International Journal of Reproduction, Contraception, Obstetrics and Gynecology
Rajbhandary S et al. Int J Reprod Contracept Obstet Gynecol. 2026 Feb;15(2):498-503
www.ijrcog.org
pISSN 2320-1770 | eISSN 2320-1789

DOI: https://dx.doi.org/10.18203/2320-1770.ijrcog20260168

Original Research Article

Correlation of anterior vaginal wall prolapse and lower urinary tract symptoms

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Received: 30 November 2025
Revised: 08 January 2026
Accepted: 09 January 2026

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ABSTRACT

Background: The mechanism of lower urinary tract dysfunction due to anterior vaginal wall prolapse has not been fully understood. There have yet to be any definitive studies in Nepal. The aim of our study was to determine the correlation between the anterior vaginal wall prolapse and presence and severity of lower urinary tract symptoms.
Methods: A cross-sectional observational study was conducted in the department of obstetrics and gynecology at Paropakar Maternity and Women's Hospital. Eighty women aged ≥18 years with anterior vaginal wall prolapse were enrolled. Prolapse was staged (1-4) using the pelvic organ prolapse quantification (POP-Q) system and LUTS were assessed using international consultation on incontinence questionnaire-female lower urinary tract symptoms (ICIQ-FLUTS) long form questionnaire and categorized as storage, voiding, or stress urinary incontinence (SUI) symptoms. Association was calculated using Chi-Square Test and Fisher Exact Test and Spearman's rank correlation.
Results: Among the 80 patients with anterior vaginal prolapse, 15 (18.8%) were POP-Q stage 1, 30 (37.5%) were POPQ stage 2, 24 (30%) were POP-Q stage 3 and 11 (13.8%) were POP-Q stage 4. 61 (76.3%) women had storage symptoms, SUI in 35 (43.8%) and voiding symptoms in 25 (31.3%) women. Stage I anterior vaginal wall prolapse was significantly associated with SUI (p=0.04). Menopausal status of women was also found to be significantly associated with the storage symptoms (p=0.032).
Conclusions: Our study demonstrated that stage I anterior vaginal wall prolapse was significantly associated with stress urinary incontinence (SUI), Also, menopausal status was found to be independently associated with the storage symptoms.

Keywords: Anterior vaginal wall prolapse, Lower urinary tract symptoms, Menopause, Storage, Stress urinary incontinence, Voiding

INTRODUCTION

Anterior vaginal prolapse (cystocele) is the pathological descent of the anterior vaginal wall.[1] Loss of lateral and/or apical support may occur with damage to or impairment of the pelvic muscles, connective tissue attachments, or both, leading to anterior vaginal prolapse.[2] Lower urinary tract symptom (LUTS) encompasses a storage, voiding, and post-micturition symptoms. The term storage symptoms are (increased daytime urinary frequency, nocturia, urgency, urinary incontinence), voiding symptoms are (slow stream, intermittency, hesitancy, straining) and post micturition symptoms are (sensation of incomplete emptying, postmicturition dribble).[3] LUTS and POP are common among women in rural Nepal. Cystocele is the most frequent, advanced, and symptomatic form of POP observed in this population.[4]

There have yet to be any definitive studies that have examined the correlation between POP and lower urinary

tract dysfunction in Nepal. The aim of our study was to determine the correlation between stage of anterior vaginal wall prolapse and presence and severity of lower urinary tract symptoms. Recognizing the association between anterior vaginal wall prolapse and the lower urinary tract symptoms will help in early diagnosis and management thereby improving the quality of life of women.

METHODS

An observational cross-sectional study was conducted in the department of obstetrics and gynecology at Paropakar Maternity Hospital, Kathmandu, Nepal after taking ethical approval from the Institutional review Committee (Reference no:1552/2081/2082). The study was conducted from June 2025 to September 2025.

Our study included women >18 years with anterior vaginal wall prolapse attending the outpatient department and ward of Paropakar maternity and women's hospital. Women who had undergone pelvic surgeries for incontinence such as Burch Colposuspension and mid-urethral sling surgeries, vault prolapse and neurological conditions affecting bladder function were excluded from our study.

A non-probability purposive sampling method was used. A sample size comprising of 80 participants was calculated using the Cohen's Formula.[5]

The demographic data and examination findings were entered in the structured proforma. The POP-Q (pelvic organ prolapse quantification system), was used to stage prolapse into stages I to IV. The points were noted as Aa, Ba and C in the anterior vaginal wall. The hymen was the fixed point of reference used throughout the POP-Q system of quantitative prolapse description. The lower urinary tract symptoms were assessed using the international consultation on incontinence questionnaire female lower urinary tract symptoms long form module (ICIQ-FLUTS LF), questionnaire which was translated in Nepali.[6,7]

The LUTS were categorized into three groups: the storage symptoms, voiding symptoms and stress urinary incontinence. Using the (ICIQ-FLUTS LF) questionnaire, the LUTS score was calculated for each patient.

