



CHRONIC LIVER DISEASE AND UNEXPECTED DEATH: CLINICAL-FORENSIC ANALYSIS

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ABSTRACT

Background: Chronic liver disease is a significant international health issue and is more often linked to acute decompensation and sudden and unexpected death. Most of these deaths do not take place in a hospital environment and would have to be medico-legally investigated to find out how and what actually caused the death. Clinical and autopsy correlations are needed to be understood to make appropriate certification and prevention strategies.

Objective: To analyze the clinical characteristics, terminal events, and autopsy findings in cases of unexpected death among patients with chronic liver disease.

Methodology: This clinical-forensic observational study has sampled 72 cases of deaths due to chronic liver disease that were confirmed through an autopsy procedure that took place from November 2023 to October 2024 at Sir Syed College of Medical Sciences (For Girls) & Khairpur Medical College, Khairpur Mir's. The demographic information, the clinical history, lab parameters, conditions of death, and post-mortem were noted. Child-Pugh classification was used to measure the severity of the disease and the relationships between the severity and cause of death were evaluated with chi-square test.

Results: Most deaths occurred in males aged 41–60 years, with hepatitis C being the most common etiology. Over half of the patients were in Child-Pugh class C at the time of death. The majority of deaths were unwitnessed and occurred at home. Variceal hemorrhage was the leading cause of death followed by hepatic encephalopathy and sepsis, showing significant association with advanced cirrhosis ($p < 0.05$). Autopsy frequently demonstrated portal hypertension, splenomegaly, and massive gastrointestinal bleeding.

Conclusion: Unexpected deaths in chronic liver disease mainly result from preventable complications of portal hypertension and hepatic failure. Autopsy examination plays a crucial role in distinguishing natural death from suspicious circumstances and highlights the importance of early identification of high-risk patients.

Keywords: Chronic liver disease, sudden death, cirrhosis, variceal hemorrhage, forensic autopsy

INTRODUCTION

Chronic liver disease (CLD) is a serious morbidity and mortality factor among the global population, where prevalence has been on the increase in the recent years owed to viral hepatitis, alcoholism and metabolic syndrome. Cirrhosis, portal hypertension, and systemic complications are ultimately caused by progressive hepatic fibrosis. Even though the patients can stay stable over long durations, some patients deteriorate suddenly leading to sudden or unexpected death. These mortalities usually take place beyond health care systems and might at first be confused with cardiac death or natural death of unknown causes [1-3].

The pathophysiology of sudden death in cirrhosis is multifactorial. Portal hypertension is predisposing to the rupture of gastro-esophageal varices, whereas hepatic encephalopathy is responsible to loss of consciousness and aspiration. Moreover, cirrhotic cardiomyopathy, electrolyte imbalance, infections, and hepatorenal syndrome also diminish the physiological reserve, and they may lead quickly to collapse. Since the clinical picture immediately before death is often ambiguous, the precise cause is often unknown unless examined in detail in post-mortem [4-6].

Medico-legal insight would dictate that an unanticipated death needs to be thoroughly considered to rule out the possibilities of being poisoned, traumatized, or to have been through negligence. In high liver disease prevalence areas, advanced cirrhosis with complications that resemble unnatural death are common during forensic autopsies. Thus, to certify death and record it in legal papers accurately, the correlation of the ante-mortem clinical findings and autopsy findings is necessary. Although most important, there is little regional information available that characterizes the forensic trends of sudden death in chronic liver disease [7-9].

The present study was conducted to analyze demographic characteristics, clinical status, terminal events, and autopsy findings in unexpected deaths among patients with chronic liver disease and to determine the relationship between disease severity and final cause of death.

METHODOLOGY

The study was planned to be an analytical observational study, which was a clinical-forensic study that would be carried out at Sir Syed College of Medical Sciences (For Girls) & Khairpur Medical College, Khairpur Mir's. All medico-legal autopsies conducted during one year from November 2023 to October 2024, were included in the study in which the underlying pathology was confirmed to be chronic liver disease. The approval of the institutional ethical review committee was obtained after which 72 cases meeting the eligibility criteria were enrolled.

The cases were accepted when the confirmed diagnosis of the cirrhosis or chronic liver disease was made on the gross and histopathological examination of the autopsy of the corpse whether the disease was previously diagnosed during life. Both hospital deaths that were submitted to medico-legal autopsy and those that were discovered out of hospital were included. The cases with evidence of advanced decomposition or significant traumatic cause of death and/or poisoning, burns, or incomplete clinical records were eliminated so as not to create confounding variables in the determination of natural death.

