Idiopathic Congenital Vertical Talus (CVT)

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Abstract

CVT is a rare, severe, important deformity. This case report is to highlight the importance of deformity and early notification. Surgical correction as one stage procedure is probably the best procedure. CVT has no sex prevalence, bilateral in 50% of cases and more than 50% of cases a secondary cause implicated. Pathological anatomy involves dislocation of the talonavicular articulation with the os calcis. Navicular bone is displaced onto the dorsolateral aspect of the talus head. Diagnostic criteria for CVT were persistent talonavicular dislocation on forced plantar flexion of foot. Talus axis and metatarsal base axis angles (TAMBA) and Calcaneal Axis and metatarsal axis (CAMBA) are introduced. TAMBA and CAMBA enable us to describe the obliquity of the talus and calcaneus, also the severity of the dislocation of the talonavicular joint and the contracture of the tendon Achilli. The current treatment is a one-stage open reduction of the talonavicular dislocation, combined with a posterior release. A subtalar bone block is often imperative to maintain correction. The surgery for (CVT) can lead complications.

Objective

The object of this presentation is to highlight the importance of this severe and important deformity and early notification at admission in a school, if ignored by a parent then the assessment in school plays a role. Surgical correction as one stage procedure is probably the best procedure. Operative correction is recommended at the end of first year of age.

Introduction

A four and half years old boy admitted from Orthopedic OPD, for the complain of pain on walking, inability to run as compare to his elder brothers at similar ages. Parents noticed a cystic swelling at plantar aspect of foot but ignored, considered it insignificant. Physiological and radiological examination (Figure 1) confirmed an Idiopathic Congenital Vertical Talus which is not associated with any other deformity [1].

Figure 1: CVT and a parallel line along tibia to talus

He underwent Subtalar Arthodesis with fibular graft by Grice Green Approach by Ollier incision His ankle was immobilized for 6 weeks in a plaster cast. Follow up x-ray shows satisfactory correction of the deformity (Figures 2 and 3).
Discussion

Congenital Vertical Talus (congenital pes valgus, rijdrotckar-bottom flat foot, congenital flat foot with talonavicular dislocation), CVT is a rare deformity of foot [1-3]. It has no sex prevalence, bilateral in 50% of cases and right foot is affected more than left, it is an isolated deformity but in more than 50 % of cases a secondary cause implicated [3,4]. Radio logically it is defined as dorsal dislocation of the navicular bone on the talus. The exact etiology of CVT remains the mystery [5,6]. It may be due to arrest in the development of foot. CVT were classified into five groups in association with (1) Neural tube defects or spinal anomalies (myelomeningiocele, spina bifida), (2) neuromuscular disorders (cerebral palsy, Anterior Horn Cell Disease), (3) malformation syndromes (Freeman-Sheldon and Marfan's Syndrome), (4) chromosomal aberrations, (Down Syndrome, Trisomy 13-15) and (5) idiopathic CVT unassociated with any of the systemic conditions mentioned just above. Idiopathic CVT were sub classified into four groups: (5A) intrauterine molded or deformed cases, (5B) digtotaldarmorphism associated with contractile finger abnormalities and genetic inheritance,(5C) close relative had CVT or oblique talus(OT) deformity and (5D) unassociated with any skeletal deformity or genetic inheritance [7]. This condition requires surgical correction if left untreated, it result in a painful rigid flat foot with weak push off power [8,9] (Figure 4).

