

Regenerative/Injection Management of a Patient with Achilles Tendinopathy: A Case Report

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ABSTRACT

Background: This paper presents a case report of physical medicine management of a patient with Achilles tendinopathy.

Case Presentation: A 42 year old female presented with a chief complaint of acute Achilles tendon and gastrocnemius pain on the left side. Her history included successful completion of over 100 half marathon races in the past without intense pain. Current pain prohibits running or non-antalgic walking. The history of intervention included self-care and advice from physical therapists, other runners, interested bloggers, and well-meaning relatives.

Diagnosis and Disposition: Achilles tendinopathy is a common cause of disability. Despite the economic and social relevance of the problem, the causes and mechanisms of Achilles tendinopathy remain unclear. Tendon vascularity, gastrocnemius-soleus dysfunction, age, sex, body weight and height, pes cavus, transverse and longitudinal arch dysfunction, and lateral ankle instability are considered common intrinsic factors. The essence of Achilles tendinopathy is a failed healing response, with haphazard proliferation of tenocytes, some evidence of degeneration in tendon cells and disruption of collagen fibers, and subsequent increase in non-collagenous matrix. Tendinopathic tendons have an increased rate of matrix remodeling, leading to a mechanically less stable tendon which is more susceptible to

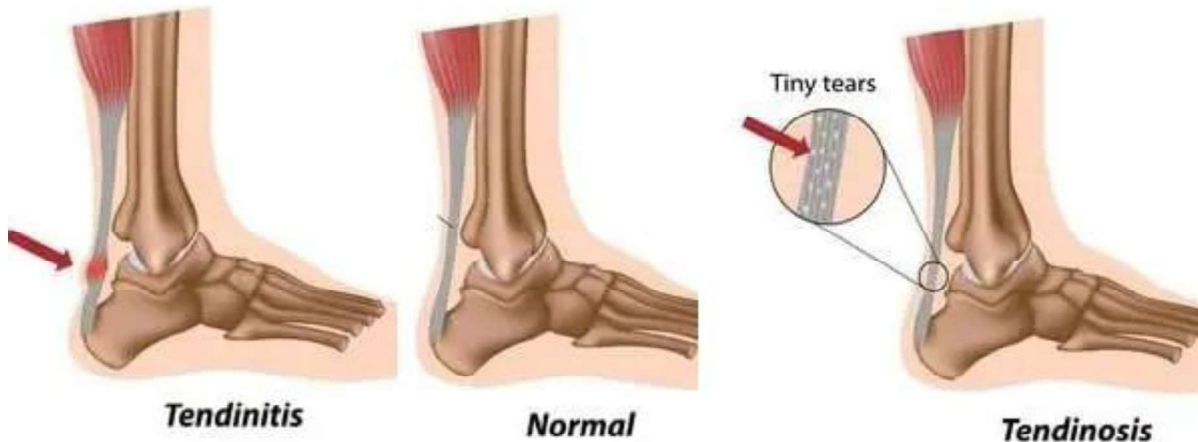
damage. The diagnosis of Achilles tendinopathy is mainly based on a careful history and detailed clinical examination. The latter remains the best diagnostic tool. Over the past few years, various new therapeutic options have been proposed for the management of Achilles tendinopathy. Despite the morbidity associated with Achilles tendinopathy, many of the therapeutic options described and in common use are far from scientifically based. New minimally invasive techniques of subdermal or intramuscular injection of ozone at various concentrations seem to allow faster recovery and accelerated return to sports, rather than open surgery. A genetic component has been implicated in tendinopathies of the Achilles tendon, but these studies are still at their infancy.

