

Diagnostic utility of image guided fine needle aspiration cytology of liver lesions in a private laboratory: A 3 year study.

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Abstract

Fine needle aspiration cytology (FNAC) has proven to be an effective technique for diagnosis of liver lesion. Cytological examination of liver aspirates effectively differentiates between benign and malignant nature of the lesion, and helps in further management of the patient. The Present study aims at determining the utility of image guided FNAC of right hypochondrium masses with emphasis on diagnosis of neoplastic liver lesions. The present three year study was conducted on 135 patients from January 2016 to December 2019. After obtaining the detailed clinical and radiological data, patients were subjected for FNAC under Ultrasonography (USG) or Computed Tomography scans (CT scan) guidance.

Out of 135 received liver lesions, the diagnostic yield was obtained in 129 cases (95.5%). Out of 129 cases, 101 (78.2%) were neoplastic and 28 (21.7 %) were non neoplastic. All 28 non- neoplastic lesions had infective etiology (25 bacterial and 3 protozoa infections). Amongst the 101 neoplastic lesions, 93% were malignant, 6 % benign and 1% was suspicious for malignancy. In malignant neoplastic tumors, 20.2% were Hepatocellular carcinoma (HCC) and were categorized into well differentiate (04), moderately differentiated (11) and poorly differentiated (04). Metastatic lesions constituted 75.5% in which possible primary could be suggested in 35 cases based upon cyto-morphology, clinical history and radiological findings. The Majority of these cases are metastatic from gall bladder (14), gastrointestinal tract (06) and lung (07). Pancreatic and nasopharyngeal carcinoma metastasis were 02 in the number and 1 case of metastatic carcinoma each from prostate, urinary bladder, prostate and ovaries. Image guided FNAC of liver proves to be a minimally invasive and cost effective technique to characterize liver masses.

Keywords - Image guided liver FNAC, Liver lesions

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I. Introduction

Right hypochondrium masses are routinely encountered in clinical practice, comprising liver lesions chiefly.¹ Clinical management includes physical examination, biochemical tests and radiological investigations¹. To establish the nature of the lesion, pathological examination of the lesion is mandatory. Fine needle aspiration cytology (FNAC) has proven to be an effective technique for the diagnosis of liver lesion.² Image guided FNAC of liver lesions enables the exact localization of lesion, assessment of multifocality, nature, vascularity of lesion and multiple passes for adequate sampling.^{1, 2} Cytological examination of liver aspirates effectively differentiates between benign and malignant nature and helps in further management of the patient.² Careful examination of cytological features of liver FNAC also enables to determine the primary and metastatic nature of malignant liver lesions and indicates towards possible primary site of metastatic tumor in the liver.^{3,4}

Present study aims at determining the utility of image guided FNAC of right hypochondrium masses with emphasis on diagnosis of neoplastic liver lesions.

II. Material and Methods

The present three year study was conducted from January 2016 to December 2019, on specimens received from various private radiological centers, labeled as image guided (Ultrasound and CT scan) fine needle aspiration of liver masses. Prior to procedure, platelet count and prothrombin time was done in each case to rule out bleeding tendencies.

Written consent for FNAC procedure was procured at radiology centers. Right hypochondrium was cleaned with spirit. A 15-20 cm long, 22-23 cm G disposable needle was used with a 10 ml disposable syringe that was fixed to the FNAC gun. Under image guidance, the needle was introduced and its position was checked before aspiration. Aspirate was collected in 2-3 passes, expressed on to a glass slide and then, spread. Dry

smears and wet smears fixed in 95% alcohol were prepared. Clinical details, history and radiological findings were received along with properly labeled, unstained cytological smears. Alcohol fixed smears were stained with Papanicolaou (PAP) and dry slides were stained with Giemsa / Leishman's stain. Statistical data of age and sex, cytological diagnosis and radiological correlation were studied.

