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CASE REPORT

# JOINT MOBILIZATION IN THE MANAGEMENT OF PERSISTENT INSERTIONAL ACHILLES TENDINOPATHY: A CASE REPORT

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## ABSTRACT

***Background & Purpose:*** Insertional Achilles tendinopathy (IAT) can be a challenging condition to manage conservatively. Eccentric exercise is commonly used in the management of chronic tendinopathy; however, it may not be as helpful for insertional tendon problems as compared to mid-portion dysfunction. While current evidence describing the physical therapy management of IAT is developing, gaps still exist in descriptions of best practice. The purpose of this case report is to describe the management of a patient with persistent IAT utilizing impairment-based joint mobilization, self-mobilization, and exercise.

***Case description:*** A 51-year-old male was seen in physical therapy for complaints of posterior heel pain and reduced running capacity. He was seen by multiple physical therapists previously, but reported continued impairment, and functional restriction. Joint-based non-thrust mobilization and self-mobilization exercise were performed to enhance his ability to run and reduce symptoms.

***Outcomes:*** The subject was seen for four visits over the course of two months. He made clinically significant improvements on the Foot and Ankle Activity Measure and Victorian Institute of Sport Assessment-Achilles tendon outcomes, was asymptomatic, and participated in numerous marathons. Improvements were maintained at one-year follow-up.

***Discussion:*** Mobility deficits can contribute to the development of tendinopathy, and without addressing movement restrictions, symptoms and functional decline related to tendinopathy may persist. Joint-directed manual therapy may be a beneficial intervention in a comprehensive plan of care in allowing patients with chronic tendon changes to optimize function.

***Level of Evidence:*** Therapy, Level 4

***Keywords:*** Ankle, Achilles tendon, manual therapy, pain

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## BACKGROUND AND PURPOSE

Insertional Achilles tendinopathy (IAT) can be a challenging condition to manage in runners, with prevalence estimates ranging between 6.5-18%.[1] The etiology of Achilles tendinopathy is typically multifactorial, including intrinsic risk factors (i.e. diabetes, obesity, hypertension, hyperlipidemia, abnormal ankle dorsiflexion (DF) range of motion (ROM), impaired plantarflexor (PF) strength, and excessive pronation) and extrinsic factors (such as training errors or incorrect footwear).[2] Medications such as statins[3] and fluoroquinolenes[4,5] have been implicated in the development of tendinopathy. IAT often manifests as ossification of the enthesial fibrocartilage.[6] Tendon degeneration may also occur at the tendon-bone interface resulting in micro tears within the tendon. Haglund's deformity, a boney prominence at the posterosuperior aspect of the calcaneal tuberosity, is often seen in combination with IAT, however a direct link of this bony variant to symptoms is not consistent.[7] Interestingly, IAT has been associated with inflammatory arthropathies, but causative associations have not been described.[1]

The diagnosis of IAT is typically based on clinical examination, including complaints of decreased functional levels, localized posterior heel pain, tenderness and thickening at the Achilles insertion on palpation, and other tissues being excluded as primary pain generators. The benefit of diagnostic imaging is under debate, as up to 59% of asymptomatic tendons may show abnormalities on imaging, yet normal imaging studies do not rule out the tendon as the source of pain.[8] More specifically, magnetic resonance imaging in patients with IAT may demonstrate microtrearing within the tendon at the insertion into the calcaneus[9] while ultrasound imaging has shown larger tendon diameter and lower echogeneity in those with IAT.[10] Lower echogeneity within the tendon on the involved extremity may also be associated with greater symptom severity.[10]

Conventional conservative treatment for IAT has included rest, orthotics and footwear modification,[7,11] extracorporeal shockwave therapy,[12] eccentric training,[12-15] stretching[14] and soft tissue management.[15] Eccentric calf-muscle strengthening has been generally successful in the management of mid-portion Achilles tendinopathy,[2] yet the effects for patients with IAT are less positive.[16] It could be postulated that IAT does not respond as well due to decreased vascularity and increased mechanical compression between the calcaneus and the Achilles tendon.[17] With regard to medical management, promising results were noted in a pilot study using sclerosing therapy at areas of neovascularization in 8 of 11 subjects, including 8-month follow up.[18] Surgical intervention is usually reserved until after six months of conservative treatment has failed.[19]

