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Systematic Review

Urethral catheterization outcomes and complications in acute urinary retention: a systematic review of emergency department studies

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ABSTRACT

Background: Acute urinary retention (AUR) is a common emergency condition managed by immediate urethral catheterization (UC), and data on catheter-related complications is less developed than post-catheter voiding outcomes. This systematic review aims to analyze original studies on outcomes and complications of UC in adults with AUR. **Methods:** Original studies were identified from PubMed, Web of Science, Scopus, and Embase. Eligible studies included adults with AUR managed with UC in ED or acute-care settings and reporting catheter-related complications, trial without catheter (TWOC), re-catheterization, or related clinical outcomes. Findings were synthesized qualitatively. **Results:** Eight original studies were included. Most studies focused on TWOC success and predictors rather than direct catheter harms. Reported TWOC success ranged from 28.3% to 68.6%, and improved in some studies with alpha-blocker therapy. Factors associated with better voiding outcomes include lower retained urine volume, smaller prostate size, younger age, and lower intravesical prostatic protrusion. Direct complications were less reported, and one comparative cohort showed higher rates of urinary tract infection (UTI), urethral stricture (US), epididymo-orchitis, and septicemia after UC than suprapubic drainage (SPD). Rapid bladder decompression was not associated with important excess hypotension or severe hematuria. **Conclusion:** UC effectively relieves AUR, and direct complication outcomes still underreported. Future emergency-based studies should assess catheter-related infective and traumatic complications more systematically alongside TWOC outcomes in practice.

Keywords: Acute Urinary Retention; Urethral Catheterization; Trial Without Catheter; Re-Catheterization; Urinary Catheter Complications; Emergency Department

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Introduction

Acute urinary retention (AUR) is a urological emergency characterized by sudden inability to pass urine with pain, distress, and urgent need for bladder decompression, and it is one of the most important acute presentations related to bladder outlet obstruction in adult men [1–3]. AUR incidence increase with age, and benign prostatic hyperplasia is the leading underlying cause in men, although US, blood clots, drugs, constipation, infection, and neurologic disorders contribute to presentation in emergency settings [3,4]. The initial treatment is immediate bladder drainage by UC because prompt decompression relieves pain, reduces bladder overdistension, and forms the first step before further assessment or TWOC (TWOC) [1,3].

UC is standard emergency management, and the literature historically focused more on whether patients void successfully after catheter removal than direct side effects of the catheter itself [2,5]. Most original papers evaluated TWOC success, re-catheterization, urinary flow, post-void residual volume, or predictors of voiding recovery after initial UC, while only a smaller number reported catheter-related complications UTI, US, epididymo-orchitis, septicemia, hematuria, or hypotension [6–9].

UC in AUR was associated with UTI, US, epididymo-orchitis, and septicemia, while SPD had a different complication pattern [10]. Studies of bladder decompression technique indicate that major immediate adverse events after urethral drainage were uncommon, because rapid decompression was not associated with important excess hypotension or severe hematuria when compared with gradual decompression [11,12]. Several studies in our review showed that post-catheter outcomes are affected by patient and disease factors, including retained volume, prostate size, age, and intravesical prostatic protrusion, which helps explain why TWOC success varied in studies [6,8,9]. Randomized trials found that alpha-blocker therapy after catheterization improved the chance of successful voiding and reduced re-catheterization [4,7,13].

Based on these findings, there is a clear need to examine UC in AUR not only as a bridge to TWOC, but also as an exposure with its own outcome profile, including infection, trauma, and decompression-related events in ED populations [3,5]. Our systematic review was conducted to synthesize the original studies on UC outcomes and complications in patients presenting with acute urinary retention, with attention to ED and acute-care studies where catheterization is usually first performed [1,3].

Methods

Study design

This study was conducted as a systematic review to identify original studies reporting outcomes and complications of UC in patients presenting with AUR in ED. The review question was focused on ED management and on studies that evaluated patients after initial urethral bladder decompression.

Eligibility criteria

Original studies were considered eligible if they included adult patients with AUR, UC as part of the initial management, and reported relevant clinical outcomes including TWOC (TWOC), re-catheterization, UTI, US, hematuria, hypotension, epididymo-orchitis, septicemia, post-void residual

urine, urinary flow, or other catheter-related outcomes. Studies were included when patients were recruited from EDs, accident and emergency units, acute admissions units, or comparable urgent care hospital settings. Randomized controlled trials, prospective observational studies, and comparative cohort studies were eligible. Review articles, editorials, conference summaries without sufficient data, case reports, animal studies, pediatric-only studies, postoperative urinary retention studies, and studies focused mainly on suprapubic catheterization without extractable urethral catheter data were excluded.

