Our experience with Radio - Pathological diagnosis of liver lesions in a tertiary health care centre.

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Abstract

Introduction: The diagnosis of space occupying lesions of liver is always a challenge especially when the lesions are multifocal in location. Imaging modalities, serum markers and pathological investigations will definitely help in arriving at a specific diagnosis for appropriate patient management and prognosis.

Aim: The aim of the current study is to know the importance of various imaging modalities in diagnosing the space occupying lesions of liver and to find an association of Radiological with Pathological diagnosis and serum markers.

Materials and methods: This retrospective study was performed over period of one year. Clinically suspicious cases for malignancy were assessed by the imaging modalities such as Ultrasonography (USG), Computed Tomography (CT) or Magnetic Resonance Imaging(MRI). Further Radiologically confirmed cases were subjected for Fine needle aspiration (FNA)/biopsy under the USG guidance, while serum markers were retrieved from laboratory investigation archives. Association of Radiological and Pathological diagnosis with serum markers was performed and analyzed.

Results: The study was conducted on 70 cases of hepatic lesion. Male to female ratio was 1.5:1 with mean age of 54.47±1.5. Most of cases were diagnosed with MDCT scan. About 95.7% cases were malignancy of which 13.4% were HCC. Among malignant cases, metastatic lesions were more prevalent which were mostly adenocarcinoma. Radiological and pathological diagnosis found to have significant association, only few cases showed the discrepancies. Serum AFP was found to have high levels in 7 cases of HCC, while other 2 HCC cases and metastatic lesions were within normal range.

Conclusion: The diagnostic accuracy of hepatic lesion enhances with utility of radiological patterns in conjunction with pathological diagnosis and serum markers. Association of radiological and pathological findings found to have statically significant value in the current study.

Key words: hepatic lesions, hepatocellular carcinoma, metastatic malignancy and Radiological imaging.

Introduction

Hepatic space occupying lesion usually presents with clinical difficulties and with diagnostic problems. The differential diagnosis of liver space occupying lesions includes neoplastic and non-neoplastic conditions; neoplastic conditions includes: primary neoplasm (benign or malignant) and secondaries (metastatic deposits)[1].

The radiologic features of hepatic lesions evaluated with Ultrasonography (USG),cross sectional modality using Computed Tomography (CT) or Magnetic Resonance Imaging (MRI) are very considerate in reaching at probable diagnosis. Integrating both radiological and serological markers can further narrow down the differential diagnosis[2]. Hence, accurate and reliable determination of nature of these lesion is crucially important because of different prognostic and therapeutic implications[3].

Among hepatic primary malignancy, Hepatocellular carcinoma (HCC) is most prevalent neoplasm worldwide, accounting for about 80% of cases with increase rate of mortality, due to the increase burden of various risk factors such as hepatitis, alcoholism, alflatoxin B1 and etc[4]. Secondaries in liver is more common than primary hepatic tumors and most frequently from gastrointestinal tract, lung, breast and

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pancreas[5].

Alpha fetoprotein (AFP) is a serum glycoprotein is considered as a serological marker for HCC, which was recognized more than 40 years ago. HCC can produce AFP ranging from normal to >1000ng/ml. AFP value of 400- 500 ng/ml is considered diagnostic with proper clinical and radiological context. However due to its low sensitivity in detecting the early stage of disease, it was considered to be controversial for HCC surveillance[6].

Imaging modalities such as USG is used as screen test, were as CT with the use of various intravenous contrast agents and using liver specific protocols such as : in arterial phase (25 - 30 secs), portovenous phase (60-75 secs),venous phase (3-5 mins) and delayed phase (5-10 mins). MRI is considered to have more diagnostic accuracy[3]. Advances in dynamic imaging modalities, have yielded a specificity of 98.9% in the diagnosis of HCC. However, false negatives are more common with small sized hepatocellular nodules; sensitivity for HCC with size of 1-2 cm is approximately 40-47%[4].

