2:00 – 3:00 pm
SESSION 6:
ANKLE ARTHROPLASTY

Moderators:
Steven L. Haddad, MD
(Glenview, Illinois)

John S. Reach, Jr, M.Sc., MD
(New Haven, Connecticut)
There was a time in the not too distant past where correcting varus and valgus deformities with available US total ankle prostheses was fraught with complication and failure. Even adhering to fundamental principles of ligament and structural balance resulted in recurrence of deformity due to the inadequacy of the ankle prosthesis itself to provide inherent stability. Our own study (Kadakia, Haddad, 2007) found that arthritic ankles with a greater than 20 degree pre-operative varus deformity, and a 15 degree preoperative valgus deformity, had respectable initial correction (immediately following surgery), which failed 75% of the time over a 2 year interval.

Interestingly, there is no definition of failure in total ankle arthroplasty. In total knee literature, failure is defined as postoperative coronal plane incongruence of greater than 3 degrees. Authors in the ankle replacement literature have chosen 5 degrees of tilt to define failure, though there is nothing to support whether that specific number leads to increased risk of osteolysis or component subsidence. Of course, though there is no literature to define an absolute number, the surgeon strives for a perfect coronal plane alignment to minimize any risk of late-term failure of the prosthesis. Those surgeons who perform any volume of total ankle arthroplasties recognize that any methodology that minimizes component failure and subsequent need for challenging revision surgery is a welcome addition to this endeavor.

To answer the primary question, I would strongly suggest that pre-existing varus and valgus matters much less than it did in the past given the host of more intrinsically stable prostheses we now have at our disposal. Over the past 17 years of modern total ankle replacement arthroplasty, we have learned both extra-articular techniques to minimize prosthetic tilt, and attempts at prosthetic placement to minimize said tilt. Some of these methods worked well, others did not work at all, and some are in evolution.

Personally, I have learned that challenging deformities are best corrected through a staged procedure. There are, however, a number of experienced and extremely competent ankle replacement surgeons who debate this point. Both camps agree that a perfect prosthetic balance, as well as a perfect extra-articular balance, must be achieved at the conclusion of the procedure(s). One stage prosthetic reconstruction certainly has advantages for the patient, including a shorter recovery time and shorter anesthetic risk. However, I would argue that, for challenging deformities, two stage procedures allow the surgeon to ensure that the extra-articular components are in perfect balance, making the second stage (prosthesis implantation) as simple as any non-deformity ankle replacement procedure. In addition, I have learned that there are contrasting surgical principles which intrinsically make less sense with one-stage ankle reconstruction in challenging deformities. For instance, our post-operative goal with any fusion operation is some form of extended immobilization to allow successful fusion. In contrast, our post-operative goal with any ankle replacement operation is early motion to prevent disappointing post-operative stiffness. Despite this prejudice, I would agree with the “one-stage camp”
that inherent stability of modern ankle joint prostheses allow greater latitude in deformity correction within the index operation.

For major deformities, the type that was previously uncorrectable by ankle replacement, a few of the “envelope pushers” have learned the power of prostheses to assist in a mobile ankle joint. This becomes particularly important for those patients with prior (or current) hindfoot fusions, as extension to pantalar fusion leads to a much less desirable outcome. These are real issues that do need tackling, as symptomatic adjacent joint arthritis is a phenomenon that leads to great patient dissatisfaction following joint fusion. Thus, techniques to tackle these deformities with joint replacement become pivotal to increasing patient satisfaction through dissipation of joint contact stresses on these adjacent joints.

To achieve major deformity correction, I begin by correcting the ankle deformity by releasing contracture preventing reduction, then pinning the ankle in neutral (with fluoroscopic confirmation) in both the coronal and sagittal planes (critical point). The bone work is then done beneath the ankle joint to ensure the hindfoot and forefoot is plantigrade. This is followed by the ligament work, lateral and medial, which, in major deformity correction, generally requires allograft tendon reconstruction for the longstanding deficient ligaments. I then fill the gap in the ankle joint (either medial or lateral erosion) with liquid methylmethacrylate, allowing it to harden completely before withdrawing the pin that traverses the ankle joint. Now, the ankle is in neutral, and the foot beneath it is plantigrade. This ankle is casted non-weight bearing for 6wks, followed by full weight bearing in a CAM boot. By twelve weeks post-operative, the patient can stand independently, and I can make a thorough assessment of any residual deformity that may require correction at the time of total ankle replacement. Note that such additions are often minor, from a calcaneal osteotomy to a Cotton osteotomy, which does not add significantly to the ankle replacement second stage. I have the patient bear full weight to both ensure the patient is satisfied with the corrected alignment, and to minimize disuse osteopenia that can compromise prosthesis fixation in the second stage.

The second stage occurs anywhere from 3.5 months to 4 months postoperatively. The ankle replacement is now routine and straightforward, regardless of the prosthesis chosen. Stability is assessed, but with ample time for ligament healing, does not require supplementation. Gutter debridement can be aggressive at this time to allow good prosthesis motion, as the stable bone alignment prevents deformity recurrence.

References:


