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## Clubfoot

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### Clubfoot

#### Definition

Clubfoot is a condition in which one or both feet are twisted into an abnormal position at birth. The condition is also known as talipes or talipes equinovarus.

#### Description

True clubfoot is characterized by abnormal bone formation in the foot. There are four variations of clubfoot, including talipes varus, talipes valgus, talipes equines, and talipes calcaneus. In talipes varus, the most common form of clubfoot, the foot generally turns inward so that the leg and foot look somewhat like the letter J. In talipes valgus, the foot rotates outward like the letter L. In talipes equinus, the foot points downward, similar to that of a toe dancer. In talipes calcaneus, the foot points upward, with the heel pointing down.

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Clubfoot can affect one foot or both. Sometimes an infant's feet appear abnormal at birth because of the intrauterine position of the fetus birth. If there is no anatomic abnormality of the bone, this is not true clubfoot, and the problem can usually be corrected by applying special braces or casts to straighten the foot.

The ratio of males to females with clubfoot is 2.5 to 1. The incidence of clubfoot varies only slightly. In the [United States \(/places/united-states-and-canada/us-political-geography/united-states\)](/places/united-states-and-canada/us-political-geography/united-states), the incidence is approximately 1 in every 1,000 live births. A 1980 Danish study reported an overall incidence of 1.20 in every 1,000 children; by 1994, that number had doubled to 2.41 in every 1,000 live births. No reason was offered for the increase.

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## Causes and symptoms

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Experts do not agree on the precise cause of clubfoot. The exact genetic mechanism of inheritance has been extensively investigated using family studies and other epidemiological methods. No definitive conclusions have been reached as of the early 2000s, although a Mendelian pattern of inheritance is suspected. This may be due to the interaction of several different inheritance patterns, different patterns of development appearing as the same condition, or a complex interaction between genetic and environmental factors. The MSX1 gene has been associated with clubfoot in animal studies. As of the early 2000s, however, these findings have not been replicated in humans.

A family history of clubfoot has been reported in 24.4% of families in a single study. These findings suggest the potential role of one or more genes being responsible for clubfoot.

Several environmental causes have been proposed for clubfoot. Obstetricians feel that intrauterine crowding causes clubfoot. This theory is supported by a significantly higher incidence of clubfoot among twins compared to singleton births. Intrauterine exposure to the drug misoprostol has been linked with clubfoot. Misoprostol is commonly used when trying, usually unsuccessfully, to induce abortion in [Brazil \(/places/latin-america-and-caribbean/south-american-political-geography/brazil\)](#) and in other countries in South and [Central America \(/places/latin-america-and-caribbean/latin-american-and-caribbean-physical-geography/central-america\)](#). Researchers in [Norway \(/places/germany-scandinavia-and-central-europe/scandinavian-political-geography/norway\)](#) have

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reported that males who are in the printing trades have significantly more offspring with clubfoot than men in other occupations. For unknown reasons, **amniocentesis**, a prenatal test, has also been associated with clubfoot. One international study published in 2004 reported that amniocentesis done at 13 weeks of gestation was associated with a fourfold increase in the risk of clubfoot. The infants of mothers who smoke during **pregnancy** have a greater chance of being born with clubfoot than are offspring of women who do not smoke.

True clubfoot is usually obvious at birth. The four most common varieties have been described. A clubfoot has a typical appearance of pointing downward and being twisted inwards. Since the condition starts in the first trimester of pregnancy, the abnormality is quite well established at birth, and the foot is often very rigid. Uncorrected clubfoot in an adult causes only part of the foot, usually the outer edge, or the heel or the toes, to touch the ground. For a person with clubfoot, walking becomes difficult or impossible.

## Diagnosis

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True clubfoot is usually recognizable and obvious on **physical examination**. A routine x ray of the foot that shows the bones to be malformed or misaligned supplies a confirmed diagnosis of clubfoot. Ultrasonography is not always useful in diagnosing the presence of clubfoot prior to the birth of a child; however, ultrasound is increasingly used in the early 2000s to evaluate the severity of clubfoot after birth and monitor its response to treatment.



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## Treatment

Most orthopedic surgeons agree that the initial treatment of congenital (present at birth) clubfoot should be nonoperative. Nonsurgical treatment should begin in the first days of life to take advantage of the favorable fibroelastic properties of the foot's connective tissues, those forming the ligaments, joint capsules, and tendons. In a common treatment, a series of casts is applied over a period of months to reposition the foot into normal alignment. In mild cases, splinting and wearing braces at night may correct the abnormality.

Another treatment for clubfoot is the Ilizarov frame, named for the Russian physician who developed it in 1951. The Ilizarov frame has been used in the [United States \(/places/united-states-and-canada/us-political-geography/united-states\)](#) and [Canada \(/places/united-states-and-canada/canadian-political-geography/canada\)](#) since 1981. It consists of two metal rings that encircle the leg to be corrected, wires that attach the rings to the bone, and metal rods between the rings that can be extended like a telescope. The frame must be applied by an orthopedic surgeon. After a week, the surgeon begins to lengthen the rods, usually at the rate of 1 mm per day. The frame must be kept in place for several months. Although the Ilizarov frame is somewhat cumbersome, it has been reported as giving satisfactory results in straightening clubfeet, particularly those untreated in infancy.

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When clubfoot is severe enough to require surgery, the condition is usually not completely correctable, although significant improvement is possible. In the most

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severe cases, surgery may be required, especially when the [Achilles \(/literature-and-arts/classical-literature-mythology-and-folklore/folklore-and-mythology/achilles\)](#) tendon, which joins the muscles in the calf to the bone of the heel, needs to be lengthened. Because an early operation induces fibrosis, a scarring and stiffness of the tissue, surgery should be delayed until an affected child is at least three months old.

Much of a clubfoot abnormality can be corrected by the use of manipulation and casting during the first three months of life. Proper manipulative techniques must be followed by applications of appropriately molded plaster casts to provide effective and safe correction of most varieties of clubfoot. Long-term care by an orthopedist is required after initial treatment to ensure that the correction of the abnormality is maintained. Exercises, corrective shoes, or nighttime splints may be needed until the child stops growing.

## Prognosis

With prompt, expert treatment, clubfoot is usually correctable. One group of French researchers found that 77% of the children they followed over a period of 11 to 18 years had good results from nonsurgical methods of treatment combined with [physical therapy \(/medicine/divisions-diagnostics-and-procedures/medicine/physical-therapy\)](#). Most individuals are able to wear regular shoes and lead active lives. If clubfoot is not appropriately treated, however, the abnormality may become fixed. This fixation affects the growth of the child's leg and foot, and some degree of permanent disability usually results.

## KEY TERMS

**Enterovirus**— Any of a group of viruses that primarily affect the gastrointestinal

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tract.

**Ilizarov frame**— A device invented by a Russian physician for correcting deformities of the legs and feet, consisting of rings to be attached to the bone and rods extending between the rings that stretch the affected limb.

**Intrauterine**— Situated or occurring in the uterus.

**Orthopedist**— A doctor specializing in treatment of the skeletal system and its associated muscles and joints.

## Resources

### BOOKS

Beers, Mark H., MD, and Robert Berkow, MD, editors. "Musculoskeletal Abnormalities." Section 19, Chapter 261 In *The Merck Manual of Diagnosis and Therapy*. Whitehouse Station, NJ: Merck Research Laboratories, 2002.

Hall, Judith G. "Chromosomal Clinical Abnormalities." In *Nelson Textbook of Pediatrics*, edited by Richard E. Behrman, et al., 16th ed. Philadelphia: Saunders, 2000, 325-34.

Van Allen, Margot I., and Judith G. Hall. "Congenital Anomalies." In *Cecil Textbook of Medicine*, edited by Lee Goldman, et al., 21st ed. Philadelphia: Saunders, 2000, 150-52.

