ORIGINAL ARTICLE

Persistent Lower Urinary Tract Symptoms Post Trans Urethral Resection of Prostate: Does the Preoperative Symptoms Duration Have a Predictive Role

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Abstract

Background: ***This study investigates whether the duration of preoperative lower urinary tract symptoms (LUTS) predicts their persistence following transurethral resection of the prostate (TURP).***

Patients and Methods: ***A retrospective observational study was conducted on 131 patients who underwent TURP between March 2020 and December 2023, with a minimum follow-up of six months. Patients were categorized into two groups: those with persistent LUTS (P-LUTS) and those without (NP-LUTS). Baseline demographics, clinical characteristics, uroflowmetry parameters, and perioperative data were analyzed. Univariate and multivariate logistic regression models were applied to identify predictors of persistent LUTS.***

Results: ***Patients in the P-LUTS group had significantly shorter preoperative symptom duration than those in the NP-LUTS group (35.8 ± 14.5 vs. 45.9 ± 23.8 months, p = 0.017). Higher IPSS storage sub-scores (OR: 1.362, 95% CI: 1.024–1.811, p = 0.034) and increased Qmax (OR: 1.531, 95% CI: 1.138–2.061, p = 0.005) were identified as independent predictors of persistent LUTS. ROC curve analysis showed that an IPSS-storage subscore threshold of 7.0 had a sensitivity of 71.4% and a specificity of 46.8% (AUC: 0.636), while a Qmax threshold of 9.0 mL/sec had a sensitivity of 40.0% and a specificity of 95.3% (AUC: 0.660).***

Conclusion: ***The preoperative LUTS duration is not associated with a higher likelihood of persistent symptoms post-TURP. Preoperative IPSS-storage subscore and Qmax may serve as valuable predictors of postoperative symptom persistence. These findings can aid in patient selection and counseling to optimize surgical outcomes.***

Keywords: Benign prostatic hyperplasia; Preoperative Symptoms; Urinary Tract Symptoms; Trans urethral Resection of the Prostate

1. Introduction

Transurethral resection of the prostate (TURP) is considered the gold standard for managing bladder outlet obstruction (BOO) secondary to benign prostatic hyperplasia (BPH). Despite its effectiveness, a subset of patients continues to experience persistent lower urinary tract symptoms (LUTS) postoperatively, which significantly impacts their quality of life. While surgical techniques have evolved over time, the underlying mechanisms contributing to the persistence of LUTS remain insufficiently understood, warranting further investigation .[1]

Most existing studies have focused on factors such as patient age, baseline severity of LUTS, and surgical techniques as predictors of post-TURP outcomes. However, the role of preoperative symptom duration in predicting persistent LUTS has not been adequately explored. One study suggested that the duration of preoperative medical therapy might serve as an independent predictor of favorable surgical outcomes in BPH management .[2,3] This highlights the need for further investigation into the duration of preoperative symptoms and their potential impact on post-TURP outcomes.

It is hypothesized that prolonged preoperative LUTS may be associated with persistent symptoms post-surgery due to irreversible bladder remodeling. Chronic BOO results in detrusor muscle hypertrophy, reduced bladder compliance, and increased collagen deposition, changes that may impair bladder function, even after the surgical relief of obstruction.

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The objective of this study is to determine whether the duration of preoperative LUTS can predict their persistence following TURP. Understanding this relationship could improve patient selection, guide preoperative counseling, and optimize surgical planning, ultimately leading to better postoperative outcomes and enhanced patient satisfaction.

2. Patients and methods

This observational case-control study included patients who underwent TURP at our institution between March 2020 and December 2023, with a minimum follow-up of six months. The study was approved by the Ethical Committee of the Urology Department, Al-Azhar University, Cairo, Egypt. Informed consent was not required from participants, in accordance with institutional ethical guidelines.

Patient medical records were reviewed, and those who met any of the following criteria were excluded: incomplete medical records, prior surgical interventions for BPH, a history of urologic malignancies or urethral stricture, neurological disorders affecting micturition, preoperative chronic retention (post-void residual (PVR) volume exceeding 300 mL), urodynamically confirmed detrusor dysfunction, detrusor-sphincter dyssynergia, perioperative complications (such as persistent infection, incontinence, or urethral stricture), or use of postoperative medications affecting micturition function.

