Pain Enduring Eccentric Exercise for the Treatment of Chronic Achilles Tendinopathy

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Outline

- Introduction
- Methods
- Results
- Discussion
- Recent Research
Why we chose this topic

- Increased interest in pain enduring eccentric exercise as a focus of treatment for chronic Achilles tendinopathy
- Closer examination of the literature needed due to ethical concerns of pushing patients through pain
- Update on current body of knowledge and consensus on treatment
Introduction to the Topic

Achilles Tendinopathy
(Tendinosis, Partial Rupture, Tendinitis)
Background

- One of the most common injuries in runners and other sports participants (Kvist, 1994); also seen in sedentary individuals (Afredson & Lorentzon, 2000)

- Risk factors, but no definitively known etiology
Predisposing factors

- Weak plantar flexors, larger inversion angle on touchdown, over-pronation (McCrory et al., 1999)
- Decreased dorsiflexion range (Kaufmann et al., 1999)
- Increase in level of activity (Cook et al., 2002)
- Running- inconsistent stretching, many years of running (McCrory et al., 1999)
- Poor footwear (Hess et al., 1989)
Pathology

- Irregular tendon structure with collagen degeneration and increased glycosaminoglycans (Alfredson & Lorentzon, 2003)
- Neovascularization in area, with increase in glutamate and lactate levels (Ohberg & Alfredson, 2004)
- No inflammatory cells (Ohberg & Alfredson, 2004)
Signs and Symptoms

- Mild or severe pain
- Tenderness on palpation, nodule?
- Decreased strength
- Decreased range of movement
- Decreased function
- Pain may be gradual or more sudden; most often associated with tendon loading
Conventional treatments

- Joint and soft tissue mobilizations
- Concentric exercises
- Stretching exercises
- Ultrasound
- Ice
- Iontophoresis
- Laser
- Friction massage
- Splinting
- Orthotics
- NSAIDs
- Corticosteroids
- Activity modification
- Rest
- Surgery
Pivotal Article

- Increased interest in 1998 with Alfredson et al.’s study out of Sweden
- Initiated a series of studies
Methods
Chronic Achilles Tendinosis
Operational definition

- Chronic - greater than 3 months
- Degenerative changes 2-7cm above the calcaneal tendon
Literature Search

- Electronic databases, reference lists, experts in the field, hand searches, gray literature searches

- Results:
  - 4 RCT’s
  - 4 Cohorts

- Not a lot of information, relatively new topic
Article Selection

259 articles found initially

- 154 not Achilles
- 32 not primary research
- 21 not eccentric intervention
- 20 inappropriate outcome measures
- 15 surgical patients
- 3 did not push through pain
- 2 subjects not human
- 2 in a language other than English
- 2 same study, different journal!

8 appropriate articles
Quality Assessment and Levels of Evidence

- Adapted Megens and Harris Scale
  - Scores of <5 were ‘Weak’
  - Scores of 5, 6, 7 were ‘Moderate’
  - Scores of 8, 9, 10 were ‘Strong’

- Sackett’s Levels of Evidence
  - 1 to 5 scale
Results
Subjects

- **Age:** Range 19-77 yrs, average 47 yrs
- **Sex:** average ratio of M:F 21:10
- **Location:**
  - mid-portion 7/8 papers
  - mixed mid and insertional 1/8 papers
- **Duration of Symptoms:**
  - Average 16.4 months
- **Activity levels:**
  - Wide variety but all appeared to be active prior to injury
Method of Diagnosis

- Clinical exam and ultrasonography
  - 5/8 studies
- Clinical exam and MRI
  - 1/8 studies
- Clinical exam alone
  - 2/8 studies
Intervention

- Alfredson et al 1998 eccentric protocol:
  - 3 sets of 15 reps eccentric heel drops 2x/day, 7 days/week for 12 weeks
  - Work through non-disabling pain
  - Progressively add weight
Intervention

- 6/8 studies used the Alfredson eccentric protocol
- 1/8 used a variation of the Alfredson protocol
  - gradually increased reps to reduce soreness
- 1/8 used a 12 week series of primarily eccentric exercises
‘Control’ Groups

- Conventional Treatments:
  - Surgery
  - Pain free concentric exercises
  - Pain free stretching
  - Night splint
  - Night splint with eccentric exercises

- Others:
  - Insertional tendinopathies
  - Contralateral tendon

- No control!
Outcome Measures

- **Pain outcome measures:**
  - VAS
  - Questionnaires
  - Subjective expression of pain

- **Function outcome measures:**
  - Ability to return to pre-injury activity
  - Jumping height
  - Plantar flexion ROM at the ankle
  - Calf muscle strength
  - Global assessment
Results: Pain

- At 12 weeks:
  - In 5/8 studies pain was significantly improved by an average of 42%.
  - In 2/8 studies a significant difference was not apparent at 12 weeks, but was apparent at 6 weeks, 6 months and 1 year.
  - In 1/8 studies pain was only qualitatively recorded; after an average of 3.8 years it did not interfere with subjects’ pre-injury activities.
Results: Pain

- In 5/8 studies improvements were seen in both the eccentric and control groups.
- Results were on average 34% better in the eccentric groups.
- 2/8 studies showed no difference between the groups; both of these studies involved stretching in the control group.
Results: Function

- At 12 weeks function improved an average of 42% from baseline in the eccentric groups.

- The control groups also improved an average of 33% from baseline.
## Quality Assessment & Levels of Evidence

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<th>Levels of Evidence</th>
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Quality Assessment & Levels of Evidence

- **Sackett’s Levels of Evidence**
  - 4 low quality RCTs (Level 2b)
  - 4 prospective cohort studies (Level 4)
  - 100% interrater agreement

- **Adapted Megens and Harris Scale**
  - 3 studies considered strong
  - 5 studies considered weak
  - Average score of all 8 studies was 5.56/10
  - 100% interrater agreement
Discussion
General Critique

- Most studies NOT randomized, controlled or blinded - relatively low quality
- Many studies out of the same centers
- Varying methods of diagnosis
- Variety of ‘control’ groups
- Variety of outcome measures used
Discussion points

- Mid-portion vs. insertional tendinopathy
  - In 2/8 studies, eccentric exercise protocol LESS effective on insertional tendinopathy
  - Why?
  - More studies needed to confirm
Discussion points

- Disproportionately higher number of men to women
- Is conventional treatment significantly less effective? What about stretching?
- Ethical responsibility?
Conclusions

- Shift towards heavy-load eccentric exercise as a therapeutic intervention
- The evidence base on the whole is persuasive
- Suggesting that pain enduring eccentric exercise is superior to conventional treatments
Clinical Recommendations

- Initial conservative, non-surgical treatment recommended
- As it stands evidence is not strong enough to ethically allow us, as practitioners, to encourage patients to push through pain
Update

- Sayana & Maffuli, 2006
- Determine effectiveness of eccentric exercise protocol for non-athletic patients with achilles tendinosis
- Prospective study, 34 patients
Update

- Langberg et al, 2006
- Proposed mechanism for why heavy load eccentric exercise is effective
- Suggest link between collagen metabolism and recovery from tendon injury
New Research

- VI SA-A questionnaire as outcome measure (Victorian Institute of Sports Assessment – Achilles)
- Reliable and valid
- Available in Swedish and English
- Can be used in research, and clinically
References

References


Thank you