

**Evaluation of Focal Liver Lesions using Real-Time Ultrasound**Navneet Ranjan Lal<sup>1</sup>, Gaurav Raj<sup>2</sup>, Deb K Boruah<sup>3</sup>, Shamrendra Narayan<sup>4</sup><sup>1</sup>Senior Resident, Department of Radiology, Dr. Ram Manohar Lohia Institute of Medical Sciences, Lucknow, UP<sup>2</sup>Professor and Head of Department, Department of Radiology, Dr. Ram Manohar Lohia Institute of Medical Sciences, Lucknow, UP<sup>3</sup>Associate Professor, Department of Radiology, All India Institute of medical sciences, Guwahati, Assam<sup>4</sup>Professor Junior Grade, Department of Radiology, Dr. Ram Manohar Lohia Institute of Medical Sciences, Lucknow, UP

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Conflict of interest: Nil

**Abstract:****Background:** In India, liver illnesses are among the most common causes of morbidity and mortality that doctors deal with on a daily basis. The purpose of this study is to assess how real-time ultrasound aids in the identification of localized liver lesions.**Methods:** Real time ultrasonography was performed in 40 patients with suspected of having focal liver lesions attending the Department of Radiology, Dr. RMLIMS, Lucknow, U.P., over a period of one year (January 2023 to December 2023).**Results:** Of the 40 patients, 26 were male (65%) and 14 were female (35%). Focal liver lesions were common in the age group between 50 – 60 years with 10 patients (25%). Out of 40 patients Hemangioma was the most common lesion with an incidence of 25%, followed by metastases (20%), liver abscess (17.5%), hepatic cysts (15%), primary malignant liver tumor (12.5%), Hydatid lesion (7.5%) and cholangiocarcinoma (2.5%). Abdominal pain and fever were the most common clinical features, followed by loss of weight and appetite. Right lobe of liver was predominantly involved with (75%), followed by both lobes (17.5%) and left lobe (12.5%). Solitary lesions were common (75%) than multiple lesions (25%).**Conclusion:** Real time Sonography is a comprehensive, multiplanar, non-invasive, safe diagnostic modality for characterization of focal liver lesions.**Keywords:** Ultrasonography, My Metastasis, Abdominal Pain, Malignant Liver Tumor.

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**Introduction**

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. [1,2] Evaluation of focal liver lesions is a complex issue which is often the major focus of a cross sectional imaging study. Next only to lymph nodes, liver is the most common site for metastases. At death, 40 to 50% of all primary carcinomas will have metastases within the liver.

Sonography is widely accessible, relatively inexpensive, portable, noninvasive, nonionizing, allows imaging in multiple planes and can be repeated frequently. It assists in real time evaluation of organ under examination, especially the liver which is situated just below the ribcage without intervening gas, has a high sensitivity and reasonable specificity. Sonography has excellent spatial and contrast resolution, hence gray-scale

morphology of a mass allows for differentiation of cystic and solid masses and in many instances, characteristic recognized appearances may suggest the correct diagnosis without further evaluation. Characterization of a liver mass on conventional sonography is based on the appearance of the mass on gray scale imaging.[3,4,5] Sonography is widely available and inexpensive. Based on the patient's complaints like vague upper abdominal pain, jaundice, fever or unexpected abnormal liver function tests many clinicians request sonography as the initial imaging modality for clinically suspected liver pathology. [6,7,8]

The presence of diffuse liver disease such as cirrhosis or steatosis may largely vary the gray-scale sonographic appearance of the hepatic tumors because the echogenicity of the background liver may be altered and make the characterization of the tumors difficult. [9,10]

## Material and Methods

This cross sectional study compromised a total of 40 patients, who are referred for sonography at radiology department, clinically suspected of having focal hepatic lesions and incidentally found focal hepatic lesions on patient's sonography done for other reasons from both inpatient & outpatient departments in Dr. Ram Manohar Lohia Institute of Medical Sciences, Lucknow, U.P from January 2023 to December 2023. All the patients who are clinically suspected of focal hepatic lesions and incidentally detected focal hepatic lesions who were referred for sonography were included in the study.

