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Pelvic floor muscle exercises with or without electric stimulation and post-prostectomy urinary incontinence: a systematic review

Exercícios dos músculos do assoalho pélvico associados ou não à eletroestimulação e incontinência urinária em pós-prostatectomizados: uma revisão sistemática

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Abstract

Introduction: Urinary incontinence (UI) after prostatectomy is difficult to treat and causes profound adverse impacts on the individual's quality of life. The main clinical treatments available for post-prostatectomy UI consist of behavioral techniques and physical therapy techniques, such as exercises, electrical stimulation and biofeedback for pelvic floor muscles (PFMs). **Objective**: To investigate the effectiveness of PFM exercises with or without electrical stimulation for reducing post-prostatectomy UI. **Methods:** We included only randomized controlled trials (RCTs) which used PFM exercises with or without electrical stimulation. The search was conducted in August of 2013 in the databases of the U.S. National Library of Medicine (MEDLINE), Scientific Electronic Library Online (SciELO), Physiotherapy Evidence Database (PEDro) and Virtual Health Library (VHL). We searched for RCTs published between 1999 and 2013. As keywords for our search, we used the following descriptors from the Health Sciences Descriptors (DeCS): urinary incontinence, pelvic

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diaphragm, prostatectomy, pelvic floor exercises, electrostimulation and electrical stimulation. We also used the following descriptors from the Medical Subject Headings (MeSH): electrical stimulation, pelvic floor, urinary incontinence, prostatectomy, physiotherapy and exercise therapy. **Results:** Of the 59 RCTs found, 26 were excluded as duplicates, and 28 were excluded for not displaying a minimum score of 5.0 on the PEDro Scale, which left us with five RCTs. **Conclusion**: PFM exercises can be effective for treating UI after radical prostatectomy, especially if begun soon after surgery. Associating electrical stimulation with PFM exercises did not show additional benefit for treating urinary incontinence. However, the selected studies presented some methodological weaknesses that may have compromised their internal validity.

Keywords: Urinary Incontinence. Electric Stimulation. PelvicFloor. ProstateCancer.

Resumo

Introdução: *A incontinência urinária (IU) pós-prostatectomia é uma complicação de difícil tratamento e que causa um profundo impacto negativo na qualidade de vida do indivíduo. Entre os tratamentos clínicos da IU pós-prostatectomia destacam-se as técnicas comportamentais e as técnicas fisioterapêuticas, como os exercícios, a eletroestimulação e o biofeedback para os músculos do assoalho pélvico (MAPs).* ***Objetivo:*** *Verificar a eficácia dos exercícios MAPs associados ou não à eletroestimulação para a diminuição da IU em pós-prostatectomizados.* ***Métodos:*** *Foram incluídos somente experimentos controlados randomizados (ECRs) que utilizaram como tratamento os exercícios dos MAPs e/ou a eletroestimulação. Realizou-se uma busca em agosto de 2013, nas bases de dados MEDLINE, SciELO, PEDro e BVS, por ECRs publicados entre os anos de 1999 e 2013, e foram utilizadas como descritores contidos nos Descritores em Ciências da Saúde (DeCS) as palavras-título: incontinência urinária, diafragma pélvico, prostatectomia, exercícios do assoalho pélvico, eletroestimulação e estimulação elétrica. Foram utilizadas como descritores contidos no Medical Subject Headings (MeSH) as palavras-título: electrical stimulation, pelvic floor, urinary incontinence, prostatectomy, physiotherapy e exercise therapy.* ***Resultados:*** *Dos 59 ECRs recuperados, 26 foram excluídos por serem duplicados, 28 foram excluídos por não obterem o escore mínimo de 5,0 na Escala PEDro, restando 5 ECRs.* ***Conclusão:*** *Os exercícios dos MAPs podem ser eficazes no tratamento da IU após a prostatectomia radical, principalmente se iniciados cedo. A associação da eletroestimulação aos exercícios dos MAPs parece não potencializar a continência urinária. Contudo, os estudos selecionados apresentaram algumas fraquezas metodológicas que podem ter comprometido suas validades internas..*

Palavras-chave*: Incontinência Urinária. Eletroestimulação. Assoalho Pélvico. Câncer de Próstata.*

Introduction

In Brazil, prostate cancer is the second most common cancer among men (the most common being non-melanoma skin cancer). In absolute numbers, it is the sixth most common in the world and the most prevalent among men, representing about 10% of all cancers. Its incidence is approximately six times greater in developed countries when compared to developing countries. The increase in incidence rates in Brazil may be partially explained by evolution of diagnostic methods (examinations), improvement in the country's information systems, and an increase in life expectancy. The estimated number of new cases in 2014 was 68.000, and the number of deaths up to 2011 was 13.129 (1).

Radical prostatectomy is a significant surgical procedure and the most effective treatment for prostate cancer (2). However, this surgery presents several consequences, among which urinary incontinence (UI) is the most distressing (3). As radical prostatectomies have become more frequent as a means of treating prostate cancer, more men have presented with UI. In general terms, it emerges due to an intrinsic weakness of the sphincters, a possible complication which patients must be aware of. The International Continence Society defines UI as a condition in which involuntary urine loss occurs (4).

The post prostatectomy UI is a complication of difficult treatment that causes a profound negative impact on quality of life of the individual. In the treatment of benign disease, this complication occurs in

less than 1% of cases, while in radical prostatectomy, the incidence ranges from 2% to 87% (5).

