

A Nonsurgical Approach to Treating Clubfoot (Talipes Equinovarus)

by Steven Koop, M.D.

Clubfoot (talipes equinovarus) occurs in approximately one of every 1,000 newborns. The congenital foot deformity primarily affects three bones: the calcaneus, talus and navicular. See Figure 1. The deformity can involve other bones and affect the growth of the entire foot.

Clubfoot, which can be bilateral, is often correctable if early intervention occurs. Beginning treatment when infants are 1 to 2 weeks old is ideal, because the tissues forming the ligaments, joint capsules and tendons are elastic and pliable.

Left untreated, clubfoot often causes children to develop unusual gaits. Such children typically place their weight on the side of the foot, rather than on the sole. As a result, they develop painful calluses, weakened calf muscles and other complications.

Clubfoot Treatment

Generally, the initial treatment for clubfoot — regardless of its severity — is nonoperative. The Ponseti method is a common, nonsurgical procedure that Gillette Children's Specialty Healthcare physicians (and other medical providers who are trained in the technique) use to correct idiopathic clubfoot, the most common congenital foot deformity.

In this article, we will highlight the phases of treatment using the Ponseti method. We also will discuss surgical treatment for clubfoot and mention some associated conditions that primary-care physicians and pediatricians might consider evaluating when there is a clubfoot diagnosis.

Diagnosing Clubfoot

Clubfoot is unmistakable; the appearance alone is usually enough to make a diagnosis. The foot is usually short and broad, and the heel points downward (equinus) while the forefoot turns inward (varus). See Figure 2. The Achilles tendon is tight. The heel can appear narrow, and the muscles in the calf are smaller than in a normal lower leg.

The twisted position of the foot causes the ligaments between the bones to contract. The joints between the tarsal bones do not move as they should, and the bones themselves are deformed.

Etiology of Clubfoot

The causes of clubfoot are unknown, but several theories might explain its occurrence. They include:

- The infant's foot stops growing at a certain point before birth.
- There is pressure on the infant's foot in the mother's womb.
- One of the bones in the foot does not form correctly, causing the remainder of the foot to twist.
- Some of the muscles form abnormally, causing bones to twist.

Prevention of clubfoot is not possible.

Figure 1

Image courtesy of Medical Multimedia Group (www.eorthopod.com).

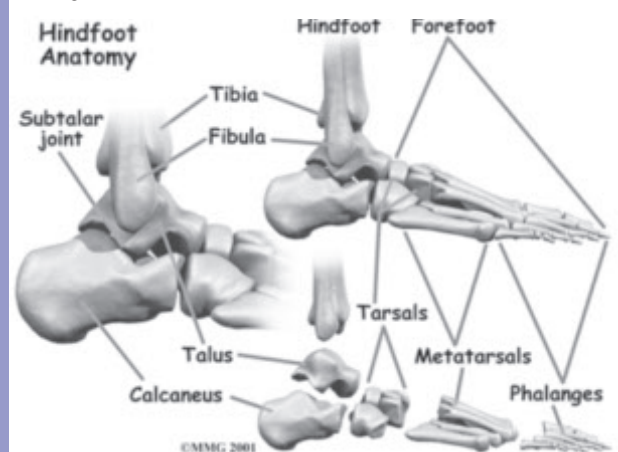


Figure 2

Image courtesy of Medical Multimedia Group (www.eorthopod.com).



Physicians can diagnose clubfoot prenatally using ultrasound. About 10 percent of clubfeet can be diagnosed as early as 13 weeks. By 24 weeks' gestation, about 80 percent of clubfeet can be diagnosed.

When a diagnosis of clubfoot is made — whether during the prenatal stage or after birth — consultation with an orthopaedic surgeon or a provider trained in clubfoot correction will help families understand the treatment and expected outcome.

Benefits of Ponseti Method

Gillette's pediatric orthopaedic surgeons often employ the Ponseti method as the initial treatment of clubfoot because of the procedure's ability to deliver excellent correction without surgery.

Moreover, studies show that patients treated with the Ponseti method enjoy a more flexible foot and ankle than do those treated surgically. Long-term studies of the Ponseti method have demonstrated that cast correction of clubfoot helps dramatically, not only during childhood but also in adulthood.

It is important to note that, even if surgery for clubfoot becomes necessary, manipulation and casting techniques should precede surgery. Techniques, such as the Ponseti method, begin the process of guiding the foot toward a more normal form.

Ponseti Method

Developed in the 1940s by Ignacio Ponseti, M.D., orthopaedic surgeon, the Ponseti method entails weekly foot manipulations and multiple plaster-cast applications. The total duration of treatment with the Ponseti method is typically less than three months.