Keywords: Achilles, Tendinopathy, Tendonitis, Ozone, Injection, Neuromusculoskeletal Medicine, Fascia, Therapy, Soft Tissue, Chiropractic, Runner, Chronic Pain

INTRODUCTION

About 52% of runners experience Achilles tendinopathy (AT) in their lifetime. In the United States military, the rate of clinically diagnosed AT cases was 5/1000 person-yr in 2015. The pathophysiology can be viewed on a continuum proceeding from reactive tendinopathy where tenocytes proliferate, protein production increases, and the tendon thickens; to tendon disrepair in which tenocytes and protein production increase further and there is focal collagen fiber disruption; to degenerative tendinopathy involving cell death, large areas of collagen disorganization, and areas filled with vessels and nerves. Inflammation may be present, especially in the early phases. Some evidence suggests AT pain may be due to neovascularization and the ingrowth of new nerve fibers in association with this process. Prospective studies indicate that risk factors include female sex, Black race, higher body mass index, prior tendinopathy or fracture, higher alcohol consumption, lower plantar flexion strength, greater weekly volume of running, more years of running, use of spiked or shock absorbing shoes, training in cold weather, use of oral contraceptives and/or hormone replacement therapy, reduced or excessive ankle dorsiflexion range of motion, and consumption of antibiotics in the fluoroquinolone class. At least 10 simple clinical tests are available for the diagnosis of AT, but based on accuracy and reproducibility, patient self-reports of morning stiffness and/or pain in the tendon area, pain on palpation of the tendon, and detection of Achilles tendon thickening appear to be the most useful. Both ultrasound and magnetic resonance imaging (MRI) are useful in assisting in diagnosis with MRI providing slightly better sensitivity and specificity. Conservative treatments that have been researched include: (1) nonsteroidal anti-inflammatory medication, (2) eccentric exercise, (3) stretching, (4) orthotics, (5) bracing, (6) glyceryl trinitrate patches, (7) injection therapies (corticosteroids, hyaluronic acid, platelet-rich plasma injections), (8) shock wave therapy, and (9) low-level laser therapy. Nonsteroidal anti-inflammatory medication and corticosteroid injections may provide short-term relief but do not appear effective in the longer term. Eccentric exercise and shock wave therapies are treatments with the highest evidence-based effectiveness. Prevention strategies have not been well researched, but in

specific populations balance training (soccer players) and shock-absorbing insoles (military recruits) may be effective. Ultrasound scans might be useful in predicting future AT occurrences.



The illustration above shows the irritation and inflammation of the tendon, its return to “normal” and the result after repetitive episodes of inflammation, disability, and symptomatic recovery. Eventual tears on the tendon result.

CASE PRESENTATION

The patient is a 42 year old female with a 16 year history of long distance running who provided the following information:

HISTORY NARRATIVE

“I started running seriously in 2005 after my first baby at age 26, and alternated 1 marathon each year with a baby the following year. My mileage began to increase significantly in May of 2014 as I began to run a half marathon each month for almost 6 years. My weekly mileage fluctuated from 10-30 miles consistently, even with occasional injury. Most of my issues were related to my feet and calves, from what I believed to be a weak core from separated abdominal muscles from 4 pregnancies in 6 years. I also have an injury from a bone chip in my left quad from 34 years ago. I've been able to avoid knee and muscle pain in that leg.

When I had injuries related to running, I used muscle stimulation, massage, and foam rolling to ease pain and get back to running, and lots of deep stretching, including 8 years of weekly Hot Bikram Yoga. Around the end of May 2021, I developed pain in my Achilles tendon while running, mostly in my right leg. I received 1 ozone shot in my right Achilles in June 2021.

In mid-July of 2021, I ran 4 half marathons 4 days in a row to complete a 4 state challenge. The courses were all very flat, but I finally started to feel the effects in my calves, ankles, and feet. My usual routine of therapy did not solve the problem of overuse. By the end of July 2021, both Achilles tendons hurt when running and with regular walking.

I received ozone shots in both right and left Achilles tendons August 5th, 2021. My calves felt better and I started really training for my next marathon in January of 2022. In September 2021, I finished my 100th half marathon at age 42. No pain in my feet or Achilles tendons since those shots. I just completed my 6th marathon and 103rd half marathon.

