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UNVEILING LIVER DISEASE THROUGH AUTOPSY: INSIGHTS FROM A YEAR OF POSTMORTEM STUDIES

Pathology

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ABSTRACT

Background: Liver disease is a significant global health burden, often progressing silently until advanced stages. Autopsy studies provide valuable insights into the true prevalence and spectrum of liver pathologies, including those that remain undiagnosed during life. This study aims to investigate the prevalence and nature of liver pathology identified through autopsy over a one-year period at a tertiary care center in Western India. **Methods:** A retrospective analysis of liver autopsy findings was conducted at B.J. Medical College and Civil Hospital, Ahmedabad, Gujarat, India, from January 1 to December 31, 2023. A total of 516 liver autopsies were performed, and the histopathological examination was carried out on each case. Demographic data, gross findings, and microscopic findings were documented and analyzed. **Results:** The study population consisted of 424 males (82.2%), 90 females (17.4%), and 1 transgender individual (0.2%), with a mean age of 39.7 ± 16.4 years. The most common gross findings were grayish color (76.2%) and firm consistency (74.8%). Microscopic examination revealed sinusoidal congestion (60.7%), fatty changes (12.4%), portal/lobular inflammation (8.7%), cholestasis (8.3%), cirrhosis (6.2%), and chronic passive congestion (5.2%) as the predominant histopathological findings. Clinically significant findings included cirrhosis (6.2%), hepatitis (8.7%), granulomas (0.8%), steatohepatitis (0.6%), and metastasis (0.2%). **Conclusion:** This autopsy-based study highlights the substantial burden of undiagnosed liver diseases in the population, with fatty liver disease, hepatitis, and cirrhosis being the most prevalent findings. The high prevalence of these conditions emphasizes the need for improved screening, early detection, and management strategies. Integration of autopsy findings with clinical data can further enhance our understanding of disease progression and guide public health interventions. Strengthening the autopsy practice and utilizing postmortem data can significantly contribute to advancing our knowledge and management of liver diseases in the population.

KEYWORDS

INTRODUCTION

Liver disease is an escalating global health burden, contributing to approximately 2 million deaths per year worldwide, with liver cirrhosis and hepatocellular carcinoma (HCC) being leading causes of liver-related mortality. Conditions such as non-alcoholic fatty liver disease (NAFLD), alcoholic liver disease, and viral hepatitis often progress silently, causing significant liver damage before clinical symptoms become evident. This asymptomatic nature poses a challenge in early detection, leading to late-stage diagnoses when curative interventions are limited. Autopsy studies provide a unique lens through which undiagnosed or subclinical liver diseases can be thoroughly evaluated, offering insights into their true prevalence and impact.

Autopsies have long been recognized as the gold standard for identifying the cause of death and discovering previously undetected pathologies. Despite advances in medical imaging and diagnostics, many liver pathologies remain clinically unrecognized until postmortem examination. This diagnostic gap underscores the importance of autopsies, not only in determining the exact cause of death but also in revealing significant coexisting diseases that were not diagnosed during life. Postmortem studies of the liver offer a comprehensive view of the pathology spectrum, particularly in cases where liver disease contributed directly or indirectly to death.

Previous studies have demonstrated that liver pathology is frequently underreported or overlooked in clinical settings, leading to missed opportunities for early intervention. For example, NAFLD, now the most common chronic liver disease globally, is often incidentally discovered during autopsy, especially in individuals without known risk factors. Similarly, cirrhosis can remain undetected until the terminal stages, with many patients presenting with complications such as variceal bleeding or hepatic encephalopathy only at the time of death. Furthermore, hepatocellular carcinoma is frequently diagnosed late due to its asymptomatic progression, and in some cases, it is only identified at autopsy.

