International Surgery Journal
Jha AA et al. Int Surg J. 2020 Nov;7(11):3718-3723
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: https://dx.doi.org/10.18203/2349-2902.isj20204679

Original Research Article

Predictors of successful trial with-out catheter following acute urinary retention secondary to benign prostatic hypertrophy

Aditya A. Jha[1], Gagandeep Singh[2]*, Madhu Govindaiah[3], Nimit Solanki[4]

[1]Department of Urology, Military Hospital, Secunderabad, Telangana, India
[2]Department of Urology, Command Hospital, Udhampur, Jammu and Kashmir, India
[3]Department of Urology, Command Hospital Air Force, Bengaluru, Karnataka, India
[4]Department of Urology, Base Hospital Delhi Cantt, New Delhi, India

Received: 27 August 2020
Revised: 04 October 2020
Accepted: 13 October 2020

***Correspondence:**
Dr. Gagandeep Singh,
E-mail: gagan150582@gmail.com

ABSTRACT

Background: Acute urinary retention (AUR) is one of the most psychologically distressing complications of benign prostatic hypertrophy (BPH). Attempt of trial without urinary catheter (TWOC) is given to all these patients, failing which they are subjected to surgical management. This study was conducted to analyse the possible predictors of successful trials in such patients.
Methods: Patients reporting to our centre with a first episode of spontaneous AUR secondary to BPH were enrolled. Following per-urethral catheterization residual urine volume (RUV) drained, duration of symptoms and international prostate symptom score (IPSS) were recorded. Using trans-abdominal ultrasonography (USG) prostate volume (PV), intra-vesicle prostate protrusion (IPP) and bladder wall thickness (BWT) were measured. Catheter free trial was given after a course of tamsulosin. Success was defined if patients could void >200 ml of urine within six hours of catheter removal with a maximum flow rate of >5 ml/sec and achieved a post void residual (PVR) urine volume of <150 ml.
Results: Ninety patients with 58 in successful and 32 in failed group were analysed. Significantly lesser age, IPSS, RUV, IPP and BWT was noted in successful group. Duration of LUTS and PV on USG were statistically insignificant parameters in determining a successful trial.
Conclusions: Age, IPSS, RUV, IPP and BWT may have a role in predicting successful TWOC following AUR secondary to BPH.

Keywords: Acute urinary retention, Benign prostatic hypertrophy, Trial without catheter

INTRODUCTION

Benign prostatic hypertrophy (BPH) even though being a benign condition can still have serious complication like haematuria, recurrent urinary tract infection (UTI), obstructive nephropathy and acute urinary retention (AUR) which can adversely affect health and quality of life (QOL).[1] AUR represents one of the most distressing complications of BPH. For those with mild score (IPSS <8), the documented incidence increases from 0.4/1000 for patients 45 to 49 years of age to 7.9/1000 person-years for those between 79 to 83 years, for those with moderate to severe scores (IPSS 8-35), rates increased from 3.3/1000 to 11.3/1000 for the respective age groups.[2] Attempt of trial without urinary catheter (TWOC) is given to all these patients, failing which they are subjected to surgical management. Various factors have been known to affect the likelihood of a successful TWOC, knowledge of which may help us to predict the outcome an according counsel the patient about the possible outcome. This study was conducted with the objective to analyse the possible predictors of successful trials in such patients.

METHODS

This was a prospective observational study conducted upon Indian males between April 2018 and March 2020 at the Department of Urology, Army Hospital (Research and Referral), New Delhi. Approval was obtained from the ethics committee of the institute.

All patients 45 years of age and above presenting with first episode of AUR secondary to BPH were included. Patients already on various combinations of alpha blocker, 5 alpha reductase inhibitor and anti-cholinergics drugs, with >1000 ml of residual urine volume (RUV) drained, suspicious digital rectal examination (DRE), known case of stricture urethra/vesicle calculus, prior lower urinary tract surgery, known neurological/psychiatric disorders or patients with history of recent surgery/UTI/gross haematuria/perineal trauma were excluded. Total of 102 patients were initially recruited. Of these seven patients had evidence of hydroureteronephrosis (HDUN) on utrasonography (USG) suggestive of obstructive uropathy, four patients had suspicious prostate on DRE and one patient had a 2 cm vesicle calculus and hence were excluded.

