

Does Surgery Benefit Postmenopausal Overweight Women with Pelvic Floor Dysfunction?

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Abstract

Introduction: Pelvic floor muscle function of 30 overweight postmenopausal women prior to and after colporrhaphy was monitored in this study. **Material and Methods:** Patients diagnosed with cystocele or combined cysto-rectocele was involved. 1 mg oral estriol and local estriol cream were administered for 30 days preoperatively. Pelvic floor muscle function was monitored by surface electromyography 1 month before (1st) 1 day prior to surgery (2nd), and six weeks after the surgery (3rd measurement). Body composition parameters (intra- and extracellular water and body fat) were also measured. **Results:** The ability to relax significantly improved ($p = 0.03$) in the preoperative period (between 1st and 2nd occasions). Six weeks after surgery a non-significant ($p = 0.054$) decrease in average muscle activity was detected when compared with values obtained before the surgery. Muscle-activity declined significantly from the first to the last measurements ($p = 0.005$). **Conclusion:** Our results confirm that postmenopausal obese women who undergo anterior or posterior colporrhaphy need a follow-up concerning pelvic floor muscle function and suggest that physiotherapy started the earliest possible may aid in preserving postoperative functionality on the long run.

Keywords

Pelvic Floor Muscle Function, Operative Period, Body Composition, Postmenopause, Obesity

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1. Introduction

Proper support of pelvic organs is maintained by the intact and coordinated functioning of pelvic floor muscles, their innervations and the connective tissue elements [1]. Increased weight (e.g. in obesity or due to internal organ enlargements) or abnormal power impulses (increased intraabdominal pressure) might overload and injure connective tissues as well as pelvic floor muscles (PFM) that leads to pelvic floor dysfunction, and eventually to pelvic organ prolapse [2]-[5].

Interventions mainly aim to reconstitute connective tissue [6] [7]. Isolated insufficiency of single pelvic tissues, however, is rare. This may explain why surgical management of pelvic organ prolapse proves unsuccessful in about one third of the cases [8].

In 2005 Vakili *et al.* established that the more preoperative muscle strength the women had, the higher chance they had to avoid relapse or reoperation [9]. To our knowledge, no study has reported yet the outcome of surgery against pelvic organ prolapse in relation to the pelvic floor muscle function of the preoperative period. In our follow-up study, we have aimed to correlate the preoperative pelvic floor muscle function with the surgical outcome in high risk and overweight patients.

2. Materials and Methods

Volunteers were recruited from patients with pelvic floor dysfunction who attended the Department of Obstetrics and Gynaecology and the Institute of Physiotherapy and Nutritional Sciences of the University of Pécs, starting in 2010 for two consecutive years. The research protocol was approved by the Regional Research Ethics Committee of the University of Pécs (Reg. Nr: 2490). The volunteers signed an informed consent on anonymous statistical analysis of their health-related and anthropometric data. Inclusion criteria were established cystocele or combined cysto-rectocele diagnosis of the patients. The study involved 30 postmenopausal, Caucasian women who underwent anterior colporrhaphy or colpoperineorrhaphy. Exclusion criteria were as follows: use of complementary medicines or special diet (e.g. slimming course or preference of phytoestrogen rich foods), pelvic floor muscle exercises, lack of cooperation, existence of psychiatric disorders, sleep disorders, clinically relevant laboratory abnormalities (e.g. liver and kidney function), acute or chronic systemic diseases (fever, confirmed infection, autoimmune diseases, neoplasm, etc.), severe neurological disease in medical history (damage to the N. pudendus, spina bifida, multiple sclerosis, progressive muscle dystrophy etc.).

At the first session a thorough medical history was taken about the volunteers' general medical condition, previous operations and interventions, gynaecological complaints and regular medications. To assess symptoms affecting the volunteers' quality of life we used the Menopause Rating Scale (MRS) [10]. Participants' abdominal muscle condition was assessed with the help of Eurofit test. The Body Mass Index (BMI) and the waist-hip ratio have been calculated as well.

During the perioperative period body composition was monitored with HUMAN IM-SCAN Bioelectrical Impedance Analyser from Dietosystem, Milan, Italy with the software Master 1.0. Measurements were performed one month and one day prior to surgery, then on the 1st and 42nd postoperative days (6th postoperative week). The following parameters were computed: Total Body Water (TBW), Extracellular Water (EW) and Intracellular water (IW), Fat Mass (FM) as well as Fat Free Mass (FFM).