III. Results

Total number of USG guided FNAC of liver lesion received were 135 out of which 6 cases showed inadequate cellularity with only occasional benign hepatocytes, thus rendering them non diagnostic (4.4%). Hence diagnostic yield was 95.5%. Repeat procedure was suggested in these cases with clinic-radiological correlation. In the study age range is 12-75 years with mean age of 50.7 years and male to female (M: F) ratio is 1.6:1. Out of 129 cases, 101 (78.2%) were neoplastic and 28 (21.7 %) were non neoplastic (Table 1). Of the total non- neoplastic lesions, 28 had infective etiology. Liver abscesses comprised 25 bacterial, 2 amoebic and 1 echinococcal infections. (Table 1, Figure 2).

Amongst the neoplastic lesions (101/129, 78.3%) 94 were malignant (93%), 6 benign (6%) and 1(1%) case showed prominent mucinous background with clusters of suspicious epithelial cells showing mild to moderate dysplasia (suspicious for malignancy).

Out of 6 benign lesions 3 were benign cystic lesions, 2 were regenerative liver nodules and 1 case was a solid mass with hemorrhagic aspirate (most likely hemangioma).

Out of 94 malignant lesions, Total 85 (90.4%) presented as solitary liver mass and 9(9.6%) were with multiple lesions in ultrasound imaging. In malignant neoplastic tumors, all the HCC (19/94, 20.2%) presented as solitary mass and only one case had multiple lesions in which differentiation between HCC and metastatic lesion could not be given on cytology. Metastatic lesions presented as a mix of solitary and multiple lesions. Nineteen cases were HCC which were categorized in to well differentiated (04), moderately differentiated (11) and poorly differentiated (04). Metastatic lesions constituted 71 cases (75.5%) in which possible primary could be suggested in 35 cases based upon cyto-morphology, clinical history and radiological findings. Majority of these cases are metastatic from gall bladder (14), gastrointestinal tract (06) and lung (07). Pancreatic and nasopharyngeal carcinoma metastasis were 02 in number and 1 case of metastatic carcinoma each from prostate, urinary bladder, prostate and ovaries (Table 2) . Cytomorphologically, 62 cases of metastases were carcinomas with glandular and acinar pattern and moderate cellular pleomorphism. Four cases showed round cell morphology with one of them had a differential of lymphoma, while rest three showed convincing morphology of small cell carcinoma. Three cases showed squamous differentiation and 2 cases had clusters of pleomorphic epithelial cells with prominent lymphoid background. In three cases differentiation between poorly differentiated hepatocellular carcinoma and metastatic carcinoma could not be made and one case had intrahepatic cholangiocarcinoma as differential of hepatocellular carcinoma (Table 3).

Table 1. Cytomorphological spectrum of liver lesions

Neoplastic					Suspicious for malignancy	Non neoplastic			Non diagnostic
Malignant		Benign		Infectious					
HCC	Metastatic	Equivocal	Cystic		Solid	Bacterial	Protozoal		
19	71	04	03	03	01	25	03		06
							Amoebic	Echinococcal	
							02	01	
101							28		6
					Total -135				

Table 2. Description of neoplastic liver lesions

Hepatocellular Carcinoma (HCC)		Metastasis with possible primary		Equivocal
Well differentiated	04	Gall bladder	14	HCC vs. Metastatic carcinoma
Moderately differentiated	11	Gastrointestinal tract	06	
Poorly differentiated	04	Lung	07	
				- 3

	Pancreas	02	HCC vs. Intrahepatic cholangiocarcinoma - 1
	Prostate	01	
	Nasopharynx	02	
	Urinary bladder	01	
	Breast	01	
	Ovary	01	
	Indeterminate	36	
Total-	19	71	04

Table 3. Cytological differentiation of metastatic liver lesions

Differentiation	Number
Well differentiated adenocarcinoma	05
Moderately differentiated adenocarcinoma	44
Poorly differentiated adenocarcinoma	13
Small cell carcinoma/Small round cell tumor	04
Squamous/ adeno-squamous carcinoma	03
Nasopharyngeal carcinoma	02
Total	71

