

This is a provisional PDF only. Copyedited and fully formatted version will be made available soon.



P O L I S H G Y N E C O L O G Y

GINEKOLOGIA POLSKA

ORGAN POLSKIEGO TOWARZYSTWA GINEKOLOGICZNEGO
THE OFFICIAL JOURNAL OF THE POLISH GYNECOLOGICAL SOCIETY

ISSN: 0017-0011

e-ISSN: 2543-6767

The impact of cystocele repair on urge symptoms in women with pelvic organ prolapse

Authors: Pawel Szymanowski, Paulina Banach, Andrzej Wisniewski, Wioletta K. Szepieniec

DOI: 10.5603/GP.a2022.0008

Article type: Research paper

Submitted: 2021-10-27

Accepted: 2022-02-13

Published online: 2022-03-24

This article has been peer reviewed and published immediately upon acceptance. It is an open access article, which means that it can be downloaded, printed, and distributed freely, provided the work is properly cited.

Articles in "Ginekologia Polska" are listed in PubMed.

[ORIGINAL PAPER/GYNECOLOGY]

The impact of cystocele repair on urge symptoms in women with pelvic organ prolapse

Pawel Szymanowski, Paulina Banach, Andrzej Wisniewski, Wioletta K. Szepieniec

Andrzej Frycz Modrzewski Cracow University, Cracow, Poland

Corresponding author:

Paulina Banach

Andrzej Frycz Modrzewski Kraków University, Cracow, Poland

e-mail: paulinabanach.kaafm@gmail.com

ABSTRACT

Objectives: The purpose of this study was to evaluate the impact of cystocele repair on urinary urge symptoms and to determine the likelihood that urge symptoms are caused by cystocele and therefore cured by cystocele repair. The secondary aim was to assess the impact of baseline cystocele stage POP on the improvement of urge symptoms following surgical treatment of POP.

Material and methods: A total of 321 female patients with cystocele stages II, III or IV (POP), who underwent repair surgery for pelvic organ prolapse, were included. A retrospective analysis was performed to determine the presence of urge symptoms in patients with cystocele and to evaluate how many patients were cured from urge symptoms by the cystocele repair. Postoperative data were obtained by interview during a follow-up examination six weeks after surgery.

Results: Preoperatively, 52.02% of all patients diagnosed with cystocele stages II, III or IV POP experienced urge symptoms. Urge symptoms were cured in 88.62% of patients with cystocele stages II after POP repair ($p < 0.005$). 88.60% of patients with cystocele stage II POP and 88.68% of patients with cystocele stages III to IV POP reported improvement in urge symptoms ($p < 0.005$). Despite cystocele repair, 11.4% of patients with preoperative cystocele stage II POP and 11.32% with preoperative cystocele stages III and IV POP reported

persistent urge symptoms. 5.84% of the study group who showed no urge symptoms preoperatively, experienced *de novo* urge symptoms after following surgery ($p < 0.005$).

Conclusions: Cystocele repair cured urge symptoms in the majority of patients. Therefore, repair of bladder prolapse may help to differentiate urge symptoms from other urinary tract dysfunctions and assist in determining a proper diagnosis and treatment.

However, the severity of POP had no significant influence on the improvement in urge symptoms following cystocele repair. Risk of *de novo* urge symptoms after anatomical repair still needs to be explored.

Key words: cystocele; urge symptoms; urinary incontinence; urinary urgency; overactive bladder; pelvic organ prolapse

INTRODUCTION

Urinary urge symptoms, defined as a complaint of sudden difficult to defer desire to pass urine, is a lower urinary tract dysfunction (LUTD) that affects millions of women of all ages [1–3]. The disorder has a substantial influence on quality of life, as it not only affects patients' physical comfort, but also their psychological and social well-being. Those with the condition are thus at an increased risk of depression and limited social and sexual function [2, 4]. As the prevalence of urge symptoms and urinary incontinence (UI) is increasing globally [5], finding adequate treatment strategies for the condition becomes one of the most important present-day aims for physicians.

Urinary urge symptoms should be understood as either urge dry (urinary urgency), that is, without leakage of urine, or urge wet, also known as urgency urinary incontinence (UUI). UUI is a urinary leakage accompanied by or immediately preceded by a sensation of an urgent need to urinate. After UI diagnosis, its type (urge, overactive bladder, stress, mixed or overflow) should be identified, as this allows the proper treatment strategy to be determined [2]. Urgency constitutes one of several mixed urinary incontinence (MUI) symptoms. MUI is defined as the involuntary leakage of urine associated with urgency but also with exertion, effort, sneezing, or coughing [6]. It is desirable to differentiate urge symptoms (dry and/or wet) from overactive bladder (OAB). While OAB is a diagnosis characterized by daytime increased urinary frequency and nocturia, urgency is also one of its symptoms. OAB is then divided into OAB wet, with urgency urinary incontinence, and OAB dry when no UI coexists [3, 7]. Distinguishing between urinary urgency or urgency UI and OAB nomenclature might

contribute to improving of the treatment results.

