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Review Article

Physical Therapy Treatment for Chronic Achilles Tendinopathy

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Abstract

Objective: To analyze the clinical effectiveness of Physical Therapy treatment for chronic Achilles tendinopathy.

Search strategy: Search in Medline, WoS, CINAHL, Pub Med Central and Science Direct based on the keywords.

Study selection: 203 studies were identified, 18 being selected on the basis of the inclusion criteria: from 2006 to November 2011, focused on the objective of the study and with pretest and posttest.

Synthesis of Results: Eccentric exercises singly or combined with other therapeutic modalities, especially shock waves are the most used option. The best results are obtained in insertional tendinopathies.

Conclusions: More studies are needed to confirm the clinical effectiveness of the different physical agents used for physical therapy treatment for chronic Achilles tendinopathy, and to determine the importance of the lesional location in the recovery process tendon.

Keywords: Achilles tendon; Tendinopathy; Chronic Disease; Physical Therapy.

Introduction

Tendinopathy is a frequent alteration of the musculoskeletal system, With several pathological manifestations. In the acute phase, the Component of inflammation, which associates an increase of neutrophils, edema Peritendinosus, local inflammation and stiffness. In subacute and chronic cases, Inflammation seems to play a less important role, predominating degeneration Of the structure of collagen tissue (which being thinner and less durable Disables the tendon to support loads), neovascularization Intratendinous (occurring both at the intra-tendinous and paratendinous levels) and the Increased neuropeptide concentration and cellular apoptosis [1-3].

Traditionally, chronic pain of the Achilles tendon has been referred to as Tendinitis is caused by pain, swelling, and vascular enlargement. Nevertheless, recently, it has been confirmed that this inflammation is very small or nonexistent [3]. And although sometimes the terms tendinitis and tendinosis are used as Synonyms [4], Achilles tendinosis involves pathological changes for the tendon with absence of inflammatory cells and, therefore, is the term related to Chronic processes [2].

Achilles tendinopathies can be classified into insertional ones (those that Occur in the tendon-bone junction) and non-insertional (more proximal, and localized, At least 2 cm above the insertion of the tendon in the calcaneus). The first Tend to occur in older, less athletic or overweight individuals [5]. These injuries, caused by tendon overuse, prevail in Activities that involve career or leap, and, consequently, a high demand of the Tendon (an estimated percentage of sports injuries of 30-50% are related to the tendon). However, it is not always associated with activity Physics, and may also occur in sedentary individuals and in the population General, especially in people who are overweight [5-7] and older than 35 Years [7,8]. In this way, Achilles tendinopathy does not only cause discomfort Sports, but can lead to a general deterioration of health and a Increased morbidity [8].

The multifactoriality (see figure 1) explains that the results obtained with Unique and simple treatments are not always effective [9], especially if other diseases that correlate with an increase in risk of tendinopathy, such as diabetes mellitus, kidney disease or Rheumatological diseases [5]. It is often stated that treatment Con-

servative is more effective, in principle, than the surgical one, but the Is varied. Traditional conservative treatment maintained little Activities that supposed to modify the structure of tendons and their capacity to withstand the tensions that arose to him, which often implied a Recurrence of the problem [6]. The eccentric exercises of the triceps muscles Sural intervention are an emerging therapeutic intervention for the treatment of Tendinopathy, especially in the Achilles tendon [8]. In a similar way, Resulting in the treatment of extracorporeal shock waves, popular in the Last decade for the treatment of soft tissue disorders [3]. In this review we aim to explore the effectiveness of treatment of physiotherapy on chronic Achilles tendinopathy, investigating a possible Consensus among studies that makes us think of a therapy or treatment Common and effective to alleviate the clinic of this pathology.

