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Evaluation of focal liver lesions by magnetic resonance imaging and correlation with histopathological Correlation

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ABSTRACT

Background: Numerous neoplasms, both benign and malignant, with distinctive histological and radiological features make up focal liver lesions. The main aim of this study is to determine how well MRI can distinguish between benign and malignant focal liver lesions and confirmation with the pathology using fine needle aspiration cytology or biopsy. This is crucial for prognosis and therapy planning.

Methods: A total of 40 patients who are referred with clinical suspicious of focal liver lesions and patients with indeterminate liver lesions detected on USG or CT were characterized on MRI on the basis of morphology, signal characteristics, enhancement patterns. Tissue diagnosis was obtained by fine needle aspiration cytology/ Tru cut biopsy/ surgery. The data were tabulated and manipulated using SPSS, version 14,

Results: Out of 40 patients, 26 were males (65%) and 14 were females (35%). The age range was 17 to 70 years There were 24 benign and 16 malignant lesions.Most common benign hepatic tumour was Abscess while Metastases was the most common malignant hepatic tumour In this study, 95% of focal liver lesions were accurately characterized on MRI.

Conclusions: In 38 of the 40 lesions (95%) that were proven on pathology or by follow-up imaging, MRI was able to predict diagnosis. Thus, MR imaging is an effective method for assessing localised liver lesions.

Keywords: Focal liver lesions, MRI Liver, Histopathology, Liver metastases, Malignant, Benign

Introduction:

Hepatic lesions or liver lesions are terms used to describe lesions or growths on or in the liver. Cancerous and benign Lesions are both possible. Lesions of the liver that are malignant are less common than benign ones. One of the benign tumours is the haemangioma, which is the most prevalent liver benign tumour [1-3]. Focal nodular hyperplasia, which also includes hepatic adenomas, angiomyolipoma, and bile duct cyst adenomas, is the second most frequent benign tumour. The majority of malignant liver lesions are metastases from other cancers, most frequently those of the breast, gastrointestinal tract, including colon cancer and carcinoid tumours, which are most usually found in the appendix. The most prevalent malignant primary liver malignancies include hepatocellular carcinoma, cholangiocarcinoma, combined hepatocellular and cholangiocarcinoma, hepatoblastoma, bile duct cystadenocarcinoma, fibrolamellar carcinoma, and tumours of mesenchymal tissue [4-6].

The benign lesions are extremely common, widespread, and asymptomatic in the majority of patients. Typically, liver function tests are undiagnosed or normal. Accurate detection of hepatic lesions is crucial in this advanced era of current technology for developing an appropriate therapeutic plan. [7]

MRI has been shown to be a superior differential diagnostic technique for focal liver lesions. MRI evidence such as signal drop out for hepatocellular adenoma or central vascular scar for FNH, as well as dynamic contrast enhancement profiles for each tumour, can enable accurate diagnosis. [8] The development of improved imaging technologies has increased diagnostic accuracy in recent years. The increased rate of diagnostic accuracy in the case of FLL helps to minimise needless biopsies, resulting in a 6.4% drop in complications and a 0.1% decrease in death. + In recent years, the use of magnetic resonance imaging has improved diagnostic accuracy in the therapy of liver lesions. [9,10] The magnetic resonance approach improves soft-tissue resolution and sensitivity to intravenous contrast agents, allowing for a more complete assessment of FLL. [11,12]

Hence, the aim of the present study was evaluation of MRI features of Focal liver lesions and their correlation with histopathology features for confirmation of diagnosis in the patients.

Materials and methods:

This cross sectional study was conducted in the department of Radiodiagnosis at Viswabharathi General Hospital, Kurnool from Dec 2021 to Nov 2022. A total of 40 patients were referred for MRI with clinical suspicious of focal liver lesions and with indeterminate lesions detected either on USG or CT in the department of Radio-diagnosis were subjected for the study after informed consent.

Inclusion criteria:

1.All patients referred for MRI with clinical suspicious of focal liver lesions and patients with indeterminate liver lesions detected on USG or CT.

2.Incidentally detected focal liver lesions

Exclusion criteria:

1.All patients having cardiac pacemakers, prosthetic heart valves, cochlear implants or any metallic implants.

2.Patient having history of claustrophobia.

3.All patients who do not consent to be a part of the study.

4.Renal dysfunction (eGFR< 40ml/ min/1.732) stage 4 & 5 CKD.

Details of imaging techniques used: MRI study was performed on a 1.5T GE Signa HDxT imaging system with external body array coil, the following sequences were used.

MRI Protocol:

1) T1-Weighted Sequences 2) Spoiled Gradient-Echo (SGE) Sequences 3) Out-of-Phase SGE Sequences 4) Post contrast imaging

Dynamic MR imaging was performed after rapid bolus injection (2.5ml/s) of gadobenatedimeglumine (Gd-BOPTA, MultiHance) and MAGNAVIST. 5 dynamics were taken including 3 minutes equilibrium phase. Delayed 10minute phase was taken wherever required. Following acquisition was taken for Dynamic Gadolinium Enhanced Imaging.

