



ORIGINAL ARTICLE

## Load management in tendinopathy: Clinical progression for Achilles and patellar tendinopathy

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### KEYWORDS

Tendinopathy;  
Achilles;  
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Exercise;  
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**Abstract** Achilles and patellar tendons are commonly affected by tendinopathy. Injury to these tendons can severely impact upon sports, recreational and everyday activities. Eccentric musculotendinous loading has become the dominant conservative intervention strategy for Achilles and patellar tendinopathy over the last two decades. Eccentric loading involves isolated, slow lengthening muscle contractions. Systematic reviews have evaluated the evidence for eccentric muscle loading in Achilles and patellar tendinopathy, concluding that outcomes are promising but high-quality evidence is lacking. Eccentric loading may not be effective for all patients (athletes and non-athletes) affected by tendinopathy. It is possible that in athletes, eccentric work is an inadequate load on the muscle and tendon. A rehabilitation program aiming to increase tendon load tolerance must obviously include strength exercises, but should also add speed and energy storage and release. The aim of this paper is to document a rehabilitation protocol for Achilles and patellar tendinopathy. It consists of simple and pragmatic exercises designed to incorporate progressive load to the tendon: isometric work, strength, functional strength, speed and jumping exercises to adapt the tendon to the ability to store and release energy. This article would be the first step for an upcoming multicentre randomized controlled trial to investigate its efficacy.

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## PALABRAS CLAVE

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Aquiles;  
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Ejercicio;  
Carga;  
Terapia física

## Gestión de la carga en las tendinopatías: progresión clínica para tendinopatías de Aquiles y rotuliana

**Resumen** Las tendinopatías de Aquiles y rotuliana son muy frecuentes. Las lesiones en estos tendones pueden afectar severamente a las actividades deportivas, recreativas y cotidianas. En las últimas 2 décadas, los ejercicios excéntricos se han convertido en la principal intervención conservadora para tratar las tendinopatías de Aquiles y rotuliana. Los ejercicios excéntricos no son efectivos en todos los pacientes afectados por tendinopatías (atletas y no atletas). Es posible que en atletas, la carga que genera el trabajo excéntrico sobre el músculo y el tendón sea insuficiente. Un programa de rehabilitación que tenga por objetivo aumentar la tolerancia del tendón a la carga debe, obviamente, incluir ejercicios de fuerza, pero también debe agregar ejercicios de velocidad y ejercicios que aumenten la capacidad para almacenar y liberar energía. Este trabajo muestra un protocolo de rehabilitación para las tendinopatías de Aquiles y rotuliana. Consiste en ejercicios simples y pragmáticos diseñados para incorporar carga progresiva al tendón: mediante trabajo isométrico, fuerza, fuerza funcional, velocidad y ejercicios pliométricos que aumenten en el tendón la capacidad de almacenar y liberar energía. Este trabajo es el primer paso para diseñar un ensayo clínico aleatorizado y multicéntrico que permita evaluar su eficacia.

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## Background

Achilles and patellar tendons are commonly affected by tendinopathy, which are overuse injuries characterized by localized tendon pain with loading and dysfunction.<sup>1-3</sup>

I understand tendinopathy as pain and dysfunction not related to the pathology, and knowing that there isn't a direct connection between structure, pain and dysfunction, a classification based on the structure is called into question. The interaction between structure, pain and function hasn't been completely understood. One can find regions in the tendon which are in different stages at the same time. The clinical presentation is a hybrid of reactive and degenerative pathologies, where the structurally "normal" part (in the regular image modalities) has a reactive response, and there is a silent degenerative part of the tendon, mechanically and structurally incapable of transmitting tractive load, and this leads to overloading the normal part of the tendon. The tendon pain is partially related to the function, to the tendinopathy, diminishing muscle strength and motor control which, at the same time, reduces the function. The function in this context refers to the muscle's ability to produce the appropriate strength so that the tendon can accumulate and release energy for the sports movements. However, one can find function changes when there is a structural pathology, independent from the pain.<sup>4</sup>

Both are common among athletes and Achilles tendinopathy may also affect sedentary people. Injury to these tendons can severely impact upon sports, recreational and everyday activities.<sup>1-3</sup> The prevalence of patellar tendinopathy is high in sports characterized by high demands on speed and power for the leg extensors (i.e. volleyball and basketball).<sup>5</sup> In the general population, the incidence of Achilles tendinopathy is 1.85 per 1000. In the adult population (21–60 years), the incidence is 2.35 per 1000. In 35% of the cases, a relationship with sports activity was recorded.<sup>6</sup>

Tendinopathy is commonly associated with tendon pathology. Pathological features of tendon pathology include altered cellularity (increased or decreased), break down in the extracellular matrix (ground substance accumulation, disorganized collagen, neurovascular ingrowth).<sup>7</sup> Endocrine tenocytes and nerve endings release biochemical substances that are thought to have a role in tendon pain (e.g. substance P).<sup>8</sup>

Eccentric musculotendinous loading has become the dominant conservative intervention strategy for Achilles and patellar tendinopathy over the last two decades. Eccentric loading involves isolated, slow lengthening muscle contractions. Systematic reviews have evaluated the evidence for eccentric muscle loading in Achilles<sup>9-13</sup> and patellar<sup>14,15</sup> tendinopathy, concluding that outcomes are promising but high-quality evidence is lacking.<sup>16</sup> Eccentric loading may not be effective for all patients (athletes and non-athletes) affected by tendinopathy.<sup>17</sup> It is possible that in athletes, eccentric work is an inadequate load on the muscle and tendon. A rehabilitation program aiming to increase tendon load tolerance must obviously include strength exercises, but should also add speed and energy storage and release.<sup>18</sup> The aim of this paper is to document a rehabilitation protocol for Achilles and patellar tendinopathy. It consists of simple and pragmatic exercises designed to incorporate progressive load to the tendon: isometric work, strength, functional strength, speed and jumping exercises to adapt the tendon to the ability to store and release energy (Fig. 1). This article would be the first step for an upcoming multicenter randomized controlled trial to investigate its efficacy.

The development of a rehabilitation plan for any individual with tendinopathy requires complex clinical reasoning, with reference to the pathoanatomical diagnosis and the functional requirements of the person. Tendinopathy and subsequent rehabilitation will vary considerably depending on the site of the pathology (i.e. insertional or

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