Original Article

CONGENITAL VERTICAL TALUS: SURGICAL CORRECTION BY A ONE-STAGE MEDIAL APPROACH

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ABSTRACT

A single stage procedure for correction of congenital vertical talus using a medial approach is described. The operation was performed on 14 feet with good initial anatomical results in all cases. No wound healing complications were observed.

Congenital vertical talus (congenital convex pes valgus) is a rare disorder of unknown etiology which may occur in isolation or in association with other congenital malformations of the musculoskeletal or nervous systems.1,7 Untreated, the deformity does not delay walking, but the foot often becomes painful in adolescence. The foot is unsightly and stiff, difficult to fit with a shoe, and gait is awkward and clumsy.

Treatment of congenital vertical talus is usually surgical. More than 20 different procedures have been described in the literature.1-12 Most series are small and success rates range from 20% to 85%. Many are two-stage soft tissue operations. Osteotomy or resection of the talus or navicular, wedge tarsectomy, or triple arthrodesis have also been described.7 Recently, a single-stage correction through a lateral approach was reported with good results.10 Skin sloughing is a complication of surgery for congenital vertical talus through a lateral approach, probably because the skin is contracted in this condition.

This report describes a single-stage operation to correct congenital vertical talus using a medial approach. The procedure has achieved excellent initial anatomic reduction and good clinical results. There have been no complications of wound sloughing with the medial approach.

OPERATIVE TECHNIQUE

In some cases, preoperative serial casting was used to stretch out the contracted anterior structures and position the forefoot at a right angle to the long axis of the tibia. The objective of surgery was to rotate the hindfoot so the talus and calcaneus were reduced to their normal positions in relation to the navicular and tibia.

A straight transverse incision is used to expose the posterior and medial structures.13 The incision is made at the level of the medial malleolus, usually ending posteriorly at the medial edge of the Achilles tendon. The neurovascular bundle, flexor digitorum longus, and flexor hallucis longus are isolated, surrounded by a Penrose drain, and mobilized. The Achilles tendon is Z-lengthened and the ends are tagged with sutures.

Posterior capsulectomy of the tibiotalar and subtalar joints is performed and the talofibular and calcaneofibular ligaments are divided laterally (Fig 1). Thus, the hindfoot is released from the tibia and the fibula. The tibialis posterior tendon is mobilized and used as a guide to the dorsally dislocated navicular. Release of the superficial deltoid ligament and medial subtalar joint capsule facilitates movement of the talus and reduction of the subtalar joint. All tissues

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Fig 1: Posterior ankle and subtalar joints. After division of the Achilles tendon, a capsulectomy of both joints is performed. The talofibular and calcaneofibular ligaments are divided.

Fig 2: Medial subtalar and ankle release with mobilization of the navicular by release of all but the lateral capsular attachments.

Fig 3: Reduction of talus posteriorly into the mortise with reduction of the talonavicular and subtalar joints.

are carefully separated from the anterior capsule of the tibiotalar and talonavicular joints. Anterior capsulotomies of these joints are performed, thus releasing the forefoot from the tibia (Fig 2).

The navicular can usually be easily reduced into proper articulation with the head of the talus by longitudinal traction, plantarflexion of the forefoot, and digital pressure beneath the talar head (Fig 3). Occasionally, the tendon of tibialis anterior must be lengthened to facilitate reduction. The extensive mobilization of the talus allows it to be dorsiflexed in relation to the tibia, which reduces tension on the extensor tendons.

Once reduction is accomplished, the talonavicular joint is fixed with a longitudinal Kirschner wire. The wire is passed from the posterior aspect of the talus to the head of the talus. As the talonavicular joint is held reduced, using the wire as a lever, the wire is driven across the joint and out the skin on the dorsum of the foot. The wire is withdrawn anteriorly until its posterior tip is flush with the posterior talus.

The tibialis posterior tendon can then be transferred to the neck of the talus, released, or lengthened. The Achilles tendon is sutured with Z-lengthening. The skin is closed with interrupted sutures.

Postoperative immobilization consists of casting for 6 weeks. After this period, the cast and pin are removed. A molded ankle-foot orthosis is applied. The authors recommend nearly full-time bracing for a minimum of 2 years. Daily range of motion exercises are performed out of the braces.