In both cases, demographic data (age, gender, residence and medical history) were retrieved through the hospital files, police inquest files, and relative interviews (where possible). The clinical parameters collected comprised of past diagnosis of liver disease, etiology, previous complications, recent symptoms, medication history and last available laboratory investigations. The severity of an illness was measured with the help of the Child-Pugh classification with bilirubin, albumin, INR, ascites, and encephalopathy status before death.

Circumstantial information was also gathered through the reports on scene investigation such as the location of death, observation of witnessing death, symptoms before falling, and any indication of trauma or unnatural death. All the autopsies were carried out following general forensic procedures. Pallor, jaundice, edema, and abdominal distension were recorded as a result of external examination. Internal inspection assessed liver size, nodularity, changes in portal hypertension, splenomegaly,

ascites, varices, gastrointestinal bleeding, pulmonary changes, changes in the kidney, and intracranial pathology. In cases where necessary, representative tissue samples have been preserved in histopathology.

The clinical history, scene findings and autopsy examination were correlated to determine the final cause of death. Deaths were classified as variceal hemorrhage, hepatic encephalopathy, sepsis, hepatorenal syndrome, cardiac, pulmonary embolism or undetermined natural causes. The statistical software were used to enter and analyze all the data. Continuous variables were summarized in the form of mean standard deviation and categorical variables in frequency and percentages. The relationship between the severity of liver disease (Child-Pugh class) and cause of death was examined with the help of the chi-square test, where p-value less than 0.05 was taken as statistically significant.

RESULTS

Advanced cirrhosis at death was more likely to be related to male gender and viral hepatitis. There was a significant likelihood of being in terminal stage presented by patients who were previously undiagnosed. We have not found any statistically significant relationship between severity and age.

Table 1. Demographic Characteristics and Severity of Disease

Variable	Child A+B (n=35)	Child C (n=37)	p-value
Male	21	28	0.048
Female	14	9	
Age >60 years	11	15	0.41
Known liver disease	27	19	0.006
Undiagnosed disease	8	18	
Hepatitis C etiology	11	17	0.032
Alcohol related	8	6	0.52

Advanced liver disease was strongly linked with ascites, coagulopathy and hypoalbuminemia. Terminal stage cirrhosis was also significantly correlated with hyponatremia and renal impairment. The presence of varices in the past was a significant predictor of decompensation.

Table 2. Clinical Status and Laboratory Findings

Parameter	Child A+B (n=35)	Child C (n=37)	p-value
Ascites	17	31	0.001
Encephalopathy	9	24	0.002
Prior variceal bleed	9	20	0.012
INR >1.5	19	33	0.003
Bilirubin >3 mg/dl	17	32	0.001
Albumin <3 g/dl	21	34	0.004
Creatinine >1.5 mg/dl	8	18	0.018
Sodium <130	6	15	0.028

Gastrointestinal blood loss and the occurrence of altered consciousness were much more common in terminal cirrhosis death. Majority of deaths that happened at home were in grossly decompensated patients. It was not significantly related to trauma pointing to natural death.

Table 3. Terminal Events vs Disease Severity

Event	Child A+B	Child C	p-value
Death at home	15	24	0.041
Unwitnessed death	17	27	0.036
Hematemesis/melena	9	23	0.002
Altered consciousness	12	25	0.001

Dyspnea	11	10	0.72
External trauma	3	2	0.64
CPR attempted	14	10	0.21

Advanced cirrhosis was closely associated with variceal hemorrhage and hepatic encephalopathy. The moderate association but not strong statistical significance was observed with sepsis and renal failure. The results establish that the sudden deaths in chronic liver diseases are major preventable complications of portal hypertension.

Table 4. Cause of Death and Severity of Liver Disease

Cause of Death	Child A+B	Child C	p-value
Variceal hemorrhage	9	19	0.003
Hepatic encephalopathy	6	9	0.041
Sepsis	7	5	0.28
Hepatorenal syndrome	3	5	0.19
Cardiac death	4	1	0.11
Pulmonary embolism	2	0	0.22
Undetermined	4	0	0.067

