

Ultrasound Guided Fine-Needle Aspiration Cytology of Liver Lesions: A Prospective Study

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Abstract

Background: The liver is a common site for metastatic tumor deposits most often from carcinomas originating in the abdominal cavity, but also for sarcomas and lymphomas. The main indication of fine-needle aspiration cytology (FNAC) of the liver single or multiple nodular lesions, demonstrated by palpation, nuclear scan, computed tomography, or ultrasonography.

Purpose: Purpose of the study is to evaluate various neoplastic lesions, whether primary or metastatic and non-neoplastic conditions of the liver.

Materials and Methods: This study was hospital-based prospective study including all the patients with space occupying lesion of the liver mass. Mass lesions on US examination of liver were subjected for FNAC under ultrasound (US) guidance.

Results: A total number of cases registered were 78. A maximum number of cases were in 7th decade (32, 41.02%). The average age of sample population was 59.37 years (standard deviation \pm 10.66) with a range of 30-80 years. Male to female ratio was 1.69:1. Out of 78 cases, 11 (14.10%) were benign and 67 (85.90%) were malignant. Among benign, reactive changes (5, 6.41%) and in malignant lesions, metastatic adenocarcinoma (37, 47.44%) were most common. The most common neoplastic liver lesion was metastatic adenocarcinoma (37, 55.22%) and least common were metastatic sarcoma and metastatic anaplastic carcinoma (1, 1.49%) each. Metastatic tumor was the most common malignancy detected, noted in 57 cases (85.07%). In the present study, hepatocellular carcinoma (HCC) was the most common primary malignant tumor of the liver.

Conclusion: We found that incidence of malignant hepatic lesions was more than benign. In benign lesions, the most common lesion was reactive changes and cirrhosis. Adenocarcinoma was most common metastatic tumor. While in the primary tumor, HCC was most common. US guided FNAC was less time consuming, safe, useful, and highly accurate technique for making diagnoses of hepatic lesions.

Key words: Carcinoma, Fine-needle aspiration cytology, Liver, Ultrasound

INTRODUCTION

Fine-needle aspiration (FNA) has proven to be a very effective means of obtaining tissue from many different body sites for diagnosis.

Most of the mass lesions of the liver and gallbladder discovered clinically or by imaging techniques are easily

assessable to FNA cytology (FNAC). It is important to establish primary or metastatic nature of the lesion and in case of the latter to comment upon the probable site of the primary tumor.¹

FNAC is a major indicative procedure in the diagnosis of hepatic lesions. Ultrasound guided FNAC (US-FNAC) in the diagnosis of hepatic lesions including focal liver lesions showed high sensitivity in identifying liver lesions. The diagnostic technique yields adequate pathological materials in the majority of cases. The advantages of US guided FNAC in the diagnosis of liver diseases cannot be overemphasized. The advantages of this technique are its high diagnostic accuracy and low cost, thereby rendering the older technique of blind percutaneous biopsy using a coarse needle obsolete.²

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The main indication of FNAC of the liver is single or multiple nodular lesions, demonstrated by palpation, nuclear scan, computed tomography (CT), and ultrasonography (USG). The purpose of the study is to evaluate various neoplastic lesions whether primary, metastatic or non-neoplastic conditions of the liver and to correlate with histopathology wherever possible.³

Also to compare and standardized the cytomorphological features of various types of hepatic lesions *viz.* cirrhosis, neoplastic and metastatic lesions.

The development of cytology has been based on cytomorphologic and cytochemical studies of tumor cells. Cytology is a diagnostic procedure which can precisely allow a decision as to whether the cells are malignant, precancerous or benign cytology at present.

The sensitivity of FNAC for malignancy was 91%, the specificity was 100%, predictive value of the positive result was 100%, and the predictive value of the negative result was 73%.

FNA of the liver was considered a very safe procedure. Anecdotal cases of fatality secondary to hemorrhage have been reported (Riska *et al.*, 1975), and bleeding disorders were considered a contraindication. The other reported complication was bile peritonitis (Schultz, 1976).⁴

One of the major advantages of radiologically guided percutaneous FNA biopsy is that it can sample malignancy anywhere in the liver, such as in the left lobe or in the area of the porta hepatis, where the use of a large-bore needle may be too risky. Therefore for any mass or masses in the liver suspected to be malignant, radiologically guided FNA biopsy is the method of choice.

