International Society for Musculoskeletal Shockwave Therapy - ISMST

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Newsletter

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Editorial · Editorial comments

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Extracorporeal shockwaves in musculoskeletal system (Orthotripsy) is gaining fast and steady recognition worldwide because of consistent and good clinical results either with controlled or non-controlled studies on proximal plantar fasciitis of the heel, lateral epicondylitis of the elbow, calcifying tendonitis of the shoulder and non-union of long bone fracture.

In the past, many physicians remained skeptical in attitude toward orthotripsy because of lack of basic scientific documentations despite good clinical data and few sporadic animal experiments. Now, things had changed dramatically. The results of many basic researches had demonstrated that shockwave application produced biological responses at the tissue level including the induction of neovascularization associated with increased expressions of angiogenic growth factors (eNOS, VEGF, PCNA and BMP etc). The discovery had changed the concept of shockwave from pure physical and mechanical implications to biological mechanism. Therefore, in musculoskeletal tissues, shockwaves manifested themselves as biological mechanotransduction which differs from shockwaves in urology (Orthotripsy). The preliminary results of other recent studies in animal models also showed that high-energy shockwaves might be associated with the release of NO free radicals and cell apoptosis by altering Wnt and DKK-1 molecules at the sub-cellular level. Based on this new concept, many new indications of shockwaves other than musculoskeletal disorders had been reported including but not limited to chronic skin lesions, osteonecrosis of the femoral head, stable angina pectoris, second degree burn, plastic flap reconstruction and antibacterial application etc. These new indications had widely opened up the field of shockwave in clinical application.

Currently, there are many unsettled issues that ISMST must play a role to resolve them.

1. Many shockwave devices are manufactured with different mechanical principles including electrohydraulic, electromagnetic and piezoelectric. Each device recommended its own energy levels and the numbers of treatment, and the information are not inter-exchangeable in mathematical and physical models.

2. There has been no clear definition on "high-energy" and "low-energy" shockwaves based on scientific data.

3. There is no study documenting the dose-response effect of shockwave despite the fact that the time- and dose-dependent effects of shockwaves were observed in clinical application.

4. It was speculated that NO free radicals might be involved in the signal transduction and mediation of physical shockwave at the sub-cellular level. Obviously, further studies are needed including genome micro-array analysis to validate the actual biological mechanism of shockwaves in musculoskeletal tissues.

5. In clinical application, shockwave should be recommended as one of the initial choices of treatment for acute and chronic insertional tendinopathies rather than only for chronic refractory conditions of 6 months or longer duration.

6. Furthermore, the off-label indications of FDA guidelines such as osteonecrosis of the femoral head, knee and ankle, OCD of the knee and ankle, infrapatellar tendonitis (jumper knee), chronic skin ulcers, non-union of long bone fracture and stress fracture etc should be recommended as routine practice.

7. The last and the most important issue is that shockwave should be regarded as a surgical procedure since shockwaves cured most diseases with one single treatment. Unfortunately, many third party insurances regarded shockwave as a therapy modality and reimbursed the cost of treatment unfavorably. Therefore, the term of "Shockwave therapy" to be changed to "Shockwave biosurgery" similar to other procedures such as radiosurgery. This change may assist the insurance companies to properly reimburse the cost of shockwave treatment.

Under the leaderships and the guidelines of ISMST, we together have made significant improvement in the field of musculoskeletal shockwaves in the past many years. However, we must work harder and closer together to further strengthen the biological concept and the clinical implication of shockwaves to our peers, and make this new effective and safe, non-invasive and non-surgical device available to patients in need worldwide.

Extracorporeal Shock Wave Therapy (ESWT) in Skin Lesions

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Introduction

Since 1981 extracorporeal shock waves have been used very successfully for the disintegration of calcified deposits in urology as well as in orthopedics. Due to high efficacy and few side effects, this therapy soon becomes very popular around the world. Since 1990 (1) shock waves have also been used for a variety of orthopedic indications. The therapy proved effective for tendon insertion conditions such as fasciitis plantaris (heel spur) and calcific tendinitis of the shoulder. Shock wave therapy is also widely used for lateral epicondylitis (tennis elbow) as described within previous chapters. Due to the few side effects shock waves also gain ground for the treatment of pseudoarthrosis (non union) and delayed union. Non-invasive and without clinical significant side effects, ESWT has also been used successfully in pilot studies for the treatment of osteochondritis dissecans (OCD) (2) as well as aseptic bone necrosis (AVN) (3, 4, 12). In Japan, shock waves were used successfully in animal experiements for the treatment of ischemia-induced myocardial dysfunction (5). Even skin flap survival in rats improved as a result of shock wave treatment (6).

When treating septic pseudoarthrosis (osteomyelitis), often linked to skin lesions (fistula formation, skin defects,Ö), bone tissue would consolidate and skin defects would heal particularly fast in many cases. In addition, Gerdesmeyer (7) found in vitro bactericidal effect of shock wave therapy. Encouraged by such findings, a pilot study on the treatment of skin lesions with ESWT was conducted.

