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Relationship between Preoperative Risk Factors and Need for Blood Transfusion in Transurethral Resection Of The Prostate (TURP)

Mukaram Ashraf, Jai Kumar, Lajpat Rai, Anila Jamshaid, Viran Raj Kamal, Muhammad Haroon

ABSTRACT

Objective: To assess the incidence of blood transfusion after transurethral resection of the prostate (TURP) and to examine the relationship between preoperative risk factors and need for blood transfusion.

Study design and Setting: Descriptive study conducted in the Department of Urology, The Indus Hospital and health network, Karachi from 1st Sep' 2024 to 28th Feb' 2025.

Methodology: Sixty patients who underwent TURP after approval by the IRB. Patients with bleeding diatheses, anticoagulant use within the previous 2 weeks prior to surgery or preoperative treatment with 5-alpha reductase inhibitors were excluded. The data was written on predesigned proforma and analyzed by using SPSS V.26. Risk factors were evaluated in patients who needed transfusion. Univariate analysis was performed by descriptive statistics and Chi-square or Fischer's exact test as appropriate, the level of significance adopted being $p<0.05$.

Results: Sixty patients were enrolled with a mean age of 67 ± 7.29 years. Hemoglobin and hematocrit decreased from 13.1 ± 1.42 g/dl and 39.7 ± 4.27% preoperatively to 12.3 ± 1.61 g/dl and 37.1 ± 4.68% postoperatively, with median reductions of 0.7 g/dl and 2.35%, respectively. Hypertension (28.2%) and diabetes (15.4%) were the most common comorbidities; 39.7% had none. Only one patient (1.7%) required transfusion, associated with indwelling catheter, prior TURP, short symptom duration, and prostate size of 40–60 g. No significant association between risk factors and transfusion was observed.

Conclusions: The rate of transfusion after TURP was low, Universal cross-matching and prearrangement of blood in all patients are probably not indicated.

Keywords: Aged; Blood Transfusion; Hemoglobin; Prostatic Hyperplasia; Transurethral Resection of Prostat

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Mukaram Ashraf
Resident, Department of Urology
The Indus Hospital, Karachi,
Email: mukaram0332@gmail.com

Jai Kumar
Senior Registrar, Department of Urology
The Indus Hospital, Karachi,
Email: drjay104@gmail.com

Lajpat Rai
Medical Officer, Department of Urology
The Indus Hospital, Karachi,
Email: Lajpatrai585@gmail.com

Anila Jamshaid
Consultant, Department of Urology
The Indus Hospital, Karachi,
Email: anila.jamashai@tih.org.pk

Viran Raj Kamal
Resident, Department of Urology
The Indus Hospital, Karachi,
Email: viran.lalwani@gmail.com

Muhammad Haroon
Resident, Department of Urology
The Indus Hospital, Karachi,
Email: drhrajper@gmail.com

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INTRODUCTION

The Benign prostatic enlargement (BPE) is a very common disease of elderly men and is still one of the most frequent causes for lower urinary tract symptoms (LUTS) world-wide. Surgery is performed when proper medical treatment does not improve patients' symptoms or complications of the condition, such as repeated urinary retention, bladder stones, and renal dysfunction, occur.[1] Transurethral resection of the prostate (TURP) remains the gold standard for symptomatic BPH yielding durable results and considerable symptom reduction.[2] Despite significant improvements in both surgical and pre-operative management, bleeding and transfusion still appears to be a significant concern of the TURP.[3]

The amount of blood loss during TURP is dependent on patient- and procedure-related factors (prostate size, resection time, patient comorbidities and the surgeon's experience).[4] Bleeding during surgery can cloud the operator's visual field, extends operative time and elevates postoperative morbidity.5 While advancements in surgical technologies, such as bipolar systems, and the implementation of patient blood management (PBM) measures have decreased

transfusion requirements, the risk remains a significant clinical concern.[6] Thus, recognition and control of preoperative risk factors for transfusion are important to enhance patient outcomes and reduce hospital resource utilization.[7]

For the past few decades, much emphasis has been placed on pharmacological means to improve perioperative hemostasis using for instance ant fibrinolytic agents. Tranexamic acid (TXA), an antifibrinolytic agent, has been demonstrated to reduce blood loss in a range of urological procedures.[8] Kim et al. performed a systematic review, and meta-analysis and found that the use of TXA reduced perioperative blood loss and blood transfusion requirement without increasing risk for thromboembolic in urology surgical procedures.[1] Similarly, Vanderbruggen et al. In a double-blinded RCT, Kathpalia et al.[2] showed that the use of TXA during TURP resulted in less intraoperative hemoglobin loss than when placebo was used. These results further assert the importance of medication support in a blood management strategy for TURP.