Patients in the age group above 18 years and focal liver lesion of diameter > 10.0 mm were included in this study. Patients with diffuse liver disease like steatosis, cirrhosis, hepatitis, storage diseases, diffuse malignancies and also the post-operative and post-traumatic patients were excluded in this study.

Data analysis was done using Rates, Ratios and Percentages of differential diagnosis made by the real time Sonography will be computed and compiled. In the present study, gray scale real time ultrasound examination was carried out using 3.5 to

5 MHz, curvilinear and linear array transducers. Once the patient agrees to participate in the study, informed consent was taken prior to ultrasound examination, followed by detailed history and brief clinical examination. Patients were kept nil by mouth for few hours prior to ultrasound examination. In some cases clinical condition of patient demanded an ultrasound examination without prior preparation. Patients were examined in the supine position to begin with and then in decubitus (right or left) and sitting position if needed.

Liver was scanned in various planes like sagittal, parasagittal, transverse, oblique, subcostal, intercostal and coronal planes. Comprehensive scanning of other upper abdominal organs was done.

## Results

In the present study, 40 patients suspected of having focal liver lesions were studied for a period of one year and were subjected to detailed ultrasonographic examination in the department of Radiology, Dr. RMLIMS, Lucknow. Some of these patients underwent CT examination and USG guided aspiration later.

**Table 1: Age distribution of focal liver lesion**

Age group (years)	No. of cases	Percentage
18-20	1	2.5
21-30	2	5
31-40	5	12.5
41-50	9	22.5
51-60	10	25
61-70	9	22.5
>70	4	10
Total	40	100

**Table 2: Sex distribution of focal liver lesion**

Sex	No. of cases	Percentage
Male	26	65
Female	14	35
Total	40	100

**Table 3: Age distribution of Individual Focal Liver Lesions**

Age group (years)	Liver abscess	PMLT	Metastases	Hemangioma	Cystic lesion	Hydatid lesion	Cholangiocarcinoma	Total
18-20	1							1
21-30				1		1		2
31-40	1			1	2	1		5
41-50	2	1		4	2			9
51-60	1		5	2	1	1		10
60-70	2	2	3	2				9
>70		2			1		1	4
Total	7	5	8	10	6	3	1	40

**Table 4: Sex distribution of Individual Focal Liver Lesions**

Age group(years)	Liver abscess	PMLT	Metastases	Hemangioma	Cystic lesion	Hydatid lesion	Cholangiocarcinoma	Total
Male	6	4	6	5	3	2	-	26
Female	1	1	2	5	3	1	1	14
Total	7	5	8	10	6	3	1	40

**Clinical features:** Out of the 40 patients, 24 (60%) patients had abdominal pain, 18 (45%) patients had fever, 16 (40%) had loss of weight and appetite, 14 (35%) patients complained of mass per abdomen, 9 (23%) had jaundice and 7(18%) patients complained of abdominal distension and urticaria.

**Ultrasound diagnosis:** Out of 40 patients, 10 (25%) had haemangiomas, 8 (20%) had metastases, 7 (17.5%) had abscess, 6 (15%) had cystic lesion, 5 (12.5%) had primary malignant liver tumor, 3 (7.5%) had Hydatid cyst and 1(2.5%) had cholangiocarcinoma.

**Location:** In 28 (70%) patients the lesions were in right lobe, in 7(17.5%) involved both lobes and in 5 (12.5%) in the left lobe.