It should be emphasized that OAB may only be diagnosed after first excluding urinary tract infections and other obvious pathologies [1, 8]. Considering the definition of OAB, pelvic organ prolapse (POP) repair may help to differentiate urge symptoms from OAB, and therefore, assist in determining a proper diagnosis and treatment. POP, which is a prolapse or drooping of any of the pelvic floor organs, including bladder, uterus, vagina, small bowel, and rectum, should be considered as an ‘other pathology’ in the OAB definition, and thus be repaired before any other treatment indication. Only the persistence of urge symptoms following POP surgery with no urinary tract infections will confirm diagnosis of OAB.

POP often coexists with urinary urgency or UUI [3, 9]. Whereas some authors have reported that POP affects 50% of parous women, 20% of whom are symptomatic, OAB symptoms are believed to coexist with POP in 88% of patients [10]. Evaluating the influence of POP on the urge symptoms is therefore fundamental. One hypothesis suggests that POP may have an impact on the female urethra and additionally play a role in mechanical bladder outlet obstruction (BOO). As a result, a prolapse within the pelvic cavity may cause OAB symptoms [11].

More than 50 years ago it was reported that prolapse-related bladder and bowel function disorders can only be resolved by surgical repair that restores the right anatomy [12, 13].

Since then, the influence of POP on OAB symptoms has been discussed in numerous studies, most of them identifying a discernable improvement in OAB symptoms after POP restoration [10, 14–18]. While some authors demonstrated the effectiveness of pessary use in urinary urgency and UI [15], others highlighted improvement in OAB symptoms after surgical correction of anterior vaginal wall prolapse [16, 17]. In some studies, attention has been drawn to preoperative factors associated with persistent OAB symptoms, but no significant correlation between preoperative cystocele severity and improvement in OAB symptoms after surgical correction have been established [18]. On the other hand, Miranne et al. [10], described a higher risk of persisting OAB symptoms in women with more severe apical and/or anterior POP.

Therefore, the relationship between cystocele repair and urge symptoms remains inconsistent, and the effect of POP repair still needs to be explored. Our hypothesis is that urge symptoms constituting OAB may result from an anatomical obstruction, namely cystocele. Our approach to cystocele treatment, resulting in the resolution of urge symptoms, was from a practical

clinical perspective based on collective experience with effective reconstructions of anatomical defects. The objective of our study was to evaluate the impact of cystocele repair surgery on urge symptoms. A secondary aim was to evaluate the impact of baseline cystocele stage POP on improvements in urge symptoms shortly after surgical treatment of POP.

MATERIAL AND METHODS

Patient characteristics

Data were collected from 371 women with cystocele stages II to IV (POP), who underwent anatomical repair between April 2016 and February 2020. POP severity evaluation was based on the Pelvic Organ Prolapse Quantification system (POP-Q) [19]. Following surgery for cystocele repair, all the women were retrospectively examined to determine the presence of urge symptoms and to identify how many of them were cured and in how many the problem appeared *de novo*. A comprehensive urogynecologic examination, including a vaginal examination and taking the subject's urogynecologic history, was performed prior to surgery and six weeks after surgery. A Pelvic Floor Distress Inventory (PFDI-20) short form was completed for each patient to determine the presence of urinary urge symptoms both pre- and postoperatively [20]. Preoperative urge symptoms were defined as a positive response to items numbered 15 and / or 16 of the PFDI-20: 'Do you usually experience frequent urination?', 'Do you usually experience urine leakage associated with a feeling of urgency, that is a strong sensation of needing to go to the bathroom?'. The absence of urge symptoms after surgical repair was considered evidence that the condition was cured. Women with cystocele stage I POP only, patients with active urinary tract infections, and those who underwent previous anti-incontinence surgery were excluded from the study. The reduction of urinary urge symptoms after cystocele repair was considered as a cure in cases of the complete disappearance of symptoms, and in cases where urge symptoms persisted, regardless of the severity, as no recovery.

