



**PONSETI METHOD FOR
CLUBFOOT CORRECTION:**
A Parent's Guide

Children's
HOSPITAL • ST. LOUIS
BJC HealthCare



What is Clubfoot?

Clubfoot refers to a foot deformity that is diagnosed at birth, or in some instances, by prenatal ultrasound.

Clubfoot can be corrected soon after birth and with proper treatment, the foot can look and function normally.

Most children born with clubfoot have no other congenital problems. When clubfoot occurs without other problems, it is referred to as idiopathic (“unknown” cause). Clubfoot may be associated with a chromosomal abnormality, as a part of a syndrome (collection of other birth defects), or neuromuscular disorder that secondarily disrupts the structure of the foot. Medical examinations by your doctor or blood tests should be able to determine whether your baby’s clubfoot is idiopathic.



Although clubfoot can be mild or severe, all cases require a proper medical evaluation. Clubfoot will not resolve on its own. The clubfoot is not painful to the infant who does not yet walk. However, if left untreated, a child will learn to walk on the outer edge of the foot instead of the sole, develop painful calluses, be unable to wear shoes and have lifelong painful feet that often severely limit activity and employment.

How Often Does Clubfoot Occur?

About one baby in 1,000 in the United States is born with clubfoot. The occurrence does vary with ethnicity. People of Chinese descent have the lowest occurrence, with 0.39 cases per 1,000 live births, whereas Polynesians have the highest occurrence at 6.5 to 7 per 1,000 live births. The ratio of clubfoot among males to females is 2:1 across ethnic groups. Both feet are affected in 50 percent of clubfeet cases, and when one side is affected, the right side is more frequently involved than the left.



BEFORE



AFTER

Example of Ponseti method results

What Causes Clubfoot?

Though the cause of clubfoot is still unknown, a genetic basis is likely. Other theories include:

- Abnormal stunting of foot development prior to birth.
- Abnormality of nerves, vessels or muscles in the leg and foot that causes the abnormal development.
- Exposure to unknown environmental chemicals or medications.

Unfortunately, there currently is no method of preventing clubfoot. It is unlikely that anything that occurred during pregnancy caused the foot deformity.

Clubfoot and Research Initiatives

Families often question if clubfoot is inherited. There is a positive family history of clubfoot in approximately 25 percent of all patients, suggesting a genetic basis for this disorder. If one child in the family has clubfoot, the chance of a second child being born with clubfoot is around five percent. Dr. Dobbs and his team at St. Louis Children's Hospital are at the front edge of

discovering the genetic factors responsible for clubfoot. By studying DNA from families from around the world, the team has already identified several genes implicated in clubfoot. Our ultimate goal is to work on a preventive strategy. As a patient in our clinic, you will likely be invited to participate in this important research.



As co-director of the Washington University Musculoskeletal Genetics Laboratory, Dr. Dobbs and his team conduct ongoing research that will benefit both medical professionals and patients to make treatment less invasive, more efficient and provide better long term outcomes.

How is Clubfoot Treated Using the Ponseti Method Instead of Surgery?

Ideally, non-surgical treatment (Ponseti method) is started as soon as possible after birth. Treatment consists of gentle stretching of the clubfoot to stretch the contracted tissues. A long leg plaster cast is then applied. The cast is designed to go above the knee because the baby can kick off a short cast. The cast is removed and reapplied every 1 or 2 weeks. On average, five casts are required to correct the clubfoot. The casting process continues for approximately 4 to 6 weeks.

You will want to check the toes in the cast periodically. The top of the toes should be exposed. When the baby is calm and has not had the legs dangling, the toes should be pink. If you cannot see the toes, it may mean the cast has slipped and correct reduction is not being maintained. The slipped cast will need to come off as soon as possible or you may need to soak it off at home. Always try to speak with our nurse if you think a cast needs to be removed (if possible, before removing it). After hours or on the weekend, call the hospital and ask for the orthopedic surgery resident on call.



Left to right: Dr. Dobbs and Dr. Ponseti

Cast Removal

If the cast has to be removed due to poor circulation or the toes are no longer visible, you may need to soak off the cast at home. Submerge and soak the cast in warm soapy water for 15-20 minutes. After soaking, the plaster will begin to break apart. Remove by unwrapping carefully.



Heel Cord Tenotomy and Cast Application

Heel Cord Tenotomy

Before application of the final cast, the baby is measured for the brace and will have a minor procedure to lengthen the Achilles tendon heel cord. The doctor performs the tendon lengthening procedure in the clinic under local anesthesia. A few drops of blood may stain the back of the cast, but no stitching is required because the incision is so small. The last cast stays on for three weeks to allow the tendon to heal.

Complex Idiopathic Clubfeet

A small percentage of idiopathic clubfeet are more resistant to treatment and are termed complex idiopathic clubfeet. These feet tend to be stiffer and have a characteristic appearance. However, using a modified Ponseti manipulation and casting technique, correction can be achieved.

