

Time-dependent mortality after single-stage revision for periprosthetic joint infection under broad indications at a specialized center

A retrospective cohort study



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TAKE-HOME

Excess mortality was concentrated in the early years and attenuated over time.

1,011

revision procedures

498 / 513

PJI / aseptic failure

7.8 years

median follow-up

71 (7.0%)

all-cause deaths

01 BACKGROUND & OBJECTIVE

Clinical problem: PJI may carry systemic mortality beyond joint failure.

Evidence gap: Long-term mortality after single-stage revision under broad indications remains incompletely characterized.

Objective: Benchmark all-cause mortality against aseptic failure (AF) and determine how the relative hazard changes over time.

02 COHORT & TREATMENT PATHWAY

Retrospective specialized-center cohort, 2009–2023; adult hip or knee revisions.

Broad-indication single-stage revision with standardized IV and intra-articular antibiotics for PJI.

AF served as the clinical comparator; primary endpoint was all-cause mortality.

03 STUDY FLOW

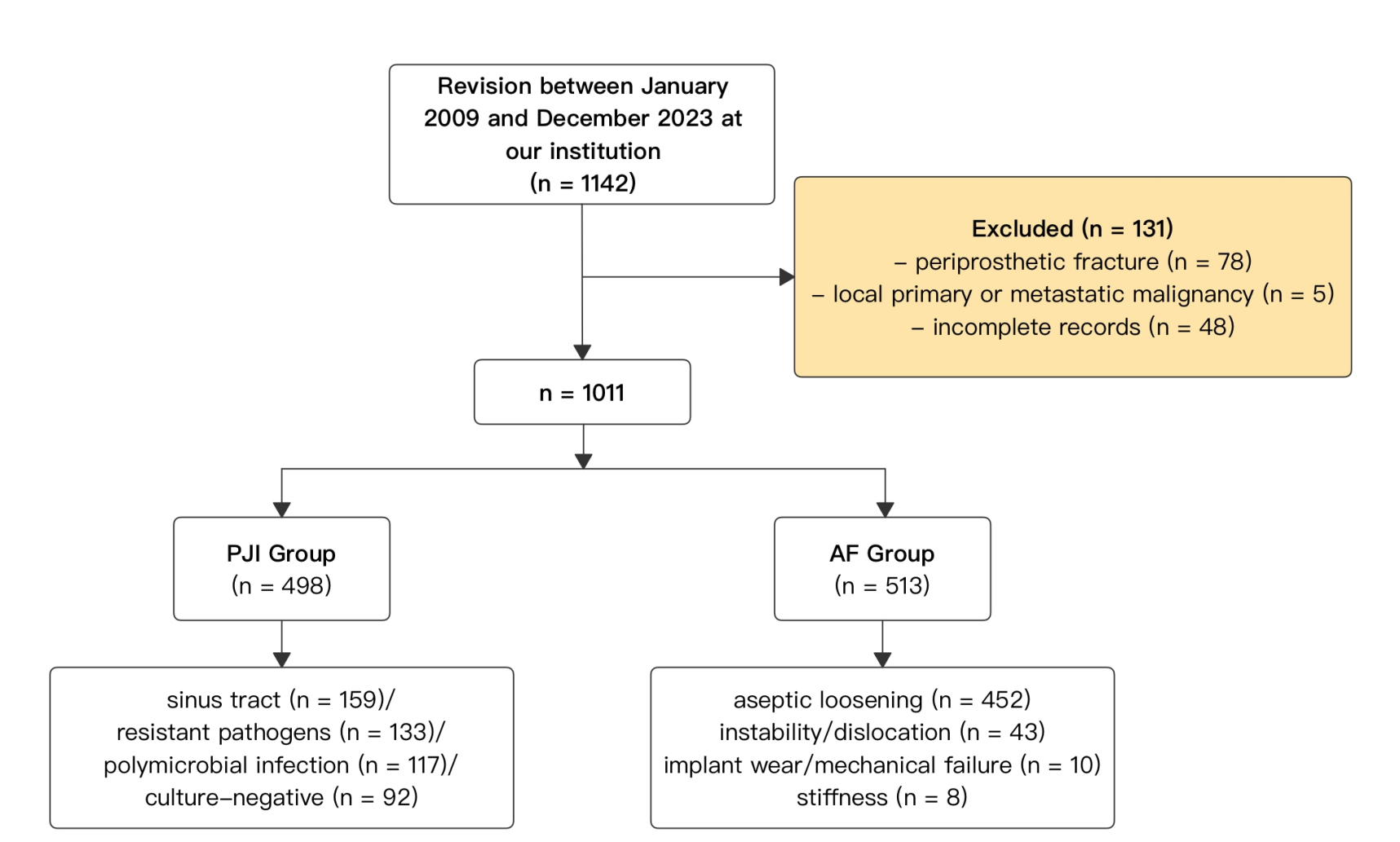


Figure 1. Consecutive eligible revisions after prespecified exclusions.

04 ANALYTIC STRATEGY

Survival: Kaplan–Meier estimates and log-rank comparison.

Time dependence: extended Cox model with a PJI × log(time) interaction.

Phase shifts: segmented regression of mortality incidence over follow-up.

Confounding: multivariable adjustment and propensity-score matching (PSM).

Recurrence: modeled as a time-dependent exposure in the PJI cohort.

