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Histopathological Findings in Medicolegal Autopsies with Emphasis on Rare Incidental Findings

Clement Wilfred D[1], Amrutha Shankar B[2], Akshit Raj S Shetty[3], Ashwini Kondapura Thimmegowda[4]

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ABSTRACT

Context: Medicolegal autopsies are not only indispensable to identify the cause of death; they are of vital importance in discovering various interesting and rare lesions/ diseases which were unnoticed or undiagnosed during the person's life. Whether these incidental lesions are the cause of death or not, they are of academic and research importance. Hence this study was aimed to evaluate the various histopathological findings in medico-legal autopsies and to highlight the rare incidental lesions.

Method: This was a prospective cross-sectional study conducted on medico-legal autopsy specimens over duration of five years, between August 2018 August 2023, at Ramaiah Medical College Hospital, Bangalore. The viscera of each autopsy case were evaluated grossly and microscopically to identify the various histopathological findings.

Results: A total of 554 histopathological lesions were identified in 549 cases, majority of which were found in cardiovascular system (47.6%), followed by pulmonary (31.3%), hepatic (12.6%), renal (6.3%), central nervous (4.3%), splenic (3.8%), pancreatic (3.5%) and female genital (0.5%) systems. The commonest lesion detected was atherosclerosis (26%) followed by myocardial infarction (11.9%) and pulmonary edema (9.6%) Rare incidental findings were observed in 5.8% of cases and incidental neoplasia was detected in 1.6% of cases.

Conclusion: Varied spectrum of incidental lesions, which are not recognised during the person's life, are discovered at autopsy. Some of these lesions are preventable; some warrant screening of close relatives and some, had they been detected before death, would have changed therapeutic management. These incidental findings are important for academic purpose, evaluating disease trends and introducing interventions.

Keywords: Autopsy; Histopathological findings; Incidental; Lesions; Medicolegal.

Author's Credentials: *[1]Professor, [2]Post Graduate, [3]Associate Professor, [4]Senior Resident, Department of Pathology, Ramaiah Medical College and Hospitals, Bangalore 560054, Karnataka, India.*

Corresponding Author: ***Clement Wilfred D,*** *Professor, Department of Pathology, Ramaiah Medical College and Hospitals, Bangalore 560054, Karnataka, India.*

Email: *clement.wilfred@yahoo.com*

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Introduction

Autopsy is a specialised procedure that entails critical, detailed and systematic examination of the deceased body either for Medico-legal or Clinical purposes.[1,2] The Medicolegal autopsy is performed to address medicolegal objectives on the directions from legal authority in all unnatural (accidents, homicide, suicide) and suspicious deaths and unexpected deaths

that require a legal investigation.[3] The Academic autopsy is performed, with the consent of the relatives, to determine the nature of the disease when ante-mortem diagnostic evaluation is inconclusive or to evaluate the pathology, character and extent of the disease which has been diagnosed ante-mortem.[1,4]

In addition to identifying the cause and manner of death, the circumstances in which it occurred and the time of death, many incidental findings which were unnoticed or undiagnosed during the person's life are discovered during histopathological analysis of medico-legal autopsy specimens.[2,4] These findings could have been the contributing factor for death or may be unrelated to the cause of death.[1,2] However they are of great academic value and research importance as they provide vital information about etiopathogenesis of untreated, rare and undiagnosed lesions.[5] Considering the vital role of autopsy in medical science, this study was conducted to evaluate the various histopathological findings in medico-legal autopsies and to highlight the rare incidental lesions.

Materials and Methodology

The current study was a single centre prospective cross-sectional descriptive study conducted on routine consecutive medico-legal autopsy specimens received over duration of five years between August 2018 and August 2023, in Pathology department, Ramaiah Medical College Hospital, Bangalore, Karnataka. The viscera of each autopsy case was received in adequate volume of 10% formalin fixative from the Forensic medicine department along with details such as age, sex, post-mortem examination findings and preliminary cause of death. In every case the standard protocol for surgical grossing and histopathogical processing was followed. After a detailed gross specimen examination, representative tissue bits were taken, processed and stained with Haematoxylin and Eosin (H&E) for light microscopic evaluation. Special stains were done wherever required. The interesting and incidental histopathological features were studied and recorded. Autolysed specimens, specimens from poorly preserved bodies, perinatal and neonatal cases and clinical autopsies were excluded from the study.

