Achilles Tendon Ruptures

by Rebecca A. Cerrato, M.D.

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and varying amounts of swelling and bruising are present. With partial tears, one may still be able to move the foot, and may only have minor pain.

Diagnosis

Most complete Achilles tendon ruptures can be appropriately diagnosed with a clinical examination. A palpable defect can be felt along the course of the tendon. Swelling and bruising can also be present. One specific examination for Achilles tendon ruptures is the Thompson test, which involves squeezing the calf muscles while the patient is lying on their stomach with their feet hanging over the examination table. With an intact Achilles, the foot can passively plantarflex. In a patient with a complete tear, there is no passive motion. If there is a question about a partial or complete rupture of the Achilles, an MRI can be obtained.

Treatment

An individual who ruptures an Achilles tendon should seek prompt medical treatment. Delay can compromise results. Treatment for Achilles tendon ruptures can be surgical or conservative.

- **Surgical**: The primary goal of surgical treatment is to reestablish appropriate length and tension to the ruptured tendon. The procedure generally involves making an incision on the back of the patient's leg and stitching the torn tendon ends together. Historically, this involved a long incision with protected immobilization as long as most non-operative protocols. The disadvantages include wound complications, nerve damage, and typical complications associated with surgery (i.e.: anesthesia, bleeding).

> Surgical advances of much smaller incisions along with enhanced suture techniques and materials improve outcomes of Achilles tendon repairs.

  Today, most surgeons use much smaller incisions with improved suture technique and material. This has significantly decreased associated skin complications. In addition, a percutaneous technique has been popularized which involves an even smaller incision. Recent literature reports similar rerupture risk compared to the standard open repair. Advantages with surgical treatment include a significantly lower rerupture risk, improved power, endurance, and return to higher level of sports activities.

- **Conservative**: Non-operative treatment involves immobilization, typically in a boot, with the foot and toes pointed downward for a period of six to 10 weeks. Advantages of non-operative treatment include no wound complications (e.g.: skin breakdown, infection, scar formation, neurovascular injury) and lower morbidity. However, this form of treatment has disadvantages including a higher (40%) risk of tendon rerupture, stiffness, and decreased push-off power and endurance. With advances in surgical techniques, non-operative management is typically recommended only for elderly patients or those with increased surgical risk factors (i.e.: diabetes, peripheral vascular disease, and poor skin integrity).

Rehabilitation

Traditionally after an Achilles tendon repair, patients were immobilized in a cast for six to eight weeks, followed with gentle ankle motion exercises. Newer protocols have challenged this routine. Recent studies have shown patients with similar rerupture rates and improved motion and strength with faster mobilization. For the first two weeks following surgery, patients are immobilized in a splint and not permitted to bear weight. Weightbearing is then permitted in a removable boot with heel lifts. A monitored physical therapy program is then initiated shortly after weightbearing is permitted.

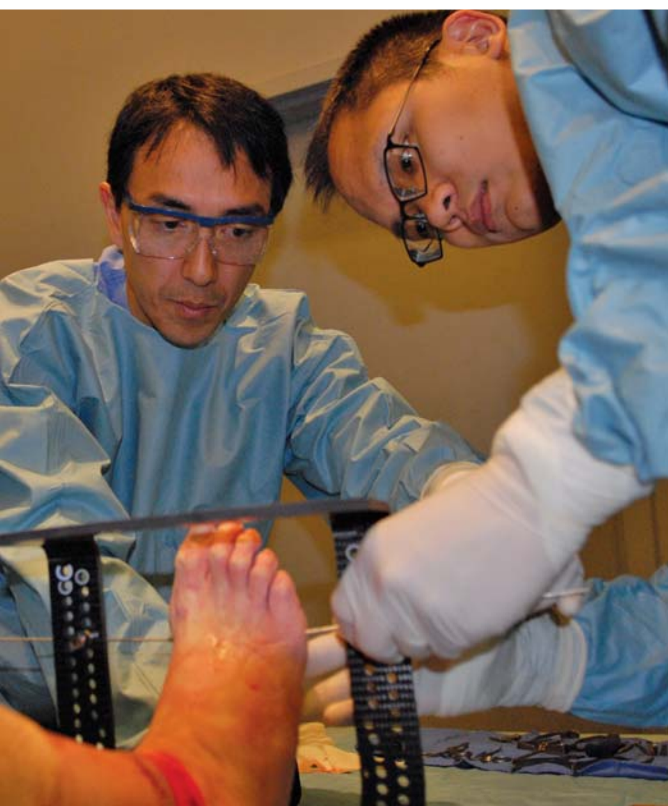
Alternative Treatment for the Younger Patient *by Clifford L. Jeng, M.D.*

Ankle arthritis in younger patients is a difficult clinical problem. It is most commonly seen in individuals who have had a previous ankle fracture and subsequently developed post-traumatic arthritis. Many of these patients are in the prime of their working years and have young families which demand that they remain physically active.

