

Original Article

Peri-operative physiotherapy improves outcomes for women undergoing incontinence and or prolapse surgery: Results of a randomised controlled trial

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Abstract

Background: Urinary incontinence and pelvic organ prolapse are common complaints in women. Physiotherapy and surgery to correct these conditions are often seen as mutually exclusive. No study has yet investigated their synergistic potential.

Aim: This study aimed to investigate the role of peri-operative physiotherapy in women undergoing corrective surgery for pelvic organ prolapse and/or incontinence.

Methods: In this randomised controlled trial, 30 women underwent preoperative physiotherapy and 30 others had no physiotherapy prior to their incontinence and or prolapse surgeries. Comparison was performed on the basis of the following tests: paper towel test, urinary symptom specific health and quality of life questionnaire, frequency/volume chart and pelvic floor muscle manometry. Women were followed up for 3 months.

Results: Both groups showed improvement in urinary continence. Significant group differences were noted in the quality of life questionnaire ($P = 0.004$), urinary symptoms ($P = 0.017$) and maximum pelvic floor muscle squeeze on manometry ($P = 0.022$). Diurnal frequency analysis indicates that there is a significant difference in favour of the treatment group ($P = 0.024$).

Conclusion: Routine pre and post operative physiotherapy interventions improve physical outcomes and quality of life in women undergoing corrective surgery for urinary incontinence and or pelvic organ prolapse.

Key words: gynaecological surgery, pelvic floor muscle exercises, pelvic organ prolapse, physiotherapy, urinary incontinence.

Introduction

Urinary incontinence and pelvic organ prolapse in women are common problems. 8.5% of women aged 15–64 experience urinary incontinence.¹ Estimates of pelvic organ prolapse range from 2 to 48% and the two problems commonly coexist.² Treatment options for women with these conditions include both surgical and non-surgical interventions such as pelvic floor muscle (PFM) exercises, bladder retraining, pharmacological agents and ring pessary.

It has been reported that women have an 11.1% lifetime risk of having surgery for prolapse or incontinence by the age of 80, with nearly 30% of these women needing repeat surgery for the recurrence of symptoms.³ Factors contributing to repeat surgery may include older age, postmenopausal status, parity and high body mass index.

Of note, one quarter of women reported deterioration in mental health following surgery for stress incontinence.⁴

Strategies to improve outcomes for women undergoing surgery for incontinence and/or pelvic organ prolapse would benefit both patients and health care providers, since there is likely to be reduced costs and burden of illness.

This study aims to examine the role of peri-operative physiotherapy on physical outcomes and quality of life factors for women having surgery for one or both of these conditions.

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Materials and methods

This study was conducted by the department of Endo-Gynaecology of the Royal Hospital for Women, Sydney, Australia. The local ethics committee approved the study and all participating women gave informed consent following interview and review of written patient information. Women attending the preoperative admission clinic 2–4 weeks prior to their surgery were approached. At this clinic, women are routinely assessed for anaesthetic suitability and are reviewed by medical, nursing and physiotherapy staff. No pelvic floor specific intervention is normally undertaken at this time. Twenty-six gynaecologists perform surgical correction of urinary incontinence and pelvic organ prolapse at the Royal Hospital for Women. Two of the consultants did not allow their patients to be approached for participation and one consultant prescribed peri-operative physiotherapy routinely as part of the management of his patients.

Criteria for inclusion in the study required women to be scheduled for surgery for pelvic organ prolapse and/or urinary incontinence, and to be able to follow verbal and written instructions in English. Attendance for follow-up at 6 and 12 weeks after their surgery was also required. Women were excluded if they suffered from neuromuscular disorders or other significant medical problems, or had pelvic floor muscle intervention as a routine part of their presurgical assessment. Women undergoing tension-free vaginal tape as the sole intervention were also excluded as they did not stay in hospital long enough to receive the postoperative intervention in this study.

Participants were then randomised to either the treatment or control group in balanced blocks of 20 via computer-generated numbers. The group allocation was stored separate to the clinic and concealed in an opaque envelope. Following recruitment, the envelope was opened by the physiotherapist who performed the preoperative intervention.

All women had a paper towel test performed for assessment of urinary stress incontinence at baseline and 12 weeks postoperatively. The paper towel test is a simple and rapid method of quantifying urine loss. Women are asked to drink a set volume of water and then at a defined interval they are asked to produce three single deep coughs onto two paper towels folded into four layers placed inside their panties.⁵ This test is easily applied in the busy preadmission clinic setting. Each patient completed a standardised urinary symptom specific health and quality of life questionnaire⁶ and a 48-h urinary frequency/volume diary^{7,8} prior to admission for surgery and again 12 weeks postoperatively. The questionnaire is separated into two parts for analysis: urinary symptoms and quality of life. Urinary symptoms assessed include frequency, nocturia, urgency, urge, stress incontinence, coital incontinence, nocturnal enuresis, frequent urinary tract infections, bladder pain and difficulty passing urine. A maximum score of 33 indicates high negative impact. Quality of life assessment includes: role, physical and social limitations, impact on personal relationships, emotions, sleep and energy, coping strategies and embarrassment. A maximum score of 900 indicates high negative impact.

