

Foot and Ankle Tendinopathy Rehab

Protocols for
Posterior Tibial Tendon Dysfunction &
Achilles Tendinosis

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Non-Operative Protocol for Posterior Tibialis Tendon Dysfunction

- Based on research by Alvarez et al. (2006) entitled “Stage I and II Posterior Tibial Tendon Dysfunction Treated by a Structured Nonoperative Management Protocol: An Orthosis & Exercise Program”
- We were using at UIHC as early as 2003 because of Dr. Charles Saltzman who is one of the co-authors.

Alvarez et al (2006)

- Subjects

- 47 (37 female, 10 male) consecutive patients with stage I or II posterior tibial tendon dysfunction
 - Inclusion criteria
 - Presence of a palpable & painful posterior tibial tendon, with or without swelling
 - Movement of the tendon with passive and active NWB clinical examination
 - Clinical strength deficit
 - Difficulty performing or inability to perform a single-support heel rise (SSHR) test.
 - Passively correctable deformities or no hindfoot deformity with standing

Alvarez et al (2006) cont.

- Treatment

- Orthotics

- Short articulated ankle-foot orthosis (SAAFO): 33 patients
 - PTT pain present for **more** than 3 months
 - Unable to perform SSHR or ambulate more than one block
 - Foot orthosis (FO): 14 patients
 - PTT pain present for **less** than 3 months
 - Able to perform at least one SSHR & could walk more than one block
 - Switched from SAAFO to FO when their strengths were within 10-15% of contralateral side & pain had subsided.

Alvarez et al (2006) cont.

- Rehabilitation
 - Pretreatment Phase
 - HEP initiated consisting of sole-to sole exercises
 - 25 reps/set, starting at 4 sets/day increasing to 12 sets by 10-14 days
 - Once 12 sets/day reached, combine sets until could easily do 300 at one setting (taking 3-5 minutes)
 - Phase I
 - Patient Education
 - Decrease to ADLs for those unable to walk 1 block w/o pain
 - Swimming/biking permitted
 - Ice up to every 2 hours
 - No whirlpools, Epsom salt baths or heat
 - NSAIDS but no steroid injections
 - HEP
 - Red t-band inversion & eversion with controlled eccentric return
 - Begin 200 reps, 1-2 times per day

Alvarez et al (2006) cont.

- Phase II
 - Isokinetic workout using Cybex, Biodex or Kincom
 - Inversion & Eversion, start at 200 reps/session, increased to 800 reps/session
 - Heel cord stretching
 - Gastrocnemius on slant board, 30 seconds x 3 sets
 - SSHR
 - Begin with double-support-heel-rise(DSHR) & progress to SSHR with UE for support & eccentric control down (goal 50 SSHR)
 - BAPS board
 - CW & CCW 5 positions w/ 20 reps each (goal 200 reps ea total)
 - Toe Ambulation
 - Start 25-30 feet, goal of 150 feet
 - Progress HEP
 - Increase t-band resistance with goal of 200 reps with blue

Alvarez et al (2006) cont.

- Phase III
 - Re-evaluation with isokinetic strength eval, assessment of SSHR for 50 reps & assessment of toe walk for distance
 - If subjective & objective progress: Phase II continued with greater intensity for 4 more visits & eval repeated
 - Treatment considered to have failed if plateau reached, phase III couldn't be passed or minimal improvement was noted. These patients were offered operative treatment.

Alvarez et al (2006) cont.

- Results

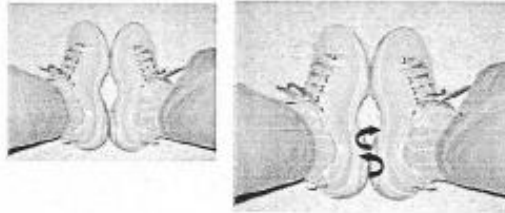
- 42/47 (89%) patients were satisfied with their treatment outcomes
 - though 3 of these were classified as treatment failures d/t persistent tenderness, required bracing or had pain with toe walking
- 5/47 (11%) had operative reconstruction
- After a median of 10 PT visits during average of 4 months, most patients had minimal or no pain, could walk on tip toes, were not limited by walking distance & could perform a painless SSHR. Orthotic devices generally became unnecessary as symptoms & activity approached normal.

General Instructions:

- Take medication as prescribed by *physician*
- Modify activity levels to ↓ symptoms
- Ice as instructed every couple of hours and after performing home exercise program

- Ice massage _____ minutes
- Ice pack 10 - 20 minutes

Do not use heat.

