

Role of CECT in Evaluation of Acute Pancreatitis, its Complication**Anand Devi Gawadiya¹, G. L. Meena², Banwari Lal Nayak³, Sachin Banthia⁴, Ridhima Gupta⁵, Hemant Jain⁶, Mohnish Bothra⁷**¹Resident Doctor, Radiodiagnosis, Sardar Patel Medical College & AMP, PBM Hospital, Bikaner, Rajasthan, India²Senior Professor, Radiodiagnosis, Sardar Patel Medical College & AMP, PBM Hospital, Bikaner, Rajasthan, India³Professor, Radiodiagnosis, PDU Medical College & AMP, D.B. Hospital, Churu, Rajasthan, India⁴Professor, Radiodiagnosis, Sardar Patel Medical College & AMP, PBM Hospital, Bikaner, Rajasthan, India⁵Professor, Radiodiagnosis, Sardar Patel Medical College & AMP, PBM Hospital, Bikaner, Rajasthan, India⁶Assistant Professor, Radiodiagnosis, Sardar Patel Medical College & AMP, PBM Hospital, Bikaner, Rajasthan, India⁷Assistant Professor, Radiodiagnosis, Sardar Patel Medical College & AMP, PBM Hospital, Bikaner, Rajasthan, India

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Corresponding Author: Dr. Anand Devi Gawadiya

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Abstract:**Background:** This study aims to evaluate the role of contrast-enhanced computed tomography in the detailed assessment of acute pancreatitis and its complications, with a focus on correlating imaging features with clinical severity, laboratory parameters, and patient outcomes. By systematically analyzing these correlations, the study seeks to establish evidence-based protocols for the timing and application of CECT in the management of AP.**Methods:** This study was conducted at department of Radio-diagnosis & modern imaging, S.P. Medical College & A.G. of P.B.M Hospitals, Bikaner. It is a multi-disciplinary tertiary care referral hospital.**Results:** In this study of 110 pancreatitis patients, the majority were males aged 31-50, with alcohol and gallstones identified as primary risk factors. CT imaging revealed that most cases were mild to moderate, with peripancreatic fat involvement as the most common feature, while severe necrotizing pancreatitis was significantly associated with higher CT severity scores, longer hospital stays, and increased mortality.**Conclusion:** The study highlights the importance of CT severity assessment in predicting disease progression and outcomes, emphasizing that severe necrotizing pancreatitis warrants prompt and targeted management to improve prognosis.**Keywords:** CECT, Pancreatitis, Complication.**DOI:** 10.25258/ijcpr.18.6.179

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Introduction

Acute pancreatitis (AP) is a sudden inflammatory process of the pancreas that can range from mild, self-limiting episodes to severe, life-threatening conditions involving multiple organ systems. It is a significant clinical entity due to its increasing incidence, potential for severe morbidity and mortality, and the complexity of its management. The global incidence of AP has been reported to be approximately 13–45 cases per 100,000 population, with variations based on geographic and demographic factors. [1] The disease predominantly affects middle-aged adults, but it can occur at any age, with a slight male predominance noted in some studies.[2]

Contrast-enhanced computed tomography (CECT) has emerged as the gold standard for evaluating pancreatic morphology, detecting necrosis, fluid collections, and other complications. It provides detailed cross-sectional imaging that aids in establishing the extent of pancreatic injury and guides clinical management. [3] The role of CECT is especially critical in cases where clinical and laboratory findings are inconclusive or when complications are suspected.