Information sources and search strategy

The included studies were identified through electronic database searching. The literature search was performed in PubMed, Web of Science, Scopus, and Embase. The search strategy combined controlled terms and free-text keywords related to AUR, urethral catheterization, TWOC, re-catheterization, urinary catheter complications, ED, and benign prostatic hyperplasia. Examples of search terms included: “acute urinary retention,” “retention of urine,” “urethral catheterization,” “urinary catheter,” “TWOC,” “TWOC,” “recatheterization,” “catheter complications,” and “emergency department.” Search results from all databases were exported and duplicates were removed before screening.

Study selection

Titles and abstracts retrieved from the database search were screened for relevance according to the predefined eligibility criteria. Full texts of eligible articles were then assessed in detail. Studies that met all inclusion criteria were included in the final review. The full text was reviewed before a final decision was made.

Data extraction

Data were extracted from the included studies using a structured data extraction form prepared for this review. The extracted variables included first author, year of publication, country, study design, clinical setting, sample size, patient characteristics, cause of acute urinary retention, catheterization approach, catheter-related intervention or comparison, duration before catheter removal when reported, and the main outcomes. Outcome data extracted included TWOC success or failure, re-catheterization rates, UTI, US, hematuria, hypotension, septicemia, epididymo-orchitis, post-void residual volume, peak urinary flow rate, and predictors of successful voiding.

Data synthesis

Because the included studies differed in design, patient selection, interventions, and reported outcomes, the findings were synthesized qualitatively. The results were grouped according to outcome domains, including direct catheter-related complications and post-catheterization clinical outcomes. Where appropriate, findings were compared in studies to identify consistent patterns in complication rates, TWOC outcomes, and predictors of successful voiding. This approach was used to provide a clinically focused summary of the available evidence relevant to emergency department UC in AUR.

Results

Eight original studies were included in the final results synthesis. The included studies were prospective cohorts, randomized comparative

studies, and placebo-controlled trials conducted in ED, accident and emergency, or acute admission settings. Sample size ranges from 31 to 141 evaluable participants per study. Most studies include male with AUR secondary to benign prostatic enlargement or benign prostatic hyperplasia after initial urethral catheterization, and the reported outcomes focused on TWOC (TWOC), recatheterization, and short-term complications after bladder drainage. Direct urethral catheter–related complications were reported in a small number of studies, while the majority of the included papers described predictors of successful voiding after catheter removal.

Horgan et al., compared urethral and suprapubic catheterization in 86 patients presenting to the ED with AUR due to prostatomegaly, in the urethral catheter group, UTI developed in 12 of 30 patients (40%), US in 5 of 30 (16.7%), epididymo-orchitis in 2 of 30 (6.7%), and septicaemia in 1 of 30 (3.4%). The suprapubic catheter group had lower UTI rates, seen in 10 of 56 patients (18%), and no USs, epididymo-orchitis, or septicaemia were reported. Suprapubic catheter dislodgement was more frequent, occurring in 12 of 56 patients (23%), compared with 1 of 30 patients (3.4%) in the urethral group, 7 of 30 urethrally catheterized patients required recatheterization after catheter removal because of recurrent retention.

Etafy et al. compared rapid versus gradual bladder decompression through a urethral catheter in 62 patients with AUR due to benign prostatic hyperplasia. Hematuria occurred in 2 patients in the rapid decompression group and in none of the gradual decompression group, but hematuria episodes were mild and treated conservatively. The mean blood pressure drop after relief of obstruction was 15 mmHg in the rapid group and 10 mmHg in the gradual group, with no patient developing clinically significant hypotension. The authors concluded that there was no difference between the two decompression methods.

The commonly reported outcome in the remaining studies was successful TWOC after initial catheterization. TWOC success rates varied between studies. Taube and Gajraj reported successful voiding in 17 of 60 patients (28.3%), while Haroon et al. reported success in 68 of 99 patients (68.6%). In the Malaysian emergency-based study, 16 of 32 patients (50%) had successful TWOC. In the community protocol study by Gopi et al., 19 of 31 patients (61.3%) had successful first TWOC and this increased to 26 of 31 patients (83.9%) after a second trial. Randomized drug studies showed better outcomes with alpha-blocker treatment. Lucas et al. found that 48% of patients receiving tamsulosin did not require re-catheterization compared with 26% in the placebo group, and success by free-flow variables was 52% versus 34%, respectively. McNeill et al. found TWOC success in 22 of 40 patients (55%) receiving sustained-release alfuzosin compared with 12 of 41 patients (29%) receiving placebo. Lower retained urine volume, smaller prostate size, and lower intravesical prostatic protrusion were associated with better TWOC outcome. In Taube and Gajraj, success was more common when retained volume was below 900 mL. In Haroon et al., successful cases had a smaller mean prostate size than failed cases (39.2 g vs 63.7 g). In the IPP-based study, TWOC failure was 82.4% in grade 3 protrusion compared with 12.5% and 14.3% in grades 1 and 2.

