



ISSN: 2091-2749 (Print)
2091-2757 (Online)

Correspondence

Dr. Narayan Thapa
Consultant Surgeon and Asst.
Professor, Department of Surgery
Shree Birendra Hospital, Nepalese
Army Institute of Health Sciences,
Kathmandu, Nepal
Email: snthapa2061@gmail.com
Phone: 9849403469

Peer reviewed by

Prof. Dr. Jay N Shah
Patan Academy of Health Sciences

Dr. Ashis Shrestha
Patan Academy of Health Sciences

Tamsulosin in the management of distal ureteric calculi

Narayan Thapa, Bharat Bahadur Bhandari, Bhairab Kumar Hamal

Department of Surgery, Shree Birendra Hospital and Nepalese Army Institute of Health Sciences, Kathmandu, Nepal

ABSTRACT

Introductions: Ureteral stones account for 20% urinary stone. Two third of ureteral stones are seen in lower third of ureter. Medical expulsive therapy is effective for such stones. This study was designed to observe the efficacy of 'tamsulosin' a selective alpha-1 adrenoreceptor antagonist in the management of lower ureteric stone.

Methods: A cross sectional study of 70 cases of distal ureteral stones of sizes 5 to 10 mm was taken in the Department of Surgery of Shree Birendra Hospital, Nepalese Army Institute of Health Sciences (NAIHS) from January 2011 to 2013. Patients were randomly divided into tamsulosin and analgesic only groups. Stone expulsion at the end of three weeks was confirmed by X-ray or Ultrasonography.

Results: Out of 70 patients, stone clearance rate in tamsulosin group was 28 in 35 cases (80%) and 21 in 35 cases (60%) in group II with analgesic only. The mean time of stone expulsion was 8.3 days in group I and 13.5 days in group II.

Conclusions: In this study the use of tamsulosin in treatment of lower ureteral stones less than 10 mm was safe and effective.

Keywords: alpha blockers, ureteral stone, tamsulosin

Plain Language Summary

The study was conducted to see effectiveness of tamsulosin in management of lower ureteric stone. The mean time of stone expulsion was lesser in tamsulosin group. tamsulosin is an effective treatment.

INTRODUCTIONS

Urinary stone is a common urological problem throughout the world.¹ More than 50% of lower ureteric stones less than 5 mm pass out spontaneously. This decreases to less than 15% for larger stones more than 5 mm.²

Studies have shown that, 'tamsulosin' a selective alpha-1 adrenoreceptor antagonist, is effective in expulsion of lower ureteral calculi. In this study, we observed the efficacy of tamsulosin in selected patients with lower ureteral stone.

METHODS

This was a cross sectional study conducted on outpatient basis from January 2011 to January 2013 at Shree Birendra Hospital, National Army Institute of Health Sciences, Kathmandu, Nepal. Patients older than 15 years of age who visited surgery OPD (outpatient department) and emergency department with symptomatic, unilateral, solitary lower ureteral stones (located below sacroiliac joint) of 5 to 10 mm size were included. Plain X-ray or ultrasound of the KUB (Kidney-Ureter-Bladder) were used to detect the stones. Those with urinary tract infection, renal failure, history of urinary surgery or endoscopic treatment, uncorrected distal obstruction and moderate to severe hydronephrosis were excluded from the study. Patients who developed deranged renal function or intractable pain that could not be managed on OPD basis or refused to participate in the study were also excluded. Complete haemogram, blood urea, serum creatinine, urine for routine examination and culture sensitivity, X-ray and ultrasound KUB were carried out in all patients. Written consent from patients or guardian or family was obtained. Permission from hospital authority was taken for the study.

Patients were divided randomly by envelop methods for tamsulosin 0.4 mg at bed time (study, group I) and observation with analgesic only (control, group II). Patients were further grouped as per stone size less than 5mm, size 5.1mm-7mm, and 7.1mm-10mm). All patients were advised to have high fluid intake more than three liters a day. Tablet Diclofenac 50 mg three times a day for five days and thereafter on demand was given for pain management. The patients were followed weekly for three weeks in surgery outpatient department. They were evaluated with urine routine examination, serum creatinine and ultrasound or X-ray KUB were performed to observe complication and passes of stone.

