

Diagnosis of Hepatoma Using Grey Scale and Doppler Ultrasound in Patient with Chronic Liver Disease

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ABSTRACT

Aim: To assess the efficacy of the greyscale and Doppler ultrasound in the diagnosis of hepatoma in chronic liver disease patients.

Study Design: Prospective study.

Place and duration of study: Department of Radiology, Jinnah Postgraduate Medical Centre Karachi from 1st October 2021 to 30th June 2022.

Methodology: One hundred and twenty patients who were diagnosed with chronic liver diseases and were suspected of hepatocellular carcinoma were included in this study. Ultrasonography was conducted under grey scale Doppler scanning in each patient after 6 hours of fasting at 3-6 megahertz with a curvilinear probe in supine as well as oblique position. Sensitivity, specificity as well as the predictive value of the image formed through the ultrasonography machine was assessed.

Results: The age of the patients was 46.5±6.5 years and there were 78 (65%) males whereas 42 (35%) were females. On the grey scale Doppler scan, there was 53% of cases seen confirmed for the presence of hepatoma. The sensitivity and specificity were observed in 65% and 85% of the grey scale Doppler ultrasonography while the positive predictive value was 92% respectively.

Conclusion: Greyscale Doppler scan is an efficient and reliable method for the detection of hepatoma and can be used in clinically confirmed cases of chronic liver disease as a screening tool.

Keywords: Hepatoma, Greyscale, Doppler ultrasound, Chronic liver disease

INTRODUCTION

Chronic liver disease (CLD) is caused for various reasons, including hepatitis, carcinoma, or liver-related infections. One such reason for CLD is hepatocellular carcinoma (HCC), which can be life-threatening. It requires urgent treatment for life expectancy and quality treatment. There is a high risk of hepatocellular carcinoma in HCC cases. Screening is required for a better evaluation of the condition and timely management¹⁻³.

Ultrasonography (USG) is one of the safest methods for the identification of any lesions as well as various anomalies and changes in body organs related to their morphology as well as consistency. It is a safe and cost-effective process because it does not use radiation. With the advancement of scientific research, there has been much advancement in ultrasound methods and techniques, with the involvement of new three-dimensional scanning and Doppler scans⁴⁻⁶.

The Doppler scans provide colour as well as grayscale images for the identification and diagnosis of various conditions. The incidence of HCC is rising in both developed and developing countries. The incidence of HCC in Pakistan is 0.00008/year with a prevalence of around 4%. The accurate detection of hepatoma formation is a confirmation of HCC in CLD cases. The identification of hepatoma is difficult and requires various tests. Ultrasonography has been used as one of the modes for detection. Accurate detection of HCC is critically important for disease management and proper treatment⁷⁻⁹.

Various studies have reported the sensitivity of USG as 60–85% in HCC cases. Although triphasic computed tomography has higher sensitivity and specificity, it may be contraindicated in some cases due to high radiation levels and the required high cost and cumbersome process¹⁰. The present study was designed to assess the efficiency of a grey-scale Doppler scan in detecting hepatoma in CLD-confirmed cases. The results of this study provided substantial data for assessing the sensitivity of the method for proper screening and diagnosis of hepatoma in CLD patients.

MATERIALS AND METHODS

This prospective study was conducted at the Department of Radiology, Jinnah Postgraduate Medical Centre Karachi from 1st October 2021 to 30th June 2022, and 120 cases were enrolled. This sample size was calculated through the WHO sample size calculator and required 80% power of test and 95% Confidence interval. The patients who were diagnosed with chronic liver diseases and were suspected of hepatocellular carcinoma were included in this study. Those cases who were referred due to lesion presence <3cm appearance in hypoechoic characteristics and were not having posterior enhancement were included in the study. Other cases like variable lesion size with heterogenous echogenicity, diffused-infiltrating lesions with irregular margins as well as lesions with pseudo-capsule or protruding mass below the liver surface as well as compression /displacement of the intra-hepatic blood vessels were also included in the study. Those patients who were already confirmed for hepatoma were not included in this study. Ultrasonography was conducted under grey scale Doppler scanning in each patient after 6 hours of fasting at 3-6 megahertz with a curvilinear probe in supine as well as oblique position. Ultrasonography was conducted under grey scale Doppler scanning in each patient. Prints of the images were taken and saved. An analysis of grey scale Doppler ultrasound was done. Sensitivity, specificity as well as the predictive value of the image formed through the ultrasonography machine was assessed. All the data of the patients and their clinical records were recorded. Data analysis was conducted through SPSS version 26.0 using the chi-square test and a P value <0.05 was taken significantly.

RESULTS

The mean age was 46.5±6.5 years with 78(65%) cases of males and 42(35%) females. The age distribution presented a range between 32 years to 71 years (Table 1). On the grey scale Doppler scan, there were 53% of cases seen confirmed the presence of hepatoma. Intravascular displacement was also present in 26% of the cases. Out of the total cases, 47% were not diagnosed and confirmed for hepatoma through ultrasound (Fig. 1).

