Conservative management of Achilles Tendinopathy: a case report

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Objective: To chronicle the conservative treatment and management of a 77-year old female patient presenting with chronic pain of 8 months duration in the midportion of the achilles tendon diagnosed as achilles tendinopathy.

Clinical features: The main clinical feature was pain in the midportion of the achilles tendon, 2 to 6 cm proximal to the calcaneal insertion. Symptom onset was gradual and unrelated to any acute trauma or overt injury mechanism.

Intervention and outcome: The conservative treatment approach consisted of medical acupuncture with electrical stimulation, Graston Technique®, eccentric calf training, and rehabilitative exercise prescription. Outcome measures included verbal pain rating scale, lower extremity functional scale (LEFS), and a return to activities of daily living (ADLs). The patient attained long-term resolution of her complaint and at 12 month follow-up reported no recurrence of symptoms.

Conclusion: A combination of conservative rehabilitation strategies may be used by chiropractors to treat midportion achilles tendinopathy and allow an individual to return to pain free ADLs in a timely manner.

(JCCA 2012;56(3):216-224)

KEY WORDS: achilles, tendinosis, tendinopathy, Graston Technique®, eccentric training

Objectif : Documenter le traitement conservateur et la gestion d’une patiente de 77 ans qui présente de la douleur chronique depuis 8 mois dans la partie du milieu du tendon d’Achille, diagnostiquée comme une tendinopathie du tendon d’Achille.

Caractéristiques cliniques : La caractéristique clinique principale est la douleur ressentie dans la partie du milieu du tendon d’Achille, à 2 à 6 cm proximal à l’insertion calcaneenne. L’apparition des symptômes s’est produite graduellement et n’est pas associée à un trauma aigu ou à un mécanisme de blessure évident.

Intervention et résultat : L’approche adoptée pour le traitement conservateur comporte l’acupuncture médicale avec stimulation électrique, la technique GrastonMD, l’entraînement excentrique du mollet et la prescription d’exercices de réadaptation. Les résultats ont notamment été mesurés au moyen d’une échelle verbale de notation de la douleur, d’une échelle fonctionnelle des membres inférieurs (ÉFMI) et du retour aux activités de la vie quotidienne (AVQ). Une résolution à long terme a été apportée à la plainte de la cliente et, au rendez-vous de suivi, douze mois plus tard, aucune récurrence des symptômes n’a été rapportée.

Conclusion : Les chiropraticiens peuvent employer une combinaison de stratégies de réadaptation conservatrices afin de traiter une tendinopathie de la partie du milieu du tendon d’Achille et de permettre à une personne de retourner à ses AVQ sans douleur et en temps opportun.

(JCCA 2012;56(3):216-224)

MOTS CLÉS : Achille, tendinose, tendinopathie, technique GrastonMD, entraînement excentrique

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Introduction:
The term “tendonitis” has traditionally been used to denote overuse injury to the tendon that is chronic in nature. The suffix “-itis” implies the presence of an inflammatory condition. However, studies have identified little or no inflammation within tendons exposed to overuse.1-3 Tendinopathy is now commonly used to describe overuse injuries in the absence of histological confirmation and includes a range of diagnoses involving injury to the tendon (e.g., tendonitis, peritendinitis, tendinosis).4,5

The pathogenesis of Achilles tendinopathy (ATY) begins when the mode, intensity, or duration of a physical activity changes and places an abnormal biomechanical demand on the achilles tendon.6,7 This is followed by an inadequate recovery period and is believed to lead to breakdown at the cellular level.8 What results is an incomplete healing response that can be attributed to ongoing mechanical forces on the tendon, poor blood supply, or a combination of both.9,10 The tendon undergoes microscopical changes, including fibrin deposition, reduction in neutrophils and macrophages, neovascularization, and disorganization of collagen fibers.11,12 The neovascularization within the degenerated achilles tendon is accompanied by an in-growth of nerve fascicles.13-15 These nerve fibers have both sensory and sympathetic components that may be responsible, in part, for the pain that is associated with ATY.8,14,15

