A Study to Assess the Accurate Detection and Characterization of Liver Masses among Patients with Liver Lesions Admitted in a Tertiary Care Centre

Varun Tyagi[1], Promod Shah[2], Bre K. Shahu[3]

[1, 2, 3] Department of Radiology, Krishna Institute of Medical Sciences (Deemed to Be University), Karad, Maharashtra, India.

ABSTRACT

BACKGROUND

A reliable affirmation and delineation of focal liver injuries is crucial for immaculate patient association. The commonly encountered liver masses on ultrasonography are simple liver cyst, haemangioma, metastasis, hepatocellular carcinoma etc. We wanted to assess the accurate detection and characterization of liver masses among patients with liver lesions.

METHODS

A prospective study was conducted among 60 patients with liver lesions, who had undergone both abdominal ultrasonography and computed tomography and correlation was done with histopathology (FNAC / FNAB) for confirmation. Ultrasonography of liver imaging was obtained with SIEMENS and Longitudinal (sagittal), transverse (horizontal), coronal and oblique planes were obtained by using 3.5 MHz frequency transducer. Triple-phase helical CT images of the liver were obtained with Siemens Emotion 16 slice MDCT machine with 5 mm collimation, 0.6 mm reconstruction interval, gantry rotation speed of 0.6 second, pitch of 1.375:1, 120 kV, and 600 mA.

RESULTS

Lesions which were encountered in the given time span were hepatocellular carcinoma (20 %), metastasis (33.3 %), hydrated cyst (2 %), abscess (5 %), haemangioma (13.3 %), Gb carcinoma, cholangiocarcinoma and other (5 % each) and simple liver cysts (10 %). Among the metastases observed in the liver, 20 % cases were from colorectal malignancies, 20 % were from lung, 15 % from breast, 15 % from ovary, and 15 % were from oesophagus and 15 % were from stomach. The highest percentages of liver metastases were from colon and rectum followed by lungs, oesophagus and stomach, and breast and ovary. Our study showed an accuracy of 98 % in diagnosing various lesions by confirming these diagnoses using image guided FNAC / FNAB.

CONCLUSIONS

Clinical diagnosis based on examination can be very inaccurate, radiological investigations using ultrasonography and computed tomography can help us to arrive at an accurate diagnosis most of the times. Image guided FNAC / FNAB can confirm / dispute radiological diagnosis. This shows excellent correlation between radiological diagnosis and histological diagnosis of various liver lesions.

KEY WORDS

Ultrasonography, Characterization, Liver Masses

Corresponding Author:
Dr. Promod Shahu.
Department of Radiology,
Krishna Institute of Medical Sciences (Deemed to Be University),
Karad, Maharashtra, India.
E-mail: drprshaha@gmail.com

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BACKGROUND

Focal hepatic mass lesions can be divided into four broad entities- 1. Pseudo-lesions or pseudo-tumours; 2. Non-tumourous mass lesions, including cysts and inflammatory masses; 3. Benign tumours; and 4. Primary and secondary malignant tumours. For the detection and characterization of focal hepatic mass lesions, ultrasonography and multi-detector computed tomography (CT) play a primary role. A reliable affirmation and delineation of focal liver injuries is crucial for immaculate patient association..[1] The commonly encountered liver masses on ultrasonography are: simple liver cyst, haemangioma, metastasis, hepatocellular carcinoma etc.

The sonography of the lesion may be diagnostic in cases like simple liver cyst and haemangioma. However, in many cases there is a significant overlap between the imaging appearances of lesion which are encountered in liver especially on ultrasound e.g. Metastases and hepatocellular carcinoma; abscess and metastasis; focal nodular hyperplasia and primary liver lesion. Therefore MDCT (Multiple Detector Computed Tomography) plays a crucial role in further diagnosis and management of the lesion.