These positive cases confirmed through greyscale Doppler ultrasound were further confirmed through histopathological analysis as well as through serum alpha-fetoprotein level and or Triphasic-computed tomography scan. Within positive USG hepatoma cases, there was 92.1% of cases also got positive confirmation through histopathology. Within the positive cases, a

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heterogeneous lesion was seen in 51.6% of cases with the most common presentation of a lesion >5cm. There were 7.81% of cases that were reported as false positive with 60% those with metastases and 405 having hemangiomas. Within the patients reported negative for hepatoma on USG hepatoma was identified in 55.2% whereas the rest only had CLD changes through other confirmatory tests (Table 2).

The occurrence of the pseudo capsule was a common outcome in cases that were true positive and was observed in 50% of the patients. The sensitivity and specificity were observed in 65% and 85% of the Greyscale Doppler ultrasonography while the positive predictive value was 92% respectively (Fig. 2)

Table 1: Distribution of age and gender within cases (n=120)

Variable	No.	%age
Age (years)	46.5±6.5	
Gender		
Males	78	65.0
Females	42	35.0

Table 2: Hepatoma confirmation through Grey Scale Doppler scan (n=120)

Variable	No.	%age
Doppler Identified Hepatoma		
Yes	64	53.3
No	58	46.7
Within Yes Hepatoma on USG		
Heterogeneous lesion	33	51.6
Histopathology confirmed	59	92.1
False positive	5	7.81
Among false-positive cases		
Metastatic Disease	3	60.0
Hemangiomas	2	40.0
Within No Hepatoma on USG		
Hepatoma found	32	55.2
CLD changes	26	44.8

Fig. 1: Frequency of positive cases of hepatoma through ultrasound

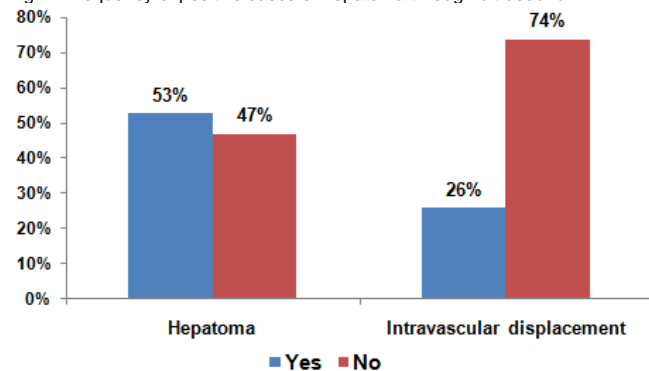
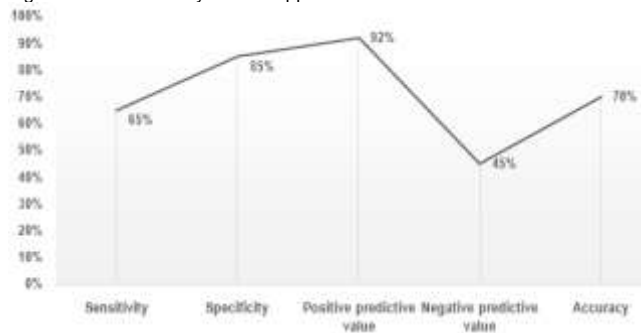


Fig. 2: Features of Grey Scale Doppler Scan



DISCUSSION

Chronic liver disease is related to various complications and leads to life-threatening conditions. One of the most common complications of CLD is hepatocellular carcinoma (HCC). The

analysis and surveillance of patients suffering from HCC are very important for their early diagnosis and treatment. There is an increased risk of hepatoma cases. Hepatoma is a primary liver carcinoma that is lethal and requires an urgent treatment plan. There are various screening methods for hepatoma¹¹⁻¹⁴.

The present study analysed and assessed the grey scale and Doppler scan for their efficacy in identifying hepatoma. Many other studies have been conducted on the same topic, with ultrasound being a relatively faster and noninvasive procedure. The present study enrolled both males and females, with the majority being males suffering from CLD and suspected of HCC. Other studies in the same field have presented data that is similar to the current study's findings¹⁵⁻¹⁷.

The specificity of this method as presented in this study was 85%, while USG accuracy was reported at 70%, suggesting a high reliability value for the method. International research has also reported a grey-scale Doppler ultrasound specificity of 96%, which is significantly higher than that reported in this study but still relevant^{18,19} Farooqi et al²⁰ have also documented the specificity of the gray-scale Doppler scan as 67.89%. Therefore, these results suggest similar findings as the current study: that in developing countries where affordability of the test is a major issue, grey-scale Doppler ultrasound scan can be a reliable source for the identification of hepatoma in chronic liver disease patients. This test seems to provide a reliable positive predictive value with higher specificity against hepatoma detection²⁰.

CONCLUSION

The greyscale Doppler scan is an efficient and reliable method for the detection of hepatoma and can be used in clinically confirmed cases of chronic liver disease as a screening tool.

Conflict of interest: Nothing to declare

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