



Original Article



Impact of Surgical Duration on Morbidity after Monopolar Transurethral Resection of the Prostate: A Prospective Analysis

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ABSTRACT

Benign prostatic hyperplasia (BPH) is associated with high morbidity and poses serious health problems in elderly males. The most effective surgical treatment for BPH that effectively relieves lower urinary tract symptoms is transurethral resection of the prostate (TURP). Still, TURP is not without complications, which can impact patient issues. **Objective:** To contribute to the existing knowledge on TURP complications with respect to resection time duration. **Methods:** From January 2021 to June 2022, this prospective cross-sectional study included 639 individuals with benign prostatic hyperplasia (BPH) and a prostate volume of 30 – 80 milliliters who underwent monopolar transurethral resection of the prostate (M-TURP) at Sindh Institute of Urology and Transplantation between the periods of 50 and 80. Complications were noted throughout a one-month follow-up period, and cases were grouped according to the length of surgery. The purpose of the study was to assess the results and benefits of M-TURP in BPH cases. **Results:** In 639 cases undergoing monopolar TURP, postoperative complications were observed in 11.6 % of cases, with a significant association between complications and surgical duration ($p=0.006$). Sepsis was more common in longer procedures ($p=0.025$), followed by Incontinence (6%), hematuria (4.6%), and urinary tract infections (1.5%). **Conclusions:** M-TURP is a dependable and effective treatment for enlarged prostate, with careful case selection and optimized surgical duration being pivotal to minimizing complications.

INTRODUCTION

In urology, prostate pathologies are common, with benign prostatic hyperplasia (BPH) being the most common [1]. Age-related differences in glandular tissue composition and cell proliferation exertion are the cause of BPH, which generally starts in the fourth decade of life [1]. Lower urinary tract symptoms (LUTS) are common in BPH cases and can have a substantial negative influence on their quality of life. An estimated 1.2 million surgical treatments are carried out encyclopedically each time to reduce symptoms and enhance patient issues due to the significant burden of BPH [2]. Medical remedy is generally the first line of treatment for benign prostatic hyperplasia

(BPH) [3]. Still, surgery is constantly the best course of action for cases with severe symptoms or those who don't respond to conventional remedies [4]. Although transurethral resection of the prostate (TURP) has long been honored as the main surgical fashion for treating BPH, surgeons must be conscious of its possible side effects. Both mono-polar and bipolar TURP methods are effective in managing benign prostatic hyperplasia, offering feasible options for cases requiring surgical intervention [5, 6]. Several studies and meta-analyses have estimated the morbidity and mortality of transurethral resection of prostate (TURP) [7]. Recent substantiation suggests that



while the operative duration of TURP is similar to other surgical technologies for benign prostatic enlargement, bipolar TURP appears to have advantages in terms of reduced transfusion rates, clot retention, and early reoperation rates [8]. Nonetheless, postoperative complications remain a significant concern, occurring in roughly 36% of cases. Specifically, Clot retention and gross hematuria are among the most common complications. [9] Urethral stricture is also commonly seen in patient have a prolonged operative time and a large prostate volume. [10-12] Similarly, urologists need to be apprehensive of these implicit complications and take measures to alleviate them, eventually improving patient outcomes. Recent substantiation highlights the significance of surgical duration in determining the threat of complications following TURP. Studies have shown that procedures lasting longer than 120 minutes are associated with a significant increase in major complications, including sepsis, deep vein thrombosis, transfusion, pulmonary embolism, and reoperation. Again, TURP procedures completed within 90 minutes are considered safest, emphasizing the need for effective and timely surgical ways to minimize morbidity and optimize case outcomes [4,5].

Whereas the existing studies point out the relationship between the duration of surgery and postoperative complications in TURP, there are no multicenter, long-term studies or comparative studies that assess the various surgical methods and patient outcomes. The primary research question is to establish the joint effects of the duration of operation and the patient-related factors on morbidity and maximize surgical safety. This study aimed to contribute to the existing knowledge on TURP complications with respect to resection time duration.

METHODS

This prospective cross-sectional study was conducted in the Sindh Institute of Urology and Transplantation, Karachi, over 18 months (January 2021 to June 2022) following synopsis approval from the institutional ERC with ref no: 157 approved on 28th February 2020. A non-probability consecutive sampling technique was used. Using the Open Epi sample size calculator, the total population of TURP patients in 18 months is 750. Considering the proportion of any complication was observed in 8.2% in 0-30 minutes with a margin of error 1% and 95% confidence level, and accounting for accounting 7% attribution rate. A total of 639 patients, between the ages of 50 and 80 years and with BPH (Volume 30-80ml) were recruited for the study. Patients with active urinary tract infections (UTI) or coagulation disorders were excluded. After written informed consent, demographic and clinical data (age, gender, comorbidities, TRUS volume, PSA, Coagulation

profile, Urine culture, hemoglobin and renal functions, Uroflow-metry, Ultrasound PVR) were abstracted onto a standardized proforma. Prophylactic antibiotics were administered according to institutional protocol. All procedure done under spinal anesthesia/ General anesthesia (in case of failed Spinal Anesthesia). The position of the patient was modified to the lithotomy position after providing anesthesia. Cystourethroscopy was done with a 22 FR cystoscopy, and then, urethral calibration was done up to 26 FR with Urethral sound dilators. 26 FR Continuous irrigations, a ceramic beak sheath is used for monopolar TURP with 1.5% Glycine as an irrigation fluid. Resection and fulguration of the adenoma were done, and the patient was discharged on the 1st post-operative day. Patients were categorized based on surgical duration. The catheter was removed according to the departmental protocol (3-5 days). Follow-up assessments were conducted at one week and one-month post-surgery to observe complications.

