DETERMINATION OF THE PREDICTIVE VALUE OF IPSS ON THE OUTCOME OF TRIAL OF VOIDING WITHOUT CATHETER IN BPH PATIENTS PRESENTING WITH ACUTE URINARY RETENTION

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Abstract

Background: Acute urinary retention is a common urological emergency. This study was to determine the value of storage IPSS, voiding IPSS and total IPSS in predicting the outcome of trial of voiding without catheter in patients with BPH presenting with acute urinary retention.

Methods: This was a prospective observational study that included patients seen at the Accident and Emergency Unit of Jos University Teaching Hospital with acute urinary retention from benign prostatic hyperplasia. Each patient had clinical evaluation, and urethral catheter was passed to relieve the retention, then an International Prostate Symptom Score questionnaire was patient self- administered. The patients were all placed on Tamsulosin 0.4 mg daily for 3 days after which they had trial of voiding without catheter (TWOC). Statistical analysis was done using SPSS$^{(R)}$ version 23 and MedCalc Statistical software version 17.2.

Results: Seventy-six patients with age range 52 - 82 years were enrolled in the study. The means of IPSS storage, IPSS voiding and IPSS total were 9.00, 10.64 and 19.55 respectively. IPSS storage (AUC = 0.768, $p < 0.0001$), IPSS voiding (AUC = 0.760, $p < 0.0001$), and IPSS total (AUC = 0.793, $p < 0.0001$) predicted the outcome of trial without catheter (TWOC) with cut-off marks of 9, 10, and 20 respectively.

Conclusion: IPSS storage, IPSS voiding, and IPSS total significantly predicted the outcome of trial without catheter in patients with BPH presenting with acute urinary retention.

Key words: IPSS, urinary retention, BPH, Tamsulosin, Trial of voiding without catheter.

Background

Acute urinary retention (AUR) is a severe complication of benign prostatic hyperplasia (BPH) characterized by a sudden and painful inability to void voluntarily.[1] It is one of the most common emergencies presenting to a urology unit.[2] It is a common event in the natural history of BPH and may be the first manifestation of bladder outflow obstruction in up to 25% of cases.[3] Although, BPH is not a life-threatening condition, some men with lower urinary tract symptoms (LUTS) have a progressive disease which is defined as a deterioration of

symptoms, deterioration of health-related quality of life, decreased peak flow rate, increased prostate size or unfavorable outcomes such as AUR and BPH related surgery.[4] AUR is often considered to be the most serious complication of BPH and it is distressing for the patient and also has considerable economic costs.[5,6] AUR is an indication for prostatectomy and accounts for 25-30% of emergency transurethral resection of the prostate (TURP)[7]. In addition, analysis of 176,046 men admitted to NHS hospital in England for AUR between 1998 and 2005 has shown that mortality within the year after a first AUR episode was much higher than in the general population, especially in younger patients.[8] Data from large community-based longitudinal studies have identified old age, severe LUTS, low peak flow rate, high post void residual urine (PVR), enlarged prostate, and high serum PSA as significant risk factors for spontaneous AUR[9]. In some cases, AUR follows a triggering event also called precipitated AUR (pAUR) such as a surgical procedure with general or loco-regional anaesthesia, excessive fluid intake, urinary tract infection (UTI), or intake of medications with sympathomimetic or anticholinergic effects.[10]

The American Urological Associations' seven-symptom index was adopted by the World Health Organization (WHO) as the International Prostate Symptom Score (IPSS), after the addition of one disease-specific quality of life (QoL) question, as a means of assessing the global impact of LUTS on the quality of life. The IPSS has been shown to have excellent test-retest reliability and to be internally consistent. It is also sensitive to changes in symptomatology.[11,12] The IPSS is the

most widely used score globally.[13] It is a well-designed and extensively studied scale for quantifying lower urinary tract symptoms suggestive of benign prostatic obstruction.[13,14] The IPSS consists of seven questions that deal with voiding symptoms (incomplete emptying, intermittency, weak stream, and straining to void) and storage symptoms (frequency, urgency, and nocturia). Measuring IPSS sub-scores and calculating the IPSS voiding-to-storage sub-score ratio (IPSS-V/S) is a simple and useful method for differentiating between failure to void lower urinary tract dysfunction (LUTD) and failure to store LUTD.[15,16]

