

Research Article

Clinical Characteristics and Treatment Outcomes of Patients with Acute Urinary Retention Presenting to the Emergency Department: A Prospective Observational Study

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Abstract: **Introduction:** Acute urinary retention is a painful urological emergency requiring immediate bladder decompression. Its causes, clinical severity, catheterisation requirements, and probability of successful voiding after catheter removal differ across settings. **Objectives:** To describe the clinical characteristics, causes, emergency treatment, and 30-day outcomes of patients with acute urinary retention and identify factors associated with a successful trial without catheter. **Methods:** This prospective observational study included 50 adults presenting to the emergency department of the Department of Urology, Government General Hospital, Bhadrachalam, Telangana, India, from February to November 2024. Demographic, clinical, laboratory, imaging, treatment, and follow-up data were recorded. Eligible patients underwent a trial without catheter within 7–14 days. Comparisons used independent-samples t-tests and Fisher's exact tests. **Results:** The mean age was 64.2 ± 12.3 years, and 46 (92.0%) patients were male. Benign prostatic hyperplasia was the commonest cause, occurring in 29 (58.0%). Routine urethral catheterisation was successful in 42 (84.0%), while two patients required suprapubic catheterisation. Acute kidney injury occurred in 11 (22.0%), and 14 (28.0%) required admission. Trial without catheter was attempted in 42 patients and succeeded in 25 (59.5%). Successful patients were younger than those with failure (60.8 ± 10.4 versus 69.7 ± 9.6 years; $p=0.007$) and had lower drained urine volumes (654 ± 220 versus 975 ± 310 mL; $p=0.001$). At 30 days, 20 (40.0%) remained catheter-free, and 13 (26.0%) underwent a definitive procedure. **Conclusion:** Benign prostatic hyperplasia was the predominant cause. Catheterisation achieved effective immediate decompression, but recurrent retention and subsequent intervention were common. Older age and larger retained urine volume were associated with unsuccessful catheter removal.

Keywords: acute urinary retention; benign prostatic hyperplasia; bladder catheterisation; trial without catheter; emergency department; treatment outcome

INTRODUCTION

Acute urinary retention (AUR) is a urological emergency characterised by a sudden inability to void despite a distended bladder, frequently accompanied by severe suprapubic pain, anxiety, and autonomic discomfort. It requires rapid clinical assessment because prolonged obstruction can lead to urinary tract infection, haematuria, hydronephrosis, electrolyte disturbances, and post-renal acute kidney injury. Although AUR can occur at any age and in both sexes, it is predominantly encountered in older men, reflecting the high burden of bladder outlet obstruction in this population. The underlying causes include benign prostatic hyperplasia (BPH), urethral stricture, prostatic malignancy, neurological disease, infection, constipation, pelvic organ prolapse, and medications with anticholinergic or sympathomimetic effects.^{1,2}

BPH is the most frequent cause of spontaneous AUR in adult men and represents an important marker of disease progression. Increasing age, severe lower urinary tract symptoms, enlarged prostate volume, high post-void residual urine, infection, immobility, alcohol

consumption, and exposure to precipitating medications have been associated with retention. An episode of AUR imposes substantial physical and psychological distress and often initiates a sequence of catheterisation, outpatient review, trial without catheter, recatheterisation, and definitive surgery. Consequently, the condition also places a considerable burden on emergency, inpatient, and urological services.^{3,4}

Immediate management is directed towards prompt and complete bladder decompression. Transurethral catheterisation is the preferred initial approach, while suprapubic catheterisation is reserved for failed or contraindicated urethral access. Evaluation after decompression includes a focused history, abdominal and genital examination, digital rectal examination in men, neurological assessment, urinalysis, renal function testing, and ultrasonography when obstruction, hydronephrosis, or upper urinary tract involvement is suspected. Rapid decompression is generally safe, although transient haematuria, hypotension, catheter discomfort, and post-obstructive diuresis require clinical surveillance, particularly in patients with large retained volumes or renal dysfunction.^{5,6}

