Section: Radiodiagnosis

Original Research Article

USG AND CT EVALUATION OF GALLBLADDER MASS AND ITS CYTOLOGICAL CORRELATION

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Received : 28/04/2024
Received in revised form : 03/06/2024
Accepted : 19/06/2024

Keywords:
GBCA, GBC, USG, CT, RUQ, GB, FNAC.

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DOI: 10.47009/jamp.2024.6.3.164

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2024; 6 (3); 801-804

Abstract

Background: Gall bladder masses represent a spectrum of pathologies ranging from benign conditions, such as polyps and adenomas, to malignant diseases, most notably gallbladder carcinoma. This study aims to evaluate the diagnostic efficacy of USG and CT in identifying and characterizing gallbladder masses and to correlate these imaging findings with cytological results. **Materials and Methods:** This is a prospective study conducted in the department of Radiodiagnosis in coordination with the Department of Pathology, M.G.M. Medical College & L.S.K. Hsopital, Kishanganj, Bihar. **Result:** The study population reveals that the majority of cases fall within the age group of 41-50 years, accounting for 36.4% of the total. The sex distribution of the study population indicates a higher prevalence of gallbladder masses in females, who constitute 60.0% of the cases. The study population shows that the most common symptom is abdominal pain, reported in 43.6% of the cases. Overall, the accuracy of USG is estimated at 96.36% (95% CI: 87.47% to 99.56%), reflecting its high performance in correctly identifying both positive and negative cases of gallbladder disease. Overall, the accuracy of CT is estimated at 98.18% (95% CI: 90.28% to 99.95%), reflecting its high performance in correctly identifying both positive and negative cases of gallbladder disease. **Conclusion:** Our study reaffirms the complementary roles of USG and CT in the evaluation of gallbladder masses, underscores the importance of cytological correlation for accurate diagnosis, and emphasizes the need for a multidisciplinary approach to the management of gallbladder disease. These findings contribute to the development of a comprehensive diagnostic algorithm for the effective management of patients presenting with gallbladder masses.

INTRODUCTION

Gall bladder masses represent a spectrum of pathologies ranging from benign conditions, such as polyps and adenomas, to malignant diseases, most notably gallbladder carcinoma. Accurate diagnosis and characterization of these masses are crucial for determining the appropriate clinical management and treatment strategies. Two primary imaging modalities, ultrasonography (USG) and computed tomography (CT) play vital roles in the initial evaluation and assessment of gallbladder masses. Since the first description of gallbladder (GB) carcinoma by Maxmillan de Stol in 1777, studies have established a characteristic pattern of late diagnosis and ineffective treatment of this disease.[1]
The exact etiology of GBC has not been properly known till date. It is yet to be established. However, several other factors such as chronic cholecystitis, gallstones, choledochal cyst, female gender, age, and exposure of carcinogens have been observed to be implicated in GB carcinogenesis. Early diagnosis of GB carcinoma is difficult because most patients present with non-specific findings of right upper quadrant (RUQ) pain, malaise, weight loss, jaundice, anorexia, and vomiting. This presentation is often confused with symptomatic cholelithiasis or chronic cholecystitis. Ultrasonography (USG) and computed tomography (CT) have revolutionized the diagnosis and management of carcinoma GB. Magnetic resonance imaging is utilized only in inoperable cases with obstructive jaundice for delineation of the biliary tract anatomy in patients considered for palliative stenting.[2]
Ultrasound (US) is the main initial diagnostic tool for suspected biliary lesions. It may be helpful for

ISSN (O): 2687-5365; ISSN (P): 2753-6556

detecting gadolinium-based contrast agents (GBCA) although the infiltrative morphology of some tumors and the presence of gallstones, inflammation, and debris may preclude tumor detection. CT has been reported as a comprehensive tool for imaging and staging of GBCA. USG in patients of carcinoma GB has certain limitations such as interference by bowel gas, limited depth resolution, and inadequate visualization of parts of the GB in the region of posterior acoustic shadowing in the presence of calculi. CT scan overcomes these drawbacks and provides definite information regarding the invasion of the tumor into the adjacent organs, distant metastasis, delineation of the biliary tree, and portal vein involvement.[3-6]

Sonography is currently the most practical and accurate method to diagnose acute cholecystitis. When adjusted for verification bias, sensitivity and specificity of US are approximately 88% and 80%, respectively.[3]

CT may be useful for depiction of complications. Sonographic findings include the thickening of the GB wall (>3 mm), distention of the GB lumen (diameter >4 cm), gallstones impacted stone in cystic duct or GB neck, pericholecystic fluid collections, positive sonographic Murphy's sign, hyperemic GB wall on Doppler, and interrogation.[7]

The integration of cytological analysis through fine needle aspiration (FNA) or biopsy under imaging guidance enhances the diagnostic accuracy for gallbladder masses.[8,9] Cytological examination provides definitive histopathological diagnosis, which is essential for the confirmation of malignancy and subsequent treatment planning. The correlation between imaging findings and cytological results is critical in establishing a precise diagnosis and guiding therapeutic decisions. This study aims to evaluate the diagnostic efficacy of USG and CT in identifying and characterizing gallbladder masses and to correlate these imaging findings with cytological results. By comparing the performance of these imaging modalities and their correlation with cytology, this research seeks to establish a comprehensive diagnostic approach for the effective management of gallbladder masses.

