ORIGINAL RESEARCH PAPER

Volume-8 | Issue-8 | August - 2019 | PRINT ISSN No. 2277 - 8179

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

PROSPECTIVE STUDY OF UROFLOWMETRY IN 100 PATIENTS WITH URINARY COMPLAINTS(A STUDY OF 100 CASES)

Surgery

Dr. Kinjal K Dodiya	Senior Resident doctor, Dept. of surgery, AMC MET Medical college, Maninagar
Dr. Lakir Patel*	3rd year Resident Doctor, Dept. of surgery, AMC MET Medical college, Maninagar *Corresponding Author
Dr. Pinal Patel	3rd year Resident Doctor, Dept. of surgery, AMC MET Medical college, Maninagar
Dr. Asim Mansuri	2nd Year Resident doctor, Dept. of surgery, AMC MET Medical college, Maninagar
Dr. Azad Vala	3rd year Resident Doctor, Dept. of surgery, AMC MET Medical college, Maninagar

ABSTRACT

Uroflowmetry is one of the non invasive diagnostic method for diagnosis of various urinary tract diseases like Benign prostatic hyperplasia, Neurogenic bladder, Detrusor muscle overactivity, Urethral stricture.

Materials and Methods: A total of 100 cases which met the inclusion and exclusion criteria were included in this hospital based prospective study. Urocap 3 uroflowmeter was used for uroflowmetry. After taking informed written consent of the patients, they have gone under uroflowmetry study and various graphs were obtained & result analysed.

Study factors: The subjects were allocated into the age group of 20-70 years with various urinary complains.

Outcome factors: Various uroflowmetry graphs like normal flow, intermittent flow, prolonged flow, box variety of flow and superflow were compared in patients with different urinary complains.

Result: The patients with Prolonged flow were diagnosed as BPH, Box variety for Urethral stricture, Intermittent flow for Neurogenic bladder, Dysfunctional voiding curve for Detrusor overactivity.

Conclusion: In our study, we found that Benign prostatic hyperplasia and Urethral stricture were diagnose by uroflowmetry and other causes of abnormal flow patterns like Neurogenic bladder, Detrusor muscle overactivity can relatively diagnose by uroflowmetry study but they required confirmation by advanced invasive pressure flow study (Urodynamic study).

KEYWORDS

INTRODUCTION

- Uroflowmetry is a simple, non-invasive diagnostic procedure that calculates the rate of urine expulsion as a function of time.[1]
- Uroflowmetry test is recommended for patient with complains of slow urination or urination difficulties. The test may also be used to determine how well patient's urinary tract is functioning.
- By measuring the average and maximum rates of patient's urine flow, the test can estimate the severity of obstruction in urinary tract. It can also help identify other urinary problems, such as a weak bladder or enlarged prostate,Urethral stricture.

VARIOUS URINARY COMPLAINS LIKE :

1. BURNING MICTURATION
2. DIFFICULTY IN URINATION
3. FREQUENCY OF URINAITON
4. URGENCY OF URINATION
5. HESITANCY IN URINATION
6. ACUTE RETENTION OF URINE

2. AIMS AND OBJECTIVES

AIM: Role of Uroflowmetry in diagnosis of various urinary tract disease in 100 patients with urinary complains at AMC MET Medical College and LG Hospital,Maninagar.

OBJECTIVES:

1. To study common urinary complains in age group between 20-70 years.
2. To study various graph pattern in patient with urinary problems.
3. To study different etiology of urinary complain from uroflowmetry.
4. To study the role of uroflowmetry in management of patients with urinary complains.
5. To study improvement in patients after drug therapy or operative procedure by comparing the graphs. (pre-operative and post –operative graphs)

3. REVIEW OF LITERATURE

HISTORICAL REVIEW[2]

In 1932 Ballanger et al. described a method to evaluate prostatic obstruction by measuring the maximum distance reached by the urinary flow. This method is obviously limited by giving exaggerated importance to meatal diameter in the velocity of the stream.

In 1948 Drake presented a uroflowmeter based on changes in the weight of accumulated urine, and in 1954 he described a simple instrument that gave a rough estimate of the flow.

In 1953 Johansonll measured the average flow before and after urethroplasty.

In 1957 Kaufman reported the result of 2000 curves obtained with an improved version of the Drake instrument. Here again the instrument of uroflowmetry lacked accuracy.

