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Comparison of Safety Outcomes of Transurethral Resection of the Prostate (TURP) in Patients with Prostate Size Above and Below 80 grams

Dr. Zeeshan Zafar[1], Dr. shakeel haseeb uddin siddique[2], Dr. Aiman Farooqi[3], Dr. Asad Abdullah[4], Dr. Wajahat fareed[5], Dr. Salman El Khalid[6]

[1]Designation: Registrar(mbbs, fcps) Department: Urology, Institute: The Kidney Centre Post Graduate Training Institute
Email ID: zeeshanzafar@live.com

[2]Designation: Assistant professor(mbbs, fcps) Department: Urology, Institute: Hamdard University
Email ID: Shakeel_dmc@hotmail.com

[*3]Designation: Consultant General Surgeon(mbbs,fcps) Department: General Surgery, Institute: Ruth K. M. Pfau Civil Hospital Karachi

[4]Designation: Medical Officer(mbbs) Department: Emergency, Institute: The Kidney Centre Post Graduate Training Institute
Email ID: Asad_abdulla@live.com

[5]Designation: Registrar(mbbs,fcps) Department: Urology, Institute: The Kidney Centre Post Graduate Training Institute
Email ID: wajahatfareed786@gmail.com

[6]Designation: Consultant General Surgeon(mbbs, fcps), Department: General Surgery, Institute: Ruth K. M. Pfau Civil Hospital Karachi
Email ID: salmanek14@gmail.com

[*]**Corresponding author:**
Dr. Aiman Farooqi
Email ID: aimanfarooqi13@hotmail.com

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ABSTRACT

Objective(s): This study aims to compare the safety outcomes in patients undergoing transurethral resection of the prostate (TURP) for benign prostatic hyperplasia (BPH) with prostate sizes above and below 80 grams.

Study Methodology: A retrospective cohort study was conducted at the Kidney Center Postgraduate Training Institute over a two-year period. The study included 291 patients aged 45 to 85 years who underwent TURP, with prostate sizes greater than 30 grams. An arbitrary size cutoff of 80 grams for prostrate size was used in our study. Patients were divided into two groups: Group A consisted of patients with prostates below 80 grams, while Group B included those with prostates above 80 grams. Pre- and post-operative hemoglobin levels, serum sodium levels and complications were analyzed using IBM SPSS version 21.0. Statistical significance was determined with a p-value ≤ 0.05.

Results: The mean prostate size for Group A was 53.4 ± 13.2 grams, and for Group B, 104.6 ± 24.8 grams. Both groups experienced a significant reduction in post-operative lab parameters, including hemoglobin and sodium levels ($p < 0.001$). However, Group B exhibited a significantly larger mean drop in hemoglobin (2.1 ± 1.3) compared to Group A (1.5 ± 1.1) ($p < 0.001$). Despite these differences in hemoglobin levels, other complications—such as the need for blood transfusions ($p=0.415$), sepsis ($p= 0.999$), and TUR syndrome ($p= 0.651$)—showed no significant differences between the groups.

Conclusions: TURP is a safe and effective treatment for BPH in patients with prostate sizes both above and below 80 grams. Despite a greater drop in hemoglobin in larger prostates, complication rates remain similar, making TURP a viable option for patients with larger prostates, especially in low-resource settings.

1. INTRODUCTION

Benign prostatic hyperplasia (BPH) is a progressive condition that is common among elderly males, affecting approximately 50% of men by age 60(1). It may present as nocturia, urinary urgency, urinary hesitancy, poor stream or incomplete voiding; symptoms collectively known as lower urinary tract symptoms (LUTS). BPH accounts for approximately 60% of LUTS among men aged 50–60 years(2).

With a growing global populace of elderly individuals, the prevalence of BPH continues to grow worldwide, leading to a slow but notable decrease in the quality of life of older men[3, 4].

Fortunately, several well-established treatments exist to date for BPH management, these may include watchful waiting for disease progression, medications such as alpha-1 blockers, minimally invasive approaches such as transurethral microwave thermotherapy or surgical approaches. Medical management is widely recognized as first line for BPH treatment for its efficacy, safety and cost effectiveness. This can include medications such as 5α-reductase inhibitors, which studies have shown can reduce prostate size by 30 grams or more[5].