All the data were entered in a structured proforma and analyzed using SPSS version 26 Inc, Chicago, USA. Categorical variables were described using frequency and percentage. Mean, standard deviation, median and inter quartile range were used to represent numerical data for normal as well as non-normal distribution. The Chi-square test and Fischer Exact test was used to analyze association between background parameters and lower urinary tract symptoms. Spearman correlation coefficient was used for correlations between different anterior vaginal wall prolapse and LUTS score. A p value of less than 0.05 was considered to be significant.

RESULTS

Among the 80 patients with anterior vaginal wall prolapse (AVWP) the mean age of patient population was 57±9.7 years (range 34-76 years). The baseline characteristics and distribution among various parameters is presented in Table 1. Among the 80 patients with anterior vaginal prolapse, 15 (18.8%) were classified as POP-Q stage 1, 30 (37.5%) were POP-Q stage 2, 24 (30%) were POP-Q stage 3 and 11 (13.8%) were POP-Q stage 4.

Table 1: Baseline characteristics and distribution of anterior vaginal wall prolapse (n=80).

Indicators	Frequency	Percent
Age (years) (Mean±SD)	57±9.7	
Parity		
Mean±SD	4.3±2.2	
Nulli (0)	2	2.5
Primi (1)	1	1.3
Multi (>1)	77	96.3
Body mass index (BMI)		
Underweight	16	20
Normal	42	52.5
Overweight	18	22.5
Obese	4	5
Menopausal status		
Yes	62	77.5
No	18	22.5
Smoking status		
Non-smoker	60	75.0
Smoker	20	25.0
POP-Q staging		
POP-Q Stage 1	15	18.8
POP-Q Stage 2	30	37.5
POP-Q Stage 3	24	30.0
POP-Q Stage 4	11	13.8

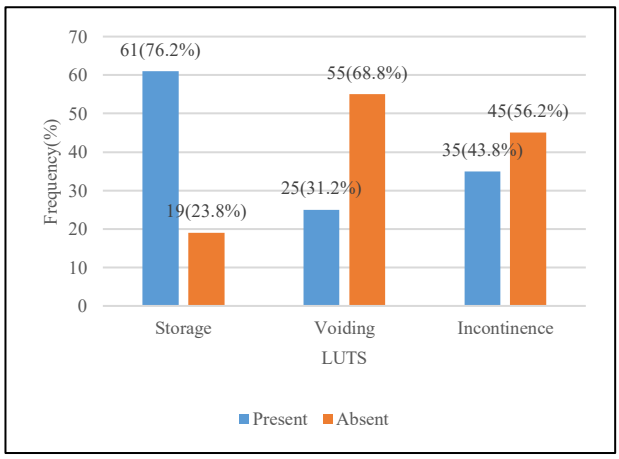

Figure 1: Distribution of lower urinary tract symptoms in patients with anterior vaginal wall prolapse (n=80).

Table 2: Comparison of LUTS with anterior vaginal wall prolapse (POP-Q staging).

POP-Q Stage	Storage (%)			Voiding (%)			Stress urinary incontinence (%)		
	Present n=61	Absent n=19	P value	Present n=25	Absent n=55	P value	Present n=35	Absent n=45	P value
Stage I	13 (21.3)	2 (10.5)	0.244*	3 (12.0)	12 (21.8)	0.236	10 (28.6)	5 (11.1)	0.041
Stage II	23 (37.7)	7 (36.8)	0.946	9 (36.0)	21 (38.2)	0.852	16 (45.7)	14 (31.1)	0.135
Stage III	17 (27.9)	7 (36.8)	0.456	9 (36.0)	15 (27.3)	0.430	7 (20.0)	17 (37.8)	0.085
Stage IV	8 (13.1)	3 (15.8)	0.768*	4 (16.0)	7 (12.7)	0.694	2 (5.7)	9 (20.0)	0.066

Associations between variables were analyzed using the Chi-square test; Fisher exact test was used as necessary*. Statistical significance was set at $p<0.05$.

Table 3: Correlation between POP-Q stage and LUTS score.

			POP stage	LUTS score
Spearman's rho	POP stage	Correlation coefficient	1.000	-0.077
		Sig. (2-tailed)		0.495
		N	80	80
	LUTS score	Correlation coefficient	-0.077	1.000
		Sig. (2-tailed)	0.495	
		N	80	80

Correlation analysis was performed using Spearman's rank correlation coefficient shows very weak negative correlation between POP-Q Stage and LUTS Score (r=-0.077, p=0.495, indicating no significant relationship between severity of prolapse and overall LUTS score in these patients. Sig.(2-tailed): Two tailed significance (p value). N: Number of participants.

