

Tendon pain - an update on mechanisms and rehabilitation

Matt Walsh PT



Treating tendon pain



Old school Vs new school

PT - how current evidence has shaped the evaluation & rehabilitation of tendinopathy



Old school

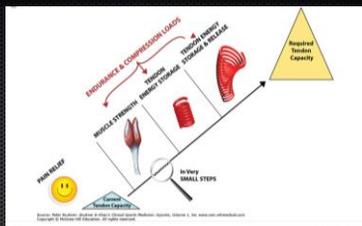
It's inflamed and therefore needs lots of rest
 The Imaging will = your diagnosis
 Collagen is torn and that is causing your pain
 PT Treatment will involve U/S, TNS, RICE, pain free exercise, massage, joint mobilization, Taping, orthotics,

REVIEW
A treatment algorithm for managing Achilles tendinopathy: new treatment options
 Hakan Alfredson, J Cook

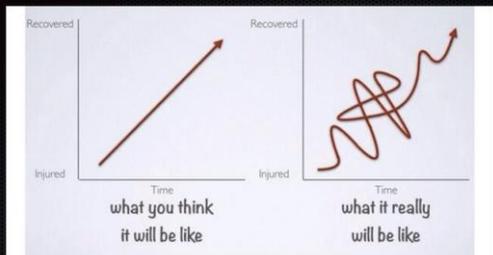
WHERE DOES THE PAIN COME FROM?
 It is well known that the chronic (persistent) Achilles and patellar tendons are affected in tendinopathy. The pain mechanisms associated with these conditions are not understood. Methods such as the structural, mechanical, biochemical, electrical and PAIN as well as ultrasonography combined with other imaging modalities provide novel and potentially important insights into the pathophysiology of Achilles tendinopathy. However, the mechanisms of pain in the chronic Achilles tendinopathy are not understood.

WHAT IS THE CURRENT TREATMENT?
 The current treatment of Achilles tendinopathy is based on the findings of a local intracortical response and increasing levels of pain with increasing activity. The current treatment is based on the findings of a local intracortical response and increasing levels of pain with increasing activity. The current treatment is based on the findings of a local intracortical response and increasing levels of pain with increasing activity.

New school



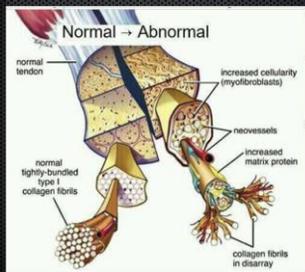
Continuum model: reactive, dysrepair, degenerative
 Imaging is used as it correlates to the history & functional capacity as well as for triage
 Treatment is focused around education, and load management
 Eccentrics... HSR... strength... isometrics... energy return...
 Modalities and manual therapy are adjuncts for increasing tolerance to load and move efficiently



Loads progression - reality

Why does my tendon hurt ?

- Nociceptor
- Compression
- Collagen damage
- Loss of lubricin, sheath slide and glide
- Increase in Matrix proteins
- Sensory changes
- NeoVascularization
- Neurogenic
- Centralised pain (upper limb)



Corticosteroid injections, eccentric decline squat training and heavy slow resistance training in patellar tendinopathy

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What works ?
1. Heavy, slow resistance



Sports Med
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SYSTEMATIC REVIEW

Achilles and Patellar Tendinopathy Loading Programmes

A Systematic Review Comparing Clinical Outcomes and Identifying Potential Mechanisms for Efficacy

Peter Malliaras · Christian J. Barman · Neil D. Reeves · Henning Langberg

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Abstract **Methods** Comprehensive searching (MEDLINE, EM-Base, CINAHL, Current Contents and SPORTDiscus™)

Introduction Achilles and patellar tendinopathy are

What works ?
2. a combination of HSR, eccentrics, isometric, concentric and energy return



Is compressive load a factor in the development of tendinopathy?

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ABSTRACT Tendons are designed to take tensile load, but excessive load can cause overuse tendinopathy. Overuse tendinopathy results in adaptive changes to the cells and extracellular matrix, resulting in activated cells, increase in large proteoglycans and breakdown of the collagen structure. While these pathological changes, there are areas of fibrocytogenesis, neovasculation, 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 reviews the potential role of compressive load in the onset and perpetuation of tendinopathy, and reviews the anatomical, epidemiological and clinical

types of loads by altering their tissue structure to be suitable for applied loads. Gillard *et al* demonstrated that in constrained rabbit tendons when they first removed and then reinstated compressive loads, resulting in tissue change from fibrous tissue towards fibrocartilage at the point of compression, with a return of fibrous tissue on removal of compression.

Milz *et al* also showed that compression can drive adaptive change within the tendon matrix. Using 3-D reconstruction of the Achilles insertion, areas of fibrocartilage were seen at and proximal to, the insertion, adjacent to the respective calcaneal tuberosity. The presence of fibrocartilage proximal to the attachment, supports the concept of compressive forces affecting tenocyte behaviour and fibrocartilage formation.

Minimise compression and aggressive stretching on insertional tendon pain



TENDINOPATHY: IS IMAGING TELLING US THE ENTIRE STORY?

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Imaging not directly related to severity of symptoms



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Isometric exercise induces analgesia and reduces inhibition in patellar tendinopathy

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ABSTRACT Background Few interventions reduce patellar tendinopathy (PT) pain in the short term. Current exercises are painful and have limited effectiveness during the competitive season. Isometric and isometric muscle contractions may have an immediate effect on PT pain.

