

RADIO FREQUENCY OVERMATCHES EXTRACORPOREAL SHOCK WAVE TREATMENT FOR PATIENTS WITH INTRACTABLE PLANTAR FASCIITIS UNDER LOCAL ANESTHESIA

WEI M., LIU Y., LI Z., WANG Z. AND ZHANG Q.

Department of Orthopedics, Chinese PLA General Hospital, Beijing, China

ABSTRACT

Purpose: A retrospective study comparing plasma radio frequency TOPAZ with electrocorporeal shock wave (ESW) in the treatment of intractable proximal plantar fasciitis's, under local anaesthesia.

Materials and Methods: From March 2006 to February 2010, our department received and treated 68 patients with intractable proximal plantar fasciitis, who had been treated with conservative therapy. We respectively used TOPAZ and ESW therapy to treat them. We did research about patients' "pre-operative intention-to-treat", and we introduced the American Orthopedic Foot and Ankle Society (AOFAS) ankle metapodium grades to estimate the effectiveness of therapy for a period of 12 months, including preoperative and postoperative time.

Results: The survey showed that 68 (100%) patients received ESW treatment, of which 16 patients (23.5%) received TOPAZ under local anesthesia, 10 (14.7%) patients received TOPAZ after invalid ESW remedy, under local anesthesia and we continued to follow-up 54 patients. At 1 year post-surgery, VAS grade reduced to 1.9 ± 1.2 from 5.4 ± 1.1 preoperative, in ESW group, AOFAS ankle hind foot grade increased significantly to 80.7 ± 11.2 1 year postoperatively compared to 50.3 ± 13.5 pre-operative score ($p < 0.05$). TOPAZ group's preoperative VAS score decreased from 5.5 ± 1.3 to 1.1 ± 1.2 1 year post-surgery, AOFAS ankle hind foot score improved significantly from preoperative 50.1 ± 9.0 to 88.6 ± 18.8 1 year post-operation ($p < 0.05$). Compared to the ESW treatment group, scores following treatment were significantly better in the TOPAZ group ($p < 0.05$).

Conclusions: Both TOPAZ and ESW can cure intractable Proximal Plantar fasciitis, with the TOPAZ treatment having significantly better effect.

Keywords: Plantar fasciitis; extracorporeal shock wave; plasma radio frequency.

INTRODUCTION

Plantar fasciitis is a common clinical fibromyalgia and there are 2 million patients requiring treatment yearly in America (orthoinfo.aaos.org). Generally, doctors employ drugs, physiotherapy and heel pad blocking as the first line of therapy but the effect of these treatments is not dependable.¹ Most of the patients fail to comply to this form of therapy as it is not curative and invasive. Therefore, doctors started using minimally – invasive procedures to treat plantar fasciitis. ESW and TOPAZ are increasingly valued for being wire soft and minimally invasive.^{2,3} This study gathered patients with intractable proximal plantar fasciitis who had been treated with conservative therapy, and were received and treated in our department between March 2006 and February 2010. We respectively used TOPAZ and ESW treatment to treat them, comparing and exploring their clinical effects at the same time.

MATERIALS AND METHODS

This retrospective investigation deals with a group of 68 patients with intractable proximal plantar fasciitis who visited the department of orthopedics at our hospital from March 2006 to February 2010.

Inclusion Criteria

(1) The bottom of heel aching, feeling pain at the beginning of the exercise, along with action proceeding, pain gradually relieved. However, after all day long activities, pain aggravates again; (2) The bottom of calcaneus partial interior has a pressing sensation, and tenderness; (3) Patients' who recrudescence repeatedly, following conservative therapy.

Exclusion Criteria

(1) Patients with history of calcaneus fracture; (2) arches of foot malformation; (3) history of rheumatic

disease; (4) of foot surgery (5) bipedal proximal plan-tar fasciitis. There were 68 patients, including 41 men, and 27 women with a median age of 52.6.

We divided the patients into 2 groups on the basis of the willingness to undergo surgical treat ment. The ESW treatment group was named group A, and those receiving TOPAZ were termed as group B.

