# The Impact of Plasmakinetic Resection and Conventional Transurethral Resection of the Prostate on Clinical Symptoms and Quality of Life in Patients with Benign Prostatic Hyperplasia: Retrospective Cohort Study

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**Purpose:** Benign prostatic hyperplasia (BPH) is a condition commonly observed in elderly males, leading to lower urinary tract symptoms and potential complications. Surgical procedures primarily include transurethral resection of the prostate (TURP) and plasmakinetic resection, with their effectiveness under active research and clinical interest.

**Materials and Methods:** This retrospective cohort study compared the impacts of plasmakinetic resection and conventional TURP on clinical symptoms and quality of life in patients with benign prostatic hyperplasia. It encompassed surgical duration, postoperative complications, urodynamic parameters, quality of life scores, sexual function, and long-term outcomes.

**Results:** Postoperative symptom improvements, including International Prostate Symptom Score (IPSS) and Quality of Life (QoL) score, were significantly higher in the plasmakinetic resection group ($P = 0.033$ and $P = 0.003$, respectively). Urodynamic parameters such as peak flow rate ($P = 0.008$), post-void residual volume ($P = 0.044$), and Qmax ($P = 0.012$) also showed significant improvements. Quality of life assessments, including (EuroQol-5 Dimensions)EQ-5D scores ($P = 0.003$), general health perception ($P = 0.009$), sexual function ($P = 0.011$), and overall satisfaction ($P = 0.004$) favored plasmakinetic resection. Plasmakinetic resection resulted in better outcomes for continence and sexual function. Long-term outcomes at 1 year post-operation, including IPSS scores ($P = 0.006$) and overall satisfaction ($P = 0.002$), were significantly better in the plasmakinetic resection group. No significant differences were observed in health care resource utilization.

**Conclusion:** The study suggests that plasmakinetic resection offers advantages over conventional TURP in symptom relief, quality of life, continence, sexual function, and long-term results for patients with BPH.

**Keywords:** plasmakinetic resection; conventional transurethral resection; clinical symptoms; quality of life; benign prostatic hyperplasia

## INTRODUCTION

Benign prostatic hyperplasia (BPH) is a prevalent condition among aging men, characterized by the non-malignant enlargement of the prostate gland, leading to lower urinary tract symptoms (LUTS) and potential complications such as urinary retention and recurrent urinary tract infections[1-3]. With an aging global population, the burden of BPH is expected to increase, emphasizing the importance of effective and sustainable management strategies for this condition[4,5]. Surgical interventions play a pivotal role in the management of BPH, aiming to alleviate LUTS, improve quality of life, and prevent urinary complications[6]. Among the various surgical techniques, transurethral resection of the prostate (TURP) has been considered the gold standard for many years. TURP involves removing excess prostate tissue using an electrocautery loop passed through a resectoscope. The electrocautery loop cuts and coagulates tissue to relieve urethral obstruction, offering effective relief of symptoms and improvement in urinary flow[7]. However, the emergence of alternative surgical modalities, such as plasmakinetic resection, has raised questions about the comparative effectiveness of these techniques in managing BPH and optimizing patient outcomes.

The rationale for conducting this study stems from the need to evaluate and compare the impact of plasmakinetic resection and conventional TURP on clinical symptoms and quality of life in patients with BPH. Plasmakinetic resection, also known as bipolar plasmakinetic vaporization or enucleation of the prostate, utilizes bipolar energy to achieve tissue ablation with reduced thermal injury and improved hemostatic control. This technique may offer advantages in terms of tissue preservation, postoperative recovery, and functional outcomes compared to traditional TURP[8-10]. However, the comparative evidence regarding the clinical effectiveness and patient-reported outcomes of plasmakinetic resection versus TURP remains an area of active research and clinical interest.

