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**Original Research Article**

# Imaging and cytopathological correlation of space occupying lesions in liver: a prospective observational study

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## ABSTRACT

**Background:** Liver is a common site for Space occupying lesions. It is difficult to distinguish these entities with imaging criteria alone. Development in liver surgery and liver pathology have led to many new types of primary hepatic space-occupying lesions (PHSOLS) being surgically resected and pathologically diagnosed, which has greatly increased the surgicopathological spectrum of PHSOLS.
**Methods:** A 2-year tertiary care teaching hospital based longitudinal study with 77 participants was done. Selection criteria was defined and a prestructured proforma was made to assess and note the findings.
**Results:** The mean age of occurrence of space occupying lesions of liver was 45.49±13.45 years with a range of 24 to 70 years. Space occupying lesions of liver was commonly observed in 4th Decade of life. 64.93% pathology of Space Occupying Lesions of Liver occur in males. 76.62% patients of space occupying lesions of liver present with pain in right upper quadrant.
**Conclusions:** Majority of space occupying lesions were surgically managed with a short-term follow-up of 1 month in which no complications were noted.

**Keywords:** Benign liver lesions, Liver abscess, Liver imaging, Liver cytology, Malignant liver lesions, Space occupying lesion

## INTRODUCTION

Liver is a common site for Space occupying lesions. It is difficult to distinguish these entities with imaging criteria alone, but certain focal liver lesions have classic ultrasonic, computed tomographic (CT) and magnetic resonance (MR) imaging features. Development in liver surgery and liver pathology have led to many new types of primary hepatic space-occupying lesions (PHSOLS) being surgically resected and pathologically diagnosed, which has greatly increased the surgicopathological spectrum of primary hepatic space-occupying lesions (PHSOLS). There is a need for an improved practical guide for oncological clinicians and pathologists to make correct diagnoses and differential diagnoses among primary hepatic space-occupying lesions (PHSOLS).

Modern imaging techniques have led to the recognition of some incidental lesions that usually have no clinical relevance, e.g. Simple hepatic cysts, liver capillary haemangiomas. Diagnostic imaging is now considered as a clinical entity. Ultrasound has proved itself a very important diagnostic and therapeutic aid in the field of liver diseases. Ultrasound is a safe and effective method of detecting focal liver lesion. Its flexibility, easy availability and lack of dependence on organ function makes it most ideal for imaging the liver.[1-6] Ultrasonography (USG) guided fine needle aspiration has

further increased the diagnostic capability of this mode of investigation. The only other modality that competes with Ultrasonography for this role is computed tomography (CT).[7] With these views in mind, we studied to evaluate and detect co-relation between Imaging and cyto-pathological features of space occupying lesions of liver in a given population. The prospective longitudinal type Study carried out at tertiary health centre of Patients.

## METHODS

The present study was carried out in a tertiary care hospital from November 2014 to November 2016. A total of 77 cases were recruited in this study on accrual basis as per inclusion and exclusion criteria.

### *Inclusion criteria*

- Patients clinically suspected or detected on imaging and diagnosed as space occupying lesions of liver.
- Both gender and > 18years of age.

### *Exclusion criteria*

- Patient with non-correctable bleeding diathesis/ disorder
- Lesions - where cyto-pathological diagnosis is not confirmed (e.g. Haemangioma).
- Patient not consenting to participate in study due to financial or personal reason or for procedure (USG guided fine needle aspiration cytology or surgery).

### *Study design*

It was a tertiary care Teaching hospital based longitudinal study.

### *Study factors*

Using a proforma for recording data demographic, clinical, biochemical and radiological findings were noted and subsequently evaluated.

*Ultrasonography*

All patients enrolled in this study underwent ultrasonography (abdomen pelvis) by a senior radiologist (post PG three years). Real-time imaging was the principal mode used while performing ultrasonography. Reporting of imaging procedure were done by senior radiologist of department of radiology. Radiologically defined criteria to identify space occupying lesions of liver on ultrasound were used for various pathological conditions.

