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A Comparative Study of Uroflowmetry between Preoperative and Postoperative Transurethral Resection of Prostate in Patients with Benign Prostatic Hyperplasia at Tertiary Care Centre, Hapur

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Abstract: ***Introduction**: Benign prostatic hyperplasia (BPH) is a prevalent condition among aging men, leading to lower urinary tract symptoms (LUTS) such as urinary frequency, urgency, and weak stream. Transurethral resection of the prostate (TURP) is a widely accepted surgical intervention for alleviating these symptoms. This study aimed to compare uroflowmetry parameters and International Prostate Symptom Scores (IPSS) pre- and post-TURP in patients with BPH at a tertiary care center in Hapur. **Objectives**: 1) To study uroflowmetry preoperatively in lower urinary tract symptoms evaluation due to benign prostatic hyperplasia. 2) To study uroflowmetry postoperatively in lower urinary tract symptom evaluation due to benign prostatic hyperplasia. 3) To compare uroflowmetry before and after transurethral resection of the prostate for benign prostatic hyperplasia. **Methods**: This prospective study included 50 patients diagnosed with BPH who met the inclusion criteria. Uroflowmetry parameters, including peak flow rate (Qmax), average flow rate (Qavg), voiding time (Tmax), and flow time (Ftm), were assessed pre- and postoperatively. Additionally, IPSS scores were recorded at multiple intervals post-TURP. **Results**: The study demonstrated significant improvements in uroflowmetry parameters and IPSS scores following TURP. Preoperatively, all patients had a Qmax below 10 ml/sec. Postoperatively, 92% had a Qmax exceeding 15 ml/sec. Similarly, Qavg improved significantly, with 28% achieving values between 10 and 15 ml/sec. Tmax and Ftm also showed notable reductions postoperatively. IPSS scores significantly decreased from a mean of 26.3 preoperatively to 9.14 one month postoperatively, indicating substantial symptom relief and enhanced quality of life. **Conclusion**: TURP significantly improves uroflowmetry parameters and IPSS scores in patients with BPH. Uroflowmetry serves as an effective tool for assessing symptomatic relief and predicting surgical outcomes, while IPSS provides a comprehensive measure of symptom severity and quality of life improvements post-TURP.*

Keywords: Benign prostatic hyperplasia; Transurethral resection of the prostate; Uroflowmetry; Peak flow rate; Average flow rate; International Prostate Symptom Score; Lower urinary tract symptoms; Quality of life; Postoperative assessment; Surgical outcomes

1. Introduction

Background of Study

Benign prostatic hyperplasia (BPH) is a common condition among aging men, characterized by prostate gland enlargement leading to lower urinary tract symptoms (LUTS). These symptoms, including urinary frequency, urgency, weak stream, and nocturia, significantly impact patients' quality of life. Transurethral Resection of the Prostate (TURP) is a widely accepted surgical intervention aimed at alleviating these symptoms by reducing prostatic obstruction.

The prostate gland serves as a crucial accessory sex organ in males, primarily contributing to exocrine secretions without a firmly established endocrine function. These secretions constitute around 15% of the ejaculatory fluid, mainly serving to enhance sperm transport[1].

While the prostate's role in reproduction remains elusive beyond this volume- enhancing function, it, along with the prostatic urethra and bladder neck, plays a vital role in facilitating sperm delivery during sexual intercourse. Nonetheless, because of its close physical proximity to the bladder, neck, and urethra, the prostate is frequently involved in benign and malignant neoplasms and infections, prompting a substantial clinical focus on its growth and function. Nonetheless, the significant clinical focus on the prostate's growth and function arises from its frequent involvement in benign and malignant infections, owing to its intimate anatomical proximity to the bladder, neck, and urethra[2].

While the prostate gland plays a role in sexual function, the precise significance of its secretions for human fertility remains uncertain. John Hunter observed that the adult prostate undergoes atrophy following castration, a finding dating back to his early

Benign prostatic hyperplasia (BPH) is the most common condition affecting men aged 50 and older. Research from various Asian countries shows that a higher percentage of men experience moderate to severe symptoms of BPH compared to those in America.[4] The prevalence of BPH increases from 18% in men in their 40s to 56% in men in their 70s[6].

