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Factors Influencing Surgical Need in Benign Prostatic Hyperplasia-Related Acute Urinary Retention

Abdelhakim S. Alnimate, MD*[1], Mohammad F. Musa, MD[2], Alaa M. Khamaiseh, MD[3], Mohammad Zaid S. AlAbbadi, MD[4], Sofian J. Alhbahbeh, MD[5]

[1]Senior Specialist of Urology, Prince Hussein Urology and Organ Transplantation Center (PHUO), Royal Medical Services, Amman, Jordan
[2]Senior Specialist of Urology, Prince Hussein Urology and Organ Transplantation Center (PHUO), Royal Medical Services, Amman, Jordan
[3]Senior Specialist of Surgery, Department of Surgery, Royal Medical Services, Amman, Jordan
[4]Specialist of Urology, Prince Hussein Urology and Organ Transplantation Center (PHUO), Royal Medical Services, Amman
[5]Specialist of Urology, Prince Hussein Urology and Organ Transplantation Center (PHUO), Royal Medical Services, Amman, Jordan

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***Corresponding author:** Abdelhakim S. Alnimate
Senior Specialist of Urology, Prince Hussein Urology and Organ Transplantation Center (PHUO), Royal Medical Services, Amman, Jordan

Abstract **Original Research Article**

Objective: This study explores the clinical features that may predict the likelihood of requiring surgical management in patients with benign prostatic hyperplasia (BPH) following an episode of acute urinary retention (AUR). ***Materials and Methods:*** This is a retrospective study on 216 male patients presenting with AUR attributed to BPH between February 2024 and August 2025 at Royal medical services emergency department (RMS), Jordan. Patients were grouped based on post-catheterization outcomes: - Group 1 (n=72): Underwent transurethral resection of the prostate (TURP) after unsuccessful voiding. - Group 2 (n=144): Successfully voided following catheter removal and continued medical therapy. Comparisons were made between the two groups for prostate volume, total prostate- specific antigen (tPSA), urinary flow rate (Qmax), and post-void residual (PVR). A p-value below 0.05 was considered statistically significant. ***Results****:* Patients who required surgery had significantly larger prostate volumes (64.2 ± 23.8 g vs. 52.6 ± 13.3 g, p = 0.0005), higher post-void residual volumes (82.5 ± 24.5 mL vs. 71.9 ± 21.4 mL, p = 0.0019), and lower urinary flow rates (11.2 ± 2.6 mL/s vs. 12.3 ± 2.6 mL/s, p = 0.0005). Serum total PSA was also higher in the surgical group (1.90 ± 1.3 vs. 1.22 ± 0.9 ng/mL, p = 0.0001). ***Conclusion*****:** Greater prostate size, lower flow rates, increased PVR, and metabolic risk factors such as diabetes and smoking were significantly associated with the need for surgical treatment after AUR. Early identification of these predictors may support timely surgical referral and personalized patient care.

Keywords: BPH, Urinary Retention, PSA, Post-void Residual, Surgical Risk.

INTRODUCTION

Benign prostatic hyperplasia (BPH) is a widespread condition among older men, characterized by noncancerous enlargement of the prostate that often results in lower urinary tract symptoms (LUTS). With increasing life expectancy, the prevalence and clinical burden of BPH continue to rise, affecting more than half of men over the age of 60. [1]

One of the most urgent complications of BPH is acute urinary retention (AUR), a painful and potentially harmful inability to void that requires immediate medical intervention [2]. AUR not only signals disease progression but may also cause long-term bladder dysfunction, infection, or renal impairment if inadequately managed. The incidence of AUR tends to increase with age, prostate size, and symptom severity—factors often associated with eventual surgical intervention [3].

Decisions regarding surgery after AUR are influenced by multiple clinical variables, including anatomical changes and functional impairments such as reduced urinary flow and increased residual urine. While previous studies have identified several of these parameters as predictors of poor catheter trial outcomes, their relevance across different patient populations remains under debate [4]. Recent literature has also drawn attention to systemic comorbidities—such as diabetes and metabolic syndrome—which may affect bladder performance and influence the natural course of

BPH. These systemic conditions are thought to contribute to worsened urinary symptoms and may increase the likelihood of surgical intervention [5].

