Treatment of Chronic Abacterial Prostatitis Using Extracorporeal Shock Wave Therapy [ESWT]

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Abstract

Objective: To evaluate the effect of extracorporeal shockwave therapy (ESWT) on chronic pelvic pain syndrome (CPPS)/chronic a bacterial prostatitis after failure of most other modalities of treatment.

Materials and Methods: In a follow-up survey, 25 patients with CPPS who failed at least previously 3 modalities of treatment other than ESWT were evaluated at 2 weeks after finishing the course of ESWT. All patients were treated by ESWT once a week for 4 weeks by a protocol of 2500 impulses at one bar over 13 minutes. The investigation was designed as an open-label uncontrolled therapeutic clinical trial which was conducted in Jordan university hospital through the period 2014-2015. The follow-up assessments were carried out by National Institutes of Health- Chronic Prostatitis Symptom Index (NIH-CPSI), International prostate symptom score (IPSS), American Urological Association (AUA) Quality of Life Due to Urinary Symptoms (QOL_US) and International Index of Erectile Function (IIEF). Data were compared using paired samples t-test.

Results: Of our total 29 patients 4 of them did not complete the study protocol, 25 patients were evaluated. The mean of NIH-CPSI, IPSS, AUA QOL_US and IIEF were evaluated pre and post ESWT and it showed statistically significant improvement without any significant side-effect of the treatment.

Conclusions: Although ESWT seems to be safe and effective specially in intractable cases, long term follow up is still mandatory to determine the effectiveness and long term benefit of ESWT and whether there is a need for further sessions, if the benefit will be the same as compared to the first course and to closely monitor patients of any side effect if present.

Keywords: Chronic pelvic pain syndrome, CPPS, Chronic a bacterial prostatitis, Extracorporeal shock wave therapy, ESWT, Prostate.

(J Med J 2016; Vol. 50 (4):195-202)

Received	***Accepted***
June 20, 2016	*Sep. 18, 2016*

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Introduction

Approximately, half of all men suffer from symptoms consistent with prostatitis at some point in their lives, less than 10% of those are bacterial[1]. Prostatitis is a common condition, clear epidemiologic data on CPPS are lacking, due to the fact that there is no standardized definition of this condition[2,3].

According to the National Institutes of Health (NIH) classification (Table 1).[4] CPPS (type IIIB), is characterized by the lack of signs of infection in urine and sperm as well as by the specific symptoms. Routine diagnostic procedure is still debatable, and the clinical diagnosis of CPPS is made in light of complaints, microbiologic findings, and exclusion of more severe, relevant diseases[5].

Table 1. Prostatitis classification of the National Institute of Health (NIH)

Category I: Acute Bacterial Prostatitis	Characterized by sudden fever, perineal and suprapubic pain and voiding symptoms. The urine shows signs of a urinary tract infection.
Category II: Chronic Bacterial Prostatitis	Chronic bacterial prostatitis is characterized by symptoms for more than 3 months with recurrent bacterial urinary tract infection.
Category III: Chronic Pelvic Pain Syndrome	(CPPS) is characterized by pain and voiding symptoms for more than 3 months, without detection of bacterial pathogens using standard microbiological methods. The CPPS is divided into two subcategories:
Category IIIA: Inflammatory CPPS	White blood cells in prostate fluid, urine, seminal fluid.
Category IIIB: Noninflammatory CPPS	No White blood cells in prostate fluid, urine, seminal fluid.
Category IV: Asymptomatic Inflammatory Prostatitis	White blood cells in prostate fluid, urine, seminal fluid, prostatic tissue with no symptoms.

1 CPPS = Chronic Pelvic Pain Syndrome

Many pharmacological treatments were proposed for treatment of CPPS such as analgesics, anti-inflammatory agents, antibiotics, α-receptor blockers, and 5α-reductase inhibitors as a single or combination therapy with variable success rates[6,7,8].

Some of the other introduced therapies have been physiotherapy, trigger-point massage, electromagnetic treatment, acupuncture, rectal massage, hyperthermia, thermotherapy, laser coagulation, and intraprostatic injection of botulinum toxin A[9,10].

Orthopaedic pain syndromes, fractures, and wound healing disorders are successfully treated by low energy extracorporeal shock wave therapy (ESWT)[11]. Ischemic myocardial areas could be reperfused by local application of shock waves [12].

