A Retrospective Analysis of Employing Sub-Talar Joint Arthroereisis in Cases of Sub-Talar Joint Arthritis

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Statement of Purpose

The purpose of this project is to retrospectively evaluate the feasibility and advantages of utilizing an Arthroereisis procedure in place of the traditional Triple Arthrodesis in patients with arthritis in the Sub-Talar Joint (STJ).

Literature Review

STJ arthritis may arise from a multitude of factors, including trauma, inflammatory arthritis, and biomechanical deformities. In response to the biomechanical joint changes caused by these factors, substantial stress is produced through articular surfaces, resulting in degenerative changes.2 Ensuring micro fractures ultimately increase stiffness of subchondral bone.2 Consequently, the reduced shock absorption produces increased force on the overlying cartilage, causing articular destruction. This, in turn, is caused by instability and further stress, leading to a repetitive cycle that generates pain secondary to articular joint surface loss.2 Determination of arthritis on plain film radiographs under uniform joint space narrowing, subchondral sclerosis, osteophyte formation, and subarticular cysts, as demonstrated in Figure 2. A. A sciatic nerve, called the “halo” sign, which is produced by ossific overgrowth of the sustentacular talus and talus is sometimes prevalent.2

It is widely accepted that a triple arthrodesis is a reliable and effective procedure to surgically correct subtalar deformities and reduce pain in patients with arthritis.3 Potential postoperative complications include: nonunion, spread of arthritis to surrounding joints, residual deformities, and painful hardware.4,5 Additionally, the patient typically remains non-weightbearing for 10-12 weeks before starting a regimen of physical therapy.5 In contrast, an arthroereisis procedure has several key advantages. Besides being a relatively simple surgical procedure in a short period of time, STJ implants are reversible and allow for future intervention if indicated.4 The procedure is extracapsular, does not interfere with ossific growth, and preserves ligaments.4 Reduced immobilization periods are indicated, as patients ambulate within the first 1-2 weeks.3

Chambers first described the concept of a subtalar arthroereisis in 1946, utilizing an autogenous bone graft to restrict subtalar joint (STJ) erosion by elevating the floor of the sinus tarsi.2 Not only does this reduce periods of external STJ pronation but also it increases external supportive moments.2 In addition, restoration of normal alignment reduces forces on surrounding soft tissue.2 This will allow for stifling and remodeling of soft tissue, which are fundamental to joint alignment.2,7

Currently, a broad variety of STJ implants are available. Vogler developed a categorization system to differentiate implants based upon their biomechanical properties.7 This system includes: self-locking wedge (restricts lateral talus process from contacting the sinus tarsus floor), and the STJ with the implant in place. The STJ arthroereisis also applies impact-blocking (reduces adduction of the lateral talus process) implants.3

The most commonly used implant is the Maxwell-Branchseau Arthroereisis (MBA).2 This is a self-locking titanium implant with a cannulated threaded cylinder and is slotted to allow soft tissue ingrowth, which helps anchor the implant.2 Generally, the magnitude of the implant is proportional to the magnitude of change. STJ arthroereisis has become an established treatment option for adults and children with flexible flat feet.6 Currently, literature is limited on the role of arthroereisis in patients with arthritis. Subtalar Arthroereisis and Feldman previously assessed the concept and discovered that “unlike an STJ implant becomes unstable or subluxed, there is no reported incidence of STJ arthritis resulting from STJ implants.”6 They also reported promising results in a small group of patients with arthritis that underwent an arthroereisis procedure.6 Postoperatively, patients reported nearly immediate pain relief along with a quick return to weight-bearing activity.4

Results

Of the 6 procedures performed, the overall success rate was 83.33% (5/6) with an average follow-up of 13.7 months (4 months – 3 years). 1 procedure out of 6 (16.67%) failed due to inability to tolerate the arthroereisis implant. Adjunct procedures were performed in 6/6 cases. The average age was 41.5 years (17 - 64 years).

Analysis & Discussion

We report on an innovative alternative usage of STJ arthroereisis, traditionally indicated for frontal plane flatfoot deformities. While the triple arthrodesis is a well-established modality for managing STJ arthritis, it is an irreversible procedure and contains its own complications.2 By using the arthroereisis implant to offset the talocalcaneal articular surfaces and lock up the subtalar joint (Figure 5), we can considerably reduce the motion and compressive forces that enhance arthritis pain and progression.

Utilizing the STJ arthroereisis procedure, 5 out of 6 (83.33%) cases in this retrospective study have indicated a significant reduction in pain when compared to their preoperative state. The average pain level of 1 case out of 6 (16.67%) that failed. In this circumstance, the patient demonstrated increased mobility, increased strength and stability through physical therapy, but was unable to tolerate the implant. A follow-up procedure with a newly-sized implant was discussed but not ultimately fulfilled by the patient. Table 1 shows age, success of the procedure, follow up time, and adjunct procedures.

In conclusion, the results of this study provide a promising foundation for an alternative to the irreversible triple arthrodesis procedure in the target demographic. In conjunction with a greatly reduced post-operative ambulation period, the data presented may substantiate an indication for arthroereisis over triple arthrodesis in cases of STJ arthritis.

References


Table 1: EGR – Endoscopic Gastrocnemius Recession

<table>
<thead>
<tr>
<th>Case</th>
<th>Age (yr)</th>
<th>Success</th>
<th>Follow Up (mo)</th>
<th>Adjunct Procedure</th>
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<tbody>
<tr>
<td>1</td>
<td>84 yrs</td>
<td>Yes</td>
<td>4 months</td>
<td>EGR</td>
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<tr>
<td>2</td>
<td>35 yrs</td>
<td>No</td>
<td>8 months</td>
<td>EGR</td>
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<td>3</td>
<td>17 yrs</td>
<td>Yes</td>
<td>1 year, 3 months</td>
<td>TAL, Resection of Calcaneo-Navicular Coalition and STJ Middle facet</td>
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<tr>
<td>4</td>
<td>59 yrs</td>
<td>Yes</td>
<td>5 months</td>
<td>EGR</td>
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<tr>
<td>5</td>
<td>35 yrs</td>
<td>Yes</td>
<td>2 years</td>
<td>None</td>
</tr>
<tr>
<td>6</td>
<td>35 yrs</td>
<td>Yes</td>
<td>3 years</td>
<td>None</td>
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Fig. 3: MBA arthroereisis in sinus tarsi

Fig. 4: Preoperative arthritic patient

Fig. 5: Postoperative arthritic patient with STJ arthroereisis

Fig. 1: Guide pin insertion across sinus tarsi

Fig. 2: Arthritic changes in STJ

Fig. 8: a 28-year-old male patient with posterior talar pain and plantar hyperkeratosis.