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ORIGINAL ARTICLE

Predictors of Postoperative Complications Following Transurethral Resection of the Prostate: A Prospective Cohort Study

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ABSTRACT

Background: Transurethral resection of the prostate (TURP) remains a standard surgical treatment for benign prostatic hyperplasia, but postoperative complications still contribute to morbidity and prolonged recovery.
Objective: To determine the incidence and predictors of postoperative complications following TURP.
Methodology: This prospective cohort study was conducted at Mansehra medical complex, Mansehra , KP ,Pakistan from June 2022 to June 2023. A total of 295 patients undergoing TURP were enrolled and followed for 30 days postoperatively.
Results: The mean age was 68.4 ± 8.7 years and mean BMI was 27.1 ± 4.2 kg/m². Hypertension was present in 184 (62.4%), diabetes in 109 (36.9%), and ASA class III–IV in 114 (38.6%) patients. Postoperative complications occurred in 67 (22.7%) patients. The commonest complications were urinary tract infection 24 (8.1%), clot retention 21 (7.1%), and bleeding requiring transfusion 16 (5.4%). Operative time >60 minutes was the strongest predictor of complications (aOR 2.67, 95% CI 1.49–4.79, p=0.001), followed by ASA class III–IV (aOR 2.31, p=0.005), prostate volume >80 mL (aOR 1.94, p=0.026), age ≥75 years (aOR 1.89, p=0.036), and diabetes mellitus (aOR 1.76, p=0.047). **Conclusion:** It is concluded that postoperative complications following TURP were common but mostly mild to moderate. Advanced age, diabetes mellitus, higher ASA class, larger prostate volume, and prolonged operative time were significant predictors.
Keywords: TURP, benign prostatic hyperplasia, postoperative complications, predictors, prostate volume, operative time.

INTRODUCTION

One of the most common urological problems in older men and a common cause of lower urinary tract symptoms (LUTS), such as urinary frequency, urgency, nocturia, hesitancy, weak stream and incomplete bladder emptying, is benign prostatic hyperplasia (BPH)[1]. BPH is more common as people get older, and it is present in about 50% of men in their 6th decade of life and in up to 80% of men more than 80 years of age[2]. As the prostate enlarges, the ability to empty the bladder may become limited and result in complications like recurrent urinary tract infections, acute urinary retention, bladder stones, hematuria, and renal dysfunction[3]. A surgical treatment option for moderate to severe LUTS due to BPH is transurethral resection of prostate (TURP) which remains the gold standard surgical procedure, especially when medical therapy is ineffective or has resulted in complications associated with BPH[4]. Although minimally invasive techniques and laser-based therapy have become available, TURP remains the procedure of choice due to its effectiveness, durability, and availability in developed and resource-poor healthcare environments[5]. The overall safety of TURP is accepted but the post-operative complications can cause higher morbidity, longer hospital stays, higher health care expenses and lower patient satisfaction rates[6]. Bleeding (transfusion), clot retention, urinary tract infection, postoperative urinary retention, transurethral resection syndrome, urethral stricture, bladder neck contracture, and urinary incontinence are common postoperative complications[7]. The frequencies of these complications range from patient factors, co-existing conditions, prostate size, operating time, surgeon experience, and perioperative management strategies[8].

Advanced age, pre-existing cardiovascular disease, diabetes mellitus, taking an anticoagulant, large prostate volume, longer operative time and prolonged catheterization have been identified as important predictors of adverse postoperative outcomes following TURP[9,10]. Other factors linked to higher postoperative morbidity include higher American Society of Anesthesiologists (ASA) score, a preoperative urinary tract infection, renal insufficiency, and length of hospital stay[11,12]. Prompt detection of patients with higher complication risk allows for a more thorough pre-op evaluation, appropriate preventive strategies, better patient counseling, and better use of healthcare resources[13]. The relative importance of individual risk factors can differ among populations, however, due to variability in patient population, clinical characteristics, surgical expertise and institutional practice[14]. There are very few prospective data on the risk factors associated with the likelihood of postoperative complications after TURP in various healthcare environments and especially in low- and middle-income countries, where disease burden and healthcare resources are significantly different from other countries reported in higher income nations[15]. A local case-by-case risk stratification may be facilitated by understanding the locally-relevant risk factors and to aid in peri-operative decision making.
Objective: To determine the incidence and predictors of postoperative complications following TURP.

