DOI: https://doi.org/10.53350/pjmhs2023171080

ORIGINAL ARTICLE

The Role of Prophylactic Tamsulosin in Preventing Postoperative Urinary Retention Following Surgery under Spinal Anaesthesia

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ABSTRACT

Background: Postoperative urinary retention (POUR) is a common complication following surgery under spinal anesthesia, often leading to prolonged catheterization, increased risk of infections, and extended hospital stays.

Objective: To evaluate the effectiveness of prophylactic tamsulosin in preventing POUR in patients undergoing elective surgery under spinal anesthesia.

Study Design: Prospective observational study

Place and Duration of Study: Mohtarma Benazir Bhutto Shaheed Medical College Mirpur AJK from 1st January 2023 to 31st July 2023.

Methodology: Two hundred and twenty five patients scheduled for elective surgery under spinal anaesthesia were enrolled. Data were collected prospectively using a standardized case report form. Demographic details, surgical and anaesthetic parameters, and postoperative outcomes were recorded.

Results: The incidence of POUR was significantly lower in the tamsulosin group (10.7%) compared to the placebo group (24.8%) (p=0.004). Patients in the tamsulosin group had a shorter time to first void (3.2±1.1 hours vs. 5.8±2.3 hours, p<0.001) and a reduced need for catheterization (8.9% vs. 22.1%, p=0.006). The mean length of hospital stay was also shorter in the tamsulosin group (2.5±0.8 days vs 3.2±1.1 days, p=0.002). Tamsulosin was well-tolerated, with no serious adverse events reported.

Conclusion: Prophylactic tamsulosin significantly reduces the incidence of POUR, shortens the time to first void, decreases the need for catheterization, and is associated with a shorter hospital stay in patients undergoing surgery under spinal anaesthesia.

Keywords: Prophylactic tamsulosin, Elective Surgery, Spinal anesthesia, Postoperative urinary retention

INTRODUCTION

Postoperative urinary retention is a common complication following surgery, particularly in procedures performed under spinal anaesthesia. It is characterized by the inability to voluntarily void urine despite having a full bladder, leading to discomfort, increased risk of urinary tract infections, and potential need for catheterization. POUR can significantly impact patient recovery, prolong hospital stays, and increase healthcare costs.[1] Spinal anaesthesia, while advantageous for its analgesic and hemodynamic stability, has been identified as a risk factor for POUR due to its effects on bladder detrusor muscle function and sensory blockade.[2] The incidence of POUR varies widely depending on the type of surgery, patient factors, and anaesthetic techniques, but it remains a significant clinical challenge that warrants effective preventive strategies. The pathophysiology of POUR is multifactorial, involving both neurological and mechanical factors. Spinal anaesthesia disrupts the normal micturition reflex by temporarily blocking sacral parasympathetic nerves, which are responsible for bladder contraction.[3] Additionally, the sympathetic blockade caused by spinal anaesthesia can lead to unopposed parasympathetic activity, resulting in bladder neck contraction and impaired detrusor muscle function. Other contributing factors include postoperative pain, opioid use, fluid overload, and pre-existing conditions such as benign prostatic hyperplasia (BPH) in male patients. These factors collectively increase the risk of POUR, making it a critical area of focus in perioperative care.[4]

Tamsulosin, a selective alpha-1 adrenergic receptor antagonist, has been widely used in the management of BPH due to its ability to relax smooth muscle in the prostate and bladder neck, facilitating urine flow.[5] By selectively targeting alpha-1A and alpha-1D receptors, which are predominantly located in the prostate and bladder, tamsulosin minimizes systemic side effects such as hypotension, making it a well-tolerated option for patients. Given its mechanism of action, tamsulosin has garnered interest as a potential prophylactic agent to prevent POUR in patients undergoing surgery under spinal anaesthesia.[6]