Successful results were defined as complete stone clearance. The time of stone expulsion was based on patient's notice of passing stone during urination and or confirmation during weekly follow up. The failure was considered if stone persisted at the end of 3rd week (21 days). Patients who required admission for uncontrolled pain or complication or discontinued the study were also considered as failure. Those with persisting stone after 21 days were considered for endoscopic removal.

RESULTS

There were total 70 patients (35 in each group I and II). There were 41 (58.5%) male patient and 29 (41.4%) female patient. Age ranged from 15 years to 63 years. The smallest size of stone was 4.6 mm and the largest 10.5 mm. Stone clearance was 28 out of 35 cases (80%) in Group I and 21 out of 35 cases (60%) in group II.

Table 1. Size of distal ureteral stone and clearance

Size of stone	Tamsulosin group I (28 stone clearance out of 35)	Control group II (22 stone clearance out 35)
< 5mm	100% (13/13)	93% (15/16)
5.1 mm -7mm	73.33% (11/15)	36.36% (4/11)
7.1 mm -10mm	57% (4/7)	25% (2/8)

DISCUSSIONS

Various treatment options are available for the management of distal ureteral calculi. Advances in endourological techniques and instrumentation have changed the management of ureteral stones by open surgeries to either minimal invasive methods like ESWL and ureteroscopic removal of stones or simple watchful waiting. The minimal invasive therapies for ureteral stone are now the accepted gold standards. Nevertheless, these techniques are not risk-free, quite expensive and are not widely available in the developing countries.³

Watchful waiting is appropriate for small stones that are not causing acute symptoms and that are likely to pass out spontaneously.⁴ The choice of the ideal method of treatment depend on the stones size, location, number, spasm of muscle, mucosal oedema, inflammation, ureteral anatomy, type of equipment available, needs of the patient and the skills of the surgeon.⁵ The problem that can emerge during expectant treatment may include development of hydronephrosis, deranged renal function, infection or urosepsis and colicky pain.⁶

Whenever we consider for conservative treatment, numerous studies currently demonstrate promising

result for adjuvant medical expulsion therapy (MET) in term of rapid stone expulsion and symptom free period. The drugs commonly used for MET are calcium channel blockers, corticosteroids, prostaglandin synthesis inhibitors and alpha- blockers.⁷ Borghi and colleagues⁸ used an expulsive therapy consisting of methyl prednisolone and nifedipine in randomized double blind study, treating patients with distal ureteral stones of different size. They demonstrated beneficial effect in reducing the time to stone passage and improving the expulsion rate. Their results were confirmed by Porpiglia et al, who used nifedipine and deflazacort.⁹ Cooper and associates treated 70 patients having ureteral calculi and found that addition of nifedipine, prednisone, acetaminophen and antibiotics to standard medical therapy resulted in higher stone passage rate and fewer workday, emergency visits and surgical interventions.¹⁰ But these studies failed to quantify the result of each drug. These drugs also have many adverse effects like asthenia, headache, palpitations which may result in discontinuation of treatment. Due to the more adverse effect of other drugs, the use of alpha-blockers has increased recently, in which it was observed that tamsulosin is a safe and effective drug that enhances spontaneous passage of distal ureteral stones sized less than 10 mm.

