Long-term efficiency of extracorporeal shockwave therapy on lateral epicondylitis

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INTRODUCTION

Lateral epicondylitis is a frequent cause of elbow pain in the adult age population. The purpose of this study was to determine the effects of extracorporeal shock wave therapy (ESWT) effective on long term clinical and functional results in the treatment on patients with lateral epicondylitis. Forty-six patients suffering from lateral epicondylitis for at least 3 months were treated in this study. Clinical evaluation scoring system tests were used before and done year after the treatment for each patient. The VAS improved from 9.3 to 1.8, and the Nirschl values improved from 6.4 to 4.3. In the control group, VAS improved from 8.4 to 7, and the Nirschl values improved from 6.8 to 6.1. ESWT application to LE patients those are resistant to the therapy, carries beneficial effects to the long term which was previously stated forth short term, both clinically and functionally.

Keywords: Epicondylitis; ESWT; long-term.

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conservative approach (6,11,30). Patients, resistant to conservative treatment modalities are treated by debridement via arthroscopic technique or open surgery (4,7,15,18,27,30).

Lateral epicondylitis does not have a universally accepted and standardized treatment. On the other hand, it is an important cause of morbidity since it is prevalent in the society and leads to a considerable workforce loss (6). Fundamental approach to the disease is conservative. It includes limiting physical activity and physical therapy sessions, but they have the disadvantage of prohibiting the patients from returning to their daily life and occupation. Injections are invasive options those are proven efficient, but have a side effect of changing the histopathological structure of the tissues (7,18).

There are short term studies showing ESWT has a beneficial effect over pain and functions in this condition (15,24,26). It has an advantage of being a non invasive option which doesn’t interfere with the daily or professional life of the patients. However, there is not enough study about its long term effects on lateral epicondylitis (12,18,23,30).

ESWT is a painless procedure and treatment last 30 minutes for once a week. Patients rapidly turn back to their work even just after the session.

METHODS

Patients those are under follow up at least for a year after receiving treatment for lateral epicondylitis during 2013-2014 were enrolled in the study. 34 conservatively treated (at least one of the following; non steroid anti inflammatory drugs, splints, physical treatment) patients and 94 patients given ESWT for the treatment of lateral epicondylitis during the determined period, were called and invited for the study. Patients’ acceptance or decline for the study was planned according to the previously set criteriac (Table I). 27 of the ESWT received patients and 19 controls from the conservative treatment group were meeting the inclusion criteria.

Lateral epicondylitis was diagnosed if there was pain with palpation of the lateral epicondyle; or painful dorsal flexion of the wrist or forearm extansory muscle group’s passive stretch; and pain with the force against the third finger extansory motion, during the examination.

ESWT application was performed while the patient was sitting on the bed, his elbow was bended 90 degrees and forearm lies neutral. Head of the ESWT device was placed 90 degrees tangential position over the painful area. Protective earmuffs were used by both the patient and the operator to avoid the discomfort of the loud noise of the device. Application area was cleaned by the iodine solution and gel material was used to enhance the concussion (coupling gel). Local anesthesia was not used in ny case. Previous studies suggest to make the application just over the painful area (12,18,21,23,30). However, due to the extreme amount of pain in LE patients, application is performed in a circular manner around the 1 cm² of the painful area in the first session. Then, in the following sessions, application was right over the painful area as previously suggested. We assume that the patients have a higher compatibility to the treatment with this gradual style.
ESWT was performed by the same operator using the same device (ElettronicaRoland 2, Pagani, Italy). Procedure consists of two stages. In the first one, energy density is 0.348 mj/cm², frequency 5 hz, 300 pulses. In the second stage 0.372 mj/cm², 3.5 hz and 1200 pulses. A total of 4 sessions were carried out once a week.

10 minutes of ice applied after ESWT treatment. Besides, patients were advised to apply ice for 20 minutes once a day during the treatment. Patients were not given any physical activity limitation. Each patients were given the same exercise plan in the second session. Ball and towel squeeze (wrist power and movement range), rolling pencil (forearm supination and pronation) and rubber stretch exercises provided the evaluation of the pain, that emerges with movement. Patients were restricted using any NSAIDs. 10 of the patients experienced a slight rash which faded away in 2 or 3 days. Five of the patients felt pain durin application but the following sessions were painless.