Currently, there is limited direct evidence to support the use of joint based manual therapy in this population. In fact, clinical trials assessing effectiveness of conventional treatment for IAT do not include joint based manual therapy in either group.[14,15] This is interesting, as foot and ankle mobility deficits have been described as a risk factor in the development of Achilles tendinopathy.[2] Additionally, emerging evidence indicates calcaneal osteoarthritic (OA) changes may be present in this population.[20] Considering how OA conditions have responded positively to joint mobilization,[21-23] it would seem appropriate to utilize joint mobilization in this population as well. There is also evidence to support the use of joint based manual therapy to those with tendon pathology at other regions.[24-27] Although not described in the IAT population, joint mobilization can improve local joint biomechanics,[28,29] act neurophysiologically at the local, spinal, and supraspinal levels,[28,30,31] and may correct imbalances in conditioned pain modulation by facilitating descending pain inhibition.[22]

While evidence is emerging to understand best practice in the conservative management of patients with IAT, gaps in the literature still exist, specifically in regards to the effects of joint mobilization in this population. The purpose of this case report is to describe the management of a patient with persistent IAT utilizing impairment-based joint mobilization, self-mobilization, and exercise.

## CASE DESCRIPTION

A 51 year-old male subject was seen in physical therapy for posterior heel pain. He provided verbal consent to publish his data. As this was a single case report utilizing safe clinical services, this work was deemed exempt from formal IRB review. He complained of a local superficial ache, reported as 0/10 at best and 5/10 at worst on the Numeric Pain Rating Scale (NPRS), and occasional stiffness at the Achilles tendon insertion, of insidious onset three years prior. Symptoms began after running his third marathon, which he believed may have been related to running with a new pair of shoes. His pain was aggravated by running more than five miles, and alleviated by stretching his calf, ice massage, and rest. He also reported ankle stiffness after sitting greater than 30 minutes, which would be alleviated after walking 15-20 steps. At the time of assessment he was running three to five miles per day on treadmills and trails, but not engaging in longer runs because of the pain. He was also swimming and performing upper and lower body resistance exercise 3 times each week. Aside from a left ankle sprain 30 years prior, his past medical history was unremarkable.

He reported multiple prior treatments. Six months following onset, he was seen by a PT where interventions included therapeutic ultrasound, electrical stimulation, and customized foot orthotics. He reported no improvement, and did not continue with the orthotics. Twelve months after symptom onset, he had a cortisone injection at the Achilles tendon insertion, which provided minimal, transient relief. Two years following symptom onset, he was seen by another PT. Throughout the plan of care he performed eccentric heel drops to neutral DF, calf stretching, ice massage to the insertion site, gluteal strengthening exercises, dynamic balance exercises in single leg stance, and he was prescribed over the counter inserts for arch support. He noted 75% reduction in symptoms, and continued with his home exercise program (HEP) following discharge, but longer running distances remained limited. His primary goal was to return to running marathons without symptoms.

## CLINICAL IMPRESSION #1

The subject's symptom report appeared consistent with chronic Achilles tendinopathy. This was based on the symptom location, nature, behavior, and no other local tissue dysfunction appearing more likely. Tendinopathy often responds well to eccentric tissue loading exercises,[32] however, this intervention strategy had already been attempted, without a level of subject-preferred improvement. Mobility deficits are a risk factor for developing tendinopathy,[2] and if not addressed, could contribute to persistence of symptoms and functional limitations. As such, the therapist believed interventions to improve local joint and/or soft tissue mobility (if impaired) would be necessary.

## EXAMINATION

The subject was examined and treated by the same therapist (DJ) at each visit, with pertinent findings presented in Table 1. While symptoms were reported to be local to the ankle, proximal segments were screened and biomechanical assessment was performed to determine relevant contributing factors. Lumbar, hip, and knee screening, consisting of active range of motion (AROM) with overpressures in all planes, was negative for symptom reproduction. Hip extension was limited and when assessing joint mobility, a posterior-anterior (PA) glide of the right proximal femur was hypomobile. Bilateral and unilateral squats did not reproduce symptoms, although early heel rise was present, suggesting possible ankle DF mobility restrictions. Hip strength of the extensors and abductors were tested in prone and sidelying, respectively, and were graded as normal bilaterally. No symptoms were noted on the left. As neural pathology may contribute to heel pain,[33] neurodynamic mobility was assessed in supine with the straight leg raise. Modifications were made to bias the neural structures in the lower limb by adding ankle PF with inversion, PF with eversion, and DF, yet the subject's primary symptoms were unprovoked.

