Transverse Tibial Transport for Chronic Nonhealing Wounds

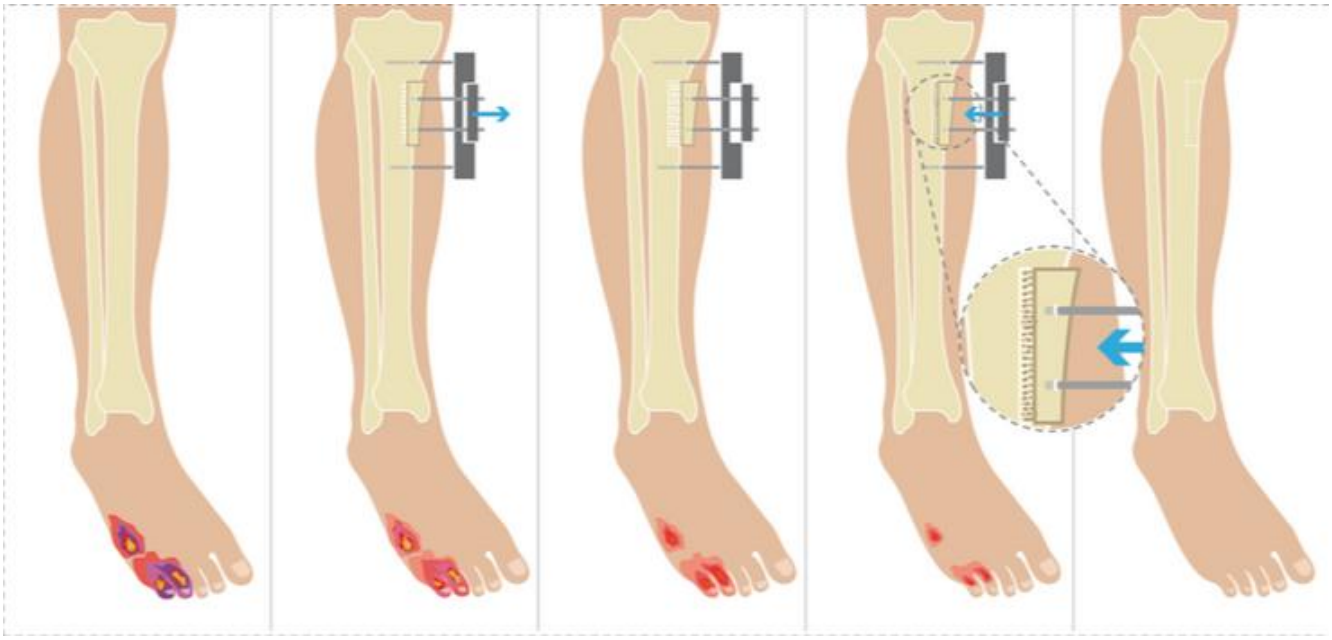
Using the Biodynamik XT3® System

A Guide for Patients and Families

How Transverse Tibial Transport Works

Transverse tibial transport (TTT) uses the same biological principle behind bone lengthening: when bone is very slowly and gently moved, the body responds by growing new tissue and new blood vessels around it. Instead of lengthening a bone, TTT gently shifts a small segment of your shin bone (tibia) sideways and then guides it back. This controlled movement is believed to stimulate new blood vessel growth (angiogenesis) and improve circulation to the lower leg and foot, which can help chronic wounds heal that have not responded to standard wound care.

TTT is most often used for chronic diabetic foot ulcers and other slow-healing wounds related to poor circulation. It is intended to work alongside — not replace — the wound care, infection control, and diabetes management you are already receiving.



Who Is This Treatment For?

Your care team may recommend TTT if you have a chronic wound, such as a diabetic foot ulcer, that:

- Has not improved after at least 3 months of standard wound care (debridement, dressings, offloading, infection control), or
- Is a more severe or deep wound (for example, exposed tendon, joint, or bone), and
- You still have at least some blood flow reaching the ankle or foot, confirmed by imaging of your leg's blood vessels.

TTT is generally not appropriate if you have:

- An active bone infection (osteomyelitis) in the proximal tibia near the device implantation
- An open wound or infection very close to where the incisions would be made
- Complete blockage of the major blood vessels supplying the leg
- A medical condition that makes surgery or anesthesia unsafe right now

Your surgical team will review your imaging, wound, and overall health to determine whether TTT is a good option for you.

What Is the Biodynamik XT3 System?

The Biodynamik XT3 System is an external fixator — a frame that attaches to the outside of your leg with small pins — designed specifically to perform transverse tibial transport. It holds and gradually moves the small bone segment created during surgery, according to a precise schedule set by your surgical team. The device is motorized and automatic, therefore you do not need to make any adjustments to the device throughout the treatment.







