

THE USE OF PREOPERATIVE CRP AND ESR AS PREDICTIVE MARKERS OF PROSTHETIC JOINT INFECTION IN PRIMARY TOTAL HIP AND KNEE ARTHROPLASTY

RESEARCH QUESTION

Do patients who undergo primary total hip arthroplasty (THA) or total knee arthroplasty (TKA) with elevated pre-operative CRP or ESR produce a higher incidence of post-operative periprosthetic joint infection (PJI), compared to THA and TKA patients that had normal pre-op labs?

What proportion of patients that developed PJI post-operatively had elevations in only CRP, only ESR, or both CRP and ESR?

Lastly, we will investigate whether patients had pre-operative elevations in CRP and/or ESR due to the presence of a modifiable risk factor, such as an acute infection or inflammation.

How did such conditions correlate with PJI development when comparing patients with modifiable and non-modifiable risk factors (age, sex, chronic disease)?

BACKGROUND

CRP and ESR are commonly utilized indicators of inflammation in the diagnosis and management of PJI among patients undergoing THA and TKA. The frequency of these surgeries is expected to increase significantly, with projections indicating a rise from 400,000 THAs and 700,000 TKAs annually to 635,000 THAs and 1,260,000 TKAs by 2030.

PJI poses a notable challenge, contributing to 20% of revision THA cases and 25% of revision TKA cases. The economic burden of PJI is substantial, estimated to reach \$753.4 million for THA and \$1.1 billion for TKA by 2030. Given the transition to value-based healthcare, optimizing patients before surgery is paramount.

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This study did not validate the use of preoperative CRP and ESR as reliable predictors of PJI in primary THA and TKA.

However, it offers valuable quantitative data on the prevalence of elevated preoperative CRP and ESR levels in all patients undergoing THA and TKA, with a significant portion having modifiable risk factors.

Given that a significant number of patients with elevated CRP and ESR levels did not develop PJI, we do not advise cancellation of THA and TKA unless there are obvious modifiable risk factors significantly increasing the risk of PJI.

Table 2. Distribution of CRP and ESR Elevation ¹				
	Total Patient Population N = 806	No PJI N = 789	PJI N = 17	P-Value
Percent of Patients With Elevation of CRP				
Negative (lab of 0.3 or less)	402 (49.9%)	397 (50.3%)	5 (29.4%)	0.1392
Positive (lab greater than 0.3)	404 (50.1%)	392 (49.7%)	12 (70.6%)	
Percent of Patients With Elevation of ESR				
Negative (lab of 30 or less)	667 (82.8%)	667 (82.8%)	12 (58.8%)	0.1796
Positive (lab greater than 30)	139 (17.3%)	139 (17.3%)	5 (29.4%)	
Percent of Patients With Elevation of CRP or ESR				
Positive ESR or Postive CRP	373 (46.3%)	421 (52.2%)	5 (0.6%)	0.0557
Both ESR and CRP are Negative	433 (53.7%)	368 (45.7%)	12 (1.49%)	
Percent of Patients With Elevation of CRP and ESR				
Positive ESR and Positive CRP	696 (86.4%)	105 (13.0%)	5 (0.6%)	0.1586
Either ESR or CRP are Negative	110 (13.7%)	684 (84.9%)	12 (1.49%)	
Percent of Patients With Elevation of CRP but ESR is Negative				
Positive CRP and Negative ESR	294 (36.5%)	287 (35.6%)	7 (0.9%)	0.6841
CRP is Negative, and ESR can be positive/negative	512 (63.5%)	502 (62.3%)	10 (1.2%)	
Percent of Patients With Elevation of ESR but CRP is Negative				
Positive ESR and Negative CRP	29 (3.6%)	29 (3.6%)	0 (0.0%)	0.4208
ESR is Negative, and CRP can be positive/negative	777 (96.4%)	760 (94.3%)	17 (2.1%)	

1. Chi Square was performed

Table 2 – Distribution of elevated CRP and/or ESR according to post-operative development of PJI vs. no PJI vs. total patient population

METHODS

A retrospective review was conducted on 806 patients from a single healthcare facility who had undergone either THA (n=291) or TKA (n=515). As part of the preoperative assessment, CRP and ESR levels were measured for all patients. Data regarding patient demographics, medical conditions, and incidences of PJI were collected. A CRP value greater than 0.3 mg/dL and an ESR value exceeding 30 mm/hr were considered positive indicators.

RESULTS

Our study revealed no statistically significant correlation between pre-operative CRP or ESR and PJI. However, it is worth mentioning that a greater percentage of patients diagnosed with PJI exhibited elevated preoperative CRP levels (70.6%) compared to PJI cases with normal CRP levels (29.4%).

FUTURE DIRECTIONS

Future investigations should strive for high-powered studies to offer a more conclusive resolution on this topic since the results thus far has been mixed. Moreover, extended follow-up periods should be used and exploration of additional complications warrants investigation. Additionally, a high-powered, prospective study focusing on this topic would be very beneficial, as surgeons could monitor patients' acute modifiable risk factors and potentially postpone surgery until their resolution, thereby assessing any impact on the risk of PJI.