Despite being a common condition with significant adverse effects on the quality-of-life (QOL) of the patients, the etiologies, pathogenesis and treatment of this condition have remained problematic and elusive[13].

Due to the possibility of chronic bacterial prostatitis being misdiagnosed as Chronic nonbacterial prostatitis (CNBP), some authors have suggested that an empirical trial period of anti-microbial treatment may be attempted at first especially in the inflammatory subtypes of the condition[14,15].

Materials and Methods

Patients with type IIIB prostatitis/ CPPS of at least one year duration and no evidence of bacteria in urinary and seminal fluid culture tests (criteria according NIH classification) who failed to respond to other traditional modalities of CPPS treatment and took a combination of at least one course lipophilic antibiotic, simple analgesia and alpha blocker were eligible for the study. In addition some patients were given a course or more of thermal therapy and prostatic massage before ESWT enrolment.

Prostate cancer (PCa) was ruled out clinically by digital rectal examination (DRE), and serologically with PSA total and ratio prior to therapy. Prostate ultrasound was also performed prior to study enrolment to rule out other pathologies.

The investigation was designed as an open-label uncontrolled therapeutic clinical trial which was conducted in Jordan university hospital through the period 2014-2015.

Informed consent was obtained from each subject after receiving approval of the experimental protocol by the institutional review board in the University of Jordan.

Our 25 Patients who were included received one perineally applied ESWT treatment weekly (2500 pulses at 1Bar of pressure and maximum total energy flow density: 0.25 mJ/mm^2; frequency: 3 Hz) for 4 wk. The device used for the study was an electropneumatic shock wave unit with a focused shock wave source (E-S.W.T Roland, pagani, Italy).The ESWT machine and probe are shown in (Fig. 1) and (Fig. 2).

Figure 1. ESWT machine

Figure 2. ESWT probe

The follow-up included clinical examinations and the questionnaire-based

reevaluation of quality of life and complaints after 2 weeks of completing the ESWT course.

The degree of pain was evaluated using the Visual Analog Scale (VAS, 0–10). CPPS-related complaints were investigated using the NIH-developed Chronic Prostatitis Symptom Index (NIH-CPSI). Micturition conditions were examined using the International Prostate Symptom Score (IPSS) and American Urological Association (AUA) Quality of Life Due to Urinary Symptoms (QOL_US); the International Index of Erectile Function (IIEF) was used for potency function.

The data sets were examined by descriptive analysis methods. Data were compared using paired samples t-test .The characteristic values, such as mean values plus or minus standard deviation (SD) are listed in Table 2. All statistical analyses were carried out using the statistical software package IBM SPSS Statistics 22.

Table 2. Results

	Before ESWT	**After ESWT**	***P*- value**	**95% Confidence interval**
IPSS	18.8 ± 8.9	11 ± 7.4	0.000	5.2 - 10.4
NIH_Pain	12 ± 5.8	6.2 ± 3.45	0.000	3.3 – 8.2
NIH_Urination	6.8 ± 2.25	3.9 ± 2.1	0.000	1.8 - 4
NIH_QOl	8.7 ± 3.0	5.2 ± 2.7	0.000	2.2 – 4.7
NIH_Total	27.5 ± 8.7	15.4 ± 6.6	0.000	7.8 – 16.6
AUA QOL_US	4.6 ± 1.4	2.3 ± 1.1	0.000	1.7 - 3
IIEF	15.8 ± 6.2	19.6 ± 4.6	0.001	-5.7 - -1.8

Data are mean ± SD.*P*- values are calculated by paired samples T-test
ESWT= Extra corporal shockwave therapy; IPSS = International Prostate Symptom Score; NIH-CPSI= NIH-Chronic Prostatitis Symptom Index; AUA QOL_US= American Urological Association Quality of Life Due to Urinary Symptoms; IIEF = International Index of Erectile Function;

Results

During the whole course of treatment no significant side effects encountered nor any type of analgesia were required. The patient's age group ranged between 22-66 y with a mean age of 41.8 and a median age of 44. The patients were not stratified according to the type of treatments received previously because of the diversity of modalities.

The results of our analysis 2 weeks after completing the 4week course of treatment showed statistically significant improvement in all of the aspects considered in the evaluation and as follow on Table 2.

As shown above the IPSS and AUA QOL_US had significant improvement with a P-value of 0.000. The NIH-CPSI was analyzed separately for each domain and the total score as well, all showed statistically significant P-value of 0.000. The IIEF also showed a statistically significant improvement with a P-value of 0.001.

