Research

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Association of Clinical Severity with Ultrasonographic and Computed Tomography Findings in Acute Pancreatitis

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1. Abstract

1.1. Background: Acute pancreatitis is an inflammatory condition of the pancreas that occurs due to premature activation of digestive enzymes within pancreatic tissue. This process results in pancreatic inflammation and may lead to systemic complications. Early identification of disease severity is essential for patient management and outcome prediction.

1.2. Objective: This study aimed to evaluate the relationship between clinical severity and imaging findings obtained through ultrasonography and computed tomography (CT) in patients diagnosed with acute pancreatitis.

1.3. Methods: A total of 273 patients with confirmed acute pancreatitis were included in this study. Clinical severity was determined using the Ranson scoring system. Ultrasonographic and CT findings were graded according to the Balthazar classification. Clinical parameters, imaging findings, and etiological factors were analyzed to determine their association with disease progression and prognosis.

1.4. Results: The analysis demonstrated no significant differences between male and female patients regarding disease severity or treatment outcomes. However, etiological factors differed between genders. A moderate positive correlation was observed between Ranson's score and ultrasound findings. In addition, a strong correlation was identified between CT imaging results and ultrasonographic findings. These results indicate that imaging techniques are valuable tools for assessing disease severity.

1.5. Conclusion: Ultrasonography and CT imaging are closely associated with clinical severity in acute pancreatitis. Ultrasound examination, particularly when performed by experienced operators, provides reliable diagnostic information and may be useful for early evaluation alongside CT imaging.

2. Keywords: Acute pancreatitis, ultrasonography, computed tomography, Ranson score, Balthazar classification

3. Introduction

Acute pancreatitis is a serious inflammatory disease characterized by the premature activation of pancreatic enzymes within the pancreas. This enzymatic activation leads to tissue injury, inflammation, and in severe cases systemic complications that may affect multiple organs.

The incidence of acute pancreatitis in European populations ranges between approximately 17 and 73 cases per 100,000 individuals annually. Over recent years, the number of diagnosed cases has increased, partly due to improved diagnostic methods and the growing prevalence of risk factors such as gallstone disease and obesity.

Clinically, acute pancreatitis can present in mild or severe forms. Mild disease is typically associated with interstitial pancreatic edema and usually resolves with conservative management. Severe pancreatitis, on the other hand, may involve pancreatic necrosis, hemorrhage, and systemic inflammatory response syndrome (SIRS), potentially leading to organ failure and increased mortality. Gallstones and chronic alcohol consumption represent the most common causes of acute pancreatitis. Other etiological factors include hyperlipidemia, certain medications, endoscopic procedures such as ERCP, and idiopathic causes.

Various scoring systems have been developed to estimate disease severity and predict clinical outcomes. These include Ranson's criteria, the Glasgow scoring system, and the APACHE II score. In addition to clinical assessment, imaging techniques such as ultrasonography and computed tomography are essential for evaluating pancreatic morphology, identifying complications, and guiding treatment decisions.

The present study investigates the relationship between clinical severity and imaging findings obtained by ultrasound and CT in patients with acute pancreatitis.

4. Materials and Methods

This retrospective–prospective study included 273 patients diagnosed with acute pancreatitis who were treated at the Clinic for Gastroenterology and Hepatology between 2009 and 2012. The study population consisted of 137 female and 136 male patients,

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aged between 18 and 85 years.

Upon admission, all patients underwent clinical examination, laboratory investigations, and imaging studies. Ultrasonographic evaluation of the upper abdomen was performed within the first 48 hours of hospitalization using modern ultrasound systems equipped with Doppler technology.

A subset of patients underwent contrast-enhanced CT scanning of the abdomen to further evaluate pancreatic structure and detect complications such as necrosis or fluid collections. Both ultrasound and CT findings were categorized according to the Balthazar grading system.

Clinical severity was assessed using Ranson's criteria. Patients with scores ranging from 0 to 2 were classified as having mild acute pancreatitis, whereas those with scores of 3 or greater were categorized as having severe disease.

Additional diagnostic procedures, including chest radiography, abdominal X-ray examination, and upper gastrointestinal endoscopy, were performed in selected cases based on clinical indications.

Statistical analysis was performed using standard statistical methods, including descriptive statistics, Student's t-test, chi-square analysis, and Spearman correlation testing in order to evaluate relationships between clinical parameters and imaging findings.

5. Results

The analysis revealed that the occurrence of acute pancreatitis varied among different age groups, with the highest frequency observed among individuals in their seventh decade of life. Male patients were more frequently affected at younger ages, whereas female patients predominated in older age groups.

Most patients presented with mild disease. Approximately 86% of patients were categorized as having mild acute pancreatitis based on Ranson's criteria, while about 14% were classified as having severe disease.

Ultrasonographic examination successfully visualized the pancreas in the majority of cases. Statistical analysis showed a moderate positive correlation between Ranson's score and ultrasound findings based on the Balthazar grading system.

Furthermore, a strong positive relationship was identified between CT imaging findings and ultrasonographic results, indicating a high level of agreement between these two diagnostic techniques.

Weak correlations were observed between Ranson's score and findings from plain abdominal radiography. No statistically significant relationship was found between Ranson's score and upper gastrointestinal endoscopic findings.

Hemodynamic parameters such as arterial blood pressure and heart rate demonstrated weak correlations with clinical severity.

The overall mortality rate among the study population was low.

6. Conclusion

Acute pancreatitis occurs with similar overall frequency in men and women, although the underlying causes differ between genders. Gallstone-related pancreatitis is more frequently observed in female patients, whereas alcohol-associated pancreatitis is more common in males.

The incidence of acute pancreatitis increases with age, and severe forms of the disease are more often observed in older individuals.

Mild forms of acute pancreatitis are significantly more common than severe forms. Clinical severity assessed by Ranson's scoring system demonstrates a meaningful association with imaging findings obtained through ultrasonography and computed tomography.

The strong correlation between ultrasound and CT findings highlights the usefulness of ultrasonography as an initial diagnostic tool. When performed by experienced practitioners, ultrasound provides valuable information for assessing pancreatic inflammation and disease progression.

Combining clinical evaluation with imaging findings enhances the ability to predict disease severity and supports effective management of patients with acute pancreatitis.

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