CHAPTER **22**

TALONAVICULAR ARTHRODESIS FOR CORRECTION FOR PEDIATRIC PES VALGUS DEFORMITY

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Pediatric pes valgus is a common part of the podiatric physician's practice. The increase of awareness by pediatricians, as well as increased morbidity of the condition can lead to earlier referrals for treatment. In the United States, there is an increasing prevalence of obesity in the pediatric population. This has been shown in the literature to be associated with higher rates of painful pes valgus conditions. There are also anthropological studies that show increased human arches have lowered over time due to the decrease in the amount of walking and running, as well as increased use of shoes. This leads to weakening of the muscles of the foot that support the arch. Often, the condition is genetic, and there is a known history of the mother or father having flat feet.

Pediatric pes valgus can be treated in a number of ways. The most common nonsurgical treatment for the condition is the use of an orthotic device. These orthotics can be made in various ways to help support the arch and relieve pain. Stretching and physical therapy can be employed depending on the patient's specific symptoms. When symptoms persist after conservative treatment, surgical intervention may be necessary. There are multiple reports on surgical treatment of the pediatric pes valgus condition, and a number of surgical procedures have been successfully utilized to resolve symptoms and deformity.

It should be emphasized that this discussion excludes children with a deformity secondary to coalition. Many obese children with pes valgus deformities can function similar to a coalesced foot, and they may even present with peroneal spasm. A step-forward Hubscher maneuver should be performed clinically and radiographically to ensure that no osseous coalition is present. Having the patient step forward while dorsiflexing the hallux will eliminate the equinus effects on the foot. The arch is essentially re-created if the condition is flexible. The author also uses this test as a guide for the patient and their parents to determine how much correction can be obtained with surgery. Families need to understand that a patient with a severe pes valgus deformity will never have a normal arch, even after undergoing surgery.

Unfortunately, there are no clear guidelines on which procedures to do based on a patient's clinical and radiographic findings. Most of these patients universally need lengthening of the gastroc-soleal complex. The basis for which osseous procedures that need to be performed come mostly from clinical and surgical experience, knowledge of the amount of correction and the dominant plane of correction of each procedure. The author finds that many pediatric patients are amenable to a combination of a Gastrocnemius recession, Evans calcaneal osteotomy, and a Cotton osteotomy of the medial cuneiform if the deformity is flexible. When the deformity is severe, the child has closed or near-closed growth plates, or the child is overweight or obese, the previously-mentioned combination of procedures may not give adequate correction to the deformity and recurrence can result. It is common to desire to perform extra-articular procedures in a child to preserve the joints, but the author has found that if an Evans and Cotton are performed in an obese child with a severe deformity, recurrence can occur within weeks of beginning a weight-bearing regimen. Intra-operative, and even initial post-operative correction and alignment can appear adequate, but once the child increases his or her activity, the correction often cannot withstand the forces.

Although fusion of a pediatric joint should be used sparingly, the author has found that an isolated talo-navicular arthrodesis is a very powerful and effective procedure in many pediatric patients with severe deformity. The combination of a gastrocnemius recession and talonavicular arthrodesis in the appropriate patient can lead to resolution of preoperative clinical symptoms and improvement of radiographic parameters.

The first patient (AS) is a 17-year-old obese male with lower extremity foot pain for years. His symptoms did not improve with custom orthotics, and therefore surgical intervention was planned (Figures 1,2). Note the calcaneus has almost no inclination and the talar head is approximately 80% uncovered. His deformity is flexible, but it was determined that a talonavicular arthrodesis would be necessary to stabilize his foot. Figures 3 and 4 show his 6 month postoperative radiographs. Note the comparison in the above mentioned parameters compared to pre-operatively. Clinically, he was pain-free. Due to his weight and the severity of the condition, I recommended that he

return to wearing orthotics regularly.

TH is a 12-year-old obese male with severe painful pes valgus deformity. Clinically, his foot seemed rigid and nonreducible. Computed tomography scans showed no coalition. He also underwent talonavicular arthrodesis and gastrocnemius recession, which was successful at eliminating his pain. He is currently playing football after bilateral foot correction and continues to be asymptomatic (Figures 5-8).

KJ is an 8-year-old female who was referred after conservative treatment had failed. Due to the severity of her deformity, the orthotics only caused her increased pain. The parents wanted to proceed with surgical correction, in part due to the father having such severely painful feet as an adult. The preoperative radiographs (Figures 9, 10) showed not only the significant pes valgus deformity, but also a skewfoot deformity with severe metatarsus adductus as well. She underwent a talonavicular arthrodesis, gastrocnemius recession, and osteotomies of metatarsals 1-5. Note the improvement of her alignment in her postoperative radiographs (Figures 11, 12).

LG is a 10-year-old child with a significant history of transverse myeliits since 10 months old. He developed contractures of the Achilles and hamstrings in addition to a severe pes valgus deformity, and his gait closely resembled that of a patient with cerebral palsy. The patient had gone through rigorous physical therapy, AFOs, and other custom braces for nearly his entire life with little to no relief of his symptoms. We determined, due the severity of his condition and the underlying neurological condition, that a talonavicular arthrodesis would be effective in correction of the deformity (Figures 13-16).

