Background

Posterior Tibialis Tendon Dysfunction (PTTD)

- Effects ~10% of the population
- Stage I: medial arch pain, possible pain with heel elevation, and mild ankle/foot swelling
- Stage II: Stage I + fixed flatfoot deformity
- Stage III: Stage I + fixed flatfoot deformity
- Stage IV: tibiotarsal degeneration stemming from valgus tilt of talus in ankle mortise

Barefoot Training

- Increased plantar surface proprioception
- Increased activation of foot intrinsic musculature
- Decreased navicular drop in patients with pes planus and hyper-pronation
- Increased support of the medial longitudinal arch

Foot Intrinsic Musculature Strengthening with Short-Short Exercise (Fig. 1)

- Showed highest EMG for intrinsic musculature
- Improved balance scores in patients with chronic ankle instability
- Decreased navicular drop in patients with pes planus and hyper-pronation
- Increased support of the medial longitudinal arch

Research

- 3 randomized controlled trials showed positive outcomes with comprehensive plan of care
- Studies have yet to include barefoot training or intrinsics foot musculature strengthening in conservative management of PTTD.

Patient Description

- 39-year-old male veteran with complaints of dull pain along the left, medial longitudinal arch
- Presence of flexible flatfoot deformity
- Patient stopped consistent exercise regimen after discharge from the military resulting in weight gain
- Pain began 3 months prior to seeking care and was worse with rising onto toes and weight bearing activities
- Unable to run any distance without pain
  - Goal for PT: return to running several miles daily without pain

Methods

Barefoot training:
- All exercises performed in barefoot
Intrinsic foot musculature strengthening:
- Short-foot exercise: 3 sets x 10 reps once per day (Fig. 2)

Comprehensive Plan of Care:

- Posterior tibialis strengthening: resisted inversion 150-600x once per day
- Increased in increments of 50 reps/week or based upon patient response. (Fig. 3)
- Manual therapy: Mulligan mobilization with movement for increase in dorsiflexion range of motion.
- 3 sets x 60 seconds (Fig. 4)
- Gastrocnemius and soleus strengthening: double heel raise with unilateral controlled descent.
- 3 sets x 10 reps 1-2x/day (Fig. 5)
- Gastrocnemius and soleus stretching: 3 sets x 30 second hold 5-7x/week.
- Orthoses: Orthotist prescribed over-the-counter orthotic prior to physical therapy initial evaluation.

Results

<table>
<thead>
<tr>
<th>Tests &amp; Measures</th>
<th>Lower Extremity Functional Scale</th>
<th>Discharge Results</th>
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<tbody>
<tr>
<td></td>
<td>Initial Evaluation Results</td>
<td>Discharge Results</td>
</tr>
<tr>
<td>Lower Extremity Functional Scale</td>
<td>49/80</td>
<td>71/80</td>
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<tr>
<td>Single Leg Heel Rise Test (Ankle ROM (degrees))</td>
<td>Right</td>
<td>Left</td>
</tr>
<tr>
<td>10 reps</td>
<td>0 reps</td>
<td>20 reps</td>
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<tr>
<td>Dorsiflexion at 0⁰ knee flexion</td>
<td>10</td>
<td>2</td>
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<tr>
<td>Dorsiflexion at 90⁰ knee flexion</td>
<td>15</td>
<td>5</td>
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<tr>
<td>Manual Muscle Testing</td>
<td>Ankle Plantarflexion</td>
<td>5/5</td>
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<tr>
<td>Great Toe Extension</td>
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<td>5/5</td>
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<tr>
<td>Posterior Tibialis</td>
<td>5/5</td>
<td>3+/5 with pain</td>
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</tbody>
</table>

Conclusion

- Barefoot training and intrinsic foot musculature strengthening with a comprehensive PT management plan of care revealed excellent outcomes for a 39-year-old veteran with type II PTTD.
- Future research may consider investigating the use of barefoot training and intrinsic foot musculature strengthening in a larger sample of subjects with PTTD.

References


Fig. 1: Foot Intrinsic Musculature
Fig. 2: Foot Intrinsic Musculature Strengthening
Fig. 3: Posterior Tibialis Strengthening
Fig. 4: Manual Therapy: Mobilization with Movement
Fig. 5: Gastrocnemius & Soleus Strengthening

To examine barefoot training and foot intrinsic musculature strengthening within a comprehensive PT plan of care for type II PTTD.