DIAGNOSTIC ACCURACY OF TRIPLE PHASE COMPUTED TOMOGRAPHY IN DETECTING HEPATOCELLULAR CARCINOMA KEEPING HISTOPATHOLOGY AS GOLD STANDARD

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Abstract

Objective: The aim of this study is to determine the accuracy of triple phase computed tomography in detecting hepatocellular carcinoma keeping histopathalogical evaluation as gold standard.

Methods: This study was conducted in the in the Radiology Department of Khyber Teaching Hospital, Peshawar from 18-03-2016 to 18-09-2016. Through a comparative cross sectional study design, a total of 365 patients suspected of having HCC were included in the study in a consecutive manner and subjected to triphasic CT followed by histopathology for the confirmation of HCC.

Results: 40.9 $\pm$ 11.7 years was the mean age of patients. We had 60% males & 40% females. On CT we observed that the HCC was recorded in 60.3% of patients compared to 49.9% on histopathology. On applying the formulae for calculation, sensitivity of CT was found to be 90.1% and specificity 69.3%. The positive predictive value of the CT is 74.5% and negative predictive value is 87.5%.

Conclusion: Triphasic CT has shown high sensitivity and specificity for HCC detection. As such, it is a useful radiological marker for diagnosis of HCC in adults and further studies are recommended to confirm its usefulness.

Key Words: Hepatocellular Carcinoma, Triphasic computed tomography, ultrasound, histopathology, cirrhosis.

INTRODUCTION

Cirrhosis is the leading cause of Hepatocellular carcinoma (HCC).Its highest incidence is due hepatitis B virus, which is endemic in these regions. In Western countries increasing number of cases of HCC are emerging due to non-alcoholic fatty liver disease[1-4] . Hepatocellular Carcinoma (HCC) is a highly malignant tumour which shows early metastasis with resultant poor prognosis. HCC is third most common cause of death due to cancer and fifth common cancer worldwide. In developing countries its incidence is 35%. This is two to three times higher than the developed countries.[5]

Recently continuous increase in the rate of HCC is observed in Western countries of which 15–50% cases of HCC are due to cryptogenic etiology[6].Environmental and host genetic factors can increase the risk of HCC in HBV or HCV infected individuals[7].

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In cirrhotic liver HCC is the most common nodule. There is greater than 80% probability of HCC in cirrhotic liver if the size of nodule is greater than 2cm. This probability decreases to 50-75% if the size is less than 2cm[8-9] .

New technological advancement in computed tomography has resulted in rapid evaluation of liver lesion by triphasic imaging after contrast administration[10]. This has resulted in significant improved diagnosis and characterization of hepatic lesions[11]. Triphasic CT helps in evaluating hepatic lesions such as adenomas, focal nodular hyperplasia, hypervascular metastasis and HCC[12]. In triple phase CT images are acquired in arterial phase (HAP), portal venous phase (PVP) and delayed phase (DP) of liver which detects, characterize and diagnose HCC[13,14].

Recently CT perfusion technique is used to evaluate morphology and hemodynamic changes in tumour edges by using image mapping in multiparameters[15-16]. One study showed triple phase CT scan to be 89% sensitive and 97% specific in diagnosing HCC[17]. In another study, the sensitivity of triphasic CT scan in the HCC diagnosis was 78% with specificity of 73%[18]. Increased arterial phase enhancement of the tumour in comparison to surrounding liver parenchyma with washout of contrast i.e. hypo attenuation relative to surrounding liver parenchyma during hepatic venous phase are strong predictors of HCC[19] .

Our study is designed to evaluate the accuracy of triple phase CT in HCC diagnosis. HCC is not uncommon in our population and early diagnosis and management is very essential to improve prognosis. Our study will not only indicate the future outcome but also provide the local data which may help us to make strategies for all patients of hepatitis B & C for early detection of HCC.

MATERIALS AND METHODS

A cross sectional comparative study was done in Radiology Department Khyber Teaching Hospital, Peshawar from 18-03-2016 to 18-09-2016. 365 patients were included in our study. Sampling was done by non-probability consecutive method.

Inclusion Criteria

1. Age between 18 -70 years.
2. Both male and female.
3. Cirrhotic liver with mass.
4. Increased AFP levels.

Exclusion Criteria

1. Liver nodule <3 cm in size on USG.
2. Patients not willing for histopathology.

The above mentioned factors act as confounders and if not excluded can create bias in study.

Data Collection Procedure

Approval of the ethical committee of the hospital was sought. Patients that fulfilled the inclusion criteria were included in the study. Patients presenting in OPD with cirrhotic liver with mass on ultrasound were selected. All the patients included in the study were explained the purpose of procedure, data usage and study publication. Written informed consent was taken from the selected patients.

