Kyzlasov, Androl Gynecol: Curr Res 2019, 7:1
DOI: 10.4172/2327-4360.1000169

Andrology & Gynecology: Current Research

Research Article

A SCITECHNOL JOURNAL

Shock Wave Therapy in Vasculogenic Erectile Dysfunction

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Abstract

Objective: The aim of this study is to evaluate the response to shock wave therapy in a group of patients with vasculogenic erectile dysfunction after underwent deep dorsal vein embolization.

Methods: A clinical record of 30 patients from 26 to 45 years with a clinical diagnosis of vasculogenic ED of more than six months and without venous leakage from legs of the penis, and cancer pathology has not been identified. Patient diagnostics consisted of questionnaire (IIEF-5), Penile Pharmacological Doppler Ultrasonography and CT Cavernosography. After confirming the diagnosis of vasculogenic ED, they all underwent deep dorsal vein embolization. Then the second stage all patients received a treatment by the shockwave device - "BTL-6000 SWT TOPLINE" (BTL Corporate). The effectiveness of therapy was evaluated by two criteria: the IIEF-5 score and evaluation of penile blood flow.

Results: The average IIEF-5 score has greatly increased from 16.7 at baseline to 22.2 post treatment. Out of 30 patients, 26 (81%) subjectively noted a persistent improvement in erectile function. An increase in the penile blood flow in the right cavernosum artery from 17.7 mm Hg at baseline to 34 mm Hg post treatment, in the left cavernosum artery from 13.2 mm Hg to 28.3 mm Hg, in the right dorsal artery from 18 mm Hg to 32 mm Hg and in the left dorsal artery from 16 mm Hg to 33 mm Hg. As well as, increase in the diameter of the cavernous bodies was noted.

Conclusion: The results of this study indicate erectile dysfunction treatment should have a personalized approach. Shock wave therapy in combination with the reduction of venous outflow may be an alternative to revascularization of the penis.

Keywords

Erectile dysfunction; Deep dorsal vein embolization; Shock wave therapy; Non-invasive; iief; Ultrasonography; Ct cavernosography

Introduction

Erectile dysfunction (ED) is defined as the persistent inability to attain or maintain an erection that is sufficient for satisfactory sexual intercourse until ejaculation or until the cessation of erotic stimulation. The pathophysiology of ED may be vasculogenic, neurogenic, anatomical, hormonal, drug-induced, and/or psychogenic [1,2]. The Massachusetts Male Aging Study reported an overall prevalence of 52% in men aged 40 to 70, while the Cologne study estimated a prevalence of 19.2% in men between the ages of 30 and 80 with an age-related increase from 2.3% to 53.4%. It therefore has a significant negative impact on the quality of life of sufferers and their partners [3-5].

As a relatively novel approach in regeneration medicine, defocused low-energy shock wave therapy (DL-ESWT) has shown great potential and promising evidences, especially for the treatment of various disorders such as tissue trauma and defects [6-10]. At present, ESWT has been applied to clinical therapy for ED, and many studies have shown that ESWT can achieve satisfactory therapeutic effects [11-13].

The mechanotransduction theory explains the process, how mechanical stimulation is perceived in living cells [14,15] by synthesis of nitric oxide (NO) and increase in vascular endothelial growth factor (VEGF), thereby creating a potential for treatment of several conditions such as bone non-unions [16,17], chronic wounds [18, 19], ischemic heart disease [20,21] and nephropathy [22].

Also known in the literature, an interventional approach to restore sufficient penile erection using selective embolization of insufficient veins have been clinically studied as an alternative to invasive surgical treatment [23,24]. Success of the interventional approach makes this procedure an attractive treatment option, as it is less invasive and more cosmetically pleasing than surgical approach [23].

The present study examines the previously unknown effect of a treatment by a dedicated device delivering shockwaves adjusted to the male sexual organ, on patients suffering from vasculogenic ED after underwent deep dorsal vein embolization.

