

Femoral Lengthening with an Intramedullary Telescopic Nail: Does Lengthening Along the Anatomic Axis Create Malalignment?

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Purpose: The purpose of the study was to see whether lengthening over the anatomic axis of the femur induces malalignment of the lower extremity. The development of new intramedullary lengthening devices makes this an important question to consider.

Methods: Twenty-four patients (27 femora) underwent isolated femoral lengthening with the intramedullary skeletal kinetic distractor (ISKD). The age of the patients ranged from 16 to 57 years, and three patients underwent bilateral lengthenings. We excluded patients who underwent simultaneous realignment procedures of the tibia/femur. The amount lengthened ranged from 1.5 to 8.0 cm (average, 4.4 cm). Preoperative, immediate postoperative, and 6-month postoperative radiographs were used to measure the alignment of the lower extremity. We measured the mechanical axis deviation (MAD), the anatomic-mechanical angle (AMA), and the amount of length obtained.

Results: Femoral ISKDs were inserted through the piriform fossa in 21 femora, and tibial ISKDs were inserted through the greater trochanter in six femora. On average, the level of the osteotomy was 5.5 cm distal to the lesser trochanter (range, 3.3 to 8.9 cm). Ten limbs experienced no change of the MAD (no change was defined as an overall change of less than 2 mm). Sixteen limbs experienced a lateral shift of the MAD (average change, 1.6 mm/cm of lengthening; range, 0.5–2.8 mm/cm of lengthening). The one remaining limb experienced a medial shift of the MAD (1.4 mm/cm of lengthening).

Conclusions: Lengthening with an intramedullary telescopic nail along the anatomic axis can result in significant changes to the MAD. Lateral shift of the mechanical axis occurs when the mechanical and anatomic axes are convergent distally before lengthening. Medial shift of the mechanical axis occurs when the mechanical and anatomic axes are divergent distally before lengthening.

Significance: The potential for the MAD to change should be taken into account when planning femoral lengthening of a substantial amount, especially for cases in which lateral MAD is already present.