ESW Treatment

Switzerland ESW corporation provide us Dolor Clast radial shock wave therapeutic apparatus. Applying supine or prone position, sign the scope of pain in the sole of foot. The frequency of shock wave: 10-15Hz. The direction shock: end – long and crosswise orientation of the location of pain, making its end crossing of energy pillar overlap on the point of pain. Shock times: 500 times each orientation, and from 1000 to 2000 seconds for the duration of the treatment. The frequency of the procedure was 3 times and the time interval was one week. Patients were advised to wear soft soled shoes, avoiding over exertion and strenuous exercise for three months, and do regular outpatient follow up.

TOPAZ Treatment

Arthrocare Corporation of America provided the plasma radio-frequency electrode. Marking the scope of pain in the sole of foot after disinfecting the bed, local infiltration of 5 ml 1% - lidocaine till local tenderness disappeared and making 2mm puncture at the center of marked scope, using vessel forceps separate hypodermics to fascia rete, punching 2mm interval by TOPAZ plasma radio-frequency head. Patients should wear shoes of soft soles following surgery, avoiding over exertion and strenuous exercise for three months, and do regular outpatient review.

Assessment of Treatment

Using VAS pain scores and AOFAS ankle – metapedes grades to evaluate curative effect at three months, six months nine months and twelve months preoperatively and postoperatively.^{4,5}

Statistical Analysis

We used SPSS 10 software for statistical analyses of

the data collected. A $p < 0.05$ was taken as a significant difference in statistical contrasts.

RESULTS

Overall 68 patients were included in the study of which, 52 (BMI > 25) patients were overweight and 31 (BMI > 30) patients were obese. There were 49 patients who often took part in light physical activities, and 13 patients regularly took part in rhythmic sportive exercises.

A survey about patients' intention of receiving treatment showed that all 68 (100%) patients could receive the treatment of ESW therapy, 16 (23.5%) patients could receive local anesthesia TOPAZ directly and 10 (14.7%) patients may consider receiving local anesthesia TOPAZ if the treatment of ESW was ineffective. Nobody could receive releasing fascia by cutting apart orthophoria or fascia released under the guidance of arthroscope, except two (2.9%) patients, who were willing to consider it after the failure of other therapies.

There were a total of 44 patients in ESW group, two patients exited from the group as they could not tolerate ESW therapy, 12 patients were lost to follow-up, and 32 patients were followed up. There were 16 patients in the TOPAZ group and all of them were followed-up. Patients of both groups had no significant difference in age, gender and index or BMI.

VAS grades had no significant differences ($p > 0.05$) before treatment between each group, however, VAS grades at 12 months after therapy was lower than grades of pre-operation ($p < 0.05$); one year after therapy it was 1.9 ± 1.2 in the TOPAZ group, and was 1.1 ± 1.2 ESW group, and the following chart shows the significant differences between the two groups (Table 1).

Function grades had no significant differences ($P > 0.05$) before treatment between each group, however, function grades at 12 months following therapy was higher than pre-operation grades ($p < 0.05$); the post-operation grade of the TOPAZ group was 88.6 ± 18.8 and that of the ESW group was 80.7 ± 11.2 , and the following chart shows the significant differences between the two groups (Table 2).

DISCUSSION

Overburden and excessive strain cause tractive damage of the attachment of planta tread calcaneus, which

Table 1: VAS grades.

	<i>Pre-operative</i>	<i>3 Months After Therapy</i>	<i>6 Months After Therapy</i>	<i>9 Months After Therapy</i>	<i>12 Months After Therapy</i>
ESW group	5.4 ± 1.1	2.2 ± 0.9	1.5 ± 1.0	1.4 ± 1.0	$1.9 \pm 1.2\alpha$
TOPAZ group	$5.5 \pm 1.3\beta$	3.6 ± 0.9	1.1 ± 1.3	1.1 ± 1.1	$1.1 \pm 1.2\alpha\gamma$

Table shows VAS grades for ESW and TOPAZ therapy groups over time. t test was performed to show statistical significance between pre-operative and post-operative VAS scores and comparing TOPAZ group with ESW group, $\beta(p > 0.05)$, $\gamma(p < 0.05)$, respectively.

Table 2: AOFAS ankle joint metapedes grades.