Pathological anatomy involves dislocation of the talonavicular articulation with the oscalcis also rotated in plantar-flexion. The navicular bone is displaced onto the dorsolateral aspect of the talar head. The ligaments and capsule on the plantar aspect are stretched where those on the dorso lateral surfaces are contracted. The long toe extensor and peronei are also foreshortened and bowstring occurs across the mid foot [5]. Calcaneus is in valgus and equinus with no anterior talocalcaneal articulation while talus is fixed in a vertical position with associated hypoplasia of the talar head and neck. Navicular articulates with the dorsal cortex of the talar neck. Tibionavicular and dorsal talonavicular ligaments are contracted precluding reduction of the navicular on the talus. Contracted calcaneo cuboid ligament caused forefoot abduction and posterior capsule and subtalar joint are contracted. Anterior tibial, extensor halluces longus, extensor digitorum longus peroneal, and Achilles tendons are contracted. Clinically there is convex deformity of planter aspect of foot. Heel is in valgus and equinates talar head can be felt on the medial plantar aspect of foot while forefoot is abducted and dorsiflexed at the midtarsal joint. Foot is fixed in this position due to the contractures of the soft tissue. Diagnostic criteria for CVT were persistent talonavicular dislocation on forced plantar flexion of OT (Oblique Talus) was diagnosed on reduction of the talonavicular dislocation on forced plantar flexion [1]. The talar and Calcaneal axis-- first metatarsal base angles (TAMBA and CAMBA) are introduced [7]. Normally, longitudinal axis of first metatarsal passes plant ward to long axis of talus. In CVT long axis of first metatarsal remains dorsal to long axis of Talus. In CVT the longitudinal axis of talus is almost parallel to tibia because of the extreme plantar-flexion of talus (Figures 1 and 2). Also, this position does not change when the radiograph is taken in maximum plantar-flexion, which enables us to describe not only the obliquity of the talus and calcaneus but also the severity of the dislocation of the talo navicular joint and the contracture of the tendon Achilli. The changing point from flexible OT to rigid CVT is TAMBA of about 60degrees and CAMBA of 20 degrees. The longitudinal axis of the first metatarsal passes dorsal to the head of talus. The angular relationship between talus and first metatarsal axis has been called the TAMBA (Talus axis and metatarsal base axis) angle [3] (Figure 5).
In oblique view the talus is plantar flexed like in the vertical talus with foot in neutral position but on plantar-flexion radiograph the long axis of talus and long axis of first metatarsal line up, thus a fixed deformity is ruled out. Hence, it is important to take a stress plantar-flexion radiograph in every suspected case of vertical talus of foot. Standard AP and lateral radiographs, and forced plantar flexion and dorsiflexion radiographs are required to confirm the diagnosis and to assess reducibility of the deformity [1,3,5]. Since the navicular is unossified at birth, the relationship between the talus and navicular is delineated by drawing lines through the longitudinal axis of talus and first metatarsal. The talar and Calcaneal axis—first metatarsal base angles (TAMBA and CAMBA) are introduced [1], which enable us to describe not only the obliquity of the talus and calcaneus but also the severity of the dislocation of the talonavicular joint and the contracture of the tendon Achilli. Normally, longitudinal axis of first metatarsal passes plant ward to long axis of talus. In CVT long axis of first metatarsal remains dorsal to long axis of Talus (Figure 2). The changing point from flexible OT to rigid CVT is TAMBA of about 60 degrees and CAMBA of 20 degrees. In CVT the longitudinal axis of talus is almost parallel to tibia because of the extreme plantar-flexion of talus (Figures 1 and 2). [10,11] this position does not change when the radiograph is taken in maximum plantar-flexion. The longitudinal axis of the first metatarsal passes dorsal to the head of talus. The angular relationship between talus and first metatarsal axis has been called the TAMBA (Talus axis and metatarsal base axis) angle [3] (Figure 6).

**Figure 5: TAMBA and CAMBA, under stress lateral view.**

**Figure 6: TAMBA & CAMBA Angles**

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The treatment of idiopathic vertical Talus has traditionally consist of manipulation and application of casts followed by extensive soft tissue releases.

Much discussion exists about the best operative technique to treat CVT.

A number of surgical procedures have been described like soft tissue procedures include posterior capsulotomy, tendon lengthenings (EHL, EDL, AT, Peroneal and Achilles tendons) and tendon transfers (split ATT and Peroneal tendon).

Bony procedures include excision of navicular, takedown and subtalar/triple arthrodesis. In the opinion of Bosker et al. [12] in children younger than 2 years, extensive release with lengthening of tendons and fixation procedures. In children 2 years older, extensive release with tendons transfer is the preferred procedure. When this procedure has failed, naviculectomy with extensive release and tendon transfer, or subtalar/triple arthrodesis must be considered. The widely accepted treatment of vertical talus after casting is correction by extensive surgery [9].

The goal of treatment is to reduce and maintain the anatomic relationship of the navicular and calcaneus to the talus. We recommend operative treatment for congenital vertical talus by the end of first year of age [2]. The current treatment is a one-stage open reduction of the talonavicular dislocation, combined with a posterior release. A subtalar bone block is often imperative to maintain correction [11].

**Complication**

The surgery for idiopathic congenital vertical talus (CVT) can lead to stiffness, wound complications and under or over correction [12].

**References**