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METHODOLOGY

The study was a prospective cohort study at Mansehra medical complex, Mansehra , KP ,Pakistan from June 2022 to June 2023 to analyze the factors associated with postoperative complications after transurethral resection of the prostate (TURP). Patients with benign prostatic hyperplasia (BPH) who were to undergo TURP were consecutively recruited and followed until 30 days after surgery. Male patients aged 50 years and older with clinically diagnosed BPH, who completed a TURP (elective monopolar or bipolar) for moderate-to-severe LUTS despite medical therapy, recurrent urinary retention, recurrent UTIs, recurrent gross hematuria secondary to BPH, bladder stones, and obstructive uropathy were included. Those who gave written informed consent and had completed postoperative follow-up were deemed eligible for patients to be included in the study.

Patients with a history or suspected prostate cancer, prior prostate surgery, associated urethral stricture disease, neurogenic bladder dysfunction, active urinary tract infection at the time of surgery, uncorrected coagulopathy, severe cognitive impairment which would preclude an adequate evaluation, concomitant major urologic procedures or incomplete clinical records were excluded from the study.
Data Collection: Ethical clearance was obtained from the Institutional Review Board (IRB) and informed written consent from all participants, then data were gathered on a structured case record form. Demographic parameters were used as baseline variables: Age, BMI, smoking status, alcohol consumption and

socioeconomic factors. Clinical parameters included were: duration and severity of LUTS, International Prostate Symptom Score (IPSS), history of acute urinary retention, use of anticoagulant drugs, antiplatelet drugs, comorbidities like hypertension, diabetes mellitus, coronary artery disease, chronic kidney disease, and American Society of Anesthesiologists (ASA) physical status classification. All the laboratory tests performed before surgery were complete blood count, serum electrolytes, renal function tests, coagulation profile, urinalysis, urine culture, prostate-specific antigen (PSA), and ultrasonographic assessment of prostate volume and post-void residual urine volume. Perioperative variables were documented such as type of anesthesia, monopolar or bipolar TURP, operative times, volume of resected tissue, amount of blood loss, irrigation fluid, catheterization times, hospital times and surgeon experience. The post-operative complications were followed up in hospital and at 2 weeks and 30 days after the surgery. The postoperative complications were bleeding (requiring transfusion), clot retention, urinary tract infection, transurethral resection syndrome, acute urinary retention, urinary incontinence, urethral stricture, bladder neck contracture, readmission and mortality. Using a modified Clavien-Dindo classification, complications were divided into five groups. The main outcome was the development of any of the postoperative complications that occurred within 30 days of TURP. Secondary endpoints were patient-related, disease-related and procedure-related predictors of postoperative complications.

Statistical Analysis: The data used were analysed by SPSS version 26.0. All data were displayed as mean ± SD or median (interquartile range) as appropriate; categorical data were displayed as frequencies and percentages. The patients were divided into two groups: complication and non-complication. Independent sample t-tests or Mann-Whitney U tests were used to compare continuous variables, whereas Chi-square tests or Fisher's exact tests were used to compare categorical variables. The p-value was determined in two tailed mode and p-value ≤ 0.05 was considered statistically significant.

RESULTS

The mean age of patients was 68.4 ± 8.7 years, with most patients aged 60–69 years, 118 (40.0%), followed by 70–79 years, 92 (31.2%). The mean BMI was 27.1 ± 4.2 kg/m². Hypertension was the most common comorbidity, 184 (62.4%), followed by diabetes mellitus, 109 (36.9%), coronary artery disease, 71 (24.1%), and chronic kidney disease, 29 (9.8%). Anticoagulant/antiplatelet use was present in 68 (23.1%), while 114 (38.6%) had ASA class III–IV. The mean IPSS was 23.8 ± 5.4, prostate volume was 71.5 ± 24.8 mL, and post-void residual volume was 146.2 ± 68.7 mL.

Most patients underwent monopolar TURP, 177 (60.0%), while 118 (40.0%) had bipolar TURP. Spinal anesthesia was used in 238 (80.7%) patients and general anesthesia in 57 (19.3%). The mean operative time was 63.5 ± 18.6 minutes, with 146 (49.5%) procedures lasting more than 60 minutes. Mean resected tissue weight was 34.2 ± 13.5 g, irrigation fluid volume was 18.6 ± 6.4 L, blood loss was 192.4 ± 84.3 mL, catheterization duration was 2.8 ± 1.3 days, and hospital stay was 3.9 ± 1.8 days. Most procedures were performed by consultants, 212 (71.9%).

