Original Research

Evaluation of Usefulness of Histopathological Examination in Medicolegal Autopsies: A Critical Tool for Determining Accurate Causes of Mortality

Vinit Goel[1], Bhaskar Jain[2], Ravindra Kumar[3], Subhash Choudhary[4]

[1]Assistant Professor, Department of Pathology, Gouri Devi Institute of Medical Sciences & Hospital, Durgapur, West Bengal, India.
[2]Associate Professor, Department of Pathology, Gouri Devi Institute of Medical Sciences & Hospital, Durgapur, West Bengal, India.
[3]Assistant Professor, Department of Forensic Medicine, IQ City Medical College Hospital, Durgapur, Burdwan, West Bengal, India.
[4]Assistant Professor, Department of Forensic Medicine, IQ City Medical College Hospital, Durgapur, Burdwan, West Bengal, India.

Corresponding Author:
Dr. Subhash Choudhary
Assistant Professor, Department of Forensic Medicine, IQ City Medical College Hospital, Durgapur, Burdwan, West Bengal, India.

Received: 03May 2023 Accepted: 17June 2023

ABSTRACT

Background:A pathological examination extends beyond merely identifying the cause of death; it plays a significant role in elucidating the pathogenesis and epidemiology of diseases. This examination is instrumental in retrospectively assessing the quality of clinical disease management and in developing new preventive strategies. This study explores the crucial role of histopathological examination in medicolegal autopsies, extending beyond cause of death determination to inform disease management, prevention, and understanding of epidemiological patterns.

Materials and Methods:This study examined 100 medicolegal cases submitted for histopathological analysis, excluding those with significant autolytic changes. Pertinent data, including demographics, clinical details, and gross and microscopic findings, were systematically recorded. Tissue sections were processed and stained with hematoxylin and eosin, with inconsistencies between observations documented.

Results:Mean age of the cases was 51.9 years. Time since death was 13 hours to 24 hours in 56 percent of the cases while it was between 25 hours to 36 hours in 10 percent of the cases. Time since death was less than 12 hours in 18 percent of the cases. Hepatic steatosis was not identified grossly in 18 cases while it was correctly identified microscopically in 2 cases. Pneumonia was not identified grossly in 7 cases while it was correctly identified microscopically in 20 cases. Histopathological examination was conclusive in ascertaining the specific cause of death in 41 out of 100 cases (41 percent).

Conclusion: The microscopic analysis of tissues remains an indispensable component of forensic practice. Therefore, it is essential to complement the macroscopic examination of tissues with microscopic techniques.

Keywords:Histopathologic, Autopsies, Mortality.

INTRODUCTION

A pathological examination extends beyond merely identifying the cause of death; it plays a significant role in elucidating the pathogenesis and epidemiology of diseases. This examination is instrumental in retrospectively assessing the quality of clinical disease management and in developing new preventive strategies. Clinical and medicolegal autopsies are fundamentally incomplete without a thorough pathological examination. When integrated with clinical history, as well as gross and histopathological findings,

it can lead to a definitive determination of the cause of death.[1-3]

The liver can be adversely affected by a diverse array of metabolic, chemical, microbiological, and circulatory factors. In certain instances, liver involvement may be secondary to conditions such as cardiac decompensation, alcohol intoxication, or infections originating outside the liver, while in other scenarios, it may be a primary issue. The liver is aptly described as "the custodian of the interior milieu."[4-6] The term "autopsy" originates from a Greek word meaning "to see for oneself," and it pertains to the examination of the human body to identify diseases and ascertain the cause of death. There are four principal categories of autopsies: 1) Medicolegal or forensic autopsies; 2) Clinical or pathological autopsies, conducted to diagnose specific diseases for research purposes; 3) Anatomical or academic autopsies, performed solely for educational study; and 4) Virtual or medical imaging autopsies, which utilize imaging technologies such as Magnetic Resonance Imaging (MRI) and Computed Tomography (CT).[7,8] This study was conducted to evaluate the usefulness of histopathological examination in medicolegal autopsies todetermineaccurate causes of mortality.