Despite the widespread adoption of TURP as the standard surgical treatment for BPH, the emergence of alternative techniques has prompted a paradigm shift in the field, leading to a critical appraisal of existing practices and the exploration of new avenues for optimizing surgical outcomes and patient experiences[11]. Plasmakinetic resection represents a notable advancement in BPH

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**Table 1.** Baseline Characteristics of the Study Population

| Parameters | Transurethral Resection (n=59) | Plasmakinetic Resection (n=64) | t | *P* |
|---|---|---|---|---|
| Age (years) | 65.32 ± 5.12 | 64.98 ± 4.76 | 0.385 | 0.701 |
| Prostate Volume (cc) | 45.67 ± 7.89 | 47.32 ± 8.54 | 1.108 | 0.270 |
| PSA Level (ng/mL) | 4.78 ± 1.23 | 4.92 ± 1.35 | 0.596 | 0.552 |
| IPSS Score | 19.54 ± 3.21 | 19.23 ± 3.09 | 0.553 | 0.581 |
| QoL Score | 4.92 ± 0.98 | 5.13 ± 1.06 | 1.143 | 0.255 |

**Abbreviations:** PSA, Prostate-Specific Antigen; IPSS, International Prostate Symptom Score; QoL, Quality of Life.

surgical techniques, potentially offering improved tissue preservation, hemostasis, and postoperative recovery. This raises important questions about its comparative effectiveness and clinical implications.

The fundamental importance of this study lies in its potential to fill a knowledge gap in the field of BPH surgical management by providing robust empirical evidence on the comparative effectiveness of plasmakinetic resection and TURP. In doing so, the study aims to inform clinical practice, enhance patient-centered care, and contribute to the evidence base for BPH management, thereby addressing an important and evolving area of clinical and research interest.

## MATERIALS AND METHODS

### *Research object*

This study was approved by our hospital's Institutional Review Board and Ethics Committee. Informed consent was waived for this retrospective study due to the exclusive use of de-identified patient data, which posed no potential harm or impact on patient care. This waiver was approved by our hospital's Institutional Review Board and Ethics Committee in accordance with regulatory and ethical guidelines pertaining to retrospective research studies.

This retrospective study analyzed the clinical data of 123 patients who underwent surgery for BPH at our hospital from January 2018 to June 2023, including 59 patients who underwent TURP and 64 patients who underwent plasmakinetic resection.

### *Inclusion and exclusion criteria*

Inclusion criteria: 1) Patients diagnosed and treated for BPH at our hospital; 2) Meeting the surgical indications and scheduled for surgery; 3) Male, aged ≥ 40 years; 4) IPSS score >7; 5) Clinical symptoms such as urgency, narrow urinary stream, difficulty in urination, and frequency; 6) Maximum urinary flow rate (Qmax) <10 ml/s.

Exclusion criteria: 1) Presence of other urological diseases; 2) Coexisting neurological and endocrine system diseases; 3) History of previous urological and pelvic surgery; 4) Coexisting cardiovascular and cerebrovascular diseases; 5) Patients with infectious diseases; 6) Patients with incomplete clinical data.

### *Surgical Procedures*

Transurethral prostate resection: Preoperative routine examinations were conducted, and the patient underwent surgery in the lithotomy position. After anesthesia, the resection instrument was placed through the urethra at the surgical site for meticulous and comprehensive exploration of the lesion. The proliferative tissues were effectively excised, fragmented tissue debris was removed, irrigation was performed, a urinary catheter was placed, and infection prevention measures were implemented.

Plasmakinetic resection via transurethral approach: Preoperative routine examinations were conducted, and the patient underwent surgery in the lithotomy position. Following anesthesia, the plasmakinetic system was used for treatment, with electrocoagulation and electrosection powers set at 80 and 200 W, respectively. Initially, the resection scope was inserted, and meticulous exploration and cutting of the proliferative lesion tissue were performed. The operation began at the 6 o'clock position near the verumontanum, with retrograde blunt dissection and excision of the prostate median lobe. Subsequent excision and hemostasis were performed on the other side. Debridement of fragmented tissue, irrigation, placement of a urinary catheter, and infection prevention measures were carried out.

### *Observation indicators*

### *Data Collection*

Data were collected by the same experienced physician from the electronic medical record system, primarily including age, prostate volume, Prostate-Specific Antigen(PSA)level, IPSS score, QoL score, patient's surgical time, intraoperative blood loss, length of hospital stay, duration of catheterization, and complications. The comparison between the two groups postoperatively focused on health status, sexual function, overall satisfaction, incontinence rate, rate of ejaculation problems, re-operation rate within one year, overall satisfaction, number of outpatient visits, hospital review rate, medication usage, and overall healthcare cost.

