Five-year outcomes comparing short and long stems used with metaphyseal cones in revision total knee arthroplasty

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INTRODUCTION: Highly porous titanium metaphyseal cones are widely used to manage bone loss in revision total knee arthroplasty (rTKA). When implanting a cone, either a short or long stem is typically used to augment fixation and offload stresses [1]. This study reports mid-term outcomes comparing short and long stems used with metaphyseal cones.

METHODS: A retrospective analysis was conducted on 177 rTKA cases using metaphyseal cones with either short stems (50–75 mm, 122 cases) or long stems (≥100 mm, 55 cases). Cases with mixed stem lengths were excluded. Kaplan–Meier survivorship was evaluated at 5 years, and patient-reported outcome measures (PROMs) were assessed at 2 years. PROMs included the 2011 Knee Society Score (KSS) objective, function, and satisfaction scores; EuroQol five-dimension scale (EQ-5D); and Short Form-12 Physical Component Summary (SF-12 PCS). A total of 43 revision TKA cases were analyzed at a minimum 5-year follow-up: 21 cases with short stems and 22 cases with long stems. Statistical comparisons used two-sided t-tests with significance level set at $\alpha=0.05$.

RESULTS: Five-year revision-free survivorship was excellent for both cohorts: 98.2% (95% CI, 92.9–99.5) for short stems and 96.3% (95% CI, 76.5–99.5) for long stems. Four revisions occurred: one femoral loosening, three deep infections (long stem: 1 loosening, 1 infection; short stem: 2 infections). PROMs at 2 years were similar between groups (KSS objective: short stem 88.8±10.8 vs. long stem 87.9±9.6; KSS function: 58.2±22.3 vs. 59.6±21.6; KSS Satisfaction: 27.4±11.1 vs. 26.6±9.4; EQ-5D: 0.79±0.18 vs. 0.79±0.19; SF-12 PCS: 37.7±12.1 vs. 40.3±11.3; all p > 0.05). Cohorts were similar in BMI (32.2 ± 5.2 vs. 31.5 ± 5.5 kg/m²; p > 0.05) and sex distribution (men: 35.3% vs. 38.2%; p > 0.05), but the short stem group was younger (65.8 ± 8.7 vs. 69.0 ± 9.4 years; p = 0.03). Tibial bone loss differed significantly (p <0.001), with short stems more frequently used for AORI Type 2A defects.

DICUSSION: At mid-term follow-up, metaphyseal cones combined with either short or long stems demonstrated excellent survivorship and sustained functional improvement, with no significant differences in PROMs at 2 years. These findings suggest that stem length can be selected based on patient anatomy and bone loss without compromising 5-year outcomes.

SIGNIFICANCE/CLINICAL RELEVANCE: These findings support the use of short stems when clinically appropriate, potentially reducing surgical complexity and preserving bone stock without sacrificing implant stability at 5 years.

REFERENCES: [1] Piuzzi NS, Hampp E, Shi S, et al. Short-term comparison of survivorship and functional outcomes for metaphyseal cones with short and long stems in revision total knee arthroplasty. J Knee Surg. 2024;37. doi:10.1055/a-2315-7778.
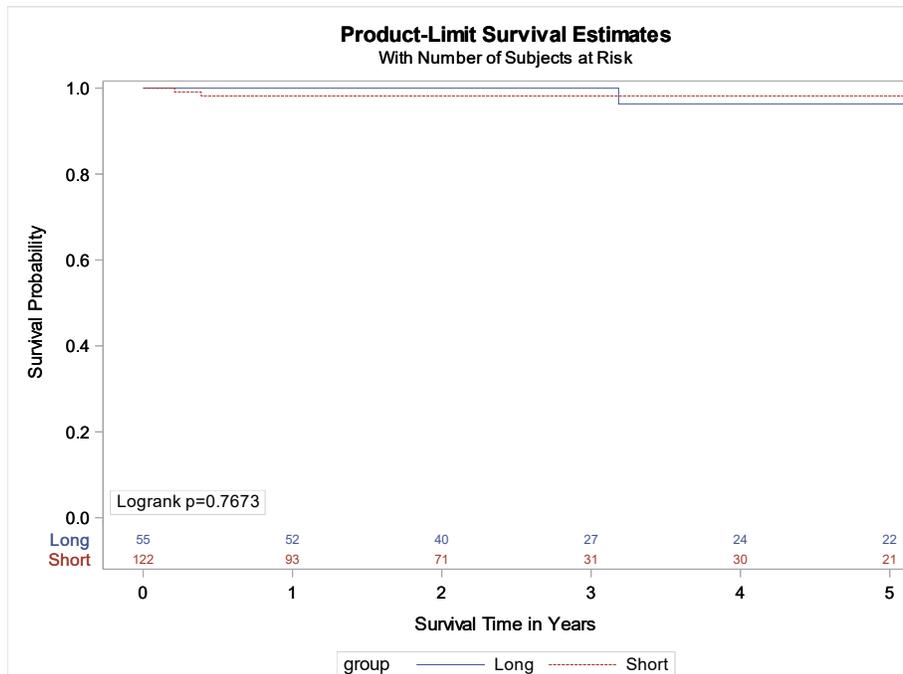

Figure 1. Kaplan-Meier survival of femoral or tibia components or cone(s).