Evaluating the Utility of Procalcitonin and C-Reactive Protein to Predict Bacteremia in Children with Musculoskeletal Infections

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Background:

Musculoskeletal infections (MSKI; osteomyelitis, septic arthritis) are among the most common invasive bacterial infections in children, often associated with complications. Bacteremia precedes these complications; thus, early identification may prevent them. Acute inflammatory markers, C-reactive protein (CRP) and Procalcitonin (PCT) are often elevated in children with acute MSKI. PCT is understudied in children with MSKI. The primary goal of this study was to evaluate the utility of PCT and CRP in distinguishing children with MSKI with bacteremia vs. those without.

Methods:

Patients 6 months to 18 years with strong clinical suspicion of MSKI were prospectively enrolled at Riley Hospital for Children from July 2019 to May 2022 unless clinical evidence suggested an alternative diagnosis or if informed consent was not obtained. CRP was obtained at admission and PCT was collected within 96 hours of presentation to the hospital. Demographic data was recorded from electronic medical records. Two-sided P values of <0.05 were considered statistically significant for univariate analysis and logistic regression.

Results:

Thirty-seven patients were enrolled, the majority being non-Hispanic white males (40.5%), median age of 8 years (IQR, 4-12). Median PCT in children with bacteremia was higher (0.41 ng/mL [IQR 0.14-0.8 ng/mL]) compared to those without (0.10 ng/mL [IQR 0.05-0.31 ng/mL]) ($p=0.03$). Median CRP in children with bacteremia was higher (13.7 mg/dL [IQR, 9.15-19.9]) compared to those without (4.1 mg/dL, [IQR 0.65-5.8]) ($p<0.01$). Both PCT and CRP showed good ability to discriminate those with bacteremia from those without, with an area under the ROC of 0.75 (95% CI 0.56, 0.94) and 0.80 (95% CI 0.64, 0.95), respectively.

Conclusions:

Initial PCT and CRP demonstrated utility in detecting bacteremia in patients presenting with MSKIs. This study warrants further exploration into the usage of PCT and CRP as early predictors of bacteremia for more appropriate treatment and potentially fewer complications of these infections in pediatric patients.