

TENDINOPATHY RESEARCH UPDATE - JANUARY 2013

Contents

NORMAL TENDON & PATHOLOGY	1
AETIOLOGY	1
Capacity for sliding between tendon fascicles decreases with ageing in injury prone equine tendons: a possible mechanism for age-related tendinopathy?	1
Predicting the Patellar Tendon Force Generated When Landing from a Jump.....	2
Foot posture is associated with morphometry of the peroneus longus muscle, tibialis anterior tendon, and Achilles tendon.	3
DIAGNOSIS, ASSESSMENT	3
IMAGING	3
MANAGEMENT.....	3
The treatment of patellar tendinopathy.	3
Shock wave therapy for Achilles tendinopathy.....	4
REHABILITATION & LOADING	4
PHYSICAL THERAPIES.....	4
Acupuncture for chronic achilles tendinopathy: A randomized controlled study.....	4
MEDICINES AND INJECTIONS	5
Hypertonic Dextrose and Morrhuate Sodium Injections (Prolotherapy) for Lateral Epicondylitis (Tennis Elbow): Results of a Single-blind, Pilot-Level, Randomized Controlled Trial.	5

NORMAL TENDON & PATHOLOGY

AETIOLOGY

Eur Cell Mater. 2013 Jan 8;25:48-60.

Capacity for sliding between tendon fascicles decreases with ageing in injury prone equine tendons: a possible mechanism for age-related tendinopathy?

Thorpe CT, Udeze CP, Birch HL, Clegg PD, Screen HR.

Abstract

Age-related tendinopathy is common in both humans and horses; the initiation and progression of which is similar between species. The majority of tendon injuries occur to high-strain energy storing tendons, such as the human Achilles tendon and equine superficial digital flexor (SDFT). By contrast, the low-strain positional human anterior tibialis tendon and equine common digital extensor (CDET) are rarely injured. It has previously been established that greater extension occurs at the

fascicular interface in the SDFT than in the CDET; this may facilitate the large strains experienced during locomotion in the SDFT without damage occurring to the fascicles. This study investigated the alterations in whole tendon, fascicle and interfascicular mechanical properties in the SDFT and CDET with increasing age. It was hypothesised that the amount of sliding at the fascicular interface in the SDFT would decrease with increasing horse age, whereas the properties of the interface in the CDET would remain unchanged with ageing. Data support the hypothesis; there were no alterations in the mechanical properties of the whole SDFT or its constituent fascicles with increasing age. However, there was significantly less sliding at the fascicular interface at physiological loads in samples from aged tendons. There was no relationship between fascicle sliding and age in the CDET. The increase in stiffness of the interfascicular matrix in aged SDFT may result in the fascicles being loaded at an earlier point in the stress strain curve, increasing the risk of damage. This may predispose aged tendons to tendinopathy.

Med Sci Sports Exerc. 2012 Dec 14. [Epub ahead of print]

Predicting the Patellar Tendon Force Generated When Landing from a Jump.

Janssen I, Steele JR, Munro BJ, At Brown N.

Abstract

PURPOSE:

Although high patellar tendon loading is believed to be the primary causative factor for patellar tendinopathy, research investigating factors that affect patellar tendon loading during landing are scarce. Therefore, the purpose of this study was to identify whether factors previously associated with the development of patellar tendinopathy, and selected variables characterizing landing technique, could predict patellar tendon loading incurred by volleyball players when landing from a jump.

METHODS:

Ten highly skilled male, 20 skilled male, and 20 skilled female volleyball players performed a lateral stop-jump movement. Sex, skill level, quadriceps strength, quadriceps extensibility, and trunk moment of inertia were recorded. Landing kinematics (250 Hz) and kinetics (1,500 Hz) were collected and peak patellar tendon force and patellar tendon force loading rate were calculated. Backward multiple regression analyses identified which risk factors or landing technique variables were predictors of patellar tendon loading.

RESULTS:

Multiple regression analyses were able to estimate and predict 52% ($F(4,49) = 14.258, P < 0.001$) and 70% ($F(4,49) = 29.329, P < 0.001$) of the peak patellar tendon force and the patellar tendon force loading rate variance, respectively. The present study revealed that male volleyball players with greater quadriceps strength who displayed increased ankle dorsiflexion velocity and trunk flexion velocity during landing, were predicted to incur higher patellar tendon loading.

CONCLUSION:

As frequent application of high patellar tendon loading has previously been identified as a causative factor for developing patellar tendinopathy, interventions designed to decrease ankle dorsiflexion velocity and trunk flexion velocity at landing, particularly in male players with strong quadriceps muscles, may be effective in reducing patellar tendon loading and, in turn, patellar tendinopathy prevalence in this population.