*Computed tomography*

All patient of hydatid cyst, metastatic lesions of liver and lesions not diagnosed on ultrasonography were made to undergo computed tomography (CT) (contrast enhanced), which gave more precise information regarding the morphology of the lesions including size, location, number, and relationships to adjacent structures.

Computed tomography is not as operator dependent as US (ultrasonography), and it gives the surgeon an accurate roadmap of the sites of the cysts in the liver.

*Cyto-pathological procedure*

In order to establish tissue diagnosis, to carry out further management in all patients except hydatid cyst of liver ultrasonography guided fine needle aspiration cytology was done.

Fine needle aspiration was done where patient condition permits. Fine needle aspiration (FNA) was done (ultrasonography guided) by conventional methods usually followed in our institution. Biopsy (Trucut and intra-operative Biopsy of Liver lesions) were done wherever indicated. Samples were sent to the department of pathology for Cyto-pathological examination. Reporting of procedure were done by at least 2 lecturers of department of pathology.

### *Outcome factors*

The main outcome factor in present study was tissue diagnosis in the form of Cytology or Histopathology and based on this co-relation was carried out with Imaging Investigation and clinical presentation of space occupying lesions of liver. Cytological or histopathological diagnosis of space occupying lesions of liver.

Co-relation between imaging and cyto-pathological Diagnosis of space occupying lesions of liver.

### *Statistical analysis*

*Descriptive statistics*

Basics demographic data like age was presented as mean, standard deviation and range. Simple tables were used to describe the demographic as well as clinical features.

*Analytical statistics*

In order to establish co-relation between Imaging and cytopathological diagnosis, Cohen's Kappa analysis was carried out to demonstrate co-relation and sensitivity, specificity, positive predictive value and negative predictive value of imaging techniques carried out.

## RESULTS

Total 77 Patients were Cyto-Pathologically confirmed cases of space occupying lesions of liver were enrolled in this study between November 2014 to November 2016 in a tertiary care Hospital (Table 1).

**Table 1: Distribution of lesions in space occupying lesions of liver.**

| Name of Disease | Number of cases | % |
|---|---|---|
| Simple hepatic cyst | 08 | 10.38 |
| Hydatid cyst | 13 | 16.88 |
| Liver Abscess | 37 | 48.05 |
| Metastatic lesions | 17 | 22.10 |
| Primary HCC | 02 | 2.59 |
| Total | 77 | 100 |

The mean age of occurrence of space occupying lesions of liver were 45.49±13.45 years with a range of 24 to 70 years. On observing decade wise distribution, space occupying lesions of liver was commonly observed in 4th decade with 37.66%. Liver abscess was seen in 64.86% (24) cases in 4th decade of life while Simple Hepatic cyst, out of 8 cases 7 (87.5%) cases occur in 7th decade of life. Metastatic lesions, out of 17cases 11(64.70 %) cases occur in 6th decade of life. In this study out of 77 cases, 50 (64.93%) cases occur in male. In liver abscess M: F=4.2:1. While in simple hepatic cyst M: F ratio was 1:3. In this study, 76.62% patients of space occupying lesions of liver presented with pain in right upper quadrant, while 100% (37) of liver abscess cases presented with pain in right upper quadrant. 36 patients presented with fever in which 30 (83.33%) patients were diagnosed with liver abscess. 28 patients had icterus, of which 57.14% were diagnosed with liver abscess and 35.71% were diagnosed with metastatic lesions. In this study, 53(68.85%) patients had hepatomegaly, 49.05 % of them had diagnosed with liver abscess and 30.15 % patients diagnosed with metastatic lesions.