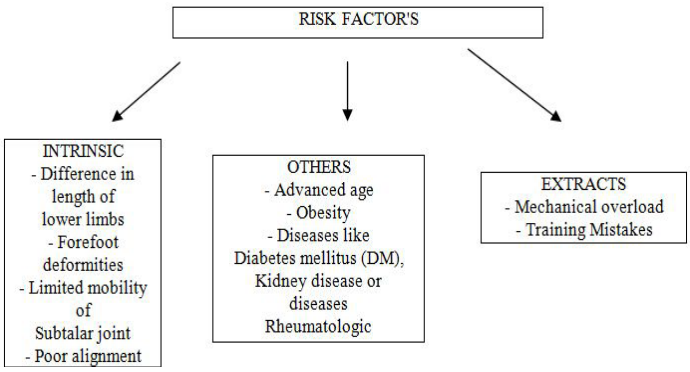

Figure 1: Representation and classification of the different risk factors of Atherosclerotic tendinopathy.

Author	Shows	Affectation	Treatment	Duration of Treatment	Results
Langberg et $_{al}$10	12football players of Elite (MS: 26)	GE: 6 with tendinosis Unilateral chronic half. GC: 6 healthy	EE	12 weeks 2 sessions / day	GE: ↑ synthesis of collagen in the Injured tendons (measured with Technique of microdiálisis) and ↓ pain (Measured with EVA scale)
Sayana et al.	34 patients Sedentary (MS: 44)	Tendinopathy Unilateral chronic half	EE	12 weeks 2 sessions / day	19 improved (use of the questionnaire VISA-A, with an average increase of 11.5 points on its scale) 15 showed no improvement
Knobloch16	59 patients 64 tendons Affections (MS: 49)	59 patients 64 tendons Affections (MS: 49)	EE	12 weeks 1 session / day	Pain and improvement of quality of life (Use of the FAOS questionnaire) ↓ the capillary blood flow of the tendon (Measured with Doppler and Blood flow spectroscopy) SatO2 invariable
Knobloch16	21 sujetos (realizaban AF) (EM: GC: 28 GE: 34)	GE: 11 con tendinosis unilateral insercional y media GC: 10 sanos (pero sin entrenar al menos en los 2 años anteriores)	EE (GE) 5 km de carrera (GC)	series 3 x15 rpt	GC: Doppler activity in 6 Tendons of 5 patients before exercise; After the race in 8 Patients. GE: Doppler activity before and After EE in all Patients.
Henriksen et al19	16 subjects Healthy (MS:)	` Any	EE	5 x 3 dorsiflexions Complete	↓ EMG activity and ↑ forces Three-dimensional reaction in Leg muscles in phase Eccentric
Your and al12	58 patients 70 tendons They performed AF) GE1: 34 (MS: 44.1) GE2: 36 (MS: 45.1)	Tendinopathy Chronic portion half	GE1: EE GE2: EE + Splint Nocturnal	12 weeks 1 session / day	19 improved (use of the questionnaire VISA-A, with an average increase of 11.5 points on its scale) 15 showed no improvement