Three hundred twenty-one patients diagnosed with cystocele met the inclusion criteria. Table 1 lists the baseline characteristics of the study population. Two hundred ninety-six patients enrolled in the study were non-smokers, and 25 admitted to smoking. One hundred forty-four women had a BMI within the norm (18.5–24.99), 172 above the norm (< 25), and 5 had a BMI below the norm (< 18.5). One hundred of the patients were of premenopausal and 221 of postmenopausal age, with a median age of 56.64. Two hundred eighty-five of the women had

given birth vaginally at least once. The study group comprised 167 subjects with, and 154 subjects without, preoperative urinary urge symptoms. Within the study group with preoperative urge symptoms there were 80 (47.9%) women with dry, 71 (42.5%) with wet, and 16 (9.6%) with mixed urinary incontinence. We evaluated the influence of preoperative cystocele of stages II to IV (POP) on urinary urge symptoms. The study group was then divided into two subgroups depending on the preoperative cystocele severity, namely the anatomically less severe group (cystocele stage II) and the anatomically more severe group (cystocele stage III and IV). Table 2 lists the baseline characteristics of the study subgroups with POP coexisting with urinary urge symptoms.

All methods were carried out in accordance with relevant guidelines and regulations. The study was conducted in accordance with the Declaration of Helsinki and the protocol was approved by the Ethical Review Board of Andrzej Frycz Modrzewski Krakow University, Poland (Decision No. KBKA/25/)/2017). A written informed consent for inclusion was obtained from all participants.

Data analysis

Statistical analysis was performed using Statistica software (ver. 13.3, StatSoft, Poland). Data expressed on a qualitative scale were presented as the number and percentage of the sample. Either the Chi-squared test (χ^2) or the Fisher exact probability test were used to compare the relationships between variables expressed in the qualitative scale. Data expressed on a quantitative scale were presented as means with standard deviations (SD). As the data were not normally distributed (Shapiro-Wilk test), the Mann-Whitney test was used. Results were considered statistically significant when p -value ≤ 0.05 .

RESULTS

Three hundred twenty-one women met the inclusion criteria. The study group comprised 167 (52.02 %) of the total number of patients with preoperative urinary urge symptoms and 154 (47.98%) without preoperative urge symptoms. Of the preoperative urge symptoms group, there were 80 (47.9%) with dry, 71 (42.5%) with wet, and 16 (19.6%) with mixed urinary incontinence. There were no significant differences between the groups of patients with urinary urge symptoms, in terms of mean body mass index and parity ($p > 0.005$) (Tab. 2).

Urge symptoms were significantly improved after surgical repair. One hundred forty-eight (88.62%) of the 167 patients with cystocele stage II POP reported improvement in urge symptoms ($p < 0.005$). One hundred fourteen women (68.26%) with preoperative urge symptoms had cystocele stage II POP (less severe anatomical group) and 53 (31.74%) had stage III to IV POP (more severe anatomical group). One hundred and one (88.60%) of the 114 patients in the less severe anatomical group and 47 (88.68%) of the 53 patients in the more severe anatomical group reported improvement in their urge symptoms ($p < 0.005$). There was no significant difference in improvement of urge symptoms comparing the cystocele stage II POP group and the cystocele stage III to IV POP group (88.60% versus 88.68%, respectively, $p > 0.005$; Tab. 3)

72 (90%) of the 80 patients with dry urge symptoms reported improvement after cystocele repair, for stages II POP, and 5 (6.25%) of them noticed no changes in urge symptoms after cystocele repair. In the remaining 3 (3.75%) patients, their dry urge symptoms changed into wet. 61 (85.92%) of the 71 patients with wet urge symptoms reported improvement after a cystocele correction, 5 (7.04%) had no changes in urge symptoms, and 5 patients (7.04%) wet urge symptoms changed into dry. Fifteen (93.75%) of the 16 patients with mixed urinary incontinence reported improvement after cystocele repair at stage II POP and in one patient (6.25%) mixed urge symptoms changed into wet (Tab. 4, 5). Both no changes and transition in urge symptoms were considered persistence.

Despite cystocele repair, 13 (11.4%) of the 114 patients with cystocele stage II POP and 6 (11.32%) of the 53 women with cystocele stages III and IV POP reported persistent urge symptoms, which were considered OAB (Tab. 3). Nine (5.84%) of the 154 women without preoperative urge symptoms reported *de novo* urge symptoms. Three (33.33%) of the 9 patients with urge symptoms diagnosed *de novo*, reported dry and 6 (66.66%) of the patients reported wet urge symptoms (Tab. 6).

