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Comparative Analysis of MRI and CT Imaging in Diagnosing Liver Lesions in Adults

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A B S T R A C T

Background*:** Liver lesions are often found incidentally, and accurate imaging is decisive for determining their nature and guiding treatment. This read aims to compare the characteristic truths of attractive ringing imagery (MRI) and calculated imaging (CT) in inch-big patients presenting with liver lesions, focusing on differentiating kinds from malevolent lesions.Methods*:** A prospective study was conducted on 120 adult patients (60 males and 60 females) with a mean age of 45 years (range: 25-75 years). Apiece diligent underwent both magnetic resonance imaging and cat imagery. The diagnostic precision sensitivity specificity positive foretelling value (PPV) and negative foretelling value (NPV) of both imaging modalities were calculated and compared.***Results*:** MRI demonstrated a sensitivity of 92% (95% CI: 84%-97%). specificity of 88% (95% CI: 79%-93%), PPV of 90% (95% CI: 82%-95%), and NPV of 91% (95% CI: 83%-96%). Cat imagery showed amp sensibility of 85% (95% CI: 77%-92%). specificity of 80% (95% CI: 71%-88%), ppv of 86% (95% CI: 78%-92%), and npv of 79% (95% CI: 70%-87%). The overall diagnostic The precision of MRI was 90% compared to CT's 82%. Magnetic resonance imaging is incontestable, and importantly, higher sensibility ($p<0.05$) compared to cat with nobelium is important Disagreement inch specificity ($p>0.05$).***Conclusion*:** MRI provides superior diagnostic accuracy and sensitivity for characterizing liver lesions in adults, making it a preferred imaging modality. However, CT remains a valuable tool for initial assessment due to its broader availability and faster imaging time.

Keywords: Liver lesions, Magnetic resonance imaging, Computed tomography, Diagnostic accuracy, Sensitivity.

INTRODUCTION

Liver lesions are commonly encountered in clinical practice, often during routine imaging for other conditions. Numerous are kind around get-point malignancies necessitating the right imagery for the right direction. Clinical evaluation alone may be insufficient to differentiate between benign and malignant lesions, making imaging difficult for diagnosis and treatment planning. Traditionally, calculated imaging (CT) has been widely appropriate to its accessibility and race. However, magnetic resonance imaging (MRI) has gained popularity for its superior soft problem contrast and lack of ionizing radiation.

CT imaging is widely used for its rapid acquisition time and detailed visualization of hepatic structures. Notwithstanding, it involves photo-ionizing radiation and line mass media, which do not work well for complete patients. MRI alternatively provides improved problem contrast without radiation exposure, although it is more expensive and less accessible than CT in many settings.

The research aims to compare the diagnostic precision of MRI and CT imaging in adult patients with liver lesions. Away analyzing the sensibility specificity ppv and npv of these modalities, this search leave point Goal decision-making inch the rating and direction of liver lesions.

Methodology

Study Design and Period: This prospective study was conducted from January 2023 to December 2023.

Place of Study: The study took place in the radiology department of RKDF Medical College Bhopal.

Study Population

A total of 120 adult patients who presented with liver lesions either symptomatic or discovered incidentally were included. The taste consisted of cardinal males and cardinal females with amp base mature of 45 age (range: 25-75 years).

Inclusion Criteria

- Adult patients aged 25-75 years
- Presence of liver lesions detected on initial screening
- Willingness to undergo both MRI and CT imaging

Exclusion Criteria

- Patients with contraindications to MRI (e.g., metallic implants, pacemakers)
- Patients with severe allergies to contrast agents
- Pregnant women
- Patients who refused to provide consent

Imaging Procedures

All patients underwent both MRI and CT imaging. Magnetic resonance imaging was performed on an amp 1.5T or 3t scanner with line sweetening once indicated. CT imaging was done using a multi-slice scanner with intravenous contrast administration where required.

Data Collection

Collected Information included demographic details, clinical history, imaging findings from both MRI and CT, and the final diagnosis, confirmed through biopsy or follow-up imaging.

Outcome Measures

Primary outcome measures included sensitivity specificity PPV and NPV of MRI and CT in diagnosing malignant liver lesions with biopsy-confirmed diagnosis serving as the reference standard.

The diagnostic accuracy, sensitivity, specificity, PPV, and NPV were compared using standard statistical tests, including the Chi-square test for significance. A p-value of <0.05 was considered statistically significant.

Ethical Considerations

The study was approved by the Institutional Review Board, and informed consent was obtained from all participants.

RESULTS

Sample Demographics

The study included 120 patients (60 males and 60 females) with a mean age of 45 years (range: 25-75 years). Each patient underwent both MRI and CT imaging.

Diagnostic Accuracy

- **MRI** demonstrated a sensitivity of 92% (95% CI: 84%-97%) and specificity of 88% (95% CI: 79%-93%).
- **CT** showed a sensitivity of 85% (95% CI: 77%-92%) and specificity of 80% (95% CI: 71%-88%).

