

TIBIALIS POSTERIOR TENDON RUPTURE: Alternative Surgical Repair

Donald R. Green, DPM

INTRODUCTION

Tibialis posterior tendon ruptures often go undiagnosed in the initial phase. Loss or weakness of this muscle will result in a significantly severe flat-foot. Since this is *usually progressive* and *unilateral*, presentation is often discovered due to the persistent pain in the medial arch or medial rear-foot of a severe collapsing pes valgoplanus foot type. This foot type is usually poorly controlled with standard functional orthoses.

The tibialis posterior tendon is the primary supinator of the foot. Initially, it helps to decelerate subtalar joint pronation in the early stance phase of gait. Then it functions to help supinate the subtalar joint with external rotation of the leg and the talus, dorsiflexion of the talus, and inversion of the calcaneus.

When rupture of this tendon occurs, many times a misdiagnosis of medial ankle sprain or arch sprain is made. As in most ruptured tendons after the initial phase of discomfort, there is little pain associated with the tendon area itself. Most of the pain and disability comes with prolonged use of the part (in this case weight bearing and walking). The spring ligament becomes stretched, the talonavicular joint dislocates with the forefoot becoming laterally subluxed, the arch collapses and a callus may form over the navicular tuberosity and/or over the medial head of the talus. Often, the tendon itself will eventually heal in an elongated fashion and chronic tenosynovitis can occur in and around the tibialis posterior.

Most commonly, the tendon rupture occurs in a chronically stressed tendon that has some predisposed tendon degeneration. An acutely stressed tendon can also lead to rupture with predisposed tendon degeneration, but this has rarely been reported.¹ Chronically stressed tibialis posterior rupture is often seen in patients with uncontrolled pes valgoplanus foot types, especially in those that are overweight. Many times, this occurs in patients who may not recall a specific injury. In younger patients, it is more common to remember a more significant episode of injury. In one study of 19 non-rheumatoid arthritic patients with ruptures of the tibialis posterior, the average referral time after injury was 43 months.² Following the injury, chronic symptoms become progressively more intense. Chronic tenosynovitis, collagen vascular disease, infections, or repeated cortisone injections may all be associated with ruptures of the tibialis posterior tendon.

CLINICAL EXAMINATION

The most important clinical examination is muscle testing of the tibialis posterior muscle. The foot is plantar flexed, adducted, and inverted. The patient is instructed to hold the foot in this position without using their toes. The examiner abducts and everts the foot against the patient's resistance. Frequently, this examination will reveal muscle strength of less than 4/5. It is very unusual that the rupture of the tibialis posterior is seen bilaterally. Therefore, the strength of the tibialis

posterior on the opposite side can help confirm significant weakness of this muscle. Furthermore, in a stance position, when the patient goes up on their toes, the foot usually supinates with inversion of the calcaneus. With a ruptured tibialis posterior tendon, the heel will not be able to invert with supination of the subtalar joint.

Imaging techniques may not be as helpful in confirming the diagnosis of ruptured tibialis posterior tendon. MRI techniques are very helpful in establishing the diagnosis of acute ruptures, especially insertional avulsions or mid substance tears about the malleolus. Incongruous longitudinal tears are harder to diagnose, except in the very early stages. Because the majority of ruptures are not picked up initially, fibrous tissue will often fill in the ruptured tendon area and mask the area of complete or "partial" rupture. Although there will be evidence of abnormal fluid in the tendon area, diagnoses of attenuated or chronic tenosynovitis are more likely to be made after the initial window of opportunity is missed.

Plain weight-bearing radiographs often aid in the diagnosis by comparing common positional relationship of the normal and abnormal foot. Often both feet will show pronatory signs on the radiographs. These findings may include occlusion of the sinus tarsi by the leading wall of the posterior facet of the talus (Kirby's sign), anterior break in the cyma line, high talar declination angle, high Kite's angle, increased cuboid abduction angle, and decreased or abducted forefoot angle. However, the amount of pronatory evidence is usually much more significant on the side of the ruptured tibialis posterior tendon.

In the *acutely* diagnosed ruptured tibialis posterior tendon, primary repair of the tibialis posterior tendon with transfer or reinforcement of the flexor digitorum longus tendon is probably adequate. Conservative treatment of a short-leg, non-weight bearing cast with the forefoot in a plantar flexed adducted and inverted position for six weeks followed by a two to four week course of a weight bearing, in a neutral, short-legged cast has been updated to be effective.¹

Unfortunately, in most of the tendon ruptures, the diagnosis is significantly delayed. By this time the tendon may have healed, but in an elongated fashion, greatly reducing the effective strength of the tibialis posterior. Primary repair of

the tendon at this stage, even with tendon graft or transfer of the flexor digitorum longus, has not proven effective.³ Triple arthrodesis has proven to be successful in restoring the rearfoot stability.⁴ Although excessive rearfoot pronation is neutralized with the fusion, it is at the expense of any subtalar joint motion at all.