The mean age of those affected by achilles tendon disorders has been reported to range between 30 and 50 years.16-18 with data suggesting males are affected to a greater extent than females.16 ATY is generally more common among individuals who increase their usual activity levels or participate in sports.19,20 However, less active individuals may also be affected as a minority of cases have been reported in sedentary groups.21,22 In one series of 58 patients, nearly one-third did not participate in vigorous physical activity.20 Onset within the sedentary population may be attributed to physical deconditioning, intrinsic risk factors, or co-morbidities associated with ATY.6,22

The long-term prognosis for patients with acute to sub-chronic ATY has been reported as favourable with nonoperative treatment.23,24 Significant decreases in pain and improvement in function have been reported in cases treated with exercise interventions.25-27 Long-term follow-up ranging between 2 and 8 years suggests that between 71% to 100% of patients with ATY are able to return to their prior level of activity with minimal or no complaints.24,28,29 It has also been reported that results of both conservative30 and operative treatments31 are less favourable in nonathletic populations and in those with insertional tendinopathy versus midportion tendinopathy32.

Chronic tendon pathology is a soft tissue condition commonly seen in chiropractic practice,33 and chiropractors can provide a number of conservative interventions used to treat tendinopathy34. This case study was conducted to chronicle the conservative treatment and management of a 77-year old female patient presenting with chronic pain in the midportion of the achilles tendon, diagnosed as ATY.

Case report:
A 77-year old female presented with chronic pain of 8 months duration in the midportion of the right achilles tendon. The complaint was one of gradual onset and not related to any acute trauma or overt injury mechanism. The patient was a retiree who stated that she maintained a busy schedule looking after her country home. This included outdoor maintenance and management of her large garden. She reported that her pain had progressed to the point of limiting activities of daily living (ADLs) such as walking greater than 15 minutes and descending/ascending stairs. The patient also reported now occasionally feeling pain at rest. Decreasing her activity levels and cryotherapy provided short term relief. She presented to her family physician’s office 5 months prior and a referral was made to another health professional for evaluation of her achilles pain. The patient reported that she was examined and fitted for a pair of custom orthotics. Despite several modifications and three months of use, the custom orthotics did not provide any significant pain relief or functional improvements in her ADLs.

The patient rated her current pain level on the Verbal Pain Rating Scale (VPRS) where 0 is “no pain” and 10 is the “worst pain that she had ever experienced”. She reported her pain as ranging from 2-3/10 occasionally at rest, and 6-7/10 with activity (i.e. walking greater than 15 minutes and descending/descending stairs). Her Lower Extremity Functional Scale (LEFS) score was 48. The LEFS is a subjective outcome measure, comprised of 20 items, that asks individuals to rate their difficulty in performing a variety of everyday activities (where 0 is “unable to perform” and 4 is “no difficulty”). The final LEFS
score can vary from 0 (low) to 80 (normal function). The patient’s past medical history was unremarkable for any right lower extremity injury or condition. A full systems review was normal with the exception of a long-standing history of bronchioectasis and related use of a corticosteroid inhaler as required.

Upon examination, inspection of the right lower extremity revealed swelling around the right achilles tendon (Figure 1). Hallux valgus was visible bilaterally as was left-sided sub-talar varus. One-legged squat testing revealed bilateral foot over pronation, along with internal femoral and tibial rotation. The patient was able to rise to her toes bilaterally, albeit with some discomfort noted on the right. With repeated heel raises, she reported increasing discomfort in the right achilles tendon and had to stop after six repetitions. Diminished balance was observed on the right with inability to maintain a one-legged stance. Range of motion (ROM) for the right knee and right hip joint was within physiological limits. Active and passive ROM at the right ankle was diminished by 25% in dorsiflexion. Palpation revealed tenderness and soft tissue thickening 3 cm from the heel along the course of the achilles tendon and into the gastrocnemius-soleus complex. Palpation also revealed tenderness in the following soft tissues of the right lower extremity: flexor hallucis longus, flexor digitorum longus, tibialis posterior, distal vastus medialis oblique, and gluteus medius and minimus. Evaluation for achilles tendon rupture was done with the Thompson test and was negative in this patient. Motor, reflex, and sensory testing for the lower extremities was within normal limits bilaterally. Supine straight leg raising was unremarkable for nerve root tension signs bilaterally.