In this study, we aim to evaluate which clinical and demographic features are most strongly associated with surgical management following AUR due to BPH. By identifying key predictors, we hope to provide evidence that can inform early risk assessment and individualized management strategies.

Materials and Methods

This retrospective study involved adult male patients who presented to the RMS emergency department/Jordan with acute urinary retention (AUR) due to clinically diagnosed benign prostatic hyperplasia (BPH). All participants had a prior history of lower urinary tract symptoms (LUTS) consistent with BPH and were receiving alpha-blocker therapy.

To ensure uniformity, patients were excluded if their urinary retention was attributed to conditions other than BPH, including prostate cancer, urethral stricture, neurogenic bladder, or other identifiable obstructive or neurological causes.

Initial management for all patients consisted of transurethral catheterization using a Foley catheter, maintained for a standard duration of seven days. A trial without catheter (TWOC) was then performed. Patients who successfully voided following catheter removal were continued on medical treatment and monitored without surgical intervention. Those unable to void underwent transurethral resection of the prostate (TURP) as definitive management.

Data collected included demographic information, comorbidities (such as hypertension, diabetes mellitus, cardiovascular disease, and smoking history), and relevant clinical parameters: prostate volume, total prostate-specific antigen (tPSA), maximum urinary flow rate (Qmax), post-void residual urine (PVR), and age.

Clinical measurements were obtained during hospitalization or from outpatient visits within the previous six months. Prostate volume and PVR were evaluated using transabdominal ultrasonography performed by experienced radiologists.

The maximum urinary flow rate (Qmax) was measured through standard non-invasive uroflowmetry using a digital flowmeter device.

All measurements adhered to institutional protocols to ensure consistency and reliability of data. Ethical approval was obtained from the Ethical Committee of the Royal Medical Services (RMS), Jordan. The requirement for informed consent was waived due to the retrospective nature of the study.

All analyses were conducted using Python version 3.11 with Pandas, SciPy, and Statsmodels libraries. Continuous variables were expressed as means and standard deviations (SD), and compared using the Mann–Whitney U test. Categorical variables were presented as counts and percentages, with comparisons made using the Chi-squared (χ^2) test. A p-value < 0.05 was considered statistically significant.

Results

A total of 216 patients with acute urinary retention secondary to benign prostatic hyperplasia was included in this study and categorized into two groups: Group 1(surgically managed= 72) and Group 2 (conservatively managed=144). The mean age was (69.91 ± 7.61 years) in Group 1 and (67.56 ± 7.31 years) in Group 2, showing a statistically significant difference ($p = 0.035$).

Patients in Group 1 had significantly larger prostates (64.24 ± 23.84 g vs. 52.65 ± 13.34 g, $p = 0.0005$), higher total PSA levels (1.90 ± 1.3 ng/mL vs. 1.22 ± 0.9 ng/mL, $p = 0.0001$), lower Qmax (11.24 ± 2.57 mL/sec vs. 12.29 ± 2.64 mL/sec, $p = 0.0005$), and greater post-void residual urine volumes (82.45 ± 24.48 mL vs. 71.86 ± 21.44 mL, $p = 0.0019$). These differences are detailed in Table 1.

Regarding prostate size grading, Group 1 showed a higher proportion of patients with Grade 3 and Grade 4 prostate volumes (≥60 g), whereas Group 2 was predominantly composed of Grade 2 prostates (41–60 g). Specifically, 16 patients in Group 1 had prostates ≥ 80 g, compared to only 5 patients in Group 2. These findings are summarized in Table 2.

Analysis of comorbid conditions revealed that smoking (55.3% vs. 39.3%, $p = 0.035$) and diabetes mellitus (34.2% vs. 18.6%, $p = 0.016$) were significantly more prevalent in Group 1. Although hypertension and cardiovascular disease were more frequent in Group 2, the differences were not statistically significant. Comorbidity data are presented in Table 3.