However, the efficacy and safety of prophylactic tamsulosin in this context remain subjects of ongoing research and debate. Several studies have investigated the role of tamsulosin in preventing POUR, with mixed results. Some randomized controlled trials have demonstrated a significant reduction in the incidence of POUR among patients receiving prophylactic tamsulosin, particularly in high-risk populations such as elderly males or those undergoing orthopedic or anorectal surgeries. These studies suggest that tamsulosin may help restore normal bladder function by counteracting the effects of spinal anaesthesia on the urinary tract.[5-7] However, other study has reported no significant benefit, highlighting the need for further research to identify patient subgroups that may benefit most from this intervention. In addition to its potential efficacy, the safety profile of tamsulosin must be carefully considered.[8] While generally well-tolerated, tamsulosin can cause side effects such as dizziness, orthostatic hypotension, and retrograde ejaculation. These side effects, although rare, may pose additional risks in the postoperative period, particularly in elderly patients or those with comorbidities. Therefore, the decision to use prophylactic tamsulosin should be individualized, considering the patient's medical history, surgical procedure, and risk factors for POUR.[9] POUR is associated with increased healthcare costs due to prolonged hospital stays, additional interventions such as catheterization, and the potential for complications such as urinary tract infections or bladder over distension. By identifying effective preventive strategies, healthcare providers can enhance recovery, reduce the burden on healthcare systems, and improve overall surgical outcomes. Prophylactic tamsulosin represents a promising option in this regard, but its use must be guided by robust evidence and tailored to individual patient needs.[10]

Received on 25-08-2023
Accepted on 02-09-2023

MATERIALS AND METHODS

This prospective observational study was conducted at Mohtarma Benazir Bhutto Shaheed Medical College Mirpur AJK from 1st January 2023 to 31st July 2023. A total of 225 patients scheduled for elective surgery under spinal anaesthesia were enrolled. The sample size was calculated based on an assumed POUR incidence of 20% in the placebo group and a 50% reduction in the tamsulosin group. With a power of 80% and a significance level of 5%, a minimum of 100 patients per group was required. The patients age ≥18 years, American Society of Anesthesiologists (ASA) physical status I–III, scheduled for elective surgery under spinal anaesthesia with an expected duration of more than 1 hour, no history of urinary retention or lower urinary tract symptoms (LUTS) and no contraindications to tamsulosin or spinal anaesthesia were included. All patients have history of chronic kidney disease or end-stage renal disease, pre-existing neurological disorders affecting bladder function, use of alpha-blockers or other medications affecting urinary function within the past 7 days, allergy or hypersensitivity to tamsulosin and pregnancy or lactation were excluded. Data were collected prospectively using a standardized case report form. Demographic details, surgical and anaesthetic parameters, and postoperative outcomes were recorded. Patients were randomly allocated into two groups. Tamsulosin group (n=112): Patients received 0.4 mg of tamsulosin orally once daily, starting the evening before surgery and continuing for 3 days postoperatively and Placebo group (n=113): Patients received a matching placebo on the same schedule.

The randomization sequence was concealed from both the patients and the investigators. The study medications were prepared by an independent pharmacist who was not involved in patient care or data collection. All patients underwent standardized spinal anaesthesia using hyperbaric bupivacaine. Intraoperative monitoring included heart rate, blood pressure, oxygen saturation, and urine output. Postoperatively, patients were monitored for the ability to void spontaneously. If a patient was unable to void within 6 hours postoperatively or had a bladder volume exceeding 500 mL on ultrasound, urinary catheterization was performed, and the case was recorded as POUR. Statistical analysis was performed using SPSS-25. Student's t-test and Chi-square test were applied and p-value <00.05 was considered statistically significant.

RESULTS

The mean age was 58.4 ± 12.3 years in the tamsulosin group and 57.8 ± 11.9 years in the placebo group, with a similar distribution of male patients (60.7% vs. 61.9%). Body mass index (BMI) was comparable between the groups (26.3 ± 3.8 kg/m² vs. 25.9 ± 4.1 kg/m²), as was the distribution of ASA physical status (I/II/III). The types of surgeries performed, including orthopedic (44.6% vs. 46.0%), lower abdominal (35.7% vs. 33.6%), and other surgeries (19.6% vs. 20.4%), were also similar, indicating no significant differences in baseline demographics or surgical profiles between the two groups (Table 1).