**Table 2.** Comparison of Surgical Outcomes between the two groups

| Parameters | Transurethral Resection (n=59) | Plasmakinetic Resection (n=64) | t/$\chi$2 | *P* |
|---|---|---|---|---|
| Operation Time (minutes) | 62.56 ± 8.74 | 59.87 ± 7.36 | 1.838 | 0.069 |
| Blood Loss (mL) | 113.21 ± 45.8 | 108.32 ± 38.64 | 0.638 | 0.525 |
| Hospital Stay (days) | 10.87 ± 0.64 | 10.74 ± 0.58 | 1.195 | 0.235 |
| Catheterization Time (days) | 6.92 ± 0.49 | 6.78 ± 0.42 | 1.590 | 0.115 |
| Complication | | | | |
| Urinary Tract Infection | 10 (16.95%) | 8 (12.50%) | 0.195 | 0.658 |
| Gross Hematuria | 9 (15.25%) | 6 (9.38%) | 0.518 | 0.472 |
| Urinary Incontinence | 4 (6.78%) | 2 (3.12%) | 0.272 | 0.602 |
| Urinary Irritative Symptoms | 8 (13.56%) | 6 (9.38%) | 0.199 | 0.656 |

**Table 3.** Comparison of Quality of Life Assessment between the two groups

| Parameters | Transurethral Resection (n=59) | Plasmakinetic Resection (n=64) | t | *P* |
|---|---|---|---|---|
| EQ-5D Score | 0.71 ± 0.18 | 0.82 ± 0.21 | 3.068 | 0.003 |
| General Health Score | 70.34 ± 8.76 | 74.65 ± 9.32 | 2.641 | 0.009 |
| Sexual Function Score | 14.23 ± 3.45 | 15.89 ± 3.67 | 2.592 | 0.011 |
| Overall Satisfaction | 85.72 ± 5.23 | 88.42 ± 4.98 | 2.935 | 0.004 |

**Abbreviations:** EQ-5D, EuroQol-5 Dimensions.

### *Uroflowmetry*
Postoperatively, uroflowmetry was conducted using a urodynamic testing instrument to measure urodynamic parameters, including maximum urinary flow rate (Qmax), postvoid residual urine volume (PVR), and peak flow rate. The measurements were meticulously performed according to the relevant standards.

### *IPSS Score*
The IPSS scores before surgery, post-surgery, and at one year post-surgery were compared. This standard serves as an effective measure for evaluating prostatic symptoms. It includes assessment of seven symptoms related to the prostate, with scores ranging from 0 to 5 for each item. Scores of 0-7, 8-19, and 20-35 respectively indicate mild, moderate, and severe symptoms.

### *QoL Score*
Comparison of the QoL scores before surgery, post-surgery, and at one year post-surgery was conducted. This assessment comprises 39 questions, with responses as "often occurs" (1 point), "sometimes occurs" (2 points), and "never occurs" (3 points), with a total score of 117. A higher score indicates a better quality of life for the patient.

### *EQ-5D Score*
The European Quality of Life-5 Dimensions (EQ-5D) was employed to assess patients' postoperative quality of life, with a maximum score of 100 indicating a better quality of life.

### *Erectile Function Score*
The International Index of Erectile Function-5 (IIEF-5) was used to evaluate postoperative erectile function for both groups. The total score of the IIEF-5 was 44, with a higher score indicating better erectile function.

### *Sexual Quality Score*
Postoperatively, both groups of patients underwent assessment of sexual quality of life, including sexual desire, and satisfaction with sexual intercourse, with scores positively correlated with sexual quality of life.

