A Pragmatic Approach to Tendonitis in Powerlifting

WEEKLY

By Dr. Kristopher Hunt, M.D. **November 2014**

Tendonitis

At the end of this article, you should be able to:

- Understand what tendonitis is
- Recognize the difference between an acute tendonitis and "tendonosis"
- Perform some simple pre- and post-hab therapies for simple tendonitis, and realize that ice is not a dead treatment
- Recognize when a health care professional may be needed for additional treatment

Pathology

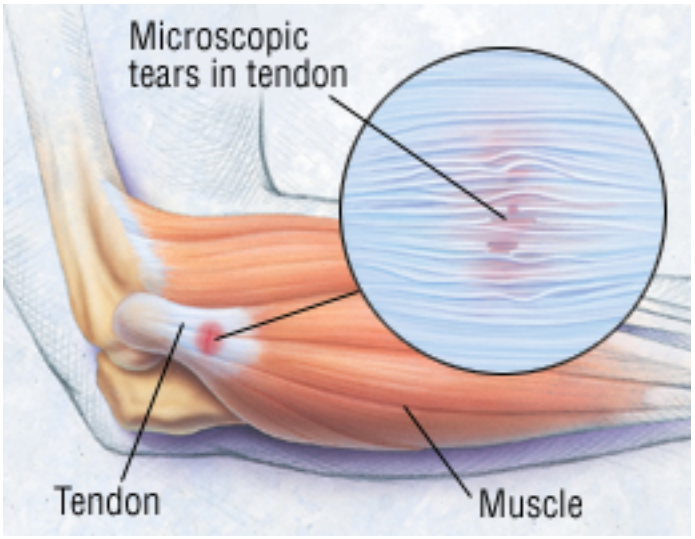
Tendonitis. It's pretty much a guarantee if you've lifted for even one month in your life. Symptoms range from mild to severe and can, at times, be quite debilitating. This article is meant to address just that – the painful, non-ruptured tendon (think patellar tendonitis, not complete biceps tendon rupture). But what is it, really? And are we appropriately calling something tendonitis, when it is really "tendonosis?"

Tendons are the thick, fibrous cords that attach a muscle to bone. The suffix "–itis" refers to any condition involving inflammation. Therefore, it serves to reason that tendonitis is an inflammation of these fibrous structures throughout our body; this serves to our historical understanding, at least. Tendons have a relative lack of blood supply near the site where they insert into bone. This is thought to be a proximate cause of tendonopathy [3]. Those of us that are interested in acquisition of strength will test tendons constantly, and they will break down with every set and rep, undergoing constant repair.

But what if we push too much? Well, that's when our tendons signal to the brain a pain reflex. Cells in our body that are normally responsible for repair of these structures become overactive, and can break down tendons at the cellular level. It's unclear if the micro-tears from use cause the pain, or if the normal mechanisms within our body to repair the tendon release pain mediators after it recognizes a physiologic insult. Confusing matters more, myofibroblasts, a separate type of cell involved in laying down the matrix for tendons to heal, have been reported to overgrow in tendonitis, and this overgrowth also sends out chemicals involved in pain perception. Basically, it's the principle of the chicken or the egg. Did the lifting cause the micro-tear which caused the pain? Conversely, did the micro-tear cause the body to heal which released a pain signal to tell your brain to stop doing what it's doing so your body can have time to heal?

Tendonitis and Tendonosis

Historically, tendon pain was always referred to tendonitis, with an understanding that inflammation was the intimate causative factor. Therefore, treatments were (and still are, in appropriate and sometimes inappropriate cases) geared toward decreasing inflammation with non-steroidal anti-inflammatory drugs (NSAIDS – think ibuprofen, naproxen) and corticosteroids (think cortisone, not the stuff on the black market).



A different shift came in the last couple of decades, as some microscopic data demonstrated that there was a relative absence of inflammatory cells in chronic tendonopathy. These data show that collagen, the stuff that makes up a large portion of tendons, became separated, thinned, and disrupted. The combination of these two facts caused a shift in prior dogmatic thinking, and clinicians began to think of tendon pain as "tendonosis," which implies an absence of inflammation. This paradigm shift was accompanied with an urge to abandon NSAIDs and corticosteroids completely; proponents of this line of thinking harped on the side effects of these drugs which include systemic effects, such as stomach irritation and weight gain, as well as local tendon disruption possibly leading to complete tendon rupture.