Contemporary management has shifted away from routine emergency prostate surgery towards catheter drainage followed by a trial without catheter (TWOC). Alpha-adrenergic blockers reduce smooth-muscle tone at the bladder neck and prostate and improve the probability of successful voiding after catheter removal. Nevertheless, TWOC success varies according to age, cause of retention, prostate characteristics, symptom severity, drained urine volume, duration of catheterisation, and prior episodes. Evidence from international surveys, randomised trials, and systematic reviews supports alpha-blocker use, but real-world practice remains heterogeneous, especially in resource-constrained emergency settings.⁷⁻¹¹

The present study was undertaken to describe the demographic and clinical characteristics, underlying causes, emergency management, and short-term outcomes of patients presenting with AUR to a tertiary care emergency department. It also aimed to determine the proportion achieving successful TWOC and to examine clinical factors associated with TWOC success or failure during 30 days of follow-up.

MATERIALS AND METHODS

Study design and setting: This prospective observational study was conducted in the Department of Urology, Government General Hospital, Bhadradi Kothagudem, Telangana, India, from February 2024 to November 2024. The manuscript was prepared in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology recommendations.¹²

Study population: Consecutive adults aged 18 years or older presenting to the emergency department with AUR were screened. AUR was defined as a sudden inability to pass urine associated with a clinically distended or painful bladder and confirmed by catheter drainage or ultrasonographic evidence of significant bladder distension. Patients with retention following major surgery or anaesthesia, traumatic urethral injury, established chronic urinary retention without an acute symptomatic episode, refusal to participate, or incomplete baseline information were excluded. A census approach was used, and all eligible patients presenting during the study period were recruited. Of 54 screened patients, 50 fulfilled the eligibility criteria and constituted the final sample.

Data collection and clinical assessment: After stabilisation, demographic characteristics, comorbidities, previous lower urinary tract symptoms, prior retention episodes, medication history, symptom

duration, and presenting manifestations were recorded using a structured proforma. Examination included vital signs, suprapubic palpation, external genital examination, focused neurological assessment, and digital rectal examination in men when clinically appropriate. Serum creatinine, urinalysis, urine culture when indicated, and ultrasonography of the urinary tract were obtained according to clinical requirements. Acute kidney injury was identified from the treating team's diagnosis based on serum creatinine findings and available baseline records. The probable cause of retention was assigned after clinical, laboratory, imaging, and urological evaluation.

Treatment and follow-up: Immediate decompression was attempted using a standard urethral catheter. Difficult catheterisation was managed by a urologist using an appropriate specialised catheter or guidewire-assisted technique. Suprapubic catheterisation was performed when urethral drainage was unsuccessful or unsuitable. Alpha-blockers, antimicrobial therapy, intravenous fluids, electrolyte correction, admission, and definitive procedures were prescribed according to the underlying condition and clinical status. Patients were observed for pain relief, haematuria, catheter discomfort, post-obstructive diuresis, and renal complications. TWOC was planned within 7–14 days for clinically suitable patients. Successful TWOC was defined as spontaneous voiding without immediate recatheterisation. Participants were followed for 30 days to document recurrent retention, catheter-free status, definitive urological intervention, and mortality.

Outcome measures and statistical analysis: The primary outcomes were successful initial bladder decompression and successful TWOC. Secondary outcomes included aetiology, admission, complications, recurrence, catheter-free status, and definitive intervention. Continuous variables were summarised as mean $\pm$ standard deviation or median with interquartile range. Categorical variables were reported as frequencies and percentages. Independent-samples t-tests compared continuous variables between TWOC groups. Fisher's exact test was used for categorical comparisons with small expected frequencies. A two-sided p-value below 0.05 was considered statistically significant.

Ethical considerations: Necessary Permissions were obtained before starting the study. Written informed consent was obtained from every participant. Patient identifiers were removed from the study database, and confidentiality was maintained throughout data collection, analysis, and reporting.

RESULTS

Participant flow and baseline characteristics

A total of 54 patients with AUR were assessed for eligibility during the study period. Four were excluded because they did not fulfil the eligibility criteria or had incomplete baseline information. The remaining 50 patients were included in the final analysis, and short-term follow-up data were available for all participants.

