Comparing Early Outcomes of Antibacterial-coated vs Uncoated Endoprostheses: A Single Institution's Experience with Nanocept Technology

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Significance & Hypothesis: Periprosthetic infection remains a significant source of morbidity and economic burden in lower extremity endoprosthetic reconstruction despite advances in perioperative care. Antibacterial implant coatings like Onkos Nanocept technology were developed to reduce intraoperative contamination; however, clinical data supporting effectiveness remains limited. This study aimed to compare early clinical outcomes between Nanocept-coated and uncoated lower extremity endoprostheses. We hypothesized that Nanocept-coated implants would demonstrate lower rates of infection and revision.

Innovation: The present study represents one of the first clinical comparisons of antibacterial-coated versus uncoated lower extremity endoprostheses, providing early patient outcomes and evidence of potential clinical benefit.

Materials & Methods: A retrospective cohort study was performed for all patients undergoing total femur, proximal femur, distal femur, or proximal tibia reconstruction at a single institution between December 2022 and October 2025. Patients were stratified based on the use of Nanocept-coated vs uncoated implants. Demographics, oncologic characteristics, and treatment variables were collected. Primary outcomes included periprosthetic infection and repeat surgery. Secondary outcomes include wound complications and implant survivorship. Comparative analyses were performed using Fisher's Exact Test, with significance set at $p < 0.05$.

Results: A total of 52 patients were included, with 25 receiving Nanocept-coated implants (13 oncology, 12 revision arthroplasty) and 27 receiving uncoated implants (16 oncology, 9 revision arthroplasty, 2 primary arthroplasty). On average, 17% of the implant surface area was covered in Nanocept (range: 7% - 39%). At a mean follow-up of 115 days, the Nanocept cohort demonstrated an infection rate of 8% (2/25) compared to 30% (8/27) in the uncoated group, though this did not reach statistical significance ($p = 0.143$). The oncology patients within the Nanocept cohort had a 0% infection rate. Re-operation rates were 16% (4/25) versus 22% (6/27) for Nanocept and uncoated implants, respectively. 8% (2/25) Nanocept and 7% (2/27) uncoated patients experienced wound complications. Implant survival at latest follow-up was 100% in the Nanocept group compared to 89% (24/27) in the uncoated group.

Discussion and Impact: Nanocept-coated endoprostheses demonstrated lower early infection rates compared to uncoated implants, with similar rates of reoperation and wound complications in this cohort. While limited by short-term follow-up and sample size, these findings suggest that antibacterial implant coatings may offer a clinically meaningful strategy to reduce infectious complications in high-risk

orthopaedic oncology reconstructions. Additional studies with larger cohorts and longer follow-up are warranted to confirm these findings and define the role of this technology in clinical practice.