

AbsolutePT's Tendinitis Approach.

By Chad Reilly, President of Absolute Physical Therapy.

Tendinitis, tendinosis, tendinopathy; the name is currently in transition due to the fact that there are no outward signs of inflammation (other than pain) as well as recent researchers failure to find any inflammatory cells at the site of injury¹ making the term tendinitis a misnomer as there is no "itis" or inflammation present. Therefore, in this article I will use the names interchangeably, but "tendinosis" seems to be emerging as a favorite by researchers.

Rather than inflammation, what has been discovered is a disruption and irregular formation of collagen fibers^{2,3}. Intratendinous glutamate¹, as well as small blood vessels surrounding the injured tendon, termed neovascularisation³⁻⁵ or angiofibroblastic hyperplasia², which seems associated with pain. Tendon thickening is frequently noted with Achilles tendinosis in particular^{3,4}.

I have taken an interest in tendinosis for both personal and professional reasons. First, as a competitive weightlifter in college I competed with bilateral patellar tendinosis for several years, had medial epicondylitis off and on for about a year, and when taking up what I thought was the leisurely sport of golf, I ended up with lateral epicondylitis. As I was prone to the injury, I knew that it was not laziness, but hard work that often caused the injury, frequently affecting those who trained and practiced very hard to improve their athletic and vocational endeavors. Subsequently, I can identify with sufferers of this condition more than most, and know that while the injury seems fairly minor in the grand scheme of things, it often prevents us from comfortably enjoying some of our favorite activities, making life that much less enjoyable.

As a physical therapist, I had treated tendinosis from time to time using the methods I had learned both in school and during my internships, in which treatment consisted of several modalities, cross friction massage, stretching, and gentle exercise. Results were less than spectacular and I doubted if I or other therapists we were having any positive effect at all on the condition, or were merely humoring the patient until they got better on their own. As it turned out my suspicions were justified, as recent research found that typical physical therapy treatment was only slightly better than a wait-and-see policy (a.k.a. no treatment at all)⁶. The fact that biopsies of affected tendons found no signs of inflammation¹, may help to explain why previous methods of treatment used by therapists are so ineffective⁶. I had previously seen evidence that Cyriax's "transverse friction massage" was ineffective⁷ and in my experience when I performed cross friction on a patient, I always regretted it later due to localized irritation associated with the technique. Phonophoresis and iontophoresis, commonly used by therapists did not appeal to me for philosophical reasons. Assuming an effective dose of corticosteroids were delivered to the tendon (no small assumption) I did not like the idea of using a medicine that while it decreased

inflammation (known not to be present in the first place) it also left the tissues in a weakened condition. If the drug was effectively delivered, it should weaken the tissues via its catabolic action just as an injection of the same drug did⁸. If no weakening of tissues was found, this should only demonstrate that the drug was not effectively delivered to the injured area. The best of all possible worlds, in which cortisone could be delivered by iontophoresis or phonophoresis, would require some supernatural force (hitherto unexplained) that caused the drug to catabolize tissues only when delivered orally or if injected, but not when administered transdermally. All points are made moot when it is considered that the research does not support the use of corticosteroid injections for tendinitis, indicating at best a short term benefit at the risk of long term detriment^{6, 8, 9}.

It made sense that we would want to increase the strength of the tendon through progressive overload, thus allowing the patient to return to their previous level of function without a recurrence of injury. However, in my competitive weightlifting days I was already overloading the tendon and that is how I ended up with the injury, and this was also the case with golf and other sports. Rest, while allowing the tissues to heal, unfortunately would allow the tissues to atrophy making them prone to re-injury. That was the sum of the catch-22 situation, how to overload the tendon to increase strength while at the same time allowing the damaged tissue to heal. In college I did an extensive literature review and did not come up with any treatment that was consistently proven effective in randomized controlled trials.

