

Correlation between Clinical Outcome and Residual Prostatic Weight Ratio after Transurethral Resection of Prostate for Benign Prostatic Hyperplasia

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A B S T R A C T

Introduction: Transurethral resection of the prostate (TURP) has been the most common surgical procedure for relieving symptoms of benign prostatic hyperplasia (BPH). However, there is no consensus regarding the amount of tissue resected during TURP and its influence on resolution of symptoms. The aim of the present study was to assess the influence of the amount of tissue resected during TURP on the improvement as assessed by AUA symptoms score, uroflowmetry and amount of residual urine; and to assess the use of new variable, the residual prostatic weight ratio (RPWR) for evaluating the clinical outcome after transurethral resection of the prostate.

Material and methods: A total of 50 patients presenting with obstructive/irritative lower urinary tract symptoms were evaluated for pre and post TURP values of prostatic weight, International Prostate Symptoms Score (IPSS), Postvoid Residual Volume (PVR), Maximum flow rate (Qmax) and Total Prostate Volume (TPV). RPWR was recorded in each case using transrectal ultrasound.

Results: The effectiveness of TURP was 76%. On evaluation of the patients for IPSS, PVR, Qmax and TPV; the difference between pre operative and post operative values of these parameters was found to be statistically highly significant $P < 0.001$. RPWR was found to be significantly lower in patients who received effective treatment. A total of 9 patients (18%) presented with post operative complications.

Conclusion: Values of IPSS, PVR, Qmax, TPV and operative parameters such as RPWR and residual prostatic weight are important parameters for the prediction of treatment outcome.

Keywords: Clinical Outcome, Residual Prostatic Weight, Transurethral Resection of Prostate, Prostatic Hyperplasia

INTRODUCTION

Benign prostatic hyperplasia (BPH) has a high prevalence in the male population that increases with age.^{1,2} It is one of the most common causes of chronic and progressive lower urinary tract symptoms (LUTS) in men and starts after the age of 50. By the age of 60 years, 50% of men have histological evidence of BPH.³ Transurethral resection of the prostate (TURP) has been the most common surgical procedure for relieving symptoms of BPH.⁴ It offers a more favorable 5-year impact on symptoms and BPH complications than watchful waiting, without a higher risk of incontinence or erectile dysfunction.⁵

Estimating prostate size before surgical intervention is important because most patients with BPH are elderly and at risk during prolonged surgery such as TURP. Unfortunately, DRE, retrograde urethrography, cystourethroscopy and the

urethral pressure profile are often inaccurate for estimating prostate size, especially for moderate and large prostates.^{6,7,8} Changes in prostate volume on TRUS before and after TURP for BPH have been reported previously⁹, but there is sparse data on how the completeness of resection influences the outcome of TURP. To evaluate any potential correlation between pre- and post operative prostate size and outcome, a new variable, the residual prostatic weight ratio (RPWR) is being evaluated. The majority of present studies, however, do not pay attention to operative parameters such as the weight of residual tissue which indicates how complete an operation is. Few studies state that the symptomatic improvement after TURP is not primarily dependent on the relative completeness of the resection. The data provided in different studies are thus contradictory and cannot answer whether or not the completeness of resection is important for the outcome.¹⁰

The aim of the present study is to assess the influence of the amount of tissue resected during TURP for benign prostatic hyperplasia on the improvement as assessed by AUA symptoms score, uroflowmetry and amount of residual urine and to assess the use of new variable, the residual prostatic weight ratio (RPWR) for evaluating the clinical outcome after transurethral resection of the prostate.

MATERIAL & METHODS

The present study was a prospective observational study carried out in the Department of Surgery at Shri Ram Murti Smarak Institute of Medical Sciences, Bareilly (U.P). A total of randomly selected 50 male patients presenting to the surgery OPD of SRMS- IMS with obstructive/ irritative lower urinary tract symptoms during the study period of October 2016 to November 2018 were evaluated.

The research procedure followed was in accordance with the approved ethical standards of Shri Ram Murti Smarak Institute of Medical Sciences, Bareilly, Ethics Committee (Human).