Preoperative data included patient demographics, clinical characteristics (such as the symptoms duration and International Prostate Symptom Score (IPSS)), laboratory results (serum prostate-specific antigen (PSA), serum creatinine, and hemoglobin (Hb) levels), ultrasound measurements (total prostate volume (TPV), transitional zone volume (TZV), PVR, associated bladder pathology, and upper tract conditions), and uroflowmetry parameters (maximum flow rate (Qmax) and voided volume). Intraoperative data included anesthetic type, surgeon experience, energy source (monopolar vs. bipolar), and any reported intraoperative complications. Postoperative data included early complications, duration of hospital stay, catheterization time, and pathology of the resected tissue. Follow-up data included delayed complications, IPSS scores, and the need for retreatment (either medical or surgical interventions).

The primary objective of the study was to determine whether the duration of preoperative lower urinary tract symptoms (LUTS) predicts the persistence of symptoms following TURP. Secondary objectives were to identify perioperative predictors of patient-reported symptom improvement. Persistent LUTS post-TURP were defined as the continuous presence of symptoms with an IPSS >7 for at least 6 months after surgery. Patients requiring retreatment within the first 6 months were classified as having persistent LUTS.

Data analysis was performed using SPSS version 26 (IBM Corp., Armonk, NY, USA). Quantitative variables are presented as means with standard deviations (SD) or medians with interquartile ranges (IQR), as appropriate. Group comparisons were conducted using the independent sample t-test or Mann-Whitney U test for continuous variables. Categorical variables are expressed as frequencies and percentages, with comparisons made using the Chi-square test or Fisher's exact test, as appropriate.

Univariate logistic regression was employed to identify potential predictors of persistent LUTS post-TURP, and variables with significant associations were further analyzed using multivariate logistic regression to determine independent risk factors. A receiver operating characteristic (ROC) curve was generated to assess predictive values and establish optimal cutoff points for preoperative variables associated with postoperative LUTS persistence. A two-tailed p-value of <0.05 was considered statistically significant.

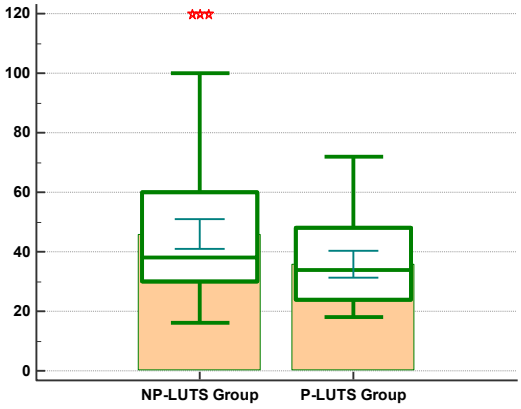
The sample provided sufficient statistical power (80%) to detect meaningful associations between preoperative symptom duration and postoperative LUTS persistence, with an alpha error of 0.05.

3. Results

A total of 131 patients were included in the study, with a mean age of 65.6 ± 8.1 years and a mean symptom duration of 45.9 ± 23.8 months. Based on the presence of postoperative LUTS, patients were divided into two groups: the Persistent LUTS (P-LUTS) group and the Non-Persistent LUTS (NP-LUTS) group.

Data on operative time, irrigant fluid volume, and resected prostate weight were not reported. Additionally, surgeon experience could not be accurately assessed due to variability in operator experience across cases. Consequently, these variables were excluded from the analysis.

The preoperative symptom duration was significantly shorter in the P-LUTS group (mean: 35.8 ± 14.5 months; 95% CI: 31.4–40.2) compared to the NP-LUTS group (mean: 45.9 ± 23.8 months; 95% CI: 40.8–60.0 months) (p=0.017) (Figure 1).



LUTS, Lower urinary tract symptoms; NP, Non-persistence; P, Persistence

Figure 1. Box-and-Whisker plot and related data demonstrating the duration of preoperative urinary symptoms in each group.

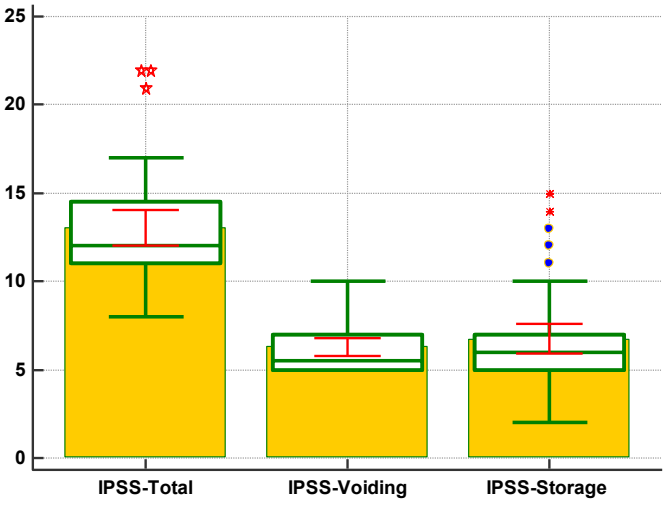
Baseline and perioperative data were compared between the two groups (Table 1). The IPSS storage sub-score, Quality of Life (QoL) score, serum PSA levels, and Qmax were significantly higher in the P-LUTS group compared to the NP-LUTS group.