All patients underwent per-urethral catheterization using 16 Fr Foley's catheter and RUV drained were recorded. Patients were admitted and subsequently underwent detailed clinical and radiological examination. Age, duration of symptoms and IPSS were documented. Using a 3.5 MHz USG probe, prostate volume (PV), intra-vesicle prostate protrusion (IPP) and bladder wall thickness (BWT) were measured after filling the bladder with 200 ml saline in retrograde manner via the Foley's catheter. PV (in grams) was measured by using an ellipsoid formula of height (cm) × width (cm) × antero-posterior (AP) diameter (cm) × π/6 after imaging prostate in both transverse and sagittal planes. For IPP we moved the sagittal scan of the USG probe both horizontally and longitudinally and measured the vertical distance from the tip of the protrusion to the circumference of the bladder at the base of the prostate gland. IPP was graded as: grade I <5 mm, grade II 5-10 mm and grade III >10 mm.[3] Using a 7.5 MHz trans-abdominal USG probe BWT was measurement (which included adventitia, detrusor muscle and mucosa/submucosa) and was considered normal if it was <5 mm and thickened if >5 mm. Patients were subsequently administered tamsulosin 0.4 mg once a day (at night) for next three days, following which they were given a TWOC. Successful trial was considered if patients could pass >200 ml of urine within 6 hours of catheter removal with a maximum flow rate of 5 ml/sec on uroflowmetry and achieved a PVR urine of <150 ml on trans-abdominal USG.

The statistical software namely statistical package for social sciences (SPSS) 22.0, R environment version 3.2.2 was used for analysis of data and Microsoft word along with excel was used to generate graphs and tables. An independent t-test was used to determine the statistically significant difference between the means in 2 groups (successful and unsuccessful). Multivariate analysis was performed to identify which were independent predictors of an unsuccessful trial. A Fisher's exact test was used to determine significant differences between grades of IPP in respect to TWOC outcomes. A p value of <0.05 was considered statistically significant. Receiver operating characteristic (ROC) curve analysis was performed to find the predictability of study variables for predicting the outcome. Diagnostic values based on area under curve (0.9-1.0 excellent, 0.8-0.9 good, 0.7-0.8 fair, 0.6-0.7 poor, and 0.5-0.6 fail).

RESULTS

Out of total 90 patients enrolled in our study, 58 (64.4%) belonged to successful group while remaining 32 (35.6%) to failed group. Complete data were available for all patients at the end of study. There was no statistically significant difference between the two groups with respect to duration of LUTS and PV on USG while statistically significant differences were noted for age, IPSS, RUV drained, IPP and BWT.

Age range was 50 to 79 years in successful group while that in failed group was 53 to 77 years (Table 1). Mean age of patients in successful group was found to be lesser by 3 years and six months. Total of 78.8% of patients in our study accepted having prior LUTS. Duration of symptoms was shorter in successful group and ranged from no prior LUTS to 18 months when compared to no prior LUTS to 20 months in failed group (Table 2).

Table 1: Age distribution of patients.

Age in years	Successful group (%)	Failed group (%)	Total (%)
50-60	18 (31.1)	4 (12.5)	22 (24.4)
61-70	26 (44.8)	10 (31.3)	36 (40.0)
71-80	14 (24.1)	18 (56.3)	32 (35.6)
Total	58 (100.0)	32 (100.0)	90 (100.0)
Mean ±SD	65.48±7.23	69.06±6.98	66.76±7.31

P=0.025*, significant, student t-test

Table 2: Duration of LUTS (months).