There are several UI treatment options, such as pelvic floor rehabilitation, pharmacological treatments, transurethral injections and artificial urinary sphincters (6). Clinical options for treatment of UI are becoming better known due to their results in reducing UI, as well as the low incidence of side effects and cost reduction. The main clinical treatments for UI consist of behavioral techniques and physical therapy techniques, such as PFM exercises, pelvic floor electric stimulation and biofeedback (7).

Pelvic floor muscle exercises promote increased urethral resistance and urinary control. The objective is to increase awareness of the existence and function of the pelvic floor (8). Functional electric stimulation of the pelvic floor has been described as a conservative treatment available for UI after radical prostatectomy. It artificially stimulates the pudendal nerve and its ramifications to provoke direct responses and reflexes of the urethral and periurethral striated muscles (9). Electric stimulation is used to passively contract pelvic floor muscles, increasing the awareness of this muscle's contraction for patients who have difficulty sensing that contractions (10). Physical therapy techniques such as PFM exercises, pelvic floor electric stimulation and biofeedback are therapies which treat this disorder by improving the muscle and nerve components of the support mechanisms of the pelvic organs (11).

This systematic review aimed at verifying the effectiveness of PFM exercises with or without electric stimulation for reducing UI after prostatectomy.

Methods

This systematic review was written according to PRISMA Statement recommendations, duly registered in the PROSPERO, *International Prospective Register of Systematic Reviews,* number CRD42013006171, accessible at: http://www.crd.york.ac.uk/PROSPERO/

Inclusion criteria

In this systematic review, we included only randomized control trials (RCTs), published in Portuguese or English, which used PFM exercises with or without electric stimulation treatment to investigate the reduction of UI in men after prostatectomy.

Exclusion criteria

We excluded RCTs written in languages other than Portuguese and English; with treatment techniques other than PFM exercises with or without electric stimulation to investigate the reduction of UI in men after prostatectomy; which conducted pre-surgical exercises; and whose sample consisted of patients who underwent transurethral resection of the prostate before radical prostatectomy surgery.

Search strategy

The search was conducted in August of 2013 in the databases of the U.S. National Library of Medicine (MEDLINE), Scientific Electronic Library Online (SciELO), Physiotherapy Evidence Database (PEDro) and Virtual Health Library (VHL). We searched for RCTs published between 1999 and 2013. As keywords for our search, we used the following descriptors from the Health Sciences Descriptors (DeCS): urinary incontinence, pelvic diaphragm, prostatectomy, pelvic floor exercises, electrostimulation and electrical stimulation. We also used the following descriptors from the Medical Subject Headings (MeSH): electrical stimulation, pelvic floor, urinary incontinence, prostatectomy, physiotherapy and exercise therapy. These keywords were combined using AND and OR logic operators.

Selection criteria

The PEDro scale was used for selection, and only studies which obtained a minimum score of 5.0 were chosen, this being one of the most frequent scores of the RCTs with the studied methodological quality (12). Studies were evaluated by the PEDro database.

Results

Below, we present a flowchart of RCT recovery and the selection and exclusion process (Figure 1). The results of studies which used PFM exercises are shown in Table 1 and those which used PFM exercises in combination with electric stimulation for treating post-prostatectomy UI are shown in Table 2.

