

Periprosthetic Joint Infection Salvage: A 10-Year Multi-Institutional Analysis Comparing Above-Knee Amputation to Knee Fusion

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INTRODUCTION

- Periprosthetic joint infection (PJI) complicates roughly 1.5% of primary total knee arthroplasties (TKA)¹ and remains one of arthroplasty's most devastating outcomes.
- When debridement, antibiotics, and revision fail to eradicate infection, above-knee amputation (AKA) and knee fusion remain last-resort salvage procedures.
- Existing series are largely single-institution or predate 2016, missing a decade of change in technology, revision protocols, and infection prevention.
- Purpose:** To compare the incidence, patient characteristics, and outcomes of AKA versus knee fusion for TKA PJI using a large multi-institutional database (2015–2024).

METHODS

- Design:** Retrospective cohort study using the TriNetX Global Federated Network (150M+ patients, 100+ U.S. healthcare organizations).
- Cohorts:** Adults with primary TKA (2015-2024) who developed PJI (ICD-10 T84.50/53/54). Patients then stratified into AKA, knee fusion, and PJI-control groups.
- Excluded:** Fracture, malignancy, or lower-extremity infection within 1 month of index TKA, or pre-existing amputation.
- Matching:** Propensity score matching (greedy nearest-neighbor, caliper 0.1 SD) on age, sex, race, and comorbidities; balance = standardized mean difference (SMD) < 0.1.
- Outcomes:** Composite "major medical complications" (acute kidney injury [AKI], deep vein thrombosis [DVT], pulmonary embolism [PE], pneumonia, myocardial infarction [MI], surgical site infection, dehiscence/infection, sepsis) and all-cause mortality at 90 days, 1 year, and 5 years.

STUDY STRENGTHS

- Large contemporary AKA/fusion series (n = 7,234 TKA PJI patients)
- Multi-institutional, 10-year federated network spanning the modern technology/revision-protocol era
- Propensity score matching with rigorous covariate balance (SMD < 0.1) for all pairwise comparisons

MATCHING

- 231 matched pairs: AKA vs. control
- 93 matched pairs: fusion vs. control
- 87 matched pairs: AKA vs. fusion

RESULTS: RISK FACTOR PROFILE

AKA and knee fusion were driven by distinct comorbidity profiles relative to matched PJI controls

Risk factor	AKA vs. control	Fusion vs. control
Peripheral vascular disease	32.9% vs 14.8% SMD 0.44	26.9% vs 14.8% SMD 0.30
Nicotine dependence	40.7% vs 22.1% SMD 0.42	26.6% vs 22.1% SMD 0.11 (ns)
Opioid-related disorders	23.8% vs 9.7% SMD 0.39	n<10, not calculable
Atherosclerosis	32.0% vs 16.1% SMD 0.39	26.8% vs 16.1% SMD 0.27
Obesity	65.8% vs 64.2% SMD 0.06 (ns)	76.9% vs 64.2% SMD 0.31
Black/African American race	13.9% vs 13.7% SMD 0.01 (ns)	24.4% vs 13.7% SMD 0.27

(ns) = non-significant finding (p>0.05)

RESULTS: COMPLICATIONS & MORTALITY

Both salvage procedures carried significantly higher major medical complication risk than matched PJI controls (odds ratio, OR):

Salvage procedure vs. matched control (OR)	90 Days	1 Year	5 Years
AKA	1.88	3.08*	3.23*
Knee fusion	2.21*	2.03*	2.02*

*p < 0.05 vs. matched control

5-year all-cause mortality vs. matched control: AKA 13.6% vs 10.2% (OR 1.39; p = 0.37). Fusion mortality could not be calculated (event count < 10).

AKA vs. knee fusion: no significant difference in complications at 90-days, 1-year, or 5-years. No significant difference in 5-year mortality (18.0% vs 12.4%; p = 0.30)

DISCUSSION

- Peripheral vascular disease, nicotine dependence, and opioid-related disorders were most strongly associated with AKA, consistent with impaired vascular supply, poor tissue healing, and immune compromise limiting infection eradication.²
- Obesity and Black/African American race were most associated with knee fusion, while nicotine dependence was not. The bony-union requirement of fusion may steer smokers toward AKA instead.
- The racial disparity in fusion utilization may reflect unmeasured socioeconomic status or comorbidity burden.
- Both procedures carried significantly higher complication rates than controls, yet showed no significant AKA-vs-fusion difference, suggesting a comparable overall morbidity burden once a salvage strategy is selected.

CONCLUSION

AKA and knee fusion are performed in distinct patient populations and carry significantly elevated complication rates versus matched PJI controls, though outcomes between the two salvage procedures themselves were comparable. Optimizing modifiable risk factors, particularly nicotine dependence and opioid-related disorders, may reduce progression to salvage surgery.

LIMITATIONS

- ICD-10/CPT-based identification is subject to coding inaccuracy
- TriNetX predominantly captures academic centers, limiting community generalizability
- No data on infecting organism, prior revision count, or antibiotic resistance
- Functional and patient-reported outcomes were not captured

KEY TAKEAWAY

AKA and knee fusion are performed in distinct, high-risk patient populations and carry comparably elevated complication burdens versus matched controls. Optimizing modifiable risk factors, especially nicotine dependence and opioid-related disorders, may reduce progression to salvage surgery.

REFERENCES

- McMaster Arthroplasty Collaborative (MAC). Incidence and Predictors of Prosthetic Joint Infection Following Primary Total Knee Arthroplasty: A 15-Year Population-Based Cohort Study. *J Arthroplasty*. 2022;37(2):367-372.e1. doi:10.1016/j.arth.2021.10.006.
- Mittal MM, Acevedo KV, Mounasamy V, Wukich DK, Modrall JG, Sambandam S. Assessing the Impact of Peripheral Artery Disease on Total Knee Arthroplasty Outcomes. *J Arthroplasty*. 2025;40(6):1560-1566.e3. doi:10.1016/j.arth.2024.11.047