### *Statistical Analysis*
To ensure the adequacy of the sample size, a power analysis was conducted using G*Power 3.1. A significance level ($\alpha$) of 0.05 and a desired power (1-$\beta$) of 0.80 were set to achieve a balance between Type I and Type II errors. The calculated minimum sample size was 102, and our study included 123 participants, which is deemed sufficient to detect the anticipated effect with adequate statistical power. The data were analyzed using Statistic Package for Social Science (SPSS) 25.0 statistical software (SPSS Inc., Chicago, IL, USA). For categorical data, [n(%)] was used for representation. The chi-square test was applied with the basic formula when the sample size was $\geq$ 40 and the theoretical frequency T was $\geq$ 5, with the test statistic represented by $\chi 2$. When the sample size was $\geq$ 40 but the theoretical frequency $1 \leq T < 5$, the chi-square test was adjusted using the correction formula. In cases where the sample size was <40 or the theoretical frequency $T < 1$, statistical analysis was conducted using Fisher's exact probability method. When conducting the Shapiro-Wilk test, a p-value greater than 0.05 ($P > 0.05$) indicates that the data do not significantly deviate from a normal distribution, suggesting the data can be considered normally distributed. For normally distributed continuous data, perform a t-test and present the results in the format (X ± s). Homogeneity of variances was assessed using Variance test. If Variance test indicated a significant difference in variances ($P < 0.05$), indicating heterogeneity of variances, Welch's t-test was used. If Variance test did not indicate a significant difference ($P > 0.05$), indicating homogeneity of variances, the independent samples *t*-test was used. Additionally, for all continuous variable comparisons, mean differences (MD) were calculated to provide a measure of the clinical importance of the findings. Non-normally distributed data was analyzed using Wilcoxon rank-sum test. $P < 0.05$ were considered as statistical significance.

## RESULTS

### *Baseline Characteristics*
The baseline characteristics of the study population were presented in **Table 1**. The mean age of the patients undergoing transurethral resection was 65.32 years (SD, 5.12), while those undergoing plasmakinetic resection was 64.98 years (SD, 4.76) (MD = -0.340, t = 0.385, $P$ = 0.701). Similarly, the prostate volume for transurethral resection (45.67cc ± 7.89) and plasmakinetic resection (47.32cc ± 8.54) did not show a statistically significant difference (MD = -1.650, t=1.108, $P$ = 0.270). Furthermore, the PSA levels, IPSS scores, and QoL scores between the two groups were also comparable, with no statistically significant differences observed (PSA: MD

**Table 4.** Comparison of Continence and Sexual Function between the two groups

| Parameters | Transurethral Resection (n=59) | Plasmakinetic Resection (n=64) | $\chi 2$ | *P* |
|---|---|---|---|---|
| Incontinence Rate (%) | 6 (10.17%) | 5 (7.81%) | 0.020 | 0.888 |
| Erectile Function Score | 17.32 ± 4.67 | 19.47 ± 5.12 | 2.436 | 0.016 |
| Ejaculation Problems (%) | 6 (10.17%) | 5 (7.81%) | 0.020 | 0.888 |
| Libido Score | 20.54 ± 5.32 | 22.89 ± 5.76 | 2.347 | 0.021 |
| Sexual Satisfaction Score | 16.76 ± 4.21 | 18.98 ± 4.67 | 2.768 | 0.007 |

**Table 5.** Comparison of Long-term Outcomes at 1 Year between the two groups

| Parameters | Transurethral Resection (n=59) | Plasmakinetic Resection (n=64) | t/χ2 | *P* |
|---|---|---|---|---|
| IPSS Score (1 year) | 7.42 ± 1.78 | 6.54 ± 1.68 | 2.801 | 0.006 |
| QoL Score (1 year) | 1.87 ± 0.52 | 1.74 ± 0.48 | 1.412 | 0.161 |
| Re-operation Rate (%) | 5 (8.47%) | 4 (6.25%) | 0.016 | 0.899 |
| Overall Satisfaction (1 year) | 91.23 ± 4.51 | 93.71 ± 4.21 | 3.153 | 0.002 |

**Abbreviations:** IPSS, International Prostate Symptom Score; QoL, Quality of Life.

= -0.140, t = 0.596, *P* = 0.552; IPSS: MD = 0.310, t = 0.553, *P* = 0.581; QoL: MD = -0.210, t = 1.143, *P* = 0.255). These findings indicate that at baseline, the study population was well-balanced between the two treatment groups in terms of demographic and clinical characteristics.

