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Research Article

ROLE OF ULTRASONOGRAPHY GUIDED FINE NEEDLE ASPIRATION CYTOLOGY IN HEPATIC LESIONS: A PROSPECTIVE AND OBSERVATIONAL STUDY AT A TERTIARY HEALTH CARE CENTRE IN CENTRAL INDIA

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ABSTRACT

Objectives: The liver is a common site for primary as well as secondary malignancies. Ultrasonography (USG)-guided fine needle aspiration cytology (FNAC) is a rapid, accurate, economical, and safe diagnostic procedure for various hepatic lesions. The aims of the study were to categorize and study the cytomorphological features of the hepatic lesions, study the age and sex distribution and analyzing cytological features of the hepatic lesions, and to evaluate the sensitivity, specificity, and diagnostic accuracy of USG-guided FNAC in diagnosing hepatic lesions.

Methods: A prospective and observational study of 64 patients with clinically and radiologically diagnosed hepatic lesions and referred for FNAC in department of pathology of a tertiary care hospital. USG-guided FNAC was performed in each patient and cytological features were analyzed.

Results: In our study, out of total 64 USG-guided FNAC of liver, metastasis was most common – 33 cases (51.56%), followed by primary hepatocellular carcinoma – 18 cases (28.12%), liver abscess – 6 cases (9.37%), and 7 cases (10.93%) were unsatisfactory smears.

Conclusion: USG-guided FNAC, in expert hands being simple, safe, quick, reliable, cost-effective, efficient, and easily available OPD-based procedure and with less number of complications, it has a very important role in accurate diagnosis of primary hepatocellular carcinoma, secondary malignant tumors of liver, and inflammatory lesions of liver.

Keywords: FNAC, Hepatic lesions, Cytology, Ultrasonography, Hepatocellular carcinoma, Metastasis.

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INTRODUCTION

With advent of time, fine needle aspiration cytology (FNAC) has progressed with great leaps and bounds, though it was considered to be riding a mad horse, but with expertise training and awareness programs, most of the pathologist has streamlined their interest in cytopathology. The advent of USG was a late diagnostic method, very late than cytology, the USG had greatly tamed the mad horse, and our needle now directly goes into the deepest possible vague lesions, which was blindly done before.

FNAC which is used for making a cytological diagnosis has become an indispensable component of the work–up of many abnormalities. USG-guided FNAC is an effective way to obtain diagnostic material in various hepatic lesions. The introduction of modern diagnostic imaging techniques, mainly USG has enabled the detection and location of lesions in sites which are not easily accessible to surgical biopsies, besides offering vast opportunities for fine needle aspiration of deeper structures [1]. Hepatic lesions are a riddle in surgical practice. Nature of pathology of the lesions must be known before starting the therapy. In maximum number of cases, the diagnosis which is obtained by FNAC is the replacement for surgical procedures like diagnostic laparotomy.

Most of the deep seated hepatic lesions are non-palpable, the idea of their size, shape, and extent of the lesion are not possible. Therefore, ultrasonography-guided fine needle aspiration cytology (USGFNAC) is a rapid, accurate, economical, and safe diagnostic procedure in which any hepatic lesion visualized can be reached quickly and precisely by a fine needle in any desired plane with constant visualization of needle tip during insertion [2].

USG-guided aspiration is an inexpensive and versatile, with use of non-ionizing radiation, does not require injection of contrast medium, and can be easily repeated when necessary. Thus, it is a valuable tool in assessment and a pre-operative diagnostic procedure in management of hepatic lesions. The biological nature of hepatic lesions can be benign, malignant, or inflammatory. Many inflammatory conditions such as hepatic abscess and tuberculosis can be misleading many a times. Imaging techniques do not always distinguish between benign and malignant lesions morphologically. A confirmed diagnosis is essential for management of malignancy (for treatment and staging of cancer).

USG-guided FNAC not only permit precise anatomical imaging and targeting of lesions, but also allow planning of a safe access route with constant visualization of the needle tip during insertion, thereby reducing the risk of complications [3].

The present study was planned with the aim to assess the utility of FNAC assisted by USG in diagnosis of hepatic lesions.

Aims and objectives

The objectives of the study are as follows:

1. To categorize the hepatic lesions into inflammatory, benign, and malignant.
2. To study cytomorphological features of hepatic lesions.
3. To study the age and sex distribution of hepatic lesions.
4. To analyze the cytological features of various hepatic lesions.
5. To evaluate the sensitivity, specificity, and diagnostic accuracy of USG-guided FNAC in hepatic lesions.