The mean age of the study population was 64.2 ± 12.3 years, with a range of 34–86 years. Thirty-four (68.0%) participants were older than 60 years. There were 46 (92.0%) males and 4 (8.0%) females, giving a male-to-female ratio of 11.5:1. Hypertension was present in 22 (44.0%), diabetes mellitus in 14 (28.0%), and chronic kidney disease in 5 (10.0%). Previous lower urinary tract symptoms were reported by 35 (70.0%), while 11 (22.0%) had experienced an earlier episode of retention. Thirteen (26.0%) were receiving an alpha-blocker before presentation (Table 1).

Table 1. Baseline demographic and clinical characteristics of the participants (N = 50)

Characteristic	Frequency/Me an	Percentage
Age, years, mean $\pm$ SD	64.2 ± 12.3	—
Age range, years	34–86	—
Age ≤ 50 years	6	12.0
Age 51–60 years	10	20.0
Age 61–70 years	18	36.0
Age > 70 years	16	32.0
Male sex	46	92.0
Female sex	4	8.0
Hypertension	22	44.0
Diabetes mellitus	14	28.0
Chronic kidney disease	5	10.0
Neurological disorder	4	8.0
Previous lower urinary tract symptoms	35	70.0
Previous episode of urinary retention	11	22.0
Previous alpha-blocker therapy	13	26.0

Clinical presentation and causes of acute urinary retention

Complete inability to void was present in all patients. Suprapubic pain or discomfort occurred in 43 (86.0%), and 44 (88.0%) had a palpable distended bladder. Urinary dribbling or overflow symptoms were reported by 14 (28.0%), constipation by 10 (20.0%), fever by 7 (14.0%), and visible haematuria by 6 (12.0%). The median interval from symptom onset to emergency presentation was 11 hours (interquartile range, 6–20 hours), and 21 (42.0%) presented after more than 12 hours.

The mean estimated bladder volume before catheterisation was 824 ± 306 mL, and the mean volume drained immediately after decompression was 782 ± 298 mL. A drained volume above 800 mL was recorded in 22 (44.0%) patients. The mean serum creatinine concentration at presentation was 1.62 ± 0.91 mg/dL. Acute kidney injury was diagnosed in 11 (22.0%), urinary tract infection in 8 (16.0%), and ultrasonographic hydronephrosis in 9 (18.0%).

BPH was the leading cause of AUR, accounting for 29 (58.0%) cases. Urethral stricture was identified in 6 (12.0%), prostatic malignancy in 4 (8.0%), and neurogenic bladder in 4 (8.0%). Urinary tract infection or acute prostatitis was the primary precipitating factor in 3 (6.0%), medication-related retention or severe constipation in 3 (6.0%), and pelvic organ prolapse in one female patient (Table 2).

Table 2. Clinical presentation and causes of acute urinary retention

Variable	Frequency	Percentage
Presenting features		
Complete inability to void	50	100.0
Suprapubic pain or discomfort	43	86.0

Variable	Frequency	Percentage
Palpable distended bladder	44	88.0
Urinary dribbling or overflow symptoms	14	28.0
Constipation	10	20.0
Fever	7	14.0
Visible haematuria	6	12.0
Presentation after >12 hours	21	42.0
Drained urine volume >800 mL	22	44.0
Acute kidney injury	11	22.0
Urinary tract infection	8	16.0
Hydronephrosis	9	18.0
Primary cause		
Benign prostatic hyperplasia	29	58.0
Urethral stricture	6	12.0
Prostatic malignancy	4	8.0
Neurogenic bladder	4	8.0
Urinary tract infection/acute prostatitis	3	6.0
Medication-related retention/severe constipation	3	6.0
Pelvic organ prolapse	1	2.0

Emergency management

Routine urethral catheterisation successfully decompressed the bladder in 42 (84.0%) patients. Six (12.0%) required urology-assisted urethral catheterisation using a specialised catheter or guidewire technique, while 2 (4.0%) underwent suprapubic catheterisation after failed urethral access. Alpha-blocker therapy was initiated or continued in 35 (70.0%), antimicrobial therapy was administered to 12 (24.0%), and 8 (16.0%) required intravenous fluids or correction of renal and electrolyte abnormalities.