Use of the Ponseti Method in Older Children

Some older patients visit our clinic for the first time (1-12 years of age) who have received no previous treatment, alternative casting methods resulting in undercorrected clubfeet, or major surgical reconstruction that resulted in a relapse. We apply the Ponseti method successfully in these difficult situations. There is no patient with clubfoot for whom the Ponseti method should not be attempted.

AFO (ankle foot orthosis) brace



What is Involved in Post-operative Care?

Three weeks after the final cast is removed, your child is fitted into a brace (foot abduction orthosis) designed to prevent the clubfoot deformity from recurring. Even when well corrected, the clubfoot has a tendency to relapse until the age of approximately four years. The brace must be worn as prescribed to prevent relapse. If worn as prescribed, there is a 95 percent chance that no other treatment will be necessary. Use of the brace will not cause developmental delays of your child. Children will still learn to crawl and walk even in the brace.

The brace consists of a custom molded insert with an AFO (ankle foot orthosis). The AFOs are attached to an articulating aluminum bar with adjustable footplates. The orientation of the footplates to the bar is set by the orthotist. Parents will be instructed on use of the brace in the clinic.

Wearing Schedule:

It is absolutely necessary that the brace be worn 23 hours a day for three months and then 12-14 hours a day (naps and nighttime) for 3-4 years.

Stretching

You will also be taught stretching exercises for your child's foot that are to be done four times a day to maintain ankle flexibility. Begin with five repetitions and work up to 40 repetitions – four times a day. Be consistent with the stretching. Distract your child by singing or playing while stretching and they will adjust to the exercises within a month. Pictures on page 13 of this booklet demonstrate the stretching exercises.

Brace wear and stretching are critical in maintaining the correction of your child's feet.

You must be consistent with NIGHTTIME brace wear early in the treatment process, since the child will wear the brace only at night when he/she begins to walk.



Brace Wearing Instructions:

1. Always use cotton socks that cover every place the foot and leg touch the AFOs. Your baby's skin may be sensitive after the last casting, so you may want to use two pairs of socks for a few days. After the second day try and use only one pair of socks. Change socks if feet are damp from sweat. **Do not** use lotions, as they can cause the brace to slip.
2. Hold the foot into the AFO and tighten the middle strap first. The strap helps keep the heel firmly down in the brace.
3. Check that the child's heel is securely down in the AFO by pulling up and down on the lower leg. If the heel slips, you must retighten the middle strap. Once the feet are securely in the brace, the nurse will mark the location of the toes; the toes will be at or beyond this line if the heel is down.

4. If possible, try to have additional help or support at home for the first few days after bracing is initiated as your child may be irritable, and require time to adjust to the brace. It is important to check your child's feet several times a day after initiating the bracing to ensure no blisters are developing on the heel. It is not uncommon to need brace adjustments during the first week.

Helpful Tips:

1. Expect your child to fuss in the brace for the first two days. This is not because the brace is painful, but because it is something new and different.
2. Play with your child in the brace. This is the key to getting over the irritability quickly. Though the articulating bar allows for independent movement, it is helpful to teach your child this by gently moving the legs up and down.
3. Make it a routine. Children do better if you develop a fixed routine for the brace wear. During the four years of night/naptime wear, put the brace on anytime your child goes to the "sleeping spot." They will figure out that when it is "that time of day" they need to wear the brace. Your child is less likely to fuss if this is a consistent routine.
4. Pad the bar. A bicycle handle bar pad works well for this. By padding the bar you will protect your child, yourself, and your furniture from being hit by the bar when the child is wearing it.



5. Never use lotion on any red spots on the skin. Lotion will make the problem worse. Some redness is normal with use. Bright red spots or blisters, especially on the back of the heel, usually indicate that the heel is slipping. Ensure the middle strap is tight enough to secure the foot.
6. If your child continues to escape from the brace try the following (check after each step to see if the heel is down, if not proceed to the next step):
 - a. Tighten the middle strap first, using your thumb to hold the foot and the tongue piece in place.
 - b. Try double-socking or place one sock under the insert and one on top to help pad and take up excess room in the AFO.
 - c. Remove the tongue of the insert (use of the orthosis, without the tongue, will not harm your child).
 - d. Try thinner or thicker cotton socks or the ones with letters on the sole.
 - e. Call your nurse for other ideas.

What is Involved with Follow-up Care?

Regular clinic visits are important after surgery. During the bracing years, your child will visit us every three months for a clinical examination and to ensure that the brace is fitting well. Noncompliance with bracing may lead to recurrence. Approximately every six months, your child will outgrow the brace and require a new one. Periodically, an x-ray of your child's feet and legs will be done to ensure good correction is maintained.





IMPORTANT:

If your child stops wearing the brace, he or she will lose correction and potentially require additional casting and/or surgery. It is critical to wear the brace for the prescribed amount of time.