Data entry and analysis were performed in SPSS version 20.0. Continuous variables (age, duration of procedure) were summarized as mean $\pm$ SD or median $\pm$ IQR based on Shapiro-Wilk normality testing. Categorical variables (gender, comorbidities, indications, prostate volume, urine sterility) were expressed as n (%). Analyses employed chi-square or Fisher's exact tests as applicable. The $p \leq 0.050$ was considered statistically significant.

RESULTS

This study investigated the outcomes and complications of monopolar transurethral resection of the prostate (TURP) in 639 patients with benign prostatic enlargement. The mean age was 64.10 ± 8.36 years, with a median of 65 years (IQR: 11 years). Transrectal ultrasound (TRUS) revealed a mean prostate volume of 59.70 ± 16.55 grams, with a median of 61 grams (IQR: 30 grams). Uroflowmetry showed a mean maximum flow rate (Qmax) of 4.74 ± 6.96 mL/s, with a median of 2.25 mL/s (IQR: 8 mL/s), and the mean post-void residual volume was 94.37 ± 171.20 mL, with a median of 15 mL (IQR: 120 mL) (Table 1).

Table 1: Descriptive Statistics of Characteristics of Patients

Variables	Mean $\pm$ SD
Age (Years)	64.10 $\pm$ 8.36
PSA	4.74 $\pm$ 7.07
TRUS Volume (gm)	59.70 $\pm$ 16.55
Qmax	4.74 $\pm$ 6.96
Post Void	94.37 $\pm$ 171.20

Preoperatively, lower urinary tract symptoms (LUTS), including renal failure (n=121, 18.9%), hematuria (n=31, 4.9%), recurrent urinary tract infections (n=103, 16.1%), and bladder stones (n=34, 5.3%), were observed (Table 2).

Table 2: Presentation of the Patients(n=639)

Indication	n (%)
With Renal Failure	121 (18.9%)
Without Renal Failure	518 (81.1%)
Recurrent Hematuria	31 (4.9%)
Recurrent UTI	103 (16.1%)
Bladder Stone	34 (5.3%)

The average surgical duration was 20.19 ± 10.95 minutes, with an average fluid usage of 11.37 ± 5.92 liters (Table 3).

Table 3: Statistics of Mean Operative Time, the Amount of Fluid (n=639)

Variables	Point Estimate
Operative time (min)	20.19 ± 10.95
Amount of Fluid (liter)	11.37 ± 5.92

Results are presented as mean with Standard Deviation

Postoperative complications occurred in 11.6% of patients. Those were significantly associated with surgical duration (18.5% Vs 9.8%, $p=0.006$). Specifically, sepsis (8.5% vs 4.1%) was more common in the longer procedures group ($p=0.025$). While other complications, such as acute urinary retention ($n=16$, 2.5%) hematuria ($n=25$, 4.7%), incontinence ($n=30$, 4.7%), and urinary tract infections (UTIs) ($n=13$, 2%), were observed, their relationship with surgical duration did not reach statistical significance except for Blood transfusion (1.5% vs 0.2%, $p=0.048$) which were more in patients having longer operative time. The findings suggest that longer surgical durations are associated with increased morbidity, emphasizing the importance of efficient surgical techniques in minimizing complications (Table 4).

Table 4: Relationship of Surgical Duration with Complications After Monopolar Transurethral Resection of Prostate(n=639)

Complications	Surgical Duration		
	≤ 30 min, n=509	≥ 31 min, n=130	p-value
Acute Urinary Retention	14 (2.8%)	2 (1.5%)	0.381
Hematuria	19 (3.7%)	6 (4.6%)	0.642
Incontinence	21 (4.1%)	9 (6.9%)	0.181
Uti	11 (2.2%)	2 (1.5%)	0.621
Sepsis	21 (4.1%)	11 (8.5%)	0.025*
Tur Syndrome	2 (0.4%)	0 (0%)	0.458
Blood Transfusion	1 (0.2%)	2 (1.5%)	0.048*
Overall	50 (9.8%)	24 (18.5%)	0.006*