The human ureter contains predominantly alpha receptors which are further classified as alpha 1 and alpha 2 receptors. In turn alpha 1 receptors which are divided into subtypes on the basis of their selectivity. Alpha 1a (proximal urethra, prostate, bladder outlet), alpha1b (smooth muscles of vessels) and alpha1d (detrusor, lower ureter).¹¹ When stimulated, they inhibit the basal tone, peristaltic wave frequency and the ureteral contractions even in the intramural part of lower ureter. They may work on the obstructed ureter by inducing an increase in the intraureteral pressure gradient around the stone, which increase in the urine bolus above the stone as well as decreased peristalsis below the ureter, in association with the decrease in basal and micturition pressures even at the bladder neck, thereby an increased chance of stone expulsion.¹² Ukhal and co-workers were the first to report positive result in accelerating the lower ureteral stone passage using alpha blocker agent.¹³

In our study the overall stone clearance rate was 80% in case of tamsulosin group whereas 60% in control group. De Sio et al published a study of 96 patients and achieved 90% expulsion rate with tamsulosin therapy.¹⁴ MS Griwan et al, noticed overall stone expulsion rate of 21 out of 30 patients (70%) was observed for control group and 27 out of 30 patients (90%) in study group.¹⁵

Cervenakov et al, concluded that the treatment by $\alpha 1$ blockers considerably decreased not only lower

urinary tract symptoms (LUTS) but also helped to accelerate the passing of minor calculi from the terminal parts of the ureter of 80.4% of patients.¹¹ Dellabella *et al*, used tamsulosin as a spasmolytic drug during episodes of ureteral colic due to juxtavesical calculi, observed an increased stone expulsion rate and with a decrease in stone expulsion time, the need for hospitalization and endoscopic procedures.¹⁶

Regarding the size of stone and clearance rate in this study, there was 100% clearance in case of group I and 93% clearance in group II when stone size was less than 5mm. In cases of stone size 5.1 mm- 7mm, the clearance rate was 73.33% in group I and 36.36% in group II. When stone size was in the range of 7.1 mm -10mm the clearance rate was 57.14% in group I and 25% in group II. The mean time of stone expulsion was 8.3 days in group I and 13.5 days in group II.

Jamshed Rahim et al, has been published an article where the average expulsion time of stone in tamsulosin group was 13.30 \pm 6.31 days and in control group it was 19.18 \pm 4.66 days. In tamsulosin group the total number of stone expulsion was in 37(87.22%) out of 45 patients and in control group stone expulsion was in 22 (48.88%) out of 45 patients only. Treatment with MET showing a significant results in term of stone clearance as compared to treatment with control group i.e., p-value=0.001.¹⁷ Abdulla- al Ansari et al, reported 100 cases of distal ureteric stones where the stone expulsion occurred in 41 of 50 patients (82%) in group with MET and in 28 of 46 patients (61%) in placebo group (p = .02). The expulsion time was significantly shorter in the tamsulosin group 6.4 \pm 2.77 days vs. 9.87 \pm 5.4 days for groups 1 and 2 respectively.¹⁸ Sayed MA et al, reported another study where the stone expulsion rate was 51.1% for Group A (control group), compared to 88.9% for Group B (study group) (p=0.001). The average time to expulsion was 12.53 \pm 2.12 days for Group A and 7.32 \pm 0.78 days for Group B (p=0.04).¹⁹

The overall stone clearance in two groups showed variable result in different size of stones, however the expulsion rate was better in MET group than control group and time of expulsion also was significantly different especially when size of stone was more than 5 mm.

CONCLUSIONS

In our study, tamsulosin was more effective in distal ureteral stone clearance than analgesic alone, decrease acute attacks by acting as a spasmolytic. Appropriately used, it may have substantial financial benefits by reducing the number of interventional procedures and the acute attacks.

