ORIGINAL ARTICLE

Detection of Malignant Cases from Focal Liver Masses by Fine Needle Aspiration Cytology and Cell Block

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ABSTRACT

Background and Objecive: Fine needle aspiration cytology of the focal liver lesions in conjunction with cell block formation offers a convenient, less invasive and better diagnostic tool. This study was carried out to determine the diagnostic accuracy of fine-needle aspiration cytology in comparison with cell block from the aspirates taken from focal liver masses.

Methods: This cross-sectional study was carried out over 13 months inthe Department of Pathology, Allama Iqbal Medical College Lahore, Pakistan in collaboration with the Department of Radiology, Jinnah Hospital Lahore, Pakistan. A total of 60 ultrasound-guided fine-needle aspiration cytological smears along with cell block material were collected from patients with focal liver lesions.Features of malignancy were noted on the fine-needle aspiration of liver lesions followed by cell blocks.

Results: Cytological diagnosis based on FNAC in 59 cases was benign, out of which 39 (66.0%) were amoebic liver abscess, 14 (23.7%) were pyogenic liver abscess, 2 (3.4%) were tuberculous hepatic abscess supported by the same findings on cell block. One case (1.7%) was diagnosed as malignant on FNAC, later on, confirmed by the cell block. Four (6.7%) cases on FNAC were reported as benign lesions which were later on diagnosed as hepatocellular carcinoma on the cell block. Taking cell block as gold standard, the sensitivity, specificity, positive predictive value negative predictive value and diagnostic accuracy of FNAC was 93%, 100%, 100%, 20% and 93.3% respectively.

Conclusion: Accurately sampled FNA smears supplemented by cell-block preparation considerably improve the false positive or negative diagnosis.

KEYWORDS: Cytodiagnosis, Cell block, Fine needle aspiration cytology, Liver mass.

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INTRODUCTION

The spectrum of liver pathologies ranges from hepatitis, cirrhosis, circulatory disorders, hereditary disorders (like Hemochromatosis, Wilson's disease), alcoholic liver disease, liver

abscesses, hepatic cysts and neoplastic lesions.[1] The neoplastic lesions encompass primary and metastatic tumours. Liver cancer is the 7th leading cancer among all new cases diagnosed worldwide.[2] Clinically,space-occupying lesions of the liver may present as a solitary, multifocal, diffuse or massive form. It is of utmost importance from the management point of view and poses a strong clinical and histological challenge to differentiate between space-occupying lesions. Fine needle aspiration cytology (FNAC) under ultrasound guidance is a valuable initial technique which is safe, reliable and is used predominantly for diagnosing focal mass lesions.[3] The cell block technique can be used for special stains and immunohistochemistry and can give better morphological details by preserving the architectural patterns.[4] FNAC smears adjunct with cell block is likely to improve the diagnosis of liver masses.Therefore this study was carried out to determine the diagnostic parameters of FNAC taking cell block as gold standard.

METHODS

It was a cross-sectional study conducted in the Department of Pathology, Allama Iqbal Medical College in collaboration with the Department of Radiology, Jinnah Hospital, Lahore, Pakistan. The study protocol was approved by the College of Physicians & Surgeons Pakistan under reference no: CPSP/REU/HSP-2008-055-275. Sixty cases over 40 years of age with radiological evidence of space-occupying lesions in the liver (single or multiple) were included in the study. Patients with radiologic evidence of hemangioma, hydatid liver disease, massive ascites or deranged coagulation profile were excluded. The demographic profile along with detailed relevant clinical history and radiological findings were recorded in a special proforma. Ultrasound-guided fine-needle aspiration cytology was performed by the radiologist under the aseptic measure. Average of 4 slides per case along with cell block was made followed by Hematoxylin and eosin staining. Ziehl-Neelsen stain, Periodic acid Schiff and May-Grunwald Giemsa stain were performed where ever required.

STATISTICAL ANALYSIS

Data was entered and analyzed using SPSS version 22.0. Mean ± Standard deviation was calculated for quantitative variables. Frequencies, percentages and graphs were made for qualitative variables. The diagnostic efficacy of FNAC as compared with cell block was expressed in terms of sensitivity, specificity, positive predictive value, negative predictive value and accuracy.

RESULTS

The male to female ratio was 3.6:1 with 47 (78.3%) males and 13 (21.6%) females and a mean age of 49.25 ± 5.5 years for both genders. Frequencies of clinical presentation areshown in Fig. 1.