METHODS

Study design
This was a prospective and observational study.

Study place
This study was conducted at cytology section of Department of Pathology, N.S.C.B. Medical College, Jabalpur (M.P.), India.

Study period
The study period was from March 1, 2015, to August 31, 2016, (1 year and 6 months).

Ethical consideration
This study was approved by the research and ethical committee of the University of N.S.C.B. Medical College, Jabalpur (Madhya Pradesh Medical Science University, Jabalpur).

Study population
All the patients with clinically and radiologically diagnosed hepatic lesions and referred for FNAC in Cytology section of Department of Pathology, N.S.C.B. Medical College, Jabalpur (M.P.) were included in the study.

A total 64 patients were subjected to USG-guided FNAC during the study period.

Exclusion criteria
The following patient's were excluded from the study:
1. Patients with hemorrhagic diathesis.
2. Patients with skin infection at the site of aspiration.
3. Patients with suspected peritonitis.

Procedure planned
Detailed clinical data which include the patient's history, physical examination findings, and reports of relevant investigations are recorded from the patients who present with clinically and radiologically diagnosed hepatic lesions. After taking consent from the patients, FNAC of the lesion is done using a 22-gauge lumbar puncture needle attached to a 10 ml syringe under USG guidance taking aseptic precautions and by shortest route possible. Smears were prepared from the aspirated material, fixed in isopropyl alcohol, and stained with hematoxylin and eosin, examined and interpreted by experienced cytopathologists. Expert cytopathologists gain enough reputation, so that their diagnosis is taken as final and patient can be safely referred to cancer ward (in case of malignancy).

Statistical analysis
The data were compiled and entered in the Microsoft excel sheet. It was analyzed using statistical software SPSS 20.0 of windows. The data were represented in tables and graphs. Categorical variables were summarized in frequency and percent distribution and Chi-square test was performed by a statistician. All means were expressed as mean±standard deviation and the proportion as in percentage. The critical value for the significance of the results was considered <0.05 level.

RESULTS

The present study comprises of 64 patients with clinical and radiological diagnosed hepatic lesions. The mean age group of patients was 51.29 ± 12.56 years and the peak incidence was in the sixth decade. The male to female ratio was 1:1.54. About 89% belonged to rural area and 11% to urban area. The common presentation was abdominal mass with or without pain.

The diagnosis was possible in 57/64 hepatic lesions, while the seven were less cellular and inconclusive. Out of these 57 hepatic lesions, 51 cases were found to be neoplastic, and all were malignant, which include 33 metastatic, and 18 primary hepatocellular carcinomas. Remaining six cases were inflammatory lesions. The details are tabulated in Table 1.

In the present study, hepatocellular carcinoma was the single most common primary malignant tumor. The cytological features are summarized in Table 2. In most of these primary hepatocellular carcinomas, the neoplastic cells were recognized as hepatocytes and showed a variable degree of pleomorphism. Most of the smears from primary hepatocellular carcinoma were moderately cellular and revealed trabeculae of malignant hepatocytes with increased nuclear to cytoplasmic ratio, nuclear membrane irregularity, hyperchromatic nuclei having prominent nucleoli, intra-nuclear inclusions, and granular cytoplasm having bile (Fig. 1), while two cases diagnosed as poorly differentiated hepatocellular carcinoma showed cellular smears having malignant cells showing no resemblance to hepatocytes, marked nuclear pleomorphism, mitotic figures, and multinucleated tumor giant cells.

Thirty-three out of 64 hepatic lesions were metastases (Fig. 2), of which 31 were adenocarcinoma. In 29 out of 31 adenocarcinoma, the primary lesion was known, while in two cases, the primary was unknown. The remaining two metastatic malignancies were poorly differentiated carcinoma for which the primary was unknown. The details of the metastatic carcinomas are shown in Table 3. Six cases were diagnosed as inflammatory lesions; all were organized liver abscess (Fig. 3).

DISCUSSION

Age distribution
The youngest patient was 17 years old and the oldest was 90 years, reflecting that USG-guided FNAC of hepatic lesions can be done in wide range of age group (from small children to older people).

