ORIGINAL RESEARCH ARTICLE

Importance of MRI in the Diagnosis of Hepatic Focal Lesions

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A B S T R A C T

Introduction: By the help of cross-sectional imaging, it can possible to found the growth of focal liver lesions (FLL). It is found that proper diagnosis and characterization of FLL is quite difficult to manage the patient. In recent days, Magnetic resonance imaging technique proved to be best for the management of liver lesions. MRI also important as noninvasive technique for the characterization of FLL. Objective- The aim of this study was to highlight the role of triphasic (dynamic) MRI in the diagnosis of hepatic focal lesions.

Material and methods: The study was conducted in the MNR Medical College and Hospital, Sangareddy on 50 patients with focal hepatic lesions. The study was performed between January 2017 and December 2019.

Results: Out of the 50 patients studied (38 male and 12 female), hepatic focal lesions were observed in 49 cases, USG reported 1 hyperechoic area and MRI revealed focal fatty infiltration. Ages varies between 30 to 71 years, with a mean age group of 54 years. MRI reported 18 benign focal lesions, 1 focal area of fatty infiltration and 31 malignant lesions.

Conclusion: MRI proved to be better diagnosis of different stages of hyper vascular cirrhotic nodules. This method can be used as routine diagnostic purpose. It has several advantages like short acquisition times, reconstruction of this and thick section. Higher imaging quality and high intrinsic soft tissue contrast.

Keywords: Malignant, Benign, Magnetic Resonance Imaging, Focal Liver Lesions, Hepatobiliary Contrast Agents.

INTRODUCTION

The cross-sectional imaging technique is improved the detection method of focal liver lesions (FLL). There is need for proper diagnosis and characterization of liver lesions for the smooth management of patients. The majority of FLL arising in noncirrhotic liver are benign[1], as well as in extra liver malignant patients. The most commonly found benign liver lesions are such as, focal nodular hyperplasias (FNH), cysts, hemangiomas and hepatocellular adenomas (HCA).[1-5] The metastases are the common malignant lesions in non-cirrhotic liver.[6-8] The most common features found in primary liver malignancies are such as hepatocellular carcinomas (HCC), and in few cases intrahepatic cholangiocarcinomas (IHC).[7,9-14] The second most benign hepatic tumor is focal nodular hyperplasia, which leads to vascular malformation. Young women have oral contraceptives or other steroid modifications, chances to develop hepatocellular adenoma. MRI is proved to be better differential diagnostic method of these lesions. MRI findings such as signal drop out for hepatocellular adenoma or central vascular scar for FNH and dynamic contrast enhancement profile for each tumor can provide quality diagnostic information.[15] From past few years wide development of newer imaging methods increase the diagnostic accuracy. The increase rate of diagnostic accuracy in case of FLL is help to avoid unnecessary biopsies, which leads to decrease the complication rate up to 6.4%, and mortality up to 0.1%.+ In the recent days involvement of magnetic resonance imaging provide the better diagnostic accuracy in management of liver lesions.[19,20] The magnetic resonance technique provides the heightened soft-tissue resolution and sensitivity to intravenous contrast agents which helps total characterization of FLL.[21,22] Previous studies estimated the sensitivity and specificity of MRI for the diagnosis of FLL of 94% and 82%-89%, respectively.[23] Therefore this study focused on diagnostic accuracy of MRI in detection and characterization of common benign and malignant FLL.

MATERIAL AND METHODS

A total of 50 patients with focal hepatic lesions were included in this study. The study was performed between January 2017 and December 2019 in B M Patil Medical College & Research Centre, Vijayapur, Karnataka. Ultrasound and CT used for the patients with single or multiple hepatic focal lesions. The imaging technique included in this study were such as, T1-weighted (T1W) images, T2-weighted

(T2W) images, T2 fat suppression sequence, in-phase and out-phase gradient echo sequence, and heavy T2-weighted images. This study was done after giving injection of 0.1 mmol/kg body weight of Gd-DTPA, flushed with 20 ml of sterile 0.9% saline solution from the antecubital vein. The imaging technique is using the T1 technique after contrast media administration. Morphological features of each lesion such as were recorded, including size, shape, signal, margin; enhancement number and site of focal lesions were reported. After these all provisional diagnosis were recorded.

RESULTS

Out of the 50 patients studied (38 male and 12 female), 49 patients were suffering from hepatic focal lesions and one revealed hyperechoic area by ultrasound and focal fatty infiltration with MRI. All the patients ages ranged between 30 to 71 years with a mean age of 54 years. All the patients gone through MRI and reported 18 benign focal lesions, 31 malignant lesions and one fatty infiltration. Malignant tumors (28 cases of HCC, 3 secondaries), benign tumors (7 cases of hemangioma, 1 case of abscess, 4 cases of regeneration nodules and 4 cases of simple hepatic cysts), 2 cases of dysplastic nodules, and 1 case of focal fat infiltration area [Table1]. 78% of HCC lesions showed pattern 1, others followed different patterns [Table 2]. 100% hemangioma lesions followed pattern 1, in this no other lesions showed different patterns [Table 3]. 66.5% of metastatic lesions reported pattern 1, 33.4% showed pattern 2 [Table 4]. 50% of regeneration nodules followed pattern 3 and the others reported different patterns [Table 5].

