

INSERTIONAL TENDONOPATHY OF THE POSTERIOR TIBIAL TENDON

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INTRODUCTION

Pathologic conditions of the posterior tibial tendon are generally considered more within the substance of the tendon and associated structures than specifically at the insertion point. If heel cord insertional pathology at the posterior calcaneus is possible, then a similar condition may be considered and is proposed at the navicular tuberosity and the posterior tibial tendon. Insertional tendonopathy with inflammation and pain at the attachment point of a tendon into bone is not an uncommon condition of the foot and ankle. It is considered more at the posterior calcaneus and the heel cord than the navicular tuberosity and the posterior tibial tendon. In both situations radiographic exostosis may be present as well as the possibility of systemic and local etiologies. Multiple local etiologies are possible in the medial arch area distinct from other anatomic areas including navicular stress fracture, tibialis posterior tendonitis in all its stages, os tibiale externum or bifurcate navicular, and talonavicular joint pathologies. A specific diagnosis of tibialis posterior insertional tendonopathy is primarily a diagnosis of exclusion and considered when the other more common pathologies are ruled out and careful assessment of pain is localized and noted at the insertion point itself. Non-operative care is empiric for most of the differential diagnosis possibilities that could account for medial arch pain in the adult. Presentations where the specific diagnosis of insertional tendonopathy is more critical is the surgical setting as the wrong diagnosis of accessory bones or tendon pathology will direct the surgeon in the wrong anatomic area and possibly less than adequate symptomatic results.

CLINICAL SYMPTOMS

The diagnosis of insertional tendonopathy of the posterior tibial tendon can be challenging to isolate and distinguish from other posterior tendon

pathologies. It may occur in conjunction or combination with other medial arch conditions. Many times the diagnosis can only be specifically isolated once the more generalized pain and inflammation of the medial arch is reduced and the forest can be separated from the trees. Typically the patient presents as an adult with generalized arch pain. An insidious onset with a progressive course is noted. Pain is worsened with stance and ambulation and relieved with rest. The clinical examination generally demonstrates diffuse pain from the navicular insertion along the course of the posterior tendon proximally. Some guarding may be noted to manual muscle testing, but little weakness to stress evaluation and bilateral comparison testing is noted. Localized edema and induration may be noted in the tarsal tunnel region. Radiographic and clinical examination in stance and gait generally shows little if any loss of the longitudinal arch and bilateral symmetry to the appearance of the feet in general. Toe-rise testing shows inversion of the calcaneus.

Most important in the diagnosis of insertional tendonopathy of the posterior tibial tendon is the response to treatment. Once measures to rest and splint the foot combined with anti-inflammatory medication and physical therapy are begun, the area of pain begins to localize at the insertional area specifically. The more generalized pain reduces and the true nidus is revealed. Classic posterior tibial tendonitis in its various stages may either fully respond or not, but does not incompletely reduce leaving residual pain at the insertion. The later stages of posterior tibial tendonitis result in loss of the longitudinal arch and bilateral asymmetry in clinical appearance of the feet in stance and gait. Bifurcate navicular or os tibiale externum pain isolates to the body of the navicular even in the presence of a more generalized initial presentation. Joint pain of the talonavicular joint can be a difficult differential from the insertional tendonopathy problems due to the anatomic proximity. Joint pain is typically noted more after rest and aided by

activity. It is more diffuse across the dorsum of the foot and into the subtalar joint area due to anatomic continuity of the joints in this area of the foot.

RADIOGRAPHIC PRESENTATION

Navicular pathologies are readily noted radiographically to aid the differential diagnosis. The bifurcate navicular appears as an enlarged navicular tuberosity with a radiolucent zone. The os tibiale externum is a round discrete ossicle just proximal to the tuberosity within the posterior tibial tendon. An enlarged navicular appears as a normal tuberosity that is over-sized. Posterior tibial tendon pathologies may not have direct radiographic evidence other than edema and induration of the soft tissues or alterations of foot structure and functional alignment based on bilateral asymmetry on comparison radiographs. Insertional tendonopathy can show exostosis formation about the navicular within the posterior tibial tendon insertion. MRI testing in posterior tibial insertional tendonopathy is usually unremarkable without evidence of tendon pathology unless a combination condition exists. Bone scans will show point areas of activity at the insertion of the posterior tibial tendon at the navicular in the later stage scans. Combinations of pathology are always

possible and the role of each must be determined clinically and radiographically to most correctly achieve reduction in clinical symptoms.