### PERIODICALS

El Barbary H., H. Abdel Ghani, and M. Hegazy. "Correction of Relapsed or Neglected Clubfoot Using a Simple Ilizarov Frame." *International Orthopedics* 28

Visited on 09/17/2018

(June 2004): 183-186.

Gigante, C., E. Talente, and S. Turra. "Sonographic Assessment of Clubfoot." *Journal of Clinical Ultrasound* 32 (June 2004): 235-242.

Philip, J., R. K. Silver, R. D. Wilson, et al. "Late First-Trimester Invasive Prenatal Diagnosis: Results of an International Randomized Trial." *Obstetrics and Gynecology* 103 (June 2004): 1164-1173.

Souchet, P., H. Bensahel, C. Themar-Noel, et al. "Functional Treatment of Clubfoot: A New Series of 350 Idiopathic Clubfeet with Long-Term Follow-Up." *Journal of Pediatric Orthopaedics, Part B* 13 (May 2004): 189-196.

## ORGANIZATIONS

[March of Dimes \(/sports-and-everyday-life/social-organizations/private-organizations/march-dimes\)/](#)Birth Defects Foundation. 1275 Mamaroneck Ave., White Plains, NY 10605. (888) 663-4637. [resourcecenter@modimes.org](mailto:resourcecenter@modimes.org). (<http://www.modimes.org>) (<http://www.modimes.org>).

National Easter Seal Society. 230 W. Monroe St., Suite 1800, [Chicago \(/places/united-states-and-canada/us-political-geography/chicago\)](#), IL 60606-4802. (312) 726-6200 or (800) 221-6827. (<http://www.easter-seals.org>) (<http://www.easter-seals.org>).

National Organization for Rare Disorders (NORD). 55 Kenosia Avenue, P. O. Box 1968, Danbury, CT 06813-1968. (203) 744-0100 or (800) 999-6673. Fax: (203) 798-2291. (<http://www.rarediseases.org>) (<http://www.rarediseases.org>).

## OTHER

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Children's and Women's Health Centre of [British Columbia \(/places/united-states-and-canada/canadian-political-geography/british-columbia\)](#). *The Ilizarov Apparatus*. (<http://www.cw.bc.ca/orthopaedics/Ilizarov.asp>).

"Clubfoot." *National Library of Medicine*. (<http://www.nlm.nih.gov/medlineplus/ency/article/001228.htm>) (<http://www.nlm.nih.gov/medlineplus/ency/article/001228.htm>).

*Clubfoot.net*. (<http://www.clubfoot.net/treatment.php3>) (<http://www.clubfoot.net/treatment.php3>).

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## Clubfoot

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### Clubfoot

#### Definition

Clubfoot is a condition in which one or both feet are twisted into an abnormal position at birth. The condition is also known as talipes.

#### Description

True clubfoot is characterized by abnormal bone formation in the foot. There are four variations of clubfoot: talipes varus, talipes valgus, talipes equines, and talipes calcaneus. In talipes varus, the most common form of clubfoot, the foot generally turns inward so that the leg and foot look somewhat like the letter J (when looking at the left foot head-on). In talipes valgus, the foot rotates outward like the letter L. In talipes equinus, the foot points downward, similar to that of a toe dancer. In talipes calcaneus, the foot points upward, with the heel pointing down.

Clubfoot can affect one foot or both feet. Sometimes the feet of an infant appear abnormal at birth because of the intrauterine position of the fetus prior to birth. If there is no anatomic abnormality of the bone, this is not true clubfoot, and the problem can usually be corrected by applying special braces or casts to straighten the foot.

True clubfoot is usually obvious at birth because a clubfoot has a typical

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appearance of pointing downward and being twisted inwards. Since the condition starts in the first trimester of pregnancy, the abnormality is quite well established at birth, and the foot is often very rigid. Uncorrected clubfoot in an adult causes only part of the foot, usually the outer edge or the heel or the toes, to touch the ground. For a person with clubfoot, walking becomes difficult or impossible.

## Demographics

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The ratio of males to females with clubfoot is 2.5 to 1. The incidence of clubfoot varies only slightly. In the [United States \(/places/united-states-and-canada/us-political-geography/united-states\)](#), the incidence is approximately one in every 1,000 live births. A 1980 Danish study reported an overall incidence of 1.2 in every 1,000 children. By 1994, that number had doubled to 2.41 in every 1,000 live births. No reason was offered for the increase.

A **family** history of clubfoot has been reported in 24.4 percent of families in a single study. These findings suggest the potential role of one or more genes being responsible for clubfoot.

## Causes and symptoms

Experts do not agree on the precise cause of clubfoot. Some experts feel that clubfoot may begin early in pregnancy, probably in the 10th to 12th weeks of gestation. The exact genetic mechanism of inheritance has been extensively investigated using family studies and other epidemiological methods. As of 2004,

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no definitive conclusions had been reached, although a Mendelian pattern of inheritance is suspected. This may be due to the interaction of several different inheritance patterns, different patterns of development appearing as the same condition, or a complex interaction between genetic and environmental factors. The MSX1 gene has been associated with clubfoot in animal studies. But, as of 2004, these findings had not been replicated in humans.

Several environmental causes have been proposed for clubfoot. Many obstetricians feel that intrauterine crowding causes clubfoot. This theory is supported by a significantly higher incidence of clubfoot among **twins** compared to singleton births. Intrauterine exposure to the drug misoprostol has been linked with clubfoot. Misoprostol is commonly used when trying, usually unsuccessfully, to induce abortion in [Brazil \(/places/latin-america-and-caribbean/south-american-political-geography/brazil\)](#) and in other countries in South and [Central America \(/places/latin-america-and-caribbean/latin-american-and-caribbean-physical-geography/central-america\)](#). Researchers in [Norway \(/places/germany-scandinavia-and-central-europe/scandinavian-political-geography/norway\)](#) have reported that males who are in the printing trades have significantly more offspring with clubfoot than men in other occupations. For unknown reasons, **amniocentesis**, a prenatal test, has also been associated with clubfoot. The infants of mothers who smoke during pregnancy have a greater chance of being born with clubfoot than are offspring of women who do not smoke.

The physical appearance of a clubfoot may vary. However, at birth, an affected foot usually turns inward and points downward. It resists realignment. The calf muscle may be smaller and less well developed than normal. One or both feet may be affected.

## When to call the doctor



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An pediatrician should be consulted at birth, the usual time clubfoot is initially diagnosed. While there is no immediate urgency, the condition should be evaluated by a pediatrician or an orthopedic surgeon in the first weeks of life so that treatment can be started.

## Diagnosis

Clubfoot is diagnosed by physician inspection. This is most often completed immediately after birth. Clubfoot may be suspected during the latter stages of pregnancy, especially in a mother of shorter or smaller than normal stature, a large fetus, or multiple infants.

## Treatment

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Clubfoot is corrected by casting or surgery. To have the best chances for successful resolution without resorting to surgery, treatment as soon after birth as possible. The Ponseti method of stretching and casting has been used with increasing success since the 1990s. The Ponseti method requires that a doctor stretch the child's affected foot toward its anatomically correct position and hold it in place with a cast. The foot is realigned and a new cast applied weekly for several weeks. Once the correct position has been achieved, a brace must be worn during periods of **sleep** to maintain the correction. To be successful, the method requires active parental involvement.

When casting and bracing are not successful, surgery may be required to realign

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the tendons, ligaments, and joints in the foot and ankle. Such a procedure is usually completed between nine and 12 months of age. After surgery, a cast holds the foot in the desired position.

