Musculoskeletal Management of a Patient With a History of Chronic Ankle Sprains: Identifying Rupture of Peroneal Brevis and Peroneal Longus With Diagnostic Ultrasonography

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Abstract

Objective: The purpose of this case report is to describe the use of mobilization and eccentric exercise training for a patient with ankle pain and a history of chronic ankle sprains and discuss the course of diagnostic decision making when the patient did not respond to care.

Clinical Features: A 48-year-old police officer who had sustained multiple ankle sprains throughout his life presented with pain and restriction in his ability to walk, run, and work. The Global Rating of Change Scale score was –6, the Numeric Pain Rating Scale score was 7/10, and the Lower Extremity Functional Scale score was –33. Palpation of the peroneus longus and brevis muscles and inversion with overpressure reproduced the chief concern (Numeric Pain Rating Scale 7/10). The patient was initially diagnosed with chronic peroneal tendinopathy.

Intervention and Outcome: Treatment included lateral translation mobilization of the talocrural joint combined with eccentric exercise using an elastic band for the peroneal muscles. The patient reported improvement in pain and function during the course of intervention but not as rapidly as expected. Therefore, follow-up ultrasonographic imaging and radiography were performed. These studies revealed partial rupture of the peroneal brevis muscle and total rupture of the peroneal longus muscle.

Conclusion: A patient with long-term concerns of the foot complex with a diagnosis of peroneal tendinopathy showed slight improvement with eccentric exercises combined with manual therapy of the talocrural joint. After a course of treatment but minimal response, a diagnosis of tendon rupture was confirmed with diagnostic ultrasonography. Clinicians should be aware that when injuries do not improve with care, tendon rupture should be considered.

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Introduction

Since the seminal study by Arthur William Myer in 1924, scholarly attention has been paid to peroneal tendon ruptures.¹ Yet peroneal tendon injuries are clinically missed in 40% of the cases of ankle problems during the first consultation.²⁻⁴ In the first examination, problems are often underrated and difficult to distinguish from each other or from the lateral ligament complex.^{5,6}

The role of pain mechanisms in the peroneal tendons in lateral ankle sprains has not been entirely identified.^{6,7} Conservative treatment consists of nonsteroidal anti-inflammatory drugs, activity modification, and muscle training.^{3,6} Eccentric muscle training has been recommended for the treatment of tendinopathy in rotator cuffs, Achilles tendonitis, and patellar tendinopathy.⁷⁻¹³

Before the work of Hensley and Kavchak,¹⁴ there were no other studies investigating specifically the additive effects of eccentric exercises, in addition to passive mobilization strategies in peroneal tendinopathy. At present, there are few studies that report the benefits of combined therapies for peroneal tendinopathy. Therefore, the purpose of this clinical case report was to use the treatment protocol described by Hensley and Kavchak in the management of peroneal tendinopathy and discuss the course of diagnostic decision making when the patient did not respond to care.

Case Report

History and Examination

A 48-year old police officer presented with pain due to a sprained left ankle during work activities. The lateral side of the left ankle remained sore and painful after the trauma. Since the injury, pain and disability along with weight bearing, walking, and working persisted. The patient underwent physical therapy (ie, massage therapy), but the symptoms became worse. A general practitioner was consulted, who administered 2 injections to the painful area, however, without any result. Subsequently, a specialized musculoskeletal therapist was consulted.

From the patient's medical history, at the age of 15, his left ankle was fractured and the deltoid ligaments were partially torn. Following this, he had multiple sprains, mostly without any serious injury. Through time, the ankle was described as being stiff. An orthopedic surgeon surgically stretched the Achilles tendon in the year 2000.

The patient pointed to the pain, which was retro-malleolar (Fig 1). In 2000, he said the pain felt like it was pulling, with burning sensations after provocation. Since that time, the burning sensations subsided; but the feeling of pulling and stiffness remained. At night, pressure on the area of chief concern caused pain that woke the patient, although this slowly improved over time. The pain and discomfort were activity dependent throughout the day. The most painful activities were running and kicking a ball, which gave an immediate onset of pain that subsided after a day. Overall, walking without a brace was problematic. Repetitive weight bearing (walking, running, walking up/down the stairs) made the pain worse up to the point where (after 20 minutes) the patient could not go any further. At rest, the pain subsided but returned quickly once activities were reassumed.

At the outset, the Global Rating of Change Scale (GROC) was rated as -6, the Numeric Pain Rating Scale (NPRS) score was 7/10, and the Lower Extremity functional scale (LEFS) was noted to be -33.

During the first examination, when compared with the right ankle, the left lateral malleolus was a warmer and more sensitive area with light swelling. Pes cavus was also noted. Weight bearing solely on the toes of the left foot was not possible because of imbalance and pain. On palpation, the fibular-calcaneal ligaments were not painful. Palpation from the peroneus longus and brevis muscles to the tendons reproduced the burning pain. Palpation of the peroneal nerve did not increase mechanosensitivity, nor was there a difference in thickness compared to the other side.

