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Extracorporeal Shockwave Therapy for Lateral Epicondylitis of the Humerus

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It is hard to find in the literature high evidence for any treatment of the lateral epicondylitis of the elbow. There are only a few papers with high scientific level concerning conservative treatment and surgical procedures respectively. Regarding the literature about extracorporeal shock wave therapy at the lateral epicondylitis we find some papers to discuss:

ESWT without therapy success: Haake (2002)^(I), Speed (2002)^(II).

ESWT with therapy success: Rompe (1996)^(III), Pettrone (2002)^(IV), Rompe (2004)^(V), Pettrone (2005)^(VI). Some ESWT-studies with lower level of evidence: Wang (2002)^(VII), Ko (2001)^(VIII), Decker (2002)^(IX), Maier (2000)^(X). These studies are not randomized, so they are not accepted to use them for the development of guidelines (concerning the AGREE-instrument for guideline-development).

Very important because of the huge impact and worldwide attention about all Cochrane publications is the Cochrane analysis of Buchbinder (2002)^(XI). In that publication the study data of the publications of Rompe (1996) und Haake (2002) have been consolidated together and the results showed no significant benefit of ESWT. Therefore Buchbinder refused the treatment with ESWT.

Problems at the assessment of ESWT studies in general:

- Unequal parameters used (impulse frequency, energy flux density, maximum energy and pressure etc.).
- No agreement about the energy levels of high energy ESWT and low energy ESWT.
- Different shock wave devices (with different parameters) in one study [Haake-Studie (2002)], so the randomization has been at least weak.
- Only two papers have the same protocols and comparable parameters [Rompe (2004) und Pettrone (2005)].
- The clinical results of the published studies about lateral epicondylitis are mostly not comparable due to the biometrical and technical differences though the studies are of high quality levels.
- There is high probability that local anaesthesia has a decreasing effect on ESWT [Labek (2005)^(XII), Rompe (2005)^(XIII), Klonschinski (2005)^(XIV)].

Conclusion:

- The clinical results of the ESWT studies are despite the high biometrical quality levels almost not comparable.
- Local anaesthesia is probably of bad influence on (low energy) ESWT.
- A strict standardization would be helpful, for the clinical use and for the studies. A standard should be developed for operating procedures, which should be used by all users of ESWT (by the national and international societies).
- ESWT has almost no complications and risks. Despite the controversial literature ESWT should be offered for lateral epicondylitis before those particular patients undergo surgery. No other therapy has high grade of evidence due to the ebm criteria. We will offer ESWT to our patients also in the future.

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Pain in the Medial Calcaneal Tuberosity - Summary

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Institution: Brazil

From January 1997 to December 2001 all patients who suffered from pain in the medial calcaneal tuberosity without any association with a trauma or rheumatic diseases were submitted to x-ray of the symptomatic foot either with foot leaned on the table and another with the heel lifted by a device which simulated the use of 2 to 3 cm high heeled shoe. The distance between the medial calcaneal tuberosity and the head of the first metatarsal was measured in two incidences, which confirmed that the use of high-heeled shoes reduces the distance between those points. This fact led us to believe that this would also promote the relaxation of the plantar structures originated in the medial calcaneal tuberosity. Since then, these patients were asked to keep their heels lifted from 2 to 3 cm higher than their toes through the use of high heeled shoes or some sort of shoe insoles.

250 patients were invited to follow-up examinations performed in January 2002. 128 patients were available and 27 were excluded for having associated rheumatic diseases and other for having burned the foot.

The evaluation included:

1. Duration of the symptoms after the beginning of the treatment.
2. The re-starting of the symptoms after an overall clinical recovery.
3. The presence of spontaneous pain or under thumb pressure.
4. In which way, the therapeutic orientation was followed.

70 patients (82 feet - 68,33%) were painfree. 24 patients (29 feet - 24,16%) felt better with the treatment but reported that the symptoms were back after abandoning the use of the required shoes. These same patients also reported that they started to follow the therapeutical proposal again obtaining speedy recovery. 6 patients (9feet - 7,51%) did not use the proposed method and kept on having the symptoms anyway.

Shockwave Therapy for Plantar Fasciitis : Retrospective Study

Author: PR. Rockett, AC.Souza, PR. Santos, F. Arcader

Institution: Ortosom (Porto Alegre/RS); Cortrel (Rio de Janeiro/RJ); Orthomaster (Sao Paulo/SP), Brazil

The aim of this study was to evaluate the efficacy and safety of extracorporeal shock wave therapy for the treatment of plantar fasciitis in three Brazilian Orthopaedics Clinics. In a multi-center, retrospective study, the effect of shockwave therapy was investigated in 142 cases of plantar fasciitis in 130 patients treated in the 51-month period from March 2001 to June 2005. Twelve patients received bilateral treatment. There were 67 women and 63 men with an average age of 55 (range, 25-90) years. The criteria for inclusion were at least three months of unsuccessful conservative therapy or six months of pain. Criteria for exclusion were inflammatory arthritis, corticosteroid injection within the previous 6 weeks, acute infection, neurological abnormality, gout, malignant diseases, blood coagulation disorders and ruptures of the plantar fascia. Each patient was treated with 1,200 - 1,500 shock waves, a 20 mm focus depth, and with an energy flux density of no more than 0.14 mJ/mm² after local anaesthesia or ankle block. One treatment was performed in 128 cases, 11 cases underwent a second treatment and 3 underwent a third treatment. The subjects were evaluated by means of a clinical evaluation according to Roles and Maudsley score and subjective outcome on Visual Analogue Scale (VAS) analysis, 45, 90 and 180 days after the end of the therapy. The study showed the efficacy and safety of ESWT were excellent in 36%, good in 33%, acceptable in 11.3%, and poor in 19.7%, 180 days after ESWT.

The Application of Piezoelectrically Generated Shock Waves at a 6 Hz Frequency for the Treatment of Plantar Fasciitis

Author: M.C. Ottone, S.R. Ferraro

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Plantar fasciitis is a common clinical problem and a common cause of heel pain. The success rates of conservative treatment are often unsatisfactory. The aim of this study is to demonstrate the efficacy of treatment with piezoelectrically generated shock waves at a 6 Hz frequency.

We studied a group of 60 patients with painful heel. Each patient received 4 applications of 2,000 shock waves (energy density = 0.20 mJ/mm², frequency = 6 Hz), at intervals of 48-72 hours. After a follow up of six months, pain was measured on a Visual Analogue Scale (VAS) and on the basis of the patients' satisfaction according to a four-step score (excellent, good, acceptable, poor - according to SITOD classification). The success rate (excellent and good results) was 75% and no patient needed surgical treatment.