### *Surgical Outcomes*

The comparison of surgical outcomes between transurethral resection and plasmakinetic resection was detailed in **Table 2**. There were no statistically significant differences observed in operation time (transurethral resection: 62.56 minutes ± 8.74 vs. plasmakinetic resection: 59.87 minutes ± 7.36; MD = 2.690, t = 1.838, *P* = 0.069), blood loss (transurethral resection: 113.21 mL ± 45.8 vs. plasmakinetic resection: 108.32 mL ± 38.64; MD = 4.890, t = 0.638, *P* = 0.525), hospital stay (transurethral resection: 10.87 days ± 0.64 vs. plasmakinetic resection: 10.74 days ± 0.58; MD = 0.130,t = 1.195, *P* = 0.235), and catheterization time (transurethral resection: 6.92 days ± 0.49 vs. plasmakinetic resection: 6.78 days ± 0.42; MD = 0.140, t = 1.590, *P* = 0.115). Furthermore, the incidence of postoperative complications including urinary tract infection (*P* = 0.658), gross hematuria(*P* = 0.472), urinary incontinence(*P* = 0.602), and urinary irritative symptoms(*P* = 0.656) did not differ significantly between the two groups. These findings suggest that the surgical outcomes of transurethral resection and plasmakinetic resection were comparable in terms of operative parameters and complications.

### *Postoperative Symptom*

The International Prostate Symptom Score (IPSS) improvement was 12.32 ± 2.76 for transurethral resection and 13.45 ± 3.09 for plasmakinetic resection, with a t value of 2.154 and a *P* value of 0.033, indicating a statistically significant difference favoring plasmakinetic resection (**Figure 1**). Similarly, the quality of life (QoL) improvement showed a mean difference of 2.78 ± 0.64 for transurethral resection and 3.15 ± 0.72 for plasmakinetic resection, with a t value of 2.996 and a P value of 0.003, indicating a statistically significant difference in favor of plasmakinetic resection. The peak flow rate, post-void residual volume, and Qmax also demonstrated significant differences between the two groups, all favoring plasmakinetic resection, with P values of 0.008, 0.044, and 0.012, respectively. These findings suggest that plasmakinetic resection may offer superior postoperative symptom improvement and quality of life outcomes compared to transurethral resection in patients with BPH.

### *Quality of Life*

The EQ-5D score showed a mean difference of 0.71 ± 0.18 for transurethral resection and 0.82 ± 0.21 for plasmakinetic resection, with a t value of 3.068 and a P value of 0.003, indicating a statistically significant difference favoring plasmakinetic resection (**Table 3**). Similarly, the general health score exhibited a mean difference of 70.34 ± 8.76 for transurethral resection and 74.65 ± 9.32 for plasmakinetic resection, with a t value of 2.641 and a *P* value of 0.009, indicating a statistically significant difference in favor of plasmakinetic resection. The sexual function score and overall satisfaction also showed significant differences between the two groups, both favoring plasmakinetic resection, with *P* values of 0.011 and 0.004, respectively. These findings suggest that plasmakinetic resection may lead to superior quality of life outcomes, including general health, sexual function, and overall satisfaction, compared to transurethral resection in patients with BPH.

### *Continence and Sexual Function*

The incontinence rate was 10.17% for transurethral resection and 7.81% for plasmakinetic resection, with a χ2 value of 0.020 and a P value of 0.888, indicating no statistically significant difference between the two groups (**Table 4**). However, the erectile function score, libido score, sexual satisfaction score, and ejaculation problems demonstrated significant differences. The mean erectile function score was 17.32 ± 4.67 for transurethral resection and 19.47 ± 5.12 for plasmakinetic resection, with a t value of 2.436 and a P value of 0.016. Additionally, the libido score and sexual satisfaction score also showed statistically significant differences favoring plasmakinetic resection, with *P* values of 0.021 and 0.007, respectively. These results suggest that plasmakinetic resection may offer superior sexual function outcomes, including erectile function, libido, and sexual satisfaction, compared to transurethral resection in patients with BPH.

