Section Radiology

Original Research Article

MRI STUDY OF FOCAL LIVER LESIONS IN PONDICHERRY POPULATION

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Abstract

Background: Although many radiological tools like USG/CT are available to study liver lesions, MRI has many advantages, like high contrast resolution, the ability to obtain images in any plane, and the and the lack of ionizing radiation. **Materials and Methods:** 75 patients aged between 17-85 years with liver lesions were studied by DWI. The obtained results were confirmed by FNAC/biopsy. Moreover, clinical, laboratory, and other imaging modalities were also correlated to diagnose and/or differentiate benign or malignant. **Result:** 20 (26.6%) simple lesions, 55 (73.3%) multiple lesions, 176 (62.4%) malignant lesions, and 106 (37.5%) benign lesions were noted. **Conclusion:** Diffusion-weighed (DWI) MRI is an ideal tool to predict the diagnosis of focal liver lesions and size characteristics. The malignant and benign lesions can be easily appreciated with the help of FNAC/biopsy and other relevant clinical modalities.

INTRODUCTION

Liver is the largest center of metabolism. It is called the busiest port in the Lake of Life. Hence, the liver is the common site for various benign or neoplastic primary lesions and distant metastasis of malignancy originating from other organs. Liver cirrhosis is often complicated by hepatocellular carcinoma. Modern operative techniques and local therapies such as radiofrequency (RF) ablations are effective methods to treat liver metastasis or primary hepatic malignancies. Therefore, the determination of the liver lesions count and the nature of the lesions are important. About 4:100000 of the Indian population has malignant livers.[1]

Although focal hepatic masses are diagnosed using ultrasonography (USG) and/or computed tomography (CT), magnetic resonance imaging (MRI) has many advantages, including high resolution, the ability to obtain images in any plane, a lack of ionizing radiation, and the safety of using particular contrast media rather than those containing iodine.[2] These make favored modality, lesion morphology, signal intensity, and contrast enhancement patterns are taken into consideration when characterizing masses with MRI.[3] It has T1 and T2-weighed sequences. Diffusion-weighted imaging (DWI) is an excellent diagnostic tool for the detection of even sub-centimeter liver lesions.[4] DWI is also useful to identify lymph nodes and other extra-hepatic lesions. Hence, an attempt was made to evaluate the size of the liver lesion malignant or benign.

MATERIALS AND METHODS

75 (seventy five) patients aged between 17-85 years who visited to Sri Venkateswaraa Medical College and research centre hospital Pondicherry 605102 were studied.

Inclusion Criteria

Patients over 16 years of age clinically suspected of focal liver lesions and indeterminate lesions detected in USG or CT patients who gave consent in writing for the study were selected.

Exclusion Criteria

Patients with cardiac pace makers, prosthetic heart valves, cochlear implants, or any metallic implants. Patients having history of claustrophobia were excluded from the study.

Method: The history of every patient related to liver lesions was noted. The diagnosis on an MRI was made with a background of clinical context. Final diagnosis in consensus with biopsy or FNAC, wherever applicable or clinical, laboratory, other imaging modality findings were correlated. The detection and characterization of focal liver lesions, malignant or benign liver lesions, and differentiated sizes of lesions were also noted. DWI (diffusion-

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weighted imaging) was used to study the liver lesions.

The duration of the study was from August 2023 to June 2024.

Statistical analysis: The classification of various parameters of diagnosis focal lesions, size of lesions, malignant or benign was studied with percentage. The statistical analysis was carried out in SPSS software. The ratio of males and females was 2:1.

RESULTS

[Table 1] Classification of patients according to diagnosis 10 (13.3%) HCC, 20 (26.6%) METS, and 2 (2.6%) Cholangio Ca, 3 (4%) Cholangio ca+ Mats, 10 (13.3%) Haemangioma, 17 (22.6%) simple hepatic cysts, 2 (2.6%) Abscess + simple hepatic cysts, 3 (4%) hydatid cysts, and 8 (10.6%) Abscess.

[Table 2] Classification of patients as per multiplicity of focal liver lesions: 20 (26.6%) simple lesions, 55 (73.3%) multiple lesions.