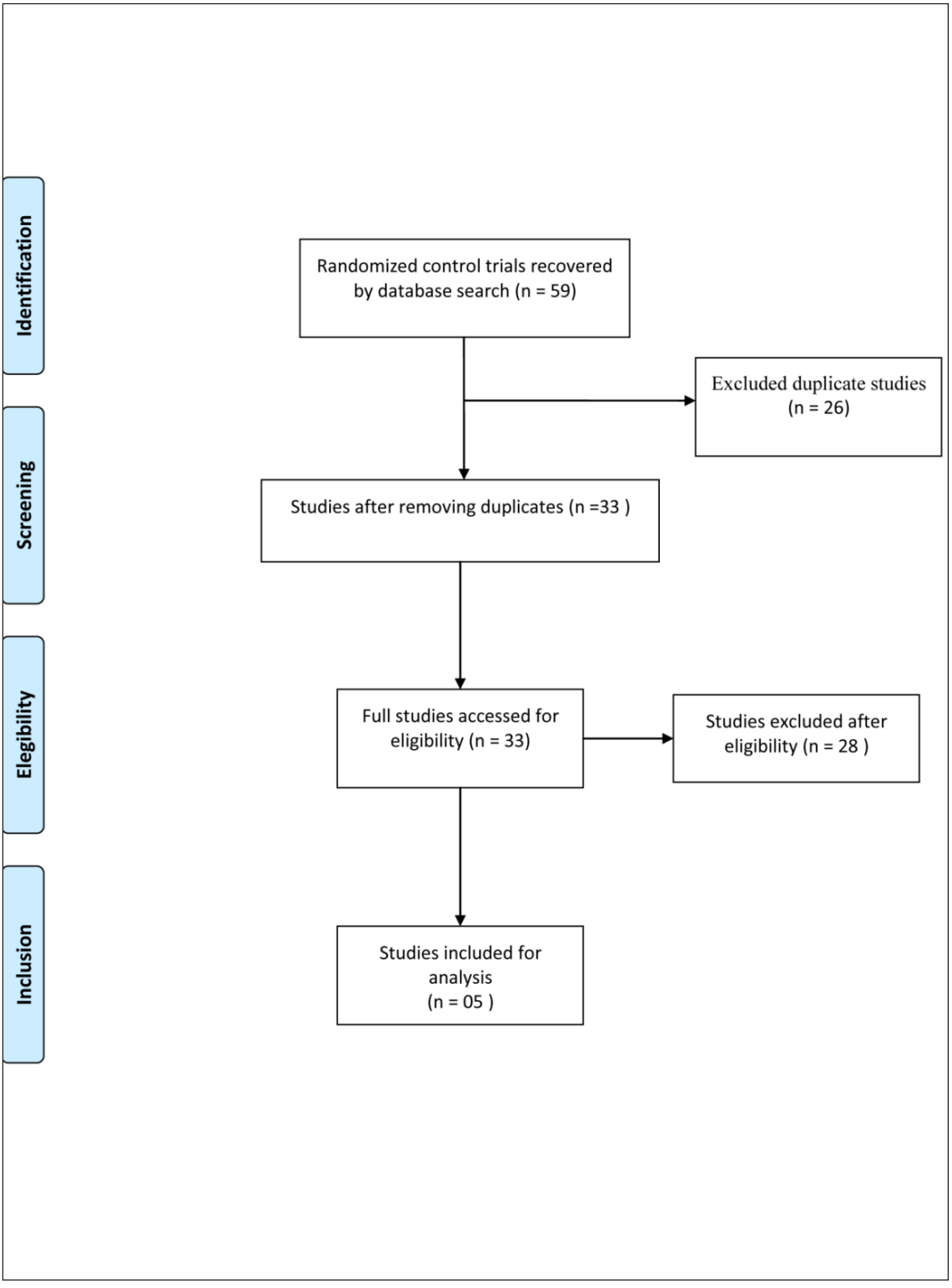

Figure 1 – Flowcharts

We excluded studies by Manassero et al. (13) because their treatment consisted in prescribed exercises to be done only at home; Glazener et al. (14) to presenting a heterogeneous sample group of post-prostatectomy patients; Glazener et al. (15) and Dorey et al. (16) for not presenting the results described in the study; Centemero et al. (17), Yamanishi et al. (18), Overgard et al. (19), Tienforti et al. (20), Delmastro et al. (21), Robinson et al. (22), Hoffmann et al. (23) and Yamanishi et al. (24) for conducting pre-surgical exercises; Bales et al. (25), Floratos et al. (3), Mariotti et al. (9), Moore et al. (26), Goode et al. (27), Chughtai and Sandhu (28), for associating biofeedback and/or other treatment techniques; Van Kampen et al. (29) because their sample contained patients who had undergone transurethral resection of the prostate before radical prostatectomy surgery; Yang et al. (30) because we could not obtain access or a reply from the author; Wille et al. (31), Yokoyama et al. (32), Tobía et al. (33), Zhang et al (34), Ribeiro et al. (35), Marchiori et al. (36), Parekh et al. (8), for scoring less than 5.0 on the PEDro scale.

Table 1 – Studies That Used Pelvic Floor Muscle Exercises (PFME) for Treating Post-Prostatectomy Urinary Incontinence
(To be continued)

Study	PEDro Score	Sample	UI Assessment*	Intervention-Protocol	Continence	Results
Filocamo et al. (2), 2005	5	n: 300 PFME group:150 Control group: 150	1h and 24h pad test Number of disposable guards used per day	PFME group: Exercises supervised by a physical therapist; used verbal explanations, palpating and visualizing the base of penis contracting with a mirror. Three sets of 10 contractions lasting 5 sec with 10 sec of muscle relaxation, in the following positions: supine, sitting, standing, squatting, climbing up and down stairs. Orientation for PFM contraction before any attempts at home. Control group: Did not receive treatment. Sessions: Not informed. Weekly frequency: Not informed Duration: 6 months.	Using one or no disposable guard per day	After 1 month Continence was attained by 29 PFME group patients (19.3%) and 12 (8%) control group patients (P = 0.006). After 3 months Continence was attained by 111 (74%) PFME group patients and 45 (30%) control group patients (P < 0.00001). After 6 months Continence was attained by 144 (96%) PFME group patients and 97 (64.6%) control group patients (P < 0.00001). Author presented neither the results of the 1h and 24h pad test, nor a comparison between groups.

Table 1 – Studies That Used Pelvic Floor Muscle Exercises (PFME) for Treating Post-Prostatectomy Urinary Incontinence (To be continued)

Study	PEDro Score	Sample	UI Assessment*	Intervention-Protocol	Continence	Results
Overgard et al. (37), 2008	5	n:80 PFME group:38 Control group: 42	24h pad test Number of disposable guards used per day	PFME group: 45 min of pelvic floor contractions once a week supervised by a physical therapist. Orientations given by physical therapist for conducting exercises at home – 3 sets of 10 contractions in any of the following positions: supine, sitting or standing, maintaining contraction for 6-8 sec, and at the end of each contraction, additional 3-4 rapid contractions. Control group: Oral and written orientations given by a nurse for daily exercises at home, 3 sets of 10 contractions each. Sessions: 48 Weekly frequency: once Duration: 12 months	Using one or no disposable guard per day	After 1 month Continence was attained by 29 PFME group patients (19.3%) and 12 (8%) control group patients (P = 0.006). After 3 months Continence was attained by 111 (74%) PFME group patients and 45 (30%) control group patients (P < 0.00001). After 6 months Continence was attained by 144 (96%) PFME group patients and 97 (64.6%) control group patients (P < 0.00001). Author presented neither the results of the 1h and 24h pad test, nor a comparison between groups.

