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Effectiveness of tamsulosin in prevention of post-operative urinary retention: a randomized double-blind placebo-controlled study

Ali Hamidi Madani, Hamidreza Baghani Aval, Gholamreza Mokhtari, Hamidreza Nasseh, Samaneh Esmaeili, Maryam Shakiba, Reza Shahrokhi Damavand, Seyed Mohamad Seyed Saadat

Urology Research Center, School of Medicine, Guilan University of Medical Sciences

ABSTRACT

Purpose: Urinary retention is one of the most common complications contributing to surgical procedures. Recent studies have shown the benefits of alpha-adrenergic blockers in preventing post-operative urinary retention (POUR). The aim of this prospective study was to compare the prophylactic effect of tamsulosin with placebo on postoperative urinary retention.

Materials and Methods: In this randomized placebo controlled, clinical trial, 232 male patients aged 18 to 50 years old admitted to Razi University Hospital for varicocelectomy, inguinal herniorrhaphy, and scrotal surgery were randomly assigned to receive either three doses of 0.4mg tamsulosin (n = 118) or placebo (n = 114), 14 and 2 hours before, and 10 hours after surgery. Patients were closely monitored for the development of urinary retention 24 hours after surgical intervention. The primary endpoint was to investigate the effect of tamsulosin in prevention of post-operative urinary retention during the first 24 hours after surgical intervention. Collected data were analyzed using SPSS software version 18 and the $P < 0.05$ was considered statistically significant.

Results: One hundred and eighteen patients were included in tamsulosin arm and 114 in placebo arm. POUR in patients who received tamsulosin was significantly lower than placebo, as 5.9% of the patients treated with tamsulosin and 21.1% placebo group, reported urinary retention following surgery ($P = 0.001$). No serious adverse effects were seen in both groups.

Conclusions: This study suggests that short perioperative treatment with tamsulosin can reduce the incidence of urinary retention and the need for catheterization after varicocelectomy, inguinal herniorrhaphy, and scrotal surgery.

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INTRODUCTION

Post-operative urinary retention (POUR) is defined as the inability to void after surgery when the bladder is full (1,2) POUR is common and represents between 5% to 70% of all surgeries (1), especially after herniorrhaphy (3,4) and anorectal surgery (5-7). Typically, this phenomenon is painful and can result in increased cost of hospitalization, prolonged length of hospital stay, bladder overdistension, and urinary tract infection (UTI) which can occur primarily or secondarily to

catheterization (1,8). Urethral catheterization, a mainstay of initial management for patients with POUR, is associated with some complications and increase in cost of care (1,2,8). Therefore, pharmacological therapy is considered as an interesting approach for patients developing urinary retention following surgery (2).

It seems that high sympathetic activity increases the risk of urinary retention (1). Therefore, inhibition of alpha-adrenergic receptors located on the bladder neck and proximal urethra may prevent POUR and improve voiding (1,9). Several drugs including alpha-blockers and parasympaticomimetics had been under investigation for their effectiveness in preventing POUR (8). Recent evidence has shown that the use of alpha-blockers facilitate voiding by decreasing the resistance of the proximal urethra and bladder neck and improving the urine flow (9,10).

Several studies evaluating the effect of alpha-blockers in preventing POUR have suggested an improvement in urinary function after hysterectomy (11), inguinal herniorrhaphy (12), colorectal surgery (1,2), and genital prolapsed repair (13). Recently, a prospective randomized study by Mohammadi-Fallah et al. (10) showed that the POUR rate after inguinal herniorrhaphy among patients who received tamsulosin was significantly lower than those who received placebo (2.5% versus 15%). Tamsulosin is a safe selective alpha 1-adrenergic receptor blocker characterized by its favorable side effect profile (14). The prophylactic effect of tamsulosin in reducing POUR has not been investigated in a large randomized double-blind study; therefore the present study was conducted to investigate the efficacy of tamsulosin compared with placebo in preventing POUR.

MATERIAL AND METHODS

Study Design

This prospective randomized double-blind, placebo-controlled trial was performed between August 2011 and July 2012 in the Department Urology of Razi University Hospital in Rasht, Iran. The study was conducted in accordance with the Declaration of Helsinki, and was approved by the local Institutional Review Board and the ethics committee of Guilan University of Medical Sciences (GUMS). It was registered online at Iranian registry of clinical trials http://www.irct.ir (identifier- IRCT201109084582N5).

