

Cardiac Abnormalities in Cirrhotic Patients: A Comprehensive Clinical Study

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Abstract :

This study aims to evaluate the clinical aspects of cirrhosis and its impact on cardiac structure and function. The methodology involved the examination of patients admitted to the Rajiv Gandhi Institute of Medical Sciences, Kadapa, diagnosed with hepatic cirrhosis. Data were collected from November 2017 to October 2019. The inclusion criteria comprised patients above 18 years with confirmed hepatic cirrhosis by abdominal ultrasound. Exclusion criteria included patients below 18 years. Ultrasound and echocardiography were used for diagnosis and assessment. Statistical analysis was conducted to evaluate the findings.

(Keywords: Cirrhosis, Cardiac Abnormalities, Ultrasound, Echocardiography, Anemia, Hyponatremia)

Introduction:

Cirrhosis, a prevalent clinical disorder, involves the extensive destruction of liver tissue, replaced by fibrosis and nodules(1). First described by Gianbattista Morgagni in 1761 and named "cirrhosis" by Lannec in 1826, it presents with characteristic clinical manifestations. Alcohol consumption is a well-discussed factor in its development, alongside Non-Alcoholic Fatty Liver Disease (NAFLD), Hepatitis B and C. Despite extensive research, understanding mortality and morbidity remains challenging due to disease progression variability and multi-system involvement.

Studies have highlighted cardiac abnormalities in cirrhosis, with Kowalski et al. noting abnormal cardiovascular function and prolonged QT intervals. Advanced cirrhosis is linked to increased blood volume, cardiac output, and reduced systemic vascular resistance, leading to hyperdynamic circulation and subsequent cardiac changes. However, limited information exists on the clinical relevance of these cardiac alterations and their correlation with liver disease severity.

Given the variable disease progression, detecting cardiac changes is crucial for predicting patient outcomes. Therefore, this study aims to assess the clinical implications of cirrhosis on cardiac structure and function using echocardiography, while also evaluating the prognostic significance of cardiac changes.

Objective: To assess the relationship between cirrhosis and cardiac abnormalities, particularly focusing on structural and functional changes.

Methods: Patients admitted for hepatic cirrhosis and its complications were studied. Diagnosis was confirmed through ultrasound and echocardiography. Statistical analysis was performed to assess the significance of findings.

Results: The study included 100 patients diagnosed with cirrhosis. The mean age was 47.1 ± 11.02 years, with a male predominance. Abdominal distention was the most common presentation, followed by jaundice and fatigue. Cardiac abnormalities were prevalent, with 66% of patients exhibiting abnormal left ventricular mass. Anemia was common, with 80% of patients having hemoglobin levels below 11 g/dL. Hyponatremia was observed in 60% of patients.

Discussion:

Cirrhosis, a common clinical disorder, manifests through various causes including alcohol consumption, viral hepatitis, autoimmune diseases, and non-alcoholic fatty liver disease. In our study of 100 cirrhotic patients, predominantly male, aged 47.1 ± 11.02 years, we compared findings with Wong F(2) et al. and P. Liu et al(3). Age and sex distributions differed slightly between studies, possibly due to sample size variations and demographics.

Clinical presentations varied, with abdominal distention being most common, followed by jaundice, fatigue, and abdominal pain. Notably, some patients exhibited no cardiac signs or symptoms despite significant cardiac abnormalities detected via echocardiography, highlighting the importance of comprehensive cardiac evaluation.

Alcoholism was the leading cause of cirrhosis in our study (67%), followed by chronic hepatitis (33%). While the correlation between cardiac abnormalities and alcoholism was not significant, cardiac alterations were comparable regardless of cirrhosis etiology (4).

Anemia was prevalent in 80% of patients, with hemoglobin levels significantly lower than normal. However, no significant relationship was observed between anemia and echocardiographic findings, possibly due to sample size limitations (5).

Hematological abnormalities extended to leukopenia in 13% of patients and thrombocytopenia in 66%. These abnormalities, along with prolonged prothrombin time and elevated INR, indicated impaired liver function.

Hyponatremia, found in 60% of patients, correlated with increased severity of cardiac abnormalities as indicated by MELD scores. Its management involves cautious correction to avoid adverse effects.

Child Pugh's score, though classifying all patients as Class C, did not correlate significantly with cardiac abnormalities. In contrast, MELD scores showed a direct relationship with severity of cardiac dysfunction.

ECG changes, particularly QTc prolongation, were prevalent and correlated significantly with cardiac abnormalities, emphasizing the need for thorough cardiac evaluation in cirrhotic patients (6,7).

Echocardiographic parameters revealed significant left ventricular hypertrophy (LVH) and diastolic dysfunction, with no significant relationship between etiology and structural abnormalities (8). LVH was associated with MELD scores, suggesting a direct link between liver disease severity and cardiac alterations (9,10). LV mass was notably elevated in 66% of the study population, with a mean value of 223 ± 54.79 gms. This finding is consistent with previous research conducted by Hamami et al. Additionally, LV diastolic dysfunction (LVDD) was observed in 96% of the population, aligning with the findings of Wong et al. (Table 1)

Table:1

Parameters	Present study	Wong et al	Pozzi et al
LAD(mm)	37.5 ± 4.5	40 ± 1	41 ± 1
LVEF (%)	61.7 ± 5.6	62.7 ± 3.6	63.4 ± 2.8

Future research avenues include investigating the impact of anemia correction on cardiac function, exploring molecular factors underlying cardiac dysfunction, and studying potential therapies such as galectin-3 inhibitors and PPAR α agonists. Additionally, optimizing preoperative strategies, like albumin infusion, may improve outcomes in cirrhotic patients undergoing liver transplantation.

Conclusion:

Patients with cirrhosis may not always exhibit clinical symptoms or signs of overt cardiac dysfunction, emphasizing the importance of proactive screening for structural and functional cardiac abnormalities irrespective of age, sex, or underlying cause of cirrhosis. Elevated levels of serum bilirubin, INR, and serum creatinine correlate with a higher likelihood of cardiac

abnormalities, while prolonged QTc intervals are indicative of cardiac structural and functional changes. Additionally, an increase in MELD criteria score directly corresponds to an elevated risk of cardiac abnormalities, underscoring the need for thorough evaluation in cirrhotic patients. Pre-transplant screening for cardiac abnormalities is crucial for individuals on the transplant recipient list to prevent death from arrhythmias post-transplantation. Furthermore, patients with pre-existing structural or functional cardiac abnormalities should undergo close monitoring for potential worsening of cardiac function after liver transplantation.

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