Associations Between Wound Closure Method and Outcomes in the Treatment of Prosthetic Joint Infection

Eric M. Kiskaddon, Geoffrey Rohlfing, Kenan Alzouhayli, Kathryn Fideler[1], Andrew Richard Phillips, Matthew Pigott[2]
[1]Ohio State University, [2]The Ohio State University Wexner Medical Center

INTRODUCTION:

Prosthetic joint infection (PJI) continues to be a potentially devastating complication following total joint arthroplasty (TJA). Multiple studies have established the importance of an excellent wound closure, as well as type of material utilized for wound closure, for success following a primary TJA. To our knowledge, no study to date has investigated an association between wound closure and outcomes in the setting of revision for a PJI. The primary purpose of this retrospective study was to determine if there was an association between wound closure type and successful outcome in patients undergoing treatment for PJI.

METHODS:

Institutional review board approval was obtained for the present study. We reviewed all patients who had been treated for a PJI at our institution and identified a cohort of 301 patients who had undergone treatment for PJI between January 1, 2017 to June 1, 2021. In addition to demographic, surgical, and comorbid data, we also reviewed the type of closure utilized during the treatment of the PJI. Closure method was substratified into superficial and deep closure. Deep closure was further subdivided into the following categories: unknown (typically a plastic surgery closure), braided absorbable/barbed absorbable monofilament, absorbable monofilament, braided non-absorbable, braided non-absorbable and braided absorbable, braided absorbable and absorbable monofilament. The superficial closure was subdivided into the following categories: unknown (typically a plastic surgery closure), absorbable monofilament, barbed absorbable monofilament, staples, non-absorbable monofilament. Closures type was analyzed to determine any association between closure type and successful outcome. Success was defined as infection free survival with or without chronic antibiotic suppression. Data was analyzed utilizing SPSS and Chi-Square or Fisher's exact test were run for categorical variables, t-tests for parametric continuous variables, and Shapiro Wilk testing for non-parametric continuous variables. A p-value of <0.05 was considered statistically significant.

RESULTS:

In total, 301 patients were identified with a PJI and included in the study. Please reference Table 1 for patient and infectious characteristics found in the cohort. In the regression model, we found that for superficial closure, barbed absorbable monofilament suture was associated with increased risk of failure ($p=0.003$) and staples were associated with successful treatment ($p<0.001$). For deep closure, we found no significant association between closure type and successful treatment outcome. Unknown closures were also associated with a significantly higher percentage of treatment failure.

DISCUSSION AND CONCLUSION:

The ever-increasing demand for TJA will continue to have a downstream effect on the number of revisions done by orthopaedic surgeons for infection. Understanding variables associated with treatment success and failure will assist orthopaedic surgeons with treatment planning. In the present study we found a negative association between barbed absorbable monofilament suture for superficial closure and overall treatment success in this unique patient population. Further, staples were associated with successful treatment of PJI. Interestingly, unknown closure (plastic surgery) was associated with failure of treatment. However, at our institution the plastic surgery service is often only involved for flap assisted closure. One could reasonably assume that these issues are more related to complexity of the PJI and lower success rates with flap coverage than they are to actual closure method. Overall, the findings of this study seemingly support most methods of deep closure during the treatment of PJI, and non-barbed suture methods of superficial closure.

Age at Index		55.3 (11.7)
Age at PJI Diagnosis		61.1 (11.4)
Sex		166 female (55.1%)
BMI		34.5 (8.8)
Procedure		182 TKA (60.5%) vs 119 THA (39.5%)
Laterality		137 Left (45.5%)
Another Joint Present?		89 yes (29.6%)
Smoking status		
	Former	118 (39.2%)
	Current	50 (16.6%)
	Never	133 (44.2%)
Comorbidities		
	T2DM	84 (27.9%)
	CKD	22 (7.3%)
Chronicity		132 Acute (43.9%)
MSIS Major		
MSIS Minor Score		11 (5.9)
Serum WBC		10.5 (5.9)
ESR		63.3 (31.9)
CRP		119.6 (107.6)
Synovial Cell Count		70,906 (141,474)
% PMNs		85.9% (19.3)

Table 1. Patient and Infectious Characteristics