

A Case of Cavus: Tackling Post Operative Recurrence

Dhavel Chauhan, DPM^{1*}, Nehal Modha, DPM¹ and Michael Cohen, DPM FACFAS²

¹ Resident physician, Foot and Ankle Surgery, HCA Florida Westside Hospital, Plantation, Florida, USA.

² Attending Physician, Foot and Ankle Surgery, HCA Florida Westside Hospital, Plantation, Florida, USA.

***Corresponding Author:** Dhavel Chauhan, DPM, Resident physician, Foot and Ankle Surgery, HCA Florida Westside Hospital, Plantation, Florida, USA.

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Abstract

Pes cavovarus deformities of the foot and ankle pose significant challenges for patients and clinicians, often leading to debilitating symptoms and sequelae. This case study presents a 67-year-old female patient who underwent multiple surgical corrections for recurrent cavus foot deformity. The initial surgery involved Tendo-Achilles Lengthening, Dwyer Calcaneal Osteotomy, and Total Ankle Arthroplasty. However, over time, the deformity migrated to the forefoot and midfoot, necessitating further interventions, including dorsiflexory wedge osteotomy and IPJ fusion. Despite these efforts, the cavus deformity recurred in the rearfoot in 2022, leading to a comprehensive surgical approach. The procedures included soft tissue and osseous corrections, such as posterior tibial tendon lengthening, deltoid release, hardware removal, lateral calcaneal sliding osteotomy, and polyethylene replacement of the ankle arthroplasty. The patient experienced pain relief and improved function following this intervention. The study highlights the challenges associated with managing cavovarus deformities and the importance of a systematic approach to address both soft tissue contractures and osseous abnormalities. Furthermore, it underscores the potential for recurrence in such cases, necessitating vigilant postoperative monitoring and adaptable treatment strategies. While the patient achieved positive outcomes twelve months postoperatively, this case emphasizes the need for careful pre-operative planning and consideration of various surgical techniques to effectively manage pes cavovarus deformities and their recurrent nature.

Keywords: *Pes Cavovarus; Varus; Varus Reconstruction; Total ankle arthroplasty; Postoperative Complications*

Background

Severe and Subtle Pes Cavo Varus deformities of the Foot and Ankle can be debilitating for patients. Sequelae of Cavus feet are lateral ligament sprains & attenuation, peroneal subluxations or strains, stress fractures of the 5th metatarsal in the metaphyseal or diaphyseal region, excessive external rotation of tibia and talus which can result in strain on the LCL of the knee joint and friction of the iliotibial band (5). Treatment of the Varus pathology and sequelae therein is of utmost importance, and as providers it is our duty to resolve these issues through conservative or surgical intervention. Conservative treatment can include: orthoses, bracing, and physical therapy. When conservative measures fail, surgical intervention is employed. Here we present to you a case of cavus foot that was surgically corrected but has since required two additional surgical corrections due to recurrence. We present this to you for your considerations in dealing with post operative complications of a similar nature.

Literature Review

Pes Cavus is a pathology that can result in severe pain and other long term debilitating sequelae that warrant intervention. This pathology is characterized by an elevated longitudinal arch, plantarflexed first ray, (10) adducted forefoot and likely a varus rearfoot. Treatments vary, but we will be focusing on the surgical corrections in this report.

There are various soft tissue and osseous surgeries that assist in the corrections, (6) and it is generally accepted that soft tissue procedures should precede osseous correction. Soft tissue (3) releases often begin with lengthening of the Achilles Tendon. Following this, there is often release of the (11) Plantar Fascia, Abductor Hallucis, Deltoid, and lateral ankle ligament repair.

