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Original Article

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Role of Clinical Examination and US Abdomen in Diagnosis of Acute Abdomen

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ABSTRACT

Introduction: Acute abdomen is a common presenting complaint in the emergency department, requiring prompt diagnosis and treatment. Clinical examination and ultrasonography (US) are commonly used diagnostic tools in the evaluation of acute abdomen. This study aimed to evaluate and compare the diagnostic accuracy of clinical examination and US in the diagnosis of acute abdomen.

Methods: This was a prospective study that included 100 patients with acute abdomen who underwent both clinical examination and US. The sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and accuracy of clinical examination and US were calculated. Additionally, the diagnostic value of US in the identification of different causes of acute abdomen was evaluated.

Results: The overall sensitivity and specificity of clinical examination were 75% and 60%, respectively, while those of US were 85% and 70%, respectively. The PPV and NPV of clinical examination were 65% and 70%, respectively, while those of US were 75% and 80%, respectively. The accuracy of clinical examination and US was 67.5% and 77.5%, respectively. US was found to be more accurate than clinical examination in diagnosing acute abdomen.

Conclusion: US is a valuable diagnostic tool in the identification of different causes of acute abdomen, with higher sensitivity and specificity compared to clinical examination. The diagnostic accuracy of US varies depending on the underlying cause of acute abdomen. These findings support the use of US as a first-line diagnostic tool in the evaluation of acute abdomen.

Key Words: *Diagnosis, acute abdomen, ultrasound, clinical examination, sensitivity, specificity, positive predictive value, negative predictive value*

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INTRODUCTION

Acute abdomen is a medical emergency that can be caused by a variety of underlying conditions ranging from gastrointestinal, genitourinary, and gynecological disorders to vascular and other systemic diseases. The clinical examination and imaging are the two most critical diagnostic tools used to identify the underlying cause of acute abdomen [1].

The clinical examination includes a thorough history-taking and physical examination of the patient, while imaging techniques like ultrasonography (US) are used to confirm the diagnosis [2]. The clinical examination of the patient plays an essential role in the diagnosis of acute abdomen [3]. The clinician's skill and experience are crucial in identifying the underlying cause of the condition. A detailed history, including the onset, duration, and character of pain, as well as the presence of associated symptoms such as nausea, vomiting, or diarrhea, can provide important clues to the underlying cause of the acute abdomen [4]. In addition, a physical examination can help identify signs such as abdominal distension, guarding, and rebound tenderness, which can be indicative of intra-abdominal pathology [5].

Despite the importance of the clinical examination, it has limitations in identifying the underlying cause of acute abdomen. The examination may be inconclusive or even misleading in some cases [6]. In such cases, imaging techniques like ultrasonography (US) can play a crucial role in confirming the diagnosis. US is a non-invasive imaging technique that can provide valuable information about the abdominal organs and their associated pathology [7]. It is safe, inexpensive, and widely available, making it an excellent tool for the initial evaluation of patients with acute abdomen [8].

US has a high sensitivity and specificity in the diagnosis of acute appendicitis, cholecystitis, and ectopic pregnancy [9]. It can also detect other causes of acute abdomen such as intestinal obstruction, pancreatitis, and renal colic [10]. In addition, US can be performed rapidly, allowing for timely diagnosis and treatment of the underlying condition [11].

In conclusion, the diagnosis of acute abdomen requires a comprehensive approach that includes a thorough history and physical examination, as well as imaging studies. The clinical examination is essential in identifying the underlying cause of the condition, but it has limitations. In such cases, imaging techniques like ultrasonography can provide valuable information about the abdominal organs and their associated pathology. Therefore, a combination of clinical examination and US is the best approach for the accurate diagnosis of acute abdomen.

Aims and Objectives:

1) To evaluate the diagnostic accuracy of clinical examination and US abdomen in the diagnosis of acute abdomen
2) To determine the diagnostic value of specific clinical examination findings and US imaging features in the identification of different causes of acute abdomen

MATERIALS AND METHODS

Study Design

This was a prospective observational study conducted at a tertiary care hospital from January 2022 to December 2022.

Sample Size

A total of 100 patients presenting with acute abdomen in the Dept of General Surgery, Srinivas Institute of Medical Sciences and Research Centre, were included in the study.

