

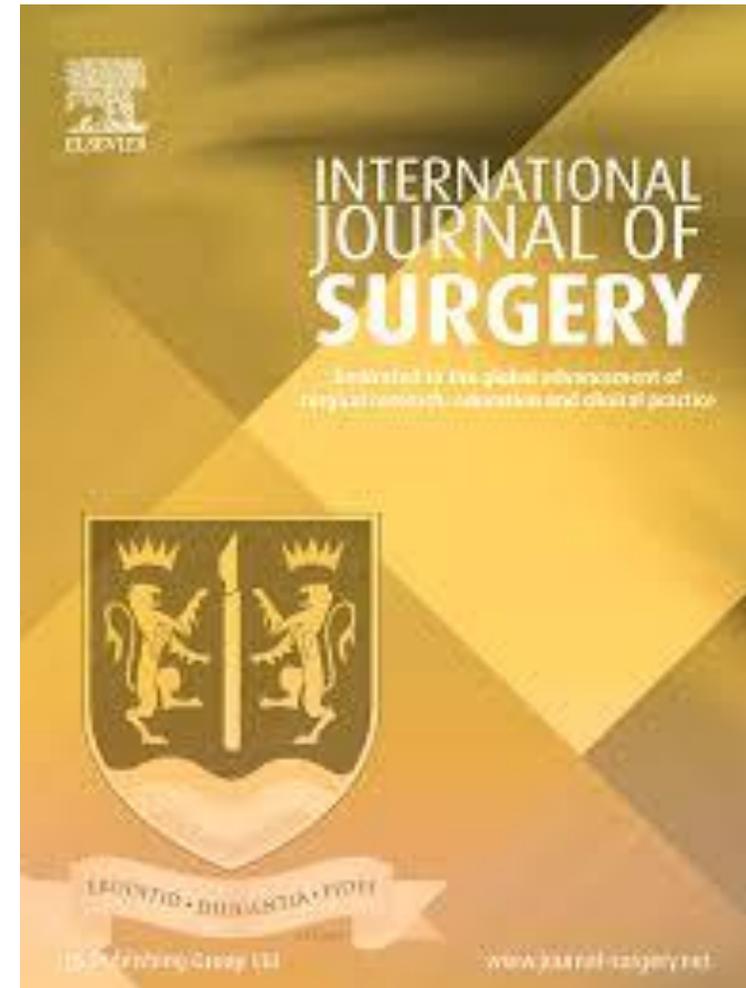
# Shockwave Treatment for Proximal Plantar Fasciitis



המרכז הישראלי לטיפול בגלי הלים (2005)

ד"ר דן צין, מומחה באורתופדיה

Extracorporeal Shockwave Treatment (ESWT)  
- Current Concepts  
Edited by Kandiah Raveendran  
Volume 24, Part B, Pages 113-222  
(December 2015)



JB&JS

THE *Journal* OF *Bone*  
& *Joint Surgery*

CURRENT CONCEPTS REVIEW

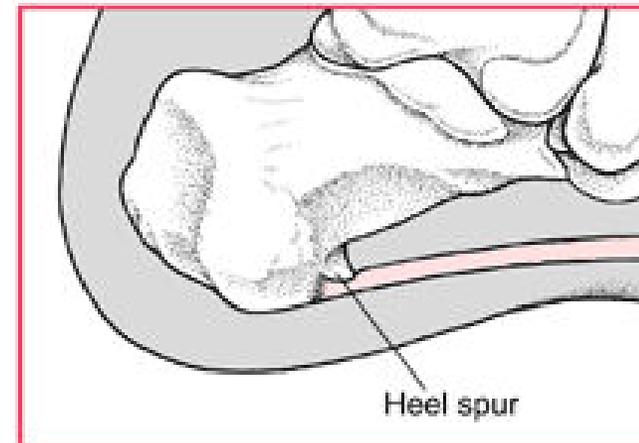
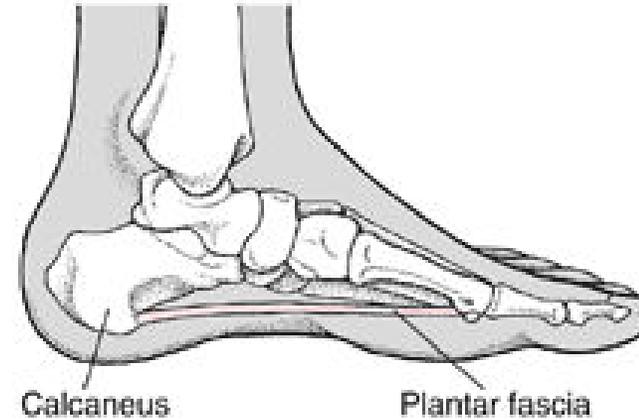
# The Role of Extracorporeal Shockwave Treatment in Musculoskeletal Disorders

Daniel Moya, MD, Silvia Ramón, MD, PhD, Wolfgang Schaden, MD, Ching-Jen Wang, MD,  
Leonardo Guiloff, MD, and Jai-Hong Cheng, MD

