

Influence of Toileting Behaviour on Anterior Vaginal Wall Prolapse Natural Course

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Abstract

Background: Many risk factors have been proposed for POP, and the cause seems most plausible to be multifactorial. This study aimed to investigate the effect of toileting behaviors on the anterior vaginal wall prolapse (AVWP) natural course.

Methods: The data of 75 women who had been operated for symptomatic AVWP were recorded. The patients with grade ³II AVWP were included in this study, and they were divided into two groups according to voiding and defecation position. The volunteers who were voiding in the sitting position defined as Group 1, and Group 2 included the volunteers who were voiding in squatting position. The Colo-Rectal-Anal Impact Questionnaire (CRAIQ), Pelvic Floor Impact Questionnaire (PFIQ), Pelvic Organ Prolapse Impact Questionnaire (POPIQ), Urinary Impact Questionnaire (UIQ) and visual analog pain scores were used for evaluation of patients' symptoms.

Results: 44 patients enrolled in group 1 (sitting position) and 31 patients enrolled in group 2 (squatting position). BMI, number of parity, menopause duration, topical estrogen using, comorbidities, presence of constipation and urinary incontinence, and ped count for incontinence were similar in both groups. The time from initial symptoms to surgery was demonstrated shorter in group 2, 12 (3-73) and 24 (2-182) months, respectively (p=0.001). The PFIQ and POPIQ scores and the POP-related VAS score were statistically higher in patients who were voiding and defecating in squatting positions.

Conclusion: Questioning the toileting position of patients with AVWP may be effective on the treatment option of the patient and may be beneficial on symptom control.

Background

Pelvic organ prolapse (POP) - a condition that causes the pelvic organs to descend and the vagina to protrude - affects millions of women worldwide and is increasingly recognized as a global burden on women's health. The social, psychological, and economic costs of POP can be high. Approximately 11.8% of women will need surgery for POP, urinary incontinence, or both during their lifetime [1]. A significant number of these will undergo two or more challenging surgical procedures. The anterior vaginal wall is most often the prolapsing part of the vaginal canal and is most likely to fail in the long term after surgical correction [2].

Many etiological factors associated with the development of POP are accused. Performing high intra-abdominal pressure (IAP) activities is often cited as a potential cause of POP [3]. Although little is known about the natural history of POP, clinical practices are guided by the assumption that POP is a largely progressive disease [2]. The Squat is the exercise that mostly increases IAP among high-intensity interval exercises [4]. Even air squatting performed without weightlifting is considered a strenuous cross-fit movement that increases IAP [4].

Squatting to defecate and void remains the traditional position in Asia (including Japan, Korea, and China) and Africa. The Western population, on the other hand, has gotten used to sitting on toilet seats. Researchers are becoming more interested in women's toilet behaviors in recent years. There are many studies on the effect of toilet position on voiding and defecation physiology. In contrast, information on the impact of toilet position on the natural course of POP is limited. This study aimed to investigate the effect of toileting behaviors on the natural course of anterior vaginal wall prolapse (AVWP).

Material And Methods

This study performed a retrospective review of a prospectively acquired database of 75 women who were operated on for symptomatic AVWP in SAU in Sakarya, Turkey, from March 2015 to February 2021 after receiving approval from Sakarya University Faculty of Medicine institutional ethics committee, number of E-71522473-050.01.04-14814-94, date of 15/02/2021. This study included patients with grade \geq II AVWP, and they were divided into two groups according to voiding and defecation position. The volunteers who were voiding in the sitting position were defined as Group 1, and Group 2 included the volunteers who were voiding in the squatting position. The Pelvic Organ Prolapse Quantification (POP-Q) measurement, previously described in the literature, was performed and recorded for each patient in the dorsal lithotomy position. The Colo-Rectal-Anal Impact Questionnaire (CRAIQ), Pelvic Floor Impact Questionnaire (PFIQ), Pelvic Organ Prolapse Impact Questionnaire (POPIQ), and Urinary Impact Questionnaire (UIQ) were used for evaluating the patients' symptoms, along with data collected by interview. Demographic data, visual analog pain scores (VAS), and questionnaire scores were recorded. Patients with prior urogynecology operation history, urge urinary incontinence, diagnose of overactive bladder, neurologic disorders, and immobile patients were excluded from the study. All methods were performed in accordance with the relevant guidelines and regulations.