The surgical options are limited. Artificial ankle replacement has a limited lifespan and should be reserved for patients with modest demands on their ankle. Therefore, it is not appropriate for these younger patients. Ankle fusion remains the "gold-standard" treatment for end-stage ankle arthritis in young adults. However, fusion is not without its own significant morbidities. Generally, for patients who have had ankle fusions

- 79 percent have difficulty on unlevel ground
- 75 percent have difficulty with stairs
- 64 percent complain of aching with prolonged activities

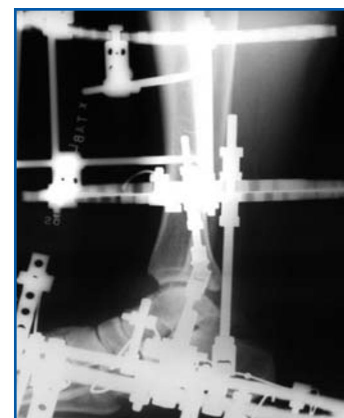
By 22 years after ankle fusion, nearly 100 percent of patients will have developed neighboring joint arthritis in the hindfoot, midfoot, or forefoot.



Dr. Clifford Jeng teaches foot and ankle orthopedic fellows the techniques in applying an external fixator frame, which helps regenerate the foot's arthritic cartilage and is usually removed after three months.

An alternative treatment called distraction arthroplasty has been performed at Mercy's Institute for Foot and Ankle Reconstruction for the past several years. The concept behind this new procedure is the remaining chondrocytes in the arthritic cartilage still have some regenerative capacity. However, because of the narrowing of the joint space and subchondral sclerosis, these chondrocytes are in a biomechanically disadvantageous environment. By applying an external fixator frame and distracting the ankle joint by 5 millimeters, this environment can be significantly improved allowing for the chondrocytes to lay down additional collagen to restore the joint space. Patients are allowed to walk on the frame, which is usually removed after three months.

Studies have shown that 75 percent of patients experience clinical improvement at the one-year follow-up exam. In addition, the relief from arthritic symptoms seems to continue to improve over the following five years. As with all orthopedic procedures, appropriate patient selection is critical for successful outcomes. The ideal patient has a low body-mass index, well-maintained ankle range of motion, and normal ankle alignment.



The surgeons at The Institute for Foot and Ankle Reconstruction at Mercy use distraction arthoplasty as an alternative treatment for ankle arthritis in younger adults. Generally, 3 out of 4 patients find relief from their arthritic symptoms following this treatment.

Biomechanics of the Foot

Computer Analysis Assists with Diagnosis and Treatment of Foot Disorders

by Mark S. Myerson, M.D.

For practical purposes, a diagnosis of a problem with the foot and ankle is made following examination of the foot. This can be done with the patient standing (a static analysis) or with the patient walking (a dynamic evaluation). Both play an important role in the diagnosis. However, there are pathologic conditions of the foot that are visibly quite obvious, but the planning of a specific treatment may not be easy due to abnormal biomechanics of the foot. In the diagnosis and treatment of hallux rigidus (see page 6), for example, the decision may be facilitated by the use of computer gait analysis.

At The Institute for Foot and Ankle Reconstruction at Mercy, both surgeons and physical therapists conduct a computer gait analysis to obtain the biomechanics of the foot, which assists in developing an appropriate treatment plan.

A pedobarograph consists of a walking pressure sensitive mat that is buried into the floor. As a patient walks across the mat, tiny optical sensors “read” the pressure of the foot in a time-force integral.

The photograph of the pedobarograph presented here is a composite of thousands of images that are formatted into a picture. The areas colored in blue are low pressure, and this part of the foot is not being used by the patient, while the areas in red are zones of very high pressure. Note that there is very little pressure under the big toe of either foot, while there is an increase in pressure directly under the lesser metatarsal heads. This is a fairly typical appearance of hallux rigidus. Because the big toe is stiff and painful, the patient avoids (either consciously or subconsciously) bearing weight on the toe, and the forefoot tilts (supinating) so that an increase in pressure is present under the outside of the foot, in this case with metatarsalgia.

Although the cause of deformity can be obvious following clinical examination, the pedobarograph is a simple and inexpensive adjunct to foot and ankle diagnosis.