DISCUSSION

The results of the present study revealed the existence of urge symptoms among patients with cystocele stages II, III and IV POP. At baseline, 52.02% of the study group with preoperative cystocele experienced urinary urgency. Prior projects mostly focused on urge symptoms and OAB symptoms concomitant with POP, with their occurrence rates varying between 53% and 69% [21, 22]. In contrast to these findings, OAB occurrence rates in patients without POP

have been reported in only 4–9% of cases [12, 23], which could confirm a correlation between both disorders and thus underline the importance of our study.

In the group of patients with POP experiencing urinary urgency or UUI, pharmacotherapy and other non-surgical treatments seem to be less effective. The adequate treatment strategy in patients with POP is the defect's resolution resulting in the removal of the bladder obstruction. In the present study, 148 patients (88.62%) with cystocele stage II POP reported improvement in urge symptoms ($p < 0.005$) after cystocele repair. One hundred and one (88.60%) of 114 patients in the less severe anatomical group, and 47 (88.68%) of the 53 patients in the more severe anatomical group, reported an improvement in postoperative urge symptoms ($p < 0.005$). Our findings are similar to results from previous studies reporting an improvement in OAB symptoms after anatomical repair of the prolapse in patients with coexisting POP [12, 24–26]. These comparable results are shown in Table 7. The reported cure rates range from 70.2% in the Liedl B et al. [12], research to 87.6% in the study by Papa Petros PE [26]. These findings support the hypothesis that urinary urgency recedes after removing of the bladder obstruction and therefore, that OAB symptoms should also improve after POP surgical repair.

Interestingly, the cure rate of urge symptoms in patients with cystocele stage II POP revealed no significant differences compared with that in the more severe anatomical group (88.60% of 88.68%, $p > 0.005$). Our findings are consistent with previously published results [9, 12] and lead us to conclude that patients with more severe prolapse respond to treatment equally well as those with less advanced stages. On the other hand, Miranne et al., described a higher risk of persisting OAB symptoms in women with more severe apical and / or anterior POP [10]. This indicates that there is good reason for clinicians to perform further research in the field of pelvic floor surgery.

In our study, *de novo* urinary urgency or UUI occurred in 9 (5.84%, $p < 0.005$) of 154 patients after cystocele repair, including three women with dry and six with wet urgency symptoms. Therefore, urinary urgency or UUI should be included in the surgical risk of cystocele repair. Our results are in line with those of other studies. DI BIASE M et al., assessed that the risk of *de novo* UI after cystocele repair was 4.1% [27]. Table 5 shows the transformation in urinary urge symptoms. Determining which factors predict the persistence of urinary urgency after POP surgical treatment and whether preoperative POP severity has an impact on the improvement of OAB symptoms are yet to be examined [9]. More research is needed to explain the change from urinary urgency to UUI and *vice versa*. In our research, five patients with wet urge symptoms switched to dry urge symptoms, and three patients with dry, urge

symptoms switched to wet urge symptoms after the surgery. However, these results proved statistically insignificant and require further investigation. Dry urgency symptoms are less inconvenient for patients and affects the quality of life to a lesser extent than wet urgency symptoms. It stands to reason that the transition from wet to dry urgency can be perceived as an improvement. In contrast, the change from dry urge symptoms to urge incontinence should be considered a deterioration of the patient's condition.

Many public health studies have highlighted that OAB symptoms negatively affect people's everyday life [28, 29]. Of the entire spectrum of OAB symptoms, urinary urgency and UUI have the greatest impact on patients' comfort and quality of life. Patients who experience OAB with UI were found to have a lower quality of life in the social and functional domains than patients with diabetes [28]. Therefore, OAB should be analyzed from both the medical and the economic points of view. American women with OAB symptoms generate an economic burden comparable to the costs of treating breast cancer or diabetes [12]. The proper surgical treatment depends on identifying the cause of urge symptoms which should be a priority for pelvic floor surgery. What may be required, is a re-definition of OAB diagnosis, stating that diagnosis can only be made after POP is excluded. We support previous hypotheses that qualification for surgery ought to be individualized and performed precisely. An adequate treatment strategy linked to the cause of the disorder should be recommended, as that will provide long-lasting improvement of the symptoms. The surgical treatment should be chosen depending on the defect causing the cystocele. Currently the surgeons have a wide range of surgical techniques to choose from, contingent on the defect's level and its type. The anterior colporrhaphy is recommended if cystocele is caused by a central defect. In case of cystocele caused by a lateral defect, lateral repair should be indicated. New laparoscopic techniques are required, when the apical influences the formation of a cystocele 30–33. Anatomical correction may also help to improve both cystocele and urinary urgency.