31 patients had increased total leucocytes counts >11,000/cumm, in which 90.32% patients had liver abscess. 28 patients had increased serum bilirubin, in which 57.14% diagnosed with liver abscess and 35.71% diagnosed with metastatic lesions. Of total 77 patients 38(49.35%) patients had increased alkaline phosphatase level > 3 times, in which 50% cases diagnosed with liver abscess and 44.73% cases diagnosed with metastatic lesions. All 17 cases of metastatic lesions had increased serum alkaline phosphatase level. In this study, deranged INR was seen in metastatic lesions (50%) and liver abscess (35%) patients. In this study, out of 77 patients 50 (64.49%) patients had space occupying lesions in right lobe of liver. In which liver abscess was seen in 27 (54.00%) patients in right lobe of liver. 42 (54.54 %) patients of 77, had single lesion in liver while 35 (45.45%) had multiple lesions in liver. Of single lesion in liver 57.14% comprised of liver abscess.

On applying statistical analysis between ultrasonography and cyto-pathology diagnosis by Kappa Test, the Kappa Value is 0.981 which implies very good agreement between ultrasonography and cyto-pathological diagnosis. P value is <0.001 which is highly significant. Of 37 cases diagnosed as liver abscess by ultrasonography, 35 cases were confirmed as liver abscess by cytopathology. 2 doubtful cases of multiple Hepatic abscess were further investigated with CT and diagnosed as metastatic lesions of liver which were confirmed on cytopathology. On ultrasonography 17 cases were identified as Metastatic lesions of liver of which 15 were recognized as metastatic lesions of liver on CT (contrast enhanced) and confirmed on cytopathology and 2 cases diagnosed as multiple liver abscess on CT and confirmed on cytopathology (Table 2).

**Table 2: Co-relation of ultrasonography and cyto-pathology diagnosis in space occupying lesions of liver.**

| Ultrasonography | Cyto-pathological diagnosis | | | | | Total |
|---|---|---|---|---|---|---|
| | Simple hep cyst | Hydatid cyst | Liver abscess | Metastatic lesions | Prim. HCC | |
| Simple hep cyst | 08 | 01 | 00 | 00 | 00 | 09 |
| Hydatid cyst | 00 | 12 | 00 | 00 | 00 | 12 |
| Liver abscess | 00 | 00 | 35 | 02 | 00 | 37 |
| Metastatic lesions | 00 | 00 | 02 | 15 | 00 | 17 |
| Prim. HCC | 00 | 00 | 00 | 00 | 02 | 02 |
| Total | 08 | 13 | 37 | 17 | 02 | 77 |

So, in present study confirmed cases of hepatic abscess were 37 (35+2) and metastatic lesions of liver were 17 (15+2). On ultrasonography 2 cases were diagnosed as primary Hepatocellular carcinoma and on cytopathology both were confirmed. On ultrasonography 9 cases were diagnosed with simple hepatic cyst and on cytopathology 8 cases confirmed with simple hepatic cyst. 2 cases of simple hepatic cyst further investigated with computed tomography which shows calcification of wall on ultrasonography and on computed tomography 1 case was diagnosed as hydatid cyst of liver and 1 with simple hepatic cyst.

On ultrasonography 12 cases diagnosed as hydatid cyst of liver and 1 case which was initially on ultrasonography diagnosed as simple hepatic cyst and on further

investigation (CT) diagnosed as hydatid cyst of liver. Total 13 cases were confirmed on cytopathology after operative management. Between ultrasonographically diagnosis and cytopathological diagnosis of space occupying lesions of liver very good agreement seen and P value is <0.001 which was highly significant. In this study, ultrasound was highly sensitive and specific in diagnosing liver abscess with a sensitivity of 94.60% and specificity of 95.0%. In diagnosing metastatic lesions of liver, ultrasound showed sensitivity of 88.24%, and specificity of 96.67 % (Table 3).

**Table 3: Sensitivity, specificity, positive predictive value, negative predictive value of ultrasonography in liver abscess and metastatic lesions of liver.**

| Lesions | Sensitivity (%) | Specificity (%) | Positive predictive value (%) | Negative predictive value (%) |
|---|---|---|---|---|
| Liver Abscess | 94.60 | 95.00 | 94.59 | 95.00 |
| Metastatic lesions of liver | 88.24 | 96.67 | 88.23 | 96.66 |

In this study simple hepatic cyst, hydatid cyst and primary hepatocellular carcinoma due to less number of cases sensitivity and specificity had no value. (Simple hepatic cyst- false negative not available. In hydatid cyst- false positive and in primary hepatocellular carcinoma false positive and negative not available) but on Kappa value is 0.981 which shows very good agreement between ultrasonography and cyto-pathological diagnosis. P value is <0.001 which is highly significant.