Materials and Methods

Clinical records of 30 patients from 26 to 45 years (35.5+9.5) with a clinical diagnosis of vasculogenic ED of more than six months and without venous leakage from legs of the penis, and cancer pathology has not been identified. Patient diagnostics consisted of the International Index of Erectile Function questionnaire (IIEF-5), Penile Pharmacological Doppler Ultrasonography and CT Cavernosography. During Penile Doppler Ultrasonography we estimated of cavernous tissue (availability starry sky) and evaluated of penile vessels. And assessment of the presence of venous leakage from legs of the penis by CT Cavernosography. After confirming the diagnosis of vasculogenic ED, they all underwent deep dorsal vein embolization at Department of Urology and Andrology in IPPE of A.I. Burnazyan SSC FMBC of FMBA of Russia (Figure 1).

Then the second stage of therapy was carried out, each patient received a treatment by the shockwave device - "BTL-6000 SWT TOPLINE" (BTL Corporate). Scheme of Shock Wave Therapy (SWT): Each treatment session included a 3-minute application of the therapeutic head in 5–6 points (four on the penis and two on the crura) and the application of 300 pulses in the treatment mode of erectile dysfunction at each point (Figure 2). An average of 18,000 shock impulses per patient per 9-week course of therapy (Figure 3). All sessions were outpatient visits, and no anaesthetic was used. The IIEF-5 score and evaluation of penile blood flow for all patients was measured at two stages: before the first session, at the end of the last session. During the examinations, known adverse effects of the treatment were investigated, such as pain, paresthesia, and skin lesions on the penis. Contraindications for patients to shock

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Received: January 25, 2019 **Accepted:** March 15, 2019 **Published:** March 31, 2019

doi: 10.4172/2327-4360.1000169

wave therapy were: acute bacterial infection in the area of exposure, open wound in the area of impact, cancer and other tumor diseases, vascular thrombosis, blood clotting disorders and anticoagulants, impaired sensitivity in the focal area, acute phase of infectious disease

Results

The average IIEF-5 score has greatly increased from 16.7 at baseline to 22.2 post treatment. Out of 30 patients, 26 (81%) subjectively noted a persistent improvement in erectile function (Diagram 1).An increase in the penile blood flow in the right cavernosum artery from 17.7 mmHg at baseline to 34 mmHg post treatment, in the left cavernosum artery from 13.2 mm Hg to 28.3 mm Hg, in the right dorsal artery from 18 mm Hg to 32 mm Hg and in the left dorsal artery from 16 mm Hg to 33 mm Hg (Diagram 2).As well as increase in the diameter of the cavernous bodies was noted.

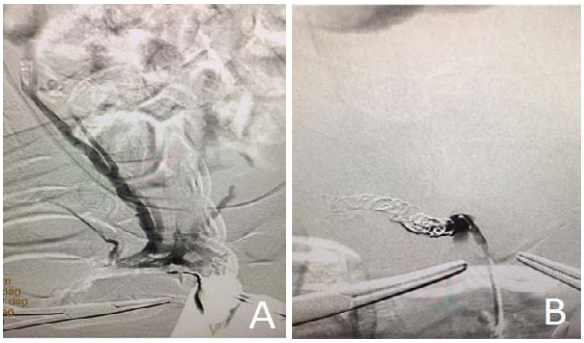

Figure 1: Deep dorsal vein Endovascular embolization. A: Before embolization; B: After embolization.

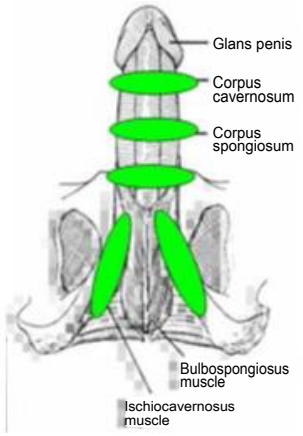

Figure 2: Shock waves focused zone.