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Table 1 – Studies That Used Pelvic Floor Muscle Exercises (PFME) for Treating Post-Prostatectomy Urinary Incontinence (Conclusion)

Study	PEDro Score	Sample	UI Assessment*	Intervention-Protocol	Continence	Results
Dubbelman et al. (38), 2010	5	n: 66 PFME group:33 Control group: 33	1h and 24h pad test	PFME group: Nine 30 min sessions supervised by a physical therapist. Home orientation for 150 pelvic floor contractions per day. Control group: Home orientation for one set of 10 contractions 1-3 minutes 15 times per hour. Total: 150 contractions in 24h Sessions: 09 Weekly frequency: not informed by author. Duration: 26 weeks	Urine loss < 1 g for 1h pad test and urine loss < 4 g for 24h pad test.	1h pad test After 26 weeks Continence was attained by 49% of PFME group patients and 39% of control group patients (P > 0.05) 24h pad test After 1 week PFME group presented an average of 207 (55 - 609)g and the control group an average of 211(55-475)g (P = 0.72) After 26 weeks PFME group presented an average of 11 (0 - 42)g and the control group average was 4 (0 - 20)g (P = 0.36)

Note: PFME – Pelvic floor muscle exercise. UI – Urinary incontinence. PEDro - Physiotherapy Evidence Database. (*)This study selected only the more objective assessments.

Table 2 – Studies Which Used Pelvic Floor Muscle Exercises (PFME) and Electric stimulation for Treating Post-Prostatectomy Urinary Incontinence (To be continued)

Study	PEDro Score	Sample	UI Assessment*	InterventionProtocol	Continence	Results
Moore K.N, Griffiths D, Hughton A (39), 1999	5	n :58 Control group: 21 PFME group: 18 PFME + electric stimulation group: 19	24h pad test	Control group: Oral and written instructions provided by nurses and urologists for pelvic floor exercises. PFME group: 30-minute sessions of 5-10 secof contraction exercises with a rest period of 10-20 sec	Urine loss ≤ 2g	24h pad test Initially Control group = 385.9 ± 256.9 PFME group = 565.6 ± 403.3 PFME + electric stimulation group = 452.5 ± 385.1 After 12 weeks Control group = 103.8 ±

Table 2 – Studies Which Used Pelvic Floor Muscle Exercises (PFME) and Electric stimulation for Treating Post-Prostatectomy Urinary Incontinence (To be continued)

Study	PEDro Score	Sample	UI Assessment*	InterventionProtocol	Continence	Results
				between, 12-20 repetitions. Resistance exercises using 65%-75% of maximum strength for contractions, 8-10 repetitions with contraction time of 20-30 sec, and the same time for rest. Rapid 5 sec contractions and 15-30 sec rest, supervised by a physical therapist. PFME + electric stimulation group: The same exercises as the PFME group, in addition to electric stimulation with electrode on anal surface: 50 Hz, intensity according to patient's comfort level, 1 s of pulse width. 30 min 2x/week. Sessions: 24 Weekly frequency: twice Duration: 12 weeks		176.3g PFME group = 86.9 ± 123g PFME + electric stimulation group = 155.5 ± 168.1g After 16 weeks Control group = 67.3 ± 137.4g PFME group = 73.5 ± 131.4g PFME + electric stimulation group = 202.2 ± 242.23g After 24 weeks Control group = 54.1 ± 103.1g PFME group = 69.9 ± 113.5g PFME + electric stimulation group = 98.2 ± 132.1g There was no significant difference among groups (F = 0.23, P = 0.80)

Table 2 – Studies Which Used Pelvic Floor Muscle Exercises (PFME) and Electric stimulation for Treating Post-Prostatectomy Urinary Incontinence

(Conclusion)

Study	PEDro Score	Sample	UI Assessment*	InterventionProtocol	Continence	Results
Kakihara CT, Sens YAS e Ferreira U (40), 2007	5	n: 20 PFME + electric stimulation group: 10 Control group: 10	1h pad test Number of disposable guards used per day	PFME + electric stimulation group: Exercises in lateral decubitus, sitting or standing position. 1st day: 2 sec of contraction and 4 sec of relaxation, 2nd day: 3 sec of contraction and 6 sec of relaxation, contraction time increased daily until reaching 10 sec maximum and 20 sec relaxation, then starting over with 1st day exercises. 90 daily contractions, 30 in the morning, 30 in the afternoon and 30 at night, at home. + electric stimulation for SUI in the first 3 months: 35 Hz frequency and after 3 months,50 Hz frequency. 1x/week. For UUI: 8 Hz and after 3 months 10 Hz. 1x/week. Control group: The same orientation for home exercises as given to the PFME + electric stimulation group Sessions: 12 Weekly frequency: once Duration: 12 months	Urine loss < 1 g for1h pad test. Amount of disposable guards used per day	1h pad test Control group initial assessment was 9.0 ± 8.1g and by the 12th month, 3.5 ± 2.4g ($P = 0.01$) PFME + electric stimulation group initial assessment was 28.0 ± 33.8g and final assessment (12th month) was 9.4 ± 12.7g ($P < 0.001$) $P = 0.47$ (intergroup) Disposable guards used Control group initial assessment was 1.7 ± 0.9 and final assessment (12th month) 0.7 ± 0.7 ($P = 0.002$). PFME + electric stimulation group initial assessment 2.5 ± 1.3 and final assessment (12th month) 1.1 ± 0.6 diapers ($P < 0.001$). $P = 0.68$ (intergroup)

