



Research Article

Comparative Study of Uroflowmetric Parameters Pre and Post-TURP in Benign Prostatic Hyperplasia

Nipun Bansal*, Prashanth Adiga

Department of Urology, Father Muller Medical College, Mangalore, Karnataka, India

*Corresponding author: Nipun Bansal, Department of Urology, Father Muller Medical College, Mangalore, Karnataka, 575002, India

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Abstract

Introduction: Benign Prostatic Hyperplasia (BPH) is one of the most common urological conditions affecting men 50 years of age and above. Uroflowmetry is a commonly used modality by urologists to assess parameters of urine flow in patients of BPH. The objective of this study is to objectively evaluate Uroflowmetry effectiveness and compare the difference in the uroflowmetry parameters in patients undergoing Transurethral Resection of Prostate (TURP) for BPH before and after the surgery.

Materials and Methods: This prospective study included 54 patients who presented at Father Muller medical college, Mangalore with Lower Urinary Tract Symptoms with BPH (between the age group of 50 to 90 years) and eventually underwent TURP. Duration of the study was from 1st August 2022 to 31st October 2022 (3 months). Various uroflowmetric parameters and International Prostatic symptom score (IPSS) were calculated prior to TURP and 2 weeks after TURP.

Results: Significant improvement was observed in terms of Q_{max} , $Q_{Average}$ and voiding time in all patients after TURP. There is significant improvement in the IPSS scoring for bothersome symptoms scores post TURP.

Conclusion: Post-TURP, the objectively assessed uroflowmetry parameters showed improvement and were correlating with subjectively assessed IPSS score. Hence, Uroflowmetry is an easy office based assessment tool for objectively assessing the symptomatic improvement in Bladder Outlet Obstruction post-TURP.

Keywords: Benign Prostatic Hyperplasia; Bladder Outlet Obstruction; International Prostatic Symptomatic Scores; Lower urinary tract symptoms; Transurethral resection of Prostate; Uroflowmetry

Introduction

Major male accessory sex gland includes the “Prostate”. The word Prostate got derived from greek word “prostatēs” that denoted “President” or “Protector [1]. Benign Prostatic Hyperplasia (BPH) or Benign Prostatic Enlargement (BPE) has been a known root cause of urinary obstruction in elderly males. A variety of bothersome Lower Urinary Tract Symptoms (LUTS) can result from blockage to the normal flow of urine when it is large. For

the purpose of evaluating and determining the baseline symptom severity in men who present with LUTS, the International Prostate Symptom Score (IPSS) questionnaire, Boyarsky score, Madsen Iversen score, and Danish prostatic symptom score have been suggested as a symptom-scoring tool throughout BPH care [2,3]. Furthermore to LUTS, sexual dysfunction may also be linked to it and can worsen the patient’s Quality of Life.

Von Garrelts introduced uroflowmeter in 1957 [4]. It is an objective, straight forward, non-invasive screening tool which can be used for the assessment and quantification of obstruction to urine flow. It is quite helpful in the decision-making process and management of benign prostatic hyperplasia. A Q_{max} of < 15 ml/s has been interpreted to be suggestive of BOO. Q_{max} is often used

equivalently with pressure flow studies to define bladder outflow obstruction [5]. Surgery of Choice for BPH is Transurethral resection of the prostate. This study is aimed at evaluating the usefulness of Uroflowmetric parameters in patients with Benign prostatic hyperplasia and LUTS undergoing Transurethral Resection of Prostate (TURP) by measuring pre and post TURP uroflowmetry parameters.

Materials and Methods

This prospective study was carried out on patients who were admitted at Department of Urology, Father Muller Medical College Hospital, Mangalore in South India with voiding Lower Urinary Tract Symptoms (LUTS) indicative of Benign Prostatic Hyperplasia (BPH). Total 54 patients between age group of 50 to 90 years with LUTS suggestive of BPH were included in the study. The study was conducted from 1st August 2022 to 31st October 2022 (3 months). Clearance from the ethical committee of the institution was taken prior to start of the study. Upon initial Evaluation, These Patients Were Subjected To A Detailed History Taking, International Prostatic symptom score (IPSS) assessment, Digital Rectal Examinations (DREs), Serum creatinine, PSA, Ultrasound with Post-void Residual volume and Uroflowmetry. Patients were usually started on medical therapy (Alpha blocker with or without 5-alpha reductase inhibitor) and given treatment for atleast 2 weeks.

