Tendinopathies II

Karim Khan
MD, PhD,
Associate Professor
University of British Columbia
Adjunct Associate Professor
The University of Queensland

Overview
1. Resistance training has level 2 evidence
2. How does loading heal tendons?
3. Two medical treatments – GTN patches (good)
   Surgery (bad)

1. Resistance training prescription has high quality evidence:
   - Male soccer players with clinically diagnosed adductor tendinopathy

Per Holmich, 1999 (Lancet)
Eccentric Training RCT

- Randomized, controlled, blinded observers
- Adductor strengthening program (eccentric & concentric) vs. electrotherapy
- 8-12 week program
- Outcome: Return to sport without pain
Electrotherapy only helped 12% of patients

Case: Achilles pain in tennis
Your patient has a 6 month history of Achilles pain & tenderness
- NSAIDs & rest provide only temporary relief.
- He wants to play tennis with his wife

1b. Resistance training
- Adductor
- Achilles
- Lateral elbow
- Etc.
Alfredson program

- Eccentric heel drop program, twice daily
- Midportion’ symptoms

Innovation …
2 types, more drops, more pain!
- 3 sets of 15 drops
- twice daily
- 7 days/week
- 12 weeks
- pain expected
- continue through pain

Progress load when pain-free e.g., weights in back pack
Heel drops only – not raises !!!

- Heel drops vs heel raises (RCT)
- Daily for 12 weeks
- 82% success rate in drop group
- 36% success rate in raise group (p<0.002).

Mafi, Alfredson, 2001

3 finer points about Achilles tendinopathies

Pain monitoring model

- Major innovation in quantifying this concept
- Based on a 10 point VAS
- Allowed to reach 5 if certain criteria are met;
- Decrease at end of exercise, pain after exercise subsided by following morning, pain and stiffness not allowed to increase day to day (I) or week to week (V)

Mean VISA score over 12 months

Gravare-Silbernagel
Practical tip

- Eccentric program not successful in ‘insertional’ Achilles tendinopathy
- Try stretching, subtalar joint mobilisation, donut, referral

Insertional Problems

Australia / Sweden study
Eccentric training – parallels Achilles protocol
3x15 reps, 2 times/day, 12 weeks
- Group A: No decline board
- Group B: 25° decline board
What happens when the exercise is prescribed?

‘Mechanotransduction’
- biological process for adjusting structure to imposed demands
- communication without neural pathways
- The tenocyte network plays an important communicating role

Tenocyte network

4 elements of mechanotransduction
1. Mechanocoupling
2. Biochemical coupling
3. Transmission of the biochemical signal
4. Tendon cell response
1. Mechanocoupling

Tendon cell responds to tension, shear, contraction

Keep travelling down inside the tendon…
Compression before contraction or heel drop  

Compression with heel drop

4 elements of mechanotransduction

1. Mechanocoupling  
2. Biochemical coupling  
3. Transmission of the biochemical signal  
4. Tendon cell response

Gap junction communication
Communication is via Ca & IP₃

4 elements of mechanotransduction
1. Mechanocoupling
2. Biochemical coupling
3. Transmission of the biochemical signal
4. Tendon cell response

Tendon remodelling
Mechanotransduction

- The secret weapon behind exercise therapies?
  - muscle ‘strengthening’
  - treatment of contractile dysfunction
  - why some pain may be necessary
  - why healing takes some time

Achilles Model

Overview

1. Resistance training has level 2 evidence (that’s good!)
2. How does loading heal tendons?
3. One new treatment – GTN patches (Nitric Oxide)
New clinical treatment?

- Nitric Oxide (NO)
- Glycerly trinitrate paste (GTN patch)
- George Murrell & Justin Paoloni

Dose is 1.25 mg/24 hours

Need to adjust patch to this dose
Side effect = headache

Much less pain with activities in GTN group

Achilles GTN trial
Surgery…

- Results are not promising
- 9-12 month recovery period, even if eventually successful

Case: Patient who may have been prescribed…

Heel raises, heel drops, rest, GTN patches…

Summary