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Utility of Ultrasonographically Guided Fine Needle Aspiration Cytology in the Diagnosis of Hepatic Masses

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Abstract

Background: With technological advances in imaging, previously inaccessible lesions can now be safely sampled by Fine Needle Aspiration Cytology (FNAC) under radiological guidance. It is also possible to ensure a more accurate diagnostic yield often providing an unequivocal diagnosis in both neoplastic and nonneoplastic conditions. This study was done to assess the role of Ultrasonographic (USG) guided FNAC in the evaluation of hepatic masses. ***Methodology:*** USG-guided FNAC was done in patients with hepatic masses. The smears made were stained by the Papanicolaou stain and the cytological features were studied. Relevant clinical data and laboratory investigations which corroborated the diagnosis were recorded. ***Results:*** A total of 90 liver aspirates were included in the study. Out of these there were 29 cases of hepatocellular carcinoma. In all the cases except one, the serum alpha fetoprotein levels were found to be elevated. There were 49 cases of metastatic tumors, in which the primary site was not known in 15 cases. The morphology of these secondary tumors was that of an adenocarcinoma. In the remaining 34 cases the primary tumor was found in various organs including the lung, pancreas, stomach, small intestine, breast, ovary, oral cavity and thyroid. There were six non-neoplastic lesions including regenerative nodules, hydatid cyst, tuberculosis, and abscess. In six cases the material was inadequate for definite diagnosis. ***Conclusion:*** USG-guided FNAC is a rapid, inexpensive and relatively safe technique for making a cytological diagnosis. A high degree of accuracy due to precise localization of the needle can be achieved and requires close co-operation between the clinician, the radiologist and the pathologist.

Keywords: ***USG-Guided FNAC, Liver, Tumors, Nonneoplastic Lesions.***

1. Introduction

Fine Needle Aspiration Cytology (FNAC) is a rapid and minimally invasive method employed for cytological evaluation of single or multiple nodular hepatic lesions. Inflammatory lesions may form tumor-like masses which can be sampled by FNAC to rule out neoplasms. Ultrasonography (USG) or Computerized tomography (CT) guided FNAC can increase the accuracy of sampling for deep seated lesions. The differential diagnosis of hepatic mass lesions includes primary liver tumors which could be benign or malignant, metastatic deposits, congenital and acquired cysts, abscesses and granulomas. Accuracy of FNAC is higher using radiological guidance since the lesion can be localised and multiple samples can be obtained and hence enhancing the chances of obtaining a representative sample.[1,2,3,4] This study was undertaken to assess the role of Ultrasonographic (USG) guided FNAC in the diagnosis of hepatic masses.

2. Methodology

This is a retrospective study of cases with liver masses for which USG-guided FNAC was done. The cases were retrieved from the archives and revaluated. The FNAC was done using USG guidance using 18-21 gauge long needle, under strict asepsis. Smears were prepared immediately and fixed in 95% methanol. The smears obtained were stained by the Papanicolaou stain and the cytological features were studied. Relevant clinical data and laboratory investigations including the serum levels of tumor markers which corroborated the diagnosis were recorded at the time of FNAC. In the event of availability of biopsy, the histopathological findings were studied and compared with the FNAC diagnoses. Repeated aspirations were done for cases which yielded only haemorrhage or failure to hit the tumor accurately.

Inclusion criteria: All cases with hepatic mass lesions for which USG-guided FNAC of the liver was done.

Exclusion criteria: Cases where the material obtained was inadequate for assessment.

3. Results

A total of 90 liver aspirates were included in the study. Out of these there were 29 cases of hepatocellular carcinoma (HCC). The smears showed groups and sheets of polygonal cells with central nuclei and abundant eosinophilic or granular cytoplasm. The nuclei were round with large prominent nucleoli. Endothelial lining of the cell groups was observed (Figures 1 & 2). In all the cases except one, the serum alpha fetoprotein levels (AFP) were found to be elevated (>1000/cumm). There were 49 cases of metastatic tumors, in which the site of the primary tumor was not known in 15 cases. The morphology of these metastatic tumors was that of an adenocarcinoma. In the remaining 34 cases the primary tumor was

found in various organs including the lung, pancreas, stomach, small intestine, breast, ovary, oral cavity and thyroid. One of the cases with a well circumscribed nodule showed abundant psammoma bodies in the smears. (Figure 3) On further investigation, a papillary carcinoma of the thyroid was diagnosed in the patient. There were six nonneoplastic lesions like regenerative nodules, hydatid cyst, tuberculosis (Figure 4), and abscess. In six cases the material was inadequate for definite diagnosis, or the material was obscured by hemorrhage.