In the author's experience, fusion and position are best obtained with this isolated joint fusion when hand resection is utilized to maintain the ball and cup relationship of the talus and navicular. Saw resection can lead to difficulty of reduction due to the length of the lateral column of the foot being maintained. Use of a joint distractor or lamina spreader is useful for joint resection. It is imperative to adequately resect the lateral aspect of the joint, which can sometimes be difficult to visualize. Fixation options are numerous and are determined by what the surgeon is most comfortable with. Cancellous and cannulated screws provide good compression. The author utilizes 4.0 mm and 6.5 mm cannulated screws, depending on the size of the patient. Plates and staples can also be used, and sometimes are useful in larger patients to provide further stability.

Patients are put in a below knee cast and kept strictly nonweightbearing for 6-8 weeks. They are then progressed to a walking boot for 2-4 weeks, depending on pain level and radiographic healing. At 12 weeks, patients can return to full activity as tolerated.

In summary, the talonavicular arthrodesis is a very useful procedure in certain pediatric patients with painful flexible pes valgus who have failed to respond to conservative treatment. Although joint salvaging procedures should be chosen if possible, they are sometimes inadequate for severe deformities. Healing is predictable with the talonavicular fusion and long term correction is generally maintained.

Figure 1. AS preoperative anterior-posterior radiograph. Note the significant uncovering of the talar head.

Figure 2. AS preoperative lateral radiograph. The calcaneal inclination angle is decreased, while the talar declination angle is increased.

Figure 3. AS 6 month postoperative anterior-posterior radiograph after talonavicular arthrodesis and gastrocnemius recession.

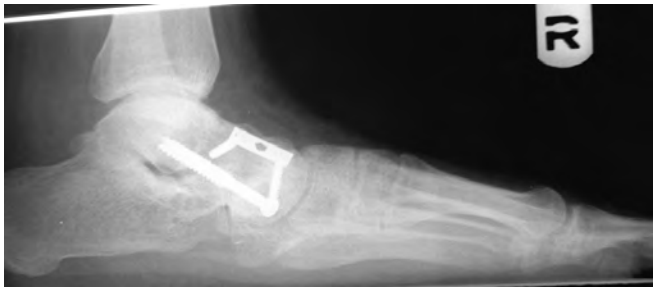

Figure 4. AS 6 month postoperative lateral radiograph.

Figure 5. TH preoperative anterior-posterior radiograph.

Figure 6. TH preoperative lateral radiograph.

Figure 7. TH 8 month postoperative anterior-posterior radiograph.

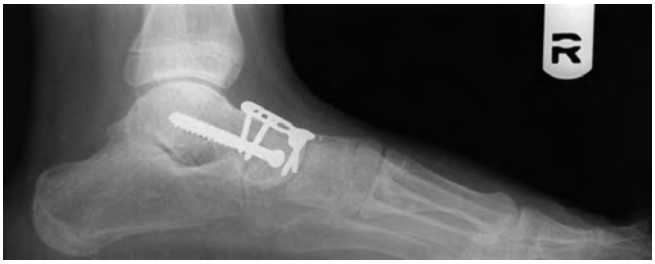

Figure 8. TH 8 month postoperative lateral radiograph. Note the inclination angle of the calcaneus as well as the talar-first metatarsal angle.

Figure 9. KJ preoperative anterior-posterior radiograph. Note the significant uncovering of the talar head, as well as the skewfoot and metatarsus adductus deformity of the entire foot.

Figure 10. KJ preoperative lateral radiograph. The calcaneal pitch is negative.

Figure 11. KJ 4 month post-operative anterior-posterior view after talonavicular arthrodesis, closing osteotomies of metatarsals 1-5 and gastrocnemius recession.

Figure 13. LG preoperative anterior-posterior radiograph. Note the severe abduction of the forefoot on the rearfoot.

Figure 12. KJ 4 month postoperative lateral radiograph after talonavicular arthrodesis, closing osteotomies of metatarsals 1-5 and gastrocnemius recession.

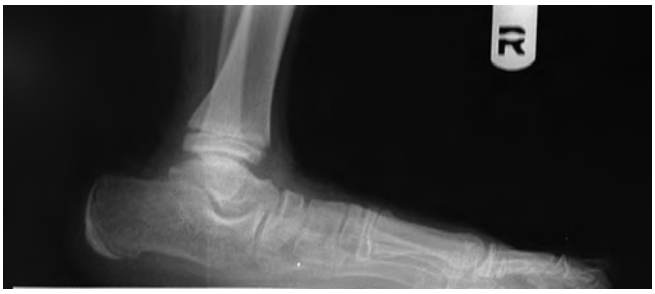

Figure 14. LG preoperative lateral radiograph. The calcaneal pitch is negative and the middle facet of the subtalar joint is not clearly visualized, as seen in feet with a coalition.

Figure 15. LG 6 month postoperative anterior posterior view after gastrocnemius recession and talonavicular arthrodesis.

Figure 16. LG 6 month postoperative lateral radiograph, after gastrocnemius recession and talonavicular arthrodesis.