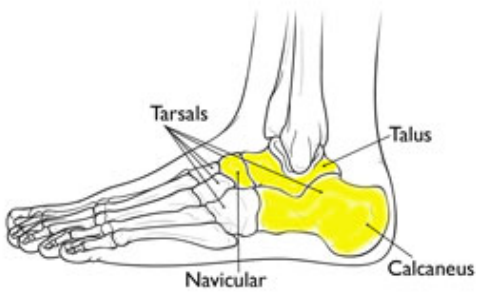
Tarsal Coalition

A tarsal coalition is an abnormal connection of two or more bones in the foot. The bones affected — called tarsal bones — are located toward the back of the foot and in the heel, and the connection of the bones can result in a severe, rigid flatfoot.

Although tarsal coalition is often present at birth, children typically do not show signs of the disorder until early adolescence. The foot may become stiff and painful, and everyday physical activities are often difficult.

For many children with tarsal coalition, symptoms are relieved with simple treatments, such as orthotics and physical therapy. If a child has severe symptoms that do not respond to simple treatments and continue to interfere with their daily activities, surgery may be recommended.

Anatomy



The calcaneus, talus, and navicular bones are those most often affected by tarsal coalition.

The bones of the feet are commonly divided into three parts: the hindfoot, midfoot, and forefoot. Seven bones — called tarsals — compose the hindfoot and midfoot. Of these bones, the calcaneus, talus, and navicular are most commonly involved in tarsal coalition.

Description

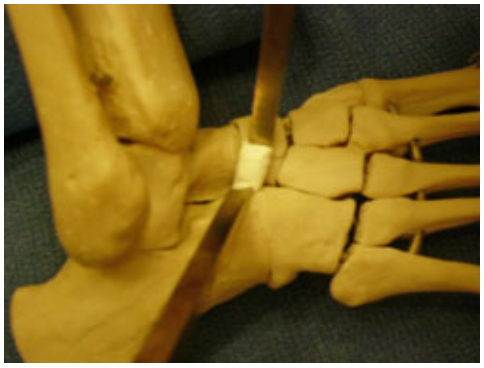
A tarsal coalition occurs when two bones grow into one another, connected by a bridge of bone, cartilage, or strong, fibrous tissue. These bridges are often referred to as "bars" and they can cover just a small amount of the joint space between the bones, or a large portion of the space.

The two most common sites of tarsal coalition are between the calcaneus and navicular bones, or between the talus and calcaneus bones. However, other joints can also be affected.

It is estimated that one out of every 100 people may have a tarsal coalition. In about 50% of cases, both feet are affected. The exact incidence of the disorder is hard to determine because many coalitions never cause noticeable symptoms.

In most people, the condition begins before birth. It is caused by a gene mutation that affects the cells that produce the tarsal bones. Although the coalition forms before birth, its presence is often not discovered until late childhood or adolescence.

This is because babies' feet contain a higher percentage of soft, growing cartilage. As a child grows, this cartilage mineralizes (ossifies), resulting in hard, mature bone. If a coalition exists, it may harden, too, and fuse the growing bones together with a solid bridge of bone or fibrous tissue similar to a scar. The ossification of the coalition typically happens between ages 8 and 16, depending upon which bones are involved. As a result, the hindfoot stiffens, causing pain and other symptoms.



In this anatomy model of the foot, surgical instruments point out a coalition bridge between the calcaneus and navicular bones.

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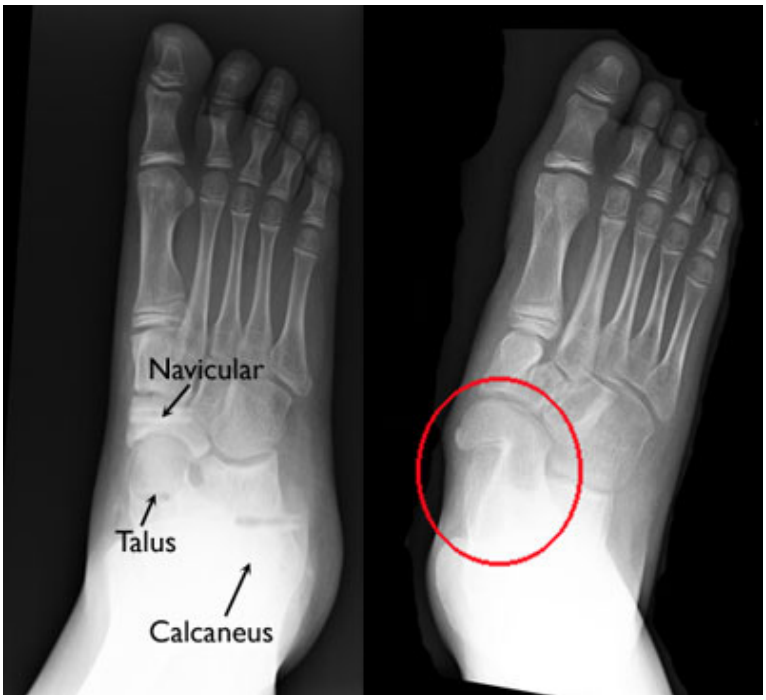
The stiffness and stress that tarsal coalitions produce may lead to arthritis over time.



(**Left**) An x-ray image of a healthy foot. (**Right**) An x-ray image that shows a large tarsal coalition that has fused the talus and navicular bones together.

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Symptoms

Many tarsal coalitions are never discovered because they do not cause symptoms or any obvious foot deformity. When symptoms do occur, they may include:

- Stiff, painful feet. The pain usually occurs below the ankle around the middle or back half of the foot.
- A rigid, flat foot that makes it difficult to walk on uneven surfaces. To accommodate for the foot's lack of motion, the patient may roll the ankle more than normal, which may result in recurrent ankle sprains.
- Increased pain or a limp with higher levels of activity.

