

Current evidences for the management of Achilles tendinopathy

Atualização no tratamento da tendinopatia do Aquiles

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ABSTRACT

Tendinopathy is one of the most frequent overuse injuries associated with sport. Although many nonoperative and operative treatments for the management of Achilles tendinopathy have been proposed, the best treatment of these patients is still controversial. We performed an overview of the evidences supporting the several treatments described for the management of Achilles tendinopathy. The first-line treatment should be the physical therapy based on an appropriately performed program of eccentric exercises. If the tendinopathy is refractory, shockwave therapy could be considered as second-line intervention. Moreover, these two approaches can be combined. Finally, high-volume injection can reduce pain and improve long-term function in patients with Achilles tendinopathy. On the other hand, the use of injectable substances, such as platelet-rich plasma, autologous blood, polidocanol, and corticosteroids in and around tendons is not supported by strong clinical evidence. Surgery may be considered in patients who failed to improve with appropriate nonoperative treatments. However, the best surgical management is still controversial because of no randomized controlled trials have been performed to compare different surgical techniques.

Keywords: Achilles tendon/injuries; Tendinopathy/therapy

RESUMO

A tendinopatia é uma das lesões por sobrecarga mais frequentes associadas ao esporte. Embora muitos tratamentos não-cirúrgicos e cirúrgicos para tendinopatia do Aquiles têm sido propostos, o melhor tratamento ainda é controverso. Uma visão geral é apresentada evidências dos diversos tipos de tratamentos. A primeira linha de tratamento deve ser a terapia física baseada num programa, apropriadamente realizado, de exercícios excêntricos. Se a tendinopatia for refratária, a terapia de ondas de choque pode ser considerada como uma segunda linha de intervenção. Além disso, estas duas abordagens podem ser combinadas. Finalmente, infiltração com grande volume de solução salina, anestésico e corticóide pode diminuir a dor e melhorar a longo prazo, a função em pacientes com tendinopatia do Aquiles.

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Por outro lado, o uso de substâncias injetáveis, tais como plasma rico em plaquetas, sangue autólogo, polidocanol e corticosteróides nos tendões não é suportado por evidência clínica forte. A cirurgia pode ser considerada viável em pacientes que não apresentam melhora com os tratamentos não-cirúrgicos adequados. No entanto, o melhor tratamento cirúrgico ainda é controverso, pois ensaios clínicos randomizados não foram realizados para comparar diferentes técnicas cirúrgicas.

Descritores: Tendão do calcâneo/lesões; Tendinopatia/terapia

INTRODUCTION

Tendinopathy is one of the most frequent overuse injuries associated with sport⁽¹⁾. It is the most common disorder of the Achilles tendon, accounting for more than 60% of its pathological conditions⁽²⁾, and it often causes disability⁽³⁾.

Over the past decades, the incidence of Achilles tendinopathy has risen, mainly because an increasing number of people participate in recreational and competitive sports^(2,4). The athlete population has the greatest risk to develop Achilles tendinopathy, but the middle and long-distance runners are the most susceptible to the injury^(2,5-8). In both recreational and high-level club runners, the incidence of tendinopathy has been estimated between 9 and 15%^(5,9,10). On the other hand, de Jonge et al.⁽¹¹⁾ evaluated the incidence of midportion Achilles tendinopathy in the general population, reporting a rate of 2.35 per 1,000 subjects in the adult population (21 to 60 years). A relationship with sports activity was present in 35% of the cases.

The term "tendinopathy" is currently preferred to indicate an overuse pathological condition in and around tendon⁽¹²⁾. Tendinopathic changes can affect different parts of the Achilles tendon, involving the insertion on the calcaneum or the main body. The midportion or non-insertional tendinopathy involves the part located 2 to 6cm above the tendon insertion, accounting for about 75% of the cases, while the insertional tendinopathy affects the insertion on the calcaneum^(2,4). At histopathological examination, tendinopathy is a failed healing response, characterized by haphazard proliferation of tenocytes, disruption and altered organization of collagen fibers, increase in non collagenous matrix and neovascularization⁽¹³⁾. In chronic stage of disease, inflammation is absent or minimal⁽¹⁴⁾. However, inflammation could play a role only in the initiation, but not in the propagation and progression, of the disease process.

