

An Audit of Extracorporeal Shockwave Therapy (ESWT) for Recalcitrant Musculoskeletal Disorders

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Abstract: Extracorporeal Shockwave therapy (ESWT) is a non-invasive treatment modality for overuse and sports related tendon disorders. Over the years its use has steadily grown. There have been numerous publications in the literature with mixed results. We introduced this treatment at our institution in 2010. In this study we have audited our results for patients who had this treatment for recalcitrant musculoskeletal disorders with a minimum follow up period of six months. These patients were asked to fill in a simple questionnaire with three questions related to their experience with ESWT. 57 questionnaires were sent out to 51 patients (6 bilateral). 53 (93%) completed questionnaires were received. The pain score on a visual analogue scale improved from 7.8 to 2.4 following ESWT ($p < 0.05$). 85% cases reported improvement, 13% felt that there was no change in their symptoms and 2% cases reported that their symptoms were worse following this treatment. Although minor & transient side effects were observed by 5.7% cases, there was no major complication following ESWT. 85% cases felt that they would recommend this treatment to others. Based on the results of our audit we feel that ESWT is a safe and effective treatment for recalcitrant musculoskeletal disorders.

Keywords: Achilles tendinopathy, Delayed union, Heel Pain, Lateral epicondylitis, Patellar tendinopathy, Plantar fasciitis, Tennis elbow, Tendon, Shockwave.

INTRODUCTION

Musculoskeletal disorders affecting tendons, ligaments or fascia are common. Although the exact incidence of these problems is not known due to lack of well-designed epidemiological studies, the risk of these disorders is increasing due to the rise in running and sporting activities [1]. This group of disorders is characterized by underlying degenerative changes and might be associated with micro tears, inflammation and fibrosis. In recent years, there has been substantial research to understand tendon pathophysiology. Most of these problems improve with simple measures such as rest, ice, NSAID, stretching exercises and physiotherapy. However, a significant proportion of these patients do not improve. It has been reported that 24% to 45.5% of the subjects with Achilles tendinopathy who fail to respond to conservative management undergo surgery [2,3].

Extracorporeal shockwave therapy (ESWT) began with an incidental observation of osteoblastic response pattern during animal studies in the mid-1980 that generated an interest in the application of ESWT to musculoskeletal disorders [4]. In the past few years shockwave therapy has emerged as the leading choice in the treatment of many musculoskeletal disorders including Plantar fasciitis, Achilles tendonopathy, Patellar tendonopathy, Tennis elbow, calcific tendonitis of rotator cuff, delayed or non union of fractures, Trochanteric Pain syndrome and diabetic foot ulcers.

There are two basic effects of shockwave. The primary effect is the direct mechanical forces that result in the maximal beneficial pulse energy concentrated at the target point where treatment is provided; and the secondary effect is the indirect mechanical forces by cavitation, which may cause negative effect or damage to the tissues. The most important physical parameters of shockwave therapy for the treatment of orthopedic disorders include the pressure distribution, energy flux density and the total acoustic energy. In contrast to lithotripsy in which shockwaves disintegrate renal stones, orthopedic shockwaves are not being used to disintegrate tissue, but rather to microscopically cause interstitial and extracellular responses leading to tissue regeneration and repair [5,6].

MATERIALS AND METHODS

ESWT for musculoskeletal disorders was introduced at Spire Leicester Hospital in July 2010.

Inclusion criteria: Patients with recalcitrant painful musculoskeletal disorders including plantar fasciitis, Achilles tendinopathy, Patellar tendinopathy and delayed union were offered this treatment. The minimum duration of symptoms was three months and all the patients had tried at least one or more of the treatment modalities including pain killers, NSAIDs, stretching exercises, local ultrasound, deep frictional massage, acupuncture, insoles, Prolotherapy and steroid injection. All the patients were given information leaflets regarding ESWT. Patients were advised that they would be sent a questionnaire for audit purposes.

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Radial ESWT was administered in 3 sessions, each a week apart. A total of 2500 shock waves were delivered per session at the rate of 10-20 impulses per second with the Swiss Doloclast radial shock wave device (EMS Electro Medical Systems, Nyon, Switzerland). Each treatment session lasted for 5-10 minutes and was done as an outpatient procedure. All the patients were advised to continue their normal activities without restriction.

Case notes were reviewed and a database was made. All the patients were sent a simple questionnaire with three questions:

1. Have your symptoms improved following the application of Shock Wave Therapy?

Yes. There is 100% improvement.

