

A Study on Echocardiographic Findings And Qt Interval In Cirrhotic Patients And its Correlation With The Severity of Cirrhosis

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Abstract

Context: Liver cirrhosis is refers to a condition of progressive disease that damages the normal architecture of the liver and it is caused by a number of conditions. This study observed that increasing frequency of QTc prolongation with worsening Child Pugh score and it correlated with a decreased heart rate Variability and these two become independent prognostic factors.

Aim Of The Study: To assess whether QT interval prolongation and left ventricular end diastolic dimension abnormality will occur in cirrhosis,

To assess whether the severity of cirrhosis is correlating with the QT interval prolongation and left ventricular end diastolic dimension.

To use these two paraclinical parameters in all advanced stage cirrhosis patients as a screening tool to assess cardiovascular complications.

Settings And Design: Prospective observational study .

Materials And Methods : This study was conducted among 100 patients diagnosed with cirrhosis of liver got admitted in general medicine wards and medical gastroenterology ward at Government Rajaji Hospital, Madurai. From January 2015 to August 2015.

Statistical analysis : One way ANOVA, Pearson correlation and Chi square test.

Results : There was a linear relation between QTc prolongation and left ventricular end diastolic dimension and severity of cirrhosis.

Conclusions : The frequency of QTc interval prolongation was statistically significant with worsening of child Pugh score. It indicates an association between QTc prolongation and the severity of cirrhosis.

Keywords : Cirrhosis, QTc interval , LVEDD

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I. Introduction

Liver cirrhosis is refers to a condition of progressive disease that damages the normal architecture of the liver and it is caused by a number of conditions. Maximum of liver parenchyma should undergo destruction before liver failure becomes clinically significant. The involvement of cardiovascular system in cirrhosis is crucial due to its pathophysiological, clinical and therapeutic relationships with the liver. [2] „Cardiac cirrhosis“ is the term refers to describe a constellation of features that indicate structural and functional abnormality of heart which are often secondary to liver cirrhosis [5] [6]. Liver cirrhosis affects the cardiovascular system which results in systolic dysfunction and diastolic dysfunction. There is an impaired stress response with structural changes which are detected by Echocardiogram and electrophysiological abnormalities such as prolongation of ventricular repolarization time (QT interval prolongation) by ECG [7] Cardiac status may be assessed by varies modalities like electrophysiological studies, echo cardiogram and biochemical parameters. QTc prolongation found to be associated with an increased risk of a number of life-threatening complications like cardiac arrhythmias torsades de pointes (TdP) , ventricular fibrillation (VF) and sudden cardiac death [8].

II. Materials And Methods:

Study Population: This study was conducted among 100 patients diagnosed with cirrhosis of liver got admitted in general medicine wards and medical gastroenterology ward at Government Rajaji Hospital, Madurai from January 2015 to august 2015.

Inclusion Criteria: Patients diagnosed as cirrhosis of liver by Ultrasonography Age 26-70 yrs Gender: Both Male and Female.

Exclusion Criteria: Patients with hypertension.
Patients with history of heart disease (valvular and ischemic).
Bed ridden patients for more than one month.
Patients with active upper gastrointestinal hemorrhage.
Severe Anemia,
Thyroid disorders and Pregnancy.
Patients with electrolyte abnormality
H/O Arrhythmias and taking anti arrhythmic drugs
Medication causing QT interval prolongation

Ethical Committee Approval: Obtained.

Study Protocol: A previously designed proforma will be used to collect the demographic and clinical details of the patients. Detailed history pertaining to present illness as well as a thorough history regarding other disease conditions were obtained. Each patient was enquired about previous drug intake for Hypertension, Diabetic and cardiac illness.

A thorough clinical examination and essential biochemical investigation was done to categorize the patients into child Pugh score A, B and C. An ECG was recorded in all patients and all of them were submitted for transthoracic echocardiography.

III. Statistical Analysis

The data collected in the study was formulated into master chart in Microsoft office excel and statistical analysis was done with the help of computer by using SPSS software and sigma stat 3.5 version (2012) Using this software percentage, mean, standard deviation and p value were calculated through one way ANOVA, Pearson correlation and chi square test and p value of < 0.05 was taken as significant.

IV. Results

Mean age (\pm S.D) 53.26 \pm 7.14 years with minimum age 36 years, maximum age 70 years

Comments: 10 % of the study population were below 40 yrs.

