ORIGINAL RESEARCH PAPER
Volume - 15 | Issue - 04 | April - 2026 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

PREDICTORS OF SUCCESSFUL TRIAL WITH-OUT CATHETER FOLLOWING ACUTE URINARY RETENTION SECONDARY TO BENIGN PROSTATIC HYPERTROPHY-A PROSPECTIVE STUDY

Urology

Chandra Shekhar* Assistant Professor Niims Jaipur*Corresponding Author
Kashmira Sharma Assistant Professor Gmc Alwar
Rajat Kumar Senior Resident Niims Jaipur

ABSTRACT

Background- This study aims to evaluate the parameters that can predict the success or failure of trial without catheter (TWOC) for acute urinary retention (AUR) due to benign prostatic hyperplasia (BPH). **Methods:** This prospective observational study was conducted in Niims hospital jaipur, rajasthan from april 2024 to march 2025. Total 70 patients with AUR secondary to BPH presenting to the emergency department and urology OPD during the study period. **Results:** The first successful and failed TWOC was recorded in 45 (64.28%) and 25 (35.71%) patients, respectively. Patients' mean age was 74.23±9.63 years. On the one hand, in the first successful TWOC group, 89.4% of the patients remained receiving medical care with tamsulocin (0.4mg/day). On the other hand, in the first TWOC failure group, 30.8% demonstrated the second successful TWOC and continued medical care. Severe lower urinary tract symptoms (IPSS ≥20 points), prostatic pain during digital rectal examination (DRE), high urine volume after catheterization (≥950 mL), and high blood urea (≥4.55 mmol/L) were found to be the predictive factors of TWOC failure in this study's univariable and multivariable analyses. **Conclusion:** The risk factors for TWOC failure in AUR due to BPH include severe lower urinary tract symptoms, prostatic pain during DRE, high urine volume after catheterization, and high blood urea.

KEYWORDS

Benign prostatic hyperplasia, AUR, TWOC.

INTRODUCTION

Acute urinary retention (AUR) secondary to benign prostatic hyperplasia (BPH) is a urological emergency characterized by inability to pass urine, which is of sudden onset and is associated with pain. It is distressful event in a patient with BPH both physically and economically. The frequency of this complication is about 0.5 to 2.5 per year. AUR accounts for one third of patients undergoing surgery for BPH [1].

In clinical practice, the AUR associated with BPH is known as spontananeous AUR. There are several risk factors which have been identified in different studies. These are advanced age, severe lower urinary tract symptoms (LUTS), low peak flow rate, high postvoid residual urine volume(PVR), drained urine volume after catheterization, enlarged prostate volume [2,3].

When the AUR develops due to a precipitating event it is known as precipitated AUR. The conditions which can precipitate AUR are non-prostate related surgery, regional anesthesia, catheterization, and excessive fluid intake, and urinary tract infection, intake of medications such as anticholinergics, antihistaminics or sympathomimetics [4]. According to the recommendation of the American Urology Association (AUA), treatment of AUR due to BPH includes the emergency release of urine in the bladder, and BPH is treated using α-1 blockers (alfuzosin and tamsulosin, among others) at the same time.[5]

Differentiation of both types of AUR is very important from the prognostic point of view. The management of AUR is the immediate urethral catheterization. If per urethral catheterization fails, then suprapubic catheterization is the next step. In the past, early surgery was the first approach and it was safer also as it could avoid an indwelling catheterization [6].

Long term catheterization either per urethral or suprapubic, was the second approach with the disadvantages associated with it. The third approach was the trial without catheter (TWOC) with medication in the form of alpha blocker. It is associated with reasonably good success rate. The patients who had a successful TWOC were followed with either medical therapy or TURP. Those patients who failed TWOC were re-catheterized and reassessed for the future treatment options such as surgery, a second trial or long term catheterization. Successful TWOC is not only advantageous to patient and health care system but also has become the standard practice worldwide [7].