Scand J Med Sci Sports. 2013 Jan 10. doi: 10.1111/sms.12025. [Epub ahead of print]

Foot posture is associated with morphometry of the peroneus longus muscle, tibialis anterior tendon, and Achilles tendon.

Murley GS, Tan JM, Edwards RM, De Luca J, Munteanu SE, Cook JL.

Abstract

The aim of this study was to investigate the association between foot type and the morphometry of selected muscles and tendons of the lower limb. Sixty-one healthy participants (31 male, 30 female; aged 27.1 ± 8.8 years) underwent gray-scale musculoskeletal ultrasound examination to determine the anterior-posterior (AP) thickness of tibialis anterior, tibialis posterior, and peroneus longus muscles and tendons as well as the Achilles tendon. Foot type was classified based on arch height and footprint measurements. Potentially confounding variables (height, weight, hip and waist circumference, rearfoot and ankle joint range of motion, and levels of physical activity) were also measured. Multiple linear regression models were used to determine the association between foot type with muscle and tendon morphometry accounting for potentially confounding variables. Foot type was significantly and independently associated with AP thickness of the tibialis anterior tendon, peroneus longus muscle, and Achilles tendon, accounting for approximately 7% to 16% of the variation. Flat-arched feet were associated with a thicker tibialis anterior tendon, a thicker peroneus longus muscle, and a thinner Achilles tendon. Foot type is associated with morphometry of tendons that control sagittal plane motion of the rearfoot; and the peroneus longus muscle that controls frontal plane motion of the rearfoot. These findings may be related to differences in tendon loading during gait.

DIAGNOSIS, ASSESSMENT

IMAGING

MANAGEMENT

J Orthop Traumatol. 2012 Dec 28. [Epub ahead of print]

The treatment of patellar tendinopathy.

Rodriguez-Merchan EC.

Abstract

BACKGROUND:

Patellar tendinopathy (PT) presents a challenge to orthopaedic surgeons. The purpose of this review is to revise strategies for treatment of PT MATERIALS AND METHODS: A PubMed (MEDLINE) search of the years 2002-2012 was performed using "patellar tendinopathy" and "treatment" as keywords. The twenty-two articles addressing the treatment of PT with a higher level of evidence were selected.

RESULTS:

Conservative treatment includes therapeutic exercises (eccentric training), extracorporeal shock wave therapy (ESWT), and different injection treatments (platelet-rich plasma, sclerosing polidocanol, steroids, aprotinin, autologous skin-derived tendon-like cells, and bone marrow mononuclear cells). Surgical treatment may be indicated in motivated patients if carefully followed conservativetreatment is unsuccessful after more than 3-6 months. Open surgical treatment includes longitudinal splitting of the tendon, excision of abnormal tissue (tendonectomy), resection and drilling of the inferior pole of the patella, closure of the paratenon. Postoperative immobilisation and aggressive postoperative rehabilitation are

also paramount. Arthroscopic techniques include shaving of the dorsal side of the proximal tendon, removal of the hypertrophic synovitis around the inferior patellar pole with a bipolar cautery system, and arthroscopic tendon debridement with excision of the distal pole of the patella.

CONCLUSION:

Physical training, and particularly eccentric training, appears to be the treatment of choice. The literature does not clarify which surgical technique is more effective in recalcitrant cases. Therefore, both open surgical techniques and arthroscopic techniques can be used.

Curr Rev Musculoskelet Med. 2011 March; 4(1): 6–10.

Published online 2010 November 26. doi: [10.1007/s12178-010-9067-2](https://doi.org/10.1007/s12178-010-9067-2)

Shock wave therapy for Achilles tendinopathy

Michelle Wilson and Jason Stacy

Abstract

Achilles tendinopathy has been reported as the most common overuse injury in sports medicine clinics (Clement et al. Am J Sports Med 12: 179–184, 1984). Standard treatment regimens include activity modification, heel lifts, arch supports, stretching exercises, nonsteroidal anti-inflammatories, and eccentric loading. There is a lack of consensus regarding treatment. Even so, most athletes will respond to this regimen. However, conservative management will prove to be inadequate for a subset of patients. When conservative therapy fails, other noninvasive treatment measures may be considered. Extracorporeal shock wave therapy (ESWT) has been used in soft-tissue disorders including lateral epicondylitis, plantar fasciitis, and calcific tendonitis of the shoulder. Conclusive evidence recommending ESWT as a treatment for Achilles tendinopathy is lacking. This article explores the role of shock wave therapy in the management of recalcitrant Achilles tendinopathy in patients attempting to avoid an invasive intervention.