REFERENCES

1. Menon M, Parulkar BG, Drach GW. Urinary lithiasis etiology, diagnosis and medical management. In: Walsh PC, Ratik AB, Vaughan ED jr, Wein AJ, editors. *Campbell's urology*. 7th ed. Philadelphia. WB Saunders;1998. p - 261-73.
2. Marshall LS. Urinary stones disease. In: Amend WJ Jr, Barbour S, Baskin LS, Berger TG, Bloom AL, Bretan PN Jr, et al. editors. *Smith's Urology*. New York: McGraw Hill; 2004. p. 256–90.
3. Lotan Y, Gettman MT, Roehrborn CG, Cadeddu JA, Pearle MS. Management of ureteral calculi: a cost comparison and decision making analysis. *J Urol*. 2002;167:1621.
4. Fowler CG. The kidneys and ureters. Russell RC, Williams NS, Bulstrode CJ, editors. *Bailey and Love's short practice of Surgery*. 24th ed. New York: Edward Arnold (Publisher) Ltd;2004. p – 1321-33.
5. Coll DM, Varanelli MJ, Smith RC. Relationship of spontaneous passage of ureteral calculi to stone size and location as revealed by unenhanced helical CT. *AJR Am J Roentgenol*. 2002;178:101-3.
6. Teichman JM. Clinical practice: acute renal colic from ureteral calculus. *N Eng J Med*. 2004;350:684-93.
7. Hollingsworth JM, Rogers MA, Kaufman Sr, Bradford TJ, Saint S, Wei JT, et al. Medical therapy to facilitate urinary stone passage: a meta-analysis. *Lancet*. 2006 Sep 30;368(9542):1171-9.
8. Borghi L, Meschi T, Amato F. Nifedipine and methylprednisolone in facilitating ureteral stone passage: A randomized double blind placebo controlled study. *J Urol*. 1994;152:1095-8.
9. Porpiglia F, Destefanis P, Fiori C. Effectiveness of nifedipine and deflazocort in the management of distal ureteral stones. *Urology*. 2000;56:579-83.
10. Cooper JT, Stack GM, Cooper TP. Intensive medical management of ureteral calculi. *Urology*. 2000;56: 575-78.
11. Cervenakov I, Fillo J, Mardaik J, Kopency M, Smilrala J, Lepies. Speedy elimination of urolithiasis in lower part of ureters with alpha1 blockers tamsulosin. *Int J Urol Nephrol*. 2002;34:25-9.
12. Pricop C, Novac C, Negru D, Iiie C, Pricop A, Tanase A. Can selective alpha blockers help the spontaneous passage of the stones located in the uretero bladder junction. *Rev Med ChirSoc Med Nat*. 2004;108:128–33.
13. Ukhal MI, Malomuzh OI, Strashnyi VV, Shulilin MV. The use of the alpha1 adrenoblockerdoxazosin in the pharmacotherapy of disorders of urine outflow of spastic origin. *LikSprava*. 1998;8:118.
14. De sio M, Antorino R, Di Lorenzo G, Damiano R, Giardino D, Consentino K, et al. medical expulsive treatment of distal-ureteral stones using tamsulosin: a single center experience. *J endourol*. 2006;20:12-6.
15. Griwan MS, Singh SK, Paul H, Pawar BS, Verma M, et al. The efficacy of tamsulosin in lower ureteral calculi. *Urol Ann*. 2010 May-Aug;2(2):63–6.
16. Dellabella M, Milanese G, Muzzonigro G. Medical expulsive therapy for distal ureterolithiasis: randomized prospective study on role of corticosteroids used in combination with tamsulosin—simplified treatment regimen and health related quality of life. *Urology*. 2005;66:712–5.
17. Rahim J, Mahmood A, Ashraf S, Tahir MM, Khan MU. Efficacy of tamsoluslin spontaneous expulsion in the treatment of distal ureteric stones. *Pakistan Journal of Medical and Health Science {Online}*. 2012 Jan-Mar;6(1):191-4. Available from: http://pjmhsonline.com/JanMar2012/efficacy_of_tamsoluslin_spontaneous_expulsion.htm.
18. Al-Ansari A, Al-Naimi A, Al Obaidy A, Assadiq K, Azim MD, Shokoir A, et al. Efficacy of tamsulosin in the Management of Lower Ureteral Stones: A Randomized Double-blind Placebo-controlled Study of 100 Patients. *Urology*. 2009;09:73.
19. Sayed MA, Abohyosa A, Abdalla MA, EL-Azab AS, et al. Efficacy of tamsulosin in medical expulsive therapy for distal ureteral calculi. *Scand J UrolNephrol*. 2008;42(1):59-62.