The patient was diagnosed with ATY. Treatment was initiated and consisted of medical acupuncture (points consisting of physiological tender regions within the painful achilles tendon and gastrocnemius-soleus complex) with electrical stimulation (IC-1107+ at 2 Hz frequency). Graston Technique® (GT) was administered by a certified provider using GT protocols to all the affected soft tissues following each acupuncture treatment.

The patient was initially prescribed exercises consisting of static stretching for the gastrocnemius and soleus muscles. In addition, unilateral eccentric heel drops with no concentric component were prescribed for each respective muscle group (Figure 2 A-C).
JA Papa instructed to assist with the unaffected contralateral lower extremity during the concentric (plantar flexion) movement phase, helping return the affected ankle to the starting position. Exercises were added as the treatment plan progressed. A summary of the full treatment protocol and prescribed exercises is included in Table 1.

The patient was seen twice a week for 4 weeks and then once per week for 4 weeks for a total of 12 treatment visits. Gradual improvement was reported during the entire course of treatment. At week 9, the patient reported a VPRS score of 0/10. Her LEFS score improved from 48 to 80. A change of 9 points or more is considered to represent a clinically meaningful functional change. Physical examination at this time revealed only mild tenderness in the midportion of the achilles tendon and into the gastrocnemius-soleus complex. ROM, functional, and palpatory testing was otherwise within normal limits. The patient was encouraged to continue with her exercise program and was subsequently discharged from active care. At 12 month follow-up conducted via telephone, the patient reported no recurrence of symptoms.

Table 1. Overview of treatment sessions, in office treatment, and rehabilitative exercise intervention(s)

<table>
<thead>
<tr>
<th>WEEK(S) SESSIONS</th>
<th>IN OFFICE TREATMENT</th>
<th>REHABILITATIVE EXERCISE INTERVENTION(S)</th>
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<tbody>
<tr>
<td>WEEK-1 • 2 sessions</td>
<td>• Medical acupuncture (points consisting of physiological tender regions within the painful achilles tendon and gastrocnemius-soleus complex) with electrical stimulation (IC-1107+ at 2 Hz frequency) • Augmented soft tissue mobilization (ASTM) Graston Technique® (GT) applied to all the tender/dysfunctional soft tissues as per physical examination findings</td>
<td>• Stretching: Gastrocnemius and Soleus, 15-20 second holds, 8-10 repetitions (reps) for each respective stretch • Eccentric heel drops: 3 sets of 10 reps • For gastrocnemius: knee fully extended (Figure 2A-C) • For Soleus: knee flexed 45 degrees</td>
</tr>
<tr>
<td></td>
<td>*Exercise performed 2 times/week in office, 3 times/week at home</td>
<td></td>
</tr>
<tr>
<td>WEEK-2 • 2 sessions</td>
<td>• Medical acupuncture and ASTM GT, same as above (SAA)</td>
<td>• Stretching and Eccentric heel drops: SAA</td>
</tr>
<tr>
<td></td>
<td>*Exercise performed 2 times/week in office, 3 times/week at home</td>
<td></td>
</tr>
<tr>
<td>WEEK 3 • 2 sessions</td>
<td>• SAA</td>
<td>• Stretching: Gastrocnemius and Soleus (SAA): Addition of hamstring and quadricep muscle groups • Eccentric heel drops: 3 sets of 15 reps • Proprioception – 1-legged stance • Introduction of Lumbopelvic conditioning and lower extremity strengthening: Bridging; side-lying hip abduction; VMO training with quad sets and supine straight leg raise; theraband inversion, eversion, dorsiflexion strengthening for right foot; Exercise prescription = 2-3 sets of 8-10 reps</td>
</tr>
<tr>
<td>WEEK 4 • 2 sessions</td>
<td>• SAA</td>
<td></td>
</tr>
<tr>
<td>WEEK 5, 6, 7, 8 • 1 session each week</td>
<td>• SAA</td>
<td>• Stretching and Eccentric heel drops: SAA • Proprioception: Rocker board training in office; Home proprioceptive challenge increased by performing 1-legged stance and introducing arm movements • Lumbopelvic conditioning and lower extremity strengthening: VMO training advanced to shallow wall squats; addition of theraband hip abduction and adduction in the standing position; Exercise prescription = 2-3 sets of 8-10 reps</td>
</tr>
<tr>
<td>WEEK 9 • Discharge</td>
<td>• N/A</td>
<td>• Discharged, encouraged to continue with home program</td>
</tr>
</tbody>
</table>
Discussion:
The achilles tendon is the largest tendinous structure in the body, and serves as the conjoined tendon for the gastrocnemius and soleus muscles. The achilles tendon does not have a true synovial sheath but instead has a paratenon. The paratenon is a connective tissue sheath that surrounds the entire tendon and is able to stretch 2 to 3 cm with movement, which allows for maximal gliding action. Initial inflammation of this layer with subsequent thickening and adhesion formation can result in diminished tendon flexibility and predispose the achilles tendon to further injury. The area of the tendon with the poorest blood supply is approximately 2 to 6 cm above the insertion into the calcaneus. Blood supply to this region further diminishes with increasing age. This hypovascular region is most commonly implicated in achilles tendinopathy and rupture.