Immediate relief of suprapubic pain following decompression was documented in 47 (94.0%) patients. Catheter-related discomfort occurred in 6 (12.0%), transient haematuria in 5 (10.0%), and post-obstructive diuresis in 4 (8.0%). All were managed conservatively, and no major catheter-related urethral injury was recorded (Table 3).

Table 3. Emergency management of acute urinary retention

Treatment or outcome	Frequency	Percentage
Successful routine urethral catheterisation	42	84.0
Urology-assisted urethral catheterisation	6	12.0
Suprapubic catheterisation	2	4.0
Alpha-blocker therapy	35	70.0
Antimicrobial therapy	12	24.0
Intravenous fluids/renal or electrolyte correction	8	16.0
Immediate relief of pain following decompression	47	94.0
Catheter-related discomfort	6	12.0
Transient haematuria	5	10.0
Post-obstructive diuresis	4	8.0

Disposition and short-term outcomes

Thirty-six (72.0%) patients were discharged from the emergency department with an indwelling catheter and instructions for urological follow-up. Fourteen (28.0%) required admission. The reasons for admission were acute kidney injury in seven patients, complicated urinary infection or sepsis in four, difficult catheterisation requiring additional evaluation in

two, and persistent gross haematuria in one. The median hospital stay among admitted patients was 3 days (interquartile range, 2–5 days).

TWOC was undertaken within 7–14 days in 42 patients. Eight were unsuitable because of malignant obstruction, neurogenic bladder, severe urethral stricture, or a requirement for prolonged catheterisation. Spontaneous voiding after catheter removal was achieved in 25 of 42 patients, giving a success rate of 59.5%. The other 17 (40.5%) developed recurrent retention shortly after catheter removal and required recatheterisation.

Among the 25 patients with an initially successful TWOC, 5 (20.0%) experienced recurrent retention during the subsequent 30-day period. Consequently, 20 (40.0%) of the total cohort remained catheter-free at 30 days. Thirteen (26.0%) underwent a definitive procedure: transurethral resection of the prostate in eight, urethral dilatation or internal urethrotomy in three, and long-term suprapubic urinary diversion in two. No deaths occurred (Table 4).

Table 4. Disposition and short-term treatment outcomes

Outcome	Frequency	Percentage
Discharged from the emergency department	36	72.0
Required hospital admission	14	28.0
Trial without catheter attempted	42	84.0
Successful trial without catheter	25/42	59.5
Failed trial without catheter	17/42	40.5
Recurrent retention after initially successful trial	5/25	20.0
Catheter-free at 30 days	20	40.0
Definitive urological procedure within 30 days	13	26.0
Mortality	0	0.0

Factors associated with successful trial without catheter

Patients with successful TWOC were significantly younger than those with failed TWOC (60.8 ± 10.4 versus 69.7 ± 9.6 years; $p=0.007$). The mean volume drained at initial catheterisation was also lower in the successful group (654 ± 220 versus 975 ± 310 mL; $p=0.001$).

A drained urine volume above 800 mL was present in 7 (28.0%) patients with successful TWOC and 12 (70.6%) with failed TWOC ($p=0.011$). Presentation after more than 12 hours and acute kidney injury were more frequent among patients with failure, but neither difference reached statistical significance. Previous retention was also not significantly associated with TWOC outcome (Table 5).

Table 5. Comparison of patients with successful and failed trial without catheter

Characteristic	Successful trial (n = 25)	Failed trial (n = 17)	p-value
Age, years, mean $\pm$ SD	60.8 ± 10.4	69.7 ± 9.6	0.007
Initial drained volume, mL, mean $\pm$ SD	654 ± 220	975 ± 310	0.001
Drained volume >800 mL	7 (28.0)	12 (70.6)	0.011
Presentation after >12 hours	8 (32.0)	11 (64.7)	0.059
Acute kidney injury	3 (12.0)	7 (41.2)	0.062
Previous urinary retention	4 (16.0)	6 (35.3)	0.268

Values are expressed as mean $\pm$ standard deviation or frequency (percentage). Independent-samples *t*-test was used for continuous variables, and Fisher's exact test was used for categorical variables. A *p*-value <0.05 was considered statistically significant.

