



ACCURACY OF ULTRASOUND IN DETECTION OF HEPATOCELLULAR CARCINOMA IN CIRRHOTIC PATIENTS.

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ABSTRACT... Objectives: Evaluate the accuracy of ultrasonography in the diagnosis of hepatocellular carcinoma among cirrhotic patients by comparing it with contrast enhanced multiphasic MRI. **Study Design:** Cross sectional study. **Setting:** Radiology Department through OPD\Admitted\emergency, Allied Hospital, Faisalabad. **Period:** 01-01-2018 to 30-06-2018. **Material & Methods:** A total of 91 cases, having symptoms of fatigue, weakness, vomiting, nausea, loss of appetite, abdominal pain, weight loss and bloating when the fluid is accumulated in abdominal cavity, itching, spider-like blood vessels on the skin were included in the study. Informed written consent was taken from all the patients or their next of kin after explaining the procedure, objectives and benefits of study. All the patients were examined with Conventional gray scale ultrasound using curvilinear probe of 5MHz and then with 1.5 tesla MR imager. **Results:** The diagnostic accuracy was computed as 42.86%(n=39) as true positive, 1.10%(n=1) as false positive, 49.45%(n=45) false negative and 6.59%(n=6) had true negative, while 46.43%(sensitivity), 85.71%(specificity), 97.5%(positive predictive value), 88.24%(negative predictive value), and 49.45%(diagnostic accuracy) were calculated. **Conclusion:** We concluded that the accuracy of ultrasonography for the diagnosis of hepatocellular carcinoma among cirrhotic patients by comparing it with contrast enhanced multiphasic MRI is in agreement with the previous studies, though its accuracy rate is lower but specificity is significantly higher and recommended in our country in low resource settings and tertiary care setups where diagnostic facilities are limited functional.

Key words: Cirrhotic Patients, Diagnostic Accuracy, Hepatocellular Carcinoma, Ultrasonography.

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INTRODUCTION

Primary liver malignancies are recorded with a dramatic increase in last 20 years, similar to hepatocellular carcinoma (HCC) being a common liver tumor worldwide. Now, HCC is considered as the commonest cause of cancer death all over the world.¹ Early and appropriate management of this morbidity is based on early detection. Hepatobiliary MRI is known as a useful technique while evaluating regenerating and dysplastic nodules. Various authors²⁻³ are of the view that MRI is better than CT for detection and characterization of focal lesions. However, MRI has emerged as a useful diagnostic modality for evaluation of cirrhosis and its associated complications. Faster sequences and automated contrast detection allow reproducible capture of

arterial phase, being essential for detection and characterization of HCC.⁴

Multiphasic dynamic gadolinium contrast enhanced T1 W in hepatic arterial, portal venous and delayed phases improve the detection and characterization of lesions, particularly small HCC, and they are superior to multiphasic helical CT.² T₂-weighted MRI is crucial in differentiating HCC'S from pre-malignant or borderline lesions in cirrhosis and serves as a tie breaker for small early-enhancing lesions. Gadolinium-enhanced MRI has advantages over contrast-enhanced CT: greater contrast enhancement, smaller volume of contrast, and less frequent adverse reactions. Double hepatic arterial-phase imaging has been performed in may center, allowing

less frequent off-timing arterial-phase imaging and improved temporary resolution.³ In addition, use of tissue-specific contrast agents such as super paramagnetic iron oxide, allows improved detection and characterization of liver tumours.^{5,6} Frequency of HCC in cirrhotic patients using contrast enhance multiphasic MRI is 96%.⁷⁻⁸ Frequency of HCC detection using US has been reported to be between 38%-63.9%.⁹

The rationale of this study to utilize the contrast enhanced multiphasic MRI as an early diagnostic tool for HCC in patients with cirrhosis of liver, so that different treatment options like resection, transplantation, tumor ablation and chemo-embolization can be offered to the patients at the early stage of disease. This study is thus being carried out to determine the accuracy of US in HCC. If this is found to be accurate then this may be used in low resource settings as well as in many tertiary care setups where there are limited functional diagnostic facilities.

METHODOLOGY

The study protocol was been approved by hospital ethical committee. Cirrhotic patients presenting in Radiology department through OPD\Admitted\ emergency having symptoms of fatigue, weakness, vomiting, nausea, loss of appetite, abdominal pain, weight loss and bloating when the fluid is accumulated in abdominal cavity, itching, spider-like blood vessels on the skin was included in the study. Informed written consent was taken from all the patients or their next of kin after explaining the procedure, objectives and benefits of study.

All the patients were examined with Conventional gray scale ultrasound using curvilinear probe of 5MHz and then with 1.5 tesla MR imager. Multiphasic contrast enhance MRI liver was included breadth hold Turbo spin echo sequences acquired before the contrast injection as well as post contrast sequences in the arterial phase, portal venous phase and delayed phase. Sense body coil was used for MRI examination. MRI protocol included T1 Weighted, T2 Weighted and fat suppression images in transverse and coronal plane having 5mm slice thickness, slice gap of

1mm, flip angle 75 degrees, reconstruction matrix of 512, voxel size 0.74mm, element selection 1234 and TR and TE were taken shortest in T1 Weighted images and fat suppression images and longest in T2 Weighted images. The conventional USG and Multiphasic MRI examination of liver was performed in the radiology department and I interpreted it for reporting under supervision of consultant radiologist. Frequency and % were calculated for gender and hepatocellular carcinoma on US & multiphasic MRI & True positives. All the data was presented in the form of tables.

