Effect of Monopolar Versus Bipolar Transurethral Resection of The Prostate on Erectile Function: A Randomized Controlled Trial with Phosphodiesterase-5 Inhibitors Users Subgroup Analysis

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Purpose: Men with lower urinary tract symptoms (LUTS) from benign prostatic hyperplasia (BPH) often experience erectile dysfunction (ED). While transurethral resection of the prostate (TURP) can improve ED, new onset ED remains a concern. This study compares monopolar (M TURP) and bipolar (B TURP) techniques, with a subgroup analysis based on phosphodiesterase 5 inhibitor (PDE5i) use.

Materials and Methods: This randomized clinical trial included candidates for TURP aged over 50 years. Patients were divided into M TURP and B TURP groups. Erectile function was assessed using the International Index of Erectile Function 15 (IIEF 15) at baseline, six weeks, and six months post surgery.

Results: A total of 205 patients were analyzed (102 M TURP, 103 B TURP). Baseline characteristics, perioperative findings, and surgical complications were similar. IIEF 15 scores were comparable between groups at all time points. In the PDE5i user subgroup, M TURP showed a slight short term decline in erectile function and total scores at 6 weeks, but both groups demonstrated no significant long term changes at 6 months.

Conclusion: No significant difference was observed between M TURP and B TURP on erectile function during medium term follow up. Patients with prior PDE5i use may experience fewer short term adverse effects on erectile function from B TURP.

Keywords: transurethral resection of the prostate; phosphodiesterase 5 inhibitors; erectile dysfunction; sexual dysfunction

INTRODUCTION

Despite newer laser based methods for BPH, TURP remains the surgical gold standard for medium sized prostates (30–80 mL).[1–3] ED and LUTS/BPH are prevalent in aging men; about 70% with LUTS/BPH also have ED. Addressing BPH surgically may improve ED, yet new onset ED after TURP occurs in 4%–40% of patients.[4]

TURP can be monopolar (M TURP) or bipolar (B TURP). In M TURP, current travels from the resection site through the body to a grounding pad; in B TURP, current travels between two electrodes on the resectoscope, limiting energy beyond the site.[5] Neurovascular bundle injury in pelvic surgery can cause postoperative ED.[6–8] Thermal injury from higher energy spread in M TURP might affect the posterolateral neurovascular bundle and cause ED.[9] Limited comparative studies suggest no short or mid term differences between techniques.[10–12]

Postoperative ED is more frequent in patients with preoperative reduced EF using PDE5i.[13] Pre existing ED may increase susceptibility to monopolar thermal effects. We compared M TURP versus B TURP on erectile function, including a PDE5i user subgroup analysis.

MATERIALS AND METHODS

Study Design

This randomized clinical trial (February 2018–August 2022) adhered to the 1964 Helsinki Declaration. Institutional ethics approval was obtained, and informed consent was secured.

Study Population

Eligible were men ≥ 50 years, married, sexually active with a continuous partner, and prostate volume 30–85 cm³. (**Figure 1**) shows the CONSORT flow. Of 345 assessed, 205 were analyzed. Exclusions: indwelling catheter > 1 month pre op; re intervention within 12 months; ED due to causes other than BPH.

Intervention

Block randomization (block size 6) with sealed envelope concealment was used. Surgeon blinding was not feasible; researchers and patients were blinded. One experienced urologist performed all procedures. M TURP used a monopolar resectoscope (Karl Storz) with 1.5% glycine irrigation; B TURP used a bipolar resectoscope (Karl Storz). Settings: cut/coag 110/80 W; continuous flow 26 Fr resectoscope; KLS Martin ME 402 generator; technique per Nesbit.[14]

Assessment

IIEF 15 assessed erectile function (EF), orgasmic function (OF), sexual desire (SD), intercourse satisfaction (IS), and overall satisfaction (OS).[15] Assessments at baseline, 6 weeks, and 6 months. EF severity categorized; EF evolution (improved/stable/deteriorated) recorded. Minimal clinically important differences (MCIDs) were applied.[16] Primary endpoints: IIEF 15 scores

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Table 1. Demographics, peri operative and follow up findings, and complication rates by treatment groups

