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CT-Scan Findings of Hepatic Mass Patients Attending at a Tertiary Care Hospital in Bangladesh

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Abstract

Background: CT-scan is a very useful diagnostic tool for the detection of hepatic mass. Objective: The present study was undertaken to determine the CT-scan findings of benign and malignant hepatic mass patients. Methodology: This was a cross sectional study conducted in Radiology and Imaging Department at Mymensingh Medical College Hospital (MMCH), Mymensingh; Dhaka Medical College Hospital (DMCH), Dhaka and Banghabandhu Sheikh Mujib Medical University (BSMMU), Dhaka with the collaboration of Pathology Department of the same institute for histopathological confirmation. This study was carried out from January 2006 to December 2007 for a period of 2 years. The patients who were clinically suspected of having hepatic mass attended in the Radiology and Imaging Department in the above mentioned institutes were included as study population. All the CT-scan findings were recorded. Result: A total number of 50 patients were enrolled for this study. CT-scan was done among 40 males and 10 females with a mean age of 51.28 years old. Hypodensity was found in 17 (60.7%) and 18 (81.8%) cases in malignant and benign hepatic lesions respectively. Ill-defined margin was detected in 12 (42.9%) and 6 (27.3%) cases respectively. Calcification was present on 11 (39.3%) malignant lesion and 6 (27.3%) benign lesions. Pressure effect on biliary apparatus was found in 11 (39.3%) malignant lesions and 1 (4.5%) benign lesions ($p < 0.05$). Lymphadenopathy was found in 10 (35.7%) malignant lesions and 1 (4.5%) benign lesions ($p < 0.05$). Conclusion: In conclusion, CT-scan findings of malignant and benign hepatic mass show hypodensity with more contrast enhancement in malignant lesions with more calcification

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in malignant lesion; however, significant difference is detected in pressure effect on biliary apparatus and lymphadenopathy.

Keywords

Hepatic Mass, CT-Scan, Hepatomegaly, Calcification, Hypodensity

1. Introduction

Hepatic mass is commonly detected liver mass [1]. It is very urgent need to determine its nature whether it is solid or cystic, benign or malignant, single or multiple [2]. There are several imaging techniques which are used to detect hepatic mass like ultrasonography, computed tomography of scan and so on. However, the CT-scan[1] appearance of liver tumours is similar and nonspecific regardless of their histopathologic type with the exception of some hepatic lesions which are containing calcium, extra-vasated blood, fat or densely enhanced parts [3]. In CT-scan hepatic lesion like hepatocellular adenoma shows a clear margin with encapsulated mass [4]. On unenhanced CT-scan, hepatocellular carcinoma (HCC) appears hypodense to liver; however, post-contrast CT images are required for the detection and characterization of HCC [5]. The post contrast CT-scan evaluation should be performed in at least three different stages of contrast enhancement and these three stages are the early hepatic arterial phase which is 17 - 20 seconds after contrast administration, the late hepatic arterial phase which is 40 - 55 seconds and the portal venous phase which is 70 - 80 seconds [6].

CT scanning before and after intravenous administration of contrast agent is an excellent method of evaluating hepatic lesion. Cystic lesions are readily identified and abscesses are usually distinguished from tumours, masses as small as it can usually be identified by CT scanning and the lesions can be biopsy under US guidance. Therefore, this present study was undertaken to determine the CT findings of malignant and benign hepatic mass patients.