## Prognosis

The prognosis for successfully treating clubfoot is good at this time. Persons with clubfoot that is corrected by surgery may notice some increased stiffness in their affected feet as they age. A corrected clubfoot is often a shoe size smaller than normal and may be somewhat less flexible. The calf muscles in an affected clubfoot leg may be slightly smaller than an unaffected leg. However, without treatment, clubfoot will result in a functional disability.

## Prevention

At the present time, there is no way to prevent clubfoot. Pregnant women can reduce the risk of clubfoot by refraining from **smoking**.

## Parental concerns

Parents of an infant with clubfoot should be prepared to participate in treatment for two or more years. They should seek prompt treatment from a qualified health care provider.

## KEY TERMS

**Intrauterine** —Situated or occurring in the uterus.

**Orthopedist** —A doctor specializing in treatment of the musculoskeletal system.

## Resources

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## BOOKS

Hall, Judith G. "Single Gene and Chromosomal Disorders." In *Cecil Textbook of Medicine*, 22nd ed. Edited by Lee Goldman, et al. Philadelphia: Saunders, 2003, pp. 191–7.

Hassold, Terry, and Stuart Schwartz. "Chromosome Disorders." In *Harrison's Principles of Internal Medicine*, 15th ed. Edited by Eugene Braunwald, et al., [New York \(/places/united-states-and-canada/us-political-geography/new-york\)](#): McGraw Hill, 2001, pp. 396–403.

Thompson, George H. "Talipes Equinovarus (Clubfoot)." In *Nelson Textbook of Pediatrics*, 17th ed. Edited by Richard E. Behrman, et al. Philadelphia: Saunders, 2003, pp. 2256–7.

## PERIODICALS

Gigante, C., et al. "Sonographic assessment of clubfoot." *Journal of Clinical Ultrasound* 32, no. 5 (2004): 235–42.

Ippolito, E., et al. "The influence of treatment on the pathology of club foot. CT study at maturity." *Journal of Bone and Joint Surgery of Britain (/places/britain-ireland-france-and-low-countries/british-and-irish-political-geography/britain)* 86, no. 4 (2004): 574–89.

Mammen, L., and C. B. Benson. "Outcome of fetuses with clubfeet diagnosed by prenatal sonography." *Journal of Ultrasound Medicine* 23, no. 4 (2004): 497–500.

Noonan, K. J., et al. "Leg length discrepancy in unilateral congenital clubfoot following surgical treatment." *Iowa Orthopedic Journal* 24, no. 1 (2004): 60–64.

Visited on 09/17/2018

Papavasiliou, V. A., and A. V. Papavasiliou. "A novel surgical option for the operative treatment of clubfoot." *Acta Orthopædica Belgium* 70, no. 2 (2004): 155–61.

## ORGANIZATIONS

*American Academy of Orthopedic Surgeons*. 6300 North River Road, Rosemont, Illinois (</places/united-states-and-canada/us-political-geography/illinois>) 60018–4262. Web site: <[www.aaos.org/](http://www.aaos.org/)>.

*American Academy of Pediatrics*. 141 Northwest Point Boulevard, Elk Grove Village, IL 60007–1098. Web site: <[www.aap.org/default.htm](http://www.aap.org/default.htm)>.

*March of Dimes* (</sports-and-everyday-life/social-organizations/private-organizations/march-dimes>). 1275 Mamaroneck Avenue, White Plains, NY 10605. Web site: <[www.modimes.org/](http://www.modimes.org/)>.

*National Easter Seal Society*. 230 W. Monroe St., Suite 1800, [Chicago](/places/united-states-and-canada/us-political-geography/chicago) (</places/united-states-and-canada/us-political-geography/chicago>), IL 60606–4802. Web site: <[www.easterseals.org/](http://www.easterseals.org/)>.

*National Organization for Rare Disorders (NORD)*. PO Box 8923, New Fairfield, CT 06812–8923. Web site: <[www.rarediseases.org/](http://www.rarediseases.org/)>.

## WEB SITES

"Clubfoot and Other Deformities." *March of Dimes* (</sports-and-everyday-life/social-organizations/private-organizations/march-dimes>). Available online at <[www.marchofdimes.com/professionals/681\\_1211.asp](http://www.marchofdimes.com/professionals/681_1211.asp)> (accessed November 16, 2004).

Patel, Mino, and John Herzenberg. "Clubfoot." *eMedicine*. Available online at

**Visited on 09/17/2018**

<[www.emedicine.com/orthoped/topic598.htm](http://www.emedicine.com/orthoped/topic598.htm)> (accessed November 16, 2004).

Ponseti, Ignacia. "Treatment of Congenital Clubfoot." *Virtual Children's Hospital, University of Iowa* ([/places/united-states-and-canada/us-political-geography/iowa](https://places/united-states-and-canada/us-political-geography/iowa)).

Available online at <[www.vh.org/pediatric/provider/orthopaedics/Clubfoot/Clubfoot.html](http://www.vh.org/pediatric/provider/orthopaedics/Clubfoot/Clubfoot.html)> (accessed November 16, 2004).

Schopler, Steven A. "Clubfoot." *Southern California Orthopedic Institute*, 2004.

Available online at <[www.scoi.com/clubfoot.htm](http://www.scoi.com/clubfoot.htm)> (accessed November 16, 2004).

Shriners Hospitals for Children. "Help for Patients with Clubfoot." *Houston Shriners Hospital*. Available online at <[www.shrinershq.org/patientedu/clubfoot2.html](http://www.shrinershq.org/patientedu/clubfoot2.html)> (accessed November 16, 2004).

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## Club Foot Repair

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### Club foot repair

#### Definition

Club foot repair, also known as foot tendon release or club foot release, is the surgical repair of a birth defect of the foot and ankle called club foot.

#### Purpose

Club foot or *talipes equinovarus* is the most common birth defect of the lower extremity, characterized by the foot turning both downward and inward. The defect can range from mild to severe and the purpose of club foot repair is to provide the child with a functional foot that looks as normal as possible and that is painless, plantigrade, and flexible. Plantigrade means that the child is able to stand with the sole of the foot on the ground, and not on his heels or the outside of his foot.

#### Demographics

In the [United States \(/places/united-states-and-canada/us-political-geography/united-states/\)](/places/united-states-and-canada/us-political-geography/united-states/), club foot is a common birth defect, and occurs at a rate of one to four cases per 1,000 live births among whites. Severe forms of clubfoot affect some 5,000 babies (about one in 735) born in the [United States \(/places/united-states-and-canada/us-political-geography/united-states/\)](/places/united-states-and-canada/us-political-geography/united-states/) each year. Boys are

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affected with severe forms of clubfoot twice as often as girls. The risk increases 30-fold in individuals who have a relative of the first-degree affected by the defects.

## Description

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A newborn baby's club foot is first treated with applying a cast because the tendons, ligaments, and bones are quite flexible and easy to reposition. The procedure involves stretching the foot into a more normal position and using a cast to maintain the corrected position. The cast is removed every week or two, so as to stretch the foot gradually into a correct position. Serial casting goes on for approximately three months.

In 30% of cases, manipulation and casting is successful, and the foot can be placed in a brace to maintain the correction. In about 70% of cases, manipulation and castings alone do not correct the deformity completely and a decision will be made concerning surgery.

The type of surgery depends on how severe the club foot is. The deformity features tight and short tendons around the foot and ankle. Surgery consists of releasing all the tight tendons and ligaments in the posterior (back) and medial (inside) aspects of the foot and repairing them in a lengthened position. Metal pins may also be used to maintain the bones in place for some six weeks. Surgery usually involves an overnight stay in hospital. After surgery, the foot is casted for some three months, followed by the use of a brace to hold the correction. The

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brace is worn for approximately six to 12 months after surgery.