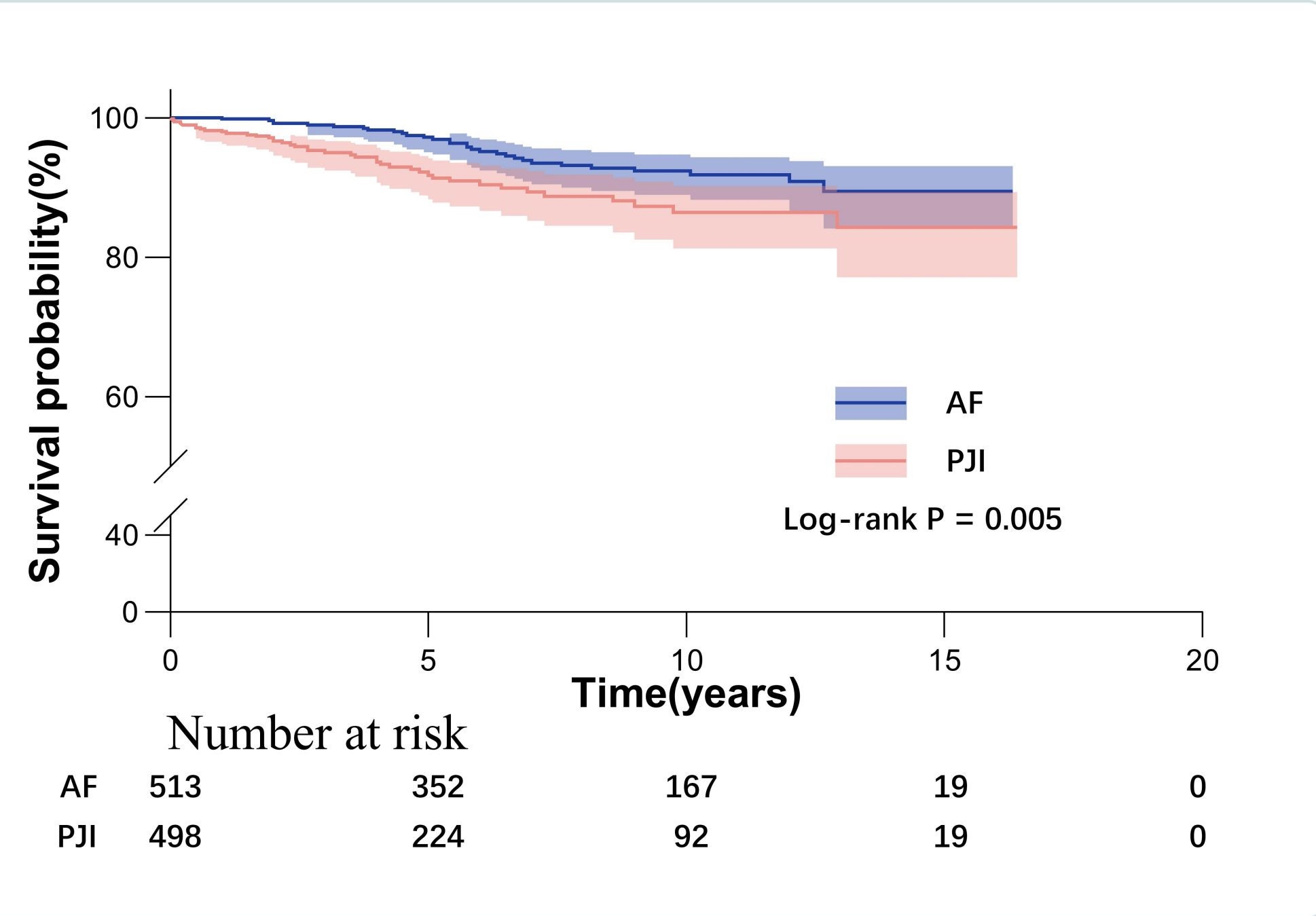
INTERPRETATION FRAME

Unmatched survival curves describe association in the full cohort.

PSM estimates test whether the difference persists after balancing baseline case mix.

No two-stage comparator was included.