Statistical Analysis: SPSS Version 18.0software was used for analysis. Continuous parameters were expressed as mean and standard deviation and qualitative variables as proportion. The percentage and frequency of each type of histopathological/ incidental lesion was determined.

Results

Specimens from total of 572 medicolegal autopsies were received over 5 years duration, of which 23 cases were excluded as the specimens were either poorly preserved or autolysed. The remaining 549 cases were included in the study. The age of the deceased ranged from 2.5 to 91 years with male: female ratio of 3.6:1. Most of the autopsy cases occurred in the4th decade followed by 3rd decade. In 549 cases 554 histopathological lesions were identified, majority of which were found in cardiovascular system (47.6%), followed by pulmonary (31.3%), hepatic (12.6%), renal (6.3%), central nervous (4.3%), splenic (3.8%), pancreatic (3.5%) and female genital (0.5%) systems (Table 1). The "more common lesions" and "interesting and rare incidental lesions" are depicted in Table 1. The most common lesion detected was atherosclerosis (26%) followed by myocardial infarction (11.9%) and pulmonary edema (9.6%) Rare incidental findings were observed in 5.8% of cases (32/549). Table 2 depicts the details of rare incidental cardiac lesions and Table 3 the details of rare incidental lesions in other organ systems.

Table 1: Histopathological findings in medicolegal autopsy specimens

Organ		Histopathological findings	No. of cases (%)
Heart	More common lesions	Atherosclerosis	144 (26%)
		Myocardial Hypertrophy	33 (6%)
	Interesting and rare Incidental lesions	Myocardial Infarction	66 (11.9%)
		Aortic Dissection	6 (1.1%)
		Valvular Heart Disease	5 (0.9%)
		Cardiac Tamponade	4 (0.7%)
		Pericarditis	3 (0.5%)
		Myocarditis	2 (0.4%)
		Cardiomyopathy	1 (0.2%)

Table Cont..

Lungs	More common lesions	Pulmonary edema	53 (9.6%)
		Chronic venous congestion	33 (6%)
	Interesting and rare Incidental lesions	Pneumonia	16 (2.9%)
		Emphysematous changes	8 (1.4%)
		Tuberculosis	5 (0.9%)
		Pulmonary thromboembolism	2 (0.4%)
		Aspergillosis	1 (0.2%)
Liver	More common lesions	Fatty liver	33 (6%)
		Chronic venous congestion	26 (4.7%)
	Interesting and rare Incidental lesions	Cirrhosis	7 (1.3%)
		Hepatocellular carcinoma	2 (0.4%)
		Non-Hodgkin's lymphoma	1 (0.2%)
		Metastasis	1 (0.2%)
Kidneys	More common lesions	Acute tubular necrosis	18 (3.2%)
		Simple cyst	6 (1.1%)
	Interesting and rare Incidental lesions	Chronic pyelonephritis	9 (1.6%)
		Tuberculous pyelonephritis	1 (0.2%)
		Renal cell carcinoma	1 (0.2%)
CNS	More common lesions	Subarachnoid hemorrhage	20 (3.6%)
	Interesting and rare Incidental lesions	Acute on chronic meningoencephalitis	1 (0.2%)
		Acute meningitis	1 (0.2%)
		Meningioma	1 (0.2%)
		Berry aneurysm	1 (0.2%)
Spleen	More common lesions	Chronic venous congestion	21 (3.8%)
Pancreas	More common lesions	Necrotizing pancreatitis	16 (2.9%)
		Chronic pancreatitis	2 (0.4%)
	Interesting and rare Incidental lesions	Pancreatic pseudocyst	1 (0.2%)
Ovary	Interesting and rare Incidental lesions	Serous cystadenoma	2 (0.4%)
		Krukenberg tumor of ovaries	1 (0.2%)
Total			**554**