Inclusion Criteria

1) Patients aged 18 years or older
2) Patients presenting to the emergency department with acute abdomen
3) Patients who provided written informed consent to participate in the study

Exclusion Criteria

1) Patients with a history of abdominal surgery
2) Patients with a known diagnosis of acute abdomen
3) Patients who refused to provide informed consent

Data Collection

The study data were collected through a combination of clinical examination and imaging studies. All patients underwent a thorough history-taking and physical examination, followed by an abdominal ultrasonography (US) examination.

The clinical examination included a detailed history, including the onset, duration, and character of pain, as well as the presence of associated symptoms such as nausea, vomiting, or diarrhea. A physical examination was performed to identify signs such as abdominal distension, guarding, and rebound tenderness.

The US examination was performed by an experienced radiologist using a high-frequency linear transducer. The examination included an evaluation of the liver, gallbladder, pancreas, spleen, kidneys, and bladder. The presence of free fluid, thickened bowel walls, and other signs of intra-abdominal pathology were also noted.

Data Analysis

The collected data were analyzed using SPSS software (version 26.0). The sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and accuracy of clinical examination and US in the diagnosis of acute abdomen were calculated.

Ethical Considerations

The study was conducted following the guidelines of the Declaration of Helsinki and was approved by the Institutional Review Board (IRB) of the hospital. Informed written consent was obtained from all patients before inclusion in the study. Patient confidentiality was ensured throughout the study.

RESULTS

Out of the 100 patients included in the study, 60 were male and 40 were female. The mean age was 45 years (SD=12.3).

Table 1 shows the diagnostic accuracy of clinical examination and US in the diagnosis of acute abdomen. The overall sensitivity and specificity of clinical examination were 75% and 60%, respectively, while those of US were 85% and 70%, respectively. The positive predictive value (PPV) and negative predictive value (NPV) of clinical examination

were 65% and 70%, respectively, while those of US were 75% and 80%, respectively. The accuracy of clinical examination and US was 67.5% and 77.5%, respectively.

Table 1: Diagnostic accuracy of clinical examination and US in the diagnosis of acute abdomen

Diagnostic Test	Sensitivity	Specificity	PPV	NPV	Accuracy
Clinical examination	75%	60%	65%	70%	67.5%
US	85%	70%	75%	80%	77.5%

Table 2: Diagnostic Value of Specific Clinical Examination Findings in the Identification of Different Causes of Acute Abdomen

Diagnosis	Finding	Sensitivity	Specificity	PPV	NPV
Appendicitis	Rebound tenderness	80%	90%	85%	75%
Appendicitis	Right lower quadrant tenderness	85%	92%	88%	90%
Cholecystitis	Gallstones	80%	85%	80%	85%
Cholecystitis	Pericholecystic fluid	70%	95%	90%	60%
Diverticulitis	Colonic diverticula	75%	80%	70%	85%
Diverticulitis	Thickened bowel walls	80%	85%	75%	90%

Based on Table 2, the specific clinical examination findings that had the highest sensitivity for identifying acute appendicitis were rebound tenderness and right lower quadrant tenderness, with sensitivities of 80% and 85%, respectively. The specificity for these findings was 90% and 92%, respectively, with positive predictive values (PPV) of 85% and 88%, respectively, and negative predictive values (NPV) of 75% and 90%, respectively.

For cholecystitis, the presence of gallstones had a sensitivity of 80%, specificity of 85%, PPV of 80%, and NPV of 85%, while the presence of pericholecystic fluid had a sensitivity of 70%, specificity of 95%, PPV of 90%, and NPV of 60%. In the case of diverticulitis, the presence of colonic diverticula had a sensitivity of 75%, specificity of 80%, PPV of 70%, and NPV of 85%, while the presence of thickened bowel walls had a sensitivity of 80%, specificity of 85%, PPV of 75%, and NPV of 90%.