Variable	Monopolar TURP (N = 102)	Bipolar TURP (N = 103)	P-value
Demographics			
Age (year)	64.9 (6.5)	64.7 (5.4)	0.81
BMI (kg/m²)	28.8 (6.0)	27.9 (5.8)	0.28
DM (%)	24 (23.5%)	27 (26.2%)	0.66
Baseline PDE5i (%)	26 (25.5%)	30 (29.1%)	0.64
Baseline alpha blocker (%)	64 (63.7%)	65 (63.1%)	0.94
Baseline 5ARI + alpha blocker (%)	5 (4.9%)	4 (3.9%)	0.27
Baseline PSA (ng/mL)	3.0 (1.4)	3.2 (1.2)	0.31
Baseline prostate size (mL)	61.1 (17.0)	60.4 (19.6)	0.77
Peri operative and follow up findings			
Catheter before surgery (%)	26 (25.5%)	28 (27.2%)	0.78
Baseline Hb (g/dL)	12.4 (1.1)	12.5 (1.1)	0.28
Post op Hb (g/dL)	10.8 (1.1)	10.9 (0.9)	0.67
Baseline IPSS	21.9 (4.7)	22.7 (4.7)	0.29
Follow up IPSS	7.8 (1.2)	8.1 (1.2)	0.14
Operative time (minute)	57.7 (18.1)	58.4 (17.2)	0.77
Capsular perforation (%)	12 (11.8%)	8 (7.8%)	0.36
Catheter time (days)	3.5 (1.5)	3.6 (1.2)	0.78
Acute complication, N (%)			
TUR syndrome (%)	1 (0.9%)	0	0.49
Blood transfusion (%)	4 (3.9%)	2 (1.9%)	0.45
Re catheterization (%)	2 (1.9%)	1 (0.9%)	0.45
Transient urge incontinence (%)	13 (12.7%)	10 (9.7%)	0.49
Late complications, N (%)			
Urethral stricture (%)	4 (3.9%)	2 (1.9%)	0.45
Bladder neck contracture (%)	4 (3.9%)	2 (1.9%)	0.45
Stress incontinence (%)	3 (2.9%)	0	0.12
Retrograde ejaculation (%)	76 (74.5%)	75 (72.8%)	0.78

Note: Data are presented as mean (standard deviation) or n (%).

at 6 weeks and 6 months. Subgroup analyses were conducted for PDE5i users.

Sample Size

Sample size was determined pragmatically based on budget and available population (census sampling).

Table 2. IIEF 15 scores in PDE5i users: baseline vs 6 week and 6 month post surgery.

Erectile Function	Monopolar TURP (N = 26)	Bipolar TURP (N = 30)	*P*-value (between group)
Baseline	19.0 [16.0–25.0]	20.0 [15.0–24.0]	0.55
6 weeks	18.0 [16.0–25.0]	19.0 [17.0–21.0]	0.59
P (within group)	0.028	0.65	–
6 months	24.0 [15.0–29.0]	23.0 [16.0–26.0]	0.43
P (within group)	0.52	0.26	–
Orgasmic Function			
Baseline	8.0 [5.0–10.0]	8.0 [5.0–9.0]	0.33
6 weeks	7.0 [6.0–8.0]	7.0 [6.0–9.0]	0.78
P (within group)	0.23	0.68	–
6 months	8.0 [4.0–9.0]	8.0 [6.0–9.0]	0.39
P (within group)	0.21	0.61	–
Sexual Desire			
Baseline	7.0 [6.0–9.0]	6.0 [6.0–7.0]	0.32
6 weeks	6.0 [5.0–7.0]	6.0 [5.0–8.0]	0.36
P (within group)	0.10	0.52	
6 months	8.0 [6.0–9.0]	6.0 [6.0–8.0]	0.12
P (within group)	0.37	0.23	–
Intercourse Satisfaction			
Baseline	7.0 [5.0–9.0]	7.0 [5.0–8.0]	0.59
6 weeks	6.0 [4.0–7.0]	7.0 [6.0–8.0]	0.15
P (within group)	0.07	0.38	–
6 months	7.0 [4.0–13.0]	7.0 [5.0–8.0] 0.63	
P (within group)	0.77	0.85	–
Overall Satisfaction			
Baseline	7.0 [5.0–8.0]	6.0 [6.0–7.0]	0.56
6 weeks	6.0 [5.0–7.0]	7.0 [6.0–8.0]	0.06
P (within group)	0.11	0.06	–
6 months	6.0 [5.0–9.0]	7.0 [5.0–8.0]	0.82
P (within group)	0.82 0.54	–	
Total IIEF scores			
Baseline	47.5 [38.0–61.0]	46.5 [36.0–55.0]	0.38
6 weeks	44.0 [37.0–48.0]	46.0 [43.0–51.0]	0.13
P (within group)	0.033	0.96	–
6 months	54.0 [37.0–66.0]	48.0 [39.0–55.0]	0.32
P (within group)	0.99	0.41	–

Note: Data are median [interquartile range].

