Original Article

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Urology Section

Evaluation of Transurethral Incision versus Medical Management in Small-sized Benign Prostatic Hyperplasia: A Prospective Interventional Study

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ABSTRACT

Introduction: Benign Enlargement of Prostate (BEP) is one of the leading causes of Lower Urinary Tract Symptoms (LUTS) in ageing men. Transurethral Incision of the Prostate (TUIP) has emerged as an alternative for managing Bladder Outlet Obstruction (BOO) caused by a small prostate. The management of a small prostate in BPH is still a debated topic with very scant available data and hence, requires further study.

Aim: To compare TUIP versus medical management with alpha blockers for small-sized benign enlargement of the prostate in terms of efficacy, safety and outcomes.

Materials and Methods: This prospective interventional study was conducted in the Department of Urology, Dr. D. Y. Patil Medical College, Pune, Maharashtra, India, over 24 months from June 2023 to June 2025. Patients with proven bladder outlet obstruction with prostate volume <40 cc on Ultrasonography (USG) on USG were included in the study. Group A was given medical management with alpha blockers, and Group B was treated with TUIP. The outcome of the two was compared in terms of improvement in post-void residue, maximum flow rate and International Prostate Symptom Score (IPSS) score and incidence of retrograde ejaculation. The statistical analysis was based on the Chi-square test for categorical variables and the Student's t-test for continuous variables for comparison of quantitative outcome parameters. A p-value <0.05 was considered statistically significant. Statistical Package for Social Sciences (SPSS) software version 24.0 was used for statistical analysis.

Results: Out of 64 patients, the 51-60 year age group had the highest number of participants in both the medical and surgical groups. The mean age was 49.59±6.04 years in the medical group and 50.37±5.79 years in the surgical group. The 36-40 cc category had the highest number of patients in both groups, with the mean prostate size being 35.95±3.02 cc in the medical group and 36.05±2.71 cc in the surgical group. Post Void Residual urine (PVR) was significantly lower in the surgical group (49.06±7.87 mL) compared to the medical group (80.15±12.47 mL), with a mean difference of 31.09 mL, p-value <0.001. Maximum urinary flow rate (Qmax) was significantly higher in the surgical arm (18.37±0.82 mL/s) than in the medical arm (12.55±1.14 mL/s), with a mean difference of -5.81 mL/s (p-value <0.001). International Prostate Symptom Score (IPSS) was markedly lower in the surgical group (6.68±1.55) compared to the medical group (10.46±1.56), with a mean difference of 3.78 points (p-value <0.001). Retrograde ejaculation was observed in 11 (34.37%) of patients receiving medical therapy compared to 4 (12.50%) in the surgical group.

Conclusion: The TUIP is a safe and effective alternative to alpha-blockers for the management of LUTS in men with small prostates, providing superior symptom relief and bladder emptying with minimal morbidity and better preservation of sexual function.

Keywords: Alpha blockers, Lower urinary tract symptoms, Prostate enlargement, Surgical management

INTRODUCTION

Benign Enlargement of Prostate (BEP) is one of the leading causes of Lower Urinary Tract Symptoms (LUTS) in ageing men [1]. BEP prevalence increases with increasing age. Autopsy studies have shown a prevalence of 8%, 50%, and 80% in the 4th, 6th, and 9th decades of life, respectively, in histopathological studies [2,3]. Evidence suggests a strong genetic component to BEP with an autosomal dominant pattern of inheritance [4]. Hence, with an increasing ageing population, the incidence of BEP is also expected to increase. Symptomatic BEP is treated by overcoming the Bladder Outlet Obstruction (BOO) caused by the enlarged prostate. This can be achieved with medications providing symptomatic relief or with surgery definitively [5].

Two categories of drugs are primarily used for the management of symptomatic BPH; one blocks the α1-adrenoreceptors, the other inhibits the enzyme 5α-reductase. The therapeutic effect of alpha-blockers starts within hours to days, but it generally takes 3 to 7 days for maximum effect [6]. Silodosin, an alpha 1 adrenergic receptor antagonist, is considered to be highly selective and extremely efficacious in patients with Benign Prostatic Hyperplasia (BPH). However, almost 70% of patients report either an ejaculation or hypospermia. 17% patients also report Orgasmic Function (OF) impairment. Younger patients are reported to have more incidences of ejaculatory dysfunction [7].

Transurethral Resection of the Prostate (TURP) is widely regarded as the gold standard surgical treatment for BPH. Similar to all invasive procedures, TURP is associated with significant morbidity. Reported complications include bleeding requiring blood transfusion (3%), and hyponatremia (TUR syndrome, 1%) as well as long-term complications such as urethral stricture (7%), resurgery (6%), urinary tract infection (4%), incontinence (0.5%), erectile dysfunction (10%), and ejaculatory dysfunction (65%) [8,9].