Pathology Tissue diagnosis: FNAC/ Biopsy specimens were acquired and processed using a 10ml syringe, a 22 gauge spinal needle with stylet/18G true cut biopsy needle, a slide, an alcohol bottle, formalin IV, and sterile gloves. The procedures were carried out under local anaesthetic with the use of imaging. In case of patients with hemangiomas and simple cysts either follow up (average 7.5 months) or post-surgical histopathology has been considered

Data and various findings seen in MRI scan collected and results were tabulated. Then compared with the final diagnosis made on surgery/biopsy/FNAC /aspiration or by therapeutic follow up and the relevant statistical analysis was done.

Result:

The present study included 40 patients with suspected FLLS, comprising 20 males and 10 females (Table 1) . With age ranging from 17 to 70 years (Table 2)

Table 1: Sex distribution

Sex	Number of cases	Percentage
Male	26	65%
Female	14	35%

Table 2: Age distribution

Age	Number of patients (n)	Percentage (%)
10-20	1	2
21-30	2	6
31-40	6	14
41-50	8	20
51-60	14	36
61-70	9	22

Table 3: Distribution of cases

Nature of Lesion	Number of patients	Percentage (%)
Benign lesions		
Simple cyst	5	12.5
Abscess	7	17.5
Hydatid cyst	4	10
Hemangiomas	4	10
Polycstic liver disease	2	5
Biliary cyst adenoma	1	2,5
Regenerative nodule	1	2.5
Total	24	60
Malignant lesions		
Metastasis	9	22.5
Hepatocellular Carcinoma	4	10
cholangiocarcinoma	3	7.5
total	16	40

Table 4: Correlation between radiological and histopathological diagnosis

Radiological diagnosis	Number of cases	Pathological confirmation	
		Same	Different
Simple cyst	5	5	-

Abscess	7	7	-
Hydatid cyst	4	4	-
Hemangiomas	4	4	-
Polycstic liver disease	2	2	-
Biliary cyst adenoma	1	1	-
Regenerative nodule	1	1	-
Metastasis	9	8	1
Hepatocellular Carcinoma	4	3	1
cholangiocarcinoma	3	3	-
Total	40	38 (95%)	2 (5%)

Discussion:

A total of 40 patients were studied. The MRI diagnosis was determined with the clinical situation in mind. With biopsy/FNAC, final diagnoses were achieved in agreement. In 38 of the 40 patients, accurate pathologic characterization was obtained. The number of lesions accurately defined on MRI is 38. The total number of lesions is 40. The percentage is 38/40, which equals 95%. On MRI, 95% of the focal liver lesions in this study were correctly identified.

Smith et al [13] employed 0.04 T MRI to show a liver tumour with the same T1 relaxation time as blood, and this tumour was eventually diagnosed as a Hemangioma, which was confirmed in surgery. Smith et al [14] published a liver NMR (nuclear magnetic resonance) study with 50 patients later in 1981, and he found that the specificity of MRI based on T1 relaxation time calculations is superior to that of ultrasonography and radionuclide tests.

Yamashita et al. [15] investigated the role of spin-echo (SE) and contrast material enhanced dynamic magnetic resonance (MR) imaging in the identification of focal liver lesions. Signal intensity on T2-weighted images, tumour margin, and internal architecture were discovered to be significant determinants for SE imaging. The hemodynamic and pattern of enhancement were important aspects in dynamic imaging. A logistic regression study revealed that these measures properly classified 86% of lesions.

Huppertz et al [16] investigated the safety and efficacy of gadoxetic acid disodium-enhanced magnetic resonance imaging (MRI) in 169 patients with localised liver lesions, as well as pathological correlation.

He discovered that the number of patients with all lesions appropriately matched increased from 89 of 129 at precontrast MR imaging to 103 of 129 at postcontrast MR imaging. The number of patients in whom all lesions were correctly matched, as well as the corresponding sensitivity values, increased from 72 (55.8%), 68 (52.7%), and 66 (51.2%) with pre contrast images to 88 (68.2%), 69 (53.5%), and 76 (58.9%) with post contrast images, indicating that MR imaging with gadoxetic agents is effective.

The majority of the patients in our study were between the ages of 51 and 60. In one study, the majority of the patients (47.2%) were between the ages of 41 and 60 [17]. In another study, the average age of the study group ranged from 19 to 93 years [18].

Histopathology in the current study classifies 16 liver lesions as malignant and 24 as benign. One study's histopathology results on liver lesions show 34 malignant and 7 benign or tumor-like lesions. [19]

Conclusion:

Of the 40 tumours examined, 24 were benign and 16 were malignant. The age group spanned from 17 to 70 years, with the majority falling between the ages of 51 and 60. The most prevalent benign lesions were liver abscesses, followed by hemangiomas, and metastases were the most common malignant lesions. Ultrasonography is a useful screening tool for hepatic lesions. Ultrasonography should be conducted on all people suspected of having hepatic lesions in order to identify and localise the lesion. For delineating hepatic masses, MRI is a reliable diagnostic tool. The findings of this study show the value of utilising multi-planar imaging MRI with considerable soft tissue contrast for detecting and characterising a variety of liver diseases. When a patient is suspected of having a hepatic lesion, US is recommended as the initial screening modality. Following that, CT and MRI should be used to further describe the lesion and stage any malignant lesions.

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