Table 3. Distribution of EF severity evolution: baseline vs 6 week and 6 month post surgery

	Monopolar TURP (N = 102)	Bipolar TURP (N = 103)	P-value	Monopolar TURP (PDE5i, N = 26)	Bipolar TURP (PDE5i, N = 30)	*P*-value
6 weeks after surgery						
Improved	17 (16.5%)	12 (11.7%)	0.14	3 (11.5%)	8 (26.7%)	0.35
Stable	69 (67.6%)	82 (79.6%)		18 (69.2%)	18 (60.0%)	
Deteriorated	16 (15.7%)	9 (8.7%)		5 (19.2%)	4 (13.3%)	
6 months after surgery						
Improved	28 (27.5%)	36 (34.9%)	0.17	7 (26.9%)	13 (43.3%)	0.43
Stable	58 (56.9%)	45 (43.7%)		14 (53.8%)	11 (36.7%)	
Deteriorated	16 (15.7%)	22 (21.4%)		6 (23.1%)	6 (20.0%)	
Reached MCID after 6 months	35 (34.3%)	31 (30.0%)	0.52	9 (34.6%)	12 (40.0%)	0.79

Note: Data are n (%).

Statistical Analysis

SPSS 27.0 was used. Continuous variables: mean (SD) or median [IQR]; categorical: n (%). Between group: independent t test or Mann–Whitney U; within group: paired t test or Wilcoxon signed rank. Two sided P < 0.05 was significant.

RESULTS

We analyzed 205 patients (102 M TURP; 103 B TURP); mean age 64.8 (5.9) years. Groups were similar in baseline characteristics, perioperative findings, and complications (**Table 1**) (all $P > 0.05$).

No between group differences were found in IIEF 15 domains or total scores at baseline, 6 weeks, or 6 months (all $P > 0.05$). Among PDE5i users, M TURP had a significant EF and total score decrease at 6 weeks versus baseline, whereas B TURP showed no significant 6 week change, suggesting more pronounced short term

