



SPECTRUM OF CYTOPATHOLOGICAL DIAGNOSIS IN USG GUIDED FNAC FROM LIVER LESIONS IN NORTH INDIAN POPULATION IN A TERTIARY CARE HOSPITAL SETUP

Radio-Diagnosis

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ABSTRACT

Introduction: Ultrasound-guided fine-needle aspiration cytology (USG-FNAC) has emerged as a pivotal diagnostic tool for evaluating liver lesions. This minimally invasive procedure utilizes real-time ultrasound imaging to precisely guide a thin needle into the targeted lesion, facilitating the retrieval of cellular material for analysis. USG-FNAC proves particularly valuable in characterizing liver lesions of unknown aetiology, distinguishing benign from malignant conditions. The cytopathological examination of aspirated cells enables clinicians to make informed decisions regarding further management, such as surgery or conservative treatment. Accurate diagnosis aids in tailoring patient-specific therapeutic strategies, improving overall outcomes. This technique, by enhancing diagnostic precision and expediting results, plays a crucial role in the comprehensive assessment of liver lesions. **Aim and Objective:** This prospective study aims to evaluate the correlation between ultrasound-guided fine needle aspiration cytology (FNAC) results and cytopathological diagnosis in liver lesions. **Materials and Methods:** A research cross sectional descriptive study including 80 patients was conducted at Rama Medical College Hospital and Research Centre, Rama City, Mandhana, Kanpur from March 2023 till December 2023. Out patient and In patients Subjects of 18 -80 years meeting the inclusion and exclusion criteria were selected. Eighty liver lesions identified through clinical or radiological means were prospectively examined. Each patient underwent abdominal ultrasound to assess echogenicity, numericity, location and classified as solitary, numerous, or diffuse, likely benign , indeterminate or malignant. **Results:** In our study, ultrasound-guided fine-needle aspiration cytology (USG-FNAC) demonstrated a commendable diagnostic success, establishing a conclusive diagnosis in 92% of the 80 cases evaluated. Malignant liver aspirates comprised the majority, constituting 75% of the diagnosed cases. Hepatocellular carcinoma (HCC) emerged as the predominant malignancy, accounting for 48.4% of cases, followed by metastatic carcinoma and primary non-Hodgkin's lymphoma (NHL). Notably, HCC often presented as solitary lesions (80.6%), while metastatic carcinoma tended to manifest as multiple lesions. A noteworthy correlation between ultrasound findings and cytopathological diagnosis was observed in 61 cases, emphasizing the efficacy of USG-FNAC in accurate characterization and subsequent management of liver lesions. **Conclusion:** Cancerous tumours, notably hepatocellular carcinoma (HCC), dominated the spectrum of observed liver lesions in our study. The majority of HCC cases exhibited a solitary lesion, while some presented with multiple sites of origin, highlighting the diverse manifestations of this malignancy. The application of ultrasound-guided fine-needle aspiration cytology (USG-FNAC) proved highly effective, achieving a significant diagnostic yield. The correlation between ultrasound findings and cytopathological diagnosis further emphasized the reliability and utility of this minimally invasive procedure in the comprehensive assessment of liver lesions. The results underscore the pivotal role of USG-FNAC in facilitating precise diagnosis and subsequent management decisions for patients with suspected liver malignancies.

KEYWORDS

Fine Needle Aspiration Cytology, Ultrasound, Solitary Lesion, Hepatocellular Carcinoma, Metastatic

INTRODUCTION

The pancreas, biliary system, and liver are vulnerable to various cancers, ranging from metastases to benign or malignant neoplasms, as well as non-cancerous disorders. Advances in minimally invasive techniques, guided by radiological methods and correlated with pathology, enhance the identification of hepatic abnormalities. Despite these advancements, precise lesion characterization remains a challenge in radiology, necessitating cytological diagnosis for accurate therapeutic guidance[1]. Biopsying pancreatic tumours carries risks, including bleeding and infection, complicating differentiation from pancreatitis.[2] Tumour markers like alpha-fetoprotein (AFP) show promise but may not be initially elevated, emphasizing the crucial role of tissue diagnosis[3]. Fine needle aspiration cytology (FNAC), a rapid and cost-effective procedure, is increasingly becoming a primary method for identifying mass lesions in the pancreas and hepatobiliary tract. Its minimal risk and high sensitivity make FNAC a favoured diagnostic tool in clinical practice.[3,4]

MATERIAL AND METHODS

In this prospective study, we examined eighty distinct cases of liver lesions identified either clinically or radiologically. Before fine needle aspiration cytology (FNAC), comprehensive assessments were conducted using blood tests (BT), computed tomography (CT), and positron emission tomography (PET). Abdominal ultrasound, categorizing liver lesions as solitary, numerous, or diffuse, was

performed for all cases. FNAC, guided by ultrasonography using either a 22-gauge needle or a spinal needle, followed aseptic percutaneous insertion into the lesion. Patients were instructed to suspend breathing during the procedure, with one to three passes made. Upon obtaining sufficient material, suction pressure was released, and the needle was withdrawn. The aspirated material was used to create smears, some immediately fixed in 95% alcohol and stained with hematoxylin and eosin (H&E). Additional smears for Wright's stain were air-dried before staining, facilitating a thorough examination of the stained slides.

