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# Extracorporeal shock waves therapy in the treatment of trochanteric bursitis: A pilot study

## Pozaustrojowa terapia falą uderzeniową w leczeniu zapalenia kaletki krętarzowej – badanie pilotażowe

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### Key words

shock waves therapy, trochanteric bursitis, hip, pain

### Abstract

**Background:** The trochanteric bursitis (TB) is becoming quite common worldwide due to the increase in the sporting activities of the population at large. Most often TB is associated with repetitive minor trauma of the muscles inserting on the greater trochanter or with a direct trauma on the lateral aspect of the thigh. The aim of our research is to evaluate the effectiveness of the extracorporeal shock waves therapy (ESWT) in the treatment of trochanteric bursitis.

**Material and methods:** 114 patients affected by TB were treated between July 2004 and May 2007. The protocol consisted of three sessions of ESWT (lithotripter 6,5 MHz ultrasound probe, 1700 pulses 0,28 mJ/mm<sup>2</sup>) performed weekly during one month. Post operative management included ice pack on to the treatment site. At the end of every ESWT application assisted kinesiotherapy and stretching were performed. All patients were allowed to perform light activities, but avoiding strenuous sport activities for 6 weeks. Each patient was evaluated with a clinical assessment, hip Range of Motion (ROM), hip stress abduction test, standard X-Rays, ultrasound and MRI. These measurements were repeated at one and four months after the beginning of the treatment.

**Results:** A decrease in pain was observed in month four in 86% of the patients affected by TB. The abduction test and flexion test performed four months after the therapy showed an increase in the hip ROM.

**Conclusions:** We assume that ESWT can reduce pain and improve the hip ROM in patients affected by TB, but further controlled trials are needed to state the effectiveness of ESWT in clinical practice.

### Słowa kluczowe

terapia falą uderzeniową, zapalenie kaletki krętarzowej, staw biodrowy, ból

### Streszczenie

**Wstęp:** Zapalenie kaletki krętarzowej (TB) staje się dość często występującym na całym świecie schorzeniem wskutek coraz częstszego uprawiania różnych dyscyplin sportu. Najczęściej TB wiąże się z powtarzającymi się, nieznacznymi urazami mięśni przyczepiających się na krętarzu większym kości udowej albo z bezpośrednim urazem bocznej powierzchni uda. Celem naszego badania jest ocena skuteczności pozaustrojowej terapii falą uderzeniową (ang. *Extracorporeal Shock Waves Therapy*, ESWT) w leczeniu zapalenia kaletki krętarzowej.

**Materiał i metody:** W okresie od lipca 2004 roku do maja 2007 roku objęto leczeniem 114 pacjentów z TB. Protokół leczenia składał się z trzech sesji ESWT (litotryptor z sondą ultradźwiękową 6,5 MHz, 1700 impulsów o mocy 0,28 mJ/mm<sup>2</sup>), wykonywanych co tydzień. Postępowanie po zabiegu obejmowało okład z lodu na leczone miejsce. Na zakończenie aplikacji ESWT przeprowadzano sesje kinezyterapii oraz ćwiczeń rozciągających. Wszystkim pacjentom zezwalano na lekkie ćwiczenia fizyczne, lecz zalecano unikanie forsownych zajęć sportowych przez 6 tygodni. Ocena każdego pacjenta obejmowała badanie kliniczne, kontrolę zakresu ruchomości (ROM) stawu biodrowego, test odwodzenia stawu biodrowego z oporem, standardowe zdjęcia RTG, ultrasonografię oraz tomografię rezonansu magnetycznego. Powyższą ocenę powtarzano po upływie miesiąca oraz czterech miesięcy od rozpoczęcia leczenia.

**Wyniki:** Po upływie czterech miesięcy u 86% pacjentów z TB zaobserwowano zmniejszenie się bólu. Test ruchu odwodzenia i zgięcia, przeprowadzony po czterech miesiącach od leczenia, wykazał zwiększenie się ROM stawu biodrowego.

**Wnioski:** Przyjmujemy, że ESWT może zmniejszyć ból i zwiększyć ROM stawu biodrowego u pacjentów z TB, jednakże ustalenie skuteczności ESWT w praktyce klinicznej wymaga przeprowadzenia dalszych badań z grupą kontrolną.

## INTRODUCTION

Trochanteric bursitis (TB) is a disorder that affects the lateral side of the thigh. Usually TB affects the fourth and the fifth decades of the active population worldwide.