Passive and dynamic testing of the ankle complex followed proximal tissue screening. Pain was reported during the push off phase of a single leg hop, which was evaluated for symptom provocation and analysis of single limb landing patterns. Ankle PF endurance was measured by single-leg heel raise repetitions. Pain limited performance on the right. Ankle DF ROM, measured with a inclinometer in standing,[34] was restricted on the right. However, when the subject's knee was flexed, right ankle DF ROM increased, indicating a probable impairment of gastrocnemius length. Upon palpation, tenderness and thickening at the insertion of the right Achilles tendon and increased resting tension of the right gastrocnemius, yet no trigger points or referred pain to the posterior calcaneus was noted. The midportion of the Achilles tendon, retrocalcaneal bursa, posterior tibial nerve,

**Table 1.** *Examination Findings*

| Test | Result |
|---|---|
| **Location of Symptoms** | Right achilles tendon insertion |
| **Biomechanical Assessment** | Early heel rise present with single and double leg squat; Single leg hop test increased pain (3/10) |
| **Proximal Joint Screening** | Negative for symptom reproduction |
| **Neurodynamic Mobility (straight leg raise)** | Negative for symptom reproduction |
| **Strength / Endurance** | 5/5 hip abductors and extensors,<br>Heel raise repetitions: Right 20 (limited by 5/10 pain), Left 25 |
| **Joint Accessory Motion** | Hypomobile PA glide right proximal hip<br>Hypomobile AP glide right talocrural joint<br>Hypomobile lateral glide right subtalar joint |
| **Ankle DF ROM (in standing)** | Left: 42$^{o}$<br>Right: 54$^{o}$ |
| **Palpation** | Tenderness (6/10) and thickening of involved achilles tendon at insertion |
| **Self-Reported Outcome Measures** | VISA-A: 57%<br>FAAM: ADL subscale 65.5%, Sport subscale 40.6% |

AP: anterior-posterior; DF: dorsiflexion; FAAM: foot and ankle measure; PA: posterior-anterior; ROM: range of motion; VISA-A: Victorian Institute of Sport Assessment – achilles tendon

and plantar fascial origin were not tender. Talocrural and subtalar joint (STJ) accessory motion was restricted on the right, while the left was normal.

### Outcome Measures

A number of objective and self-reported functional outcome measures were used to determine progress. The Victorian Institute for Sport Assessment developed a valid and reliable self-reported functional scale for disability related to Achilles tendon dysfunction (VISA-A). The VISA-A is comprised of 8 questions, scored 0 to 100, with lower scores indicating greater disability. It was shown to have good test-retest (r = 0.93), intrarater (r = 0.90), and inter-rater reliability (0.90).[35] A recent initial investigation determined the minimal clinically important difference (MCID) to be 6.5 points in this population.[36] The Foot and Ankle Measure (FAAM) is another reliable, responsive, and valid self-reported outcome measure used for a variety of musculoskeletal disorders of the lower extremity. It includes a 21-item activities of daily living (ADLs) and 8-item sports subscale, each question graded 0 (unable to to) to 4 (no difficulty), with higher scores indicating higher levels of function. The MCID for the ADL and Sports subscales were found to be 8 and 9 points, respectively.[37] At discharge, the Global Rating of Change (GROC) scale was administered. The GROC scale is a self-reported 15 point Likert scale with -7 being a 'a very great deal worse', 0 being 'no change' and +7 being 'a very great deal better'. A change of 3 or more points was determined to be a clinically important difference.[38] Additional measures of change were the number of heel raise repetitions performed, pain response, and single leg hop as these were functional movements that recreated his symptoms.

## CLINICAL IMPRESSION #2

Presenting signs and symptoms appeared consistent with IAT. This was supported by the symptom report, tenderness to palpation with thickening noted at the Achilles insertion on the calcaneus, the absence of tenderness at other locations around the foot and ankle, and no symptom reproduction with proximal joint screening. Neurodynamic testing was normal, and the symptoms were made better or worse with activity, in a pattern consistent with musculoskeletal pathology, making systemic disease processes less likely. Clinical findings were supported by diagnostic ultrasound imaging showing hypoechoic signal with loss of the typical fibrillary pattern of the right Achilles tendon at its insertion.

