VALENTI ARTHROEREISIS AND TALONAVICULAR FUSION FOR COLLAPSING PES VALGUS IN THE ADULT

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For many years, patients have been seeking relief for symptoms associated with "fallen arches". For many years, the physician has found this foot type difficult to treat. The author presents an alternative procedure for the surgical correction of severe collapsing pes valgo planus foot. The suggested procedure involves fusion of the talonavicular joint in conjunction with a Valenti arthroereisis of the subtalar joint. The indications, contraindications, surgical criteria and the detailed surgical procedure will be discussed.

A great deal of time and energy has been devoted to creating a pain-free functional foot from a severe collapsing pes valgo planus (CPPV) foot. By definition, this foot type presents with an arch non-weightbearing which collapses upon weightbearing. The rearfoot everts, the medial column and medial longitudinal arch collapses, and the forefoot abducts and dorsiflexes upon the rearfoot. Calcaneal Eversion is a key component in the vast majority of CPPV feet. This abnormal frontal plane motion allows osseous structural stability of the foot to be lost. The rigid lever effect provided by midstance resupination does not occur and the foot is forced to function in a pronated attitude throughout the midstance and propulsive phases of the gait cycle. Without resupination, the foot remains flexible and ground reactive forces are able to manipulate the bones within the foot.

The majority of forefoot abduction and dorsiflexion occurs at the level of the midtarsal joint, specifically the talonavicular joint. The talus adducts and plantarflexes as the calcaneus everts, decreasing the height of the medial longitudinal arch. This is frequently associated with a talonavicular "break or fault" with resultant dorsal jamming and osseous jamming. Articular surfaces are forced to function (end range of motion) in extreme pronation and adapt and remodel in this attitude. Soft tissue structures such as the medial band of plantar fascia, spring ligament, long plantar ligament, as well as joint capsules and tendinous structures are forced to adapt to this maximally pronated position.

Historically, in the surgical treatment of the severe symptomatic CPPV, triple arthrodesis has been the definitive procedure. Procedures varying from soft tissue transfers to osseous fusions have been advocated.

Before any treatment plan is attempted, the etiology of the deformity must be determined and addressed. In many cases of CPPV rearfoot/calcaneal eversion is a significant factor. The proposed procedure addresses this aspect of pes valgo planus. Before performing the procedure, certain patient indications must be present.

Indications

1. Flexible deformity: Calcaneal Eversion
2. Adequate range of motion at subtalar joint and midtarsal joint
3. Pain with weightbearing and collapse of medial longitudinal arch
4. Minimal amount of Degenerative Joint Disease in subtalar joint and midtarsal joint.

Contraindications

1. Rigid flat foot deformity
2. Transverse or sagittal plane forefoot deformity
3. Severe subtalar, midtarsal joint degenerative joint disease
4. Decreased subtalar joint range of motion

Advantages Associated with the Purposed Procedures

1. Allows some subtalar joint motion for adaptation to uneven terrain
2. Enables patient to have a more functional foot
3. Maintains foot length
4. Allows for partial or complete correction of frontal plane forefoot deformities such as forefoot varus or valgus
5. Allows ancillary procedures to be added as necessary, such as plantar flexory 1st ray osteotomy, or gastroc recession
6. Can be converted to complete rearfoot fusion if necessary
7. Allows treatment of younger patients not normally considered for triple arthrodesis

SURGICAL PROCEDURE

Anatomical dissection of the medial longitudinal arch is carried out as described by Dr. John Ruch in the film *Anatomic Dissection of the Medial Arch,* (Podiatry Institute). The talonavicular joint is identified and capsular and periosteal tissues are reflected. The articular surfaces are exposed and the cartilaginous surfaces removed. It is important to note that the underlying osseous integrity is preserved. Cartilage is removed down to the subchondral bone using bone curettes and rotary burrs. Subchondral drilling with a 0.062 Kirschner wire is then performed to promote osseous bridging.

A Valenti arthroereisis plug is placed within the canalis tarsi as described by LaPorta, Langford, et al. The appropriate size plug is inserted and some eversion is allowed. Attention is then returned to the talonavicular joint.

The joint surfaces are reapproximated. The navicular is plantar flexed and adducted on the talar head into a more correct anatomical position. By positioning the navicular the forefoot assumes a more correct position. Good bone to bone apposition should still be present because the boney integrity has not been destroyed.

Temporary fixation is provided by one or two Kirschner wires placed across the talonavicular joint while holding the foot in the corrected position with retrograde force applied. Two Richard's scaphoid staples are then placed across the talonavicular joint in a 90 degree attitude to one another. If room is available, a third staple placed equi-distant between the two staples may be used. Anatomical closure is then performed and dressings applied. The foot is placed in a posterior splint followed by a below-knee cast for approximately 4 to 6 weeks. Full weightbearing is allowed at 10 to 12 weeks.

CASE PRESENTATION

A case of severe pes valgo planus deformity with concomitant hallux abducto valgus, metatarsus primus varus, hammertoe deformity 2-5 and metatarsophalangeal joint subluxation will be presented.

