

A Study of Fine Needle Aspiration Cytology of Focal Liver Lesions



Medical Science

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ABSTRACT

***Aim:** To investigate the value of percutaneous FNA in the diagnosis of liver lesions and to determine the sensitivity and specificity.*

***Materials and Methods:** This prospective study was undertaken in the Institute of Pathology, Madras Medical College. Fifty two patients who were detected to have focal liver lesions by US/CT imaging, were chosen and subjected to FNA under US guidance, the smears stained and examined.*

***Results:** 23cases (44.23%) were diagnosed to be HCC, 15 cases (28.84%) were secondary adenocarcinomatous deposits and 2cases (3.84%) were hepatoblastoma. Cholangiocarcinoma, hepatic adenoma, secondary synovial sarcoma deposit and secondary squamous cell carcinomatous deposit each contributed to one case.*

***Conclusions:** Ultrasound guided FNA of liver lesions is rapid, inexpensive, safe and highly accurate, with increased sensitivity. Primary hepatocellular carcinoma was the most common malignancy in our study, followed by metastatic adenocarcinomatous deposits.*

INTRODUCTION

Fine needle aspiration (FNA) has proven to be a very effective means of obtaining tissue from many different body sites for diagnosis. Fine needle aspiration (FNA) of liver in diagnosing hepatocellular carcinoma and liver metastases is proven to be a safe, sensitive and specific method when guided by ultrasound (US) or computed tomography (CT) [1,2] Numerous studies have reported a sensitivity between 67% and 100% and accuracy rate as high as 96%[3] Severe complications and mortality rate are low, and was reported in 0.04% to 0.05% and 0.004% to 0.008% respectively in two large reviews which included a combined total of more than 65,000 cases [4]

Since fine-needle aspiration (FNA) has assumed a primary diagnostic role in the evaluation of hepatic masses, this prospective study was done focussing on the value of percutaneous FNA in the diagnosis of focal liver lesions.

MATERIALS AND METHODS:

This prospective study was undertaken in the Institute of Pathology, Madras Medical College from June 2006 to June 2009. Fifty two patients who were detected to have focal liver lesions by US/CT imaging, were chosen and subjected to FNA under US guidance. The aspirations were performed either to confirm or exclude suspected primary or metastatic liver malignancy based on clinical findings in symptomatic patients. All patients signed informed consent prior to aspiration and the study protocol conformed to the ethical guidelines of the Declaration of Government General Hospital, as reflected in a prior approval by the Hospital's Human Research Committee

Inclusion and exclusion criteria were used to select the patients. Only the radiologically (CT/US) proven cases of focal liver lesions were included. Patients with impaired haemostasis, poor performance status and advanced malignancy were excluded from the study. Informed consent was obtained. Screening laboratory studies including CBC, PT/PTT, bleeding time, coagulation time and blood group typing and cross matching for possible transfusion, electrolytes and liver function tests, viral markers and serum alpha fetoprotein were done 24-48 hours in advance.

FNA specimen was obtained using suction and aspiration into a 10 ml syringe.

TECHNIQUE:

Patient was laid in supine position. Liver margins were estimated by ultrasound. A wide area was prepped and draped in sterile fashion. The skin was anaesthetized with 1% lidocaine and a small superficial incision was made with a No 11 blade at the needle entry site to facilitate needle insertion. The first needle pass should sample the centre of the lesion. The fine needle of 20 gauge was attached to a disposable syringe and was passed through it. When the tip of the fine needle was correctly located within the lesion by US, negative pressure was applied and the needle advanced steadily for 1-2 cm and moved back and forth. With the needle still in position negative pressure was released and needle withdrawn. Several passes of the needle were performed in different directions to ensure representative sampling.

The material from aspirating syringe was smeared on clean microscope slides and sent to Cytology Laboratory. Smears were air-dried and stained with May-Grunwald- Giemsa as well as fixed in 95% alcohol and stained by the Papanicolaou method and hematoxylin and eosin. No major complications were encountered.

RESULTS:

This prospective analysis was done on fifty two patients, among which 39 were males accounting to 75% of our study population with focal liver lesions and 13 were females which was 25%. The peak incidence of focal liver lesions was highest in the age group of 61-70 years in the males and 41-50 years in the females. Males formed the majority of the cases reported as Hepatocellular carcinoma contributing to 20 of the 23 cases of which 45% were in the sixth decade.

The incidence of HCC(20 cases) and liver secondaries were high in males(14 cases) and in seventh decade. The abnormalities in liver function tests were increased bilirubin in 7 cases(13.5%), increased SGOT/SGPT in 11 cases(21%) and increased serum alkaline phosphatase in 7cases(13.5%). Viral markers were done for all cases and 2 cases showed positivity. The damage to the liver by various focal lesions was clinically manifested as jaundice in 12cases (23%), liver failure in 6 cases(11.5%), portal hypertension in 10 cases(19.2%), loss of weight and loss of appetite in 23 cases(44.2%).

