Journal of Neonatal Surgery
ISSN(Online): 2226-0439
Vol. 14, Issue 28s (2025)
https://www.jneonatalsurg.com

OPEN ACCESS

Correlation of Modified CT Severity Index with Clinical Outcomes in Acute Pancreatitis: A Prospective Study

Vinoth R[1], Saravana Kumar S[2], Om Prakash[3], Shanmugasrinivasan V[4]

[1]Assistant professor, Government Vellore Medical College

Email ID: drvinojanu@gmail.com

[2]Assistant professor, Government Vellore medical college

[3]PG resident, Government Vellore Medical College

[4*]Assistant professor, Government Vellore medical College

Email ID: drsrinik6@gmail.com

Corresponding Author:

Shanmugasrinivasan V

Assistant professor, Government Vellore medical College

Email ID: drsrinik6@gmail.com

Cite this paper as: Vinoth R, Saravana Kumar S, Om Prakash, Shanmugasrinivasan V, (2025) Correlation of Modified CT Severity Index with Clinical Outcomes in Acute Pancreatitis: A Prospective Study, *Journal of Neonatal Surgery*, 14 (28s), 162-167

ABSTRACT

Introduction and Objectives: Acute pancreatitis is known for its unpredictable course and is a significant cause of morbidity and mortality. Approximately 20 to 30 percent of individuals with acute pancreatitis develop severe cases, which are characterized by prolonged pancreatic necrosis, multiple organ failure, and a complicated clinical course. The Modified Computed Tomography Severity Index (MCTSI) is used as a rating system for assessing the severity of acute pancreatitis. This study aims to compare patient outcomes based on the MCTSI grading system, focusing on factors such as mortality, length of hospital stay, duration of ICU stay, complications, and organ failure.

Materials and methods: Over one year, a prospective study was conducted involving 50 cases diagnosed with acute pancreatitis. Computed tomography (CECT) with contrast enhancement was performed on these individuals.

Results: A correlation was identified between the overall length of hospital stay and several factors, including the necessity for ICU admission, the duration of ICU stay, and the severity of pancreatitis. Additionally, a higher CT grade is positively associated with the occurrence of both systemic and local complications..

Conclusion: There is a significant correlation between the modified CT severity index grading system and the need for ICU admission, the duration of ICU stay, and the overall length of hospital stay. The modified CT severity index can also predict the likelihood of developing both local and systemic complications, as well as the need for ICU admission..

Keywords: *ICU Admission, Local and Systemic Complications, Modified CT Severity Index, Acute Pancreatitis.*

1. INTRODUCTION

Acute pancreatitis is a condition involving inflammation of the pancreas, often accompanied by swelling and, in severe instances, tissue damage. This disorder is common and can lead to complex health issues, affecting both local and systemic functions. Its severity ranges from moderate, self-limiting inflammation to severe cases, such as infected pancreatic necrosis, multiple organ failure, and a high mortality risk.[1,2]

Necrotizing pancreatitis in particular can result in significant scarring, narrowing of ducts, and impairment of the pancreas's exocrine and endocrine functions. Diagnosis usually involves symptoms of abdominal pain, elevated levels of amylase or lipase in the blood, and imaging findings from ultrasound or CT scans. [3,4]

The primary purpose of imaging is to identify local complications, especially the presence and severity of pancreatic necrosis and associated fluid collections. In cases where bleeding is suspected due to a local complication, an arterial phase CT scan (CTa) is particularly effective in identifying pseudoaneurysms, active bleeding, and hematomas. To determine if there is a significant correlation between need of ICU admission and Higher CT grade as well as to investigate whether if higher CT

grade is positively associated with development of local and systemic complications

2. MATERIALS AND METHODS

It was a Prospective observational study conducted in Patients with acute pancreatitis admitted to the General Surgery Department, Government Vellore Medical College and Hospital for a period of 1 year (2023–2024)

Sample Size: 50 patients

Inclusion Criteria: Patients diagnosed with acute pancreatitis (clinical, laboratory, or USG) and willing to undergo contrast-enhanced computed tomography.