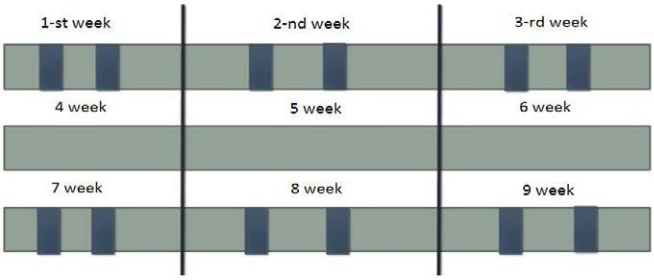

Figure 3: Shock wave therapy protocol.

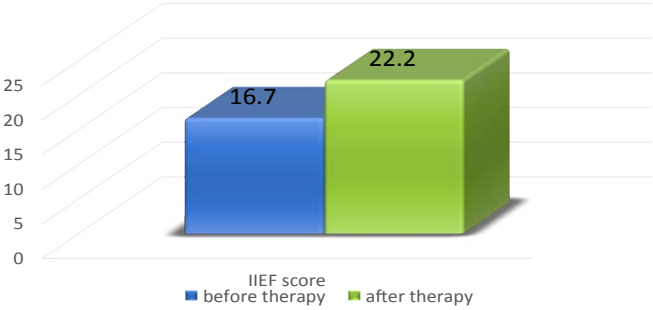

Diagram 1: Evaluation IIEF-5 before and after shock wave therapy.

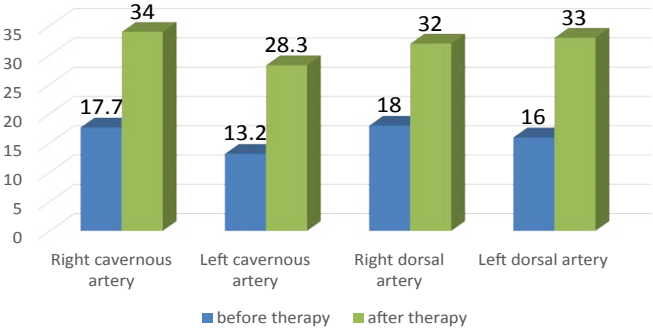

Diagram 2: Evaluation of penile blood flow before and after shock wave therapy.

Discussion

This study involved number of patients with vasculogenic ED to have been treated with SWT, after underwent deep dorsal vein embolization. The results show a significant improvement in erectile dysfunction, based on the IIEF-5 score and evaluation of penile blood flow in patients undergoing shock wave therapy. Patients received 9 weeks sessions of SWT without requiring anaesthesia and with no evidence of complications. During and after the procedure, two evaluations were carried out that showed favourable results, with an IIEF-5 score improvement in patients undergoing treatment with respect to the baseline measurement. These results are equivalent to those reported in the literature in studies that applied similar methods [25, 26]. But in the literature there is no information about the effectiveness of shock wave therapy after embolization of the deep dorsal vein in patients with vasculogenic ED.

The success of this therapy is based on its safety and ease of application, as well as it being the only therapy that seeks to modify the pathophysiology of the disease. Its effect on erectile dysfunction is due to the induction of different physiological components such as the nitric oxide synthase enzyme, endothelial growth factor, proliferating cell nuclear antigen, among other vasodilators, as well as the stimulation of stem cell migration which together lead to increased angiogenesis, thus improving the flow and the quality of erections [14-22].

The positive side of the study is one of the first small studies of the effectiveness of shock wave therapy after embolization of the deep dorsal vein in patients with vasculogenic ED, include opportunity to evaluate the IIEF-5 score and penile blood flow. However, the shortcomings of the study are experimental study.

In the future studies, we propose that the best design to evaluate the effectiveness of the therapy is the placebo-controlled clinical trial; in addition, the evaluated parameters should be broadened in questionnaires on sexual satisfaction, quality of life, and erection hardness score.

Conclusion

The results of this study indicate erectile dysfunction treatment should have a personalized approach. Shock wave therapy in combination with the reduction of venous outflow may be an alternative to revascularization of the penis.

Conflict of Interest

Authors declare no conflict of interest exists.

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