This study aims to explore the prevalence and nature of liver pathology identified through autopsy over a one-year period at [Institution Name]. By systematically reviewing postmortem liver findings, this research seeks to highlight the types and frequency of liver diseases that remain undiagnosed during life, the contribution of liver pathology to the cause of death, and any correlations with demographic and clinical factors such as age, sex, and comorbidities. These findings will provide valuable insights into the hidden burden of liver disease and emphasize the role of autopsies in improving our understanding of liver-related mortality.

Through this research, we hope to underscore the need for enhanced screening programs and earlier detection of liver diseases, particularly in at-risk populations. By shedding light on the discrepancies between clinical diagnoses and postmortem findings, this study can inform future public health strategies aimed at reducing liver disease-related mortality and improving overall patient outcomes.

MATERIALS AND METHODS

Study Design and Population

This study is a retrospective analysis of liver pathology identified in autopsy cases over a one-year period, conducted at B.J. Medical College and Civil Hospital, Ahmedabad, Gujarat, India. A total of 516 autopsies were performed during this time, with each case subjected to histopathological examination (HPE) of the liver. Demographic details, including name, age, sex, and clinical history, were documented for each case.

Autopsy And Organ Handling

Upon completion of the postmortem examination by the forensic medicine (FM) department, the liver was removed and transferred to the autopsy section for histopathological evaluation. All received organs were cross-checked against the provisional cause of death certificate and the postmortem (PM) note. Information, including the autopsy number (assigned by the autopsy section), PM number (assigned by the FM department), date of postmortem, and date of organ receipt, was recorded in a dedicated autopsy register. The condition of the received liver (e.g., gross appearance, external damage) was noted at the time of receipt.

Tissue Fixation and Grossing

The liver specimens were fixed in 10% neutral buffered formalin for a minimum of 24-48 hours to ensure optimal preservation of tissue morphology. Gross examination of the liver was conducted, including assessment of size, weight, and external surface for any abnormalities such as nodules, fibrosis, or steatosis. Representative sections from different regions of the liver were taken, with particular attention to areas showing abnormal features. These sections were placed in labeled tissue cassettes for further processing.

Tissue Processing and Embedding
The tissue cassettes were processed using an automated tissue processor. This process involved dehydration, clearing, and infiltration with paraffin wax. The processed tissues were then embedded in paraffin to create tissue blocks.

Microtomy And Staining
Paraffin-embedded tissue blocks were sectioned using a microtome to obtain thin slices of 4-5 microns. The sections were then mounted on glass slides and subjected to routine Hematoxylin and Eosin (H&E) staining. Proper staining techniques were followed to ensure clear differentiation of cellular and tissue structures. Slides were then dried and reviewed under a microscope by an expert pathologist.

Histopathological Examination And Reporting
Following staining, the liver tissue slides were examined by a qualified pathologist for diagnostic interpretation. Key pathological findings were noted, including evidence of fatty liver, cirrhosis, fibrosis, inflammation, or malignancies such as hepatocellular carcinoma. The final diagnosis was correlated with the provisional clinical diagnosis, and a comprehensive autopsy report was prepared.

RESULTS
Demographics
A total of 516 liver autopsies were analyzed in this study. The demographic characteristics of the study population are summarized in Table 1.

Table 1-Demographic Characteristics Of The Study Population

Characteristic	Number (%)
Gender	
Male	424 (82.2%)
Female	90 (17.4%)
Transgender	1 (0.2%)
Age	
Range	1 day - 93 years
Mean ± SD	39.7 ± 16.4 years
Age Distribution	
0-9 years	7 (1.4%)
10-19 years	25 (4.8%)
20-29 years	112 (21.7%)
30-39 years	148 (28.7%)
40-49 years	113 (21.9%)
50-59 years	68 (13.2%)
60-69 years	32 (6.2%)
70-79 years	9 (1.7%)
≥80 years	2 (0.4%)

The study population consisted predominantly of males (82.2%). The age of the subjects ranged from 1 day to 93 years, with a mean age of 39.7 ± 16.4 years. The majority of cases (50.4%) were in the age group of 30-49 years.