In our study all the patients with AVWP had some form of LUTS with overlapping symptoms seen in many patients. Frequency of such symptoms is presented in Figure 1. As seen in our study, 61 (76.3%) of women had storage symptoms, followed by stress urinary incontinence in 35 (43.8%) women and voiding symptoms in 25 (31.3%) women. In our study all the patients with AVWP had some form of LUTS with overlapping symptoms seen in many patients. Frequency of such symptoms is presented in Figure 1. As seen in our study, 61 (76.3%) of women had storage symptoms, followed by stress urinary incontinence in 35 (43.8%) women and voiding symptoms in 25 (31.3%) women.

Table 2 describes the association of various LUTS (storage, voiding, SUI) with severity of AVWP according to POP-Q staging. It was seen stage 1AVWP was significantly associated with stress incontinence. As seen in Table 2, 10 (28.6%) patients with POP-Q stage 1 anterior vaginal wall prolapse were significantly associated with incontinence symptom, $p<0.05$. Whereas no significant result was found on analyzing the relationship of other stages of anterior vaginal wall prolapse with LUTS.

Table 4: Association between background parameters and LUTS symptoms.

Parameters	Indicator	Storage		Test statistics (t-value/χ^2 value)	P value
		Present (%)	Absent (%)		
Age	Mean±SD	56.5±9.7	59.7±9.8	1.265	0.21
Parity	Mean±SD	4.7±2.2	3.8±1.7	-1.43	0.157
BMI	Normal	32 (52.5)	10 (52.6)	0.027	0.987
	Underweight	12 (19.7)	4 (21.1)		
	Overweight	17 (27.9)	5 (28.3)		
Smoking status	Non smoker	15 (24.6)	5 (26.3)	0.023	0.879
	Smoker	46 (75.4)	14 (73.7)		
Menopausal status	Menopausal	18 (94.7)	44 (72.1)	4.246	0.032*
	Non-menopausal	1 (5.3)	17 (27.9)		
Voiding					
Age	Mean±SD	57.0±10.4	57.4±9.5	-0.144	0.885
Parity	Mean±SD	4.0±2.0	4.7±2.2	1.434	0.156
BMI	Normal	15 (60.0)	27 (49.1)	0.843	0.656
	Underweight	4 (16.0)	12 (21.8)		
	Overweight	6 (24.0)	16 (29.1)		

Continued.

Parameters	Indicator	Storage		Test statistics (t-value/χ^2 value)	P value
		Present (%)	Absent (%)		
Smoking status	Non smoker	6 (24.0)	14 (25.5)	0.019	0.889
	Smoker	19 (76.0)	41 (74.5)		
Menopausal status	Menopausal	41 (74.5)	21 (84.0)	0.881	0.262*
	Non-menopausal	14 (25.5)	4 (16.0)		
Incontinence					
Age	Mean±SD	55.8±10.2	58.4±9.3	1.217	0.227
Parity	Mean±SD	4.1±1.4	4.7±2.5	1.244	0.217
BMI	Normal	17 (48.6)	25 (55.6)	1.479	0.477
	Underweight	6 (17.1)	10 (22.2)		
	Overweight	12 (34.3)	10 (22.2)		
Smoking status	No	8 (22.9)	12 (26.7)	0.152	0.696
	Yes	27 (77.1)	33 (73.3)		
Menopausal status	Absent	38 (84.4)	24 (68.6)	2.845	0.092
	Present	7 (15.6)	11 (31.4)		

Values are expressed as mean±SD for continuous variables and n (%) for categorical variables. Independent-samples t-test was used for continuous variables (Age, Parity). Chi-square (χ^2) test or Fisher's exact test (denoted by *) was used for categorical variables. Statistical significance was set at $p<0.05$.

The lower urinary tract scoring (LUTS) was done using the ICIQ-FLUTS symptom scoring module. The lowest score obtained was 4 and highest score was 37. The average lower urinary tract symptom (LUTS) score among the patients was varied at various POP-Q stages. The mean LUTS score of patients with stage I prolapse was 16.6±9.1, with stage II 16.3±7.2, Stage III 12.7±6.3 and Stage IV 16.4±5.1. The variances in LUTS scores between POP-Q stages were not significant (p=0.240).

Table 3 shows the correlation analysis among POP-Q stage and LUTS scoring. Correlation analysis using Spearman's rho showed a very weak negative correlation between POP-Q stage and LUTS score (r=-0.077, p=0.495), indicating no significant relationship between the stage of anterior vaginal wall prolapse and overall LUTS in these patients.

As shown in Table 4, significant association was found between menopausal status of women and storage symptoms. whereas, other parameters like (age, parity, body mass index, smoking status) and different lower urinary tract symptoms (storage, voiding, SUI) showed no significant association.