## Diagnosis/Preparation

Presurgical diagnosis requires radiography. The evaluation usually includes only the acquisition of weight-bearing images because the stress involved is reproducible. In babies, weight-bearing is simulated by the application of dorsal flexion stress.

Some surgeons prefer to wait until the child is about one year old before performing surgery, so that the foot may grow a little larger to facilitate surgery. Other surgeons operate as early as three months of age when it becomes clear that further castings will not achieve any more correction.

## Aftercare

The patient usually stays in the hospital for two days after club foot repair. The foot is casted and kept elevated, with application of ice packs to reduce swelling and pain. Painkillers may also be prescribed to relieve pain. During the 48 hours following surgery, the skin near the cast and the toes are examined carefully to ensure that blood circulation, movement, and feeling are maintained. After leaving the hospital, the cast is usually left on for about three months. Skin irritations due to the cast or infections may occur. A course of [physical therapy \(/medicine/divisions-diagnostics-and-procedures/medicine/physical-therapy\)](#) may be indicated after removal of the cast to help keep the foot in good position and improve its flexibility and to strengthen the muscles in the repaired foot. The well-treated clubfoot is no handicap and is fully compatible with a normal, active life. Most children who have undergone club foot repair develop normally and participate fully in any athletic or recreational activity that they choose.



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## Risks

The risks involved in club foot repair are the general risks associated with anesthesia and surgery.

### *Risks associated with anesthesia*

- adverse reactions to medications
- breathing problems

### *Risks associated with surgery*

- excessive bleeding
- infections

## Normal results

If club foot repair is required, the foot usually becomes quite functional after surgery. In some cases, the foot and calf may remain smaller throughout the patient's life.

## Morbidity and mortality rates

If left untreated, club foot will result in an abnormal gait, and further deformity may occur on side of the foot due to preferential weight bearing.

## Alternatives

### *The Ponseti non-surgical treatment*

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Dr. Ignacio Ponseti developed this method which consists of a weekly series of gentle manipulations followed by the application of casts which are placed from the toes to the upper thigh. Five to seven casts are applied every week. Before applying the last cast, which is worn for three weeks, the heel-cord is cut to finalize the correction of the foot. By the time the cast is removed the heel-cord has healed. After this two-month period of casting, a splint is worn full-time by the patient for a few months and is then worn only at night for two to four years. Special shoes also maintain the foot in the corrected position.

### ***The French treatment***

This method consists of daily [physical therapy \(/medicine/divisions-diagnostics-and-procedures/medicine/physical-therapy\)](/medicine/divisions-diagnostics-and-procedures/medicine/physical-therapy), featuring gentle and painless stretching of the foot. The foot is then taped to maintain the corrected position until just the next day's visit. At night, the taped foot is inserted into a continuous passive motion machine at home to maximize the amount of stretching. The tape is removed for a few hours each day to wash the foot, air the skin, and to perform exercises. Removable splints are also used to support the taped foot. The one-hour physical therapy sessions are conducted five days each week for approximately three months. Taping is stopped when the child starts walking.

### **Resources**

#### **books**

Lehman, W. B. *The Clubfoot*. Philadelphia: Lippincott, Williams and Wilkins, 1980.

Ponseti, I. V. *Congenital Clubfoot. Fundamentals of Treatment*. Oxford: [Oxford University \(/social-sciences-and-law/education/colleges-international/oxford-university\)](/social-sciences-and-law/education/colleges-international/oxford-university) Press, 1996.

Visited on 09/17/2018

Simons, G. W. *The Clubfoot: The Present and a View of the Future* New York (/places/united-states-and-canada/us-political-geography/new-york): Springer Verlag, 1994.

## periodicals

Aronson, J. and C. L. Puskarich. "Deformity and Disability from Treated Clubfoot." *Journal of Pediatrics and Orthopedics* 10 (1990): 109–112.

Cooper, D. M. and F. R. Dietz. "Treatment of Idiopathic Clubfoot. A Thirty Year Follow-up." *Journal of Bone and Joint Surgery* 77A (1995): 1477–1479.

Herzenberg, J. E., C. Radler, and N. Bor. "Ponseti Versus Traditional Methods of Casting for Idiopathic Clubfoot." *Journal of Pediatrics and Orthopedics* 22 (July-August 2002): 517–521.

Ideka, K. "Conservative Treatment of Idiopathic Clubfoot." *Journal of Pediatrics and Orthopedics* 12 (March-April 1992): 217–223.

## organizations

American Academy of Pediatrics. 141 Northwest Point Boulevard, Elk Grove Village, IL 60007-1098. (847) 434-4000. <<http://www.aap.org>> (<http://www.aap.org>).

Shrine and Shriner's Hospitals. 2900 Rocky Point Dr., Tampa (/places/united-states-and-canada/us-political-geography/tampa), FL 33607-1460. (813) 281-0300. <<http://www.shrinershq.org/index.html>> (<http://www.shrinershq.org/index.html>)

## other

**Visited on 09/17/2018**

American Academy of Pediatrics. "Club Foot." *Essentials of Musculoskeletal Care* [cited April 2003]. <<http://www.aap.org/pubserv/essenexp.htm>>.

*The Club Foot Club* [cited April 2003]. <<http://home.ica.net/~maundefamily>> (<http://home.ica.net/~maundefamily>).

"Help for Patients with Club Foot." *Shrine and Shriners Hospitals*. March 28, 2003 [cited April 2003]. <<http://www.shrinershq.org/patientedu/clubfoot2.html>> (<http://www.shrinershq.org/patientedu/clubfoot2.html>).

"List of Physicians Qualified in the Ponseti Method." *Virtual Children's Hospital* [cited April 2003]. <<http://www.vh.org/pediatric/patient/orthopaedics/clubfeet/physicians.html>> (<http://www.vh.org/pediatric/patient/orthopaedics/clubfeet/physicians.html>).

"Patient Guide to Club Foot." *John Hopkins Department of Orthopedic Surgery* [cited April 2003]. <[http://www.hopkinsmedicine.org/orthopedicsurgery/peds/clubfoot\\_new.htm](http://www.hopkinsmedicine.org/orthopedicsurgery/peds/clubfoot_new.htm)> ([http://www.hopkinsmedicine.org/orthopedicsurgery/peds/clubfoot\\_new.htm](http://www.hopkinsmedicine.org/orthopedicsurgery/peds/clubfoot_new.htm)).

Monique Laberge, Ph.D.

## **WHO PERFORMS THE PROCEDURE AND WHERE IS IT PERFORMED?**

Club foot repair is performed in a hospital. Club foot surgery is difficult and requires meticulous attention to details. It is accordingly performed by experienced pediatric orthopedic surgeons who are specialists in the field.

## **QUESTIONS TO ASK THE DOCTOR**

- Is there any treatment needed to prevent the club foot from coming back after surgery?
- What are the chances that my child's club foot will get corrected?

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- How long will it take to recover from the surgery?
- What procedures do you follow?
- How much club foot surgery do you perform each year?

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## Club Foot

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The Oxford Companion to the Body

© The Oxford Companion to the Body 2001, originally published by Oxford University Press 2001.