Table 1: Characteristics and main findings of the included studies

Study	Country and setting	Design	Population	Urethral catheter exposure and comparator	Outcomes	Main findings
Horgan 1992 [10]	Ireland; ED	Comparative consecutive cohort	86 men with AUR due to prostatomegaly; 30 urethral vs 56 suprapubic	Urethral group received latex Foley; comparator was suprapubic Cystofix catheter	UTI, US, epididymo-orchitis, septicemia, recatheterization, dislodgement	In the urethral group, UTI occurred in 12/30 (40%), US in 5/30 (16.7%), epididymo-orchitis in 2/30 (6.7%), septicemia in 1/30 (3.4%), and 7/30 (23%) required recatheterization after catheter removal. Suprapubic catheterization had fewer infections (10/56; 18%) and no strictures, orchitis, or septicemia, but more dislodgement (12/56; 23%).
Taube 1989 [6]	UK; ED	Randomized comparative study	60 men with acute urinary retention	All received 16 F Foley catheter per urethra; catheter removed immediately, at 24 h, or at 48 h	TWOC success, recatheterization, effect of retained volume, follow-up need for surgery	TWOC succeeded in 17/60 (28.3%) and 43/60 (71.7%) required recatheterization. Mean retained volume was 786 mL in successes vs 1069 mL in failures. Success was 15/34 when retained volume was <900 mL vs 2/26 when >900 mL. Catheter removal timing did not significantly change success.
Etafy 2017 [11]	Egypt; acute AUR hospital cohort	Randomized two-group comparative study	62 men with AUR due to BPH	Foley urethral catheter; rapid drainage vs gradual drainage	Hematuria, hypotension / BP drop, pain relief	Hematuria occurred in 2/31 in the rapid-decompression group and 0/31 in the gradual group; both hematuria cases were mild. Mean BP drop was 15 mmHg vs 10 mmHg, and no patient developed significant hypotension. Authors concluded there was no significant difference between rapid and gradual decompression.
Gopi 2006 [14]	UK; A&E and acute admissions ward	Prospective protocol study	31 men with first-time AUR	Protocol used 14–16 Ch 2-way urethral catheter, alfuzosin, then	First and second TWOC success, flow, postvoid residual, follow-up	Median residual volume after catheterization was 900 mL. First TWOC succeeded in 19/31 (61.3%) and second TWOC in 26/31 (83.9%). Immediate post-TWOC mean peak flow was 6.5 mL/s and postvoid

Study	Country and setting	Design	Population	Urethral catheter exposure and comparator	Outcomes	Main findings
				outpatient/community TWOC	symptom outcomes	residual 165 mL; at 3 months mean peak flow was 13.2 mL/s, postvoid residual 26.5 mL, IPSS 4.5, QoL 2.
Haroon 2018 [15]	Pakistan; ED	Prospective case-review study	99 men with primary AUR due to benign prostatic enlargement	Initial urethral catheterization, tamsulosin, then TWOC	TWOC success/failure, peak flow, PVR, prostate size, catheterized residual	68/99 (68.6%) voided successfully after catheter removal. Mean prostate size was 39.2 g in successful cases vs 63.7 g in failures (p=0.006). Mean catheterized residual volume was 731 mL in successes vs 1153 mL in failures. Mean post-TWOC follow-up peak flow in successes was 10.3 mL/s and mean PVR 114 mL.
Sharis 2013 [9]	Malaysia; ED	Prospective study	32 men with first episode of AUR secondary to BPH	All catheterized; ultrasound-assessed IPP and prostate volume; TWOC within 10 days	TWOC success/failure, IPP grade, prostate volume, age	Mean age was 70.5 years and mean prostate volume 57.4 g. TWOC succeeded in 16/32 (50%). Failure rates were 12.5% for grade 1 IPP, 14.3% for grade 2, and 82.4% for grade 3; grade 3 IPP was a significant predictor of failed TWOC.
Lucas 2005 [13]	UK/Ireland; multicentre, admitted through Accident and ED	Randomized double-blind placebo-controlled trial	149 randomized; 141 in ITT population	After catheterization for AUR , patients received tamsulosin 0.4 mg daily vs placebo before TWOC	Need for recatheterization, successful TWOC by free-flow criteria, adverse events	On TWOC day, 34 men on tamsulosin vs 18 on placebo did not require recatheterization (48% vs 26%, p=0.011). Success by free-flow variables was 52% vs 34% (p=0.019). Dizziness and somnolence were more frequent with tamsulosin, but overall adverse events were similar and mostly non-serious.
McNeill 1999 [7]	Scotland; 4-centre acute-care trial	Prospective randomized placebo-controlled trial	81 men with painful AUR related to benign prostatic obstruction; 40 alfuzosin, 41 placebos	After catheterization, patients received SR alfuzosin 5 mg twice daily vs placebo; catheter removed after 24 h of treatment	TWOC success/failure, age effect, later need for surgery/intervention	TWOC succeeded in 22/40 (55%) with alfuzosin vs 12/41 (29%) with placebo (p=0.03). Mean age of successful patients was 68.4 years vs 72.9 years in failures (p=0.015). Among the 34 men who voided successfully, 23 (68%) required no further intervention during mean follow-up of about 7 months.

