



TOWARDS A NEW INDICATION FOR EXTRACORPOREAL SHOCK WAVE THERAPY: IDIOPATHIC SCOLIOSIS

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Introduction. The use of Extracorporeal Shock Wave Therapy (ESWT) in some tendinopathies and respectively, muscle pathologies, is already common, widespread. Less known or availed is ESWT in the approach of (idiopathic) scoliosis – targeting the myofascial syndrome consequent to scoliosis' characteristic, regional, deformation. **Material and Methods.** We have retrospectively analyzed 16 patients (10 female and 6 male), hospitalized between February 2015 – February 2017, in the Neural-Muscular Rehabilitation Clinic Division – at the Teaching Emergency Hospital "Bagdasar-Arseni" – diagnosed with mild, moderate or severe (idiopathic) scoliosis. Each patient received 2000 ESWT shocks (per session), applied at a pressure of 20 MPa and a frequency of 10 Hz, in burst mode, daily, during 10 days (provided with the specific device of our Clinic's equipment/ endowment). We assessed: pain (on Visual Analogic Scale – VAS), and (including) functionality – by using the Oswestry Low Back Pain and Disability Questionnaire (OLBPDQ) and quality of life – QOL (through the Medical Outcomes Study (MOS) 36-Item Short Form Survey). **Results.** Pain decreased, on average, 6.37 points on VAS, functionality improved, on average by 28 points (decrease on the OLBPDQ Index/ Scale – statistically significant: $p = 0.001$). Regarding SF-36, ESWT statistically significant improve general health ($p = 0.001$), physical functioning ($p = 0.001$), pain ($p = 0.001$), energy, fatigue ($p = 0.001$), social functioning ($p = 0.001$) and wellbeing ($p = 0.001$). No significant adverse reactions were observed. **Conclusion.** ESWT generates good results regarding the decrease of pain and consequently, regaining functionality in scoliosis.

Keywords: shockwave, scoliosis.

INTRODUCTION

Extracorporeal Shock Wave Therapy (ESWT) is a mechanical therapy based on the application of soundwaves with a high amount of pressure (12 barr) with 10 nanosecond peak level strikes, short duration (10 microseconds), and limited diameter (2–8 mm)^{1,2}. ESWT has microtraumatic effects in the tissue structures. In cartilaginous tissue ESWT may release free radicals of peroxy nitrite and, secondarily, induce apoptosis. As a consequence, chondroblastic differentiation is initiated with rejuvenating effects. Acting mechanically ESWT induces the reorganization of the solicited muscular tissue^{3,4}. Consequently, ESWT is indicated in myoskeletal pathologies like:

painful shoulder, tennis elbow, heel spur, insertional pain, chronic tendinopathy, calcifications, jumper's knee, hip pain, medial tibial stress syndrome⁵.

Based on the effects of ESWT described above, we recommend it for patients with idiopathic⁶ scoliosis^{7,8} that associate in their scoliosis convexity, old and painful contractures and/or retractures, reactivated and self-sustaining by movements scoliosis. We are targeting the myofascial syndrome consequent to scoliosis' characteristic, regional, deformation⁹.

MATERIAL AND METHODS

In this study retrospectively analyzed 16 patients, hospitalized between February 2015 – February 2017, in the Neuro-muscular Clinic Division from

Emergency Hospital Bagdasar Arseni. The patients were 6 males and 10 females, aged 31 to 78 years old, with an average age of 51, median age 47, standard deviation 14, diagnosed with mild, moderate and severe (idiopathic) scoliosis.

They received ESWT as follows: (1) patients with mild scoliosis received one session per week, totaling two sessions; (2) patients with moderate scoliosis received 2 sessions per week totaling 4 sessions; (3) patients with severe scoliosis received 5 sessions per week, totaling 10 sessions.

All patients included in the study signed an informed consent about the therapy and the study was approved by the Bioethics Commission No 12728-16165.

The most effective number of shocks per application in the ESWT studies is between 1000-2000.^{3,10} Thus, we used 2000 shocks, at 20 MPa (2 barr) and 10 Hz frequency. We have chosen burst mode to exclude any thermal effect.² The ESWT procedure was applied to the cervico-dorso-lumbar paravertebral area on the affected muscle mass, away from spiny apophyses. The duration of the procedure was 4.48 minutes.

