RESEARCH ARTICLE

COMPARATIVE EVALUATION OF ULTRASONOGRAPHY AND COMPUTED TOMOGRAPHY IN FOCAL LIVER LESIONS

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Manuscript Info	*Abstract*
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Introduction: Liver diseases are among the commonestcauses of morbidity and mortality and accurate characterization is an important goal of diagnostic imaging.The aim of the study is to establish the role of ultrasonography and CT in differentiation and early diagnosis of focal liver lesions and to correlate the findings with pathological diagnosis.

Methodology:Th**is** prospective comparative observational and hospital based study was conducted on 100 patients. USG and CT were performed on focal hepatic mass patients. Diagnostic value of USG were compared with to those of CT.

Results: Ultrasonography and CT evaluation results were compared with final diagnosis by FNAC/ HPR.USG showed maximum cases among malignant lesions were HCC (20%) and among benign lesions were liver abscess (19%).CT diagnosed maximum number of cases as metastasis (19%) in malignant lesions andalmost equal percentage of hemangiomas(15%) and liver abscess(16%) among the benign lesions. The sensitivity and specificity of USG in diagnosing lesions turned out to be slightly less than that of CT.

Conclusion: The study concluded that ultrasonography can be adopted as the initial imaging modality with advantages of differentiating cystic from solid lesions, relationship with critical structures and can guide FNAC and biopsy. CT has a comparatively higher sensitivity and specificity in detection of lesions and can help narrow the differentials.

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Introduction:-

Liver diseases are among the commonest causes of morbidity and mortality,encountered in day-to-day practice.[1] Liver masses present a relatively common clinical dilemma, especially with the increasing use of various imaging modalities in the diagnosis of abdominal and other symptoms. Focal liver lesions are defined as solid or fluid-containing masses that are foreign to the normal anatomy of the liver and can be distinguished from the latter by imaging.[2]Focal hepatic mass lesions can be divided into four broad entities-Congenital lesions,Inflammatory and infectious lesions,benign tumours,primary and secondary malignant tumours[3].Following history and clinical examination, ultrasound has become one of the first and most useful investigation methods for patients CT offers the best spatial resolution and the ability to study the entire liver in a single breath hold[4].MDCT is currently the imaging method of choice for evaluating the liver and detecting liver masses, as it allows an excellent morphological

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representation of diffuse or focal intrahepatic masses, as well as the anatomical relationships between the liver and neighbouring organs.[5]

Materials And Methods:-
The prospective observational type of study was done in the department of radiodiagnosis, RNT medical college for a period of one year from June 01 2020 to June 01 2021. Study was done on a total of 100 patients who were referred to our department with clinically suspected focal liver lesions or incidentally detected by imaging. Patients presenting with history of trauma, pregnant women, patients with history of contrast allergy were excluded from the study. Ultrasonography wasdone in patients by using curved array transducer (ranging from 3 to 5 MHz).CT was done in 128 slice MDCT scanner with 120 KVp and 100-300 mAs with 5mm thickness and retro reconstruction of 1.25 mm thickness. For contrast study, 100 ml of 350mg/ml non ionic iodinated contrast (Iohexol) was injected in adults at the rate of 3-4ml/sec.Inchildrenadoseof2ml/kgof350mg/ml non ionic iodinated contrast (Iohexol) was injected at a rate of 1.5-2ml/sec.To establish the role of ultrasonography and CT in differentiation, characterization and early diagnosis of focal liver lesionsand to correlate the findings with final diagnosis pathological diagnosiswas the primary objective of this study.

All the data were entered into a Microsoft Excel spreadsheet. Analysis of the statistical data obtained from the study was carried out by statistical programming software Statistical Package for the Social Sciences - SPSS Statistics Version 24.P-Value <0.05 was considered statistically significant.

Observations:-
Out of 100 patients enrolled for the study, maximum patients belonged to the age group of 50-70 years. Maximum age was 87 years and minimum age was 3 years with a slight male predominance.

On ultrasonographic evaluation, most common echogenicity pattern found were hypoechoic lesions in 36% of patients and mixed heterogenous lesions in 31% of patients.Specific target like appearance were seen in 9% of patients.

On CT studies which were performed, MDCT were done in all patients and wherever possible, triple phase CT were also done which included 26 patients among the 100 patients enrolled.

CT attenuation studies showed a maximum of 50% lesions showing a hypodense appearance followed by mixed attenuation in 31% of lesions. Cystic appearance was seen in 5 (5%) of patients. CECT showed enhancement in 80 (80%) lesions on contrast administration. The patterns of enhancement were also taken into account on reaching the diagnosis with 10 lesions showing peripheral nodular enhancement, 14 lesions showing peripheral rim of enhancement and 8 lesions showing homogenous enhancement.