As with most pendulums, they continue to swing, and the answer probably lies somewhere in the middle. From a microscopic level, we understand non-ruptured tendon pain on a spectrum [4]. Tendonosis, as above, is tendon degeneration with haphazard repair cells scattered throughout, often with scarring and calcification. This is probably one of the most common presentations, and tends to be more chronic, lasting up to six months. Tendonitis involves more inflammatory cells and vascular disruption under the microscope, but is usually quicker to heal, often within six weeks. Several advances in how we look at cells under the microscope have allowed us to determine that these two processes have significant overlap, and live models of tendons under ultrasound would support this. Ultrasounds done on a disorder that is purely inflammatory in nature and one that is purely "overuse tendonosis" are nearly completely indistinguishable [11].

What You Can Do

Now that we have all the nerdy stuff out of the way, why does it matter? Well, the pathology matters because it tells us how to treat the disease. If the disease is often both structural, with haphazard scarring and calcification, and inflammatory, with chemically induced swelling and pain, then the approach to battle it needs to come from more than one angle.

Ice

Ice is a therapy that was once established treatment doctrine, then fell out of favor due to those loudly questioning it, and is now somewhat coming back into favor. Gary Reinl, physical therapist and author of Iced! The Illusionary Treatment Option, makes strong arguments against the use of icing for an injury and cryotherapy in general. His argument is that ice inhibits the normal healing mechanisms of the human body by decreasing lymphatic flow and diminishing the response of the immune system to heal the site of injury in question. In fact, in one interview, he references a review in one of the lesser known Emergency Medicine journals (my specialty), and states that the article definitively shows that ice is not an acceptable treatment modality. In looking at the article itself, however, one finds that there were insufficient data to fully support the use of ice when the article was published in 2007, but not reject it fully [5]. These are two entirely separate things, and more recent literature would suggest information to the contrary.

While I am not intending for this article to be a debate on the issue of ice, I will say that strict contrarianism is just as extreme as classic dogma. Again, the answer probably lies somewhere in the middle. Many studies that are available do not use consistent data – the place on the body that is iced differs, the baseline characteristics of the subjects are all over, and many studies do not involve the same protocols with regard to the cryotherapy; i.e., did they ice for 20 minutes? A half hour? Did the study decrease the skin 10 degrees C? 20? The answer is an inconsistent "yes" to all of these questions.

Many contrarians with regard to ice use site articles stating that ice decreases lymphatic flow. This is partly how ice alleviates pain – it decreases swelling in the short term. The contrarian camp would state that decreasing lymphatic flow decreases the influx of those very cells that allow for tendons and muscles to heal in the first place. This is, unfortunately, a gross oversimplification. Remember when we talked about tendonosis – you know, that part with disarrayed collagen in the tendon causing pain? Myofibrils are signaled by immune cells to lay down collagen in such disarray. What if we could do something to slow that down? How about icing? Moreover, a similar argument is made that ice decreases nerve responsiveness and muscle function. I would agree with this in the short term. Icing should probably be done after competition or play, not before. It may interfere with function if done as a preventative therapy [10]. However, if done as a recovery modality, it is an acceptable treatment.

What do we know about ice? We know that it decreases pain. In a review of 22 randomized, controlled clinical trials, cryotherapy seems to be very effective in decreasing pain. It is appropriate to use in conjunction with other therapeutic techniques in accomplishing this [6]. What else do we know? That it hastens return to play. Please understand that when referencing any study, you have to question

whether the endpoint matters. In the world of scientific articles, and, especially sport performance literature, confounding endpoints befuddle people. Do we really care if ice decreases lymphatic flow by 0.2 micrometers/second? Do we care if macrophages cause a release in interleukin-1 and do blah blah blah to the whatever inflammatory cascade and cryotherapy interferes with that?

I'm a pragmatist. I care if I can get back to squatting faster. A systematic review has demonstrated that cryotherapy improves return-to-participation measures [7]. Basically, you ice, you do some other treatment modalities, and you will probably be able to get back to it.

What do I suggest? If you can submerge the affected body part in an ice water bath, then please do. Good data suggests that colder water temperatures are more effective in the treatment of exercise-induced muscle and tendon damage [7]. A greater temperature differential is transmitted better through a liquid medium, so it is best to use ice water rather than ice bags whenever possible. Also, I usually suggest 15 minutes of ice water if a limb is submerged, and 20 if an ice bag is used, say, on a shoulder. Do not use ice packs, do not use frozen peas, etc. Good ol'fashioned cheap ice that you can get from your freezer is what gets and stays coldest, as studies have demonstrated that 8° C water is preferred to 22° C water [6]. Ice packs do not stay that cold long enough.

Foam Rolling

Foam rolling is a form of myofascial release. Myofascial release is essentially a release of localized tightness in the muscle tissue, fascia itself, or a combination of both. Because fascial tissue permeates the entire human body and acts as a force transmission system, it is intimately involved with tendons, which occur at joint sites. Ergo, if the muscle and fascia is released, the effect from tendonitis is probably alleviated.