MANAGEMENT

Initial treatment of insertional tendonopathy of the posterior tibial tendon is generally based on a presumptive diagnosis of an early stage of posterior tibial tendonitis. The clinical symptoms may be severe, but little clinical deformity or malalignment is present and good muscle strength of the posterior tibial tendon is noted. Treatment involves immobilization and rest combined with oral anti-inflammatory medication. The response within several weeks is generally encouraging with reduction in pain and inflammation. Posterior tibial tendonitis is typically more persistent and recalcitrant to treatment. With insertional tendonopathy, pain will persist at the insertion specifically as an isolated finding. This point area of pain may be recalcitrant and persistent. Slow response may be noted with improvement in time. The foot structure is well maintained. If the pain persists in spite of aggressive and coordinated non-operative care, surgical intervention may not be unreasonable. Surgical intervention involves



Figure 1A. Preoperative anterior-posterior foot radiograph. Note the bony spurring about the medial navicular area without gross prominence or enlargement of the tuberosity itself.



Figure 1B. Postoperative anterior-posterior foot radiograph demonstrating remodeling of the medial navicular with absence of the bony spurring and tendon anchor in place within the navicular.

reinforcing the insertion by detachment and re-attachment of the insertion of the posterior tibial tendon at the navicular. No shortening or plication of the tendon is needed other than to maintain anatomic tension.

The navicular is remodeled medially, but not as in a Kidner procedure removing redundant and excess bone. Bone is resected only to expose cancellous bone to aid tendon insertion strength with healing. Bone anchors and securing systems are employed as indicated to aid stabilization of the insertion until healing can be assured. All too often this diagnosis is noted after a failed surgical intervention and persistent pain is noted at the posterior tibial tendon insertion. Insertional tendonopathy is not a common condition but the role of the insertion in medial arch pain, as in the posterior calcaneus and heel cord, should not be overlooked or discounted in the surgical approach to medial arch pain.

CLINICAL CASES

Case 1

Initial Visit. A 47-year-old black female in good health presents with worsening arch pain of 2-3 months duration with stance and ambulation. There has been an insidious onset and progressive course without trauma or prior history. No change in the appearance of her foot has been noted. She is unresponsive to NSAIDs, rest, and soaks. Radiographs were unremarkable with the exception of bony spurring over the medial navicular (Figure 1A). Diffuse arch pain on clinical examination with good posterior tibial tendon strength and a mild degree of pes valgus bilaterally. A diagnosis of early posterior tibial tendonitis was made. Treatment included change in NSAID, immobilization in an Unna boot, and rest.

Day 30. She has now been converted to an ankle splint with OTC foot orthoses in good supportive shoes and still taking the NSAIDs. The pain has localized to the distal posterior tibial tendon area clinically. She rates her improvement at 30%.

Day 60. No significant improvement is noted in the degree of pain. The pain is now very distal near the navicular. A diagnosis of talonavicular capsulitis is made and she is provided a joint steroid injection and continued on NSAIDs and splinting in her shoes.



Figure 2A. T1-weighted MRI image of the rearfoot in the frontal plane with mild inflammatory changes noted about the posterior tibial tendon.



Figure 2B. T1-weighted sagittal plane image of the posterior tibial tendon demonstrating no evidence of attenuation or hypertrophy.

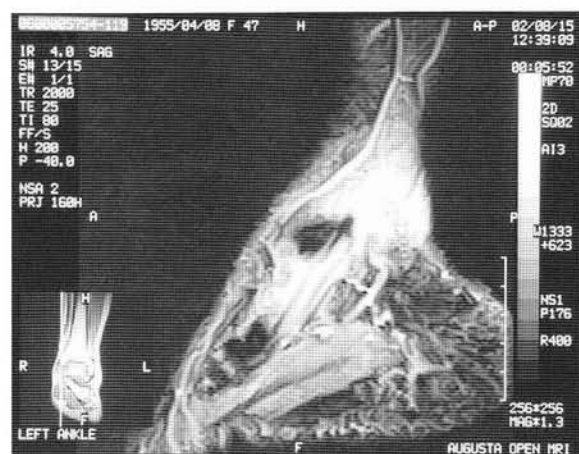


Figure 2C. T2-weighted image for comparison.