Apart from pharmacologic approaches to PBM, the institutional experience on PBM has been promising. Pastene et al. observed that PBM implementation at a French tertiary hospital led to marked decrease in transfusion rates during transurethral resection procedures. These guidelines address preoperative hemoglobin optimization, intraoperative blood loss-reducing efforts, and evidence-based transfusion indications. These type of protocols are fundamental in order to enhance patient safety and reduce unnecessary transfusions.

There have also been widespread contributions of technological advances to reducing transfusion requirements. In subsequent years, other technological improvements have been perfected to enhance transurethral resection of the prostate (TURP) in a more widespread manner including better visualization, advanced energy delivery systems and improved irrigation control?. Hughes Et Al remarked that despite the emergence of newer laser and minimally invasive techniques, transurethral resection of prostate still remains the most reliable and cost-effective surgical treatment for BPO. ?

Patient-specific factors continue to be key in the prediction of transfusion risk. Even a meta-analysis shows, that old patients, especially aged =85 years, are at higher risk for perioperative complications such as bleeding.7 Similarly, another study showed that patients who had catheterization before the operation experienced longer operative time, greater intraoperative bleeding and were more likely to have a postoperative transfusion. A study emphasized that patients receiving direct oral anticoagulants were at additional increased risk for bleeding despite appropriate management in the perioperative period. This evidence indicates the need for a more personalized patient assessment and optimization before TURP.

However, intra-operative complications remain possible including non-surgical bleeding and TURP syndrome reported a unique case of post-TURP in a patient with fluid overload and electrolyte imbalances, which elucidated the significance of ongoing intraoperative vigilance. Moreover, a study performed a large meta-analysis comparing the last two decades, and demonstrated that despite a decrease in major complications, transfusion stills remains one of the most common postoperative concerns.[10-12]

The continued importance of bleeding and transfusion after TURP makes determining the incidence and possible risk factors for these complications very important in order to improve surgical outcome. The purpose of this study is to determine the incidence of blood transfusion following TURP, and to examine preoperative and perioperative factors that predict the need for blood transfusion. This will add to the enhancement of perioperative planning, optimization of patient blood management approaches, and safer surgical management for patients with TURP.

METHODOLOGY

This descriptive cross-sectional study was conducted at the Department of Urology, Indus Hospital and Health Network (IHHN), Karachi, over a period of six months from 1st September 2024 to 28th February 2025,after getting approval from the Institutional Review Board Of IHHN (IHHN-IRB # : IHHN_IRB_2024_03_020). All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008. The rights of the participants to confidentiality, voluntary participation and data privacy were preserved during the study period. The research was approved by an independent local ethics review committee to conform to international standards for biomedical research. The confidentiality and autonomy of the respondents were strictly observed from enrollment, all participants providing written informed consent prior to participation.

All male patients older than 45 scheduled for TURP due to BPH in the study period were evaluated for inclusion. The inclusion criteria were patients with a clinical and sonographic diagnosis of BPH, lower urinary tract symptoms unresponsive to medical therapy) or who had complications such as retention of urine, or recurrent hematuria. In addition, patients with a history of bleeding disorder, exposure to anticoagulant agents for 5 days or more within 1 week before surgery, and use of 5-alpha reductase inhibitors (finasteride and dutasteride) within 2 weeks prior to the procedure were excluded as these are known risk factors affecting perioperative bleeding risk and transfusion requirement (Lotterstatter et al., 2022; Kuo et al., 2024). Patients with a known history of prostate neoplasms, or undergoing reoperation were also excluded to ensure procedural uniformity.

The sample size was determined using OpenEpi version 3.01 software, assuming a transfusion rate of 10% following TURP in An earlier regional studies (Pastene et al., 2023; Porto et al., 2024), and with a confidence interval of 95% and margin error of +5%. The estimated sample size was 138 but, to improve the reliability of the statistical analysis, a total number of 150 patients were included by consecutive non-probability sampling for study period.

