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Radiological Evaluation of Liver Lesions and Correlation with Histopathology

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ABSTARCT
This original research article is to study various types of lesions of liver and their evaluation by ultrasonography and computed tomography. Correlation with histopathology is done to know the accuracy of imaging to detect liver lesions.

I. INTRODUCTION

The liver is the largest solid organ of the body and constitutes 2% of the body weight, varying in adult from 1200-1500gms. Its functions are remarkably diverse and anatomy correspondingly complex. It is designed in the pattern of a complex matrix of functional parenchyma which is richly supplied by both systemic and splanchnic blood. Liver, probably as a consequence of its anatomic location, size, dual blood supply and favourable nutritional elements, is the site of many focal lesions within it. The study of liver lesions is particularly challenging, because many adults have benign, nonsurgical hepatic lesions, such as haemangioma or simple cyst which are managed conservatively while the malignant lesions which are more commonly seen in elderly patients require surgical management.

II. AIMS AND OBJECTIVES

1) To study various Ultrasonographic and CT patterns of focal liver lesions in arriving at a specific diagnosis before surgery or biopsy.
2) To evaluate the importance of image guided extraction of tissues and fluids for histopathological(biopsy/ FNAC) examination.
3) To correlate the radiological diagnosis by histopathological(biopsy/FNAC) studies.

III. REVIEW OF LITERATURE

A study conducted in 2006 by Stephanie R Wilson et al in 96 patients found that benign lesions such as haemangiomas were 27%, focal nodular hyperplasia were 20%, liver abscesses were 3% and hydatid cysts were 3%. Malignant lesions like hepatocellular carcinoma were 30% and metastasis were 15%[1].

A study conducted in 2013 by Dr. Vishwanath. T. Thimmaiah in 106 patients found that liver abscesses were 31%, primary malignant liver lesions were 29%, metastasis were 25%, haemangiomas were 5.7%, hepatic cysts were 5% and hydatid cysts were 4%[2].

A study conducted by in 2014 by Dr. HiralHapani et al in 50 patients found benign lesions like liver abscesses in 36%, haemangiomas in 16%, simple liver cysts in 12%, hydatid cysts in 6% of cases while malignant lesions like hepatocellular carcinoma in 8%, metastasis in 14% and contusion/laceration in 8% of cases[3].

In a study Conducted in 2016 by Garima Jain et al in100 patients found that liver abscesses were 27%, simple liver cysts were 14%, hydatid cysts were 7%, haemangiomas were 5%, focal fatty infiltration were 3%, focal fat sparing were 3% regenerative nodules were 3%. Malignant lesion primary hepatocellular carcinoma were 8% and liver metastasis were 30%[4].

LIVER IMAGING MODALITIES

ULTRASOUND:

Ultra sound is a simple, noninvasive, easily available and cost effective primary and important tool in the evaluation of focal liver lesions. The real time scan has many advantages and is easier to perform and it can easily be maneuvered and most of the liver can be evaluated. It provides easy visualization of vascular land marks. The liver is evaluated in both transverse and longitudinal planes. The liver is examined using 3 to 3.5MHz transducers. For children and superficial lesions in adults, 5 MHz transducer is necessary. Doppler is an integral part of the examination of the liver, allowing demonstration of hepatic blood flow and identification of the bile ducts.

CONTRAST ENHANCED ULTRASOUND:

The introduction of gas micro bubble agents in ultrasonographic examination has had a

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remarkable impact on the evaluation of tumoral vascularization. The combination of a contrast agent and tissue harmonic imaging technology has been reported to be helpful in the differential diagnosis of hepatic tumors on the basis of characteristic appearances of hepatic tumours[5].

ULTRASOUND ELASTOGRAPHY:

Transient elastography(TE, FibroScan) is a novel non-invasive method that has been proposed for the assessment of hepatic fibrosis in patients with chronic liver diseases, by measuring liver stiffness[6].