Inclusion Criteria:

- Patients more than 50 years of age
- Patients less than 90 years of age
- Patients who presented with lower urinary tract symptoms due to BPH.
- Patients with IPSS Score more than 7

Exclusion Criteria:

- Patients less than 50 and more than 90 years of age.
- Asymptomatic Patients
- Patients with IPSS Score less than or equal to 7
- Patients who present with Acute Urinary Retention and Catheterized.
- Patients with indwelling per-urethral catheter.
- Patients who had past history of prostatic surgery or pelvic surgeries

- Prostatic carcinoma and neurological diseases.
- Patients with Bladder Calculus, Urethral Stricture or Bladder Neck Stricture
- Patients with Chronic Urinary Retention.
- Cardiac patients.
- Patients who were compliant for medical treatment and well responding.

Patients who had failed medical therapy or non-compliant to medical therapy were selected as candidates for operative management i.e. TURP. After TURP, patients were called at 2 weeks post-operatively for re-assessment with Uroflowmetry along with IPSS Scoring. Various Uroflowmetric parameters used for the study were: Q_{max} (Peak Flow), Q_{Average} (Average flow), Voided Volume, Voiding time and Time to Peak flow. These findings were observed, recorded and compared with Pre-op flow parameters along with IPSS scoring accordingly. The IPSS questionnaire, which is used to grade symptoms severity, is based on the answers to seven questions which concern lower urinary tract symptoms along with a separate question on Quality of Life. Each question is assigned points from 0 to 5 which indicate increasing severity of the particular symptom and a total score which ranges from 0 to 35. QoL Index is added because this is what brings the patient to the urologist

In uroflowmetry, the patient urinates in a specific urinal that is fitted with a machine that acts as a measurement device in the washroom. The device provides the result in terms of average flow rate (Q_{average}), flow time, peak flow rate (Q_{max}), voided volume and Time to maximum flow (T_{max}). To do uroflowmetry, we must first confirm that the patient's bladder is completely full. Patients are asked to void when they felt a 'normal' desire to urinate.

The results, as obtained from these patients, were compared by using various statistical techniques. Correlation and significance between Pre-op IPSS and Q_{max}, Pre-op IPSS and Q_{avg} were established using Pearson's correlation coefficient.

Results

54 patients who matched the Inclusion criteria were included in the study.

The age distribution of the study population ranged from 53 years to 84 years, with mean age of 67.4 years +/- 7.52 years. Highest incidence of the BPH was found in the age group of 60-70 years with 52 % of patients followed by 33 % of patients having age more than 70 years (Figure 1).

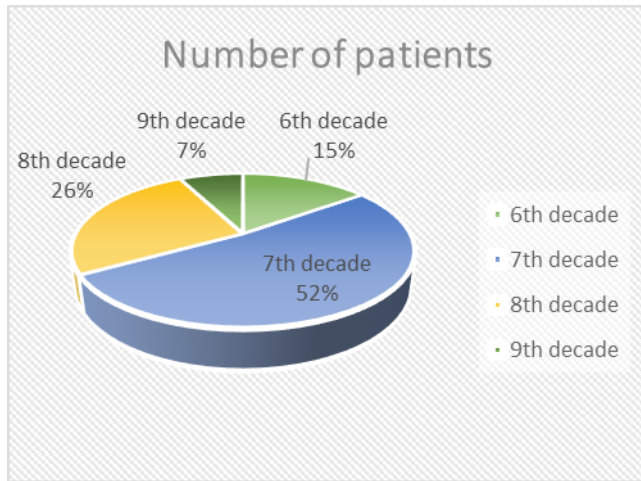


Figure 1: Age distribution.

The International Prostate Symptom Scores (IPSS) were evaluated in all the patients at the time of initial evaluation prior to TURP and after 2 weeks of TURP at the time of follow-up visit (Table 1, Figure 2).

IPSS Scoring	No. of patients (Pre-operatively)	No. of Patients (at 2 weeks after TURP)
Mild (0-7)	Not included	39
Moderate (8-19)	8	15
Severe (20-35)	46	0

Table 1: Pre and post-operative IPSS values.

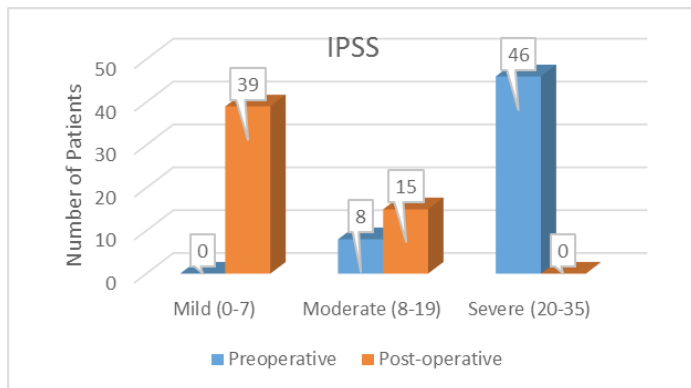


Figure 2: Pre and post-operative IPSS values plotted in bar diagram.