Additionally, TURP may be an overtreatment in cases of small prostate size, particularly in patients seeking to preserve ejaculatory function. As a result, TUIP has emerged as an established alternative for managing BOO caused by a small prostate. TUIP has demonstrated comparable symptomatic improvement in men with prostate volumes under 30 mL, while offering benefits such

as reduced bleeding and a lower risk of sexual side effects, including erectile dysfunction and retrograde ejaculation, compared to TURP [10,11].

The management of a small prostate in BPH is still a debated area. In search for literature for comparison between TUIP against medical management for small-sized BEP, authors came across only one previous study comparing transurethral incision of the prostate and Silodosin in patients having benign prostatic obstruction in terms of retrograde ejaculation dealing with this subject [12]. Hence, the current study will be an important contribution to this topic.

In the present study, the objective was to compare the outcomes of TUIP and medical management with alpha blockers (silodosin, tamsulosin, alfuzosin) treatment in men with LUTS due to a small-sized prostate in terms of efficacy, safety and outcomes.

MATERIALS AND METHODS

This prospective interventional study was conducted in the Department of Urology, Dr. D. Y. Patil Medical College, Pune, Maharashtra, India, over 24 months from June 2023 to June 2025. The study was approved by the Institutional Ethics Committee of Dr. D. Y. Patil Medical College, Pune (Ref no: I.E.S.C/326/2023).

Sample size calculation: The formula for calculating sample size is as follows:

$$n_0=\frac{Z^2pq}{e^2}$$

Where, e is the desired level of precision (i.e., the margin of error),

p is the (estimated) proportion of the population which has the attribute in question,

q is 1-p.

Based on the proportion of TUIP performed annually and the number of BPH patients at our Institute, it gives us maximum variability, p-value=0.96. At 95% confidence and at least 5%-plus or minus-precision, a 95% confidence level gives us Z-values of 1.96. Hence, it implied that

$$n=\frac{((1.96)2\ (0.04)\ (0.96))}{(0.05)2}$$

=59.01

Hence, a sample size of 60 was achieved.

Inclusion criteria: A total of 64 male patients aged 30-60 years, with prostate volume <40 cc and Urodynamic Study (UDS)-confirmed BOO, were included in the study.

Exclusion criteria: Patients with prostate size more than 40 gm, suspected malignancy on Digital Rectal Examination (DRE), ultrasound scan and Prostate-Specific Antigen (PSA) value, presence of neurogenic bladder dysfunction and urethral stricture or other diseases, history of prostate surgery and prominent median lobe and intravesical protrusion of prostate were excluded.

Study Procedure

Pre-operative evaluation: All 64 patients underwent thorough clinical evaluation, including detailed history, physical examination, urodynamic studies and were confirmed to have BOO resulting from BPH. The diagnostic evaluation included International Prostate Scoring System (IPSS), PSA level assessment, complete blood count, urine analysis and urine culture, serum creatinine and electrolytes, an ultrasonographic study of the urinary tract (kidneys, ureters and bladder) to determine prevoid volume and post-void residue, uroflowmetry for Peak flow rate. IPSS is a tool to evaluate the severity of urinary symptoms due to BPH. It consists of 8 questions with 6 answers each, ranging from 0 to 5 points, with parameters including feeling of incomplete bladder emptying, frequency of urination, intermittency of urine stream, urgency of urination, weak stream, straining and waking at night to urinate and patients' perceived quality of life [13].

Patients were allocated into two groups, odd numbers to group 1 and even numbers to group 2

- Group A (n=32): Received medical management with alpha-blockers (alfuzosin, tamsulosin, or silodosin as per protocol mentioned below) for 12 months.
- Group B (n=32): Underwent TUIP.

Written informed consent was obtained from all patients.

TUIP procedure: All procedures were performed or supervised by a single surgeon. Initial cystourethroscopy was done to confirm prostate configuration and exclude bladder pathology. TUIP was performed using a 26 Fr resectoscope with a Collins knife and monopolar cautery, with bilateral incisions made at the 5 and 7 o'clock positions, just distal to the ureteric orifices and proximal to the verumontanum to preserve antegrade ejaculation. A 3-way 20 Fr Foley catheter was placed postprocedure, with minimal irrigation and removed on postoperative day two. Patients were discharged following successful voiding.