Duration of LUTS (months)	Successful group (%)	Failed group (%)	Total (%)
0	13 (22.4)	6 (18.8)	19 (21.1)
1-5	10 (17.2)	3 (9.4)	13 (14.4)
6-10	25 (43.1)	12 (37.5)	37 (41.1)
11-20	10 (17.2)	11 (34.4)	21 (23.3)
Total	58 (100)	32 (100)	90 (100)

P=0.064+, significant, chi-square test

Mild IPSS (1-7) was seen in total of eight (9%), moderate score (8-19) in 69 (76.5%) while severe score (20-35) in 13 patients (15.5%). Out of total of eight patients with mild

symptoms only two (25%) failed while six (75%) succeeded the trial. In patients with moderate symptoms, 18 patients (26.1%) failed while remaining 51 (73.9%) succeeded while in patients with severe symptoms 11 patients (84.6%) failed and only two (15.4%) succeeded in the trial (Table 3).

Table 3: IPSS distribution of patients in two groups studied.

IPSS	Successful group	Failed group	Total
<15	28 (48.3)	10 (31.3)	38 (42.2)
15-30	30 (51.7)	21 (65.6)	51 (56.7)
>30	0 (0)	1 (3.1)	1 (1.1)
Total	58 (100)	32 (100)	90 (100)

P=0.003**, significant, Fisher exact test

PV ranged from 29 to 80 grams (mean of 44.9 grams) in successful group, while in failed group it ranged from 32 to 97 grams (mean of 47.4 grams). Though PV was lesser in the successful group, it was not found to be statistically significant (Table 4).

Table 4: PV on USG (grams) distribution of patients in two groups studied.

PV on USG (gm)	Successful group (%)	Failed group (%)	Total
<50	44 (75.9)	24 (75)	68 (75.6)
50-60	11 (19)	4 (12.5)	15 (16.7)
>60	3 (5.2)	4 (12.5)	7 (7.8)
Total	58 (100)	32 (100)	90 (100)

P=0.289, not significant, Fisher exact test

We had 14 patients (15.5%) with grade I, 50 (55.5%) with grade II and 26 (29%) with grade III IPP. Among the 14 patients with grade I IPP 12 (85.7%) had successful outcome while remaining 2 (14.3%) failed, in IPP grade II subgroup 38 (76%) succeeded while remaining 12 (24%) failed whereas in IPP grade III subgroup only eight (30.8%) succeeded while remaining 18 (69.2%) failed the attempt (Table 5). RUV drained post catheterisation ranged from 510 to 730 ml with mean of 649 ml and 670 to 880 ml with mean of 758 ml in successful and failed group respectively (Table 6).

Table 5: Intra-vesical prostate protrusion-distribution of patients in two groups studied.

IPP grade	Successful group (%)	Failed group (%)	Total
1	12 (20.7)	2 (6.3)	14 (15.6)
2	38 (65.5)	12 (37.5)	50 (55.6)
3	8 (13.8)	18 (56.3)	26 (28.9)
Total	58 (100)	32 (100)	90 (100)

P<0.001**, significant, Fisher exact test

Table 6: Urine volume (ml) distribution of patients in two groups studied.

RUV (ml)	Successful group (%)	Failed group (%)	Total
<700	44 (75.9)	4 (12.5)	48 (53.3)
700-800	14 (24.1)	19 (59.4)	33 (36.7)
>800	0 (0)	9 (28.1)	9 (10)
Total	58 (100)	32 (100)	90 (100)

P<0.001**, significant, Fisher exact test

In our study eighty four (93 %) patients of the total study population (100% of patients in failed and 89% in successful group) were found to have thickened BWT. All six patients with normal bladder wall belonged to successful group. BWT in failed group ranged from 5 to 7.2 mm with mean of 6.4 mm while in successful group it ranged from 4.5 to 6.2 mm with mean of 5.48 mm (Table 7).

Table 7: Bladder wall thickness (mm) distribution of patients in two groups studied.

BWT (mm)	Successful group (%)	Failed group (%)	Total
<6	37 (63.8)	5 (15.6)	42 (46.7)
6-7	21 (36.2)	23 (71.9)	44 (48.9)
>7	0 (0)	4 (12.5)	4 (4.4)
Total	58 (100)	32 (100)	90 (100)

P<0.001**, significant, Fisher exact test

Table 8: Comparison of clinical variables in two groups of patients studied.