Maximum number of patients were in the age group of 51–60 years, our study correlates with studies of Sapna *et al.* [4], Hemlatha *et al.* [5], Shamshad *et al*. [2], while study of Sidhaling *et al.* [6] showed maximum number of cases in age group of 50–60 years.

Sex distribution
The male to female ratio is 1:1.54, which is in accordance with the observations of Sanjay *et al*. [7], Hemlatha *et al*. [5], and Sidhaling *et al*. [6], but a male preponderance was seen in the study of Shilpi *et al*. [8], Ankica *et al*. [3], and Aparna *et al*. [9].

Area wise distribution
In our study, maximum cases (88.6%) were from rural area and remaining 11.4% of cases were from urban area.

Hepatic lesions
The aspirated material was usually adequate in malignant lesions as compared to benign and non-neoplastic lesions, suggesting that USG-guided FNAC of hepatic lesions should be routinely done in deep seated

Table 1: The details of the cytology diagnosis

Diagnosis	Number of cases
Metastases in liver	33
Hepatocellular carcinoma	18
Inflammatory lesions	6
Inconclusive	7

Table 2: Cytology features of hepatocellular carcinoma

Feature	Number of cases
Cellularity	High - 7 Moderate - 10 Scanty - 1
Trabecular arrangement	14
Intranuclear inclusions	12
Intracytoplasmic bile	4
Tumor giant cells	2

lesions because of the high adequacy rate and very low complication rate. We got conclusive reports in 89.06% of cases; hence, only 10.94% of smears were inadequate. This was possible because of expert sonologist and cytopathologist.

Maximum number of lesions in liver were malignant – 51 cases (79.68%), our study is in accordance to studies of Shilpi *et al*. [8], Rajyalakshmi *et al*. [10], Ankica *et al*. [3] and Aparna *et al*. [9], Sumana *et al*. [11], and Sidhaling *et al*. [6].

Among the hepatic malignancies, majority were metastatic deposits in liver – 33 cases (64.7%), while primary hepatocellular carcinoma were 18 cases (35.3%), which is comparable to the studies of Shilpi *et al*. [8], Rajyalakshmi *et al*. [10], Ankica *et al*. [3] and Aparna *et al*. [9], and Bharti *et al*. [12] but in the studies of Sumana *et al*. [11], and Hemlatha *et al*. [5], most common malignant lesion was primary hepatocellular carcinoma.

Hepatocellular carcinoma can be small and focal, solitary and large, multifocal or diffuse, and infiltrating, thereby, mimicking benign lesions on one hand and metastases on the other, especially in imaging studies [13]. Tumors, primary or secondary, may undergo extensive necrosis, with the resultant radiologic image of the cavitary neoplasms mimicking abscesses; abscesses are accompanied by proliferative reactive changes, making radiologic differentiation from a neoplastic process almost impossible. In these situations, FNAC plays an essential complementary role [14].

As was stated by Pilotti *et al*. [15], the most common diagnostic problem which had to be solved using a FNAC procedure in the liver was to distinguish a primary from a metastatic lesion. This was a reflection of the limitations of the non-invasive radiological methods such as USG and CT scan, which are usually employed for the preliminary work-up of these lesions. Although primary hepatocellular carcinoma is a very vascular tumor and is prone for a spontaneous rupture causing hemoperitoneum, no such complication was encountered in our study.

For a primary hepatocellular carcinoma, one of the causative agent is Australia antigen (HbsAg) and a patient suffering from HbsAg positivity and cirrhosis of liver takes years to develop into hepatocellular carcinoma, so we got maximum number of primary hepatocellular carcinoma cases in middle age group (50–60 years). The incidence of malignancy decreases in older age group (60–80 years) because either patient succumbs to the disease or due to debility do not come for follow-up.

Sensitivity of USG-guided FNAC ranged from 83% to 95.3%. In our study, it was 91.5% which was comparable to most of the studies. All studies observed 100% specificity, the same observation what we have made in our study. Our study found diagnostic accuracy of 89.06% which is comparable to most of the studies.

Limitation of USG-guided FNAC

The only absolute contraindication for the procedure is uncorrectable severe coagulopathy.