TB is associated with the repetitive minor trauma of the muscles inserting on the greater trochanter<sup>1</sup>. Another cause could be a direct trauma on the lateral aspect of the thigh (23-64% of patients)<sup>2-5</sup>. Authors<sup>6</sup> have referred to the fact that TB could be related to lower extremity biomechanical alteration, osteoarthritis of the lumbar spine, the knee or hip joint, and leg length discrepancy (List 1).

Non-professional athletes are frequently affected by TB. Skiing, ice-skating, running are mentioned to be the main sporting activities related to TB. Walking, straight postures, lying on the affected side and the practice of sports may also be the starting problem of this disorder. Even if a bursitis is connected with a good prognosis, sportsmen and women are often forced to reduce or suspend their activities for a period of from one to four months<sup>6</sup>. Degenerative changes, especially calcifications, occur in the tendons and muscles inserting on the greater trochanter or in the area surrounding the bursa<sup>7,8</sup>.

The clinical manifestation of a trochanteric bursitis is chronic, intermittent, aching pain over the lateral surface and eventually the posterior surface of the thigh. It sometimes extends to the low-back area or to the knee. Patients may therefore report numbness and paresthesia-like symptoms in the thigh.



**Figure 1**  
Physician performing a hip stress abduction test

Clinical evaluation consists of tenderness in the area of the bursa pain elicited by resisted active resistance to abduction and external rotation and, occasionally, internal rotation (Figure 1). Flexion and extension are not triggers and this can be useful for differentiating this condition from intra-articular diseases. Swelling is not evident since trochanteric bursae are deep beneath the muscles<sup>1</sup>. A physical examination may also reveal an associated condition, such as leg length discrepancy, genu valgum, rheumatoid arthritis, obesity and iliotibial band syndrome<sup>6</sup>.

Calcifications around the area of the greater trochanter, varying in shape, size and density, could be found radiographically in about 40% of patients<sup>3</sup>. X-rays could show altera-

tions on the surface of the trochanter (Figure 2). Associated musculoskeletal conditions may be also noticed, such as hip arthritis and lumbar spine degenerative disk disease<sup>6</sup>.

Magnetic Resonance Imaging (MRI) (Figure 3) usually shows a high intensity signal on short echo time inversion-recovery sequences in the greater trochanteric region<sup>9</sup>.

The diagnosis is made by clinical findings and MRI, because X-ray is often unspecific. Rest, nonsteroid anti-inflammatory drugs, cold-and-hot compresses and local injections with steroids (if necessary associated with local anaesthetics) are the most commonly used treatments to reduce pain<sup>6</sup>.

However, the results are not always very satisfying. A rate of response of 70 to 100% after corticosteroid injection has been described, but up to 25% of patients experienced a relapse within 10 months<sup>10</sup>. Surgery is indicated in refractory cases and the intervention usually consists in the iliotibial band release, excision of the bursal sac and removal of calcifications.

Only a few studies have evaluated the effects of pulsed ultrasound on trochanteric bursitis<sup>11-15</sup>. Crevenna has stated that a conservative treatment

### List 1

#### CONDITIONS ASSOCIATED WITH TROCHANTERIC BURISITIS

- Hip arthritis
- Knee arthritis
- Snapping hip syndrome
- Leg length discrepancy
- Pes planus
- Degenerative arthritis or disc diseases of the lower lumbar spine
- Fibromyalgia
- Obesity



**Figure 2**  
Hip standard RX with a calcification around the greater trochanter



**Figure 3**  
Hip MRI with a high intensity signal in the greater trochanteric region

regimen including intensive high-dose pulsed ultrasound therapy should be attempted before considering more invasive treatments (injections, surgery)<sup>7</sup>.

We think that ESWT could be performed in the treatment of several musculoskeletal pathologies. In this work we would like to test the efficacy of ESWT in the treatment of TB.

## MATERIALS AND METHODS

Our case series consists of 114 patients, suffering from TB and treated with ESWT from July 2004 to December 2006. The inclusion criteria

for ESWT treatment was the presence of a trochanteric bursitis not responding to treatment after six months of conservative treatment.

The exclusion criteria included rheumatoid arthritis, generalized polyarthritis, local infections, pregnancy, bleeding disorders, tumors, an age younger than 18 years, severe endocrine disease (hypopituitarism, hypothyroidism), advanced peripheral vascular disease (varicose veins), a pacemaker.

The details of the procedure and associated potential risks were discussed with each patient before treatment. Each patients was treated with 1700

pulses of a medium energy (0,28 mJ/mm<sup>2</sup>), using a Wolf Piezason 300 Dornier Medtech lithotripter with a 6,5 MHz ultrasound probe. These applications, focused over the trochanteric site, were performed 3 times, once a week for the duration of one month. No local anaesthesia was used<sup>11,12</sup>.