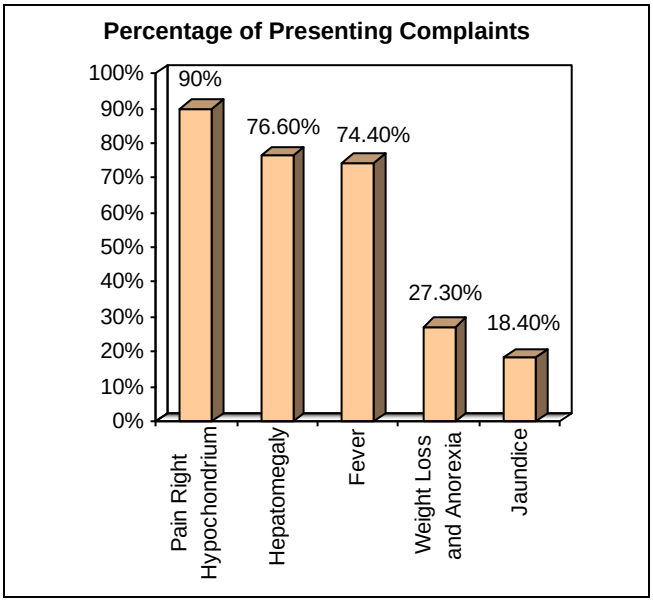

Figure 1: The graph shows the percentage of presenting complaints of patients.

On ultrasonography, 48 (79.7%) patients had solitary lesions and while 12 (20.2%) presented with multiple lesions in the liver. Among these, 46 (76%) cases had involvement of the right lobe, 6 (11.75%) had left lobe lesions while 7 (12.25%) cases had lesions in both lobes. The pathological spectrum of infectious lesions on FNAC as confirmed on cell block was amoebic abscess 39 (66%), pyogenic abscess 14 (23.7%), and tuberculous hepatic abscess 2 (3.4%). Four (6.7%) cases on FNAC were reported as benign lesions

which were later diagnosed as hepatocellular carcinoma on the cell block based on cytological features as groups, trabecular and acinar pattern of pleomorphic malignant epithelial cells containing hyperchromatic nuclei, eosinophilic cytoplasm and high nuclear cytoplasmic ratio (Fig:2-D) along with presence of bile. One case (1.7%) was diagnosed as malignant on FNAC, later on, confirmed by the cell block. Comparison of FNAC versuscell block revealed a sensitivity of 93%, the specificity and positive predictive value of 100% each, negative predictive value of 20% and diagnostic accuracy of 93.3% (Table-1).

Table-1: Fine needle aspiration cytology in comparison with cell block, considering the later as the gold standard.

		Cellblock		
		Benign	*Malignant*	
FNAC	Benign	55	4	59
	Malignant	0	1	01
	Total	55	5	60

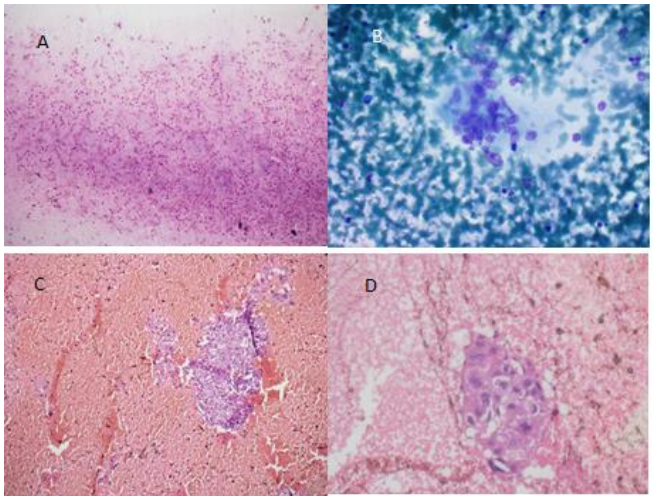

Figure 2-A: Cytology smears from pyogenic liver abscess showing plenty of neutrophils against a necrotic background (H &E stain, 40X). **B:** Cytology smears from granulomatous hepatic abscess showing epithelioid cells (Giemsa stain, 400X). **C:** Cellblock from liver mass showing features of hepatocellular carcinoma (H & E stain, 200X). **D:** Cellblock showing features of hepatocellular carcinoma (H & E stain, 400X).