US guided FNAC is a safe, quick and precise diagnostic procedure for early diagnosis and management of gallbladder cancer in developing countries.⁵ Only a few large studies on US/CT guided percutaneous FNA of gallbladder are available in the literature until date. Moreover, the cytologic findings have not been illustrated in detail.

MATERIALS AND METHODS

The study was carried out in the Department of Pathology, Sardar Patel Medical College and associated group of hospitals, Bikaner. This study was hospital based prospective study including all the patients with space occupying lesion of the liver and gall bladder mass who attended hospital.

After obtaining the detailed clinical and radiological data, the patients were subjected for FNAC under US guidance. The consent of the patient was taken before undertaking the procedure.

Inclusion Criteria

1. All patients with hepatobiliary mass confirmed by radiological examination.

Exclusion Criteria

1. Patients with marked hemorrhagic diathesis
2. Patients with skin infection at the site of aspiration
3. Critically ill patients
4. Non cooperative patients.

Procedure

The area (based on clinical examination and radiological finding) is sterilized with spirit and infiltrated with 2% xylocaine. The needle of length 15-20 cm, 22-23 G disposable needle is fixed on the 10 ml disposable syringe that is prefixed to FNAC gun. The cellular material will be aspirated into a syringe under US guidance and expelled onto slides. Four to five slides will be prepared for each patient. The wet-fixed smears will be stained with hematoxylin and eosin (H and E). While air dried smears will be stained with May-Grünwald–Giemsa (MGG) stain, and other two smears will be kept for special stains as per requirement.

RESULTS

In the present study entitled “A Prospective Study On US guided FNAC of liver lesions” was carried out in the Department of Pathology Sardar Patel Medical College, Bikaner on 78 cases with the clinical or radiological suggestion of hepatic lesions.

In the present study, indications of FNAC were hepatomegaly, abnormal USG finding of benign and malignant hepatic lesions.

A detailed clinical information and laboratory investigation were obtained. FNA was performed, and the smears stained by H and E and MGG stains and special stain are used whenever needed. The role of FNAC was evaluated for diagnosing different type of hepatic lesions.

A total number of cases registered were 78. A maximum number of cases were in the 7th decade 41.02% followed by 24.35% in 6th decade, 20.51% in 5th decade, 8.97% in 8th decade, 3.84% in 4th decade and 1.28% in 3rd decade.

The average age of sample population was 59.37 years (standard deviation [SD] \pm 10.66) with a range of 30-80 years.

The outcome of FNAC diagnosis among liver aspirate in 78 patients studied. Among this benign aspirates were 11 (14.10%), malignant aspirate were 67 (85.90%).

Table 1 reveals age wise distribution of benign and malignant liver lesions. A maximum number of malignant cases were found in 61-70 years of age groups with 27 cases (40.29%) next in order of frequency were in 51-60 years with 16 cases (23.52%), maximum number of benign case were found in 61-70 years of age groups with 5 cases (45.45%).

Gender wise distribution of benign and malignant lesions with male to female ratio 1.69:1. Out of 49 male cases, 6 were suffering from benign and 43 were suffering from malignant. Out of 29 female cases, 5 were suffering from benign and 24 were suffering from malignant lesions.

Table 2 reveals incidence of various type of benign and malignant lesions. Out of 78 cases, 11 were benign and 67 were malignant. Among benign, normal liver cytology (6.41%) and in malignant lesions metastatic adenocarcinoma (47.44%) were more common.

Most common neoplastic liver lesion is metastatic adenocarcinoma 55.22% and least common are metastatic sarcoma and metastatic anaplastic carcinoma 1.49% each (Table 3).

Table 1: Age wise distribution of benign and malignant liver lesions

Age (years)	Benign (%)	Malignant (%)
21-30	0 (0)	1 (1.49)
31-40	0 (0)	3 (4.47)
41-50	1 (9.09)	15 (22.38)
51-60	4 (36.36)	16 (23.88)
61-70	5 (45.45)	27 (40.29)
71-80	1 (9.09)	6 (8.95)
Total	11 (100)	67 (100)

Table 2: Incidence of various type of benign and malignant liver lesions

Cytological diagnosis	Frequency (%)
Benign	11 (14.10)
Cirrhosis	3 (3.85)
Fatty liver	1 (1.28)
Normal liver	2 (2.56)
Reactive changes	5 (6.41)
Malignant	67 (85.90)
HCC	10 (12.82)
Metastatic adenocarcinoma	37 (47.44)
Metastatic sarcoma	1 (1.28)
Metastatic SCC	4 (5.13)
Metastatic anaplastic	1 (1.28)
Metastatic unclassified	14 (17.95)
Total	78 (100.0)

SCC: Squamous cell carcinoma, HCC: Hepatocellular carcinoma

Out of 67 malignant lesions, cases of metastatic adenocarcinoma were most common. Males were more commonly affected (Table 4).