The etiology of ATY appears to be multi-factorial, with both extrinsic and intrinsic risk factors likely contributing. Extrinsic risk factors include training errors, increased training volume or physical activity, environmental variables, and use of faulty equipment or improper footwear. Intrinsic risk factors to consider include abnormal ankle dorsiflexion range of motion, abnormal subtalar joint range of motion, decreased ankle plantar flexion strength, increased foot pronation, increasing age, and genetic factors. Co-morbidities of obesity, hypertension, hypercholesterimia, and diabetes can also contribute, and the presence of systemic inflammatory disease and the use of antibiotics in the fluoroquinolone class may play a role as well.

In the absence of acute trauma or overt injury mechanism, ATY will clinically present as gradual pain and stiffness in the midportion of the tendon, 2 to 6 cm proximal to the calcaneal insertion. There may be a history of different or increased physical activity levels that precipitates injury and symptom reporting. In the early stages, tendon pain may be present following a period of inactivity (i.e. sleep, prolonged sitting), which lessens with a brief bout of activity, only to increase again after sustained activity. As the condition progresses to a chronic state, tendon pain may be present at rest, and exercise or activity durations are shortened due to earlier onset of pain.

Inspection of a symptomatic achilles tendon may reveal asymmetry, swelling, or abnormal tissue contour. Palpation will reveal tenderness along the tendon, reproducing the patient’s pain. If degeneration of the tendon has occurred, a thickened, nodular area may be palpable. To gauge the possible impact on foot kinematics, various ranges of motion at the foot and ankle should be assessed. It is also important to view the biomechanical alignment of the foot and ankle while the patient is standing and throughout the gait cycle. A custom foot orthotic may be utilized to correct any aberrant mechanics of the foot and ankle to relieve pain in the Achilles.

In this case, the patient reported that orthotic prescription as a stand alone intervention was not effective in providing a therapeutic or functional benefit.

Achilles tendon rupture should be suspected if there is a history of acute pain after a popping sound in the posterior aspect of the heel, if there is a positive result on the Thompson test, and/or if a gap can be palpated within the achilles tendon. Excluding tendon tear or rupture, the differential diagnostic list in patients with posterior ankle pain should include retrocalcaneal bursitis, insertional achilles tendinopathy, posterior ankle impingement, achilles tendon ossification, and systemic inflammatory disease. Plain radiography may be used as the initial investigative study for suspected achilles tendinopathy. Results are usually normal, but may reveal calcification of the tendon, osteoarthritis, or a loose body. Musculoskeletal ultrasonography and magnetic resonance imaging (MRI) may be helpful in cases where the patient fails to respond to conservative management or the diagnosis remains unclear.