Table 1. Perioperative data, overall and in each group.

	OVERALL (N=131)	NP-LUTS (N=87)	P-LUTS (N=44)	P-VALUE
AGE (YEARS), MEAN±SD	65.6±8.1	64.4±7.4	67.8±9.0	0.126
BMI, MEAN±SD	27.0±2.5	27.1±2.7	26.8±2.2	0.790
COMORBIDITIES, N (%)	46 (35.1)	29 (33.3)	17(38.6)	0.548
DM	43 (32.8)	25 (28.7)	18(40.9)	0.161
CVD	36 (27.5%)	21 (24.1)	15(34.1)	0.228
CHRONIC HEPATITIS C				
BPH MEDICATIONS, N (%)	131(100)	87 (100)	44 (100)	--
ALPHA-BLOCKERS	40 (30.5)	26 (29.9)	14(31.8)	0.821
5-ARIS	32 (24.4)	18 (20.7)	14(31.8)	0.161
ANTICHOLINERGICS/ ANTIMUSCARINICS				
SYMPTOMS, N (%)				
LUTS	131(100.0)	87 (100)	44 (100)	--
HEMATURIA	11 (8.4)	7 (8.0)	3 (6.8)	0.817
RENAL IMPAIRMENT	3 (2.3)	1 (1.1)	2 (4.5)	0.233
FIXED CATHETER	17 (13.0)	8 (9.2)	9 (20.5)	0.070
IPSS TOTAL, MEAN±SD	20.0±3.0	19.8±3.2	20.3±2.5	0.278
IPSS VOIDING SUBSCORE, MEAN±SD	11.9±2.2	12.1±2.3	11.5±1.9	0.253
IPSS STORAGE SUBSCORE, MEAN±SD	8.1±1.9	7.7±1.5	8.9±2.5	0.017
QOL SCORE, MEAN±SD	3.7±0.7	3.6±0.8	3.9±0.5	0.003
SERUM PSA (NG/ML), MEAN±SD	3.4±1.0	3.2±0.8	3.7±1.2	0.003
TPV (CC), MEAN±SD	48.2±10.7	47.8±11.4	49.3±9.9	0.298
TZV (CC), MEAN±SD	32.5±8.2	32.9±8.0	31.5±8.6	0.150
PVR URINE VOLUME (ML), MEAN±SD	83.6±45.1	80.3±45.4	91.1±44.1	0.432
ENERGY SOURCE, N (%)	23 (17.6)	15 (17.2)	8 (18.2)	0.894
MONOPOLAR	108 (82.4)	72 (82.8)	36 (81.8)	
BIPOLAR				
HISTOPATHOLOGY OF THE RESECTED TISSUE, N (%)	112 (85.5)	74 (85.1)	38 (86.4)	0.841
BPH	19 (14.5)	13 (14.9)	6 (13.6)	
PBH+PROSTATITIS				

5-ARIs: 5-alpha reductase inhibitors, BMI: Body mass index, BPH: Benign prostatic hyperplasia, CVD: Cardiovascular disease, DM: Diabetes mellitus, IPSS: International prostate symptom score, NP: Non- persistent, LUTS: Lower urinary tract symptoms, P: Persistent, PSA, Prostate-specific antigen, QoL: Quality of life.

In the P-LUTS group, 12 patients (27.3%) had persistent voiding symptoms, 18 patients (40.9%) had persistent storage symptoms, and 14 patients (31.8%) had mixed symptoms. The mean total IPSS was 13.1±3.2 (median (IQR): 12.0 (3.8)). The 6-month total IPSS, along with the storage and voiding subscores, are demonstrated in Figure 2.



IPSS, Intenational Prostate Symprom Score

Figure 2: Box-and-Whisker plot demonstrating the persistent LUTS in P-LUTS group, 6 months post-TURP.

Univariate regression analysis revealed that advanced age, shorter symptom duration, higher IPSS storage sub-score, higher QoL score, elevated serum PSA levels, and higher Qmax were all significantly associated with persistent LUTS following TURP (P<0.05) (Table 2). However, multivariate analysis identified that only a higher IPSS storage sub-score (OR: 1.362, 95% CI: 1.024–1.811, p=0.0134) and higher Qmax (OR: 1.53, 95% CI: 1.138–2.061, p=0.005) were independent predictors of persistent LUTS post-TURP (Table 3).

