Original Article

Radiological Feature of Hepatic Cirrhosis in Hepatitis "C" in Pakistan; Our experience at Department of Radiology, Services Institute of Medical Sciences

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Objects: To evaluate the accuracy of liver fibrosis stage by utilizing the techniques of advanced ultrasound performance in patients with chronic liver disease with Hepatitis C.

Material and Method: This cross-sectional study was prospectively designed by including 101 consecutive patients with a diagnosis of chronic liver disease including liver cirrhosis between January and December 2010. The ultrasound score was determined from both hepatic lobes and the average scoring was calculated for liver edge, liver surface and liver parenchymal texture. A score of 0 was given when no abnormality was observed; score 1 for mild abnormality; score of 2 for moderate abnormality; and a score of 3 for severe abnormality. Scoring was given for a blunted edge and severe irregular surface or a highly coarse texture only when these characteristics were clearly confirmed by the low frequency probe.

Results: Out of 101 subjects, 63.4 % were male and 36.6 % were female with age range of.23-70 years (mean age 50.73 years SD +/- 10). 17.8 % subjects were between age group 20-40 years, 67.3 % between age group 41- 60 years and 14.9 % between 61 years and above. Mean duration of illness was 2.86 years (minimum 1 year and maximum 15 years). Mean liver size was 12.261 with SD + 2.7145. Mean portal vein size was 1.662 SD + 2.3247. Mean spleen size was 71.71 SD + 32.226. 62.4 % had splenomegaly, 66.3 % had ascites, 56.4 % had bruising and bleeding, 62.4% had varices. 20.8 % had sharp edge 48.5 % had mildly blunted edge and 30.7 % had blunt edge, 11.9% had smooth edge. 33.7% had mildly irregular edge, 39.6 % had irregular edge and 14.9 % had highly irregular edge. Regarding liver parenchymal structure 13.9 % had fine , 22.8 % had mildly coarse, 48.5 had coarse and 14.9 % had highly coarse liver parenchymal structure.15.8 % of subjects had mild fibrosis (score 0 -2) , 55.4 % had moderate fibrosis (score 3 -5) , 28.7 % had severe fibrosis (score 6 -8).

Conclusion: US scoring system is clinically useful for differentiating patients with minimal or no fibrosis from those with mild to severe fibrosis. This is also useful for prognostic information and determining the optimal therapeutic options during the follow-up of chronic liver disease.

Keywords: Liver fibrosis, hepatitis C, ultrasound.

Introduction

The liver fibrosis stage in patients with chronic liver diseases due to an infection with hepatitis B virus (HBV) or C virus (HCV) is a pivotal factor regarding both the therapeutic options and for predicting the prognosis. A liver biopsy is considered to be the gold standard for diagnosing the liver fibrosis stage and predicting the outcome of the diseases. Although a percutaneous liver biopsy is relatively safe, it is still associated with a risk of complications, patient discomfort and a high cost. In addition, liver biopsy examinations may lead to false negative results due to inadequate liver tissue sampling. Therefore, there is a need to develop a simple, reliable and non-invasive modality in order to assess the liver fibrosis stage.[1]

Ultrasound (US) is a non-invasive, inexpensive and repeatable modality and has been used as the most important and valuable diagnostic tool for detecting hepatocellular carcinoma (HCC) during the follow-up of patients with viral hepatitis.[2,3] US is also used for monitoring the response of HCC to treatment.

An ultrasound evaluation of the liver fibrosis stage of chronic liver disease has been performed by assessing various ultrasound factors such as the liver size, the bluntness of the liver edge, the coarseness of the liver parenchyma, nodularity of the liver surface, the size of the lymph nodes around the hepatic artery, the irregularity and narrowness of the inferior vena cava, portal vein velocity or spleen size.[1,48] However, the conventional definition of the fibrosis stage of the liver based on evaluation of these ultrasound factors is imperfect and lacks accuracy and reliability.

Furthermore, these findings also depend largely on the equipment used.[8] Indeed, a few reports have demonstrated no consistent correlation between the grey scale ultrasound findings and the histological findings, thus claiming that greyscale US is unreliable for grading and staging the degree of liver damage.[9] However, recent advances in US technology have improved the diagnostic accuracy for fibrosis in patients with chronic liver disease.