Statistical analysis

Statistical analyses were performed using the SPSS 21.0 (IBM, NY, USA) statistical program. The Kolmogorov-Smirnov test was used to evaluate the appropriateness of data to normal distribution. The mean and standard deviation (mean \pm SD) showed continuous variables with normal distribution, whereas the median (min-max) showed the variables with non-normal distribution. Categorical variables were shown as the number of cases (n) and percentage (%). The independent samples t-test or Mann-Whitney U-test were used to compare continuous data and to compare categorical data, chi-square test or Fisher's exact tests were used. $P < 0.05$ was considered statistically significant.

Results

In total, 44 patients enrolled in Group 1 (sitting position) and 31 patients enrolled in Group 2 (squatting position). The mean age was 57.84 ± 9.19 in Group 1 and 58.29 ± 9.07 in Group 2 ($p = 0.835$). Body mass index (BMI), number of parity, duration of menopause, topical estrogen using, co-morbidities, presence of constipation and urinary incontinence, and pad count for incontinence were similar in both groups; this is

demonstrated in Table 1. The POP-related VAS score was statistically higher in Group 2 than Group 1: 2 (0–7) and 5 (0–10), respectively ($p < 0.001$). The time from initial symptoms to surgery was longer in Group 1 than in Group 2: 24 (2–182) and 12 (3–73), respectively ($p = 0.001$) (Table 1). There was no difference in POP-Q measurements between the groups (Table 2). C point was -4 (-1, -7) in Group 1 and -5 (-2, -6) in Group 2 ($p = 0.847$) (Table 2). While the PFIQ and POPIQ scores were statistically higher in patients who were voiding and defecating in squatting positions (Group 1), the CRAIQ and UIQ scores were similar in both groups (Fig. 1).

Table 1
Comparison of demographic data according to voiding and defecation position

| | | Group-1 (sitting) (n = 44) | Group-2 (squatting) (n = 31) | p |
|---|------------------------|---|---|-------------------------------|
| Age (year) (mean ± SD) | | 57.84 ± 9.19 | 58.29 ± 9.07 | 0.835 ^a |
| BMI (kg/m²) (mean ± SD) | | 29.17 ± 3.28 | 29.67 ± 2.98 | 0.505 ^a |
| Parity (n) (median)(min-max) | | 3 (1–5) | 3 (2–8) | 0.221 ^b |
| VAS score (median)(min-max) | | 2 (0–7) | 5 (0–10) | < 0.001^b |
| Ped count (n) (median)(min-max) | | 2 (0–6) | 2 (0–6) | 0.731 ^b |
| Menopause duration (month) (median)(min-max) | | 125 (1-360) | 120 (5-300) | 0.475 ^b |
| Time to surgery (month) (median)(min-max) | | 24 (2-182) | 12 (3–73) | 0.001^b |
| Topical estrogen use, yes (n)(%) | | 4 (9.1) | 6 (19.4) | 0.173 ^c |
| Comorbidities (n) (%) | DM | 11 (25) | 6 (19.24) | 0.565 ^d |
| | HT | 22 (50) | 17 (54.80) | 0.680 ^d |
| | CAD | 2 (4.5) | 1 (3.2) | 0.630 ^c |
| | CHF | 0 (0) | 2 (6.5) | 0.168 ^c |
| | COPD | 1 (2.3) | 2 (6.5) | 0.370 ^c |
| Menopause, yes (n)(%) | | 34 (77.3) | 27 (87.1) | 0.282 ^d |
| Smoking, yes (n)(%) | | 5 (11.4) | 7 (22.6) | 0.162 ^c |
| Symptoms, yes (n)(%) | Vaginal bulging | 37 (84.1) | 30 (96.8) | 0.081 ^c |
| | Urgency | 19 (43.2) | 18 (58.1) | 0.204 ^d |
| | Incontinence | 26 (59.1) | 21 (67.7) | 0.446 ^d |

a:Independent sample t test; b:Mann Whitney U test; c:Fisher's exact test; d:Chi-square test