When medical treatments prove unsuccessful, surgical treatments are considered, including open surgery and transurethral resection of the prostate[6]. Transurethral resection of the prostate or TURP is the treatment of choice for prostate volumes of 30 to 80 ml and may also be appropriate for volumes over 80 ml, although, current guidelines recommend Holmium laser enucleation of prostrate (HOLEP) or open prostatectomy for larger volumes[1, 4].

Today TURP remains as the most popular established treatment modality for BPH, surpassing any minimally invasive therapies. Not only is it recommended by present guidelines for prostrate volumes between 30 and 80 ml but is widely recognized as the gold standard in the operative management for BPH[7, 8, 9].

Guidelines by the European and American Urological Associations recommend open prostatectomy as the treatment of choice for management of prostate volumes larger than 80 to 100 ml in patients with concomitant large bladder stones who also have indications for diverticulum resection[8, 10]. That said, no specific prostate volume threshold has been universally accepted as the clinical parameter to decide between whether patients are better suited to open surgery or TURP. In this study, a size cutoff of 80 grams for prostate size will be used(as used in EUA and AUA).

Complications of TURP can include early post-op issues such as urinary urgency, urinary incontinence, urinary retention or transient hematuria or long-term ones such urethral strictures. The incidence of these complications remains around 18% for TURP while complication rates for open prostatectomy can range from 10% to 40%[11].

Notably, recent advancements and technological leaps made in the clinical method of TURP, such as use of laser technology, non-hemolytic irrigation solutions such as 1.5% glycine and video-guided TURP, has reduced the occurrence of complications, therefore paving the way for safer management of larger volume prostrates using TURP[12, 13].

For males with obstructive lower urinary tract symptoms (LUTS) caused by BPH, TURP is still one of the most prevalent surgical treatments, especially in low income countries where laser technology is too expensive and its availability limited[14].

In our study we aim to compare the safety outcomes in patients with prostate size above and below 80 grams after undergoing TURP. As a low-income country, most health centers in Pakistan lack resources for Holmium laser enucleation of prostrate (HOLEP) surgery while the expertise for HOLEP as well as Open prostatectomy in the younger generation of surgeons can be called in to question as neither of these techniques are routinely available in our setups. TURP, however is routinely performed for larger prostrates at our center. Through this study, we seek to evaluate the safety outcomes of TURP in patients with larger prostate sizes, using those with prostate sizes under 80 grams as a control group.

The comparison of pre- and post-operative hemoglobin drop in patients undergoing TURP in large and small size prostates has been investigated in other studies. One such study conducted in India found that prostate size significantly affects the post-operative drop in hemoglobin, although the long-term outcomes were comparable [15]. Unfortunately, no such study has been undertaken in our population to date. With this study, we aim to address this question.

2. MATERIALS AND METHODS

Study Design:

This retrospective cohort study was conducted at The Kidney Centre Postgraduate Training Institute. Ethical approval was obtained, and the study was granted exemption for patient contact due to its retrospective nature.

Sample Selection and Data Collection:

Records of 291 patients who underwent TURP between June 2022 and June 2024 were analyzed. Inclusion criteria encompassed patients aged 45–85 with prostate volumes ≥ 30 ml and no prior surgical BPH treatment or malignancy. Exclusion criteria included bladder stones, urethral strictures, or patient preference for alternative treatments. Relevant data collected included pre- and post-operative hemoglobin (Hb) levels, pre- and post-operative serum sodium (Na) levels,

prostate size, and complications such as blood transfusions, sepsis, transurethral resection (TUR) syndrome, cardiopulmonary complications, bladder perforation, re-admission history, and length of hospital stay.

Statistical Analysis:

The data was entered and analyzed on IBM SPSS version 21.0. Cleaning and coding of data were done before analysis. Mean with standard deviation was calculated for the continuous variables like age, prostate size, Hb, etc. On the other hand, frequencies with percentages were obtained for categorical variables like the need for blood transfusion. The normality of the continuous variables was checked by the normality plots and Shapiro-Wilk's test. To observe the pre-and post-operative mean differences of all patients, a paired sample t-test was applied for normally distributed parameters, while the Wilcoxon sign rank test was used in case of skewed variables. An Independent sample t-test was executed to find the mean differences in parameters between the two groups for normal continuous data, otherwise, the Mann-Whitney test was applied for skewed parameters. A Chi-square test was applied to obtain any association between categorical variables. A p-value of ≤ 0.05 was considered significant.

