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Comparative efficacy and safety of B-TUVP vs. B-TURP for benign prostatic hyperplasia at a tertiary centre in eastern Nepal

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Abstract

Introduction: Bipolar transurethral resection of the prostate (B-TURP) is an established surgical treatment for benign prostatic hyperplasia (BPH). Bipolar transurethral vaporization (B-TUVP) of the prostate using a button electrode has emerged as an alternative with potential safety advantages. This study compared the efficacy and safety of B-TUVP versus B-TURP in a tertiary centre in eastern Nepal.

Method: A retrospective cohort study of BPH treated between Jan 2021 and Dec 2024 at B and C Medical College and Teaching Hospital, Birtamod, Nepal, was conducted. Ethical approval was obtained. Patients were categorized into B-TUVP and B-TURP groups. Variables included operative time, irrigation time, haemoglobin drop, hospital stay, catheterization duration, IPSS, Qmax, QOL, and PVRV. Follow-up was at 4, 8, 12, and 24 months. Data analysis was done by SPSS version 29. A $p \leqslant 0.05$ was considered significant.

Result: A total of 400 patients (B-TUVP n=200, B-TURP n=200) were included. Baseline characteristics were comparable between groups. B-TUVP had longer operative time (60.94±18.64 vs 49.85±9.35 min, p=0.001) but shorter postoperative irrigation time (11.03±0.82 vs 14.99±2.02 h, p=0.001), less haemoglobin drop (0.74±0.14 vs 0.99±0.11 g/dL, p=0.001), shorter hospital stay (2.93±0.83 vs 3.50±1.10 days, p=0.001) and catheterization duration (3.03±0.84 vs 3.99±1.35 days, p=0.001). IPSS and Qmax improved significantly in both groups, with B-TURP showing better early outcomes. Long-term outcomes at 24 months were comparable in QOL, PVRV, and complication rates.

Conclusions: B-TUVP is a safe and effective alternative to B-TURP for surgical management of benign prostatic hyperplasia, offering favourable perioperative outcomes with comparable long-term efficacy.

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Introduction

Approximately 50% of men aged 50-60 years and up to 90% of men above 80 years exhibit histological evidence of Benign Prostatic Hyperplasia (BPH),[1,2] and lower urinary tract symptoms (LUTS)[3] which often impair quality of life, and may lead to complications.

While pharmacotherapy is often the first-line treatment, surgical intervention becomes necessary for refractory cases.[4] Transurethral resection of the prostate (TURP) has long been considered the gold standard but carries risks which have prompted the development of newer minimally invasive techniques.[5,6]

Bipolar Transurethral Vaporization of the Prostate (B-TUVP) and Bipolar Transurethral Resection of the Prostate (B-TURP) use bipolar electrosurgical systems allowing procedures in saline irrigation, but the clinical outcomes and safety profiles of these modalities continue to be actively studied and debated.[7,8]

The rationale for this study is to directly compare B-TUVP and B-TURP in patients with BPH, with the goal of determining which technique offers superior clinical outcomes, fewer complications, and improved perioperative parameters in the context of a tertiary centre in Eastern Nepal.

Method

A retrospective cohort study was conducted at B and C Medical College and Teaching Hospital, Birtamode, Jhapa, Nepal. Data were extracted from the Health Management Information System for patients who underwent surgical treatment for BPH between Jan 2021 and Dec 2024. The study was approved by the Institutional Review Committee (Ref: IRC.00302025). Informed consent was waived due to the retrospective nature of the study.

Patients were divided into two groups: Group A (B-TUVP) and Group B (B-TURP).

Inclusion criteria were: refractory urinary retention, lack of improvement after medical therapy, IPSS of 12 or higher, Qmax below 15 ml/sec, recurrent UTIs or haematuria due to BPH, and cases with azotaemia secondary to obstructive uropathy. Patients with a history of prostate or urethral surgery, presence of urethral stricture, neurogenic bladder, or a confirmed diagnosis of prostate cancer were excluded.

All patients underwent preoperative evaluation including clinical history, digital rectal examination, total serum PSA, renal function tests, uroflowmetry, and transabdominal ultrasound to assess prostate volume and PVRV. Baseline IPSS, Qmax, PVRV, and QoL scores were documented.

In Group A, the Button-type B-TUVP procedure was performed using a bipolar energy source with a "button" vaporization electrode (Figure 2). Under spinal anaesthesia, resectoscope insertion was followed by controlled vaporization of prostatic tissue using sweeping, contactless movements until a wide prostatic cavity was achieved. In Group B, B-TURP was carried out using a standard bipolar resectoscope with a loop electrode in saline irrigation, Figure 1. Both procedures were performed by a single urologist using similar operative setups.

