

Extracorporeal Shockwave Therapy for the Treatment of Achilles Tendinopathies

A Prospective Study

Robert Fridman, DPM*
Jarrett D. Cain, DPM, MSc†
Lowell Weil, Jr., DPM, MBA†
Lowell Weil, Sr., DPM†

Background: Extracorporeal shockwave therapy has been shown to be effective in the treatment of chronic tendon pathology in the elbow, shoulder, and plantar fascia. This prospective study examines the efficacy of extracorporeal shockwave therapy in the treatment of chronic Achilles tendon disorders.

Methods: Twenty-three patients (23 feet) were treated with extracorporeal shockwave therapy for Achilles tendinosis, insertional tendonitis, or both. Indications for treatment were a minimum of 6 months of conservative care, and a visual analog pain score > 5. The mean follow-up was 20 months (range, 4–35 months).

Results: Ninety-one percent (14 patients) were satisfied or very satisfied (23 patients) with treatment. Eighty-seven percent (20 patients) stated that extracorporeal shockwave therapy improved their condition, 13% (3 patients) said it did not affect the condition, and none stated that it made them worse. Eighty-seven percent (20 patients) stated they would have the procedure again if given the choice. Four months after extracorporeal shockwave therapy, the mean visual analog score for morning pain decreased from 7.0 to 2.3, and activity pain decreased from 8.1 to 3.1.

Conclusion: High-power extracorporeal shockwave therapy is safe, noninvasive, and effective, and it has a role in the treatment of chronic Achilles tendinopathy. (J Am Podiatr Med Assoc 98(6): 466-468, 2008)

Achilles tendinopathies are common presenting complaints to foot and ankle specialists. The management of Achilles tendinosis and insertional Achilles tendonitis is, at times, difficult to manage. Conservative treatments may include rest, ice, nonsteroidal anti-inflammatory drugs, heel lifts, and physical therapy. Surgical options for recalcitrant Achilles tendinopathies include Haglund's osteotomy with spur resection, Achilles tenolysis with debridement, flexor hallucis longus tendon augmentation, and more recently, Coblation therapy (ArthroCare, Austin, Texas).¹⁻⁴ However, surgical treatment has a considerably high

complication rate. In a series of 432 consecutive patients treated with surgery for chronic insertional Achilles tendonitis, Paavola et al⁵ related an 11% complication rate, including skin-edge necroses, superficial wound infections, seroma formation, hematoma, scar formation, sural nerve irritation, partial rupture, and deep vein thrombosis. Extracorporeal shockwave therapy (ESWT) is noninvasive, and therefore, is not fraught with the same complication possibilities as formal surgery is. Extracorporeal shockwave therapy has been shown to be effective in the treatment of chronic tendon pathology in the elbow, shoulder and plantar fascia.⁶⁻¹⁰ Orhan et al¹¹ conducted animal studies on the effects of ESWT on injured Achilles tendon, which showed significant post-treatment improvement. Furia¹² studied 35 patients with chronic insertional Achilles tendinopathy treated with high-energy ESWT with an 83% success rate. This prospec-

*Weil Foot and Ankle Institute, Des Plaines, IL. Dr. Fridman is now with Department of Orthopaedic Surgery, Columbia University Medical Center, New York, NY.

†Weil Foot and Ankle Institute, Des Plaines, IL.

Corresponding author: Robert Fridman, DPM, Foot Associates of New York, 60 East 56th St, New York, NY 10022. (E-mail: rf2256@columbia.edu)

tive study examines the efficacy of ESWT in the treatment of chronic Achilles tendon disorders with respect to patient-driven results.

Materials and Methods

Twenty-three patients (23 feet) were treated with ESWT for Achilles tendinosis, insertional tendonitis, or both. Indications for treatment were a minimum of 6 months of conservative care, and a modified Wong-Baker FACES visual analog pain score (VAS) > 5. All patients completed a pretreatment questionnaire regarding VAS scores for morning and activity pain, duration of symptoms, and previous treatment. Under intravenous sedation and local anesthesia, the symptomatic tendon was treated with an Orbasone (Orthometrix Inc, White Plains, New York) electrohydraulic ESWT generator using 21 kV, 2 Hz, 2000 pulses divided into two directional applications in dorsiflexion and neutral position of the ankle joint (Figs. 1 and 2). Ultrasound targeting was not found to be necessary for treatment targeting. The patients were discharged and allowed to bear weight as tolerated with athletic shoes for 2 weeks. After 2 weeks, patients were permitted to wear regular shoe gear and return to activities as tolerated. Postoperative questionnaires were completed at 4 months regarding improved condition, willingness to repeat procedure, patient satisfaction, and change in VAS score.

Results

An unpaired Student *t* test was used to statistically analyze VAS pain scores. The mean amount of time

with pain before ESWT was 27 months (range, 6–96 months). The mean follow-up was 20 months (range, 4–35 months). The mean VAS score for morning pain decreased 4 months after ESWT from 7.0 to 2.3, which is statistically significant ($P < .001$). Activity pain decreased a statistically significant degree ($P < .001$) 4 months after ESWT from 8.1 to 3.1. Of the 23 patients, 91% (14 patients) were satisfied with treatment; 30% (7 patients) were very satisfied; and 2 patients were unsatisfied. Eighty-seven percent (20 patients) stated that ESWT improved their condition, 13% (3 patients) said it did not affect the condition, and none stated that ESWT made them worse. Eighty-seven percent (20 patients) stated they would have the procedure again if given the choice.