Then in **1956 Von Garrelts30 developed a uroflowmeter**[3] based on the weight principle that recorded volume and flow rate separately. He showed that the flow rate varies with the volume voided. As early as 1957 he recorded flow rate and intravesical and intrarectal pressures simultaneously.

In 1962 Gleason and Lattimer recommended simultaneous evaluation of flow rate and vesical pressure to provide a more accurate assessment of lower tract obstruction. Micturition studies with simultaneous recording of intravesical and intrarectal pressures, flow rates, and electromyography (EMG) were further developed by Scott et al. in 1964 and Susset et al. in 1965.

Cardus et al. used a blood flowmeter based on electromagnetic induction that was placed around the narrow part of a funnel. However, urine accumulation in the funnel resulted in inaccurate evaluation of peak flow.

In 1962 Holm read directly on a volumeter used in anesthesia the volume of air displaced by the flow rate.

In 1963 Lyon and Smith recorded the sounds made by the flow on a magnetophone.

In 1965 Hinman built a simple flowmeter for the measurement of peak

flow, which appeared to him to be the most accurate parameter.

In 1966 Keitzer and Huffman described a technique to convert the kinetic energy of the flow rate into sounds, which were recorded.

In 1967 Scott et al. 20 studied the flow rate before and after prostatectomy.

In 1967 Koontz and Rowan15 collected urine in a series of 60 adjacent containers turning on a wheel at a constant speed, and the amount present in each container was then plotted.

In 1968 Larmi et al. measured the flow rate as reflected by the rate of elimination of 13I-hippuran.

In 1969 Susset and Balabanian built a flowmeter based on the displacement of a float along an electromagnetic field. This principle was not retained owing to the impossibility of satisfactorily eliminating noise.

In 1969 Zinner at al. developed the drop spectrophotometer. This sophisticated instrument measured the size of the drops of urine as well as their distance and speed via two photoelectric cells. Results were computerized and gave an accurate measurement of velocity and information about the location of obstruction. The instrument did not allow an easy measurement of the peak flow rate.

In a study of children in 1970, Gierup utilized a flowmeter based on air displacement and showed that height, weight, or body area do not significantly influence peak flow.

Finally, in 1971 Klein et al.described a uroflowmeter based on the variation of weight of the urine voided.[2]

In 1973 The standardization of the techniques for urodynamic testing was started by the **ICS (INTERNATIONAL CONTINENCE SOCIETY)**. There are three levels of complexity of urodynamics tests: uroflowmetry, essential urodynamic tests (filling cystometry, pressure/flow studies) and complex urodynamics (urethral pressure profile, video urodynamics, neurophysiologic tests)[4]

In 1983 Nomograms for Urotlowmetry on measurement of the air displaced by the volume voided. As the air cooled a tantallum wire, the amount of electrical power needed to keep the wire at 30^0 C was measured, as it is proportional to the volume and speed of the air displaced.[2]

ANATOMY OF URINARY SYSTEM[5]

The urinary system consists of the kidneys, ureters, urinary bladder, and urethra. The kidneys filter the blood to remove wastes and produce urine. The ureters, urinary bladder, and urethra together form the urinary tract, which acts as a plumbing system to drain urine from the kidneys, store it, and then release it during urination. Besides filtering and eliminating wastes from the body, the urinary system also maintains the homeostasis of water, ions, pH, blood pressure, calcium and red blood cells.

4. MATERIALS AND METHODOLOGY

SOURCE OF DATA

This prospective clinical study comprises of 100 patients presenting with various urinary complains in OPD /IPD to surgery department of AMC MET Mdical College,LG Hospital,Maninagar during the period of May 2018- June 2019.

METHOD OF COLLECTING DATA

In this study, 100 patients presenting with urinary complains were selected.

INCLUSION CRITERIA

1. AGE: 20 to 70 years of age group
2. GENDER: Both Gender
3. Patient with urinary complains.
4. Patient with full bladder.

EXCLUSION CRITERIA

1. Patient not willing to give a consent.
2. Patient with urinary catheter in situ.
3. Patient above 70 years and below 20 years.

