# Recent Trends in Treatment of Congenital Vertical Talus

*Essay*

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# ***Aim of the work:***

This work discuss the recent trends in the treatment of congenital vertical talus mainly Dobbs technique and its early reported results.

# ***INTRODUCTION***

Congenital vertical talus is an uncommon disorder of the foot, manifested as a rigid rocker-bottom flat foot. Its characteristic radiographic feature is a dorsal dislocation of the navicular on the talus. If left untreated, congenital vertical talus results in a painful and rigid flatfoot with weak push-off power. *(1)*

It occurs as an isolated deformity in approximately 50% of cases and is associated with neuromuscular and/or genetic conditions in other 50 %*( 2)*.Up to 20% of isolated cases are familial in nature with reports of autosomal dominant inheritance. *(3)*

Closed treatment with manipulation and casting was the earliest technique used for congenital vertical talus management. Through years of clinical experience surgeons have learned that serial casting alone doesn't resolve congenital vertical talus**.** *(4)*

There are multiple surgeries described for the treatment of vertical talus, which can be performed through either a one-stage or two-stage operation. If a two-stage procedure is chosen, the first stage consists of lengthening the extensor tendons, the tibialis anterior tendon and reduction of the talonavicular joint. The second stage consists of lengthening the peroneal tendons and correcting the equinus contracture through an Achilles tendon lengthening and posterior ankle and subtalar release. *(5)*

Most surgeons now prefer a one-stage procedure because of fewer complications like avascular necrosis of the talus seen ith the two-stage procedure . The one-stage correction can be done through a dorsal approach or a posterior approach . Though both approaches have been used with good short-term success , there is some data to link the dorsal approach with shorter operative time , better clinical scores and fewer complications than the posterior approach. *(6)*

Correction of vertical talus through an open reduction can be associated with significant short-term complications, including wound necrosis , undercorrection of the deformity , stiffness of the ankle and subtalar joint, and the eventual need for multiple operative procedures such as subtalar and triple arthrodesis .Long-term outcomes are likely to be complicated by a significant amount of degenerative arthritis as is seen in many patients with clubfoot treated with extensive soft-tissue releases.[7]

Serial manipulation and plaster cast treatment followed by minimal surgical interventions can also be applied to vertical talus associated with genetic syndromes and neuromuscular conditions with similar success. The method of cast correction of a vertical talus is based on a specific way of manipulating the foot so as to gradually reduce the talonavicular joint. The principles are similar to those used in the Ponseti method of clubfoot correction.[8]

The use of serial manipulation and plaster cast treatment followed by minimal surgical interventions has provided good early results in the treatment of idiopathic congenital vertical talus .[2]

Recently congenital vertical talus is treated by a serial casting followed by a mini-open procedure and heel cord tenotomy for treatment of patients with congenital vertical talus .[9]

# *Pathoanatomy Of Congenital Vertical Talus*

## *Definition:*

Vertical talus (also known as congenital convex pes valgus) is a rare condition that produces a rocker –bottom deformity of the foot. *(10)*

## *Incidence:*

The incidence of CVT according to Osmond –Clarke *(11)* is about one child with CVT for every 120 with congenital talipes equinovarus estimated about one tenth that of clubfoot deformities. Boys found to be more affected than girls with up to 71% of cases being bilateral. *(12)*

Kite *(13)* reported a higher incidence in families with a predisposition to congenital talipes equinovarus. *(13)*

## ***Etiology:***

It has been suggested that the deformity represents an arrest of fetal development of the foot occurring between the 7th and 12th weeks of gestation. ***(10)***

Possible causes include;

1. Muscle imbalance; especially over pull of the anterior tibial tendon in paralytic disorders. ***(11)***

The condition was believed to be due to imbalance between growth of muscles and bones of the foot. There was no evidence of agenesis or lack of growth potential in the bones themselves, if they were placed in the correct position without soft-tissue tension they would grow normally.

The problem, therefore, seemed to be caused by shortness of the musclotendinous units. ***(16)***

On post mortem dissection of a foot with a vertical talus deformity in a child with thoraco-lumbar myelomeningocele, Drennan and Sharrad ***(17)***concluded that the underlying cause of this deformity was an imbalance between the tibialis posterior and the evertors of the foot .

2. Embryological defect; described by Herndon and Heyman [18] who considered that the abnormality was probably related to an embryological fault during the first trimester of pregnancy. [2]
It may occur also due to intrauterine compression, especially when coupled with arthrogryposis. [11]

3. Defects of the central nervous system; congenital defects of the central nervous system are associated with a more rigid form of vertical talus including diastematomyelia, lipoma of the cauda equina, myelomeningocele and sacral agenesis. Muscle imbalance associated with both congenital neural-tube defects and neuromuscular disorders underlies the development of the congenital deformity. [5]

Multiple pathoanatomical changes occur to varying degrees as a result of CVT which includes bones, ligamentous, retinaculam and muscles abnormalities.[5]

## ***Bone abnormalities:***

The key pathology is navicular displacement onto the dorsolateral aspect of the talar head and neck. This leads to the navicular becoming wedge-shaped with a hypoplastic plantar segment.*(5,19)*

The talar head is flattened dorsally, and its articular cartilage expands to accommodate the articular surface of the displaced navicular (Fig.1).

