

SUBTALAR ARTHROEREISIS IN PLACE OF SUBTALAR FUSION FOR SUBTALAR JOINT ARTHRITIDIES: The Feldman Procedure

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Triple arthrodesis or subtalar joint (STJ) fusions have long been the accepted modalities in cases of persistent STJ arthritis.^{1,2} Although it is generally well accepted that a fusion of the STJ may result in outcomes that represent improvements over pre-existing pathologies, it is also well understood that the process of a STJ fusion is fundamentally “trading a greater bad for a lesser bad...”³ A long acknowledged tenet of STJ arthrodeses is to “Err to Valgus,” based on the understanding that a STJ fused in varus, will result in unrelenting symptoms of pain and disability arising from complex neurological reflex pathways associated with the STJ, which are incited by fixed varus rearfoot positions.^{4,5} Interestingly, these problems are not normally seen in compensating rearfoot complexes, which are the most common type of rearfoot complex encountered demographically.⁶⁻⁸ However, in the case of tarsal coalitions, there is often associated pain and reflex peroneal spasms, which progress as the maturing coalition transitions from cartilaginous to osseous.⁹⁻¹¹ In addition to tarsal coalitions, other causes of STJ arthritis include, trauma such as intra-articular calcaneal fractures, osteochondral injuries, talar body fractures, and degenerative joint disease (DJD), usually associated with extreme forms of either pes plano valgus or pes cavus.^{12,13}

Subtalar arthroereisis is a well established method of resolving frontal plane flatfoot deformities.¹⁴ Historically, the procedure was performed as described by Smith et al¹⁵ with a T-shaped implant, which limited pronation of the subtalar joint by projecting a flat or angled surface against the talar neck.¹⁶ The long stem of the T was seated in to the floor of the sinus tarsi and fixed using bone cement. Numerous studies have documented favorable, pain-free outcomes with rapid recoveries, using this procedure.^{17,18} As technology has progressed over time, the original cemented T stemmed implant gave way to various

plug designs, all of which essentially accomplish the same mechanical outcome of limiting STJ motion in the direction of pronation. It is also noteworthy that, unless an STJ implant becomes unstable or subluxed, there is no reported incidence of STJ arthritis resulting from STJ implants. However, when the implant(s) become loose, or in the case of the original Smith angled design, become rotated, all of the same symptoms and signs of STJ arthritis are seen.¹⁹ However, problems with the original Smith designed implant were quite rare,²⁰ and almost always associated with subsequent trauma to an implanted foot. Later technological developments led to plug type arthroereisis implants. These range from aggressive, cylinder shaped designs with cutting ridges to blunt ridged conical designs, all of which are cementless, much easier to insert than the traditional T shaped implants and seem to have had similarly successful outcomes²¹⁻²³ to the original Smith series.

Given the consistently favorable outcomes of subtalar arthroereisis, a hypothesis was developed by Dr. Mark H. Feldman, to consider the possibility of substituting an arthrodesis with an arthroereisis in STJ arthritides. In effect this produces a low amplitude arthrodiastasis. Many of the newer arthroereisis implants provide stable designs, which fill the sinus tarsi and do in essence, off load the posterior, middle and anterior facets of the talocalcaneal articulations. This results in a circular bearing, mounted in the sinus tarsi, able to receive compressive forces both inferiorly and superiorly, while offloading articular structures contributory to arthropathy progression. Of some interest to this hypothesis also are the findings of Baravarian²⁴ who reported a lessening of symptoms following “failed” calcaneal fractures in which, by performing a block distraction arthrodesis, the patient was finally free from pain. Although the author described this as an arthrodesis, the description of the procedure

contained within the paper suggests that in fact a sort of arthrodiastasis was performed, using a bone block in place of an implant, to achieve the same result.

This article reports on the initial series of attempted procedures, using this hypothesis. To date, 6 procedures are being followed, representing 2 females and 2 males who underwent triple Arthrodesis/reisis. Two of the male cases were bilateral. The surgeons involved in this study thus far have been: Dr. Mark H. Feldman, Dr. Thomas Merrill and Dr. Charles C. Southerland. Implementation involves use of the Talar Fit indwelling arthroereisis implant (Osteomed) along with the Stealth Fixation Frame (R&R Medical). The R&R Stealth frame was found to interface extremely well with the arthroereisis procedure, permitting stable, less encumbered fusions of the talonavicular and calcaneo-cuboid joints, which permitted early ambulation without locking up the ankle joint. To date, there have been no problems with fusions at either the calcaneocuboid nor the talonavicular joints, using this combination of procedures. We have found the Stealth Frame to be a reliable, effective construct, which is stable enough to permit early weightbearing in combination with an arthroereisis procedure. Of the initial 6 procedures, both of the bilateral cases were done sequentially (as opposed to simultaneously). Both patients indicated an immediate postoperative reduction in pain and both requested that the second side be performed as soon as possible after the initial hemisphere was healed. The balance of unilateral procedure patients indicated almost immediate postoperative relief, following long-standing pain sequela (average 6.8 months of preoperative pain, shortest preoperative symptoms 4.2 months, longest 16 months) as compared with preoperative symptoms.