MDCT is currently the imaging modality of choice for evaluation of the liver and for detection of hepatic masses for its ability to provide excellent morphologic visualization of diffuse or focal intrahepatic masses as well as of anatomic relationships between the liver and adjacent organs. MDCT offers many advantages over conventional dynamic CT (Computed Tomography). The quick information ensuring about dynamic investigating of the whole liver at various minutes after implantation of partition material, consequently making the chance of multiphasic liver CT. Fundamental liver tumours, for example, hepatoblastoma and fibrolamellar hepatoma may in like way contain foci of calcification. Unenhanced CT is ceaselessly fragile and will see the unobtrusive calcification once in a while found in metastases.[2] Most hepatic pimples are asymptomatic. Immense injuries (> 10 cm) may get illustrative from accidental load on near to structures, patients, regurgitating or obstructive jaundice. Other progressively standard weights combine channel, break or every so often torsion of the pimples. Liver breaking point stays immaculate, considering the way that the general working volume of hepatic parenchyma remains unchanged.[3]

We wanted to assess the accurate detection and characterization of liver masses among patients with liver lesions.

METHODS

Sixty non-consecutive patients belonging to all ages and both sexes admitted into the various clinical departments of Krishna Institute of Medical Sciences, Karad, were examined with a triphasic liver CT protocol and histopathology patients were included if focal liver disease was suspected clinically (positive symptoms / altered LFT) or if previous imaging studies depicted hepatic lesions and normal patients with abnormal hepatic imaging / biochemical profile. Uncooperative patients and failed FNAC / biopsy patients were excluded in this study.

Ultrasonography of liver imaging was obtained with Siemens (Accuson X300). Longitudinal (sagittal), transverse (horizontal), coronal and oblique planes were obtained by using 3.5 MHz frequency transducer.

Triple-phase helical CT images of the liver were obtained with Siemens Emotion system 16 slice MDCT machine with 5 mm collimation, 0.6 mm reconstruction interval, gantry rotation speed of 0.6 second, pitch of 1.375:1, 120 kV, and 600 mA.

Once unenhanced helical CT had been performed through the entire abdomen, 100 of Iohexol (Omnipaque) was injected intravenously through an 18 / 20-gauge cannula at a rate of 3 - 4 mL / sec with an automated pressure injector. The deferral between the beginning of differentiation material affiliation and helical checking was 20 seconds.

For the portal-dominant phase, the delay between the start of contrast material administration and helical scanning was 50 seconds. For the venous phase delay of 90 sec and for the delayed phase, the delay between the start of contrast material administration and helical scanning was 180 seconds.

Statistical Analysis

Descriptive analysis was carried out with the help of SPSS software.

RESULTS

A total of 60 patients was selected for the study between the time period of December 2015 and October 2017.

Age in Years	Number of Patients	%
1 - 10	1	1.7
11 - 20	1	1.7
21 - 30	3	5.0
31 - 40	9	15.0
41 - 50	13	21.7
51 - 60	9	15.0
61 - 70	14	23.3
71 - 80	9	15.0
81 - 90	1	1.7
Total	60	100.0

Table 1. Age Distribution of Study Subjects

Gender	Number of Patients	%
Male	39	65.0
Female	21	35.0
Total	60	100.0

Table 2. Gender Distribution of Study Subjects

CT Diagnosis	No. of Cases	Percentages
Liver Abscess	3	5
Haemangioma	6	10
Cysts	6	10
Hydatid	2	3.3
Metastasis	20	33.3
Primary Malignancy	12	20
GB Carcinoma	3	5
Cholangiocarcinoma	3	5
Others	3	5
Giant Haemangioma	2	3.3
Total	60	100

Table 3. Final Diagnosis of Liver Lesions Seen in the Study

Of the 60 patients, 31 patients were males (65 %) and 21 (35 %) were females. The age of the patients ranged from 09 years to 82 years. The spectrum of diseases included in the study were: hepatocellular carcinoma (20 %) (out of which 9 cases were in cirrhotic livers and 3 in non-cirrhotic livers), metastasis (33.3 %), hydatid cyst (2 %), abscess (5 %),

haemangioma (13.3 %), Gb carcinoma, Cholangiocarcinoma and other (5 % each) and simple liver cysts (10 %).