Day 90. No significant change is noted in the pain except it is now well localized to the insertional area of the posterior tibial tendon. An MRI is ordered that demonstrates very mild inflammation about the tendon but is otherwise unremarkable (Figure 2). She is placed in a below-the-knee cast and switched to oral steroids with a diagnosis of recalcitrant posterior tibial tendonitis.

5 months. She is still noting pain primarily at the insertion of the tendon into the navicular and is holding at 50% improved over the pre-treatment state. There has been no change in the appearance of her foot clinically or radiographically. She felt the most relief in the cast. There is no pain within the tendon or any weakness appreciated.

7 months. Based on a presumptive diagnosis of insertional posterior tibial tendonopathy a resection of the medial navicular is performed with re-attachment and anchor of the posterior tibial tendon (Figure 1B). No edema or inflammatory changes were noted operatively about the tendon itself.

1 year (6 months postoperative). A better than 90 % reduction in pain is noted with full return to activity and no further need for NSAIDs. Edema and induration has resolved with good tarsal motion and function without pain or limitation. She is wearing a custom molded foot orthoses in her shoes daily at work. She is very pleased.

Case 2

Initial Visit. A 66-year-old very active Caucasian female in good health presents with a painful medial arch area of 3-4 months duration. The pain is noted to stance and gait and is relieved with rest. An occasional knot is noted over the arch with swelling. She enjoys dancing and is limited in that activity due to pain. Radiographs are unremarkable with the exception of a small os tibiale externum with mild exostosis at the navicular on comparison to prior radiographs for a bunion concern that was satisfactorily repaired 4 years prior (Figure 3). A diagnosis of early posterior tibial tendonitis is made and treatment with ankle splinting and NSAIDs initiated.

Day 90. Multiple NSAIDs have been attempted as well as various ankle splints and custom foot orthoses with and without physical therapy with little improvement. She is limited in her dancing. She notes 20% improvement at best. An MRI is ordered which is unremarkable (Figure 4).

There has been no change in the structure or position of her foot and there is bilateral symmetry both clinically and radiographically. The pain has localized more distal at the insertion of the posterior tibial tendon into the navicular and is not as generalized about the arch area. A diagnosis of insertional tendonopathy with os tibiale externum is made and consideration for a surgical option begun.

5 months. Surgery is performed that includes resection of the medial navicular and reattachment of the posterior tibial tendon with anchoring device as well as excision of the os tibiale externum (Figure 3 C). No inflammatory changes are noted in the tissues of the posterior tibial tendon intra-operatively.

9 months (4 months postoperative). Her pain has nearly completely resolved and she has returned to full activity. There has been no loss of the longitudinal arch since her initial visit with good bilateral symmetry to her feet. She ambulates in custom molded foot orthoses and has returned to her dancing activities without further need for NSAIDs.

DISCUSSION

Insertional tendonopathy of the posterior tibial tendon into the navicular is proposed as an important etiology in the differential diagnosis of medial arch pain in the adult. It can occur in combination with other painful conditions of the medial arch or as an isolated presentation. The condition is considered in those patients whose medial arch pain localizes to the insertional area with non-operative treatment of more generalized arch pain as the original presentation. The diagnosis is further reinforced if no structural malalignment of the foot is noted or weakness in posterior tibial tendon function. The diagnosis is important in that, if present in the surgical situation, attention should be considered at the insertion of the posterior tibial tendon into the navicular itself not just to reinforcing the tendon or other structural corrections if combination conditions present. The proposed surgical approach if non-operative treatment is unsuccessful is resection of the medial navicular whether prominence is present or not and re-attachment of the posterior tibial tendon with anchoring as indicated. This reinforcement of the insertion seems to have reduced pain and improved comfort in a limited number of cases in the experience of the author very satisfactorily.



Figure 3A. Presenting anterior-posterior foot radiograph with os tibiale externum and no navicular exostosis with a complaint of bunion deformity.



Figure 3B. Presenting anterior-posterior foot radiograph 4 years later with bony spurring at the navicular insertion with os tibiale externum.