Therefore, we carried out a study to evaluate the accuracy of the liver fibrosis stage by utilizing the techniques of advanced ultrasound performance in 101 patients with chronic liver disease with Hepatitis C.

Patients and Methods

Study setting: Department of radiology Services Institute of Medical Sciences.

Study Design: Cross sectional study

Study Duration: One year

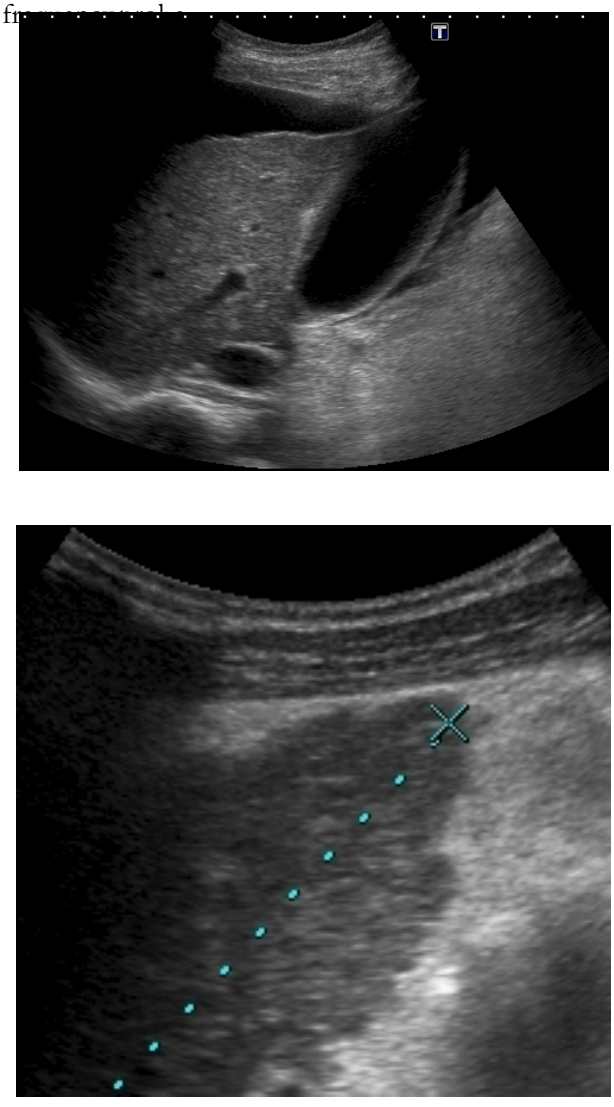
Sample size: 100 subjects with hepatitis C were included in the study.

Sampling technique: Non probability convenient sampling

Data Collection Procedure:

This cross-sectional study was prospectively designed. 101 consecutive patients with a diagnosis of chronic liver disease including liver cirrhosis at SIMS between January and December 2010 were included. The inclusion criteria were as follows: (a) history of chronic liver disease, based on the detection of persistently high levels of amino-transferase; (b) an presence of clinical and/or biochemical signs of decompensated liver diseases (jaundice, ascites or encephalopathy); and (c) no previous histo pathological diagnosis. The patients were studied ultrasonically using a real-time apparatus Toshiba Xario (SSA 660A; Tokyo, Japan) with 3.5 MHz convex array transducer C52 (low frequency probe) and a 512 MHz convex array transducer L125 (high frequency probe).

The ultrasound examinations were done by a certified specialist on static B-mode imaging. The US score was determined from the right and left lobes and the average score for each parameter was calculated as follows: (1) liver edge: score 0 for sharp; score 1 for mildly blunted; score 2 for blunted; (2) liver surface: score 0 for smooth; score 1 for mildly irregular; score 2 for irregular; score 3 for highly irregular; and (3) liver parenchymal texture score 0 for fine; score 1 for mildly coarse; score 2 for coarse; score 3 for highly coarse. A score of 0 was given when no abnormality was observed by a high frequency probe, score 1 was given when a mild abnormality was detected by a high frequency probe while it was undetected by the low frequency probe, a score of 2 was given when a moderate abnormality was detected by the low frequency probe, and a score of 3 was given when a severe abnormality was detected by the low frequency probe. A score of 2 was given for a blunted edge and a score 3 for severe irregular surface or a highly coarse texture when these characteristics were clearly confirmed by the low frequency probe.