As per IPSS scoring, out of 54 patients, 46 patients had severe symptoms, while 8 had moderate symptoms. Post operatively significant improvement was recorded in the IPSS scores with 39 patients (72.2%) having values in Mild category of IPSS Scores (0-7). Mean IPSS Score preoperatively was 26.573 +/- 6.17 which improved to 7.20 +/- 2.84 after the surgery. Out of all the parameters of IPSS Score, Incomplete emptying had mean score of 4.27 +/- 0.7 preoperatively which decreased to 1.38 +/- 0.48 after TURP. Pre operatively patients had mean quality of life (QOL) of 4.38 +/- .697 followed by post operative significant improvement with mean of 1.55 +/- .51.

The mean prostatic size was 73.8 cc, with a range of 36-119cc and standard deviation of 19.6cc. The mean prostatic size in patients with moderate symptoms was 46 cc +/- 6.65, and that in patients with severe symptoms, it was 78.65 cc +/- 16.9.

The Uroflowmetry was conducted in all patients before the surgery and after 2 weeks of Transurethral resection of Prostate. Preoperatively, all the patients had peak flow less than 10 ml/sec. The mean value of peak flow rate was found to be 6.5 ml/sec. The overall correlation coefficient between Preoperative Qmax and IPSS was -0.82 with a p value less than 0.05, which is significant and showed negative correlation Table 2, Figure 3.

Qmax	Pre-operative (No. of patients)	Postoperative number of patients
< 10 ml/sec	54 (100 %)	0
10-15 ml/sec	0	5 (9.3 %)
>15 ml/sec	0	49 (90.7 %)

Table 2: Pre and postoperative Uroflowmetry Qmax values.

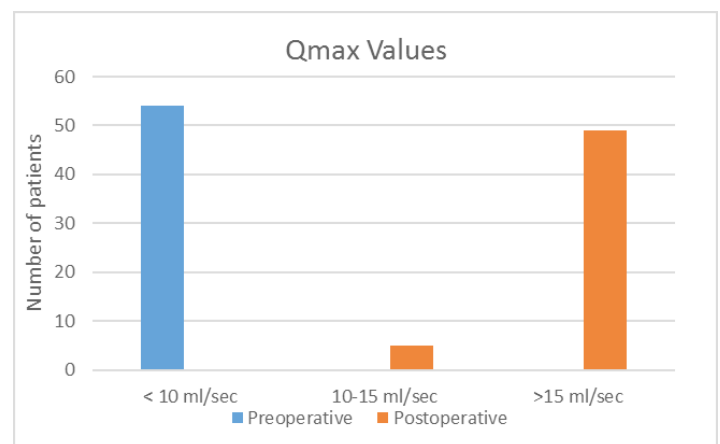


Figure 3: Pre and postoperative Uroflowmetry Q_{max} values plotted in bar diagram.

Post operatively significant improvement was noted in Q_{max} values with none of the patients value <10 ml/min and most of the patients (90.7%) having maximum flow more than 15ml/sec. In our research, Mean pre-operative $Q_{average}$ was 2.66 ml/sec. After TURP, the mean ($Q_{average}$) increased to 10.57 ml/sec. About 70% of the patients showed Average flow between 10-15ml/sec post-TURP followed by 11% of the patients having average flow more than >15 ml/sec. The correlation coefficient between Preoperative $Q_{average}$ and IPSS was -0.84 with a p value less than 0.05, which is significant and showed negative correlation (Table 3, Figure 4).

$Q_{Average}$	Pre-operative (No. of patients)	Postoperative number of patients
< 10 ml/sec	54 (100 %)	10 (18.5%)
10-15 ml/sec	0	38 (70.4 %)
>15 ml/sec	0	6 (11.1 %)

Table 3: Pre and postoperative Uroflowmetry $Q_{Average}$ values.