Table 2: Outcomes Table

Study	Direct urethral-catheter complication	Post-catheter outcome
Horgan 1992	UTI, US, epididymo-orchitis, septicemia.	Recatheterization and trial clamping outcomes.
Taube 1989	Limited direct complication reporting.	TWOC success, recatheterization, residual-volume effect.
Etafy 2017	hematuria, blood-pressure drop / hypotension.	Pain relief and decompression success.
Gopi 2006	Minimal direct catheter-complication reporting	First and second TWOC success, PVR, Qmax, IPSS, QoL.
Haroon 2018	No major direct catheter-complication.	TWOC success, flow, PVR, predictors.
Sharis 2013	No direct catheter-complication dataset.	TWOC success/failure and predictors.
Lucas 2005	Adverse-event data for medical therapy, not catheter-specific complications.	Recatheterization and TWOC success.
McNeill 1999	No detailed catheter-specific complication	TWOC success, age effect, subsequent intervention.

Discussion

The main finding of this review is that the available literature focused on post-catheter outcomes, mainly TWOC (TWOC) success and re-catheterization, but complication profile of emergency UC in AUR is still not well described [5]. The most important data in our included studies came from the accident and emergency cohort by Horgan, where UC was associated with higher rates of UTI, US, epididymo-orchitis, and septicaemia than SPD [10]. This finding is important for our review because it shows that UC is not a neutral step in the emergency pathway, and that its mechanical and infective consequences persist beyond the initial emergency visit [10]. This result should be carefully interpreted because the study nonrandomized, used latex Foley catheters, and involved prolonged catheterization periods, so the observed stricture and infection burden could be higher than what would be expected with current materials and contemporary practice [10].

Our review found that decompression-related complications were uncommon and mild, which is supported by Etafy, where hematuria occurred in only two patients after rapid drainage, no patient developed clinically significant hypotension, and no statistically significant difference was found between rapid and gradual decompression [11]. This interpretation is strengthened by the later meta-analysis by Wu, which pooled 435 patients

and found that rapid decompression did not increase post-decompression hematuria and was not associated with circulatory collapse [12]. One practical implication of our findings is that fear of severe hematuria or hypotension should not be used alone to justify slower and more complicated drainage protocols in stable patients, although higher-risk subgroups still need better study [11,12].

The TWOC results in our review were variable, with success ranging from low rates in Taube to higher rates in Haroon and in the community protocol by Gopi, which reflects differences in patient selection, retention volume, catheterization duration, use of alpha-blockers, and definitions of successful voiding [6,14,15]. This variability is similar to the recent systematic review by Christensen, where immediate TWOC cohorts had a success rate of 47% and delayed TWOC cohorts 53%, with low to very low certainty and no clear evidence favoring one strategy over the other [3]. In our included studies, smaller prostate size, lower retained volume, and lower intravesical prostatic protrusion were linked with better TWOC outcome, which gives internal consistency to the review and indicate that anatomical obstruction burden is the main determinant of recovery after emergency catheterization [6,9,15,16].

