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Step Up Your Foot Care

A Guide to Using Extracorporeal Shockwave Therapy and High-Intensity Laser Therapy to Treat Plantar Fasciitis

TABLE OF CONTENTS

A BRIEF INTRODUCTION TO PLANTAR FASCIITIS

The plantar fascia is a tough band of tissue that runs along the base of the foot. It plays a critical role in maintaining the foot biomechanics during walking and running, providing arch support and absorbing shock. The plantar fascia can become irritated and painful, resulting in a diagnosis of plantar fasciitis. The condition is usually triggered by increased activity, but other factors may also contribute, such as excessive weight gain and changes in footwear.[1,2]

The pain from plantar fasciitis typically presents in the heel and is at its worst in the morning after getting out of bed.[1,2] The pain can improve after some movement, but it tends to return as activity levels increase throughout the day. Plantar fasciitis is a common condition affecting 10% of the general population in the United States and is the cause of a million patient clinic visits annually. Runners and those aged 40-60 years old are affected the most.[2]

This guide contains evidence-based treatment strategies to help treat this prevalent condition.

COMMON TREATMENT STRATEGIES

The first step in managing plantar fasciitis is addressing the behavior that contributed to the initiation of the foot pain. Patients should avoid the activity that most likely caused the condition (e.g., running, jumping, wearing shoes with poor arch support).[1,2]

Treatment plans should include conservative measures such as:

- Loading and stretching exercises for the plantar fascia, Achilles tendon, and gastrocnemius and soleus muscles
- Nonsteroidal anti-inflammatory drugs (NSAIDs) and ice to help with the pain
- Manual therapy
- Taping
- Orthotics and night splints
- Weight loss education[1-3]

If these conservative measures are not effective, other invasive treatment options may include:

- Botulinum toxin A injections
- Platelet-rich plasma (PRP) injections
- Steroid injections
- Dry needling
- Gastrocnemius recession surgery, for those not responding to other treatments for at least 6 to 12 months.[1-3]

Before pursuing more invasive treatments, which may present potential risks and side effects, consider trying non-invasive high-intensity laser therapy and shockwave therapy. Next, we'll review the clinical guidelines that support these two modalities as treatment options for plantar fasciitis pain.

HIGH-INTENSITY LASER THERAPY AND EXTRACORPOREAL SHOCKWAVE THERAPY FOR PLANTAR FASCIITIS: WHAT THE CLINICAL GUIDELINES SAY

Before considering invasive therapies, two non-invasive treatments have been shown to be effective for plantar fasciitis: high-intensity laser therapy (HILT) and extracorporeal shockwave therapy (ESWT).

Although an important part of most care plans, exercise and stretching activities can often be uncomfortable. Using HILT and ESWT modalities can help manage pain in the clinic, which can open doors to more advanced loading exercises on the day of treatment.

Numerous research studies have confirmed the benefits of HILT and ESWT in treating plantar fasciitis, and Clinical Practice Guidelines have updated their recommendations to align with the scientific evidence.

The APTA's Guidelines

The recently revised 2023 Clinical Practice Guidelines on Heel Pain - Plantar Fasciitis from the American Physical Therapy Association (APTA) gave laser therapy a positive recommendation.[3]

The guidelines affirm that clinicians **should** use laser therapy as part of their rehabilitation program in those with acute or chronic plantar fasciitis to decrease pain.[3]

Scan the code for a summarized recap of the APTA's laser therapy recommendations.

The American Academy of Family Physicians Guidelines

The American Academy of Family Physicians guidance recommends ESWT in the treatment of chronic plantar fasciitis that has not responded to other conservative treatments.[4]

Best Practice Guide

Morrissey and colleagues generated a best practice guide and recommend the following for plantar fasciitis treatment and when to incorporate ESWT:

- The core approach (taping, stretching, exercising, and educating) should be used for approximately 4-6 weeks before consideration of adjunctive interventions such as ESWT or orthoses.
- ESWT had minimal documented adverse events and had positive effects in the short term, medium term, and long term for the most patient-reported outcomes.
- ESWT had the best evidence of any adjunctive treatment, including dry needling, and is therefore the next best course of treatment, followed by orthoses, if the core approach is unsuccessful.[5]

Extracorporeal Shockwave Therapy in the Treatment of Plantar Fasciitis

Enovis offers evidence-based shockwave modalities that can help improve patient outcomes for those with plantar fasciitis.