BPH is characterized by an overgrowth of glandular epithelial and fibromuscular stromal tissue in the prostate, which can greatly affect quality of life. Clinically, it presents with lower urinary tract symptoms (LUTS) and may also be associated with sexual dysfunction.

Between 50% and 70% of men with histological evidence of BPH also have a prostate volume greater than 25 grams (BPE), with up to 28% experiencing moderate to severe LUTS[7,8].

The clinical importance of BPH stems from the troublesome LUTS it causes. Bladder outlet obstruction (BOO) is found in about 52% of asymptomatic men and 60% of symptomatic men with BPH[9,10,11]. While not life-threatening, LUTS significantly impacts quality of life, affecting up to 30% of men over the age of 65[12].

The pathophysiology of BPH is influenced by various mechanisms, including age-related hormonal changes, tissue alterations, metabolic syndrome, and inflammation[13]. Although androgens do not directly cause BPH, their presence is essential for its development.

Moreover, hypertension, obesity, non-insulin-dependent diabetes mellitus, and low HDL cholesterol have been associated with the development of BPH. Increasing evidence indicates an inflammatory basis for BPH, a notion recognized by the American Urological Association in its National Urology Research Agenda.

Transurethral resection of the prostate (TURP) second most common surgical procedure performed on men over 50, surpassed only by cataract surgery. TURP continues to be the gold standard treatment for managing BPH, although the advent of laser technology in endourology has challenged its exclusivity. The Holmium laser enucleation of the prostate (HoLEP) is becoming a standard procedure; however, cost barriers limit its widespread adoption in developing countries. Consequently, TURP remains the predominant method for managing BPH[19,20,21].

Uroflowmetry is a simple screening procedure that measures the rate of urine flow over time. This noninvasive urodynamic test is commonly used to diagnose patients presenting with symptoms indicative of bladder outlet obstruction (BOO)[22].

As the premier noninvasive urodynamic test, uroflowmetry is effective in detecting lower urinary tract obstruction, although definitive cut-off values are yet to be established. Among its parameters, the peak flow rate (PFR; Qmax) is particularly effective in identifying patients with benign prostatic hyperplasia (BPH) compared to the average flow rate (Qavg)[23].

Despite its widespread recognition as the gold standard for diagnosing bladder outlet obstruction in BPH patients, unresolved issues remain regarding uroflowmetry. Both uroflowmetric studies and symptom scores are recommended tools for evaluating patients being considered for transurethral resection of the prostate (TURP)[24].

Therefore, this dissertation aims to evaluate the utility of uroflowmetric parameters and International Prostate Symptom Score (IPSS) symptom scores in patients with benign prostatic hyperplasia and lower urinary tract symptoms undergoing TURP by assessing pre- and post-TURP measurements.

Need of the Study

Despite TURP's established efficacy, there remains a need for comprehensive studies assessing its impact on both objective uroflowmetry parameters and subjective symptom scores like the International Prostate Symptom Score (IPSS). Such studies provide critical insights into treatment outcomes, helping clinicians and patients make informed decisions regarding surgical management options for BPH.

Statement of the Problem

The study addresses the gap in understanding the precise effects of TURP on uroflowmetry parameters and IPSS scores in patients with BPH. Specifically, it investigates:

- The extent to which TURP improves urinary flow rates (Qmax, Qavg) postoperatively.
- The degree of symptom relief, as indicated by changes in IPSS scores following TURP.
- The statistical significance of these improvements, validating TURP's effectiveness as a treatment for BPH-related LUTS.

Aim

To Compare Uroflowmetry between Preoperative and Postoperative Transurethral Resection of the Prostate in Patients with Benign Prostatic Hyperplasia at Tertiary Care Centre, Hapur

Objectives

1) To study uroflowmetry preoperatively in lower urinary tract symptoms evaluation due to benign prostatic hyperplasia.
2) To study uroflowmetry postoperatively in lower urinary tract symptom evaluation due to benign prostatic hyperplasia
3) To compare uroflowmetry before and after transurethral resection of the prostate for benign prostatic hyperplasia.