Following soft tissue correction, the rigid osseous deformities can be corrected. This is approached in the pre-operative setting by identifying where the deformity exists (6) and then appropriate operative selection. Our patients initial deformity was determined to be located in the rearfoot complex thus Total Ankle Arthroplasty, which has been shown to provide good outcomes (3) along with a Dwyer Calcaneal osteotomy (2) were chosen. These procedures were accompanied by a Tendo-Achilles Lengthening and additional split Peroneus Brevis lateral ankle stabilization. The patient had positive outcomes for 2 years, however upon presentation in 2019 it was seen the Cavus deformity migrated distally and now lied in the forefoot and midfoot. At this time a Dorsiflexory wedge (8) osteotomy of the first ray and IPJ fusion was performed. Upon presentation in 2022 there was noted to be presentation of the Cavus deformity again in the Rearfoot. During this final presentation a systematic approach was taken to deliberately reconstruct all soft tissue contractures, followed by minor osseous correction with hardware removal/replacement. The procedures performed during this 2nd reconstruction were as follows: Posterior tibial tendon lengthening, Deltoid release, STATT, TAL, hardware removal and lateral calcaneal sliding osteotomy, ankle gutter debridement and finally a polyethylene replacement for the TAR.

Case Study

CC: 67-year-old Female presents to us with residual pain and Equinovarus contracture to Right lower extremity. Patient has previously undergone Tendo-Achilles Lengthening, Dwyer Osteotomy, Total ankle Arthroplasty in 2017 & DFWO and IPJ fusion 1st ray RLE in 2019. **PMH:** Hypothyroidism, GERD, Hyperlipidemia, Mood Disorder **PSH:** Total Ankle Arthroplasty R, Percutaneous TAL R, Dwyer Osteotomy R (2017) & DFWO first ray R and IPJ fusion 1st R (2019).

Imaging: XR imaging in 2017 showed extensive hypertrophic bone formation and narrowing of the ankle joint R. Calcaneal inclination >30 degrees, XR imaging in 2019 revealed Hibb's Angle < 150 degrees. Images from the initial operation adequately display the prior mentioned deformities, as well as immediate post-operative imaging including the total ankle arthroplasty displaying resolution of ankle joint deformity (Fig 1., Fig 2. Fig 3.) Patient was sent for second opinion after presenting again in 2022. After previous rearfoot correction in 2017, newly acquired radiographs revealed deformity again in the RF complex- Calcaneal inclination >30 degrees & heterotrophic ossification bone formation around the medial and lateral gutters of the Ankle arthroplasty site.

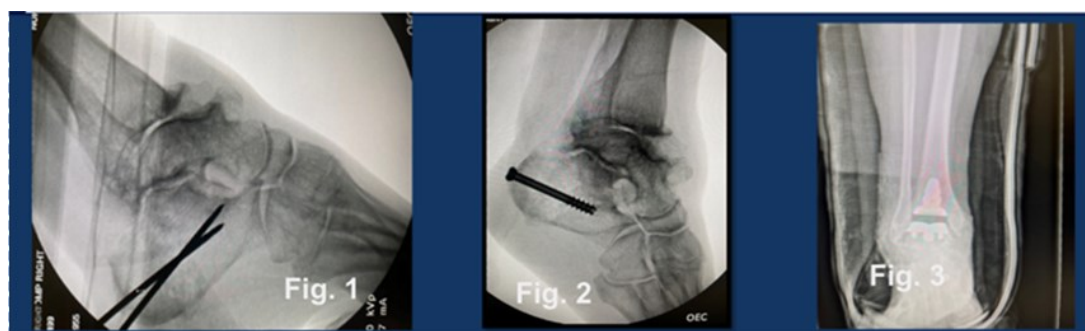


Fig 1. Intraoperative fluoroscopy prior to Dwyer Calcaneal osteotomy (2017).

Fig 2. Intraoperative fluoroscopy post Dwyer calcaneal osteotomy (2017).

Fig 3. Post operative radiograph of 2017 surgical correction.

Plan: After a period of conservative care, it was discussed with patient to attempt reconstruction of the RLE utilizing various soft tissue and osseous procedures in order to correct her residual cavus foot deformity. At this time the procedures to be included were: Tendo Achilles lengthening, Deltoid release, split tibialis anterior transposition, removal of hardware, Dwyer Calcaneal osteotomy, debridement of heterotrophic bone, and polyethylene replacement of the pre-existing ankle arthroplasty.

Surgical Overview: 2017: Initial surgical procedure involved split peroneus brevis lateral ankle stabilization utilizing a modified Evans incision. Following this, a Dwyer calcaneal osteotomy was performed in order to correct the Frontal plane deformity- this was fixated with a single 7.3 x 50mm titanium screw. Following this, and anterior approach was utilized to perform a Total ankle arthroplasty with the InBone system via Wright Medical- ultimately a 2 component tibial stem was used and a 10mm polyethylene.