Staying abreast of current research, I had heard about eccentric exercise for tendinitis, but initially did not think much of it as my earlier review, and a reading of Faust's book, *The Limits of Scientific Reasoning* led me to the conclusion that there are few treatment methods (regardless of how ridiculous) that don't have at least one study showing it to work. However, when I looked into the idea again, after consulting with yet another patient with Achilles tendinosis, I found that there was now a reasonably large and rapidly growing body of research backing up the use of eccentric exercise for the treatment of tendinosis^{3, 5, 10-19}. Further investigation on eccentric exercise led me to the 1984 book by Curwin and Stanish; *Tendinitis: its etiology and treatment*²⁰, in which eccentric exercise (in addition to heat, ultrasound and a general exercise for a warm-up, concluding with a cold pack) for tendinitis was first described. The book was the impetus for numerous research studies^{3, 5, 10-19} utilizing the eccentric protocol as written and with various modifications, virtually all of which showed beneficial effects of eccentric exercise for Achilles tendinosis, patellar tendinosis, and lateral epicondylitis. Curwin and Stanish described the use of eccentric exercise to increase tendon strength, stating that tendonitis is most frequently brought upon by eccentric contractions in which the strain on the tendon is greater than possible with either concentric or isometric contractions. Their thesis being that in order for the tendon to be able to withstand the higher eccentric strain in vocational or avocational activities it must be trained to do so in rehabilitation. It is interesting to note, however, that their treatment model was not a pure eccentric training program, as is used in the current research. For patellar tendinitis patients would squat down slowly, then faster, then as

rapidly as possible, increasing speed and then resistance as they progressed to the pain free status but returning to the upright position under concentric power. For lateral epicondylitis they would do reverse wrist curls increasing speed from session to session, then adding resistance, also they did the concentric portion of the exercise conventionally, increasing the eccentric tension only by increasing the speed of motion and trying to emphasize the eccentric braking action at the end of the rep. Achilles tendinitis was the same increasing speed and then resistance, seeking to have the exercise painful only in the 3rd set of 10 repetitions. They reported at least 6 weeks of treatment are usually required though a few may require 12 to 16 weeks treatment.

While the Curwin and Stanish protocol called for the increase of eccentric velocity before increasing resistance, more recent studies^{3, 5, 10-12, 14-16, 18, 19} have found beneficial effects by keeping the velocity relatively slow and just increasing resistance. The same researchers used a pure eccentric exercise program, in which returning the weight to the top position was done with the contralateral side. In my work with patients as well as on myself, I have found increasing resistance while attempting to keep speed constant to be more objective and repeatable from session to session. Also, as the patient progresses to higher resistances, the eccentric speed of movement will increase involuntarily forcing the patient to higher velocities anyway.

With the above data, one might wonder if it is the eccentric nature of the exercise that leads to recovery, or could it be that any exercise will do? Two studies however, looked at concentric vs. eccentric exercise to see if it is just strengthening in general that helps decrease pain, but both found the eccentric protocol considerably superior^{14, 15}. What is still untested is whether the concurrent use of concentric exercise impedes recovery in any way.

It is worth noting that one study found that pain at the point of insertion of the Achilles tendon, is less responsive to eccentric treatment (32% recovery), as compared to the more common mid portion tendon pain(89% recovery) in 12 weeks¹². However, another study on patellar tendonitis, which is generally insertional pain found the condition very responsive treatment with 90% satisfactory results in 12 weeks¹⁴.

Some researchers utilized a warm-up consisting of aerobic exercise prior to the eccentric protocol and or static stretching while those following the Alfredson protocol did not describe performing either. The advantages and optimization of a prior warm up and static stretching has not been studied but I do think it's worth noting that in performing the eccentric exercise, there is a reasonable amount of stretch implicit in the exercise itself. Nirschl² utilized strengthening of surrounding muscles and joints following his observations working with 1,300 cases of epicondylitis. As such I tend to base my warm-up on general endurance exercise to the involved area, followed by strength training of adjacent musculature to help increase blood perfusion to the injured area, while at the same time increasing strength and endurance of surrounding tissues which have been weakened due to disuse. Also it seems reasonable that strengthening of the adjacent muscle groups should help to remove some of the strain

on injured tissues during daily, vocational or sporting activities. After 15-20 minutes of strengthening of the surrounding supporting musculature, in a pain free manner, I will then work the eccentric exercise directly to the affected musculature seeking an intensity that will bring about a feeling of mild-moderate pain within 10-15 repetitions for 3 work sets. As the patient works up towards heavier resistances, over time, I will give them 1-2 warm up sets of eccentric exercise before beginning their work sets.