[Table 3] Classification of patients as per malignant or benign lesions: 176 (62.4%) Malignant, 106 (37.5%) Benign

[Table 4] Stratification of lesions by size

- HCC: <2cm – 7, 2.1 to 5cm – 6, >5cm – 11, Total 25 (8.5%)
- Mets: <2 cm – 41, 2.1 to 5 cm – 85, >5cm – 22, Total 148 (52.4%)
- Cholangio Ca: <2cm – 0, 2.1 to 5cm – 1, >5cm – 2, Total 3 (1.06%)
- Hemingioma: <2cm – 3, 2.1 to 5cm – 25, >5cm – 6, Total 34 (12%)
- Simple cyst: <2cm – 18, 2.1 to 5cm – 34, >5cm – 2, Total 54 (19.1%)
- Hydatid cyst: 2.1 to 5cm – 1, >5cm – 2, Total 3 (1.06%)
- Abscess: 2.1 to 5cm – 3, >5cm – 11, Total 14 (4.9%)
- Nodule: <2cm – 2, Total 2 (0.7%)

[Table 5] Present findings and results are compared with previous studies.

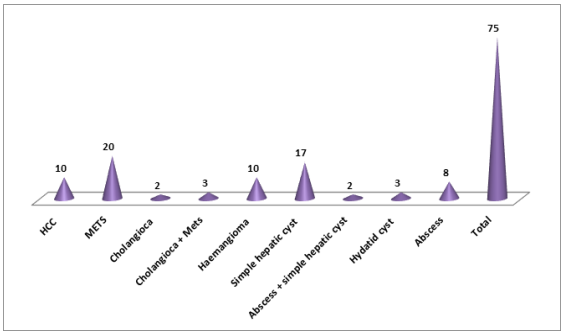


Figure 1: Classifications of patients according to diagnosis

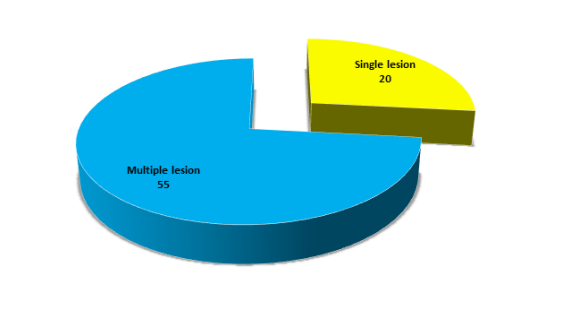


Figure 2: Classification of patients of per the Multiplicity of Focal liver lesions

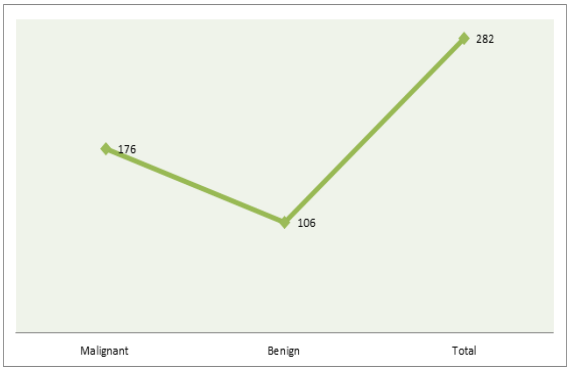


Figure 3: Classifications of patients as per Malignant or benign lesion

Table 1: Classifications of patients according to diagnosis

Sl. No	Diagnosis	No. of patients (75)	Percentage (%)
1	HCC	10	13.3
2	METS	20	26.6
3	Cholangioca	2	2.6
4	Cholangioca + Mets	3	4
5	Haemangioma	10	13.3
6	Simple hepatic cyst	17	22.6
7	Abscess + simple hepatic cyst	2	2.6
8	Hydatid cyst	3	4
9	Abscess	8	10.6
10	Total	75	100

HCC = Hepato cellular carcinoma, METS = Metastasis

Table 2: Classification of patients of per the Multiplicity of Focal liver lesions. No. of Patients: 75

Sl. No	Details	No. of patients (75)	Percentage (%)
1	Single lesion	20	26.6
2	Multiple lesion	55	73.3

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Table 3: Classifications of patients as per Malignant or benign lesion

Sl. No	Types of lesion	No. of lesions	Percentage (%)
1	Malignant	176	62.4
2	Benign	106	37.5
	Total	282	100

Table 4: Stratification of lesion by size

Diagnosis	≤ 2cm	2.1cm to 5 cm	> 5cm	No. of lesion	Percentage (%)
HCC	7	6	11	24	8.5
Mets	41	85	22	148	52.4
Cholangio ca	0	1	0	3	1.06
Hemingioma	3	25	6	34	12
Simple cyst	18	34	2	54	19.1
Hydated cyst	0	1	2	3	1.06
Abscess	0	3	11	14	4.9
Dysplastic Nodule	2	0	0	2	0.7
Total	71	155	56	282	100

HCC = Hepato cellular carcinoma, METS = Metastasis

Table 5: Comparison of present study of focal lesion of liver with or previous studies