The demographic data was recorded. Thorough history was taken. The base line investigations as well specific investigations was done. Triple phase CT scan was performed as per international protocols by an expert radiologist having minimum of five years of experience. The patient was sent back to ward and liver biopsy was performed as per international protocols and the specimen was sent for histopathalogical evaluation in formalin to a histopathalogist having more than seven year experience to detect HCC.

Data was statistically analyzed by SPSS software version 20.

RESULTS

The study included 365 patients suspected of having HCC. The mean age of the patients was 40.9 $\pm$ 11.7 years. Minimum age of 21 years and maximum age of 59 years. On grouping the sample in different age groups, most of the patients were in the age group 50-60 years (30.7%), followed by 40-50years(25.2%). Mean age of patients was 40.9 years.

While distributing the patients with regards to gender, we observed that in our study 60% of the sample was male and 40% were female gender. (Table 2)

On Triphasic CT, we observed that the HCC was recorded in 60.3% of patients. (Table 3)

After biopsy, HCC on histopathology was recorded in 49.9% of patients. (Table 4).On applying the formulae for calculation, sensitivity of CT was found to be 90.1% and specificity69.3%. The positive predictive value of the CT is 74.5% and negative predictive value is 87.5%. (Table 5).

DISCUSSION

Curative treatment for HCC include surgical resection, local ablative therapy and liver transplantation. These show improved outcome if HCC is detected at an early stage. For this reason early HCC diagnosis, when it is small in size has become primary objective in imaging cirrhotic patients[20]. MDCT is non-invasive and safe alternative to histopathology of hepatic lesions. With advent of MDCT, diagnostic approach in patients with cirrhotic liver has revolutionized with accuracy of radiological diagnosis of HCC approaching 99.6%[21]. In a study conducted by Torzilli G. et al[21] and Ahirwar CP[22] et al CT showed high accuracy, sensitivity and specificity. In light of these results the use of biopsy should be limited for diagnosis of HCC. In situations where clinical, laboratory and radiological evaluations make diagnosis of HCC certain, biopsy of hepatic lesion need not be performed[23]. Cirrhotic patients with 1-2cm nodule revealing typical contrast enhancement pattern should be confidently labelled as HCC without need for fine needle biopsy[24].

In a study conducted by Nam CY et al[25] sensitivity of CT for HCC >2cm was 65% and 40% for lesion <2cm. In another study conducted by Addley HC et al reveal 65-75% sensitivity and 47-88% specificity for HCC with drop of sensitivity to 48-57% for lesions <2cm in

Table 1: Minimum, maximum and mean age (n=365)

	N	Minimum age (years)	Maximum age (years)	Mean age (years)	Std. Deviation
Age of the patient	365	21.00	59.00	40.9603	11.76699

Table 2: Gender-wise distribution of sample (n=365)

Gender	Frequency	Percent
Male	219	60.0
Female	146	40.0
Total	365	100.0

Table 3: Frequency of HCC on CT (n=365)

HCC on CT	Frequency	Percent
Positive	220	60.3
Negative	145	39.7
Total	365	100.0

Table 4: Frequency of HCC on histopathology (n=365)

HCC on Histopathology	Frequency	Percent
Positive	182	49.9
Negative	183	50.1
Total	365	100.0

Table 5: CT and histopathology 2x2 table (n=365)

		HCC on Histopathology		Total
		Positive	Negative	
HCC on CT	Positive	164	56	220
	Negative	18	127	145
Total		182	183	365

Sensitivity of CT: TP/TP + FN = 90.1%
Specificity of CT: TN/TN + FP = 69.3%
Positive Predictive Value CT: TP/TP + FP = 74.5%
Negative Predictive Value CT: TN/TN + FN = 87.5%

size[26].In present study, sample population is restricted to hepatic lesion equal to or greater than 3cm.

In our study sensitivity of CT was found to be 90.1% and specificity 69.3%. The positive predictive value of the CT is 74.5% and negative predictive value is 87.5%. These results are comparable to a local study by Hafeez M et al in which triphasic CT for HCC had accuracy of 96.4%, sensitivity of 96.5% and specificity of 97.1%[27]. A study by Dova Madhavi has showed slightly better results for malignant lesion characterization by triple phase CT, including HCC[28]. In our study the patients' mean age was 40.9±11.7 years which is comparable with study by Hafeez M.et al[27]. In our study 60% of the sample was male and 40% were female gender which is comparable with the research of Abbas Z in which there were 78% male and 21% female patients[29]. This is also comparable to study by Garg I et al in which 31.6% were female and 68.4% were male[30].

One of the limitations of our study is limited study population. This was a cross sectional study carried out in a single hospital. The patients were not followed to assess the prognosis. Thus to confirm our results, a randomized control trial should be carried out on patients from different hospitals in future.

CONCLUSION

Triphasic CT is highly specific and sensitive tool for the diagnosis of HCC. It is cheap, readily available and non-invasive imaging modality. It has potential to replace histopathalogical determination of HCC therapy avoiding possible complications related to biopsy.

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