BMI:Body mass index, CAD:Coronary Artery Disease, CHF:Congestive Heart Failure, COPD:Chronic Obstructive Pulmonary Disease, CRAIQ:Colo-Rectal-Anal Impact Questionnaire, DM:Diabetes Mellitus, HT:Hypertension, PFIQ:Pelvic Floor Impact Questionnaire, POP-Q: Pelvic Organ Prolapse Quantification, POPIQ: Pelvic Organ Prolapse Impact Questionnaire, SD:Standart deviation, UIQ: Urinary Impact Questionnaire

| | | Group-1 (sitting) (n = 44) | Group-2 (squatting) (n = 31) | p |
|---|--|---|---|--------------------|
| | Splinting or digitation for urination | 10 (23.3) | 4 (12.9) | 0.262 ^d |
| POP-Q Grade | 2 | 23 (52.3) | 14 (45.2) | 0.544 ^d |
| (n)(%) | 3 | 21 (47.7) | 17 (54.8) | |
| a:Independent sample t test; b:Mann Whitney U test; c:Fisher's exact test; d:Chi-square test | | | | |
| BMI:Body mass index, CAD:Coronary Artery Disease, CHF:Congestive Heart Failure, COPD:Chronic Obstructive Pulmonary Disease, CRAIQ:Colo-Rectal-Anal Impact Questionnaire, DM:Diabetes Mellitus, HT:Hypertension, PFIQ:Pelvic Floor Impact Questionnaire, POP-Q:Pelvic Organ Prolapse Quantification, POPIQ:Pelvic Organ Prolapse Impact Questionnaire, SD:Standart deviation, UIQ:Urinary Impact Questionnaire | | | | |

Table 2
POP-Q measurements of the groups

| | Group-1 (sitting) (n = 44) | Group-2 (squatting) (n = 31) | p |
|---|---|---|----------|
| Aa (median)(min, max) | 1 (-1, 3) | 1 (-1, 3) | 0.104* |
| Ba (median)(min, max) | 0 (-2, 3) | 1 (-2, 4) | 0.298* |
| Ap (median)(min, max) | -2 (-1, -3) | -2 (-1, -3) | 0.801* |
| Bp (median)(min, max) | -2 (-1, -3) | -2 (-1, -3) | 0.403* |
| C (median)(min, max) | -4 (-1, -7) | -5 (-2, -6) | 0.847* |
| D (median)(min, max) | -6 (-3, -7) | -6 (-4, -7) | 0.834* |
| Gh (median)(min, max) | 4 (2, 5) | 4 (2, 4) | 0.037* |
| Pb (median)(min, max) | 2 (1, 4) | 2 (2, 3) | 0.393* |
| TVL (median)(min, max) | 7 (5, 9) | 7 (6, 8) | 0.303* |
| Data are shown as median (min, max). | | | |
| Gh: Genital hiatus Pb: Perineal body TVL: Total vaginal length | | | |
| *:Mann Whitney U test | | | |

Discussion

Various factors influence the toilet behavior women prefer, including social, cultural, and medical factors. In western countries, the widespread use of sitting toilets began in the 19th century when sewage

systems were developed to improve sanitation [5]. Women in various Asian and African countries void and defecate in a squatting position whereas, the sitting position is preferred in western countries.

Pelvic floor health and IAP are essential components of voiding, defecation dysfunction, and POP etiopathogenesis in women. The IAP changes and pelvic floor muscle load differ in the squatting and sitting positions. Studies conclude that defecation is physiological in the squatting position; the pelvic floor muscles are more dilated [6]. Although some studies have argued that the squat position is better for defecation, there is no consensus on whether the position affects the voiding function. In addition, there is no study on the effect of toilet position on the natural course of POP.

The AVWP, known clinically as cystocele, is the most common form of POP [7]. It is also the compartment with the highest rate of primary and recurrent support defects [8]. Many risk factors have been proposed for POP, and the cause seems most plausible to be multifactorial. The size of the AVWP is sensitive to maximal abdominal pressure and, a decrease in the resistance of the levator ani muscle to stretching results in a larger hiatus size [9]. The squat movement is also considered one of the most strenuous actions that enhance abdominal pressure. Evidence has emerged that strenuous physical activity increases the risk of pelvic floor disorders, such as POP and urinary incontinence [10]. The definition of "strenuous" is subjective primarily: in the pelvic floor literature, strenuous usually refers to activities thought to increase IAP significantly [11]. There is no established, data-based maximum IAP threshold used to guide activity restriction for safety purposes. In laboratory studies, a safe threshold value of > 60 cmH₂O is recommended for maximal IAP. Activities that increase IAP above this threshold may be restricted [12].

Intrathoracic pressure (ITP), IAP, and the Valsalva maneuver (VM) play important roles in activities of daily life movements [13]. The IAP increase is needed in order to maintain balance during trunk movements. Intra-abdominal pressure was lowest when the trunk was in an isometric position. Increases in ITP and IAP initiated by the VM are considered body techniques that increase the stabilization of the body during physical activity [14]. The IAP levels change in response to trunk asymmetry. During the flexion-extension movement of the trunk, the pressure in the abdomen can rise up to 150 mmHg. As the body torsions, the IAP increases [15]. Increasing the IAP is provided physiologically by contracting the anterior abdominal wall muscles as a reflex to ensure trunk stabilization [16]. There is no study on measuring IAP during toilet positions. However, as a result of the studies, it can be expected that the IAP that occurs while performing the squat position will be higher than the sitting position.

