

Comparing the Use of Shockwave Therapy as Single Therapy and Shockwave Therapy in Combination with Laser Therapy for Lateral Epicondylitis, Plantar Fasciitis and Calcar Calcanei – Preliminary Study

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Device name:

BTL-5000 SWT POWER, BTL-5000 Laser

Aim:

Evaluating the efficacy of the shockwave therapy in combination with laser therapy for the treatment of lateral epicondylitis, plantar fasciitis and calcar calcanei.

Method:

The study compares the results of the combination of shockwave and laser treatment with the results of shockwave treatment as a single therapy.

The study was carried out in more practices worldwide and the results from a group of 96 patients for the period of 4 months were collected.

All participants used the radial shockwave therapy unit for the treatment according to the recommended protocol.

The laser therapy was applied immediately after finishing shockwave treatment for one group of patients.

The intensity of pain was evaluated by VAS questionnaire before and after each treatment.

Results:

The patients showed a considerable pain level decrease after four treatments.

Good and excellent results were obtained in 44 patients (90%) from group A (SWT+laser therapy) comparing to 30 patients (75%) of group B (only SWT treatment).

Conclusion:

Preliminary results confirm that using of laser therapy after shockwave therapy brings more effective results compared to single shockwave treatment.

Even if the already published studies show very good results of shockwave treatment for investigated indications, the shockwave therapy should not be used as a monotherapy and should be combined with other therapies.

INTRODUCTION

Physical principle of shockwaves

Shockwaves are characterized by a rapid change of pressure, high amplitude and non-periodicity.

The pneumatic principle was used for this study - compressed air is used to generate kinetic energy which propels a metal projectile against a transmitter at the end of the applicator.

MAIN SHOCKWAVE MEDICAL EFFECTS

- Improved metabolism and microcirculation
- Dissolution of calcified fibroblasts
- Increased collagen production
- Decrease in muscle tension
- Enhanced elimination of substance P - analgesic effect

Physical principle of laser

A laser emits light through a process called stimulated emission. LASER is an acronym for Light Amplification by Stimulated Emission of Radiation. Photobiomodulation, also known as low level laser therapy (LLLT), is an emerging medical technique in which exposure to low-level laser light or light emitting diodes can stimulate or inhibit cellular function leading to beneficial clinical effects.

LASER MEDICAL EFFECTS

- Biostimulation
- Edema reduction
- Anti-inflammatory effect (increases in mitochondrial, monocytes and scavenger cells activity)
- Ligament neovascularization
- Blood and lymph vessel regeneration
- Analgesia (stimulation of beta endorphin production)

Medical effects of the combination therapy for investigated indications:

APPLICATION	SWT EFFECTS	LASER EFFECTS
Calcar calcanei Plantar fasciitis	<ul style="list-style-type: none">– Elimination of calcified fibroblasts– Ligament neovascularization– Increase in collagen production– Improved metabolism and microcirculation– Enhanced elimination of substance P– Decrease in muscle tension	<ul style="list-style-type: none">– Collagen restructuring– Elimination of calcified fibroblasts– Blood and lymphatic vessel regeneration– Edema reduction– Increased enzymatic activity– Increased tensile strength of tissue– Stimulation of beta endorphin production
Epicondylitis	<ul style="list-style-type: none">– Improved metabolism and microcirculation– Ligament neovascularization– Decrease in muscle tension	<ul style="list-style-type: none">– Blood vessel regeneration– Edema reduction– Increase in enzymatic activity, oxygen and glucose utilisation

MATERIALS AND METHOD:

This study was carried out in different medical centers in different countries. All centers were using the same unit with the same protocol for the treatment and same methods for collecting the results. We used the same questionnaire for collecting the following data:

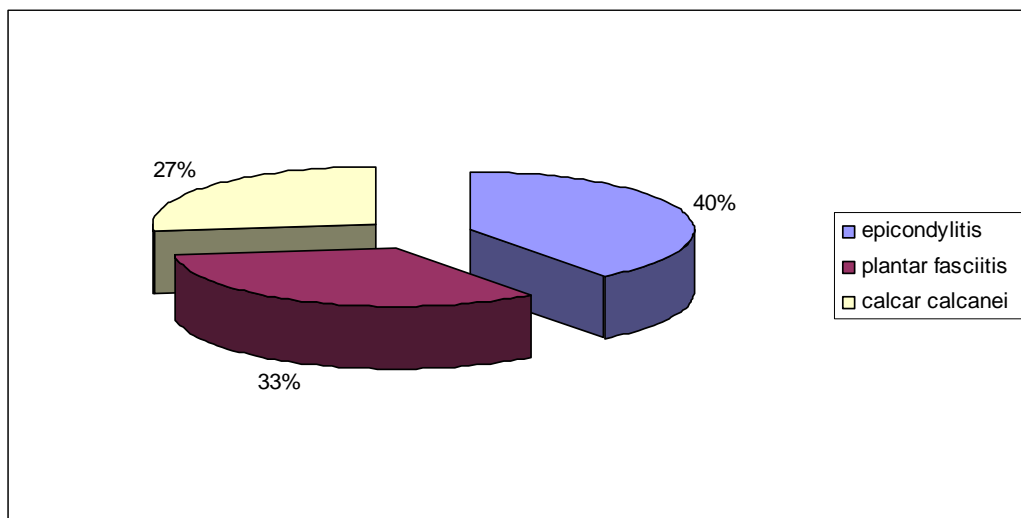
- Basic information about the patient (age, sex, anamnesis)
- Complete diagnosis data includes previous treatments and results
- Intensity of pain - using VAS score and Constant and Murley Scale (CMS) for the whole treatment process
- Protocols used for the treatment
- Reaction after the treatment – side effects
- Radiographic modifications in calcifications were evaluated before and after treatment

All centers had minimally 1-year experience with using shockwave therapy.

PATIENTS

The group of 96 patients, 54 men and 42 women, with ages between 22 and 67 years old was included in the study. The patients had the following diagnoses:

epicondylitis	38 patients
plantar fasciitis	32 patients
calcar calcanei	26 patients



The duration of symptoms ranged from 1-6 months with an average of 3.5 months.

The inclusion criteria included pain for at least one month. The patients who had received other treatments previously were excluded.

The patients were not allowed to take any other drug or treatment for their pain problem throughout the study and they were advised to avoid activities that could provoke pain.

The patients were randomly divided into two groups:

The group A of 52 patients (28 men and 24 women) was treated with the combination of shockwave and laser therapy

The group B of 44 patients (26 man and 18 women) was treated only with shockwave therapy.

TREATMENT

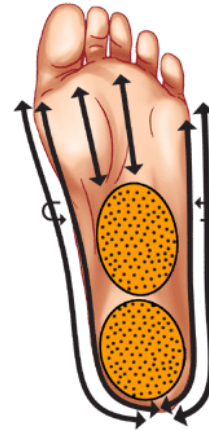
The pre-set programmes were used for the treatment with small shifts of the parameters depending on the patient's tolerability.

Therapy parameters:

Calcar Calcanei, Plantar Fasciitis

Shockwave therapy:

Type of shocks:	continuous or burst*
Pressure:	from 3 bars*
Frequency:	from 10 Hz
Number of shocks:	2000
Transmitter:	15 mm multifocused
Frequency of treatments:	within 5-10 days
Number of treatments:	4 sessions



* depending on patient's tolerability

The painful points are indicated by the dotted areas in the picture. The arrows indicate the direction of movement of the applicator on related areas.