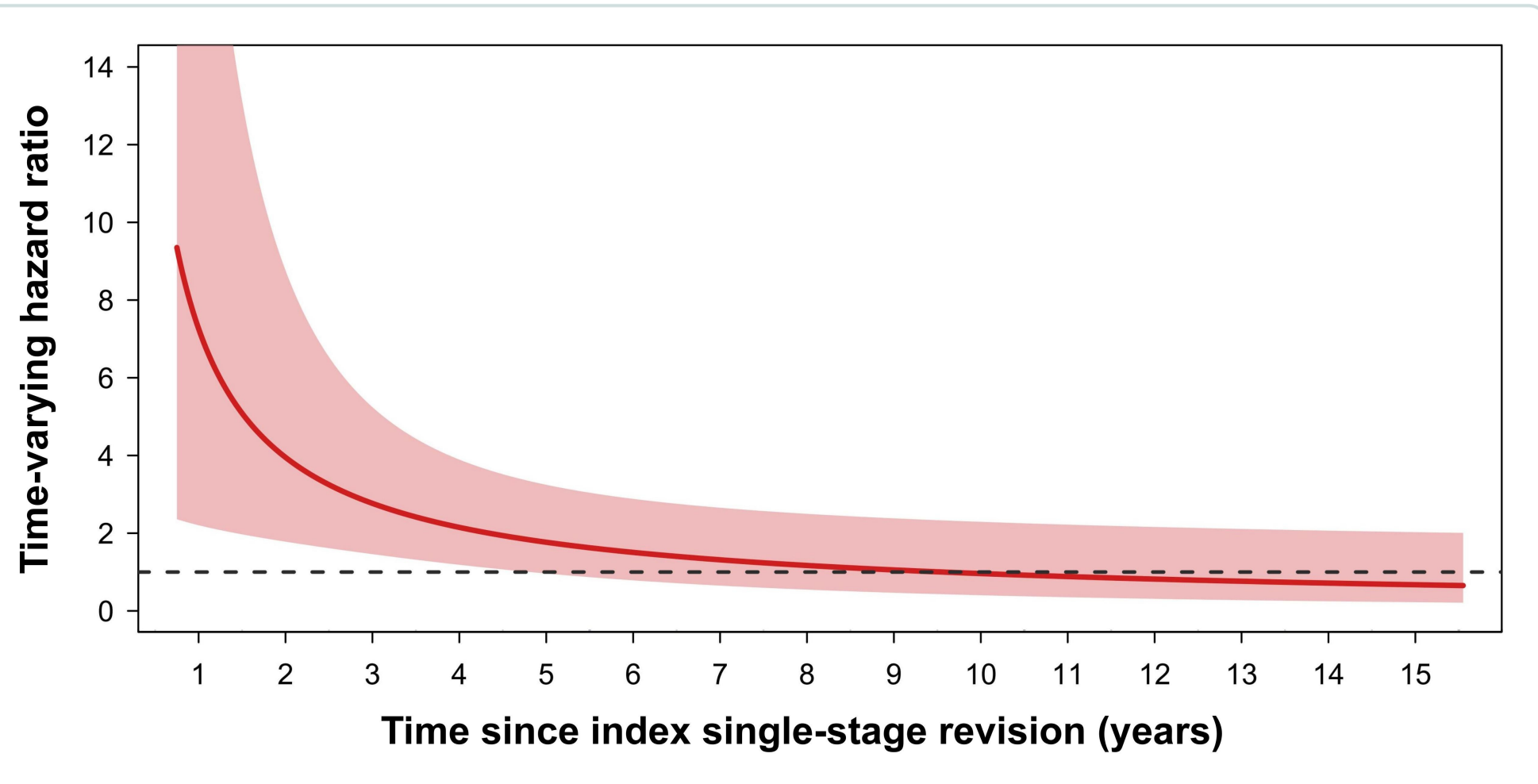
05 UNADJUSTED SURVIVAL



1 year 98.0% vs 99.8% · 5 years 91.8% vs 97.2% · 10 years 86.4% vs 92.4%

Log-rank p = .005 | PJI vs AF

06 TIME-VARYING ADJUSTED HAZARD



1 year: HR 7.26 (2.21–23.93) · 4 years: 2.15 (1.19–3.89) · 5 years: 1.77 (0.96–3.25)

Adjusted for age, sex, ASA class, and joint; relative risk approached AF around 4–5 years.

07 WHAT CHANGED AFTER ADJUSTMENT?

PROPENSITY-SCORE MATCHED SENSITIVITY ANALYSIS

294 matched pairs · HR 1.14 (0.61–2.11)