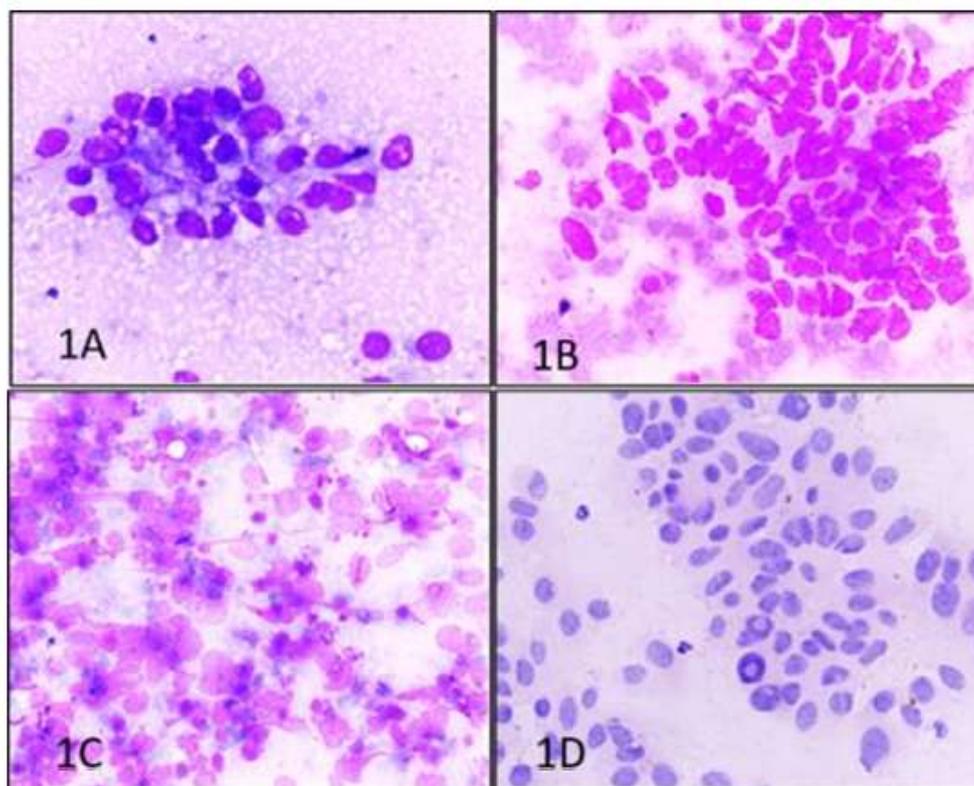


Figure 1. 1A- Metastatic adenocarcinoma, 1B – Metastatic deposits, 1C- Small cell carcinoma, 1D- Hepatocellular carcinoma

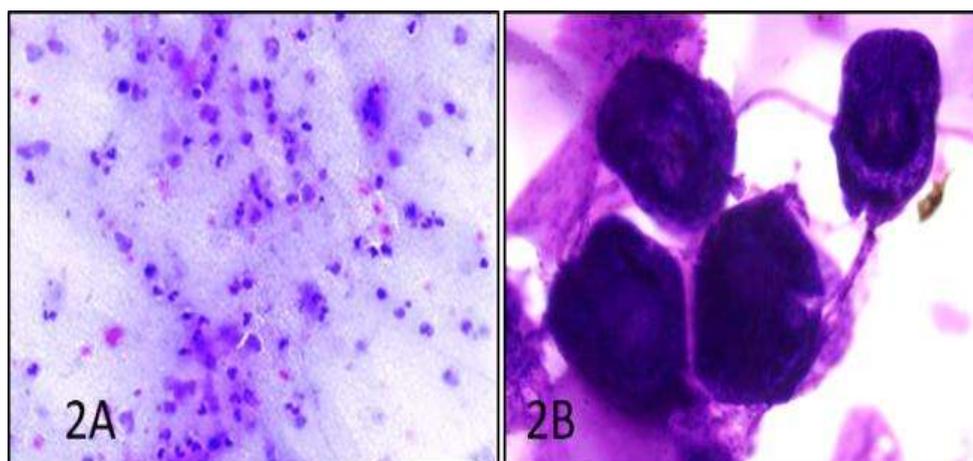


Figure 2. 2A- Liver abscess, 2B- Scolex of Echinococcus granulosus

IV. Discussion

The Age range in our study was from 12-75 years as compared to other studies which also showed variable age range^{2,5,6}. In our study the incidence of liver lesion was found to be more in males than females (M: F ratio – 1.6:1) which corresponds to the results of Lekha *et al*², Dhemeja *et al*⁵ and Swami *et al*⁶. However, other studies by Verma N *et al*¹ showed preponderance of liver lesions in females.

