ORIGINAL RESEARCH PAPER
Volume - 14 | Issue - 09 | September - 2025 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

ROLE OF UROFLOWMETRY IN EVALUATION OF LOWER URINARY TRACT SYMPTOMS IN 100 PATIENTS- PROSPECTIVE OBSERVATIONAL STUDY

Urology

Dr. Atul Pruthi Senior Resident, MCh Urology, Dr. S.N Medical College, Jodhpur

Dr. Gordhan Choudhary Professor, MCh Urology, Dr. S.N Medical College, Jodhpur

Dr. Diksha Choudhary Senior Resident, MCh Urology, Dr. S.N Medical College, Jodhpur

ABSTRACT

Background: Uroflowmetry is diagnostic procedure of various urinary tract diseases like urethral stricture, benign prostatic hyperplasia, neurogenic bladder, detrusor muscle overactivity by calculating the rate of urine expulsion against the time unit in second. Uroflowmetry is simple and non-invasive diagnostic method. **Material And Methods:** This is a prospective study of 100 cases which fulfil inclusion and exclusion criteria. After taking informed written consent of the patients, they have gone under uroflowmetry study by uroflowmeter, and graphs were obtained and result analysed. **Results:** Maximum number of patients has prolonged curve graph were diagnosed as benign prostate hypertrophy (BPH) (60%), dysfunctional voiding curve for detrusor overactivity (25%) intermittent flow curve for neurogenic bladder (8%), Box variety for urethral stricture (7%). **Conclusions:** In present study we found that uroflowmetry is helpful in diagnosis of certain urological pathologies. Common lower urinary symptoms were burning micturition, frequency and difficulty in micturition. Age group from 50-70 years was often presented with bladder outflow obstruction. Uroflowmetry overall useful in diagnosis of BPH and urethral stricture which can be supported by ultrasonography of prostate with PVRV and RGU respectively to avoid other invasive and more difficult pressure or flow urodynamic study.

KEYWORDS

Lower urinary tract symptoms, Uroflowmetry, BPH, Urethral stricture

INTRODUCTION

Lower Urinary Tract Symptoms (LUTS) are frequently present in the general population as patients age with approximately a third of individuals experiencing LUTS during their lifetime. LUTS can be further defined as having any of the following symptoms: urinary hesitancy, straining, nocturia, increased urination frequency, and dysuria. [1] They not only affect quality of life but may also indicate underlying pathology such as benign prostatic hyperplasia (BPH), urethral stricture disease, bladder outlet obstruction (BOO), detrusor underactivity, or neurogenic dysfunction. [2]

Accurate evaluation of LUTS is essential for appropriate management. While invasive urodynamic studies remain the gold standard for functional assessment, they are costly, time-consuming, and uncomfortable for patients. Uroflowmetry, on the other hand, is a simple, rapid, non-invasive, and cost-effective tool that objectively measures urinary flow rate and voiding pattern. It is widely used in both initial evaluation and follow-up of LUTS[3]

The maximum flow rate (Qmax) is the most clinically relevant parameter. A Qmax <10 mL/s strongly suggests significant bladder outlet obstruction, whereas values >15 mL/s are usually considered within normal limits. However, interpretation requires consideration of voided volume, patient age, and clinical context. Flow curve patterns—bell-shaped, plateau, staccato, or interrupted—further provide diagnostic clues.[4]

This study includes patients with lower urinary tract symptoms in age group between 30-70 years and to assess the role of uroflowmetry in the evaluation of patients with LUTS and to correlate flow parameters with clinical findings.

Aims And Objectives

1. To evaluate the diagnostic role of uroflowmetry in patients presenting with LUTS.
2. To analyze uroflowmetry parameters (Qmax, Qavg, voided volume, curve patterns) in relation to clinical diagnosis.

MATERIALS AND METHODS

This prospective study of uroflowmetry was done in 100 patients of lower urinary tract symptoms was conducted during the period of june 2024 - may 2025 at the Dr.S.N Medical college ,in the Department of Urology ,MDM hospital jodhpur Rajasthan. Inclusion criteria were patients of age group 30 to 70 years of both sexes and patients with lower urinary tract complains. Exclusion criteria were patients not willing to give consent and patient with active urinary tract infection, recent lower urinary tract surgery, indwelling catheter, or inability to void at least 150 mL during the test .