Statistical comparison of clinical variables—including prostate volume, total PSA, Qmax, PVR, and age—demonstrated consistent and significant differences between the two groups. These clinical metrics are detailed in Table 1.

Discussion

In the present study of patients with acute urinary retention (AUR) due to benign prostatic hyperplasia (BPH), surgical candidates displayed a constellation of adverse urinary parameters. They had significantly larger prostate volumes, elevated post-void residuals (PVR), and reduced maximum urinary flow

rates (Qmax), echoing insights from earlier clinical observations.

These parameters have been consistently associated with the progression of BPH and increased likelihood of requiring surgical intervention. [6] Beyond mechanical obstruction, our findings suggest an appreciable association between diabetes mellitus and more severe BPH presentations. Existing epidemiologic studies support a link between insulin resistance and the development or progression of BPH. Additionally, diabetes has been tied to higher rates of postoperative urinary retention and suboptimal surgical outcomes, which aligns with the profile seen in our surgical cohort. [7]

Age remains a pivotal risk component. Prior investigations have identified older age, coupled with reduced urinary flow and enlarged prostate size, as independent contributors to AUR. In our study, patients in the surgical group were marginally older on average, reinforcing age as a meaningful factor in the clinical trajectory of BPH [8].

While PSA levels were higher among surgically treated patients, its utility as a standalone predictor for AUR remains limited. Current guidelines emphasize the importance of integrating structural and functional assessments, such as Qmax and PVR, rather than relying solely on laboratory markers. [9]

Our observations align with evidence from time-to-event analyses that have identified baseline PSA, prostate size, flow rate, and symptom scores as relevant indicators for AUR risk. Although our study utilized a cross-sectional design, the convergence of these findings suggests a consistent pattern of anatomical and functional deterioration in surgically managed patients. [10]

Additional research has shown that age-specific AUR risk increases markedly in older men. Cumulative risk has been shown to rise from under 2% in younger populations to over 10% in men aged 70–79. These findings resonate with our data, where age and prostate volume appeared to be intertwined predictors. [11]

Interestingly, although smoking and diabetes were more common among the surgical group, hypertension and cardiovascular disease did not show significant differences. This might reflect the complexity of clinical decision-making, where certain comorbidities may lead clinicians to favor conservative approaches. [2]

Overall, this study supports previous clinical impressions that larger prostates, reduced urinary flow, elevated residuals, and certain metabolic factors such as diabetes contribute meaningfully to surgical selection in AUR cases. These results emphasize the need for holistic clinical assessment rather than dependence on any single metric. [12]

Our findings reinforce the principle that BPH is not merely a structural condition but is influenced by a variety of systemic factors including age, metabolism, and individual symptom burden. Future prospective studies are needed to better define these interactions and inform long-term management strategies. [13] Evidence from the MTOPS and PLESS trials continues to guide risk stratification, particularly highlighting the role of long-term pharmacologic intervention in reducing progression to AUR and surgery. These findings help contextualize the anatomical and functional indicators observed in our cohort. [14]

Furthermore, studies investigating the link between hyperglycemia, insulin resistance, and prostate enlargement suggest that metabolic dysregulation may have a direct influence on lower urinary tract symptoms. This adds biological plausibility to the observed association between diabetes and surgical intervention in our population. [15] Postoperative studies evaluating outcomes after transurethral resection of the prostate (TURP) have shown that diabetic patients are at increased risk of urinary retention and poor functional recovery. These findings support a more aggressive initial evaluation in this subgroup. [16]

Table 1: Comparison of Clinical Variables Between Groups

Variable	Group 1 (Mean ± SD)	Group 2 (Mean ± SD)	p-value
Prostate volume (g)	64.24 ± 23.84	52.65 ± 13.34	0.0005
PSA (ng/ml)	1.90 ± 1.30	1.22 ± 0.90	0.0001
Qmax (ml/s)	11.24 ± 2.57	12.29 ± 2.64	0.0005
PVR (ml)	82.45 ± 24.48	71.86 ± 21.44	0.0019
Age	69.91 ± 7.61	67.56 ± 7.31	0.035