Variables analysed included operative time, volume of intraoperative irrigation, postoperative irrigation duration, haemoglobin change, serum sodium change, hospital stay, catheterization duration, and complications (capsular perforation, acute retention). Follow-up evaluations were conducted at 4, 8, 12, and 24 months postoperatively, assessing IPSS, Qmax, QoL, PVRV, and complications.

Data were analysed using SPSS version 29. Descriptive statistics were reported as mean±SD for normally distributed numerical data or n(%) for categorical data. Comparative analysis was done using independent t-test, chi-square test, or Mann-Whitney U test as appropriate, and $p \leq 0.05$ was considered statistically significant.

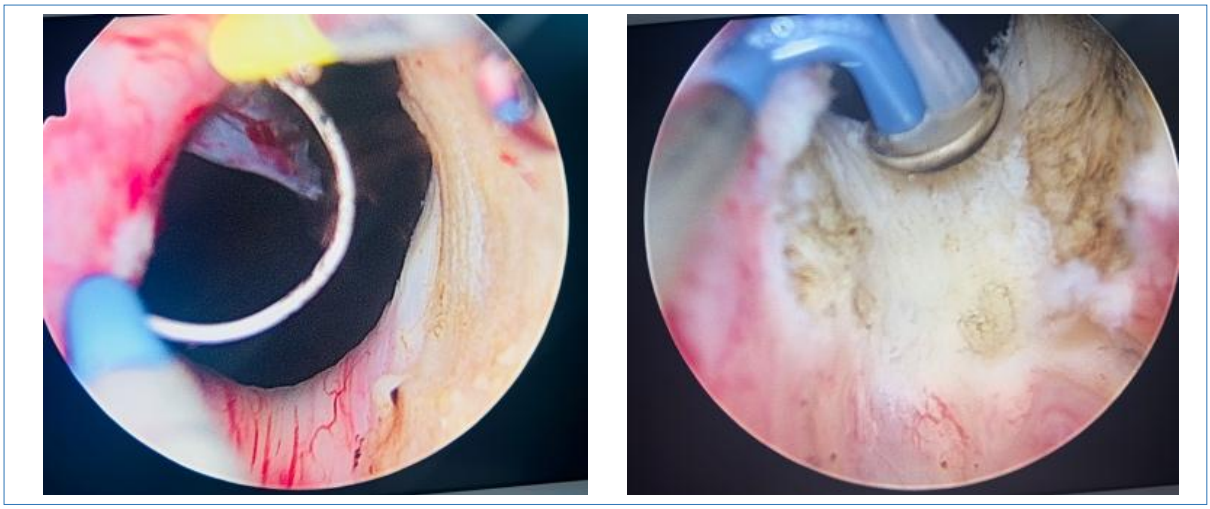

Figure 1: Bipolar TURP vs. Bipolar TUVP for BPH

Result

A total of 400 patients were included in the study: 200 in the B-TUVP group and 200 in the B-TURP group. Baseline characteristics were comparable between the two groups, Table 1.

B-TUVP was associated with a significantly longer operative time compared to B-TURP (60.94±18.64 vs. 49.85±9.35 minutes, p=0.001). However, B-TUVP demonstrated advantages in several postoperative parameters including shorter postoperative irrigation time (11.03±0.82 vs. 14.99±2.02 hours, p=0.001), less haemoglobin drop (0.74±0.14 vs. 0.99±0.11 g/dL, p=0.001), shorter hospital stay (2.93±0.83 vs. 3.50±1.10 days, p=0.001), and shorter catheterization duration (3.03±0.84 vs. 3.99±1.35 days, p=0.001). Perioperative complications were low and comparable between groups, Table 2.

Follow-up assessments at 4, 8, 12, and 24 months showed significant improvement in IPSS and Qmax in both groups. B-TURP demonstrated better symptom relief and flow rates at early follow-ups (4 and 8 months), but by 24 months, outcomes including QoL, PVRV, and complication rates were comparable between groups, Table 3.

No cases of incontinence or urethral stricture were observed in either group during long-term follow-up.