Despite improvement with the subject's second PT episode of care, the subject had experienced ongoing symptoms. As such, the therapist attempted to provide an intervention not previously offered. Joint-directed impairment-based manual therapy was added to exercise and activity modification, in attempts to decrease pain, improve mobility, and decrease strain on the Achilles tendon insertion site. The specific techniques, clinical rationale, and results of manual therapy techniques can be seen in Table 2, and were performed as described by Maitland et al.[29]

## INTERVENTION

### Visit 1 – Evaluation

Following the examination, a grade IV anterior-posterior (AP) non-thrust mobilization of the right talocrural joint (TCJ) was performed secondary to limitations noted during right ankle DF (Figure 1). This intervention was selected to decrease the strain on the PF mechanism, improve ankle hypomobility, and decrease pain. The technique was performed until more joint mobility was noted. Heel raises were re-evaluated for repetitions and pain response. After manual therapy, the subject was able to perform the same number of repetitions, but with 2/10 pain, rather than the 5/10 pain reproduced earlier. For a HEP he was instructed to continue with eccentric exercise 3 sets of 15 repetitions, to neutral dorsiflexion, and 3 sets of 30 second duration calf stretching each to be performed twice daily. Different from previous therapy, the subject was instructed to maintain a more neutral rearfoot position during the stretch, to decrease possible unilateral strain on the Achilles tendon.

**Table 2.** *Manual therapy interventions*

| Visit | Manual Therapy Technique* | Indication | Clinical Rationale | Immediate Effects | Added Component to HEP |
|---|---|---|---|---|---|
| 1 (evaluation) | - AP glide of TCJ grade IV | - Accessory glide restricted<br>- DF ROM impaired<br>- Pain | - Improve TCJ mobility<br>- Improve plantarflexor functional force generation through pain reduction | - Heel raise repetitions unchanged but pain decreased from 5/10 to 2/10 | - Calf stretching in rearfoot neutral position, 3 x 30”, 3x/day |
| 2 | - AP glide of TCJ grade IV+<br>- Lateral glide of STJ grade IV | - Persistent ankle stiffness<br>- Pain with functional activity | - Improve TCJ and STJ mobility<br>- Improve plantarflexor functional force generation through pain reduction | - Heel raise repetitions increased from 22 to 25, and were asymptomatic<br>- Pain with hop test decreased from 2/10 to 0/10 | - Self-mobilization of STJ, 5 min/day |
| 3 | - Passive physiologic mobilization of right hip extension grade IV++ | - Decreased hip extension in terminal stance of gait<br>- Decreased hip accessory PA glide | - Decrease hip mobility restriction<br>- Allow for normalized stride with running<br>- Minimize proximal impairments | - No change in symptoms (none noted pre-testing)<br>- Symmetrical gait pattern noted afterwards | - Hip flexor stretching in kneeling position, 3 x 30”, 3x/day |

Abbreviations: AP: anterior-posterior; DF: dorsiflexion; HEP: home exercise program; PA: posterior-anterior; ROM: range of motion; STJ: subtalar joint; TCJ: talocrural joint
*Each technique was performed until the treating therapist noted improved joint mobility, a specific timed dosage was not utilized

**Figure 1.** *Anterior-posterior talocrural joint non-thrust mobilization. With the patient in supine, the therapist grasps the posterior aspect of the distal tibiofibular region with the stabilization hand. A posteriorly force is directed toward the talus. The plantar aspect of the foot can rest on the therapist's thigh to improve stabilization.*

**Visit 2 – 2 weeks later**

The subject reported improvement after the initial evaluation. He reported running five miles each day, with 3/10 pain at worst, and reported consistency with his HEP. Upon examination, stiffness remained of the talocrural and STJ, but the Achilles was less tender to palpation (4/10), and he was able to perform 22 heel raises with 2/10 pain. A grade IV+ AP TCJ mobilization was performed in an attempt to improve ankle mobility and, decrease undue tendinous strain. Immediately after joint mobilization, he was able to perform 25 repetitions without pain.

With ankle PF endurance improved and less symptomatic, his single leg hop was retested in order to find another comparable sign and associated contributing factors. Insertional Achilles pain was present, but at a reduced intensity compared to initial evaluation. While TCJ mobility was improved, rearfoot hypomobility remained. Although minimal, STJ motion is necessary during the normal gait cycle, to prevent compensatory patterns, such as increased PF activity.[39] The therapist performed a grade IV lateral subtalar glide (Figure 2) until mobility improved, after which the hop test was retested and was asymptomatic. The subject was instructed to continue with eccentric exercise and stretching as before, with five minutes of daily self-mobilization of the STJ (Figure 3) added to maintain the improved mobility between sessions.