HISTORY:

All Patient OPD/IPD in our hospital with urinary complain have been examine in following manner :

- Detail questionnaire of urinary problems in terms of duration,aggravating and relieving factors and history of any medication for that.
- Past history of urinary tract surgery,trauma, per urethral foley's catheter insertion.
- External genitalia for Phimosis,other congenital abnormality of spine injuries.
- Digital rectal examination for Prostatic enlargement.

Most common Chief complains are:

1. BURNING MICTURATION
2. DIFFICULTY IN URINATION
3. FREQUENCY OF URINAITON
4. URGENCY OF URINATION
5. HESITANCY IN URINATION
6. ACUTE RETENTION OF URINE
7. INCONTINENCE

Uroflowmetry is the diagnostic procedure for various urinary complains and disease like Bladder outlet obstructions(BOO), Neurogenic bladder, Detrusor over activity, etc.

In our study we have used DISC UROFLOWMETER **(Urocap 3)** which is cheapest uroflowmeter and easy to perform the uroflowmetry, then other two instruments.

Figure : UROCAP 3 WITH FUNNEL WITH CO MODE

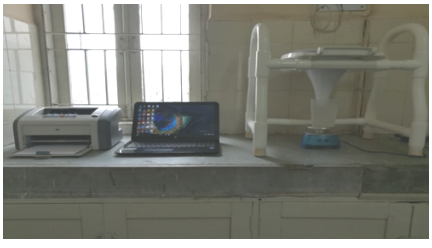


Figure : UROCAP 3 WITH LAPTOP AND PRINTER

Urocap 3 (room 1 with toilet) connected with laptop via Bluetooth device ,and Printer which was attatched with laptop for graph.(room2)

Patient with urinary complain which fulfilled inclusion criteria for our study were taken for uroflowmetry test.Patient's written informed consent was taken.

Uroflowmetry was performed in patients with full bladder. Adequate privacy was provided and patients were asked to void when they felt a NORMAL desire to void/urinate.

After all set up Uroflowmetry was performed when person urinate into a special funnel that is connected to Urocap 3 machine.Patient urinated in a special urinal toilet which was equipped with a machine, which had a measuring device.(figure7&8)

During uroflowmetry graph plotted which was showing uroflow parameters in terms of Maximum flow rate(Qmax), Average flow rate(Qave),Voiding time, voided volume ,Flow time. The test performed in full patient privacy and isolation so patients had normal urination without any discomfort.

The results of uroflowmetry were collected, analysed and interpritted accordingly.

In our study we had got different types of graphic pattern in all 100 male and female patients. Maximum Uroflowmetry procedure in our

setup is done on OPD bases.

The Graphic patterns of our study were:
1. Normal uroflow curve
2. Dysfunctional void curve (overactivity of detrusor muscle)
3. Prolonged curve (BPH)
4. Box variety curve (urethral stricture)
5. Intermittent flow curve (neurogenic bladder)

5. OBSERVATION AND ANALYSIS

We have done our study of Uroflowmetry in 100 patients both male and female with various urinary complains by Uroflowmeter (UROCAP 3).

At the end of study we have collected all data and analyzed & interpreted as given below.

1. AGE DISTRIBUTION:

AGE GROUP	NO.OF PATIENTS
20-30YEAR	7
30-40YEAR	8
40-50YEAR	14
50-60YEAR	31
60-70YEAR	40
TOTAL	100

In our study maximum patients with urinary complains were observed in age group of 50-60 years (31Patients), and in 60-70 years (40Patients).

In study of we found that maximum patients belongs from age group above 50 years (239 Patients).[10]

2. SEX DISTRIBUTION:

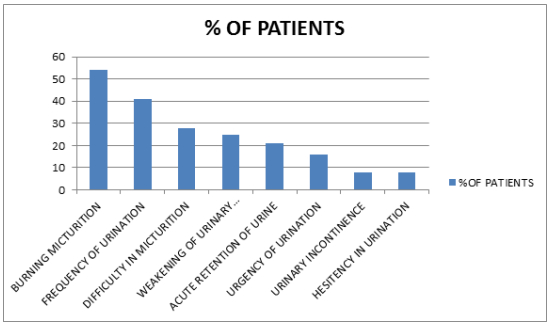
In this study total male patients are 90 and female patients are 10.

SEX	NO.OF PATIENTS
MALE	90
FEMALE	10

3. VARIOUS URINARY CMPLAINS:

In this study patents having different urinary complains which is shown in following table. According to it common urinary complains were burning micturition, frequency of urination, difficulty in urination, weak urinary streams accordingly.