J Bone Joint Surg Am. 2018;100:251-63

# ESWT for Proximal Plantar Fasciitis

- Initial treatment for PPF is non-operative
- 10-20% of all patients do not respond to conservative treatment for 4-6 months and are candidates for more aggressive managements – ESWT or surgery



# Extracorporeal Shock Wave for Chronic Proximal Plantar Fasciitis: 225 Patients with Results and Outcome Predictors

*JFAS 2009*

A retrospective review. Level of Clinical Evidence: 2

225 patients (246 feet) ESWT treatment

PF > 6m Follow-up  $30.2 \pm 8.7$  months

Success rates - 70.7% at 3 months , 77.2% at 12 months

Previous cortisone injections, body mass index, duration of symptoms, presence of bilateral symptoms, and plantar fascia thickness did not influence the outcome of ESWT.

Diabetes mellitus, psychological issues, and age were found to negatively influence ESWT outcome.



# Long-term Results of Extracorporeal Shockwave Treatment for Plantar Fasciitis

## *AJSM 2006*

Prospective study

149 patients (168 heels)

79 patients (85 heels) in the shockwave treatment group

70 patients (83 heels) in the control group.

1500 impulses of shockwaves at 16 kV to the affected heel in a single session.

Control group received conservative treatment

FU 60 to 72 months (shockwave group)

34 to 64 months (control group)

Results

SW 69.1% excellent, 13.6% good, 6.2% fair, and 11.1% poor

Control 0% excellent, 55% good, 36% fair, and 9% poor (P< .001).

Recurrence rate was 11% SW vs 55% Control (P< .001).

There were no systemic or local complications or device-related problems.



## Radial Extracorporeal Shock Wave Therapy is Safe and Effective in the Treatment of Chronic Recalcitrant Plantar Fasciitis: Results of a Confirmatory Randomized Placebo-Controlled Multicenter Study *AJSM 2008*

**Randomized, controlled trial; Level of evidence, 1**

245 Pts.

Three interventions of radial ESWT (0.16 mJ/mm<sup>2</sup>; 2000 impulses) compared with placebo

FU 12W and 12M

Results

Reduction of the VAS composite score of 72.1% compared with 44.7% ( $P = .0220$ )

Overall success rate of 61.0% compared with 42.2% ( $P = .0020$ ) at 12 weeks.

**Superiority was even more pronounced at 12 months**, and all secondary outcome measures supported radial extracorporeal shock wave therapy to be significantly superior to placebo ( $P < .025$ , 1-sided). No relevant side effects were observed.

# Chronic Plantar Fasciitis Treated with Two Sessions of Radial Extracorporeal Shock Wave Therapy

## *FAI 2010*

### **Level of Evidence: I, Prospective Randomized Study**

50 pts

RSWT ( $n = 25$ ) or placebo treatment ( $n = 25$ ).

RSWT was applied in two sessions 1 week apart (2,000 impulses with energy flux density =  $0.16 \text{ mJ/mm}^2$  per session).

Placebo treatment was performed with a clasp on the heel

FU 4W, 12W, 24W

Mean VAS reduced after RSWT from  $8.5 \pm 0.3$

$0.6 \pm 1.5$  at 4 w

$1.1 \pm 0.3$  at 12 w

$0.5 \pm 0.1$  at 24 w

Statistical analysis demonstrated that RSWT resulted in significantly reduced mean VAS scores and mean RM scores at all follow up intervals compared to placebo treatment (each with  $p < 0.001$ ).

No serious adverse events of RSWT were observed.

# High-Energy Extracorporeal Shock-Wave Therapy (ESWT) for the Treatment of Chronic Plantar Fasciitis

*FAI 2010*

## **Level of Evidence: IV, Retrospective Case Series**

63 pts (73 heels)

Routinely, 1000 shock wave impulses (frequency 2 per second, energy flux density (ED)  $0.35 \text{ mJ/mm}^2$  at 10.5 kV, total dose  $350 \text{ mJ/mm}^2$ ) were applied per treatment.

FU 6 weeks after ESWT, second clinic evaluation, final follow up at an average of **73 months after ESWT by telephone**.

The success of ESWT, defined as a 30% VAS reduction, was seen in 81% at 6w, 88% at last clinic visit, 96% at final phone follow up.

Conclusion: High-energy ESWT ( $0.35 \text{ mJ/mm}^2$ ) was successful in the treatment of plantar fasciitis and the good short-term results seemed to be maintained over time.

**Shock Wave Application for Chronic Plantar Fasciitis in Running Athletes: A Prospective, Randomized, Placebo-Controlled Trial**  
*Am J Sports Med 2003*

45 running athletes with intractable plantar heel pain for more than 12 months

half -treatment group three applications of 2100 impulses of low-energy shock waves,

half - sham treatment.

Follow-up at 6 months and at 1 year by a blinded observer.

After 6 months, VAS reduced 6.9 to 2.1 in the treatment group  
7.0 to 4.7 points in the sham group.