Inclusion criteria: Patients with obstructive lower urinary tract symptoms like hesitancy, weak urinary stream, intermittency, incomplete voiding and retention of urine. Sometimes patients also present with irritative lower urinary symptoms like increased frequency, urgency, urgency incontinence were included in this study.

Exclusion criteria: Patients with acute urinary tract infection, carcinoma prostate and benign prostatic hyperplasia with neurogenic urinary bladder and not consenting to participate in the study were excluded in this study.

Methodology

Method of collection of data:

A written consent was taken from all potentially eligible subjects. Patient's personal history including full demographic profile, history of present illness, quality of life (QoL) according to International Prostate Symptom Score (IPSS); clinical examination details including digital rectal examination findings; routine investigations including urine analysis, urine culture and sensitivity test, full blood count, renal function test, serum sodium and potassium level and prostate specific antigen (PSA) were recorded on a predesigned proforma. Ultrasonography (USG) of Kidney Ureter Bladder (KUB) and prostate and Transrectal Ultrasound with measurement of prostate size were done.

Transabdominal ultrasonography was done at the department of radiology, SRMS-IMS. The sonography was done preoperatively with full bladder and the assessment of kidneys, ureters, urinary bladder, pre-void bladder volume and prostate size. After evaluation with full bladder, the patient was instructed to void urine and post void bladder volume estimation was done. In post TURP cases the same procedure was repeated usually after 16 weeks as needed.

Uroflowmetry was done at the urodynamic laboratory in the department of urology at SRMS-IMS. Parameters considered were total voided volume, maximum flow rate, average flow rate and time to start urination, time to reach peak flow.

Procedures

All TURPs were performed by single surgeon under spinal anesthesia with 26 Fr. Karl-Storz working element having continuous out flow channel and Valleylab diathermy set with setting of 140-150 Watts for cutting and 100-110 Watts for coagulation. During procedure 1.5% isotonic glycine (3-liter bottle) was used for irrigation using in 45-60 cm height which was just sufficient for free flow.

Resection was started from middle lobe, then left lobe from 4-5 O'clock position anti-clock wise to 1 O'clock position followed by right lobe starting from 7-8 O'clock position clock wise to 11 O'clock position. Finally, the anterior part of the prostate adenoma was resected. Prostatic tissue was resected until the transverse fibers of capsule appear. Haemostasis was maintained as much as possible by coagulation. At the end of surgery after evacuation of all prostatic chips from bladder 22 or 24 Fr three-way Foley's catheter was inserted followed by continuous irrigation with isotonic normal saline till clear drain noticed in the collection bag. The catheters were removed when urine was clear without blood. Intra- and post-operative complications, operation time, weight of resected prostatic tissue, hospital stay were recorded. After discharge follow up check-up for assessment of improvements of symptoms, quality of life, any new complaints and repeat USG abdomen with PVRU measurement was done after 2-3 months.

STATISTICAL ANALYSIS

Data was analyzed using Statistical Package for Social Sciences, version 23 (SPSS Inc., Chicago, IL). Results for continuous variables are presented as mean \pm standard deviation, whereas results for categorical variables are presented as number (percentage). For comparison of mean, independent sample t-test is performed. The level $P < 0.05$ was considered as the cutoff value or significance.

RESULTS

Out of the total 50 patients under study, 23(46.0%) were in the age group of 61-70 years, 14(28.0%) in the age group of 51-60 years, 11(22.0%) in the age group of 71-80 years and only 2(4.0%) patients were such who were >80 years. The mean age of the sample group was 65.23 \pm 6.12 years.

Majority of the patients 16/50 (32.0%) had completed their education up to Secondary & Higher secondary level, 9(18.0%) patients were graduates, 14(28%) had acquired only primary education and remaining 11(22.0%) patients were illiterate.

While a great majority of patients were farmers 26(52.0%), 13 (26.0%) were employed, and remaining 11(22.0%) were unemployed. A large majority of the subjects under study 29 (58.0%) were engaged in heavy work; while 2 (4.0%), 15 (30.0%) and 4 patients were engaged in strenuous, moderate and sedentary work respectively.