Yes. There is marked improvement.

Yes. There is some improvement.

No. There is no improvement.

No. My symptoms are worse following Shock Wave Therapy.

2. Have you experienced any side effects as a result of this treatment?

a) I had no side effects

b) I had some side effects (Please mention the side effects)

3. Would you recommend this treatment to others?

a) Yes

b) No

RESULTS

There were 51 patients (six bilateral) in this audit. 57 questionnaires were sent out. One or two reminders were sent if required. We received 53 responses with a response rate of 93%. Of the 53 responses, 26 were from females and 27 were from males. The average age was 48 years ranging between 21 to 78 years.

The following was the distribution of the musculoskeletal disorders: Plantar Fasciitis- 39, Achilles tendinopathy- 10, Patellar tendonopathy- 2, Tennis elbow- 1 and delayed union of 5th Metatarsal- 1.

The duration of symptoms ranged between 3 months to 6 years with an average of 15.3 months.

The follow up period ranged between 6 to 33 months with an average of 15.8 months.

On a visual analogue scale of 0-10, the average Pain score was 7.8 prior to ESWT. Following treatment the average pain score improved to 2.4 ($p < 0.05$).

With regard to patient reported outcome, 84.9% cases (45/53) reported improvement. 32.1 % cases (17/53) had 100% improvement; 43.4 % cases (23/53) had marked improvement and 9.4% (5/53) had some improvement.

13.2% patients (7/53) had no improvement whereas one patient (1.9%) felt that the symptoms were worse following shock wave therapy.

The Majority of patients (94.3%) reported no side effects. Three patients (5.7%) reported minor side effects. One patient described bruising; one patient reported increased pain and one patient described swelling. All the reported side effects settled in due course and none of these required any treatment.

45/53 (84.9%) said that they would recommend this treatment to others. 6/53 (11.3%) would not recommend this treatment and 2/53 (3.8%) were not sure.

DISCUSSION

Musculoskeletal pain due to tendon, ligament and fascia problems is common. A significant proportion of these patients do not improve with non-invasive conservative measures. Although steroid injections can improve pain in the short term, in most cases there is recurrence in 3 months [7]. The side effects of steroid injections include rupture of tendon and plantar fascia, fat pad atrophy, infection, pain and recurrence. Mixed results have been reported with the use of autologous blood injections (ABI) or Platelet rich plasma (PRP) injections. One randomized controlled trial showed that PPI was superior to ABI in the short term for treatment of chronic lateral epicondylitis [8]. On the other hand a three group RCT comparing PRP, steroid and normal saline injections for lateral epicondylitis had 58% drop out rate at 3 months showing that none of these injections were effective [9].

Surgery for tendinopathy especially for Plantar Fasciitis has significant risks including nerve damage,

complex regional pain syndrome, swelling, infection, wound complications, clot etc. Davies *et al.* reported that less than 50% patients were completely satisfied following surgery for plantar fasciitis [10].

In a review article on the use of shock wave therapy in musculoskeletal disorders, Wang has observed that, ESWT is a new non-invasive therapeutic modality with reported effectiveness, convenience and safety. ESWT has the potential of replacing surgery in many orthopedic disorders without the surgical risks. The reported complication rates are low and negligible [4]. The results of our audit support this view.

There are a number of publications, which have reported on the use of ESWT for a particular condition. In this paper we have included all the consecutive, prospective patients who had ESWT for a recalcitrant musculoskeletal disorder. We accept that the drawbacks of this study are small sample size for different conditions and lack of a uniform validated scoring system. On the other hand the strength of this simple study is looking at ESWT as a wholesome treatment and using patient reported outcome and satisfaction measures. This audit reassures that ESWT is a safe treatment modality and has its place for miscellaneous tendinopathies and enthesopathies.

To conclude our audit results confirm that the success rate of ESWT is in the order of 85% with 75% patients reporting hundred percent or marked improvement in their symptoms following application of Shock wave therapy. It is a safe treatment and no major side effects were recorded in our audit. The improvement in pain was well maintained over one year in most of the patients and there was no case of

recurrence. It is an outpatient procedure and does not require anesthetic. Most of the patients felt that this treatment was practical, effective, safe and 85% patients felt that they would recommend this treatment to others.

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Received on 11-03-2014

Accepted on 17-03-2014

Published on 02-06-2014

DOI: <http://dx.doi.org/10.12974/2313-0954.2014.01.01.3>

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