The purpose behind the study was to evaluate the factors predicting outcome of TWOC in patients with AUR due to BPH. It also identifies the subset of patients unlikely to benefit from this treatment so that early definitive treatment can be provided. These elements would aid medical professionals in determining the best course of treatment for patients and evaluating the initial TWOC outcome.

Material and Methods

The Prospective observational study was conducted in the Niims Hospital Jaipur,Rajasthan from april 2024 to march 2025. All male patients with AUR due to BPH presenting to the emergency department and urology OPD during this study period, total 70 patients with AUR secondary to BPH included in this study. Emergency urinary catheters together with alpha-1 blockers, antibiotics and emergency urinary catheters were initially used to treat all patients with AUR caused by BPH. As a result, the urinary catheter was taken out and 24 hr later, the patients' outcomes were assessed. All study parameters gathered from the original evaluation data during the period were used to build the RF model in this study. In addition to laboratory and imaging parameters, clinical factors such as age, the classification of urinary retention, the timing of the progression of lower urinary tract symptoms, urinary signs, prostate clinical examination, comorbidities, and total urinary volume following catheterization were noted (parameters of urine sample test, bladder–prostate ultrasound, and blood count test). Additionally, the quality of life (QoL) and the international prostate symptom score (IPSS) were recorded for evaluation.(8)

Within 24 hours of the catheter removal (TWOC), the outcomes were assessed. Even if the long-term effectiveness is yet unknown, Guang-Jun et al. claim that "1-blockers provide great help in raising a satisfactory micturition during 24 h following TWOC for males with AUR due to BPH." (9)

Thus, the time 24 hours after TWOC was selected. A postvoid residual volume of less than 100 mL and the patient not requiring re-catheterization within 24 hours of withdrawing the catheter were regarded signs of a successful TWOC. Based on the effectiveness of the first applied TWOC, the patients were then divided into two groups: the first successful group and the first failure group. The aforementioned predicted criteria were therefore statistically examined. Additionally, the term "precipitated AUR" describes the inability to urinate after a trigger event (such as nonprostate related surgery, catheterization, anaesthesia, or use of drugs with sympathomimetic or anticholinergic , antihistamines, or others. The remaining AUR incidents are all categorised as spontaneous.[10]

The data was examined using R and the Statistical Package for the Social Sciences, Version 23. Descriptive analysis was also utilised to compare the two groups' research characteristics. Fisher's exact test(11) or the Mann-Whitney U test (for categorical data) were used to compare the patient characteristics between the two groups (for continuous variables).

Following multivariable analysis, the relationship between the predictors and the TWOC results was examined. In order to find the interaction and nonlinearity without prespecification, the RF was utilised to choose variables for multivariable analysis. The selected factors were incorporated into the logistic regression model based on the outcomes of the model selection stage in order to perform multivariable analysis and assess the independent predictability of each factor. Furthermore, the optimal cutoff values for continuous prognostic parameters were chosen using the receiver operating characteristic (ROC) analysis.

RESULTS

70 patients were involved in the trial. TWOC was successful and failure in 45 (64.28%) and 25(35.71%) patients, respectively. All 45 patients who underwent a successful first TWOC kept receiving tamsulosin medical treatment and were routinely followed up on. Five patients (11.11%) got transurethral resection of the prostate (TURP) surgery during the follow-up after their medicinal treatment failed. Furthermore, 25 patients who had a failed initial TWOC underwent a second TWOC after being recatheterized. Only eight patients (32%) had the second TWOC successfully, while the other 17 underwent surgical (14 cases, 82.35%) or long-term catheterization (3 instances, 17.64%) procedures. Table 1 summarises demographic information as well as the outcomes of the comparative analysis of the study characteristics.