DISCUSSION

Various non-neoplastic and neoplastic distinct types of lesions can develop in the liver. Clinically patients may present with abdominal pain and/or jaundice or they may be discovered incidentally on imaging for other reasons. Globally, in 2020, liver cancer resulted in 830,180 (8.3%) new deaths.[22] Presently, the diagnostic modalities available are ultrasonography, MRI and CT-scan followed by FNAC or biopsy. Ultrasound-guided fine-needle aspiration cytology along with cell block is quick, accurate and can be used for the safe diagnostic method.

The mean age of presentation of patients with liver mass in the present study was 49.65 ± 5.501 SD with the age range of 41 – 62 years. A study conducted by Hanif et al in 2019 had 56 ± 13.24 years and Tomer et al study group had 57.53 ± 15 years mean age of presentation.[5, 6]Both the studies showed higher frequency in male, which is consistent with the present study where male to female ratio was found to be 3.6:1.

On analyzing the cytological findings of fine-needle aspiration smears and histological features of cell block from focal liver masses, the amoebic abscess was the most common benign lesion identified. The aspirated pus in the present study was thick and chocolate, reddish-brown. Pus culture was negative in all the 39 cases. Das et al (2013) Bangladesh, in their series on the liver abscess, described aspirate in amoebic liver abscess as anchovy-sauce pus due to its consistency and colour. Pus culture was negative in all their cases, thus supporting our findings.[7]

The second most common benign liver lesion on FNA and Cellblock in the present study was a pyogenic abscess. Similar studies conducted by Lodhi et al and Abbasi et al showed 18% and 24.8% cases of pyogenic abscess respectively.[9,8]

In this study, the frequency of malignant cases on cell block histology was 8.3%, which were diagnosed as benign lesions on cytology smears, after fine-needle aspiration of hepatic masses. In this present study, hepatocellular carcinoma were labelled based on malignant features described by Soudah et al. A study evaluated 4136 cases suing FNAC and found 39.6% of cases were malignant and 57.5% with benign lesion.[10] In the present study also, most of the cases (91%) belong to benign group. Authors reported that well-differentiated HCC remains a diagnostic pitfall cytologically. The reason for the discrepancy in FNAC and cell block as, pointed out by Dahnert

et al. (1992), once blood appears in the needle hub after aspiration, it may flush the diagnostic tissue elements into the syringe. Because the last material aspirated at the end of a pass is the first expelled onto the slides, the smears may contain only blood and presentation of the cells is in a discohesive form with lack of tissue structure. Whereas the diagnostic material remains in the syringe and ultimately, the cell block yield better architecture, morphology and multiple sections.[11]

A study conducted by Nazir et alin 2010 on determining the diagnostic accuracy of FNAC in hepatic tumours showed an overall sensitivity of 95.2%, the specificity of 100 and diagnostic accuracy of 96%.[12] A large scale study conducted by Kacar et al in 2013 on fine-needle aspiration cytology of liver masses quoted overall sensitivity of 96.3%, the specificity of 90.0%, diagnostic accuracy of 95.6%, positive predictive value of 98.7% and negative predictive value of 75.0%.[13] A study conducted by Challa Vasu et al in 2015 found a sensitivity of 93%, the specificity of 90.9 %, the positive predictive value of 98.9% and negative predictive value of 58.8% along with diagnostic accuracy of 92.8%.[14] Diagnostic accuracy from 99.5% to 86.1% has been shown in the literature which is in consistent with the findings of the this study i.e., 93.3%. A study showed sensitivity & specificity of FNAC for malignant lesions of lesion had been found to be 94 & 100% respectively.[15] The findings of the present study are very much in concordance with the literature as the sensitivity of 93%, the specificity of 100%, the positive predictive value of 100% and negative predictive value of 20% and diagnostic accuracy of 93.3%. A study conducted to observe the role of FNAC & core biopsy suggested that these modalities have more ability to differentiate benign from malignant lesions in metastatic liver disease than primary lesions.[16]

CONCLUSION

The present study highlights the significance of fine-needle aspiration cytology in conjunction with cell block preparation as a simple and less traumatic procedure for the better diagnostic yield of focal liver masses. Collaboration between pathologist and radiologist and correlation with the clinical history and laboratory findings provides the best results.

LIMITATIONS OF THE STUDY

This is a single center study with limited number of cases that maynot berepresentable of the whole population.

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CONFLICT OF INTEREST

None to declare.

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None to disclose.