Patients with POP generally also have a high BMI. This elevation is considered an important factor in increasing IAP. Patients with high BMI may need to increase their IAP in order to maintain their balance while taking the squat position. In addition, patients who perform voiding and defecation in the squat position do so by opening their legs and squatting low enough to bring their knees to shoulder level; this may cause the genital hiatus to open more than the sitting position. In patients who have defecation and micturition in the squat position, increased IAP and greater opening of the genital hiatus may make it easier for the vaginal wall to exit out of the hymenal ring.

The critical factor in patients with POP deciding to take intervening measures was the worsening of the symptoms rather than the anatomical progression of the prolapse [17]. In our study, the waiting time for Group 2 patients (squat position) to decide on the operation was shorter than Group 1 (sitting position) patients ($p = 0.001$). In addition, the PFIQ and POPIQ scores were higher in Group 2 patients compared to Group 1 ($p = 0.001$, $p < 0.001$). In addition, when the pain scores of each group of patients thought were questioned, the mean VAS score of the patients in the squatting position was significantly higher ($p < 0.001$). Among the patient groups with similar demographic data, the increase in the symptom scores and VAS scores of the patients who use the squat position may affect their decision to have the operation earlier. In addition, no statistical difference was found between the UIQ scores of the patients in both groups. As a result of these values, it can be thought that the toilet position does not affect the lower urinary tract symptom score in our patient groups. Publications concluding that defecation in the squat position is more physiological than sitting position [6]. No difference was observed in the Colo-Rectal-Anal Impact Questionnaire scores among our patient groups ($p = 0.797$).

Evidence regarding the evolution of POP is scarce and conflicting [17]. Given that AVWP is a disease with minimal morbidity, it is very crucial to understand the factors that increase the likelihood of patients choosing an intervention over observation. This allows healthcare providers to provide more comprehensive counseling to women considering therapeutic measures for this disease. Vaginal swelling that the patient can see or feel is the most specific symptom of POP [17]. The complaint of a disturbing vaginal swelling was associated with the final intervention decision. However, the intensity of symptoms rather than physical examination findings determines the patients' treatment preferences. The most important factor in initially choosing observation and then choosing a therapeutic intervention is the worsening of symptom disturbance [18]. Vaginal bulging was seen as the predominant symptom in most patients in our study when deciding on the operation. Particularly, vaginal bulging is the leading symptom in 96.8% of patients in Group 2, while it is the leading symptom in 84.1% of Group 1 patients. This difference may be related to the fact that the patient feels the vaginal bulging more due to the increase in IAP while performing the squat position and then standing up, rather than increasing the IAP after taking the squat position.

Most clinicians accept an association between AVWP and lower urinary tract dysfunction and often assume a close association between worsening AVWP and worsening urinary symptoms. The decision to intervene is consistent with changes or worsening of these associated conditions. In our study, it was observed that the rate of urgency and incontinence in Group 2 patients was higher than in Group 1. However, the rate of splinting or digitation for urination was lower in Group 2. The reason for this may be the balance problem that the patients can encounter in performing the digitation action in the squat position.

In current practice, there are two active therapeutic interventions for POP treatment: the use of intravaginal pessary or surgical correction. A third option is an observation to avoid surgical and anesthetic complications. While discussing these treatment options with the patient, the healthcare professional should consider the patient's preference, lifestyle factors, prolapse size, co-morbidities, age,

future childbearing desire, and the risks and benefits of all treatment options. While informing the patient about treatment options, it is important to explain the lifestyle changes related to reducing the pressure on the pelvic organs. Among these recommendations, weight loss and avoidance of activities that increase IAP, especially in obese women, come first. In addition, considering the data we obtained from our study, questioning the toileting position may also contribute to lifestyle changes.

Conclusion

Voiding and defecation physiology are closely related to pelvic floor health. Questioning the toileting position of patients with AVWP may be effective for the decision on the treatment option of the patient. Suggesting changing the toilet position in patients with AVWP who have micturition and defecation in the squat position may prolong the time until surgery or may be beneficial to symptom control.

