

## **Stiffness After Total Knee Arthroplasty: Is It a Result of Spinal Deformity?**

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**Introduction:** There are no studies to date analyzing the effect of spinal malalignment on outcomes of total knee arthroplasty (TKA). Knee flexion is a well-described lower extremity compensatory mechanism for maintaining sagittal balance with increasing spinal deformity. The purpose of this study was to determine whether a subset of patients with poor range of motion (ROM) after TKA have unrecognized spinal deformity, predisposing them to knee flexion contractures and stiffness.

**Methods:** We retrospectively evaluated a consecutive series of patients who underwent manipulation under anesthesia (MUA) for poor ROM after TKA. Using standing full-length biplanar images, knee alignment and spinopelvic parameters were measured. Patients were stratified by pelvic incidence-lumbar lordosis (PI-LL) as a measure of spinal sagittal alignment with a mismatch  $>10$  degrees defined as abnormal, and we calculated the incidence of sagittal spinal deformity.

**Results:** 138 patients were included for analysis. Average time to MUA was  $10\pm 5$  weeks (range: 5-42). Average ROM before MUA was extension 2 degrees (range: -10-20) and flexion 82 (range: 35-125). All patients had a postoperative mechanical axis within  $\pm 3$  degrees of neutral. 113 patients (82%) had a PI-LL mismatch of greater than 10 degrees (average 14 degrees). In the spinal deformity group, average post-manipulation range of motion was statistically improved for flexion but not extension. Average post-manipulation range of motion was statistically improved for flexion and extension in the non-spinal deformity group.

**Conclusions:** This is the first study to recognize that sagittal deformity is present in patients who underwent a MUA for stiffness after TKA. We suggest that knee flexion as a compensation for sagittal imbalance predisposes to flexion contractures and poor ROM after TKA. Patients who present with a clinical suspicion of spinal deformity should be worked up preoperatively and counseled about their risk of stiffness after TKA.