Laser therapy:

The first part:	
Dosage:	20 J/cm ²
Power:	according to the probe
Irradiated area:	1 cm ²
Frequency:	cont.
Duty factor (DF):	cont.
Probe:	infrared
Frequency of treatments:	always after SWT

The second part:	
Dosage:	10 J/cm ²
Power:	according to the probe
Irradiated area:	1 cm ²
Frequency:	10 Hz
Duty factor (DF):	80 %
Probe:	infrared
Frequency of treatments:	always after SWT



The laser therapy was applied only to the patients from the group B immediately after the shockwave treatment.

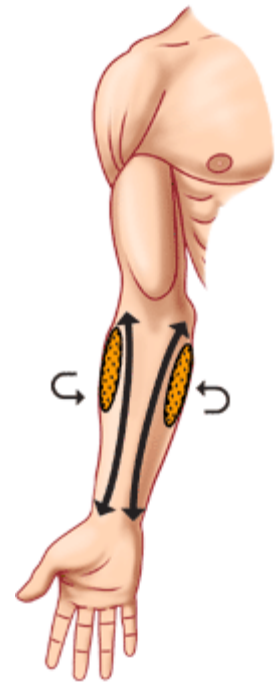
Epicondylitis

Shockwave therapy:

Type of shocks:	continuous or burst*
Pressure:	from 2 bars*
Frequency:	from 10 Hz
Number of shocks:	2000
Transmitter:	15mm multifocused
Frequency of treatments:	within 5-10 days
Number of treatments:	4 sessions

* depending on the patient's tolerability

The painful points are indicated by the dotted areas in the picture. The arrows indicate the direction of movement of the applicator on related areas.



Laser therapy:

The first part:

Dosage:	18 J/cm ²
Power:	according to the probe
Irradiated area:	1 cm ²
Frequency:	cont.
Duty factor (DF):	cont.
Probe:	infrared
Frequency of treatments:	always after SWT

The second part:

Dosage:	9 J/cm ²
Power:	according to the probe
Irradiated area:	1 cm ²
Frequency:	10 Hz
Duty factor (DF):	80 %
Probe:	infrared
Frequency of treatments:	always after SWT



The laser therapy was applied only on the patients from the group B immediately after the shockwave treatment.

RESULTS

The complete data from 89 patients were collected. Seven subjects (3 in the group A and 4 in the group B) did not complete the study or all necessary data were not received from them. There was no significant difference between the group A and B with regard to age, sex or duration of symptoms.

The study showed the following results after 4th treatment:

Efficacy	Group A Total n = 49		Group A Epicondylitis n = 17		Group A Plantar Fasciitis, Calcar Calcanei n = 32	
	Patients	%	Patients	%	Patients	%
Excellent	26	53	9	53	17	52
Good	18	37	6	35	12	38
Acceptable	3	6	1	6	2	6
Poor	2	4	1	6	1	3

Efficacy	Group B Total n = 40		Group B Epicondylitis n = 19		Group B Plantar Fasciitis, Calcar Calcanei n = 21	
	Patients	%	Patients	%	Patients	%
Excellent	18	45	9	47	9	43
Good	12	30	5	26	7	33
Acceptable	6	15	3	16	3	14
Poor	4	10	2	11	2	10

Good and excellent results were obtained in case of 15 patients (87%) from the group A (SWT+laser therapy) comparing to 14 patients (73%) from the group B (only SWT) for the treatment of epicondylitis. The combination therapy shows 14% better results.

For Plantar Fasciitis and Calcar Calcanei treatment the following results were obtained:

Good and excellent results in 29 patients (90%) from the group A and 16 patients (76%) from the group B – the difference is 14% for these diagnoses.

To sum up, good and excellent results were obtained in 44 patients (90%) from the group A (SWT+laser therapy) comparing to 30 patients (75%) of the group B (only SWT treatment).

The total difference of the efficacy of the single shockwave treatment and combined method (shockwave and laser treatment) is 15%!

CONCLUSION

Preliminary results confirm that using laser therapy after shockwave therapy brings more effective results compared to single shockwave treatment.

The study will be continued with follow-up and will collect more patients also for other indications. A larger study group with more structured protocol is necessary to underline the results of this investigation.

References

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