Fig 1. Body chart illustrating pain pattern.

Range of Motion and Muscle Strength Tests

Active movements with overpressure in dorsal flexion and plantar flexion were without restriction. Eversion gave some lateral discomfort, and inversion with overpressure gave the recognizable pain (NPRS 7/10). Muscle testing provoked the recognizable pain: the Medical Research Council scale score 4. Passive eversion gave a slight onset of pain. Anterior-posterior movement of the lower case of the left fibula on the tibia was hypermobile and provoked pain (NPRS 7/10).

Because of the long history and ongoing state of disability following the trauma, screening of the lumbar spine, sacral iliac joints, hips, and knees, including overpressure and assessment of combined movements for possible sources of dysfunctions and pain, was performed.^{15–17} See [Table 1](#) for the specific tests. There were no signs and symptoms found that could be directly related to the patient's problem.

Neurodynamic tests for involvement were performed with the Straight Leg Raise with anatomic variation of the tibial, sural, and peroneal nerve and the Slump test.^{17,18} These tests showed no abnormal responses compared with the other side, which led to the hypothesis that peripheral nociception related to neural structures was probably not involved in this case.

When reviewing the history, and the frequency and occurrence of the pain, instability due to tendinopathy seemed a likely cause.¹⁹ There was the subjective feeling of stiffness along with a lack of stiffness in the physical examination. It is plausible that a lack of stability caused the recurring injuries that are associated with tendinopathy and not, for instance, with neurodynamic changes.^{20–22} The patient was initially diagnosed with chronic peroneal tendinopathy.

Intervention and Results

The protocol for the rehabilitation of peroneal tendon disorders was based on the work of Hensley

and Kavchak.¹⁴ This includes use of accessory lateral movements on the talus in a peroneal tendinopathy case. In addition, eccentric muscle exercises using an elastic band, aimed at the peroneal muscle, were used. We treated the patient for 6 weeks with treatment sessions once a week.

Session 1

The first session included the subjective and physical assessment described above. The treatment plan—consisting of the accessory lateral movement in a Grade II to III on the talus, respecting the patient's pain—and the homework program were discussed and learned. After the manual intervention, the pain did not lessen when standing on his left foot and toes.

Session 2 (3 Days After Session 1)

At the start, the NPRS was reported as 7/10 during daily activities. Because of the local pain, we started transversal lateral movement of the left talus, in left side-lying position, from a grade II to III, respecting pain, for 4 series of 2 minutes.¹⁷ The same procedure was followed for the anterior-posterior mobilization of the talus, also performed in a grade II to III for 4 series of 2 minutes. During reassessment, the pain had decreased to NPRS 4/10 when standing; and passive inversion and eversion were without pain. Next, we increased this same protocol to grade IV because the through-range pain changed into an end-of-range stiffness. On reassessment, the dorsal and plantar flexions were unchanged, as was standing on his left foot and toes. Because the clinical pattern led us to a possible peroneal tendinopathy, we started a home work program for the Peronei muscles. This consisted of resistance to ankle eversion with an elastic band wrapped around the midfoot ([Figs 2 and 3](#)), which was clearly demonstrated to the patient. The exercise was

Table 1 Screening Tests

Screening Tests	Active Movements	Passive Movements With Overpressure
Lumbar spine	Flexion/extension w/ combinations of extension, rotation, and side flexion (quadrant)	PAMs
SIJ		In supine: flexion/adduction hip in 90° until 120° In prone: accessory movements
Hips	Extension; squats	Patrick's sign (hyperabduction test) In 90° flexion hip do external and internal rotation
Knees	Flexion and extension	Full flexion combined with adduction and abduction Full extension combined with adduction and abduction

PAMS, passive accessory movements; SIJ, sacroiliac joint.

Fig 2. Start of the eccentric exercise.

explained as follows: first, the foot is placed in as much active eversion as possible. Then, the slack is taken up from the elastic band by moving the lower leg laterally up to a still pain-free level, followed by eversion that is slowly released until inversion is reached. Duration was once a day, 4 series of 15 repetitions without pain.

Session 3 (7 Days After Session 2)

No signs of improvement were found, and NPRS was reported as 7/10. The treatment consisted of the same transversal lateral talus mobilization, grade III, for 4 series of 2 minutes, followed by anterior-posterior mobilization of the talus, grade III and IV, 4 series of 2 minutes into the stiffness and respecting pain. As in session 2, the NPRS when standing on the toes and the passive inversion and eversion changed to NPRS 5/10. Lastly, the performance of the home work exercise was checked: we decided not to increase the duration and frequency because there was no pain reduction compared to the first session.

Fig 3. End of the eccentric exercise.