Abbreviations

AVWP: Anterior vaginal wall prolapse

CRAIQ: Colo-Rectal-Anal Impact Questionnaire

PFIQ: Pelvic Floor Impact Questionnaire

POPIQ: Pelvic Organ Prolapse Impact Questionnaire

UIQ: Urinary Impact Questionnaire

POP: Pelvic organ prolapse

IAP: Intra-abdominal pressure

ITP: Intrathoracic pressure

VM: Valsalva maneuver

Declarations

Ethics approval and consent to participate: Sakarya University Ethics Committee, number of E-71522473-050.01.04-14814-94

Consent for publication: Not applicable

Availability of data and materials: The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

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Figures

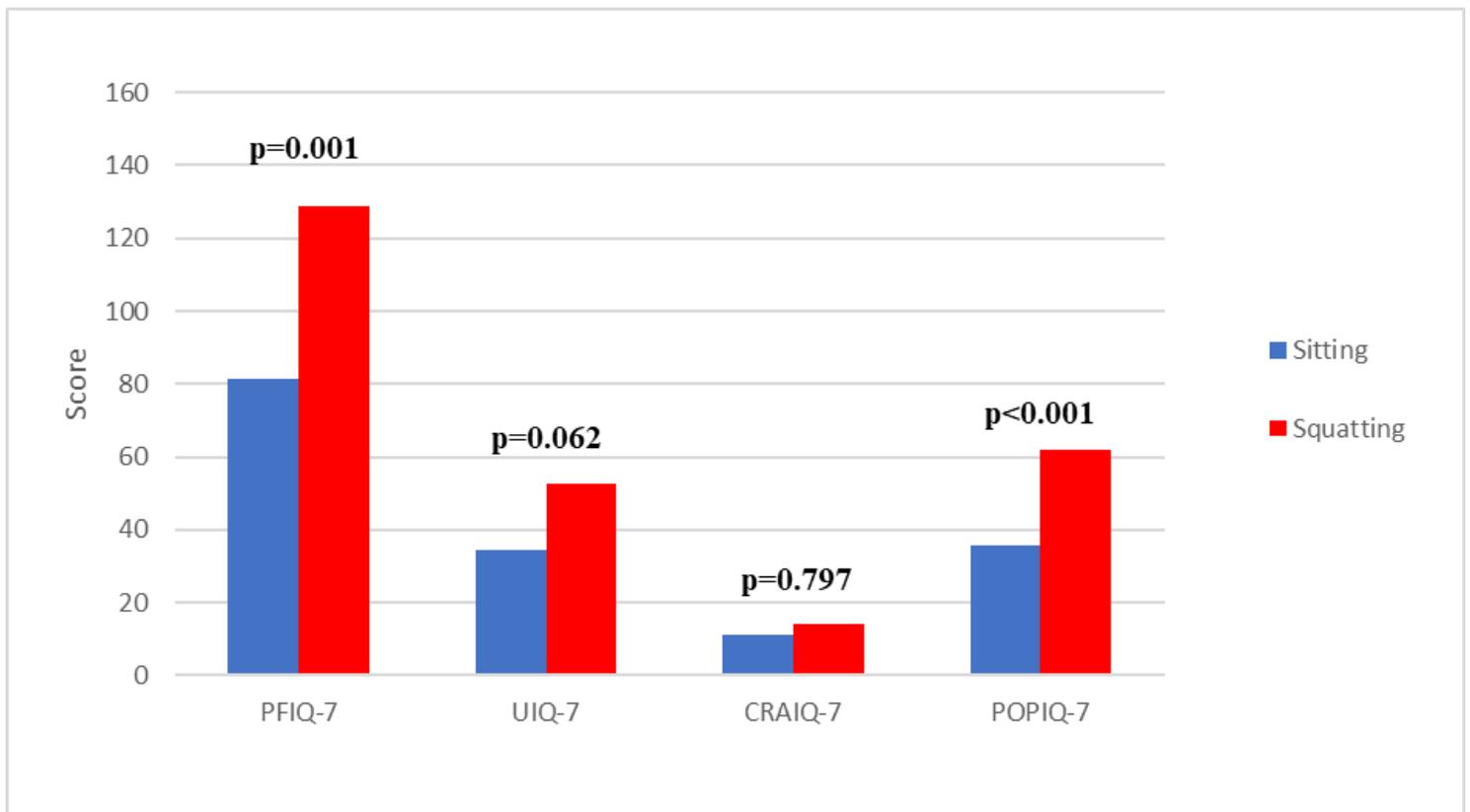


Figure 1

Comparison of pelvic floor impact questionnaire and subscale scores between groups