Material and Methods

To conduct the study an OrthoWave 180c from MTS was used. Since most often surface defects are involved, the shock wave head was modified in that the shock wave would no longer be focussed but be roughly plane to the treatment area. Low energy flow densities were used to treat the skin lesions. Depending on the size of the defect, the number of impulses varied from a few 100 to several 1,000. No anesthesia was necessary due to the defocussing and low energy of the shock waves. In principle, the treatment was performed as an outpatient except for those patients already admitted for other reasons. Between September 2004 and January 2005, 83 treatments were performed at the Trauma center Meidling Austria on 81 patients (2 patients were treated in 2 areas). Mean patient age was 61 years. The patient group was made up of 37 women and 44 men. At the same time, 21 patients (13 women and 8 men) were treated at Berlin's Center for Extracorporeal Shock Wave Therapy. The mean age was was slightly younger (54 y), The skin pathologies are listed in **Table 1**.

Causes of skin lesions	Number
Posttrauma lesions	44
Postsurgical healing disorders	10
Venous ulcer	25
Arterial ulcer	15
Decubital ulcer	5
Burns	5
Total	104

Since no empiric data were available, treatments were carried out in weekly intervals, in part in biweekly intervals. After the first treatment, the same wound dressing was used in principle as before the shock wave therapy. Only after the second or third treatment when wound conditions had improved, adequate options were indicated.

Results

Table 2 lists the results by lesion cause:

Causes of skin lesions	Number	Healed	>50%	<50%	Dropout
Posttrauma lesions	44 (42%)	39 (89%)	1 (2%)		4 (9%)
Postoperative healing disorders	10 (10%)	10 (100%)			
Venous ulcer	25 (24%)	9 (36%)	8 (32%)	6 (24%)	2 (8%)
Arterial ulcer	15 (14%)	10 (67%)	2 (13%)	1 (7%)	2 (13%)
Decubital ulcer	5 (5%)	4 (80%)			1 (20%)
Burns	5 (5%)	5 (100%)			
Total	104 (100%)	77 (74%)	11 (10%)	7 (7%)	9 (9%)

In the beginning of the treatment, all of the treated skin lesions were to be considered as infected. Particularly striking was a lessening of the infection after the first treatment because of the shock wave related bactericidal effect. None of the patients received any antiobiotics. None of the patients experienced any worsening of the woundconditions. Only one (female) patient dropped out after the first therapy because she expected herself to fail. Dropouts involved for the most part very old, in part decriped patients who, after the improvement of their wound, preferred to avoid the strenuous transportation to the hospital.

Discussion

Based on the initial encouraging results of our pilot study, a completely newl potential of shock wave therapy appears to emerge. The patients enrolled in our pilot study are reported as a negative selcted patient group because all cases refused to get any surgical intervention. Patients willing to get surgery were refered to and shock wave therapy was not offered. The promising outcome after this non invasive treatment option in chronic wound care justifies to indicate shock wave in those soft tissue condition as described above. For sure further studies have to performed to determine optimum treatment parameters. Finally subsequent prospective, randomized controlled double-blind studies may demonstrate the efficacy and safety of ESWT in treating skin lesions.

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Figures

Figure 1 shows the forearm of a 94 year old female patient after a paravenously applied infusion and a two septic revisions. An abating infection with penicillinresistant staphylococcus aureus was diagnosed (positive smear test). Because of a chronic COPD the patient is being treated with cortisone. The patient also suffers from chronic lymphatic leukemia. The fist shock wave treatment was applied on 10/13/2004 as an outpatient procedure without anesthetics.

Figure 2 shows the same patient 2 weeks after the first shock wave treatment. A pre-existing therapy with antibiotics was discontinued and the second shock wave treatment (again without anesthetics) was applied.

Figure 3 shows the lesion of the same patient after the third shock wave treatment on 11/10/2004.

Figure 4 shows the healing status 6 weeks after starting the therapy with altogether 4 shock wave treatments. In total, the 4 treatments lasted just about 12 minutes.

Instructions for Authors

Newsletter of Extracorporeal Shockwave Therapy is an international, peer-reviewed journal produced by International Society for Musculoskeletal Shockwave Therapy(ISMST) and is issued three times a year.

Newsletter of Extracorporeal Shockwave Therapy offers the opportunity to publish original research, clinical studies, review articles, case reports, clinical lessons, abstracts, book reviews, conference reports and communications regarding the scientific or medical aspects shockwave therapy.

Manuscript Submission

All manuscripts should be sent to the Editor:

By e-mail: prds@uol.com.br

On disk and mail to:

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CEP 06016-075

We encourage authors to submit manuscripts via e-mail. When submitting by e-mail, print mail address and telephone and fax numbers also should be included.

Manuscript Categories

All articles should be well-written in plain English, whereby jargon, acronyms, abbreviations and complicated data should be avoided.

Scientific research:

Theoretical or experimental (basic or applied) scientific research or the practical application of this research. The article should consist of an abstract, key words, introduction, methods, results, discussion, and conclusion.

Length: The manuscript should be no longer than 2,500 words, including title page, abstract, references, legends and tables.