**Club foot** is a deformity of which the most common form, known as *talipes equinovarus*, is characterized by the foot being turned upwards and inwards and bent towards the heel. It is frequently congenital, and less severe forms, often believed to be caused by an adverse position in the womb, may be treated with splints, plastercasts, or manipulation: all therapies used since Hippocratic times. Nowadays surgery, to cut restricted tendons and to reposition misplaced bones, may be required for more severe forms. Neurological disorders, such as poliomyelitis and [cerebral palsy \(/medicine/diseases-and-conditions/pathology/cerebral-palsy#1O128cerebralpalsy\)](/medicine/diseases-and-conditions/pathology/cerebral-palsy#1O128cerebralpalsy), can also cause acquired clubfoot. One of the most famous sufferers was the poet Lord Byron (1788–1824). Contemporary and later accounts differ greatly in their assessment of his lameness, one writer suggesting that he was lame in both legs, the left being severely withered below the knee. However, the consensus opinion seems to be that he had a mild form of talipes in his right foot. He received no treatment until he was ten, when he was put into the charge of a quack called Lavendar who forcibly manipulated and twisted the misshapen foot, and forced it into a vice-like machine. The pain and fruitlessness of these procedures convinced Byron's mother to consult Dr Baillie, a well-known London practitioner, in whose care the boy's foot was straightened to such an extent that he walked thereafter with a slight limp only, although he remained acutely conscious of this small infirmity for the rest of his life.

E. M. Tansey

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## Clubfoot

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Clubfoot or talipes (tăl'əpēz'), deformity in which the foot is twisted out of position. Maldevelopment is usually congenital, although it can result from injury or disease (e.g., poliomyelitis) after birth. It can affect one or both feet. Often the foot is twisted downward, with the heel and toe turning inward, causing only part of the foot—the heel, the toes, or the outer margin—to touch the ground; walking is difficult or impossible. Correction can be made in infancy by manipulation, braces, and casts; in severe cases only surgery can correct the condition.

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## Talipes

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A Dictionary of Nursing

© A Dictionary of Nursing 2008, originally published by Oxford University Press 2008.

**Talipes (tal-i-pee-z) n.** club-foot: a congenital deformity of one or both feet in which the patient cannot stand with the sole of the foot flat on the ground. *t. equinovarus* the most common variety of talipes, in which the foot points downwards, the heel is inverted, and the forefoot twisted. *t. valgus* talipes in which the hind foot is twisted outwards. *t. varus* talipes in which the hind foot is turned inwards.

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## Club Foot

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The Oxford Pocket Dictionary of Current English

© The Oxford Pocket Dictionary of Current English 2009, originally published by Oxford University Press 2009.

### Club foot

- 1.** a deformed foot that is twisted so that the sole cannot be placed flat on the ground. It is typically congenital or a result of polio.
- 2.** a woodland toadstool (*Clitocybe clavipes*, family Tricholomataceae) with a grayish-brown cap, primrose-yellow gills, and a stem with a swollen woolly base, found in Eurasia and [North America \(/places/oceans-continents-and-polar-regions/oceans-and-continents/north-america\)](/places/oceans-continents-and-polar-regions/oceans-and-continents/north-america).

DERIVATIVES:

**club-foot·ed** adj.

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## Talipes

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The Oxford Pocket Dictionary of Current English

© The Oxford Pocket Dictionary of Current English 2009, originally published by Oxford University Press 2009.

### **Tal·i·pes** / 'talə,pēz/

n. Med. technical term for **CLUB FOOT**.

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## Club-foot

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A Dictionary of Nursing

© A Dictionary of Nursing 2008, originally published by Oxford University Press 2008.

**Club-foot (klub-fuut) n.** see [talipes \(/medicine/diseases-and-conditions/pathology/clubfoot#1O62talipes\)](/medicine/diseases-and-conditions/pathology/clubfoot#1O62talipes).

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## Talipes

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Talipes: see [clubfoot \(/medicine/diseases-and-conditions/pathology/clubfoot#1E1clubfoot\)](/medicine/diseases-and-conditions/pathology/clubfoot#1E1clubfoot).

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## Clubfoot

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Oxford Dictionary of Rhymes

© Oxford Dictionary of Rhymes 2007, originally published by Oxford University Press 2007.

**Clubfoot** • **afoot**, clubfoot, foot, hotfoot, kaput, put, soot, splay-foot, underfoot, wrong-foot, Yakut • **Blackfoot** • flatfoot • barefoot • pussyfoot • forefoot • crowfoot • coltsfoot • goosefoot • tenderfoot • per caput • Rajput • output • throughput • Inuktitut

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## Club Foot Repair

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### Club Foot Repair

[Definition](#)

[Purpose](#)

[Demographics](#)

[Description](#)

[Diagnosis/Preparation](#)

[Aftercare](#)

[Risks](#)

[Normal results](#)

[Morbidity and mortality rates](#)

[Alternatives](#)

### **Definition**

Club foot repair, also known as foot tendon release or club foot release, is the surgical repair of a birth defect of the foot and ankle called club foot.

### **Purpose**

Club foot, or *talipes equinovarus*, is the most common birth defect of the lower extremity, characterized by the foot turning both downward and inward. The defect can range from mild to severe. The purpose of club foot repair is to provide the child with a functional foot that looks as normal as possible and that is painless,

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plantigrade, and flexible. Plantigrade means

## KEY TERMS

**Orthopedics**— The branch of medicine that deals with bones and joints.

That the child is able to stand with the sole of the foot on the ground, and not on the heels or the outside of the foot.

## Demographics

In the United States (/places/united-states-and-canada/us-political-geography/united-states), club foot is a common birth defect, and occurs at a rate of one to two cases per 1,000 live births among whites. More than 4,000 babies with club foot are born in the United States (/places/united-states-and-canada/us-political-geography/united-states) each year. Boys are affected with club foot twice as often as girls. The risk increases 30-fold in individuals who have a relative of the first degree affected by the defects.

## Description

A newborn baby's club foot is first treated with applying a cast because the tendons, ligaments, and bones are quite flexible and easy to reposition. The procedure involves stretching the foot into a more normal position and using a cast to maintain the corrected position. The cast is removed every week or two, so as to stretch the foot gradually into a correct position. Serial casting goes on for approximately three months.

In 30% of cases, manipulation and casting is successful, and the foot can be placed in a brace to maintain the correction. In about 70% of cases, manipulation and castings alone do not correct the deformity completely, and the child's physicians



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and parents must decide whether to attempt surgery.

The type of surgery depends on how severe the club foot is. The deformity features tight and short tendons around the foot and ankle. Surgery consists of releasing all the tight tendons and ligaments in the posterior (back) and medial (inside) aspects of the foot and repairing them in a lengthened position. Metal pins may also be used to maintain the bones in place for some six weeks. Surgery usually involves an overnight stay in hospital. After surgery, the foot is put into a cast for approximately three months, followed by the use of a brace to hold the correction. The brace is worn for approximately 6–12 months after surgery.

## **WHO PERFORMS THE PROCEDURE AND WHERE IS IT PERFORMED?**

Club foot repair is performed in a hospital. Club foot surgery is difficult and requires meticulous attention to details. It is accordingly performed by experienced pediatric orthopedic surgeons who are specialists in the field.

### **Diagnosis/Preparation**

Presurgical diagnosis requires radiography (x rays). The evaluation usually includes only the acquisition of weight-bearing images because the stress involved is reproducible. In babies, weight bearing is simulated by holding the baby upright on a flat surface.

Some surgeons prefer to wait until the child is about one year old before performing surgery, so that the foot may grow a little larger. Other surgeons operate as early as three months of age when it becomes clear that further castings will not achieve any more correction.

### **Aftercare**

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The patient usually stays in the hospital for two days after club foot repair. The foot is put into a cast and kept elevated, with application of ice packs to reduce swelling and pain. Painkillers may also be prescribed to relieve pain. During the 48 hours following surgery, the skin near the cast and the toes are examined carefully to ensure that blood circulation, movement, and feeling are maintained. After leaving the hospital, the cast is usually left on for about three months. Skin irritations due to the cast or infections may occur. A course of [physical therapy](/medicine/divisions-diagnostics-and-procedures/medicine/physical-therapy) (</medicine/divisions-diagnostics-and-procedures/medicine/physical-therapy>) may be indicated after removal of the cast to help keep the repaired foot in good position, improve its flexibility, and strengthen the muscles.