Discussion

There are a reasonable number of studies in the literature with strong evidence regarding the effects of PFM exercises with or without electric stimulation on UI after radical prostatectomy. However, this number is considerably reduced upon gathering studies with homogeneous methodologies regarding patients, interventions, comparison, results and study design (PICOS) and/or selecting those of best methodological quality. Our review recovered 33 RCTs, of which only five met our selection criteria (Figure 1).

The European Association of Urology states in its guidelines on urinary incontinence that supervised PFM training is the most recommended conservative, non-invasive treatment for accelerating the recovery of continence after prostate surgery (41). This recommendation is strengthened by the studies of Filocamo et al. (2) and Overgard et al. (37), which showed great strength of evidence.

Filocamo et al. (2) conducted a randomized trial with 300 men, of whom 150 performed PFM exercises and 160 did not receive any intervention. The authors concluded that there was consistent improvement or complete cure in these patients after one and six months of physical therapy intervention for (respectively) 19% and 94.6% of the intervention group versus 8% and 65% of the control group. This study concluded that pelvic physical therapy after surgery can be considered a good, safe method for treating post-prostatectomy IU and, thus, improving quality of life for these patients (2).

Overgard et al. (37) concluded that after 12 months, urinary continence, measured by the number of disposable guards used per day, was attained by 92% of the group of patients who conducted PFM exercises and 72% of the control group (P = 0.028). The authors report that during the one-year period following surgery, regular, supervised PFM training by a physical therapist specializing in pelvic floor rehabilitation significantly reduced UI when compared to those patients who trained on their own. However, this study presented an inconsistency in its urinary continence results, when measuring the 24h pad test after 12 months: The average urine loss of the PFM exercise group was 2 (0 - 55) gand of the control group,1(0 - 14)g (P = 0.95).

Contradicting the recommendations of the European Association of Urology, Dubbelman et al. (38) concluded that a PFM exercise program is lengthy and costly and, therefore, intensive orientation by a physical therapist is not necessary. However, the authors stated that they were not able to recruit the planned sample size, and thus, the results should be viewed with caution as there is a good chance they have not found where the true difference could exist (type II error). This systematic review found that three of the analyzed studies presented very distinct protocols, some lacking in information about the technique used, thus making it difficult to evaluate the effectiveness of the intervention. Only the Overgard et al. (37) study presented a complete description of the applied intervention protocol, conducted once a week. This frequency can justify the increase in urinary continence observed after only 12 months of PFM exercises, since exercise programs for the skeletal striated muscles are more effective when conducted two or more times a week (42, 43). It is interesting to observe that two of the studies summarized in Figure 1 - Dubbelman et al. (38) and Overgard et al. (37) — used different pad test values to determine continence, and that neither study followed International Continence Society (ICS) recommendations. The Filocamo et al. (2) study used the pad test, but did not present its results or a comparison between groups. Also notable is that the pad test is of Level C recommendation and Level 3 evidence according to the ICS, which suggests that it is a deficient assessment method (44).

Electric stimulation aims at facilitating PFM contractions by promoting their passive contraction (45), thus contributing to strengthening the PFMs and increasing urinary continence. Some authors report that electric stimulation is a method which can augment the success of PFM exercises in patients with UI after radical prostatectomy (46, 47, 48). However, these results were not displayed by the studies of Moore et al (39) or the Kakihara et al. (40).

Moore et al. (39) investigated whether men who received PFM exercises in addition to electric stimulation were able to attain continence faster than those who only received PFM exercises, after 12 weeks of treatment. Fifty-eight patients were randomized into three groups: a control group, a PFM exercise group, and a PFM exercise and associated electric stimulation group. Urinary incontinence was assessed by a 24-hour pad test in the 16th and 24th weeks after the 12-week treatment. Before the intervention, the groups presented, respectively, 385.9 ± 256.9 g, 565.6 ± 403.3 g, and 452. 5 ± 385.1 g of urine loss. Twenty-four weeks after the intervention, they presented 54.1 ± 103.1g, 69.9 ± 113.5g and 98.2 ± 132.1g, respectively. The authors concluded that incontinence was reduced in all three groups, with no significant difference among them (P = 0.80).

The Kakihara et al. (40) study investigated the additional improvement of treatment by associating electric stimulation with PFM exercises. The sample comprised 20 patients, of whom10 performed only PFM exercises and the other 10 performed PFM exercises and received associated electrical stimulation. Before the intervention, the groups presented 9.0 ± 8.1 g and 28.0 ± 33.8 g of urine loss, respectively, and after intervention, 3.5 ± 2.4 g and 9.4 ± 12.7 g. The authors concluded that there was no additional improvement by associating electric stimulation with functional training of the pelvic floor (P = 0.47). Nonetheless, both groups presented a significant improvement of UI (P = 0.001).