Variables	Successful group	Failed group	Total	P value
Age in years	65.48±7.23	69.06±6.98	66.76±7.31	0.025*
Duration of LUTS (months)	6.29±4.83	8.47±5.96	7.07±5.33	0.064+
IPSS	13.76±3.61	16.78±5.94	14.83±4.77	0.003**
Urine volume (ml)	649.31±51.40	758.13±60.02	688.00±75.43	<0.001**
PV on USG (gm)	44.91±9.69	47.44±12.43	45.81±10.75	0.289
BWT (mm)	5.48±0.54	6.45±0.66	5.83±0.75	<0.001**

DISCUSSION

AUR represents the most emotionally distressing complication of BPH. Immediate treatment of these patients is to undergo per-urethral bladder catheterization under aseptic conditions. The standard of care is to subject these patients to a catheter free trial after administering a course of alpha blockers. Success is seen in 23-40% of cases which helps these patients avoid the risk and stress of an unnecessary surgery.[4] For those who fail, the options remaining are either to undergo trans-urethral resection of prostate (TURP) or remain on lifelong per-urethral/supra-pubic catheter for those who are found unfit to undergo surgery. Failure of TWOC not only psychologically impacts the patients but it also prolongs his suffering. We thus conducted this study in order to evaluate parameters which can help predict success for such TWOC.

We had a success rate of 64.4% which was comparable to other studies in literature. Tiong, Sharis and Bansal et al in their respective studies demonstrated a success rate of 60%, 50% and 66.3%.[5-7] Average age was noted to be lesser by 3 years and 6 months in successful group in our study and was found to be a statistically significant parameter for determining success. The opinion on this association is divided in literature.

On one side there are studies by Bansal and McNeil et al with findings similar to ours in which they have shown that patients above 64 and 65 years respectively are likely to fail the attempt.[7,8] On the contrary there are studies which have not found any such association between advancing age and failure rate.[6,9]

Seventy nine percent of our cases accepted having prior LUTS which was little more than a worldwide survey done by Fitzpatrick et al, in which around 63% cases accepted having prior LUTS.[10] Duration of LUTS before the onset of AUR was not found to be a significant parameter in predicting success in our study. Contrary to our finding Das et al, in their study not only demonstrated an association between the two but also showed that by using cut-off of two and half months failure rate could be predicted with sensitivity of 82.1% (area under the receiver operating characteristics i.e. AUROC of 0.726) (Table 9).[9] Mahadik et al similarly showed success rate to be more in patients who had less than three months of prior LUTS.[11]

Table 9: ROC curve analysis.

Variables	ROC results to predict mortality				Cut-off	AUROC	SE	P value
	Sensitivity	Specificity	LR+	LR-				
IPSS	40.63	96.55	2.54	0.68	>18	0.658	0.0657	0.0163*
Urine volume (ml)	65.52	100.00	-	0.34	>710	0.914	0.0303	<0.001**
BWT (mm)	68.75	87.93	5.70	0.36	>6	0.860	0.0429	<0.001**

We found IPSS to be significant parameter in predicting success. This finding was in accordance with a worldwide survey by Fitzpatrick et al which not only showed that among patients presenting with AUR, 52% to 75% had moderate score while 21.9% to 40.6% had severe score but also statistically significant association between higher IPSS and failure rate ($p<0.001$).[10] Bhomi et al similarly demonstrated that by using a cut-off value of 16 for IPPS, failures can be predicted with specificity of 84% and success with a sensitivity of 81% (AUROC of 0.90).[12]

RUV drained following catheterisation was also found to be a statistically significant parameter by us. Similarly Bhomi and Li et al, in their respective studies not only showed statistical significance of RUV but also demonstrated a critical volume of 800 ml and 700 ml respectively in determining the chances of success.[12,13] On the contrary Mahadik, Zeif and Lim et al in their studies of 58, 100 and 79 patients each found RUV to be a statistically insignificant parameter (mean RUV of 850 ml, 750 ml and 800 ml respectively).[11,14,15]