Table 1. Baseline characteristics of patients with benign prostatic hyperplasia (BHP) before surgery, n=400

Variables	B-TUVP n=200 mean±SD	B-TURP n=200 mean±SD	p-value
Age (years)	68.07±7.19	69.57±7.86	0.351
IPSS	27.52±4.40	27.66±4.29	0.757
QoL score	4.49±1.13	4.48±1.10	0.964
Qmax (ml/sec)	9.60±2.32	9.23±2.60	0.212
Prostate size (grams)	58.40±15.30	59.10±18.20	0.328
PVRV (ml)	251.16±57.10	250.50±53.07	0.723

(B-TUVP): Bipolar Transurethral Vaporization of the Prostate; (B-TURP): Bipolar Transurethral Resection of the Prostate; IPSS: International Prostate Symptom Score; QoL: Quality of Life; Qmax: maximum urinary flow rate; PVRV: post-void residual urine volume; *Chi-square test for categorical variables

Table 2. Perioperative outcomes of patients with benign prostatic hyperplasia (BHP), n=400

Variables	B-TUVP n=200	B-TURP n=200	p-value*
Operative time (minutes), mean±SD	60.94±18.64	49.85±9.35	0.001
Intraoperative irrigation (L), mean±SD	15.08±5.64	15.73±6.05	0.264
Postoperative irrigation time (hours)	11.03±0.82	14.99±2.02	0.001
Haemoglobin drops (g/dL), mean±SD	0.74±0.14	0.99±0.11	0.001
Hospital stays (days), mean±SD	2.93±0.83	3.50±1.10	0.001
Catheterization (days), mean±SD	3.03±0.84	3.99±1.35	0.001
Capsular perforation, n(%)	2(1.0)	1(0.5)	0.562
Serum sodium change (mEq/L), mean±SD	-1.8±1.2	-3.2±1.5	0.001
Acute retention postop, n(%)	2(1.0)	1(0.5)	0.562

* Independent t-test for continuous variables mean±SD; Chi-square test for categorical variables n(%)

Table 3. Follow-up outcomes at 4, 8, 12, and 24 months after surgery for BHP, n=400

Follow-up months	Variables	B-TUVP n=200 mean±SD	B-TURP n=200 mean±SD	p-value*
4	IPSS	9.99±1.48	11.97±1.38	0.001
	Qmax (ml/sec)	20.18±1.43	22.05±1.42	0.001
	QoL	3.97±0.82	3.97±0.83	1.000
	PVRV (ml)	44.81±3.17	60.45±3.11	0.001
8	IPSS	7.93±0.83	10.07±0.81	0.001
	Qmax (ml/sec)	21.97±0.84	24.01±0.79	0.001
	QoL	5.06±0.83	5.12±0.84	0.440
	PVRV (ml)	20.10±1.46	15.01±1.42	0.001
12	IPSS	7.92±0.82	10.05±0.80	0.001
	Qmax (ml/sec)	23.98±0.79	24.59±1.70	0.001
	QoL	5.01±0.84	5.12±0.85	0.176
	PVRV (ml)	17.48±1.12	14.01±1.39	0.001
24	IPSS	9.93±1.46	8.05±1.39	0.001
	Qmax (ml/sec)	23.11±1.34	21.89±1.38	0.001
	QoL	4.92±0.83	4.97±0.79	0.501
	PVRV (ml)	10.02±0.81	9.99±0.82	0.760

* Independent t-test for continuous variables mean±SD

Discussion

This study comparing B-TUVP and B-TURP in a cohort of 400 patients demonstrates that while both techniques are effective surgical interventions for BPH, B-TUVP offers distinct perioperative advantages, particularly in reducing bleeding, shortening hospital stay, and decreasing catheterization time, with comparable long-term functional outcomes.

The B-TUVP required a significantly longer operative time compared to B-TURP (60.94±18.64 vs. 49.85±9.35 minutes, p=0.001). This finding contrasts with some previous studies that reported shorter operative times for B-TUVP.[9] However, this extended operative time was offset by substantial benefits in postoperative parameters. The significantly shorter irrigation time (11.03±0.82 vs. 14.99±2.02 hours, p=0.001), reduced hemoglobin drops (0.74±0.14 vs. 0.99±0.11 g/dL, p=0.001), and shorter hospital stay (2.93±0.83 vs. 3.50±1.10 days, p=0.001) observed in the B-TUVP group align with recent meta-analyses that have consistently demonstrated these advantages.[10]

The reduced blood loss associated with B-TUVP is noteworthy, as it addresses one of the primary concerns in prostate surgery. A recent systematic review and meta-analysis confirmed that B-TUVP results in significantly lower haemoglobin drop compared to B-TURP, with a standardized mean difference of -2.05 (95% CI: -2.78 to -1.31). This finding is especially relevant

for elderly patients or those with comorbidities who may be at higher risk for bleeding complications.