Medical management protocol: Patients in the medical arm were started on a daily dose of an alpha-blocker based on the clinician's discretion. Younger patients, less than 50 years of age, were given tablet alfuzosin 10 mg HS. Older patients were given tablet silodosin 8 mg HS, or Tamsulosin 0.8mg HS, depending on affordability and co-morbidities.

Follow-up assessments were conducted at 1, 3, 6, and 12 months, with evaluation of haemoglobin, IPSS, uroflowmetry parameters (Qmax), PVR and presence or absence of retrograde ejaculation.

Outcome measures at 6 months post-treatment: Safety, efficacy and outcomes were assessed using:

- International Prostate Symptom Score (IPSS) [13]
- Post-void residual urine (PVR, mL) [14]
- Peak flow rate (Qmax, mL/s) [14]
- Presence of retrograde ejaculation
- Complications were recorded using Clavien-Dindo classification system [15].

STATISTICAL ANALYSIS

All cases were completed within the stipulated time. Data was collected, compiled and tabulated. The analysis included profiling of patients on different clinical, ultrasonographic and uroflowmetry parameters as well as the procedures undertaken. Quantitative data were presented in terms of mean and standard deviation. Qualitative/categorical data were presented as absolute numbers and proportions. The statistical analysis was based on Student's t-test for continuous variables and Chi-square test for categorical variables. Chi-square test was used for testing of significance. Student t-test was used for comparison of quantitative outcome parameters. Final interpretation was based on a Z-test with a 95% level of significance. A p-value <0.05 was considered statistically significant. The SPSS software version 24.0 was used for statistical analysis.

RESULTS

A total of 64 cases were included in the study, with n=32 in each group. The 51–60 year age group had the highest number of participants in both groups, with 18 patients in group A and 17 patients in group B. The mean age was 49.59±6.04 years in group A and 50.37±5.79 years in group B. The age distribution between the two groups was similar, p-value 0.599 [Table/Fig-1].

The mean prostate size was 35.95±3.02 cc in group A and 36.05±2.71 cc in group B. The difference in mean prostate sizes between the two groups is not statistically significant, p-value=0.886 [Table/Fig-2].

Age group (years)	Group A (n)	Group B (n)	p-value
30-40	3	2	0.599
41-50	11	13	
51-60	18	17	
Total	32	32	
Mean±SD	49.59±6.04	50.37±5.79	

[Table/Fig-1]: Comparison of distribution of patients in various age groups in the medical vs the surgical arm.

Prostate size (cc)	Group A (n)	Group B (n)	p-value
25-30	2	2	0.886
31-35	12	10	
36-40	18	20	
Total	32	32	
Mean±SD	35.95±3.02	36.05±2.71	

[Table/Fig-2]: Comparison of prostate size in medical vs surgical groups.

All pre-operative parameters—haemoglobin, PVR, maximum flow rates, IPSS scores, and serum PSA were comparable between the medical and surgical groups, with no statistically significant differences observed in any variable (all p-values >0.05). This indicates that both groups were well-matched at baseline, eliminating selection bias and allowing for a more valid comparison of postoperative outcomes.

Haemoglobin levels were similar between the two groups: 13.32±1.23 g/dL in group A and 13.15±1.07 g/dL in group B [Table/Fig-3]. The mean difference of 0.17 g/dL was not statistically significant (p-value=0.546), indicating no substantial impact of TUIP on haemoglobin levels postoperatively [Table/Fig-4].

Parameters	Group A Mean±SD	Group B Mean±SD	Mean difference	p-value
Haemoglobin (g/dL)	13.33±1.27	13.58±1.12	-0.25	0.408
Prevoid (cc)	321.09±56.79	321.96±42.43	-0.87	0.945
Post-void (cc)	139.68±38.28	146.87±28.19	-7.18	0.396
Qmax (mL/s)	9.23±0.75	9.23±0.81	-0.00	0.975
IPSS	17.37±2.19	18.09±2.11	-0.71	0.187
S. PSA (ng/dL)	2.40±0.70	2.21±0.84	0.19	0.331

[Table/Fig-3]: Comparison of pre-operative parameters in medical vs surgical arm.

Parameters	Group A Mean±SD	Group B Mean±SD	Mean difference	p-value
Haemoglobin (g/dL)	13.32±1.23	13.15±1.07	0.17	0.546
Prevoid (cc)	306.15±37.65	316.56±36.02	-10.40	0.263
Post-void residual urine (PVR) (cc)	80.15±12.47	49.06±7.87	31.09	<0.001
Qmax (mL/s)	12.55±1.14	18.37±0.82	-5.81	<0.001
IPSS	10.46±1.56	6.68±1.55	3.78	<0.001

[Table/Fig-4]: Comparison of post-treatment parameters in medical vs surgical arm.