Knobloch16	59 patients 64 tendons Affections (MS: 49)	Tendinopathy Chronic instillation (10 tendons) and Mean (54 tendons)	EE	12 weeks 1 session / day	Pain and improvement of quality of life (Use of the FAOS questionnaire) ↓ the capillary blood flow of the tendon (Measured with Doppler and Blood flow spectroscopy) SatO2 invariable
Knobloch16	21 sujetos (realizaban AF) (EM: GC: 28 GE: 34)	GE: 11 con tendinosis unilateral insercional y media GC: 10 sanos (pero sin entrenar al menos en los 2 años anteriores)	EE (GE) 5 km de carrera (GC)	series 3 x15 rpt	GC: Doppler activity in 6 Tendons of 5 patients before exercise; After the race in 8 Patients. GE: Doppler activity before and After EE in all Patients.
Henriksen et al19	16 subjects Healthy (MS:)	Any	EE	5 x 3 dorsiflexions Complete	↓ EMG activity and ↑ forces Three-dimensional reaction in Leg muscles in phase Eccentric
Your and al12	58 patients 70 tendons They performed AF) GE1: 34 (MS: 44.1) GE2: 36 (MS: 45.1)	Tendinopathy Chronic portion half	GE1: EE GE2: EE + Splint Nocturnal	12 weeks 1 session / day	GE1: ↑ significant in 78% of the Tendons in the Questionnaire VISA-A + 63% of Excellent or good satisfaction (Measured by questionnaire) GE2: ↑ significant in the 71% in the VISA-A and 48% in satisfaction
Petersen and Al9	100 Patients GE1: 37 GE2: 35 GE3: 28 (MS: 42.5)	Tendinopathy Chronic portion half	GE1: IN GE2: tobillera AirHeel GE3: IN + AirHeel	12 weeks 3 sessions / day	Satisfactory results in the 3 Groups (in EVA scale, scale of AOFAS and SF-36 questionnaire) without Significant differences between them
Chester and Al13	16 patients Sedentary (MS: 53)	Tendinopathy Chronic portion half	GE1: EE GE2: US	GE1: 12 weeks 1 session / day (6 weeks Supervised and 6 Weeks no) GE2: 6 weeks 2 sessions / sem	At 6 weeks: both groups Improved in terms of pain EVA), but not at 12 weeks. ↑ values of functionality in GE2 (As measured by the FILLA index), but not Are significant in relation to GE1
Herrington y McCulloch	25 patients They performed AF with Load for The tendon) GE1: 12 (MS: 36.6) GE2: 13 (MS: 37)	Tendinopathy Chronic portion half	GE1: US + Cyriax GE2: US + Cyriax + EE	GE1: 6 weeks 1 session / sem + program of Stretching 12 Weeks GE2: Same as GE1 + EE 12 weeks 2 sessions / day	Both groups improved from The 12th week, but the improvement was Significant difference in GE2, where Reached the maximum score (Measured with VISA-A questionnaire)
Mayer et al17	28 halls (More than 32 Km / week) GE1: 11 (MS: 41) GE2: 9 (MS: 35) GC: 8 (MS: 38)	Tendinopathy Unilateral chronic	GE1: US + Cyriax +Ice + EE+ EP GE2: templates Orthopedic Semi-rigid GC: sin treatment	GE1: 8 weeks 4 sessions / sem GE2: Same GE1 + 12 Laser sessions total	Pain in 6 of GE1 and 8 of GE2 without Significant differences between the two GE (through index POI) ↑ eccentric force in both GE

Stergioulas And al1	40 patients They performed AF) GE1: 20 (MS: 28.8) GE2: 20 (MS: 30.1)	Tendinopathy Chronic portion half	GE1: EE GE2: EE + Low laser intensity	GE1: 12 weeks 2 sessions / day GE2: Same GE1 + 3 OCR sessions In total (weeks 4th, 5th and 6th)	After follow-up control on the 12th Week ↓ pain was greater and Reached faster in the GE2 (Measured with VISA-A scale). Also less symptomatology Secondary in GE2.
Rompe et Al14	68 patients They performed AF) GE1: 34 (MS: 46.2) GE2: 34 (MS: 53.1)	Tendinopathy Chronic unilateral	GE1: EE GE2: EE + OCR	GE1: 4 weeks 1 session / without GE2: Same GE1 + 1 Sitting / without OCE (4 sessions total)	At the beginning of the Treatment groups, both groups The EVA and VISA-A scales and Its FA (56% of GE1 and 82% of GE2)
Rasmussen It is	48 patients GE1: 24 (MS: 46) GE2: 24 (MS: 49)	Tendinopathy chronicle	GE1: EE GE2: EE + OCE	GE1: 12 weeks 2 sessions / day GE2: 3 sessions of OCR in total (Weeks 2 nd, 3 rd and 4ª)	After the 4th, 8th and 12th week of Follow-up, both groups improved Level of pain (EVA scale), but the GE2 achieved better results in Functionality according to the AOFAS scale
Rompe et Al18	50 patients GE1: 25 (MS: 39.2) GE2: 25 (MS: 40.4)	Tendinopathy Chronic instillation	GE1: EE GE2: OCR	GE1: 12 weeks 2 sessions / day GE2: 3 sessions of OCR in total (Range of 1 week)	At the beginning of the Treatment, both groups improved Significantly on the EVA scales And VISA-A, especially in GE2 (16 Patients of GE2 versus 7 of GE1 They get a complete improvement)
Rompe et Al15	75 patients GE1: 25 GE2: 25 GC: 25 (MS: 48.6)	Tendinopathy Chronic portion half	GE1: EE GE2: OCR GC: sin treatment	GE1: 1 session only GE2: 1 session only GC: repose, Modification of Footwear, baths contrast, Iontophoresis, ice, US, massage, Stretching ...	At the beginning of the Treatment, both GE improve Significantly on the EVA scales And VISA-A
Furia5	68 patients (42 They performed AF) GE1: 12 (MS: 52.2) Ge2: 23 (MS: 49) GC: 33 (MS: 52.6)	Tendinopathy Chronic instillation	GE1: OCE + anesthesia local GE2: OCE + anesthesia regional GC: treatment conservative	3 sessions of Spaced OCE With each other 7 days (+/- 3), without anesthesia and Restricting Taking NSAIDs	After valuation at the month, 3 and 12 months Of treatment, much greater improvement In GE than in GC (measured with Scale of Roles and Maudsley, and EVA) and They resumed AF
Saxena et al7	60 patients 74 tendons (MS: 48.32)	Paratendinosis (in 32 tendons) Proximal Tendinosis (In 23) Tendinosis Insertional (in 19)	OCR	6 weeks	After one year of treatment, and according to The Roles and Maudsley Scale, there were Significant improvements in 75% of the Paratendinosis, in 78.26% of the Proximal tendinosis and 84.21% of The insertions