Chattanooga Shockwave Devices

Intelect®
Mobile 2 RPW

Intelect®
RPW 2

Intelect®
Focus Shockwave

The Chattanooga Intelect Focus Shockwave (FSW) is indicated for extracorporeal shockwave treatment of heel pain due to chronic proximal plantar fasciitis for patients aged greater than 18 years with a history of failed alternative conservative therapies for at least six months.

The Chattanooga Intelect RPW 2 is intended to be used to temporarily increase blood flow and help reduce muscle aches and pains associated with:

- Myofascial trigger points
- Multiple tendinopathies
- Disorders of tendon insertions
- Plantar fasciitis

Research Review

Clinically relevant effectiveness of focused extracorporeal shock wave therapy in the treatment of chronic plantar fasciitis: a randomized, controlled multicenter study

Gollwitzer and colleagues conducted a randomized controlled trial to study the effectiveness of focus shockwave (FSW) in treating chronic plantar fasciitis. Patients were randomized to receive either 3 sessions of FSW or 3 sessions of placebo FSW. The pain score in the FSW-treated group decreased by 35% more than the placebo group at the 12-week follow-up. The study demonstrated that FSW is both statistically and clinically superior to placebo treatment.[6]

Scan the QR code to review the full study.

Research Review

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

Gerdesmeyer et al. studied the effect of radial pressure wave (RPW) therapy on chronic plantar fasciitis. Patients were randomized to receive three sessions of RPW treatment or three sessions of placebo RPW treatment. The patients in the RPW group had significantly lower pain scores than the placebo group at the 12-week follow-up. The pain relief lasted up to 12 months follow-up. The study investigators concluded that RPW can be strongly recommended for patients with chronic therapy-resistant plantar fasciitis.[7]
Scan the QR code to review the full study.

Research Review

Efficacy of extracorporeal shockwave therapy, compared to corticosteroid injections, on pain, plantar fascia thickness and foot function in patients with plantar fasciitis: A systematic review and meta-analysis

A systematic review and meta-analysis was recently published by Cortés-Pérez et al. that compared the efficacy of ESWT to invasive corticosteroid injections in the treatment of plantar fasciitis. Studies were included that used FSW or RPW. The meta-analysis revealed that ESWT, at 3 and 6 months post-treatment, reduces pain and improves foot function better than corticosteroid injections. The review also concluded that ESWT is a safe treatment option with only local pain and slight erythema being reported in both the ESWT and corticosteroid-treated groups.[8]
Scan the QR code to review the full study.

Based on this body of research, many clinicians are turning to shockwave therapy to augment manual therapies to help improve patient outcomes without more invasive treatments.

High-Intensity Laser Therapy in the Treatment of Plantar Fasciitis

Check out the Enovis lineup of LightForce therapy high-intensity lasers. LightForce lasers are FDA-cleared to treat minor muscle and joint pain, joint stiffness, arthritis pain, and muscle spasms. In addition, research has demonstrated the effectiveness of high-intensity lasers in treating pain from plantar fasciitis.[9,10]

LightForce Therapy Lasers

LightForce FXi Therapy Laser | 15W

LightForce XPi Therapy Laser | 25W

LightForce XLi Therapy Laser | 40W

Photobiomodulation Therapy Plus Usual Care Is Better than Usual Care Alone for Plantar Fasciitis: A Randomized Controlled Trial

Ann K Ketz, Juanita Anders, Judy Orina, Betty Garner, Misty Hull, Nicholas Koreerat, Jeff Sorensen, Candice Turner, James Johnson

Published in: International Journal of Sports Physical Therapy, 2024, 19(1); DOI: 10.26603/001c.90589

The purpose of this study was to assess the clinical impact of high-intensity laser therapy, also known as photobiomodulation therapy (PBMT), on pain and function in people with plantar fasciitis (PF). Specifically, the authors wanted to compare a standardized dose (10 J/cm^2) with different output power to see if outcomes were different.

Design

Prospective, randomized controlled clinical trial

Participants

One hundred fourteen patients who were between 18-65 years of age with symptoms of PF for at least 3 months were included and randomized into 3 groups.

- Usual Care (UC) – 6 week exercise program completed daily
- UC + PBMT delivered at 10 W
- UC + PBMT delivered at 25 W
- PBMT treatments were delivered 3x/week for 3 weeks using a 25 W high power LightForce® therapy laser

Results

Pain and function were measured over a short-term (6 weeks) period for all groups and a long-term (6 months) period for the PBMT groups.