2. Methodology

This study was designed as a cross sectional study which was conducted in the Department of Radiology and Imaging of three tertiary care hospitals in Bangladesh named as Mymensingh Medical College Hospital, Mymensingh; Dhaka Medical College Hospital, Dhaka and the only medical university of Bangladesh named as Banghabandhu Sheikh Mujib Medical University (BSMMU), Dhaka. The histopathological diagnosis was done in the Department of Pathology of same institute from January 2006 to December 2007 for a period of 2 years. Patients presented with clinically suspected hepatic mass at any age with both sexes were enrolled as study population by purposive sampling technique. The patients who had hepatomegaly due to extra hepatic causes, refused to undergo CT-scan or to do biopsy and patients who had known hypersensitivity reaction to contrast agent were excluded from this study. The research protocol was approved by the ethics review committee of the respective hospital prior to the commencement of this study. Each patient was undergone CT-scan of hepatobiliary system (HBS) at the Radiology and Imaging Department. All CT-scan were performed with a third generation CT-scan (Siemans). Somatom (2 - 5) mm thick contiguous slice were taken. These CT-scan findings were obtained by using 120 kv, 75 mm and 0.8 see scanning time for 2 slice; furthermore both pre- and post-contrast were performed. Oral contrast medium was routinely administrated before the examination. Immediately after completion of bolus injection 8 mm contiguous slice were obtained through the upper abdomen by CT-scan. All collected biopsy tissues were sent for histopathological examination in the histopathology department of respective hospital and collected reports were compared with CT-scan diagnosis. Percentages were calculated to find out the proportion of the findings. Further statistical analysis of the results was done by computer software devised as the statistical package for the social sciences (SPSS, win version 16.0). For significance of differences was done using Student's t test and Chi-square test where applicable. Statistical significance was set at p value less than 0.05 and confidence interval was set at 95% level. All probability values quoted were 2-tailed.

[1]CT-scan findings of Hepatic Mass Patients.

3. Result

A total number of 50 clinically diagnosed hepatomegaly patients were recruited in the study. The mean (±SD) age of the study population was 51.28 (±14.06) years old. Interestingly it had been found that males (80.0%) were more predominant than females (20.0%) and the ratio of male and female was found 4:1 ($p = 0.617$). The mean age of male was less than that of female which were 50.78 (±13.68) and 53.3 (±16.11) years old respectively (**Table 1**). Among all malignant lesions 17 (60.7%) were hypodense, followed by 6 (21.4%) were isodense and 5 (17.9%) had mixed pattern of density (**Table 2**). 12 (42.9%) patients of malignant diseases had ill-defined margin and 16 (57.1%) had well defined margin. 6 (27.3%) patients of benign lesions had ill-defined and 16 (72.7%) had well defined margin. No significant difference was observed (**Table 3**). All malignant lesions (100%) and 77.3% benign lesions were enhanced after giving contrast. 16 (57.1%) malignant lesions were mildly enhanced, 10 (35.7%) were moderate and 2 (7.1%) were intensely enhanced. On the other side 8 (47.1%) benign lesions were mild, 35.5% were moderate and 3 (17.6%) were intensely enhanced. Out of 28 patients of malignant diseases, maximum 13 (46.4%) patients had heterogeneous appearance followed by 12 (42.9%) had homogenous, 2 (7.1%) had rim and 1 (3.6%) had nodular pattern after enhancement. Among all benign lesions 10 (58.8%) had rim enhancement followed by 3 (17.6%) had homogenous, similar number had heterogeneous and 1 (5.9%) had nodular enhancement. Statistical significant difference was observed in term of enhancement pattern among benign and malignant lesions ($p < 0.01$) (**Table 4**). Calcification was present on 11 (39.3%) malignant lesion and 6 (27.3%) benign lesions. 9 (52.9%) calcification was present in hepatic metastasis, 4 (23.5%) in hepatic abscess, 2 (11.8%) in HCC and rest two in hepatic cyst and hemangioma ($p > 0.05$). 11 (39.3%) malignant lesions and 1 (4.5%) benign lesions had given pressure effect on biliary apparatus ($p < 0.05$). 10 (35.7%) malignant lesions and 1 (4.5%) benign lesions had lymphadenopathy ($p < 0.05$). 14.3%, 10.7%, and 7.1% patients had portal vein, hepatic vein and IVC invasion respectively. No patients had benign lesions had similar vein invasions (**Table 5**).

Table 1. Age and sex distribution of study population (n = 50).

Sex	Age (Mean ± SD)	Range
Male (n = 40)	50.78 ± 13.68	22 - 78
Female (n = 10)	53.30 ± 16.11	17 - 75
Total	51.28 ± 14	17 - 78
t value = −0.504, df = 48, p value = 0.617		

Table 2. Density of lesion on CT according to malignant and benign lesion.