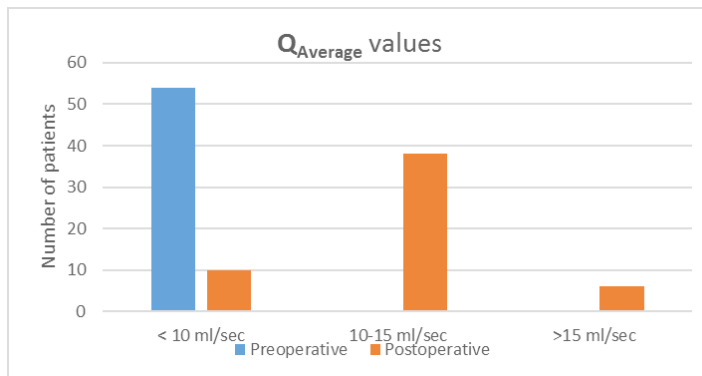


Figure 4: Pre and postoperative Uroflowmetry $Q_{Average}$ values plotted in bar diagram.

Time to Peak flow (T_{max}) was calculated in all the patients preoperatively as well as 2 weeks after TURP which again showed considerable improvement (Table 4, Figure 5).

T_{max} (in seconds)	Pre-operative (No. of patients)	Postoperative number of patients
< 10	0	54
10-15	35	0
>15	19	0

Table 4: Pre and postoperative Uroflowmetry T_{max} values.

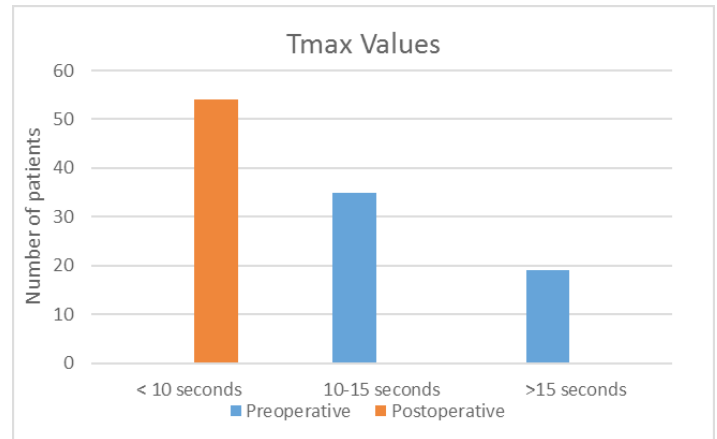


Figure 5: Pre and postoperative Uroflowmetry T_{max} values plotted in bar diagram.

The mean T_{max} before surgery was 13.9 seconds which decreased to 6.8 seconds after the surgery.

	Pre-operative	Postoperative
Q_{max} (Mean)(ml/sec)	6.5 +/- 1.72	17.59 +/- 2.53
Q_{avg} (Mean)(ml/sec)	2.66 +/- 0.84	10.57 +/-1.57
T_{max} (Mean)(in seconds)	13.9 +/- 3.68	6.8 +/- 1.36
IPSS Score	26.53 +/- 6.17	7.2 +/- 2.84
QOL	4.38 +/- 0.69	1.55 +/- 0.51

Table 5: Comparison of the uroflowmetric parameters and IPSS score pre and post TURP.

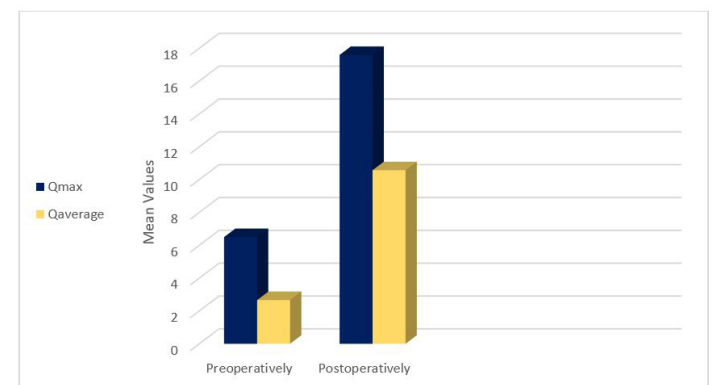


Figure 6: Comparison of the uroflowmetric parameters (Q_{max} and $Q_{average}$) pre and post TURP.

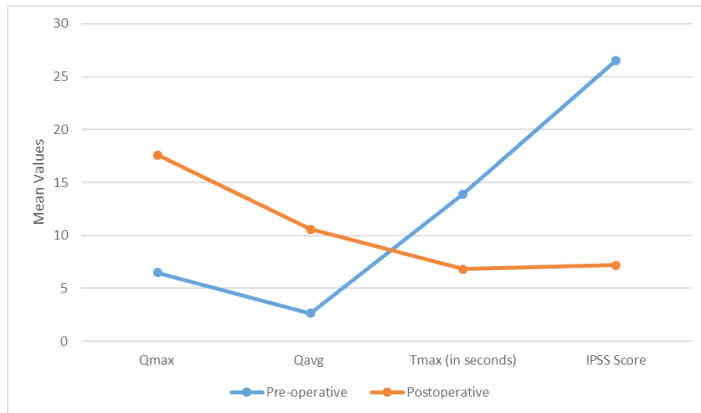


Figure 7: Comparison of the uroflowmetric parameters and IPSS score pre and post TURP.