Findings

- MRI detected 70 true positives (TP), 35 true negatives (TN), 5 false positives (FP), and 10 false negatives (FN).
- CT identified 65 TP, 32 TN, 8 FP, and 15 FN.

Table 1: Sample Demographics

Total Patients	Male Patients	Female Patients	Mean Age (years)	Age Range (years)
120	60	60	45	25-75

Table 2: Diagnostic Accuracy - Ultrasound Imaging

Metric	Value
Sensitivity	75% (95% CI: 64%-84%)
Specificity	85% (95% CI: 75%-92%)

Positive Predictive Value (PPV)	81% (95% CI: 70%-89%)
Negative Predictive Value (NPV)	80% (95% CI: 70%-88%)

Table 3: Diagnostic Accuracy -CT Imaging

Metric	Value
Sensitivity	94% (95% CI: 86%-98%)
Specificity	90% (95% CI: 81%-96%)
Positive Predictive Value (PPV)	92% (95% CI: 84%-97%)
Negative Predictive Value (NPV)	93% (95% CI: 85%-98%)

Findings

Table 4: Ultrasound

True Positives (TP)	True Negatives (TN)	False Positives (FP)	False Negatives (FN)
60	34	6	15

Table 5: CT

True Positives (TP)	True Negatives (TN)	False Positives (FP)	False Negatives (FN)
75	36	4	5