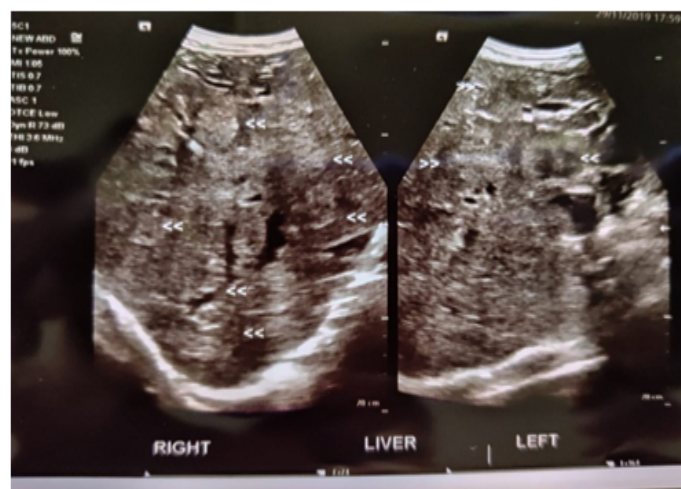
**Number of lesions:** In 30 (75%) patients had solitary lesions and 10 (25%) had multiple lesions.

**Hemangioma:** Out of 40 (100%), there were 10 cases of hemangioma in the age range of 29-70 years with a mean age of 49.6 years. There were 5 (50%) males and 5 (50%) females. The right lobe was involved in 7(70%) patients, left lobe in 2(20%) and 1 (10%) patient with both lobes.



**Figure 1: USG showing well defined hyperechoic lesion in right lobe of liver S/o Hemangioma**

**Metastases:** Out of the 40 patients (100%), 8 (20%) cases were diagnosed as hepatic metastases in the age group of 51 – 68 years, with a mean age of 58.2 years. Out of 8 patients 6 (75 %) were male and 2(25%) were female. Both the lobes were involved in 6(75%) patients and right lobe in 2(25%) patients.



**Figure2: USG showing multiple well defined Iso/hypoechoic lesion of varying sizes in either lobe of liver, most of them show peripheral halo around**

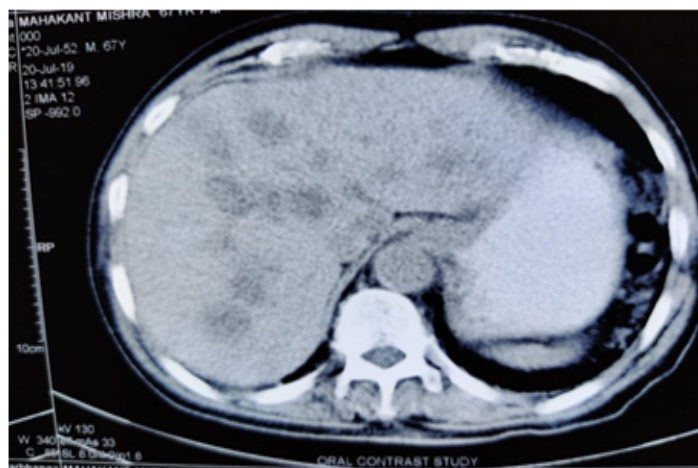


Figure 3: (NCCT)

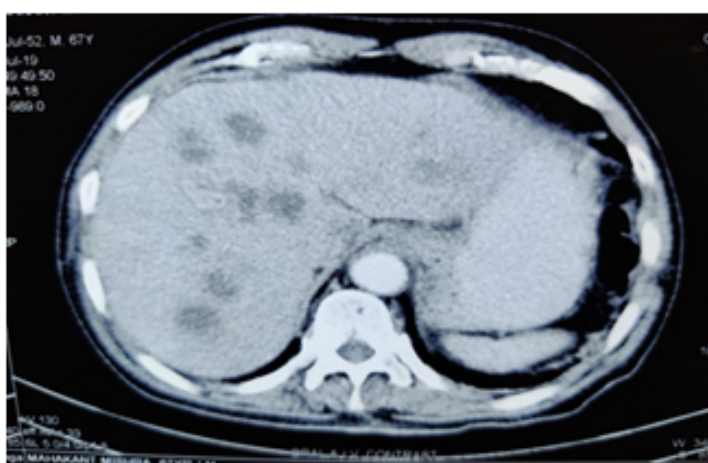


Figure 4: (CECT)

