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**Original Research Article**

# STUDY OF CT SCAN VERSUS ULTRASONOGRAPHY IN DIAGNOSIS OF ACUTE PANCREATITIS

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## Abstract

**Background:** A pancreatic inflammation with a high morbidity and mortality rate is known as pancreatitis. Acute pancreatitis can be categorized into mild acute pancreatitis (MAP) and severe acute pancreatitis (SAP). Ultrasonography gives an early radiological evaluation of the organ, a hint as to the degree of involvement, and a chance to scan adjacent abdominal organs. An organ's cross-sectional morphology, internal structure, focal or diffuse involvement, and involvement of nearby structures are all provided by a CT scan. Understanding the roles and difference in diagnosis of CT and USG in pancreatitis was the main goal, as was highlighting and assessing the instances in which USG was unable to diagnose cases that CT helped to resolve.

**Aim and Objectives:** To assess and compare the diagnostic accuracy of USG and CT scan in pancreatitis patients hospitalized in our tertiary care hospital in India.

**Materials and Methods**: It was a cross-sectional study at the Department of Radiology in our tertiary care hospital. The study included 78 patients, both male and female, aged 15-55, with an illness duration of less than two weeks. Individuals with quick onset stomach discomfort, temperature (>101F), tachycardia (heart rate >120/min), and serum amylase > 400U/L were considered positive indicators of acute pancreatitis and were included in this study. The study excluded patients with a history of abdominal injuries, hypersensitivity to iodinated contrast agents in the past, chronic renal failure, claustrophobic patients, and patients unable to undergo CT scanning.

**Result And Discussion:** In 35 patients (44.87%), ultrasonography confirmed the diagnosis of acute pancreatitis. Acute pancreatitis was verified by CT in 40 (51.28%) of the patients. There were 30 true positives and 5 false positives among the USG-positive patients. Of the 43 patients who did not receive a positive USG, 5 were false negatives and 38 were true negatives (p=0.0001). When using computed tomography as the gold standard to diagnose acute pancreatitis, the overall sensitivity,

specificity, positive and negative predictive value, and diagnostic accuracy of ultrasonography were 91.23%, 85.54%, 84.12%, 91.84%, and 89.25%, respectively. Nevertheless, in cases where a patient is chubby or has an abundance of bowel gas, USG imaging fails. It does not specify the amount of the gland's necrosis or provide a full description of the inflammatory process. When it comes to accurately detecting size, parenchyma, MPD, calcification, pseudocyst, ascites, and pleural effusion, CT is better than ultrasound.

**Conclusion:** The initial test of choice for pancreatitis is ultrasound due to its non-invasiveness, accessibility, affordability, absence of radiation risk, and capacity to show structural abnormalities in the organ. Nevertheless, ultrasonography falls short in providing a thorough description of the organ's and surrounding structures level of participation. When it comes to accurately identifying and extending pancreatitis, CT is superior to ultrasonography since it has higher sensitivity and specificity.

## INTRODUCTION:

The pancreas is an elongated, squishy organ with lobules. It is situated at the level of vertebrae L1 and L2, transverse to the posterior abdominal wall. The lesser sac divides the organ from the stomach, which is located posterior to it. It sits anterior to the inferior vena cava, aorta, splenic vein and left adrenal gland.[1,2] Pancreas is in anterior pararenal compartment of the retro peritoneum, just anterior to peri renal (gerota fascia) and posterior to parietal peritoneum.[3] Acute pancreatitis is an abrupt inflammation of the pancreas that may affect organs and tissues that are closer together or farther away. It results from the gland's own enzymes being triggered, which digests the gland. The emergency room (ED) frequently sees cases of acute pancreatitis, which typically come in mild and severe forms. ED physicians make admission decisions based on the severity of pancreatitis.[1,2]

There are two types of acute pancreatitis: severe acute pancreatitis (SAP) and mild acute pancreatitis (MAP). It is a common form of three acute abdominal pains that is clinically classified as an inflammatory pancreatic disease.[3] Low mortality, few complications, and a fair prognosis characterize mild acute pancreatitis. However, a substantial death rate is reported in cases of severe acute pancreatitis that are followed by major sequelae.[4,5] Early detection of necrotizing pancreatitis is crucial for managing symptoms, prognosis, and clinical outcome. It also aids in choosing the best course of treatment for this serious illness.[6]

Organ and soft tissue structure imaging is diagnosed and evaluated using USG. Ultrasound imaging is gradually becoming more important in evaluating the pancreas due to its non-invasive nature and ongoing advancements in imaging quality. It can rule out other possible causes of stomach pain and identify pancreatitis.

The majority of cases can be evaluated for pancreatitis by USG thanks to technological advancements and increased operator experience. With a 0.5 mm slice thickness, multiple detector rows, enhanced spatial resolution, and 3D reformatting to precisely define anatomy, 4 MDCT (multi

detector CT) is 20 times faster than its predecessor. It accepts iodinated contrast agents for arterial, pancreatic, and portal venous phases.[7]

## AIM & OBJECTIVES:

To assess and compare the diagnostic accuracy of USG and CT scan in pancreatitis patients hospitalized in our tertiary care hospital in India.