Examination of the pelvic floor muscles was performed, in all participants, via vaginal palpation using a modified Oxford

scale to assess muscle strength.⁹ Manometry^{10,11} of the pelvic floor muscles using a Peritron (Cardiodesign, Melbourne, Australia) device was performed to determine range of contraction pressures from minimum to maximum and recorded in cm H₂O and hold recorded in seconds. All women were examined in supine lying with hips flexed to 45° and knees flexed to 90°.

Women in the treatment group received an individualised pelvic floor muscle exercise program based on their assessment findings and were instructed to perform four sets of exercises per day. Special attention was paid to instruction and demonstration of 'the Knack',¹² which requires functional bracing of the pelvic floor muscles before expected increases in intra-abdominal pressure such as with coughing. As the term suggests, 'the Knack' consists of a rapid maximal contraction of the pelvic floor muscles. In addition to the pelvic floor muscle exercises, participants in the treatment group were taught voiding and defaecation techniques, which reduce the need for straining, and healthy bladder and bowel habits. Written material for reinforcement was given. Women in the control group received standard care without this specific intervention. Surgery was then carried out as listed by the surgeon.

To reinforce and assist women in the treatment group with their pelvic floor muscle exercise program, the interventional physiotherapist reviewed them on the second postoperative day. Visual examination of the perineum was performed to ensure that a correct technique of pelvic floor muscle contraction was maintained and discussion of correct and appropriate bowel and bladder care reiterated. Irrespective of the study group the consultant gynaecologist undertook routine postoperative management.

Only women in the treatment group were seen by the interventional physiotherapist at a 6-week postoperative visit. At this time, repetition of the physical assessment of the pelvic floor muscles and reinforcement of the exercise program, bowel and bladder care program were undertaken.

Women in both the treatment and control groups returned to complete the study 3 months following their index surgery. At this assessment, a physiotherapist blinded to patient allocation repeated the pelvic floor muscle assessments described earlier, completed the paper towel test to quantify urine loss, collected the patients' 48-h urinary frequency/volume diary completed in the week prior to their appointment and had the patient fill in the urinary symptom specific health and quality of life questionnaire.

Sample size was determined by assuming that a clinically significant difference of 30% in quality of life studies between the groups would be reasonable. Based on this assumption, a sample size of 60 was required with 30 in each group. Data were analysed using parametric tests: *t*-test for testing intragroup differences and paired *t*-test for intergroup differences. Non-parametric equivalents (Wilcoxon Rank Sum test and Wilcoxon Signed Rank test) were also used as there were difficulties checking normality assumption due to small sample sizes. Data were analysed via intention to treat.

For testing intragroup differences:

$$H_0: \mu_{pre} - \mu_{post} = 0$$

$$H_1: \mu_{pre} - \mu_{post} \neq 0$$

For testing intergroup differences:

$$H_0: (\mu_{Tpre} - \mu_{Tpost}) - (\mu_{Cpre} - \mu_{Cpost}) = 0$$

$$H_1: (\mu_{Tpre} - \mu_{Tpost}) - (\mu_{Cpre} - \mu_{Cpost}) \neq 0$$

Where μ = mean, pre = pre-operation, post = post-operation, T = treatment group, C = control group.

Unless otherwise stated, the reported *P*-values are those obtained performing a parametric test.

Results

Between April 2000 and December 2003 all eligible women scheduled to undergo surgical treatment for pelvic organ prolapse and/or urinary incontinence were invited to participate in the study. Twenty-five women declined participation in the study, one was not eligible to participate due to a concurrent neuromuscular condition, and five others had a poor comprehension of written or spoken English. Sixty women were recruited to the study, 30 randomised to each group. Demographics and type of surgery for the two groups are similar (Table 1). There are no differences in the type of surgery undertaken between the groups (Fig. 1). After randomisation and intervention three women in the treatment group and one woman in the control group had surgery cancelled for cardio-respiratory reasons.

Although there were a number of missed appointments and women lost to follow-up, analysis of the available data is

Table 1 Patient demographics

	Treatment			Control		
	Mean	Range	SD	Mean	Range	SD
Age	62.6	40-76	10.5	62.8	47-78	11.1
Parity	2.5	0-5	1.1	2.6	1-7	1.2
BMI	27	20-40	4.2	27.4	21-32	2.8
Patients with previous operations	12		1.1	12		0.6
Average previous operations per patient	0.9	1.0-4		0.6	1.0-2	

BMI, body mass index.