Best response in the IPSS and IIEF was looked for and showed to be urgency and no

response, respectively (Fig. 3) and (Fig. 4).

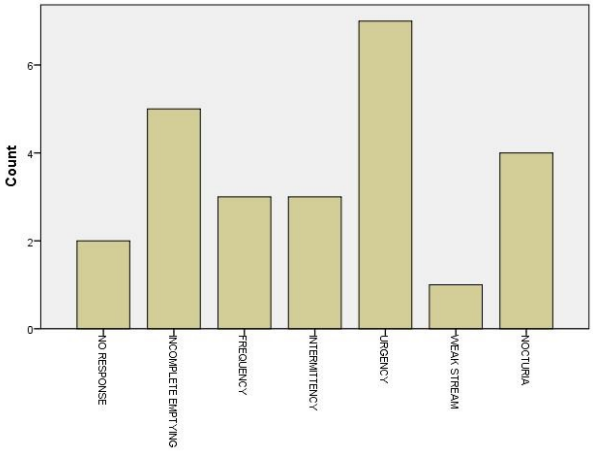

Figure 3. Best response IPSS

Discussion

CPPS remains of unknown etiology which makes the treatment difficult and commonly insufficient. Most of the used treatments are symptomatic treatments and do not treat the underlying cause.

The suggested mechanisms of ESWT are currently under investigation. Extracorporeal shock waves effect on living tissue consist of transformation of mechanical signals into biochemical or molecular-biologic signals that again induce particular alterations within cells (mechanotransduction): Hyperstimulation of nociceptors and interrupting the flow of nerve impulses could lead to pain alleviation. ESWT is able to increase local microvascularisation as well as reduce muscle tone and spasticity[16].

After the follow-up of 2 weeks after completing the course of ESWT and comparing the IPSS, AUA QOl_US, NIH_CPPS and IIEF, marked improvement noticed. Our study comes to support many other similar studies performed in different ways.

According to our literature review, In 2 recent studies by Zimmermann *et al*., in first study.[17] they showed statistically significant improvements in pain and QOL after ESWT although voiding conditions, improved but with no statistical significance. In their later one[18], they foundall 30 patients in the verum group showed statistically significant improvement of pain, QOL, and voiding conditions following ESWT in comparison to the placebo group. Yan *et al*.,[19] randomized study with 80 CPPS patients, NIH-CPSI, QOL and the pain domain scores significantly improved compared to the baseline at all post treatment time points in ESWT group.

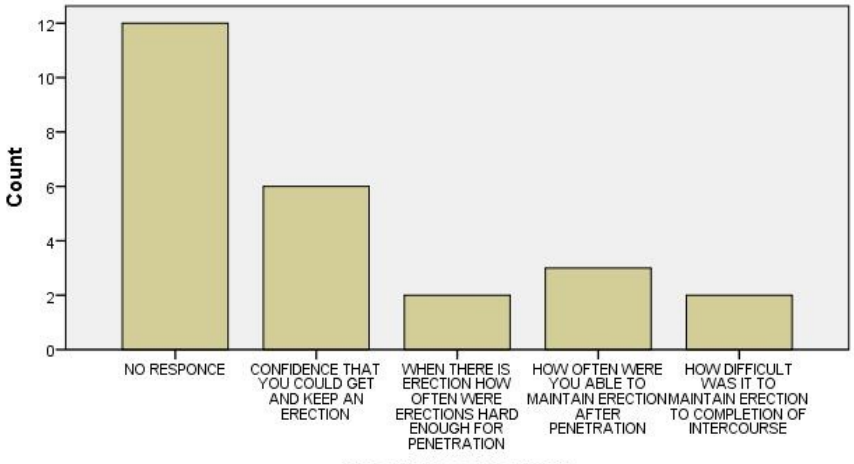

Figure 4. Best response IIEF

Moayedni*a et et al.,* in another study randomized 40 patients with CPPS into a treatment and sham groups and found ESWT to be safe and effective therapy in CPPS in short-term follow-up but its long-term efficacy was not supported by this study [20].

It is still unclear the formula which should be used in the treatment protocol such as whether to increase the intervals between sessions or the number of sessions themselves and what energy or frequency will give the best long last results with the minimal side effects[21].