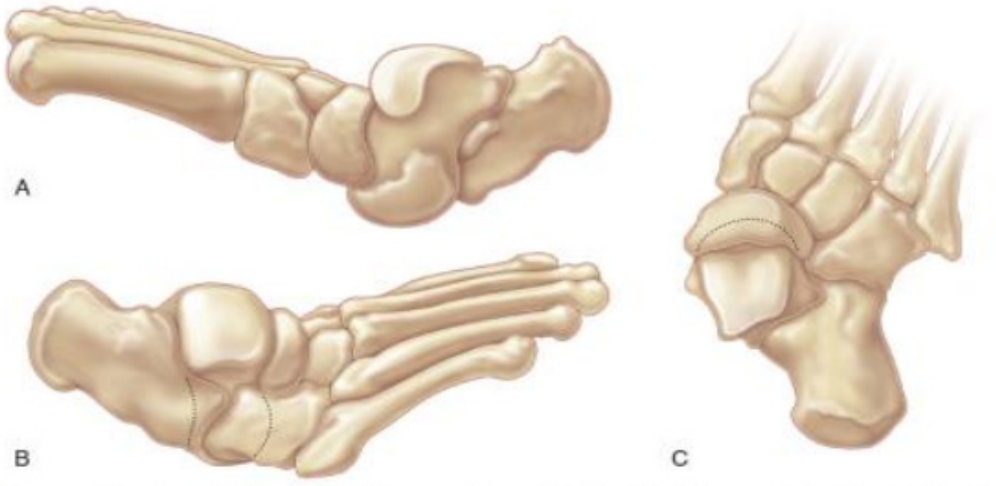


***Fig1.*** Bone and joint changes (pathoanatomy) in congenital vertical talus .**A** Medial aspect of the right foot showing dorsiflexion of the forefoot at the midtarsal joint; vertical talus, producing a rocker bottom convexity; subuxation of the navicular on the neck of the talus, which locks the talus vertically; and calcaneus in 20 to 25 degrees equinus.**B**, Lateral aspect of the right foot. Dotted lines indicate the displaced head of the talus. **C**, Dorsal aspect showing an abducted forefoot beginning at the midtarsus. Dotted lines indicate the head of the talus subluxed below the navicular bone. *(21)*

Within the ankle plafond, only the posterior one-third of the talar dome articulates as the calcaneus is plantarflexed and rotated posterolaterally. The sustenaculum tali is hypoplastic and provides no support to the talar head. The anterior and middle subtalar facets are either absent or replaced by fibrous tissue, and the posterior facet is misshapen with increased lateral tilt. The cuboid is laterally displaced. The plantar half of the cuboid may be hypotrophic when a large degree of dorsal subluxation or frank dislocation occurs through the entire transverse tarsal articulation.[5,19]

## *II.Ligamentous abnormalities*

These pathoanatomical changes are accompanied by alterations in the ligaments and muscles. The ligaments on the plantar surface of the talocalcaneonavicular joint are attenuated(Fig.2,3,4).

The calcaneonavicular (spring) ligament and the anterior fibers of the deltoid ligament are stretched. This stretching includes the medial fibers of the bifurcate ligament. There are contractures of the lateral portions of the dorsal talonavicular, calcaneofibular,interosseous talocalcaneal ligaments, and posterior capsules of the ankle and subtalar joints. [5,19]

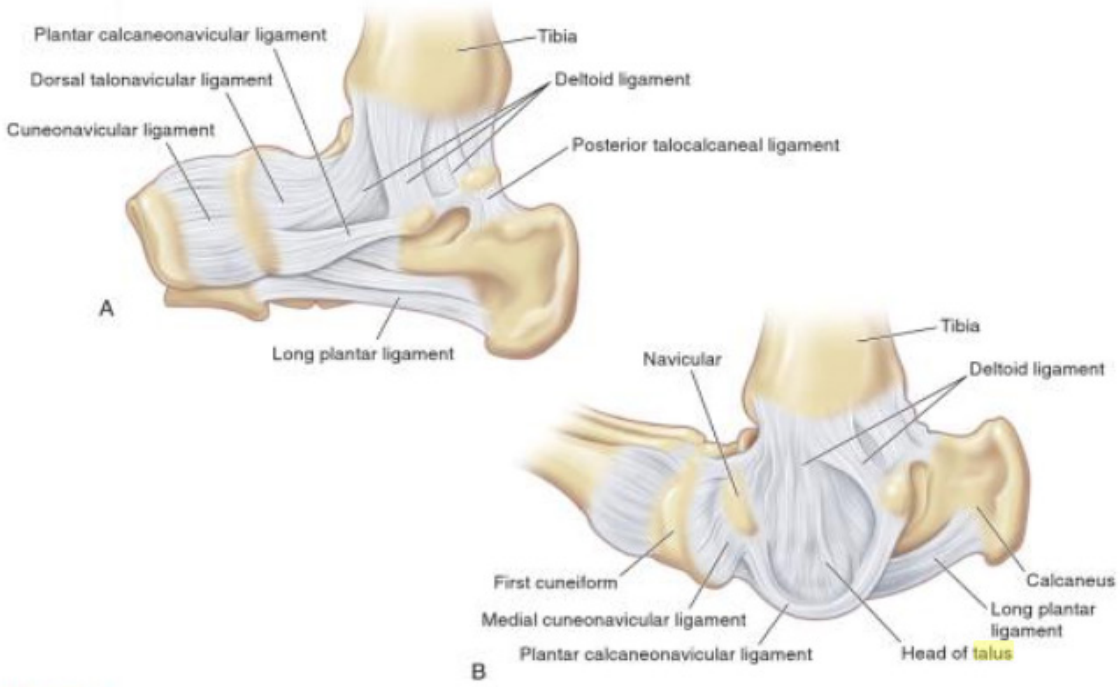


***Fig 2***. Ligamentous pathologic changes in congenital vertical talus– medial view: **A**, Normal foot. **B**, Malformed foot with congenital vertical talus (pes valgus) with stretching of the calcaneonavicular and deltoid ligaments. *(20)*


***Fig.3*** Ligamentous pathologic changes in congenital vertical talus -lateral view showing stretching of the bifurcate ligament and contracture of the calacaneofibular ligament .*(20)*