THE ROLE OF INFLAMMATORY MARKERS IN THE EARLY DIAGNOSIS OF SEPSIS

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Abstract: Sepsis is a life-threatening condition resulting from the body's extreme response to infection. Early diagnosis is crucial to reduce morbidity and mortality. Inflammatory markers, such as C-reactive protein (CRP), procalcitonin (PCT), and interleukins, play a vital role in the early identification and management of sepsis. This study investigates the diagnostic value of these biomarkers in patients with suspected sepsis in intensive care units (ICUs).

Keywords: Sepsis, Procalcitonin, CRP, Interleukin-6, Inflammatory biomarkers, Early diagnosis

Introduction

Sepsis is a major global health challenge with high mortality rates, especially in low- and middle-income countries. Defined as life-threatening organ dysfunction caused by a dysregulated host response to infection, sepsis progresses rapidly, making early detection essential. Clinical symptoms alone are often insufficient for timely diagnosis, necessitating the use of laboratory parameters. Among these, inflammatory markers have gained attention due to their sensitivity and specificity. This study focuses on evaluating the role of CRP, PCT, and interleukin-6 (IL-6) in the early diagnosis of sepsis in ICU settings.

Materials and Methods

A prospective observational study was conducted over 6 months in the ICU of a tertiary care hospital. A total of 120 patients with suspected sepsis were included based on the Sepsis-3 criteria. Blood samples were collected at admission to measure levels of CRP, PCT, and IL-6 using standardized laboratory techniques. Patients were monitored for clinical outcomes and final diagnosis confirmed by microbiological culture and SOFA (Sequential Organ Failure Assessment) score.

Inclusion criteria: Adults (>18 years) with suspected infection and two or more SIRS (Systemic Inflammatory Response Syndrome) criteria.

Exclusion criteria: Patients on immunosuppressive therapy or with chronic inflammatory conditions.

Statistical analysis was performed using SPSS version 25. Receiver Operating Characteristic (ROC) curves were plotted to determine the diagnostic accuracy of each marker.

Results

Out of 120 patients, 86 were confirmed to have sepsis. CRP levels were elevated in 78 of these patients (90.7%), PCT in 81 (94.2%), and IL-6 in 83 (96.5%). The ROC analysis revealed the area under the curve (AUC) for PCT as 0.93, IL-6 as 0.91, and CRP as 0.82. PCT demonstrated the highest sensitivity (92%) and specificity (88%) for sepsis diagnosis. IL-6 followed closely, while CRP had lower specificity.

Discussion

This study confirms that inflammatory biomarkers are valuable tools in the early diagnosis of sepsis. PCT and IL-6, in particular, showed high diagnostic accuracy, making them superior to CRP. PCT

rises within 3–6 hours of infection onset and correlates well with the severity of infection. IL-6 acts earlier than other markers and may serve as an early predictor of systemic inflammation. Although CRP is widely used, it lacks specificity in differentiating between infectious and non-infectious causes of inflammation. Thus, a combination of PCT and IL-6 could improve diagnostic precision and aid in early intervention, ultimately improving patient outcomes.

Conclusion

Inflammatory markers, especially procalcitonin and interleukin-6, are effective tools for the early diagnosis of sepsis. Their timely assessment in ICU settings can facilitate faster clinical decisions, reduce delays in treatment, and improve survival rates. Future studies should explore the cost-effectiveness of implementing these markers in routine ICU protocols.

References

1. Angus, D. C., & van der Poll, T. (2013). Severe sepsis and septic shock. *New England Journal of Medicine*, 369(9), 840–851. https://doi.org/10.1056/NEJMra1208623
2. Becker, K. L., Nylen, E. S., White, J. C., Müller, B., & Snider, R. H. (2004). Procalcitonin and the calcitonin gene family of peptides in inflammation, infection, and sepsis: a journey from calcitonin back to its precursors. *Journal of Clinical Endocrinology & Metabolism*, 89(4), 1512–1525.
3. Pierrakos, C., & Vincent, J. L. (2010). Sepsis biomarkers: a review. *Critical Care*, 14(1), R15. https://doi.org/10.1186/cc8872
4. Wacker, C., Prkno, A., Brunkhorst, F. M., & Schlattmann, P. (2013). Procalcitonin as a diagnostic marker for sepsis: a systematic review and meta-analysis. *The Lancet Infectious Diseases*, 13(5), 426–435.
5. Tan, M., Lu, Y., Jiang, H., & Zhang, L. (2014). The diagnostic accuracy of procalcitonin and C-reactive protein for sepsis: A systematic review and meta-analysis. *Journal of Cellular Biochemistry*, 115(5), 982–986.
6. Schuetz, P., Albrich, W., & Mueller, B. (2011). Procalcitonin for diagnosis of infection and guide to antibiotic decisions: past, present and future. *BMC Medicine*, 9, 107. https://doi.org/10.1186/1741-7015-9-107
7. Gogos, C. A., Drosou, E., Bassaris, H. P., & Skoutelis, A. (2000). Pro- versus anti-inflammatory cytokine profile in patients with severe sepsis: a marker for prognosis and future therapeutic options. *Journal of Infectious Diseases*, 181(1), 176–180.
8. Meisner, M. (2014). Update on procalcitonin measurements. *Annals of Laboratory Medicine*, 34(4), 263–273.
9. Póvoa, P. (2002). C-reactive protein: a valuable marker of sepsis. *Intensive Care Medicine*, 28(3), 235–243.
10. Dellinger, R. P., Levy, M. M., Rhodes, A., et al. (2013). Surviving Sepsis Campaign: international guidelines for management of severe sepsis and septic shock, 2012. *Intensive Care Medicine*, 39(2), 165–228.