RESULTS

In the comprehensive study involving eighty cases undergoing USG-guided FNAC, patients ranged from 25 to 78 years, with a mean age of 51.85±6.25 years. The male-to-female ratio was 1.5:1, with 48 male and 32 female cases. Lesion distribution revealed 1.25% as simple hepatic cysts, and 3.75% each as inflammatory, cirrhotic, and regenerative hyperplasia cases(Table-1). Malignant liver aspirates were prominent, constituting 75% of cases, with hepatocellular carcinoma (31 instances) and primary non-Hodgkin's lymphoma (03 cases) being notable(Table -2). Metastatic tumors comprised 47.5%, predominantly adenocarcinoma deposits from diverse origins. Hepatocellular carcinoma mostly presented as solitary lesions (25 cases), while metastatic carcinoma often displayed multiple lesions (24 cases)(Table-3). USG demonstrated diagnostic correlation in 61

out of 72 instances, yet 11 cases exhibited discrepancies, including misdiagnoses and reclassifications, emphasizing the potential for false-negative and false-positive results in ultrasound-based cancer detection (Table-4).

Table 1: FNAC diagnosis of liver aspirates

Type of Aspirates	No of cases	%
Inflammatory lesion	3	3.75
Regenerative hyperplasia	3	3.75
Cirrhosis	3	3.75
Simple hepatic cyst	1	1.25
Suspicious of malignancy	1	1.25
Malignant aspirate	60	75
Inconclusive	9	11.25
Total	80	100

Table 2: Malignant aspirates

Malignant aspirates	Number	Percentage
Primary Malignant Lesions	34	52.5
a. HCC	31	92.86
• Well differentiated	13	41.03
• Moderately differentiated	16	51.28
• Poorly differentiated	2	7.69
b. Primary NHL	3	7.14
Metastatic deposits	30	47.5
• Adenocarcinoma	26	86.84
• Squamous cell carcinoma	3	10.53
• Lymphoma deposits	1	3.03

Table 3: USG findings in malignant aspirates:

	Total	Solitary SOL	Multiple SOL
HCC	31	25 (80.64%)	6 (19.35%)
Metastatic carcinoma	31	7 (22.5%)	24 (77.41%)
NHL	3	0	3 (100%)

Table 4: Correlation and discrepancies in FNA and US findings

Lesions	FNA diagnosis	US Correlation	Discrepancies
Metastasis	31	28	3
HCC	31	27	4
Simple cyst	1	0	1
Abscess	3	3	0
Cirrhosis	3	3	0
Lymphoma	3	0	3
Total	72	61(80.47%)	11(15.27%)

DISCUSSION

Hepatic disorders are prevalent across various age groups, with the highest incidence occurring between 50 and 60 years old [4]. In our study encompassing patients aged 25 to 78 years, with a mean age of 51.85 years, a masculine preponderance was noted, consistent with previous findings by Franca et al. [5], Gathpoh et al. [1], although Siddalingareddy et al. observed a slight female prevalence [6]. Neoplastic lesions were more common between ages 40 and 70, while non-neoplastic lesions were prevalent between 28 and 69 years, aligning with Rasanian et al.'s research [7]. Cyto-morphological analysis mirrored Cohen et al.'s description, with ultrasonography aiding in distinguishing various liver pathologies, including fatty liver, cirrhosis, and tumors [8].

A healthy liver typically exhibits consistent echogenicity, a smooth surface, and a well-defined vascular boundary in ultrasonography images. In contrast, a fatty liver is identified by its rounded border, heightened echogenicity, and reduced vascular architecture. Cirrhosis is characterized by an uneven and nodular liver surface with an inhomogeneous echo texture. There is potential for similarities between Hepatocellular Carcinoma (HCC) and metastatic deposits. HCC may appear as a lesion with isoechoic, mildly hypoechoic, or hyperechoic features. Metastatic deposits often display a target-like appearance but can also present as a hypoechoic mass or exhibit mixed echogenicity. Consequently, the outward manifestations may vary. Necrotizing tumors typically showcase diverse characteristics, whereas Non-Hodgkin Lymphoma (NHL) tends to manifest as a hypoechoic lesion [9,10].