Healing of ATY may take several months in chronic conditions, and may partially be due to the lack of vascularity to the tendon. Initial conservative treatment measures should begin with relative rest and activity modification to provide pain relief and time for the tendon to heal. Medical acupuncture with electrical stimulation was utilized during the in-office treatment sessions to provide pain relief. This was immediately followed by GT applied to the achilles tendon as well as all the affected soft tissues in the right lower extremity identified as tender or dysfunctional during the initial assessment and subsequent treatment sessions. GT is a form of augmented soft tissue mobilization in which stainless steel instruments are utilized to apply controlled microtrauma to the affected soft tissues. Studies suggest that the controlled microtrauma induces healing via fibroblast...
proliferation. Additional studies have shown clinical efficacy using GT for the treatment of various soft tissue disorders.

Eccentric training has garnered considerable attention with respect to rehabilitation of ATY. Several studies suggest that eccentric strength exercises for the calf can improve symptoms and should be initiated early in treatment. It has been hypothesized that eccentric training may be beneficial because of its effect on improving microcirculation and peritendinous type I collagen synthesis. One particular study demonstrated that a 12-week course of eccentric strengthening exercises was more effective than a traditional concentric strengthening program for treating ATY in recreational athletes. In other studies, imaging of the achilles tendon before and after a 12-week eccentric training protocol showed thinning and normalization of the tendon structure both on ultrasound and MRI. Stretching exercises for the gastrocnemius-soleus complex have also been advocated to reduce pain and improve function. In this case, stretching exercises and eccentric calf exercises for both the gastrocnemius and soleus muscle groups were initiated early and well tolerated by the patient.

Additional conservative modalities commonly utilized in the treatment of ATY include therapeutic ultrasound, low level laser therapy, and taping. Other non-operative treatment alternatives include extracorporeal shock wave therapy, topical glyceryl trinitrate patches, and corticosteroid injections. Scientific evidence supporting corticosteroid injections is controversial, and there is evidence that their use around the achilles tendon increases the risk of rupture. As a result, steroid injection is becoming obsolete in the treatment of midportion ATY and is being gradually replaced by new therapies utilizing injections of polidocanol, along with autologous whole blood and platelet rich plasma. Surgical intervention may be considered for cases that have failed a comprehensive, nonsurgical treatment program of three to six months in duration.

There are several factors that may have influenced the favourable outcome of this case study. The patient in this circumstance did not demonstrate any significant co-morbidities that would have complicated recovery or limited her participation in an active exercise program. The patient was extremely motivated to recover and compliance to the scheduled office visits and prescribed exercises was excellent. The use of medical acupuncture points appeared to be effective in decreasing initial pain levels, while at the same time allowed active treatment in the form of static stretching and eccentric heel drops to be introduced early in the treatment protocol. Graston Technique® was useful in decreasing the soft tissue tenderness and dysfunction and theoretically aiding soft tissue healing. To ensure the likelihood of a positive therapeutic outcome, this practitioner also included gluteal and lumbopelvic conditioning, lower extremity flexibility and strength training, and proprioceptive exercises to address the functional deficits in the right lower extremity.

Summary:
Much has been written in the scientific literature about the conservative management of ATY. However, there is no high level of evidence that exists to conclusively support the use of any particular modality for treatment. Interventions that address extrinsic and intrinsic risk factors and focus on returning the patient back to work, sport, and ADLs in a timely manner require further investigation. This should include study in clinical trials with large sample sizes and controls to evaluate short and long term efficacy of various therapeutic modalities. This case demonstrates the successful management of midportion ATY using a variety of conservative interventions that can be employed by chiropractic practitioners. Although favourable results were obtained, it is important to note that the nature of this investigation was that of a case study, and therefore the treatment protocol utilized may not be appropriate for all individuals presenting with ATY. Practitioners treating this type of injury could consider implementing the conservative treatment strategies utilized in this case for other patients presenting with midportion ATY.

Acknowledgements:
I would like to thank Ms. Anne Taylor-Vaisey, CMCC Reference Librarian for her assistance with searching the literature. I would also like to thank Dr. Diane Grondin and Dr. Glen Harris for their assistance with editing and proof reading this manuscript.

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