ISSN: 0975-8585

Research Journal of Pharmaceutical, Biological and Chemical Sciences

Study Of Clinico-Patho-Radiological Correlation In Various Hepatic Lesions.

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ABSTRACT

Hepatic lesions encompass a broad spectrum of conditions ranging from benign tumors to aggressive malignancies. Accurate diagnosis is critical for effective management. This study evaluates the clinico-patho-radiological correlation of hepatic lesions using fine-needle aspiration cytology (FNAC) guided by ultrasound or computed tomography (CT). A descriptive, cross-sectional, and prospective study was conducted on 52 patients with hepatic lesions over two years. FNAC was performed under ultrasound or CT guidance, and samples were evaluated cytologically using Papanicolaou and May-Grunwald-Giemsa staining techniques. Histopathological correlation was conducted in three cases. Clinical presentations, imaging findings, and cytological results were analyzed. Ultrasound was used for FNAC guidance in 96.15% of cases, while CT was used in 3.85%. Hepatocellular carcinoma showed unifocal lesions in 75% of cases, whereas metastatic malignancies were predominantly multifocal (73.91%). The most common clinical presentation was abdominal pain (76.92%). Cytological and histopathological correlation was achieved in all three evaluated cases. No complications were observed during or after FNAC. Ultrasound-guided FNAC is a safe, reliable, and cost-effective diagnostic modality for hepatic lesions. Combining clinical, radiological, and pathological evaluations enhances diagnostic accuracy and guides appropriate management.

Keywords: Hepatic lesions, FNAC, Ultrasound guidance.

https://doi.org/10.33887/rjpbcs/2024.15.6.34

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ISSN: 0975-8585

INTRODUCTION

The liver, being a vital organ with diverse metabolic, synthetic, and detoxification functions, is prone to various pathological processes, including infections, inflammation, metabolic disorders, benign tumors, and malignant neoplasms [1]. Hepatic lesions represent a spectrum of conditions ranging from benign and reversible pathologies to life-threatening malignancies. Timely diagnosis and accurate characterization of these lesions are crucial for appropriate therapeutic management and prognostication [2, 3].

Clinico-patho-radiological correlation plays a pivotal role in understanding the nature of hepatic lesions. Clinical presentations of hepatic disorders vary widely, from asymptomatic cases detected incidentally to overt symptoms such as jaundice, pain, or abdominal mass. Pathological examination, including histology, provides definitive diagnosis and insights into the cellular characteristics of lesions. Radiological imaging, using modalities like ultrasound, computed tomography (CT), and magnetic resonance imaging (MRI), offers non-invasive techniques to evaluate lesion morphology, vascularity, and functionality [4-6].

Advances in imaging technology, combined with clinical and pathological evaluations, have enhanced diagnostic precision. This integrated approach not only aids in distinguishing benign from malignant lesions but also guides interventional procedures, follow-up strategies, and treatment planning. This study aims to analyze the clinico-patho-radiological correlation of various hepatic lesions to improve diagnostic accuracy and patient outcomes.

STUDY METHODOLOGY

This descriptive, cross-sectional, and prospective study was conducted over a period of two years , at Pravara Rural Hospital and Medical College, Loni. Fine-needle aspiration cytology (FNAC), guided radiologically by ultrasound or CT scan, was employed as the diagnostic tool for hepatic lesions. The study included 52 patients who were referred to the Department of Pathology with hepatic lesions confirmed through radiological evaluation. Informed consent was obtained from all participants after explaining the procedure, its limitations, and potential complications.

Inclusion criteria consisted of patients with radiologically confirmed hepatic lesions who consented to the procedure. Patients were excluded if they had prolonged prothrombin time (PT) or activated partial thromboplastin time (aPTT) exceeding one minute, bleeding or clotting disorders, hydatid cysts, skin infections at the aspiration site, or were uncooperative. A detailed clinical history was recorded for each patient prior to FNAC. The procedure was performed under aseptic conditions using lumbar puncture needles and syringes to aspirate material from the lesion. The aspirated samples were prepared as smears, with some fixed in 95% ethyl alcohol for Papanicolaou staining and others air-dried for May-Grunwald-Giemsa staining.

The cytological evaluation involved assessing the adequacy and representativeness of the aspirated material. Cytomorphological features, including overall cell population and predominant patterns, were examined under low power, while individual cell morphology was assessed under high power. Histopathological correlation was performed on biopsy specimens, which were fixed in 10% formalin, processed into paraffin blocks, and stained using hematoxylin and eosin (H&E). Thin sections were prepared and mounted with DPX, with final interpretations made based on both cytological and histopathological findings.

The Papanicolaou, May-Grunwald-Giemsa, and H&E staining protocols were meticulously followed. Each staining process involved specific steps for hydration, staining, and mounting to ensure optimal visualization of cellular and tissue morphology. The findings from FNAC were correlated with histopathological results to establish the diagnostic accuracy and reliability of FNAC in the evaluation of hepatic lesions.