The role of pathological diagnosis especially cytological diagnosis of hepatocellular nodular lesions has advanced over the years. Smaller nodules are being recognized on increasing surveillance of high-risk patients. The advantage of fine needle aspiration cytology is obvious as it may preclude the need of diagnostic laparotomy, especially in inoperable cases and lead to choose a specific treatment without delay[7].

The diagnostic accuracy of liver mass lesion enhances with utility of imaging modalities, pathological diagnosis and serum markers. Although clinical data, radiological findings of liver lesions can narrow down the diagnostic possibilities, however pathological diagnosis is justifiable before initiating the specific treatment.

Thus the current study was intended to know the pathological spectrum of liver lesion and to evaluate the association of Radiological findings with that of Pathological diagnosis, obtained from USG guided fine needle aspiration cytology/biopsy.

Aims and objectives:

The aim of the study was

1. To study various imaging modality patterns in space occupying lesions of liver and arriving at a specific diagnosis.
2. To assess the importance of image guided extraction of tissues for pathological examination.
3. To find the association of Radiological diagnosis with Pathological diagnosis.
4. To find association between serum markers and hepatic lesions.

Materials and Methodology:

This retrospective study was held over a period of one year in the Department of Radiology in the Tertiary health care center. All diagnosed hepatic mass lesion were included in the study. The results were analyzed.

Statistical analysis: descriptive and chi square test was used to analyze the data using SPSS Software (version 23).

Inclusion Criteria

All diagnosed hepatic mass lesion were included in the study

Exclusion Criteria

1. Patients with marked hemorrhagic diathesis.
2. Critically ill patients.
3. Non cooperative patients.

Imaging modalities:

Various imaging modalities were used, they are as follows.

1. Ultrasonography of liver imaging was obtained with help of GE VOLUSON, PHILIPHS ENVISOR MACHINES. Convex and linear transducer with frequency of 3-5 Mhz and 6 -9 mhz were used.
2. Computed Tomography CT (MDCT) is imaging technique for liver lesions. Plain CT of abdomen was performed following which 100-120 ml of iodinated contrast was injected intravenously through a 20 gauge cannula at rate of 4ml/sec with an automated power injector. Triphasic CT Images were obtained with GE 16 SLICE machine. Triple phase after iodinated contrast injection at a delay of 25s (arterial phase), 70s (portal venous phase) and 90s (venous phase). Delayed images were obtained after 5 mins.

MR imaging was performed on 3T systems (General electrical medical systems) by using hepato specific contrast media such as gadolinium ethoxybenzyl diethylenetriamine pentaacetic acid. Various phase imaging was obtained after fulfilling the respective phase specifications.

Imaging analysis

All the images depending on morphology, signal characteristics, enhancement patterns in arterial, portal, venous and delayed phases and diffusion/ ADC maps, the lesions were characterized and revived by two experienced Consultant radiologist.

Serum markers

Alpha fetoprotein (AFP) and other serum marker such as CEA, CA19-9, PSA, CaA125 were retrieved from the laboratory investigation archives (Back bone).

Pathology

Fine needle aspiration cytology (FNAC) was performed on these patients in the Radiology Department by Radiologist under ultrasound guidance with aseptic precautions. An informed consent was taken, confidentiality ensured and the patients were explained about the purpose, procedure, risks and the benefits.

Aspiration procedure was performed using 22-guage needle or long spinal needle attached to 10ml disposable syringe. Under aseptic precaution, the needle was introduced percutaneously into the lesion and to and fro movements done in various directions. A negative pressure was applied to aspirate the material. The aspirate was ejected on clean slides and smeared. The slides were stained with May-Grünwald-Giemsa or fixed in 95% ethanol and stained by Papanicolaou's stain. Stained smears were observed under binocular light microscope for cytomorphological features.

Some cases were subjected for histopathological examination such as biopsy/excision was performed under USG guidance and the samples were collected in a formalin container and sent to the Department of Pathology. The specimen was processed and the slides were stained with H and E stain.

All the pathology slides were reviewed by two Consultant Pathologist.