Table 1: Description of study characteristics between 2 groups : Trial without catheter success and trial without catheter failure

Characteristics	Total (n=70)	TWOC success (n=45)	TWOC failure (n=25)	p-value
Age (years)	75(55-85)	75(55-85)	77(56-88)	0.325
Classification of acute urinary retention Precipitated AUR Spontaneous AUR	45(64.28) 25(35.71)	33(73.33) 12(26.66)	12(48.0) 13(52.0)	0.018
Urine volume after catheterization (liters)	1.00±0.32	0.91±0.32	1.16±0.27	<0.001 1
IPSS score	16.68±7.63	13.81±5.68	21.88±8.03	<0.001
Prostatic pain during DRE a	12(16.4)	2(6.4)	9(34.6)	0.003
Creatinin (mmol/l)b	89.2±41.66	83.43±23.7	99.5±61.57	0.079
PSA (ng/dl) b,c	18.2±24.02	16.3±19.13	21.5±31.25	0.861
Maximum flow rate of urine - Qmax (ml/s)b,c	8.05±5.03	8.48±5.79	7.01±2.19	0.570
Prostate volume in ultrasoundb	57.73±26.65	54.72±26.59	62.62±26.5	0.106

Data value were reported as, n (%), median (range) or mean±SD bold type is considered statistically significant. a Fisher's exact test was applied to perform the comparison. b Mann-Whitney U test was applied to perform the comparison. c Missing data were happended. AUR: Acute urinary retention, TWOC: Trial without catheter, IPSS: International prostate symptom score, DRE: Digital rectal examination, PSA: Prostate-specific antigen, Qmax: Maxinum urinary flow rate, SD: Standard deviation

After catheterization, the urine volumes in the successful and unsuccessful TWOC groups were 0.91±0.32 L and 1.16±0.27 L, respectively (P<0.001). When comparing patients in the successful TWOC group to those in the unsuccessful TWOC group, no discernible difference in age. However, the successful TWOC group had a greater percentage of precipitated AUR (P = 0.018). In addition, the successful TWOC group's IPSS scores was significantly lower (P<0.001). Patients in the TWOC group that was successful experienced decreased pain when having their prostates examined (P = 0.003). As a result, there is no discernible difference in the proportion of comorbidities between the two groups.

Table 1 also includes the findings of the comparative examination of laboratory features. After model training, the multivariable logistic regression was only conducted using four components (IPSS, prostatic discomfort during digital rectal examination [DRE], urea, and urine volume after catheterization) [Table 2]. These risk variables have a detrimental effect on the result of TWOC. IPSS (odds ratio [OR] = 1.279, 95% confidence interval [CI] = 1.117-1.466), prostatic pain during DRE (OR = 11.273, 95% CI = 1.858- 68.376), urea (OR = 1.370, 95% CI = 1.020-1.841), and urine volume after catheterization (OR = 14.988, 95% CI = 1.528-147.055) were shown when looking at the likelihood of TWOC failure. The cutoff points to indicate TWOC failure from the ROC curve study were urea = 4.55 mmol/L (84.6% sensitivity, 44.7% specificity), urine after catheterization = 950 mL (73.1% sensitivity, 74.5% specificity) and a score of 20 in the IPSS (57.7% sensitivity and 95.7% specificity). Additionally, the examination's sensitivity and specificity for predicting TWOC pain failure were 34.6% and 93.6%, respectively.

Table 2: Univariable and multiple logistic regression to predict trial without catheter failure (n=70)

Characteristics	Univariable Analysis		Multivariable analysis	
	OR 95%(CI)	P-value	OR 95%(CI)	p-value
IPSS score	1.210(1.092-1.340)	<0.001	1.279(1.117-1.466)	<0.001
Urine volume after catheterization	12.923(2.338-71.416)	0.003	14.988(1.528-147.055)	0.020
Urea	1.150(0.922-1.434)	0.217	1.370(1.02-1.841)	0.036
Prostatic pain during DRE No Yes	Reference 7.765(1.874-32.171)	0.005	Reference 11.273(1.858-68.376)	0.008

IPSS: International prostate symptom score, DRE: Digital rectal examination, OR: Odds ratio, CI: Confidence interval

DISCUSSION

One technique for treating BPH is TURP [12]. TURP might be recommended in AUR owing to BPH as well, but patients might not benefit from it. Current recommendations state that urethral catheterization and a-blockers are combined as the first line AUR treatment for BPH [13].

