ORIGINAL ARTICLE

How many times should the uroflowmetry be repeated before making a treatment decision in the elderly males?

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Abstract

Objective: To investigate the effect of repeating uroflowmetry test on results of patients with or without lower urinary tract symptoms.

Methods: The prospective study was conducted at the Department of Urology, Ankara Training and Research Hospital, Turkey, from August to December 2012, and comprised 79 consecutive male patients with or without infravesical obstruction symptoms. All patients underwent uroflowmetry testing thrice on different occasions. The urinary maximum flow rate, average flow rate, voided volume (> or =150 ml), voiding time, flow time and time to void values were evaluated. SPSS 16 was used for statistical analysis.

Results: The overall mean of maximum flow rate was 11.4±1.69, 12.4±1.47 and 13.7±1.44 ml/sec at the first, second and third repetition respectively ($p>0.05$). The mean percentage difference in maximum flow was +8% higher between the first and second attempt, and +4% higher between the second and third attempt. The mean average flow rate, the mean voiding time and the mean flow time values were also found to have insignificantly improved. The mean voided volumes of the patients were 201±48, 209±57 and 248±61ml, respectively ($p>0.05$). The time to void decreased significantly in the second and third attempts ($p<0.01$).

Conclusion: Repeating uroflowmetry exhibits a minor improvement in maximum and average flow rates, and voided values in men, while a significant decrease was noted in time to void.

Keywords: Uroflowmetry, Average flow rate, Maximum flow rate, Lower urinary tract. (JPMA 64: 252; 2014)

Introduction

Uroflowmetry is one of the most commonly used form of tests in many urology clinics. It is the measurement of the rate of urine flow over time and useful in selecting patients for more complex testing and it gives an idea about the treatment strategy.[1] Flow rates are affected by many factors, including voided volume, age, psychological inhibition, abdominal straining, cognitive factors of the patients, ability to understand the exact aim of the study, and enviromental factors. Only one test that an individual takes for the first time in his or her life may give misleading results and may affect a urologist's treatment . This study was conducted to examine whether or not repeating uroflowmetry tests at different days affect the results of the tests.

Patients and Methods

The prospective study was conducted by the Department of Urology, Ankara Training and Research Hospital, Turkey, from August to December 2012. The project was approved by medical research ethics commitee and all the 79 patients were enrolled after they signed the detailed consent form. For uroflowmetry, the computer-based gravitimetric method was used. Calibration was initially performed using the internal self-calibration programme on the apparatus. Each male participant was asked to report with comfortably full bladder and to void into a digital gravimetric uroflowmeter (Digital Urodynamic Machine, MMS International, Turkey). It was asked whether he had any experience of uroflowmetry test. The main complaint was lower urinary tract symptoms (LUTS), but some of the patients were admitted because of different urological disorders. Past experience with uroflowmetry was part of the exclusion criterion. Also, patients with prostate-specific antigen (PSA) >4ng/ml, with urinary tract infections, with haematuria and under the age of 50 and over the age of 70 were excluded. Only representative continuous voids were included for analysis. The study was performed and interpreted in compliance with the guidelines of the International Continence Society (ICS).[2] The patients were evaluated by history, physical examination, serum PSA levels and uroflowmetry test investigations. Evaluated uroflowmetry parametres were; maximum flow rate (Qmax), average flow rate (Qave), voided volume (Vvoid), flow time, voiding time and time to void. The parametres were grouped as first second and third day groups. All the data was fed into Microsoft Excel

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worksheet and analysed using SPSS Version 16. Continuous variables were presented in mean ± standard deviation. P value of 0.05 or less was considered statistically significant. Differences were assessed for significance using analysis of variance (ANOVA) with post hoc test.

Results

The mean age of the 79 participants was 55±7.5 years (range: 50-69). All men were accustomed to voiding in standing position and were subjected to uroflowmetry testing for the first time in their lives. The mean Qmax values in the first group were 11.4±1.69 ml/sec that was insignificantly lower than in the second and third groups, which were 12.4±1.47 ml/sec and 13.7±1.44 ml/sec, respectively. The corresponding values for Qave were 10.7±1.33 ml/sec, 10.1±1.45 ml/sec and 11.0±1.99 ml/sec respectively. The mean voided values were 201±48, 209±57, 248±61 ml respectively and there was statistically insignificant increase between the second and third tests. The voiding time slightly increased with the increase of voided volumes in all uroflowmetries, while the time to void progressively decreased in the second and third attempts (18.8±5.4 sec, 6.5±2.0 sec 3.2±1.0 sec) respectively. Flow time and voiding time did not significantly differ in the repeats. Time to start voiding after the commands significantly decreased in second and third tests (Table).

Table: Parametres of uroflowmetry in first, second and third attempts.

Parametres	1st test (mean)	2nd test (mean)	3rd test (mean)	P value
Qmax (ml/sec)	11.4 ±1.69	12.4 ±1.47	13.7 ± 1.44	0.436
Qave (ml/sec)	10.7±1.33	10.1±1.45	11.0±1.99	0.976
Voided volume(ml)	201±48	209±57	248±61	0.831
Voiding time (sec)	25±9.1	28±8.7	31±10.8	0.687
Flow time(sec)	22±7.5	24±6.8	28±8.7	0.731
Time to void(sec)	18.8±5.4	6.5±2.0	3.2±1.0	<0.01

Qmax: Maximum flow rate.
Qave: Average flow rate.