Figure 1: Distribution of Causes of Unexpected Death in Chronic Liver Disease

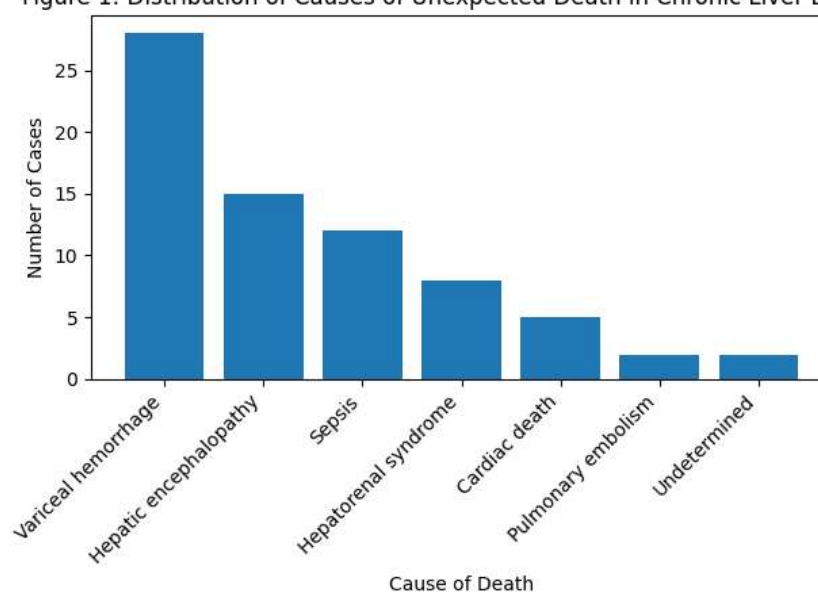


Figure 1: Distribution of Causes of Unexpected Death in Chronic Liver Disease

DISCUSSION

The current clinical-forensic research assessed the processes and conditions of sudden death among patients with chronic liver disease and revealed that the majority of deaths were observed among the persons with severe hepatic decompensation. Over half of the cases fell within the Child-Pugh class C and this implies that the terminal complications of cirrhosis may be formed outside the hospital before the medical intervention can take effect. The given percentage of already diagnosed patients also indicates that mortality caused by lack of diagnosis is not the only thing but by unpredictable acute decompensation [10-12].

Variceal bleeding became the cause of the highest mortality followed by hepatic encephalopathy and sepsis. These results are consistent with the pathophysiology of portal hypertension that rupture of gastro-esophageal varices leads to rapid hypovolemic collapse and acute death. The close statistical correlation between progressive portal pressure and coagulopathy in this experiment with advanced cirrhosis and gastrointestinal bleeding supports the idea that catastrophic bleeding is the resultant

outcome of progressive portal pressure and coagulopathy. In terms of forensics, finding that there was blood in the airway or stomach at autopsy is thus a very key indicator of natural death as opposed to trauma [12-14].

The second critical finding was that there was a huge number of unattended death cases at home. Several patients reported hematemesis or loss of consciousness just before collapsing, which implied the onset of fatal complications in a few minutes to hours. Hepatic encephalopathy was a probable factor in delayed help-seeking and the additional factors in worsening hypoxia were aspiration pneumonia and pulmonary edema. These results highlight the fact that the loss of life due to cirrhosis is frequently confused with the spontaneous cardiac death cases, and no autopsy is performed to establish the diagnosis [15-17].

Sepsis and hepatorenal syndrome were other causes of mortality as a sign of immune malfunction and circulatory instability in end-stage liver disease. These complications are not always life-threatening in the acute stage; however, they greatly limit the physiological reserve and cause terminal breakdown. The severe disease was closely linked to hyponatremia, renal impairments, coagulopathy, and therefore, they served as predictors of imminent death. These parameters can be used as warning signs that need close observation clinically [18-20].

Regarding the medico-legal perspective, in the majority of cases, patients die unexpectedly in chronic liver disease, which is proved by the fact that the severe trauma is also absent. Nonetheless, the abruptness and the fact that it happens outside the healthcare facility may often lead to the necessity of forensic investigation to rule out the possibilities of poisoning, assault, or negligence. Autopsy is thus not only necessary to establish the cause of death but also to inform the community health measures to prevent complications of cirrhosis that may be avoided.

CONCLUSION

Unexpected death in chronic liver disease primarily results from preventable complications of advanced cirrhosis, particularly variceal hemorrhage and hepatic encephalopathy. Most fatalities occur outside the hospital and may clinically resemble sudden unexplained death, making autopsy evaluation crucial for accurate certification. Early identification of high-risk patients and aggressive management of portal hypertension and infections may substantially reduce sudden mortality in cirrhotic individuals.

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