REHABILITATION & LOADING

PHYSICAL THERAPIES

Chin J Integr Med. 2012 Dec 21. [Epub ahead of print]

Acupuncture for chronic achilles tendinopathy: A randomized controlled study.

Zhang BM, Zhong LW, Xu SW, Jiang HR, Shen J.

Abstract

OBJECTIVE:

To examine whether acupuncture treatment would improve outcome in chronic Achilles tendinopathy.

METHODS:

A randomized, controlled trial at two centers of 64 randomized patients aged 18 to 70 years with chronic Achillestendinopathy was conducted from July 2007 to April 2010, with follow-up until October, 2010. These patients were randomly allocated into an acupuncture treatment group (acupuncture group) and an eccentric exercises group (control group). The validated Victorian Institute of Sports Assessment- Achilles (VISA-A) questionnaire was completed at baseline and 8, 16, and 24 weeks. The pain at rest and after activity was assessed at baseline and 8 weeks with Visual Analogue Scale (VAS).

RESULTS:

After randomization into the acupuncture group or control group, one patient was lost to follow-up. The mean VISA-A score improved significantly after 8 weeks in the acupuncture group to 67.1 points [95% confidence interval (CI), 64.1-70.2] and in the control group to 48.5 points (95% CI, 45.5-51.6) with an additional 18.6 points increase in acupuncture treatment patients ($P = 0.0000$). Acupuncture treatment resulted in a significant increase from baseline in VISA-A of 25.8 after 16 weeks and 28.4 after 24 weeks. Whereas, in the control group the increase from baseline in VISA-A were 10.0 and 16.6 after 16 and 24 weeks, respectively ($P = 0.0000$). The VAS diminished by 2.0 cm after activity, and by 1.5 cm at rest after 8 weeks in the control group. In the acupuncture group, the pain scores diminished significantly more than in the control group, with pain reduction of 3.7 cm after activity ($P = 0.0000$) and 3.2 cm at rest ($P = 0.0000$).

CONCLUSION:

Acupuncture intervention could improve pain and activity in patients with chronic Achilles tendinopathy compared with eccentric exercises.

MEDICINES AND INJECTIONS

Am J Phys Med Rehabil. 2013 Jan 3. [Epub ahead of print]

Hypertonic Dextrose and Morrhuate Sodium Injections (Prolotherapy) for Lateral Epicondylitis (Tennis Elbow): Results of a Single-blind, Pilot-Level, Randomized Controlled Trial.

Rabago D, Lee KS, Ryan M, Chourasia AO, Sesto ME, Zgierska A, Kijowski R, Grettie J, Wilson J, Miller D.

Abstract

OBJECTIVE:

Chronic lateral epicondylitis is common, debilitating, and often refractory. Prolotherapy (PrT) is an injection therapy for tendinopathy. The efficacy of two PrT solutions for chronic lateral epicondylitis was evaluated.

DESIGN:

This study is a three-arm randomized controlled trial. Twenty-six adults (32 elbows) with chronic lateral epicondylitis for 3 months or longer were randomized to ultrasound-guided PrT with dextrose solution, ultrasound-guided PrT with dextrose-morrhuate sodium solution, or watchful waiting ("wait and see"). The primary outcome was the Patient-Rated Tennis Elbow Evaluation (100 points) at 4, 8, and 16 weeks (all groups) and at 32 weeks (PrT groups). The secondary outcomes included pain-free grip strength and magnetic resonance imaging severity score.

RESULTS:

The participants receiving PrT with dextrose and PrT with dextrose-morrhuate reported improved Patient-Rated Tennis Elbow Evaluation composite and subscale scores at 4, 8, and/or 16 weeks compared with those in the wait-and-see group ($P < 0.05$). At 16 weeks, compared with baseline, the PrT with dextrose and PrT with dextrose-morrhuate groups reported improved composite Patient-Rated Tennis Elbow Evaluation scores by a mean (SE) of 18.7 (9.6; 41.1%) and 17.5 (11.6; 53.5%) points, respectively. The grip strength of the participants receiving PrT with dextrose exceeded that of the PrT with dextrose-morrhuate and the wait and see at 8 and 16 weeks ($P < 0.05$). There were no differences in magnetic resonance imaging scores. Satisfaction was high; there were no adverse events.

CONCLUSIONS:

PrT resulted in safe, significant improvement of elbow pain and function compared with baseline status and follow-up data and the wait-and-see control group. This pilot study suggests the need for a definitive trial.