

Pain therapy +++ Calcific tendinitis +++ Trigger points +++ Achillodynia

Extracorporeal shock wave therapy

Indications and applications in physiotherapy Corry Ullrich

AT A GLANCE

This article provides fundamental information on extracorporeal shock wave therapy. Originally used for the fragmentation of kidney stones, this treatment modality has evolved to encompass indications such as pseudarthrosis, epicondylitis, calcific tendinitis of the shoulder, heel spur and myofascial pain syndromes.

Evolution

Extracorporeal shock wave therapy (ESWT) was first used in pain therapy in the mid-1990s. For this purpose, modified urological lithotripters were employed, which, however, did not become established in medical practice because of their

shape and size and high investment cost. 1999 marked the beginning of the successful "career" of radial shock waves in orthopaedic pain therapy. Compact and conveniently priced shock wave systems became available for orthopaedic treatments for the first time.

System technology

Shock wave treatment has become a standard procedure in pain therapy. The systems available in the market use radial or focused shock waves or both. Various physical principles are employed to generate shock waves.

Systems working with focused shock waves use electrohydraulic, electromagnetic or piezoelectric generation methods. Focused shock waves are ideal for deep-sited target areas. Pressure waves – also referred to as radial shock waves – are generated pneumatically and employed in the treatment of superficial indications (Table 1).

Today, orthopaedic pain therapy uses primarily radial shock wave systems because of their ease of use, absence of side effects and ongoing technological improvements. Research and development have produced better materials for the different shock transmitters. As a result,



Fig. 1: Shoulder treatment

Table 1: Major differences between shock waves and pressure waves

	Shock wave	Pressure wave
Pressure	100 – 1000 bar	1 – 10 bar
Pulse duration	0.2 μ s	0.2 – 0.5 ms
Pressure field	focused	radial, divergent
Penetration depth	high	low, superficial
Effect on	cells	tissue

the range of applications was greatly extended over time and the treatment became much more comfortable for patients. Depending on the shock transmitter employed, radial shock waves may reach a depth of up to 60 mm.

Guidelines and indications

Study results

The evolution of shock wave therapy has, of course, been strongly influenced by user experience and its consistent translation into technological solutions. Over the years, scientific studies have confirmed previous field reports. The therapy approach has undergone rapid progress and improvement over the last 12 years (1).

In order to maximise treatment safety and standardise the procedure, DIGEST e. V. (German-speaking International Society for Extracorporeal Shockwave Therapy) has established guidelines for shock wave therapy (2).

The ISMST (International Society for Medical Shockwave Treatment) has published a list of clinically tested indications on its website. These include calcific tendinitis, including shoulder tendinitis (Fig. 1), lateral and radial epicondylitis, heel spur, achillodynia, tibial stress

syndrome, patellar tendinitis and trochanter tendinopathy. Further indications are trigger points, irritated tendons, irritated tendon insertions and myofascial pain syndromes (3).

Treatment

Two-step procedure

Shock wave treatment comprises two steps. The first step consists in the local treatment of muscles during which shock waves are applied to active trigger points or painful muscle spots with severe local pain. In the second step, large-area muscle treatment takes place. With this so-called muscle smoothing technique, shock waves are applied in the direction of the muscle fibres, treating not only the painful muscle, but, if necessary, also its antagonist.

Application

Treatment success is dependent on the application pressure applied, on the shock transmitter type used and on the treatment frequency. In general, patients undergo a total of six to eight therapy sessions, receiving no more than two sessions a week. When exposed to shock wave therapy, the patient's body responds to the physical stimuli by various >>>

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Fig. 2: Treatment of a horse with a mobile shock wave system

mechanisms. It is assumed that the body's direct reaction to reduce pain is to release «substance P» and increase metabolic activity.

Effects

Shock waves have demonstrated to produce antibacterial and anti-inflammatory effects. Also, growth factors have been found in vessels, bones and connective tissue. Besides analgesic effects observed immediately during the therapy, shock waves primarily produce long-term results. Generally speaking, it can be said that the biological effects induced by shock waves produce a time-shifted and sustained response inside the body. However, pain tolerance varies between patients, and they react differently to shock wave therapy. So accurate diagnostic examination and differential diagnosis are, of course, fundamental pillars of successful treatment (4).

Radial shock waves also play an increasingly important role in equine physiotherapy. Here, they are used to treat muscle imbalance, tendon problems and

chronic suspensory ligament conditions (Fig. 2).

Other medical fields that use radial shock waves include dermatology, cardiology, urology and aesthetic medicine.

In Germany, shock wave therapy can only be provided upon medical prescription (see box).

Cost-effectiveness

A shock wave system requires a somewhat higher initial investment than other common medical devices used in physiotherapy. This means that the question of cost-effectiveness is important to address. Depending on the type of system employed and on its accessories and performance parameters, the purchase price is between 10,000 and 18,000 euros. But what we should bear in mind is that a shock wave system is a capital good that helps to generate higher turnover.

LEGAL SITUATION

From a legal perspective, physiotherapists are allowed to perform shock wave treatment in the following cases:

- upon prescription for patients with private medical insurance or upon prescription by a practitioner of alternative or complementary medicine;
- in their capacity as practitioners of alternative or complementary medicine;
- in their capacity as practitioners of alternative or complementary medicine specialising in physiotherapy

With a radial shock wave system, each treatment session is generally calculated at 35 to 50 euros if one considers all costs incurred such as personnel, wear, time and fixed costs. So if one performs an average of one treatment a day on 220 working days a year and charges 50 euros per session, the annual turnover will be 11,000 euros, which means the initial investment can pay off.

FIGURES

All figures in this article courtesy of STORZ MEDICAL AG.

REFERENCES

- 1) Dreisilker U., Book „Enthesiopathies“, Heilbronn, Level 10, 2010
- 2) DIGEST e.V., (German-speaking International Society for Extracorporeal Shockwave Therapy) www.digest-ev.de
- 3) ISMST, International Society for Medical Shockwave Treatment www.ismst.com
- 4) Gleitz M., Book „Myofascial Syndromes & Trigger Points“, Heilbronn, Level 10, 2011

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