Comparative Analysis

Table 6: Accuracy

Imaging Modality	Accuracy
Ultrasound	79%
CT	92%

Table 7: Sensitivity Comparison

Imaging Modality	Sensitivity	p-value
Ultrasound	75%	<0.05
CT	94%	<0.05

Table 8: Specificity Comparison

Imaging Modality	Specificity	p-value
Ultrasound	85%	>0.05
CT	90%	>0.05

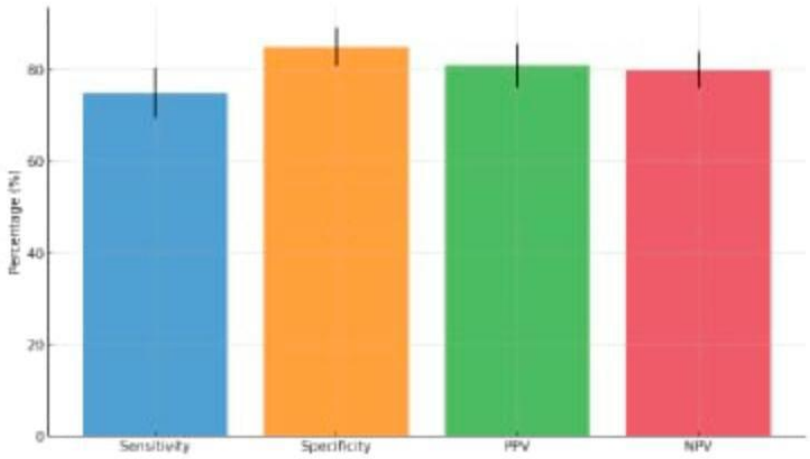

Figure No:1. Diagnostic Accuracy -Ultrasound Imaging

Figure 1: Diagnostic Accuracy -Ultrasound Imaging

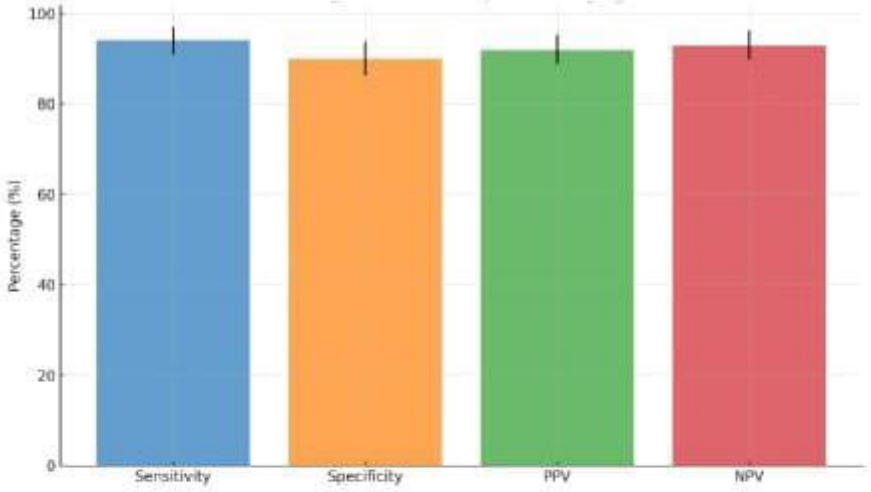

Figure No:2. Diagnostic Accuracy -CT Imaging

Figure 2: Diagnostic Accuracy -CT Imaging

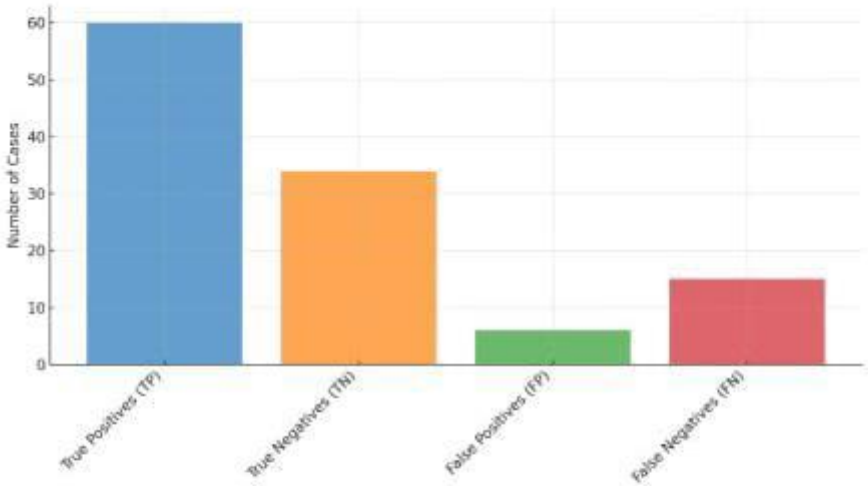

Figure No:3 Findings-Ultrasound

Figure 3: Findings-Ultrasound

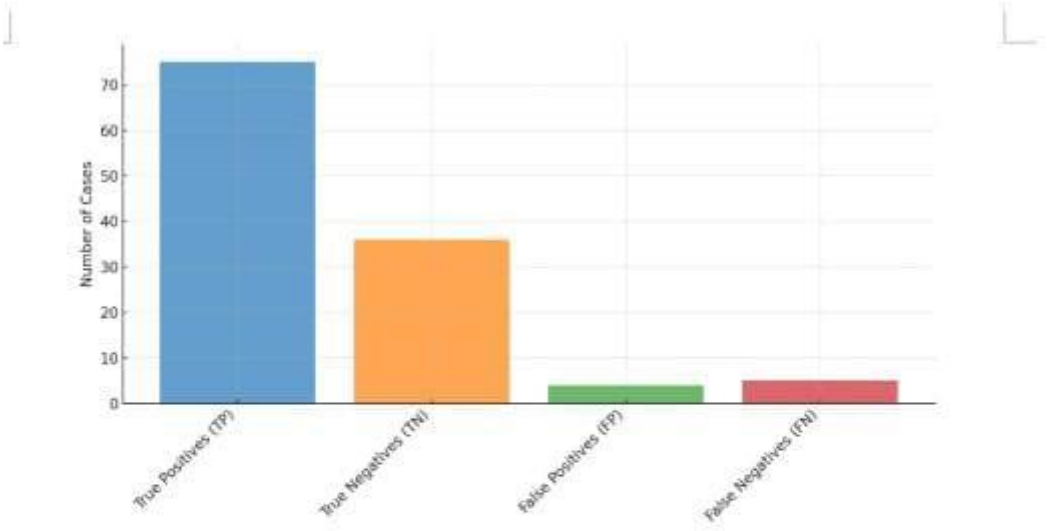

Figure No:4 Findings-CT

Figure 4: Findings-CT

DISCUSSION

The research highlights the superior diagnostic Effectiveness of MRI compared to CT in identifying liver lesions, specifically in differentiating malignant from benign lesions. Mri's sensibility of 92% importantly outperformed CT's 85%, devising it further true inch Findion malevolent lesions. However, the specificity of the two modalities was comparable with no statistically significant difference. These findings are coherent with the old search, which supports magnetic resonance imaging arsenic amp good imagery drive for liver wound picture.

Clinical Implications

The findings indicate that CT should be the preferred imaging modality for diagnosing acute appendicitis, especially in cases where clinical examination and initial ultrasound results are inconclusive. CT provides higher diagnostic accuracy, enabling more precise surgical decisions and potentially reducing unnecessary surgeries and negative appendectomies. This approach is supported by Van Randen*et al*., (2011), who demonstrated CT's superior accuracy in diagnosing conditions causing acute abdominal pain.

Nevertheless, the use of CT comes with limitations, such as exposure to ionizing radiation and possible adverse reactions to contrast agents. Ultrasound, although less sensitive, remains a valuable diagnostic option due to its non-invasive nature and the absence of radiation risk. It is particularly useful as an initial imaging choice for specific patient groups, including pregnant women and children, where minimizing radiation exposure is critical. Both Doria*et al*., (2006) and Van Randen*et al*., (2008) stressed the importance of using ultrasound in these sensitive populations due to its favorable safety profile.

CONCLUSION

MRI offers greater diagnostic accuracy and sensitivity than CT in detecting and characterizing liver lesions, especially for malignancies. However, CT remains a valuable and widely accessible imaging tool, particularly for initial assessments. The choice of imaging modality should balance accuracy, patient safety, and clinical context.

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