4. Discussion

FNAC offers accuracy without major complications and minimal interventions at low cost. The only absolute contraindications are marked haemorrhagic diathesis and suspected vascular lesion.[1,3,5,6] We studied and evaluated the different features in different lesions. At one end of the spectrum, the tumor is well differentiated – it resembles liver but does not look obviously malignant, hence needs to be excluded from benign lesions. Benign lesions like hepatic adenoma and bile duct adenoma may be mistaken for well differentiated hepatocellular carcinoma or metastasis respectively. On the opposite end of the spectrum, the tumor is poorly differentiated - it is obviously malignant but may be difficult to appreciate its hepatic origin creating problems in excluding a metastatic tumor.

The cytomorphological features which were useful in diagnosis were cellular arrangement, cell size, N/C ratio and cohesiveness of cells, nuclear shape and size, location, multinucleation, prominent nucleolus, amount of cytoplasm, vacuolation, bile production and hyaline bodies. Similarly HCC was differentiated from other non-malignant conditions of liver by the different features collectively like cellularity, acinar pattern, trabecular pattern, hyperchromasia, uniformly prominent nucleoli, multiple nucleoli and atypical naked nuclei as described.[1-20] The most important and helpful cytological features were the trabecular pattern, irregularly granular chromatin, multiple nucleoli & atypical naked nuclei. The atypical naked nuclei were included as one of the important criteria for the diagnosis of HCC as these were rarely seen in benign and metastatic conditions.[1,12,15,21] A markedly elevated serum AFP level and the finding of a single lesion with or without satellite lesions on imaging favoured a primary tumor over metastatic disease.

The cytology of cirrhotic liver is similar to that of normal liver. Occasionally, markedly reactive hepatocytes may display significant cytological atypia including variable nuclear size, increased nuclear/cytoplasmic ratio, coarse chromatin, prominent nucleoli, and frequent bi- or multinucleation. In some instances, they may represent a dysplastic process. Separating a "dysplastic" nodule and HCC in a cirrhotic liver based on cytology alone can be difficult, if not impossible, since their distinction is often based on architectural criteria. For this reason, this constitutes a potential source of false positive error.[1,7]

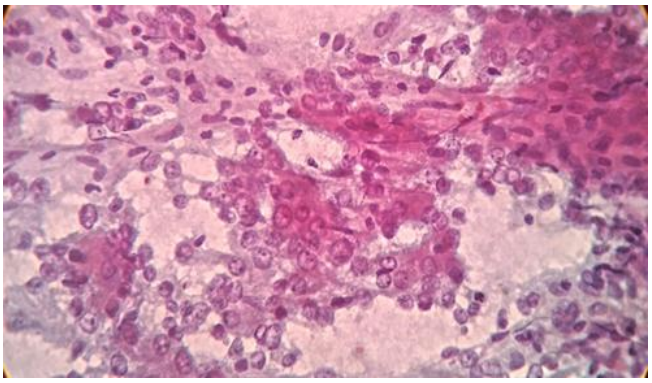

Figure 1: A case of well-differentiated Hepatocellular carcinoma (HCC) showing polygonal cells with central nuclei having prominent nucleoli and abundant cytoplasm (Pap 10x)

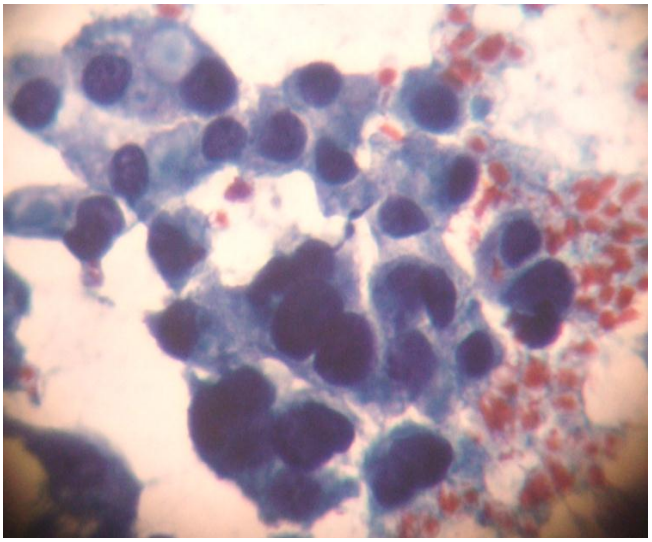

Figure 2: Hepatocellular carcinoma showing polygonal cells with central nuclei and abundant granular to vacuolated cytoplasm (Pap 100x)

