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Ultrasound Guided FNAC in Diagnosis of Space Occupying Lesions of Liver

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Abstract

Introduction: Liver is one of the most common sites for both neoplastic and nonneoplastic lesions. In the suspected liver diseases ultrasound is the first and most important diagnostic tool. As sonography alone has its limitations, cytomorphologic analysis by FNA is required to increase the diagnostic accuracy. *Aims and Objectives:* To evaluate various neoplastic and nonneoplastic lesions encountered in the liver and to correlate ultrasound findings with the USG FNA diagnosis in liver lesions. *Materials and Methods:* This was a prospective study comprising of 102 cases of liver lesions diagnosed clinically or radiologically. Abdominal ultrasonography was carried out in all cases. FNAC was performed under ultrasound guidance. Smears were stained with H & E and Wrights stain and were examined for detailed cytomorphological analysis. *Observation and Results:* The mean age of the patient was 53yrs with M: F ratio of 1.5:1. Out of 102 cases, 3 cases (2.94%) each of inflammatory, cirrhosis, regenerative hyperplasia, one case (0.98%) of simple hepatic cyst, and 83cases (81.37%) were malignant, while one case (0.98%) was suspicious of malignancy. Eight (7.84%) cases were inconclusive. Thus diagnosis was possible in 94 cases with diagnostic yield of 92.2%. Malignant liver aspirates formed vast majority 83 cases (81.37%).Of these 83 cases, primary malignant liver lesions formed 42cases (50.6%). Out of these 42 cases, 40 cases were hepatocellular carcinoma and two cases were NHL. Metastatic tumour constituted 41 cases (49.4%) of which 35 cases were adenocarcinoma deposits, five cases were Squamous cell carcinoma deposits and one case of lymphoma deposit was found. On ultrasound examination out of 40 cases of HCC, 32 cases had solitary SOL, and 8 cases had multiple SOL. Metastatic carcinoma group showed solitary lesions in 10 cases and multiple lesions in 30 cases. All 3cases of NHL presented as multifocal lesions. Ultrasound diagnosis correlated well with 73 cases out of 90 cases. Discrepancies were found in 17 cases of hepatic lesions between ultrasound diagnosis and cytological diagnosis. *Conclusion*: Malignant tumors were the commonest of the liver lesions with same incidence of primary and metastatic deposits. HCC presented as solitary lesion and deposits presented with multiple SOLs in most of the cases. On radiological examination, neoplastic and nonneoplastic lesions show overlapping features, hence cytomorphological analysis by FNAC increases the diagnostic accuracy.

Keywords: Fine Needle Aspiration Cytology; Ultrasound; SOL; Hepatocellular Carcinoma; Metastatic.

Introduction

Liver is one of the most common sites for both neoplastic and non-neoplastic lesions.In the suspected liver diseases ultrasound is the first and most important diagnostic tool. As sonography alone has its limitations, cytomorphologicanalysis by FNA is required to increase the diagnostic accuracy. Ultrasound guided FNA of liver is safe, cheap and relatively noninvasive procedure with minimum complications [1]. Cytological examination is sensitive and highly specific technique and can be routinely used for evaluation of liver diseases [2]. Accurate diagnosis of hepatic masses are very important as

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treatment ranges from supportive care for advanced metastatic lesions to partial hepatectomy for primary carcinoma [3].

The aim of the present study was to categorize the lesions of liver intoinflammatory, non-neoplastic and neoplastic lesions by ultrasound guided fine needle aspiration cytology and to correlate the ultrasound findings and FNA diagnosis of liver lesions.

Aims and Objectives

1. To evaluate various non-neoplastic and neoplastic lesions encountered in the liver.
2. To correlate ultrasound findings with the USG FNA diagnosis in liver lesions.

