Acetic acid iontophoresis for the treatment of insertional Achilles tendonitis

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DESCRIPTION

Posterior heel pain is a constellation of pathologies that may include retrocalcaneal bursitis, insertional tendonitis, paratenonitis and tendonosis among others.¹ The diagnosis of insertional Achilles tendonitis can be established clinically and radiographically and must be differentiated from retrocalcaneal bursitis and Haglund's deformity.² Patients present clinically with chronic pain of gradual onset typically relieved when the patient is unshod and it may be painful to perform a single leg raise.^{3 4} Calcaneal exostoses of the Achilles tendon may be evident on radiograph. Exostoses composed of calcium carbonate (CaCO_3) are exposed to the more chemically active acetate radical and replace the carbonate forming the blood soluble calcium acetate molecule ($\text{Ca}(\text{C}_3\text{H}_3\text{O}_2)_2$).⁵

A treatment algorithm has been developed for posterior heel pain.³ Initial therapeutic modalities include physical therapy, orthotic management and anti-inflammatory medications.³ Iontophoresis has been suggested as an alternative to local corticosteroid injections.⁴ In a prospective study by Japour *et al* transdermal application of acetic acid through iontophoresis was shown to be an effective conservative treatment modality for heel pain.⁵

A 56-year-old man presented to a local podiatry clinic with intermittent posterior heel pain of several years duration that impeded the patients' activities of daily living: driving, prolonged walking and golfing. Gait analysis of the patient revealed an antalgic gait with early heel rise on the left with a

short step length of the right. The patient required one-hand assist on ascent and descent of stairs. The patient described the pain as achy, with the left heel more painful than the right. Radiographs revealed the presence of retrocalcaneal exostoses (*figure 1*).

The patient had objective improvement in measures such as range of motion and gait deviations from manual therapy techniques such as kinesiotaping, myofascial release, deep tissue massage, joint mobilisation, ultrasound (20% at 3.3 mHz, 2.0 W/cm²) and home exercises/self-care consisting of dorsiflexion stretching, and ice massage, however the pain was still present.

The patient was then treated with iontophoresis therapy of 4% acetic acid using phoresor PM900 at a setting of 2.0 mA DC current for 20 min over five times in 2 weeks in which the positive electrode was overlying the skin of the midshaft of the fibula, and the negative electrode centred over the insertion of the Achilles tendon bilaterally (*figure 2*). The patient completed the Foot and Ankle Ability Measure, Activities of Daily Living Subscale, and the Lower Extremity Functional Scale, prior to and after the iontophoresis therapy (*figures 3 and 4*). After introduction of the iontophoresis therapy, the patient's pain scale improved. Following the third iontophoresis treatment, the patient no longer needed the rail during stair ascent and decent, and after the fifth therapy the patient was discharged from physical therapy, reaching his goal of decreased posterior heel pain.

Figure 1 Lateral and calcaneal axial radiographs of the foot and ankle bilaterally demonstrate a posterior calcification of the Achilles tendon at the level of maximal tenderness.

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Figure 2 The transdermal iontophoresis with 4% acetic acid on the negative electrode is placed on the skin over the insertion of the Achilles tendon. The positive electrode is placed on the lateral leg. The iontophoresis theory states that the negatively charged electrode will repel negatively charged ions through tissue.

Prior to treatment

Foot and Ankle Ability Measure (FAAM) Activities of Daily Living Subscale Page 2

Because of your foot and ankle how much difficulty do you have with:

	No Difficulty at all	Slight Difficulty	Moderate Difficulty	Extreme Difficulty	Unable to do	N/A
Home responsibilities	☒	☐	☐	☐	☐	☐
Activities of daily living	☐	☒	☐	☐	☐	☐
Personal care	☒	☐	☐	☐	☐	☐
Light to moderate work (standing, walking)	☐	☒	☐	☐	☐	☐
Heavy work (push/pulling, climbing, carrying)	☐	☐	☒	☐	☐	☐
Recreational activities	☐	☐	☒	☐	☐	☐

How would you rate your current level of function during your usual activities of daily living from 0 to 100 with 100 being your level of function prior to your foot or ankle problem and 0 being the inability to perform any of your usual daily activities.

— 80 . 0 %

After treatment

Foot and Ankle Ability Measure (FAAM) Activities of Daily Living Subscale Page 2

Because of your foot and ankle how much difficulty do you have with:

	No Difficulty at all	Slight Difficulty	Moderate Difficulty	Extreme Difficulty	Unable to do	N/A
Home responsibilities	☒	☐	☐	☐	☐	☐
Activities of daily living	☒	☐	☐	☐	☐	☐
Personal care	☒	☐	☐	☐	☐	☐
Light to moderate work (standing, walking)	☒	☐	☐	☐	☐	☐
Heavy work (push/pulling, climbing, carrying)	☐	☒	☐	☐	☐	☐
Recreational activities	☐	☒	☐	☐	☐	☐

How would you rate your current level of function during your usual activities of daily living from 0 to 100 with 100 being your level of function prior to your foot or ankle problem and 0 being the inability to perform any of your usual daily activities.

— 90 . 0 %

Martin, R; Irrgang, J; Burdett, R; Conti, S; VanSwearingen, J: Evidence of Validity for the Foot and Ankle Ability Measure. Foot and Ankle International. Vol.26, No.11: 968-983, 2005.

Martin, R; Irrgang, J; Burdett, R; Conti, S; VanSwearingen, J: Evidence of Validity for the Foot and Ankle Ability Measure. Foot and Ankle International. Vol.26, No.11: 968-983, 2005.

Figure 3 Foot and Ankle Ability Measure (FAAM) Activities of Daily Living Subscale prior to and after acetic acid iontophoresis therapy. Note the subjective decrease in difficulty in activities of daily living, light to moderate work, heavy work, and recreational activity.