Exclusion criteria for this study: (1) patients with general contraindications for the use of physiotherapy: HTA TAS \geq 150 mmHg, fever, acute infections, acute inflammatory diseases, neoplasia, the presence of pacemaker, valvuloplasty, altered general condition, cachexia, pregnancy, chronic decompensated pathology; (2) patients with specific contraindications for the use of ESWT: those with less than 6 weeks since treatment with non-steroidal anti-inflammatory drugs, AIS, anticoagulant therapy due to bleeding risk. Also, patients with hemorrhagic necrosis, bleeding edema, capillary rupture, erythema, redness, swelling hematoma, red spots, hemophilia

In this study patients received only ESWT for scoliosis' treatment, without any association to other physiotherapy procedures on the spine region.

If the patients had another associated medical problem they received the specific therapy for that condition. All patients followed a specific associated kinesiotherapy program.

We evaluated: (1) pain on visual analogical scale, (2) functionality by using Oswestry Low Back Pain and Disability Questionnaire (also known as Oswestry Disability Index) and (3) the Quality of Life Scale (on SF-36)¹¹. We used Oswestry Disability Index, even it was design for low back pain, because of its useful concept, which easy permit to be applied and extended for pain, and secondary disability, in scoliosis.¹²

RESULTS

The pain decreased an average of 6.37 points on VAS scale, from 7.18 recorded mean at admission to 0.81 recorded mean at discharge ($p = 0.001$).

In the first two columns of table 1 we represented the mean value and respectively, standard deviation obtained in a classic study – Medical Outcomes Study (MOS) 36-Item Short Form Survey (SF-36) Scoring¹¹. The next five columns reveals our study results at admission and at discharge, and respectively p-value, evaluated on T-test, after we state that the population are normally distributed.

Functionality measured by using Oswestry Questionnaire was improved in a statistically significant way: from 35 points on average at admission to 7 points on average at discharge ($p = 0.001$).

ESWT statistically significant improve general health ($p = 0.001$), physical functioning ($p = 0,001$), pain ($p = 0.001$), energy, fatigue ($p = 0.001$), social functioning ($p = 0.001$) and wellbeing ($p = 0.001$) – as shown in Table 1, Figures 3 and 4.

Generally speaking, scoliosis affects general health on studied patients physical functioning generates pain, affects well-being but doesn't decrease patient's energy, doesn't induce fatigue, as Table 1 reveals.

During our survey, we did not encounter any significant adverse reactions to the ESWT therapy we applied.

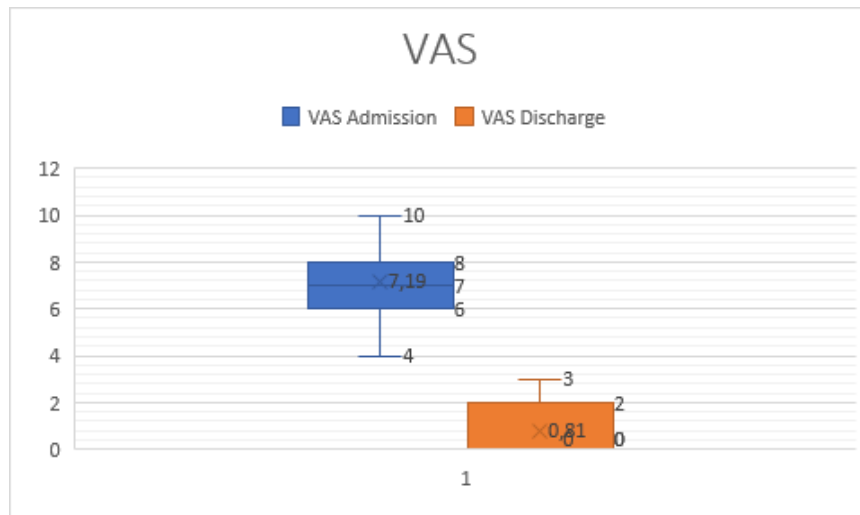


Figure 1. VAS evaluation at admission and discharge – box and whisker plot.