Doctor Examination

Medical History and Physical Examination

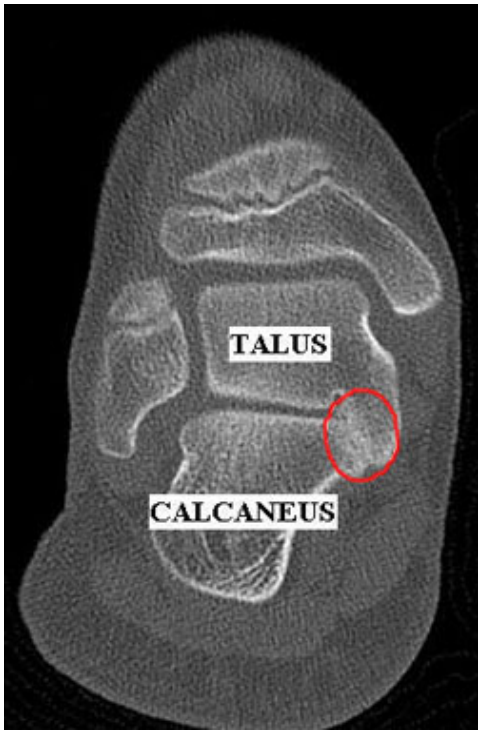
After discussing your symptoms and general health history, your doctor will do a complete examination of your foot and ankle, which will include checking your foot flexibility and gait. Patients with tarsal coalitions may have a flat arch that does not fully correct when pushing up on the toes and raising the heel.

(**Left**) A side view of a young person with flat foot. (**Right**) The feet remain flat when performing a toe raise.

Imaging Tests

To accurately diagnose the number, location and extent of the coalition(s), your doctor will order images of your foot and ankle.

- **X-rays.** These tests provide clear images of bone. Many coalitions are visible on x-rays.
- **Computed tomography (CT) scans.** The images produced with computed tomography provide greater detail of the bones. CT scans are the gold standard for imaging tarsal coalitions because they can show more subtle bars that may be missed with plain x-rays.



This CT image displays a cross-section view of the hindfoot and shows a large coalition fusing the talus and calcaneus bones.

Magnetic resonance (MRI) scans. These imaging tests provide detailed pictures that include soft tissues. Your doctor may order this test to look for irregular bars formed from cartilage or fibrous tissue.

Treatment

Tarsal coalitions only require treatment if they are causing symptoms.

Nonsurgical Treatment

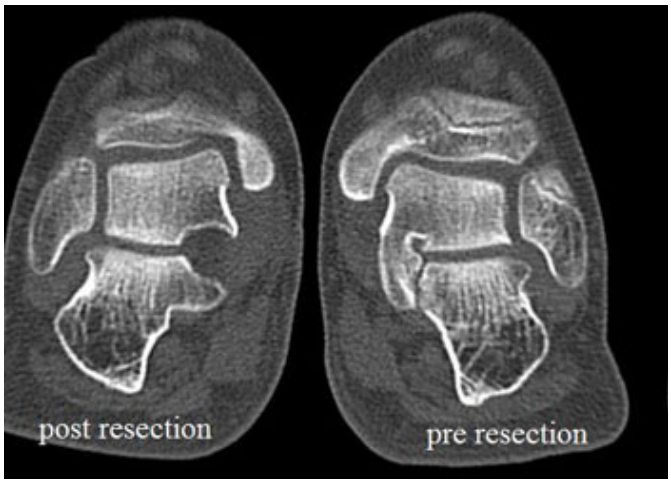
- **Rest.** Taking a break from high-impact activity for a period time — 3 to 6 weeks — can reduce stress on the tarsal bones and relieve pain.
- **Orthotics.** Arch supports, shoe inserts like heel cups and wedges, and other types of orthotics may be recommended to help stabilize the foot and relieve pain.
- **Temporary boot or cast.** These options can immobilize the foot and take stress off of the tarsal bones.
- **Injections.** Steroid medications may be used in conjunction with other nonsurgical options to provide temporary pain relief.

Surgical Treatment

When nonsurgical treatments are not effective at easing pain or improving function, your doctor may consider surgery.

The surgical procedure your doctor recommends will depend on the size and location of the coalition, as well as whether the joints between the bones show signs of arthritis.

- **Resection.** In this procedure, the coalition is removed and replaced with muscle or fatty tissue from another area of the body. This is the most common surgery for tarsal coalition because it preserves normal foot motion and successfully relieves symptoms in most patients who do not have signs of arthritis.



These CT cross-section images show a patient with coalitions between the calcaneus and talus in both feet. At the time of this scan, the coalition on the left foot had been resected, and the right foot was awaiting the procedure.

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- **Fusion.** Larger, more severe coalitions that cause significant deformity and also involve arthritis may be treated with joint fusion. The goal of fusion is to limit movement of painful joints and place the bones in the proper position. In fusion for tarsal coalition, the bones may be held in place with large screws, pins, or screw-and-plate devices.

Recovery

Depending upon the type and location of your surgery, a cast will be required for a period of time to protect the surgical site and prevent you from putting weight on the foot. Casts are typically replaced with walking boots, and your doctor may recommend physical therapy exercises to begin restoring range of motion and strength.

Your doctor will determine when it is safe for you to begin putting weight on your foot. Arch supports or orthotics may also be helpful in stabilizing the joint, even after surgery.

Although it may take several months to fully recover, most patients have pain relief and improved motion after surgery.

Last reviewed: February 2014

Reviewed by members of POSNA (Pediatric Orthopaedic Society of North America)

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