

## To Analyze Various Enhancement Characteristics of Benign and Malignant Focal Liver Lesions at Tertiary Care Centre of Indore

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### Original Research Article

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**Abstract:** Over the past 15 years, MR imaging of the abdomen and pelvis has progressed significantly. Although initially found to be useful as an adjunct to CT imaging for selective applications, MR imaging now is establishing a role as a primary diagnostic technique. Increasing evidence shows that MR imaging has advantages over CT regarding diagnostic sensitivity and specificity. This article discusses and contrasts current MR and CT techniques for imaging the liver and discusses the relative ability to identify and diagnose focal liver disease. A total of 55 patients who were referred to our department with strong clinical suspicion of focal liver lesion and those diagnosed by ultrasonography or multiphase contrast enhanced CT underwent Dynamic contrast enhanced Magnetic Resonance Imaging evaluation of abdomen using 1.5 T 8 channel MRI scanner. 31% of cases in the study also showed some incidentally detected focal lesion in the liver. 90% of the total lesions were identified initially by USG. 41 % of Focal Liver Lesions present were identified as benign in ultrasonography examination. 50 % of focal liver lesions present were identified as benign in MRI examination. Focal lesions were most common in the right lobe of liver with 41% lesions. 38% of lesions were found to be situated bilaterally.

**Keywords:** Benign, Malignant & Focal Liver Lesions.

### INTRODUCTION

With the beginning of usage of contrast materials in the field of radiology, Angiography started playing a role in the evaluation of focal liver lesions, but its lack of specificity, invasiveness with its own side effects couldn't stand the test of time in routine diagnostic imaging.

But it still plays a role in pre-operative planning and in guiding for interventional procedures in certain situations. Focal liver lesions (FLLs) are common in the general population.

FLLs could be classified into 3 clinical categories: first, benign lesions for which no treatment is needed (hepatic hemangioma, focal nodular hyperplasia (FNH), benign liver cyst, and focal fat sparing); second, benign lesions for which treatment is required (hepatic adenoma, adenomatosis, biliary cystadenoma, hepatic abscess, echinococcal cyst, granulomatous inflammation and inflammatory pseudotumor of the liver); and third, malignant mass lesions for which treatment is always required[1,5,6,7].

### MATERIALS METHODS

This prospective study was done in the Department of Radio diagnosis, Index Medical College, Indore. A total of 55 patients who were referred to our department with strong clinical suspicion of focal liver lesion and those diagnosed by

ultrasonography or multiphase contrast enhanced CT underwent Dynamic contrast enhanced Magnetic Resonance Imaging evaluation of abdomen using 1.5 T 8 channel MRI scanner.

#### Inclusion criteria

- Patients already diagnosed with focal liver lesion by ultrasonography.
- Patients with equivocal findings on contrast enhanced CT examinations.
- Patients with long standing cirrhosis with suspicious nodule on ultrasound or equivocal finding on contrast enhanced CT scan.
- Patients with strong clinical suspicion of focal liver disease, or extra hepatic malignancy elsewhere in the body.

#### Exclusion criteria

- Patients with mass lesions infiltrating the liver from outside the liver.
- Patients with traumatic injury to liver.

- Severely ill patients who couldn't maintain adequate breath hold.
- Patients with general contraindication to MRI such as those with pacemakers, cochlear implants and other electromagnetic implants in body.
- Patients with contraindication to MR contrast agent gadolinium i.e - GFR less than 30ml/ m2 body surface area. - Serum Creatinine > 1.5 mg/dl of blood.

**EQUIPMENTS & TECHNIQUES**

MRI examination was performed on 1.5 TESLA, 8 CHANNEL MAGNETIC RESONANCE IMAGING equipment. This is a high field strength superconducting magnet, with a cylindrical configuration. A dedicated QD body array coil was used for imaging the liver.

**STUDY PROTOCOL**

- A detailed history of the patient including signs and symptoms, detailed physical examination, biochemical investigations and radiological

investigations which included chest x-ray and ultrasonography of the abdomen were recorded and tabulated as in the proforma shown.

- A written consent was taken.
- It was made sure that the patient doesn't have any contraindication for MRI scanning and is not in possession of any metallic objects.
- The patient was then placed on the gantry table in supine position with arms placed above the head. Patient was explained to hold his/her breath on verbal instruction and to resume breathing on reinstruction. In case patient was dyspneic or was unable to hold breath for reasonably long time, he/she was advised to maintain shallow breathing.
- A QD body array coil was then placed over the upper abdomen with the superior surface 5 cms below the level of the nipple along with a respiratory trigger fixed just below the xiphisternum.