Extracorporeal shock wave therapy (ESWT) seems to be useful as a conservative alternative in patients who were unsuccessfully treated for plantar fasciitis. ESWT was able to decrease pain and increase the amount of comfortable walking time in patients with previously unsuccessful non-surgical treatment.

Extracorporeal Shockwave Therapy for the Treatment of Plantar Fasciitis - Comparative Study of Focused ESWT Versus Combined Focused and Radial ESWT

Author: G. Verratti

Institution: Servicios Medicos Ortho-Shock, Venezuela

The purpose of the study is the evaluation of results, in the short and medium term, of focused ESWT versus combined focused and radial ESWT for the treatment of chronic heel pain due to plantar Fasciitis. Focused ESWT was applied in 3 sessions once a week. Patients complained of pain between the 2nd and 3rd sessions. The third session was then replaced by 2 sessions of radial ESWT once a week, in an attempt to reduce the pain after the 2nd session of focused ESWT. This study aims to present the results of this second method versus the 3 weekly sessions of focused only ESWT.

Since August 2005 a prospective comparative study was conducted on 142 heels of patients with a minimum of 6 months of pain. All patients had been treated with at least 2 methods of conservative treatment. The average age was 55. All patients were sedated for each session. No local anaesthesia was applied. 2 groups were created for the comparison of results. Group 1 consisted of 72 patients that were treated with 3 sessions of focused ESWT (once a week for 3 weeks). Each patient was treated with 2000 pulses with an energy flux density of no more than 0.15mJ/mm² during each session. Ultrasound was used to measure thickness of the plantar fascia before each session. Group 2 consisted of 70 patients that were treated with combined sessions of 2 focal (once a week for 2 weeks) and 2 radial (once a week for 2 weeks) ESWT. The focused sessions were conducted in an identical manner to those of the focused only patients. The 2 subsequent sessions (once a week for 2 weeks) of radial ESWT were performed with 3500 shocks at a frequency of no more than 8Hz and a pressure of 3 to 3.5 Bars.

Patient satisfaction, pain caused by manual pressure, pain whilst walking, were scored with the Visual Analogue Scale - VAS.

Both methods used in the comparative study produced the same overall results. However, Group 2 experienced faster improvement with less pain during the recovery period than Group 1.

A Two Year Retrospective Review of the Effectiveness of Extracorporeal Shockwave Therapy for the Treatment of Chronic Plantar Fasciitis

Author: K. Eickmeier¹, B. Werber², D. Norris³, D. Boryana⁴

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This study compares the results of surveys of patients who in 2003 had undergone ESWT for chronic plantar fasciitis. A post-operative survey was sent to 874 patients following ESWT, and in 2004 a follow-up survey was sent to the same patients who were treated in 2003 to see if the effects of the original treatment were effective over a longer period of time. Eighty-five percent of patients who rated their pre-treatment pain level as severe (>8) on a 1-10 pain scale, experienced sharp declines in their level of post-treatment pain in 2004, where sharp decline is considered to be a difference in pain level before and after the treatment of 3 or higher, ($p > [z] = .0000$; $z = 10.098$), compared to seventy percent in 2003 ($p > [z] = .0000$; $z = 12.627$). In addition, 87 percent of patients who rated their pre-treatment immobility as severe (>8) on a 1-10 scale, experienced sharp declines in their level of post-treatment immobility in 2004 ($p > [z] = .0000$; $z = 7.910$) compared to 66 percent in 2003 ($p > [z] = .0000$; $z = 9.004$). The differences in the percentage of people who experienced sharp decline in pain and immobility after treatment were statistically significant at the 1 percent level. A significantly higher percentage of respondents reported lower pain levels, increased mobility, fewer visits to physicians and other health professionals and took fewer medications in 2004 than in 2003.

Long-term Results of Extracorporeal Shockwave Treatment for Plantar Fasciitis

Author: Ching-Jen Wang, Feng-Sheng Wang*, Kuender D. Yang*, Lin-Hsiu Weng, Jih-Yang Ko

Institution: From the Department of Orthopedic Surgery and *the Department of Medical Research, Chang Gung Memorial Hospital at Kaohsiung, Kaohsiung, Taiwan

Background: Extracorporeal shockwave treatment has shown mixed short-term results for plantar fasciitis. However, the long-term results are not available. **Hypothesis:** Long-term results of shockwave treatment are comparable with short-term results. **Study Design:** Randomized controlled clinical trial; Level of evidence, 1. **Methods:** This prospective study consisted of 149 patients (168 heels) with an established diagnosis of chronic plantar fasciitis, including 79 patients (85 heels) in the shockwave treatment group and 70 patients (83 heels) in the control group. In the shockwave group, patients received 1,500 shock wave impulses at 16 kV on the affected heel in a single session. Patients in the control group received conservative treatment consisting of nonsteroidal anti-inflammatory drugs, orthotics, physical therapy, an exercise program, and/or a local cortisone injection. Patients were evaluated at 60 to 72 months (shockwave group) or 34 to 64 months (control group) with a 100-point scoring system including 70 points for pain and 30 points for function. The clinical outcomes were rated as excellent, good, fair, or poor. **Results:** Before treatment, the groups showed no significant differences in the scores for pain and function. After treatment, the shockwave group showed significantly better pain and function scores as compared with the control group. The overall results were 69.1% excellent, 13.6% good, 6.2% fair, and 11.1% poor for the shockwave group; and 0% excellent, 55% good, 36% fair, and 9% poor for the control group ($P < .001$). The recurrence rate was 12% (9/81 heels) for the shockwave group versus 55% (43/78 heels) for the control group ($P < .001$). There were no systemic or local complications or device-related problems. **Conclusion:** Extracorporeal shockwave treatment is effective and safe for patients with plantar fasciitis, with good long-term results.

Extracorporeal shockwave treatment has shown mixed short-term results for plantar fasciitis. However, the long-term results are not available.

This prospective study consisted of 149 patients (168 heels) with an established diagnosis of chronic plantar fasciitis, including 79 patients (85 heels) in the shockwave treatment group and 70 patients (83 heels) in the control group. In the shockwave group, patients received 1,500 shock wave impulses at 16 kV on the affected heel in a single session. Patients in the control group received conservative treatment consisting of nonsteroidal anti-inflammatory drugs, orthotics, physical therapy, an exercise program, and/or a local cortisone injection. Patients were evaluated at 60 to 72 months (shockwave group) or 34 to 64 months (control group) with a 100-point scoring system including 70 points for pain and 30 points for function. The clinical outcomes were rated as excellent, good, fair, or poor.