It is important to emphasize some important methodological aspects which may have contributed to the results displayed by Moore et al. (39) and Kakihara et al. (40).These studies presented distinct protocols; however, the same parameter of 50 Hz was used for electrical stimulation. The literature suggests that when treating UI caused by muscular weakness, the most commonly used frequencies are 65 Hz or 70 Hz, which stimulate fast twitch fibers; 50 Hz is most commonly used for proprioception of PFM contractions or when preparing muscles to receive a higher frequency (49, 50, 51). Urinary continence depends not only on the integrity of the internal sphincter and the passive urethral mechanism, but also on the external urethral sphincter, which depends on the integrity of the fast twitch striated muscle fibers (40, 52, 53). In addition, the initial values of urine loss (g) in both studies are very different among groups and the standard deviation is too high, sometimes greater than the group average, which demonstrates that the samples may have been too heterogeneous, thus compromising the results of these studies.

In a similar study, different in its use of meta-analysis, Zhu YP et al. (54) concluded that associating electric stimulation with PFM exercises did not increase urinary continence more than PFM exercises in isolation. However, this clinical decision must be analyzed carefully: (a) Only four studies were meta-analyzed, a low number which reduces the statistical power for providing a definitive answer (55); (b) The studies presented weak methodological quality — three of the four studies included in the meta-analysis scored less than five on the PEDro scale; (c) The Moore et al. (39) and Wille et al. (31) studies used anal surface electrodes for stimulation, which may have contributed to the ineffectiveness of electrical stimulation, as skin resistance is too high and patients feel extreme pain before the pelvic floor muscle contraction (56) and (d) All the patients in the Yamanishi et al. (24) study performed pre-surgery PFM exercises.

Conclusion

Pelvic floor muscle exercises can be effective for treating urinary incontinence after radical prostatectomy, especially if begun soon after surgery. Associating PFM exercises with electric stimulation did not show additional benefit. However, the selected studies presented some methodological weaknesses that may have compromised their internal validity.

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References

1. Instituto Nacional de Câncer. Estimativa 2014: incidência de câncer no Brasil. Rio de Janeiro: INCA; 2014. Portuguese.
2. Filocamo TM, Marzi LV, Popolo DG, Cecconi F, Marzocco M, Tosto A, et al. Effectiveness of Early Pelvic Floor Rehabilitation Treatment for Post-Prostatectomy Incontinence. Eur Urol. 2005;48:734-8.
3. Floratos DL, Sonke GS, Rapidou CA, Alivizatos GJ, Deliveliotis C, Constantinides CA, et al. Biofeedback vs verbal feedback as learning tools for pelvic muscle exercise in the early management of urinary incontinence after radical prostatectomy. BJU Int. 2002;89(7):714-9.
4. Abrams P, Cardozo L, Fall M, Griffiths D, Rosier P, Ulmsten U, et al. The standardisation of terminology of lower urinary tract function: report from the Standardisation Sub-Committee of the International Continence Society. Neurourol Urodyn. 2002;21(2):167-78.
5. Lima CLM, Vaz FP, Müller V. Incontinência Urinária Pós-Prostatectomia: Tratamento. Projeto Diretrizes — Associação Médica Brasileira e Conselho Federal de Medicina. 2006 [cited 2013 Mar 12]. Available from: http://tinyurl.com/htxkcto.
6. Zaragoza JAQ, Pérez FC, Palanca AB, Meseguer JFB, Reboll LG, Sempere FP. Tratamiento de la incontinencia urinaria de esfuerzo post-prostatectomía radical mediante malla anclada a ramas isquiopubianas. ActasUrol Esp. 2005;29(8):764-8. Spanish.
7. Santos PFD, Oliveira E, Zanetti MRD, Arruda RM, Sartori MGF, Girão MJBC, et al. Eletroestimulação funcional do assoalho pélvico versus terapia com os cones vaginais para o tratamento de incontinência urinária de esforço. Rev Bras Ginecol Obstet. 2009;31(9):447-52.

8. Parekh AR, Feng MI, Kirages D, Bremner H, Kaswick J, Aboseif S. The role of pelvic floor exercises on post-prostatectomy incontinence. J Urol. 2003;170:130-3.

9. Mariotti G, Sciarra A, Gentilucci A, Salciccia S, Alfarone A, Di Pierro G, et al. Early recovery of urinary continence after radical prostatectomy using early pelvic floor electric stimulation and biofeedback associated treatment. J Urol. 2009;181(4):1788-93.

10. Moreira ECH, Yasuda EK, Kimura FR. Tratamento Cirúrgico e Conservador da Incontinência Urinária de Esforço. Fisioter Mov. 2001;13(2):9-13.

11. Haslam J. Vaginal cones in stress incontinence treatment. Nurs Times. 2008;104(5):44-5.

12. Moseley AM, Herbert RD, Sherrington C, Maher CG. Evidence for physiotherapy practice: A survey of the Physiotherapy Evidence Database (PEDro). Aust J Physiother. 2002;48(1):43-9.