REFERENCES

1. Liver and Gall bladder. In: Robbins and Cotran Pathologic basis of disease. 9th edition. Philadelphia: Elseivier Saunders. 2015: pg. 834-80.
2. Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, JemalA et al. Global cancer statistictics 2020: Globocon estimated of incidence & mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin. 2021; 1-14. DOI: https://doi.org/10.3322/caac.21660.
3. Lin CC, Lin CJ, Hsu CW, Chen YC, Chen WT, Lin SM. Fine-needle aspiration cytology to distinguish dysplasia from hepatocellular carcinoma with different grades. J Gastroenterol Hepatol. 2008; 23 (7 Pt 2): e146–52. DOI: https://doi.org/10.1111/j.1440-1746.2007.04924.
4. Wee A. Fine needle aspiration biopsy of the liver: Algorithmic approach and current issues in the diagnosis of hepatocellular carcinoma. Cytojournal. 2005; 2 (8): 7. DOI: 10.1186/1742-6413-2-7 5.
5. Hanif R, Riaz MA, Habib urRehman M and Tabbsum S. Determination of malignant and non-malignant liver lesions with triphasic computed tomography. PJMHS. 2019; 13 (3): 705-9.

6. Tomar S, Goyal M, Awasthy N and Raghuvansh S. Triple phase multidetector computed tomography of hepatic masses with cytopathological correlation. IJARS. 2019; 8 (4): 17-20. DOI: 10.7860/IJARS/2019/42598:2515.
7. Das J, Majumdar S, Das S, Anwar S, Ahmed H, Hossain I. et al. A cross sectional descriptive study of etiology and clinical pattern of liver abscess: 50 cases. CMOSHMC J. 2013; 12 (3): 44-8. DOI: https://doi.org/10.3329/cmoshmcj.v12i3.16713
8. Lodhi S, Sarwari AR, Muzammil M, Salam A, Smego RA. Features distinguishing amoebic from pyogenic liver abscess: a review of 577 adult cases. Trop Med Int Health. 2004; 9 (6): 718-23. DOI: 10.1111/j.1365-3156.2004.01246.x.
9. Abbasi B, Pathani A. Patterns and differences in characteristics of types of liver abscess cases in civil hospital, Karachi. Medical Channel MC. 2011; 17 (1): 13-7.
10. Soudah B, Schirakowski A, Gebel M, Potthoff A, Braubach P, Schlue J, et al. Overview and evaluation of the value of fine needle aspiration cytology in determining the histogenesis of liver nodules: 14 years of experience at Hannover Medical School. Oncol Rep. 2015; 33 (1): 81-7. DOI: 10.3892/or.2014.3554.
11. Dähnert WF, Hoagland MH, Hamper UM, Erozan YS, Peirce JC. Fine-needle aspiration biopsy of abdominal lesions: diagnostic yield for different needle tip configurations. Radiology. 1992; 185 (1): 263-8. DOI: 10.1148/radiology.185.1.1523321.
12. Nazir RT, Sharif MA, Iqbal M, Amin MS. Diagnostic accuracy of fine needle aspiration cytology in hepatic tumours. J Coll Physicians Surg Pak. 2010; 20 (6): 373-6. PMID: 20642965.
13. Özkara KS, Tuneli OI. Fine needle aspiration cytopathology of liver masses: 101 cases with cyto-histopathological analysis. Acta Cytol. 2013; 57 (4): 332-6. DOI: 10.1159/000351169.
14. Reddy CV, Goud YG, Poornima R, Deshmane V, Madhusudhana BA, Gayathridevi M. Role of FNAC in hepatic lesions: risk of track metastases. South Asian J Cancer. 2015; 4 (1): 35-7. DOI: 10.4103/2278-330X.149949
15. Zhang L, Cai Z, Rodriguez J, Zhang S, Thomas J, Zhu H. Fine needle biopsy of malignant tumors of the liver: a retrospective study of 624 cases from a single institution experience. Diagn Pathol. 2020; 15 (1): 43. DOI: 10.1186/s13000-020-00965-5
16. McGahan JP, Bishop J, Webb J, Howell L, Torok N, Lamba R, et al. Role of FNA and core biopsy of primary and metastatic liver disease. Int J Hepatol. 2013; 2013: 174103. DOI: 10.1155/2013/174103

Author's Contribution

SA: Concept and design of study, acquisition of data, drafting and critical input in revising manuscript.

NH, UA, TR, US: Acquisition of data, drafting and revision of the manuscript with intellectual input.

NA: Analysis of data and drafting of manuscript.

ALL AUTHORS: Approval of the final version of the manuscript to be published.