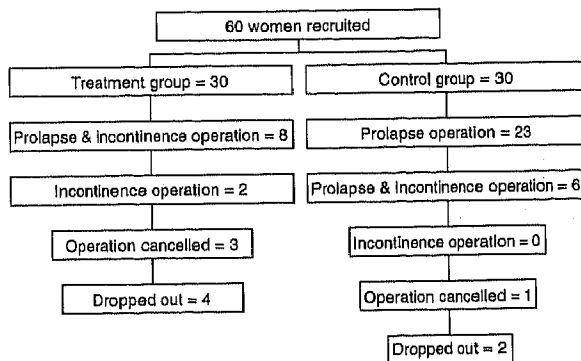


Figure 1 Patient distribution within the treatment and control groups.

possible. The treatment group shows a reduction in stress leakage at paper towel test of 62 cm², *P* = 0.001 (95% CI 28.97 cm²) and the control group of 32 cm², *P* = 0.020 (95% CI 6.58 cm²). There is no significant difference between the groups *P* = 0.150 (95% CI -11.4, 72.3).

However there are significant differences in the analysis of the questionnaire. Intra group analysis from week 0 to week 12 shows that both treatment and control groups experience significant improvement in urinary symptoms, based on their health questionnaire. The treatment group reports a mean reduction of 6.3, *P* < 0.0001 (95% CI 4.0, 8.5) whereas the control group reports a mean reduction of 2.4, *P* = 0.030 (95% CI 0.3, 4.7). There is an inter group mean difference of 3.8, *P* = 0.017 (95% CI 0.7, 6.9). Quality of life scores demonstrate significant improvement in the treatment group of 214, *P* < 0.0001 (95% CI 124 305), the control group does not reach statistical significance with improvement of 47, *P* = 0.197 (95% CI -26 121).

Analysis of the 48-h urinary frequency/volume diary shows that there is improvement overall in both groups, although statistical significance is not attained in the control group. However, non-parametric testing shows that the mean difference in diurnal frequency between the treatment and control groups is statistically significant in favour of the treatment group, *P* = 0.024 (treatment group mean reduction 1.5, control group mean reduction 0.4).

The treatment group also displayed significantly different mean maximum squeeze in comparison to the control group *P* = 0.022 (95% CI -9.92, -0.81). Improvement in mean maximum squeeze of 2.7 cm H₂O is registered in the treatment group, whilst the control group shows a reduction in mean maximum squeeze of 1.8 cm H₂O.

Discussion

In 1948, Dr Arnold Kegel, famous for pioneering pelvic floor muscle or 'Kegel' exercises, stated: 'Surgical procedures for the correction of vaginal, urethral, and rectal incompetence may be facilitated by preoperative and postoperative exercise which improves the texture, tone, and function of perineal muscles'.¹⁰ This study appears to corroborate Dr Kegel's statement and is the first study to examine the combination of pre and postoperative physiotherapy and gynaecological surgery in detail.

Physiotherapy as a rehabilitation treatment in other areas such as orthopaedic surgery is usually commenced pre-operatively and re-started as soon as possible after surgery to avoid loss of function.¹³⁻¹⁵ For gynaecological surgery, studies report that deterioration of the pubo-coccygeus muscle could contribute to the development of stress incontinence after prolapse surgery in previously continent patients¹⁶ which can be prevented by physiotherapy. Despite this, there is no consensus within the uro-gynaecological community regarding the role of physiotherapy in patients scheduled for surgical correction of prolapse and/or incontinence.

Specific improvements are seen in both quality of life measures and in urinary symptom questionnaires with significant

improvements in the intervention group in this study. Since the presenting problems of prolapse and urinary incontinence negatively affect quality of life,^{1,3,6} these findings are particularly important. Women who receive such preoperative treatment appear to have a better understanding of their pelvic floor function, and its role in maintaining good urinary habit, demonstrated by significantly greater muscle power and improved bladder capacity. Although not directly measured in this study, it is also postulated that the longevity of the procedure could be improved due to greater support of pelvic organs by the pelvic floor muscles during the crucial period of postoperative healing. Such findings reinforce previous work that reports the importance of levator ani muscle morphology on the outcome of patients having anteroposterior vaginal repair surgery.¹⁷

A major problem after prolapse and incontinence surgery is the development of de novo symptoms of stress incontinence, urgency, frequency and urge incontinence.¹⁸⁻²⁰ Pelvic floor muscle exercises and functional bracing are effective for stress and urge incontinence^{8,10,21} and are reported by incontinent patients as being beneficial in managing their symptoms.²² Additionally, constipation and straining can contribute to the recurrence of symptoms in women undergoing continence procedures.²³

By teaching methods to minimise perineal descent by counter bracing of the pelvic floor muscles (the 'Knack') prior to increases in intra-abdominal pressure and techniques for defaecation and voiding before surgery, with reinforcement of these techniques in the postoperative phase we have demonstrated significant improvements in a heterogeneous group of women undergoing gynaecological surgery. We recognise that this is a relatively small study with short follow-up, although the rigorous methodology supports the use of routine pre and postoperative physiotherapy to achieve optimal results for women undergoing such gynaecological surgical procedures. It provides evidence that peri-operative physiotherapy improves physical outcomes and quality of life in women undergoing corrective surgery for urinary incontinence and or pelvic organ prolapse.

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