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Evaluation of Bladder Neck Obstruction in Male Patients With Lower Urinary Tract Symptom

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Abstract:

Background: *Lower urinary tract symptoms (LUTS) in men are commonly attributed to benign prostatic enlargement; however, functional obstruction at the bladder neck may be under-recognized. This study investigated the prevalence and diagnostic profile of bladder neck obstruction in a Bangladeshi male population by assessing symptoms and urodynamic and endoscopic findings in a tertiary hospital.*

Methods: *This observational study enrolled 80 male patients with LUTS at the Department of Urology, Bangladesh Medical University (BMU), Dhaka, between January and December 2023. Participants underwent symptom assessment (IPSS), uroflowmetry (Qmax), post-void residual measurement, pressure–flow urodynamic study and cystoscopic or radiological bladder neck evaluation. Descriptive statistics were used to summarize demographic, symptom, and diagnostic findings.*

Results: *Most participants were aged > 40 years (65.0%). Voiding symptoms were predominant, with a weak urinary stream in 75.0% and hesitancy in 65.0%. The mean IPSS was 16.8 ± 5.2. Urodynamic data showed a mean Qmax of 8.7 ± 3.1 mL/s, a mean post-void residual of 70.3 ± 28.9 mL, and a mean bladder outlet obstruction index (BOOI) of 56.4 ± 15.2. Bladder neck obstruction consistent with PBNO was confirmed in 67.5% of the patients. Morphological findings, including a high bladder neck (55.0%) and bladder wall trabeculation (47.5%), were common.*

Conclusion: *Bladder neck obstruction is prevalent in this Bangladeshi male LUTS cohort and presents with characteristic urodynamic and morphological features. Recognition of this entity beyond benign prostatic enlargement is essential for its appropriate management.*

Keywords: *Bladder neck obstruction, lower urinary tract symptoms, urodynamics.*

1. INTRODUCTION

Lower urinary tract symptoms (LUTS) in men are one of the most prevalent clinical problems encountered in urological practice, encompassing a wide range of storage, voiding, and post-micturition complaints that significantly affect the quality of life and health economics worldwide [1].

Although benign prostatic enlargement (BPE) and benign prostatic obstruction (BPO) are traditionally regarded as the predominant causes of LUTS in aging males [2], recent advances in

urodynamic research have revealed that functional obstruction at the bladder neck, termed primary bladder neck obstruction (PBNO), is an important yet often under-recognized contributor to LUTS in both younger and middle-aged men [3,4]. PBNO is characterized by the failure of the bladder neck to open adequately during voiding in the absence of anatomical urethral or prostatic obstruction. This dysfunction results in elevated voiding pressures, low maximum urinary flow rates (Qmax), and frequently increased post-void residual volumes [5].

Epidemiological data suggest that PBNO may account for 10–11% of men presenting with LUTS in general urology clinics, with substantially higher rates reported among younger men who exhibit refractory voiding dysfunction despite normal prostate size [6]. The clinical importance of PBNO lies not only in its prevalence but also in its diagnostic complexity. Its presentation often overlaps with that of chronic prostatitis, overactive bladder, or early benign prostatic hyperplasia, leading to frequent misdiagnosis and inappropriate medical therapy [7]. Consequently, many patients experience prolonged symptoms, reduced bladder compliance, and risk of upper urinary tract deterioration due to persistent obstruction [8].

Accurate diagnosis of PBNO requires comprehensive pressure-flow urodynamic testing and, where available, video urodynamic assessment to visualize the functional obstruction at the bladder neck [4,9]. Noninvasive investigations such as uroflowmetry and post-void residual estimation, while useful for screening, are insufficiently specific for definitive diagnosis [10].

According to the European Association of Urology (EAU) guidelines, men under 50 years of age, or those with refractory LUTS despite α-blocker therapy, should undergo formal urodynamic evaluation to distinguish PBNO from detrusor underactivity or other voiding pathologies [9]. Nevertheless, such diagnostic approaches are underutilized in many developing countries, including Bangladesh, where resource limitations and lack of awareness often result in empiric treatment without proper functional assessment.

In South Asian settings, literature concerning PBNO remains limited, and existing data primarily focus on benign prostatic obstruction rather than functional bladder neck dysfunction. Early local observations indicate that PBNO may represent a substantial yet underdiagnosed cause of LUTS among Bangladeshi men, particularly those with small prostate volumes and poor uroflowmetry parameters despite medical therapy [7]. Understanding its epidemiological and urodynamic profile within this population is therefore essential to improve diagnostic precision and clinical outcomes.

