Serum Erythrocyte Sedimentation Rate and C-reactive Protein are Not Reliable Markers for Screening/Diagnosing Periprosthetic Joint Infection

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INTRODUCTION:
Based on the recommendations of the American Academy of Orthopaedic Surgeons serum erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) are the first lines for periprosthetic joint infection (PJI) work up. The studies that shaped these guidelines frequently contained small sample sizes and rarely used a standardized definition of PJI. Thus, the purpose of the paper is to reexamine the sensitivity of serological tests utilizing a contemporary definition of PJI.
METHODS:
This is a retrospective review of an institutional database of 689 total joint arthroplasties (368 knees, 321 hips) that underwent surgery for PJI. The 2018 ICM definition of PJI, and the defined thresholds for various parameters, were used to categorize patients into infected and non-infected (only the major criteria). Sensitivities were calculated for serum CRP among all PJIs, ESR for chronic infections, and for both tests together.
RESULTS:
The sensitivity of these markers for diagnosing chronic PJI (defined as infection occurring greater than 6 weeks from index arthroplasty), was 74.3% (95% CI: 67.7-80.9%) for CRP, and 80.0% (95% CI: 75.4-84.6%) for ESR. The sensitivity of these tests combined was 82.5% (95% CI: 73.3-85.7%) for ESR or CRP to be abnormal and 78.4% (72.7-90.6%) for both markers to be elevated. The sensitivity of CRP (threshold of >100mg/L) was 64.2% (95% CI: 61.3-67.1%) for acute PJIs.
DISCUSSION AND CONCLUSION:
Serum ESR and CRP have a higher false negative rate than previously reported, especially in patients with acute PJIs. Antibiotic administration, PJI with low virulent organisms, and the high thresholds for these tests than previously described may be some of the reasons for the high false negatives. Current thresholds recommended by the ICM may need to be examined and possibly lowered to improve the sensitivity of these screening tests. Surgeons should be aware that PJI may still occur despite normal serological tests and should maintain a high clinical suspicion.