Maximum number of lesions i.e., 59 (59%) were benign lesions and 41 (41%) of cases were malignant on final diagnosis.

Table 1:- Distribution of cases diagnosed in USG.

USG diagnosis	No. of patients	Percentage (%)
Hemangioma	13	13
Liver abscess	19	19
Hydatid cyst	12	12
Simple liver cyst	6	6
Focal fat sparing	1	1
Hepatocellular carcinoma	20	20
Hepatoblastoma	1	1
Cholangiocarcinoma	5	5
GB mass	2	2
Hepatic adenoma	1	1
Metastasis	19	19

Table 2:- Distribution of cases diagnosed in CT.

CT diagnosis	No.of patients	Percentage (%)
Hemangioma	15	15
Liver abscess	16	16
Hydatid cyst	12	12
Simple liver cyst	7	7
Focal fat sparing	2	2
Hepatocellular carcinoma	16	16
Hepatoblastoma	1	1
Cholangiocarcinoma	6	6
GB mass	2	2
Hepatic adenoma	1	1
Metastasis	19	19

Table 3:- USG sensitivity and specificity in lesion characterization.

Characterization	Sensitivity (%)	Specificity (%)
Benign	83.87	90.70
Malignant	97.67	87.10

Table4:- CT sensitivity and specificity in lesion characterization.

Characterization	Sensitivity (%)	Specificity (%)
Benign	91.94	95.35
Malignant	97.67	91.90
Malignant	97.67	87.10

Discussion:-

The present study was done to assess the role of USG and CT in early detection and characterisation of focal liver lesions and their correlation with pathological diagnosis. In our study, we analyzed the USG and CT of focal liver lesions of 100 patients ranging from 3-87 years with clinically suspected liver lesions or incidentally detected liver lesions.

Haemangioma is considered commonest benign lesion of liver[6].In our study, haemangioma accounted for 16 cases (16%) which was less than the prevalence of liver abscess, 20 cases (20%) among the benign lesions. Ultrasonography diagnosed 14 lesions (14%) to be haemangioma with a sensitivity and specificity of 64% and 96% respectively. CT diagnosed 15 cases (15%) as haemangioma with a sensitivity and specificity of 76% and 96% respectively. it has a higher sensitivity possibly due to the typical peripheral nodular enhancement pattern and homogenous enhancement in delayed phase [7](Table-1).

Liver abscess accounted for 20 cases (20%) in our sample population. The results were comparable to the study done by Kuku Mariam et al in 2008.[8]

Hydatid cysts can have different appearances depending on the stage of evolution[9]. It comprised 11 cases (11%). USG could diagnose 8 cases out of the 11 correctly. 4 false positive cases were also present which later turned out to be 2 cases of liver abscesses and 2 cases of haemorrhagic cysts. CT diagnosed 13 cases as hydatid cyst with a sensitivity and specificity of 91.6% and 97.85% respectively. This can be compared to the study done by Garima Jain et al in 2016 which showed 100% sensitivity and 100% specificity for hydatid cyst detection.[10]

Figure 1:- USG image showing anechoeic lesion with internal echogenic membrane suggestive of hydatid cyst with detached laminated membrane.
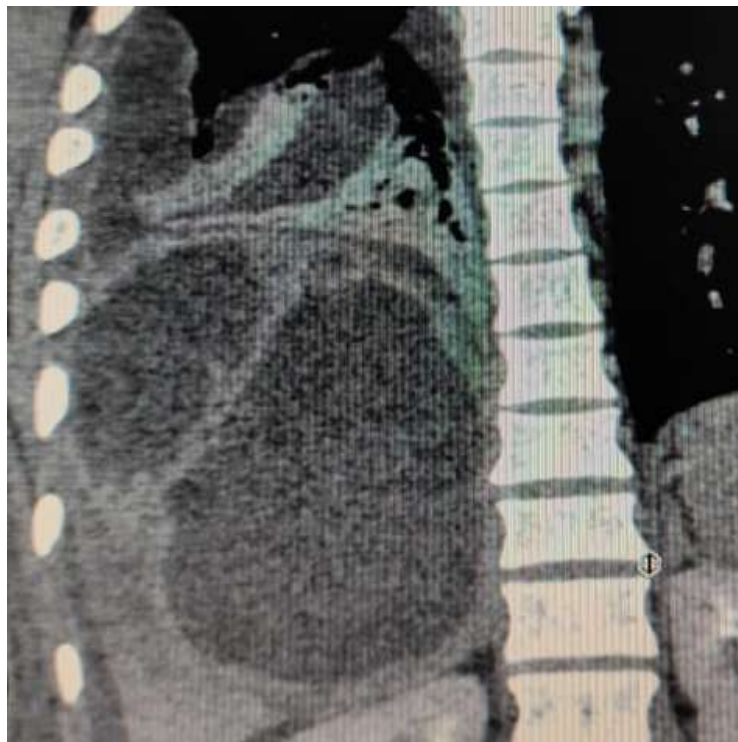

Figure 2:- A case of hepatic hydatid cyst with rupture into pleural cavity.