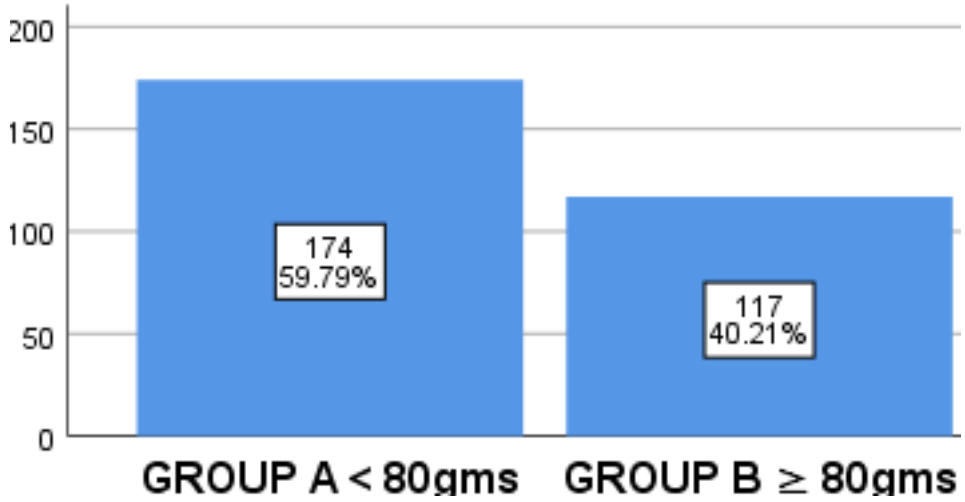

Figure 1: Group Distribution of Patients.

3. RESULTS

There were 291 patients in our study with a mean age of 68.1±8 years, 174(59.8%) in group A (<80 grams weight of prostate) and 117(40.2%) in group B (≥80 grams weight of prostate) (See Figure 1). The Mean age of group A was 68 ± 8.1 while that of group B was 68.3 ± 8. The Mean Pre-operative Hb levels for Group A and B were 13.2 ± 1.7 and 13.5 ± 1.6 respectively, while pre operative Na levels were 139.2 ± 3 and 139.1 ± 2.7 respectively. Hence our groups were the same at baseline parameters ($p \geq 0.05$). (See Table 1)

Table 1: Comparison of Baseline parameters of the patients of two groups.

Pre-operative variables	Group A Prostate size < 80		Group B Prostate size ≥ 80		P- Value
	Mean ± STD	Range	Mean ± STD	Range	
Age in years	68 ± 8.1	47 - 91	68.3 ± 8	53 - 81	0.689
Prostate size	53.4 ± 13.2	24 - 79	104.6 ± 24.8	80 - 213	<0.001
Pre-operative Hb	13.2 ± 1.7	10 - 18.6	13.5 ± 1.6	10.4 - 16.7	0.136
Pre-operative Na	139.2 ± 3	130 - 146	139.1 ± 2.7	133 - 146	0.566

As would be expected, we recorded a significant difference between the pre- and post-operative laboratory parameters of all patients ($p<0.001$). The hemoglobin and sodium saw a significant drop post-operatively in both groups. (See Table 2)

Table 2: Pre- and Post-Operative Laboratory Changes

Laboratory parameters	Mean ± STD	P- Value
Pre-operative Hb	13.2 ± 1.7	<0.001
Post-operative Hb	11.6 ± 1.6	
Pre-operative Na	139.1 ± 3	<0.001
Post-operative Na	136.2 ± 3	

When we compared postoperative complications and laboratory parameters between the two groups, we found no significant difference in pre- and post-operative sodium levels (p=0.737)(p<0.001), with a similar decline in sodium for both groups(p=0.737) On the other hand, post operative decline in hemoglobin was more significant in the patients with larger prostate size (p <0.001), but it did not translate into a greater need for post-op blood transfusion. The need for blood transfusion was equal in both groups, with 17(9.8%) patients requiring transfusion in group A and 15(12.8%) patients requiring transfusion in group B (p=0.415).