In 95 percent of clubfoot cases, physicians can accomplish successful correction using the Ponseti technique alone. In some instances, subsequent surgery is necessary to correct clubfoot abnormalities. The long-term goal of this treatment — and other clubfoot therapies — is to correct the clubfoot and maintain as normal a foot position as possible while facilitating normal growth and development of the child.

Casting and Manipulation

In the Ponseti method, physicians apply casts to an infant's feet and legs, holding the foot in the corrected position and allowing it to gradually reshape. Generally, a child needs five to six sequential casts to fully correct the alignment of the foot and ankle.

Before treatment, the marked curvature of the foot — called a cavus deformity — is characterized by a visible crease in the midsection of the foot. The first cast application corrects this foot deformity by aligning the forefoot with the hindfoot.

Gillette orthopaedic surgeons usually apply the first cast in two stages. First, a short-leg cast is applied to just below the infant's knee. Once the plaster sets, the cast is extended above the knee. Ponseti emphasizes the importance of long-leg casts to maintain adequate stretching of tendons and ligaments.

After each cast removal, a short period of manipulation occurs before a new cast is set. Weekly casting and manipulation techniques continue for four to six weeks to gradually straighten the forefoot, allowing it to move in line with the heel. After the application of four to five casts, normal position of the foot will become visible. See Figure 3.

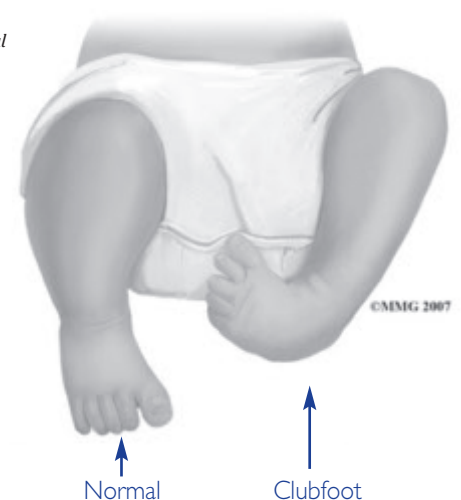
Achilles Tenotomy

A large majority of children with clubfeet require a percutaneous tenotomy of the Achilles tendon before the final cast is set. In children with clubfoot, this tendon is shortened, preventing the ankle from flexing properly. In the Ponseti technique, such lengthening is accomplished with a percutaneous surgical release of the tendon. The procedure is quick, typically done through a small puncture under local anesthesia.

After a percutaneous Achilles tenotomy, physicians apply the final long-leg cast for three weeks, allowing the Achilles tendon to heal.

Figure 3

Image courtesy of Medical Multimedia Group (www.eorthopod.com).



Maintenance Phase

For three months after removing the final cast, the infant wears an orthosis for 23 hours per day. After that, infants wear the orthosis while sleeping, usually until around age 3 or 4, thus maintaining the foot in its correct position. The orthosis, called a foot abduction brace, consists of a bar with high-top, open-toed shoes attached to its ends. Recurrence rates are extremely low when parents and caregivers employ the bracing regimen accurately.

The risk of recurrence persists for several years after casting is complete. Early recurrences — before age 1 — are best treated with several long-leg plaster casts applied at two-week intervals.

Surgery

A small percentage of infants with short, portly feet and stiff ligaments that do not yield to stretching might need surgical correction. Children who present for treatment after 4 or 5 months of age also might require operative correction because their ligaments are less malleable than those of newborns are. It is always reasonable to apply a series of casts in the hope of gaining correction and minimizing surgery. Sometimes surprising corrections can be gained, and surgery can be limited to percutaneous tendoachilles lengthening.

In principle, however, the longer a foot has gone untreated, the more difficult it will be to correct, because soft tissues become less pliable and bony structures begin to change their shapes. More extensive surgeries to improve dorsiflexion or to realign bony structure are sometimes necessary.

Associated Conditions and Prevalence

Several conditions are linked to clubfoot. Primary-care physicians and pediatricians might consider evaluating children who have clubfeet for developmental dysplasia of the hip and for neuromuscular disorders, including cerebral palsy, spina bifida, arthrogyposis and myelodysplasia.

Clubfoot can be transmitted genetically. If one parent was born with clubfoot, offspring have a 3- to 4-percent chance of being affected. When both parents had clubfoot, each child of that couple has a 15-percent chance of being affected. Clubfoot affects boys twice as often as girls.

Author's PROFILE



Steven Koop, M.D., is a pediatric orthopaedic surgeon at Gillette Children's Specialty Healthcare. He treats children who have various orthopaedic issues as a result of cerebral palsy, spina bifida and other conditions. Koop

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Koop received his bachelor of arts degree from St. John's University in Collegeville, Minn., and his medical degree from the University of Minnesota Medical School. At the University of Minnesota/Minneapolis Veteran's Administration Hospital, Koop completed an orthopaedic surgery residency. He completed a pediatric orthopaedic fellowship at Newington Children's Hospital in Newington, Conn.

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