Post operative management included ice pack applied to the treatment site. All patients were allowed to performed light activities, avoiding strenuous sport activities for 6 weeks. At the end of every ESWT applications assisted kinesiotherapy and stretching were performed (the same protocol for all patients, twice a week for four weeks).

A physical examination and a clinical functional evaluation (range of motion and hip stress abduction test) were carried out right before the beginning of the therapy and after the first and fourth month after its conclusion, estimating the post-treatment residual pain in the development of normal daily activities. Therefore a questionnaire was given and completed by patients to estimate the pain using three scales: Numeric Rating Scale (NRS), McGill Pain Questionnaire (MPQ) and Chronic Pain Grade Questionnaire (CPG).

Patients were divided into four groups based on the results obtained, using NRS's numerical scale (0-10): A (0, very good result: no residual pain), B (1-3, good result: residual little pain), C (4-7, sufficient: residual moderated pain), D (8-10, unsatisfactory: unchanged pain).

The scores before and after treatment were compared using a Wilcoxon signed rank test and the statistical significance was set at a p value of <0,001.

Imaging evaluation was performed with standard X-rays, ultrasound and MRI. A residual bursitis was estimated, searching for calcifications with X-rays or for the presence of inflammatory fluid with MRI or ultrasound. Each patient was submitted to X-rays and ultrasound exams at a pre and post-treatment time. Only 49 patients had an MRI (pre treatment, after 1 month and after 4 months).

**Table 1**

<b>Pre treatment and post treatment pain values estimated in Numeric Rating Scale (NRS), McGill Pain Questionnaire (MPQ) and Chronic Pain Grade Questionnaire (CPG)</b>			
	<b>Pre ESWT</b>	<b>1 month after</b>	<b>4 Month after</b>
NRS	3.89 ± 0.41	3.62 ± 0.32	1.72 ± 0.40 *
MPQ	10.02 ± 1.03	9.43 ± 0.98	3.40 ± 0.52 *
CPG	1.53 ± 0.26	1.57 ± 0.31	0.81 ± 0.21 *

\* significant difference in comparison to pretreatment values (p<0,001)

**Table 2**

<b>Evaluation at the beginning of treatment, and after 1 and 4 months</b>			
	<b>T0: beginning of treatment</b>	<b>T1: after 1 months</b>	<b>T2: after 4 months</b>
N° patients	114	114	114
Questionnaire	114	114	114
VAS (average value)	7	5	1
Range of Motion (average value):			
Flex-extension	0°-100°	0°-100°	0°-100°
Abduction-Adduction	30°-20°	30°-20°	50°-30°
Internal-external rotation	0°-0°	10°-10°	25°-30°
X-rays	114	114	114
MRI	49	49	49

**Table 3**

<b>Results at the end of treatment</b>				
	<b>A. Excellent benefit</b>	<b>B. Good benefit</b>	<b>C. A little benefit</b>	<b>D. No benefit</b>
N° patients	73	25	10	6

**RESULTS**

The clinical evaluation showed a significant decrease in pain (p<0,001) four months after the beginning of the treatment; NRS, MPQ and CPG values are reported in Table 1.

The clinical evaluation, hip ROM, and hip stress abduction tests showed a pain relief in 86% of patients (p<0,001) (A=73 B=25 C=10 D=6) (Table 2 and Table 3).

Imaging evaluations (calcifications in X-rays or the presence of inflammatory fluid with ultrasound and MRI) at 4 months after ESWT showed a complete reduction of

signs of pathology. Flush skin was observed in only 20% of patients, as has been described by other authors<sup>10,11</sup>.

**DISCUSSION**

The aim of our research is to evaluate the efficacy of ESWT in the treatment of TB.

In literature there are different evaluation scales; the ones referred to in this study made us able to observe a substantial clinical and subjective improvement for each patient, especially more than one month after the concluding of treatment.

In fact there is no significant difference between the values obtained for the pre-therapy evaluation and the values obtained after just one month from the commencement of treatment.

In our study we considered only one group of patients, all submitted only to ESWT. But in the future we intend to analyze also other ways of treatment, in order to compare the outcomes with those of different methods.

However it is possible to assert, from X-rays and MRI data, that the treatment has been useful in order to reduce the inflammation of the trochanteric bursa.

**CONCLUSION**

According to our data we assume that Extracorporeal Shock Wave Therapy has been a useful method in reducing trochanteric pain in our case series and flush skin is the only complication we have observed during the treatment.

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