Gross Findings
The key gross findings observed during liver autopsy are presented in Figure 1.

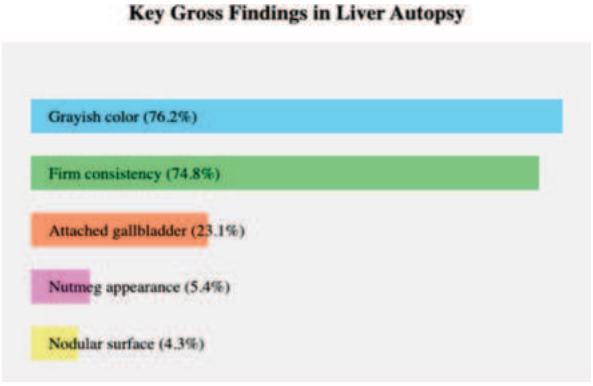

Fig 1 - Key Gross Finding

Grayish color (76.2%) and firm consistency (74.8%) were the most frequently observed gross findings, followed by the presence of attached gallbladder (23.1%). Nutmeg appearance and nodular surface were noted in 5.4% and 4.3% of cases, respectively.

Microscopic Findings
The prevalence of various histopathological findings in liver autopsy is depicted in Figure 2.

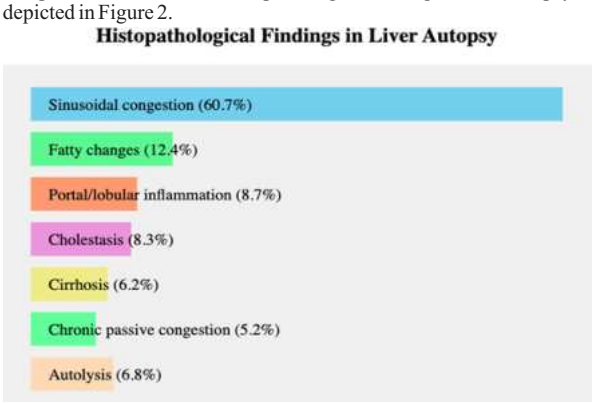

Fig 2 The Prevalence Of Various Histopathological Findings In Liver Autopsy

Sinusoidal congestion was the most prevalent histopathological finding, observed in 60.7% of cases. Fatty changes were noted in 12.4%, portal/lobular inflammation in 8.7%, cholestasis in 8.3%, cirrhosis in 6.2%, and chronic passive congestion in 5.2% of cases. Autolysis precluded detailed assessment in 6.8% of cases.

Clinically Significant Findings
Table 2 summarizes the prevalence of clinically significant findings in liver autopsy.

Table 2- Clinically Significant Findings In Liver Autopsy

Finding	Number (%)
Cirrhosis	32 (6.2%)
Hepatitis (portal/lobular inflammation)	45 (8.7%)
Granulomas (suggestive of tuberculosis)	4 (0.8%)
Steatohepatitis	3 (0.6%)
Metastasis	1 (0.2%)

Cirrhosis was identified in 32 cases (6.2%), while features suggestive of hepatitis were seen in 45 cases (8.7%). Granulomas indicative of tuberculosis were noted in 4 cases (0.8%), steatohepatitis in 3 cases (0.6%), and metastasis to the liver in 1 case (0.2%).

CONCLUSION
This retrospective analysis of liver autopsy findings at B.J. Medical College and Civil Hospital, Ahmedabad, Gujarat, India, provides valuable insights into the spectrum and prevalence of liver diseases in the studied population. The study included 516 liver autopsies performed over a one-year period, with a predominance of male subjects (82.2%) and a wide age range spanning from 1 day to 93 years (mean age: 39.7 ± 16.4 years).

The most common gross findings observed during liver autopsy were grayish color (76.2%) and firm consistency (74.8%), which are non-specific changes that can be associated with various liver pathologies. The presence of an attached gallbladder (23.1%) was noted in a significant proportion of cases, indicating the importance of examining the biliary system in liver autopsies.

