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Review

Treatment Techniques

Patellar tendinopathy: a critical review of current therapeutic options

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Abstract

Introduction

The treatment of patellar tendinopathy remains a subject of ongoing debate in the field of sports medicine. It was initially thought that the tendon injury produced was characterised as an inflammatory process, but this thinking has evolved to reasoning it as a cellular degenerative process so as to explain the poor evolution that tendon injuries generally show. Traditionally, conservative treatment by means of eccentric exercise was advocated, going on to surgery when good results were not obtained. The use of minimally invasive techniques has grown in popularity over recent years. Currently, there is a significant therapeutic arsenal at our disposal in clinical practice that ranges from the use of shock waves, growth factors, sclerosis of neovessels using polidocanol or techniques such as intratissue percutaneous electrolysis (EPI®). Despite the abundance of literature on the treatment of tendinopathy, there are few studies of high scientific evidence. Thus, the choice of a therapeutic method as a gold standard remains a point of debate. This present critical review, focused on the treatment of patellar tendinopathy, aims to shine a light on the different studies of each of these treatment options by analysing each ones level of scientific evidence.

Conclusion

Larger randomised controlled trials on the various treatment options and even comparative studies between them are needed to determine what the treatment of choice for patellar tendinopathy should be.

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Introduction

Patellar tendinopathy, with a prevalence rate that may reach 40% in high demand functional athletes[1,2], is a disease that is especially problematic for the patient as it is usually a chronic injury which can mean the end of a career in sports in severe cases[3].

Historically, patellar tendinopathy was considered an inflammatory process, but it is now known that this affectation is characterised as a degenerative process that may be associated with inflammation of the paratenon in some cases[4]. During the course of the tendon lesion, healing mechanisms are altered as a result of a faulty repair process that produces a degeneration of collagen fibres of the tendon as well as vascular changes[5,6]. There are multi-factor causes for the onset of patellar tendinitis[3], presenting repetitive microtraumatisms that bring about cyclical tendon overload as the common denominator. Secondarily, as a result of inadequate healing and insufficient recovery time, the tendon will initiate a degenerative process of the collagen fibres[3–6].

Many therapeutic techniques have been described in the literature. However, none has emerged as the gold standard[7] and that is probably due to lack of sufficient scientific evidence. Eccentric exercise has gained recognition within the scientific literature as first-line therapy[8], but when it fails or is ineffective there is no consensus as to which therapy to use.

Among the therapies most used currently, there are open or arthroscopic surgery[9,10], extracorporeal shockwave therapy (ESWT)[11], the intratissue percutaneous electrolysis technique (EPI®)[12] and the use of polidocanol injections[13] or platelet-rich plasma (PRP)[14].

This critical review, focused on patellar tendinopathy, studies these therapeutic methods by analysing the extent of scientific evidence.

Discussion

The authors have referenced some of their own studies in this review. These referenced studies have been conducted in accordance with the Declaration of Helsinki (1964) and the protocols of these studies have been approved by the relevant ethics committees related to the institution in which they were performed. All human subjects, in these referenced studies, gave informed consent to participate in these studies.

The great difficulty that the treatment of patellar tendinopathy presents, given their high rate of chronicity and sport disability, has made this disease a great battlefield in traumatology and sports medicine today. At present, the literature does not present a clear treatment as the gold standard. The ones with the most widespread use are eccentric exercises and, if those should fail, the surgical option.

Establishing which should be the method of choice when treating patellar tendinopathy after failed conservative treatment is currently very

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difficult given the fact that there are very few randomised controlled trials (RCTs) or high quality studies, there mostly being prospective or retrospective studies of case series or low level of evidence comparative studies. Therefore, the present review aims to show the most relevant studies within each therapeutic option.

Historically, eccentric exercises have been considered a good treatment for tendinopathy although some authors argue that their strength is founded more in prevention than in the treatment of fully established lesions[2]. While some authors have argued for this therapeutic means[15,16], others indicate that there are no significant differences upon comparing them with control groups[17,18].

Although eccentric exercise is a good therapeutic tool, the type of exercises to use, the frequency, the load and the dosage of the same require further research so as to establish a clear protocol to follow.

Surgery has been positioned as the option of choice when other less invasive treatments have no effect[10]. A recent meta-analysis[19] reported that open surgery obtains results comparable to those obtained with arthroscopic surgery, being therefore up to the surgeon as to what must be the most suitable approach to treating this condition while producing the least comorbidity.