Table 2: Rare incidental cardiac lesions in medicolegal autopsies

Sl. NO	Age / Gender	Indication for autopsy; History	Incidental findings
1	43/F	Brought dead; H/o sudden collapse	Aortic Dissection
2	65/F	Brought dead; H/o severe breathlessness	Aortic Dissection
3	27/M	Hospital death; severe breathlessness, collapsed in ICU	Aortic Dissection
4	26/M	Brought dead; H/o chest pain and collapse	Aortic Dissection
5	28/M	Brought dead; Marfan syndrome	Aortic Dissection
6	55/M	Brought dead; K/c/o hypertension, suddencollapse	Aortic Dissection

Table Cont...

7	13/M	Brought dead; H/o fever	Chronic rheumatic heart disease
8	29/M	Brought dead	Chronic rheumatic heart disease
9	55/M	Found dead	Chronic rheumatic heart disease
10	50/M	Found dead	Infective endocarditis
11	32/M	Found dead	Infective endocarditis
12	31/M	Brought dead	Pericarditis
13	45/F	Brought dead	Pericarditis
14	65/M	Found dead	Pericarditis
15	28/M	Brought dead; H/o fever	Myocarditis
16	2.5/F	Brought dead	Myocarditis
17	19/M	RTA	Hypertrophic Cardiomyopathy

Table 3: Rare incidental lesions in organs other than cardiovascular system

Sl. NO.	Age / Gender	Indication for autopsy; History	Incidental findings
1	24/M	Accidental fall	Pulmonary thromboembolism
2	22/M	Brought dead; H/o severe respiratory distress	Pulmonary thromboembolism with infarct.
3	22/F	RTA	Bronchopulmonary aspergillosis
4	57/F	Suicide by hanging	Hepatocellular carcinoma
5	58/M	Found dead	Hepatocellular carcinoma
6	91/M	aluminium phosphide poisoning	Non-Hodgkin's lymphoma, liver
7	72/F	Found dead	Metastatic Adenocarcinoma, liver
8	29/M	Found dead	Tuberculous pyelonephritis
9	75/M	Suicide by consumption of insecticide	Renal cell carcinoma, papillary type
10	38/M	Brought dead; H/o chronic headache	Acute on chronic meningoencephalitis
11	16/M	Brought dead; H/o fever	Acute meningitis
12	47/M	Found dead; H/o old myocardial infarction and epilepsy	Transitional Meningioma
13	42/F	Brought dead	Berry aneurysm
14	38/M	Found dead; chronic alcoholic	Pancreatic pseudocyst
15	48/F	Brought dead; K/c/o Carcinoma stomach, H/o hematemesis	Krukenberg tumor of ovaries

Discussion

Histopathological evaluation of medicolegal autopsy specimens not only provides information concerning cause and nature of death, it also reveals lesions that were undiagnosed during life. In the present study various lesions were found, some of which are rare.

Majority of the histopathological findings were found in cardiovascular system (47.6%) with the commonest lesion being atherosclerosis (54.5%), which is in synchrony with most of the published studies, including those by conducted by Sulegaon R et al, Arunalatha P et al, Kaur M et al, Manjula K et al, and Patel S et al.[1,2,6-8] The second commonest cardiac lesion identified was myocardial infarction (25%), similar to the study conducted by Manjula K et al.[7] Aortic dissection (AD) was detected in five cases, none of these cases were detected prior to death and were first identified at autopsy examination (Fig. 1 A). Huynh et al reviewed cardiac autopsy specimens for AD and found only 336 cases over duration of 60 years. Majority of these cases (63%) were diagnosed only at autopsy.[9] We identified one case, who was brought dead, as Marfan syndrome with fatal aortic dissection. Literature review reveals that aortic dissection is an important cause that limits