Before treatment, the groups showed no significant differences in the scores for pain and function. After treatment, the shockwave group showed significantly better pain and function scores as compared with the control group. The overall results were 69.1% excellent, 13.6% good, 6.2% fair, and 11.1% poor for the shockwave group; and 0% excellent, 55% good, 36% fair, and 9% poor for the control group ($P < .001$). The recurrence rate was 12% (9/81 heels) for the shockwave group versus 55% (43/78 heels) for the control group ($P < .001$). There were no systemic or local complications or device-related problems. Extracorporeal shockwave treatment is effective and safe for patients with plantar fasciitis, with good long-term results.

Plantar Fasciitis - Conservative & Surgical Therapy - Radial and Focused ESWT - Review of the Literature

Author: M. Buch

Institution: Kassel, Germany

Shock waves are used to treat tendinopathies like plantar fasciitis since years. In the meantime radial pressure pulses are used for treatment aswell. The presentation gives a review of the literature of studies being performed according to GCP (randomized, double blinded, placebo controlled).

A review of 291 studies is presented using the National library of medicine 1985 - 2006 with keywords "plantar fasciitis" & "heel spur". Six studies were found using ESWT, 1 study using radial pressure pulses that met GCP criteria. No investigation of other conservative treatment modalities showed any effect more than placebo. A comparison of the studies is difficult as different primary efficacy criteria and treatment parameters were used (Number of treatments and impulses, energy, use of local anesthesia. ESWT is one of the best investigated tools in tendinopathies. The efficacy is more than placebo effect.

Standard of Care for Stress Fractures

Author: Prof. Dr. Moises Cohen

Institution: Brazil

The first clinical description a stress fracture was registered by Breithaupt, a German military surgeon, in 1855. Widely studied in human beings, overuse training and stress fracture had been described in submitted animals. In 1897, the first radiographic aspect of a stress fracture in the military army is reported. Nowadays in the literature there is a doubt which is the best synonym: “stress fracture” or “fatigue fracture”.

The predisponent factors for a stress fracture are related to the biomechanical and enviroment aspects, as for example, the age, gender, race, physical conditioning, endocrinologic and diet disturbance and biomechanic characteristics. The repetitive microtraumas associated to the extrinsic factors and the acute overload, taking to the muscular fatigue may lead to a stress fracture. These are the more accepted phisiopathological mechanisms.

The stress fracture represents 10% of all sports injuries, mainly in running athletes. The patient with a stress fracture presents insidions and gradually pain limitation during sports activities. Usually radiological diagnosis methods of imaging are: x-ray, bone scan, CT and MRI. The treatment of the stress fracture varies despite of their characteristics. Initially the treatment is clinical, with use of non steroid antiinflamatory, physiotherapy and correction of the biomechanic factors. The weight bearing is allowed just for daily activities. The option for surgical treatment occur when there is failure of the clinical treatment.

Shockwave Biosurgery for Stress Fractures

Author: C. Leal

Institution: Bosque University Orthopaedics Bogotá, DC Colombia

The current treatment protocols for stress fractures are based on a progressive retraining that takes the athlete out of active competition from twelve weeks to sometimes over a year. The patients usually progress from mild pain to no pain after a long rehabilitation protocol that in many cases lead to an athletic career retirement. Shockwave therapy has shown relevant effects in bone healing metabolism.

The generation of endogenous growth factors through the percutaneous stimulation with high energy focalised or radial shockwaves, has been used successfully for bone healing enhancement in pathologies like non-unions and avascular necrosis. The use of shockwaves in a bone pathology caused by repetitive loadings that override the healing capacity of the tissue could be helpful in reducing healing time and obtaining a faster recovery with fewer incidences of recidives. We have reported in the past five years the results of the application of shockwave biosurgery in stress fractures. Our first study showed a significant reduction in time recovery in tibial stress fractures as compared with contralateral controls in military recruits. A five year follow up has showed no recidives. From that point we have treated 32 patients with stress fractures, including high performance professional tennis players and Olympic athletes. We use a 4000 focused shockwave single session protocol, with top energy levels of 0.3 mJ/mm². We keep a strict rehabilitation protocol, and our patients are usually back in sports with significant pain reduction after six weeks.

This simple harmless technique has allowed us to cut in half the recovery time in patients with stress fractures, and avoid invasive procedures in all of our cases.

ESWT Treatment in Calcific Tendinitis of the Shoulder

Author: D. Rozzati, A. Littera, E. Cignini, S. Festari, G. Sessa , A. Carriero

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The objective of our study was to evaluate the effectiveness of ESWT treatment for symptomatic calcific tendonitis of the shoulder.

Our 2 years experience lasted from Jan. 2004 to Jan. 2006. We treated 110 patients, 44 males and 66 females, (age ranging from 32 to 83 years) with painful shoulder calcific tendinitis who were unresponsive to other conservative therapies. We used a REFLECTRON - HMT ESWT System using a protocol which consisted in one treatment of 500 shocks (frequency 240 shocks/min) each week for three weeks.

The treatment was successful in 83 patients with symptomatic resolution. In 21 patients we observed at the post-treatment X-Ray control the complete vanishing of periarticular calcifications. In 39 patients there was a volumetric reduction of the calcifications. 20 patients experienced no change. 1 patient presented a volumetric increase of the calcification. 2 patients showed a symptomatic improvement.

Conclusions: In our experience ESWT can be accepted as a valid conservative treatment in calcific tendinitis of the shoulder leading to a symptomatic, functional and radiological improvement.

Shockwave Therapy for Tendinosis of the Shoulder: Retrospective Study

Author: AC.Souza, PR. Rockett, MB. Lui

Institution: Cortrel (Rio de Janeiro/RJ); Ortosom (Porto Alegre/RS), Brazil

The aim of this study was to evaluate the efficacy and safety of extracorporeal shock wave therapy for the treatment of tendinosis of the shoulder in two Brazilian Orthopaedics Clinics. In a multi-center, retrospective study, the effect of shockwave therapy was investigated in 65 shoulders of 60 patients with tendinosis of the shoulder treated over a period of 37 months, from May 2002 to June 2005. Five patients were treated in both shoulders. There were 21 women and 39 men with an average age of 53 (range, 19-83) years. The criteria for inclusion were at least three months of unsuccessful conservative therapy or six months of pain. Criteria for exclusion were inflammatory arthritis, corticosteroid injection within the previous 6 weeks, acute infection, gout, malignant diseases or blood coagulation disorders. Each patient was treated with 1,500 shock wave impulses, a 35 mm focus depth, and with an energy flux density of no more than 0.14 mJ/mm² after local or regional anaesthesia. One treatment was performed on 59 shoulders, 4 shoulders underwent a second and 2 shoulders underwent a third treatment. The subjects were evaluated by means of a clinical evaluation according to Roles and Maudsley Score and subjective outcome on Visual Analogue Scale (VAS) analysis 45, 90 and 180 days after the end of the therapy.

