

# Progressive Development of Tibialis Spastic Varus Foot Deformity Secondary to Calcaneonavicular Coalition

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#### Statement of Purpose

To demonstrate the unique progression of a case of pediatric flexible flatfoot deformity to a rigid cavovarus foot type, secondary to calcaneonavicular coalition

#### Literature Review

First reported by Schmidt in 1931 in Germany, calcaneonavicular coalition resulting in a cavovarus foot type is an extremely rare condition with only 10 cases previously reported in the literature. The deformity was termed tibialis spastic varus foot (TSVF) by Simmons after he reported 3 cases in 1965.

TSVF is found in children with a median age of 10-11 years old (range: 8-12 yr)<sup>1-9</sup>, and results in a cavovarus foot type, often associated with spasms of the tibialis anterior muscle (comparable to spastic flat foot caused by the peroneal muscles). In the literature, there appears to be a slight female predominance in the deformity, though total reported cases are limited.

#### Case Study

An active 10 year old female presented to the office with an initial complaint of bilateral heel pain of approximately 6 months duration, right greater than left. There was no history of trauma. Past medical history and surgical history were noncontributory. There was positive family history of bilateral talar coalitions in her father, which were treated surgically. Physical exam demonstrated tenderness on palpation of the calcaneal apophysis of bilateral heels. Weight bearing examination demonstrated collapse of the medial longitudinal arches bilaterally, with valgus calcaneal stance position and forefoot abduction. Range of motion and muscle power were within normal limits to all joints and all quadrants, respectively. Radiographs were negative. The patient was diagnosed with calcaneal apophysitis secondary to pediatric flexible flatfoot deformity, and treatment was initiated, which included RICE, orthotics, NSAIDs, and physical therapy referral.

The patient followed up at one year with a new chief complaint of right foot pain. Due to scheduling complications, she had been seen by another provider in the interim who had ordered an MRI revealing calcaneonavicular coalition, and initiated protected weight bearing in a CAM boot. Physical exam demonstrated a cavus foot type, significantly different from her physical exam only one year prior. Curiously, the left foot maintained its valgus orientation with a notable difference between limbs. There was new onset of restricted subtalar and midtarsal range of motion, and radiographic evaluation was consistent with CN bar and associated posterior break in the cyma line, positive anteater sign, and a Meary's angle of -13°.

### Case Study Continued

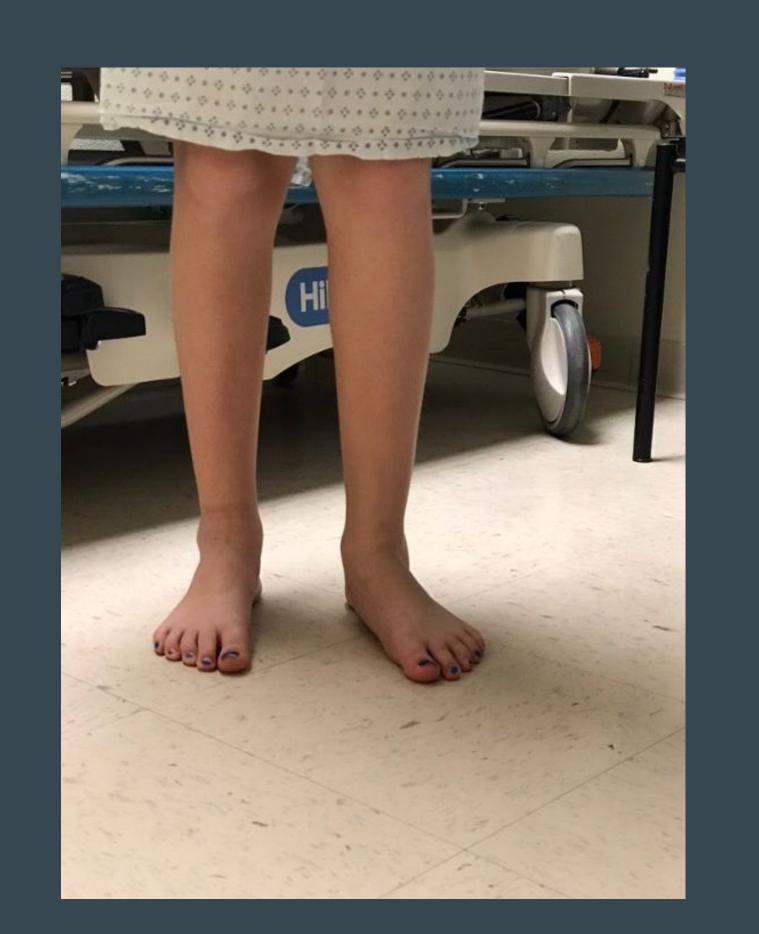
Initial conservative treatment was continued with a period of protected weight bearing in a CAM boot, which did not resolve and ultimately led to surgical intervention. The calcaneonavicular coalition was resected with interposition of the extensor digitorum brevis muscle belly.