Histopathological examination revealed sinusoidal congestion as the most prevalent finding (60.7%), likely representing terminal changes or passive congestion due to underlying cardiac or circulatory disorders. Fatty liver disease, identified by the presence of fatty changes, was observed in 12.4% of cases, highlighting the increasing burden of this condition in the population. Features suggestive of hepatitis, such as portal/lobular inflammation, were noted in 8.7% of cases, emphasizing the need for early detection and management of viral or autoimmune hepatitis.

Cirrhosis, an advanced stage of liver fibrosis, was identified in 6.2% of cases, which is higher than the estimated prevalence in the general

population. This finding underscores the importance of early diagnosis and intervention to prevent the progression of chronic liver diseases to cirrhosis. Chronic passive congestion, indicative of right heart failure or venous outflow obstruction, was observed in 5.2% of cases, highlighting the link between cardiovascular disorders and liver dysfunction.

Although rare, the identification of granulomas suggestive of tuberculosis (0.8%), steatohepatitis (0.6%), and liver metastasis (0.2%) in this autopsy series emphasizes the role of histopathological examination in detecting these clinically significant entities. Autolysis, which precluded detailed assessment in 6.8% of cases, remains a challenge in postmortem liver evaluation and underscores the importance of timely autopsy and proper tissue preservation techniques.

The age distribution analysis revealed that the majority of cases (72.3%) were concentrated in the age range of 20-49 years, with the highest number of cases in the 30-39 years age group (28.7%). This finding suggests that liver diseases are affecting a significant proportion of the young and middle-aged population, highlighting the need for early screening and preventive measures.

In conclusion, this study provides a comprehensive overview of the histopathological findings in liver autopsies at a tertiary care center in Western India. The high prevalence of fatty liver disease, hepatitis, and cirrhosis underscores the need for improved awareness, early detection, and management of these conditions. The age distribution pattern highlights the importance of targeting preventive strategies towards the young and middle-aged population. Integration of autopsy findings with clinical data can further enhance our understanding of disease progression and guide public health interventions. Future research should focus on correlating histopathological findings with clinical parameters, exploring novel diagnostic markers, and developing targeted therapies for liver diseases. Strengthening the autopsy practice and utilizing the valuable data obtained from postmortem studies can significantly contribute to advancing our knowledge and management of liver diseases in the population.

Here's a more detailed version of the recommendations based on the findings of this liver autopsy study:

Recommendations

1. **Increase awareness and education about preventable liver diseases:**
- Launch public health campaigns to educate the general population about the risk factors, prevention, and early signs of common liver diseases such as alcoholic liver disease, non-alcoholic fatty liver disease (NAFLD), and viral hepatitis.

- Collaborate with healthcare providers, schools, and community organizations to disseminate information and promote healthy lifestyle choices, including balanced diet, regular exercise, and avoidance of excessive alcohol consumption.

- Utilize social media platforms and mass media to reach a wider audience and raise awareness about the importance of liver health and the consequences of neglecting it.

2. **Emphasize early diagnosis and management of fatty liver disease and hepatitis:**
- Encourage regular screening for fatty liver disease, especially in high-risk populations such as individuals with obesity, diabetes, or metabolic syndrome.

- Promote the use of non-invasive diagnostic tools, such as ultrasound and liver function tests, for early detection of fatty liver disease in primary care settings.

- Stress the importance of timely diagnosis and treatment of viral hepatitis through increased testing, vaccination programs, and access to antiviral therapies.

- Develop and implement standardized clinical guidelines for the management of fatty liver disease and hepatitis, ensuring consistent and evidence-based care across healthcare facilities.

3. **Maintain high suspicion for cirrhosis, infections, and malignancies:**
- Train healthcare providers to recognize the clinical signs and risk factors associated with cirrhosis, such as jaundice, ascites, and coagulopathy, and to promptly refer patients for further evaluation and management.