All patients had a comprehensive preoperative assessment. Data on demographics, medical history and comorbidities (e.g., diabetes, hypertension and cardiovascular disease) were acquired through one-on-one interviews with urology residents. Preoperative laboratory work up included CBC, coagulation profile, renal function test and urine examination. The preoperative hemoglobin and hematocrit levels were noted as the baseline reference for later comparison.

All operations were performed under spinal anesthesia with the standard monopolar resect scopes technique to reduce procedural variation. To ensure consistency of technique, all techniques are performed by senior registrars or consultants who have at least two years of independent operating experience. A solution of 5% dextrose in water was used for irrigation in all cases. A 22 Fr. three-way hematuria Foley catheter was inserted post procedures, and continuous bladder irrigation was done for the first 24 h.

Any decrease in postoperative hemoglobin and hematocrit was re-examined on the first postoperative day. Decrease of hemoglobin was defined as changed ratio between the pre- and post-interventional Hb level. Led by the institutional transfusion protocol (Eraky et al., 2024; Pastene et al., 2023), blood transfusions were given to patients with hemoglobin of =8 g/dL. Patients who developed gross hematuria postoperatively had daily CBCs repeated and were transfused clinically as necessary.

The postoperative blood transfusion was the main dependent variable. Secondary outcomes were extent of postoperative anemia and potential preoperative risk factors for transfusion such as prostate volume, baseline hemoglobin level, comorbidity, and operative time.

All statistical analyses were carried out using the IBM SPSS Statistics for Windows, (Version 26.0) software package (IBM Corp., Armonk, NY, USA). The normal distribution of continuous variables were tested, and reported as mean ± standard deviation for variables with a normal distribution or median (IQR) for skewed distribution. The frequency and percentage statistics were calculated for the categorical variables. The independent sample t-test was used to compare mean preoperative and postoperative hemoglobin and hematocrit, while Chi-square test (or Fisher exact test as applicable) determined association between categorical predictors and blood transfusion outcomes. Statistical significance level was according to p-value <0.05.

RESULTS

A total of 60 patients were enrolled in the study, with a mean age of 67 ± 7.29 years. The mean preoperative hemoglobin level was 13.1 ± 1.42 g/dL, which decreased to 12.3 ± 1.61 g/dL postoperatively. Similarly, the hematocrit level declined from 39.7 ± 4.27 to 37.08 ± 4.68 after surgery. The median reduction in hemoglobin was 0.7 g/dL (IQR: 0.4–1.27), while the median decrease in hematocrit was 2.35% (IQR: 1.07–4.4) (Table 1).

Among the comorbid conditions, hypertension was the most frequent (28.2%), followed by diabetes mellitus (15.4%). Other comorbidities—including chronic kidney disease, cerebrovascular accident, ischemic heart disease, and chronic obstructive pulmonary disease—were less common, ranging between 2.6% and 6.4%. Notably, 39.7% of the patients had no comorbidities. Most participants (73.3%) had lower urinary tract symptoms (LUTS) lasting more than six months, and 55.0% had an estimated prostate size between 40–60 g on digital rectal examination. Preoperative indwelling catheterization was present in 41.7% of the patients, while 5% had undergone prior TURP (Table 2).

Blood transfusion was rarely required—only 1 patient (1.7%) received a transfusion, whereas 59 patients (98.3%) did not. The transfused patient had multiple predisposing factors: a preoperative indwelling catheter, symptom duration of less than six months, a prostate size between 40–60 g, and a prior history of TURP. Transfusion was administered within 24 hours to 3 days postoperatively.

When analyzed for risk associations, patients with preoperative indwelling catheters and previous TURP showed a relatively higher likelihood of requiring transfusion, although none of these associations reached statistical significance ($p > 0.05$) (**Table 3**).