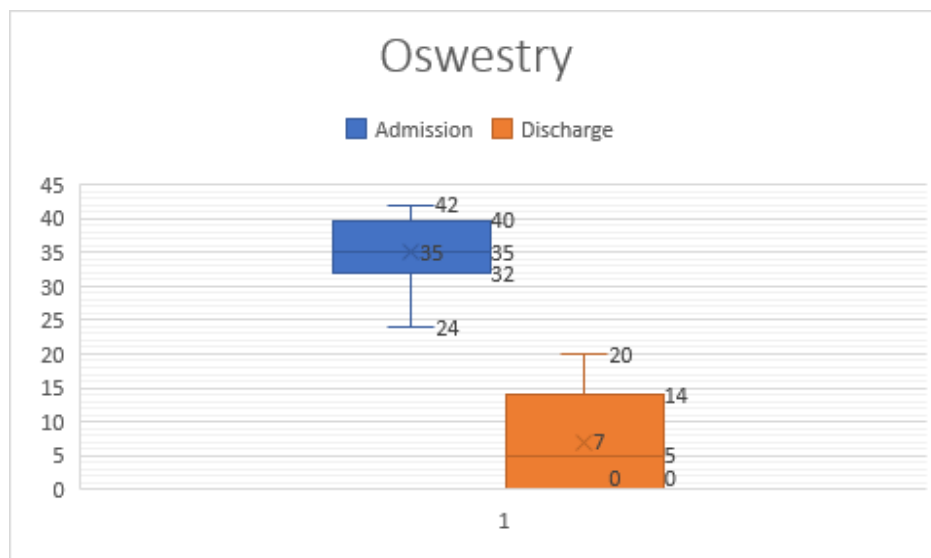


Figure 2. Oswestry Questionnaire at admission and discharge – box and whisker plot.

Table 1

Representative items SF-36 questionnaire

Items	Mean values SF 36	SD SF -36	Our study Mean values at admission	Our study SD at admission	Our study Mean values at discharge	Our study SD at discharge	p-value
Physical functioning	70.61	27.42	54.37	24.21	70.62	16.91	0.001
Energy/fatigue	52.15	22.39	74.06	28,59	75.68	27.47	0.045
Emotional well-being	70.38	21.97	62.81	18.97	70	17.14	0.001
Social functioning	78.77	25.43	71.09	17.51	76.25	15.66	0.001
Pain	70.77	25.46	38.9	14.85	65.31	11.87	0.001
General health	56.99	21.11	50.37	13.78	55	12.38	0.001

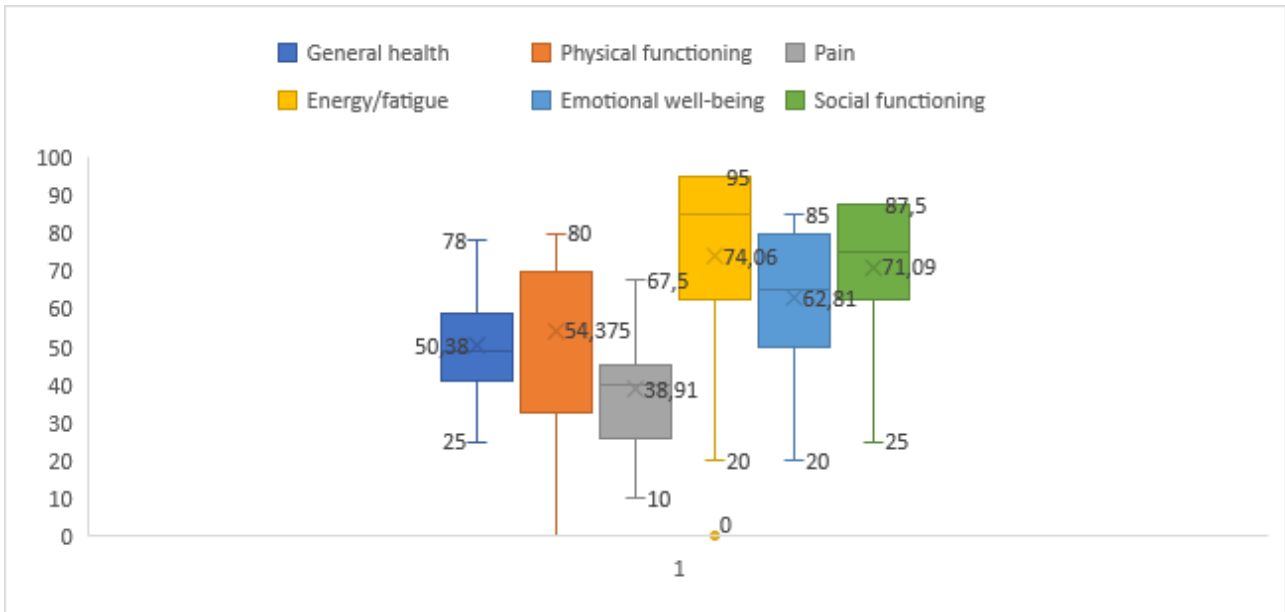


Figure 3. Representative items SF-36 questionnaire at admission – box and whisker plot.