What Happens During Surgery

Through one small incisions on the upper inner shin, your surgeon cuts one small rectangular window in the outer layer of the tibia (the bone cortex), without destabilizing the bone. Pins are then placed through the skin into this bone segment, and the external fixator frame is attached to the outside of the leg and connected to the pins.

This is a separate procedure from the treatment of the wound itself. Your care team will continue wound debridement, dressing changes, and infection management throughout your treatment.

The Transport Process (Timeline)

- **Latency phase:** The bone segment is typically left undisturbed for about 4 to 5 days after surgery before transport begins.
- **Distraction:** The bone segment is then gradually moved outward, at a rate of about 1 millimeter per day, split into several small adjustments — either by your care team or by you, if trained to use the device.
- **Retraction:** The bone segment is then guided back to its original position at a similar rate.
- **Total time in fixator:** The external fixator generally stays in place until your wound has fully healed and the bone window has stabilized, which published studies report can range from several weeks to a few months depending on wound severity and individual healing. Your surgical team will give you a more specific estimate.
- **After removal:** After the fixator is removed you will have no restrictions.

What to Expect: Recovery and Healing

Published studies of transverse tibial transport for chronic diabetic foot ulcers report healing in the large majority of patients, though individual results vary based on wound severity, blood flow, infection control, and overall health.

You will have no weight bearing restrictions during your treatment but you will likely require an offloading boot or shoe to help keep pressure off your chronic foot wound. You will continue regular weekly follow-up visits for wound checks, pin site care, and x-rays to monitor the bone segment in alignment with your weekly visits with the wound care team.

Caring for Yourself at Home

- **Pin site care:** Clean the pin sites exactly as instructed, and watch closely for redness, swelling, or drainage. Pin site care is one of the most important parts of preventing infection.
- **Wound care:** Continue all wound care, dressing changes, and offloading instructions from your wound care team. TTT works alongside this care, not in place of it.
- **Blood sugar control:** Tight blood sugar control supports both wound healing and bone healing. Work closely with your diabetes care team during treatment.
- **Nutrition:** Eat a balanced diet with enough protein, vitamin C, and vitamin D to support healing, and stay well hydrated. You may be provided with a nutrition supplement (Juven) by your orthopedic or wound care team.

- **Smoking:** Avoid smoking and secondhand smoke. Smoking significantly impairs circulation and wound healing.
- **Activity:** You may be weightbearing with the use off an offloading boot or shoe.

Possible Risks and Complications

As with any surgery, transverse tibial transport carries some risks. Your surgical team will talk with you about how these apply to your situation. Possible complications include:

- Pin site infection (the most common complication, usually minor and treatable with local care and/or oral antibiotics)
- Bleeding or infection at the incision site
- Pain during transport, uncommon but usually manageable with medication or an adjusted schedule
- Tibial fracture (rare)
- Risks related to anesthesia and surgery in general
- The possibility that your wound may not fully heal despite treatment, which in some cases can still lead to amputation, especially with uncontrolled infection or very poor blood flow

Call Your Care Team Right Away If You Notice:

- Increasing redness, warmth, swelling, or drainage at a pin site or incision
- A pin that feels loose or a frame that feels unstable
- Fever or feeling generally unwell
- Severe or worsening pain not relieved by your prescribed medication
- New numbness, tingling, or coldness in the foot or leg
- The wound appears to be getting larger, darker, or more foul-smelling

Frequently Asked Questions

Does this replace my regular wound care?

No. TTT is designed to work alongside your existing wound care, debridement, offloading, and infection management, not to replace them. Keep all wound care appointments during treatment.

Will I be able to walk during treatment?

In general, you may be weightbearing as tolerated throughout treatment in addition to an offloading boot or shoe provided by your care team.

How is this different from limb lengthening?

The surgery and external fixator are similar in concept, but the goal is different. Limb lengthening aims to add length to a bone. TTT does not lengthen the bone. It briefly shifts a small bone segment and returns it, aiming to stimulate blood flow to help a wound heal.

What if my wound still doesn't heal?

TTT improves the odds of healing for many patients, but it is not guaranteed to work for everyone. If your wound does not respond, your care team will discuss other options with you, which may include further surgery.

Questions or Concerns?

Contact your Mayo Clinic care team with any questions about your surgery, recovery, or the transport process. If you are unable to reach your care team and believe you have an urgent problem, go to the nearest emergency department.

Care team / clinic phone: 904-953-2496

After-hours or urgent line: 904-953-2000