**Visit 3 – 4 weeks after evaluation**

The subject reported continued symptomatic and functional improvement. He was running 7-10 miles daily without symptoms. At 11 miles he had 2/10 pain, but mentioned that cardiorespiratory endurance was more of a limiting factor than pain. Upon examination, both the hop test and heel raises were asymptomatic, and palpation of the Achilles insertion was less tender (2/10). The VISA-A and FAAM were re-administered, with clinically significant improvements noted.

Despite improvements, symptoms remained, prompting the therapist to re-examine other possible contributing factors. Running gait was re-examined using simple video analysis, and while asymptomatic, early

**Figure 2.** *Subtalar joint lateral glide mobilization. With the patient sidelying on the involved side, the therapist stabilizes the distal tibia and fibula with one hand. With the other hand, the therapist grasps the calcaneus, distal to the talus, and provides a mobilization force perpendicular to the ground.*


**Figure 3.** *Self-mobilization of the subtalar joint. The patient crosses the involved leg over the opposite thigh. The stabilization hand grasps the distal fibula and lateral aspect of the talus, while the mobilization hand directs a lateral force to the calcaneus.*

heel off and decreased hip extension was noted on the right. Early heel off can be a sign of ankle DF restrictions[39] however ankle mobility was normal on re-assessment. Considering the hip mobility restriction present at initial evaluation, and impairment in functional extension ROM, the therapist theorized the subject had to over utilize the ankle PFs to propel himself forward, rather than using momentum and passive recoil through allowing the hip to extend. A grade IV++ passive physiologic mobilization was performed for hip extension on the right (Figure 4). Symmetrical running gait was noted afterwards. The subject was instructed to continue with his previous HEP, and add hip flexor stretching in half-kneeling, in order to maintain improved mobility.

**Figure 4.** *Passive physiologic hip joint extension mobilization. The patient is positioned in prone. The mobilization is applied with a posterior-anterior force directed to the hip joint while simultaneously bringing the distal femur superiorly into extension.*

### Visit 4 – 8 weeks after evaluation

Due to scheduling conflicts, the subject was seen one month after his previous visit. At this time, he reported consistency with his HEP, no pain or stiffness, and was able to run 15 miles without symptoms. Upon examination, talocrural, subtalar, and hip mobility was normal. Hop testing was asymptomatic, and no heel rise was present with squat testing. Considering the subject's progress, lack of symptoms, and independence with an HEP for long-term self-management, the subject was discharged with instructions to contact the PT should any questions arise.

## OUTCOMES

The subject was seen in physical therapy for four visits over the course of two months. Primary outcomes can be seen in Table 3. Notably, the subject reported satisfaction with his symptom state after interventions, reported no functional disability on

**Table 3.** *Outcomes*

| Outcome Measured | Evaluation | Discharge (8 weeks later) |
|---|---|---|
| **Pain (NPRS)** | Best: 0/10<br>Worst: 6/10<br>Palpation: 6/10 | Best: 0/10<br>Worst: 0/10<br>Palpation: 0/10 |
| **VISA-A** | 59/100 | 97/100 |
| **FAAM Subscales** | ADLs: 55/84 (65.5%)<br>Sports: 13/32 (40.6%) | ADLs: 84/84 (100%)<br>Sports: 30/32 (93.8%) |
| **GROC** | NA | +7 |
| **Comparable Signs (right lower extremity)** | Repeated single leg heel raise: 20 (5/10 pain)<br>Single leg hop: Pain with push off (3/10) | Repeated single leg heel raise: 25 (0/10 pain)<br>Single leg hop: normal, asymptomatic |

ADLs: activities of daily living; FAAM: foot and ankle measure; GROC: global rating of change; NA: not applicable; NPRS: numeric pain rating scale; VISA-A: Victorian institute of sport assessment – achilles tendon

multiple outcome measures, and reported feeling a very great deal better, as compared to initial evaluation. Improvements met the MCID for clinical significance, and were maintained at one-year email follow up, during which time he was able to run three full marathons without symptoms.

## DISCUSSION

This case report details the inclusion of joint mobilization in the rehabilitation of an individual with persistent IAT. Despite a growing body of evidence regarding best practice in this patient population,[12-15] the majority of authors do not describe utilization of joint-directed treatments. Although excessive ankle DF may contribute to the development of Achilles tendinopathy,[2] ankle mobility restrictions contribute to abnormal tendon strain.[2,40] If these mobility deficits are not eliminated, it could be hypothesized that chronic tendon dysfunction, and associated activity and participation restrictions, would persist.