And 90% were belongs to above 40 yrs of age.

Majority of the study subjects were males (68%) while the remaining (32 %) were females.

10 % of study population were in 26-40 years age group. In this 4% belongs to Child Pugh A , 5 % were in Child Pugh B, remaining 1% had Child Pugh C.

Majority of the study population were in 41-55 years (50%) remaining 40 % were between 56 – 70 years.

Child Pugh A 3% in 41-55 age group , Child Pugh B 23 % in 41-55 age group and 13% in 56- 65 age group, Child Pugh C 24 % in

41-55 age group and 27 % in 56-65 age group.

Among the study population 4% of males belongs to Child Pugh A, and females 3% . Among the 41 % of Child Pugh B group 25 % are males and females 16%. 39 % Of males and 13 % of females belongs to Child Pugh C. in the study population more than 50% were alcoholic. 12% had viral etiology and alcohol history. 19% belongs to others category . In the study population, alcoholic group had a mean QTc of 443.18. viral etiology group with 439. The mean QTc of 413.92 were observed in others group. In the study population, among the child Pugh A group 1 out of 7 had prolonged QTc interval and 6 had normal QTc . The percentage of prolonged and normal QTc were 14 % , 86 % respectively. The frequency of prolonged QTc in child Pugh B, child Pugh C were 12 out of 41 (29%) and 27 out of 52 (52%) respectively. The mean QTc found to be 429.16 \pm 42.4 msec. The Mean QTc of child pugh A, Child pugh B and Child pugh C were 405.6 msec, 430.3 msec and 451.6 msec respectively.
p vaule 0.017 – significant.

In the study population as the child Pugh score increases from A TO C the mean LVEDD also increases like 33.14 mm, 38.97 mm, 43.67mm with p value 0.011 (significant). In the study population the mean QTc interval of male patients were found to be 443.76 and in the female it was 430.93 with the p value 0.223 (Clinically not significant) Among the study population the mean LVEDD of male and female patients were found to be 41.87mm, 39.19mm with the p value 0.237 (Clinically not significant)

Child Pugh score Vs QTc	Mean QTc msec	SD	p value
A (7)	405.6	31.3	
B (41)	430.3	45.2	
C (52)	451.6	50.7	0.017 Sig

Child Pugh Score vs. LVEDD	Mean LVEDD	SD	p value
A (7)	33.14	3.53	
B (41)	38.97	9.94	
C (52)	43.67	10.81	0.011 Sig

V. Discussion

Cirrhosis of liver, the end point of many liver disorder adversely affects many organ system in the body. Cardiovascular complications due to cirrhosis per se without any underlying cardiac illness can occur. The cardiovascular manifestations are blunted ventricular response to stimuli, systolic and diastolic dysfunction, absence of overt left ventricular failure at rest. When these patients undergoing treatment for varies complications of cirrhosis, the overt heart failure becomes manifested and results in many complications. So strict volume control is necessary in these patients before taken up for any interventional procedures like shunt surgery, liver transplantation.

The ECG abnormality QTc prolongation is an important finding in cirrhosis patients. The prolonged QTc interval was associated ventricular arrhythmias and sudden cardiac arrest and death of the patient. The prolonged QTc interval was positively correlated with the LVEDD. The QTc and the ECHO finding LVEDD are progressively increased from child Pugh score A to C.

Age distribution: In the study population the mean age was 53.26 ± 7.14 with age ranges from 26-70 years and more than 90% of population belong to above 40 years. This indicates increased prevalence of cirrhosis in higher age groups due to the long natural history of cirrhosis. Study by Hafeezullah sheikh et al, the mean age was 51.7 ± 10 with the age ranges from 26-70 years. A.B.Bhatti et al showed the mean age \pm SD of $57.05 (\pm 12.03)$. An another study by Alireza moaref et al showed the age distribution between 20-60 years with the mean age of 41.01 ± 14 years. All the previous studies were done among 25-70 year age group, correlating with the present study population.

Gender distribution: in the study population 68% were males the remaining 32% were females, the male : female ratio found to be 2.1:1. A study by Adnan Bashir Bhatti et al, showed the male and female population were 58%, 42% respectively. In the sheikh et al study the male : female ratio was 1.6:1., Mukhtiar Abro et al showed 55.41% were male and 44.59% were female. In all the above studies the males were predominate in the study population. The study done at our hospital also revealed male predominance. Distribution of child Pugh score among the study population: majority of the study population were in 46-55 age group with child Pugh score of 3%, 23% and 24% A, B and C respectively. In the 56-70 age group population 13%, 27% were in child B and C respectively.