Materials and Methods

This is a prospective study comprising of 102 cases of liver lesions diagnosed clinically or radiologically and referred to Department of Pathology KIMS, Hubballi. Abdominal ultrasonography was carried out in all cases. Liver lesions were categorizedas single, multiple or diffuseand echogenicity was studied. Before FNAC, BT, CT and PT were done in all the cases. FNAC was performed under ultrasound guidance using 22 gauze needle or spinal needle.Under aseptic precaution, during suspended respiration, the needle was introduced percutaneously into the lesion under ultrasound guidance. One to three passes were made.When adequate material appearedin the needle hub,the needle was withdrawn after releasing the suction pressure. Smears were made from aspirated material. Few slides were fixed immediately in 95% alcohol and stained with H& E. Air dried smears were prepared for Wrights stain. Stained smears were examined.

Observation and Results

USG FNAC was performed in 102 cases. Patient's age ranged from 27-92 years withmean age of 53yrs. 61(59.8%) cases were male and 41(40.2%) cases were female with M: Fratio of 1.5:1.

Out of 102 cases, 3cases (2.94%) each of inflammatory, cirrhosis, regenerativehyperplasia, one case (0.98%) of simple hepatic cyst, and 83cases (81.37%) were malignant, while one case (0.98%) was suspicious of malignancy, as it had few atypical cells against haemorrhagic background. Eight (7.84%) cases were inconclusive, as it contained only few scattered hepatocytes and blood. Thus diagnosis was possible in 94 cases with diagnostic yield of 92.2%.

Malignant liver aspirates formed vast majority 83 cases (81.37%). Of these 83 cases, primary malignant liver lesions formed 42cases (50.6%). Out of these 42 cases, 40 cases were hepatocellular carcinoma and two caseswere primaryNHL.

Metastatic tumour constituted 41 cases (49.4%) of which adenocarcinoma deposits in 35 cases from various sites like colorectal (8 cases), breast (7cases), stomach (3cases), gallbladder (2cases), renal cell carcinoma (2cases), pancreas (1case), and testis (1 case) were identified. In 11 cases primary was unknown. Squamous cell carcinoma deposits (5 cases) from primary site namely, oral cavity (1case), tongue (1case), cheek (1case), oesophagus (1case) and lung (1case) were identified. One case of lymphoma deposit in liver was found.

Table 1: FNAC diagnosis of liver aspirates:

	Type of Aspirates	No of cases	%
1	Inflammatory lesion	3	2.94
2	Regenerative hyperplasia	3	2.94
3	Cirrhosis	3	2.94
4	Simple hepatic cyst	1	0.98
5	Suspicious of malignancy	1	0.98
6	Malignant aspirate	83	81.37
7	Inconclusive	8	7.84
	Total	102 cases	100%

Table 2: Malignant aspirates

Primary Malignant Lesions	42	50.6%
HCC	40 (95.2%)	
Well differentiated	17 (42.5%)	
Moderately differentiated	20 (50%)	
Poorly differentiated	03 (7.5%)	
Primary NHL	02(4.8%)	
Metastatic deposits	41	49.4%
Adenocarcinoma	35 (85.4%)	
Squamous cell carcinoma	05 (12.2%)	
Lymphoma deposits	01 (2.4%)	
Total	83	100%

Table 3: USG findings in malignant aspirates:

	Total	Solitary SOL	Multiple SOL
HCC	40	32 (80%)	8 (20%)
Metastatic carcinoma	40	10 (25%)	30 (75%)
NHL	3	0	3 (100%)

Table 4: Correlation and discrepancies in FNA and US findings.