In order to determine the need for joint mobilization in this population, current evidence must be considered. Eccentric tendon loading has been prescribed for treatment of both mid-portion and insertional Achilles tendinopathy.[7,11,12,41,42] The research into the mechanisms for the efficacy of eccentric loading of the Achilles tendon remain ongoing. Eccentric exercise programs resulted in decreased tendon thickening,[43] an absence of neovascularization in associated painful areas,[44] and reduced pathologically increased capillary blood flow without changes of tendon oxygen saturation in subjects with both insertional and mid-portion Achilles tendinopathy.[45] It has been reported that eccentric loading through full ROM is less successful for IAT[12,46] with only 32% of patients having good clinical outcomes in one report.[16] At the insertion site where osteophytic changes are common, ankle dorsiflexion beyond neutral may create a mechanical impingement between the calcaneus, Achilles tendon and retrocalcaneal bursa.[13] As such, modifications have been made to eccentric heel drop exercises, to end in a neutral dorsiflexion for patients with IAT. More positive outcomes have been noted with this adjustment,[13] however 33% of patients reported dissatisfaction, indicating further research into best practice is indicated.

There has been a recent focus in the literature regarding the mechanistic effects of manual therapy. These effects include, but are not limited to, biomechanical and neurophysiological alterations. Biomechanically, limited ankle DF during gait has been associated with excessive STJ pronation.

A relationship has also been shown between excessive pronation and the development of Achilles tendinopathy.[47] Hypotheses for this include: (1) an increased tensile load on the medial tendon and (2) a "wringing" effect of the Achilles tendon.[48] AP TCJ mobilizations have been shown to immediately improve DF ROM.[49,50] An improvement in DF ROM may decrease the amount of compensatory STJ pronation as the lower limb advances over the ankle joint complex during, thereby decreasing the abnormal loading through the Achilles tendon. In this case, AP TCJ mobilizations were performed at the first two visits resulting in both within and between session improvements in pain and strength as tested by heel raises. Theoretically, normalization of talocrural and STJ coupling following AP TCJ mobilizations may explain the pain reduction seen in this patient. However, it may not be the only biomechanical explanation for the patients' improvements.

Hip extension during terminal stance has been estimated to be 10º in healthy individuals.[39] Similar to the foot-ankle complex, impaired sagittal plane motion at the hip during gait manifests as a compensatory and excessive tri-planar movement proximally. Hip rotational movement during gait has been shown to be temporally coupled to rearfoot pronation-supination during gait.[51] Impaired hip extensor moments have also been seen in recreational runners diagnosed with Achilles tendinopathy.[52] These relationships suggest hip function should be examined and treated as needed in this patient population. It is possible that immediate improvements in hip ROM following hip extension mobilizations at visit 3 may have facilitated normalizing the foot position for push-off.

While the positive effects of joint mobilization could be related to improvement in joint mobility and biomechanical alterations, there may be a neurophysiological explanation. Alterations of peripheral nociceptive biomarkers[53] and enhanced conditioned pain modulation[22] have been previously demonstrated following joint mobilization illustrating peripheral and central effects. Utilizing joint mobilization in this case may have provided a hypoalgesic effect through pain modulation and decreased pain-induced weakness. This is demonstrated by the immediate improvements in pain and performance of heel raise repetitions (a measure of strength) following talocrural and STJ mobilization. Immediate improvements in strength have been seen in numerous regions following joint mobilization[54-56] and are likely explained by a combination of peripheral and central mechanisms.

As with every case report, limitations exist. Given the study design, no clear determination of the effectiveness of a single intervention is reasonable, and generalization of results is not possible. It could be argued that a number of confounding variables exist, and as such, results should be interpreted with caution, if not skepticism. However, in the absence of higher quality studies, investigations should be made into best practice management options for individuals with challenging health conditions. The authors hope this work will facilitate further investigation into best outcomes of the IAT population.

## CONCLUSION

Insertional Achilles tendinopathy (IAT) can be a challenging condition to manage. Mobility deficits have been described as a risk factor for developing IAT, however no studies to date have investigated the utilization of joint-directed manual therapy for the IAT population. In this case a 51 year-old male with persistent IAT responded positively to eccentric exercise and impairment based manual therapy, with improvement maintained at one-year follow-up. Manual therapy may be a positive adjunctive intervention in the management of individuals with chronic tendon dysfunction.

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