### *Long-term Outcomes*

**Table 5** presents the comparison of long-term outcomes at 1 year between patients who underwent transurethral resection and plasmakinetic resection. The International Prostate Symptom Score (IPSS) at 1 year post-operation was significantly lower in the plasmakinetic resection group (6.54 ± 1.68) compared to the transurethral

**Table 6.** Comparison of Health Care Resource Utilization between the two groups

| Parameters | Transurethral Resection (n=59) | Plasmakinetic Resection (n=64) | t/χ2 | *P* |
|---|---|---|---|---|
| Clinic Visits (1 year) | 2.64 ± 0.73 | 2.47 ± 0.69 | 1.279 | 0.204 |
| Hospital Readmissions (%) | 2 (3.39%) | 1 (1.56%) | 0.005 | 0.943 |
| Medication Use (1 year) | 6.32 ± 1.64 | 6.09 ± 1.48 | 0.804 | 0.423 |
| Overall Healthcare Cost (￥) | 16813.78 ± 356.89 | 16821.54 ± 331.76 | 0.125 | 0.901 |

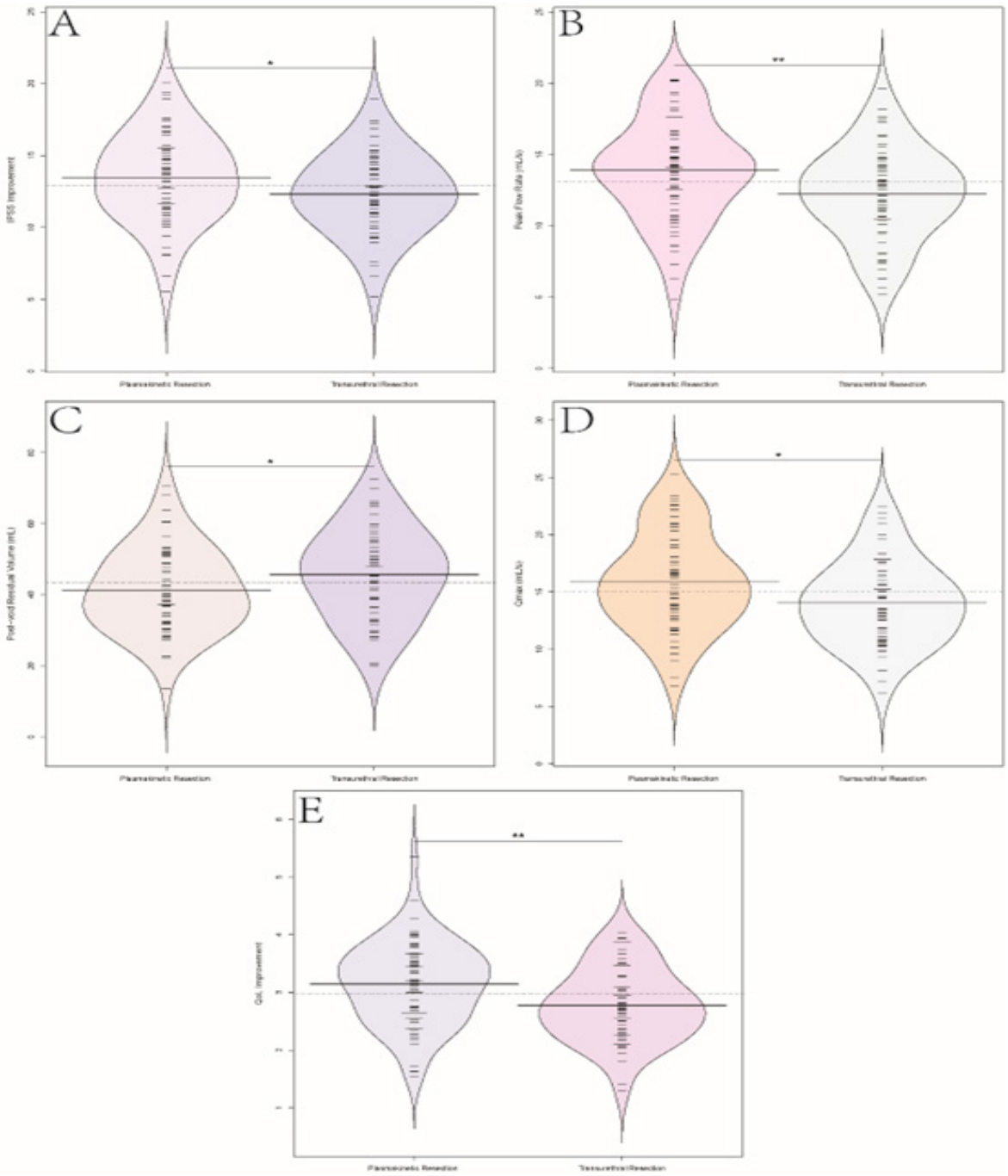


**Figure 1.** Comparison of Postoperative Symptom Improvement between the two groups

resection group (7.42 ± 1.78), with a statistically significant difference (MD = 0.880, t = 2.801, *P* = 0.006). Although the Quality of Life (QoL) scores at 1 year did not show a statistically significant difference between the two groups (*P* = 0.161), the overall satisfaction at 1 year was significantly higher in the plasmakinetic resection group (93.71 ± 4.21) compared to the transurethral resection group (91.23 ± 4.51) (MD = -2.480, t = 3.153, *P* =0.002). Furthermore, the re-operation rates at 1 year did not differ significantly between the two groups (*P* = 0.899). These findings suggest that plasmakinetic resection may lead to better long-term improvement in urinary symptoms and overall patient satisfaction at 1 year following the procedure, compared to conventional transurethral resection for the management of BPH.

### *Health Care Resource Utilization*

The comparison of health care resource utilization between patients who underwent transurethral resection and plasmakinetic resection was outlined in **Table 6**. The number of clinic visits at 1 year (*P* = 0.204), medication use at 1 year (*P* = 0.943), hospital readmissions (*P* = 0.423), and overall healthcare costs (*P* = 0.901) did not demonstrate statistically significant differences between the two groups. These results indicate that there were no significant disparities in health care resource

utilization over the 1-year follow-up period between patients undergoing transurethral resection and those undergoing plasmakinetic resection for the management of BPH.

## DISCUSSION

The management of BPH remains a topic of significant interest and research, particularly with a focus on surgical interventions such as TURP and emerging techniques like plasmakinetic resection[12-14]. This retrospective cohort study aimed to compare the impact of plasmakinetic resection and conventional TURP on clinical symptoms and quality of life in patients with BPH. Our findings highlight several key advantages of plasmakinetic resection over TURP.