Discussion

Although uroflowmetry is a non-invasive and simple diagnostic test, the most important problem is the wide variability among patients which may result in different problems. To solve that, uroflowmetry devices that can be used at home were invented. With the help of those devices the need for hospital admissions and the variabilities due to enviromental factors such as the finding suitable venue, spending enough time for each test etc. were tried to be reduced. Despite reducing all those factors, it was shown that Qmax varies typically by up to 10ml/sec in an individual by home uroflowmetry studies. Sonke et al. analysed the Qmax and Vvoid results by collecting multiple home flows and found them to differ considerably among individuals.[3] Most of our results comparing the repeated uroflowmetry results are in line with the results by Sonke et al.[4] Despite a statistically insignificant increase in each study cohort, Qmax values progressively increased in our study. It was shown that one way to determine a single measurement of Qmax is to calculate the standard deviation (SD) of multiple readings. Home studies have found that the SD of multiple measurements of Qmax in an individual ranges up to 6.0 ml/sec.[5,6] This implies that a moderate SD of 2.5ml/sec. In our results, the SD of the Qmax was less than 2ml/sec. It was also found that Qmax may vary by up to 10ml/sec due to random fluctuation.[4]

The changes of different uroflowmetry parameters have been evaluated by many other authors. Golomb et al. also demonstrated the variability of uroflowmetry in patients with benign prostate hypertrophy.[7] In their study group, uroflowmetric parametres varied more in men with benign prostatic hyperplasia (BPH) than in healthy controls. In our study we could not conclude more effect on any group of patients since we did not group our patients on the basis of BPH. Witjes et al.[8] compared circadian changes in men with varying grades of bladder outlet obstruction and significant differences in Qmax and Vvoid between groups with differing grades of obstruction were seen according to the time of the day.[8] Porru et al.[9] also found significant circadian differences in multiple measurements of Qmax at home in more than a hundred patients with LUTS.[9] We invited our patients at the same time of the day and the tests were performed nearly on the same hours of the day, we could not conclude about the circadian changes since the exact time for testing varied (all tests were performed between 11 am and 12 am). Many other factors affecting the variabilities has also been demonstrated by different authors. Significant systematic variability in Qmax has also been found in the clinic with voiding position (e.g., sitting versus standing) and even season and temperature.[10,11] The length of our study was five months, but temperature of the testing room was stable at 24°C. Also, all of our patients were accustomed to voiding in standing position. As such, our study is silent about the variations with temperature or voiding position changes.

In another study that supports the idea of variations of

uroflowmetric tests, Caffarel et al. recruited 22 volunteers to perform two uroflows and record home uroflows for two weeks and concluded considerable variation between the two clinic readings whereas comparison of average Qmax from multiple home flow recordings showed little variation.[12] Meier et al. investigated 100 men with micturition disorders to record multiple home flows and thus calculated the number of measurements required to detect a given difference in average Qmax. It was demonstrated that approximately 50 measurements were needed to be certain of a difference of 2ml/sec.[13] Using similar data, sample sizes could be reduced considerably by recording multiple voids from each individual before and after the intervention.[14]

Contrary to other series mentioned above, we did not observe significant difference in Qmax and Qave even though we did not use a different approach to uroflowmetry. We suggest that the achieved values in this study are due to our special attention to each individual by giving enough time for every test and explaining the steps of the uroflowmetry in details.

As discussed above, most of the authors relied on Qmax in the results and ignored all the other parameters. Although Qmax is thought to be the single most important parameter that can be interpreted according to the uroflowmetry traces, Qave, Vvoid, voiding time, flow time, time to start voiding are all important parameters and should be discussed together.[15,16] In patients without intermittant voiding, Qave gives an idea about the flow pattern and has a value in interpreting the tests. In our study, that value did not significantly change like Qmax.

It is also known that flow rates are dependent on Vvoid, therefore it should be one of the parameters which needs to be considered. In many centres, Vvoid is not considered important. In our study there was a significant increase of the voided volumes and it can be concluded that with motivation and being experienced, the participants showed greater tolerance to more urine in their bladder. This suggests that bladder sensation can be affected by the state of mind. Despite the increase of the voided volumes in the later tests, the mean voided volume was lower than 250ml. This may be explained by religious considerations to avoid getting wet.

Time to void is an important parameter and normally it is less than 10 sec. Detecting a long time to start voiding may be a result of hesitancy. In the present study, this parameter was considered and it was found that waiting time significantly decreased as the experience of the patient increased. There was also an insignificant increase in voiding time and flow time and it was probably because of the increase in voided volumes.

The lower urinary tract is associated with a complex and dynamic system and this system depends on multiple alterations like convulsions, dysfunctions, coughing, sneezing, exercise, listening to running water, fear, infections, temperature, and many enviromental factors. Several models have been introduced to explain the mechanical properties of the lower urinary system, but to date none of them has been able to describe that complex system clearly and without any unidentified question.[17] In a study evaluating paediatric age it was demonstrated that repetition of uroflowmetric study does not seem to improve the efficacy of the modality in assessing voiding function.[18] Although there has been many retrospective studies that evaluated some single parameters, but to our knowledge, there is not a large prospective study examining the effect of repeating the test that evaluates all of the parameters in the elderly. We beleive that our findings offer useful descriptive data and a novel insight into relevant findings in repeating the uroflowmetry procedure.

The potential study limitations must be considered. Since we focused on an elderly male cohort, results may not be applicable to younger or female patients. However, the present study with a small sample size, indicates an apparent effect of repeated uroflowmetry findings. Also, there was no standard time between the repeating periods.

Conclusion

We noted no difference among the three uroflowmetry findings except the time to start micturition in patients with or without infravesical obstruction symptoms. In elderly males, the single uroflowmetry test proved to be efficent, because it was able to show nearly the same values in three attempts. The only different values were detected in time to start voiding, but the other values did not change. The changed parameter has no value on quality of life and physican's treatment decision. However, a larger clinical multicentre trial for the evaluation of multiple uroflowmetry tests and the impact factors for the probable changes should be benefical.

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