RESULTS

Age distribution of the patients was done which shows that 23.08% (n=21) were between 15-30 years, 41.76% (n=38) between 31-60 years and 35.16% (n=32) were between 61-80 years of age, mean±sd was calculated as 46.98±5.62 years. Gender distribution of the patients was done which shows that 70.33% (n=64) were male and 29.67% (n=27) were females.

Frequency of hepatocellular carcinoma on multiphasic MRI reveals 92.31% (n=84) patients with positive hepatocellular carcinoma while 7.69% (n=7) has no findings of HCC. (Table No. I)

Age(in years)	No. of patients	%
15-30	21	23.08
31-60	38	41.76
61-80	32	35.16
Total	91	100

Table-I. Age distribution (n=91)
Mean±sd:46.98±5.62

Gender distribution of the patients was done which shows that 70.33%(n=64) were male and 29.67%(n=27) were females. (Table No. II)

Gender	No. of patients	%
Male	64	70.33
Female	27	29.67
Total	91	100

Table-II. Gender distribution (n=91)

In Table III, diagnostic accuracy was computed as 42.86%(n=39) as true positive, 1.10%(n=1) as false positive, 49.45%(n=45) false negative and 6.59%(n=6) had true negative, while 46.43%(sensitivity), 85.71%(specificity), 97.5%(positive predictive value), 88.24%(negative predictive value), and 49.45%(diagnostic accuracy) were calculated.

Ultrasound	MRI		Total
	Positive	Negative	
Positive	True positive(a) 39 (42.86%)	False positive (b) 1 (1.10%)	a + b 40(43.96%)
Negative	False negative(c) 45 (49.45%)	True negative (d) 6 (6.59%)	C + d 51(56.04%)
Total	a + c 84 (92.31%)	b + d 7(7.69%)	91(100%)

Table-III. Diagnostic accuracy of ultrasonography to detect hepatocellular carcinoma among cirrhotic patients (n=91)

Sensitivity = $a / (a + c) \times 100 = 46.43\%$
 Specificity = $d / (d + b) \times 100 = 85.71\%$
 Positive predictive value = $a / (a + b) \times 100 = 97.5\%$
 Negative predictive value = $d / (d + c) \times 100 = 88.24\%$
 Accuracy rate = $a + d / (a + d + b + c) \times 100 = 49.45\%$

DISCUSSION

We planned this study with the view to determine the accuracy of US in HCC. If this is found to be accurate then this may be used in low resource settings as well as in many tertiary care setups where there are limited functional diagnostic facilities.

In our study, 23.08%(n=21) were between 15-30 years, 41.76%(n=38) between 31-60 years and 35.16%(n=32) were between 61-80 years of age, mean+sd was calculated as 46.98±5.62 years, 70.33%(n=64) were male and 29.67%(n=27) were females, frequency of hepatocellular carcinoma on multiphasic MRI reveals 92.31%(n=84) patients with positive hepatocellular carcinoma while 7.69%(n=7) has no findings of HCC while diagnostic accuracy of ultrasonography to detect hepatocellular carcinoma among cirrhotic patients was computed as 42.86%(n=39) true positive, 1.10%(n=1) as false positive,

49.45%(n=45) false negative and 6.59%(n=6) had true negative, while 46.43%(sensitivity), 85.71%(specificity), 97.5%(positive predictive value), 88.24%(negative predictive value), and 49.45%(diagnostic accuracy) were calculated.

The other studies also confirmed that using USG for detection of HCC is in practiced with acceptable level of sensitivity i.e. 65-80% while the specificity is >90%.¹⁰⁻¹² The size of tumor is of significant effect while detecting HCC on US. The sensitivity ranges for 42% for the lesions ≤1cm¹³⁻¹⁴ to 95% for larger sized tumors.¹⁵ The sensitivity is poor when used for pre-transplant screening due to echotexture coarse of liver and the frequent presence of higher malignant lesions and frequent ascites in cases with end staged liver disease.¹⁶ A previous retrospective trial consisting of 200 cases undergoing liver transplantation within 12 weeks of last screening, the US scanning was recorded to be correlated with explanted livers, while the sensitivity was ranged from 13.5% to 50% of lesions between 1-5 cm of diameter.¹⁷ However, CT/MRI should be used in cases with liver transplant.¹⁸

In our study being the limitation of the study we did not differentiated the sensitivity according to the size of the lesion, however, it is recommended that in further trials the differentiation may be done to further authenticate the results of the study, on the hand, this technique may be used in low resource settings as well as in many tertiary care setups where there are limited functional diagnostic facilities as we recorded a higher specificity.

CONCLUSION






We concluded that the accuracy of ultrasonography for the diagnosis of hepatocellular carcinoma among cirrhotic patients by comparing it with contrast enhanced multiphasic MRI is in agreement with the previous studies, though its accuracy rate is lower but specificity is significantly higher and recommended in our country in low resource settings and tertiary care setups where diagnostic facilities are limited functional.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author(s) Full Name	Contribution to the paper	Author(s) Signature
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2	Rakhshanda Jabbar	Literature review.	
3	Owais Bin Qadeer	Collection of References.	
4	Nasira Parveen	Literature review.	
5	Fouzia Sultan	Literature review.	
6	Shakeel Ahmad	Literature review.	