Pelvic floor muscle activity was assessed with FemiScan surface EMG (Mega Electronics Ltd, Kuopio, Finland). The following parameters were measured: muscle activity, relaxing ability and activity differences between the left- and right sides. Measurements were performed 1 month and 1 day prior to surgery, and on the 6th postoperative week. Preoperative management involved daily 1 mg oral estriol (Ovestin tablet) and local hormone therapy (Ovestin cream, 1 mg/g estriol). No other special care was provided during the pre- or postoperative periods, neither any specific pelvic floor muscle exercises were performed prior to or during the study.

The statistical data were processed according to mean, standard deviation, median, range. Data obtained before and after the surgery were compared by Fisher's exact test or Student's t-test, and the results were considered to be significant at $p < 0.05$.

3. Results

Demographic data of participant postmenopausal (59.47 ± 8.58 years) women (BMI 30.3 ± 3.86 kg/m²; median: 29.6 kg/m²), the waist circumference mean and waist-hip ratio are listed in **Table 1**. Average pregnancy rate was 3.5 (± 1.59), number of births was 2.43 (± 1.41) and birth weights were 3295.16 ± 352.58 g (range 2600 - 4100 g).

In previous medical history of the participants the following surgical events have been recorded: colpoperineorrhaphy in 6 cases, adnexectomy in 5 cases, myoma removal in 2 cases and two vaginal hysterectomies one without- and the other one with bilateral oophorectomy. Of non-gynecological surgeries (e.g. appendectomy, herniotomy, mastectomy and cholecystectomy etc.) 8 were performed. Concomitant diseases are listed in **Table 1**.

Initial urogenital dimension of the Menopause Rating Scale decreased by 0.36 points at the end of examination. Detailed MRS results are listed in **Table 1**. According to Eurofit tests the patients achieved 58% less than expectable abdominal strength.

Most of the participants (except 2 of them; 93.33%) were regularly involved in some kind of physical work (e.g. moving goods or gardening) due to their jobs and/or their hobbies.

No significant difference was observed in body composition (**Table 2**) between the first and second sessions in the preoperative period. There was no difference in the average fluid intake (1.73 ± 0.39 l/day), and eating habits between pre- and postoperative periods. Concerning bioelectrical impedance data of the second and third sessions (*i.e.* immediate pre- and postoperative days) a significant difference was found in each computed parameters, except the intracellular fluid ($p = 0.15$). Fluid replacement during surgery and the postoperative period followed the regular management of 1st degree postoperative care. No significant changes were found between bioelectrical impedance data obtained on the 1st postoperative day and 6 weeks after the surgery (**Table 3**).

Table 1. Descriptive characteristic of patients.

Characteristics	Age (years)	BMI [°] (kg/m ²)	Waist (cm)	Hip (cm)	Waist-hip ratio	Concomitant disease					MRS ^{°°} (1st measurement)**	MRS ^{°°} (2nd measurement)**
						Total*	Cardiovascular*	Respiratory*	Diabetes*	Musculoskeletal*		
Mean	59.47	30.3	98.56	111.3	0.89	4.13	21	4	4	3	12.91	12.55
SD	8.58	3.86	8.34	8.79	0.05	3.79	-	-	-	-	8.5	8.2

*counts; **scores; °Body Mass Index (BMI); °°Menopause Rating Scale (MRS).

Table 2. Data of total body fat and pelvic floor muscle (PFM) strength.

Characteristics	1st measurement		2nd measurement		3rd measurement		4th measurement					
	Mean ± SE	95% CI		Mean ± SE	95% CI		Mean ± SE	95% CI				
		Lower bound	Upper bound		Lower bound	Upper bound		Lower bound	Upper bound			
Total body fat (%)	30.13 ± 3.1	25.03	35.23	27.92 ± 3.16	22.76	33.08	28.3 ± 3.23	23.05	33.56	28.33 ± 3.25	21.96	34.71
PFM* strength (µV)	7.13 ± 0.97	5.23	9.04	6.98 ± 1.206	4.62	9.35	-	-	-	5.55 ± 0.76	3.83	7.27

*Pelvic Floor Muscle (PFM) Strength.