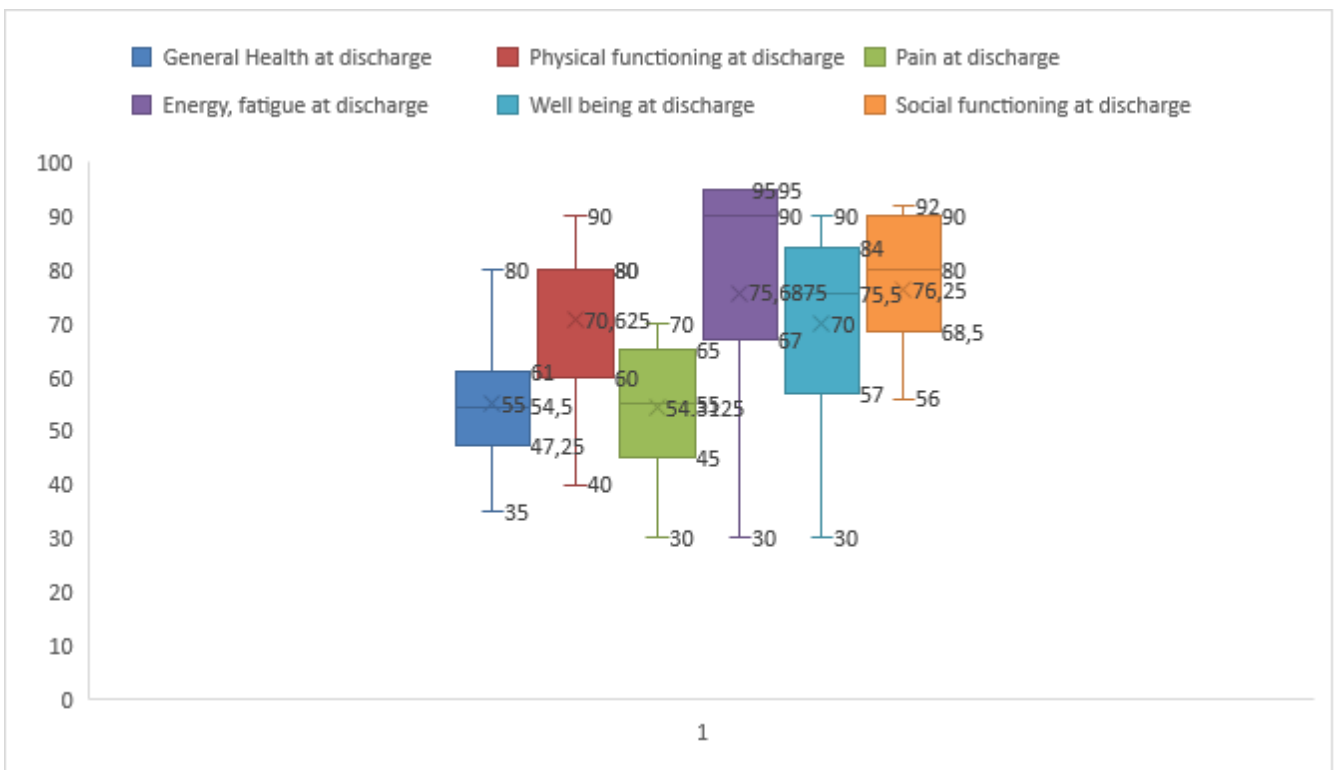


Figure 4. Representative items SF-36 questionnaire at discharge – box and whisker plot.

DISCUSSIONS

We had good feedback from all the people we treated, so we want to encourage fellow doctors to

use this procedure in idiopathic scoliosis, which their natural evolution is slowly progression.¹³ Idiopathic scoliosis, as a distinct entity with a natural history which implies chronic back pain,¹⁴

necessities an effective new approach in physical and rehabilitation treatment care. In fact, after ESWT, the antalgic effects were noted even after the first treatment session. In mild scoliosis, significant analgesia was established 2–3 days after first application. In moderate and severe cases, significant relief occurs at the end of the therapy cycle. The existence of pain is a necessary condition for the administration of ESWT because of the immediate relief provided by such treatment. In our study, this procedure was not indicated to patients with scoliosis who did not register pain as a symptom upon admission.

CONCLUSIONS

ESWT proved to be a safe and effective form of treatment. Cases of scoliosis which generate contractures or retractions of the muscles (maybe painful or old) in their convexity, may represent a new indication for ESWT.

This study is a start in the research field of noninvasive symptomatic treatments for scoliosis. Our endeavor may justify future studies in this specific area. Until further results, we underline the potential use of ESWT in treating scoliosis.

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