

# Extracorporeal Shockwave Therapy for Refractory Greater Trochanteric Pain Syndrome

**Research Article****Abstract**

**Introduction:** Greater trochanteric pain syndrome (GTPS) is a common and disabling condition characterized by pain and tenderness at or around the trochanteric area. Extracorporeal shockwave therapy (ESWT) has been described as a method of treatment. The National Institute for Health and Clinical Excellence (NICE, UK) guidance suggests a possible benefit but with limited evidence.

**Materials and Methods:** We retrospectively identified 71 consecutive patients who underwent ESWT for refractory GTPS over a period of 16 months. ESWT was offered to patients with refractory symptoms despite a minimum of 3 months of conservative treatment. Standardised questionnaires were used to collect data including pain scores (0-10), change in symptoms, discomfort of the procedure, and complications.

**Results:** Fifty-nine patients (83%) were followed up. The mean time to follow up was 8 months (3 to 19). The mean age was 59 (29 to 88) with 86% females. Two-thirds had improvement in their symptoms with a significant drop of 6 points in their pain score ( $p < 0.05$ ); however, symptoms recurred in 60% at a mean of 4 months. Most patients (60%) had mild or no discomfort from the treatment. Two patients (3.3%) could not tolerate the treatment. One complication was reported; an exacerbation of sciatica symptoms which settled spontaneously.

**Conclusion:** This study shows an improvement in the symptoms of 67% of patients with refractory GTPS, for up to 15 months, but with frequent relapsed. Further research is required to confirm whether MRI may be useful in selecting patients for ESWT.

**Keywords:** Pain; Hip; Tendinitis; Bursitis

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**Abbreviations:** GTPS: Greater Trochanteric Pain Syndrome; ESWT: Extracorporeal Shockwave Therapy; NICE: National Institute for Health and Clinical Excellence; MRI: Magnetic Resonance Imaging

**Introduction**

Greater trochanteric pain syndrome (GTPS) is a condition characterized by pain and tenderness at or around the trochanteric area [1,2]. Described originally as trochanteric bursitis, most now prefer to use the term GTPS. This is because in most cases, no inflammation is detected in the bursa on imaging or surgery, and the source of pain could be enthesopathy, gluteus medius and / or minimus partial tendon tears, or a snapping iliotibial band [1-4].

GTPS mainly affects middle age women, with a female to male ratio of 4:1 and a prevalence of 10-25% in the general population. Despite being commoner in people with sedentary life style, it also affects runners and athletes who tend to be younger [1]. The diagnosis is mainly clinical, with pain and tenderness around the trochanteric area [2,3]. Radiographs are required to rule out other pathology. Ultrasound and MRI scans may help the diagnosis; but the presence of scan abnormalities is a poor predictor of symptoms with high false positives [5,6].

The treatment is usually conservative, and includes relative rest, anti-inflammatory medications, ice and heat, stretching and strengthening physiotherapy exercises, local ultrasound, and local corticosteroid injections with or without a local anaesthetic [3,7]. Even though this treatment generally improves symptoms,

discomfort usually persists and symptoms usually recur [3,7,8]. Several surgical procedures have been suggested including open or arthroscopic bursectomy, releasing or lengthening the iliotibial band, open or arthroscopic repair of the hip cuff, and trochanteric reduction osteotomy [3]. Whilst some studies have shown encouraging results from surgery with success in excess of 80%, all of these were small in number, mostly retrospective with short term follow-up, and did not compare surgical and conservative management [9-13]. Our own experience with surgery for GTPS does not match the success rates in the literature; and all of the previous studies agree that surgery should be used for refractory cases where all other non-operative interventions have failed.

Extracorporeal shockwave therapy (ESWT) for the treatment of GTPS was based on the successful use of radial shockwave therapy for plantar fasciitis, Achilles tendinitis and lateral epicondylitis [3,7,14]. The National Institute for Health and Clinical Excellence (NICE, UK) published its guidelines in January 2011 on the use of ESWT for the treatment GTPS, and concluded that "evidence on the efficacy and safety of ESWT for refractory greater trochanteric pain syndrome is limited in quality and quantity" and that clinicians that use this modality of treatment should "review clinical outcomes" of using ECST for GTPS. In addition, NICE surveyed 30 patients with questionnaires and found that the procedure worked in 21; they recommended further research into the effectiveness and possible side effects of ESWT therapy for GTPS [15]. ESWT has been used at our institution for refractory GTPS for the past 2 years. This study aims to review the clinical outcomes of this treatment.