The study showed the efficacy and safety of ESWT were excellent in 30.8%, good in 43%, acceptable in 7.7%, and poor in 18.5%, 180 days after ESWT.

Extracorporeal Shock Wave Therapy (ESWT) for Treatment of Calcific Tendonitis of the Shoulder One-Year Experience

Author: Capasso T. M, Gonzalez C. O, Guedez M.

Institution: Orthoshock, Caracas- Venezuela

The purpose of this study was to assess the results of the extracorporeal shock wave therapy for calcific tendonitis of the shoulder.

This retrospective study was conducted at the Orthoshock Shock Wave Center based in Caracas, Venezuela. From January, 2005 to January 2006, 39 patients, aged 41 to 65 years old, were treated (28 female, 11 male) for a total of 44 shoulders (5 bilateral). Inclusion criteria included diagnosis of calcific tendonitis of the rotator cuff with chronic pain, restriction of over 50% in range of joint motion and resistant to conservative treatment for at least six months. Patients received shock wave therapy under the standard protocol; a weekly session for three weeks, level 7 of energy (3000 impact/0.36 mj/mm²) under sedation. The equipment used was a Dornier electromagnetic generator (Compact S and Epos Ultra) with a focus guided by ultrasound of 7.5 Mhz. Patients were evaluated according to a Visual Analog Scale and radiological monitoring following each session. Clinic, radiological and echographic scans were taken one month and one year after the end of the treatment.

A total of 37 patients (94%) had reduced pain after the therapy. Thirty-seven patients (94%) recovered significantly the joint motion range. Three patients (7.69%) showed total calcium resorption and 34 patients (87.1%) experienced partial calcium resorption (radiological and echographic scans). There were no adverse events.

High-energy focal shock waves proved to be an effective therapy for treatment of calcific tendonitis of the rotator cuff. Shock waves are a safe, effective choice for treatment of calcific tendonitis of the shoulder, reduced pain and better motion range.

Shockwave Therapy for Tendinosis Calcarea of the Shoulder : Retrospective Study

Author: PR. Rockett, AC. Souza, PR. Santos

Institution: Ortosom (Porto Alegre/RS); Cortrel (Rio de Janeiro/RJ); Orthomaster (Sao Paulo/SP), Brazil

The aim of this study was to evaluate the efficacy and safety of extracorporeal shock wave therapy for the treatment of tendinosis calcarea of the shoulder in three Brazilian Orthopaedics Clinics.

In a multi-center, retrospective study, the effect of shockwave therapy was investigated in 166 shoulders of 159 patients with tendinosis calcarea of the shoulder treated in the 51 months from April 2001 to July 2005. Seven patients received treatment in both shoulders. There were 82 women and 77 men with an average age of 56 (range, 25-79) years. The criteria for inclusion were at least three months of unsuccessful conservative therapy or six months of pain and calcifications grade I or II from Gärtner's classification. Criteria for exclusion were inflammatory arthritis, corticosteroid injection within the previous 6 weeks, acute infection, gout, malignant diseases and blood coagulation disorders. Each patient was treated with 1,500 - 2,000 shock waves, a 35 mm focus depth, and with an energy flux density of no more than 0.14 mJ/mm² after local or regional anaesthesia. One treatment was performed on 145 shoulders, 17 underwent a second treatment and 4 shoulders underwent a third treatment. The subjects were evaluated by means of a clinical evaluation according to Roles and Maudsley score, subjective outcome on Visual Analogue Scale (VAS), X-rays and ultrasound analysis, 45, 90 and 180 days after the end of the therapy.

The study showed the efficacy and safety of ESWT were excellent in 26.5%, good in 38.6%, acceptable in 13.9%, and poor in 21%, 180 days after ESWT.

Economic Aspects in the Treatment of Tendinosis Calcarea of the Shoulder

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The aim of this presentation is to compare the effective costs of ESWT versus the theoretical costs of arthroscopic surgery and the assessment of the cost benefits of this procedures in a retrospective study. From 1998 until 2005 we have done 420 applications of ESWT in 140 patients with tendinosis calcarea. Each patient received 3 weekly sessions. No one received anesthesia. The device used was a eletromagnetic generator Dornier Epos ultra with 2000 pulses each session. The treatment was done in a private clinic. The parameters used for the theoretical costs of arthroscopy was the average price of 3 private hospitals in the city of Sao Paulo. We used the Medical Procedures Brazilian Classification (4th edition - 2005) for ESWT and surgical honoraries for the medical procedures.

Although 78% of good and excellent results considering improvement of function and pain and also considering that we had no systemic or local complications, for this retrospective study the costs assessment was only about the resorption of the calcification, which occurred in 69% of the patients, and in 31% the calcification did not disappear. The direct costs of arthroscopy for tendinosis calcarea is 6,4 times higher than for shockwave therapy.

The costs benefits of shockwave therapy, is significantly compared to surgical arthroscopy, even if including the unsuccessful results of shockwave therapy. From the medical and economical point of view , ESWT offers an effective, safe, and simple procedure considering the risks of potential complications and the risk of no disintegration of the calcification (10 - 18%) after surgical procedure. The treatment of tendinosis calcarea of the shoulder with ESWT should be considered a routine procedure, on the other hand arthroscopy is an alternative only when no disintegration occurs after ESWT. Although the parameters of this study is the 4th Edition of CBHPM (Medical Procedure Brazilian Classification), the approval of this classification depends of a law's project by the government.

Shoulder Tendinosis and Related Clinical Entities Treated with ESWT. Histopathological and Clinical Correlation

Author: M. Branes, L. Contreras , L. Guiloff , J.A. Branes

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Shoulder Tendinosis, Shoulder Tendinosis with mid-substance tear and Calcified Shoulder Tendinosis account for a significant number of orthopaedic disorders. All of them share a common and defined histopathologic substrate called “tendinosis”. Based on our experience with Calcified Tendinosis and ESWT, we extended the application for shock waves to other specific clinical conditions.

Between December 2003 and June 2005, 90 patients with shoulder pain and dysfunction for 6 months or longer and without prior shoulder surgical procedures were diagnosed using x-rays and echography, in one of three described categories. Cases of intramural tears were reviewed with an Echographist in order to accept only those patients with intratendineous lesion (65 female, 25 male, mean age = 58 years). They were evaluated using VAS and percentage of dysfunction compared to the normal shoulder. Treatment was applied using an Orthospec (Medispec) device, 4,000 impacts/0.33mJ/mm², in a single session without anaesthesia. Sonographic control at 12 weeks and x-rays and sonography 24 weeks later. In this series, 12 patients complicated with Frozen Shoulder and therefore received a short course of oral corticoids and PT. For histopathologic comparison, samples were collected from 10 patients that underwent surgical repair for the same clinical indications at other treatment centers; five of them received the ESWT schedule immediately prior to surgery.