- **Pain**: After the 3 weeks of treatment, participants treated with PBMT (10 W or 25 W) had reductions in pain compared to the usual care group. The pain reduction was greater than two points on the visual analogue scale, indicating that the reduction was both clinically meaningful and statistically significant. This reduction in pain was maintained out to 6 weeks. There were no differences between the 10 W and 25 W PBMT groups. It was also found that participants in the PBMT groups used less pain medication (non-steroidal anti-inflammatory drugs) over time than the usual care group. Long-term follow-up showed stable pain scores in both PBMT groups.
- **Function**: Both PBMT groups had clinically significant changes in the sports subscale of the Foot and Ankle Ability Measure compared to the usual care group.
- **Tolerance**: No adverse events were reported for PBMT treatment, indicating that treatment is safe. All participants tolerated treatment well, regardless of Fitzpatrick skin scale.

Take Home Message

- PBMT added to usual care resulted in significant improvement of pain compared to usual care only, and the improvement was maintained for up to 6-months follow-up.
- Dosing is key! A dose of 10 J/cm^2 is a safe and effective treatment for patients with plantar fasciitis. Increasing output power allows for safe and effective treatment at a faster rate of delivery.

Why were the outcomes similar for 10 W and 25 W?

- It makes sense that since plantar fascia is not a deep tissue, higher power/irradiance is not required to provide effective treatment. Additional studies should be done in deeper tissues to reinforce the benefits of higher power.
- It is important to note the benefit in this study of using the higher power 25 W laser, which allowed clinicians to treat 2.5x faster than when using 10 W.

The effect of high-intensity versus low-level laser therapy in the management of plantar fasciitis: a randomized clinical trial

Banu Ordahan, Ali Yavuz Karahan, Ercan Kaydok

Published in: Lasers in Medical Science, 2018 https://doi.org/10.1007/s10103-018-2497-6

This clinical trial compared high-intensity laser therapy (HILT) with low-level laser therapy (LLLT) in the treatment of plantar fasciitis symptoms.

Seventy-five patients with plantar fasciitis unresponsive to conservative treatment were enrolled in the trial. Patients were randomized to receive HILT or LLLT. Both groups completed 3 treatment sessions per week for 3 weeks.

- **HILT group**
  Patients received treatment with a 12 W laser. The first 3 sessions used pulsed wave therapy for 75 seconds, 8 W, 6 J/cm^2. The following 6 sessions used continuous wave therapy for 30 seconds, 6 W, 120-150 J/cm^2.

- **LLLT group**
  Patients received treatment from a laser with an output power of 240 mW. Treatment was given over the tendon insertion at 0.16 W/cm^2 and over the medial border of the fascia at 0.08 W/cm^2. Each treatment session was for 157.5 seconds.

In addition to laser therapy, both groups were instructed to wear an insole and to complete home exercises twice daily.

Patients were assessed for pain using the visual analogue scale (VAS) and Heel Tenderness Index (HTI). They were evaluated for function and quality of life using the Foot and Ankle Outcome Score (FAOS).

After 3 weeks of treatment, both the HILT and LLLT groups demonstrated significant improvement in all outcome measures. However, the HILT group improved significantly more than the LLLT group. For example, VAS scores decreased by 33.4% for the LLLT group, but the HILT group scores decreased by 69%.

The study concludes that HILT and LLLT improve patient pain, function, and quality of life. However, HILT yields even better outcomes for plantar fasciitis patients than LLLT.

Clinical studies support the use of both ESWT and HILT for plantar fasciitis, but should the modalities be combined? In the next section, we'll review the benefits of combining both treatments.

Are Two Modalities Better than One?

While both ESWT and HILT have been shown to improve outcomes in patients with plantar fasciitis, a study by Takla et al. demonstrated that combining the Intelect Focus Shockwave unit and laser therapy can give patients even better outcomes than laser therapy or ESWT alone.[11]

Clinical effectiveness of multi-wavelength photobiomodulation therapy as an adjunct to extracorporeal shock wave therapy in the management of plantar fasciitis: a randomized controlled trial

Mary Kamal Nassif Takla and Soheir Shethata Rezk-Allah Rezk

Published in: Lasers in Medical Science, 2019 https://doi.org/10.1007/s10103-018-2632-4

This clinical trial evaluated the effectiveness of combining extracorporeal shockwave therapy (ESWT) with laser therapy, also known as photobiomodulation therapy (PBMT), to treat pain and disability in patients with plantar fasciitis.