Management of AUR consists of immediate bladder decompression by catheterization, which is usually followed by BPH-related surgery.[17,18] The functional symptoms of BPH can be reduced by α-blockers such as Doxazocin and Tamsulosin, which improve flow rates and bladder emptying, and it is thought that they help to reduce bladder outlet resistance by effects on the sympathetic tone of the bladder neck and prostatic stroma.[6] Surgical intervention in the presence of a urinary catheter can lead to an increased risk of sepsis, which potentially contributes to the observed increase in operative morbidity (especially in older patients). These findings led to the increasing use of trial without catheter (TWOC), which is a therapeutic method to induce self-voiding after a certain period of urethral catheterization and it is being attempted in many patients with AUR.[18]

This study was to find out the predictive value of IPSS storage, IPSS voiding and IPSS total on the outcome of TWOC in patients presenting with AUR from BPH. This is to provide a simple method of assessing outcome of TWOC in AUR from BPH, hence avoiding urgent surgery or allow elective surgical intervention without the presence of a prolonged urinary catheter.

Methods

This study was a hospital-based observational study from August, 2018 to July, 2019 at the authors' institution. Male patients with first episode of AUR from BPH who consented were recruited for this study via a non-probability (purposive) sampling technique, after obtaining ethical approval from the ethical committee of the hospital. The exclusion criteria were; patients with AUR who had been receiving treatment for BPH, patients with UTI, gross haematuria or carcinoma of the prostate, and patients

with failed urethral catheterization and those with urinary drainage of greater than 1000 mls after relief of retention.[19]

Patients that presented to the Accident and Emergency with features suggestive of AUR were clinically evaluated. They were relieved of urinary retention by passing a size 16 F latex Foley urethral catheter, and urine samples were taken for microscopy, culture, and sensitivity. The volume of urine drained was recorded using a calibrated container and the catheter spigotted. A copy of the IPSS questionnaire was patient self-administered. Blood samples were taken for urea, electrolyte, and creatinine, prostate specific antigen (PSA) test and fasting blood glucose (FBG). Trans-abdominal ultrasound evaluation of the prostate and urinary tract, including prostate volume was performed by the same consultant radiologist in the hospital after which the drainage bag was applied.

All patients who fulfilled the inclusion criteria were recruited for this study. Each subject was placed on Tamsulosin 0.4 mg daily. The patients were discharged home and were told to come for TWOC on the third day post urethral catheterization. On presentation at the uroflow room, the drainage bag was removed and a spigot was applied to the drainage port of the urethral catheter, and patient was instructed to drink 750 ml of water. The urethral catheter was removed once the patient had the urge to urinate. TWOC was attempted under uroflowmetric study. Maximun flow rate (Qmax), average flow rate (Qave), and voided volume were recorded in a structured proforma for subsequent analysis. Patients with inability to pass urine or passage of < 150 ml of urine, and Qmax < 10 ml/s were said to have an unsuccessful TWOC.[20] A size 16 F silicon Foley catheter was passed for all patients with unsuccessful TWOC.

All data obtained from the study subjects were collated and subjected to statistical analysis using the Statistical Package for the Social Sciences (SPSS®) version 23. MedCalc Statistical software version 17.2 was used for receiver operating curve (ROC) analysis. The receiver operating characteristic (ROC) curve was used to determine the predictive power of IPSS- storage, IPSS-voiding, and IPSS- total in the outcome of TWOC in patients with AUR attributable to BPH. A *p*-value of < 0.05 was considered as statistically significant.

Ethical approval and consent to participate

Permission to conduct this study was obtained from the Research and Ethics Committee of Jos University Teaching Hospital (JUTH) with committee reference number JUTH/DCS/ADM/127/XXV/193. Informed consent was also obtained from all patients who met the criteria for inclusion in the study and only consenting patients were enrolled for this study.