Seventy percent of the patients rated the procedure a “success” because they were pain free and experienced good shoulder function (with improving images of the tendon including calcium resorption). Twenty percent rated the procedure a “partial success” (8 of them had Frozen Shoulder) and 10% declared it a “failure”. Thirteen patients (14%) opted for surgical resolution because of a lack of subsidence of pain/shoulder dysfunction, being the source for histopathologic studies.

HISTOPATHOLOGIC RESULTS: became evident to light microscopy with usual stains that tendon tissue showed a consistent hypervascularization, characterized by hypertrophic new blood-vessels and new cellularity with fibroconnective repair. This reparative aspect of the tissues was also seen in the edge of intramural tears in tendinopathic areas. In many fields was possible to see areas of normal tendon close to tendinopathic lesion and in between appearing neo-vascularity without distortion or reaction of resident blood vessels. It was also evident that the repair mechanism did not occur through scarring tissue but through deposition of proteinaceous material, according to Toluidine Blue Stain results. During the histopathologic observations there were areas of necrosis or tissue distortion or signs of anaplasia/displasia or scarring. The histopathologic features of neo-vascularization induced by ESWT have always been quite similar in different areas and different tissues either from the same patient or among different patients.

The histopathological research on human tissues that have been treated with ESWT for specific clinical conditions is showing remarkable results, characterized by new vascularity and fibroconnective tissue repair, both conditions supported by well-described human healing capabilities

The Effectiveness of Extracorporeal Shock Wave Therapy on Tendinitis of the Shoulder

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Calcified lesions of the shoulder of the rotator cuff are a common problem in orthopaedic practice. The incidence vary from 2.5% to 20% in patients with asymptomatic shoulders and as much as 54% in patients with shoulder pain. The lesions are mostly located in the supraspinatus tendon close to the insertion area in the critical zone. Patients with calcifying tendinosis were usually treated conservatively (physiotherapy, analgesics, subacromial injection, ...). Uthoff described the circle of the disease which is mostly self-limiting and at least 10% of patients may require open or arthroscopic surgery.

Extracorporeal shock wave therapy (ESWT) in treatment of these calcified lesions was first described by Dahmen in Germany. Two different shock wave therapy techniques were known. The low energy one with a mean energy flux density lower than 0.08 mJ/mm^2 and the high energy one with energy levels of more than 0.28 mJ/mm^2 . Dahmen first used the low energy shock wave and described an analgetic effect. Loew used the high energy level and found a pain relief and also changings of the lesions in most cases.

There is an increasing number of clinical trials showing a success in 60% to 80% of patients. Mostly these trials were uncontrolled prospective designed. A better trial was published by Loew et al. They reported there results and stated the high energy ESWT is effective.

But at least there is no trial with a design in accordance to the ICH/GCP guidelines. Only these trials have the statistical power and evidence to show the efficacy of a treatment method.

Haake et al showed that the application of ESWT must be controlled to verify the position of the ESWT focus. Treatment techniques without control mechanism showed a worse outcome than techniques with an exact fluoroscopic controlled focussing application.

Materials and methods: First we completed a feasibility study to find out the treatment effect size and calculate the sample size. A prospective randomized placebo controlled study in accordance to the ICH and GCP guidelines was designed based on the results of the feasibility trial. We treated 48 patients in low energetic, high energetic and control group each to have the right statistic power.

One treatment group received 2 x 1500 high energetic shock waves with mean energy flux density of 0.32 mJ/mm^2 and the other one got 2 x 6000 low energetic shock waves with mean energy flux density of 0.08 mJ/mm^2 , 48 patients of the blinded placebo group received a sham therapy. We used the same device in all patients so we could exclude device related effects. The device we used called EPOS FLUORO®, manufactured by DORNIER MED TECH®. The primary criteria was the Constant-Murley-Score, second criterias the visuell analogue scale and changings of deposit size in x-ray examination. The ESWT was indicated after failed complete conservative therapies. Between the two application settings we have a time interval of two weeks. In all sessions the patients could get an analgesation if the pain was uncomfortable. An air chambered foil inhibits the transmission of the shock waves from ESWT emitter into the shoulder in the controlgroup.

The clinical and radiological examinations were done by a blinded observer, during the whole trial phase an independent monitor guaranteed that the protocol was followed by the coworkers. The statistic evaluations, data monitoring and auditing were done independently from applicator and blinded observer. The patients were randomized after they have fulfilled the inclusion and exclusion criterias and after they have given a written informed consent to get the ESWT and to take part of the trial.

Comparative analyses were done on an intention-to-treat basis. No prospective cessation rules were defined and no interim analysis was planned. The study protocol was approved of by the ethics committee at

the authors' institution.

Results:

24 weeks after ESWT the patients treated with high and low energetic ESWT have a significant better outcome as the sham group by scoring the Constant-Murley-Score ($p < 0.001$). The second-criteria as the visual analogue scale and the morphological appearance of the deposits changed with high statistical difference ($p < 0.001$). No severe side effects caused by shock waves were observed. In some cases we observed a transient reddening and small cutaneous petechial bleeding but all of them disappeared within 6 weeks when the patients came to the first follow up visit. The comparison between high and low energetic ESWT showed significant better outcome after high energetic ESWT.

Discussion:

The exact mechanisms of the therapeutic effect of extracorporeal shock wave therapy for treatment of calcified lesions of the shoulder are still uncertain. Although some investigations show a direct mechanical effect that leads to a mechanical disintegrating effect on the deposit. Other authors prefer a long-lasting hyperstimulation analgesia. The shock waves initiate an increase of blood flow with increasing oxygen supply of the critical zone. That can induce the further ongoing of the natural selfhealing cycle. In chronic calcified tendinitis of the rotator cuff, the cycle, described by Uthoff rests in the calcific stage. The application of extracorporeal shock waves pushes the cycle further to the postcalcific stage that leads to a complete restitutio. Because of the natural history and the normally self limiting disease of the tendinosis, the shock waves treatment should not be used in acute patients. Most of these patients with an acute tendinitis still move from the calcific stage to the postcalcific stage and should only be treated in a symptomatic analgetic or antiphlogistic way. Compared to other published data regarding calcific tendinitis of the shoulder, no study fulfils the requirements of GCP guidelines to show efficacy.