Figure 3C. Postoperative anterior-posterior foot radiograph demonstrating remodeling of the medial navicular with absence of the bony spurring, absence of the os tibiale externum, and tendon anchor in place within the navicular.

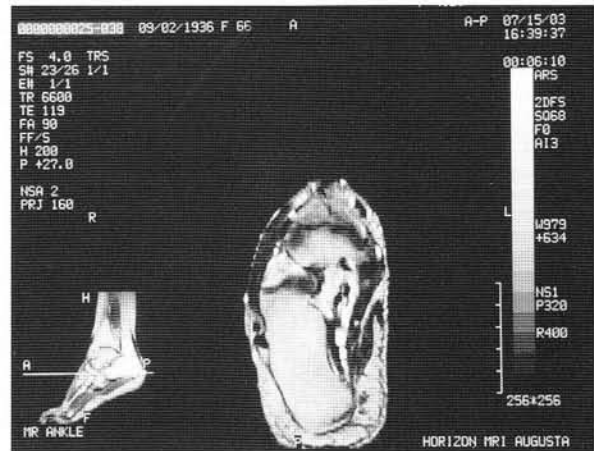


Figure 4. A.T1-weighted MRI image of the rearfoot in the frontal plane with mild inflammatory changes noted at the posterior tibial tendon insertion.

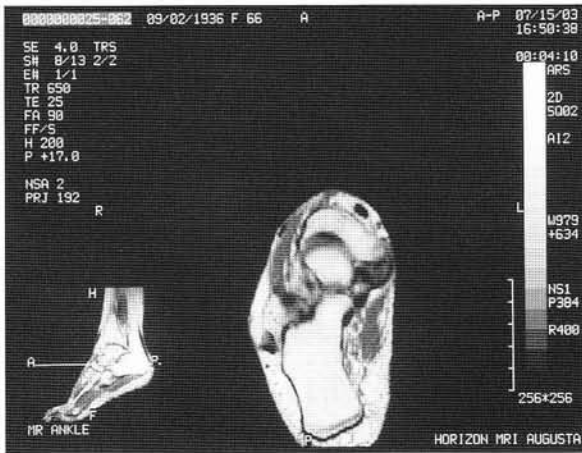


Figure 4B. T2-weighted image for comparison.

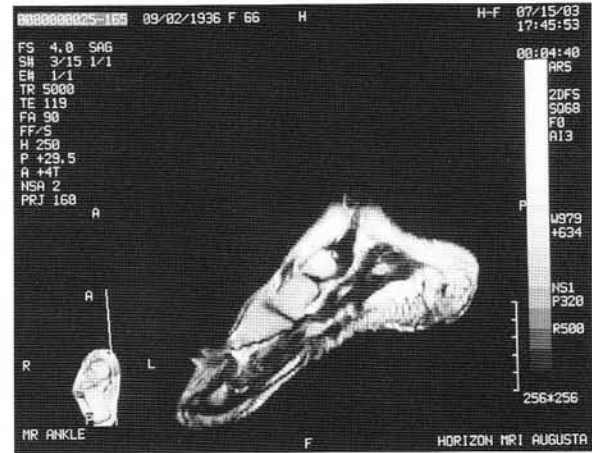


Figure 4C. T1-weighted sagittal plane image of the posterior tibial tendon demonstrating no evidence of attenuation or hypertrophy.

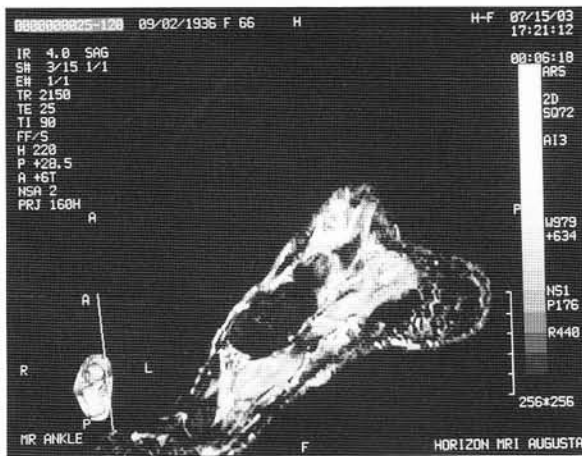


Figure 4D. T2-weighted image for comparison.