Impact of Intervention Timing on the Failure of DAIR in Acute Postoperative PJI

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INTRODUCTION

- Debridement, antibiotics, and implant retention (DAIR) is the leading treatment strategy for acute postoperative periprosthetic joint infection (PJI).
- The optimal therapeutic window remains debated: the 2025 International Consensus Meeting (ICM) supports DAIR within 6 weeks, while recent registry studies suggest the window may extend to 12 weeks.

Purpose: Evaluate the association between timing of DAIR and treatment failure following primary total hip (THA) and knee arthroplasty (TKA).

Hypothesis: Earlier DAIR would be associated with lower failure rates, with progressively increasing risk as time to intervention increases.

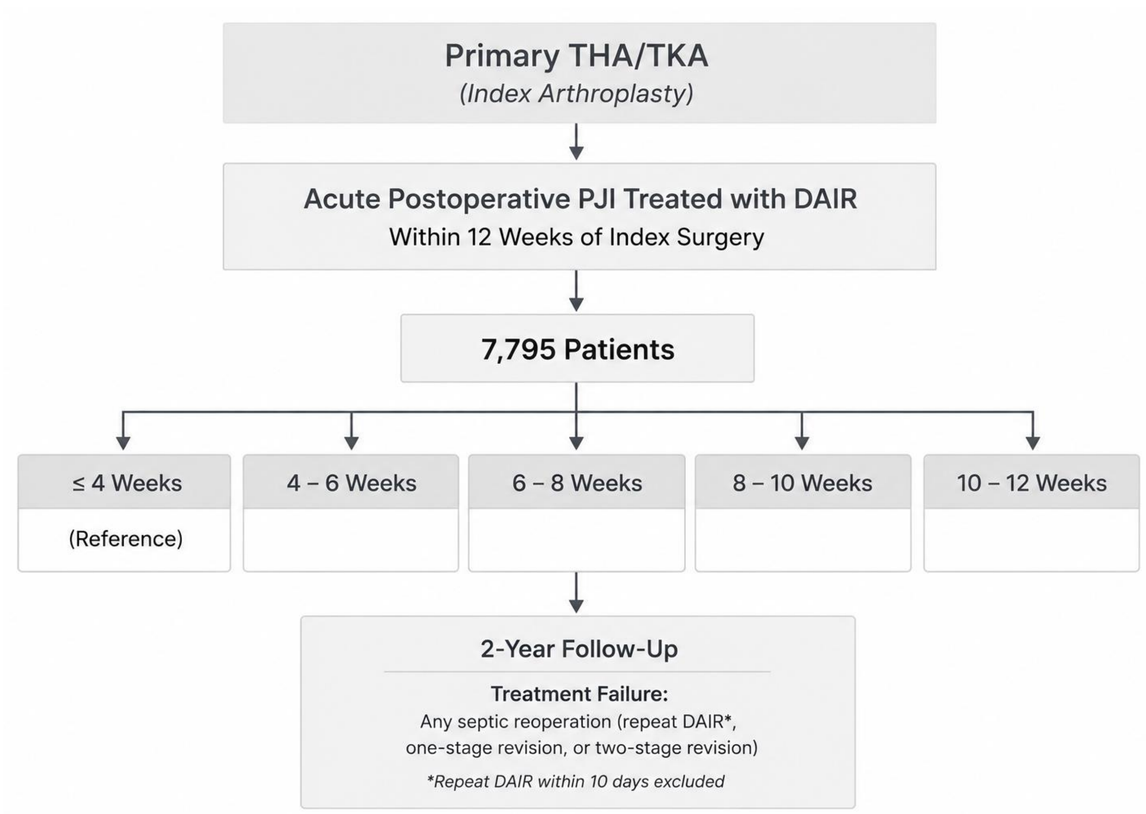
METHODS

- **Design:** Retrospective matched cohort study using a national Ortho Database (2010–2023).
- **Population:** Adults with acute postoperative PJI undergoing DAIR within **12 weeks** of primary THA or TKA.
- **Final Cohort: 7,795 DAIR procedures** with ≥2 years of follow-up.
- **Exposure:** Time from primary arthroplasty to DAIR, stratified into:
  - ≤4 weeks *(reference)*
  - 4–6 weeks
  - 6–8 weeks
  - 8–10 weeks
  - 10–12 weeks
- **Primary Outcomes:**
  - Treatment failure within 2 years, defined as subsequent septicreoperation with repeat DAIR, one- or two-stage revision.

Statistical Analysis: Multivariable logistic regression adjusted for demographic and clinical risk factors.

Threshold Analysis: Segmented (joinpoint) regression evaluated the timing at which failure risk accelerated.

Subgroup Analysis: THA and TKA evaluated independently.