Result

A total of 80 men who met the inclusion criteria and gave consent were recruited for the study. The study period was from June 2018 to July 2019. However, 4 patients were excluded from the study because they did not turn up for TWOC, leaving 76 (95%) for analysis. The age range of the subjects was 52 - 82 years with a mean age of 65.13 years. The educational level of the study participants is shown in Figure 1

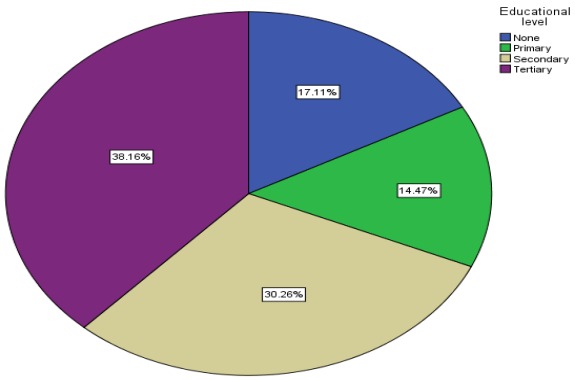

Figure 1: The descriptive statistics showed that the mean urine volume drained was 708.41 mls, while the mean maximum flow rate was 7.63 ml/s as shown in Table 1.

Table 1: Descriptive statistics of the study population (n = 76)

Parameters	Successful Mean ± SD	Unsuccessful Mean ± SD	Total Mean ± SD	t-test	p-value
Urine volume (mls)	691.83 ± 123.83	715.60 ± 134.60	708.41 ± 131.07	0.724	0.471
Prostate volume (mls)	64.52 ± 22.25	86.89 ± 4.88	80.12 ± 4.37	2.098	0.039
PSA (ng/ml)	4.40 ± 1.80	4.91 ± 2.22	4.76 ± 2.11	0.972	0.334
FBG (mmol/l)	4.36 ± 0.73	4.62 ± 0.78	4.54 ± 0.77	1.328	0.188
Voided volume (mls)	166.30 ± 15.67	55.00 ± 5.44	88.68 ± 6.17	13.004	0.001
Maximum flow rate (ml/s)	13.91 ±5.60	4.96 ± 3.16	7.63 ± 5.75	8.873	0.001
Average flow rate (ml/s)	8.65 ± 1.97	2.79 ± 2.20	4.57 ± 3.44	10.982	0.001

The mean scores of IPSS storage, IPSS voiding, and IPSS total were 9.00, 10.64, and 19.55, respectively.

Twenty-three patients (30.3%) had a successful TWOC.

The area under the curve (AUC) of ROC for IPSS storage and the outcome of TWOC was 0.768 ($p < 0.0001$), sensitivity of 86.96%, specificity of 56.60%, and cut-off value of 9. The positive predictive value (PPV) and negative predictive value (NPV) for IPSS storage were 46.5% and 90.9%, respectively.

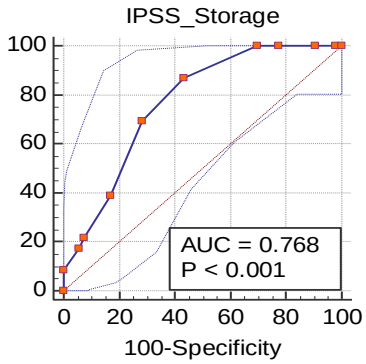

Figure 2

The AUC of ROC for IPSS voiding and outcome of TWOC is shown in Figure 3. The sensitivity was 86.96%, specificity was 62.26%, and a cut-off value of 10. The PPV and NPV for IPSS voiding were 50.0% and 91.7%, respectively.

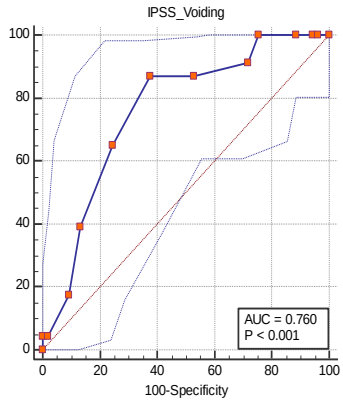

Figure 3

The AUC of ROC for IPSS total and the outcome of TWOC is shown in Figure 4. It has a sensitivity of 91.30%, specificity of 58.49%, and cut-off value of 20. The PPV and NPV for IPSS total were 48.8%% and 93.9%, respectively.