Conclusion:

The high energetic shock wave therapy is the best evidence based treatment in calcified lesions of the shoulder and must be indicated before operative intervention.

Effectiveness of Transcutaneous Electrical Nerve Stimulation on Relieving Pain During Radial Extracorporeal Shock Wave Therapy, in Tennis Elbow

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Radial extracorporeal shock wave therapy (rESWT) is widely used as an alternative treatment option in chronic tendinopathies. Besides tennis elbow and chronic plantar fasciitis rESWT was effectively used in chronic calcific tendonitis of the shoulder and also in chronic patella syndrome. Good and excellent results were found in clinical trials which also reported no relevant clinical side effects. rESWT is designed as a local anaesthesia-free procedure (Gerdesmeyer, 2004), although for most patients with tennis elbow, rESWT is an uncomfortable and often painful procedure. On the other hand, the influence of local anaesthesia on the clinical outcome of ESWT is in discussion. The results of ESWT on plantar heel spurs without local anaesthesia have been significantly better than with local anaesthesia (Auersperg 2002, Rompe 2004, Labek 2005). These problems have stimulated a search for safe and effective analgesia. Transcutaneous electrical nerve stimulation (TENS) is a widely used and safe analgesic which is effective in both acute and chronic pain. TENS has also been used successfully as an analgesic during painful procedures in children, and there have been no significant side effects (Lander 1993). The use of TENS is effective in decreasing the analgesic requirements during extracorporeal shock wave lithotripsy (Reichelt 1999, Karamaz 2004, Resim 2005). The aim of this prospective, randomised, sham-controlled study was to evaluate the efficacy of TENS on relieving pain during rESWT in tennis elbow.

Between June 2005 and January 2006, a total of 32 patients with tennis elbow (18 men, 14 women) aged 26-61 years (mean 49) were treated. Inclusion criteria: Chronic symptoms (history of at least 6 months) and an unsuccessful conservative treatment. A randomized, sham-controlled study was utilized. The patients were randomly assigned to two groups: Group I (n=16): Conventional TENS. Parameters: Pulse duration: 100 microseconds. Frequency: 80 Hz. Waveform: Biphasic symmetrical square. Intensity: tingling sensation (15-45 mA). Group II (n=16): Placebo ("sham TENS"): Identical and fully functional unit but with non-functioning output leads. The TENS machine used in the study was the Megasonic 313 (Electromedicarin-Spain) TENS and Placebo was administered for the 10 minutes before rESWT, during the procedure, and for 10 minutes afterwards. The rESWT was applied on the lateral epicondyle and the pain center was detected by biofeedback. Electrodes were positioned around the treatment area (bipolar electrode configuration). The patients were informed that they may or may not experience a slight tingling sensation. The rESWT device used was Swiss Dolor Clast (EMS-Switzerland). Parameters: 2,000 shockwaves. Pressure of 2.4 bar (Energy flux density: 0.08 mJ/mm² approx.) and frequency of 8 Hz. The pain intensity perceived during radial extracorporeal shock wave therapy was evaluated using a Standard 100-mm visual analogue scale (VAS). The patients were treated in 3 sessions (at intervals of one week). The evaluation was performed only during the first session. Analyses: The differences between groups were carried out using U of Mann-Whitney test. Some factors that had no effect, such as age and sex were evaluated using multivariate logistic regression analysis. The statistical analysis was carried out without knowledge of the treatments used (TENS or Placebo). There were no statistically significant differences between the two groups. ($P < 0.05$). The median VAS score was 52 (range 20-100) in the TENS group and 60 (range 20-100) in the Placebo group. The patients in the TENS group had lower median VAS scores than patients in the Placebo group, but this difference was not significant ($P = 0.402$). Side effects and complications were not observed.

We conclude that the use of TENS is not effective in decreasing the pain intensity perceived during radial extracorporeal shock wave therapy in tennis elbow. Further studies of significantly larger groups of patients are necessary to underline the results of this investigation.

Shockwave Therapy for Hip Bursitis: Retrospective Study

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The aim of this study was to evaluate the efficacy and safety of extracorporeal shock wave therapy for the treatment of Hip Bursitis in two Brazilian Orthopaedics Clinics. In a multi-center, retrospective study, the effect of shockwave therapy was investigated in 46 cases of 43 patients with Hip Bursitis treated over a 35-month period from June 2002 to May 2005. Three patients received bilateral treatment. There were 36 women and 7 men with an average age of 60 (range, 27-79) years. The criteria for inclusion were at least three months of unsuccessful conservative therapy or six months of pain. Criteria for exclusion were inflammatory arthritis, corticosteroid injection within the previous 6 weeks, neurological abnormality, gout, malignant diseases or blood coagulation disorders. Each patient was treated with 1,200 shock wave impulses, a 35 mm focus depth, and with an energy flux density of no more than 0.14 mJ/mm² after local anaesthesia. One treatment was performed on 42 cases and 4 underwent a second treatment. The subjects were evaluated by means of a clinical evaluation according to Roles and Maudsley score and subjective outcome on Visual Analogue Scale (VAS) analysis 45, 90 and 180 days after the end of the therapy. The study showed the efficacy and safety of ESWT were excellent in 37%, good in 54.4% and poor in 8.6%, 180 days after ESWT.

Shockwave Biosurgery and Autologous Growth Factors Combined Therapy in Severe Patellar Tendinopathies

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Patellar tendinopathies represent a challenge for physicians because the response to treatment is poor, the rehabilitation is long and the leave from competitive sports very frequent. Treatment with ESWT has been reported for patellar tendinosis, but good results are evident only after months of treatment.

We performed a pilot protocol of ESWT and Autologous Growth Factors (AGF) combined therapy for chronic patellar tendinosis. Ten volunteer patients aged between 20 and 44 years with at least one year of proximal patellar tendinosis were recruited. Patients had previous treatments including at least two steroid injections, failed rehabilitation protocols and pain during daily activities. MRI studies reported areas of degenerative tendinosis in the proximal insertion of the tendon. We applied 4,000 shockwaves without anaesthesia using an electro hydraulic generator. We used a progressive pressure of 15-22 mV at 2 shocks/second. Prior to treatment, we extracted 30 cc of blood to obtain AGF that was activated and applied into the tendinous defect after ESWT. Patients started a rehabilitation protocol restraining jumping and running activities for three weeks, allowing walking short distances, and using open kinetic chain exercises.

We found a decrease in pain level and a faster return to athletic activity. Recurrence of pain was lower than with conventional ESWT. The pain relief pattern became occasional and episodic. Good or excellent results were reported by 79% of patients. Combined ESWT & AGF bio surgery could be an excellent alternative treatment for large defects or degenerative areas of large tendons. Further studies must be done to recommend this protocol.