Results

Seventy cases of hepatic lesions were enrolled in the study. Male preponderance (40 cases) was noted with M:F ratio of 1.5:1. The cases were in wide age range between 28-80 years and peak age of incidence was noted between 40-60 years with mean age being 54.47±1.5.

Radiological diagnosis:

Most of the cases were diagnosed by imaging modality such as MDCT scan. Among 70 cases; 6 cases were diagnosed using USG of which 2 cases were HCC (figure 2), 1 - cholangiocarcinoma, 1 -benign cyst (figure 1), 1 - hemangioma (figure 4), 1- metastasis (figure 3) which were further confirmed with MDCT scan and only one cases (HCC) was diagnosed with aid of MRI due small size lesion (< 2cm).

About 95.7% were malignant cases of which13.4% were HCC, 0.1% cases of cholangiocarcinoma and 86.5% cases of metastasis, 4.3% were benign cases. The HCC on CT imaging showed early arterial enhancement and washout in the venous phase with delayed capsular enhancement (figure 2) (table 1). While metastasis showed heterogeneous enhancement and some of them show peripheral enhancement in venous phase (figure 3) (table 1).The size of the lesion varied from 1.2cm to 9 cm with an average of 5.5 cm. However the size of the lesion could not predict the malignant nature of lesion.

Table 1: Computed tomographic enhancement of hepatic lesions

Number of lesion	**Total number of cases :70**	**Percentage**
Single	**10**	**14.3%**
Multiple	**60**	**85.7%**
Plain		
Hypodense	70	100%
Contrast enhancement		
Arterial		
Enhancing	07	10%
Nonenhancing	63	90%
Venous		
Enhancing	61	87.2%
Nonenhancing	2	2.9%
Delayed enhancement		
Enhancing	2	2.9%
Nonenhancing	2	2.9%

Pathological diagnosis:

Majority of the cases were diagnosed by cytological examination and only few cases were diagnosed by histologically, especially which were not conclusive on cytology.

Some of the cases found have discrepancies between radiological and pathological diagnosis (table 2).

Two pathologically proven Hepatocellular carcinoma (figure 5) were interpreted as metastasis on Radiological examination could be due multifocal lesion and heterogeneous enhancement.

Table2: Association of Radiological diagnosis with Pathological diagnosis of 70 cases

Incidence	Radiological diagnosis	Pathological diagnosis	P value and r value
Benign	3 (4.3%)	3	
Hemangioma	1	1	
Benign cyst	2	2	<0.001
			r = 0.9
Malignancy	67 (95.7%)	67	
HCC	07	09	
Metastasis	59	53	
Cholagiocarcinoma	01	01	
Others	00	03 (NHL)	
		01 (tumor necrosis)	

Metastatic lesion were predominantly form the adenocarcinoma (47 cases; 79.6%) mainly from GI tract followed by pancreas, breast carcinoma and prostate (figure 6), Non Hodgkins Lymphoma (3 cases) lung non small cell carcinoma, ovarian malignancy (2cases each) and renal cell carcinoma, squamous cell carcinoma, thyroid malignancy and GIST (1 case each). One case of metastatic lesion was concluded as tumor necrosis on both cytological and histological examination.

We found association between radiological and pathological diagnosis with significant P value < 0.001 using the chi square test. Association of both variable found to be highly positive (r = 0.9).

Serum AFP was found to have high levels in 7 cases of HCC, while other 2 HCC cases and metastatic lesions was within normal range. Other serum markers such as CEA was found to be high in colorectal carcinoma, Ca19-9 in pancreatic malignancy, PSA in prostatic carcinoma and Ca125 in case of ovarian tumors respectively.

