



TWO DIMENSIONAL SPECKLE TRACKING ECHOCARDIOGRAPHIC ABNORMALITIES IN CHRONIC LIVER DISEASE & ITS CORRELATION USING MODEL FOR END STAGE LIVER DISEASE (MELD) SCORE

Gastroenterology

Sandeep Jindal	Post Graduate in Department of Medical Gastroenterology, Chettinad Hospital and Research Institute, Kelambakkam, Kanchipuram Dist, Chennai-603103
Babu Kumar Shanmugam*	Associate Professor, Department of Medical Gastroenterology, Chettinad Hospital and Research Institute, Kelambakkam, Kanchipuram Dist, Chennai-603103 *Corresponding Author
M. Chokkalingam	Professor, Department of Cardiology, Chettinad Hospital and Research Institute, Kelambakkam, Kanchipuram Dist, Chennai-603103
T. Pugazhendhi	Professor, Department of Medical Gastroenterology, Chettinad Hospital and Research Institute, Kelambakkam, Kanchipuram Dist, Chennai-603103

ABSTRACT

Introduction: Chronic liver disease is defined as hepatic parenchymal injury and fibrosis which is associated with development of regenerative nodules

Materials and Methods: 50 patients of chronic liver disease without any intrinsic cardiopulmonary disease enrolled in the study. All the patients subjected to the Routine Investigation, LFT, UGI Endoscopy, ECG, Ultrasound Abdomen, and Speckle Tracking Echocardiography. The patients were divided in two groups according to their MELD score and group A was MELD <10.5 and group B MELD >10.5.

Results: Mean longitudinal strain and strain rate between group A and B was statistically significant (P Value <0.001). Mean circumferential strain and strain rate between group A and B was statistically significant (P Value <0.001).

Conclusion: Higher the MELD score, higher the longitudinal and circumferential strain and strain rate. Speckle Tracking Echocardiography is an important tool to assess the subclinical left ventricular dysfunction in chronic liver disease.

KEYWORDS

longitudinal strain (Ls), longitudinal strain rate (LsR), Circumferential strain (Cs), Circumferential strain rate (CsR)

INTRODUCTION:

Chronic liver disease is defined as hepatic parenchymal injury and fibrosis which is associated with development of regenerative nodules⁽¹⁾ These features result from number of factors like necrosis of the hepatocyte, vascular bed distortion and nodular restoration of residual hepatic parenchyma^(2,3) Cardiac dysfunction are often unnoticed because of Gastroenterologist are concern about the liver, and cardiologist about the heart.

METHODOLOGY:

Longitudinal and circumferential strain and strain rate values were obtained by speckle-tracking Imaging analysis of LV.

Study Population:

- 50 Patients with chronic liver disease hospitalized between May 2017 and May 2018 at the Chettinad Hospital and Research Institute were included in the study. An informed consent for the study was obtained from the patients.
- **Inclusion criteria:** All patients aged above 18 years and diagnosed with chronic liver disease via clinical, laboratory and imaging findings.
- **Exclusion criteria**
- Patients with systemic hypertension, history of heart disease (valvular and ischemic), New York Heart Association class III-IV heart failure, pericarditis or massive pericardial effusion, cardiac rhythm anomalies
- Patients with hepatic encephalopathy, active upper gastrointestinal bleeding.
- Bed ridden patients for more than one month.
- Severe Anemia, Thyroid disorders and Pregnancy.

Study Group:

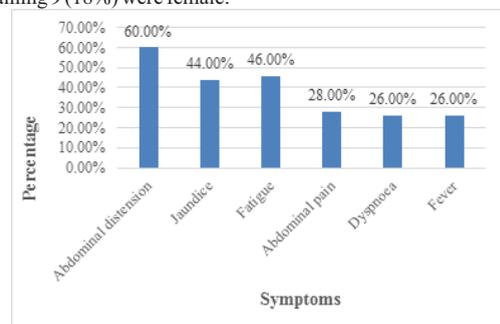
The patients were divided in two groups according to their MELD score and group A was MELD <10.5 and group B MELD >10.5 .All patients underwent routine investigation, TSH, X-ray chest, UGI endoscopy, ultrasound abdomen and speckle tracking echocardiography.