Methods This single-blinded, randomised cross-over study compared immediate and 45 min effects following a bout of isometric and isometric muscle contractions. Outcome measures were PT pain during the single-leg decline squat (SLDS, 0–10), quadriceps strength on maximal voluntary isometric contraction (MVIC), and measures of corticosteroid instability and inhibition. Data

competitive season, there has been poor adherence due to increased pain, and either no benefit¹ or worse outcomes.² Athletes are reluctant to cease sporting activity to complete eccentric exercise programmes³ and they may be more compliant with exercise strategies that reduce pain to enable ongoing sports participation.

Exercise-induced pain relief would have several clinical benefits. First, athletes may be able to manage their pain with exercises either immediately prior to or following activity. Second, exercise is non-invasive and without potential pharmacological side effects or sequelae of long-term use that are associated with some interventions. Third, exercise

Isometrics are valuable in the reactive phase



- 1
- 2 **A proposed return to sport program for patients with midportion**
- 3 **Achilles tendinopathy: rationale and implementation**
- 4
- 5 Karin Grävare Silbernagel PT, ATC, PhD¹, Kay M Crossley (BappSc
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- 9 The authors certify that they have no affiliations with or financial involvement in
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Continuing to load in low pain activities is valuable (eg running)



Rehabilitation of tendon pain

- Examine
- Educate
- Treat
- ...repeat



Exam / Management

- History - are they actually a tendon?
- Is there an onset of pain that is related to a change in loading? (under/over/chronic/acute workloads)
- Can pain be clearly localised to a tendon by the patient? (two finger rule)?
- Does Load provoke pain?
- Do higher loads create more pain?
- Determine the tendons load capacity
 - strength
 - mobility / flexibility
 - quality of their movement



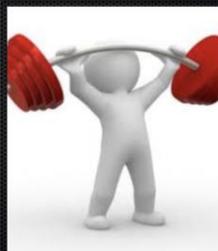
Determine the patients safest load / duration or volume for ea exercise as well as a reassessment sign (load capacity test)

'manageable pain'
Based on your clinical exam and their history



Load capacity & irritability

- How much can they do before pain significantly impairs function?
- How severe, lasting or escalating is this pain-
- 24 hour rule - if the next day the load capacity test is the same - carry on - if not, modify the load 20-50% for one day



History / Exam

- Stage the problem, it's severity and irritability
- Create a practical, and mutually agreed upon plan with
 - Objective benchmarks of progression
 - Reasonable time frames
 - Options for the inevitable 'bumps' in progress
- Identify the factors that will slow recovery or require imaging/further referral?

Identify the risk factors for a slower recovery or the need to refer out

- High BMI
- Diabetes
- Psoriatic arthritis
- Ankylosis spondylitis
- Stress
- Age

Other Risk factors that slow progress

- Occupational (workers comp, litigation, vibration , repetitive use..)
- Historical (prior injury, radiculopathy, ligament rupture, central pain or fear avoidance based behaviour , poor exercise habits)
- Physical (weakness, poor movement awareness, severe mobility restrictions, miserable malalignment)

Original Article

Psychological factors not strength deficits are associated with severity of gluteal tendinopathy: A cross-sectional study

M.L. Plinsinga, B.K. Coombes, R. Mellor, P. Nicholson ... See all authors

Treatment - S.I.M.P.L.E

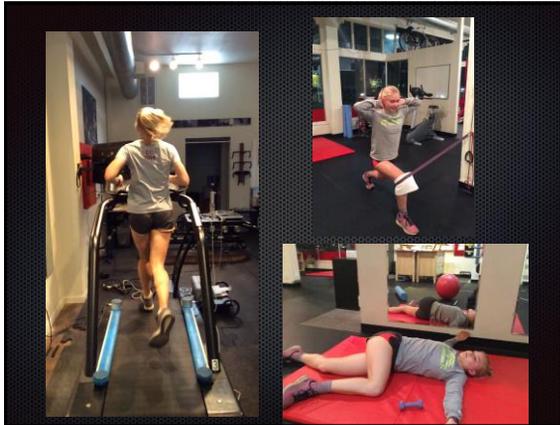
- S - strengthen - what is the best type of exercise
- IM - integrated movement with quality
- P - pain management
- L - length / flexibility
- E - education re the causes of tendon pain

Typical exercise progressions

- Isometrics / Eccentrics / isotonic /
- Resistance ,Free weights
- Energy return activities,Plyometrics and complex work and sport specific patterns
- These should dominate the amount of time spent on rehab*

	Typical session	Progression	Problem?
Isometrics	2x45sec x 6-10 per day	Add load or secondary joint challenges	Try a different range , duration or 1/2 day rest
Eccentrics	2x20reps .2x per day	Once weight is added move to every 2nd day	Reduce the volumes or load 25% and a rest day
Concentric/ eccentric	3-4x12-15	Every 2nd day full range + pause	Take a one day rest from C/E
Energy return	5x8 full rest between sets	Every three days Increase	Take two days rest from ER





Other good stuff P.T's do!

- Graston, Astym
- Kinesio tape
- Blood flow restriction
- Shockwave
- Manual therapy
- *These should occupy no more than 10% of the rehab*

Rehab MUST include....

- Frequent high movement quality loading at the right intensity balanced by adequate recovery and modification of risk factors
- Education about the likely causes of tendon pain and the time frames for recovery
- Individualised care: plans that acknowledge how tendon pain affects the patients life and sense of self.