***Correlation between ultrasonography and contrast enhanced CT***

In this study, 2 patients of simple hepatic cyst were investigated with contrast enhanced CT in which calcification of wall present on ultrasonography. Out of 2 cases 1 case diagnosed simple hepatic cyst and another with hydatid cyst and similar diagnosis seen on cytopathology. 12 cases on ultrasonography were diagnosed with Hydatid cyst of liver and on CT similar diagnosis. 1 case was diagnosed with simple hepatic cyst on ultrasonography and on CT diagnosed with hydatid cyst of liver. Total 13 (12+1) cases of hydatid cyst of liver were diagnosed on computed tomography and confirmed with histopathological report after operation. In hepatic abscess only 2 cases were further investigated with CT in which on ultrasonography diagnosed with multiple liver abscess and on CT diagnosed with metastatic lesions of liver and similar diagnosis on cytopathology were seen. All cases of metastatic lesions of liver (n=17) and primary Hepatocellular carcinoma diagnosed on ultrasonography were confirmed on CT which also helped in diagnosing primary tumour, operability, lymph nodal status and relation with surrounding structure. On CT, out of 17 cases 15 cases diagnosed with metastatic lesions and 2 cases diagnosed with multiple liver Abscess (Table 4).

**Table 4: Co-relation between ultrasonography and CT diagnosis).**

| Ultrasonography | Computed tomography (CECT Abdomen+ pelvis) | | | | |
|---|---|---|---|---|---|
| | Simple hep cyst | Hydatid cyst | Liver abscess | Metastatic lesions | Prim. HCC |
| Simple hep cyst | 01 | 01 | 00 | 00 | 00 |
| Hydatid cyst | 00 | 12 | 00 | 00 | 00 |
| Liver abscess | 00 | 00 | 00 | 02 | 00 |
| Metastatic lesions | 00 | 00 | 02 | 15 | 00 |
| Prim. HCC | 00 | 00 | 00 | 00 | 02 |
| Total (35) | 01 | 13 | 02 | 17 | 02 |

***Management of space occupying lesions of surgically amenable disease***

*Simple hepatic cyst*

Total 8 patients diagnosed with Simple Hepatic cyst on Imaging and USG guided therapeutic aspiration of cyst done and fluid sent for cyto-pathological confirmation. patients followed up for 3 weeks by ultrasonography and collapse of wall seen.

*Hydatid cyst of liver*

Total 13 patients diagnosed with Hydatid Cyst on clinically and imaging modalities, investigated and Operated with cystectomy and specimen sent for histopathological examination and confirmation.

*Liver abscess*

***Various modalities of treatment***

Out of 37 those with less than 5 cm abscess cavity on USG treated conservatively or aspiration and those with larger abscess than 5 cm guided drainage was done, 08 patients underwent aspiration under ultrasonography guidance 27 patients underwent pigtail catheterization and in 02 patients with multiple abscess combine pigtail catheter as well as aspiration was done (Table 5).

***Volume of abscess cavity reduced on 3rd day after Intervention on ultrasonography***

Decrease in volume of abscess cavity on USG is maximum in Pigtail+aspiration (100%) and Pigtail (74.00%) groups it was followed by aspiration (Table 6).

***Primary hepatocellular carcinoma***

In this study 2 cases diagnosed as primary malignancy of liver, after diagnosis on Imaging, cyto-pathological confirmation done and palliative treatment advised.

