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Sagittal alignment may not correlate with the range of motion in ankle arthritis and total ankle replacement

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Introduction: Improving range of motion is a key objective in total ankle replacement, yet factors influencing postoperative mobility remain unclear. As ankle motion occurs mainly in the sagittal plane, this study evaluated the relationship between sagittal tibiotalar alignment and pre and postoperative range of motion. We hypothesized that sagittal alignment parameters would correlate with ankle mobility.

Methods: We conducted a retrospective review of prospectively collected data from primary ankle replacements performed between March 2019 and April 2022 with pre- and postoperative weight-bearing radiographs. Ankle and global range of motion were measured using validated techniques. Sagittal alignment was assessed by two observers using three parameters: pre- and postoperative sagittal tibiotalar ratio, anteroposterior offset ratio, and postoperative tibial implant sagittal slope. Sixty-one ankles were analyzed. Pearson correlation coefficients were used to evaluate associations between alignment and range of motion, with values below 0.4 considered weak. Interobserver reliability was assessed with intraclass correlation coefficients.

Results: Median preoperative sagittal tibiotalar ratio was 36.5, and postoperative was 35.9, indicating minimal change. Mean tibial implant sagittal slope was 88.5°, with limited variation. No moderate or strong correlations were found between sagittal alignment measures and range of motion. Weak negative correlations were identified between preoperative tibiotalar ratio and plantarflexion offset, and between offset ratio and postoperative dorsiflexion and total range of motion, suggesting that anterior talar position may slightly limit mobility.

Conclusion: Overall, sagittal alignment showed weak or no meaningful association with range of motion in this cohort.

Keywords: Arthroplasty, replacement, ankle; Ankle joint; Arthritis.

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