Tumor masses, whether originating as primary or secondary growths, often undergo significant necrosis, resulting in a radiologic presentation that resembles cavitory neoplasms mimicking abscesses. Furthermore, abscesses are characterized by reactive proliferative changes, making it challenging to radiologically distinguish them from a neoplastic process. In such cases, aspiration cytology or Fine Needle Aspiration Biopsy (FNAB) becomes crucial. Ultrasonography aids in ensuring accurate sampling, thus enhancing the likelihood of obtaining a proper yield of material, both of which are essential for achieving an accurate diagnosis [11].

According to Rasanian A et al. in 2007, the principal reason for undertaking Fine Needle Aspiration Cytology (FNAC) of the liver is the identification of single or multiple nodular lesions, whether palpable, nuclear-scanned, CT-scanned, or USG-scanned. FNAC serves as a valuable diagnostic technique for a diverse range of liver conditions. This method offers precision in diagnosis, entails minimal intervention, and is cost-effective, making it a highly beneficial tool [7].

In the present study, ultrasound examination uncovered a solitary space-occupying lesion in 32 instances and multiple or multifocal lesions in another 33 cases. This finding contrasts with the investigation conducted by Swamy MCM et al. [12], where solitary lesions were identified in nearly half of the patients (49.23%). In the ongoing study, malignant lesions were predominantly identified, aligning with the results reported by Khurana et al. [13], Ramadas et al. [3], and Sapna Goel et al. [14]. In contrast, Gathpoh et al. [1] found that the occurrence of neoplastic and non-neoplastic lesions was approximately equal. Isolated Space-Occupying Lesions (SOLs) were detected in 80% of cases of head and neck cancer and 25% of cases with metastatic deposits, mirroring the percentages described by Ahuja A et al. [15].

In the ongoing investigation, a total of 12.5% of patients were categorized as having non-neoplastic lesions. Specifically, pyogenic abscesses were identified in three cases (3.75%), while widespread parenchymal diseases, manifested as cirrhosis and regenerative hyperplasia, were observed in another 6 cases (7.5%). Additionally, a simple hepatic cyst was responsible for one case (1.25%) in this category. Patients diagnosed with widespread parenchymal diseases, such as cirrhosis and regenerative hyperplasia, exhibited a range of findings, including degenerative changes, reactive changes, inflammation, fibrosis, and fatty change. The diagnoses were primarily assigned based on the presence of cirrhosis. While Khurana et al. [13], Salamao et al. [16], and Ceyhan et al. [17] predominantly identified malignant lesions with only a few benign lesions, the current investigation revealed that all neoplastic lesions in 64 cases (80%) were malignant. This aligns with the findings in the present study by Khurana et al. [13]. These results imply that ultrasound-guided fine needle aspiration cytology smears demonstrated a high efficacy in detecting malignant lesions compared to benign lesions and other types of non-neoplastic lesions.

Within the 64 instances of malignant lesions in the current investigation, primary hepatic tumors constituted 34 cases (52.5%), while the remaining cases (47.5%) were attributed to secondary metastatic lesions. Similar results were reported by Ceyhan et al. [17], indicating that secondary metastatic tumors accounted for 51.65% of the most prevalent malignant liver lesions.

Ultrasound-guided fine needle aspiration cytology of the liver revealed hepatocellular carcinoma (HCC) as the most frequently encountered primary hepatic malignancy, identified in 31 patients. Early detection of HCC is deemed crucial, given the potential for successful surgical removal in certain individuals, underscoring the significance of timely diagnosis. Several studies, including the current investigation, have consistently demonstrated a diagnostic accuracy of approximately 90.3% for FNAC in precisely diagnosing HCC. This aligns with the findings of numerous studies.

In the current study, three cases of primary Non-Hodgkin Lymphoma (NHL) were identified. Cholangiocarcinoma emerged as the second most prevalent primary hepatic malignancy based on the majority of research findings. Conversely, malignant lymphoma and heman gioendothelioma were the least common types of primary malignant lesions. Based on the collective findings from various studies, including the present one [12,14], metastatic adenocarcinoma emerges

as the most common type of secondary hepatic tumor. The study revealed that adenocarcinoma-like characteristics were identified in 86.84% of cases with metastatic deposits, a result consistent with the observations of Rasania A et al. [7]. MCM Swamy et al. [12] reported that the colorectal region was the most frequently affected site by malignancies. Additionally, two instances of Renal Cell Carcinoma (RCC) deposits, similar to those described by Pinto et al. [18], were identified. Thus, the combination of ultrasound and ultrasound-guided Fine Needle Aspiration Cytology (FNAC) is proposed for the diagnosis of space-occupying lesions in the liver to enhance the overall diagnostic accuracy of this condition.

CONCLUSION

Cancerous tumors were the most prevalent kind of liver lesion, and the prevalence of primary and metastatic liver tumor deposits was comparable. In the majority of the instances, HCC was found to be a single lesion, and deposits were shown to be associated with several SOLs. Because nonneoplastic and neoplastic lesions display overlapping characteristics on radiological examination, cytomorphological investigation by FNAC is necessary to boost diagnosis accuracy.

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