LESION	NUMBER OF CASES	PERCENTAGE OF TOTAL
HEPATOCELLULAR CARCINOMA	23	44.23%
ADENOCARCINOMA	15	28.84%
SQUAMOUS CELL CARCINOMA	1	1.92%
SYNOVIAL SARCOMA	1	1.92%
SECONDARIES NOT SPECIFIED	1	1.92%
CHOLANGIOCARCINOMA	1	1.92%
HEPATIC ADENOMA	1	1.92%
HEPATOBLASTOMA	2	3.84%
CARCINOMA NOT SPECIFIED	2	3.84%
NEGATIVE	4	7.69%
OTHERS	1	1.92%
TOTAL	52	100%

Table1. Distribution of focal liver lesions- FNA

By FNA, 23 cases (44.23%) were diagnosed to be HCC, 15cases(28.84%) were secondary adenocarcinomatous deposits and 2cases (3.84%) were hepatoblastoma. Cholangiocarcinoma (1.92%), hepatic adenoma (1.92%), secondary synovial sarcoma deposit (1.92%) and secondary squamous cell carcinomatous deposit(1.92%) each contributed to one case. Definitive typing of malignancy could not be done in 2 cases(3.84%) and in one case(1.92%) the smear showed evidence of secondaries liver but could not be specified. Another 4smears (7.69%) showed no evidence of malignancy, which might be due to non representative sampling. Another case (1.92%) which had definitive radiological evidence of malignancy, proved to be an abscess [Table1]

The sensitivity of FNA in diagnosis of malignancy was 95.7% in our study which is in accordance with the sensitivity rates of studies by various authors like Pagani, Holm et al ,Butler and Smith, Buscatine et al and Fornari et al[5,6,7] .The specificity in diagnosing malignancy was 80%.False positive rate was 20% and false negativity was 4.3%.The low false negativity rate could be attributed to the image guidance of the procedure .The positive predictive value was 97.8% and negative predictive value was 66.7%.

FNA of HCC showed a sensitivity of 91.66% and a specificity of 96.42% of False positive rate was 3.57%, false negative rate was 8.34%, positive predictive value was 95.65% and negative predictive value was 93.5%.

FNA of secondaries showed a sensitivity of 85%and a specificity of 93.75% of false positive rate was 6.25%, false negative rate was 15%, positive predictive value was 89.5% and negative predictive value was 90.90%.[Table2]

DISCUSSION:

Studies by various authors support the usefulness of FNA in diagnosing benign and malignant liver lesions. The overall sensitivity varies from 67-100% in diagnosing malignant liver lesions. The specificity was 99%. The positive predictive value was 99%, and negative predictive value was 71%.This was in accordance to our study with sensitivity

of 95.7%, specificity of 80%, positive predictive value of 97.8% and the negative predictive value of 66.7%. The relationship between size of lesion and proportion in which a correct diagnosis was made was studied by Reading et al [8]and correct diagnosis was made by FNAC in 79% of lesions 1 cm or less in diameter. False positive were due to sampling error or are were based on aspiration material that often was scanty .With regard to HCC FNA is accurate with a sensitivity rate 80 to 95% and a specificity of 100%[9,10,11]

Table2.Analysis of Liver lesions

Lesion	Sensitivity (%)	Specificity (%)	+ve predictive Value (%)	-ve predictive Value(%)	False +ve (%)	False -ve (%)
Focal liver lesion	95.7	80	97.8	66.7	20	4.3
HCC	91.66	96.42	95.65	93.5	3.57	8.34
Secondaries	85	93.75	89.5	90.9	6.25	15

According to Bakshi et al[12] study of 41 FNACs from pediatric liver SOL, the FNAC sensitivity was 95%, specificity was 100%, positive predictive value was 100% & negative predictive value 92.3% . In our study, the 2 cases of pediatric liver SOL reported as hepatoblastoma in FNA showed similar results.

Xu GA in 1989[13] compared the accuracy rate of ultrasound , FNAC ,and HPE and the results were found to be higher for FNAC (95.2%) than US (86.7%).This was in concordance with accuracy rate of our study.

Isin Soyuer et al[14] in 2003 analysed 17 cytologic and 5 architectural features in a series of 320 FNACs from HCC and compared them with 73 FNACs with benign lesions and with 705 FNACs metastatic carcinoma. The sensitivity of FNA for hepatic malignancy was 99.5% and specificity was 100%. Microscopically bile plugs, centrally placed nuclei and intranuclear inclusions were the most specific cytologic criteria of HCC, with trabecular pattern consisting of sinusoidal capillarization and endothelial rimming of the malignant hepatocytes as the predominant pattern.[Fig1,2] In our study also the smears of HCC showed similar characteristic features.