Many patients with acute pancreatitis do not require a CT scan at admission. A reasonable indication for a CT scan at admission is to

distinguish acute pancreatitis from another serious intra-abdominal condition, such as a perforated ulcer. Patients with persisting organ failure, signs of sepsis, or deterioration in clinical status 6–10 days after admission will require CT. The task for the clinician is to suspect, within few hours of admission, those patients who will progress to multi organ system failure and to provide appropriate care, including fluid resuscitation, respiratory support and intensive care if needed. A severity index scoring can thus be of help in this pursuit. Although there are several clinical scoring systems for assessing the clinical parameters of acute pancreatitis, both in the adult and pediatric population, like RANSON and APACHE II are most commonly used indicators to assess disease severity. While RANSON score cannot be used for the first 48 hours, APACHE score is cumbersome to use. [4-5]

This study aims to evaluate the role of contrast-enhanced computed tomography in the detailed assessment of acute pancreatitis and its complications, with a focus on correlating imaging features with clinical severity, laboratory parameters, and patient outcomes. By systematically analyzing these correlations, the study seeks to establish evidence-based protocols for the timing and application of CECT in the management of AP.

Materials and Methods

Study area: This study was conducted at department of Radio-diagnosis & modern imaging, S.P. Medical College & A.G. of P.B.M Hospitals, Bikaner. It is a multi-disciplinary tertiary care referral hospital.

Study Design: This is an observational cross sectional study.

Sample Size: A total number of 110 cases who referred for CECT abdomen in radio- diagnosis Department.

Study population: Clinically suspected acute pancreatitis based on symptoms likes epigastric pain, nausea, vomiting, serum amylase, serum lipase elevation who were attending/referred to S.P. Medical College & Associated Groups of Hospitals.

Sample technique: Simple random sampling technique was used.

Sample Size Calculation

Assumptions: A sample size of 110 patients of acute pancreatitis is required to verify the proportion of patients who have diffuse

enlargement of pancreas on CT scan (as per seed article) [18].

Confidence level =95%

Precision (d)= ±5%

For estimation of sample size following formula has been used $N = (Z^2 \times P \times (1-P))/d^2$

$N = 1.96^2 \times 0.032 \times (1-0.032)/0.05^2$

Where;

Z= Value of standard normal variate corresponding to α level of significance P= likely value of parameter

$Q = 1 - P$

d= Margin of errors which is a measure of precision

With these assumptions the sample size works out as 110.

Study Duration: One year (Oct 2024 to Oct 2025).

Eligibility Criteria:

Inclusion Criteria:

- Patients of any age groups with clinically suspected pancreatitis referred to CECT abdomen were including in the study after taking their informed consent.
- All age groups and both sex patients will be included in the study.

Exclusion Criteria:

- Patients with chronic pancreatitis.
- Any previous pancreatic surgery or Postoperative cases.
- Contraindicated cases for contrast study examples Bronchial asthmatic patient (scan can be done in anesthetic standby) and Patient having allergy to any drug may be considered for scanning under anesthetic fitness and patients with renal impairment.
- Pregnant females.
- Patients not willing to give informed written consent.

Results

Table 1 presents the distribution of the study group based on CT diagnoses, showing that the majority of patients, with a frequency of 60 (54.55%), had acute pancreatitis without necrosis. This was followed by 25 patients (22.73%) with acute on chronic pancreatitis, 13 patients (11.82%) with acute necrotising pancreatitis, and 12 patients (10.91%) with no evidence of pancreatitis.

Table 1: Distribution of study group as per CT Diagnosis

CT diagnosis	Frequency	Percent
Acute pancreatitis without necrosis	60	54.55%
Acute necrotising pancreatitis	13	11.82%
Acute on chronic pancreatitis	25	22.73%
No pancreatitis	12	10.91%
Total	110	100%

Table 2: Association among study group between CT diagnosis and Ranson score

CT Diagnosis		Ranson score		Total
		Mild to moderate (<3)	Severe (>3)	
Acute pancreatitis without necrosis	Count	52	8	60
	Percent	86.67%	13.33%	100
Acute necrotising pancreatitis	Count	3	10	13
	Percent	23.08%	76.92%	100
Acute on chronic pancreatitis	Count	20	5	25
	Percent	80%	20%	100
No pancreatitis	Count	12	0	12
	Percent	100%	0.00	100
Total	Count	87	23	110
	Percent	79.09%	20.91%	100
Chi-square test	Value	Df	P value	Association is
Pearson chi-square	30.95	3	< 0.0001	Significant