Statistical Methods: The comparison between MELD score group and strain parameters was assessed by comparing the median values. Mann Whitney U test was used to assess statistical significance. The

Association between quantitative MELD echocardiographic parameters was assessed by calculating spearman rank correlation coefficient (r_s) and the data was represented in a scatter diagram. P value < 0.05 was considered statistically significant. IBM SPSS version 22 was used for statistical analysis.

RESULTS:

Among the study population male participants were 41 (82%) remaining 9 (18%) were female.



The majority of the 30 (60%) participants had abdominal distention followed by jaundice, fatigue, abdominal pain, dyspnoea and fever was 22(44.00%), 23 (46.00%), 14 (28.00%), 13 (26.00%) and 13 (26.00%) respectively.

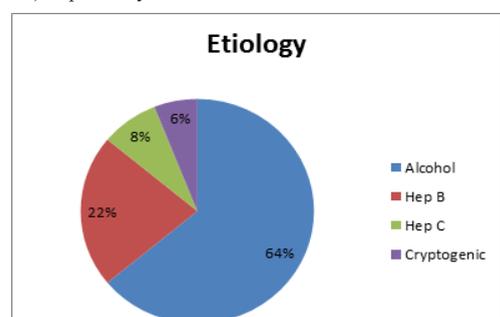


Figure 2: Pie chart of Etiology in the study population (N=50)

Among the study population, 32 (64%) participants were alcohol, 11(22%) participants are hepatitis B, 4 (8%) participants are hepatitis C and cryptogenic 3 (6%). All participants had splenomegaly (100%), followed by Ascites, Palmar erythema, parotid swelling and Edema was 64.00%, 54.00%, 50.00% and 42.00% respectively.

The comparison of the strain pattern (longitudinal and circumferential) and the strain rate (longitudinal and circumferential) with MELD score showing in table 1.

Table 1: Comparison of strain parameters between the MELD score groups (N=50)

Strain Parameters	MELD score group		P value
	< 10.5 (Group A)	≥10.50 (Group B)	
Strain (%)			
• Longitudinal (Median IQR)	-21.61 ± 0.94	-19.32 ± 0.73	<0.001
• Circumferential (Median IQR)	-24.11 ± 1.15	-26.65 ± 1.37	<0.001
Strain Rate (l/s)			
• Longitudinal (Median IQR)	-1.22 ± 0.12	-1.08 ± 0.13	<0.001
• Circumferential (Median IQR)	-1.39 ± 0.08	-1.53 ± 0.16	0.002

DISCUSSION:

The progression of liver disease to chronicity (or cirrhosis) and further worsening with development of complications is mainly dependent on the duration of the disease and the etiology.^(4,5) Portal Hypertension is considered as one of the major complication which occurs with the progression of liver disease and results in an increased resistance for the portal blood flow⁽⁶⁾ Portal hypertension leads to formation of collaterals and shunts which are responsible for further manifestations^(7,8).

In our study 2STE findings, among the people with ,MELD score <10.50, the mean strain longitudinal (Ls) was -21.61 ± 0.94 and it was -19.32 ± 0.73 in people with MELD score ≥10.50. The difference in the Ls between MELD score group was statistically significant (P Value <0.001). Among the people with MELD score <10.50, the mean strain rate longitudinal (LsR) was -1.22 ± 0.12 and it was -1.08 ± 0.13 in people with meld score ≥10.50. The difference in the LsR between MELD score group was statistically significant (P Value <0.001). The best indicator of the dysfunction of the ventricle in the early stages is Ls and Lsr which correlates the fibrosis of myocardium. It means that MELD score is directly related to the myocardium damage. This finding also supported by the hammami et al.⁽⁹⁾

Among the people with MELD score <10.50, the mean strain Circumferential (Cs) was -24.11 ± 1.15 and it was -26.65 ± 1.37 in people with MELD score ≥10.50. The difference in the Cs between MELD score group was statistically significant (P Value <0.001). Among the people with MELD score <10.50, the mean strain rate circumferential (CsR) was -1.39 ± 0.08 and it was -1.53 ± 0.16 in people with MELD score ≥10.50. The difference in the (LsR) between MELD score group was statistically significant (P Value 0.002). These results are similar to the study conducted by the refik et al^(10,11).