	Pre-operative	3 Months After Therapy	6 Months After Therapy	9 Months After Therapy	12 Months After Therapy
ESW group	50.3 ± 13.5	79.0 ± 10.7	87.2 ± 7.6	84.3 ± 9.1	80.7 ± 11.2 α
TOPAZ group	50.1 ± 9.0 β	76.6 ± 6.0	87.6 ± 2.5	89.3 ± 13.3	88.6 ± 18.8 $\alpha\gamma$

Table shows VAS grades for ESW and TOPAZ therapy groups over time. t test was performed to show statistical significance between pre-operative and postoperative VAS scores and comparing TOPAZ group with ESW group, $\beta(p > 0.05)$, $\gamma(p < 0.05)$, respectively.

develop into proximal plantar fasciitis. Fascia comes about tiny tissue tearing, beyond the capacity of pleurosis, resulting in the decrease of mechanical property. Conservative treatment involved changing the type of physical activity taking non-steroidal anti-inflammatory drugs local injection of cortical hormone wearing brace physiotherapy and the like, but it has a poor effect for some patients, and reducing the quality of patients' life severely.⁶

Traditional therapy of fascia released under the assistance of arthroscopy causes trauma to a certain extent and it is difficult for patients to accept. The survey showed that no patient was willing to have this procedure done, except two (2.9%) patients, who were willing to consider it after the failure of some other therapies. Therefore, we adopted the requirement of minimally invasive therapeutic modalities.

The energy produced by the ESW therapy could form acoustics cavitation effect at the target region, damaging the cell membrane of phlogistic fascia not the organelle, consequently, induce a therapeutic reaction.^{7,8} It has been reported that ESW therapy is valid for calcaneodynia, doctors can use it in the clinic as it does not affect the patients' regular work and also it neither involves anesthetia nor surgery, and it costs less.^{9,10} The survey showed that all 68 (100%) patients could receive ESW therapy, and 52 patients were in the ESW group. However, it required spending long periods of time during the course of ESW treatment, furthermore, pain may aggravate during the procedure, two patients quit the treatment because of pain, 10 patients were lost to follow-up. Finally, data was collected from 38 patients. Preoperative VAS scores of 5.4 ± 1.1 decreased to 1.9 ± 1.2 one year after therapy, and preoperative AOFAS ankle metapedes scores of 50.3 ± 13.5 increased to 80.7 ± 11.2 one year after therapy and the differences were statistically significant ($p < 0.05$).

TOPAZ electrode forms a thin layer of vaporization and its electric field leads to dissociation of gases and forms plasma. The particles in plasma carry strong energy that can break the molecular chemical bonds of most connective tissue. Using RF to punch on muscle tendon aponeurosis, can support cell viability, kick start cell proliferation, stimulate healing response and

improve tendon revascularization, which are beneficial to recovery. Neovascularization is an important part of the healing response. Bi-Polar RF can stimulate the growth of vessel and help to adjust numerous growth factors, improving fascial nutrition, and creating proper environment for healing. Earlier studies have indicated that nerve fibers showed regression in early stages following the use of radio frequency (RF), followed by a healing response, consequently, improving local symptoms.^{11,12}

It has been reported that the effective rate of RFA may be up to 85 - 92%¹³⁻¹⁵ on proximal plantar fasciitis. However, the survey showed that only 16 (23.5%) patients were able to receive local anesthesia TOPAZ treatment directly and 10 (14.7%) patients may consider receiving local anesthesia TOPAZ treatment if ESW therapy failed. The reasons for unwillingness to accept the TOPAZ treatment were; use of anesthesia, surgical intervention and high cost. 16 patients who were willing to receive local anesthesia TOPAZ treatment were added to the TOPAZ group. Preoperative VAS scores of 5.5 ± 1.3 decreased significantly to 1.1 ± 1.2 one year after therapy, and preoperative AOFAS ankle metapedes scores of 50.1 ± 9.0 increased significantly to 88.6 ± 18.8 one year following therapy ($p < 0.05$).

Results show that the curative effect of TOPAZ under local anesthesia was superior to the ESW group ($p < 0.05$). Fourteen patients did not have results because of reference to the survey on patients' intention of receiving therapy, not non-random assignment. In addition, another important reason is that pain may aggravate during ESW therapy. Consequently, the results of this test may have selection bias.

In **conclusion**, TOPAZ is more effective though both TOPAZ and ESW can treat intractable proximal plantar fasciitis.

Conflict of Interest

There are no conflicts of interest associated with this study.

ACKNOWLEDGEMENTS

This study was not supported by any grant.

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