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Rehabilitation of Achilles and patellar tendinopathies

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Achilles and patellar tendinopathies affect a broad range of the population and are difficult conditions to manage clinically. The pathology is persistent in the chronic tendon and can be considered to be failed healing. The exact cause of tendinopathy pain is unclear but may be related to changes in neurovascular structures.

Rehabilitation for Achilles and patellar tendinopathies is based on an exercise programme that aims to improve muscle–tendon function and normalise the pelvic/lower limb kinetic chain. This incorporates a programme for restoring and improving muscle strength, endurance and power and retraining sport-specific function.

Rehabilitation may take a prolonged period of time, both the athlete and clinician must be patient and persistent to maximise results from an exercise-based treatment.

Key words: Achilles tendinopathy; patellar tendinopathy; tendon healing; eccentric exercise.

INTRODUCTION

Achilles and patellar tendinopathies occur most commonly in people participating in sporting and physical activity[1–4] but have also been reported in non-athletic populations.[5] The exact aetiology of these conditions is unknown but is thought to consist of a combination of impact loading, genetic make-up, inefficient lower limb biomechanics and musculoskeletal function. Rehabilitation of Achilles and patellar tendinopathies can be difficult and prolonged and it requires both careful planning by the clinician and discipline from the patient to adhere to an often long rehabilitation programme.

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The pathology of chronic tendinopathy and the source of pain must be considered when planning a rehabilitation programme. The current knowledge of tendon pain, pathology and repair will be presented in this chapter together with an explanation of how this impacts on rehabilitation.

The essential components of the rehabilitation programme required to maximise success in managing these clinically difficult injuries will also be explained. Finally, there will be a discussion of the planning and implementation of a specific rehabilitation programme for Achilles and patellar tendinopathy, with particular emphasis on the indicators for the success or failure of rehabilitation.

TENDON PATHOLOGY AND REPAIR

Despite the anatomical proximity of muscle and tendon, the management of tendon pathology varies considerably from that of muscle injury. The differences in the management of muscle and tendon pathologies are reflected in their reparative responses to injury. Whilst the response to muscle injury follows a logical progression of inflammatory phase, muscle fibre regeneration and repair; tendon injury may not have an inflammatory stage and can result in a permanent state of pathology (failed healing).[6,7] Histological evaluation of pathological tendons has demonstrated there is no evidence of prostaglandin-mediated inflammation[8] although there may be some neurogenic inflammatory markers, such as neuropetides, present.[9,10]

In order to develop appropriate rehabilitation programmes for tendinopathies, it is important to understand tendon structure, pathology and repair. Normal tendons are well organised hierarchical structures that are predominantly made up of long strands of Type I collagen. The collagen is enveloped by ground substance that is mainly comprised of small proteoglycans with hydrophilic glycoaminoglycan chains, supplied by sparse, but adequate, neurovascular structures.[6]

Acute tendon injuries, such as lacerations, heal with a standard triphasic response of inflammation, proliferation and maturation, leading to functional scar formation. Overuse tendinopathy, however, does not follow the same pathway[11] and essentially results in long term disruption of the extracellular matrix.

Tendon pathology is characterised by four main changes in structure: (i) change in cell function, (ii) increase in ground substance, (iii) breakdown of collagen bundles and (iv) neurovascular proliferation (neovascularisation).[12] The activation and increase in the number of cells results in the increased production of essential extracellular materials such as ground substance and collagen. There is a change in the type of proteoglycans present in the ground substance in pathological tendons, with an increase in the larger proteoglycans such as aggrecan. The cells also produce Type III collagen, which is thinner and less capable of forming bundles than Type I collagen. The combination of inferior Type III collagen and the excessive amount of ground substance, leads to a disruption in the structure of the tendon and affects its ability to absorb forces.[13]

Tendinopathy is also associated with an increase in blood vessels and nerves within the tendon. Whilst this neovascularisation may appear to be part of the normal process of soft tissue repair, the presence of these neovessels and their associated nerves is thought to play an important role in tendinopathy-related pain. The presence of these vessels has been linked to symptomatic Achilles and patellar tendinopathies[14–18], as will be discussed later in this chapter.

These four components associated with tendon pathology are also part of the repair process, therefore, tendinopathy can be defined as a failed healing response.[6,7]