The functional outcomes in our study demonstrated interesting temporal patterns. At early follow-up intervals (4 and 8 months), B-TURP showed superior symptom relief as evidenced by lower IPSS scores and higher maximum flow rates. However, by 24 months, both techniques achieved comparable outcomes in terms of quality of life and post-void residual volume. This pattern suggests that while B-TURP may provide more immediate symptom relief, the long-term efficacy of both procedures is similar.

These findings are consistent with recent prospective studies that have shown B-TUVP to have similar short-to-medium-term efficacy compared to other surgical modalities.[10-11] A randomized controlled trial comparing B-TUVP with GreenLight laser photoselective vaporization demonstrated non-inferiority of B-TUVP at 24 months, with mean IPSS scores of 7.2±2.8 for B-TUVP.[12] Our 24-month IPSS results align closely with these findings, supporting the durability of symptom improvement with B-TUVP.

The safety profile observed in our study favors B-TUVP, particularly regarding perioperative bleeding and hospital resource utilization. The shorter catheterization duration (3.03±0.84 vs. 3.99±1.35 days, p=0.001) and hospital stay represent significant advantages from both patient comfort and healthcare economics perspectives. Recent studies have consistently reported similar findings, with B-TUVP demonstrating shorter catheterization periods and hospital stays compared to traditional resection techniques.[9-10]

The complication rates in our study were low and comparable between both groups, with capsular perforation and urinary retention occurring in less than 1% of patients in each group. This low complication rate is consistent with recent literature that has established B-TUVP as a safe procedure with minimal perioperative morbidity. The statistically significant but clinically negligible sodium level differences between B-TUVP and B-TURP (-1.8 vs.-3.2 mEq/L) reaffirm the safety of bipolar resection. Notably, no cases of TUR syndrome were observed in either group, which aligns with the theoretical advantages of bipolar technology in preventing electrolyte disturbances.[13-14]

Furthermore, B-TUVP has shown promising results in patients with large prostates. A recent feasibility study demonstrated that second-generation B-TUVP is effective and safe for treating patients with prostate volumes ≥100ml, achieving catheter-free status in 82.1% of patients with preoperative urinary retention. This expands the potential application of B-TUVP beyond the traditional size limitations often associated with the vaporization techniques.[13-14]

A prospective randomized controlled trial specifically comparing diode laser vaporization with B-TUVP in bleeding-prone BPH patients demonstrated the safety and efficacy of vaporization techniques in this high-risk population.[15]

The shorter hospital stays and reduced catheterization time associated with B-TUVP translate into potential cost savings for healthcare systems. A randomized trial comparing B-TUVP with GreenLight laser therapy found that the estimated cost per B-TUVP procedure was significantly lower, making it an economically attractive option. The widespread availability of bipolar electrosurgical systems in most urological centres further enhances the cost-effectiveness of B-TUVP compared to laser-based alternatives.[12]

Recent reviews have emphasized the need for longer follow-up studies to validate the long-term efficacy of B-TUVP.[16]

This study provides one of the largest comparative datasets of B-TUVP and B-TURP, with a cohort of 400 patients and a follow-up extended to 24 months. The extended follow-up confirmed the durability of improvements with both procedures, with B-TUVP showing perioperative advantages and B-TURP maintaining slightly better symptom scores at 24 months. These findings position B-TUVP as a

safer, recovery-friendly alternative in many patients, without compromising long-term efficacy.

Some of the limitations of our study may be a retrospective design which has the potential selection and information bias, and data from a single centre may affect generalizability. Important outcomes such as cost-effectiveness, detailed sexual function, and patient-reported satisfaction were not systematically evaluated. Despite these limitations, the study provides valuable real-world evidence from a resource-limited setting.

Conclusion

Present study demonstrates that B-TUVP is a safe and effective surgical alternative to B-TURP for the management of benign prostatic hyperplasia. While B-TUVP requires a longer operative time, it has advantages of reduced bleeding, shorter catheterization duration, and shorter hospital stay, with comparable long-term functional outcomes at 24 months.

Author contribution

Concept design: AKS, SV, SK, DP, BDB; Literature search: AKS, SV, SK; Data collection: AKS, SV, SK, DP, BDB; Data analysis: AKS, SV, SK; Draft manuscript: AKS, SV; Final manuscript and accountability: All

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Conflict of interest

None

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Supplementary material

Data and supplementary material that support the findings of this study are available from the corresponding author upon reasonable request.

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