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Whole body vibration therapy on a treatment bed as additional means to treat postprostatectomy urinary incontinence

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Summary An innovative form of whole body vibration therapy on a treatment bed (Evocell®) to fight against the disabling and isolating symptom of postoperative incontinence in a prostate cancer patient is presented. A supervised program with outpatient active pelvic floor training and a novel form of synchronous high-intensity whole body vibration therapy using the Evocell® device was performed in a patient with postprostatectomy stress urinary incontinence. The patient had previously failed regular pelvic floor exercise. During the intervention, namely a whole body vibration treatment in a lying position on a treatment bed, the patient performed active and passive pelvic floor exercises under professional guidance. Over a period of 6 weeks after starting treatment, the patient regained continence (usage of 1 safety pad). Furthermore, his ability to work increased (return to work) and his ability to attend social activities improved.

Keywords Prostate cancer · Urinary incontinence · Treatment · Mechanical transduction · Whole body vibrations

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Ganzkörpervibration auf einer Therapieliege als zusätzliche Therapiemöglichkeit bei Inkontinenz nach Prostataoperation

Zusammenfassung Dieser Fallbericht dient zur Darstellung einer innovativen Form der Ganzkörpervibrationsbehandlung (Ganzkörperliege mit biomechanischer Wellentechnologie, Evocell®) zur Bekämpfung der beeinträchtigenden Symptome einer therapieresistenten Post-Prostatektomie-Stressinkontinenz bei einem Prostatakarzinompatienten trotz stattgehabter Rehabilitation mit konsequenter Beckenbodenreedukation. Im Rahmen eines Programms mit einer Ganzkörpervibrationsbehandlung wurden mit dem Patienten passiv-induziertes sowie aktives Beckenbodentraining auf einer Ganzkörperliege mit biomechanischer Wellentechnologie 2-mal pro Woche durchgeführt. Innerhalb von 6 Wochen erreichte der Patient nahezu vollständige Kontinenz, volle Arbeitsfähigkeit sowie eine deutliche Steigerung seiner sozialen Teilhabe.

Schlüsselwörter Prostatakarzinom · Harninkontinenz · Therapie · Mechanotransduktion · Ganzkörpervibration

Introduction

Prostate cancer is a massive burden with an enormous impact on health and the main malignancy in men in industrialized countries. The recent advances in prostate cancer therapy in all fields of interdisciplinary treatment have created a favorable prognosis with 5-year survival rates of approximately 99 % for patients, making prostate cancer a chronic disease with various side-effects affecting quality of life [1].

Although nerve-sparing surgical techniques in radical prostatectomies are improving, a significant portion of men will experience (early) incontinence [2]. The surgical treatment of postprostatectomy stress urinary incontinence remains the gold standard procedure [3]. Nevertheless, modalities from the field of Physical Medicine and Rehabilitation have been described to serve as additive noninvasive treatment options and to be able to help patients in regaining continence [4]. Such programs for pelvic floor re-education include physical modalities like physiotherapeutic exercises (pelvic floor training), biofeedback (and electro- and multichannel biofeedback), as well as whole body vibration therapy, and have been shown to be efficacious and well-accepted in inpatient rehabilitation programs [2]. Nevertheless, it had been shown that a continuous improvement in continence also depends on the consistent continuation of an outpatient program [2]. Whole body vibration therapy, especially synchronous high-intensity whole body vibration therapy of long duration, has been proven to be effective in incontinent patients [4]. In this case report, a new form of whole body vibration therapy on a therapeutic bed to treat the disabling and isolating symptom "incontinence" is presented.

Case report

A 55-year-old patient suffering from severe urinary incontinence after radical prostatectomy in August 2015 due to prostate cancer (adenocarcinoma, Gleason score 7 (3 + 4), pT2a, pNx, L0, V0) was admitted to our department in the middle of November 2015. His history revealed that his urine loss was a massive burden for him being a very active businessman—and seemed to be therapy resistant. Due to his incontinence, he needed at least 5 pads/day (at least 35 pads/week). The patient was unable to work regularly and to attend meetings in his job. Furthermore, he was very limited in his social and private activities due to massive urine loss.