After 12 months: 1.5 points in the treatment group, 4.4 points in the sham group.

## Extracorporeal Shock Wave Therapy for Chronic Painful Heel Syndrome: A Prospective, Double Blind, Randomized Trial Assessing the Efficacy of a New Electromagnetic Shock Wave Device

*J Foot Ankle Surg 2007*

Published data describing the efficacy of [extracorporeal shock wave therapy](#) for the treatment of plantar [heel pain](#) provide conflicting results, and optimal treatment guidelines are yet to be determined. To assess the efficacy and safety of extracorporeal shockwave therapy compared with placebo in the treatment of chronic painful heel syndrome with a new electromagnetic device, we undertook a prospective, double-blind, randomized, placebo-controlled trial conducted among 40 participants who were randomly allocated to either active, focused extracorporeal shockwave therapy (0.25 mJ/mm<sup>2</sup>) or sham shockwave therapy. Both groups received 3 applications of 2000 shockwave impulses, each session 1 week apart. The primary outcome was the change in composite heel pain (morning pain, pain with activities of daily living, and pain upon application of pressure with a focal force meter) as quantified using a visual analog [pain scale](#) at 12 weeks after completion of the interventions compared with baseline. Secondary endpoints included changes in morning pain, pain with activities of daily living, and pain upon application of pressure with a focal force meter, as measured on a visual analog pain scale, as well as the change in the Roles and Maudsley score, at 12 weeks after the baseline measurement. Active extracorporeal shockwave therapy resulted in a 73.2% reduction in composite heel pain, and this was a 32.7% greater reduction than that achieved with placebo. The difference was not statistically significant (1-tailed Wilcoxon Mann-Whitney *U* test, *P* = .0302), but reached clinical relevance (Mann-Whitney [effect size](#) = 0.6737). In regard to the secondary outcomes, active extracorporeal shockwave therapy displayed relative superiority in comparison with the sham intervention. No relevant adverse events occurred in either intervention group. The results of the present study support the use of electromagnetically generated extracorporeal shockwave therapy for the treatment of refractory plantar heel pain.

## **Randomized, placebo-controlled, double-blind clinical trial evaluating the treatment of plantar fasciitis with an extracorporeal shockwave therapy (ESWT) device: A North American confirmatory study**

***J Orthop Res 2006***

multicenter, randomized, placebo-controlled, double-blind, confirmatory clinical study undertaken in four outpatient orthopedic clinics. The patients, 114 adult subjects with chronic plantar fasciitis, recalcitrant to conservative therapies for at least 6 months, were randomized to two groups. Treatment consisted of approximately 3,800 total shock waves ( $\pm 10$ ) reaching an approximated total energy delivery of 1,300 mJ/mm<sup>2</sup> (ED+) in a single session versus placebo treatment. This study demonstrated a statistically significant difference between treatment groups in the change from baseline to 3 months in the primary efficacy outcome of pain during the first few minutes of walking measured by a visual analog scale. There was also a statistically significant difference between treatments in the number of participants whose changes in Visual Analog Scale scores met the study definition of success at both 6 weeks and 3 months posttreatment; and between treatment groups in the change from baseline to 3 months posttreatment in the Roles and Maudsley Score. The results of this study confirm that ESWT administered with the Dornier Epos Ultra is a safe and effective treatment for recalcitrant plantar fasciitis

## **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 2002*

40 feet, follow-up time of 8.4 months.

IV sedation and local anesthesia.

An electrohydraulic shock wave with a mean of 20.6 kV combined with a mean of 2,506 pulses was used.

The results of a similar demographic class of patients having undergone a percutaneous plantar fasciotomy at our institution were compared to the results of this cohort of shock wave patients.

Success: 82% ESWT vs 83% percutaneous plantar fasciotomy

There were no complications encountered in any patient in this study.

ESWT is an effective treatment, which significantly reduces the symptoms associated with chronic plantar fasciitis and compares favorably to the results achieved with surgical intervention in the form of a percutaneous plantar fasciotomy.

## Endoscopic plantar fasciotomy versus extracorporeal shock wave therapy for treatment of chronic plantar fasciitis

*Arch Orthop Trauma Surg 2010*

prospective study

37 patients

17 patients endoscopic plantar fasciotomy (EPF); FU

11 months.

20 patients ESWT; FU 7.6 months.

			Limitations of activity			
	VAS pre	VAS post	No	minimal	Moderate	Pts satisfaction
EPF	9.1	1.6	58.8%	35.3%	5.9%	82.3%
ESWT	9	2.1	50%	35%	10%	75%

Because of better results with endoscopic release versus the benefits of no complications, no immobilization, and early resumption of full activities with ESWT, we conclude that ESWT is a reasonable earlier line of treatment of chronic plantar fasciitis before EPF.

## סיכום

- למצבים כרוניים - < 6 ח'
- ריפוי תוך 3 ח'.
- הצלחה 70%
- תוצאות מתקרבות לטיפול ניתוחי
- תופעות לוואי – כאב בלבד.