

Effect of Extra-Osseous TaloTarsal Stabilization on *Posterior Tibial Tendon Strain* in Hyperpronating Feet

Journal of Foot and Ankle Surgery, Volume 50, Issue 6, Pages 676-681, November 2011

Michael E. Graham, DPM, FACFAS, Nikhil T. Jawrani, MS, Vijay K. Goel, PhD

Purpose

The purpose of this study was to quantify strain on the posterior tibial tendon in cadaveric feet exhibiting displacement of the talotarsal joint complex. It was hypothesized that posterior tibial tendon strain would increase with talar displacement on the tarsal mechanism and likewise decrease after an extra-osseous talotarsal stabilization procedure utilizing *HyProCure*[®].

Background

Posterior tibial tendon dysfunction is considered one of the most common causes of progressive adult acquired flatfoot deformity. The etiology leading to the dysfunction of the posterior tibial tendon remains controversial. Talar displacement on the tarsal mechanism leads to increased forces acting on the medial column of the foot. The posterior tibial tendon has to overcome these excessive forces while standing, walking or running. Eventually a critical threshold is reached leading to symptoms of the posterior tibial tendon. Therefore, methods to decrease the strain on the posterior tibial tendon would prove to be extremely useful in treating this foot deformity.

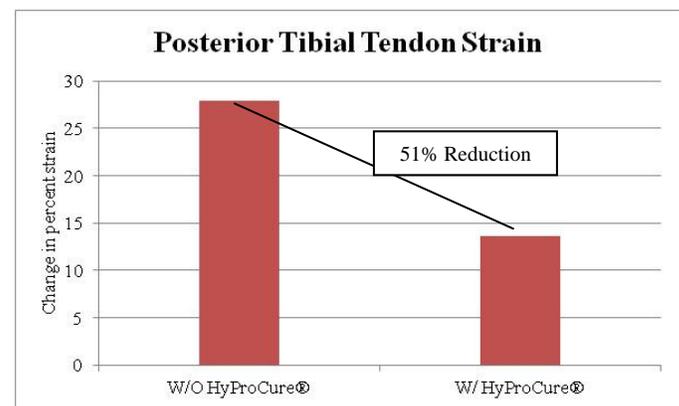
Methods

- A strain gauge was used to measure the elongation of the posterior tibial tendon in 9 fresh-frozen cadaver specimens.
- The elongation was measured as the foot was moved from its neutral to maximally pronated position, before and after intervention with the *HyProCure*[®] extra-osseous talotarsal stabilization device.
- The blinded sub-investigator was instructed to maximally pronate the talotarsal mechanism by applying maximum force to the 4th & 5th metatarsal heads. A pressure sensor was placed under the 4th & 5th metatarsal heads ensuring that the same maximum pressure was applied for each reading.

Talotarsal joint stabilization with *HyProCure*[®] lead to an average reduction in posterior tibial tendon elongation and strain of 51%.

Results

- The mean elongation of the *posterior tibial tendon* (with respect to a fixed reference point) was found to be 6.23 ± 2.07 mm in specimens exhibiting talotarsal dislocation (partial) and 3.04 ± 1.85 mm after placement of *HyProCure*[®] extra-osseous talotarsal stabilization device. (N = 27; variation is ± 1 SD).
- The average elongation reduced by 51% and was statistically significant with $p < .001$.
- Strain on the posterior tibial tendon is significantly higher in hyperpronating feet.



Representation of data showing posterior tibial tendon strain in hyperpronated cadaveric feet considered in this study, without and with intervention.

Clinical Significance & Conclusions

- Historically, external measures have been used to decrease the strain on the posterior tibial tendon. Their effectiveness has not been proven.
- An extra-osseous talotarsal stabilization procedure with *HyProCure*[®] reduces excessive abnormal elongation of the posterior tibial tendon suggesting the primary deforming forces leading to strain on this very important structure begin in the hindfoot.
- This minimally invasive, internal procedure may provide a viable treatment option to prevent or eliminate posterior tibial tendon dysfunction in patients exhibiting talotarsal joint dislocation (partial).

Additional Scientific Papers on *HyProCure*[®] are available. Visit the *Library* section on:

www.GraMedica.com