life expectancy in Marfan syndrome patients.[10]There were five cases of valvular heart disease with three cases of chronic rheumatic heart and two cases of infective endocarditis, two cases of myocarditis and three cases of pericarditis. All these cases were either brought dead or found dead under suspicious circumstances. Khiste JA et al retrospectively evaluated 300 cases of medicolegal autopsies and reported the frequencies of infective endocarditis, myocarditis and pericarditis as 0.3%, 6% and 4.6% respectively.[11] Literature review reveals that valvular heart disease accounts for 1 to 5% and myocarditis accounts for 1% of sudden cardiac deaths (SCD)rerespectively.[12,13]Although these lesions are rarely encountered in autopsies, once identified, the cause of death may be explained with greater reliability. We reported one case of hypertrophic cardiomyopathy (HCM)in a 19 year male who died in RTA (road traffic accident).HCM is an important cause of SCD in young individuals especially in males involved in sporting activities.[14] Arrhythmias, a consequence of myocardial fibrosis, could be the cause of SCD.[2] Generally these individuals are asymptomatic without previous clinical diagnosis.[2,14]Arunalatha P et al reported two cases of HCM in 16 and 26 years males with H/o of sudden death.[2] As HCM is a genetic disease, its identification is useful for screening close relatives to prevent SCD.[2]

Pulmonary system was the second commonest system with histopathologial findings (21.3%) The commonest lesion in our study was pulmonary edema (9.6%), which is in synchrony with study by Sulegaon Ret al (37.7%), Arunalatha P et al, Patel S et al (11%) and Khiste JA (43%) et al.[1,2,8,11] The other respiratory lesions encountered were chronic venous congestion (6%), pneumonia (2.9%)and tuberculosis (0.9%). Kaur M et al reported the frequencies of latter lesions as 5.9%, 1.8%, and 1.4% respectively.[6] In a study of 159 sudden deaths, by Chaudri et al, 11.3% was due to tuberculosis and 7.5% due to pneumonia, thus highlighting the importance of histopathological examination of autopsy specimens.[15] We encountered two cases of pulmonary thromboembolism (PTE), both in young male adults. One case had H/o accidental fall and exhibited acute saddle thrombus at bifurcation of pulmonary trunk with acute corpulmonale (Figure 1 B & C). The other case was brought dead with H/o respiratory