Post-void Residual Urine (PVR) was significantly lower in group B (49.06±7.87 mL) compared to group A (80.15±12.47 mL), with a mean difference of 31.09 mL (p-value <0.001), indicating that surgical treatment is more effective in achieving better bladder emptying [Table/Fig-4].

Maximum urinary flow rate (Qmax) was significantly higher in group B (18.37±0.82 mL/s) than in group A (12.55±1.14 mL/s), with a mean difference of -5.81 mL/s (p-value <0.001). This reflects a clear advantage of surgical intervention in improving urinary flow dynamics [Table/Fig-4].

International Prostate Symptom Score (IPSS) was markedly lower (better) in group B (6.68±1.55) compared to group A (10.46±1.56), with a mean difference of 3.78 points (p-value <0.001). This indicates significantly better symptomatic relief following surgical treatment [Table/Fig-4].

Retrograde ejaculation was observed in 11 (34.37%) of patients receiving medical therapy compared to 4 (12.50%) in the surgical group. The overall incidence among all participants was 15 (23.44%), and the difference between the two groups was statistically significant (p-value=0.039) [Table/Fig-5].

Parameters	Group A n (%)	Group B n (%)	Total n (%)	p-value
Yes	11 (34.37%)	4 (12.50%)	15 (23.44%)	0.039*
No	21 (65.63%)	28 (87.50%)	49 (76.56%)	
Total	32 (100.00%)	32 (100.00%)	64 (100.00%)	

[Table/Fig-5]: Incidence of retrograde ejaculation: medical vs surgical.

Side-effects and complications: Patients, 2 (6.25%) in the medical group, experienced significant postural hypotension, which was resolved with dose adjustment and lifestyle modifications. In the surgical arm, 1 patient (3.12%) had significant haematuria, but was managed conservatively and did not require blood transfusion. Patients, 4 (12.5%) had significant dysuria, which resolved over 2 weeks conservatively. There were no major complications; Clavien-Dindo grade 3 or 4 in the surgical group [15]. The average hospital stay after surgery was 2.03±0.17 days.

DISCUSSION

The two primary mechanisms of BOO resulting from BPH are dynamic (increased tension of the prostatic smooth muscle) and mechanical (compression of the urethra by an increase in prostate size). The symptoms of obstruction do not, however, entirely correlate with the prostate's size [16].

The debate continues regarding early surgical management versus prolonged pharmacotherapy. Advocates of early surgery argue that medical therapy may have side effects, is less cost-effective, and that delaying surgery may result in poorer outcomes. On the other hand, critics suggest that medications can effectively manage LUTS in appropriate patients and reduce the risk of disease progression while avoiding surgical complications such as sexual dysfunction [17]. Hence, in the present study, the authors aimed to study the safety and efficacy of the medical and surgical management and found TUIP to have a significantly better outcome than medical management, with an acceptable rate of complications

In current study, the 50-60-year age bracket had the highest number of participants in both groups. This correlates well with a study by Jeh S et al., which concludes that small-prostate BPH (≤40 cc) tends to be most common in the 50-70 age group, before most prostates grow beyond that threshold [18].

In present study, the 36-40 cc category had the highest number of patients. Though the American Urological Association (AUA) guidelines define small prostates as being ≤30 g (≈30 cc) [19]. The authors found that most such patients usually fall in the range of 36-40 cc and hence were included in the study.

In current study, the pre-operative parameters evaluated were post-void residue of urine (139.68±38.28 vs146.87±28.19), Peak flow (Qmax) (9.23±0.75 vs 9.23±0.81) and IPSS score (17.37±2.19 vs18.09±2.11) in medical and surgical groups, respectively. Singh K et al., in their study, had similar results in their study; pre-operative parameters in small prostate patients were as follows: PVR (238.7±165.64), Peak flow (Qmax) (5.27±4.8), and IPSS score (11.88±5.42) [20].

Cakiroglu B et al., in their study, had comparable pre-operative parameters in TUIP vs medical group - IPSS, PVR and Qmax were 12.9±4.0 vs 11.9±3.9, 68.2±29.6 vs 68.0±26.2, and 12±3.5 vs 12±2.4 in TUIP and silodosin groups, respectively [12]. The decrease in post-void residue was from 139.68±38.28 to 80.15±12.47 in

the medical group and from 146.87±28.19 to 49.06±7.87 mL in the surgical group. This correlated well with a study by Cakiroglu B et al., In this study, the decrease in post-void residue post-treatment was higher in the TUIP group (from 68.2±29.6 to 20.8±23.24) than in the Silodosin group (from 68.0±26.2 to 26.5±26.8) [12]. Hussain M et al., also had comparable results in the TUIP group with a pre-operative PVR of 82.4±13.1 and postoperative PVR 25.2±5.8 mL [21].

