



Medical Treatment of Distal Ureteric Stone

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Abstract

Various treatment modalities are available in the market for the treatment of distal ureteric stone. This study was conducted to evaluate the efficacy of tamsulosin as an expulsive pharmacologic therapy for the treatment of distal ureteral stone. 100 patients over 15 years of age who were diagnosed as a case of distal ureteric calculi of size less than or equal to 8mm were included in the study and they were randomized blindly into two groups with 50 patients in each group. Group A Patients were given Cap Tamsulosin 0.4 mg, 1 daily up to 4 weeks while group B patients were given placebo, 1 Cap daily up to 4 weeks. Both groups were given tab diclofenac Sodium 50 mg, 1 tab 8 hourly for pain control on required basis and advice to drink plenty of water. Patients were evaluated with plain X-Ray KUB and USG whole abdomen after one week, two week, three week and four weeks. The primary endpoint was expulsion rate. Expulsion time, need for analgesics, need for hospitalization and drug side effects were secondary endpoints. Both group contains 50 patients. Mean age of patients in Group A is 31.90 ± 5.76 and in Group B is 33.14 ± 5.97 . Mean stone size was 6.87mm in greatest dimension. Regarding age, sex, stone size and stone lateralization (right/left), there was no significant difference between the group A and B. A stone expulsion rate of 78% (39 patients) was noted in group A and 48% (24 patients) in group B. Group A revealed a statistically significant advantage in term of stone expulsion rate ($p=0.0018$). By using tamsulosin a higher stone expulsion rates can be achieved in a shorter time.

Introduction

Various methods are available for the treatment of ureteral stone which include: conservative management, medical expulsive therapy, active intervention with either shockwave lithotripsy (SWL) or ureteroscopy (URS). Treatment of the

ureteral calculi depends on various factors which can be broadly divided in four categories stone factors (locations, size, composition, presence and duration of obstruction), clinical factors (symptom severity, patient's expectations, associated infection, obesity, coagulopathy,

hypertension and solitary kidney); *anatomic factors* (horseshoe kidney, ureteropelvic junction obstruction and renal ectopia); and *technical factors* (available equipment, expertise and cost)¹. Generally most of the ureteral stones pass spontaneously and it depends on stone size, shape, location and associated ureteral oedema. Ureteral calculi 4–5 mm in size have a 40–50% chance of spontaneous passage. In contrast, calculi >6 mm have a <5% chance of spontaneous passage. The vast majority of stones that pass do so within a 6 weeks period after the onset of symptoms. Ureteral calculi discovered in distal ureter at the time of presentation have a 50% chance of spontaneous passage, in contrast to a 25% and 10% chance in the mid and proximal ureter, respectively². Successful medical expulsive therapy (MET) for patients with distal ureteral stones using the non selective α -blocker doxazosine was first reported in the late 1990³. Tamsulosin hydrochloride adrenergic blockers used for expulsion of ureteral stone because distal one third of ureter and ureterovesical junction has high densities of α -1 receptors and α -1d-receptors^{4,5,6}. Therefore, α -adrenergic receptor antagonists decrease intraureteral pressure and increase fluid transport. Among these antagonists, tamsulosin hydrochloride seems to be selective and particularly interesting for medical expulsive therapy^{7,8}.

Materials and Methods

Study Area: Department of General Surgery Government Medical College Haldwani.

Study Population: All patients presenting in OPD and Emergency in our hospital who were diagnosed as a case of ureteric calculi confirmed by X-ray KUB, Ultrasonography of abdomen.

Sample Size and Sample Design: A total 100 patients were included in the study, who were randomized blindly into two groups with 50 patients in each group.

Inclusion criteria of study were

1. All patients with age >15 yrs

2. Stone Size \leq 8 mm and stone in distal 1/3 of ureter.

Exclusion criteria of study were

1. Patients with ureteric obstruction
2. Distal ureteric stricture
3. Previous ureteral surgery
4. Solitary kidney
5. Aberrant ureteral anatomy (e.g., ureteral ectopia, ureterocele and mega ureter)
6. UTI and radiolucent stone.

Study Techniques

After careful physical examination, basic investigation like complete haemogram, renal function test, Urine Routine microscopic, X-Ray KUB, U/S KUB and IVU (if required), all patients with the diagnosis of ureteral stone in distal 1/3 were recruited in the study. Group A Patients were given Cap Tamsulosin 0.4 mg, 1 daily up to 4 weeks while group B patients were given placebo, 1 Cap daily up to 4 weeks. Both groups were given tab diclofenac Sodium 50 mg, 1 tab 8 hourly for pain control on required basis and advice to drink plenty of water. Patients were evaluated with plain X-Ray KUB and USG whole abdomen after one week, two week, three week and four weeks. The primary endpoint was expulsion rate. Expulsion time, need for analgesics, need for hospitalization and drug side effects were secondary endpoints. Data was recorded on a Performa. The collected data was then analysed.