How Can You Help Care for Your Child in a Cast?

Feeding

When feeding the baby on your lap, place a small pillow or folded blanket between yourself and the baby's cast. This will keep the cast from hurting you when the baby kicks.

Dressing

Traditional clothing with attached footwear is usually not large enough to cover casts. Sweat suits or loose-fitting jogging clothes work well. Pants with snaps or velcro closures on the inner leg seam often make dressing easier.

Extra large socks help keep toes warm in cold weather. Remember that the cast keeps the leg warm. Thus, legs and feet tend to sweat if too much clothing is used. Try not to over-dress your child.

Bathing

Sponge baths must be given while the baby is in a cast. Careful attention to the diaper area is needed since the baby cannot be placed in the water. In no case should the child be allowed to get into the tub or

shower. Keep cast edges out of the diaper. Be sure to use the correct size diaper to keep leakage from the top of casts.

Safety

Check car seats, swings, carriers and other baby equipment to make sure the casts do not keep safety belts, pads and other safety equipment from working properly. Check to see that the additional weight of the cast does not overbalance an infant seat used on the floor or in a grocery cart. Beware of the length of time the child's legs are hanging down when sitting and check for swelling of the toes.

Sleep

Casts do not normally cause sleeping problems. However, if the baby is ill or teething, the casts may make it harder for the baby to get in a comfortable position to fall asleep.

Playing and Cuddling

The baby will be heavier and a little harder to hold but still needs lots of hugging and cuddling. Be sure to use only toys that are approved for the baby's age.

Positioning

Repositioning often can help a fussy baby. Elevate casts and legs for added comfort. Use a rolled up blanket or towel to elevate brace and or casts for comfort.

Mobility

Wagons, strollers, carriers and other equipment for mobility are very useful. Make sure the child is strapped in safely. Babies almost always enjoy motion and often a short ride will comfort them when fussy. Remember to limit time with legs dangling to decrease swelling and discomfort.



If any cast or brace problems occur,
please call and notify your nurse
314.454.2065

Or call the medical assistant
314.454.4192

If it is an emergency after hours
you can call **314.454.6000**
and ask for the orthopedic resident on call

Homecare Instructions

Your child should not stand or walk in the cast. If casts crack or break down, use heavy tape to support the cast until you can return to the clinic.

Daily Care:

1. Sponge bath
2. Check skin around cast edges for redness or sores
3. Look for signs of infection or pressure.
4. Keep cast clean and dry

Signs of infection:

1. Swelling
2. Redness
3. Severe pain
4. Foul odor

Signs of cast pressure:

1. Loss of movement – baby does not wiggle toes
2. Toes become white or bluish in color
3. Toes become cold to touch
4. Toes slip back into cast

Cast problems:

1. Cast slips or comes off
2. Cast cracks, breaks or has soft spot
3. Object gets into cast

How Can You Help Stretch and Exercise Your Child?

FIGURE 1



Exercise: Ankle Dorsiflexion

Starting position: Lay child on back.

Place one hand on your baby's flexed knee (Fig. 1). Grasp your baby's foot with the palm of your other hand placing your index finger above the heel. Now you can gently flex the ankle up and extend it down.

Motion: Pull heel down and bend ankle as much as possible (Fig 2).

FIGURE 2

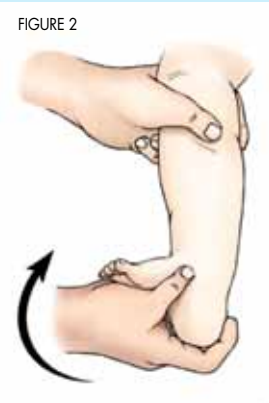


FIGURE 3



Exercise: Ankle Inversion and Eversion

Starting position: Lay child on back.

Hand placement: Stabilize with one hand on leg just above the ankle. (Fig. 3).

Motion: At the base of the big toe use other hand to turn foot in (Fig. 3).

Motion: Stretch forefoot out (Fig. 4).

FIGURE 4



St. Louis Children's Hospital

St. Louis Children's Hospital, located in the heart of mid-town St. Louis, is a nationally recognized hospital for the care of children from infancy through young adulthood.

The hospital draws patients from across the United States and around the world. Founded in 1879, the hospital is ranked by *Child* magazine and *U.S. News & World Report* as one of the top children's hospitals in the country.

Children's Hospital holds the nation's highest honor for nursing excellence, the Magnet designation from the American Nurses Credentialing Center. To date, just four percent of the nation's 5,000 hospitals have Magnet status.

Physicians at the hospital are faculty members of Washington University School of Medicine. Ranked among the best medical schools in the country, Washington University's faculty excels in patient care, medical research and teaching.

The School of Medicine and St. Louis Children's Hospital are affiliated with the Alvin J. Siteman Cancer Center, a National Cancer Institute-designated center for premier cancer research and treatment.



For more information, call:

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