Postoperative complications occurred in 67 (22.7%) patients, while 228 (77.3%) had no complications. The most common complication was urinary tract infection, 24 (8.1%), followed by clot retention, 21 (7.1%), bleeding requiring transfusion, 16 (5.4%), temporary urinary incontinence, 14 (4.7%), acute urinary retention, 12 (4.1%), urethral stricture, 8 (2.7%), TUR syndrome, 5 (1.7%), readmission, 11 (3.7%), and mortality, 1 (0.3%). Most complications were mild to moderate, with Clavien-Dindo grade I in 24 (8.1%) and grade II in 31 (10.5%).

Multivariable analysis showed that operative time >60 minutes was the strongest independent predictor of postoperative complications with an adjusted OR of 2.67 (95% CI: 1.49–4.79, p=0.001). ASA class III–IV also significantly increased complication risk, aOR 2.31 (95% CI: 1.29–4.14, p=0.005), followed by prostate

Table 1: Baseline Demographic and Clinical Characteristics of Patients Undergoing TURP (n = 295)

Variable	Category	n (%) / Mean ± SD
Age (years)	Mean ± SD	68.4 ± 8.7
Age group	50–59 years	52 (17.6)
	60–69 years	118 (40.0)
	70–79 years	92 (31.2)
	≥80 years	33 (11.2)
Body mass index (kg/m²)	Mean ± SD	27.1 ± 4.2
Smoking status	Current/former smoker	123 (41.7)
	Never smoker	172 (58.3)
Hypertension	Yes	184 (62.4)
Diabetes mellitus	Yes	109 (36.9)
Coronary artery disease	Yes	71 (24.1)
Chronic kidney disease	Yes	29 (9.8)
Anticoagulant/antiplatelet use	Yes	68 (23.1)
ASA class	I–II	181 (61.4)
	III–IV	114 (38.6)
IPSS score	Mean ± SD	23.8 ± 5.4
History of acute urinary retention	Yes	103 (34.9)
Prostate volume (mL)	Mean ± SD	71.5 ± 24.8
Post-void residual volume (mL)	Mean ± SD	146.2 ± 68.7

Table 2: Perioperative Characteristics of Patients Undergoing TURP (n = 295)

Variable	Category	n (%) / Mean ± SD
TURP modality	Monopolar	177 (60.0)
	Bipolar	118 (40.0)
Type of anesthesia	Spinal	238 (80.7)
	General	57 (19.3)
Operative time (minutes)	Mean ± SD	63.5 ± 18.6
Operative time >60 minutes	Yes	146 (49.5)
Resected tissue weight (g)	Mean ± SD	34.2 ± 13.5
Irrigation fluid volume (L)	Mean ± SD	18.6 ± 6.4
Intraoperative blood loss (mL)	Mean ± SD	192.4 ± 84.3
Catheterization duration (days)	Mean ± SD	2.8 ± 1.3
Length of hospital stay (days)	Mean ± SD	3.9 ± 1.8
Surgeon experience	Consultant	212 (71.9)
	Senior resident	83 (28.1)

Table 3: Postoperative Complications Following TURP According to Clavien-Dindo Classification (n = 295)

Variable	Category	n (%)
Any postoperative complication	Yes	67 (22.7)
	No	228 (77.3)
Bleeding requiring transfusion		16 (5.4)
Clot retention		21 (7.1)
Urinary tract infection		24 (8.1)
Acute urinary retention		12 (4.1)
TUR syndrome		5 (1.7)
Temporary urinary incontinence		14 (4.7)
Urethral stricture		8 (2.7)
Readmission within 30 days		11 (3.7)
Mortality		1 (0.3)
Clavien-Dindo grade	Grade I	24 (8.1)
	Grade II	31 (10.5)
	Grade III	10 (3.4)
	Grade IV	1 (0.3)
	Grade V	1 (0.3)

Table 4: Multivariable Logistic Regression Analysis of Predictors of Postoperative Complications Following TURP (n = 295)

Variable	Adjusted OR	95% CI	p-value
Age ≥75 years	1.89	1.04–3.42	0.036
Diabetes mellitus	1.76	1.01–3.08	0.047
ASA class III–IV	2.31	1.29–4.14	0.005
Prostate volume >80 mL	1.94	1.08–3.47	0.026
Operative time >60 minutes	2.67	1.49–4.79	0.001
Anticoagulant/antiplatelet use	1.58	0.86–2.89	0.137
Chronic kidney disease	2.14	0.98–4.66	0.056
Bipolar TURP	0.74	0.41–1.33	0.315

volume >80 mL, aOR 1.94 (95% CI: 1.08–3.47, p=0.026), age ≥75 years, aOR 1.89 (95% CI: 1.04–3.42, p=0.036), and diabetes mellitus, aOR 1.76 (95% CI: 1.01–3.08, p=0.047). Anticoagulant use, chronic kidney disease, and bipolar TURP were not statistically significant predictors.