The strengths of our study include participation of a large group of respondents and an objective assessment with a precise physical examination of anatomical correlations before and after the surgery. The follow-up examination shortly after the surgery (6 weeks) enabled the exclusion of other factors in patients (weight, age, hormonal changes, longer period of work) that had the potential to impact on the surgical outcome. The limitation of our study is the lack of a long-term efficacy evaluation. However, our study revealed that urge symptoms may be caused by bladder prolapse, thus POP repair might indicate a proper treatment.

Further studies are required to evaluate the recurrences of urge symptoms after a longer period.

CONCLUSIONS

A short-term efficacy evaluation indicates that just the anatomical correction may help to improve urinary urgency. Cystocele repair resulted in a cure of urge symptoms in most patients and thus should be repaired before any other treatment indication. However, the severity of preoperative POP had no significant influence on the improvement of those symptoms. Postoperative persistent urinary urgency or UUI considered OAB, were not related to baseline POP. The risk of *de novo* urge symptoms after anatomical repair still needs to be explored.

Conflict of interest

All authors declare that they have no conflict of interest.

References:

1. Ferris DO. Management of urinary incontinence in women. *Surg Clin North Am.* 1947; 27(4): 857–865, doi: [10.1016/s0039-6109\(16\)32186-7](https://doi.org/10.1016/s0039-6109(16)32186-7), indexed in Pubmed: [20254970](https://pubmed.ncbi.nlm.nih.gov/20254970/).
2. Khandelwal C, Kistler C. Diagnosis of urinary incontinence. *Am Fam Physician.* 2013; 87(8): 543–550, indexed in Pubmed: [23668444](https://pubmed.ncbi.nlm.nih.gov/23668444/).
3. Abrams P, Cardozo L, Fall M, et al. Standardisation Sub-Committee of the International Continence Society. 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): 167–178, doi: [10.1002/nau.10052](https://doi.org/10.1002/nau.10052), indexed in Pubmed: [11857671](https://pubmed.ncbi.nlm.nih.gov/11857671/).
4. Coyne KS, Sexton CC, Irwin DE, et al. The impact of overactive bladder, incontinence and other lower urinary tract symptoms on quality of life, work productivity, sexuality and emotional well-being in men and women: results from the EPIC study. *BJU Int.*

2008; 101(11): 1388–1395, doi: [10.1111/j.1464-410X.2008.07601.x](https://doi.org/10.1111/j.1464-410X.2008.07601.x), indexed in Pubmed: [18454794](https://pubmed.ncbi.nlm.nih.gov/18454794/).

5. Irwin DE, Kopp ZS, Agatep B, et al. Worldwide prevalence estimates of lower urinary tract symptoms, overactive bladder, urinary incontinence and bladder outlet obstruction. *BJU Int.* 2011; 108(7): 1132–1138, doi: [10.1111/j.1464-410X.2010.09993.x](https://doi.org/10.1111/j.1464-410X.2010.09993.x), indexed in Pubmed: [21231991](https://pubmed.ncbi.nlm.nih.gov/21231991/).
6. Haylen BT, de Ridder D, Freeman RM, et al. An International Urogynecological Association (IUGA)/International Continence Society (ICS) joint report on the terminology for female pelvic floor dysfunction. *Int Urogynecol J.* 2010; 21(1): 5–26, doi: [10.1007/s00192-009-0976-9](https://doi.org/10.1007/s00192-009-0976-9), indexed in Pubmed: [19937315](https://pubmed.ncbi.nlm.nih.gov/19937315/).
7. Liedl B, Goeschen K, Yassouridis A, et al. Cure of underactive and overactive bladder symptoms in women by 1,671 apical sling operations gives fresh insights into pathogenesis and need for definition change. *Urol Int.* 2019; 103(2): 228–234, doi: [10.1159/000500329](https://doi.org/10.1159/000500329), indexed in Pubmed: [31185473](https://pubmed.ncbi.nlm.nih.gov/31185473/).
8. Haylen BT, de Ridder D, Freeman RM, et al. An International Urogynecological Association (IUGA)/International Continence Society (ICS) joint report on the terminology for female pelvic floor dysfunction. *Int Urogynecol J.* 2010; 21(1): 5–26, doi: [10.1007/s00192-009-0976-9](https://doi.org/10.1007/s00192-009-0976-9), indexed in Pubmed: [19937315](https://pubmed.ncbi.nlm.nih.gov/19937315/).
9. Kim MiS, Lee GH, Na ED, et al. The association of pelvic organ prolapse severity and improvement in overactive bladder symptoms after surgery for pelvic organ prolapse. *Obstet Gynecol Sci.* 2016; 59(3): 214–219, doi: [10.5468/ogs.2016.59.3.214](https://doi.org/10.5468/ogs.2016.59.3.214), indexed in Pubmed: [27200312](https://pubmed.ncbi.nlm.nih.gov/27200312/).
10. Miranne JM, Lopes V, Carberry CL, et al. The effect of pelvic organ prolapse severity on improvement in overactive bladder symptoms after pelvic reconstructive surgery. *Int Urogynecol J.* 2013; 24(8): 1303–1308, doi: [10.1007/s00192-012-2000-z](https://doi.org/10.1007/s00192-012-2000-z), indexed in Pubmed: [23229418](https://pubmed.ncbi.nlm.nih.gov/23229418/).
11. Cameron AP. Systematic review of lower urinary tract symptoms occurring with pelvic organ prolapse. *Arab J Urol.* 2019; 17(1): 23–29, doi: [10.1080/2090598X.2019.1589929](https://doi.org/10.1080/2090598X.2019.1589929), indexed in Pubmed: [33110659](https://pubmed.ncbi.nlm.nih.gov/33110659/).

