

DOUBLE HINDFOOT ARTHRODESIS VERSUS TRIPLE ARTHRODESIS FOR DIFFICULT HINDFOOT VALGUS DEFORMITIES

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Triple arthrodesis has been a long-standing approach for treatment of difficult hindfoot deformities. The ability to stabilize all three of the hindfoot joints in certain situations is often desirable and provides positional and functional stability to the whole foot and ankle. Over the past years, there has been much debate over procedural selection in the treatment of flatfoot deformities. There has been a tremendous amount of literature discussing the 4 stages of posterior tibialis tendon dysfunction, with certain accepted procedures being assigned to each stage. These procedures include many extra-articular and soft tissue procedures for Stages 1 and 2. In Stage 3 and 4, the focus has been towards more stabilizing procedures such as a double or triple arthrodesis. My standard approach to severe Stage 3 pes planovalgus deformities has been to rely on a triple arthrodesis. For the calcaneocuboid joint, it will sometimes gap slightly when the talonavicular joint is realigned using curettage techniques. In these cases, I will often consider a bone graft to provide a scaffold for fusion to occur, rather than abducting the foot and compromising correction in order to get good joint contact. I have regularly relied on the lateral column lengthening portion of the triple to provide better stability and re-articulation and correction to the talonavicular joint medially (Figures 1,2).



Figure 1B. Lateral view with severe collapse.



Figure 1A. Example of severe pes valgus deformity with talonavicular subluxation.



Figure 1C. Important to check an anterior-posterior ankle view to evaluate the presence of deltoid insufficiency and stage 4 injury.



Figure 2A. Traditional approach with triple arthrodesis utilizing bone graft at the calcaneal cuboid joint to provide lateral column stability to assist in medial column alignment.

Over the past several years, there have been more foot and ankle surgeons advocating a double arthrodesis in place of a triple fusion. There are several varieties of double combinations in hindfoot surgery. One could be a double fusion of the two midtarsal joint, which leaves the subtalar joint intact. Most of these articles have described this approach for Charcot deformities. Another option is a subtalar joint and calcaneocuboid arthrodesis, often utilized for failed calcaneal fractures, which may have an intra-articular extension into the calcaneocuboid joint. Nevertheless, the double combination that has been popularized recently for pes planus deformities is one of a subtalar joint and talonavicular joint fusion. This has claimed to provide tremendous stability back to the medial column and the entire hindfoot complex and allow patients to function pain-free with good radiographic and clinical outcomes. Interestingly, advocates have also reported minimal to no calcaneocuboid joint symptoms as well.

Authors advocating this approach have listed several arguments in favor of a triple. The common arguments are 1) avoiding lateral wound healing issues/lateral incisional dehiscence; 2) reduction in operating room time; 3) painful calcaneal cuboid joint problems; 4) ability to correct abduction easier; and 5) preservation of some hindfoot motion. A kinematics study published by Wulker et al (1) shows that a subtalar and talonavicular joint double fusion more closely resembles a triple arthrodesis than the other combinations. With this in mind, it is logical this approach may be a good alternative for avoiding a triple fusion when



Figure 2B. Postoperative lateral view with calcaneal cuboid graft for triple arthrodesis.

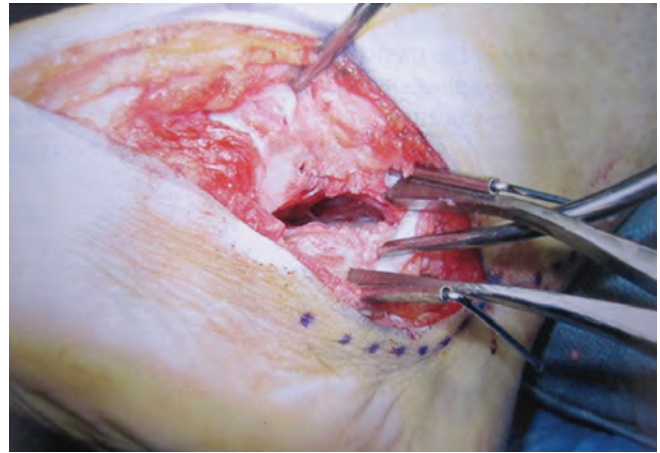


Figure 3. Current recommended single medial incision for access to the talonavicular and subtalar joints for double arthrodesis.

someone presents with severe Stage 3 posterior tibialis tendon dysfunction with hindfoot valgus deformity.

In several articles, the incisional approach is a single one for access to both joints and is on the medial side. It starts at the medial malleolus and comes out towards the plantar talonavicular joint. Dr. Jack Schuberth from Kaiser, San Francisco, has lectured about this incision for many years, and it is his preferred approach to either isolated subtalar joint fusion or more involved fusions. Schuberth claims there is an advantage of visualization and easier manipulation to adequately reduce the displaced heel back underneath the talus with clear exposure to joint preparation for fusion. Nevertheless, this is not an easy dissection for many novice foot surgeons as we are more commonly trained to approach this joint from the lateral side.

There are some other procedures where one approaches the medial portion of the subtalar joint, but these are somewhat rare and the neurovascular bundle is obviously a major concern here (Figure 3). One example of medial

subtalar joint dissection is for a middle facet coalition resection. Another approach would be through an aggressive postero-medial Turco Clubfoot release where the subtalar joint is effectively released from this medial approach. Many surgeons have not had much experience with these scenarios and find it challenging to use one extensile medial incision for the double fusion.

Regardless of your skillset and confidence level, my recommendation is to perform what you do comfortably and what you do well. If it is easier to perform a double fusion utilizing two incisions, one from a medial and lateral incision because of your previous training, then that should be the approach. There will still be multiple benefits to saving time and hardware expenses not having to worry about the calcaneo-cuboid joint. Weinraub et al

stated that there was up to a 60 minute reduction in the average times for each procedure (2). This was calculated to be savings of upwards to \$2000 for operating room and anesthesia costs. They also stated that avoidance of fixation hardware for the lateral joint as another area of savings. They claimed that in 45 patients in their study, there was only one with calcaneocuboid joint pain.

The real question is “can the double fusion provide as stable of long-term results as the previous triple has ...”. The jury is still out on how long-term outcomes will be, however it has clearly been positive in the early to mid-term follow-up reports. Most of the follow-up has been upwards to only 20 months and this is too early for any worthwhile conclusions. Sammarco et al (3) have reported a long-term follow-up of up to eight years with good predictable results.



Figure 4A. Preoperative radiograph for double arthrodesis. Note the talonavicular faulting.



Figure 4B. Postoperative lateral double fusion.



Figure 5A. Preoperative double fusion approach for pes planus.



Figure 5B. Postoperative views.

They stated the radiographic angles of correction were similar to a triple arthrodesis. These patient numbers are small but promising for future reports.

Long-term advocates of the triple arthrodesis still feel there will be inherent stability lost from leaving the calcaneocuboid joint alone. The stability provided from stabilization of the calcaneocuboid joint is paramount to the long term success of these procedures. They are cautious on advocating this approach in significant deformities and have not embraced this double concept. Only future reports and better follow-up will tell how these patients will bear out long-term. My limited experience of 15 cases has given me some confidence in exploring this concept further. Hopefully we will see reputable prospective and retrospective studies on this evolving approach as time continues. This is a very exciting area of further research and I look forward to future articles on this approach (Figures 4, 5).

REFERENCES

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