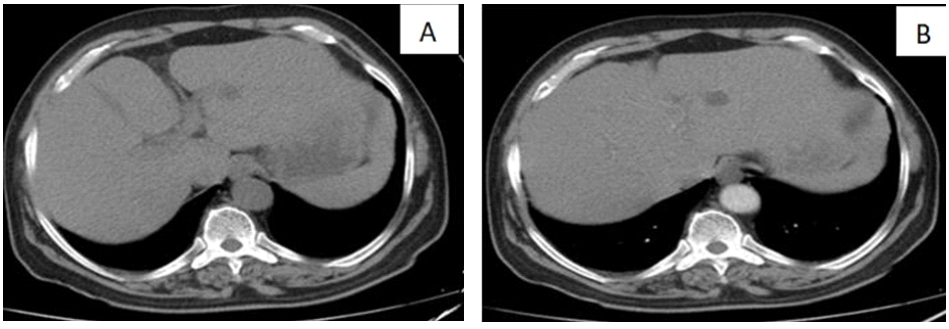

Figure1 : A) Non enhanced CT images of liver showing a cystic lesion. B) Contrast enhanced CT image ofsimple cyst

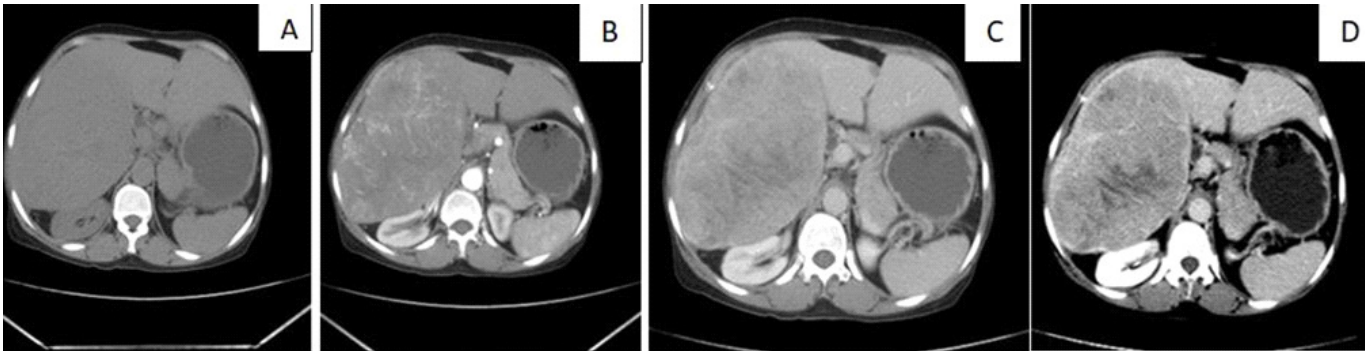

Figure2: Plain and CECT images of liver lesion (Hepatoma) in a 60 year old female showed(A) hypodense lesion on plain images, (B) early arterial enhancement, (C) washout of contrast in venous phase and (D)delayed phase shows significant washout with capsular enhancement.

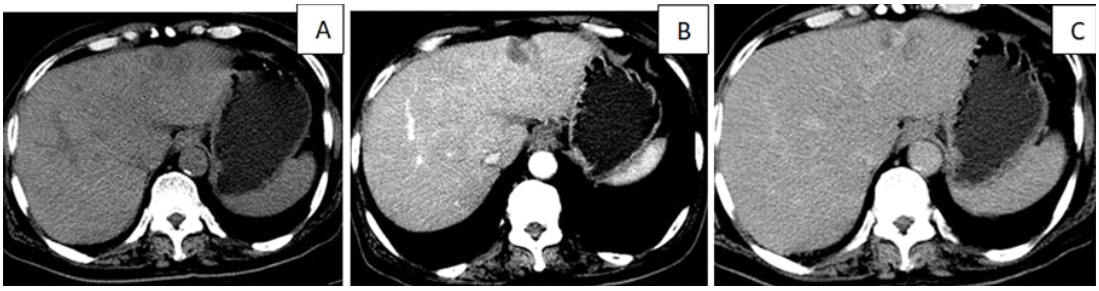

Figure 3: Plain and CECT images of liver lesion (metastasis) in a 70 year old male with carcinoma colon showed (A) hypodense lesion on plain image,(B)Peripheral rim enhancement on contrast CT and (C) hypodense lesion compared to liver parenchyma ondelayed image.