Surgical outcomes, including operation time, blood loss, hospital stay, and catheterization time, did not demonstrate significant differences between plasmakinetic resection and TURP. Similarly, the incidence of postoperative complications such as urinary tract infection, gross hematuria, urinary incontinence, and urinary irritative symptoms did not significantly differ between the two groups. These findings suggest that both techniques were comparable in terms of operative parameters and short-term complications, aligning with previous literature that has reported similar outcomes between plasmakinetic resection and TURP in terms of safety and feasibility[15,16].

Of particular interest were the postoperative symptom improvements observed in this study. Plasmakinetic resection showed significantly higher improvements in IPSS and QoL scores compared to TURP. Furthermore, urodynamic parameters including peak flow rate, postvoid residual volume, and Qmax demonstrated statistically significant improvements in the plasmakinetic resection group. These results were consistent with previous research indicating the potential superiority of plasmakinetic resection in improving urinary symptoms and quality of life outcomes compared to conventional TURP[17].

Quality of life assessments, including the EQ-5D scores, general health perception, sexual function, and overall satisfaction, also favored plasmakinetic resection, with statistically significant differences observed between the two treatment groups. This suggests that plasmakinetic resection may offer patients better overall health perception, sexual function, and satisfaction compared to TURP. The impact of these findings was noteworthy, as the ultimate goal of surgical interventions for BPH was not only to alleviate symptoms but also to enhance patients' overall well-being and quality of life.

The assessment of continence and sexual function revealed interesting differences between the two techniques. While the incontinence rates were similar between the two groups, plasmakinetic resection resulted in significantly higher erectile function scores, libido scores, and sexual satisfaction scores. These findings point to the sustained efficacy of plasmakinetic resection in providing long-term relief of urinary symptoms and enhanced patient satisfaction, contributing to the growing body of evidence supporting its favorable outcomes compared to TURP. The clinical significance of these findings lies in the fact that even minor improvements in sexual function can have a substantial positive impact on patient satisfaction and mental health. Additionally, reducing urinary incontinence can boost patients' confidence and social interaction, contributing to an enhanced quality of life.