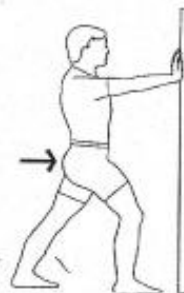
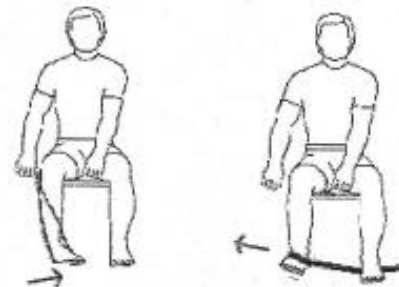


Sole to Sole

Position feet as shown. Pull inside border of heels together (**with no movement actually taking place**) in an inward and upward motion simultaneously [as if rolling pressure from inside border of foot → across heel → to outside border of foot]. Hold briefly. Repeat 25 reps. Perform 4 sets per day.

Theraband Inversion / Eversion

Anchor red theraband around forefoot as shown. Perform _____ reps in each direction.



Calf Stretch

Perform 3 sets of 30 second holds.

- Perform with rear knee slightly bent.

Why high-repetition exercise program?

- To train the muscles in an aerobic manner for long-term endurance.
- Low-rep with strong resistance trains muscles anaerobically which is not consistent with normal ankle function with walking.

More Recent Research on PTTD

- In 2009, Kulig et al published “Nonsurgical Management of Posterior Tibial Tendon Dysfunction with Orthoses & Resistive Exercise: A Randomized Controlled Trial” in Physical Therapy Journal.
 - 1st RCT reporting on effectiveness of orthoses & tibialis posterior tendon-specific exercise in the management of PTTD.

Kulig et al (2009) cont.

- 36 adults with stage I or II PTTD were randomly assigned to 1 of 3 groups
 - Orthoses wear & stretching (O group)
 - Orthoses wear, stretching & concentric PRE (OC group)
 - Orthoses wear, stretching & eccentric PRE (OE group)
- Pre & Post intervention data were collected
 - Foot Functional Index
 - Distance traveled in 5-Minute Walk Test
 - Pain immediately after 5-Minute Walk Test

Kulig et al (2009) cont.

- Results

- Foot Functional Index scores (total, pain & disability) **decreased** in all groups after the intervention
- OE group demonstrated the **most improvements** in each subcategory
- O group demonstrated **least improvement**
- Pain immediately after the 5-Minute Walk Test was **significantly reduced** across all groups after the intervention.

Kulig et al (2009) cont.

- Conclusion

- People with Stage I & II PTTD benefited from a program of orthoses wear & stretching
- Eccentric & Concentric exercises further reduced pain & improved perceptions of function
- OE group tolerated greater loading after intervention

- Limitation

- They used an exercise device (TibPost Loader) for OC & OE groups that resisted horizontal foot adduction

Kulig TibPost Loader



Eccentric Strengthening for Chronic Achilles Tendinosis

- Protocol that I've been using since I was at UIHC was based on the Alfredson et al, (1998) study out of Sweden
 - This appears to be one of the 1st controlled studies on eccentric calf muscle training in patients with Achilles tendinopathies.
 - Based on recent studies (2013 & 2014), they are still using Alfredson's study as the "gold standard" that other protocols are being tested against.

Alfredson et al (1998)

- Subjects

- 30 recreational runners with pain preventing running
- Chronic Achilles Tendinosis (2-6 cm above insertion)
- Failed conventional treatment (rest, NSAIDs, changes in footwear/orthoses, PT & “ordinary training programs”)
- All selected for surgical treatment, but 15 underwent eccentric calf muscle training program while waiting for surgery.

Alfredson et al (1998) cont.

- Group 1: 15 patients (12 men, 3 women)
 - Age 44.3 +/- 7 yrs
 - 12 wk heavy load eccentric program
- Group 2: 15 patients (11 men, 4 women)
 - Age 39.6 +/- 7.9 yrs
 - Treated surgically
 - This group had longer duration of symptoms only because waiting time for surgery at their clinic was 6-12 months

Alfredson et al (1998) cont.

- Variables
 - Pain scale: VAS (0-100) during activity (running)
 - Concentric & eccentric calf muscle strength (Biodex Isokinetic Dynamometer)
 - Group 1: evaluated week 0 & 12
 - Group 2: evaluated week 0 & 24

Alfredson et al (1998)

- Results

- Non-surgical patients

- Activity levels: all returned to pre-injury activity levels by wk 12
- Pain scale: ↓ from 81.2 to 4.8
- Eccentric & concentric strength: returned to **normal** by wk 12
- Follow up: (unpublished) at 2 years: 14 patients asymptomatic, 1 required surgery; further unpublished studies reported that out of 66 patients, only 4 (6%) required surgery.