The table 2 illustrates the association between CT diagnosis and Ranson score categories in the study group. Among patients with acute pancreatitis without necrosis, 52 (86.67%) had mild to moderate scores (<3), while 8 (13.33%) had severe scores (>3). In cases of acute necrotising pancreatitis, 3 (23.08%) had mild to moderate scores, and 10 (76.92%) had severe scores. Patients with acute on chronic pancreatitis included 20

(80%) with mild to moderate scores and 5 (20%) with severe scores. All 12 patients without pancreatitis (12, 100%) had mild to moderate scores, with none falling into the severe category. Overall, 87 (79.09%) patients had mild to moderate Ranson scores, and 23 (20.91%) had severe scores. The analysis shows a significant association between CT diagnosis and Ranson score category, with a p-value of < 0.0001.

Table 3: Modified CT severity index in different categories of Pancreatitis

CT diagnosis		Modified CT severity index			Total
		Mild (0–2)	Moderate (4–6)	Severe (8–10)	
Acute pancreatitis without Necrosis	Count	50	10	0	60
	Percent	83.33%	16.67%	0	100
Acute necrotising pancreatitis	Count	0	3	10	13
	Percent	0.00	23.08%	76.92%	100
Acute on chronic pancreatitis	Count	22	2	1	25
	Percent	88.00%	8.00%	4.00%	100
No pancreatitis	Count	12	0	0	12
	Percent	100%	0.00	0	100
Total	Count	84	15	11	110
	Percent	76.36%	13.64%	100%	100
Chi-square test	Value	df	P value	Association is	
Pearson chi-square	19.13	3	0.0002	Significant	

Table 3 presents the distribution of the modified CT severity index across different categories of pancreatitis. In cases of acute pancreatitis without necrosis, 50 (83.33%) had mild, 10 (16.67%) had moderate, and none (0%) had severe severity. Among patients with acute necrotising pancreatitis, none (0%) exhibited mild, 3 (23.08%) had moderate, and 10 (76.92%) had severe severity. For acute on chronic pancreatitis, 22 (88.00%) were

classified as mild, 2 (8.00%) as moderate, and 1 (4.00%) as severe. Patients with no pancreatitis included 12 (100%) with mild severity, and none with moderate or severe. Overall, out of 110 cases, 84 (76.36%) were mild, 15 (13.64%) moderate, and 11 (10.00%) severe. The p-value of 0.0002, indicating a significant association between the type of pancreatitis and the modified CT severity index.

Table 4: Association among study group between CT Diagnosis and Hospital stay

Hospital stay		CT Diagnosis			Total
		Acute pancreatitis without necrosis	Acute necrotising pancreatitis	Acute on chronic pancreatitis	
Less than 5 days	Count	20	0	5	25
	Percent	80%	0	20%	100
5 to 10 days	Count	35	4	14	53
	Percent	66.04%	7.55%	26.42%	100
More than 10 days	Count	5	3	6	14
	Percent	35.71%	21.43%	42.86%	100
Death	Count	0	6	0	6
	Percent	0	100%	0	100
Total	Count	60	13	25	98
	Percent	61.22%	13.27%	25.51%	100
Chi-Square test	Value	df	P value	Association is	
Pearson Chi-Square	49.65	6	0.000	Significant	

Table 4 shows the association between study groups based on CT diagnosis and hospital stay duration. Patients with acute pancreatitis without necrosis mostly stayed less than 5 days (20 out of 25, 80%), while none of these patients had stays of 5 to 10 days or more than 10 days. In contrast, patients with acute necrotising pancreatitis primarily had longer hospital stays, with 4 out of 53 (7.55%) staying 5 to 10 days and 3 out of 14 (21.43%) staying more than 10 days, and all 6 deaths occurring in this group. Patients with acute on chronic pancreatitis had varied stays: 5 out of 25 (20%) stayed less than 5 days, 14 out of 53 (26.42%) between 5 and 10 days, and 6 out of 14 (42.86%) for more than 10 days. Overall, there were 98 patients, with 60 (61.22%) staying less than 5 days, 13 (13.27%) between 5 and 10 days, and 25 (25.51%) staying more than 10 days. The chi-square test revealed a significant association between CT diagnosis and hospital stay (value 49.65, $p=0.000$).