Table 2. Univariate binary logistic regression

analysis of predictors for persistent lower urinary tract symptoms after transurethral resection of the prostate.

	B	OR	95% CI OF OR	P VALUE
AGE	0.055	1.056	1.007 to 1.108	0.025
DM	-0.231	0.794	0.374 to 1.686	0.548
PREOPERATIVE CATHETER	-0.932	0.394	0.140 to 1.105	0.077
SYMPTOMS' DURATION	-0.027	0.974	0.953 to 0.995	0.015
IPSS-TOTAL	0.054	1.055	0.927 to 1.201	0.416
IPSS-VOIDING SUBSCORE	-0.169	0.845	0.670 to 1.065	0.153
IPSS-STORAGE SUBSCORE	0.301	1.351	1.091 to 1.673	0.006
QOL SCORE	0.627	1.873	1.220 to 2.875	0.004
SERUM PSA	0.454	1.575	1.037 to 2.393	0.033
TPV	0.008	1.009	0.975 to 1.044	0.626
TZV	-0.023	0.978	0.934 to 1.024	0.336
PVR URINE	0.005	1.005	0.996 to 0.014	0.238
QMAX	0.394	1.483	1.164 to 1.890	0.001
ENERGY SOURCE (MONOPOLAR)	0.065	1.067	0.414 to 2.749	0.894
RESECTED TISSUE (PROSTATITIS)	0.107	1.113	0.392 TO 3.159	0.841

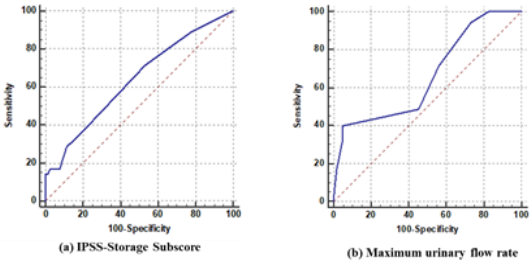
B: Regression coefficient, DM: Diabetes mellitus, IPSS: International prostatic symptoms score, OR: Odds ratio, PSA: Prostate-specific antigen, PVR: postvoiding residual, Qmax: maximum flow rate, QoL: Quality of life, TPV: Total prostate volume, TZV: Transitional zone volume.

Table 3. Multivariate binary logistic regression analysis of predictors for persistent lower urinary tract symptoms after transurethral resection of the prostate.

	B	OR	95% CI OF OR	P VALUE
AGE	0.010	1.010	0.943 to 1.081	0.779
SYMPTOMS' DURATION	-0.015	0.985	0.985 to 0.959	0.284
IPSS-STORAGE SUBSCORE	0.309	1.362	1.024 to 1.811	0.034
QOL SCORE	0.628	1.874	0.827 to 4.245	0.132
SERUM PSA	0.424	1.528	0.964 to 2.422	0.071
QMAX	0.426	1.531	1.138 TO 2.061	0.005

B: Regression coefficient, OR: Odds ratio, PSA, Prostate-specific antigen, Qmax: maximum flow rate, QoL: Quality of life.

ROC curve analysis for the IPSS-Storage subscore showed that at a threshold of 7.0, the model achieved a sensitivity of 71.4% and a specificity of 46.8% (AUC: 0.636, 95% CI: 0.541–0.724) (Figure 3a). Similarly, at a Qmax threshold of 9.0 mL/sec, the model demonstrated a sensitivity of 40.0% and a specificity of 95.3% (AUC: 0.660, 95% CI: 0.558–0.752) (Figure 3b).



IPSS, International prostate symptom score

Figure 3. ROC curve analysis of preoperative (a) IPSS-storage subscore and (b) maximum flow rate as a predictor of persistent lower urinary tract symptoms post transurethral resection of the prostate.

4. Discussion

This study evaluated whether preoperative symptom duration predicts persistent LUTS following TURP. Univariate analysis suggested an association between shorter symptom duration and persistent LUTS, but multivariate regression did not confirm this. Instead, a higher preoperative IPSS-storage subscore and increased Qmax were independent predictors, emphasizing voiding symptom severity and detrusor function as more critical determinants of postoperative outcomes.

Persistent LUTS affected 27.3% of patients with voiding symptoms, 40.9% with storage symptoms, and 31.8% with mixed symptoms. The median total IPSS at six months post-TURP was 12.0, indicative of moderate symptoms. These findings contrast with Rahman et al.[4] who reported a lower rate of persistent storage symptoms, and Abou-zeid et al.[5] who found a substantial reduction in IPSS scores. Differences in surgical techniques, patient selection, and comorbidities may explain these variations.