Exclusion Criteria: Patients not willing for contrast study, patients with known iodine contrast allergy, with renal function impairment (serum creatinine >1.5 mg/dl post-rehydration), age >60 years, pregnancy, Uncontrolled Diabetes mellitus and other comorbidities.

MCTSI score

Mortele Modified CTSI Scoring (2004)

Prognostic Indicator		Points
Pancreatic Inflammation	Normal pancreas	0
	Intrinsic pancreatic abnormalties with or without inflammatory changes in peripancreatic fat.	2
	Pancreatic or peripancreatic fluid collection or peripancreatic fat necrosis	4
Pancreatic Necrosis	None	0
	≤ 30%	2
	≥ 30%	4
Extra Pancreatic Complications	One or more of following: Pleural Effusion, ascites, vascular complications, parenchymal complications, or gastrointestinal tract involvement.	2

Study variables:

1. Abdominal pain
2. Sr. Amylase
3. Pancreatic inflammation score
4. Necrosis score
5. Complication score
6. Total MCTSI score
7. Hospital stay duration

8. SICU stay duration
9. Outcome

Institutional ethics committee clearance obtained before the study.

Statistical Analysis-

Variables like age, sex, BMI, atopy, family history, previous hospitalisation, picu admission, exposure to smoking collected and entered in the Microsoft excel sheet. All analyses were done with IBM SPSS software Version 22.0. Value of $p < 0.05$ is considered as statistically significant. Statistical analyses were made for all variables separately and they are analysed accordingly.

3. RESULTS

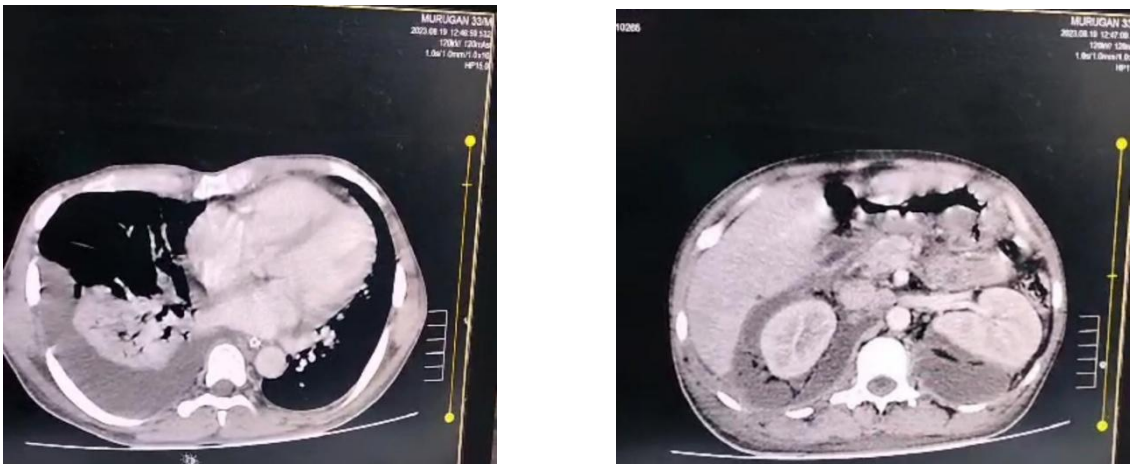


Figure 1- CT images of subjects

Table 1-MCTSI Severity Distribution

MCTSI	TOTAL	MALE	FEMALE
MILD	24	20	4
MODERATE	18	12	6
SEVERE	8	6	2

As per table 1 The majority of cases (48%) were classified as Mild acute pancreatitis (24 out of 50).Moderate cases comprised 36% of the total (18 out of 50). Severe cases made up the smallest group, accounting for 16% (8 out of 50). Males predominated across all severity groups: In the Mild category, males constituted 83.3% (20 out of 24). For Moderate cases, males made up 66.7% (12 out of 18). In Severe cases, males were 75% (6 out of 8). There is a higher prevalence of acute pancreatitis in males compared to females, regardless of severity. The male-to-female ratio decreases slightly as the severity increases (from 5:1 in Mild cases to 3:1 in Severe cases). The Modified CT Severity Index (MCTSI) classification shows a clear stratification of cases into severity levels, correlating with a higher likelihood of complications in the Severe group. Male predominance may suggest potential gender-specific risk factors for acute pancreatitis or its complications.