Subjects

Male patients aged 18 to 50 years who were admitted in our center for elective inguinal herniorrhaphy, varicocelectomy or scrotal surgeries under spinal anesthesia were included in our study. Patients who had urinary symptoms before surgery, a known history of neurological, urological or significant systemic disease (such as diabetes mellitus), previous history of urinary retention, previous urological or abdominal surgery, history of using medications that could interfere with natural voiding function such as benzodiazepines, cholinergic drug prior to surgery, or current treatment with alpha or beta agonists were not included. Exclusion criteria were: IV fluid administration of more than 1500cc during surgery, or use of other anesthetic drugs except for lidocaine for spinal anesthesia. Patients were further excluded if their surgical procedures last more than 90 minutes.

After obtaining written informed consent from all participants, patients were randomized to receive either three doses of 0.4mg of tamsulosin or placebo using random block design. Treatment allocation sequence was carried out based on a block size of four generated with a computer random--number generator (using excel program). Group allocation was concealed in sealed opaque envelop by a third party (independent researcher) prior to the treatment. The study medication was administered by a nurse who was not informed which medication was used. Patients, study staff and investigators were blinded to treatment assignment.

Interventions

Half-life of tamsulosin is 9-15 hours, so we administered three doses with 12 hours intervals. The medications were administered 14 and 2 hours before and 10 hours after surgical operation. Patients were asked to empty their bladder prior to surgery. Surgery was performed under spinal anesthesia using 2cc lidocaine. The patients were then closely followed up (monitored) by blinded research associates for the presence of urinary

retention, any voiding difficulty and side effects during 24 hour after surgery, and the occurrence of POUR was compared between both groups. Patients were allowed to void once they felt they had a full bladder. NSAIDs were prescribed for postoperative analgesia. Opioid analgesics were not administered to any patient postoperatively.

Measurement

The diagnosis of urinary retention was established when the patient had a painful and palpable mass in his suprapubic area, and was unable to void during the first 24 hours after surgery. The diagnosis was confirmed by emptying of more than 400mL of urine by catheterization. A 14-French nelaton catheter was placed to decompress the bladder of patients who could not urinate 12 hours after surgery.

Data Collections

Upon admission, data including age and type of surgery were collected from all patient's files. Perioperative fluid administration and operative time were also collected 24 hours after surgical intervention.

Endpoints

Our primary endpoint was to investigate the effect of tamsulosin in prevention of POUR during the first 24 hours after surgical intervention.

Statistical analysis

According to previous studies, reporting 15% incidence of urinary retention in patients who undergo scrotal surgery, varicocelectomy and Herniorrhaphy with spinal anesthesia, we calculated that the study could be done with 111 subjects in each study arm. This number of subjects would give 80% of power at the 0.05 level to show 75 percent reduction in the rate of urinary retention by Chi-square test.

Collected data were analyzed using SPSS software version 18. Descriptive data were reported as mean $\pm$ SD or median (interquartile range) as appropriate. Normality was assessed by Kolmogorov-Smirnov test and a Chi-square test applied to compare the efficacy of treatments between two groups. Univariate analysis of factors related to incidence of POUR was compared using the independent sample t-test for continuous variables and the Chi-square test for categorical variables. A backward stepwise logistic regression model yielding odds ratio (OR) and 95% confidence interval (CI) was performed on POUR to analyze the treatment effect when adjusting for other related covariates. The model included baseline variables (e.g. age, type of surgery, operative time, treatment groups and serum volume) and variables showing an univariate association ($P < 0.1$) with POUR (e.g. age, treatment groups and operative time).The goodness of fit of the regression model was evaluated by the Hosmer-Lemeshow test. All statistical tests were two tailed, and the $P < 0.05$ was considered statistically significance.

RESULTS

Two hundred and thirty two patients who were randomly assigned to tamsulosine group (n = 118) or placebo group (n = 114) were included in the analysis.

Demographic data and clinical features of both treatment groups are presented in Table-1. Varicocelectomy was the most frequent surgery in both groups. All patients were male, and the mean age was the same in both Tamsulosin and placebo arms (27.59 $\pm$ 7.29 vs. 27.72 $\pm$ 7.2 years). There were also no significant differences between two groups in terms of surgery type, perioperative fluid volume, and operative time.

In tamsulosin group, there was a significantly lower proportion of patients with POUR compared with the placebo group (5.9% vs. 21.1%; P = 0.001).