Out of 67 malignant cases, there were 43 male and 24 female with maximum number of cases found in 7th decade. Male to female ratio were found 1.79:1 (Table 5).

Table 6 reveals the distribution of different type of metastatic tumors. Out of total 78 cases, 57 cases were

Table 3: Cytological diagnosis of neoplastic liver lesions

Diagnosis	Number of cases (%)
HCC	10 (14.93)
Metastatic adenocarcinoma	37 (55.22)
Metastatic sarcoma	1 (1.49)
Metastatic SCC	4 (5.97)
Metastatic anaplastic	1 (1.49)
Metastatic unclassified	14 (20.89)
Total	67 (100.0)

SCC: Squamous cell carcinoma, HCC: Hepatocellular carcinoma

Table 4: Gender wise distribution of liver lesion

Diagnosis	Female (%)	Male (%)	Total
Cirrhosis	2 (6.9)	1 (2.04)	3
Fatty liver	1 (3.45)	0 (0)	1
Normal liver	1 (3.45)	1 (2.04)	2
Reactive change	1 (3.45)	4 (8.16)	5
HCC	3 (10.34)	7 (14.29)	10
Metastatic adenocarcinoma	14 (48.28)	23 (46.94)	37
Metastatic sarcoma	0 (0)	1 (2.04)	1
Metastatic SCC	3 (10.34)	1 (2.04)	4
Metastatic anaplastic	0 (0)	1 (2.04)	1
Metastatic unclassified	4 (13.79)	10 (20.41)	14
Total	29 (100)	49 (100)	78

SCC: Squamous cell carcinoma, HCC: Hepatocellular carcinoma

Table 5: Gender wise distribution of various types of malignant liver lesion

Diagnosis	Female (%)	Male (%)	Total
HCC	3 (12.5)	7 (16.28)	6
Metastatic adenocarcinoma	14 (58.33)	23 (53.48)	39
Metastatic sarcoma	0 (0)	1 (2.33)	1
Metastatic SCC	3 (12.5)	1 (2.33)	4
Metastatic anaplastic	0 (0)	1 (2.33)	2
Metastatic unclassified	4 (16.67)	10 (23.25)	15
Total	24 (100)	43 (100)	67

SCC: Squamous cell carcinoma, HCC: Hepatocellular carcinoma

Table 6: Distribution of metastatic liver lesion

Type of metastatic tumor	Number of cases (%)
Metastatic adenocarcinoma	37 (64.91)
Metastatic sarcoma	1 (1.75)
Metastatic squamous cell carcinoma	4 (7.02)
Metastatic anaplastic tumor	1 (1.75)
Metastatic unclassified tumor	14 (24.56)
Total	57 (100)

metastatic malignant tumors. Adenocarcinoma was the most common metastatic tumor detected, noted in 37 cases (64.91%).

The study reveals HCC was more common in male. Male to female ratio were 2.33:1.

DISCUSSION

Diseases of the liver include space-occupying lesions, such as cysts, abscesses, and benign or malignant tumors. This group is the target of FNAC, and can also be performed under imaging guidance (USG).⁶

A total number of 80 cases of liver aspiration cytology were studied during this period. It was positive in 78 cases out of 80 cases, and the diagnostic yield of the present study was 97.5%.

Similar results were seen in the earlier studies in which diagnostic yield of FNAC were 96% (Tsui *et al.*⁷ in 1980), 93.5% (Talukder *et al.*⁸ In 2004).

In the present study, out of 78 cases, 29 (37.18%) were female and 49 (62.82%) were male. Male to female ratio was 1.69:1. Maximum number of case was in 7th decade.

Similar results were seen in the earlier study conducted by Talukder *et al.*⁸ In 2004, on 108 cases result were 67 (62.0%) males and 41 (37.96%) females with a mean age 53 years (SD \pm 14) ranging from 2 to 83 years.

Similar result was seen in the earlier study conducted by Nazir *et al.*⁹ in 2010 on 100 cases find out the mean age at presentation was 55(SD \pm 12) years with male to female ratio of 1.7:1.

