Posterior tibialis tendon transfers, with and without osteotomy

These procedures are utilized for patients with posterior tibial tendon dysfunction, also known as posterior tibial tendon insufficiency, and which are typically in the Stage II classification. This stage includes those people with a unilateral/asymmetric and progressive flatfoot deformity due to dysfunction of the posterior tibial tendon. The entity is often associated with a contracture of the tendo-Achilles complex. Surgical management has progressed over the last several years, and no longer is an isolated tendon transfer utilized, but rather the soft tissue reconstruction performed is supported with some type of bone corrective procedure. The most common one now utilized is a medial displacement calcaneal osteotomy that improves the posture of the arch, provides support for the soft tissue reconstruction, and medializes the Achilles tendon. Occasionally this procedure is performed with an Achilles tendon lengthening.

The procedure is performed under regional or general anesthesia and in which the diseased posterior tibial tendon is removed and then replaced with a transfer of the FDL tendon to a drill hole in the navicular tuberosity. When a calcaneal osteotomy is performed, it is done through a small lateral incision that medializes the posterior tuberosity of the calcaneus approximately one centimeter medially, and this is typically secured with a screw. This is a fairly stable osteotomy. Other types of bone corrective procedures may also be utilized to help support the soft tissue reconstruction in this entity, and include a lateral column lengthening (distraction-arthrodesis of the calcaneo-cuboid joint) or medial based procedure such as a Miller procedure that involves arthrodesis of the naviculo-cuneiform, and occasionally the first tarsometatarsal joint. The tendon transfer is usually secured under maximum tension with the foot in supination. Due to this posture, it is difficult for the patient to weight bear on the foot for a period of four weeks. Everyone has their own specifics in how quickly they rehabilitate an individual patient, but typically weight bearing is begun in a cast or boot at four weeks, and more aggressive range of motion/strengthening activities are initially eight weeks. Thereafter, the patient is allowed to freely weight bear in a shoe modified with a good arch support.

SPLATT

SPLATT stands for split anterior tibial tendon transfer. It is typically utilized for adult patients having suffered a stroke/CVA and in which they have developed a spastic equinovarus deformity. This includes a imbalance of the tendon function to the foot, with an overactive anterior tibialis tendon and associated heel cord contracture. The procedure involves a lengthening of the Achilles tendon and a transfer of one-half of the Achilles
Physical Therapy Protocols

SPLATT (contd)

tendon to the cuboid laterally. We often release the FHL and FDL tendons, or perform
toe flexor releases, to further minimize varus-deforming forces. Postop the patient is
placed into a cast and is typically non-weight bearing for the first two weeks. At two
weeks they are allowed to fully weight bear in a short leg cast. By eight weeks they are
typically ambulating in their AFO, and at three-four months, the AFO may gradually be
discontinued if their overall ambulatory status allows.

“Bridle” posterior tibialis tendon transfer

The Bridle procedure is utilized for patients with foot drop who are unable to utilize an
AFO for whatever reason. Generally, these are patients who have at least a Grade IV
strength to the posterior tibial tendon, and which is unopposed by the peroneals, with lack
of function in the anterior tibialis tendon. The procedure involves numerous incisions
that allow for a re-routing of the posterior tibial tendon to the dorsum of the midfoot. It is
brought down through a drill hole in one of the midfoot bones and secured to the bottom
of the foot. In re-routing this posterior tibial tendon, it is woven through the non-
functioning anterior tibialis tendon, and then further tenodesed to the peroneus longus.
The peroneus longus portion of this procedure involves releasing the tendon at the mid-
fibular level, and leaving it intact at its insertion, and then re-routing it subcutaneously to
the anterior aspect of the ankle where it is tied into the anterior tibialis and posterior
tibialis tendon. Therefore, the posterior tibialis tendon is now coursed into the midfoot,
and has the advantage of the anterior tibialis tendon going medially and the peroneus
longus going laterally, thus creating a “yoke” effect. The transferred posterior tibialis
tendon will now pull through these three structures and create more of a balanced foot
that will have some dorsiflexion ability.

Following surgery the patient is placed in a cast and is non-weight bearing for two weeks,
and then placed in a short leg walking cast for approximately 6-8 weeks. At that time
they are advanced to an AFO. Many of these transfers end up having only a tenodesis
effect, keeping the foot out of plantar flexion, while several actually do work dynamically
providing a small amount of dorsiflexion to the foot. In the latter case, these patients can
eventually discontinue their AFO.