ISSN: 0975-8585

RESULTS

Age of the patient in the study ranged from 35 to 87 years of age with a mean of 60 years. Majority of patients fell in between 41-70 years of age group. Most common age group affected by hepatic lesion was 51-60 years (36.54%) followed by 61-70 years (25.00%).

Table 1: Distribution of Cases According to Mode of Guidance Used for FNAC.

Mode	No. of Cases	Percentage (%)
Ultrasound	50	96.15
CT	2	3.85
Total	52	100

Table 2: Ultrasound/CT Findings in Hepatocellular Carcinoma and Metastatic Malignancies.

Type of Lesions	Hepatocellular Carcinoma	Metastatic Malignancies
Unifocal	9	6
Multifocal	3	17
Total	12	23

Table 3: Clinical Presentation of Cases with Hepatic Lesions.

Nature of Complaints	No. of Cases
Abdominal pain	40
Loss of appetite	16
Hepatomegaly	12
Others (Ascites, lump in abdomen, blood in stools, lymphadenopathy, etc.)	11

Table 4: Cytological and Histopathological Correlation.

Case Type	Cytological Correlation	Histopathological Correlation
Hepatocellular carcinoma	Yes	Yes
Malignant lymphoma	Yes	Yes
Poorly differentiated carcinoma	Yes	Yes

DISCUSSION

Hepatic lesions present a diagnostic challenge due to their wide spectrum, ranging from benign conditions to aggressive malignancies. The integration of clinical, radiological, and pathological tools is crucial for accurate diagnosis and effective management. This study emphasizes the clinico-patho-radiological correlation of various hepatic lesions, utilizing fine-needle aspiration cytology (FNAC) as the primary diagnostic modality [7].

Mode of Guidance for FNAC

The results highlight the predominance of ultrasound as the preferred imaging modality for guiding FNAC, accounting for 96.15% of cases, compared to only 3.85% guided by CT. Ultrasound guidance is favored due to its real-time imaging capability, ease of access, cost-effectiveness, and minimal radiation exposure. The few cases where CT guidance was utilized could be attributed to the challenging location or depth of lesions, making them less accessible by ultrasound. This aligns with existing literature, which suggests that ultrasound-guided FNAC is the gold standard for hepatic lesions, offering high accuracy and low complication rates [8].

Ultrasound and CT Findings

The radiological findings in this study revealed distinct patterns in hepatocellular carcinoma (HCC) and metastatic malignancies. Among the 12 cases of HCC, 75% (9 cases) were unifocal, while the remaining 25% (3 cases) were multifocal. In contrast, metastatic malignancies predominantly presented

as multifocal lesions (73.91%, 17 cases), with unifocal lesions in only 26.09% (6 cases). These findings are consistent with the known radiological behavior of these lesions. HCC is typically associated with unifocal growth in its early stages, progressing to multifocal or diffuse patterns as the disease advances. On the other hand, metastatic lesions often appear multifocal, reflecting the spread of malignant cells from primary sites [9].

The ability to differentiate these patterns radiologically is invaluable, as it aids in determining the etiology of hepatic lesions and guiding further diagnostic and therapeutic interventions. For instance, unifocal lesions in HCC may indicate suitability for localized treatments such as surgical resection or ablative therapies, whereas multifocal metastatic lesions often necessitate systemic therapy.

Clinical Presentation of Hepatic Lesions

Abdominal pain emerged as the most common clinical presentation, affecting 76.92% (40 cases) of patients. This was followed by loss of appetite (16 cases, 30.77%), hepatomegaly (12 cases, 23.08%), and a range of other symptoms, including ascites, abdominal lumps, blood in stools, and lymphadenopathy (11 cases, 21.15%). These findings underscore the non-specific nature of symptoms associated with hepatic lesions, which often overlap between benign and malignant conditions [10, 11].

Abdominal pain, the predominant symptom, likely reflects the stretching of the liver capsule or the involvement of adjacent structures, a common feature in both primary and secondary hepatic malignancies. Hepatomegaly, a classical sign, was less common in this cohort, possibly due to the inclusion of small or early-stage lesions that do not significantly enlarge the liver. The presence of systemic symptoms like loss of appetite highlights the metabolic and systemic effects of hepatic diseases, particularly malignancies. These clinical observations align with other studies, which emphasize the importance of combining clinical features with radiological and pathological findings for accurate diagnosis [12].

Cytological and Histopathological Correlation

Cytological and histopathological correlation was performed in three cases, comprising one case each of hepatocellular carcinoma, malignant lymphoma, and poorly differentiated carcinoma. A 100% correlation was observed, demonstrating the reliability and accuracy of FNAC as a diagnostic tool for hepatic lesions. This is particularly significant in resource-limited settings where FNAC offers a cost-effective and minimally invasive alternative to more extensive diagnostic procedures.

Hepatocellular carcinoma is characterized cytologically by atypical hepatocytes with increased nuclear-to-cytoplasmic ratio, prominent nucleoli, and trabecular or pseudoglandular patterns. Malignant lymphoma displays a monomorphic population of lymphoid cells with high nuclear-cytoplasmic ratio and scant cytoplasm. Poorly differentiated carcinomas exhibit pleomorphic cells with marked atypia, making cytological evaluation challenging without histopathological confirmation. The ability to achieve a high degree of correlation reflects the meticulous preparation and interpretation of FNAC samples in this study.

