

PELVIC FLOOR FUNCTIONAL PROPERTIES OF WOMEN WITH URINARY INCONTINENCE AFTER ENDOMETRIAL CANCER TREATED BY SURGERY AND RADIOTHERAPY: AN EXPLORATORY STUDY.

Hypothesis / aims of study

Endometrial cancer is the sixth most prevalent cancer affecting women globally (1). Its treatment frequently involves different interventions such as resection surgery and radiation therapy (RT). Between 30 to 70% of these women develop urogenital dysfunctions such as urinary incontinence after these interventions. It is plausible that these dysfunctions are associated, at least in part, to an alteration of the pelvic floor muscles functional properties. The aim of our study was to compare pelvic floor muscles (PFM) functional properties of women reporting urinary incontinence (UI) after hysterectomy and radiotherapy (RT) for endometrial cancer, to women with a history of comparable hysterectomy without UI. Additionally, to verify if exists a correlation between muscle functional properties and urogenital and bowel function. We hypothesized that the participants with UI would have significantly lower maximal strength of their PFM, higher passive resistance to stretch, and that the severity of their urogenital and bowel dysfunction would be associated to muscle functional properties.

Study design, materials and methods

A cross-sectional, clinical study was conducted. Women in the oncology group (ONCO) had to: 1) have been treated for endometrial cancer stage I and II with total hysterectomy and RT between the past 12 to 60 months, and 2) have symptoms of UI at least three times a week, which was verified with Brown's brief questionnaire (3IQ) on urinary symptoms. Women were excluded if they had a body mass index (BMI) ≥ 40.0 kg/m², a POP-Q >2 , chronic constipation (according to the Rome III criteria), or if they used medication known to interfere with continence and PFM functional properties evaluation of the present study. Women of the comparison group were post-menopausal women (aged ≥ 55 years or with bilateral ovariectomy) with previous hysterectomy (group HT). Similar selection criteria were used, except they did not have a history of pelvic cancer and did not experience symptoms of UI. All participants provided written informed consent before enrollment in the study. They attended a 90-minute evaluation session with an experienced physiotherapist trained to the assessment procedures. Three categories of variables were collected: 1) personal and anthropometric characteristics, 2) urogenital and bowel function through a 7-day urinary diary and questionnaires (ICIQ-UI, ICIQ-VS and ICIQ-B), in addition to 3) PFM functional properties through dynamometry (2). For all variables, median value and range were reported per group. Comparison of continuous variables between groups was performed with the Mann-Whitney U-test and with Wilcoxon Rank-Sum test for categorical variables. Association between variables was measured with Spearman's correlation coefficients (r_s). Significance level alpha was set at 0.05 for all statistical tests. Statistical power from 61% to 99% was obtained for the PFMs variables studied in our sample of subjects using an error $\alpha=0.05$, except for maximal PFM strength ($\beta=0.35$) and PFM endurance ($\beta=0.16$). The research protocol was approved by the institutional ethics committees.

Results

Twenty-nine women (ONCO, n=11; HT, n=18) were recruited between March 2014 and March 2015. Personal characteristics of the participants of both groups were comparable in terms of parity, but women in the ONCO group were older and had a higher body mass index (BMI) (ONCO: 70 years [61-81], HT: 64.5 years [53-81]), BMI (ONCO: 30.7 [23.5-37.5], HT: 25.6 [20.0-36.3]) and parity (ONCO: 1 [0-4], HT: 2[0-4]).

Preliminary results showed a higher PFM passive forces (in Newtons, N) at a minimal 1 mm aperture between the dynamometer branches in the ONCO group as compared to the HT group (ONCO: 0.9 [0.5-2.3], HT: 0.5 [0.02-1.7]; $p=0.02$). The women of the ONCO group had a lower maximal stretching amplitude of the vaginal opening, as measured by maximal aperture of the dynamometer in mm, (ONCO: 21.6 [14.6-35.1], HT: 33.2 [20.6-40.2]; $p=0.001$). Vaginal length (cm), measured with a hysterometer, was also significantly shorter in the ONCO group (ONCO: 7 [6-10], HT: 9 [8-12]; $p=0.001$) as compared to the HT group.

The maximal rate of force development (N/s) was significantly lower in the ONCO group during a PFM maximal voluntary contraction (ONCO: 3.1 [0.5-11.4], HT: 7.1 [1.2-43.3]; $p=0.04$). The number of rapid contractions during a 10s-interval was also smaller for that group (ONCO: 4 [1-7], HT: 8 [3-12]; $p=0.0002$). No significant difference was found between groups in the following variables: maximal PFM strength in N (ONCO: 6.6 [3.7-16.7], HT: 8.7 [2.2-14.8]; $p=0.06$), and PFM normalized endurance (N/s) as measured during a 60s sustained contraction (ONCO 90.8 [21.3-361.5], HT 133.1 [48.8-495.2]; $p=ns$).

The urogenital and bowel functions of the ONCO group were significantly different as measured by almost all components of the ICIQ questionnaire. The ICIQ-UI total score (minimal dysfunction = 0, maximal dysfunction = 21) was higher in the ONCO group (ONCO: 12 [7-16], HT: 0 [0-12]; $p<0.0001$). The ICIQ-B scores (minimal dysfunction = 0, maximal dysfunction = 75 for bowel pattern and 98 for bowel control) were also significantly higher for bowel pattern (ONCO: 6 [1-28], HT: 1 [0-43]; $p=0.008$) and for bowel control (ONCO: 10 [0-46], HT: 2 [0-13]; $p=0.005$) in the women of the ONCO group. Vaginal symptoms and sexual matters scores from the ICIQ-VS were not significantly different between groups. However, 4 participants (36%) of the ONCO reported not having sexual activities because of their vaginal symptoms, while there were none in the HT group.

The ICIQ-UI total score was found to be significantly correlated to maximal stretching amplitude of the vaginal opening ($r_s: -0.57$; $p=0.001$), to maximal PFM strength ($r_s: -0.41$; $p=0.03$), to maximal rate of force development ($r_s: -0.48$; $p=0.008$) and to the number

of rapid contractions (r_s : -0.726; $p=0.00001$) performed in 10 seconds in the whole sample of participants ($n=29$). No correlation was found between the ICIQ-UI total score and age, neither with BMI.

Interpretation of results

Alteration of the PFM function was observed in women with endometrial cancer treated by surgery and RT (ONCO group). These alterations were seen both in passive properties (shortening of the vaginal aperture and a higher resistance at rest suggesting a possible stenosis of the vaginal tissues) and contractile properties of the PFM. Our observation of an alteration in vaginal soft tissues (possible stenosis) corroborates the results of previous studies (3). The severity of the urogenital and bowel dysfunctions was associated to changes in PFM functional properties, leading us to believe that these symptoms could improve with PFM rehabilitation. However, even though age and BMI were not associated to the urogenital and bowel functions in this study, they are known to affect PFM function, and further research with greater sample size would be needed to increase our understanding of PFM changes after RT in endometrial cancer.

Concluding message

It is the first time that changes in PFM functional properties after surgery and RT are reported for women with endometrial cancer. The potential of PFM rehabilitation should be explored as a valuable option for the treatment of urogenital and bowel symptoms of women treated for endometrial cancer in the future.

References

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Disclosures

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