DISCUSSION

Our study found that only stage I anterior vaginal wall prolapse was significantly associated with stress urinary incontinence (SUI). Consistent with our findings, Romanzi revealed that mild anterior vaginal wall prolapse has a higher occurrence of stress urinary incontinence. This finding supports the theory that early-stage anterior descent impairs urethral support, leading to SUI. The relationship between stress urinary incontinence and POP is based on the normal anatomy and physiology of the pelvic floor.[8,9] Similarly in a study of correlations between severity of anterior vaginal wall prolapse and parameters of urethral pressure profile by Chang, it was seen that AVWP significantly attenuated urethral pressure.[10]

DeLancey, postulated that severity in stages of anterior vaginal wall prolapse might cause divergent effects on urinary continence based on an anatomical and mechanical perspective.[2] Bu et al found that 93.4% of women with SUI had a grade I or II cystocele, compared to 47.5% of those with prolapse alone ($p<0.05$), highlighting the central role of early anterior support defects in SUI.[11]

Samuelsson et al, reported the prevalence of UI was 58% among women with anterior vaginal wall prolapse, 55% in those with posterior prolapse, and 72% in women with apical prolapse. However, upon multivariate logistic regression analysis, anterior prolapse was the only compartment found to be significantly associated with UI, and women with anterior prolapse are 2.5 times more likely to have UI than women without anterior prolapse.[12]

However, the impact of POP on the occurrence of stress urinary incontinence is controversial. In a study by Rada et al, it was observed that the presence of a cystocele did not significantly impact bladder neck mobility.[13]

Also, Schimpf et al, reported that women without anterior vaginal wall prolapse are more likely to report stress urinary incontinence. Ellerkmann et al, noted a weak correlation between advancing anterior wall prolapse and urinary incontinence.[14,15]

Other anatomical changes, such as voiding difficulties caused by severe cystoceles, may mask incontinence symptoms.[4]

However, Brubaker et al, analyzing data from two large female SUI surgical cohorts, found that POP stage was not strongly associated with urinary incontinence severity.[16]

Our findings showed no significant association between anterior vaginal wall prolapse and storage symptoms (urgency, frequency or nocturia). These findings are consistent with findings by Schimpf et al, which reported no differences in urgency or urodynamic parameters between early and advanced prolapse groups. Similarly, Espuña-Pons et al, observed there is no correlation between OAB syndrome and POPs.[9,14]

The integral theory, states that OAB and detrusor overactivity is caused by a normal but prematurely activated micturition reflex due to poor support of stretch receptors of the bladder base caused by a lax vagina.[17]

In our study no association was seen between anterior vaginal wall prolapse and voiding symptoms. Although in previous studies, it was seen that women with advanced POP are more likely to have voiding difficulties due to urethral kinking and bladder outlet obstruction.[8]

In our cohort, Spearman's rank correlation confirmed the lack of a significant association between POP-Q stage and overall LUTS score (ρ=-0.077, p=0.495, n=80), highlighting that anatomical severity alone does not predict urinary symptom burden. In a study by Liao et al, they found that only OAB had moderate correlation with anterior vaginal wall prolapse.[5]

Contrary to our findings, in a study by Smita et al, it was seen that strong association exist between POP and micturition symptoms.[18]

A significant association was seen between menopausal status of women and storage symptoms (p value 0.032) which are consistent with those of Zhu et al, menopausal status appears to influence storage symptoms independently of prolapse stage. This finding is consistent with previous research showing that the hormonal changes of menopause exert independent effects on lower urinary tract function. The decline in circulating estrogen after menopause leads to atrophic changes in the bladder, urethra and vaginal epithelium, reduced vascularity, and alterations in collagen and elastin content. These changes can compromise urethral closure pressure and alter bladder sensory pathways, predisposing to urgency, increased frequency and nocturia, even in the absence of significant prolapse.[19]

The limitation of our study is that it is a single centre study with small sample size that may not reflect the scenario of the entire population.

CONCLUSION

Our study demonstrated that stage I anterior vaginal wall prolapse is significantly associated with stress urinary incontinence (SUI), suggesting that even mild anterior vaginal descent may impair urethral support and contribute to leakage during physical exertion. Storage symptoms and voiding symptoms were not associated with any stage of anterior vaginal wall prolapse. There was lack of a significant association between POP-Q stage and overall LUTS score highlighting that anatomical severity alone does not predict urinary symptom burden. Also, menopausal status was found to be independently associated with the storage symptoms.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee (Reference no:1552/2081/2082)

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Cite this article as: Rajbhandary S, Shrestha M, Dangal G, Basnet S. Correlation of anterior vaginal wall prolapse and lower urinary tract symptoms. Int J Reprod Contracept Obstet Gynecol 2026;15:498-503.