

Tamsulosin versus Fluid Therapy in Management of Ureteric Stone: A Comparative Study

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ABSTRACT

Introduction: Almost all ureteric stone migrates from kidney. The drugs commonly used to assist in the passage of bigger calculi include alpha-blockers, calcium channel antagonists, phosphodiesterase inhibitors, corticosteroids. Tamsulosin is an alpha-1 adrenergic receptor antagonist known to augment the stone expulsion rate. **Aims:** To evaluate the efficacy of Tamsulosin versus fluid therapy in management of urolithiasis. **Methods:** The study was carried out on 100 patients (divided into 2 groups) at Nepalgunj Medical college Hospital Nepalgunj from May 2020 to April 2021, between 18-50 years of age of either sex, presenting with a symptomatic urinary calculus as demonstrated on imaging. Group 1 received 0.4mg of tablet tamsulosin once daily for 4 weeks, whereas Group 2 fluid therapy for a period of 4 weeks or until expulsion of stone. **Results:** Group A reflected 88% (40 patients) expulsion rate, whereas Group B reflected 72.0% (36 patients) expulsion rate. There was a statistically significant difference in the expulsion rate amongst both the groups. 92.0% (46 patients) subjects in Group A demonstrated stone expulsion within 4 weeks, mean time being 8 days. In comparison only 70.0% (35 patients) subjects in Group B demonstrated stone expulsion within 4 weeks, mean time being 14 days. Use of tablet diclofenec 100mg was lower in Group A in comparison to Group B. **Conclusion:** Tamsulosin is a safe and effective pharmacological agent in management of ureteric stones as it known to increase overall stone expulsion rate, reduced stone expulsion time, decrease acute attacks by acting as a spasmolytic, and fewer pain episodes. It may be considered as a conservative therapeutic option before more invasive procedures like ureteroscopic removal or Extracorporeal shock wave lithotripsy.

Keywords: Alpha blockers, medical expulsion therapy, microhematuria, spasmolytic, Tamsulosin, urolithiasis, ureteric stone

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INTRODUCTION

Urolithiasis, also referred to as urinary stone disease is one of the commonest pathologies linked to the urinary tract.¹ It may occur at any age or gender; however, men are more frequently affected than women between 20–49 years of age.² Stones are primarily composed of calcium oxalate or phosphate (80%).³ Recent studies reflect that ureteric stones could be triggered due to lack of physical activity, obesity, dietary habits, family history, environmental factors, etc.⁴ Stone formation may be triggered by reduced fluid ingestion, excessive intake of animal protein, tea, coffee, aerated drinks, beans, berries, chocolate, potatoes, etc.⁵ There is development of crystals in supersaturated urine which adhere to the urothelium, thereby generating a nidus for consequent stone escalation.⁶ Factors which may contribute to the development of calculi include low urinary pH, hypovolemia and hyperuricosuria.⁷ Obstruction may act as source of septicemia and often associated with hemodynamic instability.^{8,9} Ultrasound, intravenous pyelography, computed tomography, digital tomosynthesis, Magnetic Resonance Imaging are the commonly used

modalities for diagnosis.^{10,11} Therapeutic modalities include shockwave lithotripsy, ureteroscopy, surgical removal and pharmacologic therapy. Commonly used drugs are analgesics, antiemetics, etc.¹² Drugs commonly used to promote discharge of calculi include alpha-blockers, calcium channel antagonists, phosphodiesterase inhibitors, corticosteroids, etc.¹³ Tamsulosin blocks the α -1 adrenergic receptors which reduces basal smooth muscle contraction causing propulsive antegrade peristalsis aiding stone expulsion.¹⁴ The study was carried out to evaluate the efficacy of Tamsulosin versus fluid therapy as expulsive agent in management of ureteric calculi.

METHODS

This comparative study was carried out at Nepalgunj Medical College Hospital Nepalgunj from the time period of one year (May 2020 to April 2021). A total of 100 patients, between 18-50 years of age of either sex, presenting with a symptomatic all ureteic calculus of less than 10 mm in size (diameter along the axial cross section) as demonstrated on ultrasound and computed tomography. Subjects presenting with symptoms suggestive of urinary tract infection; pregnant patients,

calculus greater than 10mm, solitary kidney, ureteral strictures, patients with elevated creatinine levels; pediatric patients or patients with a history of kidney transplant or stone in solitary kidney, known allergy to alpha blockers were excluded from the study.

A thorough history of presenting illness was recorded along with clinical examination. All the subjects were subjected to routine urine analysis, urine culture, serum creatinine. The imaging modalities used were X-ray kidney ureter bladder (KUB), ultrasonography (USG)abdomen pelvis, or Computed tomography based on the availability and preference of the doctor. The location and size of the calculi were determined by the reporting radiologist and the size was measured in the biggest dimension along the axial cross section.

The subjects were randomly divided into 2 groups: Group 1 received 0.4mg of tamsulosin tablet once daily for 4 weeks, whereas Group 2 received fluid therapy alone for a period of 4 weeks or until expulsion of stone. Both groups were prescribed analgesic, namely tablet diclofenac 100mg twice a day and a proton pump inhibitor namely Pantoprazole 40mg tablet once a day. Patients were instructed to consume copious amount of fluids and strain their urine. Each group was evaluated for primary outcome measures i.e. passage of stone within 4 weeks of therapy and the secondary measures like expulsion time, use of analgesics, repeated visits to the emergency department and side effects. Participants who underwent emergency surgery for the ureteral stone were considered as failures.

Permission was granted from the Ethical Committee Board and an informed consent was taken for all the patients. The readings were recorded in master chart, and the data analysis was carried out statistically by using SPSS 19.

