Correction of Femoral Rotational Malalignment With Intramedullary Nailing: A Retrospective Review of PROMs and Complications

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INTRODUCTION:
Whether congenital or acquired, femoral rotational malalignment can result in significant functional limitations, pain, and gait abnormalities, even when these alterations may appear subtle. Surgical correction using intramedullary nailing (IMN) offers a biomechanically advantageous and minimally invasive approach that supports early weight-bearing and with reduced complication rates. Despite its growing adoption, there is limited data evaluating the clinical outcomes and safety of IMN specifically for isolated rotational deformity correction. This study aims to assess patient-reported outcomes and complication rates following IMN for femoral rotational malalignment.
METHODS:
We conducted a retrospective review of patients who underwent acute femoral rotational deformity correction using an intramedullary nail (IMN) between April 2016 and April 2024, with a minimum follow-up of one year. Patients treated with lengthening nails were excluded. Femoral torsion was measured preoperatively using computed tomography (CT) scans. Patient-reported outcome measures (PROMs), including the Limb Deformity-modified Scoliosis Research Society (LD-SRS) questionnaire and the Patient-Reported Outcomes Measurement Information System (PROMIS), were collected both pre- and post-operatively to assess functional improvement. Complications and unplanned reoperations were recorded to evaluate the safety profile of the procedure.
RESULTS:
We evaluated 194 femurs from 135 patients who underwent femoral deformity correction with IMN. Of these, 154 femurs had isolated rotational deformities and were included in this analysis. The average patient age was 27 years, with 61.7% identifying as female. The majority of deformities were congenital in origin (136 femurs, 88.3%), while post-traumatic cases accounted for 14 femurs (9.1%). Sixty-two femurs were associated with patients presenting with tetratorsional malalignment.
Patients presented with an average of 35.6° ± 8.7° of femoral anteversion or 7.5° ± 11.5° of retroversion. The mean correction achieved was 20.7° ± 6.1° in cases of anteversion and 21.0° ± 6.3° in retroversion. Across all PROM domains, improvements were observed, with self-image showing statistically significant improvement (LD-SRS score: 2.9 ± 0.8 preoperatively vs. 3.5 ± 0.6 postoperatively, $p = 0.002$).
Regarding complications, seven patients (4.5%) developed infections. Five of these resolved with oral antibiotics alone, while two (1.3%) required surgical irrigation and debridement. Delayed union was observed in five patients (3.2%), all of whom ultimately achieved healing following intervention with either bone marrow aspirate concentrate (BMAC) injection or exchange nailing. Despite large rotational corrections in some patients, very few patients had nerve related symptoms that required intervention (3.2%) and none suffered a permanent injury.
DISCUSSION AND CONCLUSION:
Intramedullary nailing is a safe method for correcting isolated femoral rotational deformities with a low complication rate.