Before his presentation, the patient had learned active exercises for pelvic floor re-education by a physiotherapist. He had performed this program regularly and consequently at home. Following this therapeutic approach, the patient attended an additional inpatient rehabilitation visit of 3 weeks where he was treated by another physiotherapist by both pelvic floor exercises and biofeedback (in an inpatient competence centre). Nevertheless, his urine loss did not change form baseline (5 pads/day, respectively 35 pads/week).

After his presentation at our department, we started a supervised program—continuing his active pelvic floor training—and added a novel form of synchronous high-intensity whole body vibration therapy by means of an Evocell® device. Vibrations of 20–26 Hz were applied by a specific treatment couch (170 × 82 × 66 cm, Evocell®) with an adjustable frequency ranging from 15 Hz to 30 Hz [4]. One central actuator transmitted a stroke of 0.7 mm to the surface plate providing a radial proliferation [5]. The patient was in a supine position on the device and changed from passive to active (performing pelvic floor exercises) treatment. Body vibration therapy was performed 2 times a week for a period of 6 weeks. The patient regained continence within a time of 6 weeks after starting our special program. His urine loss almost stopped completely. His ability to work increased enormously and a so-called "return to work" were reached successfully. So did his ability to attend social and private activities.

Discussion

Active exercises and pelvic floor training, biofeedback, and whole body vibration therapy have previously been shown to be efficient and well-accepted measures of programs for pelvic floor re-education [2, 4]. We report on a patient suffering from significant postprostatectomy stress urinary incontinence, where a whole body vibration therapy leading to synchronous high-intensity whole body vibrations was used with the aim to improve continence. Synchronous high-intensity whole body vibration therapy of long duration has been shown to significantly enhance the activation of the pelvic floor muscles in young continent women [4]. Although so-called stochastic resonance vibration leads to higher pelvic floor muscle activation in subjects with weakened pelvic floor muscles and achieves higher pelvic floor activation than maximum voluntary contraction alone, the continuous whole body vibration therapy is recommended in clinical practice as it is easier to apply and less time consuming [4, 6]. The consequence is maintenance of reflexive pelvic floor muscles activity despite pelvic floor muscles fatigue or a compensation of slow red pelvic floor muscles fiber fatigue by an increase of innervation frequency and motor unit recruitment of fast white fibers [6]. Another putative mechanism causing therapy response is the "mechanical transduction" ("Mechanotransduktion") phenomenon, namely the transformation (of transduced) mechanical forces into biochemical signals within cells which could be the underlying mechanism of cell recovery, regeneration, and tissue healing [5, 7]. It has been shown that the application of shock waves is able to relief pain, and to positively regulate inflammation and stem cell activities [5, 7].

The reported patient regained continence within a time period of 6 weeks after initiation of treatment. Furthermore, his ability to work increased and his ability to attend social activities improved. During whole body vibration treatment, he was in a supine position on the Evocell® device and able to actively perform pelvic floor exercises. Accordingly, reflexive pelvic floor muscle activity ("passive exercises") can be considered an important part of the experimen-

tal treatment used. To our knowledge, being able to achieve intensive passive muscle stimulation alone or to perform active exercises at the same time, both in a lying or sitting position, is unique and has not been previously reported in the literature.

For most patients suffering from postprostatectomy stress urinary incontinence, surgical treatment options are the gold standard procedure [3]. In some patients (and in some situations), on the other hand, conservative modalities can be used as additive non-invasive treatment options which are often used during inpatient or outpatient cancer rehabilitation [8]. This case report shows a benefit of the additional use of high-intensity whole body vibration therapy in a patient suffering from severe postradical prostatectomy urinary incontinence. Nevertheless, further clinical studies are urgently needed to investigate the effects of this inexpensive treatment modality for the highlighted patient group.

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Conflict of interest R. Crevenna, F. Cenik, M. Margreiter, M. Marhold, T. Sedghi Komanadj, and M. Keilani declare that they have no competing interests.

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