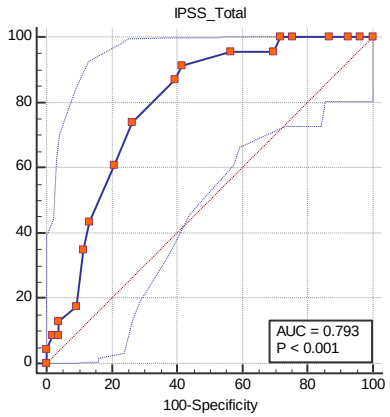

Figure 4

Discussion

This study was designed to determine the predictive value of IPSS storage, IPSS voiding, and IPSS total on the outcome of TWOC in patients presenting with AUR from BPH.

In this study, seventy-six (76) patients who presented with AUR from BPH were studied. This study demonstrated that AUR was commonest among patients within the age range of 60 to 69 years with percentage 48.68%. This is similar to a study by Adegun et al.[21] in Ekiti where the commonest age range for AUR was 60 to 69 years with a percentage of 33%.

This study showed that the mean urine volume drained following relief of retention, and mean prostate volume were 708.41 ml and 80.12 ml, respectively which is similar to a study by Mohammed et al.[22] in Egypt, which revealed mean urine volume drained and mean prostate volume of 672.6 ml and 59.7 ml, respectively. This is contrary to a study by Mahadik et al.[23]

who reported a mean urine volume drained of 854.8 ml. This study and the study by Mohammed et al. had as an exclusion criterion of patients with initial urine drained of > 1000 ml, while Mahadik et al. excluded patients with initial urine volume drained > 1200 ml. This might be responsible for the high mean of urine drained reported by Mahadik et al.

In this study, the mean IPSS storage, mean IPSS voiding, and mean IPSS total were 9.00, 10.64, and 19.55, respectively. The mean IPSS total is similar to the study by Mahakalkar et al.[24] who reported a mean IPSS total of 17.45. This is contrary to the study by Mohammed et al.[22] in Egypt, who recorded 13.25 as the mean IPSS total. Mohammed et al. adopted a patient self-

administration of IPSS and the IPSS was validated in their local language before use, while this study employed a patient self-administered IPSS that was not validated in the patients' local languages. The study by Mahakalkar et al. employed an author administered method of IPSS.

Twenty-three patients (30.3%) had a successful TWOC, while 53 patients (69.7%) had failed TWOC after three days of urethral catheterization. This is similar to a work done by Farelo-Trejos et al.[25] in Argentina, where 38% had a successful TWOC on the third day post relief of retention. It is also similar to a study by Bhomi et al.[26] in Nepal who revealed a successful TWOC in 43.75% of patients on the third day post relief of retention. However, this is contrary to the study by Adegun et al. in Ekiti which showed that 68% of patients that had Tamsulosin and TWOC three days post relief of retention had a successful TWOC. It is also contrary to a study by Mohammed et al. who reported 60% successful TWOC on the third day post relief of retention. Though patients in this study and the compared studies had Tamsulosin before TWOC, differences in the definition of success following TWOC could be the reason for the difference[20-26.] This study defined success as the ability to pass ≥ 150 ml of urine and maximum flow rate of 10 ml/s[20]. Adegun et al. defined successful TWOC as ability to void without difficulty or the aid of catheter. Mohammed et al. defined success as ability to void greater than 200 ml of urine following TWOC.

This study showed that IPSS total significantly predicted the outcome of TWOC following AUR from BPH. A patient with IPSS total of ≤20 is more likely to have a successful TWOC, while those with IPSS >20 have less probability of successful TWOC. This is similar to the work by Bansal et al.[27], Bhomi et al.[26], and Mohammed et al.[22] which revealed that IPSS total predicted the outcome of TWOC. Bansal et al. found that patients with IPSS total > 20, had less probability of successful TWOC following AUR from BPH. Bhomi et al. reported that patient with IPSS total of >16 had less probability of having a successful TWOC. However, Lodh et al.[28] in India found out that IPSS does not predict outcome of TWOC. The finding by Lodh et al. might be due to the method of obtaining IPSS which was dependent on the educational level of the patients or inability of the patients to completely comprehend IPSS when explained by the investigators.