(B)

Fig. (A). Transverse sonogram demonstrating various parameters of cirrhosis of liver (mildly blunted liver edge, irregular liver surface and coarse liver parenchymal texture). **(B).** Magnified view of left hepatic lobe for the confirmation of the average score for sonographic cirrhotic liver parameters.

Data Analysis Procedure:

Data was entered and analyzed in SPSS ver.17.0. Mean and SD was calculated for numerical variables, age, duration of illness, biochemical value of LFTs,. Frequency tabulation was done for sign and symptoms, and liver edge score and was presented as mild, moderate and severe fibrosis depending upon their cumulative score of liver parenchyma, surface and edge.

Results

101 subjects those fulfilling the inclusion criteria were included in our study. 63.4 % were male in our study and 36.6 % were female. Minimum age was 23 years and maximum age was 70 years with a mean age of respondents was 50.73 years SD + 10. 17.8 % of the respondents were between age group 20-40 years, 67.3 % of the respondents were between age group 41- 60 years and 14.9 % of the respondents were between age group 61 years and above. Mean duration of illness was 2.86 years with minimum duration of one year and a maximum duration of 15 years. Mean serum bilirubin level was 2.96 SD + 3.7904 with minimum value of .20 to maximum of 19.30. Mean serum AP level was 182.57 SD + 160.976 with minimum value of .20 to maximum of 19.30. Mean serum ALT level was 60.02 SD + 52.961 with minimum value of 10 to maximum of 305. . Mean serum AST level was 60.07 SD + 34.352 with minimum value of 23 to maximum of 228 IU. Mean serum Albumen level was 4.378 SD + 160.976 with minimum value of 1.8 to maximum of 15.0 mg/dl. Mean liver size was 12.261 with SD + 2.7145 with minimum 1.2 and maximum 18.3. Mean portal vein size was 1.662 SD + 2.3247 minimum of 1.0 and maximum of 16.8. Mean spleen size was 71.71 SD + 32.226 with a minimum of 4 and a maximum of 176.

62.4 % had splenomegaly, 66.3 % had Ascites, 56.4 % had bruising and bleeding, 62.4% had varices. 40.6 % had jaundice, 46.5 % had hepatic encephalopathy. 20.8 % had sharp edge 48.5 % had mildly blunted edge and 30.7 % had blunt edge, 11.9% had smooth edge. 33.7% had mildly irregular edge, 39.6 % had irregular edge and 14.9 % had highly irregular edge. Regarding liver parenchymal structure 13.9 % had fine , 22.8 % had mildly coarse, 48.5 had coarse and 14.9 % had highly coarse liver parenchymal structure.15.8 % of subjects had mild fibrosis (score 0 -2) , 55.4 % had moderate fibrosis (score 3 -5) , 28.7 % had severe fibrosis (score 6 -8)

Table-1: Demographic and clinical profile of cases with scoring.

Variable	Frequency	Percent
Gender of subjects		
Male	64	63.4
Gender of subjects	37	36.6
Age of subjects	**Mean 50.73 SD+10.207**	
20-40 years	18	17.4
41-60 Years	68	67.3
61 years and above	15	14.9
Sign and symptoms		
Splenomagaly	63	62.4
Accites	67	66.3
Bruising and bleeding	57	56.4
Varice	63	62.4
Jaundice	41	40.6
Hepatic encephlogathy	47	46.5
Liver edge		
Sharp	21	20.8
Mildly blunted	49	48.5
Blunt edge	31	30.7
Liver surface		
Smooth	12	11.9
Mildly Irregular	34	33.7
Irregular	40	39.6
Highly irregular	15	14.9
Fine		
Mildly Coarse	14	13.9
Coarse	23	22.8
Highly Coarse	15	48.5
Male	37	14.9
Scoring		
Mild fibrosis (0-2)	16	15.8
Moderate fibrosis (2-5)	56	55.4
Sever fibrosis (6-8)	20	28.7