Over the last three to four years we have been providing patients with the chronically weakened or ruptured tibialis posterior tendon with two alternative surgical options. In the younger more active patients, a surgical advancement or tightening of the tibialis posterior tendon with or without flexor digitorum longus tendon transfer reinforcement and transfer of the tibialis anterior procedure is performed in conjunction with a STA-peg arthroereisis. This has benefit over triple arthrodesis by preserving much of the subtalar joint motion while increasing the strength of supination over primary repair alone. The STA-peg arthroereisis is done first to block the excessive pronation of the subtalar joint. (Figure 1A-C) The medial tendon repair is then performed. (Figure 2A-D) In the particular case demonstrated, the irregular thinned portion of the tibialis posterior was sectioned and removed as the tendon was shortened. The tibialis anterior was routed through the navicular in a "Young" technique.

The second alternative is a talonavicular fusion with the STA-peg arthroereisis in older patients. Although this effectively eliminates subtalar joint motion, it is not as significant a surgical intervention as the triple arthrodesis. (Figure 3A-D) The talonavicular area is prepared for fusion by removing the cartilage from both sides of the joint. The STA-peg is then inserted laterally. The talonavicular joint is finally fixated in approximate position. A 6.5 cancellous screw was used in the case shown. X-rays confirm the position.

The Kidner-Young-Cobb procedure has had some mixed results with the STA-peg arthroereisis. It has worked well to restore strength to the tibialis posterior area in most patients, but in two patients significant pain occurred in the sinus tarsi area. One patient developed a spur in this area with loosening of the STA-peg. In this case, the plug needed to be removed and the patient may yet require rearfoot fusion. A second patient developed peroneal spasm due to pain in the sinus tarsi and the peg was also removed. Some

other patients who eventually did very well developed some transient sinus tarsiitis which resolved with injection therapy.

Postoperatively, the patients are casted in a supinated plantar flexed position to relax the pressure on the tendon repair. This initial supinated position may allow some fibrosis to occur within the sinus tarsi and lead to the previously mentioned complications. Usually, with the STA-peg arthroereisis, the foot is allowed to maximally pronate initially after the surgery. Currently, the

procedures are being staged to avoid this particular complication. The STA-peg arthroereisis is performed six to eight weeks after the tendon work.

The talonavicular fusion and STA-peg arthroereisis in the older and usually heavier adult has proven rewarding in our preliminary study. The patient is casted postoperatively non-weight bearing for six weeks and then weight bearing for four to six weeks. All patients are followed up with functional orthoses.

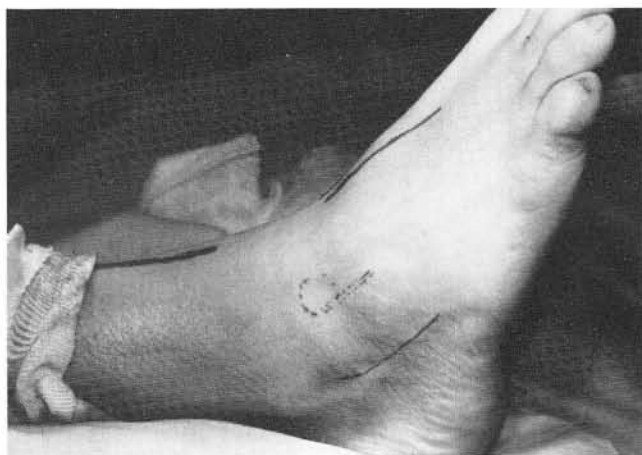


Figure 1A. Lateral view of the right foot demonstrating the sinus tarsi area.

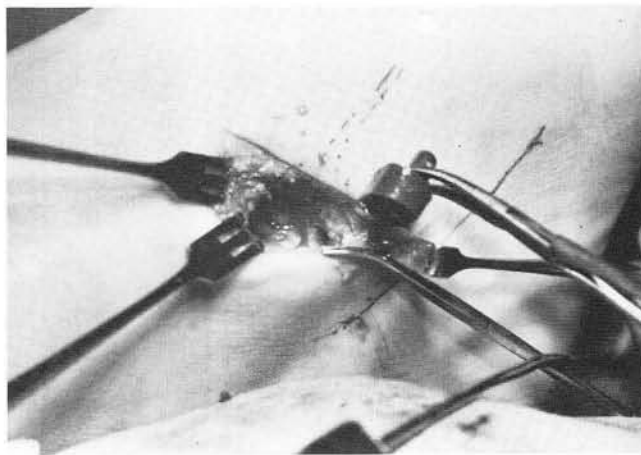


Figure 1B. Sinus tarsi area is prepared for insertion of the STA-peg at approximately a 45° angle with a drill hole into the calcaneus. A trial spacer was utilized.