2. Materials and Methods

The prospective study, which was conducted at the Saraswathi Institute of Medical Sciences in Hapur between July 2022 and June 2024, aimed to assess the outcomes of transurethral prostatectomy (TURP) in patients diagnosed with benign prostatic enlargement. The institute's ethical committee approved the study protocol.

Study Design: A prospective time-bound study

Calculation of Sample Size:

The sample size for the study was calculated by using the formula below: $n=4pq / d^2$

Where n = sample size

p = prevalence (considered at 3.3 % from the previous study).

q = 100-p =100-3.3 = 96.7 %

d = standard error (5 % at a 95% confidence interval)

Therefore, $n = 4 \times 3.3 \times 96.7 / (5)^2$ n 51.0576.

(Approximately 50 patients)

So, the sample size is 50 patients.

Period of Study: The study took place from July 2022 and June 2024

Study Population:
All patients between the ages of 40 and 80 present with lower urinary tract symptoms (LUTS) with BPH Grade 3 in SIMS, Hapur (UP).

Sample Selection:

Inclusion criteria:
- Patients with lower urinary tract symptoms (LUTS) attributed to benign prostatic hyperplasia (BPH) grade 3.
- Patients who had not developed urinary retention.
- Patients who had not been catheterized.

Exclusion criteria:
- Patients diagnosed with urethral stricture.
- Patients with benign prostatic hyperplasia (BPH) grade 1 or grade 2.
- Patients diagnosed with bladder neck stricture.
- Catheterized patients.
- Patients are experiencing acute urinary retention and requiring indwelling catheterization.

Methodology:
Patients recommended to undergo TURP were selected for the study, and various parameters, including age, International Prostate Symptom Score (IPSS), average flow rate (Qave), peak flow values, post-void residual urine, quality of life, and prostatic size, were tabulated preoperatively.

Preoperatively, uroflowmetry was conducted just before surgery, followed by uroflowmetry post-TURP after 7 and 30 days, and the results were correlated.

A thorough history, particularly focusing on symptoms, was obtained from each patient. Additionally, a comprehensive physical examination, including a digital rectal examination of the prostate, was performed. Various investigations, such as ultrasound of the kidneys, ureters, and bladder (KUB), X-ray of KUB, complete blood count (CBC) with chemistry panel and blood group, urine routine examination, urine culture and sensitivity (C/S), liver function tests (LFT), and blood sugar levels, were carried out. In selected cases, prostate- specific antigen (PSA) levels were also evaluated if deemed necessary.

Materials:
1) Uroflowmetry equipment: This comprised electronic devices capable of recording urine flow rate throughout the course of micturition. The equipment was essential for assessing urinary flow patterns and measuring parameters such as peak flow rate and voided volume.
2) Diagnostic equipment: ultrasound machines, X-ray machines for kidney- ureter-bladder (KUB) imaging, and laboratory facilities for conducting blood tests, urine tests, and prostate-specific antigen (PSA) evaluations were utilised for comprehensive patient assessment and diagnosis.
3) Standardised protocols: Established protocols and guidelines for conducting uroflowmetry, collecting patient data, and performing diagnostic tests were followed to ensure consistency and accuracy in the study procedures.

These materials were essential for conducting the study, assessing patients with benign prostatic enlargement, and evaluating the outcomes of transurethral prostatectomy

Ethical Consideration
- **Conflict of Interest:** There was no conflict of interest.
- Financial Aid: Self

Statistic alanalysis
- Data will be entered into Microsoft Excel (Windows 7; Version 2007) and analyses will be done using the Statistical Package for Social Sciences (SPSS) for Windows software (version 20.0; SPSS Inc, Chicago).