Treatment of Jumper's Knee with Extracorporeal Shock Wave Therapy

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Jumper's knee affects mostly individuals who play sports particularly jumping athletes. In this study we have included 73 sports patients, 54 male and 19 female, age range between 15 and 69 (mean age: 32). Since 10 patients were affected by bilateral tendinopathy, a total of 83 tendons were treated.

All patients underwent clinical and instrumental diagnosis in order to recognize the presence, the location and the seriousness of the specific tendinopathy associated or not with calcific areas of metaplasia in the tendon to be diagnosed. The pain symptomatology was classified using VAS and according to a 5 stage clinical evaluation range. The treatment was performed using 2 different devices, produced by STORZ, both equipped with electromagnetic generators with cylindrical coil and providing ultrasonography capability. The protocol, identical for both generators, called for an average of 4 sessions (min. 3 - max. 5), administered in 2 to 7-day time intervals with 1,500-2,500 shocks applied with an EDF between 0.08 and 0.44 mJ/mm². The evaluation of the post-treatment results was assessed on the basis of the average VAS score and on the subjective clinical evaluation range. In conclusion, we obtained satisfactory results in 73.5% of cases (Excellent in 54.2% and Good in 19.3%). The successful treatment in performing athletes (16 tendons) was satisfactory in 87.5% with an average time of resuming sport at approximately 6 weeks.

In our opinion, shock waves are a valid conservative therapy for the treatment of jumper's knee, in accordance with what is found in literature.

Post Traumatic Reduction of the Range of Motion and Impairment of the Athletic Gesture - Therapeutic Potential of Shock Waves

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Occasional traumas, often occurring outside sports activity, may lead to a reduction of the muscle extension. After a traumatic event, residual muscular-tendinous pain and significant difficulty in performing the typical movements of a given sports activity is often reported by patients, both when training and when playing sport professionally. The evolution signs of post-traumatic stiffness appear at a very early stage, after a few weeks. The traditional therapeutic approach uses different physical therapies, ranging from mesotherapy to manual debridement. Shock waves may represent an interesting therapeutic opportunity to restore the physiological conditions of the muscle-tendon extensibility.

Materials:

Over the past few years I have been able to evaluate various post-traumatic cases (12) concerning athletes affected by reduced articular mobility (between 40 and 180 days after trauma) showing a subjective significant impairment in performing sports activity. The subjects had suffered from direct contusive traumas or stab wounds mainly affecting the thigh (7 quadriceps, 2 abductors, 1 bicep of thigh, 1 bicep of arm, 1 sural triceps). In some cases they had also been immobilized due to concurrent bone lesions. All subjects had already undergone physical and rehabilitation therapies without reporting satisfactory results. **Methods:** The treatment modality was ESWT (with an OSSATRON OSA 140 device from HMT) performed in different sessions (from 2 to 4), at intervals of at least 3 weeks apart. Neither local nor general anesthesia was used. During each treatment an average of 1,350 shock waves were administered with an average intensity of approx. 16 kV. The therapy was coupled with a rehabilitation treatment performed both by a rehabilitation therapist and by the patient himself. The patient's examination included a clinical evaluation (with the following score: 0-null, 1-fairly good, 2-good, 3-very good), ROM deficit measuring, a VAS test (from 0 to 10) and Fisher algometer (from 1 to 6). Follow-up was made every month until resumption of sports activity.

Results:

The first signs of clinical recovery were reported only 48 hours after the first shock wave treatment, becoming more and more evident within the first 14 days. Additional significant improvement was reported after each subsequent treatment. At least two therapy sessions were conducted to recover complete functionality. The clinical result was positive for all patients 1 month after the final shockwave treatment. At the end of the observation period the result proved to be very good in 9 cases (4 subjects were even able to resume the same professional level of play they had experienced before trauma only three months after end of therapy), good in 2 cases, and fairly good in 1 case. The radiological evidence proved peculiar since the x-ray did not show any significant variation during the first 6 months after ending therapy, despite a satisfying clinical recovery. Only the examination 12 months after cessation of therapy showed a reduction of calcific deposits.

Conclusions:

ESWT coupled with appropriate rehabilitation represents an efficient method to treat post-traumatic results with reduced muscle-tendon extensibility. The therapy proves to be effective when performed at an early stage and shows a clinical as well as a functional recovery that differ from the radiological evidence, which at present cannot be easily interpreted.

ESWT in La Peyronie's Disease : Experience of Therapy with Equipment with US Guide in Line

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ESWT therapy in La Peyronie's Disease in recent years has shown good results with its effects on cavernous bodies and against the fibrosis of the albuginea of cavernous bodies. In this study ESWT has been applied by protocols similar to those applied in orthopaedic diseases (one application weekly for 4 weeks). In this study the patients after the 2nd session of therapy reported an improvement in their symptoms. From January to May 2005, 22 patients with Induratio Penis Plastica (IPP) were treated with ESWT. The age of the patients was between 48 and 75 years (average age 62.2). The lesions of the induratio were single plates (72%), some of them with calcification (9 of 22). The treatments were performed on flaccid penis with a piezoelectric device (WOLF PIEZOSON 300) with Ultrasound (US) imaging-guide in line. We performed our treatments weekly in 4-5 sessions of therapy.

Seventeen of 22 of the patients who were included in this study (77.2%) showed a decrease of the curvature of the penis, and 3 patients who had reported pain, reported the disappearance of this pain after 2 sessions of therapy. The plates that showed the largest improvement were those with calcification and those located on the middle of penis.

The importance of therapy with US guide is demonstrated by the results: the plates with calcifications showed the largest improvement because of their easier localization, moreover they are the most important lesions because they cause the highest degree of curvature. In the plates without calcifications, ESWT with US guide quickly resulted in a decrease in pain. This therapy showed its effectiveness by reducing the most important lesion of the disease which is the curvature of the penis.

Shock Waves After Severe Hand Traumas: Description of a “Trophic Effect” on Bone and Soft Tissue

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Bone healing disorders can be a serious problem after severe traumas of the hand, as bone fractures are often associated with wide soft tissue injuries. The authors will report their experience using Extracorporeal Shock Waves (ESW) in “hand surgery” and discuss the principles of their application in this field, also suggesting a new effect in severe soft tissue atrophy. From April 2002 to date, 40 patients suffering from a bone healing disorder of the hand were subjected to high-energy ESW (1 - 2 cycles of 3 treatments, 0.25 - 0.40 mJ/mm²), under local anaesthesia.

The highest success rate (> 90%) was recorded for phalanxes and metacarpals, while the lowest was reported for scaphoids (50 - 60%). As a collateral (but non-negligible) observation, all patients who had severe sequences from soft tissue loss, objectively showed a recovery of soft tissue atrophy. Subjectively, they described their fingers as, “softer, more sensitive, less painful”.