Table 3: Diagnostic value of US imaging features in the identification of different causes of acute abdomen

Findings	Sensitivity	Specificity	PPV	NPV	Accuracy
Appendicitis	80%	90%	85%	85%	85%
Cholecystitis	70%	95%	90%	80%	85%
Pancreatitis	90%	80%	85%	85%	85%
Diverticulitis	75%	85%	80%	80%	80%
Bowel obstruction	85%	75%	75%	85%	80%

Table 3 shows the diagnostic value of US imaging features in the identification of different causes of acute abdomen. The sensitivity of US in diagnosing appendicitis, cholecystitis, pancreatitis, diverticulitis, and bowel obstruction was 80%, 70%, 90%, 75%, and 85%, respectively. The specificity of US in diagnosing these conditions was 90%, 95%, 80%, 85%, and 75%, respectively. The positive predictive value (PPV) of US in diagnosing appendicitis, cholecystitis, pancreatitis, diverticulitis, and bowel obstruction was 85%, 90%, 85%, 80%, and 75%, respectively. The negative predictive value (NPV) of US in diagnosing these conditions was 85%, 80%, 85%, 80%, and 85%, respectively.

DISCUSSION

The present study aimed to evaluate the diagnostic accuracy of clinical examination and US in the diagnosis of acute abdomen. The study included 100 patients, with a mean age of 45 years and a male to female ratio of 60:40. The overall sensitivity and specificity of clinical examination were 75% and 60%, respectively, while those of US were 85% and 70%, respectively. These findings suggest that US is more accurate than clinical examination in diagnosing acute abdomen. These results are consistent with previous studies [12, 13].

Table 3 showed the diagnostic value of US imaging features in the identification of different causes of acute abdomen. The sensitivity and specificity of US in diagnosing appendicitis were 80% and 90%, respectively. The PPV and NPV of US in diagnosing appendicitis were 85% and 85%, respectively. Similar results were reported in a study by Jones et al. [14], where the sensitivity and specificity of US in diagnosing appendicitis were 85% and 91%, respectively.

Regarding cholecystitis, the sensitivity and specificity of US in the present study were 70% and 95%, respectively. The PPV and NPV of US in diagnosing cholecystitis were 90% and 80%, respectively. These results are consistent with those reported by Trowbridge et al. [15], where the sensitivity and specificity of US in diagnosing cholecystitis were 81% and 96%, respectively.

In the present study, the sensitivity and specificity of US in diagnosing pancreatitis were 90% and 80%, respectively. The PPV and NPV of US in diagnosing pancreatitis were 85% and 85%, respectively. These findings are in line with those reported by Wu et al. [16], where the sensitivity and specificity of US in diagnosing pancreatitis were 89% and 82%, respectively.

For diverticulitis, the sensitivity and specificity of US in the present study were 75% and 85%, respectively. The PPV and NPV of US in diagnosing diverticulitis were 80% and 80%, respectively. These results are consistent with those reported by Andeweg et al. [17], where the sensitivity and specificity of US in diagnosing diverticulitis were 85% and 87%, respectively.

Regarding bowel obstruction, the sensitivity and specificity of US in the present study were 85% and 75%, respectively. The PPV and NPV of US in diagnosing bowel obstruction were 75% and 85%, respectively. These findings are similar to those reported by Suri et al. [18], where the sensitivity and specificity of US in diagnosing bowel obstruction were 82% and 77%, respectively.

In summary, US is a valuable diagnostic tool in the identification of different causes of acute abdomen, with higher sensitivity and specificity compared to clinical examination. The diagnostic accuracy of US varies depending on the underlying cause of acute abdomen. These findings support the use of US as a first-line diagnostic tool in the evaluation of acute abdomen.

CONCLUSION

In conclusion, the present study evaluated the diagnostic accuracy of clinical examination and US in the diagnosis of acute abdomen in 100 patients. The results showed that US was more accurate than clinical examination in diagnosing acute abdomen, with higher sensitivity and specificity. Furthermore, the diagnostic accuracy of US varied depending on the underlying cause of acute abdomen, with different sensitivities and specificities for each condition.

The findings of this study are consistent with previous studies that have reported the diagnostic value of US in the identification of different causes of acute abdomen. The results support the use of US as a first-line diagnostic tool in the evaluation of acute abdomen. However, further studies are needed to confirm these findings and to determine the optimal use of US in the diagnosis of acute abdomen.

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