International Journal of Medicine
pISSN 1468-3814 | eISSN 2667-7008
https://theinternationalmedicine.com/

Original Researcher Article *DOI: 10.61336/im/26-2-12*

Impact Of Residual Prostatic Weight Ratio on Symptom Improvement And Functional Recovery After TURP For BPH: A Correlative Study

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Received: 09-02-2026
Revised: 20-02-2026
Accepted: 06-03-026
Published: 18-03-2026

Abstract

Background: Transurethral resection of the prostate (TURP) is the gold standard surgical treatment for benign prostatic hyperplasia (BPH). However, the relationship between the extent of tissue resection and postoperative clinical improvement remains unclear. Residual prostatic weight ratio (RPWR) has emerged as a potential indicator of surgical adequacy. ***Objective:*** To assess the impact of residual prostatic weight ratio on symptom improvement and functional recovery following TURP in patients with benign prostatic hyperplasia. ***Materials and Methods***: This prospective correlative study included 50 patients with symptomatic BPH undergoing TURP. Preoperative and 6 month postoperative International Prostate Symptom Score (IPSS), maximum urinary flow rate (Qmax), and average urinary flow rate (Qavg) were compared. RPWR was calculated as the ratio of residual prostate weight after TURP to initial prostate weight. Statistical analysis evaluated correlations between RPWR and postoperative outcomes. ***Results:*** The mean age was 68.96 ± 8.7 years, and the mean prostate weight was 66.06 ± 16.8 g. Mean RPWR was 0.17 ± 0.07 (range 0.07–0.50). Significant improvements were observed in IPSS, Qmax, and Qavg at 6 months postoperatively ($p < 0.001$). Lower RPWR values were associated with greater symptom relief and superior improvement in urinary flow parameters, demonstrating a negative correlation between RPWR and clinical outcomes. ***Conclusion***: RPWR shows a measurable association with symptom improvement and functional recovery following TURP. Lower RPWR values tend to predict better postoperative outcomes, suggesting RPWR may be a useful adjunctive parameter for evaluating surgical adequacy.

Keywords: Benign prostatic hyperplasia, TURP, residual prostatic weight ratio, RPWR, IPSS, urinary flow rate.

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INTRODUCTION

Benign prostatic hyperplasia (BPH) is a highly prevalent condition among ageing men and a leading cause of lower urinary tract symptoms (LUTS). Progressive enlargement of the prostate gland can result in bladder outlet obstruction, leading to both storage and voiding symptoms that significantly impair quality of life. Although pharmacological therapy is effective in early stages, surgical intervention remains the mainstay of treatment for patients with moderate to severe symptoms or complications.

Transurethral resection of the prostate (TURP) continues to be regarded as the gold standard surgical procedure for BPH due to its proven efficacy and durability. Clinical success following TURP is typically evaluated using subjective symptom scores, particularly the International Prostate Symptom Score (IPSS), and objective functional measures such as maximum urinary flow rate (Qmax) and average flow rate (Qavg).

Despite extensive experience with TURP, the relationship between prostate size, amount of tissue resected, and postoperative outcomes remains controversial. Several studies have demonstrated poor correlation between prostate volume and symptom severity, as well as between absolute resected tissue weight and clinical improvement. This has prompted interest in alternative parameters that better reflect the completeness of adenoma removal.

Residual prostatic weight ratio (RPWR), defined as the ratio of residual prostate weight after TURP to the initial prostate weight, has been proposed as a novel variable to quantify surgical adequacy. A lower RPWR theoretically reflects more complete adenoma removal and may translate into improved symptom relief and functional recovery. The present study evaluates the impact of RPWR on postoperative outcomes following TURP for BPH.

MATERIALS AND METHODS

This prospective correlative study was conducted at a tertiary care teaching hospital over a one year period from August 2014 to July 2015. Fifty patients diagnosed with symptomatic benign prostatic hyperplasia and scheduled for TURP were included after obtaining institutional ethics committee approval and informed consent.

Preoperative Assessment

All patients underwent comprehensive clinical evaluation, including history, physical examination, and digital rectal examination. Laboratory investigations included routine hematological tests and serum prostate specific antigen (PSA). Symptom severity was assessed using the International Prostate Symptom Score (IPSS).

Uroflowmetry was performed preoperatively to measure maximum urinary flow rate (Qmax) and average flow rate (Qavg). Prostate size was assessed using transabdominal ultrasonography, measuring sagittal and transaxial dimensions. Prostate volume was calculated using the prolate ellipsoid formula (length × anteroposterior diameter × transverse diameter × 0.523). Prostate volume was considered equivalent to prostate weight.

Surgical Technique and RPWR Calculation

All patients underwent standard monopolar TURP using a 26 Fr Storz resectoscope. Resected prostatic tissue was collected and weighed using a sensitive top loading weighing balance. Residual prostate weight was calculated by subtracting the resected tissue weight from the initial prostate weight.