Table 2: Distribution of Prostate Size Grades

Prostate size grade	Size range (g)	Group 1(n, %)	Group 2(n, %)	Total (n)
Grade 1	20-40	9 (11.8%)	17 (12.1%)	26
Grade 2	41-60	30 (39.5%)	95 (67.9%)	125
Grade 3	61-80	21 (27.6%)	23 (16.4%)	44
Grade 4	>80	16 (21.1%)	5 (3.6 %)	21

Table 3: Comorbidities by Group (Count and Percentage)

Comorbidity	Status	Group 1(n, %)	Group 2 (n, %)
Cardiovascular disease	Yes	15 (19.7%)	31 (22.1%)
	No	61 (80.3%)	109 (77.9%)
Hypertension	Yes	37 (48.7%)	51 (36.4%)
	No	39 (51.3%)	89 (63.6%)
Diabetes millets	Yes	26 (34.2%)	26 (18.6%)
	No	50 (65.8%)	114 (81.4%)
smoking	Yes	42 (55.3%)	55 (39.3%)
	No	34 (44.7%)	85 (60.7%)

CONCLUSION

This study provides insight into the clinical profile of patients with BPH who are more likely to undergo surgical management following acute urinary retention. Key predictors identified include increased prostate size, elevated post-void residual urine, reduced urinary flow rates, and the presence of metabolic comorbidities such as diabetes mellitus and smoking history.

These results reinforce the need for comprehensive clinical evaluation following AUR episodes, incorporating both urodynamic data and patient comorbidity status.

Early identification of individuals at risk for surgical failure of conservative management may lead to more appropriate and timely treatment planning. Further prospective studies are warranted to validate these associations and develop predictive models that can be applied in routine clinical practice to enhance patient outcomes.

REFERENCES

1. Wei JT [1], Calhoun E, Jacobsen SJ. Urologic diseases in America project: benign prostatic hyperplasia. J Urol. 2005;173(4):1256–1261.
2. Emberton [2] M, *et al.,* The management of acute urinary retention in men: a systematic review. BJU Int. 2008;101(4):371–377.
3. Kupelian [3] V, *et al.,* Association of symptoms of BPH with uroflowmetric measures. Urology. 2006;68(5):1040–1045.
4. Parsons [4] JK. Benign prostatic hyperplasia and male lower urinary tract symptoms: epidemiology and risk factors. Curr Bladder Dysfunct Rep. 2010;5(4):212–218.
5. Roehrborn CG [5]. Pathology of benign prostatic hyperplasia. Int J Impot Res. 2008;20 Suppl 3: S11–S18.
6. Lowe FC [6], *et al.,* Patient risk profiles for progression of lower urinary-tract symptoms and BPH. Eur Urol. 2004.
7. Elbadawi [7] A, Hasan SA. Benign Prostatic Hyperplasia. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024.
8. Cho SY [8], *et al.,* Risk factors for urinary retention after prostate vaporization. World J Mens Health. 2015.
9. American Academy of Family Physicians [9]. Benign Prostatic Hyperplasia: Evaluation and Treatment. Am Fam Physician. 2023;107(6):610–618.
10. D'Agate [10] S, *et al.,* Model-based meta-analysis of time to first AUR/S. Clin Pharmacol Ther. 2021.
11. UroToday [11]. Risk factors for AUR in BPH from the Islamic Republic of Iran. 2010.
12. Roehrborn CG [5]. Benign prostatic hyperplasia: an overview. Rev Urol. 2005;7 Suppl 9: S3–S14.
13. McConnell [13] JD, Roehrborn CG [5], Bautista OM, *et al.,* The long-term effect of
14. doxazosin, finasteride, and combination therapy on BPH progression. N Engl J Med. 2003;349(25):2387–2398.
15. Gabr AH [14]. MTOPS and PLESS evidence on risk of AUR and surgery. Afju. 2022.
16. Breyer [15] BN, Breyer [15] MD. Hyperglycemia and insulin resistance in BPH and LUTS risk. J Urol. 2014.
17. Lin YH [16], *et al.,* Diabetes mellitus and postoperative urinary retention outcomes after TURP. World J Mens Health. 2017.