Descriptive Statistics:
- Mean and Standard Deviation: Used to describe central tendency and variability of continuous variables like age, symptom scores, and uroflowmetry parameters.
- Frequency and Percent: Employed to summarize categorical variables, indicating the distribution of different categories within the sample.

Inferential Statistics:
- Chi-Square Test: Assesses the association between categorical variables, such as symptom presence and treatment outcomes.
- Paired-Samples T Test: Compares means of two variables within the same group, useful for pre- and post-treatment measurements.
- Repeated Measure ANOVA: Analyzes related dependent variables to assess changes over time or conditions.
- Significance Level: The significance level for all statistical tests was set at $p < 0.05$, indicating that results with a probability of occurrence of less than 5% were considered statistically significant.

3. Results

Age Distribution:
The study included 50 patients who met the inclusion criteria for benign prostatic enlargement. The age distribution ranged from 42 to 73, with a mean age of 67.3 and a standard deviation of 08.09.

Table: Age distribution

Age Group	No. of Patients	Percent
<50 years	3	6%
51-60 years	8	16%
61-70 years	20	40%
>71 years	19	38%
Total	**50**	**100%**

The age distribution of patients revealed that the majority (40%) fell within the 61 to 70 age range, with another 38% being over 71. Additionally, 16% were aged 51 to 60, while only 6% were under 50. This suggests a predominantly older patient cohort, as commonly observed in studies on benign prostati c enlargement.

Regarding BPH incidence, the highest rates were observed in the 60–70 age group (40%) and among those over 70 (38%). In the 50–60 age range, 16% were affected, while only 6% of those under 50 had BPH. This underscores the correlation

between aging and BPH development, particularly prevalent in individuals aged 60 and older.

Symptoms

The International Prostate Symptom Scores (IPSS) were evaluated in all the patients included in the study.

Table: Distribution of pre and postoperative IPSS values

IPSS Score	Pre- Operative (No. of Patients	Post- Operative (No. of Patients)
0-8	0	3(6%)
9-19	5(10%)	47(94%)
>20	45(90%)	0

In the current investigation, none of the patients exhibited an IPSS Score lower than eight before surgery. Five patients (10%) had scores ranging between 9 and 19, while 45 (90%) presented IPSS values exceeding 20.

Following surgery, a notable improvement in IPSS scores was observed: 3 patients (6%) displayed scores below 8, 47 patients (94%) had scores ranging from 9 to 19, and none had scores surpassing 20.

The shift in IPSS scores from preoperative to postoperative was statistically significant, with a p-value of .002.

Table: Distribution of IPSS values pre- and postoperatively at different intervals of time

IPSS	Mean	Std Deviation
PRE-OP	26.3	4.0267
POST OP (1 week)	9.9	0.78895
POST OP (1 month)	9.14	0.90373

Distribution of IPSS values pre- and postoperatively at different intervals of time

Before surgery, the patients had a mean IPSS Score of 26.3000 +/- 4.02670.

One week postoperatively, there was a notable improvement with a mean IPSS score of 9.9000 +/- .78895.

By one month, the mean IPSS score further decreased to 9.1400 +/- .90373, The IPSS symptoms demonstrated consistent improvement over time.

The uroflowmetry study included assessments of Qmax (Peak/Maximum Flow Rate) for all patients before and after Transurethral Resection of the Prostate (TURP). The distribution of Qmax values before and after the operation was recorded.

Uroflowmetry Study:

Qmax - Peak/Maximum Flow Rate**.**

Table: Distribution of pre and postoperative Uroflowmetry Qmax values

Qmax values	Pre- Operative (No. of Patients	Post- Operative (No. of Patients)
<10ml/sec	50(100%)	0
10-15ml/sec	0	4(8%)
>15ml/sec	0	46(92%)

P=.006

In the current study, all patients (100%) exhibited a Qmax of less than 10 ml/sec before the operation.

Following the operation, a significant improvement in Qmax values was observed:
none of the patients had a value below 10 ml/min, 8% of patients had values ranging between 10 and 15 ml/min, 92% of patients had values exceeding 15 ml/min.

The change in Qmax values from preoperative to postoperative was statistically significant, with a p-value of .006.