**Table 5: Various modalities of treatment of liver abscess.**

| Name of disease | Various modalities of interventional treatment(with medical treatment) | | |
|---|---|---|---|
| Liver abscess | Usg guide aspiration (<5cm in size or < 150cc in vol) | Pigtail catheterization alone (USG guided) (>5cm in size or >150cc in vol) | Pigtail catheterization + usg guided aspiration (multiple lesions of abscess) |
| Liver abscess (37) | 08 | 27 | 02 |

**Table 6: Volume of abscess cavity reduced on 3rd day after intervention on ultrasonography.**

| | | | Treatment modalities | | | |
|---|---|---|---|---|---|---|
| | | | **Aspiration** | **Pigtail** | **Pigtail+aspiration** | **Total** |
| Reduction in Volume on USG (3rd day) | Yes | Count | 5 | 20 | 02 | 27 |
| | | % within T/t | 62.5% | 74.00% | 100% | 72.97% |
| | No | Count | 3 | 07 | 00 | 10 |
| | | % within T/t | 37.5% | 26.00% | 00 | 27.03% |
| Total | | Count | 08 | 27 | 02 | 37 |
| | | % within T/t | 21.63% | 72.97% | 5.40% | 100.0% |

**Table 7: Distribution of primary malignancy in metastatic lesions of liver.**

| Diagnosis of primary malignancy in metastatic lesions of liver | Number of patients (%) |
|---|---|
| Colo-rectal carcinoma | 07 (41.20%) |
| Carcinoma of pancreas+ periampullary region. | 03 (17.64%) |
| Carcinoma of oesophagus | 02 (11.76%) |
| Carcinoma stomach | 02 (11.76%) |
| Carcinoma gall bladder | 02 (11.76%) |
| Small cell carcinoma of lung | 01 (5.88%) |
| Total | 17 (100.0%) |

## DISCUSSION

Traditionally, definitive diagnosis of a liver disease requires analysis of biopsy specimens and/or imaging data provided by ultrasonography, laparoscopy, or computed tomography. Liver biopsy is the gold standard for diagnosis of most liver diseases. Biopsy is often considered unnecessary for diagnosis if adequate laboratory, clinical, and imaging data are available.[8] In present study, we compared numerous demographic and clinical factors of patients with space occupying lesions of liver. In the present study, we have enrolled 77 cases of Space Occupying Lesions of Liver and observed the following parameters and compared with standard literature.

***Distribution of disease in space occupying lesions of liver in this study.***

In this present series, hepatic abscess were found to be the most frequent which comprised of about 48.05% of total cases followed by metastatic lesion which was found in is 22.10% of cases. Frequency of hydatid cyst was

16.88%, other lesions encountered in this study were Hepatic cyst (10.38%), Hepatocellular carcinoma (2.59%). Various authors have done similar studies whose findings are shown in the table below.

In present study, the mean age of occurrence of space occupying lesions of liver was 45.49±13.45 years with a range of 24 to 70 years. On Observing decade wise distribution, space occupying lesions of liver was commonly observed in 4th decade of life accounting for almost 37.66 % (29) of cases.

***Simple hepatic cyst***

In present study mean age of simple hepatic cyst was 64.25±3.24 years. Most commonly seen in 7th decade of life. Study done by Eva-Maria T et al and Tocchi A et al and Cowles R et al mean age were 64.7, 68.3 and 66.5 years of age respectively.[9,10] The observations were similar with present study.

***Hydatid cyst of liver***

In present study mean age of hydatid cyst was 33.38±1.30 years in space occupying lesions of liver and commonly seen in 3rd and 4th decade of life. Md. Jawed et al, C Palanivelu, Daradkehs et al studies shown mean age 36.52, 38.6, and 39.2 which were near to present study mean age.[12-14] In All studies, common age group is 4th decade of life.

