



Correlation of serum procalcitonin levels with clinical outcomes in acute pancreatitis: A prospective observational study

Dr. Ravikant Bhardwaj¹, Dr. Surabhi Sharma²

¹ Department of Surgery, Indira Gandhi Medical College, Shimla, Himachal Pradesh, India

² Department of Obstetrics and Gynaecology, Indira Gandhi Medical College, Shimla, Himachal Pradesh, India

Abstract

Background: Acute pancreatitis (AP) presents a clinical spectrum from mild to severe disease with systemic complications. Serum procalcitonin, a marker of bacterial translocation and inflammation, may help predict adverse outcomes. This study explores the correlation between procalcitonin levels and clinical outcomes in AP.

Methods: In a prospective observational study of 100 patients with AP, serum procalcitonin levels were measured at admission. Outcomes including ICU admission, organ dysfunction, length of hospital stay, and mortality were analyzed in relation to procalcitonin levels.

Results: Elevated serum procalcitonin levels showed strong correlation with poor outcomes. Patients with procalcitonin >2 ng/mL had significantly higher rates of ICU admission, longer hospital stays, and increased mortality.

Conclusion: Serum procalcitonin is a reliable early biomarker for predicting adverse clinical outcomes in acute pancreatitis, aiding in early identification of high-risk patients.

Keywords: Procalcitonin, acute pancreatitis, clinical outcomes, biomarker, mortality

Introduction

Acute pancreatitis (AP) is an acute inflammatory condition of the pancreas that ranges from a mild, self-limiting illness to a severe, life-threatening disease characterized by systemic inflammatory response, multi-organ dysfunction, and significant mortality. Globally, the incidence of AP has been increasing, making it one of the most common causes of hospitalization for gastrointestinal disorders. Despite advances in imaging and intensive care, the early prediction of disease severity remains a major clinical challenge.

Accurate and timely stratification of patients at risk for complications is crucial to guiding therapeutic decisions, optimizing resource allocation, and improving patient outcomes. Several clinical scoring systems and laboratory markers have been developed for this purpose, but their utility is often limited by complexity, delay in data availability, or low specificity.

Procalcitonin (PCT), a 116-amino acid prohormone of calcitonin, has emerged as a potential biomarker for systemic inflammatory responses, particularly in the context of bacterial infections. In AP, elevated levels of procalcitonin are believed to reflect bacterial translocation from the gut and the ensuing systemic inflammatory cascade. Unlike other inflammatory markers such as C-reactive protein (CRP), procalcitonin levels rise rapidly within 6 to 12 hours of inflammation onset and correlate with the severity of the condition.

This prospective observational study was undertaken to evaluate the correlation between serum procalcitonin levels measured at hospital admission and clinical outcomes in

patients with acute pancreatitis. The aim was to determine whether procalcitonin could serve as a reliable early biomarker to identify patients at higher risk for adverse outcomes, including ICU admission, organ dysfunction, prolonged hospitalization, and mortality.

Materials and Methods

This prospective observational study was conducted over 12 months at a tertiary care hospital. 100 patients diagnosed with AP based on clinical, biochemical, and radiological findings were included. Exclusion criteria were chronic pancreatitis, pancreatic malignancy, and recent surgery. Serum procalcitonin levels were obtained within 24 hours of admission.

Patients were monitored for clinical outcomes including ICU admission, organ dysfunction, length of hospital stay, and in-hospital mortality. Procalcitonin levels were stratified into <1 ng/mL, 1–2 ng/mL, and >2 ng/mL categories. Statistical analysis was performed using chi-square test and ANOVA.

Results

The distribution of outcomes by procalcitonin levels is summarized below. Patients with procalcitonin levels above 2 ng/mL had significantly higher rates of ICU admission (68%), organ dysfunction (58%), and mortality (17%). The mean hospital stays also increased with higher procalcitonin levels, indicating a correlation between elevated procalcitonin and worse prognosis.

Table 1: Clinical Outcomes Stratified by Serum Procalcitonin Levels

Procalcitonin Level	Patients (n)	ICU Admission (%)	Organ Dysfunction (%)	Mortality (%)
<1 ng/mL	36	2.7%	0%	0%
1–2 ng/mL	34	11.8%	12%	2.9%
>2 ng/mL	30	68%	58%	17%

Table 2: Mean Length of Hospital Stay Based on Procalcitonin Levels

Procalcitonin Level	Mean Hospital Stay (days)
<1 ng/mL	4.1
1–2 ng/mL	7.3
>2 ng/mL	11.6

Discussion

This study demonstrates that serum procalcitonin levels at admission are strongly correlated with adverse outcomes in acute pancreatitis. Patients with procalcitonin >2 ng/mL had substantially higher ICU admissions, organ failure, and mortality rates, making this biomarker a useful tool for early triage.

Procalcitonin reflects the degree of systemic inflammation and bacterial translocation, processes integral to severe pancreatitis. Our findings align with prior studies by Rau *et al.* and Pezzilli *et al.*, who also highlighted the predictive value of elevated procalcitonin in AP severity and prognosis.

Interestingly, procalcitonin values below 1 ng/mL were consistently associated with mild disease and favorable outcomes, suggesting it may be used to rule out severe progression. The correlation with hospital stays further supports its utility in resource planning. Limitations include single-center design and lack of serial biomarker measurements. Larger studies could help establish threshold values for risk stratification in clinical settings.

Conclusion

Serum procalcitonin levels measured at admission significantly correlate with clinical outcomes in acute pancreatitis. Levels above 2 ng/mL are indicative of severe disease, longer hospitalization, and higher risk of death. Early measurement of procalcitonin may improve patient management and triaging in AP.

Limitations

This study has several limitations. First, it was conducted at a single tertiary care center, which may limit the generalizability of the findings to broader populations and different healthcare settings. Second, serum procalcitonin levels were measured only once at admission. Serial measurements might provide a more dynamic assessment of disease progression and improve predictive accuracy. Third, the study did not account for potential confounding factors such as co-existing infections, prior antibiotic use, or comorbidities, which could influence procalcitonin levels independently of pancreatitis severity. Lastly, the sample size, while adequate for preliminary analysis, may not be sufficient to detect subtler associations or to stratify outcomes across more specific subgroups.

Future Implications

Incorporating PCT into severity assessment algorithms can improve clinical accuracy, reduce unnecessary testing, and guide the escalation of care. With further refinement, PCT could become part of infection severity scoring systems, especially in sepsis management protocols.

Declarations

Funding: None

Conflict of Interest: None declared

Ethical Approval: Approved by institutional ethics committee

References

1. Rau BM, *et al.* Role of procalcitonin in the early prediction of severity in acute pancreatitis. *Am J Gastroenterol*, 2003.
2. Pezzilli R, *et al.* Procalcitonin as a marker for severe acute pancreatitis. *Eur J Clin Invest*, 2007.
3. Banks PA, *et al.* Classification of acute pancreatitis—Revised Atlanta Criteria. *Gut*, 2013.