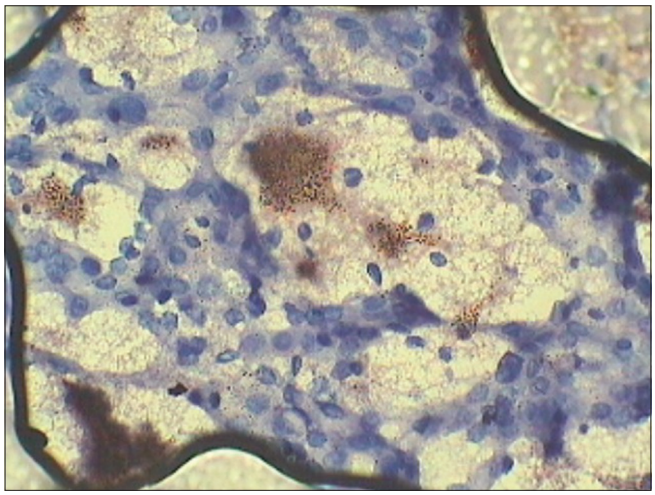

Fig. 1: Hepatocellular Carcinoma showing trabeculae of malignant hepatocytes with hyperchromatic nuclei having prominent nucleoli and intranuclear inclusions (H&E, ×40)

Table 3: The details of metastatic tumors of liver

Metastatic tumor	Number of cases
Adenocarcinoma with known primary	29
Adenocarcinoma with unknown primary	2
Metastatic poorly differentiated carcinoma	2

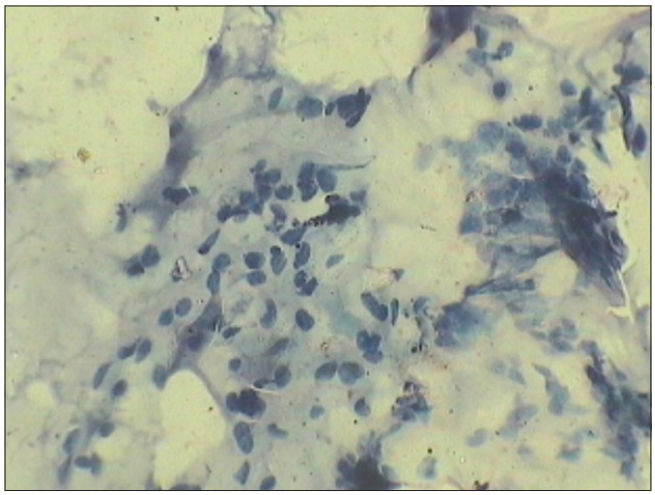

Fig. 2: Metastatic deposits in liver showing large round hyperchromatic nuclei with scanty cytoplasm, cells are arranged in multilayer and diffuse sheets (H&E, ×40)

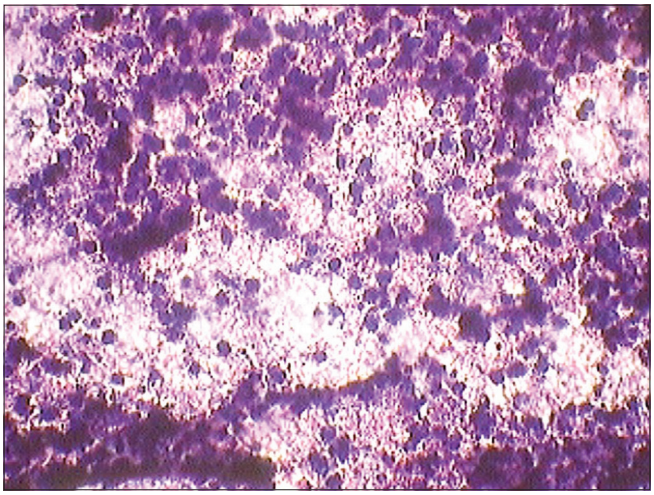

Fig. 3: Organized liver abscess showing degenerated lymphocytes, neutrophils, and macrophages admixed with degenerated hepatocytes in necrotic background (H&E, ×40)

CONCLUSION

USG-guided FNAC in expert hands being simple, safe, cost-effective, quick, reliable, efficient, and easily available procedure has a very important role in accurate diagnosis of primary hepatocellular carcinoma, secondary malignant tumors of liver, and inflammatory lesions of liver. USG-guided FNAC is a reliable, sensitive, and specific method with a high diagnostic accuracy for the diagnosis of malignant lesions of liver. With less severe types of and less severe number of complications, USG-guided FNAC being an OPD-based minimal invasive procedure should be a first investigation of choice for diagnosis of superficial as well as deep seated hepatic lesions.

CONFLICTS OF INTEREST

None declared.

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Nil.

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