13. Manassero F, Traversi C, Ales V, Pistolesi D, Panicucci E, Valent F, et al. Contribution of early intensive prolonged pelvic floor exercises on urinary continence recovery after bladder neck-sparing radical prostatectomy: Results of a prospective controlled randomized trial. Neurourol Urodyn. 2007;26(7):985-9.

14. Glazener C, Boachie C, Buckley B, Cochran C, Dorey G, Grant A, et al. Urinary incontinence in men after formal one-to-one pelvic-floor muscle following radical prostatectomy or transurethral resection of the prostate (MAPS): two parallel randomized controlled trials. Lancet. 2011;378(9788):328-37.

15. Glazener C, Boachie C, Buckley B, Cochran C, Dorey G, Grant A, et al. Conservative treatment for urinary incontinence in Men After Prostate Surgery (MAPS): two parallel randomized controlled trials. Health Technol Assess. 2011;15(24):1-290.

16. Dorey G, Glazener C, Buckley B, Cochran C, Moore K. Developing a pelvic floor muscle regimen for use in a trial intervention. Physiotherapy. 2009;95(3):199-209.

17. Centemero A, Rigatti L, Giraudo D, Lazzeri M, Lughezzani G, Zugna D, et al. Preoperative pelvic floor muscle exercise for early continence after radical prostatectomy: A randomized controlled study. Eur Urol. 2010;57(6):1039-44.

18. Yamanishi T, Mizuno T , Watanabe M , Honda M, Yoshida K. Randomized, placebo controlled study of electrical stimulation with pelvic floor muscle for severe urinary incontinence after radical prostatectomy. J Urol. 2010;184(5):2007-12.

19. Mørkved S, Overgård M, Lydersen S, Angelsen A. Does pelvic floor muscle with follow up instructions by a physiotherapist reduce urinary incontinence after radical prostatectomy? A randomised controlled trial (Abstract number 15). Neurourol Urodyn. 2008;27(7):587-8.

20. Tienforti D, Sacco E, Marangi F, D'Addessi A, Racioppi M, Gulino G, et al. Efficacy of an assisted low-intensity programme of perioperative pelvic floor muscle in improving the recovery of continence after radical prostatectomy: a randomized controlled trial. BJU Int. 2012;110(7):1004-10.

21. Delmastro F, Marchisio C, Lamberti G, Giraudo D. Urinary incontinence after radical prostatectomy: a randomized controlled trial comparing preoperative intensive pelvic muscle exercises with or without proprioceptive (Abstract). Neurourol Urodyn. 2010;29(2 Suppl):62-3.

22. Robinson JP, Bradway CW, Nuamah I, Pickett M, McCorkle R. Systematic pelvic floor for lower urinary tract symptoms post-prostatectomy: a randomized clinical trial. IJUN. 2008;2(1):3-13.

23. Hoffmann W, Liedke S, Dombo O, Otto U. Electrostimulation in therapy of postoperative urinary incontinence. Therapeutic value for quality of life. Urologe A. 2005;44(1):33-40.

24. Yamanishi K, Mizuno T, Sakakibara R, Uchiyama T, Ito Y, Yamamoto T, et al. A randomized, placebo-controlled, double-blind study of electrial stimulation with pelvic floor muscle for the treatment of urinary incontinence after radical prostatectomy (Abstract number 30). Neurourol Urodyn. 2006;25(6):545-6.

25. Bales GT, Gerber GS, Minor TX, Mhoon DA, McFarland JM, Kim HL, et al. Effect of preoperative biofeedback/pelvic floor on continence in men undergoing radical prostatectomy. Urology. 2000;56(4):627-30.

26. Moore KN, Valiquette L, Chetner MP, Byrniak S, Herbison GP. Return to continence after radical retropubic prostatectomy: A randomized trial of verbal and written instructions versus therapist-directed pelvic floor muscle therapy. Urology. 2008;72(6):1280-6.

27. Goode PS, Burgio KL, Johnson TM 2nd, Clay OJ, Roth DL, Markland AD, et al.Behavioral therapy with or without biofeedback and pelvic floor electrical stimulation for persistent postprostatectomy incontinence: a randomized controlled trial. JAMA. 2011;305(2):151-9.

28. Chughtai B, Sandhu JS. Incontinence: Conservative treatment of postprostatectomy incontinence. Nat Rev Urol. 2011;8(5):237-8.

29. van Kampen M, De Weerdt W, van Poppel H, De Ridder D, Feys H, Baert L. Effect of pelvic-floor re-education on duration and degree of incontinence after radical prostatectomy: a randomised controlled trial. Lancet. 2000;355(9198):98-102.

30. Yang BS, Ye DW, Yao XD, Peng JY, Zhang SL, Dai B, et al. The study of electrical acupuncture stimulation therapy combined with pelvic floor muscle therapy for postprostatectomy incontinence. Zhonghua Wai Ke Za Zhi. 2010;48(17):1325-7.

31. Wille S, Sobottka A, Heidenreich A, Hofmann R. Pelvic floor exercises, electrical stimulation and biofeedback after radical prostatectomy: Results of a prospective randomized trial. J Urol. 2003;170(2 Pt 1):490-3.

32. Yokoyama T, Nishiguchi J, Watanabe T, Nose H, Nozaki K, Fujita O, et al. Comparative study of effects of extracorporeal magnetic innervation versus electrical stimulation for urinary incontinence after radical prostatectomy. Urology. 2004;63(2):264-7.