Types of disease	Percentage (%)
Hepatocellular carcinoma	28 (56)
Hemangioma	7 (14)
Cyst	4 (8)
Regeneration nodules	4 (8)
Dysplastic nodule	2 (4)
Abscess	1 (2)
Metastasis	3 (6)
Focal fat infiltration	1 (2)
Total	50 (100)

Table-1: Categorization of diseases in total of 50 patients.

DISCUSSION

In this present study, we observed that most of HCC lesions showed a typical feature of contrast washout and early arterial enhancement in the portal and delayed phases. Similar findings were reported by Mannelli and Rosenkrantz, who concluded that the arterial enhancement and delayed hypointensity are key features of HCC. In case of liver parenchyma on venous and delayed phase images, sometimes HCC become hyperintense. In case of immediate gadolinium-enhanced images HCC remain hypovascular surrounding parenchyma. This condition leads to lack of arterializations of the tumor which leads to imaging difficulty and biopsy is the only choice.[24] Our study did not show any vascular invasion in portal vein. But Chen *et al.* study revealed malignant portal vein thrombosis associated with HCC.[25] Other than HCC also, we observed cirrhotic features of the liver, and some of the them reported early cirrhotic changes. We observed doubtful lesions within the liver and further investigations and imaging was essential to diagnose the case. The cirrhotic liver contains large areas of fibrosis. They do not wash out and remain isointense to the liver.[26] Kato *et al* study reported MRI imaging of peripheral nodular enhancement and progressive fill-in'.[26] In this study, we found 7 cases of hemangioma. The most important clinical parameters are including age and sex, clinical history, and symptoms.[27] The multilocular cystic hepatic lesion includes common

Pattern 1(79%)	Wash in	Wash out	Wash out
Pattern 2 (15%)	No enhancement	No enhancement	Not definite
Pattern 3 (6%)	Wash in	Wash in	Wash out

Table-2: demonstrate the pattern of enhancement hepatocellular carcinoma in different dynamic phases.

Pattern 1(100%)	Peripheral nodular enhancement	Gradual filling in	Gradual filling in
Pattern 2 (0%)	No enhancement	No enhancement	Not definite
Pattern 3 (0%)	Wash in	Wash in	Wash out

Table-3: Patterns of enhancement of hemangioma in different dynamic phases (n=7).

Pattern 1(67.5%)	Peripheral enhancement	Not definite wash out	Not definite wash out
Pattern 2 (32.5%)	Wash in	Not definite wash out	Not definite wash out
Pattern 3 (0%)	Wash in	Wash in	Wash out
Pattern 4 (0%)	Not definite wash out	Not definite wash out	Not definite wash out

Table-4: Patterns of enhancement of metastatic lesions in different dynamic phases (n=3).

Pattern 1(25%)	Wash in	Not definite wash out	Not definite wash out
Pattern 2 (25%)	Low enhancement	Not definite wash out	Not definite wash out
Pattern 3 (50%)	No enhancement	Not definite wash out	Not definite wash out

Table-5: Patterns of enhancement of regeneration nodules in different dynamic phases (n= 2).

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and uncommon entities. A lesion's cystic components and internal septa show pathologic basis, although imaging findings are not always specific.[28] 4 cases of hepatic cysts found in our study, in which all have homogeneous very high signal intensity on T2-weighted images and very low signal intensity on T1-weighted images and. Mortele and Ros study reported 1 case of pyogenic liver abscess with similar criteria.[27] To know the primary malignancy in patients the diagnosis of hypervascular metastatic lesions was useful; hence, it is important to find out a primary malignancy with multiple hepatic nodular lesions. Murakami and Tsurusaki study revealed that metastatic tumors can be easily diagnosed if we know the primary lesion.[29] Hanna *et al.* study showed that regenerative nodules are the most common lesion related to hepatocellular nodules.[30] This study revealed four cases with multiple scattered regeneration nodules. The MRI imaging can further diagnose the doubtful nodules by detection of enhancement pattern of nodules. This way it can prove the importance of MRI in the evaluation and characterization of hepatic focal lesions. Mannelli and Rosenkrantz study reported that regenerative nodules RNs reveal enhancement similar to the normal liver parenchyma in all phases after contrast enhancement.[24] The present study not reported any case related to FNH. It occurs primarily in 75-80% young women. Murakami and Tsurusaki said that the images of FNH such as central scar, presence of Kupffer cells, proliferation of cholangiole and intratumoral centrifugal arteries from the center.[29]

CONCLUSION

In conclusion, MRI proved to be important in diagnosis of different cirrhotic hypervascular nodules. It is recommended to use as routine diagnostic purpose. It has several advantages such as retrospective thin-section or thick-section reconstruction, shorter acquisition times, high-quality liver imaging and improved three-dimensional rendering.

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