Aim and Objective

To evaluate the diagnostic efficacy of ultrasonography (USG) and computed tomography (CT) in the identification and characterization of gallbladder masses, and to correlate these imaging findings with cytological results obtained through fine needle aspiration cytology (FNAC).

MATERIALS AND METHODS

Type of Study: A Prospective study.

Place of Study: Study conducted in the department of Radiodiagnosis in coordination with the Department of Pathology, M.G.M. Medical College & L.S.K. Hsopital, Kishanganj, Bihar.

Duration of the study: 16 months (September 2022 to April 2024).

Study Population: Patients with suspected GB masses was included in our study.

Inclusion Criteria

- Patients who presented with a chronic complaints of upper abdominal pain, jaundice, dyspepsia, nausea, or vomiting. These cases were subjected to imaging and on discovery of thickening of the GB wall; FNAC was performed under image guidance.
- Aged between 18 – 60 years.

Exclusion Criteria

- Patients who did not undergo all the three investigation (USG, CECT, FNAC).
- Aged < 18 and > 60 years.

RESULTS & DISCUSSION

It was prospective study. The study conducted in the department of Radiodiagnosis in coordination with the Department of Pathology, M.G.M. Medical College & L.S.K. Hsopital, Kishanganj, Bihar. A total 55 patients who presented with a chronic complaint of upper abdominal pain, jaundice, dyspepsia, nausea, or vomiting. These cases were subjected to imaging and on discovery of thickening of the GB wall; FNAC was performed under image guidance. After follow-up we have found:

The study population reveals that the majority of cases fall within the age group of 41-50 years, accounting for 36.4% of the total. This is followed by the 31-40 age group, which constitutes 25.5%, and the 51-60 age group, representing 23.6%. The youngest age group, 18-30 years, comprises 14.5% of the cases. The sex distribution of the study population indicates a higher prevalence of gallbladder masses in females, who constitute 60.0% of the cases. In contrast, males represent 40.0% of the total cases. The study population shows that the most common symptom is abdominal pain, reported in 43.6% of the cases. Jaundice is the next most frequent symptom, occurring in 25.5% of the cases. Weight loss is observed in 14.6% of the patients, while fever or vomiting is reported in 9.0%. Itching all over the body is the least common symptom, noted in 7.3% of the cases. The gallbladder lumen shows that computed tomography (CT) identified such masses in 56.3% of the cases. In comparison, ultrasonography (USG) detected masses in 43.7% of the cases. Cases with focal wall thickening of the gallbladder reveals that computed tomography (CT) detected this feature in 14.5% of the cases. In contrast, ultrasonography (USG) identified focal wall thickening in 7.3% of the cases. The distribution of cases with diffuse wall thickening of the gallbladder shows that computed tomography (CT) detected this condition in 12.7% of the cases, whereas ultrasonography (USG) identified it in 5.4% of the cases. Intraluminal mass lesions in the gallbladder indicates that both ultrasonography (USG) and computed tomography (CT) detected this condition in an equal number of

ISSN (O): 2687-5365; ISSN (P): 2753-6556

cases, with each modality identifying intraluminal mass lesions in 5.4% of the cases. Cases involving the detection of gallbladder calculi shows that ultrasonography (USG) identified calculi in 40.0% of the cases. Computed tomography (CT) detected calculi in 36.3% of the cases, slightly less than USG. Common bile duct (CBD) dilation reveals that both ultrasonography (USG) and computed tomography (CT) identified this condition in a substantial proportion of cases. USG detected CBD dilation in 32.7% of the cases, while CT identified it in 36.3% of the cases. Intrahepatic biliary radicals indicates that both ultrasonography (USG) and computed tomography (CT) detected this condition, with CT showing a higher percentage. USG identified dilated intrahepatic biliary radicals in 41.8% of the cases, while CT detected them in 56.3% of the cases. Ultrasonography (USG) and computed tomography (CT) identified liver invasion as the most prevalent. USG detected liver invasion in 67.2% of cases, while CT identified it in 70.9%. Additionally, CT revealed invasion into the right and left hepatic duct in 12.7% of cases, whereas USG detected it in only 1.8%. Invasion into other sites such as the duodenum, pylorus, and colon was less common, each detected in 1.8% of cases by CT, with no detection by USG. Porcelain gallbladder shows that both ultrasonography (USG) and computed tomography (CT) detected this condition, albeit in a small percentage of cases. USG identified porcelain gallbladder in 5.4% of cases, while CT identified it in 3.6% of cases.