Prior to treatment

The Lower Extremity Functional Scale

We are interested in knowing whether you are having any difficulty at all with the activities listed below because of your lower limb problem for which you are currently seeking attention. Please provide an answer for each activity.

Today, do you or would you have any difficulty at all with:

Activities	Extreme Difficulty or Unable to Perform Activity	Quite a Bit of Difficulty	Moderate Difficulty	A Little Bit of Difficulty	No Difficulty
1 Any of your usual work, housework, or school activities.	0	1	2	3	4
2 Your usual hobbies, recreational or sporting activities.	0	1	2	3	4
3 Getting into or out of the bath.	0	1	2	3	4
4 Walking between rooms.	0	1	2	3	4
5 Putting on your shoes or socks.	0	1	2	3	4
6 Squatting.	0	1	2	3	4
7 Lifting an object, like a bag of groceries from the floor.	0	1	2	3	4
8 Performing light activities around your home.	0	1	2	3	4
9 Performing heavy activities around your home.	0	1	2	3	4
10 Getting into or out of a car.	0	1	2	3	4
11 Walking 2 blocks.	0	1	2	3	4
12 Walking a mile.	0	1	2	3	4
13 Going up or down 10 stairs (about 1 flight of stairs).	0	1	2	3	4
14 Standing for 1 hour.	0	1	2	3	4
15 Sitting for 1 hour.	0	1	2	3	4
16 Running on even ground.	0	1	2	3	4
17 Running on uneven ground.	0	1	2	3	4
18 Making sharp turns while running fast.	0	1	2	3	4
19 Hopping.	0	1	2	3	4
20 Rolling over in bed.	0	1	2	3	4
Column Totals:					

Minimum Level of Detectable Change (90% Confidence): 9 points SCORE: **54/80**

Source: Binkley et al (1999): The Lower Extremity Functional Scale (LEFS): Scale development, measurement properties, and clinical application. *Physical Therapy*. 79:371-383.

After treatment

The Lower Extremity Functional Scale

We are interested in knowing whether you are having any difficulty at all with the activities listed below because of your lower limb problem for which you are currently seeking attention. Please provide an answer for each activity.

Today, do you or would you have any difficulty at all with:

Activities	Extreme Difficulty or Unable to Perform Activity	Quite a Bit of Difficulty	Moderate Difficulty	A Little Bit of Difficulty	No Difficulty
1 Any of your usual work, housework, or school activities.	0	1	2	3	4
2 Your usual hobbies, recreational or sporting activities.	0	1	2	3	4
3 Getting into or out of the bath.	0	1	2	3	4
4 Walking between rooms.	0	1	2	3	4
5 Putting on your shoes or socks.	0	1	2	3	4
6 Squatting.	0	1	2	3	4
7 Lifting an object, like a bag of groceries from the floor.	0	1	2	3	4
8 Performing light activities around your home.	0	1	2	3	4
9 Performing heavy activities around your home.	0	1	2	3	4
10 Getting into or out of a car.	0	1	2	3	4
11 Walking 2 blocks.	0	1	2	3	4
12 Walking a mile.	0	1	2	3	4
13 Going up or down 10 stairs (about 1 flight of stairs).	0	1	2	3	4
14 Standing for 1 hour.	0	1	2	3	4
15 Sitting for 1 hour.	0	1	2	3	4
16 Running on even ground.	0	1	2	3	4
17 Running on uneven ground.	0	1	2	3	4
18 Making sharp turns while running fast.	0	1	2	3	4
19 Hopping.	0	1	2	3	4
20 Rolling over in bed.	0	1	2	3	4
Column Totals:					

Minimum Level of Detectable Change (90% Confidence): 9 points SCORE: **74/80**

Source: Binkley et al (1999): The Lower Extremity Functional Scale (LEFS): Scale development, measurement properties, and clinical application. *Physical Therapy*. 79:371-383.

Figure 4 The Lower Extremity Functional Scale prior to Acetic Acid Iontophoresis Therapy completed by the patient prior to and after the iontophoresis therapy. Note the subjective decrease in difficulty of running, ascending and descending stairs, walking a mile, and performing heavy activities around the home. The minimum level of detectable change increased from 54/80 to 74/80.

Learning points

- ▶ Iontophoresis can be utilised as an alternative to local corticosteroid injection for the treatment of posterior heel pain along with other conservative measures such as stretching, myofascial release and taping.
- ▶ The multifactorial nature of posterior heel pain can be attributed to increasing age, weight gain, biomechanical faults, medications and a myriad of systemic disorders.²
- ▶ Treatment algorithms suggest that after conservative treatment has been exhausted surgical intervention may consist of resection of the offending calcaneal spur and tendon debridement.

Competing interests None.

Patient consent Obtained.

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REFERENCES

- Schepisis AA, Jones H, Haas AL. Achilles tendon disorders in athletes. *Am J Sports Med* 2002;30:287-305.
- Tu P, Bytowski JR. Diagnosis of heel pain. *Am Fam Physician* 2011;84:909-16.
- Aronow MS. Posterior heel pain (retrocalcaneal bursitis, insertional and noninsertional Achilles tendinopathy). *Clin Podiatr Med Surg* 2005;22:19-43.
- Thomas JL, Christensen JC, Kravitz SR, et al. The diagnosis and treatment of heel pain: a clinical practice guideline-revision 2010. *J Foot Ankle Surg* 2010;49(3 Suppl): S1-19.
- Japour CJ, Vohra R, Vohra PK, et al. Management of heel pain syndrome with acetic acid iontophoresis. *J Am Podiatr Med Assoc* 1999;89:251-7.

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