12. Liedl B, Goeschen K, Sutherland SE, et al. Can surgical reconstruction of vaginal and ligamentous laxity cure overactive bladder symptoms in women with pelvic organ prolapse? *BJU Int.* 2019; 123(3): 493–510, doi: [10.1111/bju.14453](https://doi.org/10.1111/bju.14453), indexed in Pubmed: [29908047](https://pubmed.ncbi.nlm.nih.gov/29908047/).
13. Martius H. *Lehrbuch Der Gynäkologie*. Springer, Berlin, Heidelberg, Stuttgart 1946.
14. Papa Petros PE. *The Integral Theory System. A Simplified Clinical Approach with Illustrative Case Histories*. <http://www.pelvipерineology.org> (30.05.2021).
15. Clemons JL, Aguilar VC, Tillinghast TA, et al. Patient satisfaction and changes in prolapse and urinary symptoms in women who were fitted successfully with a pessary for pelvic organ prolapse. *Am J Obstet Gynecol.* 2004; 190(4): 1025–1029, doi: [10.1016/j.ajog.2003.10.711](https://doi.org/10.1016/j.ajog.2003.10.711), indexed in Pubmed: [15118635](https://pubmed.ncbi.nlm.nih.gov/15118635/).
16. Okui N, Okui M, Horie S. Improvements in overactive bladder syndrome after polypropylene mesh surgery for cystocele. *Aust N Z J Obstet Gynaecol.* 2009; 49(2): 226–231, doi: [10.1111/j.1479-828X.2009.00965.x](https://doi.org/10.1111/j.1479-828X.2009.00965.x), indexed in Pubmed: [19432617](https://pubmed.ncbi.nlm.nih.gov/19432617/).
17. Nguyen JK, Bhatia NN. Resolution of motor urge incontinence after surgical repair of pelvic organ prolapse. *Journal of Urology.* 2001; 166(6): 2263–2266, doi: [10.1016/s0022-5347\(05\)65547-4](https://doi.org/10.1016/s0022-5347(05)65547-4), indexed in Pubmed: [11696748](https://pubmed.ncbi.nlm.nih.gov/11696748/).
18. Fletcher SG, Haverkorn RM, Yan J, et al. Demographic and urodynamic factors associated with persistent OAB after anterior compartment prolapse repair. *Neurourol Urodyn.* 2010; 29(8): 1414–1418, doi: [10.1002/nau.20881](https://doi.org/10.1002/nau.20881), indexed in Pubmed: [20623545](https://pubmed.ncbi.nlm.nih.gov/20623545/).
19. Bump RC, Mattiasson A, Bø K, et al. The standardization of terminology of female pelvic organ prolapse and pelvic floor dysfunction. *Am J Obstet Gynecol.* 1996; 175(1): 10–17, doi: [10.1016/s0002-9378\(96\)70243-0](https://doi.org/10.1016/s0002-9378(96)70243-0), indexed in Pubmed: [8694033](https://pubmed.ncbi.nlm.nih.gov/8694033/).
20. Barber MD, Walters MD, Bump RC. Short forms of two condition-specific quality-of-life questionnaires for women with pelvic floor disorders (PFDI-20 and PFIQ-7). *Am J Obstet Gynecol.* 2005; 193(1): 103–113, doi: [10.1016/j.ajog.2004.12.025](https://doi.org/10.1016/j.ajog.2004.12.025), indexed in Pubmed: [16021067](https://pubmed.ncbi.nlm.nih.gov/16021067/).