Univariate analysis showed a significantly lower incidence of POUR in patients who received tamsulosin (P = 0.001). Longer duration of surgical intervention (P = 0.039) and lower age (P = 0.017) were also associated with POUR. At logistic regression analysis, the odds of POUR in the tamsulosin group was about 0.24 times lower (OR = 0.24, 95% CI = 0.09 - 0.6, P = 0.002) than in the placebo group after adjustment for potential risk factors including age and operative time. Longer

Table 1 - Demographic characteristics and clinical features of patients in both treatment groups.

	Tamsulosin group (N = 118)	Placebo group (N = 114)
Type of surgery		
Herniorrhaphy	14 (11.9%)	11 (9.6%)
Varicocelectomy	58 (49.2%)	57 (50%)
Scrotal surgery	46 (39%)	46 (40.4%)
Mean age ± SD (year)	27.59 ± 7.29	27.72 ± 7.2
Mean operative time ± SD (min.)	50.37 ± 13.35	53.50 ± 11.92
Mean perioperative fluid administration ± SD (mL)	1094.92 ± 200.78	1096.67 ± 214.08

P value was not significant for all the values.

operative time (OR = 1.03, 95% CI = 1 - 1.07, P = 0.027) and younger age (OR = 0.93, 95% CI = 0.87 - 0.99, P = 0.029) were other parameters that significantly influenced the rate of POUR (Tables 2 and 3).

Two patients in tamsulosin arm showed side effects at 24 hours follow-up. Both patients experienced vomiting and dizziness. Side effects were mild to moderate, and did not lead to exclusion of patients from the study.

DISCUSSION

POUR is one of the most common complications of anesthesia and surgery. It occurs more frequently after lower abdominal and pelvic, gynecologic and anorectal surgeries (10). Overall incidence of POUR ranges from 5% to 70% (1). Development of POUR is associated with age, gender, history of underlying urologic and non-urologic disease, perioperative fluid intake, type of anesthesia and surgery and duration of surgery (4,10). POUR causes to major discomfort and pain after surgery and catheterization for resolving it, may lead to urethral injury or stricture or urinary tract infection and increase cost and work load and hospitalization period. Occasionally patients may suffer persistent POUR that complicates at the postoperative period. There are several mechanisms involving development of POUR. Multiple facets of surgery, anesthesia and perioperative management may interrupt the voiding reflex. Anesthesia interferes with sensation of bladder fullness. Other factor include the balance between sympathic and parasympatic disturb during perioperative period, systemic sympatic discharge due to anesthesia and pain after surgery and local sympatic motor activity due to bladder distention, inhibition of detrusor contraction and intensity of the bladder.

Outlet closure is done via increasing alpha--mediated tone in bladder outlet (8). Perineal and lower abdominal pain can inhibit the perineal relaxation that is necessary for voiding. Detrusor contractures can also be inhibited by a reflex involving afferent fibers of the pudental nerve. Immobilization and have to void in supine position contribute to post-operative voiding dysfunction (8).

Three methods have been used to diagnose POUR: 1) history and physical examination (lower abdominal pain and discomfort and palpation or percussion of bladder in suprapubic area); 2) bladder catheterization; 3) ultrasonographic assessment of bladder postoperatively (4).

We used these criteria to confirm POUR in our study: patients discomfort or palpable bladder or inability to void more than 12 hours after induction of anesthesia (1,15).

We included patients 18-50 years old, because in older age there is a decrease in contractility of detrusor and increase in incidence of some

Table 2 - Associated factors of POUR within 24 hours after surgical intervention.

	All	POUR		P-value
		No	Yes	
Mean age ± SD (year)	27.65 ± 7.59	28.02 ± 7.55	25.25± 7.55	0.017
Type of surgery				0.919
Herniorrhaphy	25 (10.8)	21 (84%)	4 (16%)	
Varicocelectomy	115 (49.6)	100 (87%)	15 (13%)	
Scrotal surgery	92 (39.7)	80 (87%)	12 (13%)	
Mean operative time ± SD (min.)	51.91 ± 12.73	51.16 ± 12.48	56.77 ± 13.51	0.039
Mean perioperative fluid administration ± SD (mL)	1095.78 ± 206.98	1097.01 ± 200.47	1087.74 ± 248.71	0.376
Treatment groups				
Placebo	114 (49.1)	90 (78.9%)	24 (21.1%)	0.001
Tamsulosin	118 (50.9)	111 (94.1%)	7 (5.9%)	

Table 3 - Adjusted odd ratio for treatment group and potential risk factors of POUR.