- Surgical patients

- Activity levels: all returned to pre-injury running levels by wk 24
- Pain scale: ↓ from 71.8 to 21.2
- Eccentric & concentric strength : **significant deficits** at wk 24
- Time needed to regain full strength was 6 months

Alfredson's Eccentric Program

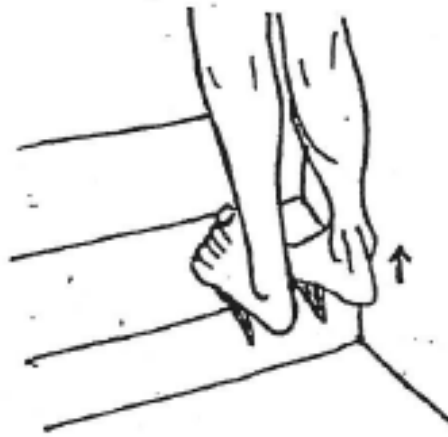
- 2 times daily, 7 days/week for 12 weeks
 - Calf muscle was eccentrically loaded off step both with the knee straight & (to maximize soleus activation,) also with knee bent
- Each exercise: 3 sets of 15 repetitions
- Muscle soreness is expected, pain should not be disabling
- When they could perform without pain, they could increase load by adding weight in backpack or using weight machine

EXERCISE 1: "Knee Straight"

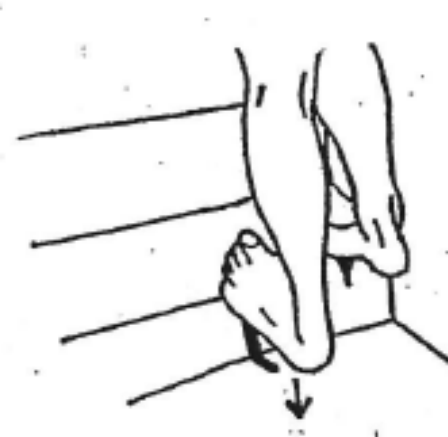
Perform: 3 sets of 15 repetitions with a 30 second rest between sets



Stand with both heels over the edge of a step. Hold onto something for balance.



Raise up on toes of uninvolvement leg only.



Transfer weight onto toes of the involved leg only. Slowly lower the heel of the involved leg below the level of the step with the knee straight. Transfer your weight onto the uninvolvement leg and repeat this sequence.

EXERCISE 2: "Knee Bent"

Repeat the above exercises, but bend the involved knee as you lower your heel over the step. Perform: 3 sets of 15 repetitions with a 30 second rest between sets.

Note: You may experience some pain during the exercises for the first several days. Only discontinue the exercises if the pain becomes worse.

Progression: Once you have no pain with performance of these exercises, you may start gradually adding approximately 5 pounds per week up to 25-35 pounds. You can do this by adding weights such as phone books or food cans to a backpack or by using a weight belt.

Why Eccentrics?

- Exact mechanism is not completely clear
 - Stimulating mechanoreceptors
 - Increase collagen production
 - Alter or reverse tendinosis cycle
 - Improves tensile strength of tendon
 - Improves collagen alignment
 - Stimulates cross-link formation
 - Strong stretch
 - Lengthens muscle-tendon unit
 - Reduces load during dorsiflexion

Recent Achilles Tendinopathy Research

- Alfredson's Eccentric Program is still the comparison!
- Stasinopoulos & Manias in 2013 compared eccentric & static exercises as proposed by Stanish (who was 1st to propose this in 1986) to Alfredson's protocol.
 - Alfredson's protocol was superior to Stanish model to reduce pain & improve function at end of treatment & 6 mo f/u
- Stevens & Tan in JOSPT February 2014 compared Alfredson Protocol with a Lower Repetition-Volume Protocol in a RCT
 - There was NO statistically significant difference in change scores between Alfredson group & do-as-tolerated group for VISA-A & VAS pain scores at end of 6 week intervention

Recent AT Research cont.

- Ram et al in 2013 in Canada had 20 patients perform Alfredson protocol with surprisingly low patient satisfaction (only 2 were satisfied) despite symptom improvement
 - This was may be due to a more varied patient population
- Habets & van Cingel in February 2014 published “Eccentric exercise training in chronic mid-portion Achilles tendinopathy: A systematic review on different protocols”
 - “Strong evidence for Alfredson exercise protocol”
 - As in every review, conclusion is “ further research comparing the content of different exercise protocols is warranted!”

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