Chronic Achilles Tendon Repairs

There are patients who have chronic Achilles tendon problems in the non-insertional
area, either from neglected or inappropriately treated acute ruptures, or those that have
tendinosis (degenerated tendon) that requires excision and reconstruction. Most surgeries
performed for chronic Achilles tendon problems in the non-insertional area involve
excision of a certain amount of tendon, followed by augmentation either utilizing a “turn-
down” of more healthy tendon proximally and extending over the defect to connect to
distal tissue, versus an actual transfer of the FHL tendon to the calcaneus. Whether a
Physical Therapy Protocols

Chronic Achilles Tendon Repairs (contd)

FHL tendon transfer is utilized typically is determined by the amount of tissue excised or whether or not a turn-down had been utilized previously and is unsuccessful.

The surgeon will have to individualize each patient in regard to the aggressiveness of their postoperative rehabilitation that is determined by a number of factors. In general, most patients are non-weight bearing in a cast or boot, in plantar flexion, for two-four weeks. At four weeks they may be able to begin gentle range of motion activity and weight bearing in a boot with the use of a heel lift. The heel lift will be gradually reduced over a period of several weeks. By eight-ten weeks they are able to progress to a shoe that includes a heel lift that again will be decreased in height over a period of several weeks.

Peroneal Tendon Surgery

Peroneal tendons often require surgery for longitudinal split tears, subluxation/dislocation, and degeneration with or without frank rupture.

For more minor problems that include small split tears, the tendon is debrided and directly repaired side-to-side. If there is no instability of the tendon complex itself, these patients are allowed to weight bear fairly immediately in a boot, and begin fairly aggressive strengthening when their wound allows, usually two-four weeks.

For subluxation/dislocation and in which the tendons are restabilized utilizing a fibular groove deepening technique or reconstruction of the SPR, patients are generally non-weight bearing in a cast for two weeks and then allowed to weight bear in a short leg cast for four additional weeks. At that time, they will be placed into a walker boot and allowed to initiate peroneal strengthening and range of motion activities.

For patients with a degenerated tendon, with or without rupture, the diseased or ruptured tendon is usually excised and then the healthy portions of the tendon proximally and distally are tenodesed to the adjacent peroneal tendon. The usual scenario is that the peroneus brevis is the one that is diseased, and the degenerated or ruptured segment is excised and then the proximal and distal aspects of the peroneal brevis are tenodesed, side-to-side, with the peroneus longus. In these cases the patient is often weight bearing for two weeks in a splint or cast, followed by a walking cast or boot for an additional four weeks. At six weeks they can begin peroneal strengthening exercises and range of motion activity. At two-three months, we will oftentimes place these peroneal tendon patients into a shoe that is modified with a lateral heel wedge to diminish stress on the peroneal complex. In addition, it is important to assess these patients for underlying cavovarus deformities, as this is a situation that may lead to recurrent peroneal tendon problems due to the ongoing overloading of the peroneal complex. This too can be managed by appropriate shoewear modifications.
**Physical Therapy Protocols**

**Modified Broström-Evans lateral ankle reconstruction**

Lateral ankle sprains are a very common injury, and generally recover well. However, up to 20 percent of lateral ligament injuries to the ankle can lead to chronic problems that include functional and mechanical instability. Patients may present with a feeling of “giving way” that may include a tendency towards recurrent inversion even with routine daily activities. Non-operative measures include aggressive peroneal tendon strengthening, and the use of shoewear modifications like lateral heel wedges, as well as ankle braces or taping techniques. It is important to assess these patients for underlying cavovarus posture, which may exacerbate this particular problem.

When surgery is necessary for lateral ligament instability, the tendency is now to perform an anatomic repair of these anterior talofibular and calcaneofibular ligaments. This basically involves shortening of the attenuated ligaments and direct repair with suture fixation. If this anatomic repair is reinforced with advancement of the inferior extensor retinaculum, it is called a modified Broström technique. Over the years, we have augmented this gold standard procedure with a slip of the peroneus brevis tendon through a drill hole in the distal fibula. This acts as a check rein to inversion stresses. We find that this provides improved durability to the anatomic repair, but does not limit long-term inversion/eversion.

Following the procedure, the patient is typically non-weight bearing in a splint for two weeks, and then is advanced to a short leg walking cast for a period of four weeks. At six weeks, they are placed into a boot or an air cast and allowed to work on dorsiflexion and plantar flexion. At ten-twelve weeks, peroneal strengthening can be instituted with care taken to avoid inversion tendencies. Long-term management may include shoe modifications like a lateral heel wedge, as well as prophylactic bracing.