Discussion

Extracorporeal shockwave therapy has been shown to be effective and safe in treating plantar fasciosis and lateral epicondylitis in a number of clinical trials. Recently, Furia¹² studied 35 patients with chronic insertional Achilles tendinopathy, who were treated with one dose of high-energy ESWT and compared them to patients in a control group. At 1 month, 3 months, and 12 months after treatment, the mean VAS for the control and ESWT groups were 8.2 and 4.2 ($P < .001$), 7.2 and 2.9 ($P < .001$), and 7.0 and 2.8 ($P < .001$), respectively, with 83% of patients in the ESWT group having a successful result. The current study examines the efficacy of ESWT in the treatment of chronic Achilles tendon disorders. Our results are similar to those obtained by Furia,¹² with significant improvement in VAS scores. In contrast, Costa et al¹³



Figure 1. Directional application of extracorporeal shockwave therapy in neutral position of the ankle joint.



Figure 2. Directional application of extracorporeal shockwave therapy in dorsiflexion position of the ankle joint.

conducted a double-blind randomized placebo-controlled trial of ESWT for Achilles tendinosis in 43 patients (20 treatment group, 23 placebo) with follow-up for 1 year. They found no difference between the treatment and placebo groups and had two cases of subsequent tendon rupture in patients older than 60 years of age. Low-power (0.2 mJ/mm^2) ESWT was used three times at 1-month intervals and was titrated according to individual pain tolerance to a maximum of 0.2 mJ/mm^2 .¹³ In our current study all patients received the same pulse amount and strength of treatment—2000 pulses at 21 kV, 2Hz in one operating room session. We feel that this protocol may allow patients to begin to return to function at a more structured pace, and could therefore be a reason for the difference between the study by Costa et al and our own. There were no complications in either this prospective study, or with any other of our patients undergoing ESWT. Ninety-one percent of patients were either satisfied or very satisfied with the outcome of the procedure, and pain scores dramatically decreased for both morning and activity pain on the VAS 4 months postoperatively. We conclude that high-power ESWT is safe, noninvasive, and effective, and has role in the treatment of chronic Achilles tendinopathy.

Financial Disclosure: None reported.

Conflict of Interest: None reported.

References

1. KRISHNA SAYANA M, MAFFULLI N: Insertional Achilles tendinopathy. *Foot Ankle Clin* **10**: 309, 2005.
2. JÄRVINEN TA, KANNUS P, MAFFULLI N, ET AL: Achilles tendon disorders: etiology and epidemiology. *Foot Ankle Clin* **10**: 255, 2005.
3. WILCOX DK, BOHAY DR, ANDERSON JG: Treatment of chronic Achilles tendon disorders with flexor hallucis longus tendon transfer/augmentation. *Foot Ankle Int* **21**: 1004, 2000.
4. JOHNSTON E, SCRANTON P JR, PFEFFER GB: Chronic disorders of the Achilles tendon: results of conservative and surgical treatments. *Foot Ankle Int* **18**: 570, 1997.
5. PAAVOLA M, ORAVA S, LEPPILAHTI J, ET AL: Chronic Achilles tendon overuse injury: complications after surgical treatment. An analysis of 432 consecutive patients. *Am J Sports Med* **28**: 77, 2000.
6. TASTO JP: The use of bipolar radiofrequency microtenotomy in the treatment of chronic tendinosis of the foot and ankle. *Tech Foot Ankle Surg* **5**: 110, 2006.
7. OGDEN JA, ALVAREZ R, LEVITT R, ET AL: Shock wave therapy for chronic proximal plantar fasciitis. *Clin Orthop Relat Res* **387**: 47, 2001.
8. BUCHBINDER R, GREEN SE, YOUNG JM, ET AL: Shock wave therapy for lateral elbow pain. *Cochrane Database Syst Rev* **19**: CD003524, 2005.
9. ROMPE JD, HOPF C, KULLMER K, ET AL: Analgesic effect of extracorporeal shock-wave therapy on chronic tennis elbow. *J Bone Joint Surg [Br]* **78B**: 233, 1996.
10. WEIL LS JR, ROUKIS TS, WEIL LS, ET AL: Extracorporeal shock wave therapy for the treatment of chronic plantar fasciitis: indications, protocol, intermediate results, and a comparison of results to fasciotomy. *J Foot Ankle Surg* **41**: 166, 2002.
11. ORHAN Z, ÖZTÜREN K, GÜVEN A, ET AL: The effect of extracorporeal shock waves on a rat model of injury to tendo Achillis: a histological and biomechanical study. *J Bone Joint Surg [Br]* **86B**: 613, 2004.
12. FURIA JP: Extracorporeal shockwave therapy in the treatment of chronic insertional Achilles tendinopathy. *Orthopade* **34**: 571, 2005.
13. COSTA ML, SHEPSTONE L, DONELL ST, ET AL: Shock wave therapy for chronic Achilles tendon pain: a randomized placebo-controlled trial. *Clin Orthop Relat Res* **440**: 199, 2005.