Details	Demir etal (2010)	Kim etal (1999)	DM young (2011)	Xie sum (2005)	Present study (2024)
Total No. of lesions	41	92	97	149	28.2
Malignant lesions	17	54	51	71	176
Size Range (cm)	1.17	0.7-10	0.5 – 5.5	0.8 – 25.8	0.8 – 13.6
Average size (cm)	7.4	3.7	176	--	3.74

(Present study results are more or less in agreement with previous studies)

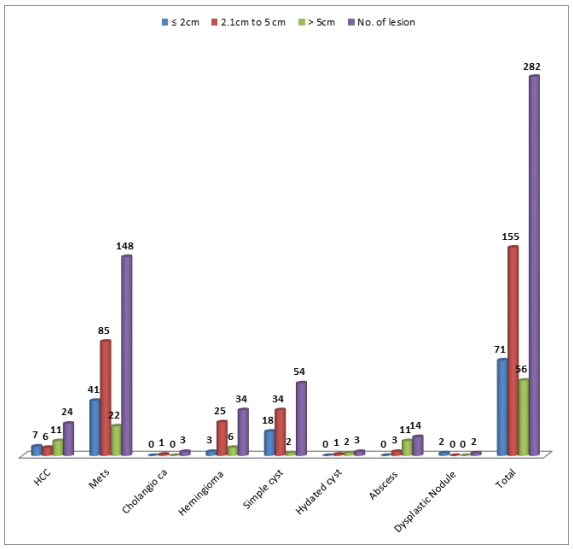


Figure 4: Stratification of lesion by size

DISCUSSION

Present study of MRI of focal liver lesions in Pondicherry population. 20 (26.6%) metastasis (METS), 10 (13.3%) hepatocellular carcinoma (HCC), and 8 (10.6%) abscesses were studied (Table 1). 20 (20.6%) simple lesions, 55 (73.3%) multiple lesions [Table 2]. 176 (62.4%) malignant, 106 (37.5%) benign lesions were noted [Table 3]. In the stratification by size, 148 (52.4%) metastasis (METS), 54 (19.1%) simple cyst, 24 (8.51%) HCCs, and 14 (4.9%) abscesses were noted (Table 4). These findings are more or less in agreement with previous studies.[5-7]

Before approving an MRI study, an initial clinical evaluation will help the radiologist and physician make a proper diagnosis. A history of chronic hepatitis or the features of or complications of liver cirrhosis HCC and intra hepatic cholangio-carcinoma.[8] Long-term oral contraceptive use predisposes certain women to hepatic adenoma. Family history is also of value in the initial clinical evaluation. E.g., type II DM, the death of parents due to malignancy may predispose to hepatic adenomatosis, physical complaints such as abdominal pain are non-specific but may be the reason to seek medical attention, and other physical symptoms are more suggestive of the underlying disease. For example, pruriritis, dark urine, and pale stools are observed in biliary obstruction. Constitutional features of malignancy also include anorexia, weight loss, and fatigue.[9] The physical examination may reveal features of chronic liver diseases such as spider angiomas, a periumbilical caput medusa indicative of portal hypertension, hepatomegaly, or splenomegaly.[10] Pain-less juindice is highly suggestive of a malignancy such as cholangiocarcinoma or pancreatic adenocarcinoma.

Moreover needle biopsy combined with histopathology and immune histochemistry can be valuable for characterizing liver masses for further evaluation. Diffusion-weighted imaging (DWI) sequences have been shown to be an emerging contributor for liver MRI.[11] Diffusion is a physical process of the random movement of water molecules. This movement of intracellular water molecules is restricted by the presence of cell membranes. In highly cellular tissues, such as neoplasms, diffusion is restricted due to the relative larger intracellular volume and high density of cellular membranes.[12] DWI exploits this phenomenon, and its image contrast is based on differences in the mobility of

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water protons (as a measure of cellularity) between different tissues. Hence, various parameters of the morphology of lesions in conventional MRI and parameters in DWI were evaluated.

Limitation of study: Owing to the tertiary location of the research center, the small number of patients, and the lack of the latest techniques, we have limited findings and results.

CONCLUSION

In the present study of MRI in focal liver lesions, diffusion weighted (DW) MR imaging has proven to be a gold standard tool to analyze various lesions with their size and clinical histopathological background, but the present study demands that such clinical or radiological trials be conducted in a large number of patients in a hi-tech research center where the latest techniques are available to confirm the present significant findings. Despite all the development in MRI, its diagnostic performance is still affected by motion artifacts, which may result in inconsistent image quality. Motion artifacts, especially those produced by physiological motion caused by patient respiration, may distinctly degrade the quality of MRI images.

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