## **Risks**

The risks involved in club foot repair are the general risks associated with anesthesia and surgery.

Risks associated with anesthesia include:

- adverse reactions to medications
- breathing problems

Risks associated with surgery include:

- excessive bleeding
- infections

## **QUESTIONS TO ASK THE DOCTOR**

- Is there any treatment needed to prevent the club foot from coming back after surgery?
- What are the chances that my child's club foot will get corrected?
- How long will it take to recover from the surgery?
- What procedures do you follow?
- How much club foot surgery do you perform each year?

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## Normal results

If club foot repair is required, the foot usually becomes quite functional after surgery. In some cases, the foot and calf may remain smaller throughout the patient's life. Most children who have undergone club foot repair develop normally and participate fully in any athletic or recreational activity that they choose.

## Morbidity and mortality rates

If left untreated, club foot will result in an abnormal gait, and further deformity may occur on the side of the foot due to preferential weight bearing.

## Alternatives

### **The Ponseti non-surgical treatment**

Dr. Ignacio Ponseti developed this method, which consists of a weekly series of gentle manipulations followed by the application of casts that are placed from the toes to the upper thigh. Five to seven casts are applied every week. Before applying the last cast, which is worn for three weeks, the heel cord is cut to finalize the correction of the foot. By the time the cast is removed, the heel cord has healed. After this two-month period of casting, a splint is worn full time by the patient for a few months and is then worn only at night for two to four years. Special shoes also maintain the foot in the corrected position.

### **The French treatment**

This method consists of daily [physical therapy](/medicine/divisions-diagnostics-and-procedures/medicine/physical-therapy/), featuring gentle and painless stretching of the foot. The foot is then taped to maintain the corrected position until the next day's visit. At night, the taped foot is inserted into a continuous

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passive-motion machine at home to maximize the amount of stretching. The tape is removed for a few hours each day to wash the foot, air the skin, and perform exercises. Removable splints are also used to support the taped foot. The one-hour physical therapy sessions are conducted five days each week for approximately three months. Taping is stopped when the child starts walking.

## Resources

### BOOKS

Behrman, R. E., et al. *Nelson's Textbook of Pediatrics*. 17th ed. Philadelphia: Saunders, 2004.

Canale, S. T., ed. *Campbell's Operative Orthopaedics*. 10th ed. St. Louis: Mosby, 2003.

### PERIODICALS

Aronson, J., and C. L. Puskarich. "Deformity and Disability from Treated Clubfoot." *Journal of Pediatrics and Orthopedics* 10(1990): 109–112.

Cooper, D. M. and F. R. Dietz. "Treatment of Idiopathic Clubfoot. A Thirty Year Follow-up." *Journal of Bone and Joint Surgery* 77A (1995): 1477–1479.

Herzenberg, J. E., C. Radler, and N. Bor. "Ponseti Versus Traditional Methods of Casting for Idiopathic Clubfoot." *Journal of Pediatrics and Orthopedics* 22 (July–August 2002): 517–521.

Ideka, K. "Conservative Treatment of Idiopathic Clubfoot." *Journal of Pediatrics and Orthopedics* 12 (March–April 1992): 217–223.

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## ORGANIZATIONS

American Academy of Pediatrics. 141 Northwest Point Boulevard, Elk Grove Village, IL 60007-1098. (847) 434-4000. <http://www.aap.org> (<http://www.aap.org>) (accessed March 11, 2008).

Shrine and Shriner's Hospitals. 2900 Rocky Point Dr., Tampa, FL 33607-1460. (813) 281-0300. <http://www.shrinershq.org/> (<http://www.shrinershq.org/>) (accessed March 11, 2008).

## OTHER

*The Club Foot Club*. [cited April 2003]. <http://home.ica.net/~maundefamily> (<http://home.ica.net/~maundefamily>) (accessed March 11, 2008).

"List of Physicians Qualified in the Ponseti Method." Virtual Children's Hospital. [cited April 2003]. <http://www.uihealthcare.com/topics/medicaldepartments/orthopaedics/clubfeet/physicians.html> (accessed March 11, 2008).

"Club Foot." John Hopkins Department of Orthopedic Surgery. [cited April 2003]. <http://www.hopkinsortho.org/clubfoot.html> (<http://www.hopkinsortho.org/clubfoot.html>) (accessed March 11, 2008).

Laberge Monique, PhD

Rosalyn Carson-DeWitt, MD

Coarctation of the aorta *see* (</medicine/encyclopedias-almanacs-transcripts-and-maps/heart-surgery-congenital-defects-1>)Heart surgery (</medicine/divisions-diagnostics-and-procedures/medicine/heart-surgery>) for congenital defects

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## Clubfoot

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### Clubfoot

#### Definition

Clubfoot is a condition in which one or both feet are twisted into an abnormal position at birth. The condition is also known as talipes.

#### Description

True clubfoot is characterized by abnormal bone formation in the foot. There are four variations of clubfoot, including talipes varus, talipes valgus, talipes equines, and talipes calcaneus. In talipes varus, the most common form of clubfoot, the foot generally turns inward so that the leg and foot look somewhat like the letter J. In talipes valgus, the foot rotates outward like the letter L. In talipes equinus, the foot points downward, similar to that of a toe dancer. In talipes calcaneus, the foot points upward, with the heel pointing down.

Clubfoot can affect one foot or both. Sometimes an infant's feet appear abnormal at birth because of the intrauterine position of the fetus birth. If there is no anatomic abnormality of the bone, this is not true clubfoot, and the problem can usually be corrected by applying special braces or casts to straighten the foot.

#### Genetic profile

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Experts do not agree on the precise cause of clubfoot. The exact genetic mechanism of **inheritance** has been extensively investigated using family studies and other epidemiological methods. As of 1999, no definitive conclusions had been reached, although a Mendelian pattern of inheritance is suspected. This may be due to the interaction of several different inheritance patterns, different patterns of development appearing as the same condition, or a complex interaction between genetic and environmental factors. The MSX1 **gene** has been associated with clubfoot in animal studies. But, as of 2001, these findings have not been replicated in humans.

A family history of clubfoot has been reported in 24.4% of families in a single study. These findings suggest the potential role of one or more genes being responsible for clubfoot.

Several environmental causes have been proposed for clubfoot. Obstetricians feel that intrauterine crowding causes clubfoot. This theory is supported by a significantly higher incidence of clubfoot among twins compared to singleton births. Intrauterine exposure to the drug, misoprostol, has been linked with clubfoot. Misoprostol is commonly used when trying, usually unsuccessfully, to induce abortion in Brazil and in other countries in South and [Central America \(/places/latin-america-and-caribbean/latin-american-and-caribbean-physical-geography/central-america\)](#). Researchers in Norway have reported that males who are in the printing trades have significantly more offspring with clubfoot than men in other occupations. For unknown reasons, **amniocentesis**, a prenatal test, has also been associated with clubfoot. The infants of mothers who smoke during pregnancy have a greater chance of being born with clubfoot than are offspring of women who do not smoke.

## Demographics



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The ratio of males to females with clubfoot is 2.5 to 1. The incidence of clubfoot varies only slightly. In the [United States \(/places/united-states-and-canada/us-political-geography/united-states\)](#), the incidence is approximately one in every 1,000 live births. A 1980 Danish study reported an overall incidence of 1.20 in every 1,000 children; by 1994, that number had doubled to 2.41 in every 1,000 live births. No reason was offered for the increase.