Analysing the works on the treatment of patellar tendinopathy with surgery is very difficult given the great heterogeneity of the samples studied, the various types of functional analysis and the fact that the postoperative rehabilitation protocol is detailed in few studies. This might clearly influence the clinical and functional outcomes[19].

Authors such as Pascarella et al.[9] or Willberg et al.[19] who advocate the use of arthroscopy or others such as Cucurulo et al.[10] or Shelbourne et al.[20] who advocate open surgery can be found in the current literature. Despite these results, authors such as Bahr et al.[15], in their RCT, showed that there was no advantage to patellar tenotomy versus eccentric exercise, opening a big question about the potential benefit of putting the patient through a surgical procedure.

These findings along with the low prediction of the results obtained with the surgical option for patellar tendinopathy[10] emphasise the importance of reserving surgery for those carefully selected patients who have undergone very controlled conservative treatment. It must be remembered that in any of these cases, it would result in a significant delay in the return to sporting activities.

Some authors have presented the ESWT as a valid option in cases in which conventional therapies have proven ineffective in the treatment of tendinopathy[11]. It supposedly provides benefits in reducing pain by suppressing the substance P neurotransmitters and the calcitonin gene-related peptide as well as by destroying unmyelinated nerve fibres[11].

An important multi-centre RCT showed that shock waves obtained the same results as the application of a placebo in a population of active broad-jump athletes with patellar tendinopathy[21]. In parallel, other studies such as the Wang et al.[22] study showed positive results with the use of ESWT. Notably, the participants continued their high level of physical activity throughout the study process in the study of Zwerver et al.[21]. This may have interfered in the results, while the Wang et al.[22] group did not allow patients to perform heavy activities.

A major weakness of the technique is the lack of consensus as to what the protocol for the application of ESWT should be in terms of dose, time or mode of application[23].

Intratissue percutaneous electrolysis (EPI®) is a technique that is performed under ultrasound guidance by which a non-thermal electrolytic ablation induces a controlled inflammatory response of injured tissue. Experimental studies have shown that the EPI® technique permits the activation of the cellular mechanisms involved in phagocytosis and the regeneration of damaged soft tissue[24].

This technique, created by Sanchez-Ibañez et al.[12,24] and who have over 10 years experience in its use[12], uses a flow of cathodic current directed exclusively to the area of degenerated tendon through an ultrasound guided needle that brings about an organic reaction that leads to rapid regeneration of the degenerated tendon. The EPI® technique combined with eccentric exercises has shown excellent results in the treatment of refractory tendinopathies over conventional treatment[12,25].

Despite being one of the few studies that follows the rules of the functional assessment of patellar tendinopathy by means of the validated Victorian Institute of Sport Assessment-Patella questionnaire and providing a follow-up of 10 years, the study has some important limitations for being a prospective study of a case series[12,25].

The combination of different techniques with eccentric exercise is a common practice in studies of tendinopathy as eccentric exercises provide physical support for the proper maturation of collagen fibres. Recent work by authors such as de Vos et al.[26] and Filardo et al.[27] reported so, therefore, the fact of using eccentric exercises in combination with other techniques when exercise alone has failed does not limit the results obtained in these studies.

If the aetiological hypothesis of tendinopathies that defends hypervacularisation as the cause of the pain is accepted as valid, the use of sclerosis of neovessels using polidocanol may be justified[13]. Some authors such as Hoksrud et al. advocate this technique[13], whereas authors such as Willberg et al.[28], in a randomised controlled study, demonstrated that patients treated with polidocanol in-

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jections showed no better functional outcomes than those treated with arthroscopic surgery.

The use of PRP is based on the hypothesis that it has the potential to cause changes in the production and degradation of collagen fibres by acting at the level of matrix regulating enzymes[14]. In spite of the many laboratory studies that suggest the great potential of this technique[29], the fact that healthy or surgically injured tendons are used represents a difficulty in extrapolating clinical data.

There are studies that show significant improvements in both pain and function when using PRP. Nevertheless, most of them are without significant differences when compared with controls groups[30].

Regardless of the great potential of this technique, the main limitation is currently in the lack of conclusive studies on the quantity of growth factors that are obtained with different systems of cell separation, what the optimal mixture is, which conditions the patient must meet prior to blood collection or what the volume and frequency of injections should be[14]. Similarly, it remains unclear as to whether the activation of platelets prior to infiltration is required[14,30].

Conclusion

Larger RCTs on the various treatment options and even comparative studies between them are needed to determine what the treatment of choice for patellar tendinopathy should be.

Abbreviations list

ESWT, extracorporeal shockwave therapy; PRP, platelet-rich plasma; RCT, randomised controlled trial.

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