DISCUSSION

This prospective study describes the emergency presentation and 30-day outcomes of 50 patients with AUR in a tertiary care hospital. The cohort was predominantly male and elderly, with more than two-thirds aged above 60 years. BPH accounted for 58.0% of

cases, confirming that benign prostatic obstruction remains the principal cause of AUR among older men.^{3,4,7} Urethral stricture, prostatic malignancy, neurogenic bladder, infection, constipation or medication exposure, and pelvic organ prolapse formed smaller but clinically relevant groups. This aetiological

diversity supports a systematic assessment rather than attributing every episode in an older man to BPH.

Complete inability to void and suprapubic discomfort were the dominant symptoms, and most patients had a palpable bladder. The mean drained urine volume was 782 mL, while 22.0% had acute kidney injury and 18.0% had hydronephrosis. These findings indicate that a considerable proportion presented with physiologically important obstruction rather than isolated lower urinary tract discomfort. Delayed presentation, documented in 42.0%, could have contributed to larger retained volumes and renal complications. Early recognition and prompt referral are therefore important components of emergency care.^{1,2}

Routine urethral catheterisation achieved decompression in 84.0% of patients, and only 4.0% required suprapubic catheterisation. Immediate pain relief occurred in 94.0%. Transient haematuria, catheter discomfort, and post-obstructive diuresis were uncommon and responded to conservative management. This pattern is consistent with evidence supporting prompt complete bladder drainage and close observation instead of gradual decompression.⁵ Most patients were discharged with a catheter, whereas admission was reserved for acute kidney injury, complicated infection, difficult catheterisation, or persistent haematuria. Similar variation in admission and TWOC policies has been documented across urological services.⁶

TWOC was attempted in 42 patients and succeeded in 59.5%, closely matching the 61% success reported in a large international survey.⁷ Alpha-blocker therapy was used in 70.0% of the cohort. Randomised trials, Cochrane evidence, and meta-analyses demonstrate that alpha-blockers improve the probability of successful catheter removal, although success remains influenced by patient and disease characteristics.⁸⁻¹¹ In the present study, successful patients were younger and had substantially lower initial drained volumes. A retained volume above 800 mL was significantly associated with failure. These findings agree with studies identifying advanced age, greater residual volume, larger prostate size, and marked intravesical prostatic protrusion as adverse predictors of TWOC.^{7,13,14}

Despite initial success, one-fifth developed recurrent retention within 30 days, and only 40.0% of the entire cohort remained catheter-free. More than one-quarter underwent a definitive procedure. Thus, successful initial decompression does not represent definitive resolution. Structured follow-up, reassessment of the underlying cause, optimisation of medical treatment, and timely surgery for persistent obstruction are essential to reduce recurrent emergency visits and prolonged catheter dependence.^{3,4}

Limitations

This study was conducted at a single tertiary hospital and included only 50 participants, limiting precision and

external generalisability. Consecutive recruitment reduced selection bias, but the heterogeneous causes of retention restricted cause-specific analyses. Prostate volume, intravesical prostatic protrusion, symptom scores, and urodynamic findings were not uniformly available. Follow-up was limited to 30 days, preventing assessment of long-term recurrence, catheter dependence, surgical outcomes, and renal recovery.

CONCLUSION

Acute urinary retention predominantly affected older men, and benign prostatic hyperplasia was the leading underlying cause. Prompt urethral catheterisation provided effective bladder decompression and rapid symptomatic relief in most patients, with few transient complications. A trial without catheter was successful in approximately three-fifths of eligible participants. Younger age and a lower initial drained urine volume were associated with successful voiding, whereas retained volumes above 800 mL predicted failure. Recurrent retention and the need for definitive intervention remained frequent during short-term follow-up. Standardised emergency assessment, appropriate alpha-blocker therapy, planned catheter removal, and timely urological review are required to improve sustained catheter-free recovery and reduce repeat emergency presentations and avoidable hospital admissions.

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