One hundred twenty patients with plantar fasciitis for more than 6 months and unresponsive to conservative treatment were enrolled in the trial. Patients were randomized to one of the following groups:

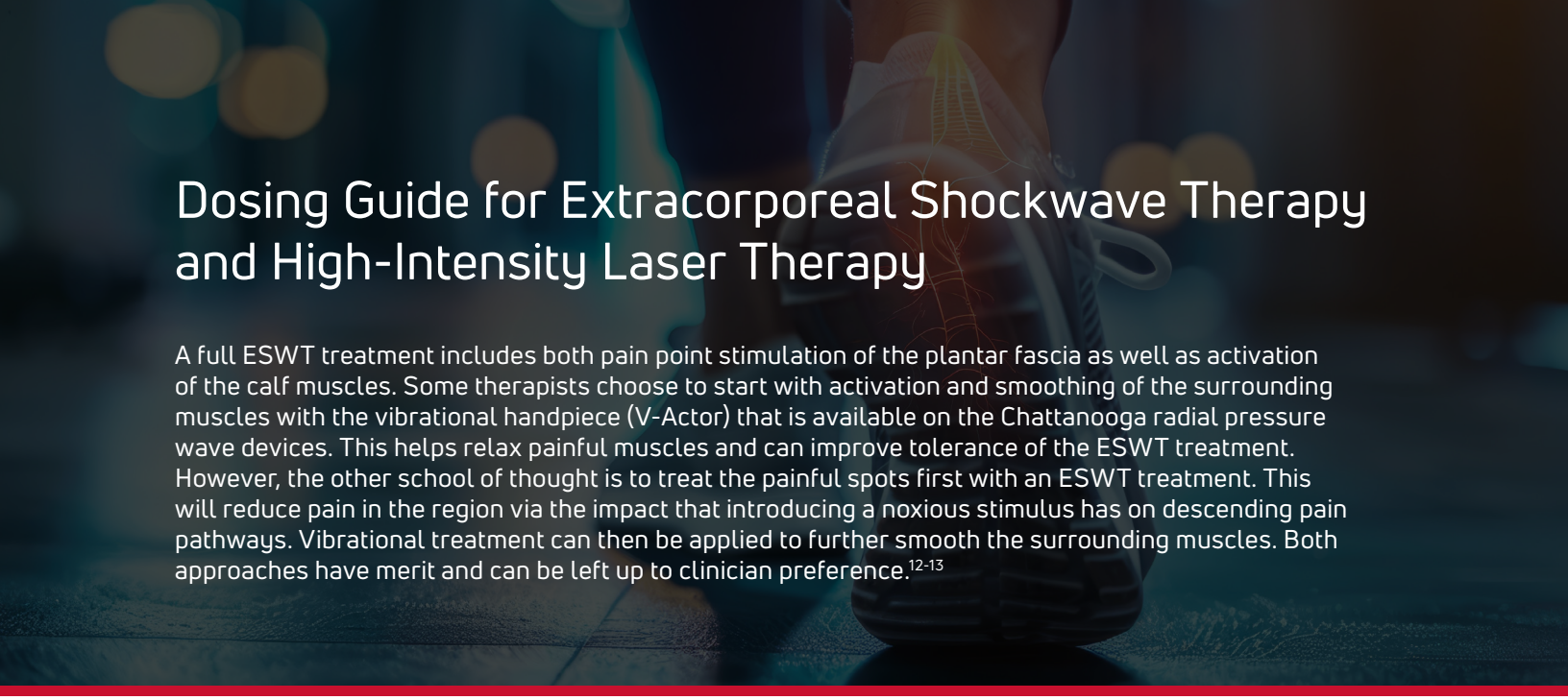
- **ESWT**
  Patients in this group were treated with the Chattanooga® Intelect® Focus Shockwave. Treatment sessions were completed once a week for 3 weeks and consisted of 2000 pulses at an energy level between 0.22 and 0.28 mJ/mm^2.
- **PBMT**
  Patients in this group received photobiomodulation therapy at a dose of 2.8 J/cm^2 for 60 seconds per session. Treatments were completed 3 times a week for 3 weeks.
- **ESWT + PBMT**
  Treatment parameters for this group were the same as those described for each of the single-therapy groups. Patients received one ESWT and 3 PBMT treatments per week. Once a week, ESWT and PBMT were administered consecutively, with ESWT being given prior to PBMT.
- **Sham PBMT**
  Patients in this group received sham PBMT 3 times a week for 3 weeks, where no power was emitted from the device.

Study outcomes included pressure pain threshold (PPT), VAS pain score, and the functional foot index disability subscale (FFI-d). The ESWT, PBMT, and ESWT + PMBT groups showed improvement in all outcome scores after 3 weeks of treatment, with further improvement at the 12 week follow-up. The ESWT + PBMT group was superior to either treatment alone in reducing pain and disability.