33. Tobía I, González MS, Martínez P, Tejerizo JC, Gueglio G, Damia O, et al. Estudio randomizado sobre continencia urinária postprostatectomía radical conrehabilitación perineal kiesica previa. Arch Esp Urol. 2008;61(7):793-8. Spanish.

34. Zhang AY, Strauss GJ, Siminoff LA. Effects of combined pelvic floor muscle exercise and a support group on urinary incontinence and quality of life postprostatectomy patients. Oncol Nurs Forum. 2007;34(1):47-53.

35. Ribeiro LHS, Prota C, Gomes CM, Bessa Jr J, Boldarine MP, Dall'Oglio MF, et al. Long-term effect of early postoperative pelvic floor biofeedback on continence in men undergoing radical prostatectomy: a prospective, randomized, controlled trial. J Urol. 2010;184(3):1034-9.

36. Marchiori D, Bertaccini A, Manferrari F, Ferri C, Martorana G. Pelvic floor rehabilitation for continence recovery after radical prostatectomy: role of a personal re-educational program. Anticancer Res. 2010;30(2):553-6.

37. Overgard M, Angelsen A, Lydersen S, Morkved S. Does physiotherapist-guided pelvic floor muscle reduce urinary incontinence after radical prostatectomy? A randomized controlled trial. Eur Urol. 2008;54:438-48.

38. Dubbelman Y, Groen J, Wildhagen M, Rikken B, Bosch R. The recovery of urinary continence after radical retropubic prostatectomy: a randomized trial comparing the effect of physiotherapist-guided pelvic floor muscle exercises with guidance by an instruction folder only. BJU Int. 2010;106(4):515-22.

39. Moore KN, Griffiths D, Hughton A. Urinary incontinence after radical prostatectomy: a randomized controlled trial comparing pelvic muscle exercises with or without electrical stimulation. BJU Int. 1999;83(1):57-65.

40. Kakihara CT, Sens YAS, Ferreira U. Efeito do treinamento funcional do assoalho pélvico associado ou não à eletroestimulação na incontinência urinária após prostatectomia radical. Rev Bras Fisioter. 2007;11(6):481-6.

41. Lucas MG, Bosh JLHR, Madden TB, Nambiar A, Neisius A, Pickard RS, et al. Guidelines on urinary incontinence. Arnhem (The Netherlands): European Association of Urology; 2012. p. 40-1.

42. Silva NL, Farinatti PTV. Influência de variáveis do treinamento contra-resistência sobre a força muscular de idosos: uma revisão sistemática com ênfase nas relações dose-resposta. Rev Bras Med Esporte. 2007;13(1):63.

43. American College of Sports Medicine. Position stand: progression models in resistance for healthy adults. Med Sci Sports Exerc. 2002;34:364-80.

44. Abrams P, Cardoso L, Khoury S, Wein A. Incontinence. 4th ed. Paris: Health Publication; 2009. 623 p.

45. Fall M, Madersbacher H. Peripheral electrical stimulation. In: Mundy AR, Wein AJ. Urodynamics principles, practice and application. London: Churchill Livinstone; 1994. p. 495-520.

46. Salinas CJ, Virseda CM, Salomon MS, Bravo de Rueda C, Aristizabal JM, Resel EL. Results of electrical stimulation in the treatment of post-prostatectomy urinary incontinence. Actas Urol Esp. 1996;20(6):544-50.

47. Hirakawa S, Hassouna M, Deleon R, Elhilali M. The role of combined pelvic floor stimulation and biofeedback in post-prostatectomy urinary incontinence. J Urol. 1993;149:235(Abs 87).

48. Sotiropoulos A, Yeaw S, Lattimer JK. Management of urinary incontinence with eletronic stimulation: observations and results. J Urol. 1976;116(6):747-50.

49. Moreno LA. Fisioterapia em Uroginecologia. São Paulo: Manole; 2009. p. 127-8. Portuguese.

50. Virtuoso JF, Tonon SC, Krugerl AN, Mazo GZ, Birolo NPB, Berreta R. Resultados e adesão do tratamento fisioterapêutico em mulheres incontinentes atendidas na rede pública de saúde. ACM Arq Catarin Med. 2010;39(2):63.

51. Enoka RM, Fuglevang AJ. Motor unit physiology: some unresolved issues. Muscle Nerve. 2001;24(1):4-17.

52. Matheus WE, Ferreira U. Incontinência urinária no homem adulto. In: D'Ancona CAL. Princípios básicos de urodinâmica. São Paulo: Atheneu; 1995. p. 65-72. Portuguese.

53. Palma PCR. Incontinência urinária pós-prostatectomia. In: D'Ancona CAL, Netto Jr NR. Aplicações clínicas da urodinâmica. Campinas (Brazil): Cartgraf; 1995. p. 273-80. Portuguese.

54. Zhu YP, Yao XD, Zhang SL, Daí B, Ye DW. Pelvic floor stimulation for postprostatectomy urinary incontinence: A meta-analysis. Urology. 2012;79(3):552-5.

55. Rodrigues CL, Ziegelmann PK. Meta-analysis: a practical guide. Rev HCPA. 2010;30(4):436-47.

56. Robinson AJ, Snyder-Mackler L. Eletrofisiologia clínica. 3rd ed. Porto Alegre (Brazil): Artmed; 2010. p. 309-27.

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