36 (72.0%) of the patients were Hindu, 11(22.0%) Muslim and rest 3 (6.0%) patients had other religions. Based on dietary preferences, 23(46.0%) patients were vegetarians and 27(54.0%) were non-vegetarians.

Clinical symptoms like poor flow, straining, incomplete voiding, frequency, urgency, intermittency, hesitancy,

| | Pre-operative | Post-operative | p value |
|----------------------------------------------|---------------|----------------|---------|
| International Prostate Symptoms Score (IPSS) | 25.60±6.30 | 14±2.2 | <0.001 |
| Quality of life | 4.20±0.60 | 2.7±0.1 | <0.001 |
| Postvoid Residual Volume (PVR) ml | 71.26±15.6 | 16.45±4.45 | <0.001 |
| Maximum flow rate (Qmax) ml/s | 8.60±3.70 | 14.62±8.88 | <0.001 |
| Total Prostate Volume (TPV) ml | 58.32±18.56 | 29.26±6.35 | <0.001 |

Table-1: Comparison of IPSS, VS, SS, QoL, and Qmax of each group, before and after TURP of studied patients

| Parameter | Ineffective treatment (n=12) | Effective treatment (n=38) | P Value |
|---------------------------------|------------------------------|----------------------------|---------|
| Resected tissue weight | 16.5±3.4 | 24.8±4.05 | <0.001 |
| Residual prostate weight | 27.8±5.2 | 20.2±2.30 | <0.001 |
| Residual prostatic weight ratio | 0.69±0.04 | 0.48±0.02 | <0.001 |

Table-2: Operative parameters according to treatment efficacy of studied patients

| Complication | Frequency (n=50) | Percentage |
|------------------------------------|------------------|------------|
| Complaints of Poor stream of Urine | 3 | 6% |
| TURP syndrome | 2 | 4% |
| Bleeding with clot retention | 1 | 2% |
| Post-operative urethral stricture | 1 | 2% |
| Post-operative LUTS | 2 | 4% |
| Total | 9 | 18% |

Table-3: Postoperative Complication of studied patients

| Studies | IPSS | QoL | Qmax | PVR | TPV |
|---------------------------------|---------|---------|---------|---------|---------|
| Daimantas Milonas ²⁴ | P<0.001 | P<0.001 | P<0.001 | P<0.001 | P<0.001 |
| Yu Jin Kang et al ⁹⁴ | P<0.001 | P<0.001 | P<0.001 | P<0.001 | - |
| Present study | P<0.001 | P<0.001 | P<0.001 | P<0.001 | P<0.001 |

Table-4: Comparison of IPSS, QoL, Qmax, PVR and TPV in Pre-operative and post-operative quality

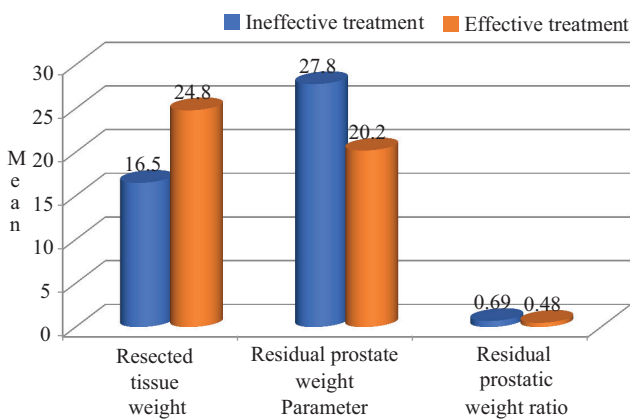


Chart-1: Operative parameters according to treatment efficacy of study patients

dribbling and nocturia were uniformly distributed among the entire lot of patients with 48 to 66 % of patients presenting with these symptoms at the first clinical visit. However, acute urinary retention was observed only in 11(22.0%) patients. On evaluation of the patients for International Prostate Symptoms Score (IPSS), Postvoid Residual Volume (PVR) in milliliters(ml), Maximum flow rate (Qmax) in ml/s and Total Prostate Volume (TPV) in ml; the difference between pre operative and post operative values of these parameters was found to be statistically highly significant P<0.001.