21. Tomoe H. Improvement of overactive bladder symptoms after tension-free vaginal mesh operation in women with pelvic organ prolapse: Correlation with preoperative urodynamic findings. *Int J Urol*. 2015; 22(6): 577–580, doi: [10.1111/iju.12744](https://doi.org/10.1111/iju.12744), indexed in Pubmed: [25754989](https://pubmed.ncbi.nlm.nih.gov/25754989/).
22. Lawrence JM, Lukacz ES, Nager CW, et al. Prevalence and co-occurrence of pelvic floor disorders in community-dwelling women. *Obstet Gynecol*. 2008; 111(3): 678–685, doi: [10.1097/AOG.0b013e3181660c1b](https://doi.org/10.1097/AOG.0b013e3181660c1b), indexed in Pubmed: [18310371](https://pubmed.ncbi.nlm.nih.gov/18310371/).
23. de Boer TA, Salvatore S, Cardozo L, et al. Pelvic organ prolapse and overactive bladder. *Neurourol Urodyn*. 2010; 29(1): 30–39, doi: [10.1002/nau.20858](https://doi.org/10.1002/nau.20858), indexed in Pubmed: [20025017](https://pubmed.ncbi.nlm.nih.gov/20025017/).
24. Goeschen K. Posterior Fornix Syndrome: Comparison of original and modified (2015) post-PIVS anatomic and symptomatic results — a personal journey. *Pelvipерineology*. 2015; 34: 85–91.
25. Caliskan A, Goeschen K, Zumrutbas AE. Long term results of modified posterior intravaginal slingplasty (P-IVS) in patients with pelvic organ prolapse. *Pelvipерineology*. 2015; 34: 94–100.
26. Petros PE. New ambulatory surgical methods using an anatomical classification of urinary dysfunction improve stress, urge and abnormal emptying. *Int Urogynecol J Pelvic Floor Dysfunct*. 1997; 8(5): 270–277, doi: [10.1007/BF02765483](https://doi.org/10.1007/BF02765483), indexed in Pubmed: [9557990](https://pubmed.ncbi.nlm.nih.gov/9557990/).
27. Costantini E, Mearini L, Lazzeri M, et al. Mp81-18 abdominal vs laparoscopic sacrocolpopexy: a randomized controlled trial. *Journal of Urology*. 2016; 196(1): 159–165, doi: [10.1016/j.juro.2015.02.2896](https://doi.org/10.1016/j.juro.2015.02.2896), indexed in Pubmed: [26780167](https://pubmed.ncbi.nlm.nih.gov/26780167/).
28. Nitti V. Clinical testing for overactive bladder. *Rev Urol*. 2002; Suppl 4: S2–6, doi: [10.5489/cuaj.712](https://doi.org/10.5489/cuaj.712), indexed in Pubmed: [16986018](https://pubmed.ncbi.nlm.nih.gov/16986018/).
29. Stuart Reynolds W, Fowke J, Dmochowski R. The Burden of Overactive Bladder on US Public Health. *Current Bladder Dysfunction Reports*. 2016; 11: 8–13, doi: [10.1007/s11884-016-0344-9](https://doi.org/10.1007/s11884-016-0344-9).

30. Szymanowski P, Szepieniec WK, Szweda H. Preperitoneal laparoscopic lateral repair in pelvic organ prolapse — a novel approach. *Ginekol Pol.* 2021; 92(10): 689–694, doi: [10.5603/GP.a2021.0120](https://doi.org/10.5603/GP.a2021.0120), indexed in Pubmed: [34541640](https://pubmed.ncbi.nlm.nih.gov/34541640/).
31. Szymanowski P, Szepieniec WK, Gruszecki P, et al. Laparoscopic hysteropexy in case of total uterus prolapse — case report. *Int J Surg Case Rep.* 2018; 53: 120–126, doi: [10.1016/j.ijscr.2018.10.052](https://doi.org/10.1016/j.ijscr.2018.10.052), indexed in Pubmed: [30391736](https://pubmed.ncbi.nlm.nih.gov/30391736/).
32. Śliwa J, Kryza-Ottou A, Zimmer-Stelmach A, et al. A new technique of laparoscopic fixation of the uterus to the anterior abdominal wall with the use of overfascial mesh in the treatment of pelvic organ prolapse. *Int Urogynecol J.* 2020; 31(10): 2165–2167, doi: [10.1007/s00192-020-04287-4](https://doi.org/10.1007/s00192-020-04287-4), indexed in Pubmed: [32303776](https://pubmed.ncbi.nlm.nih.gov/32303776/).
33. Sliwa J, Kryza-Ottou A, Grobelak J, et al. Anterior abdominal fixation — a new option in the surgical treatment of pelvic organ prolapse. *Ginekol Pol.* 2021; 92(7): 471–474, doi: [10.5603/GP.a2021.0004](https://doi.org/10.5603/GP.a2021.0004), indexed in Pubmed: [33844247](https://pubmed.ncbi.nlm.nih.gov/33844247/).

