

Novel Physical Therapy Protocol Results in Increased Compressive Strain and Improved Outcomes in Insertional Achilles Tendinopathy

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Introduction/Purpose: Insertional Achilles Tendinopathy (IAT) affects 5% of the general population and up to 20% of the athletic population. Despite trials of non-surgical management, over 50% of patients ultimately pursue surgery. Previously in healthy controls it was demonstrated that ankle dorsiflexion tasks increase transverse compressive strain (force perpendicular to the tendon fibers) most in the deep region of the tendon insertion, where IAT is often most severe. Thus the purpose of this study was to utilize a novel physical therapy protocol that combines isometric and eccentric exercises in order to increase transverse compressive strain and decrease axial tensile strain (force parallel to tendon fibers) in patients with IAT and to determine whether this corresponds with improved patient outcome scores.

Methods: Forty-two patients with IAT were enrolled in the study from May 2014 to June 2016, of which twenty-seven patients (mean age: 56.7 + 9.9 years, BMI: 29.6 + 5.9, 56% women) completed the study. A subset (n=15, mean age 58.9 + 8.6 years, BMI: 30.0 + 4.0, 47% women) underwent ultrasound elastography to determine transverse compressive and axial tensile strain in the Achilles tendon during dorsiflexion tasks. Patients were then placed on a physical therapy protocol that focused on progressive loading of the Achilles tendon while avoiding ankle dorsiflexion. Seated isometric plantar flexion, bilateral eccentric heel lowering, and single limb heel lowering exercises were utilized. Questionnaires validated for use in Achilles tendinopathy, the Victorian Institute of Sport Assessment – Achilles (VISA-A) and the Foot and Ankle Ability Measure (FAAM), were completed at the beginning and at the completion of the study.

Results: Twenty-three of 27 subjects that completed the study, had clinically significant improvements in their VISA-A (mean change 19.3) or FAAM ADL and sports scores (mean change 16.2 and 22.6, respectively). Ultrasound elastography revealed that the deep region of the Achilles tendon experienced more transverse compressive strain and less axial tensile strain compared to the superficial portion of the tendon when standing. Completion of the physical therapy program resulted in increased transverse compressive strain in the superficial Achilles tendon compared to the pre-therapy value when standing (mean change 52%, $p=0.043$). Moreover, there was a decrease in axial tensile strain within the deep portion of the tendon in response to physical therapy (mean change 53% $p=0.0434$).

Conclusion: Treatment of IAT patients with a physical therapy protocol utilizing a combination of isometric and eccentric exercises results in improved outcomes, as measured by VISA-A and FAAM questionnaires. Furthermore, ultrasound elastography suggests that while the physical therapy protocol increases the transverse compressive strain in the superficial portion of the Achilles tendon, it results in decreased axial tensile strain in the deep portion of the tendon. Therefore, it is likely that the combination of these two exercise modalities result in the improved clinical outcomes observed in our patients with IAT after undergoing this physical therapy protocol.