A higher preoperative IPSS-storage subscore was significantly associated with persistent LUTS, indicating a role for bladder dysfunction beyond BOO. Detrusor overactivity and impaired compliance may persist despite obstruction relief, contributing to symptom persistence. Similarly, a higher preoperative Qmax correlated with persistent LUTS, suggesting that patients with high IPSS and milder obstruction may have underlying bladder dysfunction limiting surgical benefit. Our findings align with those of Gharib et al.[6] who reported a significant increase in Q max among individuals with persistent storage symptoms. The ROC analysis demonstrated moderate predictive ability for storage subscore (AUC: 0.636) and Qmax (AUC: 0.660), with the latter showing high specificity (95.3%).

Our study focused on the duration of preoperative urinary symptoms as a potential predictor of postoperative outcomes. The mean

preoperative symptom duration was 42.5 months. This extended symptom duration contrasts with the findings of Chalise and Agrawal[7] who reported an average symptom duration of 26.7 months. Moreover, the results of Joshi et al.[8] who demonstrated that prostate size affects symptom duration, showed that patients with a prostate size greater than 80 grams had a longer symptom duration (22.4 months) compared to those with smaller prostates (19.1 months). The variability in symptom duration may reflect differences in disease severity, patient demographics, or even institutional practices.

Age was associated with persistent LUTS in univariate analysis (OR: 1.056, p = 0.025) but was insignificant in multivariate analysis. Choi et al.[9] reported that 31% of patients had persistent or worsening LUTS after TURP, possibly due to age-related bladder changes or incomplete tissue resection.[8] Diabetes and PSA levels were also associated with persistent LUTS. The median preoperative PSA was 3.0 ng/mL, with significantly higher levels in the P-LUTS group (p = 0.003). Elevated PSA may indicate a larger prostate volume, contributing to persistent symptoms, though findings on PSA's predictive role remain inconsistent .[10,11]

Preoperative storage symptoms and Qmax should be considered in patient counseling. While TURP effectively relieves BOO, patients with severe storage symptoms or high Qmax may require additional therapies. The variability in symptom resolution across studies underscores the complexity of LUTS, with multiple contributing factors including bladder compliance, detrusor function, and baseline symptom severity. A tailored approach that incorporates objective measures, such as urodynamic studies, could enhance patient selection and postoperative outcomes.

The observed differences in persistent LUTS rates compared to other studies may be influenced by patient demographics, comorbid conditions, or institutional surgical techniques. Previous studies have demonstrated that larger prostate volumes and prolonged symptoms are associated with worse outcomes, yet our findings suggest that symptom severity may be a stronger predictor than duration alone. Moreover, while symptom relief is the primary goal of TURP, persistent storage symptoms may necessitate adjunctive pharmacological treatment.

The role of diabetes in LUTS persistence has been well-documented, as neuropathic changes in diabetic patients may impair bladder contractility and contribute to both voiding and storage symptoms. In contrast to Shah et al.[12] and Kant et al.[13] who identified diabetes as a contributing factor to persistent LUTS, our study did not find diabetes to be a significant predictor. This discrepancy may be due to differences in study populations or methodologies. However, the interplay between systemic conditions and bladder dysfunction still highlights the need for a comprehensive preoperative assessment beyond standard LUTS evaluation.

ROC curve analysis further reinforced the predictive role of Qmax and IPSS-storage subscores. The model for IPSS-storage subscore showed moderate predictive capacity, while Qmax demonstrated high specificity but lower sensitivity. These findings suggest that patients with high Qmax preoperatively may be at greater risk of persistent LUTS due to pre-existing bladder dysfunction rather than obstruction alone. In clinical practice, this information can refine patient selection and preoperative counseling.

Limitations of this study include its retrospective design, single-center setting, and lack of urodynamic assessments. A larger, prospective multicenter study incorporating objective measures of bladder function would provide a more comprehensive understanding of factors contributing to persistent LUTS. Additionally, future research should investigate whether targeted preoperative interventions, such as medical therapy, can improve postoperative outcomes for high-risk patients.

4. Conclusion

In conclusion, preoperative symptom duration was not an independent predictor of persistent LUTS following TURP. Instead, a higher IPSS-storage subscore and increased Qmax were significant predictors of symptom persistence. These findings underscore the importance of symptom severity over duration in preoperative evaluations. By prioritizing preoperative IPSS-storage subscores and Qmax values, clinicians can improve patient selection and expectations, potentially enhancing post-TURP outcomes. Future studies should explore additional predictors and therapeutic approaches to further optimize patient care.

Disclosure

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