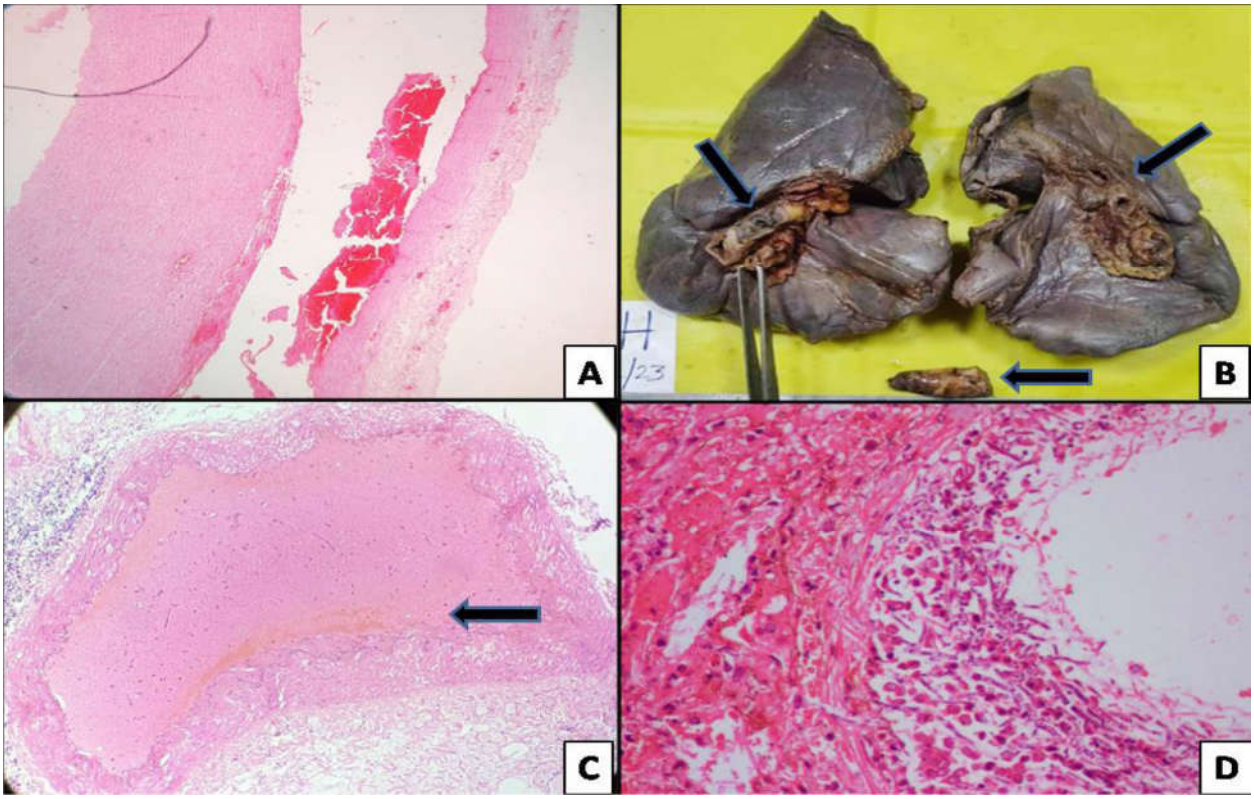

Fig. 1: A) Aortic dissection. B) Gross image showing saddle thromboembolus (arrows) at bifurcation of pulmonary trunk. C) Thromboembolus in pulmonary artery D) Bronchopulmonary aspergillosis (arrow shows fungal hyphae). (H&E stain; A- x10; C- x10; D- x20)

distress, and showed thromboemboli in medium sized pulmonary arteries with associated hemorrhagic infarcts. Histopathological examination in these cases confirmed thromboemboli and excluded post-mortem clots. PTE usually originate from deep vein thrombosis of the lower limbs and can cause sudden unexpected collapse.[2,16]

Arunalatha P et al studied 155 autopsy cases and reported a single case of PTE (saddle thrombus) causing sudden death in a 25 years male.[2] We found bronchopulmonary aspergillosis in a RTA case who was hospitalised (Figure 1D). Hospital stay with mechanical ventilation was the predisposing cause of Aspergillosis in this case. Similarly Singh G et al reported Aspergillosis in 62 year male, a case of assault, who was hospitalised and was on mechanical ventilation.[17] Aspergillosis, in autopsy specimens, is a rare finding with an average incidence of around 0.19%.[17] The predisposing conditions for Aspergillosis include immunosuppression, chronic debilitating diseases and prolonged hospitalization with mechanical ventilation.[17]

In the current study hepatic system was the third commonest system with histopathologial findings (12.6%) with fatty liver being the commonest lesion (6%) followed by chronic venous congestion (4.7%) and cirrhosis (1.3%). Similar to our observations, Kaur M et al reported fatty liver (17.6%) as the commonest hepatic lesion followed by chronic venous congestion (8%) and cirrhosis (3.3%).[6] In majority of the studies the commonest hepatic lesions identified at autopsy was fatty liver.[1,2,8,11] This probably reflects the alcohol consumption habit, as alcohol is the major etiopathogenetic factor of fatty liver. We found two cases of, previously undiagnosed, hepatocellular carcinoma (HCC) as rare incidental lesions (0.4%; 2/554). Recent data on the epidemiology of HCC in autopsies is unavailable. Schlageter M et analysed 44,104 autopsies and found HCC in only 0.9% of the cases.[18] The major risk factors include hepatotropic viruses (Hepatitis B and C) and chronic alcoholism and as these risk factors result in cirrhosis, over 80% of HCC occur in cirrhotic background.[18,19] Similarly, in our study both the cases occurred in backdrop of cirrhosis. We had a case of Non-Hodgkin's lymphoma involving the liver, in a 91 years male, a case of homicidal aluminium phosphide poisoning. The liver showed diffuse sinusoidal infiltration of dyscohesive medium to large sized atypical lymphoid cells morphologically favouring diffuse large cell lymphoma (Figure 2 A & B).