The incidence of postoperative urinary retention was significantly lower in the tamsulosin group (10.7%) compared to the placebo group (24.8%) (p=0.004). Patients in the tamsulosin group also had a shorter time to first void (3.2±1.1 hours vs 5.8±2.3 hours, p<0.001) and a reduced need for catheterization (8.9% vs. 22.1%, p=0.006). Additionally, the mean length of hospital stay was shorter in the tamsulosin group (2.5±0.8 days vs. 3.2±1.1 days, p=0.002). There were no significant (p>0.05) differences in postoperative complications such as urinary tract infections (UTIs), hypotension, or dizziness between the two groups [Table 2).

Tamsulosin group compared to the placebo group across all subgroups. In patients younger than 60 years, POUR occurred in 9.2% of the tamsulosin group versus 22.4% in the placebo group (p=0.03), showing a significant reduction. Similarly, among male patients, POUR was significantly lower (p=0.01) in the tamsulosin group (11.8%) compared to the placebo group (28.6%) [Table 3).

Tamsulosin significantly reduced the incidence of postoperative urinary retention in patients undergoing orthopedic surgery, with 10.0% in the tamsulosin group compared to 26.9% in the placebo group (p=0.02). However, for lower abdominal surgeries (15.0% vs. 26.3%, p=0.18) and other surgeries (4.5% vs. 17.4%, p=0.19), the differences were not statistically significant (Table 4).

Tamsulosin group had a shorter time to catheterization (6.5±1.2 hours) compared to the placebo group (7.8±2.1 hours), with a statistically significant difference (p=0.04). The volume of urine at catheterization was slightly lower in the tamsulosin group (620±150 mL vs. 680±180 mL), but this difference was not significant (p=0.12). Postoperative urinary tract infections (UTIs) occurred less frequently in the tamsulosin group (8.3%) than in the placebo group (14.3%), though the difference was not statistically significant (p=0.56) [Table 5).

Table 1: Baseline characteristics of the study population

Characteristics	Tamsulosin Group (n = 112)	Placebo Group (n = 113)
Age (years)	58.4±12.3	57.8±11.9
Gender		
Male	68 (60.7%)	70 (61.9%)
Female	44 (39.3%)	43 (38.1%)
BMI (kg/m²)	26.3±3.8	25.9±4.1
ASA status		
I	45	48
II	50	49
III	17	16
Type of surgery		
Orthopedic	50 (44.6%)	52 (46.0%)
Lower abdominal	40 (35.7%)	38 (33.6%)
Other	22 (19.6%)	23 (20.4%)

Table 2: Primary and secondary outcomes

Outcome Measure	Tamsulosin Group (n = 112)	Placebo Group (n = 113)	p-value
Incidence of POUR	12 (10.7%)	28 (24.8%)	0.004
Time to first void (hours)	3.2±1.1	5.8±2.3	<0.001
Need for catheterization	10 (8.9%)	25 (22.1%)	0.006
UTIs	2 (1.8%)	6 (5.3%)	0.17
Hypotension	3 (2.7%)	4 (3.5%)	0.72
Dizziness	4 (3.6%)	2 (1.8%)	0.41
Length of hospital stay (days)	2.5±0.8	3.2±1.1	0.002

Table 3: Subgroup analysis of POUR incidence based on age and gender

Subgroup	Tamsulosin Group (n = 112)	Placebo Group (n = 113)	p-value
Age (years)			
< 60	6 (9.2%)	15 (22.4%)	0.03
≥ 60	6 (12.8%)	13 (27.7%)	0.06
Gender			
Male	8 (11.8%)	20 (28.6%)	0.01
Female	4 (9.1%)	8 (18.6%)	0.18

Table 4: Incidence of POUR based on type of surgery

Type of Surgery	Tamsulosin Group (n = 112)	Placebo Group (n = 113)	p-value
Orthopedic Surgery	5 (10.0%)	14 (26.9%)	0.02
Lower Abdominal Surgery	6 (15.0%)	10 (26.3%)	0.18
Other Surgeries	1 (4.5%)	4 (17.4%)	0.19

Table 5: Postoperative outcomes in patients with POUR

Outcome Measure	Tamsulosin Group (n = 12)	Placebo Group (n = 28)	p-value
Time to catheterization (hours)	6.5±1.2	7.8±2.1	0.04
Volume of Urine at Catheterization (mL)	620±150	680±180	0.12
Postoperative UTIs	1 (8.3%)	4 (14.3%)	0.56
Length of Hospital Stay (days)	3.8±1.0	4.5±1.3	0.03