A detailed history was obtained and physical examination performed.Symptom severity was assessed using the International Prostate Symptom Score (IPSS). Uroflowmetry was performed with a standard electronic uroflowmeter. Patients were instructed to void with comfortably full bladder (≥150 mL voided volume).Parameters recorded included maximum flow rate (Qmax), average flow rate (Qavg), voided volume, time to peak flow, and curve pattern.Post-void residual (PVR) urine was measured by ultrasonography.

Statistical Analysis

Data were analyzed using descriptive statistics. Correlation between uroflowmetry parameters and clinical diagnosis was assessed using Pearson correlation coefficient and chi-square test where applicable. A p-value <0.05 was considered statistically significant.

RESULTS

Table No 1 Age

Age	Number of patients
30-40	3
40-50	12
50-60	40
60-70	45

In this study maximum no. of patients with lower urinary tract symptoms were in age group of 60-70 years (45 patients), in 50-60 years (40 patients)

Table No 2 Gender Distribution

Gender	Number of patients
Male	85
Females	15

In this study total male patients are 85 and female patients are 15.

Table No 3. Various Graph Pattern In Different Lower Urinary Tract Symptoms

Graph pattern	Percentage of patients
Normal curve	10
Continuous prolonged curve	55
Box variety	8
Dysfunctional voiding curve	20
Intermittent flow curve	7

Among 100 patients 10% have normal curve, 55% have continuous

prolonged curve, 8% have Box variety curve, 20% have dysfunctional voiding curve and 7% have intermittent flow curve.

Table No 4 Urinary Complaints

Urinary complaints	% of patients
Burning micturition	60
Frequency	34
Difficulty in micturition	24
Weak urinary stream	26
Urgency	22
Urinary incontinence	9
Hesitancy	8

Table No 5 Diagnosis From Uroflowmetry Graphs Or Curves And Various Parameters.

Uroflow pattern	Qmax (mean±SD)(ml / sec)	Qavg (mean±SD) (ml/sec)	Voiding time (mean±SD) (sec)	Flow time (mean±SD) (sec)	Voided volume (mean±SD) (ml)
Normal curve	22.61±11.01	12.2±5.88	23.28±9.1	21.36±8.2	272.22±20.59
Continuous prolonged curve	10.02±7.3	6.01±5.8	39.13±21.01	31.60±18.48	169.1±157.12
Box variety	7.98±3.72	4.43±2.0	65.58±32.1	61.06±31.01	269.48±169.1
Dysfunctional voiding curve	17.24±17.23	5.18±3.81	44.27±27.86	39.75±28.25	176.57±155.37
Intermittent flow curve	16.12±15.04	5.15±4.01	60.32±57.63	49.15±32.1	249.56±189.58

In this study most common complaints were burning micturition and frequency of urination. From our study we have concluded that patient having normal uroflow curve have mean Qmax-22.61 ml/sec, Qavg-12.2 ml/sec, voiding time 23.28 sec, flow time 21.36 sec, voided volume- 272.22 ml. Patient with Box variety of curve having mean Qmax 7.98 ml/sec, Qavg 4.43 ml/sec, voiding time 65.58 sec, flow time 61.06 sec, voided volume- 269.48 ml. Patients with other curves,parameters are described in Table 5.

In this study probable diagnosis made with graph pattern of uroflowmetry, were BPH (55%), detrusor muscle overactivity (20%), neurogenic bladder (8%), urethral stricture (7%), normal study (10%).

DISCUSSION

In this study maximum no. of patients with lower urinary tract symptoms were in age group of 60-70 years (45 patients), in 50-60 years (40 patients). In study of Kumar et al, he found that maximum patients belongs from age group above 50 years (239 patients).[5] In this study among 100 patients 55% have continuous prolonged curve, 20% have dysfunctional voiding curve, 10% have normal curve, 7% have box variety curve,8% have intermittent flow curve, which is correlate with study Sundaram et al where maximum curve pattern was continuous prolonged curve which was 41%.[6] In this study probable diagnosis made with graph pattern of uroflowmetry, were benign prostatic hyperplasia (BPH) 55%, Detrusor muscle overactivity 20%, neurogenic bladder 8%, urethral stricture 7%, normal study 10% which is correlate with study of Sundaram et al where in maximum 41% patients were diagnosed as BPH by graph pattern of uroflowmeter.[6]In this study has average Qmax of BOO was 9.09 ml/sec which is correlated with study of Reynard et al as where average Qmax is suggestive of 9.7 ml/sec patients with BOO[7] In this study mean voided volume was 227ml which correlate with study of Sanjeev et al mean voided volume was 269.6 ml.[8]