COMPUTED TOMOGRAPHY:

Multi-detector helical acquisition CT systems allows complete data acquisition of the upper abdomen in 5–10sec and a choice of section thickness post acquisition. Unenhanced imaging is valuable for assessing diffuse hepatic changes, such as fat infiltration and iron deposition, and focal changes, such as subtle calcification and hemorrhage. Contrast enhanced imaging following IV administration of water-soluble contrast medium is widely used for the detection and characterization of focal lesions. Arterial phase (20–40sec post injection), portal phase (60–80sec post injection) and delayed phases of CT imaging is widely used for detection and characterization of liver lesions. The normal liver parenchyma is homogeneous with attenuation values of 50–60 HU[7,8].

MAGNETIC RESONANCE IMAGING:

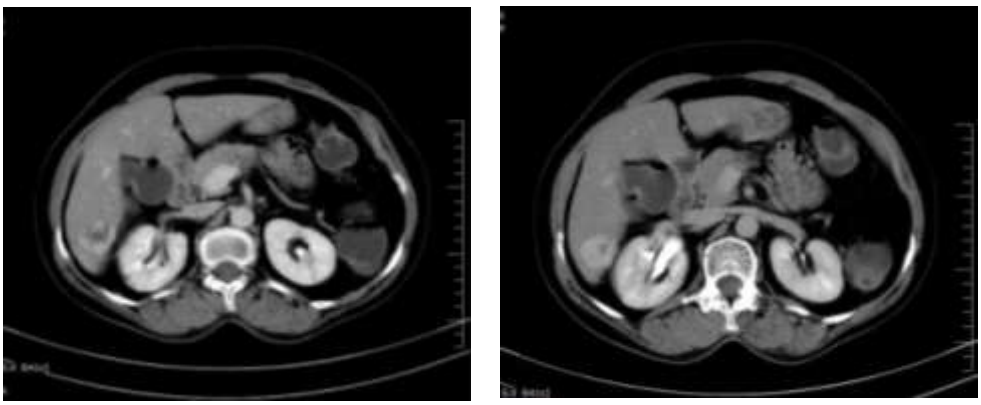
MRI has a relatively limited role in liver evaluation. At most institutions MRI serves primarily as a problem solving technique and is used only in selected clinicalsituations. Reasons for the limited use of hepatic MRI include cost, availability, length of examination, and limited evaluation of pulmonary and extra hepatic abdominal disease[9,10].

RADIOISOTOPE SCANNING:

The dominant cell populations of the liver are hepatocytes (85%) and reticulo endothelial or Kupffer cells (15%), which are also found in the spleen, the bone marrow and the lymph nodes. These reticulo-endothelial cells remove colloids from the blood, so the liver can be scanned after intravenous injection of 99mTc- colloid particles or milli microspheres of albumin (10microns). 80-90% of this activity is accumulated in liver and spleen. 10 minutes after intravenous injection of 75 MBq of colloid, anterior, lateral and posterior images of the liver and spleen are recorded, with at least 5 Lakh counts per image

IV. FINDINGS

a **b**



a) Post contrast axial CT image in arterial phase showed early peripheral nodular enhancement of thelesion.

b) Portal phase image showed centripetal progression of enhancement of the lesion. Radiological diagnosis is hemangioma and fnac confirmed the same.

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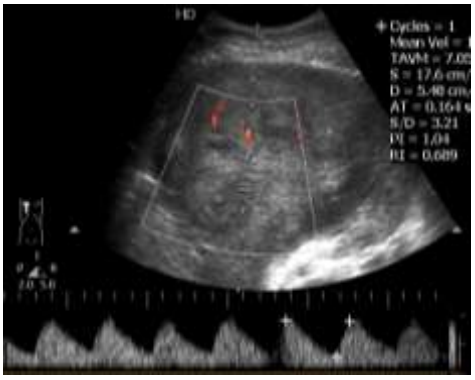
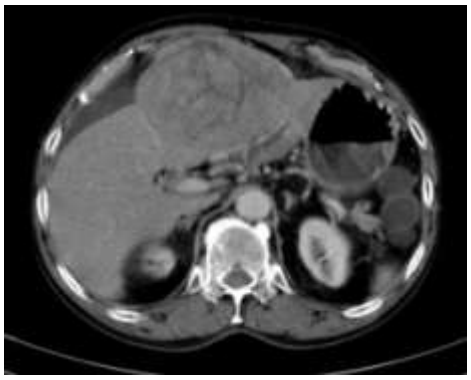


