Clubfoot

Clubfoot is a foot and ankle deformity caused by multifactorial congenital abnormalities or fetal position in the womb. Clubfoot may also be a symptom of a disorder such as cerebral palsy, spina bifida, chromosomal aberrations, or generalized joint immobility. The various types of clubfoot include talipes varus, talipes valgus, talipes equinus, and talipes calcaneus, with talipes equinovarus (TEV) being the most common form. The types of clubfoot are determined by the foot's abnormal positioning, such as inversion, eversion, plantar flexion, or dorsiflexion. Most cases of clubfoot involve a combination of these positions. Serial casting may be initiated shortly after birth to gradually stretch the tight skin and structures of the deformed foot. The Ponsenti method involves serial casting after birth with weekly gentle manipulation and stretching of the foot. Prior to walking, the child may undergo surgery to lengthen or release tight soft tissue structures and reposition deformed bones.



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Cause/Mechanism

Multifactorial Congenital Anomalies

Multiple Animal-anomalies Present-from-birth

Clubfoot is a common congenital abnormality caused by various genetic and environmental factors and affects boys twice as often as girls. The etiology of clubfoot may involve genetic predisposition, chromosomal anomalies, neuromuscular pathologies, and anomalies of the uterine environment during pregnancy. Clubfoot may be a symptom of problems affecting the nervous, muscular, and skeletal systems.

Fetal Position

Fetus Positioning-in-uterus

Abnormal fetal position in the womb during pregnancy may lead to the development of postural clubfoot. Usually mild, postural clubfoot is commonly corrected with serial casting with minimal residual effects.

Assessment

Deformed Foot and Ankle Position

Deformed Foot and Ankle

Deformed foot and ankle positions include foot inversion, eversion, plantar flexion, and dorsiflexion. A majority of cases involve a combination of various abnormal foot positions. The child is unable to maintain a neutral position of the foot. Although clubfoot is painless in infants, early intervention is critical in preventing significant ambulation problems as the child grows and develops.

Talipes Equinovarus

Tall-heels Horse

Talipes equinovarus (TEV), the most common type of clubfoot, presents with the child's forefoot inferior to the hindfoot. The child's plantarflexed foot appears small, wide, stiff, and "C-shaped" because of calcaneal inversion. A shortened Achilles tendon causes the foot to point downward and inward with an inverted heel. The leg of the affected foot appears small due to hypoplasia of the calf muscle.

Interventions

Serial Casting

Cereal Casting

Clubfoot, left untreated, may result in stiffening that affects the child's ability to walk. Serial casting is initiated shortly after birth before discharge from the nursery. The procedure promotes gradual stretching of the skin and tight structures on the medial aspect of the foot. Due to the rapid growth of early infancy, manipulation and casting are frequently performed each week over a period of 8-12 weeks. Since one position of the foot is usually addressed at a time, the inward direction of the foot is frequently corrected first.

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Ponseti Method

Spoon-setting Method

Ponseti Method involves serial casting after birth with weekly gentle manipulation and stretching of the foot. Usually, within 6-10 weeks, maximum correction is achieved. Often, a percutaneous heel cord tenotomy is done to correct equinus deformity. If this procedure is done, then a long-leg cast is applied and is left in place for 3 weeks.

Early Surgery

Early-sun Surgeon

Surgical intervention occurs before the infant begins to walk. The surgery is indicated to lengthen or release tight soft-tissue structures and reposition deformed bones as needed. After surgery, the infant is placed in a cast. Providing the infant's caregivers with instructions on how to protect the cast and check for neurovascular compromise is critical for preventing compartment syndrome (refer to the Picmonic on "Compartment Syndrome Assessment"). Assessing the infant's cast is especially important due to the rapid growth during early infancy.

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