DISCUSSION

We conducted an observational study of 295 men with BPH who underwent TURP to assess the incidence and the risk factors for postoperative complications. Postoperative complication rate was 22.7%, of which the most common were urinary tract infection, clot retention and bleeding with transfusion. Advanced age, diabetes mellitus, higher ASA class, larger prostate volume and longer operative time were identified as independent risk factors for postoperative complications. The mean age for the study population was 68.4 ± 8.7 years and the most common age group was 60-69 years (40.0%) followed by 70-79 years (31.2%). This age distribution correlates with the natural history of BPH which is mainly a disease of older men. Similarly, a previous study showed a mean age of 65 to 72 years for men undergoing TURP, which also indicated the age-dependent changes in the incidence of symptomatic BPH [16]. The most frequent comorbidities included hypertension (62.4%) and diabetes mellitus (36.9%) and coronary artery disease (24.1%). Almost 40% of the patients were considered ASA class III–IV. A large proportion of medical comorbidities underscores the complexity of perioperative care given in this population. Previous studies have shown that patients with multiple comorbidities and higher ASA classifications are at greater risk for development of postoperative complications due to decreased physiological reserve and impaired recovery capacity[17]. In our study, the mean prostate size was 71.5 ± 24.8 mL and the mean operative time was 63.5 ± 18.6 minutes. Around half of the procedures (49.5%) were greater than 60 minutes. Previous studies have highlighted that an increased prostate size requires longer operative times, which can lead to bleeding, copious irrigation fluid absorbed and infection. The overall complication rate of 22.7% in this study is similar to those reported in other studies of the last 20 years, ranging from 15% to 30% depending on patient selection, surgical technique and length of follow-up. In most of the present study, the complications were minor to moderate with 18.6% of complications having a Clavien-Dindo grade of I and II[18].

The most frequent postoperative complications were UTI (8.1%), clot retention (7.1%) and bleeding requiring transfusion (5.4%). Temporary urinary incontinence occurred in 4.7% of patients, acute urinary retention in 4.1% and TUR syndrome in 1.7% of patients. Some past studies also have found urinary tract infection, postoperative bleeding, and clot retention as the most common complications after TURP. In modern practice, the number of severe complications, including TUR syndrome, has decreased due to improved surgical instruments, irrigation systems and antibiotic use before and after the procedure[19]. Operative time greater than 60 minutes emerged as the strongest predictor of postoperative complications, with an increase in the risk of 2.7-fold, in multivariable logistic regression analysis. Blood loss and fluid absorption increase as operative time extends, as have been consistently shown in previous research, as well as length of catheterization and incidence of infection. A comparison of ASA class III-IV with ASA class I-II showed patients in the former group had over twice the risk of developing postoperative complications. The same results have been reported in previous studies, which showed that ASA scores have a reliable relationship to perioperative risks and postoperative morbidity[20]. Older patients (age ≥ 75 years) were significantly more likely to have complications. This association has been reported to be due to physiologic decline, decreased functional reserve, and increased burden of comorbid conditions with advancing age. Similarly, diabetes mellitus was an independent risk factor to postoperative complications, with a risk of about 76% due to the impaired immune function, delayed wound healing, and increased risk of infection in patients with diabetes mellitus. There was a significantly higher risk of postoperative complications in patients with prostate volume > 80 mL. Larger prostates have been found to be related to difficult procedures, longer resection times and higher rates of bleeding during surgery in previous studies, that all lead to poor postoperative outcomes[21]. A trend towards higher risk was seen for the use of anticoagulants and chronic kidney disease, but these were not found to be significant after adjusting for other confounding variables. Likewise, bipolar TURP was also found to be associated with lower risk of complications than monopolar TURP, although this was not significant. Some studies have suggested that monopolar systems may have a greater complication rate, others have indicated that monopolar and bipolar systems had similar outcomes, and others have indicated that monopolar systems may have a lower complication rate. The results of the present study highlight the need for a thorough preoperative risk evaluation and optimization. Often, patients can be identified at risk due to old age, increased comorbidity burden, prostate size and the duration of the surgery; this can help plan the surgery individually, counsel patients more effectively and minimise morbidity after surgery.