## Materials and Methods

We retrospectively identified all patients who underwent ESWT for refractory GTPS over a period of 16 months starting from April 2012 to August 2013. The diagnosis of GTPS was made clinically, based on the presence of localized pain and tenderness at the greater trochanteric area, in the absence of other clinical abnormalities such as back problems or hip impingement. All patients had plain pelvic radiographs, and patients with evidence of hip joint arthritis were excluded. Where the diagnosis was in doubt, MRI scans were obtained. All patients were initially managed with localized injections of corticosteroid and local anaesthetic, followed by a minimum of 3 months of physiotherapy. This included gluteus medius and iliotibial band stretching exercises.

Patients with refractory symptoms three months following at least a single injection and physiotherapy were offered ESWT. The possible benefits and risks were discussed with patients and they were made aware of the current NICE guidelines and were given information on how to access the complete guidelines. The treatment was carried out in our Lithotripsy Unit. The machine used is a radial shockwave therapy machine, which has been used for Achilles tendinitis and plantar fasciitis treatment. This was a Storz Modulith® SLX-F2 machine (Storz Medical AG, Switzerland). The treatment protocol was based on the manufacturer's guidelines for soft tissue treatment. It consisted of 5 sessions, one week apart. Patients were offered an injection of Pethidine 50-100mg IM prior to starting each session. Two-thousand shocks were applied at a frequency of 3 shocks per second and a power level of 3. This was applied to the area of maximum pain and tenderness, corresponding to the area of trochanteric prominence using fluoroscopy guidance. Patients were asked to report any side-effects, and were followed up in clinic 3 months post treatment. Activity post-treatment was not restricted and was as tolerated.

Patients were followed up using a standardized questionnaire. Data was collected through a direct interview in clinic or a telephone interview. Pain score on a scale from 0 to 10 were documented prior to the intervention and following the completion of all treatment sessions at follow up. Patients were asked if their symptoms were much worse, slightly worse, stayed the same, were slightly better, much better or completely settled. They were also asked about the procedure discomfort (none, mild, moderate and severe). Time to follow up was documented, in addition to whether symptoms recurred and the time to recurrence. Patients were also asked whether they would recommend the treatment to a friend or relative with a similar condition, and whether they suffered any side effects or complications.

The study was approved by the local research and development department and patient advice and liaison services, as a service evaluation project. Data was organized and analyzed using Microsoft Excel 2007. Continuous variables were compared using two-tailed paired Student t-test, and categorical variables using Fisher's exact test, with a p-value < 0.05 indicating statistical significance. Statistical analysis was carried out using SPSS (version 16.0; SPSS Inc., Chicago, Illinois).

## Results

Over the 16-month period, 71 patients were treated using

ESWT for refractory GTPS. The mean age at treatment was 59.1 ± 12.5 (range 29 to 88), with 61 (85.9%) being females. Twelve were lost to follow up leaving 59 (83.1%) patients. The mean time to follow up was 7.86 ± 3.50 months, with a minimum of 3 months follow up and a maximum of 19 months. Two patients were unable to tolerate the treatment and it was therefore abandoned. Although patients who could not tolerate the treatment had a lower mean age of 52.0 ± 9.1, this was not statistically significant (p = 0.42).

For the remaining 57 patients, the mean age was 60.1 ± 12.3 with 48 (84.2%) females. The mean pre-treatment pain score was 8.12 ± 1.41 (range 4 to 10). Symptoms improved in 38 (66.7%), and stayed the same or got slightly worse in the remainder (Table 1). The mean post-treatment pain score was 4.16 ± 3.48, with a mean drop of 3.97 points for all patients (p < 0.001). The mean drop in pain score for the 38 patients in whom the treatment was successful was 6.11 (p < 0.001).

**Table 1:** Change of symptoms following ESWT.

Change in Symptoms (n=57)	No. (%)
Completely resolved	13 (22.8)
Much better	19 (33.3)
Slightly better	6 (10.5)
Same	15 (26.3)
Slightly worse	4 (7.0)
Much worse	0 (0.0)

Out of the 38 patients whose symptoms improved, symptoms relapsed in 23 (60.5%) at follow up. The mean time to relapse was 3.70 ± 2.27 months (range 1 to 8 months). In the remaining 15 (39.5%), symptoms did not relapse at a mean follow up of 8.04 ± 3.83 months (range 3 to 15 months).

Twenty-three patients had MRI scans. Of the 8 who had evidence of tendinosis and/or enthesopathy, 7 (87.5%) responded to the treatment. On the other hand, only 6 (40%) out of the 15 who had no evidence of tendinosis or enthesopathy responded. However this was not statistically significant (p = 0.07).

Table 2 shows the level of discomfort patients experienced during the treatment sessions. Eight patients (13.6%) declined Pethidine as they felt they did not need it. Forty-six patients (80.7%) said they would recommend ESWT to a friend or relative with GTPS. Only one complication was reported; a patient had an exacerbation of her sciatica symptoms on the same side of treatment after the 3rd session. No further sessions were given and the sciatica symptoms settled spontaneously at two months with no residual sensory or motor deficit.