Several of the research studies utilized exercise 7 days per week, 2 times per day^{5, 10, 12, 14, 15}, while others exercised once daily 7 days per week^{13, 17, 18}, once 5 days per week¹⁹ and once 3 days per week¹¹. There is currently no research comparing different frequencies of exercise to see what the ideal is, but results seem grossly similar between protocols. In my practice I have seen mildly beneficial effects with treatment as low as 2 times per week but outcomes seem considerably better at a frequency of 3 times per week. Subsequently, in therapy I like to see my patients 3 times per week in the office, and if a patient has access to the necessary equipment for their particular form of tendinitis I will print off a copy of their program for them to follow at home or in the gym between therapy sessions. The in office treatment, combined with an independent exercise program, ensures that they will progress their resistance adequately, safeguarding against over enthusiasm, but keeping treatment costs reasonable. If the patient is unable to do the exercises at home, the three visits per week are generally adequate to bring about recovery.

In practice I have followed the exercise program with continuous ultrasound and mild soft tissue mobilization to the injured area, which patients have told me really helps to relieve their symptoms following the treatment. I had previously thought this was entirely psychological, but I did not want to cause my patients pain during their exercises and then send them home without some TLC, as this might adversely affect compliance and thereby outcomes. However there is some evidence that continuous ultrasound has a beneficial effect on tendinitis²¹ compared to a placebo. This was confounded by another study, which while it found a beneficial effect of continuous ultrasound when compared to rest, was not significantly better than a placebo²². Pulsed ultrasound has not been shown to offer any advantages over a placebo²³. I was unable to come across any evidence, in a literature review, to suggest that cross friction massage, commonly used by therapists, has any effect on recovery and one study which found no benefit⁷. Anecdotally I have found that the combination of continuous ultrasound and light soft tissue mobilization to the painful area is appreciated by patients, subjectively decreases pain immediately following treatment, though this may only be the spoon full of sugar that helps the medicine go down. Ice alone, in addition to an eccentric exercise program has not shown to make a further contribution to outcomes over exercise alone.¹⁹

The use of forearm compressive bands with lateral epicondylitis is common and has been researched with regards to force reduction of the extensor carpi radialis brevis muscle (the most commonly affected muscle with lateral epicondylitis) and reduced stresses to the tendon insertion are generally noted²⁴⁻²⁶ particularly if the strap is

applied at a force of 30 to 50 mmHg²⁵ or 40-50 mmHg²⁴. One study found increased pain free grip strength with the use of a band²⁷, while another did not²⁸. Nirschl does recommend the use of forearm bands with his many patients². Presently, no study has compared their use, with regards to improved recovery rate from lateral epicondylitis. In the eccentric studies that looked at lateral epicondylitis, one did use a forearm support band¹⁸ while two did not mention the use of a brace^{11, 19} yet all found beneficial effects that were roughly similar. It's worth noting that in the studies addressing Achilles or Patellar tendinosis, no compressive band of any type was used. In practice I am agnostic to the benefit of compressive band for tendinosis of the epicondyles. Compressive bands are relatively inexpensive and if the patient has one and likes it I do not discourage its use. However, if they find it uncomfortable, or do not have one, neither do I encourage its use.

Regarding daily activities, various recommendations have been given, ranging from taking 1-2 days off from the offending activity only if pain is worsening²⁰ to resting for 6-8 weeks^{5, 14} while undergoing therapy, before gradually returning to the original aggravating activity. As such, the best method is still unknown though I have had fairly good results with both, depending on the intensity of the offending activity. Generally, I tell patients to avoid activities that cause anything more than a mild aggravation if at all possible, until pain free strength levels have improved prior to letting them progress back into higher stress activities with minimal and preferably no discomfort.

New applications may also benefit from the use of eccentric exercise. A small pilot study was recently finished showing benefit from eccentric with those with chronic impingement syndrome, who had failed to benefit from past therapy²⁹. I also believe this protocol may have applications in the treatment of De Quervain's disease as well as plantar fasciitis but neither has been formerly researched.

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