Lesions	FNA diagnosis	US Correlation	Discrepancies
Metastasis	40	34	6
HCC	40	36	4
Simple cyst	1	0	1
Abscess	3	1	2
Cirrhosis	3	2	1
Lymphoma	3	0	3
Total	90	73(81.1%)	17(18 .9%)

On ultrasound examination, solitary space occupying lesion were seen in 42 cases (44.7%), multiple/multifocal lesions in 38 cases(40.4%) and diffuse lesion in 14 cases (14.9%) . The lesions showed mixed echogenicity in 35 cases (37.2%), hypoechoeic in 32 cases (34%), and hyperechoicin 27cases (28.7%). Out of 40 cases of HCC, 32 cases had solitary SOL, and 8 cases had multiple SOL. Metastatic carcinoma group showed solitary lesions in 10 cases and multiple lesions in 30 cases. All 3cases of NHL presented as multifocal lesions.

Ultrasound diagnosis correlated well with 73 cases out of 90 cases. Discrepancies were found in 17 cases of hepatic lesions between ultrasound diagnosis andcytological diagnosis. Six cases diagnosed as metastatic deposits by ultrasound turned out to be hepatocellular carcinoma in 4 cases, cirrhosis in one case and inflammatory in one case. Four cases diagnosed as HCC by ultrasound turned to be metastasis in 3 cases, and NHL in one case. One case of hydatid cyst turned to be simple hepatic cyst. One case suspicious as malignancy was HCC and two cases diagnosed as abscess were lymphoma and HCC. Ultrasound thus may give false negative and false positive results for malignancies.

Discussion

Hepatic diseases are common in our environment. It affects all age groups with peak age in 5th and 6th decades of life [4]. In the present study patient's age ranged from 27 -92 years with mean age of 53yrs similar toFranca et al [5]. M: F ratio was 1.5:1 showing malepredominance. Franca et al [5], Gatphoh et al [1] observed male preponderance, while Siddalinga reddy et al [6]observed slight female preponderance. The neoplastic lesions were common between 40-70 years and nonneoplastic lesions in age group 28-69 years similar to that of study by Rasania A et al [7]. The cytomorphological details were evaluated as described by Cohen et al [8].

On ultrasound, normal liver appears as homogenous echogenicity with smooth liver surface and vessel border. Fatty liver shows rounded border with increased echogenicity and decreased vascular architecture .Cirrhosis shows irregular nodular surface with inhomogenous echo texture. HCC and metastatic deposits may show overlapping features. HCC appears as isoechoic or slightly hypoechic or hyperechoic lesion. Metastatic deposits appear as hypoechoicmasses or mixed echogenicity or may have target appearance. Thus the appearances are variable. Necrotic tumors are typically heterogeneous and NHL appears as hypoechoiclesion [9,10].

Tumor masses, primary or secondary,undergo extensive necrosis, with the resultant radiologic image of the cavitaryneoplasm mimicking abscesses and abscesses are accompanied by reactiveproliferative changes, making radiologic differentiation from a neoplastic processalmost impossible. Here aspiration cytology or FNAB plays an important role andultrasonography enhances proper sampling and hence proper yield of material which will aid in accurate diagnosis [11].

In 2007, Rasania A et, al, discussed that the main indication of FNAC ofliver are single or multiple nodular lesions, demonstrated by palpation, nuclear scan, CT or USG. FNAC is a very useful procedure for diagnosis of various hepatic lesions. It offers accuracy without major complications and minimal interventions at low cost [7].

In the present study, on ultrasound examination, solitary space occupying lesion were seen in 42 cases (44.7%), multiple/multifocal lesions in 38 cases (40.4%) and diffuse lesion in 14 cases (14.9%). Lesions showed mixed echogenicity in 35 cases (37.2%),

hypoechoeicin 32 cases (34%), and hyperechoic in 27 cases (28.7%). While Swamy MCM et al [12] in their study observed solitary lesions (51.38%) in over half of his patients followed by multifocal lesions in 26 (36.12%), diffuse parenchymal disease in eight cases (11.12%) and normal echogenicity in one case (1.38%).