Christenson2	Single case (athlete) (Age 39)	Chronic Tendinosis bilateral	Cyriax + work Isometric and Of load Dynamics of Triceps sural		At the end of the treatment program, Maximum score on the VISAA scale, Without pain (EVA scale) and increased Of the length of twins and soleus, Confirming this improvement in the Follow up 3 months later

Table 1: Characteristics of included studies.

Mean age. GE: Experimental group. GC: Control group. EE: Eccentric exercise. EVA: Visual Analog Scale. VISA-A: Victorian Institute of Sports Assessment-Achilles Questionnaire. FAOS: Foot and Ankle Outcome Score. SatO2: Saturation of oxygen. AF: Physical activity. EMG: Electromyographic. AOFAS: American Orthopedic Foot and Ankle Society Score. SF-36: Health Survey Questionnaire Short-Form 36. US: Ultrasound. FILLA: Functional Index of the Leg and Lower Limb. EP: Exercises Proprioceptive. PDI: Pain Disability Index. OCR: Radial shock waves. OCE: Extracorporeal shock waves.

Material and Methods

From October 2010 to November 2011 a review was carried out Systematic review of scientific articles related to the treatment of physical therapy in Chronic Achilles tendinopathy. The bibliographic search was done in the bases Medline, WoS and CINAHL, being complemented with the base search engine Pub Med Central and the Science Direct portal. For the choice of the articles the keywords "Physical Therapy "," Achilles Tendon "," Chronic Disease "," Tendinopathy "and the following inclusion criteria: - Scientific articles published from 2006 to the present-Articles dealing with chronic Achilles tendinopathy and Effect of different conservative therapeutic modalities on the same. - Accessible articles available in full text. - Articles written in English, Spanish or Portuguese. Figure 2 reports the search strategy followed in each case, as well as Such as the results obtained and the exclusion criteria used for the disposal of unused items.

Results

After the bibliographic search, 18 studies were analyzed (of the total 19 articles found) for this review that met the criteria of inclusion. One of them corresponds to a study protocol, in which they still specified the results of the investigation, so it was not analyzed. The articles analyzed investigate the effect of different modalities Therapies that can be managed by physiotherapists in case of tendinopathy Chronic Achilles tendon. The modalities used in the different Articles were as follows:

- Eccentric exercise program only (in 5 articles).
- Eccentric exercise program combined or compared to other exercises

Therapeutic modalities: shock waves, ultrasound (US), night splints, AirHeel ankle brace, combined conservative therapies (US, transverse massage Deep, ice ...) and laser (in 10 articles)

- Treatment with extracorporal shock waves (in 2 articles, one

Which compares this therapy with other conservative therapies, and the other, which focuses only in shock waves).