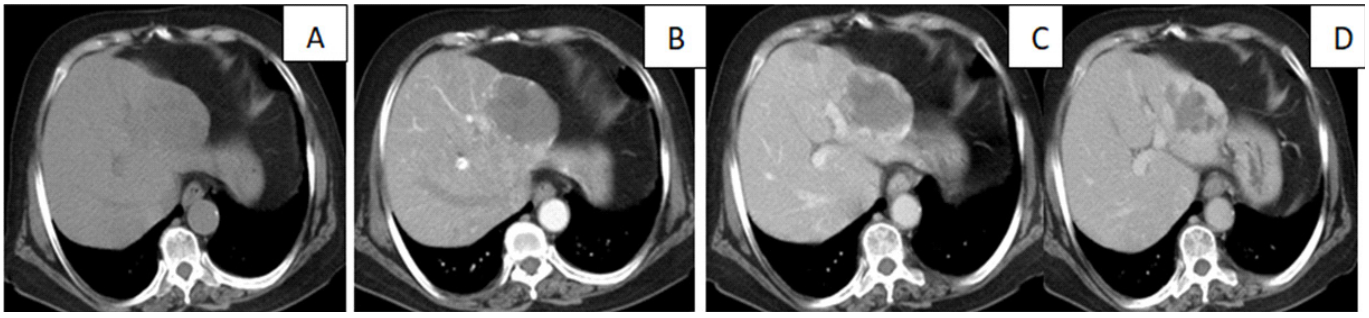

Figure 4: 50 year old female was diagnosed of liver lesion on USG underwent CECT for further evaluation, (A) plain CT showing hypodense lesion in left lobe, (B) arterial phase of CECT showed peripheral puddles, (C) venous phases showed filling in of contrast and (D) delayed images showed further centripetal filling of contrast which was suggestive of Haemangioma

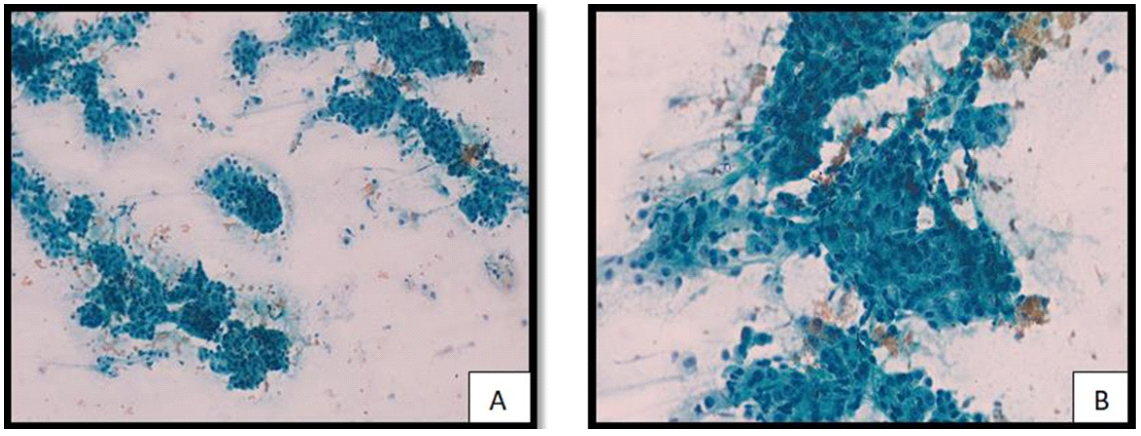

Figure 5: A) Photomicrograph of Hepatocellular carcinoma,Pap stain; magnification 10X,
B) Photomicrograph of Hepatocellular carcinoma,Pap stain; magnification 40X