	Odd- ratio	95% confidence Interval	P-value
Age	0.93	0.87- 0.99	0.029
Operative time (min.)	1.03	1- 1.07	0.027
Treatment groups			
Placebo	1	0.09- 0.6	0.002
Tamsulosin	0.24		

diseases such as benign hyperplasia of prostate that present with urinary symptoms and may interfere with patient randomization and study results (development of urinary retention).

In Petros et al. study comprising patients who were submitted herniorrhaphy, age below 53, spinal anesthesia and preoperative fluid administration less than 1200cc significantly decreased risk of POUR (3).

Some studies have reported higher incidence of POUR in men compared with women (6) but in other studies, there isn't significant difference between men and women (3). In our study only men participated due to type of surgeries. There are various medical prophylactic methods for prevention of POUR, such as parasympathomimetic and α-adrenergic blockers. Restriction of preoperative fluid intake, induction of local instead of regional or general anesthesia, use of short acting anesthesia agent, early ambulation of patients after surgery, and use of warm compress in suprapubic area can prevent POUR (1,8).

Excessive perioperative fluid intake lead to bladder over distention, that increases risk of POUR. So, restriction of perioperative fluid intake may prevent POUR (16).

Type of anesthesia is another important factor in the development of POUR. Risk of POUR in local anesthesia is lower than regional and general anesthesia (1,8,17).

The purpose of pharmacologic prevention of POUR is the increase of detrusor contractility or bladder neck and proximal urethral relaxation.

Parasympathomimetic agents such as bethanechol theoretically increase bladder smooth muscle contractility, but their clinical utility is under question owing to poor efficacy and adverse side effects (18).

Alpha-adrenergic blockers decrease bladder outlet resistance and facilitate micturation. Several studies found that prophilatic administration of phenoxybenzamine significantly decreases the incidence of postoperative urinary retention (19-21).

Gönüllü et al. used prazosin (another α-blocker) for prevention of post-herniorrhaphy urinary retention and concluded that prazosin decreased the incidence of POUR from 25% to 10.8% ($P<0.05$) (12).

Tamsulosin is a superselective long acting alpha-1a blocker with acceptable side effects. Mohammadi-Fallah et al. assessed preventive effect of tamsulosin on post-herniorraphy urinary retention. In this randomized study, 40 patients received 0.4mg tamsulosin 6 hours before and 6-12 hours after surgery and 40 patients received placebo in the same manner. They concluded perioperative administration of tamsulosin reduced the risk of POUR from 15% to 2.5% ($p = 0.04$). They mentioned that type of anesthesia, the duration of surgery and severity of preoperative urinary symptoms had no significant effect on the incidence of POUR (10).

In our study in tamsulosin group, 7 from 118 patients developed POUR (5.9%) while in placebo group 24 from 114 patients developed POUR (21.1%). So tamsulosin reduced development of POUR significantly ($P = 0.001$). Although we have excluded patients with duration of surgery more than 90 min., but even in patients in this range longer duration there was associated a higher risk of POUR ($p = 0.039$). Also, in our study, lower age was associated with higher risk of POUR ($p = 0.017$). Although clinical importance of this finding may be insignificant because all of patients were below 50 years old. In our study, the type of surgery (varicocelectomy, herniorrhaphy and scrotal surgery) didn't affect the risk of POUR ($P = 0.919$). We have excluded patients with excessive fluid intake perioperatively (> 1500cc) and long duration of surgery (> 90 min.) since their effects on development of POUR were confirmed in several studies.

In the majority of medical centers these kinds of surgeries are performed very frequently as an outpatient procedure, and admission of all patients in our department was one of the most limitations of our study. Diagnosis of POUR by history and physical examination instead of sonography is another study limitation.

CONCLUSIONS

This study suggests that perioperative tamsulosin administration reduces the incidence of postoperative urinary retention and the need for catheterization after varicocelectomy, herniorrhaphy and scrotal surgery.

CONFLICT OF INTEREST

None declared.