CT feature: Density	Histopathological diagnosis		Total n (%)
	Malignant n (%)	Benign n (%)	
Hypodensity	17 (60.7)	18 (81.8)	35 (70.0)
Isodense	6 (21.4)	0 (.0)	6 (12.0)
Hyperdensity	0 (.0)	1 (4.5)	1 (2.0)
Mixed	5 (17.9)	3 (13.6)	8 (16.0)
Total	28 (100.0)	22(100.0)	50(100.0)

Chi square value = 2.851, df = 3, p value = 0.425.

Table 3. Margin of the lesion on CT according to malignant and benign lesion.

Margin of the lesion	Histopathological diagnosis		Total n (%)
	Malignant n (%)	Benign n (%)	
Ill defined	12 (42.9)	6 (27.3)	18 (36.0)
Well defined	16 (57.1)	16 (72.7)	32 (64.0)
Total	28 (100.0)	22 (100.0)	50 (100.0)

Chi square value = 1.299, df = 1, p value = 0.254.

Table 4. Features of the lesion after contrast on CT according to malignant and benign lesion.

CT-scan feature	Histopathological diagnosis		p value
	Malignant n (%)	Benign n (%)	
Contrast enhancement (n = 50)	28 (100.0)	17 (77.3)	0.008
Type of enhancement (n = 45)			0.535
• Mild	16 (57.1)	8 (47.1)	
• Moderate	10 (35.7)	6 (35.5)	
• Intense	2 (7.1)	3 (17.6)	
Enhancement pattern (n = 45)			0.002
• Rim	2 (7.1)	10 (58.8)	
• Homogenous	12 (42.9)	3 (17.6)	
• Heterogeneous	13 (46.4)	3 (17.6)	
• Nodular	1 (3.6)	1 (5.9)	

Table 5. Associated CT findings according to malignant and benign hepatic mass.

CT feature:	Histopathological diagnosis		p value
	Malignant n (%)	Benign n (%)	
Calcification	11 (39.3)	6 (27.3)	0.373*
Pressure effect on biliary apparatus	11 (39.3)	1 (4.5)	0.004*
Lymphadenopathy	10 (35.7)	1 (4.5)	0.022**
Portal vein invasion	4 (14.3)	0 (.0)	0.186**
Hepatic vein invasion	3 (10.7)	0 (.0)	0.325**
IVC invasion	2 (7.1)	0 (.0)	0.581**

*p value was determined by Chi square test; **p value was determined by chi square test with Yates correction.

4. Discussion

Liver is a large solid organ of the body which is uniquely suited to examine by CT-scan [7]. CT-scan is the best single examination to determine both the presence and extent of space occupying lesions within the liver when it has been compared with scintigraphy, sonography and CT-scan [8]. It is very important to detect the intrahepatic masses whether these are solid or cystic, neoplastic or inflammatory [9]. Contrast enchantment pattern of hepatoma, hemangioma and metastases seen on two phase dynamic incremental CT-scan are useful in the differential diagnosis of these tumours [10]. It has been established that CT-scan without contrast is helpful in detecting metastases from hypervascular tumours [11]. The most common primary malignant tumour of the liver is hepatocellular carcinoma which represents more than 80% of all primary hepatic malignancies [12]. It is commonly reported in Africa and Asia which is rare in United States [13] [14].

Usually hepatic masses is noticed when these are reported by the patient, by the physician or on diagnostic radiological studies. The increased documentation of hepatic masses is due to the advancement of technologies with the expanded use of imaging modalities. This study was aimed to determine CT-scan findings of benign and malignant hepatic masses. During the study period from January 2006 to December 2007, total 50 cases were studied who had undergone CT-scan of hepatobiliary system and the histopathological confirmation was made.

The mean age of male of present study was 50.78 years with a standard deviation of ±13.68 whereas female was 53.3 years with standard deviation of ±16.11 years. Age range of the total patients was 17 year to 78 years. Maximum patients were within 56 to 65 years age range. It is interesting that 30% patients were within 56 to 65 years age range followed by 26% were 46 to 55 years and 16% patients were 36 to 45 years age range. Statistical analysis of patients of both sex has revealed that they were within similar age distribution (p value = 0.617). From the result of this study it has been established that liver mass can occur in a person of any age; however, the incidence is more common in middle aged and elderly persons [15]. Furthermore the age of study population

was varied from 20 - 75 years old. Most of the patients were found between 41 - 50 years old. These results were nearly comparable with present study. Hepatocellular carcinoma are seldom encountered before the age 60 with male and female ratio of about 6:1 to 8:1 in the USA and Western Europe. However, the picture is different in Africa and Asia and has reported that this form of cancer occurs in younger individuals between 20 and 40 years old with a male predominance [16]. Out of 50 patients of present study 40 were male and 10 were female with a male and female ratio 4:1. This result was consistent with other studies [17] [18]. In another study male and female ratio of hepatic masses was 6:1 in Bangladeshi people [18].