MATERIALS AND METHODS

The present study was conducted to evaluate the usefulness of histopathological examination in medicolegal autopsies todetermineaccurate causes of mortality. 100 medicolegal cases submitted by the forensic department for histopathological analysis were examined. Cases exhibiting significant autolytic changes were excluded from the study due to the inability to interpret them accurately. The research was conducted using all pertinent data collected during the same timeframe. All viscera were preserved in formalin, and the tissue sections underwent routine processing, resulting in the preparation of hematoxylin and eosin-stained slides. General information, including age, sex, time since death, as well as gross and microscopic findings alongside clinical details, was systematically recorded in a Performa. Any inconsistencies between gross and microscopic observations were also documented. The findings were compiled in a Microsoft Excel spreadsheet and analyzed statistically using SPSS software.

RESULTS

The mean age of the cases was 51.9 years. Time since death was 13 hours to 24 hours in 56 percent of the cases while it was between 25 hours to 36 hours in 10 percent of the cases. Time since death was less than 12 hours in 18 percent of the cases. Hepatic steatosis was not identified grossly in 18 cases while it was correctly identified microscopically in 2 cases. Pneumonia was not identified grossly in 7 cases while it was correctly identified microscopically in 20 cases. Histopathological examination was conclusive in ascertaining the specific cause of death in 41 out of 100 cases (41 percent).

Table 1: Time elapsed since death

Time since death (hours)	Number	Percentage
0 to 12	18	18
13 to 24	56	56
25 to 36	10	10
37 to 48	12	12
More than 48	4	4
Total	100	100

Table 2: Discrepancies between gross and microscopic findings

Findings	Not identified / Misidentified grossly	Correctly identified microscopic	p-value
Hepatic steatosis	18	2	0.010*
Hepatic fibrosis	3	3	1
Hepatitis	5	0	NA
Acute myocardial ischemia	2	0	NA
Cardiomyopathy	0	6	NA
Ischemia heart disease	6	0	NA
Pneumonia	7	20	0.001*
Chronic nephritis	8	3	0.25
Others	10	7	0.19
Total	59	41	-

*: Significant

DISCUSSION

Autopsy studies significantly contribute to understanding the causes of death and the formulation of medical strategies. The etiologies of numerous liver diseases are well-documented. Excessive alcohol consumption typically leads to three distinct pathological liver conditions: fatty liver, hepatitis, and alcoholic cirrhosis. It is possible for a patient to present with one, two, or all three of these conditions concurrently.[7-9] A wide array of liver diseases has been identified through autopsy examinations, which are a major factor in global mortality rates. Forensic histopathology focuses on cellular and tissue alterations observable under a light microscope, which may provide insights into the cause of death. However, not all medicolegal autopsies undergo routine histopathological evaluation. Only those cases where the cause of death is not immediately evident during gross examination are referred for histopathological analysis, either to validate the suspected cause of death or to identify pre-existing diseases that may inform the cause of death. Nonetheless, there exists a divergence of opinions regarding the effectiveness of histopathological assessments in medicolegal investigations.[9-11]This study explores the crucial role of histopathological examination in medicolegal autopsies, extending beyond cause of death determination to inform disease management, prevention, and understanding of epidemiological patterns.

The mean age of the cases was 51.9 years. Time since death was 13 hours to 24 hours in 56 percent of the cases while it was between 25 hours to 36 hours in 10 percent of the cases. Time since death was less than 12 hours in 18 percent of the cases. Hepatic steatosis was not identified grossly in 18 cases while it was correctly identified microscopically in 2 cases. Pneumonia was not identified grossly in 7 cases while it was correctly identified microscopically in 20 cases. Histopathological examination was conclusive in ascertaining the specific cause of death in 41 out of 100 cases (41 percent). Khiste JA et al studied histopathological findings and their gender wise and age wise distribution in medicolegal autopsy specimens. This study conducted a retrospective analysis of 319 medicolegal autopsy cases processed in the pathology department over the course of one year. The organ specimens were meticulously examined in their gross form and subsequently preserved in 10% formalin. Representative tissue sections were obtained, processed, and stained following established protocols for histopathological evaluation. The results were systematically analyzed. Among the 319 medicolegal autopsy cases, 19 exhibited autolytic changes and were therefore excluded from further analysis. The male-to-female ratio was found to be 1:1. Histopathological examination of the remaining 300 cases revealed a predominance of pulmonary edema (43%), pulmonary hemorrhages (38.6%), atherosclerosis (37%), pneumonia (33%), acute tubular necrosis (33%), and meningeal congestion (52%). Additionally, rare occurrences of aspergillosis and pulmonary cryptococcosis were identified in 0.3% of the cases each. Notably, a single instance of metastasis from a round cell tumor to the liver and one case of splenic cryptococcosis were documented. This study underscores the prevalence of both common and unexpected rare findings in medicolegal autopsies, which hold significant implications for academic research and clinical practice.[12]Start et al[13] are in strong disagreement with the suggestions that advances in diagnostic techniques have diminished the role of autopsies. PE in autopsy is essential for retrospective quality assessment of clinical diagnosis by Kurz et al.[14] The autopsy, if combined with relevant details and histopathological examination, is of great value in establishing reasons that led to death.[13, 14]