An excellent site which I encourage you to visit is called www.strengthandconditioningresearch.com. An excellent review of foam rolling was recently performed, and they conclude that pre-workout foam rolling improves flexibility, while not reducing neuromuscular performance as seen with static stretching pre-workout. Also, foam rolling probably equally improves both short and long term recovery [2]. A relative dearth of information exists with regard to myofascial release in general, as it is difficult to study this modality against placebo. If you are having chronic issues with tendonitis, I would suggest adding foam rolling and myofascial release to your treatment regime if at all possible, as it may assist with regeneration of healthy tendon tissue and aid in breaking down scar tissue and calcification.

Ultimately, what matters is returning quickly to function, and the use of active treatment modalities such as eccentric loading and cryotherapy supports this.

Eccentric Strengthening

One of the more interesting modalities proposed recently has been eccentric loading. While more research probably needs to be done in this area, some experts have successfully demonstrated that eccentric strengthening stimulates collagen production in tendons and improves the cellular matrix in an otherwise haphazard tendon. This modality has been shown to decrease signal on MRI (meaning decreased swelling) and decreased pain scores in subjects as well [12]. I believe this may be somewhat related to the push toward dynamic stretching and ballistic stretching, which is a separate topic.

However, it is worth noting that the repeated bout effect may be at play here as well. For those unfamiliar with the term, it is the adaptation of a muscle to reduce further damage from the same exercise [9]. The human body essentially heals itself after a higher frequency of similar intensity of the same stimulus, especially in the eccentric load. This may apply to tendon disease as well.

For those that are unfamiliar with Reactive Training Systems, a premise of the method is to train the lift you want to get better at, and train it often. When I received my first week of training, I thought to myself, "*I am going to die if I do a heavy squat variation at a high intensity three times a week!"* As it turns out, the exact opposite was true. I found that my chronic patellar tendonitis, rotator cuff issues with holding a squat bar, and frequent wrist tendonitis improved greatly from more frequent bouts of training, rather than what I did previously with a "go all out on legs one day a week" method. This is probably directly attributable to the repeated bout effect.

When to Get a Medical Professional

There is no clear answer as to when to involve a medical professional with simple tendon pain. However, if you believe that you have fully ruptured the tendon, then that is a different story: stop lifting, and see a doctor. If the joint is severely swollen, relatively immobile without pain, significantly warm, or has bruising, these are all signs of something other than simple tendon disease going on. These all could indicate issues ranging from a micro-fracture to a full thickness tendon rupture going on.

I would suggest that if your normal range of motion is affected and causes pain without external loading, then a medical professional should be involved. Think about it for a second – a bodyweight squat should not be significantly pain limited. Standing out of a chair should not bring you to tears.

A medical professional will assist you as to additional therapies that may be possible [1]. NSAIDs will probably be the first step outside of what you may have already been doing. Although the historical "tendonosis" camp and Gary Reinl will tell you that NSAIDs are bad, there are innumerable studies demonstrating the efficacy of NSAIDs in the short term. Bear in mind, again, they are probably only effective in the short term. The decreased pain with NSAIDs probably allows return to play and faster time to eccentric loading, which will ultimately probably help the most. Any benefits of NSAIDs over the long term will probably be negated by the fact that they partly inhibit normal healing and have other side effects.

Moreover, corticosteroid injections may be an additional treatment for the short term, but realize that this should not be used as a repetitive, continued treatment as there is a large amount of data to support the fact that chronic corticosteroid injections can lead to complete tendon rupture. Non-medication options are growing in number, which include physical therapy (see eccentric therapies as above), shock wave therapy, sclerotherapy, nitric oxide patches, surgery, and stem cell treatments. Some of these have been proven to be more efficacious than others, but know that there are many options available if one treatment pathway fails.

Conclusion

Tendonitis is probably a continuum of disease ranging from an acute phase to a chronic phase. Micro-tears within the tendon cause the tendon to exhibit a pain response from a variety of mechanisms. Many therapies exist to battle this common disease, and ice and foam rolling should be your primary combatants. Ultimately, what matters is returning quickly to function, and the use of active treatment modalities such as eccentric loading and cryotherapy supports this. Strict rest with tendonitis is probably not an ideal treatment. Be aware of severe symptoms, however, and know when to seek help.

About the Author

Kristopher Hunt, MD, FACEP is a lifetime drug free powerlifter. He presently holds the raw American Record in squat at 198 with 622lbs. He completed residency at Beth Israel Medical center, where he was named Chief Resident, Senior Resident of the Year, and achieved the Resident Scholarly Activity award. He presently works as an Emergency Physician with St. Vincent Emergency Physicians in Indianapolis, IN.

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