Review articles:

Review articles on topics of general interest are welcomed. Reviews should include the specific question or issue that is addressed and its importance for the shockwave therapy community, and provide an evidence-based, balanced review on this topic. The article should include a description of how the relevant evidence was identified, assessed for quality, and selected for inclusion; synthesis of the available evidence such that the best-quality evidence should receive the greatest emphasis; and discussion of controversial aspects and unresolved issues. Meta-analyses also will be considered as reviews. Authors interested in submitting a review manuscript should contact the editorial office prior to manuscript preparation and submission.

Length: Approximately 2,000 to 2,500 words and no more than 40 references.

Case reports

Authors are encouraged to submit articles with interesting case reports with relevant information regarding diagnosis and therapy, unique for shockwave therapy. The articles should be short, accurate and easy to understand, and should consist of the following:

- A summary with the clinical relevance;
- An introduction explaining the clinical problem;
- A short report of the cases, consisting of history, physical examination, further investigation, treatment and follow-up.
- A discussion, whereby the clinical consequences are described and the most interesting aspects of the case report.

Length: Approximately 750 to 1,200 words and a maximum of 15 references.

Clinical lesson

Authors are invited to give a description and background information of developments in the field of further diagnostics and clinical tests and methods that are relevant to all aspects of shockwave therapy, training and rehabilitation. It is not necessary to include examples of patients, as in case reports. The articles should be up-to-date, short, accurate, and easy to understand and should contain the following:

- A summary with the clinical relevance (max. 150 words)
- And introduction with the theme of the article
- A description of the used test method or diagnostic
- A conclusion with the practical relevance and practical tips.

Length: Approximately 750 to 1,200 words and a maximum of 5 references.

National organisation communications

National organisations are invited to describe any aspect of medical care or science in their country, e.g. the function of their medical committee, medical care of their players, research that is being conducted etc.

Approximately 300 to 500 words

Letters to the editor:

Letters discussing an article that has been published in Journal of Extracorporeal Shockwave Therapy have the greatest chance of acceptance if they are sent in with 2 months of publication. Letters that are approved will be forwarded to the author, who will have 6 weeks to respond. The original letter and the reply will be published simultaneously.

Length: Such letters should not exceed 400 words of text and 5 references. Research Letters reporting original research also are welcome and should not exceed 600 words of text and 6 references and may include a table or figure.

Review of the Literature

Authors are invited to submit summaries of published article of particular interest for the shockwave therapy community. The opinion of the author should be stated following each summary.

Length: Such a review should be approximately 500 to 700 words. A review of three articles simultaneously should be no longer than 1,000 words.

Conference reports and Abstracts

Authors are invited to submit reports of conferences they have attended, and to include one to three photographs taken at the meetings. Please include the names and highest titles of the persons that can be identified in the photographs. Summaries of work presented at the conference may be submitted for publication as well.

Length: 300 to 500 words per report or abstract.

Manuscript Preparation

Manuscripts should be prepared in accordance with the Uniform Requirements for Manuscripts Submitted to Biomedical Journals (Vancouver Style). http://www.nlm.nih.gov/bsd/uniform_requirements.html

- If submitting by e-mail, text, tables, and figures should be included in the same file. Do not submit duplicate copies by mail or fax.
- Articles should be in Microsoft Word format.
- Double-space throughout, including title page, abstract, text, acknowledgements, references, figure legends, and tables.
- Do not use abbreviations in the title or abstract and limit their use in the text.
- Please use Times New Roman, size 12.
- On the title page include the full names, highest academic degrees, and affiliations of all authors. If an author's affiliation has changed since the work was done, list the new affiliation as well.
- Figures, summary tables and diagrams should be numbered consecutively throughout the paper. Photographs should be clearly labelled.
- References. Number references in the order they appear in the text; do not alphabetise. In text, tables, and legends, identify references with superscript Arabic numerals. When listing references, follow AMA style and abbreviate names of journals according to Index Medicus. List all authors and/or editors up to 6; if more than 6, list the first 3 followed by et al.

– Journal: Kibler WB. The role of the scapula in athletic shoulder function. Am J Sports Med. 1998;26(2):325-337.

– Book: Perry J. Biomechanics of the shoulder. In: Rowe CR, ed. The shoulder. London: Churchill Livingstone, 1988:1-15.

- Footnotes should be avoided.

Review process

Contributions will be reviewed by the editorial board for scientific research, review papers, case reports, clinical lessons, and abstracts. Manuscripts should meet the following criteria: material is original; writing is clear; study methods are appropriate; the data are valid; conclusions are reasonable and supported by the data; information is important; and topic has general shockwave therapy interest.

Manuscripts with insufficient priority or quality for publication are rejected promptly. Other manuscripts are sent to expert consultants for peer review. Peer reviewer identities are kept confidential, but author identities are known by reviewers. The existence of a manuscript under review is not revealed to anyone other than peer reviewers and editorial staff.

Intellectual property

- The article must be your own original work.
- If the article contains any photographs, figures, diagrams, summary tables, graphs or other non-textual elements that are not your own original work, you must ensure that you have obtained written permission from the copyright owner to include their work in your article for publication in Journal of Extracorporeal Shockwave Therapy. Permission letters must be submitted with your article.