Academy of PHYSICAL MEDICINE

Research Paper Review

This review is published with the permission of Research Review Service (www.researchreviewservice.com)

Is compressive load a factor in the development of tendinopathy?

British Journal of Sports Medicine 2012; 46: 163-168

Cook JL & Purdam C

ABSTRACT

Tendons are designed to take tensile load, but excessive load can cause overuse tendinopathy. Overuse tendinopathy results in extensive changes to the cells and extracellular matrix, resulting in activated cells, increase in large proteoglycans and a breakdown of the collagen structure. Within these pathological changes, there are areas of fibrocartilaginous metaplasia, and mechanotransduction models suggest that this response could be due to compressive load. As load management is a cornerstone of treating overuse tendinopathy, defining the effect of tensile and compressive loads is important in optimising the clinical management of tendinopathy.

This paper examines the potential role of compressive loads in the onset and perpetuation of tendinopathy, and reviews the anatomical, epidemiological and clinical evidence that supports consideration of compressive loads in overuse tendinopathy.

ANALYSIS

Reviewed by Dr. Joseph Brence DC (Research Review Service)

Author's Affiliations

School of Primary Health Care, Monash University, Melbourne, Australia; Department of Physical Therapies, Australian Institute of Sport

Background Information

Excessive overuse or training can induce overloading of tendons, resulting in the onset of tendinopathy, which generally includes pain and dysfunction of a particular tendon. It has been estimated that up to 70% of runners experience these overuse injuries within a 1-year period and that tendinopathies account for approximately 7% of all physician visits in the United States (1). This is a very common problem!

Tendons are structures which transmit tensile load, having a fibrous tissue structure that accommodates this task. Recently, researchers have provided evidence suggesting that compression of a tendon may be a factor that results in an overloading scenario and potential tissue damage (2).

Clinically, research continues to be limited in the best management of tendinopathies. This could potentially be due to a limited understanding (or consideration) of the role of compression in the pathology of these conditions. For example, a recently published article in *JAMA* which compared the effectiveness of corticosteroid injections to physiotherapy for the treatment of chronic lateral epicondylitis indicated that neither of these well-accepted treatment approaches resulted in significant differences in clinical outcomes. In addition, the researchers found that the corticosteroid group, as compared to a placebo group, had worse clinical outcomes (3). There has been some research demonstrating positive gains through eccentric exercise, particularly in Achilles tendinopathy (4), but further research needs to be conducted to assess if this approach is effective in other forms of tendinopathy.

As load management is a foundational principle for treating overuse tendinopathy, defining the effect of tensile and compressive loads is important in guiding clinical management of this condition. Therefore, the authors of this paper examined the potential role of compressive loads in the onset and perpetuation of tendinopathy, and reviewed the anatomical, epidemiological and clinical evidence that supports consideration of compressive loads in overuse tendinopathy.

SUMMARY

This paper attempted to assess the role for compression in typical tendinopathies which are encountered in clinical practice. Because this article is a narrative review, the author's recommendations were based upon a modern understanding of the cellular, biomechanical and clinical level of scientific plausibility (which they suspect may impart a better understanding and management approach for tendinopathies in general).

The authors state that nearly all clinical tendinopathy occurs at, or near, the bone-tendon junction (normal tendon attachment will transition from tendon through fibrocartilage to mineralised fibrocartilage to bone over a relatively short distance - < 2 mm). Due to this, they recommend that a more appropriate term for the disorder would be enthesopathy. They also suggest that compressive anatomy of tendons can lead to clinical options to reduce that compression. For example, they suspect

that a load of the Achilles tendon in a dorsiflexed position (during activities such as bare foot walking) is aggravating for an individual with Achilles insertional tendinopathy. Due to this, they believe that the addition a heel raise should have a level of effectiveness. In addition, they recommend the following additional clinical options (with their perceived level of effectiveness) to reduce compressive/tensile loads on a tendon:

- Treating tibialis posterior tendinopathy with orthotics and a heel raise (limited effectiveness)
- Treating an upper hamstring tendinopathy with limiting sitting/lunging (moderate effectiveness)
- Treating gluteus medius and minimus tendinopathy with lumbopelvic control and sleeping supine (effective)
- Treating adductor longus tendinopathy by limiting loads in abduction/extension (moderate effectiveness)
- Treating peroneal/fibular tendinopathy by adding a heel raise (limited effectiveness)
- Treating quadriceps tendinopathy by limiting loads in deep knee flexion (moderate effectiveness)

The authors do state that complete rest from tensile loads for a tendinopathy is contraindicated because it may decrease mechanical strength and induce tendinopathic changes. They recommend subjecting tendons to tensile, moderate isometric loads while protecting against compression, which in-turn, should improve recovery.

CLINICAL APPLICATION & CONCLUSIONS

This article provides a theoretical framework to help us understand the detrimental effects of compressive loads in tendinopathies. This concept needs to be further investigated to determine if altering the compressive load on tendons has an advantageous effect, clinically. Until that time, due to the rationale and scientific plausibility, a prudent clinician could integrate the authors' recommendations while closely monitoring patient responses (adapt and update your treatment in the absence of patient improvement – right?).

It is worth repeating, we should remember that absolute rest from tensile loads for a tendinopathy is contraindicated, as it can decrease mechanical strength of the tendon. Further, total removal of load can induce tendinopathic changes due to the lack of a mechanical stimulus. The take home point is, a sweet spot likely exists regarding loading and activity that will optimize tendon healing. Therefore, subjecting tendons to moderate tensile loads, while protecting against compression, should improve recovery.

STUDY METHODS

This paper was a narrative review which examined the potential role of compressive loads in the onset and perpetuation of tendinopathy.

Outcome Measures:

- None…this was a narrative literature review which assessed the potential role of compressive loads in the onset and perpetuation of tendinopathy *A narrative review is most useful for obtaining a broad perspective on a topic and comparable to a textbook chapter. Narrative reviews may or may not have an author's bias present.*

STUDY STRENGTHS / WEAKNESSES

Strengths

- This paper is a review of the most current evidence which discusses the potential role of compressive loads which can lead to tendinopathy
- The study challenges more traditional models of tendinopathy, which suggest the occurrence is due to purely tensile loading.

Study Weaknesses

- Because this is a narrative review, it has a low level of evidence and potential author bias
- The authors of this paper appear to include "expert opinion" and some statements appear to lack properly cited evidence
- The clinical recommendations of load management of compressive tendinopathies also appears to be based upon "expert opinion"

Additional References

1. Skjong CC, Meininger AK, Ho SSW. Tendonpathy Treatment: Where is the evidence? Clin in Sports Med 2012; 31: 329-350
2. Almekinders LC, Weinhold PS, Maffulli N. Compression etiology in tendinopathy. Clin Sports Med 2003; 22: 703-710.
3. Coombes BK, Bisset L, Brooks P et al. Effect of corticosteroid injection, physiotherapy, or both on clinical outcomes in patients with unilateral epicondylalgia: A randomized controlled trial. JAMA 2013; 309: 461-469.
4. Yu J, Park D, Lee G. Effect of eccentric strengthening on pain, muscle strength, endurance and functional fitness factors in male patients with Achilles tendinopathy. Am J Phys Med Rehab 2013; 92: 68-76.