The fact that no significant side-effects were noted during and after treatment with the ease of application on an out-patient basis facilitates and encourage it's use. However, further follow up is still needed to monitor if there is any side-effects in the future.

Erectile dysfunction was one of the most embarrassing complaints in young patients with CPPS, most of the patients didn't correlate their erectile dysfunction with CPPS and didn't mention it till we used the IIEF questionnaire. Fortunately significant improvement was noticed after ESWT course of treatment. And this is why we think each patient with CPPS should be followed regarding erectile function.

The strength of our study lies on the fact that all of our included patients have failed all other traditional modalities of treatments (combined alpha blocker, simple analgesia and antibiotics), and some of them even failed further modalities such as (thermotherapy and prostatic massage). Also, this investigation has been performed by an independent center with members who had no personal interest in the establishment of this new therapy.

The weakness of Our study was the short-term follow up of the patients for only 2 weeks and a further follow up is recommended to assess maintenance of the improvement, Another limitation was the lack of a controlled group to compare with and a small sample size.

Conclusions

Our study confirmed ESWT to be a safe and effective therapy in CPPS in short-term follow-up, although its long-term efficacy was not supported by ours and more comprehensive follow-up is essential.

It is easy, cost effective, and by avoiding the systemic side effects of other treatments as a local therapy and being introduced on an out-patient basis with little expenditure, in terms of either time or personnel and the possibility of repeating it at any time makes this treatment an option of significant importance.

Acknowledgments

Saddam Al Demour, MD
Ahmad Al Aqqad, MD
Heba Shanti, MD
Who served as scientific advisors.

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علاج التهاب البروستات المزمن اللابكتيري باستخدام الموجات الصادمة العلاجية

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الملخص

الأهداف: تقييم فاعلية العلاج بالموجات الصادمة العلاجية للمرضى الذين يعانون من إلتهاب البروستات المزمن اللابكتيري بعد فشل العديد من طرق العلاج التقليدية.

الطرق والأدوات: تم متابعه خمس وعشرين مريضا مصابين بالتهاب البروستات المزمن اللابكتيري والذين لم يستفيدوا من تجربه أكثر من طريقه أخرى للعلاج بحيث لا تقل عن ثلاثة طرق. حيث تم إخضاع كل مريض لجلسة علاج بالموجات الصادمة العلاجية أسبوعياً لمدة ثلاث عشرة دقيقه بمعدل الفين وخمسمائة ضربه بتردد ثلاثة هرتز وبضغط واحد بار لمدة أربعة أسابيع متتالية، وتم تقييم المرضى بعد أسبوعين من استتمام العلاج المذكور. تم إجراء هذه التجربة من دون مجموعه مقارنه في مستشفى الجامعة الأردنية في الفترة الممتدة ما بين 2014 و2015. تم متابعه المرضى باستخدام نماذج الاستطلاع المتعارف عليها عالميا:

National Institutes of Health- Chronic Prostatitis Symptom Index (NIH-CPSI), International Prostate Symptom Score (IPSS), American Urological Association (AUA) Quality of Life Due to Urinary Symptoms (QOL_US) and International Index of Erectile Function (IIEF).

تم تحليل النتائج باستخدام برنامج IBM SPSS Statistics 22

وبطريقه مقارنه المعدلات paired samples t-test

النتائج: بعد مقارنة النتائج للخمس وعشرين مريضا الذين استكملوا علاجهم من أصل التسع وعشرين مريضا الذين بدأت الدراسة عليهم تبين ان العلاج بالموجات الصادمة العلاجية أظهر تحسنا ملموسا في جميع نماذج الاستطلاع المذكورة سابقا ولم يتسبب بآثار سلبية لأي من المرضى.

الخلاصة: على الرغم من فاعليه العلاج بالموجات الصادمة العلاجية لمرضى التهاب البروستات المزمن اللابكتيري غير أن المتابعة كانت لفترة قصيرة، لذلك يتوجب علينا متابعة المرضى بشكل أطول لمعرفة ديمومة التحسن وما اذى كانت هنالك حاجة لإعطاء المزيد من الجلسات العلاجية ومدى فاعليتها مقارنه بالجلسات السابقة وما إذا كانت هنالك آثار جانبيه للعلاج ظهرت لاحقا.

الكلمات الدالة: التهاب البروستات المزمن اللابكتيري، العلاج بالموجات الصادمة العلاجية، التهاب الموثة، البروستات.