URINARY COMPLAINS	% OF PATIENTS OUT OF 100
1.BURNING MICTURITION	53
2.FREQUENCY OF URINATION	41
3.DIFFICULTY IN MICTURITION	28
4.WEAKENING OF URINARY STREAM	25
5.ACUTE RETENTION OF URINE	21
6.URGENCY OF URINATION	16
7.URINARY INCONTINENCE	8
8.HESITANCY IN URINATION	8



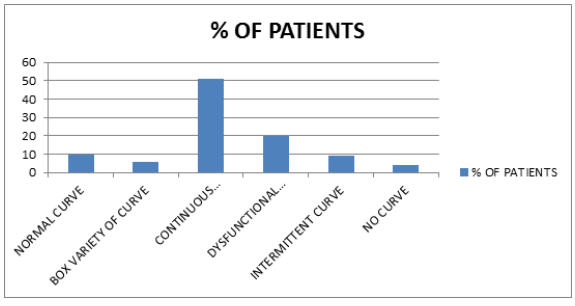
4: VARIOUS GRAPH PATTERN IN DIFFERENT URINARY COMPLAINS:

In Uroflowmetry various graph patterns obtained from which diagnosis was made.

There are Normal curve, Box variety curve,Continuous prolonged curve,Dysfuctional voiding curve,Intermittent flow curve,No flow(curve).

Among 100 patients 10% have Normal curve,6% have Box variety curve,51 % have Continuos prolonged curve,9% have Intermittant flow curve,20% have Dysfunctional voiding curve and 4% have No flow pattern.

UROFLOW PATTERN	% OF PATIENTS (OUT OF 100)
1.NORMAL CURVE	10
2.BOX VARIETY CURVE	6
3.CONTINUOUS PROLONGED CURVE	51
4.DYSFUNCTIONAL VOIDING CURVE	20
5.INTERMITTENT FLOW CURVE	9
6. NO CURVE	4



From our study we found that the patients who have box variety and continuous prolonged flow had significant change in Maximum flow rates from that we concluded that the patient with these curve having strong suspicion of Bladder outlet obstruction.

5. DIAGNOSIS FROM UROFIOWMETRY GRAPHS / 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)
1.NORMAL CURVE	22.61+11.01	12.2+ 5.88	23.28+ 9.1	21.36+ 8.2	272.22+ 20.59
2.BOX VARIETY CURVE	7.98+ 3.72	4.43+ 2.0	65.58+ 32.1	61.06+31.01	269.48+ 169.1
3.CONTINUOUS PROLONGED CURVE	10.02+ 7.3	6.01+ 5.8	39.13+21.01	31.60+18.48	169.1+157.12
4.DYSFUNCTIONAL VOIDING CURVE	17.24+ 17.23	5.18+ 3.81	44.27+27.86	39.75+28.25	176.57+ 155.37
5.INTERMITTENT FLOW CURVE	16.12+ 15.04	5.15+ 4.01	60.32+ 57.63	49.15+ 32.1	249.56+ 189.58

From our study we have concluded that Patient having Noral Uroflow curve have mean Qmax-22.61ml/sec,Qavg-12.2ml/sec,Voiding time-23.28 sec,Flow time 21.36sec,Voided volume-272.22ml.Patient with Box variety of curve having mean Qmax-7.98ml/sec,Qavg-4.43ml/sec,Voiding time-65.58 sec,Flow time 61.06sec,Voided volume-269.48ml, Patient having continuous Prolonged curve having mean Qmax- 10.02ml/sec,Qavg-6.01ml/sec,Voiding time-39.13sec,Flow time 31.60sec,Voided volume-169.1ml.Patients with other curves, parameters are described in above table.