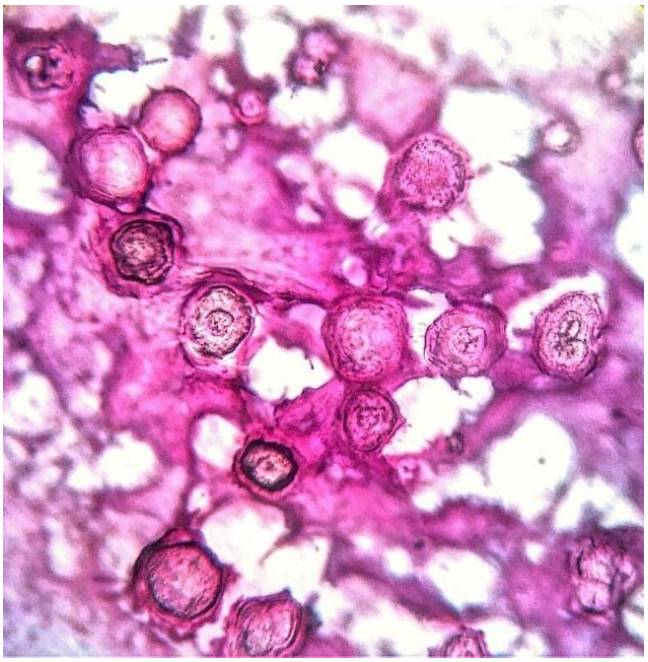

Figure 3: Aspiration from a metastatic papillary thyroid carcinoma showing multiple psammoma bodies. (Pap 40x)

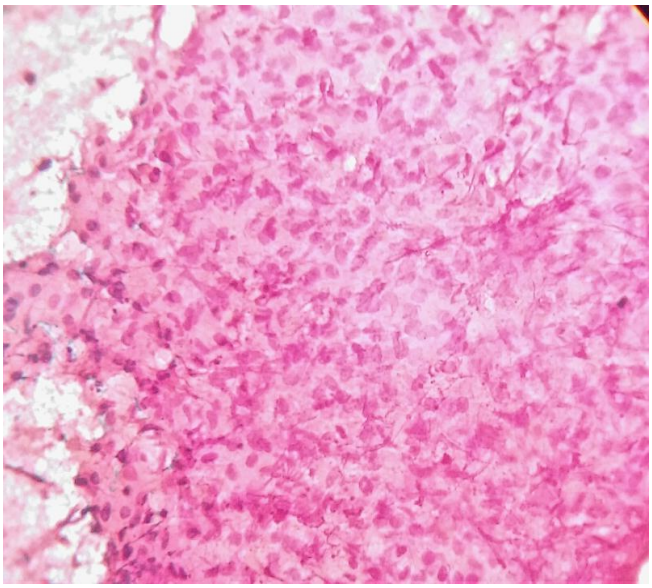

Figure 4: Smears from a case of tuberculosis showing epithelioid cells (Pap 10x)

Cytologically, bile production, as evidenced by the presence of bile in the cytoplasm of malignant cells or in canaliculi between malignant cells, is considered diagnostic of HCC. Unfortunately bile is present in only half of the cases. Although the "basketing" endothelial pattern is pathognomonic for HCC, it is often absent in poorly differentiated tumors. The presence of "traversing" capillaries is less specific and can be seen in some metastatic lesions, particularly, renal cell carcinoma. The key in diagnosing a poorly differentiated HCC is to look for better differentiated cells, with more typical hepatocytic features.[1,3,4,20]

FNAC is regarded as the gold standard for diagnosing metastasis in the liver. The presence of foreign cells in the liver with characteristic patterns and morphologies often points fingers to the primary. Metastatic tumors also show features like increased necrosis and inflammation in comparison to hepatocellular carcinoma. Differentiating a metastatic lesion from poorly differentiated lesions can be difficult and the distinction is necessary for determining the appropriate therapy.[14]

5. Conclusion

Ultrasonographically guided aspiration cytology is a rapid, inexpensive and relatively safe technique for making a cytological diagnosis. A high degree of accuracy due to precise localization of the needle can be achieved and requires close co-operation between the clinician, the radiologist and the pathologist.

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