Neoplastic lesions were the most frequently diagnosed inthe present study similar to Khurana et al [13], Ramadas et al [3] and Sapna Goel et al [14] whereas, Gatphoh et al [1] found near equal frequency of both neoplastic and non neoplastic lesions. 80% of cases of HCC & 25% of cases of metastatic deposits showed solitary SOLs, same as reported by Ahuja A et al [15].

In the present study 10 cases (9.8%) were categorized as non-neoplastic lesions. They were pyogenic abscess 3 cases (2.94%), diffuse parenchymal disease as cirrhosis 3 cases (2.94%) and regenerative hyperplasia 3 cases (2.94%), andsimple hepatic cyst one case (0.98%). Thecases which were diagnosed as diffuse parenchymal disease in the form of cirrhosis and regenerative hyperplasia showed variable findings such as degenerative changes, reactive changes, inflammation, fibrosis aswell as fatty change.

All neoplastic lesions 84 cases (89.4%) in the present study were malignant which is same as that observed by Khurana et al [13] whereas Salamao et al [16] and Ceyhanet al [17] observed malignant lesions-predominantly with few benign lesions.These observations indicates that malignant lesions were diagnosed withoutmuch difficulty in ultrasound guided fine needle aspiration cytology smears, thanbenign lesions and other non-neoplastic lesions.

In the present study, out of the 84 cases of malignant lesions, primary hepatictumors constituted 41cases [48.8%] and remaining were secondary metastatic lesions 43 cases [51.2%]. Similar observations were noted by Ceyhan et al [17] whoobserved secondary metastatic tumors (51.65%) as more frequent malignant hepatic lesions.

Most frequent primary hepatic malignancy on ultrasound guided fine needle aspiration cytology of liver was hepatocellular carcinoma and was diagnosed in 40 cases. The early recognition of HCC appears to be of importance in view of the favorable diagnosis in some patients in whom it can be resected. The diagnostic accuracy of FNAC in the specific diagnosis of HCC was about 85% in many reports. Most studies includingthe present study observed similar findings. One case of primary NHL was diagnosed in the present study. Cholangiocarcinoma accounted for second most common primary hepatic malignancy in most studiesand least common primary malignant lesions were malignant lymphoma and hemangioendothelioma.

Most frequent secondary hepatic tumor were metastatic adenocarcinomas asobserved by most studies including the present study [12,14]. Metastatic deposits showed features of adenocarcinoma in 88.5% of cases which is similar to that observed by Rasania A et al [7]. Most common site was colorectal malignancies as observed by MCM Swamy et al [12]. Two cases of RCC deposits were observed similar to Pinto et al [18]. In present study, primary was unknown in 11 cases as observed by Cochand Priollet et al [2]. Squamous cell carcinoma deposits in 11.5% of cases, which is higher than that observed by Rasania A et al [7]. Lymphomadeposits was diagnosed in two patients who were adult male and is similar to that noted by Gat phon E .D. [1].

Thus ultrasound guided fine needle aspirationcytology of liver is most valuable and cost effective means of distinguishingprimary hepatocellular carcinoma and secondary adenocarcinoma without muchdifficulty than ultrasonography alone or fine needle aspiration cytology alone.Ultrasound enables us to find out liver SOL, but it is difficult to make an accurate diagnosis of tumors as it has its limitation in differential diagnosis.Hence ultrasound can be combined with ultrasound guided FNAC for the diagnosis of SOL of liver, in order to improve the accuracy of its diagnosis.

Conclusion

1. Malignant tumors were the commonest of the liver lesions with almostsame incidence of primary and metastatic deposits. Hepatocellular carcinoma was the commonest primary and colorectal adenocarcinoma was more common metastatic deposits in liver.
2. Although HCC presented as solitary lesion and metastatic deposits presented with multiple SOLs in most of the cases, multicentric HCCand solitary deposits have to be kept in mind as observed in Present study.
3. On radiological examination, neoplastic and nonneoplastic lesions show overlapping features, hence cytomorphological analysis by FNAC increases the diagnostic accuracy.

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