***Liver abscess***

In our study the frequency of liver abscess is maximum in 4th decade of life. Debakey and ochsner et al, Mathur et al and Ramani et al also had shown maximum frequency of liver abscess in 4th decade of life while Kapoor et al study shown in 3rd decade of life.[15-18]

***Metastatic lesions of liver***

Regarding age group, the peak age group for hepatic metastatic lesions was >50-70 years of life (6th and 7th decade of life). In present study Mean age metastatic lesions was 57.3±7.01 years of age and commonly lesions diagnosed in 6th decade of life. Other studies also shown almost similar mean age as in present study except Schwerk WB et al which shown mean age 64.5 years.[19]

***Primary hepatocellular carcinoma***

In present study 2 cases of primary hepatocellular carcinoma were diagnosed in 7th decade of life. According to our results, it shows that there is association between the age of patients and developing hepatic cancer, with most cancer associated with age group of 6th and 7th decade of life. According to American Cancer Society, the average age at diagnosis of liver cancer is 63. More than 95% of people diagnosed with liver cancer are 45 years of age.

In present study, out of 77 cases 50 (64.93%) cases occur in male. In a study of Sumana BS et al. Out of 62 patients, 42 (67.74%) were males and 20 (32.26%) were females which was almost similar to this study. Pinnamaneni HB et al study 73% were males and 45% were females.[20] Males had increased predilection for liver diseases.

Considering simple hepatic cyst, in present study M: F Ratio was 1:3 which was almost similar to Adriano Tocchi et al.[10] Other studies also showed that simple hepatic cyst occurred more commonly in females.

Considering hydatid cyst of liver, in present study Male: Female ratio was 1:1.16 which was similar to other studies showing that Female were predominantly affected by hydatid cyst of liver except Palanivelu C study in which Male: Female ratio was 5:1.[13]

Considering liver abscess, in all studies males were predominantly affected by liver abscess than females. In present study M: F was 4.28:1. A retrospective analysis in 1978 reported that the male: female ratio was 5.66:1, Kapoor et al18 which had remained constant over 30 years (between 1946 - 1976).

***Metastatic lesions of liver***

Considering metastatic lesions of liver, present study population were comprised of 10 male and 7 females with Male: Female ratio- 1.42:1. In other studies M: F ratio were M > F seen. Liver cancer is the 3rd most common cancer in developing countries among men after lung and stomach cancer. It is also between two and eight times more common in men than in women.

In present study 2 cases had primary hepatocellular carcinoma diagnosed and both were male.

***Co-relation between ultrasonography and cytopathology***

Ultrasonography has been an accepted method for the diagnosis of liver lesions because of its rapidity of diagnosis and its high sensitivity.[21] Ultrasound features of liver lesions was studied and diagnosis was confirmed by cyto-pathology. Cyto-pathological diagnosis was taken as gold standard in comparing the diagnosis made by ultrasonography. The various focal liver lesions encountered in the study were liver abscess, metastasis, cystic and hydatid lesions and primary hepatocellular carcinoma.[21]

In present study (n=8) on ultrasonography has 100% sensitivity and specificity 98.55%. In The study of Vishwanath et al (n=3) showed sensitivity and specificity for diagnosis of hepatic cyst was 40.00% and 99.00%, respectively.[21] Pinnamaneni HB (n=6) study showed sensitivity and specificity for Hepatic cyst were 98.9% and 100%, respectively.

In present study 13 cases diagnosed with hydatid cyst of liver. Ultrasonography showed a sensitivity of 92.3% and specificity of 100 % in diagnosing Hydatid cyst of liver. As compare to Pinnamaneni HB (n=5) study it showed 92.3% sensitivity and 98.3% specificity which was quite similar with this present study. Other study of Vishwanath T (n=3) showed sensitivity, specificity for diagnosing hydatid cyst of liver were 75% and 98%, respectively.

In present study 37 cases diagnosed liver abscess, sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) of ultrasonography for diagnosis of liver abscess were 94.6%, 95.00%, 94.59%, 95.00%, respectively. In Pinnamaneni HB and Vishwanath T et al studies quite similar percentage of sensitivity and specificity seen.[20,21] Sanchez Alvarez J et al in their study of 20 cases of liver abscess, sensitivity of ultrasonography in the diagnosis of liver abscess was found to be 78%.[22] Donovan AJ et al in their study found that hepatic abscess - amoebic or pyogenic can be diagnosed with great accuracy by ultrasonography.[23] Ultrasound is the modality of choice with a high sensitivity and specificity of 90% and 93% respectively. The higher sensitivity and specificity could be attributed to the higher number of liver abscesses found in the study.