- Approach with a set of combined and specific mobilizations Of soft tissue (in 1 article). Table 1 shows the main characteristics of the studies Included in the present study. In relation to the eccentric work developed, Indicate that most of the work applies a training regime Eccentric with a similar protocol consisting of 12 weeks of exercises Eccentrics with daily work (usually 3 sets of 15 repetitions, performed One, two or three times daily depending on the study). The exercises were performed On a platform or ladder, supporting the forefoot of the affected member and Maintaining maximum plantar flexion. Once in this position, and leaving as Sole support of the affected limb's foot, it slowly descended to a Maximal dorsiflexion, with consequent stretching of the tendon. The climb, Concentric contraction, was developed with the healthy limb (in the Cases of unilateral tendinopathy) and with the help of the arms (in cases Bilateral). This exercise was performed with the stretched knee (for contraction of both twins) and folded (to center the work on the soleus). In all it was noticed To patients experiencing possible pain or discomfort from mild to Moderate, which was permitted, as long as it was not an incapacitating pain. Progressive eccentric training was applied, both in repetitions and in Load, placing a backpack with 5 kg of weight once the patients did not They will experience pain when performing the exercises with the own weight of the body.

Discussion

After the results found in the review, the first thing we can To point out is that the most used therapeutic option is the exercise Eccentric, since they are a treatment regimen in 15 of the 18 articles analyzed, Which, to a certain extent, indicates its importance in the management of tendinopathy Chronicle of Achilles. Second, we encounter shock waves. However, as we can see throughout the analysis of the results, Not all articles analyze the same treatment regimen, do not follow the Same Achilles involvement, nor to the same area of the tendon. Thus, we find ourselves With a majority that focuses on the pathology of the middle and proximal area of the Tendon, discarding insertional pathology [1,6,9-15] Another group, not so numerous, that It treats pathology of the insertion and the middle portion indistinctly, or that It simply does not spec-

ify the exact location of the affection [2-4,7,16,17] two that They exclusively treat the pathology of tendon insertion [5,18]; And, finally, one whose Sample are healthy subjects [19]. If we talk about the type of pathology, we can that the articles generally analyze tendinopathy in general, without Clarify what type of concrete injury persists in the tendon. However, there are Exceptions. The first, the article published by Henriksen et al [19] Healthy subjects (although we focus on the effectiveness of eccentric treatment at the Tendinopathy of the middle portion of the Achilles). And, in the same way, led them to By Boesen ET al [4], Christenson [2] and Langberg et al [10], in the three cases are Tendinosis, and that of Saxena et al [7], whose specimens show paratendinosis or Tendinosis. Likewise, not all patients have the same characteristics. The subjects that make up the different samples are from physically Active and practicing sports on a regular basis, to subjects practicing sports Occasionally, people with a sedentary life without sports practice or even, elite athletes. These differences make it difficult to compare results Obtained, since the patients will evolve differently depending on their state of form, their activity and their age. In addition to these differences, we can observe that the sample size Used by the authors is not broad enough to extrapolate the results to the population and generalize the results obtained in them. In spite of all these limitations, Positive results obtained in most of the studies, which, although it is necessary to continue with the research in this field, it allows to show the Benefits of a conservative treatment from the physiotherapy of tendinopathy Chronicle of Achilles. Thus, the eccentric work in this pathology shows a Beneficial in the regeneration of the collagen tissue [10], in the microcirculation of the Tendon [16] and in its vascular response [4], besides an improvement in the functionality [1-3,5- 7,9,11-16,18], in pain [1-3,5-7,9-11,11,12,14-18] and in the quality of life of the patients Patients [1,5,7,9,13-16,18]. In addition, if the eccentric exercises are added the waves of shock, as reflected in the works of Rompe ET al [14] and Rasmussen et al.