Several theories have been proposed to explain the pathogenesis of tendinopathy. Probably there is a continuum of tendon pathology from asymptomatic tendons to tendon tears⁽¹⁵⁾. Thus, a clinically acute tendinopathy is actually a well-advanced failure of a chronic healing response. Histopathological features of tendinopathy have been associated with both chronic overloaded and unloaded states, inducing

a decrease of mechanical integrity of the tendon and its vulnerability to damage⁽¹⁵⁾.

In literature, many nonoperative and operative treatments for the management of Achilles tendinopathy have been proposed, however the best treatment of these patients is still controversial^(16,17). In the present study, we perform an overview of the evidences supporting the several treatments described for the management of Achilles tendinopathy.

NONOPERATIVE MANAGEMENT

Eccentric exercises

Eccentric exercises showed the best evidence of effectiveness for the management of the midportion Achilles tendinopathy⁽¹⁸⁾. In a comparative randomized study, Mafi et al.⁽¹⁹⁾ reported a return to normal activities in 82% of patients underwent 12-week programme of eccentric exercises, whereas only 36% of patients managed with concentric exercises returned to normal activities. These excellent clinical results have been confirmed both in athletic and sedentary patients^(20,21). Although some authors reported lower rates of success⁽²²⁻²⁴⁾, the overall trend suggests a positive effect of eccentric exercises in term of pain relief and functional improvement, without significant adverse effects⁽²⁵⁾. Moreover, the association of shockwave therapy (SWT) showed with eccentric exercises provide a higher success rate when compared with the success rate achieved with these approaches alone⁽²⁶⁾.

In our clinical practice, we recommend a programme of eccentric exercises consisting of daily sessions of 180 repetitions per day. The exercises can be performed with 90 repetitions, in sets of 15, twice a day (eg. morning and evening). During the exercises, the patient should feel a moderate pain; it can be quantified around 4, in a scale from 0 (no pain) to 10 (maximum pain). The duration of treatment may be 12 weeks.

Extracorporeal SWT

Low-energy SWT has been proposed for the management of the Achilles tendinopathy because it seems to stimulate soft-tissue healing and inhibit pain receptors⁽²⁶⁻²⁸⁾.

Rompe et al.⁽²³⁾ performed a randomized controlled trial to compare the effectiveness of eccentric loading, repetitive low-energy SWT, and no treatment in patients with chronic midportion Achilles tendinopathy. After a 4-month follow-up, both management modalities showed outcomes superior to those of no intervention, reporting success rates of 60, 52 and 24%, respectively. However, Costa et al.⁽²⁹⁾ reported disappointing results of the SWT when compared with placebo in patients with chronic Achilles tendinopathy.

Rompe et al.⁽²⁸⁾ also performed a randomized controlled trial to compare the effectiveness of eccentric loading and repetitive low-energy SWT in patients with chronic insertional Achilles tendinopathy. The SWT showed better results sustained in a 1-year period, with a success rate of 64% compared with 28% of eccentric exercises.

Rasmussen et al.⁽³⁰⁾ performed a randomized, double-blind, placebo-controlled trial on patients with chronic Achilles tendinopathy managed with conservative treatment and randomized to receive either active SWT or sham SWT. After a 12-week follow-up, the active treatment reported significantly better results, showing that SWT can be a supplement for the management of chronic Achilles tendinopathy. Moreover, Rompe et al.⁽²⁶⁾ compared the eccentric exercises alone with eccentric training associated with SWT in patients with chronic midportion Achilles tendinopathy. They reported that eccentric loading alone was less effective than the combination of eccentric loading and repetitive low-energy SWT.

In our clinical practice, the low-energy extracorporeal SWT is administered once a week for 4 consecutive weeks, with final assessment at 12 weeks after the last, as described in several well conducted randomized controlled trials^(23,26).

High volume injections

This procedure consists of injecting 40mL of normal saline with 10mL of 0.5% bupivacaine hydrochloride and 25mg of hydrocortisone acetate between the Kager's triangle and the Achilles tendon to destroy the neovassels and neonerves associated with tendinopathy. The procedure should be performed under ultrasound guidance to avoid intratendinous injection of corticosteroids. The hydrocortisone acetate is added at the solution to prevention an acute mechanical inflammatory reaction produced by the large amount of fluid injected in the proximity of the tendon⁽³¹⁾.