At 1 year post-operation, the plasmakinetic resection group showed significantly lower IPSS scores and higher overall satisfaction compared to the TURP group. Over time, this sustained benefit holds clinical significance as it indicates that the initial improvements are not transient but rather enduring. The finding suggests that the potential benefits observed with plasmakinetic resection can be achieved without substantial differences in healthcare costs or resource utilization, which was a favorable aspect for healthcare decision-making and resource allocation.

Plasmakinetic resection has potential advantages over conventional TURP in managing BPH. These factors contribute to its potential to provide improved postoperative symptom relief, quality of life outcomes, continence, sexual function, and long-term results for BPH patients[18]. Tissue Selectivity and Reduced Thermal Injury: Plasmakinetic resection uses bipolar energy, minimizing thermal damage and preserving the prostatic capsule, sphincter, and neurovascular bundles[19-21]. Reduced Tissue Trauma and Irritation: Efficient tissue ablation with minimal mechanical trauma leads to reduced postoperative symptoms and improved voiding function[22]. Preservation of Sexual Function: Better preservation of the prostatic capsule and neurovascular bundles reduces the risk of sexual dysfunction[23,24]. Minimized Tissue Ischemia: Enhanced hemostasis and reduced thermal injury contribute to better tissue healing and fewer complications[25,26]. Improved Postoperative Recovery: Enhanced tissue preservation leads to shorter catheterization times and hospital stays[27]. Tissue Vaporization and Debulking Efficiency: Plasmakinetic technology effectively relieves bladder outlet obstruction, improving urinary flow dynamics[28-30].

However, it is important to acknowledge the limitations of plasmakinetic resection. Despite the noted advantages, plasmakinetic resection requires specialized equipment and training, which may not be readily available in all healthcare settings. This could limit its accessibility and widespread adoption. Additionally, the learning curve for surgeons transitioning from conventional TURP to plasmakinetic resection may be steeper, potentially affecting the consistency of outcomes during the initial stages of implementation.

Limitations of this study should be acknowledged to provide a comprehensive interpretation of the findings. As a retrospective cohort study, there was a potential for selection bias and confounding variables that may have influenced the treatment outcomes. The reliance on existing medical records for data collection restricted the ability to capture certain variables or perform specific assessments that may be relevant to the study objectives. Additionally, the study was conducted at a single center, which may limit the generalizability of the findings to broader patient populations and healthcare settings. The specific context and patient characteristics of our institution, including the age range of the patients, may introduce biases that limit the applicability of our findings to other settings. Furthermore, the relatively short-term follow-up period of 1 year may not capture the complete spectrum of long-term outcomes associated with plasmakinetic resection and TURP for BPH management. Moreover, the absence of randomization and control for potential confounders is a signif-

icant limitation. This lack of random allocation might lead to baseline imbalances between treatment groups, affecting the internal validity of the study. Although we attempted to adjust for known confounders through statistical methods, we cannot fully exclude the influence of unknown or unmeasured variables. Future research should consider employing a randomized controlled trial design to better control for these potential confounders, thereby enhancing the reliability and external validity of the findings. These limitations suggest the need for cautious interpretation of the results and warrant further research, potentially through prospective studies with longer follow-up periods and multi-center collaborations, to address these limitations and validate the comparative effectiveness of plasmakinetic resection and TURP.

## CONCLUSIONS

The findings from this retrospective cohort study suggest that plasmakinetic resection may offer potential advantages over conventional TURP in terms of postoperative symptom improvement, quality of life outcomes, continence, sexual function, and long-term results for patients with BPH. However, the generalizability of these findings is limited by the single-center design. Future research, particularly prospective, multi-center studies with longer follow-up periods, is warranted to validate these findings and to further investigate the comparative effectiveness of plasmakinetic resection and TURP in a broader patient population.

## CONFLICT OF INTEREST

The authors declared no conflict of interest.

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