REFERENCES

1. Baldini G, Bagry H, Aprikian A, Carli F: Postoperative urinary retention: anesthetic and perioperative considerations. Anesthesiology. 2009; 110: 1139-57.
2. Buckley BS, Lapitan MC: Drugs for treatment of urinary retention after surgery in adults. Cochrane Database Syst Rev. 2010; 10: CD008023.
3. Petros JG, Rimm EB, Robillard RJ, Argy O: Factors influencing postoperative urinary retention in patients undergoing elective inguinal herniorrhaphy. Am J Surg. 1991; 161: 431-3; discussion 434.
4. Chen J, Matzkin H, Lazauskas T, Lelcuk S, Braf Z: Posthernioplasty urinary retention: a noninvasive work-up for prediction. Urol Int. 1993; 51: 243-5.

5. Barone JG, Cummings KB: Etiology of acute urinary retention following benign anorectal surgery. Am Surg. 1994; 60: 210-1.
6. Zaheer S, Reilly WT, Pemberton JH, Ilstrup D: Urinary retention after operations for benign anorectal diseases. Dis Colon Rectum. 1998; 41: 696-704.
7. Toyonaga T, Matsushima M, Sogawa N, Jiang SF, Matsumura N, Shimojima Y, et al.: Postoperative urinary retention after surgery for benign anorectal disease: potential risk factors and strategy forprevention. Int J Colorectal Dis. 2006; 21: 676-82.
8. Darrah DM, Griebling TL, Silverstein JH: Postoperative urinary retention. Anesthesiol Clin. 2009; 27: 465-84.
9. Fitzpatrick JM, Kirby RS: Management of acute urinary retention. BJU Int. 2006; 97(Suppl 2): 16-20; discussion 21-2.
10. Mohammadi-Fallah M, Hamedanchi S, Tayyebi-Azar A: Preventive effect of tamsulosin on postoperative urinary retention. Korean J Urol. 2012; 53: 419-23.
11. Livne PM, Kaplan B, Ovadia Y, Servadio C: Prevention of post-hysterectomy urinary retention by alpha-adrenergic blocker. Acta Obstet Gynecol Scand. 1983; 62: 337-40.
12. Gönüllü NN, Dülger M, Utkan NZ, Cantürk NZ, Alponat A: Prevention of postherniorrhaphy urinary retention with prazosin. Am Surg. 1999; 65: 55-8.
13. Lose G, Lindholm P: Prophylactic phenoxybenzamine in the prevention of postoperative retention of urine after vaginal repair: a prospectiverandomized double-blind trial. Int J Gynaecol Obstet. 1985; 23: 315-20.
14. Lucas MG, Stephenson TP, Nargund V: Tamsulosin in the management of patients in acute urinary retention from benign prostatic hyperplasia. BJU Int. 2005; 95: 354-7.
15. Faas CL, Acosta FJ, Campbell MD, O'Hagan CE, Newton SE, Zagalaniczny K: The effects of spinal anesthesia vs epidural anesthesia on 3 potential postoperative complications: pain, urinary retention, and mobility following inguinal herniorrhaphy. AANA J. 2002; 70: 441-7.
16. Bross S, Schumacher S, Scheepe JR, Zendler S, Braun PM, Alken P, et al.: Effects of acute urinary bladder overdistension on bladder response during sacral neurostimulation. Eur Urol. 1999; 36: 354-9.
17. Finley RK Jr, Miller SF, Jones LM: Elimination of urinary retention following inguinal herniorrhaphy. Am Surg. 1991; 57: 486-8; discussion 488-9.
18. Hindley RG, Brierly RD, Thomas PJ: Prostaglandin E2 and bethanechol in combination for treating detrusor underactivity. BJU Int. 2004; 93: 89-92.
19. Jensen P, Mikkelsen T, Kehlet H: Postherniorrhaphy urinary retention--effect of local, regional, and general anesthesia: a review. Reg Anesth Pain Med. 2002; 27: 612-7.
20. Goldman G, Leviav A, Mazor A, Kashtan H, Aladgem D, Greenstein A, et al.: Alpha-adrenergic blocker for postherniоplasty urinary retention. Prevention and treatment. Arch Surg. 1988; 123: 35-6.
21. Savona-Ventura C, Grech ES, Saliba I: Pharmacological measures to prevent post-operative urinary retention; a prospective randomized study. Eur J Obstet Gynecol Reprod Biol. 1991; 41: 225-9.

Correspondence address:
Hamidreza Baghani Aval, MD
Urology Research Center, School of Medical,
Guilan University of Medical Sciences
Urology Research Center,Razi Hospital,
Sardar Jangal St.,Rasht,Iran
Fax: +98 131 552-5259
E-mail: hamidreza_baghani@yahoo.com