Tibial Orientation Measurements With an Insert Goniometer Can Help the Surgeon Select the Thickness That Balances the Posterior Cruciate Ligament in a Medial Ball-in-Socket Total Knee Arthroplasty

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In total knee arthroplasty (TKA), interest in insert conformities that mimic the physiologic medial-pivot axial rotation of the tibia, upon which native patellofemoral tracking depends, is increasing; however, surgeons who switch from a low-conforming insert to the intrinsic anteroposterior stability of a medial ball-in-socket insert lose the ability to detect changes in sagittal plane laxity, which is an intraoperative assessment that may help select optimal insert thickness. This video discusses an alternative solution: an insert goniometer that measures the change in external tibial orientation of screw-home movement in extension and internal tibial orientation at 90° of flexion between inserts that are 1 mm different in thickness. The first section of the video presents peer-reviewed evidence showing that the native knee, and TKA implant need a properly tensioned posterior cruciate ligament to restore native axial rotation and promote patellofemoral tracking. The second section of the video details the medial ball-in-socket and a lateral flat articular surface design of the insert goniometer, which mimics the conformity of the native knee. The third section of the video shows the essential surgical steps of caliper-verified kinematic alignment that sets the components coincident with a patient's pre-arthritic joint lines. The fulfillment of kinematic alignment intraoperative verification steps balance the TKA implant by reducing the risk of over- and under-tensioning the posterior cruciate ligament and restores native knee medial and lateral tibial compartment forces without release of healthy ligaments. The fourth section of the video shows the surgeon trialing inserts that differ in 1 mm thickness and measuring the change in the external tibial orientation in extension and internal orientation at 90° of flexion. Finally, a case-series of kinematic alignment TKA with implantation of the insert thickness that resulted in the maximum external tibial orientation in extension or internal orientation at 90° of flexion achieved a 73-point median Forgotten Joint Score at 6 months postoperatively, indicating high satisfaction and function.