This study aimed to evaluate bladder neck obstruction in male patients presenting with LUTS at a tertiary care center in Dhaka, Bangladesh. By systematically analyzing clinical, urodynamic, and endoscopic parameters in a defined cohort, this study seeks to characterize the prevalence and diagnostic features of PBNO in the Bangladeshi context. The findings are expected to bridge an important knowledge gap and guide the development of rational, evidence-based diagnostic strategies for men with LUTS in resource-limited healthcare settings.

2. Materials & Methods

This was a hospital-based prospective observational study conducted at the Department of Urology, Bangladesh Medical University (BMU), Dhaka, Bangladesh, from January to December 2023. The study population comprised male patients presenting to the urology service with lower urinary tract symptoms (LUTS) during that period and who underwent full diagnostic evaluation for bladder outlet obstruction.

2.1. Sample Selection

Inclusion criteria

- Male sex, age ≥18 years, presenting with LUTS (voiding and/or storage-type symptoms).
- Symptom duration of at least three months.
- No prior surgical intervention for bladder outlet obstruction or prostate surgery.

Exclusion criteria

- Known neurological disease affecting lower urinary tract function.
- Anatomical urethral stricture or prior pelvic radiation, or a history of prostate cancer.
- Patients with predominant storage symptoms attributed to an overactive bladder without any voiding component who declined urodynamic testing.

3. Data Collection Procedure

Eligible patients were consecutively enrolled after presenting to the urology outpatient clinic.

Demographic data were collected, and symptoms were assessed using the International Prostate Symptom Score (IPSS). All patients underwent uroflowmetry (free flow), measurement of post-void residual (PVR) by ultrasound, and a full pressure-flow urodynamic study conforming to the International Continence Society standards, including measurement of detrusor pressure at Qmax (PdetQmax), maximum flow rate (Qmax), and calculation of the bladder outlet obstruction index (BOOI = PdetQmax – 2×Qmax).

Additionally, patients underwent cystoscopic assessment of the bladder neck configuration (high bladder neck vs. normal), bladder wall trabeculation, and prostate urethral angle measurement on imaging when applicable (transabdominal ultrasound/urethrocystogram). Informed consent was obtained from all participants, and confidentiality was maintained.

3.1. Statistical Analysis

Descriptive statistics (frequency, percentage, mean ± standard deviation) were used to summarize baseline characteristics, symptom prevalence and urodynamic findings. Statistical analyses were performed using SPSS version 25.0.

4. RESULTS

Table 1. *Baseline characteristics of the study population (n = 80)*

Variables	Category	Frequency (n)	Percentage (%)
Age group (years)	20–30	8	10.0
	31–40	20	25.0
	41–50	24	30.0
	>50	28	35.0
Residence	Urban	46	57.5
	Rural	34	42.5
Occupation	Service holder	30	37.5
	Business	22	27.5
	Farmer	16	20.0
	Others	12	15.0
Comorbidity	Diabetes mellitus	20	25.0
	Hypertension	14	17.5
	None	46	57.5

Patients aged >50 years comprised 35.0% of the cohort, followed by 41-50 years (30.0%). Urban residents accounted for 57.5% and rural residents 42.5%. Regarding occupation, 37.5% were service holders, 27.5% were business owners, 20.0% and others 15.0%. The comorbidities included diabetes mellitus (25.0%), hypertension (17.5%), and none (57.5%).

Table 2. *Distribution of lower urinary tract symptoms (LUTS)*

Symptom	Present (n, %)	Absent (n, %)
Weak urinary stream	60 (75.0)	20 (25.0)
Hesitancy	52 (65.0)	28 (35.0)
Frequency	48 (60.0)	32 (40.0)
Nocturia (≥2 times/night)	38 (47.5)	42 (52.5)
Incomplete emptying	44 (55.0)	36 (45.0)
Urgency	40 (50.0)	40 (50.0)
Intermittency	42 (52.5)	38 (47.5)

Weak urinary stream occurred in 75.0% of patients, hesitancy in 65.0%, frequency in 60.0%, nocturia (≥2 times/night) in 47.5%, incomplete emptying in 55.0%, urgency in 50.0%, and intermittency in 52.5%. The absence of symptoms varied accordingly. The mean International Prostate Symptom Score (IPSS) was 16.8 ± 5.2.