In present study 17 cases were diagnosed as metastasis by ultrasound of which 15 were confirmed by cytopathologically as metastatic lesions of liver, 2 were false positive by ultrasound on further investigation diagnosed as multiple liver abscess. 2 cases were false positive by ultrasound as liver abscess, after further confirmed by cytopathology as metastatic lesions. So on cytopathology total metastatic lesions diagnosed were 17 (15+2) cases. In diagnosing metastatic lesions of liver, Ultrasound showed sensitivity, specificity, positive predictive value (PPV) and Negative Predictive Value (NPV) of 88.24%, 96.67%, 88.23%, and 96.66%, respectively.

In Vishwanath T (n=26) Study showed sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) of ultrasonography for diagnosis of metastatic lesions of liver were 76.9%, 92.4%, 76.9%, 92.4%, respectively.[21]

In Roy SK (n=19) study showed sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) of ultrasonography of metastatic lesions were 100%, 96.42%, 95%, 100%, respectively.[24]

In Pinnamaneni HB (n=22) study significant association between USG (ultrasonography) findings and FNAC (Fine needle aspiration and cytology) findings (Chi square (X2) = 168.8, p <0.001.Contingency Coefficient value of 0.851 p <0.001 was found to be highly significant. Statistical values of the study - USG was highly sensitive and specific in malignant liver tumour with sensitivity of 84.6% and specificity of 93%. For metastasis, it showed sensitivity of 77.2% and specificity of 93.4%.

Primary hepatocellular carcinoma in the present study, with a sensitivity of 100.0%. Despite the drawback of less number of cases (n=2), it is evident from this study that ultrasonography has a wide applicability in the diagnosis of focal liver lesion. Being a safe, simple, repeatable and without radiation exposure to the patient, it is worthy of being included in routine diagnostic work. In spite of the advent of newer diagnostic modalities, it still holds a unique status even in the current perspective.

In Vishwanath T (n=32) study showed sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) of ultrasonography for diagnosis of primary hepatocellular carcinoma were 80.6%, 90.5%, 78.10% and 91.7%, respectively. Roy SK (n=13) study showed sensitivity, Specificity, positive predictive Value (PPV) and negative predictive value (NPV) of ultrasonography for diagnosis of primaryhepatocellular carcinoma were 92.3%, 97.05%, 92.3% and 97.05%, respectively.

***Computed tomography for space occupying lesions of liver***

Total 77 patients had space occupying lesions of liver, out of which 35 patients investigated with CT of abdomen and pelvis. Out of 35 cases 2 cases of simple hepatic cyst, 2 cases of doubtful multiple Liver abscess on ultrasonography, 12 cases of hydatid cyst of liver, 17 cases of metastatic lesions and 2 cases of primary hepatocellular carcinoma (HCC) were investigated with contrast enhanced computed tomography for diagnosis and management.

On later histopathological examination, 35 of the total 77 cases had confirmed diagnosis and shown similar diagnosis as computed tomography shown, with contrast enhanced computed tomography scan was found to have a sensitivity and Specificity of 100 % in present study.

Judson H. Snow study shown Sensitivity of Computed tomography in hepatic neoplasm was 96%, while Nelson RC study shown Sensitivity of Computed tomography in Hepatic lesions was 86%.[25,26]

In a meta-analysis of hepatic metastases from cancers of the gastrointestinal tract, Kinkel et al reported a mean weighted sensitivity of 72% for computed tomography scan based on 25 publications that included 1,747 patients.[27] In another study with surgically proven liver lesions, a sensitivity of 69% to 71% and a specificity of 86% to 91% was shown using dual-phase helical Computed tomography.[28] Computed tomography scan (CT) has high sensitivity (93%) and specificity (100%) for detecting hepatic metastases in Chezmar JL study.[29] In present study 13 cases of hydatid cyst of liver operated

with cystectomy and specimen sent for histopathological confirmation of diagnosis.