Inconclusive or non-diagnostic aspirates constituted 4.5% (6 cases) in our study which was found to be lower as compared to results of Verma N *et al*¹ (10%) and Barbhuiya M *et al*⁷ (18.7%). However, diagnostic yield in our study (129/135, 95.5%) was found to be comparable to results of Tailor SB *et al*⁸. Out of 6, 5 of the inconclusive aspirates in our study constituted of hemorrhagic smears with benign hepatocytes and few scattered inflammatory cells. One case showed a single myxoid stromal fragment with cells entangled in it. Repeat aspirate was suggested in all of them.

Categorization of liver lesions in our study showed 101 neoplastic (78.3%) and 28 non neoplastic (21.7%) as compared to results of Barbhuiya M *et al*⁷ in which there were 96.9% neoplastic cases and 2.2% non-neoplastic cases. Lekha *et al*² showed 88.8% neoplastic and 10.16% non neoplastic lesions in liver.

Occurrence of malignant neoplastic lesions in our study (93%) is comparable to results of Verma *et al*¹. Metastatic tumors have been found to constitute the majority of malignant liver lesions in various studies like in a series of 1383 cases of FNAC of liver, by Tao *et al*⁹ 1037 (75%) were metastatic cancers. Some other workers have reported metastatic liver malignancy as high as 90%¹⁰. In the present study, metastases were 75.7%, comparable to results of Barbhuiya M *et al*⁷ in which metastatic liver lesions comprised of 74.9%.

In 35 metastatic liver tumors, primary could be discerned, out of which gall bladder (40%) and gastrointestinal tract (17.1%) constituted the majority. Similar findings were reported by other studies as well^{2,7}. However, in our study, lung as primary site of tumor also constituted a significant portion of metastatic liver lesion (20%).

When differentiation of metastatic tumors was studied, our results showed 87.3% as adenocarcinoma, 5.6% small cell carcinoma and 4.2% as tumors with squamous differentiation (squamous cell carcinoma/adenosquamous carcinoma). These results were comparable to studies by Rasanian *et al*¹¹ and Kuo *et al*¹².

Hepatocellular carcinoma was classified on the basis of differentiation and moderate differentiation was more prevalent (57.8%) as compared to well and poorly differentiated HCC (21% each). Rasani *et al*¹¹ similar preponderance of moderate differentiation in HCC (56.2%) as opposed to results of Lekha *et al*², who found well and poor differentiation more in HCC. In 3 cases in present study, due to marked loss of differentiation, distorted morphology and low cellularity, HCC could not be differentiated from metastatic carcinoma.

In present study, 3 cystic liver masses with benign morphology could have differentials of simple liver cyst, biliary hamartoma or pseudocyst but they could not be differentiated by cytology alone¹³. In one case in which there was prominent mucinous background with dysplastic epithelial cells, differential of biliary cyst adenoma/cyst adenocarcinoma could be considered¹⁴.

The limitation of our study is lack of histological correlation because of loss of follow up of patient which is of common occurrence in private setup. However, to the best of our knowledge, the present study is largest and most comprehensive analysis of image guided FNAC of liver in a private standalone laboratory.

V. Conclusion

Image guided FNAC of liver proves to be a minimally invasive and cost effective technique to characterize liver masses. Cyto-morphology along with clinic-radiological correlation is first line of diagnostics in management of liver lesions.

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Patient's consent

For the academic / publication of the data, written informed consent has been taken from all the patients in whom study is performed.

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Competing Interests

Authors have declared that there are no competing interests.

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