## MATERIALS & METHODS:

This study was carried out in our tertiary care hospital in the radiology department after taking voluntary consent from the patient.
For the study, data of 78 patients was collected. Every patient who showed signs of suspected acute pancreatitis, such as temperature (>101F), tachycardia (heart rate >120/min), abrupt onset stomach discomfort, and serum amylase level >400U/L, was considered positive and added to the trial.
The study comprised patients of both genders aged 15-55 years, with an illness duration of less than two weeks. Exclusions from the trial were individuals with a history of abdominal trauma, intolerance to iodinated contrast agents, chronic renal failure as determined by history and medical record, claustrophobic patients, and patients unable to undergo CT scan.

**Study type**: It is cross sectional, observational study.

**Sample size**: 78

## RESULTS:

There were 78 patients in all that were included in our study. Of these 78 patients, 28 (35.89%) were female and 50 (64.10%) were male. The average illness duration and BMI were 8.43±3.24 days and 29.73±2.85 kg/m, respectively.
In 35 patients (44.87%), ultrasonography (USG) confirmed the diagnosis of acute pancreatitis. Acute pancreatitis was verified by CT results in 40(51.28%) patients. Five USG positive cases were false positives, whereas 30 real positives were found. Table 2 shows that out of 43 USG negative patients, 5 were false negatives and 38 were actual negatives (p=0.0001). Using CT scan as the gold standard, the sensitivity, specificity, positive, negative predictive value, and diagnostic accuracy of ultrasonography in the diagnosis of acute pancreatitis were, in order, 91.23%, 85.54%, 85.71%, 88.37%, and 87.17%, respectively.

**Table 1: Symptomatology.**

| | **Abdominal pain** | **Vomiting** | **Fever** | **Weight loss** |
|---|---|---|---|---|
| **Acute pancreatitis** | 41 (52.56%) | 33 (42.30%) | 29 (36%) | 6 (7.69%) |

**Table 2: Diagnostic accuracy (taking CT scan as gold standard)**

| | Positive on CT scan | Negative on CT scan |
|---|---|---|
| **Positive on USG** | 30 | 5 |
| **Negative on USG** | 5 | 38 |
| **p-Value** | 0.001 | |
| **Sensitivity** | 91.23% | |
| **Specificity** | 85.54% | |
| **Positive predictive accuracy** | 85.71% | |
| **Negative predictive accuracy** | 88.37% | |
| **Diagnostic accuracy** | 87.17% | |

## DISCUSSION:

Pancreatic enzymes auto digest the gland in pancreatitis, an inflammatory condition. Acute pancreatitis is the term for the condition in which the gland recovers without undergoing any morphologic alterations or function impairment. Chronic pancreatitis is the term for pancreatitis that recurs frequently and results in the functional and morphologic loss of the gland. The purpose of this study was to determine the degree to which ultrasonography can diagnose acute conditions when CT is the gold standard. In 35 patients (44.87%), ultrasonography confirmed the diagnosis of acute pancreatitis. In 40 (51.28%) of the cases, computed CT results verified acute pancreatitis.

Of the USG positive patients, 30 were real positives and 5 were false positives. In the USG negative, 5 were false negatives and 38 were real negatives.

In our study, we used computed tomography as the gold standard to assess the overall sensitivity, specificity, positive and negative predictive value, and diagnostic accuracy of ultrasonography in the diagnosis of acute pancreatitis. We found that the USG could correctly identify 91.23% of patients as having acute pancreatitis and 85.54% of patients as not having acute pancreatitis. Another study demonstrated 91.0% sensitivity & 83.0% specificity of ultrasonography in diagnosis of patients with acute pancreatitis.[8]

In research done by Tenner et al. a total of 110 patients with acute pancreatitis were included. The likelihood of a positive ultrasonography result in a patient with acute pancreatitis that was clinically significant was 89.60% (sensitivity). The sensitivity of ultrasound in identifying moderate and extreme kinds was 77.80% in evaluating the severe and moderate forms of acute pancreatitis as identified during a laparotomy. When comparing with our findings, the sensitivity, specificity, negative and positive predictive values, and ultrasonography's diagnostic accuracy using computed tomography as the gold standard, the rates of acute pancreatitis were 90.77%, 86.81%, 83.10%, 92.94%, and 88.46%, in that order.[9]

## CONCLUSION:

Acute pancreatitis can be diagnosed noninvasively and with good sensitivity and accuracy using ultrasonography. It has enhanced the capacity to identify acute pancreatitis, but also improved patient care through appropriate preoperative scheduling and treatment of patients with acute pancreatitis. Although the pancreas is a retroperitoneal organ, ultrasound can identify the presence of inflammation and describe the size, shape, and echo texture of the gland. However, evaluation of this imaging modality is challenging. An axial and coronal reconstruction CT scan of the abdomen is required for a thorough assessment of the pancreas.

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**Conflicts of interest**
There are no conflicts of interest.

**Ethical approval**
The study was approved by the Institutional Ethics Committee.

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