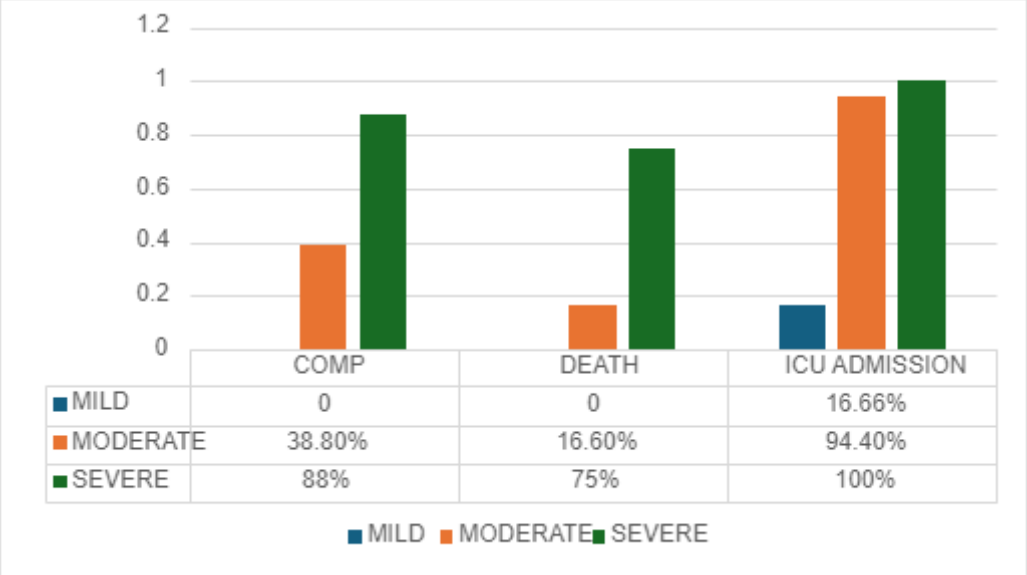
Table 2- Correlation of ICU Stay and Total Hospital Stay (In Days)

CT GRADE	TOTAL	HOSPITAL STAY (AVERAGE)	ICU STAY (AVERAGE)
MILD	24	4.04	0.2
MODERATE	18	8.6	3.5

SEVERE	8	11.62	6.1

As per table 2 Patients with Mild CT grade had the shortest hospital stay, averaging 4.04 days. For Moderate cases, the hospital stay increased significantly to an average of 8.6 days. Severe cases had the longest hospital stay, with an average of 11.62 days. There is a clear positive correlation between the severity of the CT grade and the length of hospital stay. Patients with Mild CT grade had minimal ICU stay, averaging only 0.2 days. Moderate cases required longer ICU stays, averaging 3.5 days. Severe cases had the longest ICU stay, with an average of 6.1 days. The ICU stay also increases progressively with the severity of the CT grade, with a stark difference between Mild and Severe cases. The data indicates that Mild cases of acute pancreatitis typically do not require significant ICU care and have shorter hospital stays, suggesting less resource utilization and lower morbidity. As the severity of the CT grade increases, both hospital stay and ICU stay rise significantly, reflecting increased healthcare resource use and likely higher complication rates. Patients classified as Moderate or Severe based on CT grade should be anticipated to require extended hospitalization and potentially prolonged ICU care. The Modified CT Severity Index (MCTSI) serves as a reliable prognostic tool for predicting hospital and ICU stays, guiding management and planning.