Hepatic cysts are very common lesion seen in liver on routine radiological evaluation.[11] Although the typical liver cyst with anechoic appearance and thin walls were identified correctly by USG and CT, those with haemorrhagic

transformation posed some inaccuracy. CT however gave a 100% sensitivity and 97.96% specificity in diagnosis of hepatic cysts.

Focal fat sparing included 2 cases (2%) of our cases. Although ultrasonographic evaluation accounted only fora sensitivity of 50% in detection, it showed a specificity of 100%. CT could give a specificity as well as sensitivity of 100% possibly due to the typical location and normal traversing of blood vessels through the area.[12]

Hepatic adenomas are benign lesions most commonly in young women on oral contraceptive pills[13]. Our study had 3 cases of hepatic adenoma, all of them were females in the age group of 30-40 years. USG showed sensitivity of 33.33%, however specificity of 100% and CT showed a sensitivity and specificity of 66.6% and 100% respectively.

Hepatocellular carcinoma comprised 14 cases (14%) and was one of the most common lesion identified in our sample population. Characterization of lesion as malignant in USG was based on the criteria including hypoechoic appearance or hypoechoic halo, ill defined margins, involvement of adjacent structures, presence of internal vascularity and presence of enlarged adjacent lymph nodes. USG showed a sensitivity and specificity of 73.33% and 88.89% respectively. CT evaluation with contrast enhancement diagnosed hepatocellular carcinoma with a sensitivity and specificity of 80% and 94.44% respectively. Triple phase CT was done whenever possible and the lesions showed significant enhancement in arterial phase and washout in portal venous phase.

Figure 3:- USG image showing large heterogenous lesion with ill defined margins, a case of hepatocellular carcinoma.

Hepatoblastoma is the most common primary malignant liver tumour in children under four years[14]. Our case was a three year old girl who presented with abdominal pain and anorexia. The USG as well as CT studies could identify the lesion with 100% sensitivity and specificity.

Cholangiocarcinoma is the second most common primary hepatobiliary malignancy after HCC[15]. Our study population had 8 (8%) cases of cholangiocarcinoma. USG had a sensitivity of only 50% in diagnosing the lesion. However the specificity reached 97.94%. CT showed a sensitivity of 62% and specificity of 98.97%.

Metastasis comprised 14 (14%) of our cases. The exact radiological identification of metastasis can be difficult due to its widely variable appearance mimicking other benign lesions like haemangioma and focal nodular hyperplasia[16]. USG showed a sensitivity of 80% and specificity of 91.1%. The target like appearance of metastasis helped in its accurate diagnosis whenever present. CT detection showed a sensitivity of 73.33% and specificity of 94.44%. In the

study by Garima Jain et al in 2016, the hepatic metastasis showed sensitivity and specificity of 90.1% and 97% respectively.[10]

Net evaluation showed the sensitivity and specificity of USG in lesion characterization as benign to be 83% and 90% respectively and as malignant to be 97% and 87% respectively(Table-3). The sensitivity and specificity of CT in lesion characterization as benign was 95% and 91% respectively and as malignant was 97% and 91% respectively (Table-4).

Conclusion:-
In our study, most common benign liver lesion was of infective etiology, with liver abscess being the commonest. Among benign lesions, haemangioma also had a higher prevalence. Among the malignant lesions, metastasis was the most common lesion followed by hepatocellular carcinoma.

Ultrasound is an effective and safe method of detection of focal liver lesion. Its easy availability, and lack of dependence on function of organs makes it most ideal for imaging of liver. Apart from detecting lesion, other important information like ascites, vessel involvement, primary source of malignancy in abdomen and pelvis also be easily assessed.

Computerized tomography has a comparatively higher sensitivity and specificity in detection of lesions. CT is particularly useful to assess the enhancement pattern of the lesions like haemangioma and in differentiating the malignant lesions by triple phase study. Computerized tomography is also useful to determine density of a lesion, hence will help in detecting calcification, haemorrhage, fatty changes and fluid content of a lesion.

In conclusion, this study shows that ultrasonography along with the additional findings of colour doppler evaluation can be used as the initial imaging modality in focal liver lesions and can also be used to guide aspirations, FNAC and biopsy. CECT/triphasic CT is the modality with a higher diagnostic accuracy and can help narrow the differential diagnosis.

Conflicts of interest:
Nil.

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