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# Functional outcomes of antibiotic-loaded intramedullary nails versus antibiotic-loaded beads in the management of chronic osteomyelitis of the Tibia: a comparative study

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## ABSTRACT

**Background and Objective:** Chronic osteomyelitis of the tibia is a persistent bone infection that, if inadequately managed, can cause significant disability. Antibiotic-loaded intramedullary nails (ALIN) and antibiotic-loaded beads (ALB) are commonly used for infection control and limb preservation, yet their comparative effectiveness remains unclear. This study aimed to compare functional outcomes, pain control, reinfection rates, quality of life (QoL), and complications between ALIN and ALB in managing chronic tibial osteomyelitis in local patients.

**Methods:** In this randomized comparative study, 60 patients with chronic tibial osteomyelitis were allocated into the Nail Group ( $n = 30$ ) receiving ALIN or the Bead Group ( $n = 30$ ) receiving ALB. Pain was assessed using the Visual Analog Scale (VAS), limb function via the American Orthopaedic Foot and Ankle Society (AOFAS) score, and QoL with the SF-36 questionnaire. Reinfection was assessed clinically, and complications were recorded. Follow-up was conducted over 12 months. Independent  $t$ -test was used for continuous variables and chi-square test for categorical variables, with  $p < 0.05$  considered statistically significant.

**Results:** The Nail Group showed superior outcomes in pain reduction (VAS:  $1.5 \pm 0.4$  vs.  $2.0 \pm 0.5$ ;  $p < 0.05$ ), functional status (AOFAS:  $85 \pm 6$  vs.  $78 \pm 7$ ;  $p < 0.05$ ), and QoL (SF-36:  $72 \pm 5$  vs.  $65 \pm 6$ ;  $p < 0.05$ ). Reinfection rates were not significantly different (27% vs. 31%;  $p > 0.05$ ). Complications were fewer in the Nail Group, with fewer nail failures compared to bead migration in the Bead Group.

**Conclusion:** Antibiotic-loaded intramedullary nails offer better pain relief, functional recovery, and QoL than antibiotic-loaded beads in chronic tibial osteomyelitis, without increasing reinfection rates. These findings support ALIN as a preferred option in suitable patients.

**Keywords:** Chronic osteomyelitis, antibiotic-loaded intramedullary nails, antibiotic-loaded beads, quality of life.

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