Out of 49 male cases, 6 were suffering from benign and 43 were suffering from malignant. Out of 29 female cases, 5 were suffering from benign and 24 were suffering from malignant lesions.

Malignant and benign lesions both were more common in male.

Maximum number of malignant cases were found in 61-70 years of age groups with 27 cases (40.29%) next in order of frequency were in 51-60 years with 16 cases (23.88%), Maximum number of benign case were found in 61-70 years of age groups with 5 cases (45.45%).

Similar results were seen in the earlier study conducted by Gatphoh *et al.*,¹⁰ Gaytri in 2003 find out the most common age group of the malignant liver disease was 51-60 years.

Metastatic tumor was the most common malignancy detected, noted in 57 cases (85.07%). Next most frequent malignancy was HCC noted in 10 cases (14.93%).

Similar results were seen in the earlier study conducted by Rasanian *et al.*³ in 2007 who found that metastatic tumors were the most common and constituted 70.4% while the hepatocellular carcinoma (HCC) accounted for 26.2% of the malignant liver lesion.

In present study, HCC was the most common primary malignant tumor of the liver. HCC was diagnosed in 14.93% of all malignant lesions.

The results were higher the earlier study conducted by Bottles *et al.*¹¹ in 1988, Gatphoh *et al.*¹⁰ in 2003 (31%).

In the present study, out of 78 cases, 57 cases were metastatic malignant tumor. Adenocarcinoma was the most common metastatic tumor detected, noted in 37 cases (64.91%). Next common was unclassified carcinoma, noted in 14 (17.95%), metastatic squamous cell carcinoma was noted in 4 (5.13%), single case of metastatic sarcoma and metastatic anaplastic was noted. (1.28% each).

Similar result was seen in the earlier study conducted by Das *et al.*¹² studied on 61 metastatic lesions which were included 43 (70.49%) adenocarcinomas, 6 (9.8%) small cell anaplastic carcinomas, undifferentiated carcinoma and soft tissue sarcoma each (1.63%).

The outcome of FNAC diagnosis among liver aspirate in 78 patients studied. Among this benign aspirates were 11 (14.10%), malignant aspirate were 67 (85.90%).

Maximum number of malignant cases were found in 61-70 years of age groups with 27cases (40.29%) next in order of frequency were in 51-60 years with 16 cases (23.52%), maximum number of benign case were found in 61-70 years of age groups with 5 cases (45.45%).

A maximum number of cases were in 7th decade 41.02 % followed by 24.35% in 6th decade, 20.51% in 5th decade, 8.97% in 8th decade, 3.84% cases in 4th decade and 1.28% cases in 3rd decade. Average age was 59.37 years with a range of 30-80 years of age.

Similar results were seen in the earlier study conducted by Nggada *et al.*² A total of 47 patients were studied with a mean age of 47.04 (SD \pm 14.24) years and range between 14 and 75 years. The peak age incidence is between 40 and 59 years age groups.

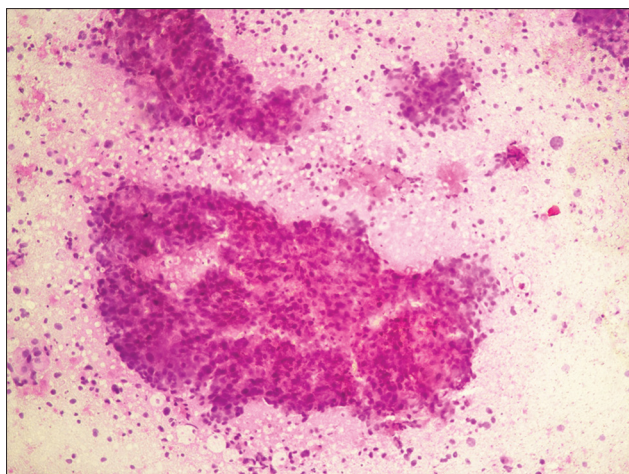


Figure 1: Hepatocellular carcinoma - showing sinusoidal pattern, clusters of cells are surrounded by endothelial wrapping (H and E, x10)