**Table 2:** Level of discomfort during treatment sessions.

Level of Discomfort (n=59)	No. (%)
None	9 (15.3)
Mild	26 (44.1)
Moderate	15 (25.4)
Severe	7 (11.8)
Not tolerated	2 (3.4)

## Discussion

GTPS is a common condition affecting mainly middle-age women, with a prevalence of ~10-25% in the general population [1]. The condition could be disabling, and initial treatment is mostly non-operative. The NICE guidelines state that whilst ESWT may be useful, the evidence is limited [15].

We have reviewed 59 consecutive patients over a period of 16 months. The results suggest that when tolerated, ESWT results in improvement in symptoms in two-thirds of patients with refractory GTPS, with 55.1% of patients having significant reduction or complete resolution of the symptoms (Table 1). Furia et al. [14] found a response rate of 79% as compared to a control group. Rompe et al. [7] found that 74% of patients who underwent ESWT had improvement in their symptoms, as compared to 48% of patients having corticosteroid injections. The effect lasted up to 15 months, and ESWT was faster in achieving symptomatic relief than physiotherapy and home training. This study assessed the effect of ESWT on patients with refractory rather than primary GTPS, where corticosteroid injections and physiotherapy have failed. This may explain the slightly lower success rate of 66.7% in our study. NICE found that 21 out of 30 patients (70%) with refractory GTPS contacted using a questionnaire had improvement in their symptoms [15]. The symptomatic improvement lasted between 1 to 15 months in our study, with 60% of patients having a relapse of their symptoms at a mean of 3.7 months.

Treatment protocols vary between different studies, with variation in the number of shocks given per session, the frequency of shock delivery, the pressure/power level, and the number of sessions given. We followed the manufacturer's guidelines for soft tissue treatment for our machine. It may be that a different treatment protocol may be better suited for patients with GTPS, but this is yet to be established. This may be difficult given that different units use different machines, and the numbers needed to detect any difference between protocols may be difficult to recruit. Many patients in our cohort who had a relapse asked for a repeat of the procedure, however, there is no literature to indicate how often ESWT can be repeated, and what is the interval between re-treatments.

Complications reported in other studies included local skin redness and irritation in addition to the discomfort from the procedure [3,7,14]. Our protocol included offering patients an injection of Pethidine prior to each session. Most patients (60%) had mild or no discomfort from the treatment, and 8 (13.6%) declined the Pethidine injection as they felt they did not need it. Seven patients (11.8%) had severe discomfort but were able to carry on with the treatment, whilst 2 (3.3%) could not tolerate the treatment (Table 2). Despite this, 80% of patients would recommend the procedure to a friend or relative with a similar condition.

The only significant complication reported was in a patient who had exacerbation of her sciatica symptoms following the 3rd treatment session. To our knowledge, this has not been reported in the literature. Patient's symptoms settled spontaneously within 2 months with no residual motor or sensory deficit. This may be a coincidental exacerbation of her pre-existing symptoms or may be due to the treatment.

The mechanism through which of shockwave therapy works

for GTPS is not fully understood, but it is thought to work on tendinosis or enthesopathy of the gluteal tendons [1-4,14]. MRI scanning may help in the diagnosis of GTPS and the selection of patients with tendinosis or enthesopathy for ESWT [14]. Only a fraction of our patients (23, 39%) had MRI scans. There was a trend towards better response to ESWT in patients with evidence of tendinosis or enthesopathy (87.5% versus 60%), however, this was not statistically significant ( $p = 0.07$ ). Fifteen had no evidence of tendinosis or enthesopathy; of which 9 (60%) were in the non-responders group. This shows a trend of better response to ESWT when the underlying pathology is tendinosis/enthesopathy ( $p = 0.07$ ).

Limitations of this study include the retrospective nature and the absence of a control group. However, we did achieve a high follow up rate of 83.1%. Furthermore, this study shows significant symptomatic improvement in two-thirds of patients undergoing ESWT for up to 15 months. This confirms the findings of previous studies but in a clinical setting, with a large number of patients and longer follow up. It also shows a significant relapse rate of 60% at a mean of 3.7 months, which has not been previously reported. Further research is needed to confirm whether MRI could be useful in selecting patients for ESWT, and to establish the best treatment protocol.

## Conclusion

This study confirms that ESWT is effective in relieving the symptoms of GTPS in 67% of patients who failed other modalities of conservative treatment, with results lasting up to 15 months but a high rate of relapse of 60% at a mean of 4 months. The treatment was well tolerated by patients. MRI scanning may help in patient-selection, but further research is required to confirm this.

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