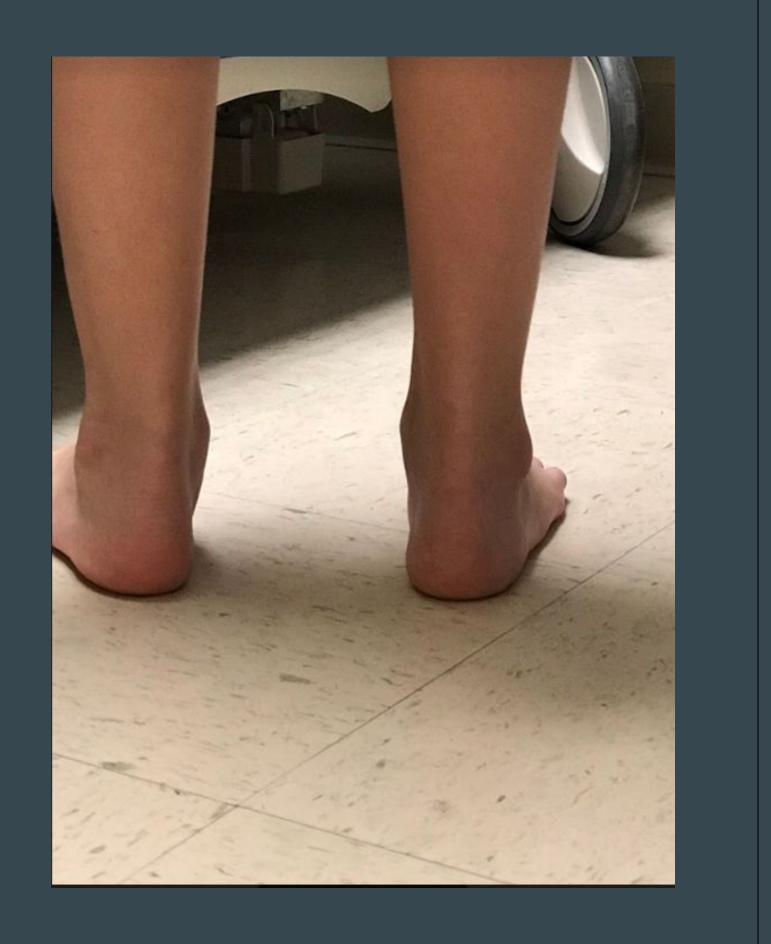
Post-operative course was uneventful and the patient was discharged from physical therapy at 6 months.

#### Initial Radiographs



### Clinical Appearance Post Coalition





#### Post Coalition Ossification Radiographs







### **Analysis and Discussion**

The onset of pain associated with coalitions is well documented in the literature and is typically reported during adolescence when the foot becomes less flexible due to ossification of growth plates. Some also attribute this pain to the increase in activity during adolescent years. This can lead to microtears in non-osseous coalitions and secondary changes of the soft

In cases of osseous coalitions. These secondary changes can include reflexive spasm of specific skeletal muscles leading to global deformity, as demonstrated by extensive documentation of peroneal spastic flat foot.

Although previously reported as rare in the literature, the presentation of a cavovarus foot type in patients should not preclude one from the suspecting a tarsal coalition. While the mechanism of development is still unknown, most authors agree that spasm of the anterior muscle group is a causative factor, analogous to peroneal spasm causing rigid flat foot deformity.

The case presented provides a unique view of the development of a rare pathology. Because of her initial presentation at skeletal immaturity, we have been able to observe the acute change from bilateral pediatric flexible flat foot to unilateral pes cavovarus deformity. This caused the development of painful symptoms necessitating surgical intervention. Through physical therapy, the patient was able to work through spasm of the anterior compartment muscles, and regain a normal gait pattern at 6 months post-op. The patient has been discharged with no remaining symptoms and has returned to sports uneventfully.

#### Post-Op Radiographs







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