NCCT+ CECT Abdomen shows multiple well defined Iso/hypodense lesion varying sizes in either lobe of liver

**Hepatic abscess:** Out of the 40 patients (100%), 7(17.5%) cases were diagnosed as hepatic abscess,

in the age group of 19 – 63 years with a mean age of 47 years. Six (85.7%) patients were male and one (14.3%) female patient.

In all seven (100%) patients right lobe was involved.



Figure 5: USG showing Two well defined hypo/anechoic lesion with low level echoes within in right lobe of liver





**Figure6: USG showing well defined hypo/anechoic lesion with low level echoes within in right lobe (segment 6) of liver**

### Hepatic cysts

Out of the 40 patients (100%), 6 (15%) patients had hepatic cysts. Hepatic cysts were found in both sexes equally, 3 each. The age distribution was between 36 -75 years of age with mean age of 48.3 years. Right lobe was involved in 5 (83.3%) patients and left lobe in 1(16.7%) patient.

### Primary malignant liver tumor

PMLT was found in 5 patients (12.5%) in the study group with age distribution of 49 – 84 years with a mean age of 66.8 years. Four (80%) were men and one (20%) female patient. Right lobe was affected in 4(80%) and left lobe in 1(20%) patient.

### Hydatid cystic lesion

There were 3 (7.5%) cases of echinococcal cyst, in the age group of 28-54 years of age with a mean age of 38.6 years. Two male (66.6%) and one (33.3%) female patient were affected. Right lobe was involved in 2 (66.6%) and left lobe was involved in 1(33.3%) patient.

### Cholangiocarcinoma

There was one (2.5%) case of intrahepatic cholangiocarcinoma in a female patient aged 75 years involving the right lobe with associated dilated intrahepatic biliary radicles.

### Discussion

A total of 40 patients, clinically suspected of having focal space occupying lesions in the liver who underwent Sonography were chosen for the study during a period of 1 year.

The mean age of the patients in the sample study was 53.4 years with an age range of 19 to 84 years. Majority of the patients were males. The most common complaints were abdominal pain and fever. The most common lesions were hemangioma followed by hepatic metastases. In this study, out of

40 cases, hemangioma was present in 10 patients, metastases in 8 patients, abscess in 7 patients, hepatic cysts in 6 patients, primary malignant liver tumor in 5 patients, hydatid cyst disease in 3 patients and 1 patient with cholangiocarcinoma.

Complimentary studies like laboratory investigations and chest radiographs were undertaken with special emphasis on ultrasonography. Ultrasonography serves as an important diagnostic tool in imaging and characterization of focal liver lesions.

### Conclusion

Ultrasonography is a safe and effective method of detecting focal liver lesions. It's easy availability, portability, flexibility, lack of dependence on organ function and lack of ionizing radiation makes it ideal for imaging the liver.

Ultrasonography also serves a vital role in guided FNAC, which avoid unnecessary repeated trauma to the patient and also help to yield productive specimen for histopathological evaluation. It also helps the operating surgeon in planning in the pre-operative approach to the lesions. With ultrasonography as an initial imaging modality, time and cost to arrive at an diagnosis was significantly reduced.

Its multiplanar imaging ability and portability has a significant advantage in sick patients to detect lesions, to locate lesion and to identify solid from the cystic nature of lesion, thereby aid in characterization of lesions. Information regarding the secondary features of liver disease such as ascites, primary source of malignancy, secondaries in the abdomen, splenomegaly, pleural effusion can be evaluated. As ultrasonography is safe, repeatable and low cost as compared to newer modalities CT and MRI, it is still one of the most effective imaging modality for characterization and for overall assessment of abdomen.

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