Time Since Primary Arthroplasty Predicts DAIR Outcomes for Periprosthetic Joint Infection of the Knee: Utility of Current Classification Systems

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INTRODUCTION:
Prosthetic joint infection (PJI) is a common cause of failure following total knee arthroplasty (TKA). While debridement, antibiotics, and implant retention (DAIR) offer a less invasive treatment option, its success varies based on infection timing and causative organisms. This study aimed to investigate outcomes of DAIR in a large multicenter cohort of TKA PJIs and assess the predictive utility of existing classification systems for early versus late infections.
METHODS: In a multicenter review over 23 years, 441 patients underwent DAIR for first episode PJI following primary TKA. Patient demographics, disease and surgical factors, treatment regime, and outcomes were identified. Success was defined as patients alive with no evidence of infection, not on long-term antibiotics, and retention of the original prosthesis without revision. Multivariate regression identified predictors of DAIR success, and the prognostic accuracy in outcomes using multiple classification systems (International Consensus Meeting (ICM), Coventry, and Auckland).
RESULTS: Patients were followed up for an average of 6.2 years. The overall success rate of DAIR was 51.5% and remained consistent over time (50.5% for the period 2001-2015, and 52.2% for 2016-2023). Success was higher in 'early' PJIs as defined by ICM (<90 days, adjusted odds ratio [AOR] 2.0, $p<0.01$), Coventry (<30 days, AOR 2.5, $p<0.01$), and Auckland (<1 year, AOR 2.2, $p<0.001$) classifications. Infections occurring more than one year after TKA had markedly lower success, particularly when caused by *Staphylococcus aureus* (20% vs 50% for other organisms, AOR 4.1, $p<0.001$). Subclassification of late infections into acute hematogenous vs chronic did not predict outcome.
DISCUSSION AND CONCLUSION: DAIR offers moderate success in early PJIs but has limited efficacy in late infections, especially those due to *S. aureus*. Time since primary TKA is a stronger predictor of DAIR success than current subclassifications of late PJI, highlighting the critical role of infection timing in surgical decision-making.