Primary malignant lymphoma involving the liver is very rare, secondary involvement from extrahepatic lymphomas is relatively more common.[19] In our case, even though the other organs submitted for examination were negative for lymphoma infiltration, we couldn't determine the primary/ secondary nature of the disease

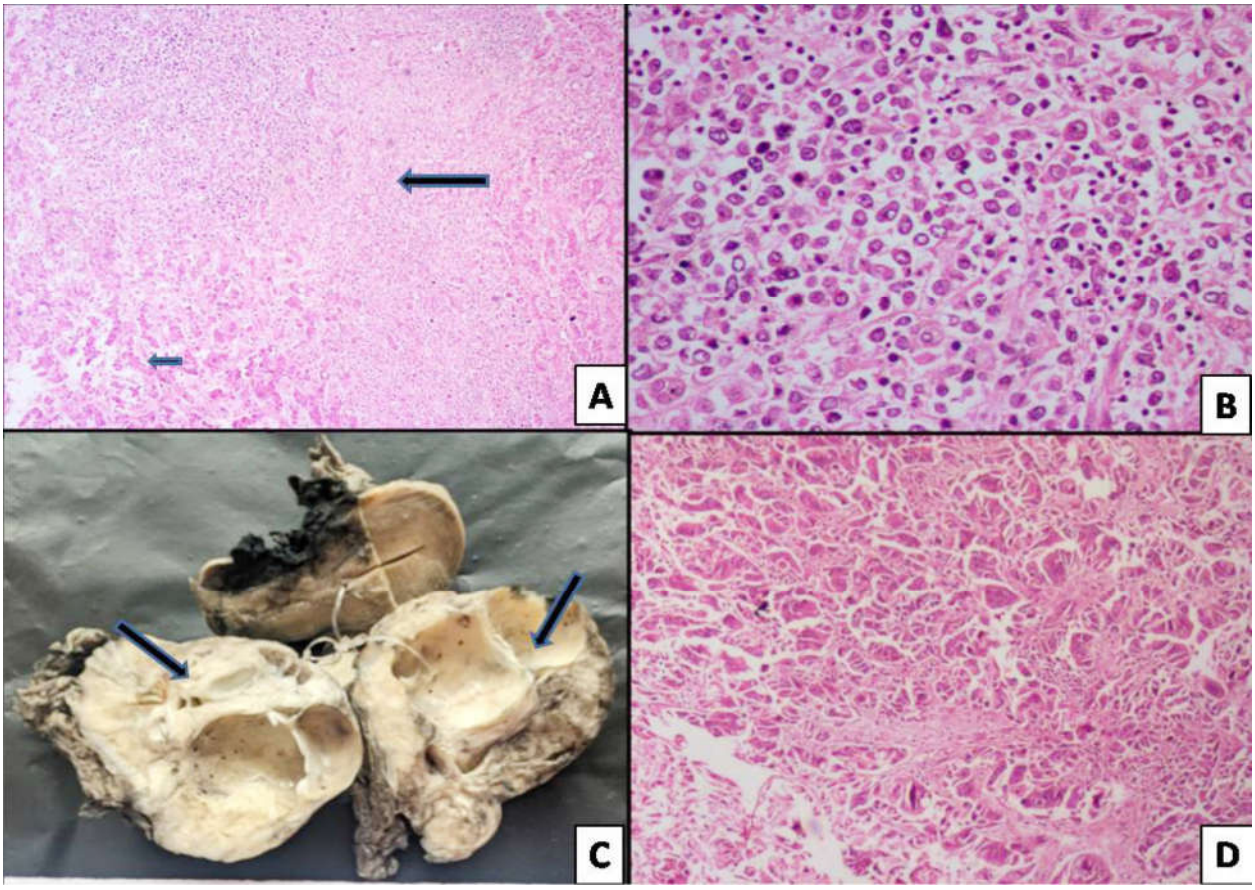

Fig. 2: A) Non-Hodgkin's lymphoma (long arrow) involving the liver parenchyma (short arrow). B) Diffuse infiltration of large Non-Hodgkin's lymphoma cells. C) Gross image showing metastatic ovarian malignancy (arrows). D) Cohesive and dyscohesive metastatic tumor cells involving the ovarian parenchyma. (H&E stain; A- x5; B- x20; D- x10).