Maximum numbers of patients encountered were of metastatic lesions (33.3 %). Out of the 12 cases of the HCC (primary malignancy), 9 cases were seen in cirrhotic Liver and 3 cases were seen in non-cirrhotic Liver.

DISCUSSION

Focal liver lesions are common on pathologic or imaging evaluation of the liver and include a variety of malignant and benign neoplasms, as well as congenital and acquired masses of inflammatory and traumatic nature. Evaluation of focal liver lesions is a complex issue which is often the major focus of the cross-sectional imaging study.[4]

In our study 60 patients with age ranging between 9 - 82 years, with clinically suspected liver lesions or radiologically pre-diagnosed liver lesions were studied and evaluated clinico-radiologically correlating with histopathology wherever available. Out of 60 patients, youngest patient was of age 9 years and the oldest was 82 years old with a mean age of 49 years. Majority of patients were between the age range of 51 - 60 years (33.3 %). In a study of 40 patients conducted by Gopalakrishnan et al, 2014, the youngest patient was of age 19 years and the oldest of age 84 years with a mean age of 52 years with majority being in the age group of 50 - 60 years.[4]

In our study out of a total 60, 65 % were males and 35 % were females. Gopalakrishnan et al, 2014 in their study of 40 patients had a majority of males who numbered 26 (65 %) and 14 (35 %) were females with the male to female ratio being 1.8:1.[4]

Leeuwen et al, 1996[5] in their study documented Spiral computed tomography as the preferred CT technique for routine liver evaluation because it provides image acquisition at peak enhancement of the liver parenchyma during a single breath hold (1 - 4 seconds). In our study, out of a total 60 patients underwent computed tomography (CT) evaluation. In non-contrast plain CT evaluation out of a total 60, 85 % lesions were hypodense, 13.3 % heterogenous and 1.6 % were isodense 8 (9.3 %).

On Arterial Phase

On contrast administration to all the 60 patients, 75 % of lesions showed enhancement while, 25 % were non-enhancing. Out of the enhancing lesions: 8.3 % showed homogenous enhancement; 16.6 % showed abnormal internal vessels, 11 % showed peripheral puddles; 33.3 % showed complete ring enhancement 1 % showed heterogenous enhancement. From the beginning CT depended overwhelmingly upon their appearance during the gateway venous time of enhancement.[6] Unfortunately however, except for haemangiomas; relatively few lesions exhibit a highly specific appearance during the portal venous phase. With helical CT, imaging during the arterial phase became possible. Arterial phase appearance of hepatic lesions is diagnostically useful.[6] The purpose of the study was to apply a classification scheme to the appearance of lesions in the multiple phases was to determine whether a certain appearance suggests a particular diagnosis.

The anomalous interior vessels or variegated model demonstrated HCC with a PPV (Positive Predictive Value) of 100 % and a demeanour of 100 %. Wounds in this gathering have either anomalous internal vessels or unpredictably flowed areas of both hyper attenuation and hypo attenuation. The definition for unpredictable inside vessels foreseen that vessels ought to be sporadic in structure or to branch conflictingly, disclosures that reflected neovascularity related with threat in angiographic studies.[6] This definition would not include the central feeding vessels described by Van Hoe and colleagues within a small proportion because the arterial supply to such lesions does not exhibit abnormal contours or abnormal arborisation.[6] Concerning variegated enhancement, hyper attenuation was required specifically in the series, rather than just heterogeneity as described in the mosaic pattern in portal venous phase imaging, to confer specificity for HCC, which often is hyper attenuating in the arterial phase.[6] This enhancement feature may reflect the presence of viable tumour interspersed with necrosis, as suggested by previous authors.

