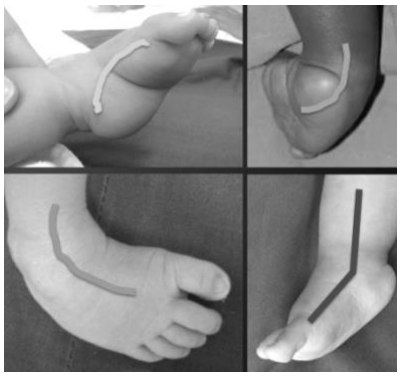
Clubfoot Overview

Clubfoot (CF) is one of the most common congenital anomalies in the extremities which is seen in 1 in 800 live births. The male-to-female ratio has been reported to be 2:1. Bilateral involvement is found in 30-50% of cases. There is a 10% chance of a subsequent child being affected if the parents already have a child with a clubfoot.

Clubfoot is characterized as having 4 deformities (clock-wise starting at upper left).



- midfoot Cavus
- forefoot Adductus
- hindfoot Varus
- hindfoot Equinus

Pathologic Anatomy:

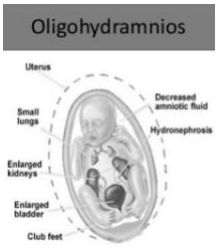
Intra-osseous abnormalities:

- Talus
    - plantarflexed, with the body externally rotated
    - the body of the talus is extruded anterolaterally and is uncovered and can be palpated
    - the neck of the talus is medially deviated and plantarflexed
- Calcaneus - Medial rotation and an equinus and adduction deformity are present
- Navicular - The navicular is medially subluxated over the talar head
- Cuboid - The cuboid is medially subluxated over the calcaneal head

Inter-osseous abnormalities:

- Atrophy of the leg muscles - number of fibers in the muscles is normal, but are smaller
- Contracted triceps surae, tibialis posterior, flexor digitorum longus (FDL), and flexor hallucis longus (FHL) tendons
- Contractures of the posterior ankle capsule, subtalar capsule, and talonavicular and calcaneocuboid joint capsules
- Contractures in the calcaneofibular, talofibular, (ankle) deltoid, long and short plantar, spring, and bifurcate ligaments

Classification according to Etiology



- Positional
    - secondary to positioning in utero
    - "packaging problem" - oligohydramnios
    - resolves on its own with stretching and manipulation

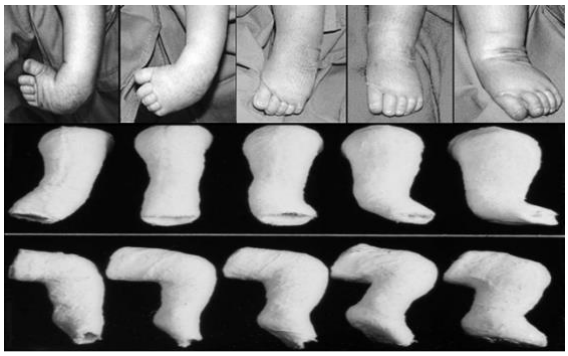
- Syndromic
    - as part of Arthrogryposis or Streeter's Dysplasia

- Neurologic
    - Cerebral palsy, meningocoele and Spina bifida

- Idiopathic (most common)
    - Unknown cause
    - Recently genetic origin
    - Single mutation PITX1 gene (transcription factor involved in early limb development)

Treatment

Treatment of clubfoot is serial casting using the Ponseti method. This method entails weekly manipulation and casting of the foot to gradually correct the deformities. Deformites are corrected in a step-wise fashion starting with the midfoot adductus followed by the midfoot adductus and hindfoot varus. The equinus deformity is the last one to be corrected usually (around 85%) but doing an achilles tendon tenotomy.



After the clubfoot deformity is corrected, the feet are placed in a foot abduction orthosis to maintain the position in its corrected state. The FAO is worn initially for 23 out of 24 hours for 3-4 months and is gradually weaned to wearing it only when asleep. FAO is maintained until the child is 4-5 years old.

References:

1. Tachdjian's Paediatric Orthopaedics 5th Edition
2. https://emedicine.medscape.com/article/1237077-overview
3. https://youtu.be/BrRVSbN7CCQ