- Encourage regular screening for hepatocellular carcinoma (HCC) in patients with cirrhosis or chronic liver diseases, using imaging modalities like ultrasound or CT scan, as per established guidelines.

- Emphasize the importance of vaccination against hepatitis B virus (HBV) and screening for hepatitis C virus (HCV) in high-risk populations to prevent the development of chronic liver disease and cirrhosis.

- Promote awareness about the link between cirrhosis and increased susceptibility to infections, and implement strategies for early detection and prompt treatment of bacterial and fungal infections in patients with advanced liver disease.

4. **Correlate autopsy findings with clinical data to better understand disease progression:**
- Establish a standardized protocol for collecting and documenting clinical data, including medical history, laboratory results, and imaging findings, for all liver autopsy cases.

- Encourage multidisciplinary collaboration between pathologists, hepatologists, and other relevant specialties to correlate autopsy findings with antemortem clinical data and gain insights into the natural history and progression of liver diseases.

- Utilize the correlated data to identify potential risk factors, prognostic markers, and therapeutic targets for liver diseases, guiding future research and clinical decision-making.

- Develop a centralized database or registry to store and analyze the correlated autopsy and clinical data, facilitating large-scale studies and enabling the identification of trends and patterns in liver disease epidemiology.

5. **Leverage the autopsy data for community-based liver health screening and education programs:**
- Utilize the findings from this study to identify high-risk communities or regions with a higher prevalence of specific liver diseases and design targeted screening and education programs.

- Collaborate with local healthcare authorities, non-governmental organizations (NGOs), and community leaders to organize regular liver health screening camps, providing accessible and affordable diagnostic services to the population.

- Integrate liver health education into existing community health programs, such as maternal and child health initiatives, to reach a broader audience and promote early adoption of healthy lifestyle habits.

- Engage community health workers and trained volunteers to conduct door-to-door awareness campaigns, distribute educational materials, and provide basic counseling on liver disease prevention and management.

6. **Strengthen the autopsy practice and postmortem liver evaluation:**
- Advocate for the importance of autopsy in understanding the burden and spectrum of liver diseases, and encourage its inclusion in routine medical practice and research.

- Develop standardized protocols and guidelines for liver autopsy, including tissue sampling, fixation, and histopathological examination, to ensure consistent and high-quality postmortem evaluation across institutions.

- Provide regular training and education to pathologists and autopsy technicians on the latest techniques and best practices in liver autopsy and histopathological assessment.

- Establish a quality control and assurance program to monitor and improve the accuracy and reliability of liver autopsy findings, ensuring the validity and comparability of data across different centers.

7. **Foster interdisciplinary collaboration and research:**
- Encourage collaboration between pathologists, hepatologists, epidemiologists, and public health experts to design and conduct comprehensive studies on liver diseases, leveraging the autopsy data and clinical correlations.

- Promote the sharing of autopsy data and findings through publications, conferences, and online platforms, facilitating knowledge exchange and stimulating further research in the field of liver pathology.

- Establish partnerships with academic institutions, research organizations, and industry partners to support and fund research projects aimed at unraveling the mechanisms, risk factors, and potential therapeutic targets for liver diseases.

- Encourage the development and validation of novel diagnostic markers, such as biomarkers or imaging techniques, that can aid in the early detection and monitoring of liver diseases, guided by the insights gained from autopsy studies.

By implementing these detailed recommendations, healthcare systems and research institutions can work towards improving the prevention, diagnosis, and management of liver diseases in the population. The valuable data obtained from this liver autopsy study should be leveraged to guide public health policies, allocate resources, and prioritize interventions to reduce the burden of liver diseases and improve patient outcomes. A concerted effort involving healthcare providers, researchers, policymakers, and the community is essential to translate these findings into actionable strategies and drive meaningful change in the field of liver health.

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