Discussion

Chronic liver diseases with viral infection manifest varying degrees of hepatic fibrosis ranging from no fibrosis to cirrhosis. Yoshida et al revealed that the

Annual incidence of hepatocellular carcinoma increased from 0.5% among patients with the stage F0 or F1 fibrosis to 7.9% among the patients with stage F4 fibrosis [13]. It has thus become increasingly apparent that the fibrosis stage is a key factor in defining the prognosis and management of chronic liver diseases with a viral infection. The gold standard in hepatology for the diagnosis of the fibrosis stage has been a histological liver evaluation based on specimens taken either by a needle biopsy or at operation. Recently, non-invasive and reliable assessments for monitoring chronic liver disease using the platelet counts[14-16] aspartate aminotransferase (AST)/alanine aminotransferase (ALT) ratio,[15,16] and serum hyaluronan and type III procollagen amino-terminal peptide[17] have been developed. However, none of the currently available tests or modalities can completely replace a histological analysis. Previous studies have assessed several methods for evaluating the fibrosis stage of chronic liver disease using various US parameters. However, there have so far been few studies concerning the accuracy in detecting the signs of compensated cirrhosis by US[5,18] Gaiani et al[5] and Hung et al[19] proposed a complex US scoring system using indices of the liver surface, parenchymal echogenecity, the vessel pattern, spleen size etc. to determine the fibrosis stage. In addition, recent advances in ultrasound technology have now made it possible to obtain more precise information about the liver surface, edge and parenchymal texture.[8] Our study attempt to assess the US scoring system with a newly developed US equipment based on the conventional parameters of the liver edge, surface and parenchymal texture might obtain sufficiently accurate results in comparison with the histological findings for fibrosis obtained by a liver biopsy. Our study found out 20.8 % had sharp edge 48.5 % had mildly blunted edge and 30.7 % had blunt edge, 11.9% had smooth edge. 33.7% had mildly irregular edge, 39.6 % had irregular edge and 14.9 % had highly irregular edge. The liver parenchymal structure was fine in 13.9 %, 22.8 % had mildly coarse, 48.5 had coarse and 14.9 % had highly coarse liver parenchymal structure.15.8 % of subjects had mild fibrosis (score 0-2) , 55.4 % had moderate fibrosis (score 3 -5) , 28.7 % had severe fibrosis (score 6 -8)

With conventional US, the liver surface has been most commonly utilized as a sole indicator for the diagnosis of cirrhosis.[5,20,22] However, numerous papers have reported that the sole factor of the liver surface can not sufficiently distinguish cirrhosis from chronic hepatitis. Gaiani et al confirmed that the stage of cirrhosis may be underestimated when based on a single specimen and clarified that only two US variables, namely liver surface nodularity and the portal vein mean flow velocity, independently contributed to the diagnosis of cirrhosis.[5]

An irregular and nodular liver surface may be easily assessed in patients with decompensated liver cirrhosis, particularly in the case of ascites, and it has been observed in 88% of unselected patients with cirrhosis [20]. Gaiani et al reported the findings of a US scoring system, based on the liver, spleen and portal vein features, which identified cirrhosis in 82.2% of the cases [5]. In our study, 20.8 % had sharp edge 48.5 % had mildly blunted edge and 30.7 % had blunt edge, 11.9% had smooth edge. 33.7% had mildly irregular edge, 39.6 % had irregular edge and 14.9 % had highly irregular edge.

Although our study was limited on account of the relatively small number of patients due to the strict inclusion criteria but our scoring system for correctly predicting cirrhosis was found to be very accurate and the score proposed in our study is easy to obtain and can be applied in every ultrasound laboratory by utilizing regular commercially available US equipment. Our scoring system based on three parameters such as the liver edge, surface and parenchymal texture was able to accurately predict the fibrosis stage (correlation coefficient of 0.9524), especially when distinguishing chronic hepatitis from compensated liver cirrhosis.

Conclusion

The study demonstrated that US scoring system is clinically useful for differentiating patients who have chronic liver disease with minimal or no fibrosis from those with mild to severe fibrosis. These parameters may also be useful for providing prognostic information and also for determining the optimal therapeutic options during the follow-up of patients with chronic liver disease, especially in patients with chronic hepatitis C. .

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