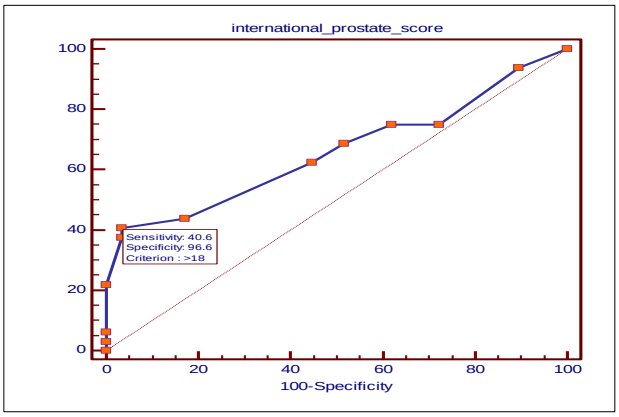

Figure 1: ROC curve of IPSS.

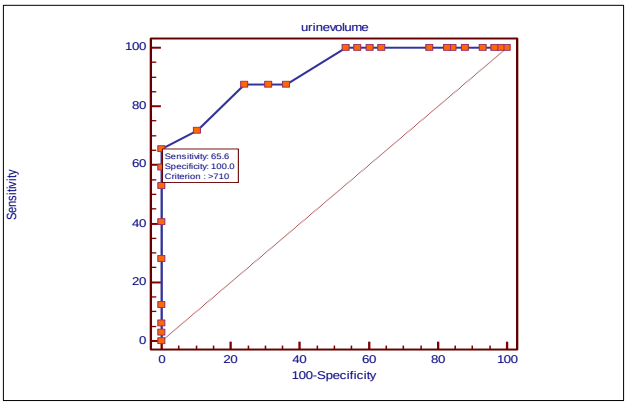

Figure 2: ROC curve of RUV.

PV was not found to be a parameter of statistical significance in our study. Literature is divided with respect to this. On one side there are studies by Bae et al, also showing an insignificant association (35.4 grams in successful versus 39.4 grams in failed group, p value=0.02).[16] Contrary to this a study by Maha et al has shown marginal significance of increasing prostate size with failure rate (p value=0.042).[17]

IPP was another parameter found to be of statistical significant in our study with patients with higher grade more likely to fail the attempt. Sharis et al similarly found that 87.2% of patients with grade III IPP fail the trial while Bhomi et al in their study by using a ROC model demonstrated that by using IPP cut-off value of 8 mm, failure rate can be predicted with specificity of 89% and sensitivity of 92% (AUROC of 0.98).[6,12]

BWT was another statistically significant parameter in our study. Similar association was noted by Das et al who found 80.4% and 97.4% patients in successful and failed group to be having thickened bladder wall (>5 mm) respectively with a significantly thicker bladder wall in failed group (p value=0.014).[9] Somewhat similar study but analysing detrusor wall thickness (DWT) by Kurniasari et al showed a statistically significant thicker DWT in failed group (2.8±0.4 mm) when compared with successful group (1.8±0.3 mm).[18]

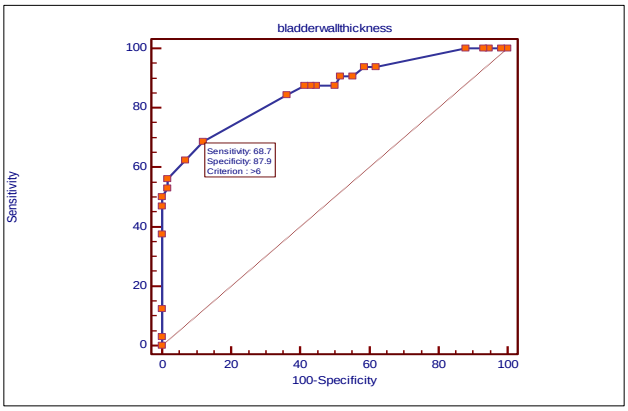

Figure 3: ROC curve of BWT.