Patel et al determined the spectrum of histopathological findings including neoplastic lesions related or unrelated to the cause of death. A retrospective study of medicolegal autopsies for six years was undertaken in a tertiary care centre to determine the spectrum of histopathological findings including neoplastic lesions related or unrelated to the cause of death and to highlight various incidental and interesting lesions in autopsies. The study consisted of a series of 269 autopsy cases and histopathological findings were studied only in 202 cases. The commonest cause of death was pulmonary oedema. The most common incidental histopathological finding noted was atherosclerosis in 55 (27.2%) cases followed by fatty liver in 40 (19.8%) cases. Neoplastic lesions accounted for 2.47% of cases. Their study has contributed a handful of findings to the pool of rare lesions in pathology.[11]

CONCLUSION

The microscopic analysis of tissues remains an indispensable component of forensic practice. Therefore, it is essential to complement the macroscopic examination of tissues with microscopic techniques.

REFERENCES

1. Singh D, Tiwari RC, Kumar A, et al. A comprehensive review of pathological examination in forensic medicine: past, present, and future. Cureus2022;14:0.
2. Khare P, Gupta R, Ahuja M, Khare N, Agarwal S, Bansal D. Prevalence of lung lesions at autopsy: a histopathological study. J Clin Diagn Res 2017;11:0-6.
3. Lanjewar DN, Sheth NS, Lanjewar SD, Wagholikar UL. Analysis of causes of death as determined at autopsy in a single institute, the Grant Medical College and Sir J. J. Hospital, Mumbai, India, between 1884 and 1966: a

retrospective analysis of 13 024 autopsies in adults. Arch Pathol Lab Med 2020;144:644-649.
4. Delteil C, Tuchtan L, Torrents J, Capuani C, Piercecchi-Marti MD. Pediatric medicolegal autopsy in France: a forensic histopathological approach. J Forensic Leg Med 2018;53:106-111.
5. Selvam V, ThamilSelvi R, Subramaniam PM, Vijayanath V. Prevalence of Common Diseases in lungs and Liver; A Histopathological study. JPBMS 2011;12(9).
6. Jani CB, Gupta S, Gupta M, Patel K, Shah M. Forensic Histopathology: Bane or a Boon. J Indian Acad Forensic Med 2009;31(3):222-229.
7. Singal P, Kaur M, Garg V. Postmortem study of histopathological lesions of heart in cases of sudden death - Incidental findings. Ann Int Med Res 2018;4(6):1-4.
8. Rothenberg K. The Autopsy through History. In: Embar-Seddon A, Pass AD, editors. Forensic Science. Salem Press; 2008. p. 100-100.
9. Bal MS, Singh SP, Bodal VK, Oberoi SS, Surinder K. Pathological findings in liver autopsy. J Indian Acad Forensic Med 2004;26:55-57.
10. Panchal MG, Sonwane RG. Histopathological Study of MLC and Autopsy Cases in Our Hospital. Indian J Forensic Med Pathol 2019;12(2):106-112.
11. Patel S, Rajalakshmi BR, Manjunath GV. Histopathologic Findings in Autopsies with Emphasis on Interesting and Incidental Findings - A Pathologist's Perspective. J Clin Diagn Res 2016;10(11):EC08-EC12.
12. Khiste JA, Dantkale SS, Pandit GA, Bendre MA. Histomorphological Study of Medicolegal Autopsy Cases. Int J Dent Med Sci Res 2021;3(2):92-97.
13. Kurz SD, Sido V, Herbst H, et al. Discrepancies between clinical diagnosis and hospital autopsy: a comparative retrospective analysis of 1,112 cases. PLoS One 2021;16:0.
14. Start RD, McCulloch TA, Silcocks PB, Cotton WK. Attitudes of senior pathologists towards the autopsy. J Pathol 1994;172:81-84.