New Operating Room Opens at The Institute for Foot and Ankle Reconstruction at Mercy

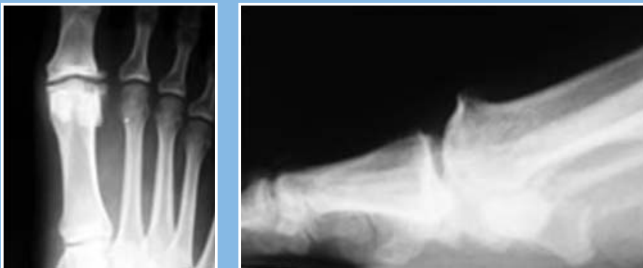
Drs. Clifford Jeng; Mark Myerson, Medical Director; Rebecca Cerrato; and John Campbell are pleased to announce the opening of a new operating room specifically dedicated to foot and ankle surgery. The third operating room of its kind at The Institute for Foot and Ankle Reconstruction at Mercy enables the surgeons to remain on the forefront of innovative surgical techniques. It is equipped with the latest in digital and wireless communications, voice-activated surgical support tools, and video equipment. In addition, foot and ankle surgical patients now have a dedicated pre- and post-operative area providing for their comfort and privacy.

Treating Arthritis of the Big Toe

by John T. Campbell, M.D.

Hallux rigidus is a localized form of arthritis that affects the joint at the base of the big toe (hallux) where it connects to the foot. It is a common disorder that causes pain and stiffness of the toe. Bone spurs and cartilage damage develop first, followed by full-blown arthritis. Hallux rigidus can occur following traumatic injuries like fractures or severe sprains of the toe (so-called “turf toe” injury), as well as due to overuse as in running or athletics. However, hallux rigidus affects athletes and non-athletes alike. Architectural features of the foot may also play a role in causing hallux rigidus, such as the length, shape, or relative position of the involved bones. Some patients develop hallux rigidus without a clear predisposing cause.

Patients with hallux rigidus complain of pain, stiffness, and jamming of the toe during walking and other activities. Tenderness is located on the top of the joint, where a bump or bunion develops due to the underlying bone spurs. Shoes with a high heel or an overly flexible sole may cause painful jamming and are poorly tolerated. Tight or constrictive footwear can also irritate the bunion on the top of the toe.



Prior to full arthritis of the big toe, bone spurs develop causing pain and stiffness. Patients can find relief by adjusting their footwear. Surgery may be necessary only if non-operative methods do not reduce symptoms.

Non-Operative Treatment Options

Initial treatment of hallux rigidus focuses on non-operative methods. Patients should avoid high heels or poorly supportive footwear, instead relying on comfortable shoes, sneakers, or clogs. A shoe with a stiff sole may help diminish bending stress and pain at the arthritic joint; this can be achieved by having a shoe modified to stiffen the sole or using a lightweight carbon fiber insert within the shoe. Rest may help, particularly in runners or athletes, and anti-inflammatory medications can alleviate pain. Cortisone injection into the joint can temporarily relieve the pain, although in most patients symptoms return.

Understanding Surgical Options

If non-operative treatment fails, surgery becomes an option.

- **Arthroscopy:** Arthroscopy of the toe joint is reserved for cases with mild inflammation, loose fragments or torn cartilage, and small bone spurs.
- **Cheilectomy:** In cases with early arthritis and larger spurs, this open surgical procedure involves cleaning out debris, inflammatory tissue, and bone spurs. A cheilectomy relieves pain, improves motion, and allows roughly 90 percent of patients to resume activities.
- **Joint Fusion:** More severe arthritis of the toe joint responds poorly to the cheilectomy approach and, in such cases, a joint fusion typically is recommended. Fusion surgery is successful 90 percent of the time, but does lead to stiffness and may impair some activities such as running and sports.

Joint replacement of the toe has not shared the same high levels of success as similar surgery of the hip and knee. Current research is actively investigating alternative treatments for such advanced arthritis, particularly in younger athletic patients who wish to avoid or postpone fusion surgery and continue sports activities for as long as possible.

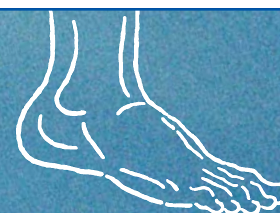
Arthroscopic surgery can reduce pain and stiffness experienced by patients who suffer from mild inflammation, loose fragments or cartilage, or small bone spurs in their big toe joints.

Foot and Ankle Surgeons Active in the Community

Clifford Jeng, M.D., and John Campbell, M.D., along with foot and ankle fellows studying at The Institute for Foot and Ankle Reconstruction at Mercy, were among a medical team to provide foot screenings at Baltimore's local Helping Up Mission. Participating in the national "Our Hearts to Your Soles" program founded in 2004, the local shelter provides free foot screenings along with new socks and shoes for homeless men. The Institute's surgeons and fellows annually volunteer their medical services for this community outreach event.

Appointments & Consultations

If you are seeking a second opinion for your patient or are interested in a consultation with the physicians at The Institute for Foot and Ankle Reconstruction at Mercy, please call **410-659-2800**.



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