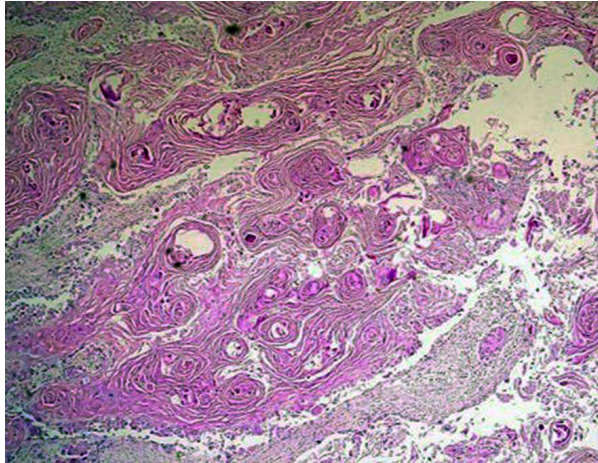


Figure 13: Photomicrograph showing Well differentiated squamous cell carcinoma lung (H&E, 20x): Large, polygonal tumour cells in sheets with keratin pearl formation

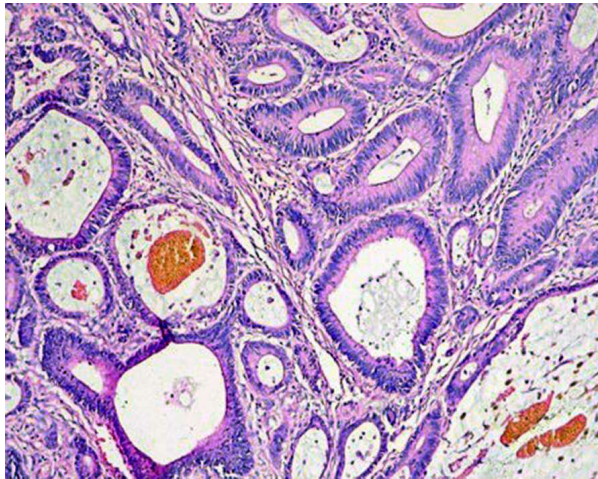


Figure 14: Photomicrograph showing Adenocarcinoma of intestine (H&E, 20x): Glandular arrangement of tumour cells showing elongated, hyperchromatic nuclei

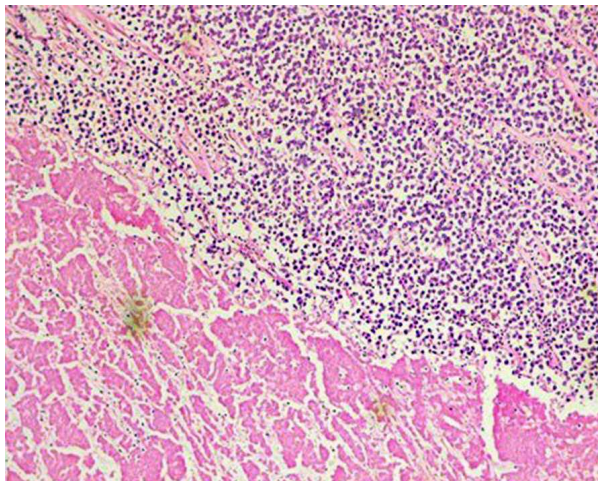


Figure 15: Photomicrograph showing Seminoma testis (H&E, 20x): Sheets of pale tumour cells arranged in poorly demarcated lobules separated by delicate septa with adjoining area of necrosis

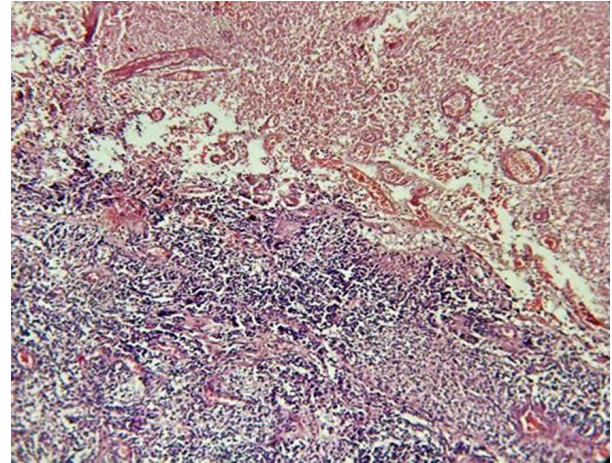


Figure 16: Photomicrograph showing Glioblastoma (H&E, 20x): Highly cellular astrocytic tumour with marked pleomorphism, nuclear atypia, brisk mitosis and palisading necrosis