## Signs and symptoms

True clubfoot is usually obvious at birth. The four most common varieties have been described. A clubfoot has a typical appearance of pointing downward and being twisted inwards. Since the condition starts in the first trimester of pregnancy, the abnormality is quite well established at birth, and the foot is often very rigid. Uncorrected clubfoot in an adult causes only part of the foot, usually the outer edge, or the heel or the toes, to touch the ground. For a person with clubfoot, walking becomes difficult or impossible.

## Diagnosis

True clubfoot is usually recognizable and obvious on physical examination. A routine x ray of the foot that shows the bones to be malformed or misaligned supplies a confirmed diagnosis of clubfoot. Ultrasonography is not always useful in diagnosing the presence of clubfoot prior to the birth of a child.

## Treatment and management

Most orthopedic surgeons agree that the initial treatment of congenital (present at birth) clubfoot should be non-operative. Non-surgical treatment should begin in the first days of life to take advantage of the favorable fibro-elastic properties of the foot's connective tissues, those forming the ligaments, joint capsules, and

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tendons. In a common treatment, a series of casts is applied over a period of months to reposition the foot into a normal alignment. In mild cases, splinting and wearing braces at night may correct the abnormality.

When clubfoot is severe enough to require surgery, the condition is usually not completely correctable, although significant improvement is possible. In the most severe cases, surgery may be required, especially when the [Achilles tendon](/medicine/anatomy-and-physiology/anatomy-and-physiology/achilles-tendon) (</medicine/anatomy-and-physiology/anatomy-and-physiology/achilles-tendon>), which joins the muscles in the calf to the bone of the heel, needs to be lengthened. Because an early operation induces fibrosis, a scarring and stiffness of the tissue, surgery should be delayed until an affected child is at least three months old.

Much of a clubfoot abnormality can be corrected by the use of manipulation and casting during the first three months of life. Proper manipulative techniques must be followed by applications of appropriately molded plaster casts to provide effective and safe correction of most varieties of clubfoot. Long-term care by an orthopedist is required after initial treatment to ensure that the correction of the abnormality is maintained. Exercises, corrective shoes, or nighttime splints may be needed until the child stops growing.

## Prognosis

With prompt, expert treatment, clubfoot is usually correctable. Most individuals are able to wear regular shoes and lead active lives. If clubfoot is not appropriately treated, the abnormality becomes fixed. This has an effect on the growth of the leg and foot, and some degree of permanent disability usually results.

## Resources

### BOOKS

Visited on 09/17/2018

Hall, Judith G. "Chromosomal Clinical Abnormalities." In *Nelson Textbook of Pediatrics*. 16th ed. Edited by Richard E. Behrman et al., 325–34. Philadelphia: Saunders, 2000.

Jones, KL. "XO Syndrome." In *Smith's Recognizable Patterns of Human Malformation*. 5th ed. Edited by Kenneth L. Jones and Judy Fletcher, 81–7. Philadelphia: Saunders, 1997.

Thoene, Jess G., ed. *Physicians' Guide to Rare Diseases*. 2nd ed. Montvale, N.J.: Dowden Publishing Co., 1995.

Van Allen, Margot I., and Judith G. Hall. "Congenital Anomalies." In *Cecil Textbook of Medicine*. 21st ed. Edited by Lee Goldman, et al., 150–52. Philadelphia: Saunders, 2000.

## PERIODICALS

Chesney, D., et al. "Epidemiology and Genetic Theories in the Etiology of Congenital Talipes Equinovarus." *Bulletin of the Hospital for Joint Diseases* 58, no. 1 (1999): 59–64.

Gonzalez, C. H., et al. "Congenital Abnormalities in Brazilian Children Associated with Misoprostol Misuse in First Trimester of Pregnancy." *Lancet* 351, no. 9116 (May 30, 1998): 1624–27.

Honein, M. A., L. J. Paulozzi, and C. A. Moore. "Family History, Maternal Smoking, and Clubfoot: An Indication of a Gene-Environment Interaction." *American Journal of Epidemiology* 157, no. 7 (October 1, 2000): 658–65.

Lochmiller, C., et al. "Genetic Epidemiology Study of Idiopathic Talipes Equinovarus." *American Journal of Medical Genetics* 79, no. 2 (September 1, 1998):

Visited on 09/17/2018

90-6.

Rebbeck, T. R., et al. "A Single-Gene Explanation for the Probability of Having Idiopathic Talipes Equinovarus." *American Journal of Human Genetics* (*/medicine/anatomy-and-physiology/anatomy-and-physiology/human-genetics*) 53, no. 5 (November 1993): 1051-63.

Robertson, W.W., and D. Corbett. "Congenital Clubfoot. Month of Conception." *Clinics in Orthopedics* 340, no. 338 (May 1997): 14-18.

## ORGANIZATIONS

March of Dimes (*/sports-and-everyday-life/social-organizations/private-organizations/march-dimes*)/Birth Defects Foundation. 1275 Mamaroneck Ave., White Plains, NY 10605. (888) 663-4637. [resourcecenter@modimes.org](mailto:resourcecenter@modimes.org). <http://www.modimes.org> (<http://www.modimes.org>).

National Easter Seal Society. 230 W. Monroe St., Suite 1800, Chicago, IL 60606-4802. (312) 726-6200 or (800) 221-6827. <http://www.easter-seals.org> (<http://www.easter-seals.org>).

National Organization for Rare Disorders (NORD). PO Box 8923, New Fairfield, CT 06812-8923. (203) 746-6518 or (800) 999-6673. Fax: (203) 746-6481. <http://www.rarediseases.org> (<http://www.rarediseases.org>).

## WEBSITES

"Clubfoot." *National Library of Medicine*. <http://www.nlm.nih.gov/medlineplus/ency/article/001228.htm> (<http://www.nlm.nih.gov/medlineplus/ency/article/001228.htm>).

Visited on 09/17/2018

*Clubfoot.net*. <<http://www.clubfoot.net/treatment.php3>> (<http://www.clubfoot.net/treatment.php3>).

Ponseti, Ignacio, MD. "Treatment of Congenital Clubfoot." Revised January 1998. *University of Iowa (/social-sciences-and-law/education/colleges-us/university-iowa) Health Care*. <<http://www.vh.org/Providers/Textbooks/Clubfoot/Clubfoot.html>> (<http://www.vh.org/Providers/Textbooks/Clubfoot/Clubfoot.html>).

Schopler, Steven A., MD. "Clubfoot." *Southern California Orthopedic Institute*. <<http://www.scoi.com/clubfoot.htm>>.

L. Fleming Fallon, Jr., MD, DrPH

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## Clubfoot

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### Clubfoot

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#### Description

True clubfoot is characterized by abnormal bone formation in the foot. There are four variations of club-foot, including talipes varus, talipes valgus, talipes equines, and talipes calcaneus. In talipes varus, the most common form of clubfoot, the foot generally turns inward so that the leg and foot look somewhat like the letter J. In talipes valgus, the foot rotates outward like the letter L. In talipes equinus, the foot points downward, similar to that of a toe dancer. In talipes calcaneus, the foot points upward, with the heel pointing down.

Clubfoot can affect one foot or both. Sometimes an infant's feet appear abnormal at birth because of the intrauterine position of the fetus birth. If there is no anatomic abnormality of the bone, this is not true clubfoot, and the problem can usually be corrected by applying special braces or casts to straighten the foot.

#### Genetic profile

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Experts do not agree on the precise cause of club-foot. The exact genetic mechanism of **inheritance** has been extensively investigated using family studies and other epidemiological methods. No definitive conclusions have been reached, although a Mendelian pattern of inheritance is suspected. This may be due to the interaction of several different inheritance patterns, different patterns of development appearing as the same condition, or a complex interaction between genetic and environmental factors. The **MSX1 gene** has been associated with clubfoot in animal studies. But these findings have not been replicated in humans.