as neither were the lymph nodes received for examination nor was there any past history of lymphoma. Manjula K et al reported a single case of Primary Mediastinal B cell lymphoma with secondary liver involvement, in a young male who was brought dead, following autopsy examination.[7]We identified adenocarcinoma metastasis to liver in a 72 years female who was found dead. In a large autopsy series, conducted on adult patients with malignant tumors, liver metastasis was found in 39% of the cases.[19]

The commonest lesion identified in the renal system was acute tubular necrosis (3.2%) followed by chronic pyelonephritis (1.6%), which is in concordance with studies by Manjula K et al and Kaur M et al.[6,7] The incidence of the latter two lesions, in other autopsy studies, varies from 7 to 22% and 0.8 to 5%, respectively.[7] We reported a case of tubercular pyelonephritis in a young male who was found dead. The commonest cause of death from infectious disease is tuberculosis. The diagnosis of urogenital tuberculosis can be easily missed due to its nonspecific clinical presentation. Autopsy studies have provided valuable information about the natural history and pathogenesis of urogenital tuberculosis and have indicated that antemortem diagnosis of these diseases is often missed and usually recognised at autopsy.[20] We detected a case of incidental Papillary renal cell carcinoma (RCC) that was limited to the kidney (early TNM stage), in a case of suicidal poisoning. Patel B et al reported two cases of incidental RCC's (one case of clear cell RCC and another case of multilocular cystic RCC) with a rate of 2/269 autopsies.[8] Early stage RCC's are usually asymptomatic and may be first detected at autopsy.

The interesting and rare incidental findings in Central Nervous System (CNS) were- single case each of meningitis, meningoencephalitis, berry aneurysm and transitional meningioma. Kaur M reported three cases of meningitis, one case of diffuse astrocytoma and three cases of gliosis.[6]The authors concluded that autopsy plays an important role in these cases as usually antemortem biopsies, for these cases, are not normally received.[6] A study on incidental meningiomas observed that they are detected at a frequency of 2-3% at autopsy with a predilection for WHO grade I morphology and male preponderance. Similarly, our case was a male and exhibited WHO grade I morphology.[21]

The other incidental findings detected in our study were pancreatic pseudocyst in an alcoholic and Krukenberg tumour of the ovaries in a case of carcinoma stomach (Figure 2 C & D). Pancreatic pseudocyst is a localised collection of secretions and necrotic material, that develops after pancreatitis. Majority occur as a complication of alcohol induced pancreatitis.[22]Arunalatha P reported a single case of pancreatic pseudocyst with associated fatty liver.[2]Krukenberg tumor is metastatic signet ring cell carcinoma of the ovaries, with stomach being the primary site in 70% of the cases.[23]

The frequency of incidental neoplasia in our study was 1.6% (9/554) which is close to that quoted by Patel S et al who detected unsuspected neoplasia with a frequency of 2%.[8] Sinhasan SP et al encountered 32 neoplasms in 795 autopsy cases (*i.e.* frequency of 4%) and stated that not only does medicolegal autopsy provides an opportunity to evaluate diagnosed and treated tumors, but also is vital to understand the natural evolution of untreated tumors.[24] Thus histopathological evaluation of autopsy specimens is vital in the detection of unsuspected neoplasms and the true incidence of cancer.[8]

Conclusion

The study presents the varied histopathological spectrum of lesions detected at medicolegal autopsies and highlights the unexpected rare incidental cases. Atherosclerosis, pulmonary edema, fatty liver and acute tubular necrosis are the commonest histopathological lesions detected in cardiac, pulmonary, hepatic and renal systems respectively. Many incidental findings, which are not recognised or diagnosed during the person's life, are identified at autopsy. The latter lesions either contribute to death or may be unrelated to the cause of death. Some of these concealed lesions are preventable and their identification is useful for screening of close relatives. Further, some of the histopathological lesions, had they been detected before death, would have significantly changed patient management. These incidental findings enrich medical knowledge and are vital for academic purpose, research, evaluating disease trends and introducing interventions.

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