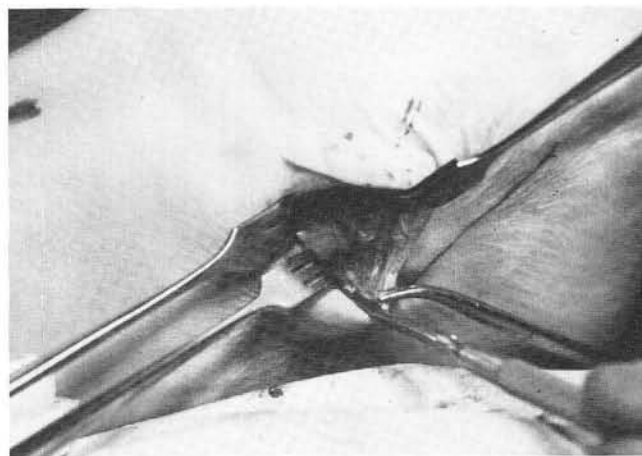


Figure 1C. The trial spacer is removed and the Sta-peg implant is inserted. This is to block the forward progression of the leading wall of the posterior facet of the talus.

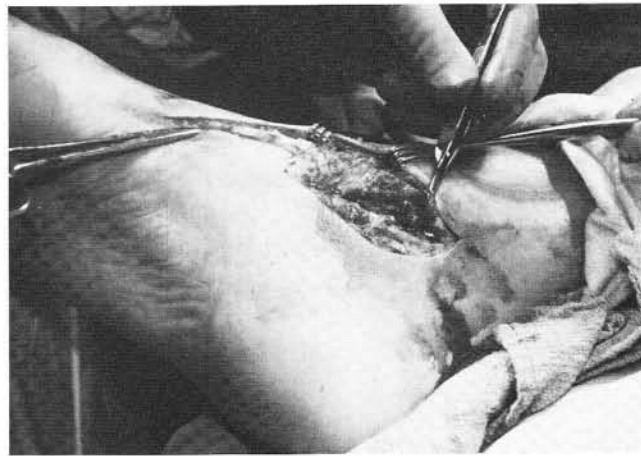


Figure 2A. Medial exploration for the tibialis posterior tendon.

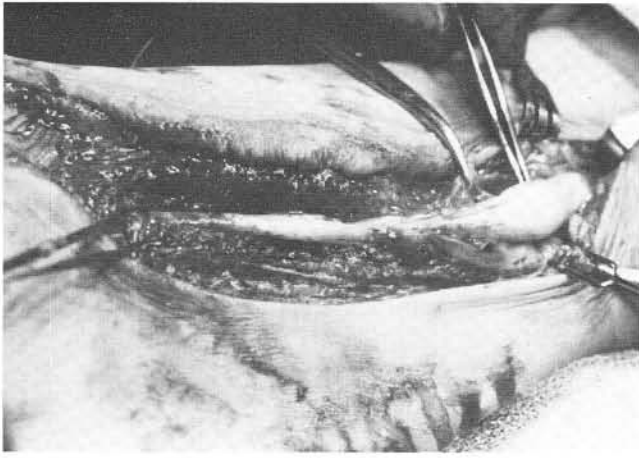


Figure 2B. A thinned tibialis posterior tendon is noted intact with a bulbous form of the tendon approximately 2" above the medial malleolus. The tendon is intact, but attenuated where it had previously ruptured.

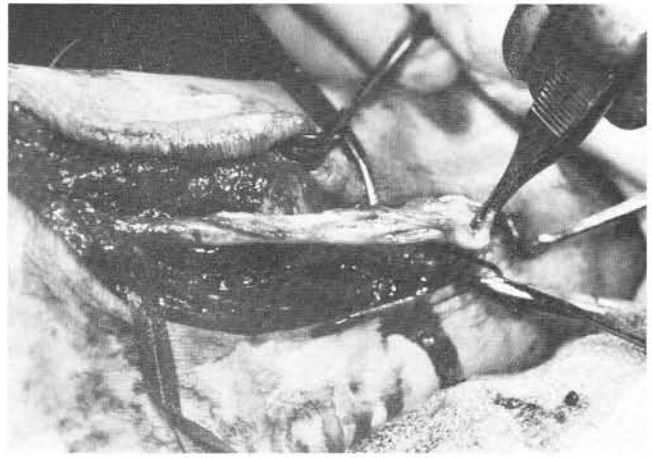


Figure 2C. The tibialis posterior tendon is shortened and sutured in a tightened position.