Uroflowmetry Study: Qavg – Average Flow Rate.

Table: Distribution of pre and postoperative Uroflowmetry Qavg values

Qmax values	Pre- Operative (No. of Patients	Post- Operative (No. of Patients)
<10ml/sec	50 (100%)	36 (72%)
10-15ml/sec	0	14 (28%)

In the current study, all patients (100%) exhibited a Qavg (average flow rate) of less than 10 ml/sec before the operation.

Following the operation, a significant improvement in Qmax values was noted: 36 patients (72%) had values below 10 ml/min
Fourteen patients (28%) had values ranging between 10 and 15 ml/min.

The change in Qavg values from preoperative to postoperative was statistically significant, with a p-value of .02.

Uroflowmetry Tmax values- time is taken for voiding maximum volume in seconds

Table: Distribution of pre and postoperative Uroflowmetric Tmax values

Tmax - in seconds	Pre- Operative (No. of Patients	Post- Operative (No. of Patients)
<10 sec	0	50 (100%)
10-15 sec	38 (72%)	0
>15 sec	18 (28%)	0

(p=.005)

Before the operation, none of the patients had a Tavg (average voiding time) of less than 10 seconds; 72% had values between 10 and 15 seconds, and 28% had values exceeding 15 seconds.

Following the operation, there was a notable improvement in Tmax (maximum voiding time) values, with 100% of the patients having values below 10 seconds.

The change in Tmax values from preoperative to postoperative was statistically significant, with a p-value of .005.

Uroflowmetry F tm-flow time (time taken for complete emptying of the bladder) in seconds

Table: Distribution of pre and postoperative F tm-flow time values in seconds at different intervals.

Flow time-in seconds	Mean values in seconds	Standard deviation in seconds
Preoperatively	83 sec	22 sec
Postoperatively (at one week)	28 sec	3.4 sec
Postoperatively (at one month)	26 sec	2.6sec

(P= .005)

In the current study, patients exhibited a mean flow time of 83 seconds +/- 22 seconds postoperatively.

A significant improvement was observed, reflected in the decreased time required to empty the bladder completely.

Specifically, at the end of the first week, the values decreased to 28 seconds +/- 3.4 seconds, and at the end of the first month further reduced to 26.3800 seconds +/- 2.67940 seconds.

The flow time (Ftm) demonstrated a consistent improvement over time. The change in Ftm values from preoperative to postoperative was statistically significant, with a p-value of .005.

Table: Distribution IPSS Scoring with six bothersome lower urinary symptoms with one question regarding quality of life affected by these symptoms pre and post-TURP

IPSS Parameters	Mean values with SD
1. Q-LIFE PRE Q-LIFE POST	4.9800+/-.42809 2.2800+/-.45356
2. INC-EMP PRE INC EMP POST	3.3000 +/- .64681 0.7400 +/- .44309
3. FRE- PRE FRE-POST	3.9600 +/- .40204 2.0000+/- .00000
4. INT-PRE INT-POST	3.3400+/- .65807 .5200 +/- .50467
5. URG-PRE URG-POST	3.5200+/- .64650 1.0200 +/- .14142
6. WK-STR PRE WK-STR POST	3.8400 +- .55842 0.9800 +/- .14142
7. STR PRE STR POST	3.8400 +/- .82906 0.8400 +/- .50669
8. N-UR PRE N-UR POST	3.9800 +/- .47337 2.0000+/- .00000

(P = .005)

The most significant improvement was in weak stream, incomplete emptying, and intermittency.

