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Bladder-neck effective, integrative pelvic floor rehabilitation program: follow-up investigation

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ABSTRACT

Objectives: To evaluate the effectiveness of a pelvic floor rehabilitation program consisting of pelvic floor (PF) and transverse abdominal muscle (TrA) pre-contraction, coordination training and sustained submaximal contractions employing a validated pelvic floor questionnaire.
Study design: Fifty-five consecutive women with stress urinary incontinence ($n = 9$), overactive bladder ($n = 9$) or mixed symptoms ($n = 37$) were invited to participate. The German version of the Australian pelvic floor questionnaire was completed by all women before and after treatment, and additional validated improvement and satisfaction scales assessed patient-centered outcome. Individual treatment programs were selected according to the dysfunction evaluated by vaginal palpation and perineal ultrasound. Bladder-neck effective pelvic floor contraction was ensured using perineal ultrasound. Co-contraction of TrA was incorporated. Active integration of the pelvic floor contraction into daily life and individual incontinence triggering activities was practiced (duration, submaximal contraction, maintenance, pre-contraction before breathing, getting up and urgency).
Results: Of 46 women with stress urinary incontinence symptoms, 67% and of 46 women with OAB symptoms 78% were improved or cured. Bladder, bowel and sexual function domain scales improved significantly after 1–6 sessions (median 2). Pre-contraction of PF and TrA was routinely performed by 39 of 55 women (71%) resulting in less incontinence.
Conclusion: The bladder-neck effective, integrative pelvic floor rehabilitation program is highly effective for SUI and OAB. Although PF strengthening with maximal contractions was omitted, these results are comparable with strength programs in the literature. Due to the integration of submaximal PF contractions into daily life and individual incontinence situations, life-long strength training might be unnecessary, and this has to be studied further.

1. Introduction

There is no doubt that pelvic floor rehabilitation should be offered to most patients complaining of urinary and/or anal incontinence [1,2]. The best treatment regime, however, is not known [1]. Most treatment programs consist of pelvic floor muscle (PFM) strengthening and many do not involve integration of pelvic floor (PF) activity into daily life [1]. These programs are based on principles of regular skeletal muscle strength training resulting in an increased cross-sectional area (hypertrophy) of muscles with type II muscle fibers [3]. Up to 80% of the PFM, however, consists of type I muscle fibers (slow-twitch fibers) [4] mainly responsible for tonic activity and endurance. The PFM is part of the abdominal capsule, a muscle cylinder that stabilizes the trunk, together with the transverse abdominal muscle (TrA), the multifidi muscles and the diaphragm [5]. In healthy women, the TrA co-contracts with a PFM contraction [6–8]. There is also a PFM pre-contraction as a postural response before trunk perturbation [9], but this pre-contraction might get lost in incontinent women [9]. In a clinical study it has been demonstrated that teaching a PFM pre-contraction (the so-called "Knack") [10], e.g. in advance of a cough, can prevent urinary leakage [10] and reduces bladder neck (BN) descent [11]. Significant reductions in urine loss were achieved within one week, which is too early to be a result of PFM strength increase and hypertrophy [12].

Taking the above findings into account, we developed a specific pelvic floor rehabilitation program. Perineal ultrasound is used to assess PFM function, to teach a BN effective PFM contraction and especially a pre-contraction ("Knack"). Abdominal ultrasound is employed to ensure the physiological co-contraction of the TrA and to avoid pathological co-activity of the oblique abdominal muscles. Maximal PFM contractions are omitted to prevent undue increases

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in intra-abdominal pressure (IAP) [8] and to allow for longer PFM contractions. Finally integration of correct PFM activity into daily life is practiced.

The aim of this study was to prospectively evaluate the effectiveness of this pelvic floor rehabilitation program with focus on motor control and integration into daily life, employing ultrasound as a visual biofeedback method and a self-administered validated pelvic floor questionnaire [13].

2. Materials and methods

Terminology conforms to the standardization of the International Urogynecological Association (IUGA) and International Continence Society (ICS) [14]. Initial assessment was performed by one physiotherapist, experienced in the rehabilitation of TrA, multifidus and PFM and in the use of ultrasound for rehabilitation. Follow-up assessment was performed by one independent health care provider, (E.S.), registrar in urology. This study was approved by the Institutional Ethics Committee and conformed to the Declaration of Helsinki. Informed written consent was obtained.