One notable finding is the absence of complications during and after the FNAC procedure in all 52 cases. This reinforces the safety profile of image-guided FNAC when performed under strict aseptic precautions and proper technique. The exclusion of patients with coagulopathies or other contraindications further minimized the risk of complications. These results are consistent with the broader literature, which reports low complication rates for FNAC, such as minor bleeding or pain, occurring in less than 1% of cases.

The strengths of this study include its prospective design, detailed cytological and histopathological evaluation, and the use of ultrasound and CT for precise lesion localization. However, there are limitations, such as the relatively small sample size of 52 cases and the limited availability of histopathological correlation, which was performed in only three cases. Expanding the study to include more cases and histopathological evaluations would enhance the generalizability of the findings.

This study highlights the pivotal role of FNAC in the diagnosis of hepatic lesions, especially in settings where histopathological evaluation may not always be feasible. The integration of clinical,

radiological, and cytological findings enables a comprehensive approach to diagnosis and management. For example, unifocal lesions in HCC identified radiologically can be confirmed cytologically and subsequently managed with curative intent. Similarly, multifocal metastatic lesions identified on imaging can be confirmed as secondary malignancies, guiding the initiation of systemic therapy.

CONCLUSION

The findings of this study underscore the importance of a multidisciplinary approach to the evaluation of hepatic lesions. Ultrasound-guided FNAC emerges as a reliable, safe, and cost-effective diagnostic modality. Radiological patterns provide valuable insights into the etiology of lesions, while cytological and histopathological correlation ensures diagnostic accuracy. Future studies should aim to expand the sample size and explore advanced imaging and molecular techniques to further enhance the diagnostic and prognostic evaluation of hepatic lesions.

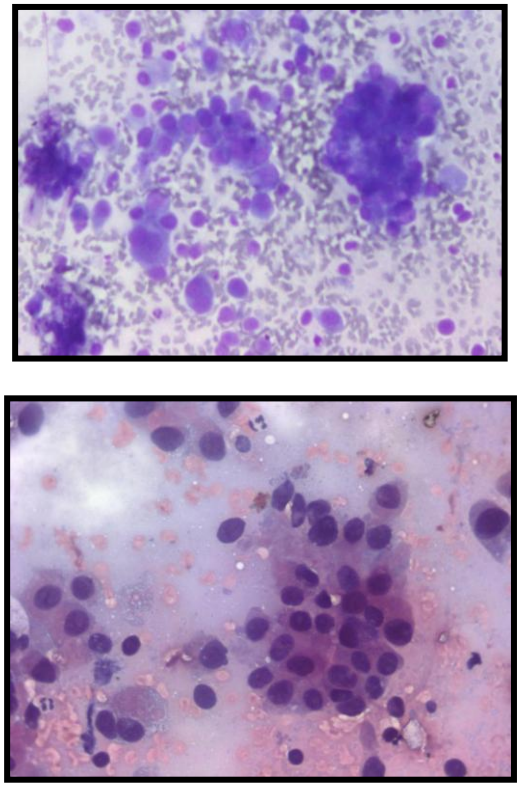
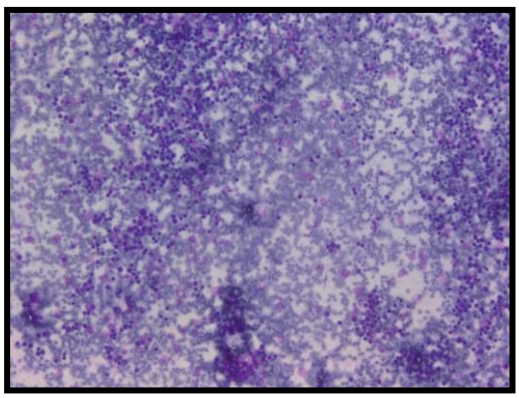


Figure 1: Metastatic squamous cell carcinoma.

Smear shows clusters of keratinizing malignant squamous cells. [(a) MGG x400 (b)PAP x400].



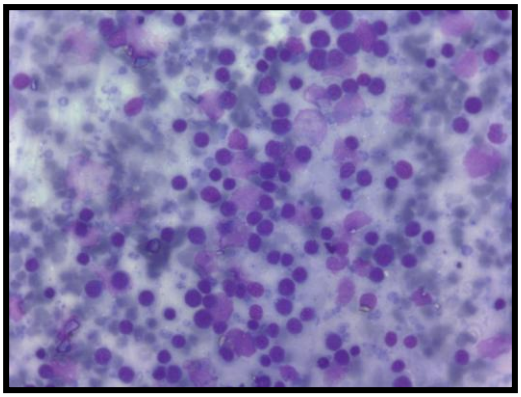


Figure 2: Leukemia /Lymphoma infiltrate

Smear shows small to medium sized lymphoid cells and smudge cells.
[(a) MGG x100 (b) MGG x400].

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