p = .689 → no statistically significant residual difference

INDEPENDENT RISK MARKERS WITHIN PJI

Age ≥65 years

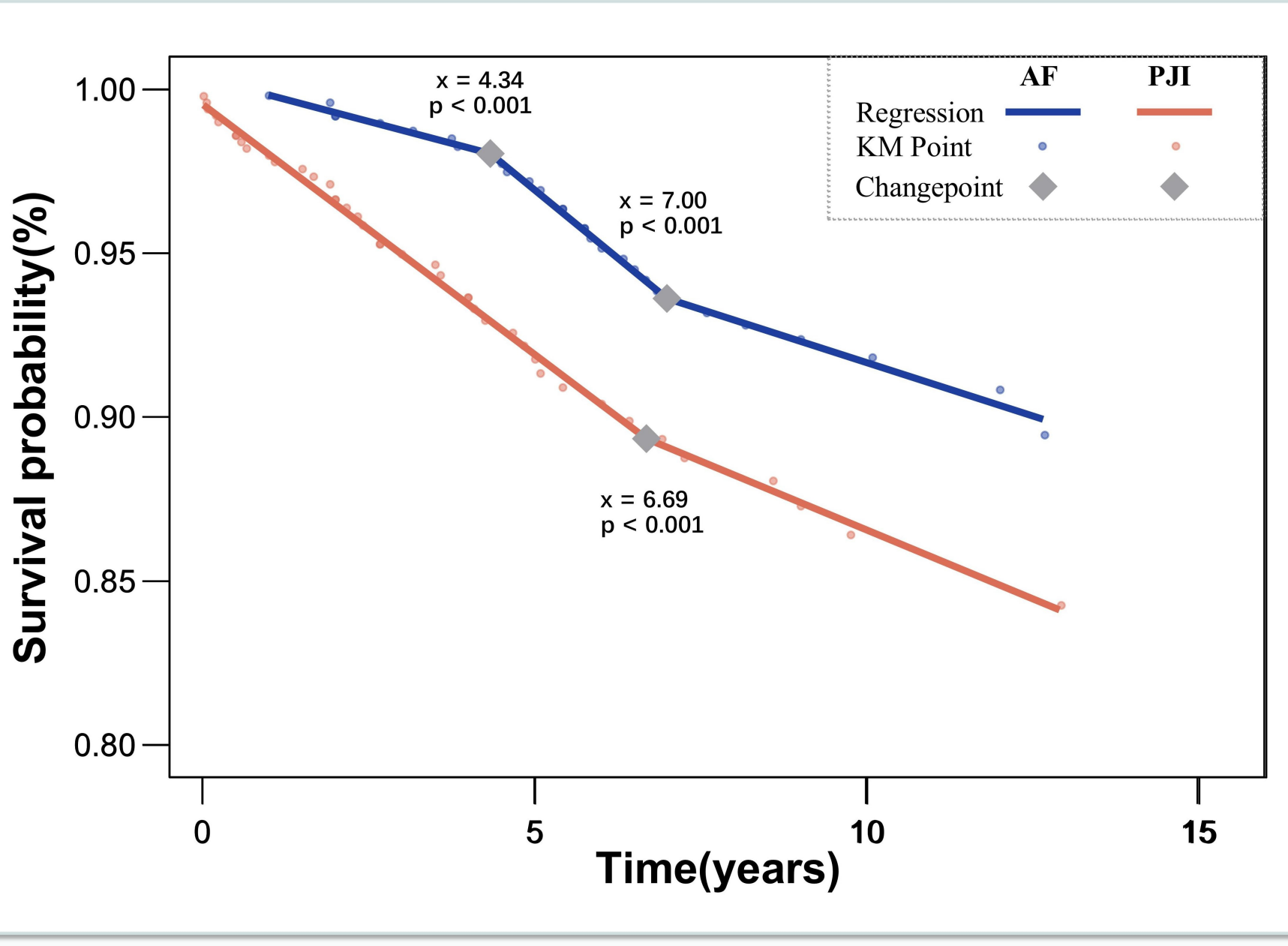
aHR 2.46 (1.05–5.73)
p = .038

ASA class ≥III

aHR 2.63 (1.30–5.31)
p = .007

The unmatched difference was largely attenuated after balancing measured baseline characteristics. This supports risk-adapted care, not a causal mortality penalty attributable to the surgical strategy itself.

08 MORTALITY PHASE SHIFTS



PJI changepoint: 6.7 years (95% CI 6.2–7.2)

16.3 → 8.8 deaths / 1,000 person-years
IRR 0.54; p = .160

09 RECURRENCE IN CONTEXT

Unadjusted survival differed by recurrence status (p = .011).

After time-dependent adjustment:
aHR 1.92; p = .095

Recurrence was not an independently significant mortality predictor in the adjusted model.

CONCLUSION

Single-stage revision under broad indications achieved favorable long-term survival in a specialized center.

The excess hazard was greatest early and attenuated over time.

Older age and higher ASA class identified patients needing intensified perioperative optimization and surveillance.

Centralized multidisciplinary care may be most consequential during the early high-risk window.

CLINICAL IMPLICATIONS & LIMITATIONS

Prioritize perioperative medical optimization and risk-adapted follow-up during the first years after revision.

Interpret findings as observational associations from a specialized-center cohort.

Residual confounding remains possible; there was no two-stage comparator.

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