Biofeedback Training for the Recovery of Urinary Continence After Prostatectomy: A Systematic Review

Nívea Adriano de Santana e Santos

Maria Vieira de Lima Saintrain

Carina Barbosa Bandeira

Ana Ofélia Portela Lima

Rosendo Freitas de Amorim

Davi Oliveira Bizerril

Programa de Pós-Graduação em Saúde Coletiva,

Universidade de Fortaleza (UNIFOR), Fortaleza, Ceará, Brazil

Flaviano da Silva Santos

Curso de Psicologia, Universidade de Fortaleza

(UNIFOR), Fortaleza, Ceará, Brazil

Abstract

Post-prostatectomy incontinence (PPI) has various forms of treatment to improve pelvic floor muscle function and biofeedback can accelerate the return to continence. We aimed to systematize scientific evidence on the use of biofeedback in the recovery of PPI. Randomized controlled trials (RCTs) on the treatment of PPI through biofeedback with or without other techniques were selected from MedLine/PubMed, LILACS, Cochrane Library, SciELO, IBECS and PEDro databases using the descriptors prostatectomy AND urinary incontinence AND pelvic floor. Methodological quality was assessed using the Cochrane risk of bias tool and Jadad scale. In all, 61 articles were reviewed and nine which used biofeedback after prostatectomy were selected. In 55.5% (5/9) of the studies, biofeedback presented better results (recovery of continence) compared to other types of treatment or no intervention. Shorter time to recovery of continence was observed in three studies. Biofeedback appears to be an effective option for the recovery of continence after prostatectomy.

Keywords: Prostatectomy; Urinary incontinence; Pelvic floor

Introduction

Prostate cancer (PC) is the second most common cancer in men worldwide, with an estimated 1.1 million new cases according to the latest worldwide estimates dating from 2012 (Ferlay et al., 2015). With the increase in life expectancy, Brazil reports 61,200 new cases of PC and an estimated risk of 61.82 new cases per 100,000 men, with the state of Ceará presenting an estimated rate of 57.52 new cases per 100,000 men (Brasil, 2015).

The definitive treatment method – standard of care – for localized prostate cancer (PC) is radical prostatectomy (RP). However, surgery is an approach that can lead to complications such as urinary incontinence (UI), which is a cause for concern and anxiety among patients. UI in men is common after surgical removal of the prostate and its occurrence will depend on the surgical technique used and the surgeon's experience (Michaelson et al., 2008).

In the procedure, the prostatic urethra is also removed; thus, continence is now maintained by the external urinary sphincter which might require strengthening exercises to recover the ability to resist increases in abdominal pressure and thus hold the urine (Kakihara, Sens, & Ferreira, 2007).

The spontaneous recovery time of urinary continence, which may take from three months to two years after surgery, is still unclear. Therefore, invasive treatments for incontinence must be postponed for at least one year after prostatectomy (Marchiori, Bertaccini, Manferrari, Ferri, & Martorana, 2010; Zequi & Campos, 2010).

Conservative treatment for post-prostatectomy incontinence (PPI) may include various forms of treatment as a way to help improve the function of pelvic floor (PF) muscles, for instance: pelvic floor exercises (PFE), electrical stimulation (ES), biofeedback (BFB) and behavioral therapy (BT), which includes educational activities, or a combination of these techniques.

Physical therapy measures may favor the reduction of urinary incontinence due to increased pelvic muscle contraction strength, increased interval between voids and – consequently – decreased urinary frequency, and decreased degree of loss; additionally, they can also provide patients with greater satisfaction with the quality of life[7].

The International Continence Society (ICS) recognizes the PFE as first-line treatment for stress urinary incontinence (SUI) in women (Grade A recommendation) and as initial treatment for men with SUI after prostatectomy (Grade B recommendation) (Abrams et al., 2009).

The PFE may be performed through contractions only or contractions associated with BFB – an adjuvant to training capable of accelerating the return to continence (MacDonald, Fink, Huckabay, Monga, & Wilt, 2007). Thus, BFB devices offer patients

the ability to coordinate muscular responses through visual and/or audio signals generated by a device, providing an effective contraction (Seleme, Bertotto, & Ribeiro, 2009).