Case 1: A 71 years old women presented with complains of pain in right hypochondrium and weight loss.

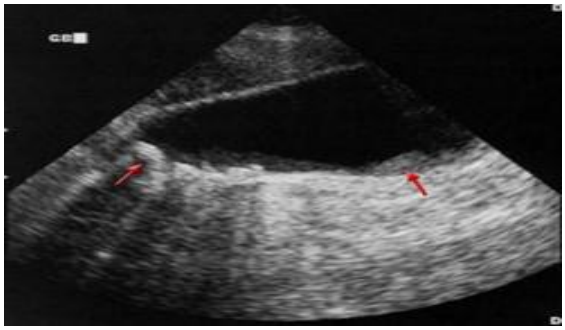

Figure 1: Sagittal sonogram in a 71-year-old woman. This image demonstrates heterogeneous thickening of the gallbladder wall (arrows). The diagnosis was primary papillary adenocarcinoma of the gallbladder

Case 2: A 65 years old male presented with complains of pain in right hypogatrium, weight loss and jaundice.

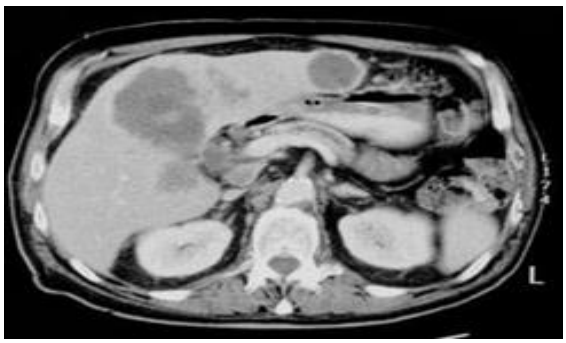

Figure 2: Computed tomography scan in a 65-year-old man. This image depicts squamous cell carcinoma of the gallbladder and invasion of the liver.

Assessment of vascularity and enhancement illustrates a notable difference between ultrasonography (USG) and computed tomography (CT). USG detected vascularity and enhancement in 50.9% of cases, while CT identified it in a significantly higher percentage, 94.5% of cases. In terms of periportal lymph node involvement, USG detected it in 49.0% of cases, while CT identified it in 52.7%. Peripancreatic lymph node involvement was observed in 40.0% of cases with USG and in 41.8% with CT. Aortocaval lymph node involvement was detected in 10.9% of cases by USG and in 18.1% by CT. Mesenteric lymph node involvement was found in 9.0% of cases with USG and in 16.3% with CT.USG detected masses in 89.0% of cases, while CT identified masses in 90.9% of cases. FNAC, however, showed the highest detection rate, identifying masses in 92.7% of cases. Overall, the accuracy of USG is estimated at 96.36% (95% CI: 87.47% to 99.56%), reflecting its high performance in correctly identifying both positive and negative cases of gallbladder disease. Overall, the accuracy of CT is estimated at 98.18% (95% CI: 90.28% to 99.95%), reflecting its high performance in correctly identifying both positive and negative cases of gallbladder disease.

CONCLUSION

Based on the comprehensive evaluation of ultrasonography (USG) and computed tomography (CT) in the assessment of gallbladder masses and their cytological correlation, our study draws several significant conclusions.

- Firstly, both USG and CT play pivotal roles in the initial detection and characterization of gallbladder masses, with CT demonstrating slightly higher sensitivity in certain aspects such as the detection of vascularity and enhancement. However, USG remains a highly sensitive and specific imaging modality for the identification of gallbladder pathology, especially in routine clinical practice due to its widespread availability, cost-effectiveness, and lack of radiation exposure.
- Secondly, the correlation between imaging findings and cytological results, particularly

ISSN (O): 2687-5365; ISSN (P): 2753-6556

through fine needle aspiration cytology (FNAC), enhances the diagnostic accuracy and aids in the formulation of appropriate management strategies for patients with gallbladder masses. FNAC emerges as a valuable adjunct to imaging modalities, providing definitive histopathological diagnosis and guiding therapeutic decisions.

- Furthermore, our study underscores the high prevalence of gallbladder disease in the studied population, emphasizing the importance of early detection and prompt management to optimize patient outcomes. The excellent sensitivity, specificity, positive predictive value, and negative predictive value of both USG and CT highlight their effectiveness in diagnosing gallbladder pathology and guiding clinical decision-making.

Our study reaffirms the complementary roles of USG and CT in the evaluation of gallbladder masses, underscores the importance of cytological correlation for accurate diagnosis, and emphasizes the need for a multidisciplinary approach to the management of gallbladder disease. These findings contribute to the development of a comprehensive diagnostic algorithm for the effective management of patients presenting with gallbladder masses.

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ISSN (O): 2687-5365; ISSN (P): 2753-6556