V AS, Nirshcl, Venhaar clinical evaluation scoring system tests were used before an done year after the treatment for each patients. Also jamar measurements were performed in the first year control visit. Patients did not need any surgical or any alternative treatment for one year after the treatment.

Statistical Package for the Social Sciences (SPSS) 17 program was used for the statistical evaluation of the study. Demographic data was compred using Fischer’s chi square and Mann Whitney-U tests. MannWhitney -U, Pearson chi square and wilcoxon tests were used to compare evaluation scores.

RESULTS

27 ESWT treated patients and 19 control patients receiving conservative treatment met the inclusion criteria and enrolled in the study. ESWT group consisted of 20 females and 7 males (mean age 42,9 ± 10,2 years). Right/left ratio was 22 /5. Mean follow up period was 10,5±6,0 months. Control group was consisted of 14 females and 5 males (mean age 47,5 ± 9,1 years). Right/left ratio was 11 / 8. They were followed up for 18,6±7,9 months. (Table II)

V AS score of the ESWT treated patients were 9,3±0,7 at the onset and 1,8±1,2 after one year. The reduction was statistically significant (p = 0,000,4). Nirschl values of the same group was 6,4±0,7 and 4,3 ± 1,9 consecutively for the onset and the first year visit with a statistically significant (p = 0,000) reduction. In the control group, V AS values were reduced from 8,4±1,1 to 7±1,5 in one year (p = 0,000) and Nirschl values reduced from 6,8±0,4 to 6,1± 0,9 in one year follow up which was also statistically significant (p = 0,003). In the last control of the cases, Venhaar scores of the ESWT group were 3,3±0,8 and showed statistical significance (p = 0,002) when compared to control group score of 2,4±0,7 (Table III).
pain which leads to a disruption in the daily life and interrupts work life. There is not a consensus on its treatment (6,15).

ESWT is used in orthopedic conditions like plantar fasciitis, calcific tendinitis of the shoulder and non union, since 1980s (2,6,25,31,32). Its field of utility rapidly widens. Today, using ESWT in the treatment of lateral epicondylitis and plantar fasciitis is approved by FDA (2).

ESWT is assumed to provide benefits by blocking nociceptors and accelerating healing by amplifying the permeability of tenocytes (6).

Past studies show that it may be beneficial for the cases those are resistent to the other modalities (5,8,18,21,23,30).

In our study, we treated LE patients with ESWT, who did not benefit from conservative treatment procedures such as medication, splint, injection. Returning back to work was also better in ESWT group and 16 (59.2%) patients returned back to their occupation immediately after the treatment. In summary, we observed that ESWT treated patients were pain free and functional after one year.

There was no difference between two groups regarding age (p = 0.2), gender (p = 1.0) and affected side (p = 0.4, p = 0.1). Smokers were higher in ESWT group but the difference was not significant. ESWT group consisted of 11 housewives, 9 blue collar workers (earns life by physical work), 6 white collars (earns life by desk work) and 1 student. On the other hand, control group consisted of 8 housewives, 5 blue collar workers (earns life by physical work), 5 white collars (earns life by desk work) and 1 student.

DISCUSSION

Lateral epicondylitis or in another widely used term tennis elbow is a frequent cause of elbow

<table>
<thead>
<tr>
<th>Table II. — Baseline characteristics of subjects in each group</th>
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<td>Demographic details</td>
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<td>Age (years)</td>
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<tr>
<td>Gender (Male/Female)</td>
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<tr>
<td>Cigarette</td>
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<tr>
<td>Dominant andRight/left*</td>
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<td>SideofinvolvementRight/left</td>
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Statistical significance was set at p<0.05
** Mann Whitney –U
* Fischer’s ki-kare

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<tr>
<th>Table III. — Pre-treatment and Post-treatment results of the study</th>
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<tr>
<td>ESWT group n=27</td>
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<tr>
<td>Pre-treatment VAS</td>
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<tr>
<td>Post-treatment VAS (Twelve Month)</td>
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<td>Pre-treatment Nirschl</td>
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<td>Post-treatment Nirschl (Twelve Month)</td>
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<td>Venhaar</td>
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ESWT: extra-corporeal shock wave therapy  VAS: visual analogue scale. * Mann Whitney-U
Furthermore, studies using ESWT indicates that recovery after ESWT may prolong up to 24 weeks and patients may need ESWT treatment again. (15,18,20) However our patients did not need the treatment again.