In addition, to the above triplex procedures, we are following a single female patient with OCD of the posterior facet of the STJ, who underwent an isolated STJ arthroereisis with complete resolution of symptoms, which had been progressively worsening over a 6-month period. MRI confirmed the presence of an osteochondral lesion slightly

medial of mid-center on the calcaneal side of the posterior facet. The lesion was not readily available to small scope arthroscopy, and had started to produce changes on the talar side of the facet as well. Placement of the arthroereisis seems to have completely alleviated the patient's ongoing symptoms. The goal of surgeries performed thus far has been to place the arthroereisis implant such that it locks up the subtalar joint, essentially to the point of slight arthrodiastasis, with the calcaneus vertical. While care has been taken not to impart any varus to the rearfoot, there has been no focused attempt to leave any valgus either. Also, in choosing from available sizes to determine the correct size for the anatomy, dimensions have been selected that clearly filled the sinus tarsi without an oversized implant. In other words, use the same size for the patient's anatomy, which would be used if attempting to correct a flatfoot. We have also recommended flat posted functional orthotic devices in follow up.

CONCLUSION

Although the focus population for this technique remains small, the initial results are very promising. Adding to this initial impression is the fact that 2 of the male patients (1 unilateral, 1 bilateral) were worker's compensation patients, both of whom were able to return to work at 3 months postoperative arthroereisis/arthrodesis procedures (per hemisphere), with limited restrictions. Both of these were employment related intra-articular calcaneal fracture injuries, in which the employees had been entirely unable to work until after the arthroereisis/ desis procedures were performed. This procedure poses an alternative to traditional interventions in which a triple arthrodesis was indicated. It is much simpler to perform than a traditional triple and, at least in this initial series, appears to offer a much more rapid recovery and much more satisfactory index of pain relief. Possible long-term concerns include the potential for "pistoning" of the implant over time and normal concerns, which should be addressed with any indwelling foreign body.



Figure 1. The patient is a 58-year-old male who is post intra-articular, comminuted calcaneal fracture, who was initially treated with Synthes reduction plate (removed at 7-months post injury). The patient has ongoing pain in the left ankle/subtalar joint area. A triple arthroereisis/arthrodesis procedure was performed using Talar Fit STJ Arthroereisis and Stealth Frame External Fixation systems.

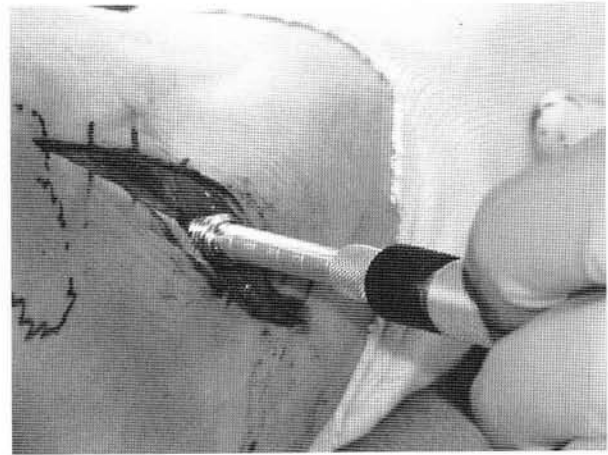


Figure 2. Intraoperative view of insertion of sizer.



Figure 3. Fluoroscopic placement of the implant.



Figure 4. AP view of fixation with the STJ implant.

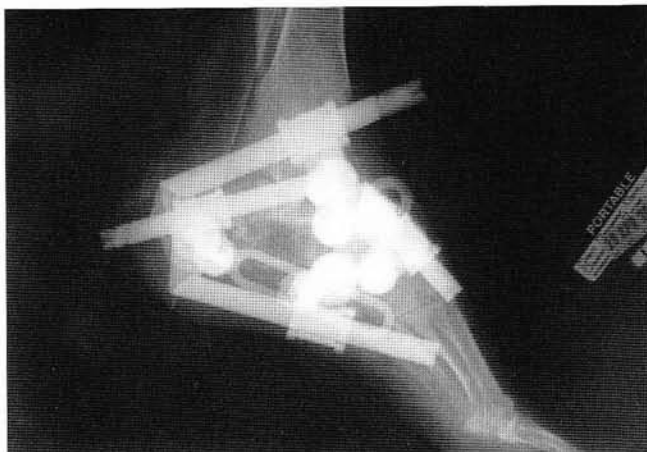


Figure 5. Lateral view of fixation with the implant.

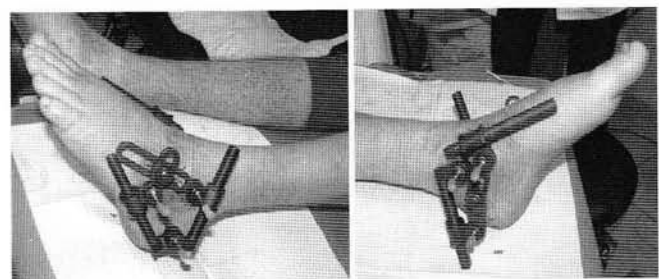


Figure 6. View at 2 weeks postoperative.

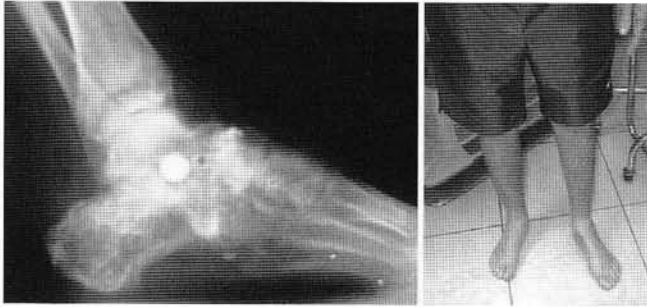


Figure 7. View at 3 months postoperative.

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