a

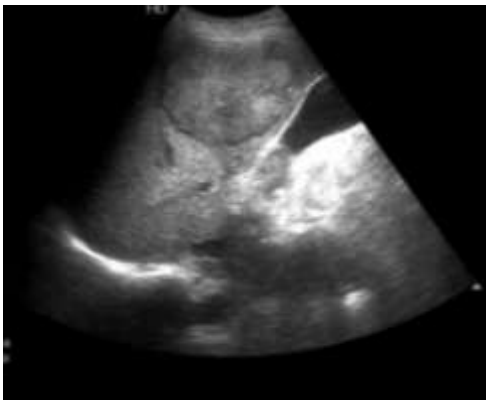


b

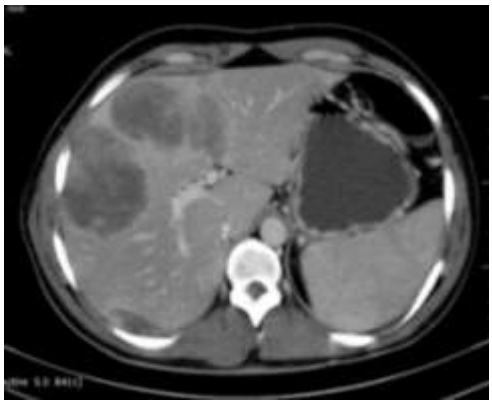
a) Ultrasound image showed large well defined heterogeneously hyperechoic lesion with peripheral thin hypoechoic rim in left lobe of the liver which demonstrated internal vascularity on color Dopplerexamination.
b) Post contrast arterial phase image showed early enhancement of the lesion. The lesion is causing mass effect over adjacent vessels and capsular stretching noted.

Radiological Diagnosis was suggestive of Hepatocellular carcinoma. Histopathology also confirmed the thelesion as Hepatocellular carcinoma.

a



b



a.Ultrasound image showed multiple well defined iso echoic lesions with peripheral thin hypoechoic halo noted in right lobe of liver.
b.Portal phase image demonstrated the lesions more conspicuously with progressive enhancement.

Radiological Diagnosis was suggestive of liver metastasis. Histopathology from liver lesion confirmed as metastasis from adenocarcinoma of GIT.

V. DISCUSSION

A prospective study was conducted in 50 patients who had underwent both abdominal ultrasonography and computed tomography and correlation was done with histopathology (FNAC/FNAB) for confirmation.Focal liver lesions were ranged from 17 to 69 years with mean age of 43years.
Most common age group to be involved was 40-49years.
M:F ratio was3.1:1.
Most common liver lesion was metastasis with mean age for liver metastasiswas51.5 years.
Metastasis to the liver was more common among males thanfemales.
Most common primary tumour metastasizing to the liver was fromGIT.
Hepatocellular carcinoma was second most common lesion and mean agewas 48years.
Hepatocellular carcinoma was more common among males than infemales

Liver abscesses were more common among malepatients.
Amoebic abscesses were more common than pyogenicabscesses.
Right lobe was more commonly involved in case of amoebic abscesses while left lobe was more commonly involved in pyogenicabscesses.
Haemangiomas were more common among femalepatients.
Hydatid cysts were more common among malepatients.
Ultrasound was less sensitive and less specific in diagnosis of liver lesions when compared toCT.
Computed tomography was most accurate in diagnosing focal liver lesions and results were closely correlating with histopathology.
Among all 50 cases, only 4 cases were misdiagnosed radiologically, of which two cases were false positive abscesses and two cases were false negative metastasis. This shows excellent correlation between radiological and histopathological diagnosis of various liver lesions.

VI. CONCLUSION

Liver lesions are of varying etiology and is important that proper etiological diagnosis is arrived in order to treat correctly. Clinical diagnosis based on examination can be very inaccurate, radiological investigations using ultrasonography and computed tomography can help us to arrive at an accurate diagnosis most of the times. Image guided Biopsy/FNAC can confirm/dispute radiological diagnosis.

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