2019: Follow up after a 2-year period revealed migration of the cavus deformity to the midfoot and forefoot- particularly the first ray. At this time a dorsiflexory wedge osteotomy was performed on the first metatarsal and an interphalangeal joint arthrodesis was completed. These procedures were fixed with a plate & screw construct and only screw fixation respectively. (Fig.4)



Figure 4: Shows Clinical follow-up after surgery (2019).

2022: During this follow up, it was seen there was limitation of ROM at the ankle joint with varus deformity recurrence noted in the rearfoot. In order the procedures performed were removal of screw in the Dwyer osteotomy site & removal of the IPJ fusion screw. Following this a through and through vertical cut was made in the calcaneus, the posterior fragment was then mobilized laterally to correct the varus deformity. This was fixated with 2 4.5x55mm cannulated screws. Next the percutaneous 3-stab incision TAL was performed to release the equinus contracture. Next, the tibialis posterior tendon was lengthened by Z-plasty- this gave us increased eversion, however because there was not adequate eversion and dorsiflexion yet, a Deltoid release was performed as well. Following this, an anterior approach was utilized to debride the medial and lateral gutters to release any continued ankle impingements- increased dorsiflexion was noted at this time. Finally, the previous polyethylene was replaced with a smaller size (size 8) which allowed better ROM. Lastly, a STATT procedure was performed where the TA was vertically split, and one half was released from its original insertion site and tenodesed to the cuboid. **Follow-Up:** Patient was admitted for observation for 48-hours to HCA Westside Regional Medical Center with pain management on board. Pain was controlled in the AM after surgery at which time initial surgical dressing change was completed. During this time it was seen patient had a continued rectus alignment of RLE as was noted intra-operatively and immediately postoperatively. (Fig. 5, 6, & 7)



Figure 5 & 7: Post operative radiographs (2022). The DFWO osteotomy that was fixated with plate and screws can be noted (2019).

Figure 6: Post operative day 1 initial dressing change and clinical image reveals a rectus foot with adequate weight bearing surface when loaded.

Analysis & Discussion

Equinovarus deformity of the lower extremity is a challenging pathology to treat, however with adequate pre-operative planning it can be tackled with a degree of certainty. The postoperative period can be difficult to manage in patients with this condition as was our case. There was migration of the cavus deformity distally which was corrected, then there was the recurrence of the cavus deformity where it initially presented. Recurrence of the cavus deformity can be seen in the literature (4,9). There are numerous options of soft tissue and osseous procedures to consider when attempting to correct cavus foot deformity. The authors in this report analyzed the specific pathology that was presented in front of them and tackled the case as such.

During the creation of this poster, the patient is approximately 9-months post operation of her 3rd and final RLE surgical correction. At this time the patient has returned to her normal activity, is ambulating without pain, and is using a Richie Brace during ambulation (1).

Conclusions

In conclusion, the presented case study underscores the multifaceted and recurrent nature of pes cavovarus deformities in the foot and ankle, emphasizing the challenges they pose to patients and clinicians alike. This complex clinical scenario required a systematic and adaptable approach, involving a combination of soft tissue and osseous procedures at various stages of management.

The initial surgical correction in 2017, targeting the rearfoot, yielded favorable outcomes for a period of two years. However, the deformity's recurrence and distal migration to the midfoot and forefoot in 2019 necessitated further intervention. This highlights the importance of postoperative monitoring and the potential for these deformities to manifest in different areas of the foot.

The final presentation in 2022 demonstrated the patient's enduring struggle with pes cavovarus deformity- now affecting the rearfoot once again. The comprehensive surgical approach, incorporating multiple procedures, provided the patient with pain relief and improved function. However, it is essential to recognize the complexity of these cases, the potential for recurrence, and the importance of individualized treatment plans.

This case study reinforces the need for thorough pre-operative planning and consideration of various surgical techniques when managing pes cavovarus deformities. It also highlights the importance of a patient-centered approach, adapting treatments as needed to address the evolving nature of the deformity. Ultimately, successful management of these challenging deformities requires a combination of surgical expertise, ongoing patient care, and a commitment to resolving the pathology.

Conflict of Interest

The authors have no conflicts of interest to declare.

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