DISCUSSION

Postoperative urinary retention (POUR) is a common and clinically significant complication following surgery under spinal anaesthesia, with reported incidence rates ranging from 10% to 50%, depending on patient and surgical factors. The results show how tamsulosin effectively decreases POUR occurrence and shortens the first voiding period and elimines the need for catheterization and leads to reduced hospitalization time.[11] The benefits of this research affect patient care in the perioperative environment while identifying tamsulosin as a potentially useful preventive approach for high-risk surgical patients. A lower proportion of 10.7% patients in the tamsulosin group experienced POUR compared to 24.8% patients in the placebo group. The observed benefit reaches 56.9% compared to placebo which demonstrates strong clinical significance. Tamsulosin lowers POUR rates through its selectivity with alpha-1 adrenergic receptors to relax prostate and bladder neck smooth muscles thus improving urine flow.[12] Tamsulosin has shown reduction in POUR benefits which support previous research findings described for male patients and those requiring lower abdominal or orthopedic surgery. Subjects who received tamsulosin voided first after an average of 3.2±1.1 hours compared to 5.8±2.3 hours in patients using placebo.[13]

The quick recovery of bladder function represents a crucial factor for both patient comfort and recovery process. Patients treated with tamsulosin required catheter insertion less frequently than patients who received placebo care (8.9% vs. 22.1%) as patients on tamsulosin demonstrated lower rates of POUR postoperative complications. Patients in the tamsulosin group stayed in the hospital an average of 2.5±0.8 days whereas those in the placebo group spent 3.2±1.1 days.[14] Hospital stay duration reduction improves patient happiness and minimizes healthcare expenses by using fewer hospital resources. The prevention of POUR and its complications most probably contributed to this favorable result. The patients experienced positive tolerance of tamsulosin treatment because no major adverse events manifested during the study. Minor dizziness emerged as the main side effect but disappeared on its own. This study demonstrates that the safety characteristics of tamsulosin make the medication suitable for perioperative prophylaxis.[15] Tamsulosin showed its most significant benefits in therapeutic effect for male patients with orthopedic or lower abdominal surgeries. Discourse about POUR indicates that male patient groups experience greater risk since Benign Prostatic Hyperplasia (BPH) affects their urinary retention patterns negatively. Patients undergoing orthopedic surgeries that need joint replacements encounter prolonged immobilization periods with simultaneous opioid usage which act as POUR risk factors.[16] Additional research based on larger participant numbers should confirm the observations that tamsulosin proves most effective for preventing POUR in these high-risk groups. This research supports earlier investigations which showed tamsulosin prevents POUR effectively.[17] The research findings from Bai et al[2] showed that alpha-blockers such as tamsulosin effectively decrease post-operative urinary retention risks during surgical procedures. Additional research is needed to determine the patient groups and surgery types where tamsulosin demonstrates maximal effectiveness since some studies fail to demonstrate clear advantages. This study delivers significant research findings though it contains multiple restricting aspects.[18] Although the study used adequate sample numbers these numbers did not have the statistical power to see differences among uncommon adverse effects or distinct population groups. The research was performed at one center thus restricting broad application of its current data.

CONCLUSION

Prophylactic tamsulosin is an effective and well-tolerated intervention for reducing the incidence of postoperative urinary retention (POUR) in patients undergoing surgery under spinal anaesthesia. The study demonstrated a significant reduction in POUR incidence, a shorter time to first void, a decreased need for catheterization, and a shorter hospital stay in patients receiving tamsulosin compared to those receiving a placebo. These findings highlight the potential of tamsulosin to improve postoperative recovery, enhance patient comfort, and reduce healthcare resource utilization.

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This article may be cited as: Ch TS, Mustafa G, Usman N, Toheed F, Memon SK, Rehman SAU: The Role of Prophylactic Tamsulosin in Preventing Postoperative Urinary Retention Following Surgery under Spinal Anaesthesia. Pak J Med Health Sci, 2023; 17(10): 80-82.