Another important finding in our review is that alpha-blocker use improves post-catheter outcomes, because Lucas showed lower re-catheterization with tamsulosin than placebo, while McNeill showed higher TWOC success with alfuzosin than placebo, and these results support the modern approach after initial bladder drainage [7,13]. This is also in agreement with broader reviews of AUR management, which describe alpha-blockers as useful adjuncts that avoid surgery in a subgroup of men after catheterization for AUR [4]. Our findings indicate that emergency UC is effective for immediate relief of AUR, but its complication profile is underreported, and future studies should measure direct catheter-related trauma and infective outcomes.

Conclusion

UC is the main emergency treatment for AUR for its effective immediate bladder decompression. Direct catheter-related complications are reported less consistently than post-catheter voiding outcomes. In the included studies, TWOC success was influenced by retained urine volume, prostate size, age, and intravesical prostatic protrusion. Alpha-blocker therapy improved voiding outcomes and reduced re-catheterization in randomized studies. Future emergency-based studies should use standardized outcome measures and assess clinical benefit and catheter-related side effects more completely.

References

1. Emberton M, Anson K. Clinical review Fortnightly review Acute urinary retention in men: an age old problem. n.d.
2. Choong S, Emberton M. Acute urinary retention. BJU Int. 2000 Jan;85(2):186-201. doi: 10.1046/j.1464-410x.2000.00409.x. PMID: 10671867.
3. Christensen VS, Skow M, Flottorp SA, Strømme H, Mdala I, Vallersnes OM. Immediate or delayed trial without catheter in acute urinary retention in males: A systematic review. BJUI Compass

2024;5:732–47. https://doi.org/10.1002/bco2.369.
4. Roehrborn CG. Acute urinary retention: risks and management. Rev Urol. 2005;7 Suppl 4(Suppl 4):S31-41. PMID: 16986053; PMCID: PMC1477606.
5. Hollingsworth JM, Rogers MAM, Krein SL, Hickner A, Kuhn L, Cheng A, et al. Determining the Noninfectious Complications of Indwelling Urethral Catheters A Systematic Review and Meta-analysis. 2013.
6. Taube M, Gajraj H. Trial without Catheter following Acute Retention of Urine 1989;63:180–2. https://doi.org/10.00.
7. Mcneill SA, Daruwala PD, Mitchell IDC, Shearer MG, Hargreave TB. Sustained-release alfuzosin and trial without catheter after acute urinary retention: a prospective, placebo-controlled trial. vol. 84. 1999.
8. Mahadik P, Vaddi SP, Godala CM, Vijaya Kumar Reddy V, Sambar VK. Factors affecting trial without catheter for first spontaneous acute urinary retention. Int Neurourol J 2013;17:121–6. https://doi.org/10.5213/inj.2013.17.3.121.
9. Syazarina ShariS O, Zainuddin zulkifli M, Hamid hamzaini A. Predicting Outcome of Trial of Voiding Without Catheter in Acute Urinary Retention with Intravesical Prostatic Protrusion. n.d.
10. Horgan AF, Prasad B, Waldron DJ, O'sullivan DC. Acute Urinary Retention. Comparison of Suprapubic and Urethral Catheterisation. vol. 70. 1992.
11. Etafy MH, Saleh FH, Ortiz-Vanderdys C, Hamada A, Refaat AM, Aal MA, et al. Rapid versus gradual bladder decompression in acute urinary retention. Urol Ann 2017;9:339–42. https://doi.org/10.4103/0974-7796.216320.
12. Wu MY, Chang JR, Lee YK, Lin PC, Tsai TY. The Effect and Safety of Rapid and Gradual Urinary Decompression in Urine Retention: A Systematic Review and Meta-Analysis. Medicina (Lithuania) 2022;58. https://doi.org/10.3390/medicina58101441.
13. Lucas MG, Stephenson TP, Nargund V. Tamsulosin in the management of patients in acute urinary retention from benign prostatic hyperplasia. BJU Int 2005;95:354–7. https://doi.org/10.1111/j.1464-410X.2005.05299.x.
14. Gopi SS, Goodman CM, Robertson A, Byrne DJ. A prospective pilot study to validate the management protocol for patients presenting with acute urinary retention: a community-based, nonhospitalised protocol. ScientificWorldJournal 2006;6:2436–41. https://doi.org/10.1100/tsw.2006.379.
15. Sabir Khan H, Nadeem Azam Khan M, Malik G. TRIAL WITHOUT CATHETER: WHAT PREDICTS THE OUTCOME IN ACUTE URINARY RETENTION? vol. 14. 2018.
16. Kumar V, Mark C, Bhuvangiri A, Irwin P. A prospective study of conservatively managed acute urinary retention: Prostate size matters. BJU Int 2000;86:816–9. https://doi.org/10.1046/j.1464-410X.2000.00918.x.