This study also revealed that IPSS storage significantly predicted the outcome of TWOC in patients with AUR from BPH. Patients with BPH who have an IPSS storage of ≤ 9 are more likely to have a successful TWOC following AUR. IPSS storage was found to have a lower PPV and NPV compared to that of IPSS total.

It was also found that IPSS voiding predicted the outcome of TWOC in patients with AUR from BPH, and patients with an IPSS voiding of ≤ 10 are more likely to have a successful TWOC. IPSS voiding had the highest PPV, however, had a lower NPV than IPSS total. IPSS voiding had the best predictive value for a successful TWOC following relief of AUR from BPH.

The high NPV of patients with IPSS total (cut-off ≤ 20), IPSS voiding (cut-off ≤ 10), and IPSS storage (cut-off ≤ 9) means IPSS and its sub-scores are good tools in predicting an unsuccessful TWOC. IPSS voiding had the best predictive value for success while IPSS total had the best predictive value for an unsuccessful TWOC. This study has shown that IPSS is a useful tool in predicting outcome of TWOC.

Conclusion

This study shows that IPSS storage, IPSS voiding, and IPSS total significantly predicted the outcome of TWOC in patients presenting with AUR from BPH with a cut-off value of 9, 10, and 20, respectively. IPSS is therefore a valuable tool in determining the outcome of TWOC in patients presenting with AUR from BPH. Patients with AUR from BPH with an initial IPSS storage, IPSS voiding, and IPSS total greater than 9, 10 and 20 respectively are unlikely to have a successful TWOC.

Recommendations

1. IPSS should be included in the armamentarium for the initial assessment of men with AUR from BPH. This is to avoid an unnecessary TWOC in patients with AUR from BPH. Patients with AUR from BPH with an IPSS total > 20, IPSS voiding > 10, or IPSS storage of > 9 should be counseled and worked up for an early intervention rather than TWOC.

2. Further studies need to be carried out to corroborate the correlations between IPSS sub-scores and the outcome of TWOC, so that it can gain wider acceptance among urologists.

Competing interests

The authors declare that they have no competing interests.

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APPENDIX I: INTERNATIONAL PROSTATE SYMPTOM SCORE (IPSS)

International Prostate Symptom Score (I-PSS)[1]

Date_____

Circle your score for each below.

	Not at all	Less than 1 time in 5	Less than half the time	About half the time	More than half the time	Almost always
1 Over the past month or so, how often have you had a sensation of not emptying your bladder completely after you finished urinating?	0	1	2	3	4	5
2 Over the past month or so, how often have you had to urinate again less than two hours after you finished urinating?	0	1	2	3	4	5
3 Over the past month or so, how often have you found that you stopped and started again several times when you urinated?	0	1	2	3	4	5
4 Over the past month or so, how often have you found it difficult to postpone urination?	0	1	2	3	4	5
5 Over the past month or so, how often have you had a weak urinary stream?	0	1	2	3	4	5
6 Over the past month or so, how often have you had to push or strain to begin urination?	0	1	2	3	4	5

7 Over the last month, how many times did you most typically get up to urinate from the time you went to bed at night until the time you got up in the morning?	None	1 time	2 times	3 times	4 times	5 or more times
	0	1	2	3	4	5

Total Symptom Score =

Sum of Questions 1 to 7 = ____ /35

Quality of Life Due to Urinary Symptoms

1 If you were to spend the rest of your life with your urinary condition just the way it is now, how would you feel about that?	Delighted	Pleased	Mostly satisfied	Mixed about equally satisfied and dissatisfied	Mostly dissatisfied	Unhappy	Terrible
	0	1	2	3	4	5	6

Quality of Life Assessment Index L = ____