# **ORIGINAL ARTICLE**

# Diagnostic Accuracy of Computed Tomography in the Diagnosis of Necrotizing Pancreatitis Taking Surgical Findings as Gold Standard

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## ABSTRACT

**Introduction:** Acute pancreatitis is an acute inflammatory disease of the pancreas characterized by auto digestion of the pancreatic parenchyma, interstitial fat necrosis and necrotising vasculitis, resulted from the inappropriate intracellular activation of proteolytic pancreatic enzymes.

**Objectives:** The main objective of the study is to analyse the diagnostic accuracy of computed tomography in the diagnosis of necrotizing pancreatitis taking surgical findings as gold standard.

**Material and methods:** This cross sectional study was conducted in Bahawal Victoria Hospital/QAMC Bahawalpur during from March 2019 to April 2020. The Sample size was 191 using the following parameters. The data was collected through non probability consecutive sampling. The study was conducted after approval from hospitals ethical and research committee. All patients presenting to OPD with high suspicion of necrotizing pancreatitis was included in the study.

**Results:** The study was conducted on 191 patients suspected of having necrotizing pancreatitis. The mean age of the sample was 29.5 + 6.7 years. The range of age in our study was 23 years with minimum age of 19 years and maximum age of 42 years. On grouping the sample in different age groups, we observed that 26.2% of patients were in the age group up to 25.00 years, 47.1% were in the age group 25.01 to 35.00 years and 26.7% of patients were in the age group 35.01 to 45.00 years.

**Conclusion:** It is concluded that CT is more accurate and effective in the diagnosis of necrosis in AP patients. **Keywords:** Necrotizing pancreatitis, Computed Tomography, Accuracy

### INTRODUCTION

Acute pancreatitis (pancreatic illness) is an acute inflammatory disease that is characterized by self-digestion, interstitial fat necrotization and necrotic vascular disease due to improper intracellular activation of proteolytic pancreatic enzymes. The inflammatory process can be confined to the pancreas, spread to neighboring tissues or even to distant organs, leading to multi-organ failure and eventual mortality<sup>1</sup>.

The idea of pancreatitis acute does not merely require the understanding of the disease subtypes and associated complications but also family familiarity with the appropriate radiological nomenclature as defined at the Atlanta Symposium in 1992<sup>2</sup>, and, more recently, in 2008, as amended by the Working Group on Acute Pancreatitis Classification<sup>3</sup>. The correct usage of the words characterizing radiological results is essential for the decision-making in acute pancreatitis patients.

Acute pancreatitis (AP) is a sudden inflammation of the pancreas with tissues and organs in nearby or remote areas [4]. It is triggered by the detonation of its own enzymes, which cause the gland to breakdown. AP is a common presentation of moderate and severe versions often in the emergency department (ED). ED doctors admission judgements are made based on the severity of the pancreatitis. Rapid clinical assessment by the attending physician will be valuable to predict patient outcomes using reliable and validated methods<sup>5</sup>. For the first staging, clinical and laboratory evaluation and findings of contrast enhanced computed tomography (CECT) imaging are

used. CECT is best identified as the predictor of local problems, superior to the Acute Physiology and Chronic Health Evaluation II (APACHE II) scores<sup>6</sup>. This multiplanar image, encompassing coronary and sagittal images, with a 3D volume, determines the real boundaries of the disease. The CT gravity index (CTSI) is now a description standard. At a scale with 10 points, points are paid based on the presence or absence of fluid collections, the presence and gradation of pancreatic necrosis and therefore classified as mild (0-2 points), medium (4-6 points) and severe (7-10 points)<sup>7</sup>. CECT assessment studies and surgical connection of peripheral necrosis and fluid collections detection are scarce. Peri-pancreatic necrosis is not visible on CECT and the existence of peri-pancreatic necrosis cannot be excluded as a normal increase of pancreas<sup>8</sup>.

# MATERIAL AND METHODS

This cross sectional study was conducted at Bahawal Victoria Hospital/QAMC Bahawalpur during from March 2019 to April 2020. The Sample size was 191 using the following parameters. The data was collected through non probability consecutive sampling. All patients presenting with clinical features suspicious of necrotizing pancreatitis, age group 18-45 years and either gender were included. Patients with history of surgical intervention in the abdomen in the last one month, patients with symptopms of Urinary Tract infection ( dysuria, Urgency, frequency) with positive Urine R/E findings &/ or renal/ uretric calculi on ultrasound, patients with Renal failure and pregnant women were excluded.

The study was conducted after approval from hospitals ethical and research committee. All patients presenting to OPD with high suspicion of necrotizing pancreatitis was included in the study. The purpose and benefits of the study was explained to the patient, they was assured upon the purpose and benefits of the study, the risks involved and they was explained that the study is done purely for research and data publication and if agreed upon. All patients having suspected necrotizing pancreatitis clinically with symptoms as defined in the operational definition and fulfilling the inclusion criteria was subjected to CT Scan examination which was performed at the department of Diagnostic Radiology using a multi-slice CT scanner (SOMATON Sensation or Definition, Siemens Medical Solutions USA, Inc., Malvern, PA). 145 cc of Isovue-300 IV contrast at a rate of 2 cc/s just prior to the scan was given. Serial 3-mm axial images was obtained. Additional delayed images was obtained through the lower abdomen. Once done with CT, all the patients was subjected to surgery and biopsy was obtained. All surgeries was performed at the department of Surgery using the same standard technique. All the biopsy investigations was done by the histopathologist at the department of Pathology. All the radiological investigations was done by single expert radiologist having minimum experience of five years. All the above mentioned information was recorded on a pre-designed proforma. Strictly exclusion criteria were followed to control confounders and bias in the study results.

