Debridement, Antibiotics, and Implant Retention (DAIR) within 48 Hours for Acute Knee Periprosthetic Joint Infection May Not Improve Success Rate

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INTRODUCTION: Periprosthetic joint infection (PJI) is a leading cause of failure after total knee arthroplasty (TKA). Debridement, antibiotics, and implant retention (DAIR) is widely utilized for acute PJI, yet reported success remains limited, with failure rates approaching 40–50%. While symptom duration influences outcomes, the optimal timing for surgical intervention relative to initial healthcare presentation or formal diagnosis remains undefined. Expert consensus supports urgent intervention, but high-level evidence guiding early versus delayed DAIR is sparse. This study evaluated the association between DAIR timing and treatment outcomes in acute TKA PJI.

METHODS: An IRB-approved retrospective cohort study included 166 patients (85 male patients, 81 female patients) who underwent DAIR for acute PJI between 2016 and 2022 across a regional health system. Patients were stratified into three groups by time from first healthcare contact and from formal diagnosis to DAIR (<24h, 24–48h, >48h). The primary outcome was treatment failure, defined as reoperation for PJI per MSIS Outcome Reporting Tool. Secondary outcomes included 90-day readmission, 90-day and 1-year mortality, chronic suppressive antibiotics, and adverse events. Demographics, comorbidities, labs, microbiology, and outcomes were analyzed using ANOVA, Chi-square tests, and multivariable logistic regression adjusting for age, diabetes, hemoglobin, and comorbidity index.

RESULTS: The mean follow-up was 3.7 years. Overall failure occurred in 40.4% of cases, with no significant differences by timing from presentation (<24h: 38.1%, 24–48h: 41.7%, >48h: 40.4%; P=0.97) or diagnosis (<24h: 40.9%, 24–48h: 43.6%, >48h: 37.7%; P=0.84). Time to DAIR was not associated with differences in readmission, chronic suppression, or adverse events. Notably, 90-day mortality was significantly higher in patients undergoing DAIR <24h from diagnosis (12.1%, P=0.001), possibly reflecting triage of higher-risk patients. Multivariate analysis identified older age, diabetes mellitus, and lower preoperative hemoglobin as independent predictors of mortality, readmission, and adverse events. Elevated C-reactive protein was not associated with failure (P>0.05).

DISCUSSION: Urgent DAIR within 48 hours of either presentation or diagnosis did not confer improved outcomes compared to later intervention, challenging the assumption that expedited debridement necessarily improves success. The observed excess early mortality in the <24h group likely reflects selection of sicker patients for emergent surgery rather than a causal effect of timing. These findings support brief delays to permit optimization of comorbidities and stabilization prior to surgery without sacrificing infection control.

SIGNIFICANCE/CLINICAL RELEVANCE: (1-2 sentences): For acute TKA PJI, DAIR should be considered an urgent procedure and short delays to allow medical optimization may be acceptable. Larger multicenter studies are warranted to validate timing thresholds and inform standardized guidelines.

Table 1: Outcomes by Time from First Contact with the Healthcare System or Time from Diagnosis with Acute Periprosthetic Joint infection.

Outcomes for Time from First Contact with the Healthcare System			
	< 24h (n = 21)	**24-48h (n = 36)**	**> 48h (n = 109)**	*P*-value
Overall failure, n (%)	8 (38.10)	15 (41.67)	44 (40.37)	0.97
One-year failure, n (%)	6 (28.57)	9 (25.00)	31 (28.44)	0.92
90-day readmit, n (%)	6 (28.57)	11 (30.56)	41 (37.61)	0.60
90-day mortality, n (%)	2 (9.52)	2 (5.56)	4 (3.67)	0.34
Chronic suppression, n (%)	5 (23.81)	18 (50.00)	41 (37.96)	0.14
Outcomes for Time from Diagnosis with Acute Periprosthetic Joint Infection			
	< 24h (n =66)	**24-48h (n =39)**	**> 48h (n =61)**	*P*-value
Overall failure, n (%)	27 (40.91)	17 (43.59)	23 (37.70)	0.84
One-year, n (%)	18 (27.27)	12 (30.77)	16 (26.23)	0.88
90-day readmit, n (%)	21 (31.82)	17 (43.59)	20 (32.79)	0.43
90-day mortality, n (%)	8 (12.12)	0 (0.00)	0 (0.00)	**0.001***
Chronic suppression, n (%)	22 (33.33)	20 (51.28)	22 (36.67)	0.17
*<24h significantly greater than 24-48h (p=0.024) and >48h (p=0.006)			