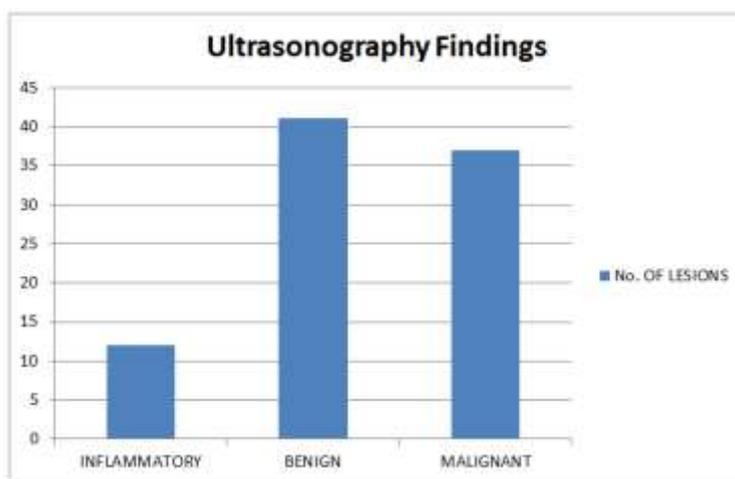
**OBSERVATION & RESULTS**

**Table-1: Presenting Complaint**

S. No.	COMPLAINTS	NO OF CASES	% OF CASES
1	INCIDENTAL	22	31%

**Table-2: Ultrasound Findings**

S. No.	TYPE OF LESION	No. OF LESIONS	% OF LESION
1	INFLAMMATORY	12	12%
2	BENIGN	41	41%
3	MALIGNANT	37	37%
	TOTAL	90	90%



**Fig-1: Ultrasonography Findings**

90 lesions were detected on USG among which 41 were benign and 37 diagnosed as malignant.

**Table-3: MRI Findings**

S.No.	TYPE OF LESION	No. OF LESIONS	% OF LESION
1	INFLAMMATORY	6	6%
2	BENIGN	50	50%
3	MALIGNANT	44	44%
	TOTAL	100	100%

**DISCUSSION**

MRI with Dynamic Contrast Enhanced (DCE) imaging using Liver Specific Contrast Media (LSCM) and imaging in the hepatobiliary phase, is very efficient not only in detection but also accurate diagnosis of liver lesions ranging from subcentimetric to larger sizes. It also characterizes the condition of the parenchyma and is very sensitive in diagnosis of cirrhosis of liver, Morana *et al.* [2].

With this background, we attempt in our study to determine the role of DCE-MRI in the identification and characterization of the focal liver lesions and to assess the correlation of LI-RADS grades of the lesions.

Mahfouz *et al.* 1994, to assess the value of peripheral washout of contrast medium in differentiating benign from malignant focal liver lesions. One hundred two patients, 49 with malignant liver tumors and 53 with benign lesions, underwent unenhanced T1- and T2-weighted and dynamic gadolinium-enhanced magnetic resonance (MR) imaging. On the dynamic contrast-enhanced images, 12 of the 49 malignant tumors had a rim that was hypo-intense to the center of the lesion ("peripheral washout" sign); this rim was best seen 10 minutes after administration of contrast material. The peripheral washout sign had a sensitivity of 24.5% and a specificity of 100% in the diagnosis of malignancies of the liver. The malignant tumors with peripheral washout showed no difference in signal intensity between the periphery and the center on the unenhanced T1- and T2-weighted images. Peripheral washout is a specific sign of malignancy in dynamic gadolinium-enhanced MR imaging of liver lesions [3].

Parikh *et al.* 2008, Fifty three consecutive patients (30 men, 23 women; mean age, 60.7 years) with at least one FLL of 1 cm or greater in diameter were evaluated. Two hundred eleven FLLs (136 malignant, 75 benign) were detected at consensus review. Overall detection rate (averaged for two observers) was significantly higher for DW (87.7%) versus T2 weighted (70.1%) imaging (P<.001). FLL characterization was not significantly different between DW (89.1%) and T2 weighted (86.8%) imaging (P<.51). ADCs of malignant FLLs were significantly lower than those of benign FLLs (P<.001). The area under the curve for diagnosis of malignancy was 0.839, with sensitivity of 74.2%, specificity of 77.3%, positive predictive value of 85.5%, negative predictive

value of 62.3%, and accuracy of 75.3%, by using a threshold ADC of less than 1.60x10<sup>3</sup> mm<sup>2</sup>/sec. DW MR imaging was better than standard breath hold T2weighted imaging for FLL detection and was equal to breath-hold T2-weighted imaging for FLL characterization [4].

**CONCLUSIONS**

- 31% of cases in the study also showed some incidentally detected focal lesion in the liver.
- 90% of the total lesions were identified initially by USG. 41 % of focal liver lesions present were identified as benign in ultrasonography examination.
- 50 % of focal liver lesions present were identified as benign in MRI examination.
- Focal lesions were most common in the right lobe of liver with 41% lesions. 38% of lesions were found to be situated bilaterally.

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