**Clinical Experience**

The single stage correction using the medial approach has been performed on 14 feet with congenital vertical talus in eight children. The operations were performed by the authors from 1979 to 1987 at the Shriners Hospital, Childrens
Hospital of San Francisco, or University of California Hospital. Patients included five boys and three girls, ranging in age from 4 months to 8 years. Six were less than a year old at the time of surgery. Five were white, two black, and one Native American. Congenital vertical talus was bilateral in six children and unilateral in two. In three patients, the deformity was isolated. Two children had associated myelomeningocele. There was one case each of carpal tarsal syndrome, pterygium syndrome, and chromosome 9 abnormality.

Treatment prior to single stage release included casting in 4 patients, bracing in 2, posterior release in 1, and no treatment in 1. Follow up ranged from 6 months to 8 years, with an average of 2.5 years. The operations were performed as described above with few modifications. In four feet, the medial incision was extended proximally and posterior to the medial malleolus. The tibialis posterior was left intact in 6 feet, released in 5, transferred to the undersurface of the neck of the talus in 2, and lengthened in 1 foot. The tibialis anterior was detached to facilitate reduction, and reattached without lengthening in four feet. One foot had concurrent resection of a talocalcaneal bar. Fourteen feet were fixed with a single Kirschner wire, while two had a second wire placed percutaneously across the calcaneocuboid joint. Clinical results were classified as excellent, good, or poor (Table). An excellent foot had anatomic reduction by radiograph and normal appearance. A good result demonstrated incomplete reduction of the talonavicular joint and/or some residual deformity. A foot with a poor result was one with loss of reduction and recurrence of deformity.

Range of motion was not used to classify operative results in this series because five of the eight patients had primary diagnoses which cause stiffness. In these children, surgery was usually performed to make the deformed feet braceable.

Initial postoperative correction was excellent in all 14 feet. At follow up, results were rated excellent in 1 foot, good in 11, and poor in 2 feet. One of the patients (two feet) classified as a good result had good reduction of the talonavicular joint, but at 13 months postoperative demonstrated equinovalgus deformity with tight peroneals and toe extensors. In this case, tendon lengthening was offered, but the family declined.

The two poor results were in one patient who had undergone posterior release and casting 3 years prior to medial correction at age 5. The initial reduction of the talonavicular dislocation was good, but both the dislocation and deformity recurred 9 months later. For these feet, which have failed two attempted operative corrections, triple arthrodesis is planned near maturity.

All five children with primary neuromuscular disease and unbraceable stiff feet had braceable feet postoperatively. Good results were obtained in two of the three children with a diagnosis of isolated congenital vertical talus. Postoperative range of ankle motion in these was 10° dorsiflexion with 25° plantarflexion in one and 20° dorsiflexion with 10° plantarflexion in the other.

There were no complications of the single stage medial procedure. There were no skin sloughs and no infections.

### DISCUSSION

Congenital vertical talus can be a challenging deformity to the surgeon. Using a medial approach, the principle deformity, dislocation of the talonavicular joint, can be corrected. As a one-stage operation, this approach offers reduced surgical time and a single anesthetic. The medial approach provides excellent exposure of the talonavicular joint and allows for complete mobilization of the talus.

Medial placement of the skin incision allows the wound to be closed without tension, as there is a relative abundance of soft tissue available medially after correction of the deformity. Lateral incisions often must be closed under tension, which can lead to skin sloughs.

The technique of introducing the talonavicular fixation wire from the posterior aspect of the talus is easy. The talus can be properly positioned in the mortise while a very good view of the talonavicular joint reduction is maintained during pinning.

Complete mobilization of the talus is essential in the reduction of vertical talus deformity. Not only the talonavicular joint but also the talocalcaneal articulation can be aligned. The
talus can be positioned more posteriorly in the ankle mortise, which relieves tension on contracted lateral soft tissues. The relative lengthening of these tissues facilitates reduction of the talonavicular joint without surgical tendon lengthening.

The single stage medial procedure for correction of congenital vertical talus offers a very good technique for anatomic reduction of the deformity. The operation has yielded good clinical results without complications.

REFERENCES