Table 1. Baseline characteristics of the study population

| | POP 2, 3, 4 (n = 321) | POP = 2 (n = 232) | POP = 3, 4 (n = 90) | p-value |
|----------------------------------|-----------------------|-------------------|---------------------|---------|
| Age (yr) | 56.64 ± 14.84 | 54.42 ± 15.03 | 62.33 ± 12.75 | < 0.001 |
| Premenopausal patients (31.15%) | 100 | 87 (37.66%) | 13 (14.44%) | < 0.001 |
| Postmenopausal patients (68.85%) | 221 | 144 (62.34%) | 77 (85.56%) | < 0.001 |
| BMI [kg/m ²] | 25.74 ± 4.32 | 25.38 ± 4.14 | 26.61 ± 4.64 | 0.019 |
| Parity | 2.10 ± 1.03 | 2.00 ± 0.82 | 2.35 ± 1.41 | 0.113 |
| Urge | 167 (52.02%) | 114 (46.35%) | 53 (58.89%) | 0.124 |

Table 2. Baseline characteristics of patients with POP and coexisting urinary urge symptoms

| | POP = 2 + urge (n = 114) | POP = 3, 4 + urge (n = 54) | P-value |
|--|--------------------------|----------------------------|---------|
|--|--------------------------|----------------------------|---------|

| | | | |
|-------------------------------------|---------------|---------------|---------|
| Age (yr) | 56.18 ± 15.23 | 65.62 ± 11.25 | < 0.001 |
| Premenopausal patients (35.09%) | 40 | 4 (7.55%) | < 0.001 |
| Postmenopausal patients (64.91%) | 74 | 49 (92.45%) | < 0.001 |
| BMI [kg/m ²] | 25.93 ± 4.18 | 27.66 ± 4.88 | 0.045 |
| Parity | 2.13 ± 0.87 | 2.46 ± 1.57 | 0.499 |

Table 3. Changes in urge symptoms depending on POP severity

| CYSTOCELE | | | | |
|----------------------|------------------------------|------------------------|--------------------------|----------------|
| URGE SYMPTOMS | POP 2, 3, 4 (n = 167) | POP 2 (n = 114) | POP 3, 4 (n = 53) | p-value |
| Cure | 148 (88.62%) | 101 (88.60%) | 47 (88.68%) | 0.806 |
| Persistence | 19 (11.38%) | 13 (11.40%) | 6 (11.32%) | 0.806 |

Table 4. Changes in urge symptoms depending on its type

| | Dry | Wet | Mixed |
|-------------|------------|------------|--------------|
| Cure rate | 72/80 | 61/71 | 15/16 |
| % | (90) | (86) | (94) |
| Persistence | 8//80 | 10//71 | 1/16 |
| % | (10) | (14) | (6) |

Table 5. Transition in urge symptoms

| | Dry — > Wet | Wet — > Dry | Mix — > Dry/Wet |
|-------------------|-----------------------|-----------------------|---------------------------|
| Transition | 3 | 5 | 1 |

Table 6. Urge symptoms *de novo*

| | All (154) | Dry | Wet |
|---------------------|------------------|------------|------------|
| Urge <i>de novo</i> | 9 | 3 | 6 |
| | (5.84) | (1.96) | (3.90) |

Table 7. Comparison of results from previous studies

| | Goeschen et al., 2015 [21] | Caliskan et al., 2015 [22] | Liedl et al., 2016 [11] | Petros, 1997 [23] |
|-------------------|-----------------------------------|-----------------------------------|--------------------------------|--------------------------|
| Urge | | | | |
| Cured | | | | |
| Cases/observed | 102/127 | 70/95 | 92/131 | 85/97 |
| Cases | 80.3 | 73.7 | 70.2 | 87.6 |
| Cure rate, % | 73–87 | 65–83 | 62–76 | 83–92 |
| 95% CI | | | | |
| Urge incontinence | | | | |
| Cured | | | | |
| Cases/observed | 44/55 | 49/70 | 72/106 | 74/86 |
| Cases | 80.0 | 70.0 | 67.9 | 86.0 |
| Cure rate, % | 69–91 | 59–81 | 59–77 | 81–91 |
| 95% CI | | | | |