DISCUSSION

The present study evaluated histopathological findings in medicolegal autopsies over a one-year period at a tertiary care centre in Mumbai. Maximum cases were observed in the 31-40 year age group, with a clear male predominance. Similar demographic trends have been reported in previous Indian studies.^{7,8}

Pulmonary pathology represented the most frequent organ involvement in the study. Congestion and pulmonary edema were among the commonest findings observed on microscopic examination. Comparable observations have been described by P. Arunalatha *et al.* and A. Sangeetha *et al* from India.^{9,10}

In the present study, rare embolic phenomena in the form of bone marrow embolus and foreign body embolus were identified in the lungs in isolated cases. The case showing a foreign body embolus in the lungs was a 24-year-old male with a documented history of intravenous drug abuse, a recognised predisposing factor for intravascular introduction of exogenous material and its subsequent embolization to the pulmonary vasculature. One case showing bone marrow embolism was a maternal mortality case with a history of recent delivery and acute deterioration prior to death. Multiple embolic foci in this case indicates an underlying predisposition to embolic events during the peripartum period. Bone marrow embolism is classically associated with trauma and fractures; however, its occurrence in this

case highlights that embolic phenomena may also be encountered in maternal deaths and may not be apparent on gross examination.

Pulmonary thrombus was identified in 4 cases in this study predominantly involving older individuals. One case revealed a 58 year old male with a history of prolonged immobilization due to paralysis following a stroke. Pulmonary thrombi are commonly associated with venous stasis, endothelial injury, and hypercoagulable states, and their incidental detection indicates the role of predisposing clinical factors contributing to thromboembolic events.

In this study, the most common cardiac pathology identified was atherosclerosis of aorta (56%), followed by atherosclerosis and lumen obliteration of the coronary vessels (41%) and myocardial hypertrophy (31%). Similar findings were observed in an Indian study done by Nada Chettian Kandy *et al.* where atherosclerosis of aorta was the commonest finding.¹¹ The age wise distribution indicated that the incidence of four common pathologies: myocardial infarction, atherosclerosis, ventricular hypertrophy and myocarditis was prevalent in 41-60 year age group. Comparable observations were made by Garg S *et al.* in India.¹²

This study also provides valuable insights into the prevalence and pattern of coronary atherosclerosis among young and middle-aged individuals in the Indian population. The findings highlight a concerning trend of cardiac diseases in the younger population, suggesting a possible trend; however, further large-scale studies are required to confirm this finding.

Renal histopathology commonly demonstrated congestion, arteriosclerotic changes, chronic pyelonephritis, and glomerulosclerosis. Non-glomerular renal lesions were encountered more frequently than primary glomerular pathology in the present study. These findings are similar with a previous Indian study.¹³

In the present study, fibrin thrombi were identified in the renal microvasculature in a 48 year old male with septicemia prior to death. Fibrin thrombi in renal vessels are commonly associated with systemic conditions such as sepsis and disseminated intravascular coagulation, leading to impaired renal perfusion

and acute kidney injury. The demonstration of fibrin thrombi on histopathology highlights the importance of microscopic evaluation in cases with suspected systemic coagulopathy.

Regarding liver pathology, portal triaditis was the most frequently observed lesion (31%), followed by fatty change (24%), congestion (13%), cirrhosis (4%), and hepatitis (3%). These results contrast with the findings of Dr. M.S. Bal *et al.*, who reported fatty liver change as the most common pathology (39%), followed by cirrhosis (14%), congestion (9%) and malignancy (3%).¹⁴

In the present study, congestion was observed most commonly in brain (52%), followed by meningitis (18%), encephalitis (8%), brain edema (2%), and intraparenchymal hemorrhage (2%). This corresponds with the study done by Dnyaneshwar S Jadhav *et al.* in India which revealed that the leading cause of death in brain pathology was congestion.¹⁵

A 45 year old male, operated for glioblastoma, showed residual tumour on histopathological examination following surgery. The presence of residual tumour on histopathology confirms the infiltrative nature of glioblastoma and the difficulty in achieving complete surgical removal.