CONCLUSION

It is concluded that postoperative complications following TURP were common but mostly mild to moderate. Advanced age, diabetes mellitus, higher ASA class, larger prostate volume, and operative time >60 minutes were significant predictors of complications. Therefore, careful preoperative assessment, optimization of comorbidities, and reduction of operative duration may help decrease postoperative morbidity and improve patient outcomes.

REFERENCES

1. Desai A, Chen R, Cayetano A, Jayasena CN, Minhas S. Understanding and treating ejaculatory dysfunction in men with diabetes mellitus. Andrology. 2023;11(2):379-398.
2. Chan ASW, et al. Mitigating lower urinary tract symptoms secondary to benign prostatic hyperplasia. Am J Men's Health. 2023;17(6):15579883231205521.
3. Asfuroglu A, et al. Male urethral stricture in patients with metabolic syndrome. Urol Res Pract. 2023;49(2):131.
4. Hong H, Hong S. Simplenomo: a Python package of making nomograms for visualizable calculation of logistic regression models. Health Data Sci. 2023;3:0023.
5. Philippe E, et al. Inappropriate combined antiplatelet and anticoagulant therapy in older patients with atrial fibrillation. Drugs Aging. 2023;40(3):273-283.
6. Zhang L, Zhan S, Zhang Y. Study on the effect of completely preserving the ejaculatory duct during prostatectomy on reducing postoperative retrograde ejaculation in BPH patients. Videosurgery Miniinv. 2022:180-186.
7. Mannem SR, et al. Incidence of urethral stricture following bipolar transurethral resection of prostate. Indian J Urol. 2022;38(2):146-150.
8. García Rodríguez LA, et al. Trends in the use of oral anticoagulants, antiplatelets and statins in four European countries. Eur J Clin Pharmacol. 2022;78(3):497-504.
9. Navar AM, et al. Trends in oral anticoagulant use among patients with atrial fibrillation in community practice. J Am Heart Assoc. 2022;11(22):e026723.

10. Wu HY, et al. Adverse outcomes after non-hepatic surgeries in patients with alcoholic liver diseases. BMC Gastroenterol. 2022;22(1):475.
11. Higazy A, Tawfeek AM, Abdalla HM, et al. Holmium laser enucleation of the prostate versus bipolar transurethral enucleation of the prostate in BPH. Int J Urol. 2021;28(3):333-338.
12. Higazy A, Osman D, Osman T. Rezum: a novel minimally invasive treatment for LUTS secondary to BPH. Int Urol Nephrol. 2021;53(9):1747-1756.
13. Chen LK, Lai YW, Chiu LP, Chen SS. Relationship between transrectal color Doppler ultrasound parameters and sexual dysfunction in BPH patients after TURP. BMC Urol. 2021;21(1):9.
14. Lerner LB, et al. Management of lower urinary tract symptoms attributed to BPH: AUA guideline part II. J Urol. 2021;206(4):818-826.
15. Launer BM, et al. The rising worldwide impact of benign prostatic hyperplasia. BJU Int. 2021;127(6):722-728.
16. Sagen E, et al. Patient-related factors affecting in-hospital costs of a TURP procedure. Scand J Urol. 2021;55(4):324-330.
17. Åsberg K, Bendtsen M. Perioperative digital behaviour change interventions for reducing alcohol consumption, improving diet, physical activity and smoking cessation. Perioper Med. 2021;10(1):18.
18. Stoddard MD, et al. A systematic review on the timing of surgical intervention for benign prostatic enlargement. Curr Urol Rep. 2020;21:1-9.
19. Becher K, et al. Management of geriatric patients with benign prostatic hyperplasia. Urologe A. 2020;59(10):1195-1203.
20. Wang JW, Man LB. Transurethral resection of the prostate stricture management. Asian J Androl. 2020;22(2):140-144.
21. Lock JF, et al. Increased risk of postoperative bleeding complications during perioperative bridging anticoagulation. Perioper Med. 2020;9(1):39.

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