Among all malignant lesions 60.7% were hypodense, followed by isodense (21.4%) and mixed pattern of density (17.9%). In another study it has been reported that 76% hepatic lesions were hypodense, 7.6% were hyperdense and 15% were isodense [16]. CT finding of early HCC were usually isodense with respect to surrounding liver on unenhanced, early enhanced and late enhanced CT scans. This pattern was seen in 17 (46%) of 37 lesions in a study [19].

In malignant lesions ill-defined margin was observed in 12 (42.9%) patients and well defined margin was observed in 16 (57.1%) patients. 6 (27.3%) patients of benign lesions had ill defined and 16 (72.7%) had well defined margin (p value > 0.05). Both malignant (100%) and benign (77.3%) lesions were enhanced after giving contrast. Majority malignant lesions were mildly enhanced (57.1%) followed by moderate (35.7%) and intensely enhanced (7.1%). Prolonged enhancement and delayed enhancement are non-specific; however, still are of some value in the differentiation of hepatic masses on dynamic CT. On dynamic CT of prolonged enhanced masses many masses show hyperdensity in the early phase and lasting 3 minute or longer, but some tumours reveal prominent enhancement occurring after the arterial dominant phase [20]. On the other side 8 (47.1%) benign lesions were mild, 6 (35.5%) moderate and 3 (17.6%) were intensely enhanced. Out of 28 patients of malignant diseases, maximum 13 (46.4%) patients had heterogeneous appearance followed by 12 (42.9%) had homogenous, 2 (7.1%) had rim and 1 (3.6%) had nodular pattern after enhancement. On CT, most lesions are visible on arterial phase imaging (80%), with washout of contrast in the portal venous phase. The appearance of the lesion on CT varies primarily with size; small lesions are more homogenous, while large lesions may exhibit mosaic pattern due to necrosis and fatty change [21].

Among all benign lesions 10 (58.8%) had rim enhancement followed by 3 (17.6%) had homogenous, similar number had heterogeneous and 1 (5.9%) had nodular enhancement ($p < 0.01$). Calcification was present on 11 (39.3%) malignant lesion and 6 (27.3%) benign lesions ($p > 0.05$) in the present series. 9 (52.9%) calcification was present in hepatic metastasis, 4 (23.5%) in hepatic abscess and 2 (11.8%) in HCC. Focal area of internal calcification have described in up to 7.5% of HCC [22]. 11 (39.3%) malignant lesions and 1 (4.5%) benign lesions has given pressure effect on biliary apparatus. Statistical significant difference was seen in term of pressure effect on biliary apparatus ($p < 0.05$). 10 (35.7%) malignant lesions and 1 (4.5%) benign lesions had lymphadenopathy. Statistical significant difference was seen in term of lymphadenopathy ($p < 0.05$). 14.3%, 10.7%, and 7.1% patients of current series had portal vein, hepatic vein and IVC invasion respectively. No patients had benign lesions had similar vein invasions. Similar to present study result, tumour invasion of the portal and the hepatic vein or Inferior vena cava occur frequently and show as distension of the vein with a filling defect on contrast-enhanced CT-scan [22]. There are some limitations of this present study. The most important is the small sample size; furthermore this was performed in tertiary care hospitals in Bangladesh which can be done nationwide. These are due to lack of time and financial constraint.

5. Conclusion

In conclusion, CT-scan findings of malignant and benign hepatic mass show hypodensity with more contrast enhancement in malignant lesions. Calcification is more in malignant lesion; however, significant difference is detected in pressure effect on biliary apparatus and lymphadenopathy. Therefore, CT-scan should be performed to detect the hepatic mass to differentiate benign and malignant hepatic mass.

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