Discussion

This study provides valuable insights into the demographic, clinical, and radiological profile of pancreatitis patients, highlighting the predominance of males aged 31-50 and the significant role of alcohol and gallstones as primary risk factors. The correlation between CT severity scores, serum enzyme levels, and clinical outcomes underscores the importance of comprehensive imaging and biochemical assessment in managing pancreatitis. Notably, severe necrotizing pancreatitis was associated with higher morbidity and mortality, emphasizing the need for early detection and aggressive intervention in such cases. However, variations in serum enzyme levels and the presence of incidental findings like fatty liver and renal calculi also suggest the multifactorial nature of pancreatic pathology. These findings reinforce the importance of a multidisciplinary approach

combining clinical, biochemical, and radiological data to optimize patient outcomes.

Our analysis shows a clear association between CT findings and Ranson scores. Patients with acute necrotising pancreatitis were more likely to have a severe Ranson score, with 76.92% falling into this category, compared to only 13.33% of those with pancreatitis without necrosis. Conversely, patients without necrosis mostly had milder scores, with 86.67% in the mild to moderate group. The statistical test confirmed this relationship as highly significant ($p < 0.0001$). This indicates that more severe CT findings are strongly associated with higher Ranson scores, reflecting greater disease severity.

In a similar study of Sharma S, et al. (2018) [6] found that patients with extensive pancreatic necrosis on CT had significantly higher Ranson scores, with approximately 70% of these patients exhibiting scores greater than 3, indicating severe disease. In our study, we observed that 76.92% of patients with necrosis had severe Ranson scores, demonstrating a similar trend and strong correlation between the extent of necrosis on CT and clinical severity. Both studies highlight that pancreatic necrosis is a key imaging marker associated with higher Ranson scores, reflecting more severe pancreatitis. The slight difference in percentages (70% vs. 76.92%) could be attributed to differences in sample sizes or patient populations, but overall, both studies reinforce the significant relationship between CT findings of necrosis and disease severity as measured by Ranson scoring.

These findings are consistent with those reported by Kumar et al., who observed pancreatic enlargement in approximately 48-55% of cases, with localized swelling predominantly in the head region, and atrophic changes in about 10%, similar to our results. Patel et al. (2017) [7] also reported that 50-60% of patients showed diffuse pancreatic enlargement, with localized swelling in a small

percentage, and atrophic pancreas in around 15%, aligning closely with our data. Similarly, Singh et al. (2019) [8] found pancreatic swelling in about 55% of cases, with atrophic changes in approximately 10-13%. Overall, our findings are in good agreement with these published studies, highlighting the prevalence of pancreatic enlargement and atrophic changes in patients evaluated within our department. Smaller groups showed localized enlargement in the head (2.73%), head and body (1.82%), body alone (1.82%), and tail alone (2.73%). Additionally, 12.73% had an atrophic pancreas, while 24.55% had a normal-sized pancreas.

Conclusion

In this study of 110 pancreatitis patients, the majority were males aged 31-50, with alcohol and gallstones identified as primary risk factors. CT imaging revealed that most cases were mild to moderate, with peripancreatic fat involvement as the most common feature, while severe necrotizing pancreatitis was significantly associated with higher CT severity scores, longer hospital stays, and increased mortality. Elevated serum amylase and lipase levels correlated with disease severity, although no significant link was found between serum lipase and CT findings. The study highlights the importance of CT severity assessment in predicting disease progression and outcomes, emphasizing that severe necrotizing pancreatitis warrants prompt and targeted management to improve prognosis.

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