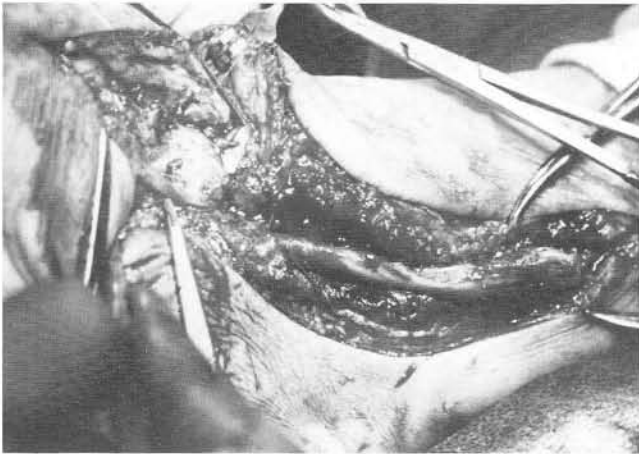


Figure 2D. The tibialis anterior is threaded through the navicular to reinforce the supination.



Figure 3A. Unilateral rupture of the tibialis posterior has led to much more significant pronation and subluxation laterally of the left foot as compared to the right foot.



Figure 3B. Lateral radiograph show occlusion of the sinus tarsi (Kirby's sign) and pronatory subluxation with relatively normal calcaneal inclination angle.

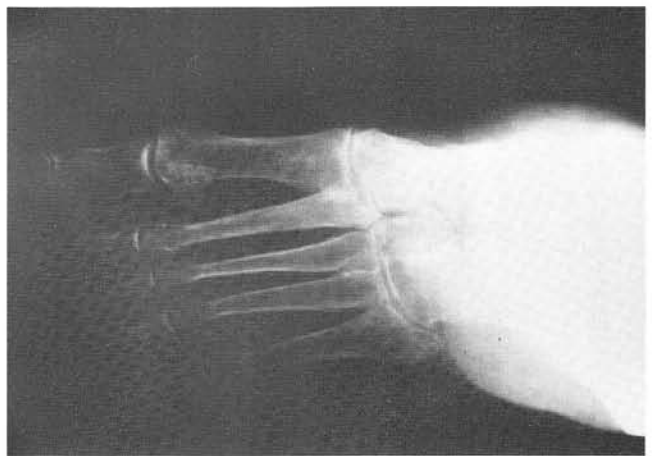


Figure 3C. The dorsal plantar view of this left foot is so pronated that it appears almost like an oblique radiograph.



Figure 3D. Following the STA-peg arthroereisis, the talonavicular joint is fused with a 6.5 cancellous screw to hold it in place.

REFERENCES

1. Silvani S: Management of Acute Tendon Trauma. In McGlamry ED, Banks AS, Downey MS (eds) *Comprehensive Textbook of Foot Surgery*; 2nd Ed, Williams & Wilkins, Baltimore (2): 1957, 1992.
2. Mann RA, Thompson FM: Rupture of the Posterior Tibial Tendon Causing Flatfoot. *J Bone Surg*. 67:556, 1985.
3. Goldner JL, Keats PK, Bassett FH, Clippinger FW: Progressive Talipes Equino Valgus due to Trauma or Degeneration of the Posterior Tibial Tendon and Medial Plantar Ligaments. *Orthop Clin*. 5:39, 1974.
4. Williams R: Chronic Nonspecific Tendo Vaginitis of Tibialis Posterior. *J Bone Joint Surg [Br]*. 45:542, 1963.

ADDITIONAL REFERENCES

- Alexander IJ, Johnson KA, Berquist TH: Magnetic Resonance Imaging in the Diagnosis of Disruption of the Posterior Tibial Tendon. *Foot Ankle* 8: 144, 1987.
- Banks AS, McGlamry ED: Tibialis Posterior Tendon Rupture. *J Am Podiatr Med Assoc*. 77: 170, 1987.
- Basmajian JV, Stecko G: The Role of Muscles in Arch Support of the Foot. *J Bone Joint Surg*. 1184, 1963.
- Cozen L: Posterior Tibial Tenosynovitis Secondary to Foot Strength. *Clin Orthop*. 43: 101, 1965.