A study by Hafeezullah et al, showed child Pugh score A, B and C 4.9%, 45.9%, 49.1% in 41-55 age group and 0%, 28.5%, 71.5% in 56-70 age group respectively. The similar results were observed in the study conducted by Genovese et al, Zuberi et al they concluded that worsening of child Pugh score above 40 years of age. Gender distribution in the study population: majority were males in the present study, in this 4%

had child Pugh A, 25%, 39% had B and C score respectively. In the female study population the child Pugh score A, B and C were found to be 3%, 16%, 13% respectively.

Study done by Sheikh et al revealed among the male population 6.7% had child Pugh score A, 34.7%, were in B and 58.7% were in C. In the females 10.9%, 50%, 39.1% were found to be in child Pugh A, B and C respectively. The significance of etiology for cirrhosis: in the present study 45 persons gave history of alcohol consumption. Hepatitis virus causing cirrhosis found to be in 24 persons. 12 persons had both alcohol consumption and viral etiology. Apart from these two common etiologies there are many reasons for cirrhosis, 19 persons categorized in this group. Worldwide in general viral etiology found to be common in cirrhosis. But the incidence of cardiovascular complications in cirrhosis patients is not significant with respect to etiology of cirrhosis. Frequency of QTc prolongation in the study population: in the present study among the 100 patients 40% had prolonged QTc interval (>440 msec). The distribution of population with prolonged QTc were found to be 14% in child Pugh A group, 29% in child Pugh B and 52% in child Pugh C group.

Li et al, reported a QTc prolongation frequency of 21.05%, 56.89% and 59.60% in child Pugh A, B and C respectively. Bernardi et al demonstrated 25%, 51%, and 60% of increased QTc with child A, B and C respectively. Bashir Bhatti et al, showed the relation between prolonged QTc with child Pugh score 4.5%, 23.2% and 32% in A, B and C group respectively. In the present study the mean QTc was found to be 429.16

± 42.4 msec. Alizera moaref et al, showed the mean QTc interval of

490.02 ± 51 msec. Bhasir bhatti et al observed the mean QTc interval of 429.92 ± 45.11 in their study.

Similar results were revealed by Ioana mozos et al and Zahmatkesha et al they showed higher QTc max and QTc dispersion with worsening child Pugh score. All the above studies demonstrated that the frequency of QTc prolongation was increased with worsening of child Pugh score. p value found to be 0.017. An another important paraclinical parameter observed in this study was LVEDD. As the child Pugh score worsens from A to C, the LVEDD also increase linearly. The observed mean LVEDD values were 33.14mm, 38.97mm and 43.67mm in child Pugh A, B and C respectively. The p value 0.011, significant. Alzahtani SA et al and Bernardi M et al studies showed similar correlation between child Pugh score and LVEDD. The present study showed a linear correlation between QTc and LVEDD. The coefficient correlation was found to be 0.962 (good correlation). Alireza moaref et al showed a positive correlation between QTc prolongation and LVEDD. Samiullah Shaikh et al showed the prolongation of QTc interval with worsening child Pugh score and it was linearly correlated with decrease in ejection fraction.

We also observed that there were no difference in the frequency of QTc prolongation between male and female population. The mean QTc was 443.76 msec in male and 430.93 msec in female. p value 0.223, not significant.

A.B. Bhatti et al observed 26% of males and 22.9% of females were found to be had prolonged QTc with p value > 0.05, not significant. The LVEDD also not influenced by gender variation. In the present study mean LVEDD was 41.87 mm in male population and 39.19 mm in female population with the p value 0.237, not significant.

Conclusion

The frequency of QTc interval prolongation was statistically significant with worsening of child Pugh score. It indicates an association between QTc prolongation and the severity of cirrhosis. The QTc interval was linearly correlated with LVEDD. This indicates a relationship between electrophysiological problems and overloaded heart in cirrhosis patients. These two paraclinical parameters the QTc interval and LVEDD were linearly correlated with worsening child Pugh score. There was no significant correlation between gender and prolonged QTc or LVEDD. There was no significant correlation between different etiology for cirrhosis and frequency of prolonged QTc interval.

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