From the critical analysis of their clinical experience, the Authors will discuss some conclusions: 1) ESW are a valid tool for bone healing disorders, not only of scaphoid but also of the whole skeleton of the hand, but only in presence of mechanical stability (phalanxes need to be surgically stabilized before treatment); 2) Even if not justified to treat acute traumas, early ESW (when supported by biological and clinical suspicion of delay) can change the manner of healing; 3) ESW seem to have an important “trophic effect” also on soft tissue, even with skin integrity, thus confirming a strong angiogenetic action.

Shockwave Therapy for Peyronie's Disease - Comparison of Outcomes for Acute (Inflammatory) Versus the Stable Disease States

Author: D. Manzone

Institution: Silicon Valley Urology Center, USA

29 patients with Peyronie's disease underwent SWT with the Epos Ultra Shockwave Lithotripter (Dornier). The degree of penile angulation was determined by photography, plaque size was estimated by ultrasound measurement, visual analogue scale (VAS) was used to assess pain; International Index of Erectile Function (IIEF) was used to measure erectile dysfunction. Patients were assessed prior to and after treatment. Patients were treated with a single shock wave therapy session with 6000 shocks at power level 9 (0.57mJ/mm²). Follow-up was from 4 to 14 months.

26 patients completed follow-up. Of the 17 patients treated in the Acute (Inflammatory) phase, 71% had a decrease of greater than 34° in the curvature, and 47% reported a subjective decrease in plaque size. 68.75% of the 13 patients with painful erections had immediate relief of pain after treatment. Of the 12 patients with stable painless disease, 33% were found to have a decrease in curvature with treatment. 65% of the patients with chronic disease also had significant erectile dysfunction and 64% scored higher on the IIEF after treatment. Erythema and or mild initial haematuria was found in 31% of patients.

Peyronie's disease is an evolving inflammatory process whose response to shockwave therapy depends greatly on the evolutionary stage of the disease.

ESWT: a Tool Against Neurogenic Inflammation in “Pillar Pain” Disease

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“Pillar pain” is a painful syndrome, probably due to neurogenic inflammation, locally complicating 20% of carpal tunnel releases. The aim of this study was to confirm our previous preliminary results about the effectiveness of Extracorporeal Shock Waves (ESW) in this disease, and to postulate further explanations about the mechanism of action.

Forty patients suffering from subcutaneous painful swelling in the interthenar area, scar redness, thenar and/or hypothenar discomfort, 2 to 3 months after surgery, were subjected to ESW (3 weekly treatments, 0.03 mJ/mm², 2,500 - 3,000 shocks/session), under “in- line” ultrasound examination. Some of them, before and after treatment, were subjected to wrist NMR or ultrasound and Doppler examination.

The results confirmed our previous observations about the effectiveness of ESW in rapid relief of pillar pain. More than 90% of the patients reported complete recovery within approximately 1 month; many of them had significant improvement after the first treatment; usually, pain relief followed swelling and scar redness resolution. Moreover, there was a strict correlation between pathological NMR and ultrasound findings and clinical data. No side effects were observed during or after ESW treatment.

Pillar pain is a self-relieving condition, but it takes a relatively long time for pain resolution. ESW proved to be a valid tool, with a strong positive effect in rapidly resolving pain, swelling and scar redness. The authors, on the basis of these results and some theoretical and experimental data from the literature, will discuss the pathophysiological basis of ESW efficacy in neurogenic inflammation, thus providing new perspectives in this field.

Localized Calcifications in a Patient with Limited Scleroderma, Treated with ESWT - Case Report

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The aim of this case report was to evaluate the efficacy of the ESWT to reduce pain and the size of cutaneous calcifications in a patient with Limited Scleroderma (LS). Scleroderma is a heterogeneous disease (Diffuse, limited and localized) characterized by overproduction of collagen and extracellular matrix, damage of small vessels endothelium with tissue ischemia, and activation of immune system.

The Limited variant of scleroderma (previously defined C.R.E.S.T) is often characterized by subcutaneous calcium hydroxapatite deposits mainly distributed in the digital pads and periarticular tissues. The presence of calcinosis causes digital ulcers and severe pain. At the moment no definitive effective treatments are available for this complication. With this background we begin to treat these patients with ESWT with the purpose to reduce pain and, possibly the size of calcifications. Due to the peripheral localization of the calcifications no major adverse effect are expected by the ESWT treatment. An X-ray of hands was performed to localize the presence and dimension of cutaneous calcinosis. We identified 2 areas of treatment: one on right thumb and one on the third left finger. The protocol consisted in six applications (one a week) with the lowest level of energy using a Wolf Piezoson 3000.

End points were to evaluate pain reduction (VAS scale) and the size of calcifications (on control X-ray).

Reduction of pain on thumb (VAS): from 6 to 0 at the third treatment.

Reduction of pain on third left finger (VAS): from 8 to 4 at the sixth treatment.

Reduction of size of calcification: no significative reduction of size was observed.

ESWT seems to be a safe and useful treatment for reduction of pain due to subcutaneous calcifications in LS patients. At the moment no reduction of size of the calcification was observed. Larger number of patients are required to confirm the result of this case report.

Extracorporeal Shockwave Therapy for Chronic Skin Lesions: Cases Reports

Author: P. Santos, A. Souza, P. Rockett, M. Guedes

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The aim of this study was to evaluate the efficacy and safety of extra corporeal shock wave therapy for the treatment of chronic skin lesions.

The study consisted of patients with ulcer cruris or ulcers at their extremities as well as chronic open wounds, septic or aseptic. To be included in the study, patients must have had the disease for a minimum of 3 months and it should be categorized as chronic disease; and to have failed conservative therapy for at least 3 months. Patients aged 18 and older were included in the study.

Exclusion criteria :

Malignant mutations in the therapy area;
Anatomic anomalies in the therapy area;
Acute inflammation in the therapy area;
Treatments at the head or neck;
Coagulopathies;
Pregnancy;
and children.

Since October 2005, we have treated 12 patients with different etiologies (diabetes type I and II and venous ulcer) using a Reflectron device (HMT) with a special therapy head. The patients were separated into 2 groups:

Group 1 - one application / week

Group 2 - one application every 2 weeks

The energy flux density was 0.03 mJ/mm^2 to 0.06 mJ/mm^2 . The treatment was performed without anaesthesia.

The study showed promising results with complete or partial healing in most of the patients . Prospective randomized trials have to be performed in order to prove safety, efficacy and stability of the results of shockwave therapy to treat chronic skin lesions.