Women with stress urinary incontinence (SUI) or overactive bladder symptoms (OAB) who were referred by gynecologists, urologists or general practitioners were consecutively invited to participate. Exclusion criteria were neurogenic bladder dysfunction, pelvic organ prolapse stage II or more [14], previous pelvic floor surgery, or inability to voluntarily contract the PFM on vaginal palpation (Oxford = 0) [15].

The validated German version of the Australian pelvic floor questionnaire [16] was completed by all patients at their first consultation to assess bladder, bowel, prolapse and sexual symptoms with severity scores, bothersomeness and quality of life. After the rehabilitation program, it was completed again by all women including a validated post-treatment module with improvement scales for all domains (much better, a little better, no change, a little worse, much worse) and a visual analog scales (VAS) from 0 (not at all satisfied) to 100 (very satisfied) to assess satisfaction with care and with treatment [13]. Additional questions evaluated the patient' compliance and self-judged integration of the PFM into daily-life.

SUI, urgency and urge incontinence were defined according to the validated PF questionnaire. OAB symptoms included urgency with or without urge incontinence. Mixed incontinence was assumed when SUI and OAB were present concomitantly. Cure was defined when symptoms ceased after rehabilitation, and improvement when frequency of symptoms was reduced according to the PF questionnaire [13].

A vaginal examination of the pelvic floor muscle was performed at rest and during contraction. Functional aspects were palpable contraction, maintained contraction during inspiration and during consecutive breaths (co-ordination and endurance) and pre-contraction before a cough. Insufficiencies were noted and guided the individual rehabilitation.

Perineal ultrasound was applied to evaluate pelvic floor activity and BN position at rest, during breathing, speaking, coughing and during a voluntary PFM (SonoSite 180 plus, C60 curved transducer with 5–2 MHz).

Abdominal palpation and ultrasound were used to assess transverse abdominal and internal and external oblique muscle activation [17]. Ultrasound was performed medial to the anterior superior iliac spine, standing or supine as convenient (SonoSite 180 plus, L25 linear transducer with 10–5 MHz). This probe position corresponds to the lower part of the TrA [18] which specifically co-contracts with submaximal PFM contractions [8].

A specific PF rehabilitation program was devised according to motor learning principles and to the individual dysfunction identified on palpation and ultrasound. Goals included a bladder neck effective contraction on perineal ultrasound with submaximal contractions, a PFM contraction before an increase in abdominal pressure (pre-contraction, e.g. before coughing), a PFM contraction that can be maintained during breathing and coughing, a co-contraction of the TrA evaluated by palpation and with ultrasound, and integration of PFM pre-contractions into daily life, especially in individual situations that lead to urinary incontinence.

Fig. 1. Use of perineal ultrasound as a visual biofeedback instrument for assessing, teaching and controlling movements of the bladder neck.
Full consent has been given to publish this photo.

Elimination of internal and external oblique muscle activation was sought and maximal PFM contractions were avoided to omit undue increases of abdominal pressure [8]. Treatment included instructions to maintain a submaximal PFM contraction during breathing, urgency, and on the way to the toilet, e.g., and to pre-contract before coughing, lifting, blowing the nose, etc.

Responses to the instructions were checked on vaginal palpation and ultrasound. Patients were shown the effects of their PFM contraction on the BN position and their TrA co-contraction on the ultrasound screen (visual biofeedback). Visible bladder neck elevation was practiced employing perineal ultrasound during breathing and coughing and individual symptoms (Fig. 1). Whenever feasible, perineal ultrasound was used as a biofeedback instrument, e.g. standing, bending over or lifting.

Behavioral advice was given when OAB symptoms were present. This included instructions on submaximal PFM contractions with the urge sensation and to maintain the contraction until the urge subsides. The same applied to fecal urgency. Women were also advised to perform a gentle PFM contraction before a typical urge trigger, e.g. before the key is inserted into the lock or before the tap is opened. If appropriate, recommendations on voiding and defecation were given. No formal strength training or standardized home-training was added. Finally, patients were encouraged to integrate all components of the program into their daily life, sports activities and incontinence situations. The initial treatment session lasted approximately 60 min. Further appointments were scheduled as necessary.

SPSS 19.0 was used for statistical analyses. Descriptive methods as well as *t*-tests and non-parametric tests according to the distribution of the variables were employed. Chi-square or Fisher's exact test as appropriate were used for assessment of risk factors (like age or BMI).

3. Results

Fifty-five consecutive women were included: no one declined participation. Four women were excluded before inclusion because