When I had a gait analysis done (in 2010) it revealed that I had weak abdominal muscles that had been stretched and separated during pregnancies. I had a tummy tuck (2019) to re-attach my separated abdominal muscles to help my balance and strength during running. I had 4 pregnancies in 6 years, and I am currently still working on proper alignment and core strength during running. All of this has affected my calves and feet in marathon training. My Achilles pain in both legs occurred 1 year post surgery as the alignment of my body was different and I began to ramp up weekly mileage.”

PAST HISTORY NARRATIVE

“I have a 34 year old injury in my left quad. I had a three-wheeling accident that resulted in a bone chip in my left femur, which has calcified. It does not cause any pain, but I do have weakened quad muscles as a result and I take particular time to strengthen my quads and hamstrings to counter the effects of that injury. I’ve noticed more consistent problems in my left leg because of this injury.”

EXAMINATION

This 42 year old female presented with complaints of Achilles tendon and calf pain self-rated on the visual analogue pain scale (VAS) at 8. Inspection of the foot, ankle calf, thigh, and pelvis was unremarkable. Palpation of the bony prominences revealed tenderness of the calcaneus bilaterally. Palpation of the soft tissues showed tenderness on the dorsum of the feet and the Achilles tendons. Mensuration of the thighs and legs were symmetrical respectively. Muscle grading of the hip, knee, and foot were all grade 5 with noted pain on dorsiflexion of the right foot. Compression of the right calf increased the pain response. Heel and toe walking and other muscle testing of the ankle could not be performed due to guarding. Deep tendon reflex of the Achilles was also guarded beyond value. Thompson’s test for tear of the Achilles tendon was negative but performance produced increased pain.

MANAGEMENT AND OUTCOME

The patient was treated on two separate occasions. The first encounter began with the patient rating her Achilles pain at 10 on VAS. Treatment began and included ozone

injection into two subcutaneous regions adjacent to the most tender points of the right Achilles tendon, one medially and one laterally using 10 cc and 8 cc respectively of 19 gamma dosage. The injection sites were prepared using cold pack anesthesia, isopropyl alcohol and silver gel. Injection technique included specific, brisk penetration, blowing the plug, delivering the active ingredient, and retrograding withdrawal at each site. The patient reported extreme pain on full delivery of the ozone which lasted for about 2 minutes. The patient was then instructed to do mild ROM movements of the foot and ankle to pain tolerance. A 15 minute application of electrical stimulation using graduating and recurring frequency of Bi-Polar current from 1 to 150 pps increased to patient tolerance. Specific manual manipulations of the foot and ankle joints were performed and included the general foot mobilization, modified metatarsal shear, foot figure eight, a modified version of the Achilles tendon technique, supine plantar cuneiform, Tarsal – Metatarsal shear, posterior tibia and fibula techniques. Considerable extra-vertebral manipulation is important. This was followed by specific percussive massage using a Theragun with very mild trigger point massage for 10-40 seconds per point. Treatment concluded with mild eccentric exercise of the foot, ankle, and calf muscles using surgical hose as resistance. Treatment time was a total of 31 min. The patient rated her pain on exit as 0 (VAS) and was instructed to return PRN.

The second encounter was almost two months later when complaints of bilateral Achilles tendonitis were reported. Several races had been run during the interim two months. The patient reported gradual increase in pain due to several races. She reported 10 VAS on the right and 8 on the left. The same protocol was delivered only this time on both sides. The patient again experienced extreme pain on full delivery of the ozone which lasted for about 2 minutes. Following the completion of the treatment protocol, pain level was again reported at 0 (VAS) bilaterally. The patient returned 7 months later for an unrelated complaint and coincidentally reported having run 10 half marathons and has had no return of the Achilles complaint on either side.

LIMITATIONS

The author recognizes limitations of this case study. Generalization of the diagnostic findings and outcomes represented in this case may not necessarily apply to other patients. Measurements of the outcomes have not been globally standardized in all respects.

CONSENT

Written consent for publication was obtained from the patient.

COMPETING INTERESTS

The author declares no competing interests.

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