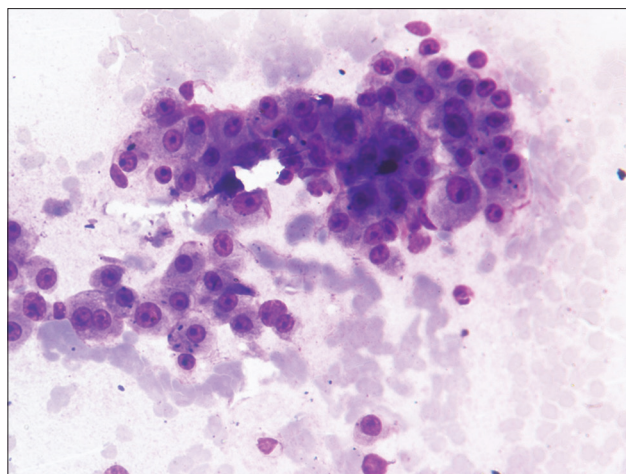


Figure 4: Hepatocellular carcinoma - showing cluster of cells, having moderate amount of cytoplasm, round nuclei and prominent nucleoli (May-Grünwald-Giemsa, x40)

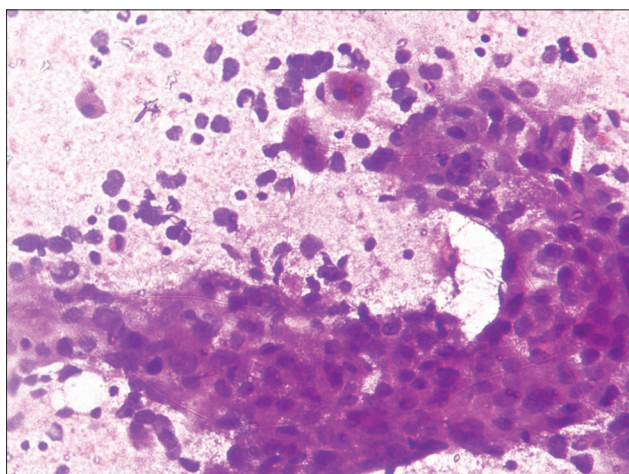


Figure 2: Hepatocellular carcinoma - showing trabecular pattern of cells, one cell shows bile accumulation in the cytoplasm (H and E, x40)

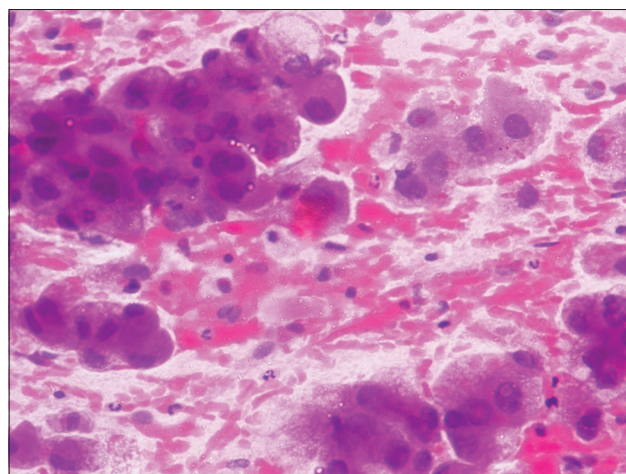


Figure 5: Metastatic adenocarcinoma - showing clusters of pleomorphic cells having abundant cytoplasm and pleomorphic nuclei, normal hepatocytes are also present (H and E, x40)

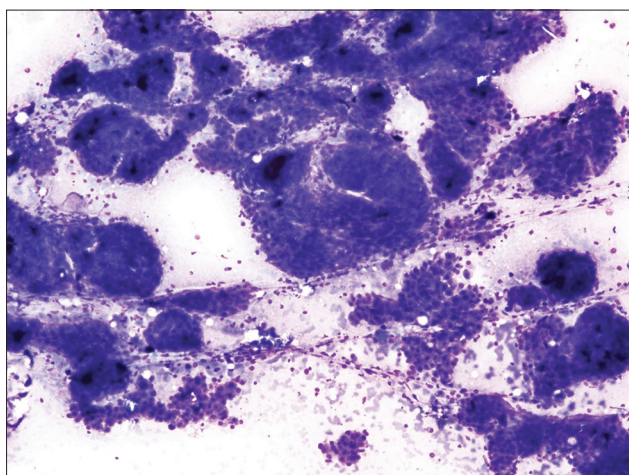


Figure 3: Hepatocellular carcinoma - smear shows sinusoidal pattern, clusters are traversed by endothelium of capillaries (May-Grünwald-Giemsa, x10)