In this study, total 37 cases diagnosed with liver abscess in which imaging guided aspiration only of hepatic abscess done in 8 cases (< 5 cm in size or < 150 cc volume), imaging guided percutaneous pigtail catheter drainage done in 27 cases (>5 cm in size or >150 cc of volume) and both done in 2 cases (multiple lesions of abscess).

In this study we treated 8 patients with Percutaneous Needle Aspiration along with systemic antibiotics. In these the mean volume of cavity was 75.8cc (27cc - 120cc), 6 patients out of the 8 patients who underwent this procedure showed relief in a single aspiration attempt while 2 patients each required a second and third attempt at aspiration for relief. One important reason for this is the inability to completely evacuate thick pus that was present in some cases. The mean size of abscess cavity on the third day after procedure as evaluated on ultrasonography (USG) was 22.38cc (10cc - 54cc). The success rate of this procedure is 75% in our study. A study done by Sukhjeet Singh et al. showed approximate same result the reported success rate of 77%, the mean volume of largest cavity was 249±121cc. Time taken for resolution of total cavity size was 10.1±4.2 weeks, several studies documented that patients can be managed with a combination of systemic antibiotics and percutaneous drainage with excellent results.[30,31]

In Present study we treated 27 patients with Pigtail Catheter Drainage along with systemic antibiotics. In these the mean volume of largest cavity was 298.45cc (150cc - 680cc). The decrease in volume of the abscess cavity after pigtail catheterization was significantly low as compared to other procedures ($p<0,001$). Ultrasonography (USG) on the third day also showed significant decrease in size of abscess cavity as compared to other groups($p<0.001$). The success rate was about 100%. Same result was reported by Singh S et al.[32]

In present study, we treated 2 patients with pigtail catheter drainage along with aspiration and systemic antibiotics.

The major advantages of percutaneous needle aspiration over percutaneous catheter drainage are: 1) it is less invasive and less expensive; 2) avoids problems related to catheter care; and 3) multiple abscess cavities can be aspirated easily in the same setting.[33,34]

However, in present study we had a success rate of percutaneous needle aspiration which was significantly lower than with catheter drainage (71% versus 100%, P <0.005). There are some problems with catheter drainage like pain, cellulitis at the insertion site and sometimes catheter dislodgement. The success rate of percutaneous needle aspiration (PNA) in the literature varies from 79-100%.[35]

In present study, commonly metastatic lesions seen from colo-rectal malignancy. Recent concept in the management of colorectal malignancy is first treat liver metastasis and then primary malignancy.[67] as the infrastructure and support for liver resection surgery is not available. Patients referred to higher centre for further management of metastatic lesions of colorectal malignancy and primary hepatocellular carcinoma. Otherwise in metastatic lesions of liver patients were referred to oncologist. Whenever needed surgical intervention done only for palliation like gastric bypass, triple bypass, and colostomy etc.

## CONCLUSION

The present study was conducted in a tertiary care academic hospital for a period of 2 years. The study enrolled 77 cases. Liver abscess was the most common space occupying lesion seen more in males than in females. Right upper abdominal pain and fever were the most common symptoms and hepatomegaly was present in majority of patients. Alkaline phosphatase was significantly raised in liver abscess and metastatic lesions of liver. Majority of lesions were solitary and in right lobe of liver.

On co-relation, ultrasonography was highly sensitive and specific in diagnosing liver abscess and metastatic lesions of liver. In the present study, due to less number of cases of simple hepatic cyst, hydatid cyst and primary hepatocellular carcinoma, sensitivity and specificity could not be commented. In cases with equivocal findings on ultrasonography, CT is helpful in diagnosis specially in differentiating simple hepatic cyst from small hydatid cyst and multiple liver abscess from multiple metastatic lesions.

Majority of space occupying lesions were surgically managed with a short-term follow-up of 1 month in which no complications were noted. Large-scale long term studies need to be conducted to evaluate these modalities further.

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