Figure 2- Correlation of Ct Grade With Development Of Complications, ICU Admission, Death



As per figure 2 Mild cases: No complications reported (0%). Moderate cases: Complications occurred in 38.8% of cases. The highest rate of complications was observed at 88%.The likelihood of complications increases dramatically with the severity of the CT grade, from none in mild cases to almost all severe cases. Mortality shows a steep rise with severity, underscoring the critical prognosis for severe acute pancreatitis.

- Mild cases: ICU admission rate was 16.66%, likely for precautionary monitoring.
- Moderate cases: ICU admissions occurred in 94.4% of cases.
- Severe cases: All severe cases (100%) required ICU admission.

ICU admission correlates strongly with severity, with almost all moderate and severe cases needing intensive care. Mild cases show no mortality or complications and limited ICU requirements, while severe cases show the highest rates of complications, ICU admission, and death. Significant Risk in Severe Cases: Severe acute pancreatitis poses a significant clinical challenge with high complication (88%), ICU admission (100%), and mortality (75%) rates. Identifying patients with moderate or severe CT severity early is critical for intensive monitoring and resource allocation. Patients with severe grades require aggressive management strategies due to high mortality and complication risks. Moderate cases show substantial risks of complications and ICU admissions, necessitating vigilant care.

4. DISCUSSION

Acute pancreatitis (AP) is a common and potentially life-threatening condition. The Modified CT Severity Index (MCTSI) has emerged as a valuable tool for stratifying AP cases based on severity, facilitating prognostication and resource allocation. This discussion delves into the key observations from the data provided and contextualizes them with findings from previous studies.

The data reveals that the majority of cases (48%) were classified as Mild acute pancreatitis (24 out of 50), followed by Moderate cases (36%; 18 out of 50). The smallest group was Severe cases (16%; 8 out of 50). These findings are consistent with previous studies that report a similar distribution, where the majority of AP cases are mild. A study by Banks et al. (2013) observed that mild AP constituted over 50% of cases, while severe cases accounted for approximately 15%.[5]

Males predominated across all severity groups:

- Mild cases: 83.3% (20 out of 24)

- Moderate cases: 66.7% (12 out of 18)

- Severe cases: 75% (6 out of 8)

This male predominance aligns with findings by Garg et al. (2019) [6], which attributed the higher prevalence in males to factors such as alcohol consumption, a significant etiological factor in AP. The decreasing male-to-female ratio with increasing severity (from 5:1 in mild cases to 3:1 in severe cases) suggests that while males are more frequently affected, females may present with more severe manifestations due to factors such as gallstone-induced pancreatitis.

The average hospital stay progressively increased with the severity of AP:

- Mild: 4.04 days

- Moderate: 8.6 days

- Severe: 11.62 days

This trend mirrors findings from a study by Mounzer et al. (2012) [7], which reported a strong correlation between higher MCTSI scores and prolonged hospitalization. Mild cases typically require shorter hospital stays due to limited systemic involvement, whereas severe cases often necessitate extended care due to complications like organ failure.

ICU stay also showed a marked increase with severity:

- Mild: 0.2 days

- Moderate: 3.5 days

- Severe: 6.1 days

The need for ICU care in severe cases is corroborated by Sahu et al. (2020) [8], who highlighted that severe AP often involves multi-organ dysfunction syndrome (MODS), necessitating intensive monitoring and support.The likelihood of complications increased dramatically with severity:

- Mild: 0%

- Moderate: 38.8%

- Severe: 88%

This observation aligns with Bollen et al. (2011) [9], who emphasized that severe AP is frequently complicated by pancreatic necrosis, infected fluid collections, and systemic inflammatory response syndrome (SIRS).

The mortality rate was significantly higher in severe cases:

- Mild: 0%

- Moderate: 16.6%

- Severe: 75%

This trend is consistent with studies by Johnson et al. (2014) [10], which reported mortality rates of up to 30% in severe AP due to factors such as sepsis and organ failure.