Studies aimed to verify the effectiveness of BFB and compare it with other interventions have shown inconclusive results. Thus, the aim of this review was to systematize the scientific evidence on the use of BFB in the recovery of post-prostatectomy urinary continence.

Methods

The present review was carried out based on the Methodological Guideline for the development of systematic reviews and meta-analyses of randomized controlled trials of the Ministry of Health of Brazil (Brasil, 2012). The PICO strategy was used to build the following question: "Do prostatectomy patients undergoing pelvic floor biofeedback therapy have better reduction in the degree of urine loss and shorter time to recovery of continence compared to exercises without the use of this technology?"

The literature search was carried out on May 2015 in PubMed, LILACS, MedLine, Cochrane Library, SciELO and PEDro databases using the following descriptors: prostatectomy AND urinary incontinence AND pelvic floor.

The review included randomized clinical trials published in English whose outcomes included the recovery of urinary continence after RP due to PC in individuals at any ages, without period distinction, undergoing training of the PF muscles using the biofeedback device only or combined with other interventions compared with individuals receiving no treatment, placebo treatment or other interventions. Studies that – in addition to PPI – addressed cases of erectile dysfunction or other types of incontinence and articles that could not be fully accessed were excluded.

Initially, the articles were selected for analysis of titles and/or abstracts. Then, full-text articles that potentially addressed the issue were accessed and read in its entirety.

The Cochrane risk of bias tool and the Jadad scale were used to verify the quality of the selected studies. The Cochrane risk of bias tool was used to assess the following criteria: (i) selection bias (random sequence generation/ allocation sequence concealment), (ii) performance bias (blinding of participants and personnel), (iii) bias detection (blinding of outcome assessment), (iv) attrition bias (incomplete outcome data) and (v) reporting bias (selective outcome reporting). In this assessment, each study gets a judgment on the potential risk of bias in each of the areas above and are classified into three categories: "low risk", "high risk" or "unclear risk" (Carvalho, Silva, & Grande, 2013).

The quality scale by Jadad consists of five questions with scores ranging from 0 to 5 in which trials scored less than three points are considered to be of low

methodological quality and have a low possibility of extrapolating the results to the scientific community (Jadad et al., 1996).

Given the small number of clinical trials and the wide variability of the proposed interventions, a qualitative analysis of the contents of the selected studies was carried out; however, statistical analysis using a meta-analysis could not be carried out.

Results

The literature search yielded 321 studies, but only nine were chosen for analysis, as shown by the article selection Flowchart for the systematic review.

In five of the nine studies included in the review (55.5%), the BFB training led to better results in the recovery of continence after RP compared to other groups. However, in four studies, no significant differences were observed in patients using this technology with or without other interventions and/or other treatments (Goode et al., 2011; Floratos et al., 2002; Franke et al., 2000; Ribeiro et al., 2010; Wille, Sobottka, Heidenreich, & Hofmann, 2003). Three studies (33.3%) reported a significant reduction in the time to recovery of continence in the groups using BFB (Mariotti et al., 2009; Ribeiro et al., 2010; Van Kampen et al., 2000). Seven of the selected studies (77.7%) used electromyography-BFB with surface electrodes.

Table 1 shows the descriptive data of the selected studies. There was a great variability of interventions in the groups undergoing BFB therapy: BFB only (Franke et al., 2000); BFB and PFE (Van Kampen et al., 2000); BFB and ES (Ahmed, Mohammed, & Amansour, 2012; Mariotti et al., 2009); BFB and instructions for performing PFE (Floratos et al., 2002; Ribeiro et al., 2010; Tienfort et al., 2012); BFB, ES and instructions for performing PFE (Wille et al., 2003) and BFB, ES, PFE and bladder control strategies (Goode et al., 2011).