RESULTS

- Failure remained similar between DAIR performed ≤4 weeks (**37.7%**) and 4–6 weeks (**40.1%, P=0.06**).
- Failure increased significantly thereafter:
  - **6–8 weeks:** 45.2%
  - **8–10 weeks:** 50.4%
  - **10–12 weeks:** 55.2%
- Adjusted odds of failure progressively increased after 6 weeks, reaching **aOR 2.12 (95% CI 1.73–2.58)** at 10–12 weeks.
- DAIR timing demonstrated a greater association with failure than the other patient-level factors included in the multivariable model.

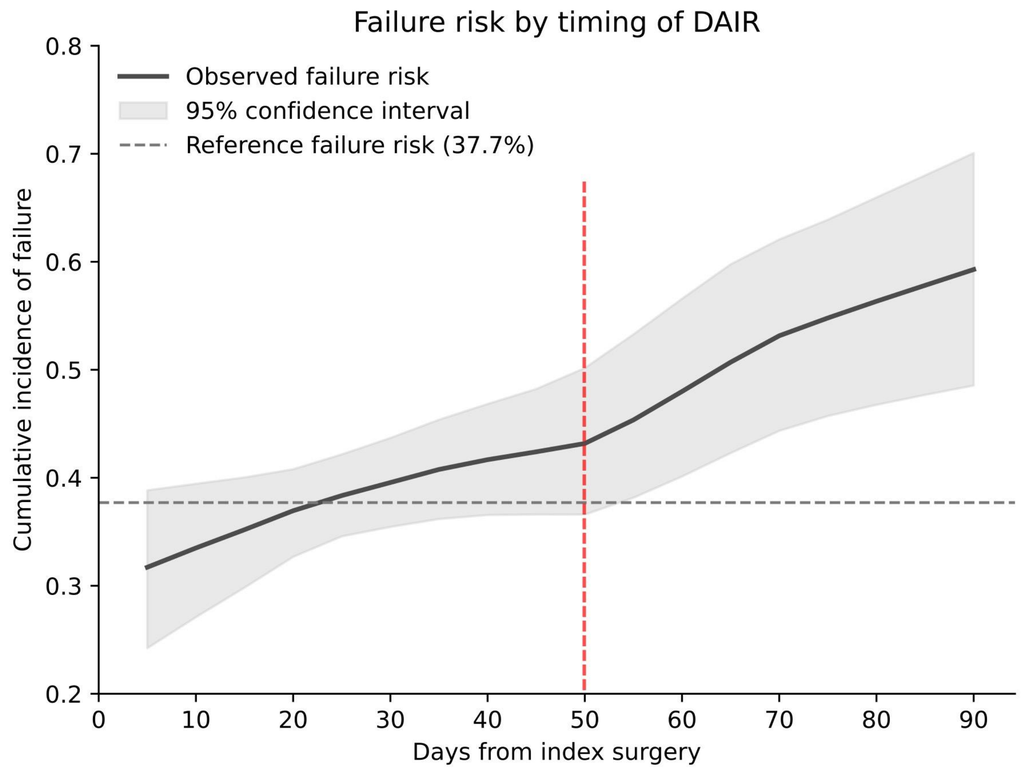
Table 1. Two-Year DAIR Failure by Timing of Intervention

DAIR Timing	Failure Rate	Adjusted OR (95% CI)
≤4 weeks	**37.7%**	Reference
4–6 weeks	**40.1%**	1.08 (0.94–1.25)
6–8 weeks	**45.2%***	1.35 (1.17–1.57)*
8–10 weeks	**50.4%***	1.73 (1.45–2.08)*
10–12 weeks	**55.2%***	2.12 (1.73–2.58)*

**P < 0.001 vs ≤4 weeks for failure rates; adjusted estimates as reported in the study.*

TIMING THRESHOLD

- Joinpoint regression identified an inflection point at approximately **7 weeks (50 days)** after primary arthroplasty.
- Before this threshold, failure risk increased gradually by **0.28 percentage points/day**.
- After approximately 7 weeks, the rate increased to **0.39 percentage points/day**.
- This inflection suggests a clinically meaningful transition to a **higher-risk period** for DAIR failure.



Conclusions

- DAIR outcomes for acute postoperative PJI are **time-dependent**.
- Failure remained relatively stable during the first **6 weeks** following primary arthroplasty.
- A clinically meaningful threshold occurred at approximately **7 weeks**, beyond which failure risk accelerated.
- The association between delayed DAIR and failure was **primarily driven by TKA**, while THA demonstrated comparatively modest changes.
- These findings are generally consistent with the **2025 ICM recommendation** supporting DAIR within 6 weeks.
- **Clinical implication:** DAIR should be preferentially considered within the early postoperative period, with caution when extending indications beyond approximately **7 weeks**.