The Longitudnal and circumferential rates affects early before the onset of the clinical symptoms and signs and detects the earliest changes in the heart and prevent the Cirrhotic cardiomyopathy. But in the earliest stages the myocardial function remains unaffected while the Longitudnal and circumferential rates were changed; this is due to the LV shows compensation to preserve the EF⁽¹²⁾.

CONCLUSION:

The most common etiology of chronic liver disease was alcohol. In our study, the common presentation was abdominal distension. Higher the MELD score, higher the longitudinal and circumferential strain and strain rate. Speckle Tracking Echocardiography is an important tool to assess the subclinical left ventricular dysfunction in chronic liver disease.

REFERENCES:

- In Faucu, Braunwald, Kasper, et al. editor. Harrison's Principles of Internal Medicine. 17th ed. McGraw-Hill; 2008; 1971-80
- M. Pozzi, S. Carugo, G. Boari et al., Evidence of functional and structural cardiac abnormalities in cirrhotic patients with and without ascites. Hepatology, vol. 26, no. 5, pg. 1131-1137, 1997.

- Y. Iwakiri and R. J. Groszmann. The hyperdynamic circulation of chronic liver diseases: from the patient to the molecule. Hepatology, vol. 43, no. 2, supplement 1, pp. S121-S131, 2006.
- Garcia-Pagán JC, Bosch J. Endoscopic band ligation in the treatment of portal hypertension. Nat Clin Pract Gastroenterol Hepatol 2005; 2:526-535.
- Hanekom L, Cho GY, Leano R, Jeffriess L, Marwick TH. Comparison of two-dimensional speckle and tissue Doppler strain measurement during dobutamine stress echocardiography: an angiographic correlation. Eur Heart J 2007; 28: 1765-1772.
- Karsan HA, Morton SC, Shekelle PG, Spiegel BM, Suttrop MJ, et al . Combination endoscopic band ligation and sclero-therapy compared with endoscopic band ligation alone for the secondary prophylaxis of esophageal variceal hemorrhage: a meta-analysis. Dig Dis Sci 2005; 50:399-406.
- Bolondi L, Gaiani S, Gebel M. Portohepatic vascular pathology and liver disease: diagnosis and monitoring. Eur J Ultrasound 1998; 7: 3:S41-S52.
- Pritchett AM, Mahoney DW, Jacobsen SJ, Rodeheffer RJ, KaronBL, Redfield MM. Diastolic dysfunction and left atrial volume: apopulation-based study. J Am Coll Cardiology 2005; 45: 87-92
- Hammami R, Boudabbous M, Jdidi J, Trabelsi F et al. Cardiac cardiomyopathy: is there any correlation between the stage of cardiac impairment and the severity of liver disease. Libyan journal of medicine 2017;12:1-7
- Refik EA, Burcu C, Mustafa SK, Deniz O, Necmi D, Ibrahim D. Evaluation of subclinical systolic dysfunction using two dimensional speckle tracking echocardiography in patients with non alcoholic cirrhosis. Hellenic journal of cardiology. 2013;11:402-410
- Teske AJ, De Boeck BW, Melman PG, Sieswerda GT, Doevendans PA, Cramer MJ. Echocardiographic quantification of myocardial function using tissue deformation imaging, a guide to image acquisition and analysis using tissue Doppler and speckle tracking. Cardiovascular Ultrasound. 2007; 5: 27
- Safwat AH, Yaser EL S, Mostafa I, Mohammed A, Abdallah H. Evaluation of cardiac functions in patients with liver cirrhosis by conventional and 2 dimensional speckle tracking echocardiography. New york science journal.. 2016;9(12):13-16