DISCUSSION

Transurethral resection of the prostate (TURP) is the most common minimally invasive surgical procedure that is carried out in bladder outlet obstruction due to benign prostatic hyperplasia. Though recent innovations in surgical management and improved perioperative care, perioperative bleeding is still a concern of significance. At our place, as in many other centers, it is still routine to do group and

Table 1. Descriptive Statistics of Continuous Variables (n = 60)

Parameter	Mean ± SD / Median (IQR)
Age (years)	67 ± 7.29
Hemoglobin (g/dL) preoperative	13.1 ± 1.42
Hemoglobin (g/dL) postoperative	12.3 ± 1.61
Hematocrit (%) preoperative	39.7 ± 4.27
Hematocrit (%) postoperative	37.08 ± 4.68
Drop in Hemoglobin (g/dL)	—/0.7 (0.4–1.27)
Drop in Hematocrit (%)	—/2.35 (1.07–4.4)

crossmatch prior to TURP on an off chance that patient may require some transfusion. The current series showed a post-operative transfusion rate of 1.7%, toward the lower end of reported literature (2.0%-7.0%). 7, 8 This low rate reflects advances in perioperative and surgical technology aimed to reduce intraoperative blood loss.

The relatively low rate of transfusion in our series could also be explained partly by the endoscopic management and frequent use of 5-alpha reductase inhibitors prior to TURP at our place. Preoperative use of these blockers for a period of at least 6 months decreases the prostate volume and vascularity providing decreased risk during operation. These tendencies have been realized in other series as well, with patients receiving such therapy having significantly lower transfusion rates; some have cited TICU transfusion rates of 0.6%.[9-12] The decrease in blood loss by pharmacologic modulation of prostate vascularity supports the concept of preoperative optimization in these patients.

Table 2. Descriptive Statistics of Categorical Variables (n = 60)

Variable	Category	Frequency n (%)
Comorbidities	Hypertension	22 (28.2)
	Diabetes mellitus	12 (15.4)
	CKD	2 (2.6)
	CVA	4 (5.1)
	IHD	5 (6.4)
	COPD	2 (2.6)
	None	31 (39.7)
Duration of LUTS	< 6 months	16 (26.7)
	> 6 months	44 (73.3)
Prostate size (g)	< 40 g	11 (18.3)
	40–60 g	33 (55.0)
	> 60 g	16 (26.7)
Indwelling catheter	Yes	25 (41.7)
	No	35 (58.3)
Previous TURP	Yes	3 (5.0)
	No	57 (95.0)
Transfusion received	Yes	1 (1.7)
	No	59 (98.3)

The relationship between a variety of factors and perioperative blood loss during TURP was considered by many authors. However, the weight of the resected prostate was consistently shown to establish an independent dependence on blood loss. Our findings are in line with this evidence, as a transfusion-requiring patient with the largest prostate size in our series – approximately from 40 to 60 g – was monozygotic with a transfusion.[13-14] The increased volume of the gland extends the operation time and expands more peripherally vascular surfaces, which explains its predisposition to bleeding. Other risk factors may include pre-catheterization or re-treatment, both of which were present in the transfused patients in this case study. [15-17] Urinary tract infection due to an indwelling catheter is likely to weaken the vascularity, making resection prone to bleeding. Previous transurethral excision of the prostate may also result in reduced anatomical planes possessing weakened vascularity vulnerable to bleeding. Although the number of reported cases is insufficient for conclusive evidence, such relationships are clinically meaningful. Randomized controlled trials by larger centers could finally provide better scientific evidence.[18] Interestingly, no significant association with high transfusion risk was revealed even though most patients had significant comorbidities, particularly diabetes mellitus and hypertension. Above, data correspond to previous ones. However, the presence of pharmaco-therapeutical protocols was a key manifestation, as participants also had no data for the conclusion.[19-20]

Furthermore, various studies have examined the association between operative duration, gland size, and blood loss. Long operative times are undoubtedly topmost blood loss factor as they expose new tissue to the once concealed subjacent irrigated bed. It further normalizes the importance of a surgeon's proficiency and resection strategy optimization at minimizing the operative period and subsequent surgical bleeding. Aside from that, the introduction of bipolar resection technology, heightened ability of energy modulation, and anatomic features have also expanded cauterization has also

Table 3. Association of Preoperative Risk Factors with Postoperative Blood Transfusion (n = 60)

Risk Factor	Category	Transfusion n (%)	No Transfusion n (%)	p-value
Indwelling catheter	Yes	1 (4.0)	24 (96.0)	0.28[a]
	No	0 (0.0)	35 (100)	
Duration of LUTS	< 6 months	1 (6.3)	15 (93.7)	0.17[a]
	> 6 months	0 (0.0)	44 (100)	
Previous TURP	Yes	1 (33.3)	2 (66.7)	0.06[b]
	No	0 (0.0)	57 (100)	
Prostate size (g)	< 40	0 (0.0)	11 (100)	0.49[a]
	40–60	1 (3.0)	32 (97.0)	
	> 60	0 (0.0)	16 (100)	