Table 2 Outcome Measures During Treatment

Outcome measures	Time(weeks)					
	Baseline	3	4	5	6	7
Global Rating of Change Scale (GROC) (-7 to +7)	-6	-6	2	2	-2	-6
Numeric Pain Rating Scale (NPRS)	7	7	6	6	7	7
Lower Extremity Functional Scale (LEFS)	33					29

Session 4 (6 Days After Session 3)

The patient reported that the pain was reduced during walking (NPRS 6/10) and it was less when lying in bed (NPRS 1/10). Both the mobilization techniques on the talus were now explored in variations of a grade IV to IV+ because of the end-of-range tendency for 4 series of 2 minutes, respecting the patient's pain. The home work program was still performed properly.

Session 5 and 6 (After 7-13 Days of Session 4)

During sessions 5 and 6, the ankle pain when standing on the toes was slowly reduced to NPRS 3/10. After the sixth week, the NPRS in standing returned to 7/10. With pressure on the ankle when lying in bed, the pain returned.

Session 7 (8 Days After Session 6)

After session 7, the NPRS on inversion and eversion was slightly improved (5/10); and pain upon standing was also reduced (NPRS 5/10). An adequate treatment should clearly reduce symptoms after 4 to 6 weeks. As our positive test results were only temporary, it was agreed to stop the current treatment procedure and to seek further orthopedic intervention (Table 2).

The patient was sent to an orthopedic surgeon who conducted ultrasonography and radiographic imaging. The report revealed partial rupture of the peroneal brevis muscle (Figs 4 and 5) and a total rupture of the peroneal longus muscle. The patient was then sent to an orthopedic surgeon specializing in the lower extremity and underwent surgery. The peroneal brevis muscle was repaired and was used as an anchor for the peroneal longus muscle.

Discussion

The most remarkable observation from this case is the brief effect in week 4, as stated in Table 2. Mobilization techniques can have a positive effect on

Fig 4. Partially ruptured peroneal brevis muscle.

Fig 5. Totally ruptured peroneal longus muscle.

pain and functionality. This is comparable with the case report from Hensley and Kavchak (2012).¹⁴ The GROC made a minimal clinically important difference of “+5” points, which was the main reason to continue the intervention until week 7 even though functionality did not increase as rapidly as expected.

To assess changes in activities, we used the GROC, which showed a moderate outcome when “+5” change is measured.^{23,24} For pain, the NPRS was applied.²⁵ For assessing the ankle function, the LEFS was used during the first and last treatment sessions (see Table 2 for the results).²⁶ Outcome increased by 4 points. The minimal clinically important difference for this test is 9 points.²⁶ The GROC seemed to show a clear progression; however, the LEFS did not.

The frequency and the occurrence of lateral ankle pain in the history of the patient suggested that recurring injuries were associated with tendinopathy over time. This may be due to a lack of stability, which might be the case here as well.^{3,5,6,19} These findings are consistent with peroneal tendon injuries.²⁷ Weakness at resistance to eversion suggests that the peroneal

muscles were involved.^{4,15,28} In addition, there was no increase in pain when screening other regions for possible sources of this concern.

Manual therapy (passive mobilization) and eccentric exercises seemed to help this patient with stable signs and symptoms of a suspected tendinopathy of the peroneal muscle. This treatment protocol seemed to improve function (GROC) and reduce the pain experienced (NPRS) during physiological ankle movements, but not as much as expected. Diagnosis by ultrasonographic imaging showed partial rupture of the peroneal brevis muscle and a total rupture of the peroneal longus muscle.

This case emphasized that clinicians need to be aware of the possibility of structural changes or damage in the lateral ankle complex after a traumatic history with long-term concerns and a stable nature even when the outcome of adequate musculoskeletal therapy seems to be positive. Noninvasive valid measurements, like ultrasonographic assessment at an early stage, could prevent ineffective long treatments even if signs and symptoms reduce.

Limitations

As this is a case report, it is difficult to project the findings of this one patient to the general public. In general, such cases may benefit from global treatment goals such as mobility and stability endurance, strength and agility, and balance and coordination. In addition, more functional movements could have been used to assess physical function. Whether this would have worked in our case is a bit uncertain because of the fact that our patient had high pain levels. In hindsight, this possibly could have led to more structural damage.

Conclusion

The patient in this case report showed signs of improvement of his left ankle pain with a treatment protocol of manual therapy (passive mobilization) and eccentric exercises. Because he did not improve as expected, follow-up by diagnostic ultrasonography showed a partially ruptured peroneal brevis muscle and hematoma around the tendon of the peroneus longus. Practitioners should be aware of the possibility of rupture in the lateral ankle complex after a traumatic history with long-term concerns even when the outcome of musculoskeletal therapy seems to be positive.

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No funding sources or conflicts of interest were reported for this study.

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