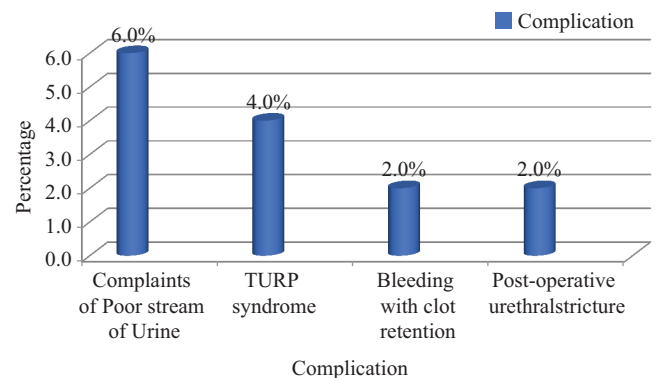


Chart-2: Postoperative Complication of study patients

(Table 1)
The effectiveness of transurethral surgery was 76% (n=38, 76%). Patients who had greater resected tissue weight with lesser residual prostatic weight showed a more complete resolution of symptoms. Overall, the residual prostatic weight ratio(RPWR) was found to be significantly lower in patients who received effective treatment.(Table 2, Graph 1) A total of 9 patients(18%) presented with post operative complications including poor urinary stream (6%), TURP syndrome (4%), post-operative LUTS (4%), post-operative urethral stricture(2%) & bleeding with clot retention(2%). (Table 3, Graph 2)

DISCUSSION

Generally, the outcome of TURP, performed because of lower urinary tract symptoms, is favorable in 78–93% of the patients¹¹. The effectiveness of transurethral surgery in this study was found to be 76% which is slightly less than the reported range.

In the present study, mean age of all studied 50 patients was reported 65.23 years with a standard deviation of 6.12. Majority of them 23 (46.0%) were in the age group of 61–70 years, 14 (28.0%) in the age group of 51–60 years, 11 (22.0%) in the age group of 71–80 years and only 2 (4.0%) patients were such who were >80 years.

In a similar study done by M. Nagarathnam et al¹² it was found that majority 46 (46 %) of patients were between 61–70 years of age, followed by 31 (31%) patients between 51–60 years of age, 21 (21%) between 71–80 years of age and only 2 (2%) patients were greater than 80 years of age. A study done by M. Pahwa et al¹³ reported mean age of all studied patients as 65.6 years which is also very close to our findings.

Severity of symptoms increased with increase in age. A greater percentage of severity of symptoms was observed in older age groups. Another study from coastal Andhra Pradesh done by Rao CN et al⁴⁸ also reported a higher number of patients with moderate symptoms in the age group of 70–79 years.

The educational status of patients in the present study was found to be in concordance to the findings reported by M. Nagarathnam et al study⁹² who found that majority 39 (39%) patients were educated to Secondary & Higher secondary level followed by 25 (25%) educated till primary level and only 11 (11%) were graduates while 25 (25%) patients were illiterate. Our occupation status, type of work, religion, dietary habit findings of patients were also similar to the findings of M. Nagarathnam et al.

In present study, improvement was reported after TURP in all patients. The IPSS values before and after TURP were 25.60±6.30 and 14±2.2, Quality of life 4.20±0.60 and 2.7±0.1, Q_{max} 8.60±3.70 and 14.62±8.88, TPV 58.32±18.56 and 29.26±6.35. All the above parameters showed a statistically significant difference in the pre and post operative values. Our findings were in concordance to those of Daimantas Milonas²⁴ (p<0.001). In another study done by Yu Jin Kang¹⁴, the IPSS values before and after TURP were 25.6±7.1 and 14.4±7.3 (p<0.05), Q_{max} 9.6±3.7 and 17.8±6.9; differences in which were statistically significant (p<0.05)(Table 4). In another study, IPSS in the Permixon treated group was significantly reduced (p<0.006) from 20.0±5.9 to 14.9±3.8 after three months of treatment.¹⁵