A 77 year old white female presented with a chief complaint of severe right ankle and foot pain, for 2 1/2 years duration. Symptoms were progressing in severity limiting ambulation and activity to the point where the patient periodically required a wheel chair. Symptoms were located in the medial arch and sinus tarsi and were associated with increasing pain in the ankle joint.

Clinical examination revealed severe collapsing pes valgo planus deformity and talar ptosis, mid tarsal joint abduction and calcaneal valgus. Moderate swelling was noted along the posterior tibial tendon with marked pain upon palpation. Pain was also noted with palpation of the sinus tarsi and anterior lateral ankle. Muscle testing of the posterior tibial tendon was 4 minus, and painful.

Review of standard dorsoplantar and lateral radiographs revealed mid tarsal abduction with marked increase in the talo calcaneal angle and plantar declination angle. Hallux malleolus and abductus as well as hammertoe deformities with lateral metatarsophalangeal joint deviation was also noted (Fig. 1A,B)

The case represents a severe biomechanical imbalance resulting from long standing collapsing pes valgo planus deformity. Due to the subtalar joint pronation and concomitant metatarsal talo joint abduction, chronic posterior tibial tendonitis resulted. Loss of the rearfoot stability resulted in lateral jamming and sinus tarsitis. A fixed forefoot

Fig. 1A. Dorsoplantar and lateral radiographs reveal severe collapsing pes valgus deformity with associated forefoot pathology.

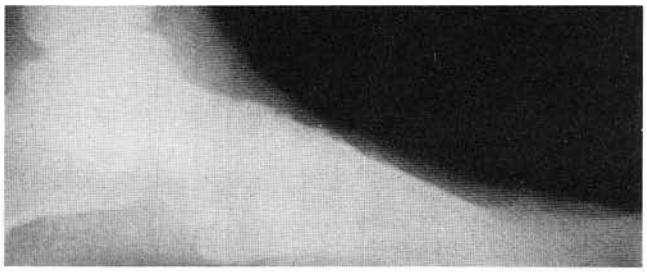

Fig. 1B.

Fig. 2A. Postoperative radiographic appearance of Valenti arthroereisis, talonavicular arthrodesis at three months. First metatarsophalangeal joint implant arthroplasty and toe fusions 2-5 were also performed. Note the restoration of the talo calcaneal, and plantar declination angle. Increase in the calcaneal inclination angle and cyma line is also noted.

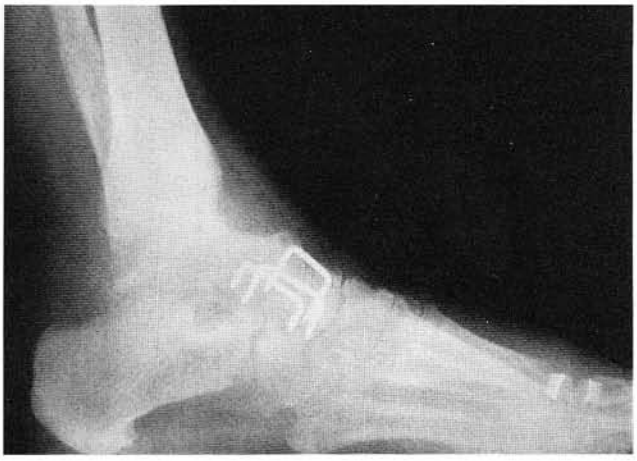

Fig. 2B.

varus subsequently leads to metatarsalgia with complications of hallux malleolus hammertoe deformity and increase in metatarsophalangeal joint pathology.

Surgical considerations include Valenti Arthroereisis, and Talo Navicular Arthrodesis. Adult collapsing pes valgo planus with associated forefoot pathology is a difficult deformity to manage.

Numerous flatfoot procedures have been used and have not stood the test of time. One might easily consider a triple arthrodesis in this

case. However, if subtalar joint pronation is "blocked", ie a Valenti implant or stapeg, the rearfoot can not collapse. An ancillary talo navicular arthrodesis will allow derotation of the forefoot varus and control forefoot abduction. This in turn will provide a stable platform for weightbearing without the need for a triple arthrodesis (Fig. 2A, B). Results of reconstructive forefoot procedures are thus greatly improved with biomechanical rearfoot stability.

DISCUSSION

When addressing the etiologic basis of CPPV, it is crucial to understand that the osseous stability of the mid and forefoot will be maintained by control of the rearfoot. Previous procedures designed to correct the "fallen arch" failed to address the major contributing etiology and were doomed to failure from the start. Although the foot appears to be corrected, without rearfoot control, the foot will continue to function in the same manner which originally created the deformity.

The amount of midfoot and forefoot abduction can be controlled by eliminating excessive calcaneal eversion. It is important to avoid locking up the rearfoot as this will result in symptoms similar to those of subtalar joint coalition. The adult foot, unlike that of the child, is not able to readily adapt to the new position provided by the arthroereisis. In addition, with the eversion controlled, the adult foot continues to attempt to function in the pronatory attitude it has adapted to. Pronation of the forefoot may still occur. The talonavicular joint, being the apex of the majority of this motion, would seem to provide the most accurate biomechanical site for control.

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