Devi VL et al[15] also found that trabecular pattern covered by endothelium was the most common pattern in a study of smears of 32 cases of FNA of HCC.[Fig3]

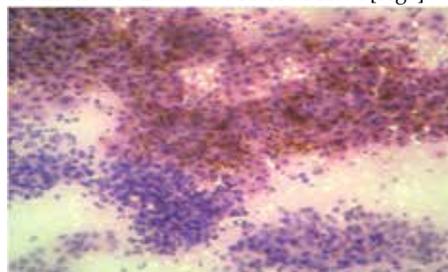


Fig1.Hepatocellular carcinoma showing bile plugs (100x) H&E

Fig2.Hepatocellular carcinoma showing intranuclear inclusion (400X) MGG

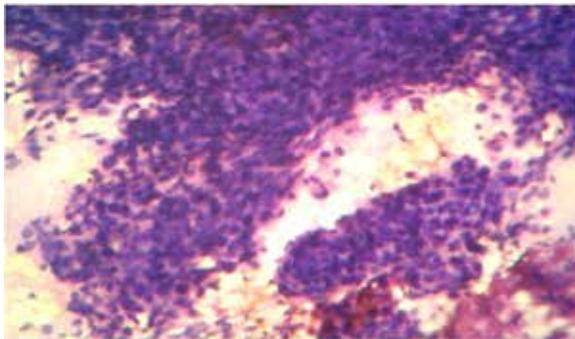
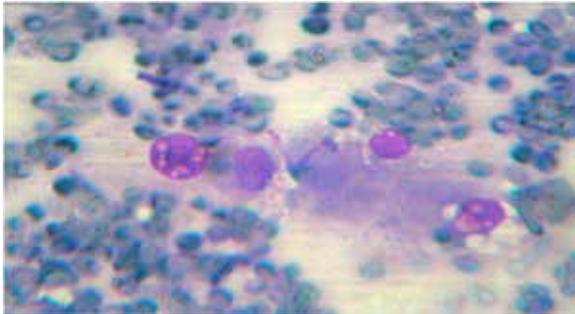


Fig3.Hepatocellular carcinoma showing endothelial rimming(100x)

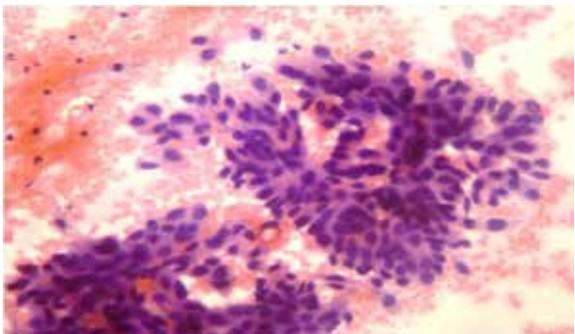


Fig4. Secondary adenocarcinoma (400x) H&E

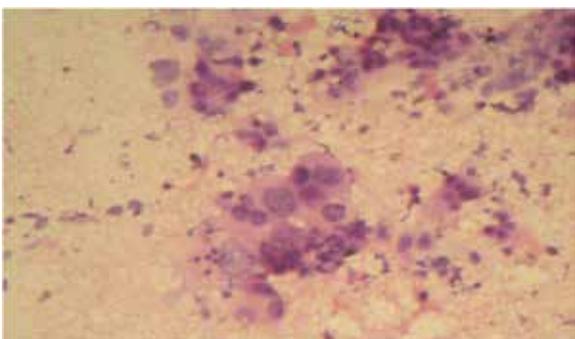


Fig5. Cholangio carcinoma (400x) H&E

CONCLUSION:

Ultrasound guided FNA of liver lesions is a rapid inexpensive, safe, highly accurate and minimally invasive technique for obtaining a tissue diagnosis in solid focal lesions of the liver. The sensitivity of imaging guided FNA in our study was 95.67% and specificity was 80%, false positive rate was 20% and false negative rate was 4.3%. Primary hepatocellular carcinoma was the most common malignancy

in our study (44.23%), followed by metastatic adenocarcinomatous deposits (28.84%). It may be difficult to differentiate well differentiated HCC from benign or reactive hepatocytic lesion and poorly differentiated HCC from metastatic cancer. The diagnostic accuracy of FNA is 94.23%. The risks of implantation seeding and tumour metastases was almost negative in our study. US guidance increases the accuracy of diagnosing the malignancies of the liver. FNA is useful in the diagnosis of focal liver lesions and determination of primary site of origin in metastatic lesions. FNA technique yielded higher number of positive diagnosis of malignancy than obtained with core needle, because aspirated material obtained with fine needle, represents a considerably larger area since repeated aspirations are performed in various directions. The combination of FNA and trucut biopsy should be considered complementary diagnostic techniques.

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