The major limitation of our study was its retrospective design. Our control group was not uniform. Our effort to make our study and control groups uniform, led us to set a wide inclusion and exclusion criteria set and this limited our study and control patients’ number.

One year long term results of ESWT treatment resulted a significant improvement in VAS, Nirschl and venhaar scores according to control group. All of our patients had a good compliance to the treatment and ESWT had no major complications in our patients. Some minor complications were encountered but they quickly resolved. Complications regarding the application mentioned in the literature till today are, local swelling, pain during application, petechiae and small sized hematomas (13). According to previous reports, those complications are usually resolved in 1 or 2 days. Long term result of ESWT is a subject on which there is a limited number of studies present (12,18,21,23,30). In 2002, in a study of 272 patients of LE, Haake et al showed that ESWT has no additional benefit over placebo (12). This study is important because it is the first one which clearly describes inclusion and exclusion criteria and includes a placebo group. On the other hand, in the placebo group, head of ESWT was covered with air filled polyethylene foil and was not contacted to skin via gel. We think that this compromises placebo concept in this study. Because even little, some side effects were noted in the placebo group of abovementioned study. This was caused by the active function of the device during application. Our placebo application suggestion is to apply non functional head of the ESWT device while the other head is still active. Besides, applying local anesthesia to the ESWT site interferes with the results of the treatment. Thus, we did not use local anesthesia in any of our patients. Melikyan et al also conducted a placebo controlled study with 86 patients in 2003 and did not use locan anesthesia (18). They did not find a significant difference between two groups after a year. Using a similar patient population, Rompe et al studied 78 tennis players and in this valuable study they revealed that ESWT is superior to placebo (23).

Pettrone et al, using ESWT in LE is safe and effective (21). They stated that even the similar conditions and design of their study to Haake et al’s (12), different results might be the consequence of local anesthesia. Limited number of randomized controlled long term studies push ESWL forward as an effective and safe procedure.

Different injection therapies are used in LE treatment, but there is a lack of wide, double blind, uniform trials regarding the superiority of any of those (14,18). Generally, steroid injections are efficient in short term, within 6 weeks period (3,15,27,28). There are various sized and quality studies showing the superiority of botulinum toxin, autologous blood, PRP, hyaluronic acid and prolotherapy on placebo (14,16). On the other hand, injection therapies have infection risk because of its invasive nature. In a meta analysis of 744 cases who were given steroid injections for shoulder or elbow tendinitis, a temporary pain in the injection site %10.7, skin atrophy or depigmentation %4 were reported as side effects (10). Studies also report work force loss after the treatment.

In our study, we differently performed the treatment not directly to the most painful area, but around it in a circular manner. Due to the high noise of the device, both the operator and the patient used earmuffs. Lateral epicondilytis is an important cause of work force loss (9). It is an important advantage for the ESWT treated patients to continue working without any work force loss. Patients continue their daily life activities and have a shorter recovery period. Other advantages are less occupational loss and lower cost of treatment than surgical procedures.

On the contrary, the major disadvantage is the lack of clear protocols. However there are some causes those obstacles to achieve an agreement on a common treatment protocol. Technical variations during application (device design, number of sessions), differences in patient population, variation of the severity of the disease and differences of study designs may lead to this (2).
CONCLUSIONS

Lateral epicondylitis is hard to treat and has recursive nature. If untreated, it leads to a painful period of 6 months to 2 years when the patients can not contribute to work life. There is not a common opinion for its treatment. ESWT is a non invasive procedure with no or minimal complications. We believe that, studies conducted on a wide patient series are needed, which has placebo control as we defined, to establish the effectiveness of ESWT treatment.

REFERENCES