- Daffner RH, Riemer BL, Lupetin AR, Dash N.: Magnetic Resonance Imaging in Acute Tendon Ruptures. *Skeletal Radiol*. 15:619, 1986.
- DeZwart DF, Davidson JSA: Rupture of the posterior Tibial Tendon Associated with Fractures of the Ankle. *J Bone Joint Surg* 65: 260, 1983.
- Downey DJ, Simkin PA, Mack LA, Richardson ML, Kilkoyne RF, Hansen, ST: Tibialis Posterior Tendon Rupture: A Cause of Rheumatoid Flatfoot. *Arthritis Rheum*. 31: 441, 1988.
- Funk DA, Cass JR, Johnson KA: Acquired Adult Flatfoot Secondary to Posterior Tibial-Tendon Pathology. *J Bone Joint Surg*. 68: 95, 1986.
- Griffiths JC: Tendon Injuries around the Ankle. *J Bone Joint Surg [Br]*. 47:686, 1985.
- Henecroth WD, Deyerle WM: The Acquired Unilateral Flatfoot in the Adult: Some Causative Factors. *Foot Ankle*, 2:304, 1982.
- Hirsh S, Healey K, Feldman M: Chronic Tenosynovitis of the Tibialis Posterior Tendon and the Use of Tomography. *J Foot Surg* 27:306, 1988.
- Jahss MH: Spontaneous Rupture of the Tibialis Posterior Tendon: Clinical Findings, Tomographic Studies, and a New Technique or Repair. *Foot Ankle* 3:158, 1982.
- Johnson KA: Tibialis Posterior Tendon Rupture. *Clin Orthop Relat Res* 177:140, 1983.
- Kelbel M, Jardon OM: Rupture of Tibialis Posterior Tendon in a Closed Ankle Fracture. *J Trauma* 22:1026, 1982.
- Kettlekamp DB, Alexander HH: Spontaneous Rupture of the Posterior Tibial Tendon. *J Bone Joint Surg* 51:759, 1969.
- Lipsman S, Frankel JP, Count GW: Spontaneous Rupture of the Tibialis Posterior Tendon. A Case Report and Review of the Literature. *J Am Podiatry Assoc* 70:34, 1980.
- Mann RA: *Rupture of the Tibialis Posterior Tendon, Part III*, AAOS: Instructional Course Lectures, p. 302.
- Mueller TJ: Ruptures and Lacerations of the Tibialis Posterior Tendon. *J Am Podiatry Assoc* 74:109, 1984.
- Rosenberg ZS, Jahss MH, Noto AM, et al.: Rupture of the Posterior Tibial Tendon: CT and Surgical Findings. *Radiology* 167: 489, 1988.
- Rosenberg ZS, Cheung Y, Jahss MH, Noto AM, Norman A, Leeds NE: Rupture of Posterior Tibial Tendon: CT and MRI Imaging with Surgical Correlation. *Radiology* 169:229, 1988.
- Schaffer JJ, Lock TR, Saliciccioli GG: Posterior Tibial Tendon Rupture in Pronation-External Rotation Ankle Fractures. *J Trauma* 27:795, 1987.
- Scheller AD, Kasser JR, Quigley TB. Tendon Injuries about the Ankle. *Ortho Clin* 11:801, 1980.
- Schneider M, Balon K: Deformity of the Foot Following Anterior Transfer of the Posterior Tibial Tendon and Lengthening of the Achilles Tendon for Spastic Equino Varus. *Clin Orthop Relat Res* 125:113, 1977.
- Seeburger RH: The Surgery of Tendon. *J Foot Surg* 19:193, 1980.
- Simpson RR, Gudas CJ: Posterior Tibial Tendon Rupture in a World Class Runner. *J Foot Surg* 22:74, 1983.
- Soballe K, Andersen K: Ruptured Tibialis Posterior Tendon in a Closed Ankle Fracture. *Clin Orthop Relat Res* 231:140, 1988.
- Stein RE: Rupture of the Posterior Tibial Tendon in Closed Ankle Fractures. *J Bone Joint Surg* 67, 1985.
- Trevino S, Gould N, Korson R: Surgical Treatment of Stenosing Tenosynovitis at the Ankle. *Foot Ankle* 2:37, 1981.
- Hotherington, CJ, YU GV, Koludrovich B: Posterior Tibialis Tendon Rupture-Diagnosis and Treatment. Podiatry Tracts Audiotape and Summary pg. 33 VOL II 3, William and Wilkins, 1989.