The data presented in this study indicate that RPWR changed the most significantly when effective and ineffective treatment groups were compared. Patients who had greater resected tissue weight with lesser residual prostatic weight showed a more complete resolution of symptoms (P<0.001). This is similar to findings of Daimantas Milonas.²⁴

Efficacy of treatment in this study was estimated following the criteria (pre/post-operative changes of IPSS, QoL, Q_{max}, and TPV) of the Second International Consultation on Benign Prostatic Hyperplasia and it differs with aforementioned studies. It means that during the resection

of the prostate, at least 30% of the prostate volume should be removed to avoid an unfavorable outcome.

There is always a risk of complication during the surgical management of larger prostate. Complications like intra-operative or post-operative bleeding and TUR syndrome are discouraging factors to perform TURP in large prostates.³¹ Although the use of improved instruments, modern irrigation fluids with improved surgical techniques has significantly decreased the incidence of TUR syndrome from 3–5% to < 1%, but it still remains one of the major peri-operative complication.^{86,87,90,16} In a study done on large population of patients (n=3885) who were treated by TURP, it was clearly seen that the complication rate was higher in patients having large prostate and incidence of TUR syndrome was higher (2%) with resection time more than 90 minutes.⁹⁶

In the present study, post-operative complications occurred in 18% of patients. 3(6%) patients complained of Poor stream of Urine, 2(4%) each complained of TURP syndrome or Post-operative LUTS and 1(2%) each had Post-operative urethral stricture & Bleeding with clot retention. These complications may be due to prolonged operative time. In our study no, post-operative bladder neck contracture was observed. In three patients (6%) there was poor stream of urine despite normal cystoscopic finding without urethral stricture which may be due to bladder dysfunction.

A study done Joshi HN et al²⁵ reported post-operative poor stream of Urine and TURP syndrome in 3.1% of patients each respectively. In the previous studies the incidence of post TURP urethral stricture has been reported from 2.2% to 9.2% and bladder neck contracture occurred in 0.3 to 9.2%.^{96,17}

There is no consensus regarding the exact amount of prostatic tissue that should be resected during TURP. Some studies suggest complete resection should be performed for better results while others have suggested that a partial resection is adequate for short term functional results.^{26,18} The recommended TURP technique consists of a complete resection of adenomatous tissue inside the surgical capsule for better result in terms of quality of life and symptom improvement.⁸² However, prolonged TURP in medically compromised patients with large prostate may be associated with increased bleeding and TUR syndrome development.⁸² We found significant difference in preoperative QoL in patients having smaller prostate in comparison to that of patient group having large (> 80 grams) prostate size. However, after complete resection of adenomatous tissue, the QoL score after TURP showed no difference between both groups. In present study we also observed a significant improvement in IPSS from severe to mild or zero score level. Similar results with long term efficacy of TURP were found in other studies.^{31,87,19}

Despite the greatly decreasing number of interventional treatments of lower urinary tract symptoms because of BPH, resection of the prostate remains the most effective treatment when long-term outcomes are compared²⁶. Minimal resection, as an acceptable treatment modality, was suggested by Aagaard et al.²⁶; however, other authors have not confirmed this. The data of this study suggest performing resection of

the prostate as complete as possible with obligatory resected weight of 30% of TPV. If such amount of tissue cannot be resected because of small transition zone volume, the probability for ineffective outcomes is very high.

CONCLUSION

Transurethral resection of the prostate remains a very effective treatment modality of lower urinary tract symptoms because of the benign prostatic obstruction regardless of prostate size. Values of International Prostate Symptoms Score (IPSS), Postvoid Residual Volume (PVR) ml, Maximum flow rate (Q_{max}) ml/s, Total Prostate Volume (TPV) ml and operative parameters such as residual prostatic weight ratio and residual prostatic weight are important parameters for the prediction of treatment outcome.

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