DISCUSSION

Due to acute urine retention, numerous cases in underdeveloped nations have surgery for benign prostatic hyperplasia (BPH), constantly following an unprofitable catheter-free trial. In discrepancy, the main reason for surgery in Western nations is irritable lower urinary tract symptoms (LUTS) [11]. Due to fiscal enterprises, monopolar transurethral resection of the prostate (M- TURP)

continues to be the most commonly performed treatment despite the inadequacy of newer modalities [12]. For BPH that's resistant to drugs, M- TURP is a tried- and-true standard surgical procedure, especially for prostate volumes between 30 and 80 cc. In our study, a significant proportion of cases presented with preoperative complications of BPH, including renal failure (18.9%), hematuria (4.9%), repeated urinary tract infections (16.1%), and bladder calculi (5.3%). These findings are harmonious with former studies, similar to those conducted in Nigeria, and maybe it's among the top list of suggestions according to the current EAU guidelines [13]. The prevalence of postoperative complications following TURP varies across studies. In this series, complications were observed in 11.6% of cases (74/639), with sepsis being the most common at 5% (32/639), followed by incontinence and hematuria, each at 4.7% (30/639 and 25/639, independently). Other complications included acute urinary retention (2.5%), urinary tract infections (2%), and blood transfusions (0.5%). A meta-analysis across 103 RCTs found TUR syndrome (2%), hematuria (8%), urinary incontinence (8%), and stricture of the urethra (3%) [12]. Specifically, our complication rates were lower compared to some studies, which have reported advanced rates of complications, particularly infections in cases with urinary retention [4]. A study by Khan et al. reported a 2.3% prevalence of sepsis after transurethral resection of the prostate (TURP), with 19 out of 837 cases developing sepsis [14]. Specifically, these cases had either an indwelling catheter or pre-existing bacteriuria and were receiving perioperative antibiotics. Another study reported UTI in 7.8% and 11.1% of the patients, respectively. In discrepancy, our study set up an advanced prevalence of sepsis at 5%, which increased with the duration of surgery. Specifically, the threat of sepsis was smallest in procedures lasting ≤ 30 minutes and highest in those exceeding 30 minutes. These findings punctuate the significance of surgical duration and patient factors in determining the threat of sepsis after TURP [15]. The reported frequency of postoperative urinary incontinence after transurethral resection of the prostate (TURP) varies across studies. Estimates range from 0.3% to 4%, with some studies suggesting that patient incontinence can trouble cases for several months postoperatively [16, 17]. The current study reported the prevalence of incontinence $n=30/639$ (4.7%), pressing the need for farther disquisition into the factors contributing to this complication. The reported prevalence of urinary tract infections (UTIs) after transurethral resection of the prostate (TURP) varies extensively, from 2.3% to 19% [18]. The current study set up a 2% prevalence, potentially due to shorter resection in a large proportion of cases. Urinary retention following TURP has been proven to occur in 3% to

9% of cases, and it's constantly linked to primary detrusor failure rather than partial resection [19]. The prevalence of urine retention in the current study was 16/639 (2.5%), emphasizing the significance of scrupulous case selection and postoperative care. A potentially dangerous consequence of dilutional hyponatremia, the TUR pattern is marked by symptoms including bradycardia, internal disorientation, hypertension, visual abnormalities, nausea, and vomiting. Over the past many decades, the prevalence of the TUR pattern has dropped dramatically, from roughly 3% to less than 1%. Another meta-analysis across 103 RCTs found TUR syndrome (2%) [5, 20]. The prevalence of TUR pattern in our study was 2/639 (0.3%), which is in line with the downward trend noted in recent exploration. In this study, the volume of irrigation fluid status and duration of the procedure were also studied. Our study employed 1.5 glycine irrigation fluid, with an average operation of 11.37 liters and a surgical duration of 20.19 minutes. Specifically, gill dragged TURP procedures (>120 minutes) are associated with increased pitfalls of major complications. Completing TURP within 90 minutes is recommended for optimal issues [5]. In line with the current study ($p=0.034$), the total complication rate was 9.0% and increased vastly with lesser surgical length ($p<0.001$). An increased threat of deep vein thrombosis or pulmonary embolism, transfusion, reoperation, and postoperative sepsis or shock was linked to longer operating times.

Nevertheless, the study has weaknesses of a single-center design, a limited follow-up duration, and non-probability sampling, which limit the generalization. Research in the future ought to concentrate on larger, multicenter longitudinal research, the incorporation of various populations, and the comparison of monopolar and bipolar methods to enhance clinical outcomes and evidence-based practice.

CONCLUSIONS

Monopolar transurethral resection of the prostate (M-TURP) remains a dependable and effective surgical option for managing an enlarged prostate. The current study underscores the significance of careful case selection and optimizing surgical duration to minimize complications, thereby ensuring the uninterrupted safety and efficacy of M-TURP in urological practice.

Authors' Contribution

Conceptualization: BZ

Methodology: FH

Formal analysis: AS, AUHR

Writing and Drafting: BZ, FH, SU, AS, AUHR

Review and Editing: BZ, FH, SU, AS, AUHR

All authors approved the final manuscript and take responsibility for the integrity of the work

Conflicts of Interest

All the authors declare no conflict of interest.

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