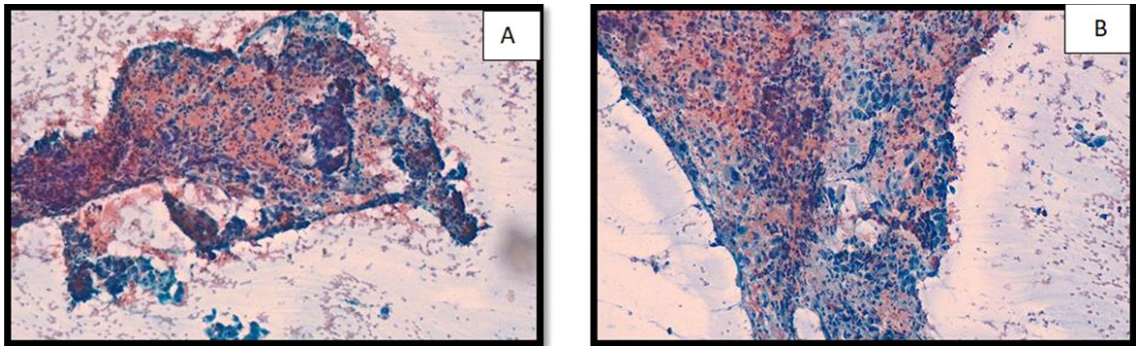

Figure 6: A) and B)Photomicrograph of metastatic adenocarcinoma, Pap stain;magnification20X

Discussion:

The current study was conducted to establish the relative role of various imaging modalities for diagnosing the space occupying lesion of liver and also to assess the association of imaging findings with that of Pathological diagnosis and serum marker levels.

The current study had majority of the cases in the age group of 40-60 years with mean age of 54.47±1.5 which was comparable with Qaisarani M K et al[8] and other studies one which was published in 2018 by Parveen S et al[9] and Sudakar G et al[10]. Our study had male predominance for lesions as compared to females which was in concordance with Qaisarani M K et al[8], ParveenS et al[9], Sudakar G et al[10] and Agarwal A et al[11]. Were as study conducted by Khanna M et al[12] found to have equal frequency of distribution among males and females.

Malignancy was most common diagnosis seen in 95.7% of cases which collaborates with various other researcher[8-11]. In contrast to this, an article published by Rao UM et al[13] in 2016 found to have more of benign diagnosis. In our study metastatic diagnosis (86.5%) was most prevalent than primary HCC; metastasis preferably from adenocarcinoma of gastrointestinal tract and this finding was in accordance with Ominde ST et al[14] and variousother researcher results[8-10,12]. Were as Agarwal A et al[11] reported gall bladder malignancy as the most common primary site of metastatic deposits in liver followed by lung, gastrointestinal tract, breast and ovary.

Most frequently Hepatocellular carcinoma presents with solitary space occupying lesion on imaging but they might also show multiple small nodules thus resemble metastatic deposits in the liver. The current study on imaging yielded 14.3% solitary lesions and 85.7% as multifocal lesion;of which only 2 cases were HCC. Khanna M et al[12] reveled 56% of HCC cases as multifocal lesion. Agarwal A et al[11], reported 17.8% of solitary lesion and 82.2% as multifocal lesions on Radiological findings.

The average size of the hepatic lesions in the current study was found to be 5.5cm, however size could not predict characteristic of lesion. Ominde ST et al[14] reported the average size of the lesion as 5.8cm, while malignant lesion had 6.3 cm and benign lesion had 4.7cm.

On contrast computed tomography scan; 8arterial enhancing lesion was noted in 10% of the cases, while venous enhancement was reported on 87.2% and delayed enhancement yielded in 2.9% of the cases in our study. Ominde ST et al[14] found 93% of sensitivity, 50% specificity and 72.2% of PPV in differentiating benign from malignant hepatic lesion on contrast CT scan.

Association between Radiological and Pathological findings revealed a significant value i.e. P-value<0.05 which was found to be similar to Agarwal A et al study[11].

Serum AFP levels in the current study found be normal values in two HCC cases which was in concordance with Ahuja A et al[15] while other serum marker could not be compared with others due to paucity of literature.

Conclusion:

The study concludes that metastatic cases are more prevalent than primary in liver. The diagnostic accuracy of hepatic lesion enhances with utility radiological diagnosis with aid of contrast CT scan due various enhancement pattern in conjunction with pathological diagnosis and serum markers. Association of Radiological and Pathological findings found to have statically significant relation.

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