A family history of clubfoot has been reported in 24.4% of families in a single study. These findings suggest the potential role of one or more genes being responsible for clubfoot.

Several environmental causes have been proposed for clubfoot. Obstetricians feel that intrauterine crowding causes clubfoot. This theory is supported by a significantly higher incidence of clubfoot among twins compared to singleton births. Intrauterine exposure to the drug, misoprostol, has been linked with clubfoot. Misoprostol is commonly used when trying, usually unsuccessfully, to induce abortion in Brazil and in other countries in South and Central America (/places/latin-america-and-caribbean/latin-american-and-caribbean-physical-geography/central-america). Researchers in Norway have reported that males who are in the printing trades have significantly more offspring with clubfoot than men in other occupations. For unknown reasons, **amniocentesis**, a prenatal test, has also been associated with clubfoot. The infants of mothers who smoke during pregnancy have a greater chance of being born with club-foot than are offspring of women who do not smoke.

## Demographics

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The ratio of males to females with clubfoot is 2.5 to 1. The incidence of clubfoot varies only slightly. In the [United States \(/places/united-states-and-canada/us-political-geography/united-states\)](#), the incidence is approximately one in every 1,000 live births. A 1980 Danish study reported an overall incidence of 1.20 in every 1,000 children; by 1994, that number had doubled to 2.41 in every 1,000 live births. No reason was offered for the increase.

## Signs and symptoms

True clubfoot is usually obvious at birth. The four most common varieties have been described. A clubfoot has a typical appearance of pointing downward and being twisted inwards. Since the condition starts in the first trimester of pregnancy, the abnormality is quite well established at birth, and the foot is often very rigid. Uncorrected clubfoot in an adult causes only part of the foot, usually the outer edge, or the heel or the toes, to touch the ground. For a person with clubfoot, walking becomes difficult or impossible.

## Diagnosis

True clubfoot is usually recognizable and obvious on physical examination. A routine x ray of the foot that shows the bones to be malformed or misaligned supplies a confirmed diagnosis of clubfoot. Ultrasonography is not always useful in diagnosing the presence of clubfoot prior to the birth of a child.

## Treatment and management

Most orthopedic surgeons agree that the initial treatment of congenital (present at birth) clubfoot should be non-operative. Non-surgical treatment should begin in the first days of life to take advantage of the favorable fibro-elastic properties of the foot's connective tissues, those forming the ligaments, joint capsules, and



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tendons. In a common treatment, a series of casts is applied over a period of months to reposition the foot into a normal alignment. In mild cases, splinting and wearing braces at night may correct the abnormality.

When clubfoot is severe enough to require surgery, the condition is usually not completely correctable, although significant improvement is possible. In the

Most severe cases, surgery may be required, especially when the [Achilles tendon](#) ([/medicine/anatomy-and-physiology/anatomy-and-physiology/achilles-tendon](#)), which joins the muscles in the calf to the bone of the heel, needs to be lengthened. Because an early operation induces fibrosis, a scarring and stiffness of the tissue, surgery should be delayed until an affected child is at least three months old.

Much of a clubfoot abnormality can be corrected by the use of manipulation and casting during the first three months of life. Proper manipulative techniques must be followed by applications of appropriately molded plaster casts to provide effective and safe correction of most varieties of clubfoot. Long-term care by an orthopedist is required after initial treatment to ensure that the correction of the abnormality is maintained. Exercises, corrective shoes, or nighttime splints may be needed until the child stops growing.

## Prognosis

With prompt, expert treatment, clubfoot is usually correctable. Most individuals are able to wear regular shoes and lead active lives. If clubfoot is not appropriately treated, the abnormality becomes fixed. This has an effect on the growth of the leg and foot, and some degree of permanent disability usually results.

## Resources

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## BOOKS

Hall, Judith G. "Chromosomal Clinical Abnormalities." In *Nelson Textbook of Pediatrics*. 16th ed. Edited by Richard E. Behrman et al., 325–34. Philadelphia: Saunders, 2000.

Jones, KL. "XO Syndrome." In *Smith's Recognizable Patterns of Human Malformation*. 5th ed. Edited by Kenneth L. Jones and Judy Fletcher, 81–7. Philadelphia: Saunders, 1997.

Thoene, Jess G., ed. *Physicians' Guide to Rare Diseases*. 2nd ed. Montvale, NJ: Dowden Publishing Co., 1995.

Van Allen, Margot I., and Judith G. Hall. "Congenital Anomalies." In *Cecil Textbook of Medicine*. 21st ed. Edited by Lee Goldman, et al., 150–52. Philadelphia: Saunders, 2000.

## PERIODICALS

Chesney, D., et al. "Epidemiology and Genetic Theories in the Etiology of Congenital Talipes Equinovarus." *Bulletin of the Hospital for Joint Diseases* 58, no. 1 (1999): 59–64.

Gonzalez, C. H., et al. "Congenital Abnormalities in Brazilian Children Associated with Misoprostol Misuse in First Trimester of Pregnancy." *Lancet* 351, no. 9116 (May 30, 1998): 1624–27.

Honein, M. A., L. J. Paulozzi, and C. A. Moore. "Family History, Maternal Smoking, and Clubfoot: An Indication of a Gene-Environment Interaction." *American Journal of Epidemiology* 157, no. 7 (October 1, 2000): 658–65.

**Visited on 09/17/2018**

Lochmiller, C., et al. "Genetic Epidemiology Study of Idiopathic Talipes Equinovarus." *American Journal of Medical Genetics* 79, no. 2 (September 1, 1998): 90–6.

Rebbeck, T. R., et al. "A Single-Gene Explanation for the Probability of Having Idiopathic Talipes Equinovarus." *American Journal of Human Genetics (/medicine/anatomy-and-physiology/anatomy-and-physiology/human-genetics)* 53, no. 5 (November 1993): 1051–63.

Robertson, W. W., and D. Corbett. "Congenital Clubfoot. Month of Conception." *Clinics in Orthopedics* 340, no. 338 (May 1997): 14–18.

## ORGANIZATIONS

March of Dimes (/sports-and-everyday-life/social-organizations/private-organizations/march-dimes)/Birth Defects Foundation. 1275 Mamaroneck Ave., White Plains, NY 10605. (888) 663-4637. [resourcecenter@modimes.org](mailto:resourcecenter@modimes.org). <http://www.modimes.org> (<http://www.modimes.org>).

National Easter Seal Society. 230 W. Monroe St., Suite 1800, Chicago, IL 60606-4802. (312) 726-6200 or (800) 221-6827. <http://www.easter-seals.org> (<http://www.easter-seals.org>).

National Organization for Rare Disorders (NORD). PO Box 8923, New Fairfield, CT 06812-8923. (203) 746-6518 or (800) 999-6673. Fax: (203) 746-6481. <http://www.rarediseases.org> (<http://www.rarediseases.org>).

## WEBSITES

"Clubfoot." *National Library of Medicine*. <http://www.nlm.nih.gov/medlineplus/ency/article/001228.htm> (<http://www.nlm.nih.gov/medlineplus/ency/article/001228.htm>)

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[/001228.htm](#)).

*Clubfoot.net*. <<http://www.clubfoot.net/treatment.php3>> (<http://www.clubfoot.net/treatment.php3>).

Ponseti, Ignacio, MD. "Treatment of Congenital Clubfoot." Revised January 1998. *University of Iowa (/social-sciences-and-law/education/colleges-us/university-iowa) Health Care*. <<http://www.vh.org/Providers/Textbooks/Clubfoot/Clubfoot.html>> (<http://www.vh.org/Providers/Textbooks/Clubfoot/Clubfoot.html>).

Schopler, Steven A., MD. "Clubfoot." *Southern California Orthopedic Institute*. <<http://www.scoi.com/clubfoot.htm>>.

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