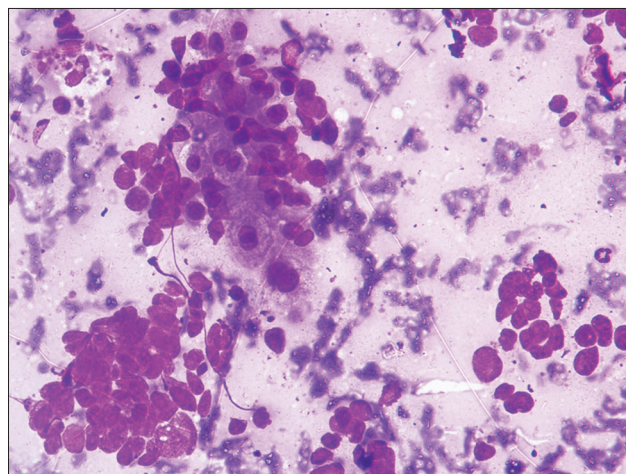


Figure 6: Metastatic anaplastic carcinoma - smear showing cells arranged in clusters and dispersed pattern having scanty cytoplasm, pleomorphic nuclei, nuclei show nuclear molding, along with normal hepatocytes (May-Grünwald-Giemsa, x40)

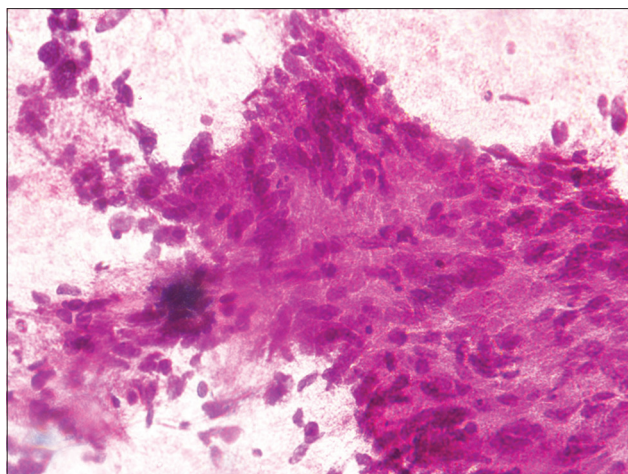


Figure 7: Metastatic sarcoma - showing cluster of spindle-shaped cells (H and E, x40)

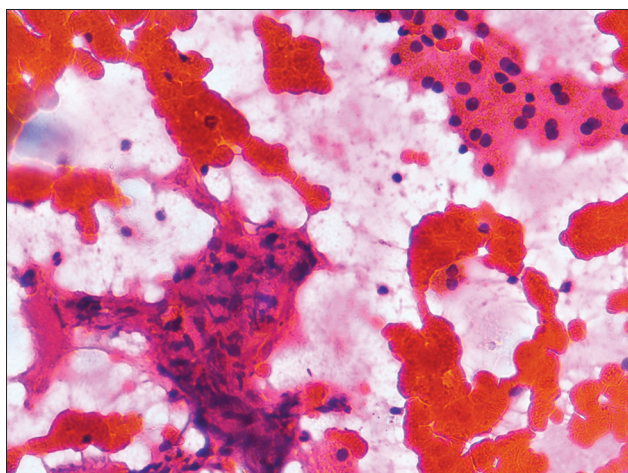


Figure 8: Smear showing clumps of reactive hepatocytes and fragment of fibrocollagenous tissue and hemorrhage in the backgrounds (H and E, x40)

Out of 78 cases 11 (14.10%) were benign and 67 (85.90%) were malignant. Among benign, reactive changes (5, 6.41%) and in malignant lesions, metastatic adenocarcinoma (37, 47.44%) were most common.

Most common neoplastic liver lesion is metastatic adenocarcinoma (37, 55.22%) and least common are metastatic sarcoma and metastatic anaplastic carcinoma (1, 1.49%) each.

Figures 1-8 depict morphological features of different hepatic lesions seen on cytology.

CONCLUSION

We found that incidence of malignant hepatic lesions was more than benign. In benign lesions common were reactive changes and cirrhosis. While in malignant liver lesions, metastatic were more common than primary. Adenocarcinoma was most common metastatic tumor. While in the primary tumor, HCC were most common.

From this study, in present set up it is felt that with the help of US guided FNAC is less time consuming, safe, useful, and highly accurate technique for making diagnoses of hepatic lesions.

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