CONCLUSION

Age of patient, IPSS, RUV drained, IPP and BWT can be used as parameters in predicting successful catheter free trial following AUR secondary to BPH.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Wang JY, Liu M, Zhang YG, Zeng P, Ding Q, Huang J, et al. Relationship between lower urinary tract symptoms and objective measures of benign prostatic hyperplasia: A Chinese survey. Chin Med J. 2008;121:2042-5.
2. Roehrborn CG. Acute urinary retention: risks and management. Rev Urol. 2005;7(4):31-41.
3. Chia SJ, Heng CT, Chan SP, Foo KT. Correlation of intravesical prostatic protrusion with bladder outlet obstruction. BJU Int. 2003;91:371-4.
4. Emberton M, Fitzpatrick JM. The Reten-World Survey of the Management of Acute Urinary Retention: Preliminary Results. BJU Int. 2008;101(3):27-32.
5. Tiong HY, Tibung MJB, Macalalag M, Li MK, Consigliere D. Alfuzosin 10 mg once daily increases the chances of successful trial without catheter after acute urinary retention secondary to benign prostate hyperplasia. Urol Int. 2009;83(1):44-8.
6. Sharis OS, Zulkifli MD, Hamzaini AH. Predicting Outcome of Trial of Voiding Without Catheter in Acute Urinary Retention with Intravesical Prostatic Protrusion. Malays J Med Sci. 2013;20(1):56-9.
7. Bansal A, Arora A. Predictors of successful trial without catheter following acute urinary retention in benign prostatic enlargement: A single centre, multivariate analysis. Neurourol Urodyn. 2017;36(7):1757-62.
8. McNeill SA, Hargreave TB. Members of the Alfaur Study Group. Alfuzosin once daily facilitates return to voiding in patients in acute urinary retention. J Urol. 2004;171(1):2316-20.
9. Das RK, Deb PP, Basu S, Dey RK, Gupta R, Choudhary A. Factors predicting outcome of trail without catheter in patients with acute urinary retention secondary to prostate enlargement. J Clin Diagnostic Res. 2018;12(1):4-7.
10. Fitzpatrick JM, Desgrandchamps F , Adjali K, Guerra LG, Hong SJ, Khalid SE. Management of acute urinary retention: a worldwide survey of 6074 men with benign prostatic hyperplasia. BMJ Int. 2011;109:88-95.
11. Mahadik P, Vaddi SP, Godala CM, Reddy, VK, Sambar VK. Factors Affecting Trial Without Catheter for First Spontaneous Acute Urinary Retention. Int Neurourol J. 2013;17(3):121-6.
12. Bhomi KK, Bhattachan CL. Factors predicting the success of a trial without catheter in acute urinary retention secondary to benign prostatic hyperplasia. Nepal Med Coll J. 2011;13:178-81.
13. Li YK, Leung CS, Hui TL, Chiu LH. Acute urinary retention: how useful is an ambulatory care protocol? Hong Kong J Emerg Med. 2009;16:134-40.
14. Zeif H, Wallace DM, Subramonian K. Predictors of successful trial without catheter in acute urinary retention. Br J Med Surg Urol. 2010;3:5-10.
15. Lim KB, Wong MY, Foo KT. The outcome of trial off catheter after acute retention of urine. Ann Acad Med Singapore. 1999;28:516-8.
16. Bae JH, Kang SH, Cheon J, Ko YH, Cho DY, Lee JG. Determinant factors affecting successful voiding trial without catheter (TWOC) after single

intermittent catheterisation for the acute urinary retention patients due to benign prostatic obstruction. BJU Int. 2006;97:727-33.
17. Maha P, Vaddi S, Godala CM, Reddy VVK. Factors Affecting Trial Without Catheter for First Spontaneous Acute Urinary Retention. Int Neurourol J. 2013;17(3):121-6.
18. Kurniasari D, Budiono, Tarmono, Hardjowijoto, Soetojo. Predicts the Successfulness of a Trial Voiding Without Catheter (TWOC) Through Urine Retention Volume, Detrusor Wall Thickness (DWT) and Intravesical Protrusion of Prostate (IPP) on Acute Urinary Retention (AUR) Patients Due to Benign Prostatic Hyperplasia (BPH). Ind J Public Health Res Develop. 2019;10(4):1308-14.

Cite this article as: Jha AA, Singh G, Govindaiah M, Solanki N. Predictors of successful trial with-out catheter following acute urinary retention secondary to benign prostatic hypertrophy. Int Surg J 2020;7:3718-23.