A Single-Center Retrospective Cohort Study Exploring the Correlation Of Vaginal Wall Prolapse and Voiding Dysfunction

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Hypothesis / aims of study

Voiding dysfunction (VD) is a general term that refers to any problem with the ability to urinate normally. It encompasses a wide range of issues, all of which involve difficulty emptying the bladder completely (1). Pelvic organ prolapse (POP) and voiding dysfunction are two prevalent conditions that often intertwine, significantly impacting the quality of life for many women. While the link between these conditions is well-established, the specific role of different vaginal wall prolapse subtypes in the development of voiding dysfunction remains a subject of ongoing investigation. This intricate relationship necessitates a deeper understanding of how specific anatomical changes in POP contribute to urinary dysfunction, paving the way for more tailored diagnostic and treatment approaches (2). The exact cause of VD is complex and can vary from person to person. However, cystocele or prolapse, which involves the weakening of tissues supporting the bladder, is a common cause that can disrupt normal urinary function. Cystocele, a prolapse of the vaginal wall that can lead to increased resistance in the urinary tract and impaired urination, is also associated with urinary incontinence, particularly when involving the anterior vaginal wall (3). A limited number of studies, using multi-channel urodynamic testing on over 100 patients, have explored the link between anterior vaginal wall prolapse and urinary disorders. However, many earlier studies predate standardized prolapse correction techniques, making their results difficult to interpret.

Study design, materials and methods

This retrospective cohort study, approved by the Ethics Committee of Tehran University of Medical Sciences, examined women with voiding dysfunction (VD) who visited the pelvic floor disorders clinic at Imam Khomeini Hospital in Tehran from March 2018 to February 2020. The study included women aged 18 and older with VD, excluding those with prior urinary incontinence surgeries, specific neurological conditions, uncontrolled diabetes, disc issues, congenital urinary tract anomalies, urogenital fistulas, and urethral strictures. Data were gathered from electronic records, including detailed questionnaires (UDI-6 and IIQ-7) to identify urinary incontinence (UI) and assess its impact on quality of life. Symptoms of VD included hesitancy, straining to void, weak flow, intermittent stream, post-void dribbling, and incomplete voiding. The degree of prolapse was evaluated using the POP-Q system, which measures various vaginal points, with assessments performed by qualified specialists. Urodynamic evaluations included a two-channel cystometry study and a pressure flow study for patients with VD symptoms. In this study, patients were categorized into three groups based on the prolapse of the anterior, posterior, and apical vaginal walls. Voiding problems in women were assessed using urodynamic criteria, specifically defining impaired bladder emptying as a peak flow (Q-MAX) of less than 12 mL/s, provided at least 100 cc had been voided. Additional criteria included a residual urine volume greater than 100 cc, a detrusor pressure during urination of less than 20 mmHg, or pelvic floor muscle contraction during urination. The selection process for patients is illustrated in a flowchart. For statistical analysis, data were recorded and analyzed using SPSS version 23, with a significance level set at $p < 0.05$. Descriptive statistics included absolute and relative frequencies for qualitative data and standard deviations for quantitative data. The Kolmogorov-Smirnov test was used to assess the normality of data distribution, which indicated a nonparametric distribution for all variables. Consequently, the Kruskal-Wallis test was employed for group comparisons, while Chi-square tests were used for quantitative comparisons. Additionally, correlation analysis for ordinal scale variables was conducted using Kendall's tau-b, a non-parametric measure of association.

Results and interpretation

This study examined urinary symptoms and bladder function in 382 patients, most of whom (82%) had a history of vaginal delivery. The average severity of urinary symptoms and pelvic floor muscle weakness was high. A majority of patients reported symptoms like intermittent stream (53.1%), incomplete emptying (70.3%), and post-voiding dribbling (57%). Electromyography showed that a significant number of patients (68.4%) had inactive pelvic floor muscles. While most patients (92.7%) had a post-void residual urine volume (PVR) less than 100 ml, a smaller proportion (2.2%) had a PVR greater than 100 ml. The findings suggest a high prevalence of urinary symptoms and pelvic floor dysfunction in this population, highlighting the need for further research on underlying causes and potential interventions. The findings indicated that as the stage of prolapse increased across the three areas—anterior, posterior, and apical—patients experienced more severe symptoms.

Notably, a significant correlation emerged between the severity of urinary symptoms and the stage of prolapse specifically within the apical region ($p=0.001$). No substantial connections were found with the anterior and posterior regions ($p>0.05$). According to the table below, symptoms of an intermittent stream were significantly linked to stages III and IV of prolapse in both the apical and anterior areas ($p=0.02$ for apical and $p=0.006$ for anterior). Additionally, the symptoms associated with straining to void were significantly correlated with stages III and IV of prolapse in the apical and anterior regions as well ($p<0.001$) (Table 1). However, while symptoms of incomplete bladder emptying did show a significant relationship with the prolapse stages III and IV in the apical region ($p=0.001$), no notable associations were present for other parameters across varying vaginal regions ($p>0.05$) as illustrated in Table 2. The findings of the current study demonstrated a notable correlation between intermittent stream symptoms and the severity of prolapse in both the apical and anterior regions. Furthermore, the symptoms associated with straining to urinate were also significantly linked to the stage of prolapse in these areas.