- Regarding symptom scores, the highest mean scores were observed for frequency, weak stream, and incomplete emptying preoperatively, while for postoperative assessments, the highest mean scores were for nocturia and frequency.
- Before the operation, patients had a mean quality of life score of 4.9800 +/-.42809, significantly improving postoperatively to a mean of 2.2800 +/- .45356.
- Before the operation, patients experienced a mean sensation of incomplete emptying (INC-EMP) of 3.3000 +/- .64681, significantly improving postoperatively to a mean of 0.7400 +/- .44309.
- Before the operation, patients had a mean frequency of urination of 3.9600 +/- .40204, which significantly improved postoperatively to a mean of 2.0000 +/- .00000.
- Before the operation, patients experienced a mean intermittency of urination (INT) of 3.3400 +/- .65807, significantly improving postoperatively to a mean of 0.5200 +/- .50467.
- Before the operation, patients had a mean urgency of urination (URN) of 3.5200 +/- .64650, significantly improving postoperatively to a mean of 1.0200 +/- .14142.
- Before the operation, patients experienced a mean weak stream while urinating of 3.8800 +/- .55842, significantly improving postoperatively to a mean of 0.9800 +/- .14142.
- Before the operation, patients had a mean straining while urinating (STR) of 4.0800 +/- .82906, significantly improving postoperatively to a mean of 0.7800 +/- .50669.
- Before the operation, patients experienced a mean nocturnal frequency of urination (NC URN) of 3.9800 +/- .47337, significantly improving postoperatively to a mean of 2.0000 +/- .0000.
- The change in IPSS symptom scores from preoperative to postoperative was statistically significant with a p-value of .000

Table: Distribution Paired Samples Statistics of all the uroflowmetric parameters and IPSS score pre and post-TURP

Pairs	Mean
1- IPSS-Pre	26.30000+/-4.02670
IPSS-Post	9.0333+/-.72921
2-Qmax-pre	6.9000+/-.99488
Qmax-post	16.7667+/-1.05892
3- Qavg-pre	3.1400+/-.75620
Qavg-post	9.5067+/-.94579
4-Tmax-pre	14.6600+/-1.83626
Tmax-post	6.2067+/-.51679
5- F tm-pre	83.4000+/-22.09534
F tm-post	26.2467+/-2.36357

(P = .006)

At present, all uroflow parameters and IPSS scores have shown improvement postoperatively.

Before the operation, patients had a mean IPSS Score of 26.30000 +/- 4.02670, which improved postoperatively to 9.0333 +/- .7292.

The preoperative uroflowmetric Qmax mean value was 6.9000 +/- .99488 ml/sec, which improved postoperatively to 16.7667 +/- 1.05892 ml/sec.

Additionally, the preoperative mean Qavg value was 3.1400 +/- .75620 ml/sec, which improved postoperatively to 9.5067 +/- .94579 ml/sec.

Patients also experienced a preoperative mean Tmax value of 14.6600 +/- 1.83626 sec, which improved postoperatively to 6.2067 +/- .51679 sec.

The change in IPSS symptom score and uroflowmetry parameters from preoperative to postoperative was statistically significant, with a p-value of .006.

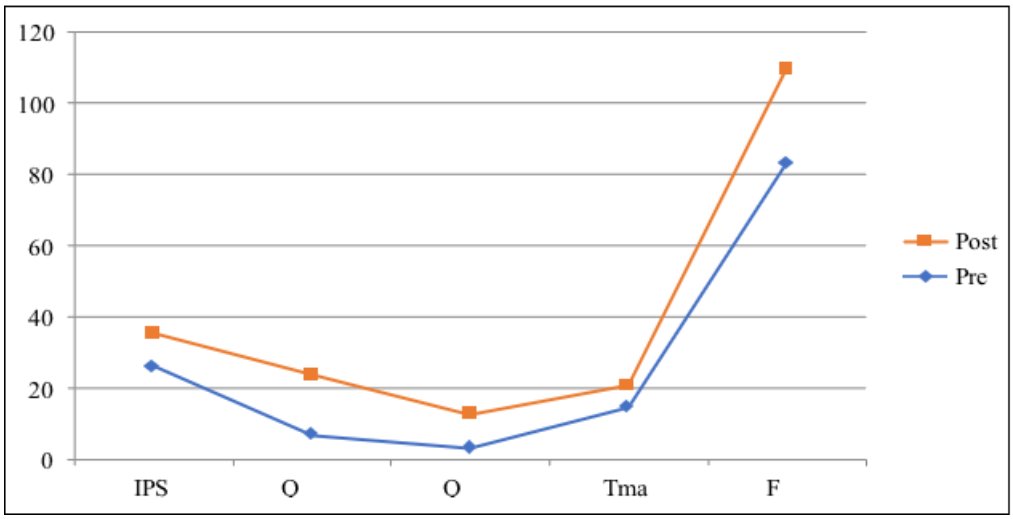

Figure: Distribution Paired Samples Statistics of all the uroflowmetric parameters and IPSS score pre and post-TURP