The recovery of urinary continence was observed using the pad-test, self-reports of continence, number of incontinence pads and bladder diary. The pad-weighing test (pad-test) proposed and validated by the International Continence Society (ICS) (2002) makes it possible to quantify and classify the urinary incontinence into mild, moderate and severe, based on the weight of a pad previously weighed and reweighed after conducting provocative maneuvers such as coughing and bending. The time needed to carry out the test is also variable – commonly carried out in 20 minutes and 1, 24 or 48 hours. In this review, two authors did not perform this type of test[14,22]. The most commonly used pad-test was the 24-hour test (Ahmed et al., 2012; Mariotti et al., 2009; Ribeiro et al., 2010; Van Kampen et al., 2000).

Likewise, the number of pads used can also be considered an indicator of the improvement or recovery of continence during the treatment, which is verified when patients report they no longer need to use pads. Only two authors did not use this information in their studies (Franke et al., 2000; Goode et al., 2011). Following the same thought, self-reported continence can also be considered to assess the progress made in the treatment. Although subjective, patients are considered continent if they

no longer report leaking urine. In this review, two studies used this information (Ahmed et al., 2012; Tienfort et al., 2012).

Regarding the methodological rigor assessed by the Cochrane risk of bias tool, judgments could not be made on performance and detection biases due to the impossibility of blinding in the clinical trials assessed. As for the other criteria, most studies were classified into "low risk" or "unclear risk." With regard to the Jadad scale, two studies scored three points, five studies scored four points and two studies scored five points. Although the present review included only randomized clinical trials for the review, that is, studies with a high degree of scientific evidence, some studies have shown weaknesses in aspects such as the description of randomization and losses. The absence of such information compromises the quality of the studies.

Discussion

PF muscles exercises are the main physical therapy intervention for the treatment of UI. In theory, BFB training associated with exercises can enhance the urethral closure mechanism and consequently improve continence in addition to representing a playful mode of exercise for the patient. In the long term, BFB training combined with exercises can provide the same efficacy than exercise only. However, in patients with insufficient or lacking awareness of the pelvic floor muscles (PFM), i.e., those who cannot contract or relax properly, the BFB is an excellent tool to provide muscle awareness (Berghmans, 2014).

In general, the recovery of continence occurs for most prostatectomized individuals. However, according to the studies reviewed, the association with BFB showed high success rates ranging 62.5%-96.7% while in the other groups these rates ranged 6.2%-81%. Noteworthy, one study showed the lowest success rate (62.5%) while the others that have reported positive effects with the use of this technology found continence rates above 95% (Tienfort et al., 2012). In addition, the BFB not only speeds up the recovery of continence, but also allows the improvement of the degree of incontinence, urinary symptoms and PFM strength after 12 months postoperatively (Ribeiro et al., 2010).

Review studies on the effect of BFB training on the treatment of PPI are scarce and its effectiveness is still unclear. According to a Cochrane review conducted in 2015 involving 2,736 men undergoing conservative intervention, PFE with or without BFB did not prove to be better than the control for men with PPI, reflecting uncertainties (Anderson et al., 2015).

In this perspective, a systematic review was conducted to assess the effect of the exercises in patients with PPI (MacDonald et al., 2007). Based on the available evidence, it was found that PFE with or without BFB not only improved but also sped up the return of continence compared to men with PPI who performed no exercises.

In the present review, several factors prevented the comparison between the analyzed studies – for instance, the lack of standardization of interventions, methods

of assessment and classification of UI, and the beginning and duration of treatment. Furthermore, the combination of various interventions hinders critical analysis and prevents statistical analysis through meta-analysis.

Conclusion

Physical therapy interventions should be the first treatment option for patients with UI after prostatectomy. The BFB training appears to be an effective option to assist in the recovery of continence. However, it depends on the use of specific equipment, which may require financial investment from institutions, although they have a reasonable cost compared to the surgery to treat UI.

In order to provide a standardization that will contribute to increase scientific evidence and reliability of the BFB training, further research with good degrees of evidence should be conducted from the reproduction of those that have greater methodological rigor.

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