VAS pain scores for the ESWT + PBMT group decreased by 90.5% at the 12-week follow-up, and the FFI-d scores decreased by 56.2%! In comparison, the Sham PBMT group's VAS pain scores increased by 3.8%, and the FFI-d scores increased by 0.6%.

The authors concluded that both ESWT and PBMT are effective treatments for reducing pain and improving function in patients with plantar fasciitis. However, combining the two treatments gives the best results.

Are you missing out on having these modalities in your clinic?
Scan the QR code to schedule a demonstration or to get a quote for a high-intensity laser therapy or shockwave device
www.chattanoogarehab.com/us/request-a-quote



Dosing Guide for Extracorporeal Shockwave Therapy and High-Intensity Laser Therapy

A full ESWT treatment includes both pain point stimulation of the plantar fascia as well as activation of the calf muscles. Some therapists choose to start with activation and smoothing of the surrounding muscles with the vibrational handpiece (V-Actor) that is available on the Chattanooga radial pressure wave devices. This helps relax painful muscles and can improve tolerance of the ESWT treatment. However, the other school of thought is to treat the painful spots first with an ESWT treatment. This will reduce pain in the region via the impact that introducing a noxious stimulus has on descending pain pathways. Vibrational treatment can then be applied to further smooth the surrounding muscles. Both approaches have merit and can be left up to clinician preference.[12-13]

Radial Pressure Wave Therapy with the Intelect RPW 2

Muscle Activation and Smoothing with RPW[12,13]

Position	Prone position with foot hanging over the end of the table or supported on a roll.
Where	Treat the Gastrocnemius, Soleus, and intrinsic muscles of the sole of the foot.
Dosage	Typically requires 3-6 treatments every 5-10 days. Combine this treatment with RPW on the painful points of the plantar fascia.
Intensity	2.0 Bar - 3.0 Bar
Pulses	2000
Frequency	15 Hz
Transmitter	D 20

Treating Over the Plantar Fascia with RPW[12,13]

Position	Prone position with foot hanging over the end of the table or supported on a roll.
Where	Localize the painful points on the sole of the foot with manual palpation. Then, use the RPW handpiece on the pain points with small circular movements.
Dosage	Typically requires 3-6 treatments every 5-10 days. Combine this treatment with activation and smoothing of the surrounding muscles.
Intensity	1.6 Bar - 2.8 Bar
Pulses	1500-2000
Frequency	10-15 Hz
Transmitter	DI 15/ Ro40

Focus Shockwave Therapy with the Intelect FSW

If the clinician has access to both RPW and FSW devices, the clinician can use the RPW device to activate and smooth the surrounding muscles as described in the Muscle Activation and Smoothing with RPW table above and then use the FSW device to treat the painful plantar fascia.[14]

Treating Over the Plantar Fascia with FSW[6,13]

Position	Prone position with foot hanging over the end of the table or supported on a roll.
Where	Localize the painful points on the sole of the foot with manual palpation. Treat the painful points with the handpiece held at each spot.
Dosage	Typically requires at least 3 treatment sessions at weekly intervals.
Intensity*	0.2-0.3 mJ/mm^2
Pulses	2000
Frequency	4 Hz
Stand-off	Use stand-off 1 for medium penetration (up to 105 mm)

**Clinicians may choose to start at a lower intensity (0.01-0.25 mJ/mm^2) and increase the intensity over 500 shocks to introduce the patient to the therapy.[6]*

Laser Therapy with LightForce High-Intensity Lasers

A recent retrospective study on the efficacy of LightForce therapy lasers demonstrated that high-intensity laser therapy successfully reduced pain by at least 30% for patients suffering from plantar fasciitis. These were patients treated with the LightForce therapy laser pre-set protocol for plantar fasciitis.[15]

93% of patients treated for plantar fasciitis had a clinically significant reduction in pain after at least 4 weeks of treatment.

Based on the pre-set laser protocol and publication by Ketz et al.,[9] laser therapy parameters are suggested in the table below for treating the pain associated with chronic plantar fasciitis.

Laser Therapy Dosing Parameters

Position	Prone position with foot hanging over the end of the table or supported on a roll.
Where	Treat over the calf and the sole of the foot. Recommended to use the massage ball attachment head.
Dosage	Typically requires 3 treatment sessions per week for 3 weeks.
Power	18-40 W
Time	250 s at 18 W; 112.5 s at 40 W
Total Energy	4500 J
Energy Density	Approximately 10 J/cm^2, depending on size of foot and calf

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