Al [3], it appears that the results on chronic Achilles tendinopathy improve. InIn any case, it would be necessary to continue investigating on which therapeutic modality is more In the work of Rompe et al [18], better results are obtained in the Group treated only with shock waves than in the group treated only with exercises Eccentric, although in the other of this same first author [15] are not observed Significant differences between both, although yes with respect to the control group. That it seems clear is that the shock waves also appear to conform A valid therapeutic option [5, 7]. Despite what was said in the previous paragraph, Physiotherapy in the treatment of the chronic tendinopathy of the Achilles tendon still has a way to go. So, of the three works that used an orthosis, the results with a night splint were not positive [12] and with an Air Heel ankle brace they did not improve those obtained to the group that followed a work with eccentric exercises [9], while the use of Semi-rigid splints did offer better results than a physiotherapeutic treatment [17]. No better results were obtained with the use of ultrasound [13] or Ultrasounds and Cyriax [6] than with eccentric exercises. The same we can think of If using laser [1], although its use offered similar benefits to the treated group Only with eccentric exercises, the authors modified the habitual protocol followed In case for the use of these. All this, together with the limitations indicated at the beginning of this section, allows us to suggest that the effects of the various therapeutic modalities related to the treatment of tendinopathy to use common protocols of action and valuation in order to be able to and use larger samples to facilitate the generalization of Results.

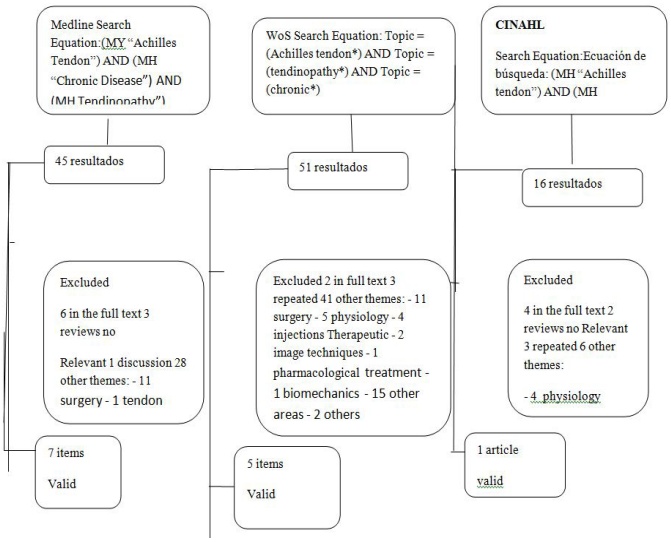

Figure 2: Scheme with the search strategy carried out and the results obtained in each case, as well as the excluded articles and the Exclusion criteria.

Conclusions

Eccentric exercises are the most standardized therapy at the time of Treating, through physiotherapy, chronic tendinopathy of the Achilles tendon, following most articles a common protocol lasting 12 weeks Where 3 sets of 15 repetitions are performed, usually once or twice a day. The annexation of other therapeutics different from the exercise program Eccentric is shown favorable with US and deep transverse massage, with laser or with shock waves. In the latter case, even its use offers better Results than with the eccentric exercise program. On the contrary, the addition A night-time splint or an Air Heel ankle bracelet does not produce this synergistic effect. There are authors who do not investigate this synergistic effect, but rather Effectiveness of eccentric exercises with other therapeutic alternatives. From this Form different treatments valid and alternative to the exercises Eccentrics, such as shock waves or the use of Semi-rigid orthopedic insoles. Within the generic pathology of chronic Kolesin tendinopathy, The articles focus on some areas or other tendon, or on a type of involvement Concrete or other, so the results are not comparable, although the most Favorable results are obtained in tendinopathies that af-

fect insertion rather than Middle or proximal tendon We can also conclude that sedentary patients evolve worse and More slowly than active patients or with involvement in the sport. Of the same In this way, the longer the evolution affects, the worse the evolution. Finally, the work should consist of a larger sample for the Extrapolation and generalization of results. This systematic review Offers a possible pathway for chronic tendonopathy of the tendon of Achilles, but its effectiveness still has yet to be proven and the data. Conflict of interests. The authors state that there is no conflict of interest when writing the article.

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