COMMENTARY & PERSPECTIVE

Are We Expanding the Limits of Preoperative Ankle Deformity in Patients Undergoing Total Ankle Arthroplasty?

Commentary on an article by Gun-Woo Lee, MD, et al.: “Comparison of Intermediate to Long-Term Outcomes of Total Ankle Arthroplasty in Ankles with Preoperative Varus, Valgus, and Neutral Alignment”

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Lee et al. present a retrospective study on the clinical outcome of 144 consecutive ankles that underwent primary total ankle arthroplasty using a HINTEGRA (Newdeal) mobile-bearing ankle prosthesis. The study compares and contrasts the outcome according to the degree of preexisting deformities in the coronal plane as measured by the tibiotalar anatomic axis in 3 groups of patients who had undergone ankle arthroplasty: the neutral group, <5° from neutral; the valgus group, 5° to 20° of valgus; or the varus group, 5° to 20° of varus. The number of revisions or failures of the prosthesis requiring extraction or curettage and bone-grafting was tracked. Clinical outcome was also tracked in the 3 groups with patient-reported outcomes assessments including the Ankle Osteoarthritis Scale (AOS) pain and disability score, American Orthopaedic Foot & Ankle Society (AOFAS) ankle-hindfoot score, visual analog scale (VAS) pain score, Short Form (SF)-36 Physical Component Summary (PCS) score, and range of motion including degrees of dorsiflexion and plantar flexion measured by a goniometer.

Most surgeons have avoided ankle replacement in patients with coronal plane deformity of >15° because of fears of edge-loading and premature failure. More recent articles have noted successful outcomes in patients with preoperative deformity of up to 30° when the deformity is corrected with concomitant or staged procedures. In this study, Lee et al. were able to correct the coronal plane deformity to within an average of 3.2° of deformity in the coronal plane in the varus group, 2.7° in the valgus group, and 2.0° in the neutral group. More concomitant procedures were performed in the varus and valgus groups than the neutral group. The remarkable finding is that even with this relatively challenging mobile-bearing design, clinical outcomes and survival rates were comparable among the 3 groups at a mean follow-up of 7.3 years.

Although no clinical article is perfect, this study attempts to point out that patients with advanced tibiotalar coronal plane deformity should not be relegated to arthrodesis in many cases. Surgeons should consider the following items when evaluating these results. This article breaks down preoperative deformity to 1 simple measurement: coronal plane alignment. Most patients have multiplanar deformity. The corrections of heel osteotomy and Achilles tendon lengthening do not really address all deformities that surgeons encounter in patients. Preoperative prone lower-limb examination should be considered to assess the intermalleolar axis and thigh-foot angles in these patients. Weight-bearing radiographs that include both foot deformity and ankle deformity should always be obtained preoperatively. Orthopaedic foot and ankle surgeons are aware of the tripod effect of the forefoot on the hindfoot. Patients with underlying congenital pes cavus who have stressed the medial tibiotalar joint and sprained the ankle all of their lives and damaged the peroneal tendons present substantial multiplanar bone deformity and soft-tissue correction challenges. In contrast, patients with coalitions and posterior tibial tendon de
deficiency have experienced increased lateral tibiotalar contact forces while attenuating the deltoid and spring ligament complexes. These deformities must direct the surgeon to create a plantigrade foot preoperatively or during ankle replacement to avoid edge-loading and premature failure. First, metatarsal osteotomies, triple arthrodesis, subtalar fusion, lateral column lengthening, and, rarely, supramalleolar osteotomy should be considered in addition to calcaneal osteotomies for preoperative or concomitant deformity correction. Although not utilized in this study, patient-specific guides based on preoperative computed tomographic scans have made total ankle replacement more consistent and have increased surgeon confidence in correcting preexisting ankle deformity. This planning process should be used as a tool to help the surgeon to understand the patient’s deformity more comprehensively and to plan which degree of intraoperative correction is possible through the ankle joint alone. The patient-specific guides cannot always be followed blindly, as they do not always take into account intra-articular pressure and alignment changes in the ankle joint affected by the foot deformity during weight-bearing. Talar hypoplasia and joint height also need to be taken into consideration as there are limits as to what degree of deformity correction can be performed through the tibiotalar joint at the time of ankle replacement surgery.

When compared with balancing knee ligaments and correcting limb alignment during knee replacement surgery, which we are all trained to perform, the ankle is very unforgiving. I would advocate staged periarticular deformity correction procedures to allow a surgeon to assess the effect of correction on a patient prior to ankle replacement. Let’s not repeat the lessons learned from...
knee replacement in patients who have poorly balanced knees and experience poor postoperative functional outcome and premature failures. Aligning the limb to the patient’s individual needs will always be a sound principle. Understanding the tolerance of the prosthesis and patient functional demand is key to improving prosthesis longevity and patient satisfaction. Joint registries, along with long-term outcome studies such as the one by Lee et al., will help us to collect and analyze data that will guide us to better decision-making and help us to expand the indications for total ankle arthroplasty. Nothing will ever substitute for careful preoperative planning and excellent intraoperative execution of the plan.

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References

2. Reddy SC, Mann JA, Mann RA, Mangold DR. Correction of moderate to severe coronal plane deformity with the STAR ankle prosthesis. Foot Ankle Int. 2011 Jul;32(7):659-64.