

Intramedullary Nail-Guided Correction of Lower Extremity Long Bone Deformity

Megan Lanelle Anderson¹, Austen Thompson, Ankur Khanna, Brandon J Yuan, Krystin Hidden, Jennifer Tangtiphaiboontana, William Wood Cross, Stephen A Sems

¹Department of Orthopedic Surgery

INTRODUCTION: Limb deformities of the lower extremity are frequently managed with gradual correction using external fixators. Some authors have described utilizing computer-assisted hexapod external fixators for precise intraoperative deformity correction (DC). However, external fixator correction is both costly and time intensive, and intramedullary nail-guided correction (IMNG) may be an acceptable alternative. The purpose of this study was to assess the efficacy of IMNG as a non-inferior cost-effective alternative approach to lower extremity long bone DC.

METHODS: All adult patients with femoral and/or tibial deformities treated with IMNG correction and dome or standard wedge osteotomy between 2006 and 2022 were reviewed, and patients with less than 2 years of follow-up were excluded. 16 IMNG deformity correction (DC) procedures performed on 10 patients were included (mean age 24.6 years; 90% female; mean BMI 34.5 kg/m²). Pre- and postoperative mechanical axis deviation (MAD) and joint angles, as well as complications and radiographic outcomes, were recorded.

RESULTS: Six (60%) patients had a history of metabolic bone disease, two (20%) patients had a history of congenital deformity or childhood growth disturbance, and eight (80%) patients had undergone prior corrective surgery at the site of deformity. Eight (50%) IMNG procedures were performed for tibial deformities, and eight (50%) IMNG procedures were performed for femoral deformities. All patients were followed until clinical and radiographic union, with a mean follow-up of 62 (29-111) months. Mean MAD was corrected from 56.6 ± 41.1 mm preoperatively to 10.4 ± 4.7 mm from targeted MAD. Complications arose after 4 (25%) procedures, including symptomatic implants and subsequent hardware removal in 3 cases and delayed healing in 1 case. There were no cases of neurologic or vascular injury with the IMNG technique.

DISCUSSION AND CONCLUSION: IMNG correction is an effective and cost-conscious technique to correct complex long bone deformities of the femur and tibia that may be accompanied by a relatively lower rate of hardware removal and soft tissue complications compared to other DC techniques.