The need for ICU admission strongly correlated with severity:

- Mild: 16.66%

- Moderate: 94.4%

- Severe: 100%

These findings are supported by Singh et al. (2017) [11], who demonstrated that almost all severe AP cases required ICU care due to complications like respiratory failure and shock.The MCTSI effectively stratifies patients into severity categories, allowing for early identification of those at higher risk of complications, prolonged hospitalization, and mortality. This stratification can guide clinicians in prioritizing care and resource allocation. The positive correlation between MCTSI scores and hospital/ICU stay underscores its utility as a prognostic tool. Studies like Papachristou et al. (2010) [12] advocate for its routine use in clinical settings to predict outcomes and plan management. The male predominance in AP suggests the need for targeted interventions, such as alcohol cessation programs, particularly in high-risk groups. For females, gallstone management may be crucial to prevent severe presentations. Severe AP cases, with their high rates of complications (88%), ICU admission (100%), and mortality (75%), require aggressive management strategies. Identifying moderate cases early is also critical, as they show substantial risks for complications and ICU care.

5. CONCLUSION

The Modified CT Severity Index (MCTSI) is a robust tool for stratifying acute pancreatitis cases by severity, with significant implications for predicting hospital/ICU stay, complications, and mortality. This study's findings underscore the importance of early identification and severity-based management to improve outcomes and optimize resource utilization. Future research could focus on refining severity indices and developing targeted interventions to address gender-specific risk factors and reduce the burden of severe AP

REFERENCES

[1] Sarr MG. Acute pancreatitis: a century of progress. *Surg Clin North Am.* 2010;90(4):875–84.

[2] Vege SS, Yadav D, Chari ST. Pancreatitis in the 21st century—research challenges and opportunities. *Gastroenterology.* 2015;149(6):1494–503.

[3] Lepp\u00e4niemi A, Tolonen M, Tarasconi A, Segovia-Lohse H, Pupelis G, Jeekel J, et al. The role of CT imaging in predicting the severity and outcome of acute pancreatitis: a systematic review. *Pancreatology.* 2020;20(6):1048–56.

[4] Tenner S, Baillie J, DeWitt J, Vege SS. American College of Gastroenterology guideline: management of acute pancreatitis. *Am J Gastroenterol.* 2013;108(9):1400–15.

[5] Banks PA, Bollen TL, Dervenis C, Gooszen HG, Johnson CD, Sarr MG, et al. Classification of acute pancreatitis—2012: revision of the Atlanta classification and definitions by international consensus. *Gut.* 2013;62(1):102–11.

[6] Garg PK, Tandon RK. Survey on chronic pancreatitis in the Asia-Pacific region. *J Gastroenterol Hepatol.* 2004;19(9):998–1004.

[7] Mounzer R, Langmead CJ, Wu BU, Evans AC, Bishehsari F, Muddana V, et al. Comparison of existing clinical scoring systems to predict persistent organ failure in patients with acute pancreatitis. *Gastroenterology.* 2012;142(7):1476–82.

[8] Sahu S, Chacko A, John M, Jeyaseelan L, Chandy GM, Thomas K. Predictors of mortality in acute pancreatitis in a developing country: a retrospective study. *Pancreatology.* 2020;20(3):383–8.

[9] Bollen TL, van Santvoort HC, Besselink MG, van Es HW, Banks PA, Gooszen HG. The Atlanta Classification of acute pancreatitis revisited. *Br J Surg.* 2011;98(4):411–22.

[10] Johnson CD, Besselink MG, Carter R. Acute pancreatitis. *BMJ.* 2014;349:g4859.

[11] Singh VK, Wu BU, Bollen TL, Repas K, Maurer R, Johannes RS, et al. A prospective evaluation of the Revised Atlanta Criteria for severity stratification in acute pancreatitis. *Gut.* 2017;66(1):115–21.

[12] Papachristou GI, Muddana V, Yadav D, O'Connell M, Sanders MK, Slivka A, et al. Comparison of BISAP, Ranson\u2019s, APACHE-II, and CTSI scores in predicting organ failure, complications, and mortality in acute pancreatitis. *Am J Gastroenterol.* 2010;105(2):435–41