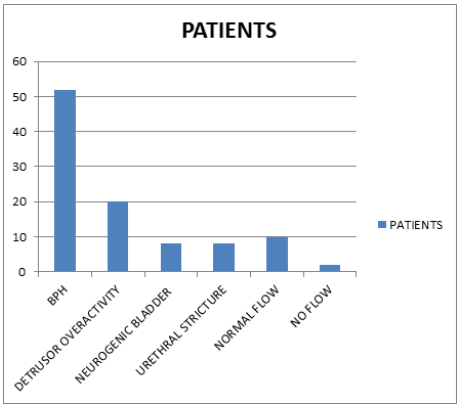
In Our study has found that average Qmax of BOO(BPH+Urethral stricture) was 9.09 ml/sec.which is supported by study done by Reynard et al. as where average Qmax is suggestive of 9.7 ml/sec. patients with BOO.[11]

In Our study mean voided volume was 227ml (range from 169-272ml) which correlate with study done by reference [et al mean voided volume was 269.6ml(range from 181-584)].[12]

In our study probable diagnosis made with graph pattern of Uroflowmetry, were Benign prostatic hyperplagia 52%, Detrusor muscle overactivity 20%, Neurogenic bladder 8%, Urethral stricture 8%, Normal study 10% with no abnormality with No flow study 2%.

DIAGNOSIS	% OF PATIENTS
BENIGN PROSTATIC HYPER PLASIA	52
DETRUSOR OVER ACTIVITY	20
NEUROGENIC BLADDER	8

URETHRAL STRICTURE	8
NORMAL FLOW	10
NO FLOW STUDY	2



Patients which were diagnosed as benign prostatic hyperplasia by uroflowmetry were 52 out of 100.They were further confirmed by Ultrasonography of Prostate(size,volume and post voidal residual volume) and digital rectal examination and 8 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 Manu marin et al.[4]

6. CONCLUSION

We found that Uroflowmetry is clearly helpful in diagnosis of certain urological pathologies. Common urinary complains were burning of micturition, frequency &difficulty in micturition. Age group from 50-70 years were often presented with bladder outflow obstruction.

Prolonged curve with low Qmax with extended flow time very commanly seen in patients with BOO. (BPH) another common variety of graph was Box curve (Flat curve) with low Qmax were strongly suggestive of urethral stricture. Detrusor muscle overactivity &neurogenic bladder gave intruppted flow curve which required further more invasive pressure / flow studies to confirm the diagnosis.

Uroflowmetry overall useful in diagnosis of BPH & Urethral stricture which can be supported by Ultrasonography of prostate with PVRV and RGU respectively to avoid other invasive and more difficult pressure / flow study.

REFERENCES

1. https://www.yumpu.com/en/document/view/27359045/atlas-of-urodynamics/55
2. CHAPTER 49: Development of Nomograms for Application of Uroflowmetry https://link.springer.com/chapter/10.1007%2F978-1-4612-5476-8_49
3. Von Garrelts B: Analysis of micturition: a new method of recording the voiding of the bladder. Acta Chir Scand 112: 326, 1956
4. The value of uroflow in evaluating LUTS (Lower Urinary Tract Symptoms) in men; ten years of experience A. Manu-Marin, R. Neamflu, N. Calomfirescu, M. Neamflu, L. Vesa, C. Belinski, C.Neicuflescu Secflia Urologie, Spitalul Prof. D. GEROTA, Bucureøti
5. http://www.innerbody.com/image/urinov.html#full-description ANATOMY OF URINARY SYSTEM Prepared by Tim Taylor, Anatomy and Physiology Instructor
6. https://www.google.co.in/search?biw=1366&bih=662&tbm=isch&sa=1&q=anatomy+of+lower+urinary+system&oq=anatomy+of+lower+urinary+system&gs_l=psyab.3...35695.37141.0.38092.6.6.0.0.0.0.0.299.852.0j2j2.4.0....0...1.1.64.psyab..2.1.181...0i13k1j0i13i30k1.0.1ICXqP0NmB4#imgrc=tYVos5LROXh3nM:
7. ANATOMY OF PROSTSTE : Bailey & Love short practise of surgery:26th edition,chapterno 77 Prostate and seminal vesuicals,page no 1340&1341
8. URODYNAMICS MADE EASY.3rd edition, chapter no.3Urodynamic study, page no.29-35
9. http://www.nytimes.com/health/guides/test/uroflowmetry/overview.htm
10. 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;25:461-6.
11. http://onlinelibrary.wiley.com/doi/10.1046/j.1464410x.1998.00813.x/full
12. Experience with Uroflowmetry in Evaluation of Lower Urinary Tract Symptoms in Patients with Benign Prostatic Hyperplasia. https://www. ncbi.nlm.nih.gov/pmc/articles/ PMC4064883/