According to Fitzpatrick et al. [14], 61% of their population had successful TWOC. Among them, 86.7% received a -blocker therapy and 5.6% had TURP, respectively. The success rates of TWOC were 88.8% for Hagiwara et al. [15] and 66.9% for Zhengyong et al. [16], respectively. These findings, which were supported by 64.28% and 32% of the first and second successful TWOCs, respectively, are consistent with those of our study.

10.6% of patients in the effective TWOC group required surgery because medical treatment had not improved their condition, while the majority of patients (89.4%) remained receiving medical care along with tamsulosin. Following the failure of the first TWOC, it is anticipated that the second or third TWOC would be successful. The majority of patients who experienced TWOC failures required surgical procedures, since Oelke et al. [17] showed that the success rate for TWOC after the second or third attempt was not very great.

This study shown that TWOC was beneficial for a large number of patients and that surgical treatment for AUR caused by BPH could be minimal. But not all patients will benefit from this surgery. The combination treatment with a -1 blockers is one of the key elements linked to TWOC effectiveness. In the ALFAUR research, TWOC failure was more common in patients under ≥65 and with a catheter measured urine volume of ≥1000 mL. However, among patients who received tamsulosin treatment for a few days prior to TWOC, the success rate of TWOC increased by a factor of two.

This study showed that TWOC was effective for many patients, and the surgical intervention for AUR due to BPH can be limited. However, this procedure is not beneficial for all patients. One of the crucial factors associated with TWOC success is the combined treatment with α-1 blockers. However, successful TWOC rate increased two times in patients who were treated with alpha blocker for 2–3 days before TWOC.[18]

As a result, alpha1 blockers before TWOC were also examined in Cochrane's report, where the overall successful TWOC rate tended to

be higher in the group treated with alpha1 blockers compared with placebo (relative risk [RR] = 1.39, 95% confidence interval [CI] = 1.18-1.64) by using alfuzosin (RR = 1.31, CI = 1.10-1.56) or tamsulosin (RR = 1.86). [19]

Additional research revealed that a -1 blockers (tamsulosin) may assist boost TWOC effectiveness and lower the number of individuals who require surgery. [20] A recent study found that, in addition to a -1 blockers, the use of five 5-alpha-reductase inhibitors (5-ARIs) could reduce prostate growth by roughly 18%-28% after 6–12 months of treatment. [21]

The EAU recommendations state that clinical effects compared to placebo are visible after a minimum treatment period of at least 6 to 12 months. [22] The drug's action might not materialise to a significant degree prior to the resumption of symptoms. tamsulosin was thus employed in this study. Numerous research put out variables that might indicate TWOC failure. These indicators include age (≥70 years), prostate size (≥50 g), IPSS (>20), urine volume after catheterization (≥1000 mL), and spontaneous AUR, according to Fitzpatrick et al.(14). However, Manjunath and Hofer[23] found that age (>69 years) and urine volume following catheterization (>654 mL) were the main predictors of TWOC failure.

In this investigation, high urine volume following catheterization (V ≥950 mL), discomfort during a DRE, severe urinary tract symptoms (IPSS ≥20), and high blood urea (urea ≥4.55 mmol/L) levels were postulated as predictive variables of TWOC failure [Figure 1]. Age and the size of the prostate as determined by ultrasound did not appear to be related to the TWOC results. Additionally, one of the latest potential factors that could be swiftly assessed in clinical practice is pain experienced during DRE. However, there was no consensus regarding the quantitative factors. Therefore, a systematic review may be required to get over the original research' limitations and offer insightful data for therapeutic practise.

CONCLUSION

The initial method of choice for treating AUR brought on by BPH is TWOC. Severe lower urinary tract symptoms (IPSS ≥20 points), discomfort during DRE, a high urine volume following catheterization (V ≥950 mL), and high blood urea (≥4.55 mmol/L) are the characteristics that indicate TWOC failure, according to a multivariable analysis of the predictive factors of the findings of TWOC.

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