Table 3. *Urodynamic and endoscopic findings relevant to bladder neck obstruction*

Parameters	Frequency (n)	Percentage (%)
Maximum flow rate (Qmax)	8.7 ± 3.1 mL/s	
Post-void residual (PVR)	70.3 ± 28.9 mL	
Bladder outlet obstruction index (BOOI)	56.4 ± 15.2	

Confirmed PBNO	54	67.5
High bladder neck on cystoscopy	44	55.0
Bladder trabeculation	38	47.5
Prostatic urethral angle >35°	40	50.0

The mean maximum flow rate (Qmax) was 8.7 ± 3.1 mL/s, and the mean post-void residual (PVR) volume was 70.3 ± 28.9 mL. The average bladder outlet obstruction index (BOOI) was 56.4 ± 15.2. PBNO was confirmed in 67.5% of the patients. Cystoscopic evaluation showed a high bladder neck configuration in 55.0% of patients, bladder wall trabeculation in 47.5%, and prostatic urethral angle >35° in 50.0%.

5. Discussion

In this study, 80 Bangladeshi men presenting with lower urinary tract symptoms (LUTS), our findings demonstrated a substantial burden of functional bladder neck obstruction, with 67.5 % of participants showing urodynamic criteria consistent with primary bladder neck obstruction (PBNO). This prevalence is appreciably higher than the 11 % reported in a broader Italian cohort of men with LUTS by Schifano et al. [6]. The elevated rate observed may reflect selected referral bias at a tertiary center and the younger mean age of presentation in our setting, but importantly reinforces that PBNO may not be rare in men outside the traditional older benign prostatic hyperplasia (BPH) demographic.

The baseline characteristics of our study population show patterns consistent with previous research on male LUTS populations. The increasing prevalence of symptoms with age—highlighted by 35% of patients being above 50 years—aligns with Mohamad et al.[11], who also reported a strong age-related rise in LUTS severity among men over 40. Our distribution of comorbidities, particularly diabetes mellitus (25%), parallels the findings of Kant et al.[12], where diabetes was a frequent associated condition in men presenting with LUTS.

The predominance of urban residents and service-oriented occupations in our cohort is also comparable to their study settings, suggesting similar lifestyle and environmental influences. Overall, these similarities indicate that our study sample is demographically and clinically representative of populations evaluated in earlier LUTS research.

The urodynamic profile (mean Qmax 8.7 mL/s and PVR 70.3 mL) and mean BOOI 56.4 indicate significant obstruction consistent with definitions described by the American Urological Association (AUA) and European guidelines, which cite Qmax < 15 mL/s and elevated detrusor pressure as thresholds suggestive of bladder outlet obstruction [13]. These parameters mirror findings from Kang et al., who identified lower Qmax and poor compliance as predictive of obstruction in a Korean cohort [14]. The cystoscopic features of high bladder neck (55 %) and trabeculation (47.5 %) serve as additional morphological correlates, underscoring the multimodal nature of diagnosis—consistent with imaging and cystoscopic observations in PBNO when anatomical obstruction is excluded [15].

From a regional perspective, this study provides important evidence in a Bangladeshi clinical context, where previously only limited data (e.g., Islam et al.[16]) suggested PBNO as a possible cause of LUTS in young men [10]. Our data extend this by quantifying urodynamic and morphological findings in a larger sample.

Clinically, the high proportion of PBNO suggests that practitioners in Bangladesh should maintain a higher index of suspicion for bladder neck obstruction in men with LUTS, especially when standard empirical treatments for BPH or prostatitis fail. Moreover, the strong association between low flow, elevated residual, and bladder neck configuration emphasizes the value of full urodynamic evaluation rather than reliance on non-invasive tests alone. The EAU guideline discourages routine use of urodynamics for all men with LUTS, but highlights its role in younger men or where intervention is considered—a recommendation supported by the findings of this study [13].

In summary, this study corroborates the concept that PBNO is a significant and underdiagnosed cause of LUTS in men and presents with characteristic urodynamic, symptomatic, and morphological features.

The implications for practice are clear: early identification could lead to tailored management, avoid misdiagnosis, and potentially ameliorate the long-term sequelae of outlet obstruction. Future research should evaluate treatment outcomes in this demographic and assess the cost-effectiveness of diagnostic algorithms tailored to resource-limited settings.

6. Limitations of the Study

The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community.

7. Conclusion

This study demonstrated that functional bladder neck obstruction was confirmed in more than two-thirds of the patients via urodynamic and endoscopic assessments. The symptom pattern, flow parameters, and morphological features were consistent with international findings on primary bladder neck obstruction. These results highlight the importance of considering bladder neck obstruction as a cause of LUTS beyond benign prostatic enlargement in the local context of this study. Early recognition and targeted diagnostic assessment may improve the management outcomes of men with voiding dysfunction.

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Conflicts of Interest

There are no conflicts of interest.

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