In the current study on the post-treatment parameters, maximum urinary flow rate (Qmax) was significantly higher in the surgical arm (18.37±0.82 mL/s) than in the medical arm (12.55±1.14 mL/s) (p-value <0.001), which showed a clear advantage of surgical intervention in improving urinary flow dynamics. A study by Cakiroglu B et al., had similar results with higher Qmax in the TUIP group (19.6±3.9) compared to the silodosin group (15.0±4.7) with a p-value <0.001 [12].

In the medical group, the Qmax increased from 9.23±0.75mL/s to 12.55±1.14 mL/s in the present study. As opposed to this finding, a study conducted by El-Adawy MS et al., the improvement in Qmax in patients with prostate volume <30 cc was significantly higher from 9.54±2.0 ml/s pretreatment to 15.57±2.58 post-treatment. This improvement in Qmax with medical treatment can be attributed to the long-term follow-up of 2 years in the above-mentioned study [22]. In the current study, in the surgical group, the Qmax improved from 9.23±0.81mL/s to 18.37±0.82 mL/s. Carilli M et al., in their study, had similar outstanding results with improvement in Qmax of +7.7(+5.2; +11.0) [23].

The IPSS was markedly lower (better) in the surgical group (6.68±1.55) compared to the medical group (10.46±1.56) (p-value <0.001) in the present study, indicating significantly better symptomatic relief following surgical treatment. Cakiroglu B et al., also reported better improvement of IPSS in the TUIP group compared to the Silodosin group (4.7±2.0 vs 5.7±2.6) (p-value=0.005) [12].

Retrograde ejaculation was observed in 11 (34.37%) of patients receiving medical therapy compared to 4 (12.50%) in the surgical group in this study. The overall incidence among all participants was 15 (23.44%), and the difference between the two groups was statistically significant (p-value=0.039*). This suggests a lower incidence of retrograde ejaculation in the surgical arm. However, it must be noted that retrograde ejaculation secondary to alpha blockers is reversible upon stopping the medication, whereas Retrograde Ejaculation (RE) post-TUIP is irreversible. Kaplan SA in a study demonstrated similar results with ~10% risk of RE with tamsulosin, ~25–30% with silodosin, and ≤1% with alfuzosin [24]. Hussain M et al., also reported a rate of 12.0% (4/35) in the TUIP arm [21].

Patients, 2 (6.25%) in the medical group experienced significant dizziness in the current study, which was resolved with dose adjustment and lifestyle modifications. Yoosuf BT et al., in their study, reported a rate of 1–9% (dose-dependent); ~1.4% symptomatic in RCTs of dizziness with alpha blockers [25]. In the surgical arm, 1 patient (3.12%) had significant haematuria in this study, but was managed conservatively and did not require blood transfusion. Elkoushy MA et al., in their study, also reported no significant bleeding complications [26]. Although the present study does not take into account the cost-effectiveness of medical versus surgical management, it can be inferred that a one-time surgical procedure will be more cost-effective than long-term daily medication.

The study has several notable strengths. Its prospective, comparative design allowed for real-time data collection and a controlled comparison between groups, enhancing the study's internal validity. Additionally, the groups were well-matched in terms of baseline characteristics, which helped minimise potential confounding variables. This careful matching ensures that any observed differences in outcomes are more likely attributable to the interventions being studied rather than to pre-existing differences between the groups.

Limitation(s)

Despite the clear outcomes of the study, several limitations should be acknowledged. First, the sample size of 64 patients, although balanced, may limit the generalisability of the findings to a broader population. Second, the follow-up period, while sufficient for assessing early outcomes, may not fully capture the long-term durability of symptom relief or the development of late complications, such as bladder neck contracture. Lastly, the study did not include a subgroup analysis based on the type of alpha-blocker used, which is important since different medications within this class may have varying side effect profiles, particularly in relation to ejaculatory dysfunction.

CONCLUSION(S)

Based on the findings in the present study it can be concluded that TUIP is a safe and effective alternative to alpha-blockers for the management of LUTS in men with small prostates, providing superior symptom relief and bladder emptying with minimal morbidity and better preservation of sexual function. While our study shows clear advantage of TUIP, it has a very short follow-up period and does not take into account late complications or reoperation rates. Hence, long-term studies are required in future with a longer follow-up period to establish better outcomes in TUIP.

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