In our study, we found a significant improvement in Q_{max} , $Q_{average}$, T_{max} and IPSS Scoring post-TURP (Table 5, Figures 6,7).

Discussion

Benign prostatic hyperplasia is a disease of aged men which leads to troublesome LUTS. The enlarged gland contributes to the overall Lower Urinary Tract Symptoms (LUTS). In the present study, Mean age was 67.4 years with 7th decade the most common affected age group (52%). 50% of males between the ages of 51 and 60 exhibited histological evidence of BPH, according to Berry et al. (1984). Nonetheless, our research indicated that the 51–60 age group was the most prevalent [6].

All 54 patients were evaluated by using IPSS questionnaire. The IPSS is the ideal instrument which can be used to grade baseline symptom severity. The most frequent symptom score range, according to our study of the pre-operative IPSS symptom score as a whole, was between 20 and 35, which included 85.2% (n=46) of patients with a mean pre-operative IPSS score of 26.53 +/- 6.17. The most crucial outcome for the patient is clinical and symptomatic improvement as depicted by symptom and bother ratings [7]. The maximum number of post-operative patients were having a score below 8 (n=39, or 72%) and we achieved a postoperative mean IPSS score of 7.20 +/- 2.84. Hence, TURP performed for BPH symptoms led to post-operative symptomatic improvement as seen by the decline in post-operative IPSS score. Uroflowmetry is a simple procedure which is used to objectively calculate various parameters of flow of urine. When used in combination with symptom scores, it has a better probability of correctly characterizing whether there is bladder outlet obstruction.

Examination of the highest urine flow rates revealed a post-operatively considerable improvement. Mean pre-operative Q_{max} was 6.5 ml/sec. After TURP, the mean (Q_{max}) increased to 17.59 ml/sec. Similarly, Preoperative Q_{max} was 9.59 ml/sec and Post-operatively mean (Q_{max}) was 17.33 ml/sec as reported by Songra et. al. [8]. According to Nielson et. al., Preoperative maximum

flow rate was 9.5 ml/sec which improved to 17.0 ml/sec when uroflowmetry was done at 3 months [9]. In similar studies by Dorflinger et al, after transurethral resection of the prostate at three months follow up, the maximum flow rate was 21.5 ml/s in nineteen patients [14]. Regarding $Q_{average}$, again our findings were in line with other researchers' findings, particularly those of RH. Abrams et al. (1977) [10]. The average Q_{max} had increased from 8.0 to 17.2 ml/sec, they discovered. The results of Roehrborn et al. (1986) who discovered a highly significant difference between the pre-operative and post-operative flow rates were similar to these findings [11]. In our research, Mean pre-operative $Q_{average}$ was 2.66 ml/sec. After TURP, the mean ($Q_{average}$) increased to 10.57 ml/sec. Similarly, Preoperative $Q_{average}$ was 5.18 ml/sec and Post-operatively mean ($Q_{average}$) was 11.92 ml/sec as reported by Songra et. al. [8]. Preoperative average flow rate was 4.0 ml/sec, and when uroflowmetry was performed after 3 months, it increased to 8.7 ml/sec, according to Nielson et al. [9]. Barry MJ and Girman CJ, however, found no connection ($r = 0.13$; non-significant) between average flow rate and symptom score [12]. A statistically significant correlation ($p < 0.01$) between average flow rate and IPSS was reported by Wadie et al. [13] Hence, it was determined that the IPSS is helpful in evaluating the symptom complex of LUTS with BPH, and uroflowmetry parameters can be utilised to assess symptoms and predict TURP outcomes. But the bottleneck of this study is that IPSS questionnaire is subjective and each patient will interpret symptoms in a different way.

Conclusion

After evaluating 54 patients with benign prostatic hyperplasia who underwent TURP, it can be said that Uroflowmetry and IPSS should be taken into account before surgery to gauge the severity of the condition. Peak flow rate, duration to peak flow, and average flow rate which are the important objective uroflowmetry parameters, correlated well with the study's subjective parameter, represented by the IPSS score. Following TURP, all patients showed a significant improvement in terms of Q_{max} , Average Flow, and Time to Max Flow. The superiority of uroflowmetry will be even more clearly demonstrated, however, in a larger trial with a longer period of follow-up.

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