In literature, only preliminary studies⁽³¹⁻³³⁾ investigated the high-volume injections for the management of patients with chronic midportion Achilles tendinopathy refractory to a 3-month program of eccentric exercises. The injection reduced pain and improved short and long-term function,

with no significant adverse events. Moreover, it resulted in a quick return to sports.

Hyperosmolar dextrose injections

In literature, no randomized controlled trial evaluating the hyperosmolar dextrose injections for the management of the Achilles tendinopathy has been published. Maxwell et al.⁽³⁴⁾ performed a pilot study with a mean follow-up of 12 months on 36 patients with chronic midportion or insertional Achilles tendinopathy. Sonography-guided intratendinous injections of 25% hyperosmolar dextrose (1mL of 2% lignocaine -20mg/mL- and 1mL of 50% dextrose -25g/50mL) were performed every 6 weeks until symptoms relief or no improvement was shown. The authors reported a significant reduction of pain at rest and during physical activities. Moreover, they found a significant reduction of tendon thickness. Ryan et al.⁽³⁵⁾ investigated the same injections in a larger population, including 108 patients with chronic Achilles tendinopathy (86 midportion and 22 insertional), with a follow-up of 2 years. The authors reported a significant improvement of pain in both groups of patients. On the other hands, a significant reduction of the size of the intratendinous tear and the hypoechoic region was observed only in patients with midportion tendinopathy.

Platelet-rich plasma

Although several studies on the application of platelet-rich plasma (PRP) to promote tendon healing are ongoing worldwide, the exact mechanisms by which PRP promotes tendon healing are still not clear. De Vos et al.⁽³⁶⁾ performed a double-blind, placebo-controlled trial randomising 54 patients with midportion Achilles tendinopathy to receive eccentric exercises associated with injection of either PRP or saline solution. After 24 weeks, the PRP injection did not result in greater pain relief or improvement in activity compared with the saline-solution injection. Authors concluded that PRP injection does not provide any further clinical benefit in patients with chronic midportion Achilles tendinopathy who underwent eccentric exercises. These findings have been also confirmed after a 1-year follow-up⁽³⁷⁾. Moreover, the same group showed that PRP is not able to improve the tendon structure and to decrease the degree of neovascularisation in chronic midportion Achilles tendinopathy, when compared with placebo⁽³⁸⁾.

Autologous blood injections

Pearson et al.⁽³⁹⁾ randomized 33 patients with chronic midportion Achilles tendinopathy to receive a peritendinous

autologous blood injection added to eccentric exercises or standard exercises alone for 12 weeks. The authors reported a slight better clinical outcome in the group managed with exercises and AB injection at a 3-month follow-up. Given the fact that only one prospective randomized controlled trial has been performed to investigate the role of autologous blood injection, further adequately powered randomized studies may be performed.

Polidocanol injections

Alfredson and Ohberg⁽⁴⁰⁾ performed a double-blind randomized controlled trial comparing the effectiveness of the injection of polidocanol (5mg/mL) and the injection of lidocaine hydro-chloride (5mg/mL) associated with adrenaline in 20 patients with chronic midportion Achilles tendinopathy. In all patients, the injections were ultrasound and colour Doppler-guided, targeting the area of neo-vascularisation around the ventral part of the Achilles tendon. At a mean follow-up of 3 months, after a maximum of two treatments, the authors reported a significant reduction of tendon pain in the group managed with polidocanol, compared with the controls. Moreover, the pain relief was associated with the absence of the neo-vascularisation. The authors concluded that polidocanol reduce tendon pain during activity in patients with chronic painful midportion Achilles tendinopathy. In these subjects, Willberg et al.⁽⁴¹⁾ demonstrated that there was no significant difference, in terms of clinical outcomes, between injections with 5mg/mL or 10mg/mL of polidocanol.

Finally, Alfredson et al.⁽⁴²⁾ compared the injection of polidocanol with open surgical revision of the area with neurovascular ingrowth around the Achilles tendon, in 20 patients with chronic midportion Achilles tendinopathy. After a 6-month follow-up, both treatments were able to reduce the tendon pain during activity, without any significant difference between the two groups. However, van Sterkenburg et al.⁽⁴³⁾ reported disappointing results in patients with midportion Achilles tendinopathy, reporting an improvement of the symptoms only in 44% of patients.