Table 3. p value of body composition parameters.

Measurements	TBW*	ECW**	ICW***	FM****	FFM*****
1st and 2nd measurements	0.76	0.75	0.35	0.99	0.99
2nd and 3rd measurements	0.043	0.031	0.15	0.023	0.023
3rd and 4th measurements	0.83	0.61	0.81	0.5	0.3

*Total Body Water (TBW), **Extracellular Water (EW), ***Intracellular water (IW), ****Fat Mass (FM), *****Fat Free Mass (FFM).

Surface EMG results show a significant improvement in the pelvic floor muscles' ability to relax ($p = 0.03$) in the preoperative period (1st and 2nd sessions). Although not significant ($p = 0.054$), but a decreasing tendency was observed in average muscle strength on the day before and at 6 weeks after the surgery, a significant decrease of muscle strength was found at the left side ($p = 0.034$). A significant ($p = 0.005$) decrease was found between the first and last sessions' (1 month prior the surgery and 6 weeks after surgery) average muscle strength.

4. Discussion

Obesity is a common condition among people nowadays that may significantly contribute to pelvic organ prolapse. Other well known risk factors are: increased intraabdominal pressure, advanced age, previous local surgical interventions and weakness of levator muscle function [11]-[16]. Body mass index of all our obese patients reached or exceeded the upper limit of 25 in the follow-up period, a factor that is known to contribute to postoperative relapses [17]. According to the waist-hip ratio central obesity is prevalent in our sample which is an increased risk factor for prolapse [18]. A higher than average FM was observed already in the preoperative period, despite the fact, that almost all participants (93.3%) performed regular physical activity in their jobs and/or free time, but it decreased by 1.8 FM% (5.97%) during the postoperative follow-up.

It is widely accepted that levator muscle function is a determinant for not only the subjective or objective symptoms but also for relapse and for a need of a surgical intervention in pelvic floor dysfunction. The anatomical position of the levator muscle may favourably change in the postoperative period [4] [9]. In current study pelvic floor muscle activity indicators showed poor results in the preoperative period. When compared with data of Rett *et al.* who found 20.9 (± 2.7) μV average muscle activity, our values were 65.88% lower [19]. It might be due to the aging process where not only skeletal muscle weakness but also a decrease in both the connective tissue and the smooth muscle fiber strength [20] may occur in the urethral sphincter. The subjects in our study were about 17 years older [19]. Dannecker *et al.* found a 36.9% better result in pelvic floor muscle activity in their group, where average age was approximately the same [21]. The difference may be due to the 17.49% lower average BMI of their patients. Nevertheless, the type of obesity was not clarified in these previous studies. Our group involved patients suffering particularly from abdominal obesity. It may result in pelvic floor weakness and abdominal muscle dysfunction leading to disturbance of the biomechanical balance between abdominal and pelvic floor muscles [22].

Lack of hormonal effect in postmenopausal women changes the tissue quality in the levator muscle and sacrouterine ligaments [23]-[28]. Muscle activity results on the preoperative day and 6 weeks after the surgery show a significant decrease. Muscular activity difference found between the right and left sides might most probably explained by scar of the episiotomic incision generally performed on the right side in Hungary.

Taking into consideration the average muscle activity of the pelvic floor as measured by the EMG a significant, 22.15% decreasing tendency can be seen 1 month prior the surgery and 6 weeks after surgery.

Our knowledge on the origin and therapy of pelvic floor muscle dysfunctions is still insufficient. A higher case number from randomized sample would be needed in the future to obtain more reliable data concerning pelvic floor dysfunction. Nevertheless, our study 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 [29]. The main strength of the study is its scope since only scarce reports are found to date in the literature on studies that addressed the change of pelvic muscle strength before and after the appropriate gynecological surgeries. Limitations of our study are the relative low number of participants, the non-randomised, non-double-blind setting and the short follow-up period. Further studies would be necessary to compare a control group and a group performing pelvic floor muscle training as well.

5. Conclusion

Our results confirm that postmenopausal obese women who undergo anterior or posterior colporrhaphy need a follow-up concerning pelvic floor muscle function and suggest that physiotherapy starting the earliest possible may aid in preserving postoperative functionality on the long run.

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