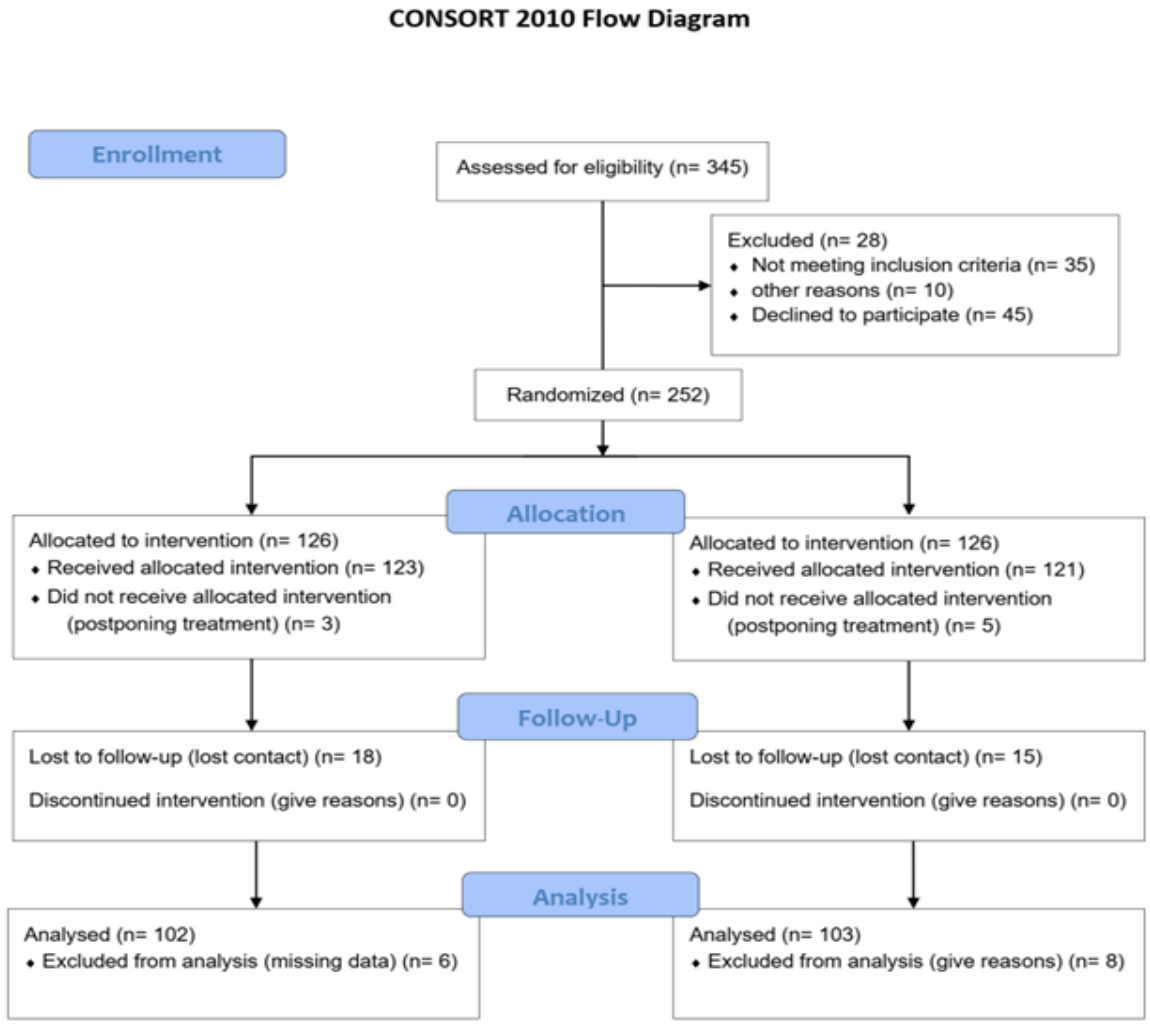

Figure 1. CONSORT flowchart depicting the progression of study participants.

effects on EF with M TURP in this subgroup (Table 2). At 6 months, neither group differed from baseline.

EF severity evolution distributions did not differ between groups at either follow up (**Table 3**) ($P > 0.05$). At 6 months, MCID level EF improvement occurred in 34.3% (M TURP) and 30.0% (B TURP) ($P > 0.05$). In PDE5i users, EF evolution and MCID achievements were also similar between techniques ($P > 0.05$).

DISCUSSION

Both M TURP and B TURP yielded modest, non significant IIEF improvements at 6 months, with no inter technique differences at either time point. In PDE5i users, short term declines with M TURP suggest B TURP may offer transient sexual function advantages, though not meeting MCID thresholds.

Comparative literature on EF after M TURP vs B TURP is limited and definitions vary.[17–20] Using the comprehensive IIEF 15 and PDE5i subgroup analysis, we add nuance to prior findings. A small 6 week EF dip is consistent with reports linking early postoperative EF and ejaculatory changes,[15,21] with recovery by 6 months possibly due to adaptation or a weak EF orgasmic link.[22] Temporary EF reductions may reflect neurapraxia from thermal spread or perioperative stress.[6–8,23]Our findings align with studies showing no major EF differences between techniques and a trajectory of early decline followed by recovery.[10,12]

PDE5i users may be more sensitive to monopolar effects. The bipolar system's lower operating temperature and localized current path could reduce thermal/neural injury, and saline irrigation avoids potential glycine related toxicity.[24–29] Limitations include medium term follow up, lack of surgeon blinding, and potential confounding. Strengths include EF evolution and MCID analyses. The mild, non clinically significant subgroup differences may reflect limited power; larger studies focused on PDE5i users are warranted.

CONCLUSIONS

M TURP and B TURP had similar medium term effects on erectile function. Among PDE5i users, B TURP may be associated with fewer short term adverse effects on erectile function.

SUMMARY

Both monopolar and bipolar TURP had comparable effects on erectile function overall. Men already using ED medications experienced fewer short term sexual side effects after bipolar TURP.

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CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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