Injections of corticosteroids

The current evidence does not support the benefits of this procedure. Two randomized controlled trials demonstrated some benefit in terms of healing^(44,45), whereas one randomized controlled trial reported no positive effects⁽⁴⁶⁾ in patients with Achilles tendinopathy managed with local injection of corticosteroids. Moreover, Shrier et al.⁽⁴⁷⁾ performed a meta-analysis reporting only little benefits and the potential risks of tendon rupture.

OPERATIVE MANAGEMENT

Open surgery

The standard open surgical approach provides a complete exploration of the Achilles tendon. During the procedure, the surgeon can easily excise fibrotic adhesions, diseased paratenon, and areas of tendinopathy. Moreover, multiple longitudinal incisions in the tendon can be performed. When more than 50% of the tendon is excised, an augmentation can be performed with tendon transfers, including peroneus brevis and flexor hallucis longus tendons⁽⁴⁸⁻⁵³⁾. Although the rate of success for the open surgery ranges from 75 to 100%⁽⁵⁴⁻⁶¹⁾, there is a negative correlation between the quality of the outcomes and that of the methodology of the study⁽⁶²⁾. In a large series, Paavola et al.⁽⁶³⁾ reported a complication rate of 11% and a reoperation rate of 3%.

In patients with chronic midportion tendinopathy, Maffulli et al. demonstrated that the duration of recovery, the rate of complications, and the risk of further surgery are higher in nonathletic subjects than athletes⁽⁶⁴⁾, and in females than males⁽⁶⁵⁾.

Percutaneous tenotomies

In patients with chronic midportion Achilles tendinopathy, multiple percutaneous longitudinal tenotomies can be performed if the pathological area is <2.5cm long and the paratenon is not affected⁽⁶⁾. The procedure is not as effective in patients with diffuse or multinodular tendinopathy or pantendinopathy. A preoperative assessment with the high resolution ultrasound is useful to properly identify the area of tendinopathy before the stab incision is performed^(6,66,67). Surgery is performed under local anaesthesia and without a tourniquet. Good clinical results have been reported in about 75% of patients, with a very low rate of complications and no long-term morbidity.

Neovessel destruction

The neovessel destruction can be achieved with minimally invasive techniques that allow the surgeon to remove the pathological neovascularization in the tendinopathic tendon, interfering with the pain sensation caused by tendinopathy. Longo et al. and Maffulli et al.⁽⁶⁸⁻⁷⁰⁾ developed a minimally invasive technique of stripping of neovessels and neonerves from the Kager's triangle with Ethibond suture. The procedure is performed under local anaesthesia, and it provides a rate of success similar to that of open surgery with decreased preoperative morbidity. On the other hands, some authors used the endoscopy to identify the area of tendi-

nopathy and to remove the neurovascular ingrowth around the tendon with a motorized shaver or diathermy^(71,72). The ultrasound guided electrocoagulation has been also investigated in patients with chronic non-insertional Achilles tendinopathy⁽⁷³⁾.

Tendoscopy

Several authors investigated the tendoscopy for the management of insertional and midportion chronic Achilles tendinopathy^(72,74-80). During the endoscopic procedure, the surgeon can explore the whole tendon and remove the affected paratenon, pathological tendon tissue and neoneurovascular structures arising from the Karger's triangle. Moreover, longitudinal tenotomies and excision of the postero-superior corner of the calcaneum can be performed. Several authors reported high rate of success, including pain relief and return to previous sport activities in both insertional and midportion tendinopathy^(72,74-80). Tendoscopy is also a safe procedure associated with a very low rate of complications.

CONCLUSION

Tendinopathy is the most common disorder of the Achilles tendon. Nonoperative approach including an appropriately performed program of eccentric exercises represents the first-line treatment. SWT can be performed as second-line intervention in patients with a refractory tendinopathy. Moreover, these two treatments can be associated, resulting in good results. As alternative to SWT or when tendinopathy does not respond to those interventions, high volume injections could be considered. However, among conservative treatments, eccentric exercises and SWT are supported by the best evidences.

Surgery may be considered in patients who failed to improve with appropriate nonoperative treatments. The best surgical management is still controversial because of no randomized controlled trials have been performed to compare different surgical techniques. However, the minimally invasive techniques provide a similar rate of success to that of open surgery with decreased perioperative morbidity.

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