Table 1. Correlation between urinary symptoms and stage of prolapse.

Variables		Apical			Posterior			Anterior		
		I	II	III,IV	I	II	III,IV	I	II	III,IV
Hesitancy	Yes	45 (44.1)	23 (22.5)	34 (33.3)	18 (17.5)	70 (68)	15 (14.6)	10 (9.7)	53 (51.5)	40 (38.8)
	No	192 (53.2)	69 (19.1)	100 (27.7)	50 (13.8)	256 (70.7)	56 (15.5)	34 (9.4)	206 (56.9)	122 (33.7)
P-value		0.12			0.46			0.44		
Incomplete voiding	Yes	170 (52.3)	67 (20.6)	88 (27.1)	51 (15.6)	99 (71.7)	49 (15)	36 (11)	177 (54.1)	114 (34.9)
	No	67 (48.6)	25 (18.1)	46 (33.3)	17 (12.3)	227 (69.4)	22 (15.9)	8 (5.8)	82 (59.4)	48 (34.8)
P-value		0.29			0.43			0.50		
Intermittent Stream	Yes	113 (45.9)	55 (22.4)	78 (31.7)	30 (12.1)	175 (70.9)	42 (17)	24 (9.7)	120 (48.60	103 (41.7)
	No	124 (57.1)	37 (17.1)	56 (25.8)	38 (17.4)	151 (69.3)	29 (13.3)	20 (9.2)	139 (63.8)	59 (27.1)
P-value		0.02			0.07			0.006		
Poor flow	Yes	39 (58.2)	11 (16.4)	17 (25.4)	11 (16.4)	46 (68.7)	10 (14.9)	6 (9)	36 (53.7)	25 (37.3)
	No	198 (50)	81 (20.5)	117 (29.5)	57 (14.3)	280 (70.4)	61 (15.3)	38 (9.5)	223 (56)	137 (34.4)
P-value		0.25			0.73			0.65		
Post voiding dribble	Yes	140 (53.2)	47 (17.9)	76 (28.9)	35 (13.2)	187 (70.6)	43 (16.2)	18 (6.8)	156 (58.9)	91 (34.3)
	No	97 (48.5)	45 (22.5)	58 (29)	33 (16.5)	139 (69.5)	28 (14)	26 (13)	103 (51.5)	71 (35.5)
P-value		0.48			0.28			0.53		
Straining to void	Yes	52 (38.8)	28 (20.9)	54 (40.3)	20 (14.9)	90 (67.2)	24 (17.9)	8 (6)	62 (46.3)	64 (47.8)
	No	185 (56.2)	64 (19.5)	80 (24.3)	48 (14.5)	236 (71.3)	47 (14.2)	36 (10.9)	197 (59.5)	98 (29.6)
P-value		0.0001			0.56			0.0001		

Table 2. Relation between urodynamic parameters and stage of prolapse

Variables		Apical			Posterior			Anterior		
		I	II	III,IV	I	II	III,IV	I	II	III,IV
Qmax12	>12	155 (51.2)	60 (19.8)	88 (29)	48 (15.8)	211 (69.4)	45 (14.8)	27 (8.9)	173 (56.9)	104 (34.2)
	<12	38 (48.7)	17 (21.8)	23 (29.5)	9 (11.5)	57 (73.1)	12 (15.4)	10 (12.8)	41 (52.6)	27 (34.6)
P-value		0.90			0.64			0.54		
Pdet20	>20	84 (53.8)	29 (18.6)	43 (27.6)	22 (14)	106 (67.5)	29 (18.5)	18 (11.5)	87 (55.4)	52 (33.1)
	<20	40 (47.6)	11 (13.1)	33 (39.3)	14 (16.7)	59 (70.2)	11 (13.1)	7 (8.3)	44 (52.4)	33 (39.3)
P-value		0.15			0.53			0.54		
PVR100	>100	1 (6.7)	4 (26.7)	10 (66.7)	2 (13.3)	10 (66.7)	3 (20)	0(0)	7 (46.7)	8 (53.3)
	<100	226 (53.3)	82 (19.3)	116 (27.4)	61 (14.3)	302 (70.9)	63 (14.8)	42 (9.9)	236 (55.4)	148 (34.7)
P-value		0.001			0.85			0.21		

Conclusions

This study investigated the relationship between prolapse stages in the apical and anterior regions, urinary symptoms (intermittent stream and straining to void), and post-void residual urine (PVR) in women with voiding dysfunction (VD). The findings showed that the symptoms of intermittent stream and straining to void were associated with prolapse stages in both apical and anterior regions. However, only a high PVR (>100 ml) was significantly linked to the stage of apical prolapse, suggesting a potential connection between apical prolapse and urinary retention. While previous research indicated a correlation between cystocele and increased PVR, this study found no statistically significant relationship between cystocele and high PVR in VD patients. The authors recommend further investigation with a larger sample size to better understand the relationship between PVR and prolapse stages.

References

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