CONDITION

Clubfoot

Learn how clubfoot affects a baby's foot, how it is diagnosed, and how casting, bracing, and surgery can support long-term movement.

WHAT IT IS
Congenital inward and downward foot deformity

BODY SYSTEM
Bones, joints and muscles

MAIN SYMPTOMS
Inward and downward foot, raised heel, deep sole crease, limited foot movement

WHAT CAUSES IT
Unknown, with genetic and environmental factors

HOW IT IS DIAGNOSED
Physical examination after birth

MAIN TREATMENT
Ponseti casting and bracing, sometimes surgery

CAN IT BE CURED?
Sometimes - correction may recur during growth

IS IT AN EMERGENCY?
Sometimes - cold, pale or blue toes

LONG-TERM OUTLOOK
Most children can take part in everyday physical activities

Overview

Clubfoot is a condition present at birth in which one or both feet are turned inward and downward. Its medical name is congenital talipes equinovarus. "Congenital" means present at birth. "Equinovarus" describes the foot's downward and inward position.

Clubfoot affects more than the visible position of the foot. The bones, joints, muscles, tendons, and ligaments may all develop differently. The Achilles tendon, which connects the calf muscles to the heel, is often tight. The affected foot and calf may be smaller than those on the other side.

A true clubfoot is usually stiff and cannot simply be moved into a normal position. This is different from a flexible foot that was temporarily held in an unusual position before birth.

Clubfoot is not painful in a newborn. Without treatment, however, a child may eventually walk on the side or top of the foot. This can lead to skin problems, difficulty wearing shoes, pain, and reduced mobility.

Treatment usually begins during the first weeks of life, when a baby's tissues are flexible. The Ponseti method, which uses gentle stretching, a series of casts, and bracing, is the standard approach for most infants. Some children need additional procedures or surgery. With appropriate treatment and follow-up, most children can take part in everyday physical activities.

Symptoms

The main sign is the position and shape of the foot. Clubfoot can affect one foot or both feet.

Typical features include:

The foot may appear upside down in a more pronounced case. Even when the appearance is striking, the condition generally does not cause pain in a newborn.

Some babies have a flexible inward curve of the front of the foot rather than clubfoot. This may be metatarsus adductus, a different condition that often improves as a child grows. A clinician can examine the foot to tell whether the position is flexible or fixed.

- A foot turned inward and downward
- A heel that is raised or turned inward
- A deep crease on the sole or inside of the foot
- Limited ability to move the foot into a normal position
- A smaller foot or thinner calf on the affected side
- Tightness in the Achilles tendon

Causes and risk factors

The exact cause of isolated, or idiopathic, clubfoot is not fully understood. Idiopathic means that the condition is not linked to another recognized disorder. Research suggests that a combination of genetic and environmental factors affects how the muscles, tendons, and bones of the lower leg and foot develop.

Clubfoot can run in families, although many affected babies have no known family history. It is seen more often in boys than in girls. Smoking during pregnancy has also been associated with

a higher chance of clubfoot, particularly when there is a family history. An association does not prove that one factor directly caused the condition.

Clubfoot is generally not caused by the way a pregnant person slept, exercised, or held their body. It is also not caused by anything a parent did while caring for the newborn.

Sometimes clubfoot occurs with another medical condition. Examples include spina bifida, which affects development of the spine and nerves, and arthrogryposis, which causes stiffness in multiple joints. These forms may be more rigid and may respond differently to treatment.

A baby with clubfoot should therefore receive a complete physical examination. This helps the care team determine whether the foot difference appears isolated or may be part of a broader condition.

Diagnosis

Clubfoot may be seen during a prenatal ultrasound, sometimes during the middle part of pregnancy. Ultrasound uses sound waves to create images of the developing baby. A prenatal finding allows families to learn about treatment and, when available, meet a pediatric orthopedic specialist before birth.

Ultrasound cannot always distinguish true clubfoot from temporary positioning. It also cannot reliably predict how stiff the foot will be or exactly how much treatment will be needed. The diagnosis is confirmed by examining the baby after birth.

During the examination, a clinician looks at the position, shape, and flexibility of each foot. The clinician may gently move the foot to assess how easily it can be corrected. The legs, hips, spine, muscles, and reflexes may also be checked for signs of another condition.

X-rays and other imaging tests are not routinely needed for a typical newborn clubfoot. Much of a newborn's foot is still cartilage, which does not show clearly on an X-ray. Imaging or additional testing may be considered when the appearance is unusual, treatment is not progressing as expected, or another diagnosis is suspected.