4. Discussion

The study examined 50 patients diagnosed with benign prostatic enlargement (BPE), revealing a mean age of 67.3 years, consistent with typical BPE demographics. Notably, the majority of patients (40%) fell within the 61-70 age bracket, reflecting the age-associated prevalence of BPH. This pattern aligns with previous studies by Sanjeev Singh et al., Malik Hussain Jalbani et al., and K. Bar et al., which similarly found a predominant representation of older individuals in BPH cohorts, reinforcing the correlation between aging and BPH development.

Assessment of International Prostate Symptom Scores (IPSS) highlighted significant preoperative symptom severity, with none scoring below eight and 90% exhibiting scores surpassing 20. However, postoperative IPSS assessments revealed substantial improvemen t, with 94% exhibiting scores ranging from 9 to 19 and none exceeding 20. This improvement underscores the efficacy of TURP in alleviating BPH-related symptoms, enhancing patients' quality of life.

Uroflowmetry studies pre- and post-TURP demonstrated significant improvements in peak flow rate (Qmax), average flow rate (Qavg), voiding time (Tmax), and flow time (Ftm). Preoperatively, all patients exhibited Qmax values below 10 ml/sec, which improved postoperatively, with 92% achieving values exceeding 15 ml/sec. Similarly, Qavg showed improvement, with 72% achieving values above 10 ml/sec postoperatively. Moreover, significant reductions were observed in Tmax and Ftm postoperatively, indicating enhanced voiding efficiency following TURP.

Comparative analysis with previous studies supported the present findings. For instance, Malik Hussain Jalbani et al. and Nielsen et al. reported similar improvements in Qmax postoperatively, with values reaching 17 ml/sec. Similarly, M.C. Songra et al. demonstrated consistent improvements in Qmax, with values increasing from 9.59 ml/sec preoperatively to 17.33 ml/sec postoperatively, aligning with the present study's outcomes.

Regarding Qavg, the present study showed a significant improvement from preoperative values to postoperative values, consistent with findings by Malik Hussain Jalbani et al. and M.C. Songra et al. These studies reported similar trends in Qavg improvement following TURP, indicating enhanced urinary flow rates postoperatively.

Additionally, analysis of IPSS parameters revealed significant improvements in all assessed symptoms postoperatively. This aligns with previous studies by F.P. Chuang et al. and D. Porru et al., which reported similar decreases in IPSS scores post-TURP, indicating symptom relief and improved urinary function.

The present study demonstrates significant improvement in all uroflowmetric parameters postoperatively in patients with BPH undergoing TURP. Enhanced Maximum flow rate (Qmax) and Average flow rate (Qavg) were consistently observed across all postoperative follow-up visits. These findings suggest that uroflowmetry parameters not only assess symptoms but also predict the outcome of TURP effectively.

5. Conclusion

- Our study demonstrates significant improvements in uroflowmetric parameters and IPSS scores following TURP in BPH patients.
- Maximum flow rate (Qmax) and Average flow rate (Qavg) consistently improved postoperatively, indicating enhanced urinary function.
- Uroflowmetry parameters serve not only as indicators of symptomatic relief but also as predictors of TURP outcomes.
- The IPSS is valuable for assessing the symptom complex of LUTS in BPH patients.
- Post-TURP, there was a significant mean decrease in IPSS scores, particularly notable for symptoms like weak stream, incomplete emptying, and intermittency.
- IPSS serves as a comprehensive measure of symptomatic relief and quality of life improvement post-TURP.

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