Residual prostatic weight ratio (RPWR) was calculated as:

RPWR = Residual prostate weight / Initial prostate weight

Follow Up and Statistical Analysis

Patients were followed for 6 months postoperatively. IPSS, Qmax, and Qavg were reassessed and compared with preoperative values. Data were expressed as mean ± standard deviation. Paired and independent t tests were used for comparisons, and correlation analysis was performed using Pearson's or Spearman's correlation coefficient. A p value < 0.05 was considered statistically significant.

RESULTS

A total of 50 patients were analyzed. The age ranged from 52 to 89 years, with a mean age of 68.96 ± 8.7 years. Mean prostate weight was 66.06 ± 16.8 g (range 30–110 g), and the mean resected tissue weight was 54.14 ± 14.7 g.

The residual prostatic weight ratio ranged from 0.07 to 0.50, with a mean RPWR of 0.17 ± 0.07. Based on prostate volume, patients were categorized into three groups: Group I (31–50 g; n = 10), Group II (51–70 g; n = 25), and Group III (>70 g; n = 15). RPWR differed significantly among these groups ($p < 0.005$).

Symptom Improvement (IPSS)

Mean preoperative IPSS values were 11.30 ± 3.02 in Group I, 12.68 ± 3.32 in Group II, and 14.06 ± 2.22 in Group III. At 6-month follow-up, IPSS improved significantly in all groups to 2.00 ± 1.40, 2.00 ± 0.88, and 2.33 ± 0.97, respectively ($p < 0.001$). The mean overall improvement in IPSS was 10.04 points.

Functional Recovery (Urinary Flow Rates)

Preoperative Qmax values were 11.1 ± 2.92 ml/s in Group I, 9.92 ± 2.56 ml/s in Group II, and 9.33 ± 2.35 ml/s in Group III. Postoperatively, Qmax improved significantly to 18.90 ± 2.30 ml/s, 18.92 ± 2.08 ml/s, and 18.06 ± 2.47 ml/s, respectively ($p < 0.001$). The mean overall improvement in Qmax was 8.27 ml/s.

Similarly, mean Qavg increased from preoperative values of 5.60 ± 1.38 ml/s, 5.04 ± 1.32 ml/s, and 4.73 ± 1.29 ml/s to postoperative values of 11.70 ± 1.37 ml/s, 11.04 ± 1.32 ml/s, and 10.08 ± 1.44 ml/s in Groups I, II, and III, respectively ($p < 0.001$). Mean improvement in Qavg was 6.64 ml/s.

Correlation with RPWR

A negative correlation was observed between RPWR and postoperative improvement in IPSS, Qmax, and Qavg. Patients with lower RPWR values demonstrated greater symptom relief and better functional recovery, whereas higher RPWR values were associated with comparatively lesser improvement.

Table 1. Baseline Demographic and Perioperative Characteristics

Parameter	Mean ± SD / n (%)
Number of patients	50
Age (years)	68.96 ± 8.7
Prostate weight (g)	66.06 ± 16.8
Resected tissue weight (g)	54.14 ± 14.7
Residual Prostatic Weight Ratio (RPWR)	0.17 ± 0.07

Table 2. Comparison of Preoperative and Postoperative Functional Outcomes.

Parameter	Preoperative (Mean ± SD)	Postoperative 6 months (Mean ± SD)	P value
Qmax (ml/s)	10.02 ± 2.63	18.62 ± 2.28	<0.001
Qavg (ml/s)	5.05 ± 1.33	10.94 ± 1.41	<0.001
IPSS score	12.88 ± 3.05	2.14 ± 1.03	<0.001

Table 3. Prostate Volume Group-wise Analysis of RPWR and Outcomes

Group	Prostate Volume (g)	Patients (n)	RPWR (Mean ± SD)	IPSS Improvement	Qmax Improvement (ml/s)
I	31–50	10	0.24 ± 0.12	9.30	7.80
II	51–70	25	0.15 ± 0.03	10.68	8.99
III	>70	15	0.18 ± 0.05	11.73	8.73

DISCUSSION

The findings of this study confirm that TURP results in significant improvement in both symptom scores and urinary flow parameters. Importantly, the extent of residual prostate tissue, expressed as RPWR, appears to influence postoperative outcomes. A lower RPWR, reflecting more complete adenoma removal, was associated with superior symptom improvement and functional recovery.

While prostate size alone did not reliably predict postoperative outcomes, RPWR provided a more meaningful assessment of surgical adequacy. These findings support the concept that completeness of adenoma removal, rather than absolute prostate size, plays a critical role in determining clinical success after TURP.

Limitations of this study include reliance on transabdominal ultrasonography for prostate volume assessment, calculated rather than directly measured residual prostate weight, and a relatively short follow up period of 6 months. Nonetheless, the observed correlations suggest RPWR may be clinically relevant.

CONCLUSION

Residual prostatic weight ratio has a measurable impact on symptom improvement and functional recovery following TURP for benign prostatic hyperplasia. Lower RPWR values are associated with greater improvement in IPSS and urinary flow rates. RPWR may serve as a useful adjunct parameter in assessing surgical adequacy and predicting early postoperative outcomes after TURP.

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