RESULTS

The present study was conducted on 100 subjects ranging between years of age group of 18-50 years comprising of 68 males and 32 females.

Stone passage was determined by computed tomography or ultrasound in both groups. Group A reflected 88.0% (44 patients) expulsion rate, whereas Group B reflected 72.0% (36 patients) expulsion rate. There was a statistically significant difference in the expulsion rate amongst both the groups.

Expulsion time was significantly shorter in the tamsulosin group than the placebo group. 92.0% (46 patients) subjects in Group A demonstrated stone expulsion within 4 weeks, mean time being 8 days. In comparison only 70.0% (35 patients) subjects in Group B demonstrated stone expulsion within 4 weeks, mean time being 14 days. Use of analgesics was lower in Group A in comparison to Group B. Also, in group A only 26.0% (13 patients) subjects experienced recurrent attacks of pain, whereas 64.0% (32 patients) subjects in group B experienced recurrent attacks of pain.

On comparison of side effects between the 2 groups like dizziness, vomiting, hypotension, headache, fatigue, were

often reported, however, there was no statistically significant difference found. None of the patients in both the groups underwent hospitalization or had emergency room visits.

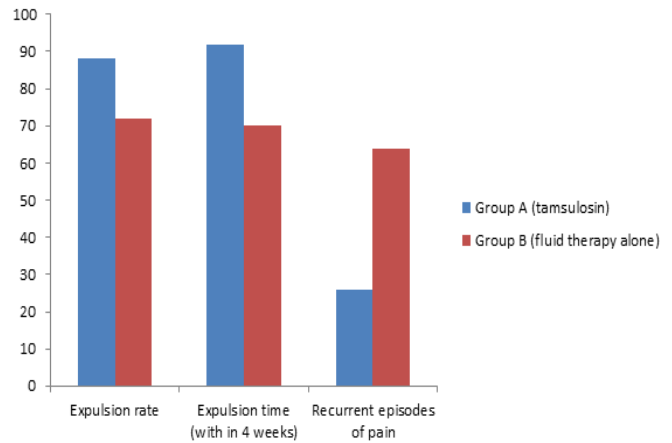


Figure 1: Distribution of treatment outcome measures

Outcome	Group A (n=50)	Group B (n=50)	P-value
Stone passage	44 (88.0%)	36 (72.0%)	0.01, S
Expulsion time (within 4 weeks)	46 (92.0%)	35 (70.0%)	0.01, S
Recurrent episodes of pain	13 (26.0%)	32 (64.0%)	0.024, S
Side effects to the drugs	17 (34.0%)	16 (32.0%)	0.58

S- Significant

Table I: Outcomes by treatment groups

DISCUSSION

Medical expulsion therapy is gaining attention currently as it is known to promote spontaneous stone expulsion and alleviate pain.¹⁵ The pharmacological action of alpha blockers in augmenting stone expulsion could be attributed to reduction in spasm, increase in pressure proximal to the stone and dilatation/ relaxation of the ureter at the sites distal to the stone. The basis in incorporating these agents in expulsive therapy is their proficiency in reducing ureteral contractions, decreasing the regularity of peristaltic contractions and increasing the amount of fluid bolus transported down the ureter. Tamsulosin has been the most commonly studied agent in the management of calculi.¹⁶

Group A reflected 88.0% (44 patients) expulsion rate, whereas Group B reflected 72.0% (36 patients) expulsion rate. There was a statistically significant difference in the expulsion rate amongst both the groups. Our findings were in concordance with the one conducted by Griwan et al 2010 who conducted a comparative study in between watchful waiting and treatment with tamsulosin in 60 patients, with a follow up of 28 days. Group II showed a statistically significant advantage in terms of the stone expulsion rate.¹⁷ Expulsion time was significantly shorter in the tamsulosin group than the placebo group. Similar results were found in the study carried out by Chandawat et

al where the Tamsulosin group had a mean expulsion time of 7.86 days, whereas in high fluid group, the mean expulsion time was 18.64 days.¹⁵

Use of analgesics was lower in Group A in comparison to Group B. Also, in group A only 26.0% (13 patients) subjects experienced recurrent attacks of pain, whereas 64.0% (32 patients) subjects in group B experienced recurrent attacks of pain. Similar results were found in the study conducted by Elgalaly et al to compare the efficacy of silodosin (8 mg) vs tamsulosin (0.4 mg), as a medical expulsive therapy, in the management of distal ureteric stones. It has been reflected that Tamsulosin group showed a significant advantage for stone expulsion time and analgesic use.¹⁸

There is an additional benefit associated with the use of α -blockers in ureteric stone patients being subjected for surgical intervention; as it is known to relieve symptoms related to an indwelling stent, as also reported by other studies.¹⁹

LIMITATIONS

The limitations of the present study were the relatively few patients, which should be increased in future studies, similarly the study is nonrandomized. The study has not considered the site of the ureteric stone as lower ureteric stone has more chance of passing than upper and middle.

CONCLUSION

Tamsulosin may thus be concluded as a safe and effective pharmacological agent in management of ureteric calculi as it known to increase overall stone expulsion rate, reduced stone expulsion time, decrease acute attacks by acting as a spasmolytic, and fewer pain episodes. It may be considered as a conservative therapeutic option before more invasive procedures like ureteroscopy or lithotripsy. It may also be used use post-lithotripsy for enhancing the clearance rate, reducing expulsion time and reducing renal colic. The long-term use of the drug may be helpful in preventing recurrence; however the patients must be reevaluated for stone progression and other causes of renal colic.

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