A case of leukocytoclastic vasculitis was also identified on histopathological examination. The deceased was a 32 year old female with fever and purpuric rash and was under treatment for a suspected infective condition prior to death. Leukocytoclastic vasculitis is commonly associated with infections and drug reactions, and its detection highlights the importance of histopathological examination in identifying underlying vascular pathology.

In the spleen, congestion was most frequently observed (32%), followed by chronic venous congestion (4%), arteriosclerosis (2%), and tuberculosis (1%). In contrast, studies by Kayode A. Adelusola *et al.* and Stephen A. Osasan *et al.* from Nigeria showed that hemorrhagic necrosis was secondary to splenic laceration.¹⁶

In our study, incidental neoplastic lesions were identified in autopsy specimens across a diverse histopathological range, including diffuse large B-cell lymphoma (DLBCL), glioblastoma, seminoma, adenocarcinomas, hepatocellular carcinoma, renal cell carcinoma,

leiomyoma, cavernous hemangioma, and lipoma. This underscores the silent burden of both benign and malignant tumors undiagnosed during life. Our incidental tumor detection rate of 4.9% aligns closely with several tertiary-centre and medico-legal autopsy series including the one by Patel et al. From India with a rate of 2.47% in a 269-case series.⁶ The mean age of the study population was 40.5 ± 23.38 years with maximum deaths observed in 61-70 year age population (26.7%). Similar observations were seen in the study done by Patel et al. in which the mean age was around 62-64 years for unsuspected malignancies.⁶ In our study, a higher incidence of malignant lesions was noted (66.7%) as compared to benign lesions (33.3%) which correlates with Indian study done by Mohan *et al.*¹⁷ These tumors were clinically unsuspected and discovered only on histopathological examination, indicating a silent burden of disease.

Tuberculosis was identified as an incidental histopathological finding in 7% of cases in the present study. This observation is epidemiologically significant, as tuberculosis remains endemic in India. In contrast, similar autopsy-based studies from developed countries report a markedly lower incidence of tuberculosis, owing to better socioeconomic conditions, widespread vaccination, and effective disease control programmes.

Other uncommon systemic findings such as sickle cell disease, amyloidosis and extramedullary hematopoiesis were also identified. These observations underscore the critical role of routine histopathological examination in medicolegal autopsies, particularly in cases where gross findings are inconclusive.

CONCLUSION

Our study shows that lungs, heart, liver, kidneys, brain, and spleen were the most frequently involved organs, with a predominance of cases in the 30-40 year age group and a male preponderance. Importantly, rare embolic phenomena such as bone marrow embolus related to trauma and foreign body embolus associated with intravenous drug abuse, along with incidental benign and malignant neoplasms and systemic disorders including amyloidosis, sickle cell disease, and tuberculosis, were detected only

on histopathological examination. These observations highlight that routine postmortem histopathology not only assists in determining the cause of death but also uncovers occult pathological lesions with possible clinical significance. The demonstration of male preponderance, maternal mortality-related events, and an increasing burden of atherosclerotic changes in younger individuals emphasizes on the need for larger and more region-specific postmortem studies, particularly in India and metropolitan regions such as Mumbai. Such studies are essential to understand demographic trends, gender differences, and emerging disease patterns. Regular use of histopathological examination in autopsy protocols can thus contribute in identifying the cause of death but also add to valuable epidemiological insights relevant to public health planning may, though further large-scale studies are required for definitive conclusions.

Strengths of the Study

This study included all medicolegal and pathological autopsy cases received over a one-year period, minimizing selection bias. Routine histopathological examination of multiple organs facilitated detection of cause-related and incidental lesions, including rare embolic phenomena and hematologic findings such as sickle cell disease and amyloidosis. The study also revealed clinically silent neoplastic and systemic conditions, emphasizing the diagnostic value of postmortem histopathology.

Limitations of the Study

The present study has certain limitations. Ancillary investigations such as special stains, immunohistochemistry, or toxicological correlation were not routinely performed in all cases, potentially limiting further characterization of certain lesions.

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