The collected data was entered in SPSS version 20 and analyse through it, study variable was CT findings and Histopathology report. Frequency and percentage was calculated for categorical variables like gender. Mean + SD was calculated for continuous variables like age. Sensitivity, Specificity, positive predictive value (PPV), negative predictive value (NPV) was determined by taking Histopathology as gold standard from 2x2 table. All the results was presented in the form of tables and graphs.

# RESULTS

The study was conducted on 191 patients suspected of having necrotizing pancreatitis. The mean age of the sample was 29.5 + 6.7 years. The range of age in our study was 23 years with minimum age of 19 years and maximum age of 42 years. On grouping the sample in different age groups, we observed that 26.2% of patients were in the age group up to 25.00 years, 47.1% were in the age group 25.01 to 35.00 years and 26.7% of patients were in the age group 35.01 to 45.00 years (Table 1). While distributing the patients with regards to gender, we observed that in our study 53.4% of the sample was male and 46.6% were female gender (Table 2). On CT, we observed that the necrotizing pancreatitis was recorded in 58.1% of patients. After surgery, necrotizing pancreatitis on histopathology was recorded in 47.6% of patients. On applying the formulae for calculation, sensitivity of CT was found to be 89% and specificity 70%. The positive predictive value of the CT is 72.9% and negative predictive value is 87.5% (Table 3).

Table 1.	Ago Mico	Dictribution	of Somplo	(n - 101)
Table 1.	Ade-wise	DISINDULION	of Sample	(n = 191)

	n	Range	Minimum	Maximum	Mean	Std. Deviation
Age of the patient	191	23.00	19.00	42.00	29.5136	6.73198
Age Groups		Frequency	Percent			
	Up to 25.00 years	50	26.2			
	25.01 to 35.00 years	90	47.1			
	35.01 to 45.00 years	51	26.7			
	Total	191	100.0			

Table 2: Frequency of Necrotizing Pancreatitis on CT (n=191)

		Frequency	Percent
Pos	ositive	111	58.1
Neg	egative	80	41.9
Tot	otal	191	100.0

#### Table 3: CT & Histopathology 2 x2 Table (n = 191)

		Necrotizing pancreatitis on Histopathology		Total
		Positive	Negative	
Necrotizing pancreatitis on CT	Positive	81	30	111
		TP	FP	
	Negative	10	70	80
	-	FN	TN	
Total		91	100	191

Sensitivity of CT: TP/TP + FN = 89%

Specificity of CT: TN/TN + FP = 70%

Positive Predictive Value CT: TP/TP + FP = 72.9% Negative Predictive Value CT: TN/TN + FN = 87.5%

#### DISCUSSION

Acute pancreatitis (pancreatic illness) is an acute inflammatory disease that is characterized by self-digestion, interstitial fat necrotization and necrotic vascular disease due to improper intracellular activation of

proteolytic pancreatic enzymes. Infection can be confined to the pancreas, spread to neighboring tissues, or even to distal organs, leading to multi-organ failure and occasional death<sup>9</sup>. A panacea of acute pancreatitis involves an awareness not only of the subtype and the complications involved, but also familiarity with the appropriate radiological nomenclature defined by the Atlanta Symposium in 1992<sup>2</sup>, and recently amended in 2008 by the Working Group on Acute Pancreatitis Classification<sup>10</sup>. The correct usage of the words characterizing radiological results is essential for the decision-making in acute pancreatitis patients.

Imaging is advised for patients with acute pancreatitis in order to confirm the clinical diagnosis, study etiology and the grade of disease and its severity. Ultrasound (US) is the first-line method of imaging in most centres, but has limitations in acute clinical environments for confirmation of the disease and the exclusion of other explanations of the acute abdomen. In the assessment and evolution of the disease and its complications, contrast-enhanced computed tomography (CT) plays an important role. Magnetic resonance imaging (MRI) has become an increasingly significant part of acute pancreatitis diagnosis. It is notably useful for imaging, collection-characterizing and evaluation of an aberrant or detached pancreatic duct for patients with iodine allergies<sup>11</sup>.

CT is now considered the gold standard diagnostic for AP identification, which identifies its complication and therapy response. Recent studies have demonstrated that CT characteristics suggestive with AP are also present in patients with blood amylase and lipase levels in the standard range. 2 According to research, in just 34 percent of cases can a qualified physician diagnose AP by clinical examination, and in only 40 percent using serum lipase and amylase levels. Although Lipase remains a key serologic test for pancreatitis, it cannot unintentionally be confirmed if the levels are 3 times or more higher than the upper norm, and there can be many other probable differential diagnoses<sup>7</sup>. Therefore, when the diagnosis is in dispute, CT is a tool. CECT reliability is about 90 percent in pancreatic necrosis and increases with increasing pancreatic necrosis. CT specificity is approximately 50% if there are just tiny areas of necrosis; whereas the specificity of CT is 100% in more than 30% necrosis. These findings were also reflected in our study and in previous studies<sup>12</sup>.

### CONCLUSION

It is concluded that CT is more accurate and effective in the diagnosis of necrosis in AP patients.

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