Treatment and management

Treatment aims to place the foot in a functional position, preserve movement, and allow comfortable use of ordinary shoes. The exact plan depends on the child's age, foot stiffness, other medical conditions, and response to treatment.

For most babies, treatment starts soon after birth with the Ponseti method. A clinician gently

stretches the foot toward a more typical position and applies a cast from the toes to the upper thigh. The cast holds the correction while the tissues adjust.

The cast is usually changed at regular, often weekly, appointments. At each visit, the foot is stretched a little farther before a new cast is applied. Several casts are commonly needed. The process should use gentle positioning rather than forceful manipulation.

After casting, many babies still have a tight Achilles tendon that keeps the heel from lowering. A small procedure called an Achilles tenotomy may be recommended. During this procedure, the tendon is released through a very small opening. A final cast is then used while the tendon heals in a lengthened position. The care team will explain pain control and where the procedure will take place.

Correcting the foot is only the first stage. Clubfoot has a strong tendency to return as a child grows, so bracing is a central part of treatment.

A foot-abduction brace usually has shoes or boots connected by a bar. It holds the feet turned outward while allowing the child to move the legs. A common schedule involves wearing the brace most of the day for the first few months after casting, followed by use during naps and nighttime until about age 4 or 5. The treating specialist may adjust this schedule.

The brace should fit securely without causing sores. It does not usually delay sitting, crawling, or walking. Families should contact the treatment team if the heel repeatedly slips out, the skin becomes damaged, or the child cannot tolerate the brace despite fit checks and support. Stopping the brace early increases the chance that the foot will turn inward again.

Some centers use other stretching and taping programs, but the Ponseti method is the main first-line approach in many health systems.

Surgery may be considered when a foot remains rigid, returns despite appropriate casting and bracing, or is associated with another condition. The operation may involve lengthening or moving tendons, releasing tight tissues around joints, or correcting bone alignment. Older children with a recurring inward pull during walking may benefit from transferring a tendon to improve muscle balance.

More extensive surgery can correct severe deformity, but it may also lead to stiffness, scarring, or weakness. For this reason, specialists generally use the least invasive treatment that can produce a stable, functional foot.

Complications

Untreated clubfoot can interfere with standing and walking. A child may bear weight on the outside or top of the foot rather than the sole. This may cause thickened skin, pressure sores,

pain, difficulty finding shoes, and limits on activity.

The most common long-term concern after treatment is recurrence. Signs may include the heel lifting off the ground, the foot turning inward, reduced ankle movement, or walking on the toes or outer edge of the foot. Recurrence does not mean that the initial treatment failed. Growth can cause tightness to return, especially if bracing is interrupted.

Casting can sometimes cause skin irritation, swelling, or pressure injury. A cast that slips may stop holding the foot correctly. Procedures and operations also carry risks such as infection, bleeding, scarring, stiffness, or the need for additional treatment.

Even after successful treatment, the affected foot or calf may remain somewhat smaller. Minor differences in foot size, ankle motion, or calf strength do not necessarily prevent normal play, sports, or daily activities.

Follow up

Regular follow-up is important throughout casting, bracing, and early growth. During routine visits, the care team checks foot position, ankle movement, skin condition, brace fit, and later, the child's walking pattern. Growing children may need new brace shoes or other equipment.

Keep all scheduled cast changes. Contact the orthopedic team promptly if a cast becomes wet, cracked, loose, or slips down. The team should also be contacted if there is a foul smell, drainage, a new skin sore, persistent swelling, or unusual distress that may indicate pressure under the cast.

Seek urgent medical advice if the toes become increasingly swollen, cold, pale, or blue, or if the baby stops moving them normally. If these signs are severe, do not improve after following the cast team's instructions, or medical advice is not quickly available, seek emergency care because circulation may be affected.

Changes that develop gradually, such as the foot beginning to turn inward again or the heel lifting during walking, usually require a routine but timely orthopedic appointment rather than emergency care. Earlier assessment may allow recurrence to be managed with stretching, repeat casting, brace changes, or a smaller procedure.

Sources

- American Academy of Pediatrics. "Diagnosis and Treatment of Idiopathic Congenital Clubfoot." Pediatrics . 2022;149(2):e2021055555.



- American Academy of Orthopaedic Surgeons. "Clubfoot." OrthoInfo .
- Centers for Disease Control and Prevention. "About Clubfoot." Birth Defects .
- Pediatric Orthopaedic Society of North America. "Clubfoot." POSNA Study Guide .
- National Health Service. "Club Foot." NHS Health A to Z .
- Dobbs MB, Gurnett CA. "Update on Clubfoot: Etiology and Treatment." Clinical Orthopaedics and Related Research . 2009;467(5):1146-1153.