Parameter derived from uroflowmetry are considered to be clinically reliable only if voided volume is >150 ml.[9] Patients which were diagnosed as BPH by Uroflowmetry were 55 out of 100. They were further confirmed by ultrasonography of prostate (size, volume and post voidal residual volume) and digital rectal examination and 7 patients which were diagnose as having urethral stricture confirmed by retrograde ureterogram (RGU). Diagnosis of bladder outlet obstruction by uroflowmetry is consistant with study done by Marin et al.[10]

CONCLUSION

Uroflowmetry is a simple, non-invasive, and reliable investigation in the evaluation of LUTS. It provides valuable information on urinary flow rates and patterns, helps distinguish obstructive from non-obstructive causes, In this study we found that uroflowmetry is helpful to diagnose various lower urinary tract symptoms. Most common patient presented with age group between 50-70 years. Most common pathology of bladder outlet obstruction was BPH. When combined with clinical assessment and ultrasound PVR, uroflowmetry significantly enhances diagnostic accuracy Although not a substitute for complete urodynamic studies, it serves as an effective first-line diagnostic and follow-up tool in the management of patients with LUTS.

Acknowledgements

The authors would like to thank my co-author who provided their clinical experience and knowledge,

Financial Support And Sponsorship: - NIL

Conflicts Of Interest :- There is no conflict of interest

REFERENCES

1. Anderson DJ, Aucoin A, Toups CR, Cormier D, McDonald M, Hasoon J, Viswanath O, Kaye AD, Urits I. Lower urinary tract symptoms in depression: a review. Health psychology research. 2023 Jul 15;11:81040.
2. Lee CL, Kuo HC. Pathophysiology of benign prostate enlargement and lower urinary tract symptoms: Current concepts. Tzu Chi Medical Journal. 2017 Apr 1;29(2):79-83.
3. El Helou E, Naba J, Youssef K, Mjaess G, Sleilaty G, Helou S. Mobile sonouroflowmetry using voiding sound and volume. Scientific Reports. 2021 May 27;11 (1):11250.
4. https://www.sciencedirect.com/topics/medicine-and-dentistry/uroflowmetry
5. Kumar V, Dhabalia JV, Nelivigi GG, Punia MS, Suryavanshi M. Age, gender, and voided volume dependency of peak urinary flow rate and Uroflowmetry nomogram in the Indian population. Indian J Urol. 2009;25(4):461-6.
6. Deepak S, Ponnusamy KS, Gunapriya R, Vijaylakshmi S, Vijaykumar J, Maria FY, et al. Correlation of Prostate Size and Uroflowmetry in Patients with Lower Urinary Tract Symptoms. J Clin Diagn Res. 2017;11(5):1-4.
7. Reynard JM, Yang Q, Donovan JL, Peters TJ, Schafer W, de la Rosette JJ, et al. The ICS-'BPH'Study: Uroflowmetry, lower urinary tract symptoms and bladder outlet obstruction. Br J Urol. 1998;82(5):619-23.
8. Sanjeev S, Ramneesh G, Ankit S, Sandeep S, Jasdeep S, Pulkit S. Experience with Uroflowmetry in Evaluation of Lower Urinary Tract Symptoms in Patients with Benign Prostatic Hyperplasia. J Clin Diagn Res. 2014;8(4):1-3.
9. Yoo S, Lee Y, Park J, Cho SY, Cho MC. Voided volume in men with storage symptoms: Is it an unreliable test result or a sign of severe storage symptoms? PloS One. 2019J;14 (1):e0207208.
10. Marin AM, Neamflu R, Calomfirescu N, Neamflu M, Vesa L, Belinski C, et al. The value of uroflow in evaluating LUTS (lower urinary tract symptoms) in men; ten years of experience. Roman J Urol. 2007;2(4):34-8.