The overall incidence of post-op complications was low. No significant differences were found between the groups for sepsis, TUR syndrome, or bladder perforation (p > 0.05). Sepsis was considered present if 2 or more of the following parameters were met: respiratory rate (> 20/min), temperature (> 38°C or < 36°C), WBC count (> 12k/mm³ or < 4k/mm³), heart rate(90/min) with signs of infection. TUR syndrome was diagnosed using a triad of hypertension, bradycardia, and changes in mental state. There was no post operative mortality in either group and there was no statistically significant difference in the rate of 28-day re-admission between the groups. (See Table 3)-

Table 3: Comparison of postoperative complications and laboratory parameters between two groups of patients n (%)/ Mean±Std.

Post- Operative parameters	Group A Prostate size < 80	Group B Prostate size ≥ 80	P- Value
Difference in Na	2.9 ± 2.7	3 ± 2.6	0.737
Difference in Hb	1.5 ± 1.1	2.1 ± 1.3	<0.001
Resected weight	24.3 ± 12.5	49.2 ± 19.8	<0.001
Need of transfusion	17(9.8)	15(12.8)	0.415
Post-operative sepsis	1 (0.6)	1(0.9)	0.999
Cardiopulmonary complications	7(4)	6(5.1)	0.655
TUR syndrome	3(1.7)	1(0.9)	0.651
Re-admission within 28 days	0	2(1.6)	0.169
Hospital stay in days	2.8 ± 0.6	3 ± 0.54	0.006
Operative time in minutes	86.2 ± 29.6	115 ± 27.6	<0.001

4. DISCUSSION

According to our study, it is indicated that transurethral resection of prostate(TURP) is an effective treatment option for a variable range of prostate sizes including sizes above 80gms. The safety profile of this treatment is also satisfactory. Although a significant decline in hemoglobin values was observed with prostate sizes above 80gms, a corresponding increase in requirement of blood transfusions or severe complications was not observed. Our results align with the existing literature that recommends TURP as the preferred procedure as opposed to more invasive procedures, especially in resource poor countries.

Larger prostates have been treated historically by open prostatectomy but there has been a higher morbidity rate associated with this surgical option of about 10-40% along with increased chances of other complications like higher blood loss, post operative sepsis, bladder perforations- all leading to an extended hospital stay. In contrast, our study shows that TURP maintains a complication rate below 20% even for larger prostates, with no significant increase in major postoperative events

such as TUR syndrome, sepsis, or bladder perforation. This reinforces TURP's reputation as a less invasive, safer, and more manageable option than open prostatectomy for large prostate volumes.

Recent advances in the field have seen Holmium Laser Enucleation of the Prostate (HOLEP) as an effective treatment for larger prostates but although its gaining traction in first world countries, it may not be a feasible option in resource poor countries in terms of its cost effectiveness due to the specialized equipment and training required. Monopolar TURP on the other hand is accessible and a well-established technique available worldwide in healthcare settings. It is logistically simpler and cost effective requiring basic standard urological equipment and training easily available in most resource limited setups.

Further economic considerations of monopolar TURP vs HOLEP is the reliance of HOLEP on laser technology, high maintenance cost and the need for use of disposables. Monopolar TURP on the other hand offers low operational cost and presents an affordable alternative without compromising patient safety. This makes monopolar TURP a more accessible procedure for larger prostates, particularly where healthcare budgets and technological resources are constrained.

5. CONCLUSIONS

Our findings support TURP as a safe and effective alternative to open prostatectomy for larger prostates with a favorable safety profile even for prostate sizes over 80 grams. Given its accessibility, lower morbidity relative to open surgery, and cost advantages over advanced techniques like HOLEP, monopolar TURP remains a highly viable solution for managing BPH in both well-resourced and resource-limited healthcare settings.

6. LIMITATIONS OF STUDY

Due to the retrospective nature of our study, we could not fully account for selection bias, as participants were included based on available hospital records only. Additionally, some patients may have been lost to follow-up, while certain records may be incomplete. We also did not observe for variables such as future recurrences or the long-term impact on patients' quality of life.

To address these, we recommend conducting prospective studies or randomized controlled trials that take into account long-term outcomes such as recurrence rates and quality of life measures, to confirm our findings.

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