[a]Fisher's exact test, [b]Chi-square test, No variable showed a statistically significant association ($p > 0.05$)

played a major role in evading this limitation, promoting hypercoagulable settings and improved visual fields.[21] These aspects are primarily responsible for the dwindled transfusion rates reported over recent years in comparison to historical studies. While observing the present study, although all the 60 patients' blood grouping and cross matching were conducted prior to the procedure, only one necessitated transfusion. That implied that 98.3% of cross matched units were left over. Herein raises the question of the provision of such resources when transurethral resection of prostatic tissue patients get admission. Ever-increasing evidence has repeatedly stressed cost-effective ways to reduce resource waste-using the "group and save" tradition on low-class patients as low-hangers. Regular loss-making radically expands workload, blood product waste, and costs. Selective cross matching based on multiple communal factors such as large prostate size, prior catheterization, and still on-going anticoagulation could be honest examples. Additionally, peri-operative interventions to lessen surgical bleeding, including thoughtful patient selection, coagulation optimization before surgery, and an unchanging tranexamic acid use, have appeared equally advantageous.[22] Similarly, Tranexamic acid, particularly when painter into the dead space or added to irrigation fluid, has been reported to significantly reduce the intraoperative and postoperative bleeding and hemorrhage.[15-19] Overall, these procedures can be highly profitable in high-risk patients or when you need the reverse happening.

Apart from transfusion considerations, the anesthetic method and intraoperative care also can impact on perioperative complications and patient outcome. Studies have also revealed that catheter-induced inflammation as well as the anesthetic used, regional or general, could impact bleeding tendencies, although evidence is conflicting. Thus, the preferred anesthetic should be carefully chosen based on patient comorbidity and the expected difficulty of the operation. The COVID-19 pandemic also caused rescheduling and reprioritization of elective urological procedures, such as TURP, which resulted in case postponements and potentially more advanced disease at the time of surgery. These delays can also impact perioperative outcomes, including blood loss and transfusion requirements, thus the need for triage systems during such public health emergencies as the COVID-19 pandemic. In general, our data support the idea that while TURP is a safe and effective procedure, routine cross matching is not necessary for all cases. By applying group and save selectively based on predictable clinical risk factors, the use of blood transfusions can be further reduced. In addition, pharmacological interventions such as 5-alpha-reductase inhibitors or intraoperative antifibrinolytics are indicated for patients that are at high risk of bleeding to further decrease transfusion needs. In summary, this study confirms significant bleeding during TURP surgery is a relatively rare occurrence when using modern surgical and pharmacological management. The observed transfusion requirement of 1.7% is way below prior averages, reflecting patient optimization achievements and improved surgical care. Evidence-based cross matching practices, patient selection and adherence to protocols can reduce the risk of unnecessary transfusions, enhance resource management, and assure patient safety during TURP. Limitations of the study: This is a single center tertiary referral study and the results may not be generalizable to other institutions with different patient populations or operative practice. The number of subjects in the sample was not very large, therefore there may have been a lack of power to detect less common risk factors. The study was observational and, consequently, causal relationships could not be inferred. A number of potential confounders, including measurement accuracy of intraoperative blood loss and surgeon experience were not able to be tightly controlled. Furthermore, the postoperative surveillance was limited, and information on delayed transfusion requirements or long-term results was not available.

CONCLUSION

Our study demonstrates low incidence of post-TURP transfusion, which is consistent with findings in previous literature. It suggests that preoperative indwelling urinary catheter, enlarged prostate and prior history of TURP may increase the risk of transfusion. Large multicenter studies are needed to validate specific risk factors for perioperative blood transfusion in TURP. We propose that guidelines should be formulated on perioperative blood management in TURP patients.

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Authors Contribution:
Mukaram Ashraf: Conception and design of study, data collection, drafting of manuscript, final approval
Jai Kumar: Study design, supervision, methodology refinement, critical review of manuscript
Lajpat Rai: Data acquisition, literature review, initial drafting of sections
Anila Jamshaid: Methodology guidance, interpretation of results, critical revision, overall supervision
Viran Raj Kamal: Data entry, statistical analysis, preparation of tables/figures
Muhammad Haroon: Data interpretation, manuscript editing, final draft review

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