The remaining enhancement pattern in the categorization scheme, the homogeneous pattern, were associated with PPVs too low to be considered clinically useful for the purpose of distinguishing lesions of different histologic origins. 25 % of the 60 lesions did not exhibit any arterial phase enhancement, including 1 metastasis and 1 abscess speculation that the higher frequency of enhancement observed in our study may reflect differences in the severity of disease in patients enrolled at different institutions.[7]

A number of limitations should be considered with this study. First, we focused on visible features exhibited by lesions in the arterial phase, not their detectability or conspicuity. Second, it is possible that the results would differ with a larger series. For example, relatively few haemangiomas and hyper vascular metastases were included in our study, and further work will be necessary to fully examine their enhancement patterns. In practice, portal venous phase imaging may also contribute useful information. Finally, our thresholds for considering PPVs and specificity to be clinically useful are subjective and based on our own clinical experience. Our experience suggests that the peripheral puddles, complete ring, and abnormal internal vessels or variegated enhancement patterns in the arterial phase are associated with the diagnoses of haemangioma, metastasis, and HCC, respectively, with PPV of 90 - 100 % and specificity of 89 - 100 %. In this way, the closeness of hepatic wounds in the vein time of update has potential use in the confirmation of unequivocal disclosures, and the course of action envision presented thus may be a significant instrument for the impression of vein stage CT considers.

Out of 60 lesions in the portal phase; 78.3 % were enhancing out of which 18 % showed a progressive centripetal filling; the progressive centripetal filling which was observed were of two types one which was observed in haemangioma and one which was seen in the cholangiocarcinoma. The centripetal filling which was observed in the haemangioma was of the similar intensity to that of the aorta in all phases. The centripetal filling enhancement of cholangiocarcinoma was to a lesser intensity as compared to haemangioma. 20 % were enhancing more as compared to the arterial phase and 20 % were non enhancing and 1.6 % showed equilibrium. In the delayed phase 10 % showed enhancement, 20 % showed

no enhancement, 45 % showed equilibrium and 25 % showed washout.

These exposures are viewed as in correspondence with the evaluation created by Hollett et al, 1995[8] where they found that unenhanced channels had a low affectability for divulgence of little wounds since they were as routinely as possible hard to see; even with disengaged redesigned looks available for affiliation this was viewed as vexatious. Bolus or vein stage surveys were viewed as impeccable in little injuries that moved to a more noteworthy degree than the coterminous liver (positive parcel).[8] They other than found that vein stage helical CT of the liver improved the particular proof of some little hepatic neoplasms when isolated and zone venous looking at alone. In the study conducted by Leeuwen et al, 1996 parenchymal enhancement of the liver in the arterial phase was found to be well below than that in the portal phase. They found visually good enhancement of the liver parenchyma in the portal phase in all the patients.[5]

The final CT diagnosis in our study revealed hepatocellular carcinoma (20 %), metastasis (33.3 %), hydatid cyst (2 %), abscess (5 %), haemangioma (13.3 %), Gb carcinoma, Cholangiocarcinoma and other (5 % each) and simple liver cysts (10 %). On final analysis with statistical evaluation in our study CT was found to be 100 % sensitive and 100 % specific in diagnosis of liver haemangiomas, simple liver cysts and liver hydatidosis. For liver abscess, primary malignant liver tumours, liver secondaries and cholangiocarcinoma its sensitivity and specificity was found to be 100 % and 100 %, 100 % and 100 %, 100 % and 97.56 %, 100 and 98.28 % respectively.

CONCLUSIONS

Liver lesions are of varying aetiology and proper aetiological diagnosis is important to start correct treatment. Clinical diagnosis based on examination can be very inaccurate. Radiological investigations using ultrasonography and computed tomography can help us to arrive at an accurate diagnosis most of the times. Image guided FNAC / FNAB can confirm radiological diagnosis. There is excellent correlation between radiological diagnosis and histological diagnosis of various liver lesions.

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