Plan for analysis of data: For categorical variables chi-square test was used. For continuous variables independent samples' t-test was used. P-value <0.05 was considered as significant.

Objective of Study

The objective was to evaluate the efficacy of tamsulosin as an expulsive pharmacologic therapy for the treatment of distal ureteral stone. Patients were randomly assigned into one of the two groups. A written informed consent was taken from all the patients.

Result

Group A included 28 males & 22 females with a mean age of 31.90 ± 5.76 whereas Group B consist of 33 males and 17 females with a mean age group 33.14 ± 5.97 there was no significant difference in terms of genders or age of the patients .45 patients had right ureteral calculus and 55 patients had left ureteral calculus. Mean stone size was 6.87 mm (range 4–8 mm) in greatest dimension .Regarding age, sex, stone size and stone lateralization (right/left), there was no significant difference between the group A and B.

Table 1 Stone Expulsion in Both Groups

	Stone pass		
	Yes	No	
Group A	39	11	50
Group B	24	26	50
	63	37	100

As shown in table 1 stone expulsion rate of 78% (39 patients) was noted in group A and 48% (24 patients) in group B. Group A revealed a statistically significant advantage in term of stone expulsion rate ($p=0.0018$).

Table 2 Stone Expulsion Time in Days

Expulsion Time in days	Group A (n=50)	Group B (n=50)
Within 7 days	10 (20%)	2 (4%)
8-14 days	15 (30%)	4 (8%)
15-21 days	5 (10%)	3 (6%)
22-28 days	9 (18%)	2 (4%)
Stone not passed	11 (22%)	26 (52%)

In group A 10 patients (20%) passed their stone within 7 days of treatment, 15 patients (30%) passed stone within 14 days, 5 patients (10%) passed stone within 21 days of treatment and 9 patients (18%) passed stone within 28 days of treatment. On other hand in group B, 2 patients (4%) passed their stone within 7 days of treatment, 4 patients (8%) passed stone within 14 days, 3 patients (6%) passed stone within 21 days and 2 patients (4%) passed their stone within 28 days of treatment.

10 patients (20%) in group A required analgesic (Diclofenac Na) while in group B, 18 patients (36%) required analgesics. No significant difference in terms of pain episodes in group A as compared to group B ($p=0.2482$). No drug side

effects were noted in both the groups. All those patients who did not pass stone at the end of 28 days were successfully treated with ureterorenoscopy.

Discussion

Various treatment modalities available for ureteral stone for example open surgery, minimal invasive methods like ESWL and ureteroscopy or to watchful waiting .The minimally invasive therapies for ureteral stone are now the accepted gold standards. Nevertheless, these techniques are not risk free, are quite expensive and are concentrated at tertiary care centre⁹.

Waiting for the spontaneous passage is an option, only for the smaller ureteral calculi. It may be associated with discomfort of painful episodes. Smaller, more distal and right sided stones are more likely to pass spontaneously¹⁰. However the expectant approach may result in complications, such as infection of urinary tract, hydronephroureter and renal damage¹¹.

Alpha adrenergic receptors are found in abundance in the detrusor and intramural part of the ureter with a predominance of I1A and I1D receptor subtypes in the distal one-third of the ureter^{4, 12}. Alpha-1 adrenergic inhibition reduces the frequency and intensity of peristalsis of the ureter with an increase in the urine flow¹³. Alpha-1 antagonists work on the obstructed ureter by inducing an increase in the intraureteral pressure gradient around the stone, that is an increase in the urine bolus above the stone (and consequently an increase in intraureteral pressure above the stone) as well as decreased peristalsis below the ureter (and consequently a decrease in intraureteral pressure below the stone), in association with the decrease in basal and micturition pressure even at the bladder neck; thereby, an increased chance of stone expulsion. Furthermore, the decreased frequency of phasic peristaltic contractions in the obstructed ureteral tract induced by tamsulosin might determine a decrease in the algogenic stimulus or its absence¹³.

Dellabella and colleagues (2003)¹³, in a study performed to investigate the efficacy of tamsulosin in facilitating ureteral stone passage, found that tamsulosin therapy was associated with an increased stone expulsion rate and a decreased time to stone expulsion

In our study a stone expulsion rate of 78% (39 patients) was noted in group A and 48% (24 patients) in group B. Group A revealed a statistically significant advantage in term of stone expulsion rate ($p=0.0018$). These results are comparable to similar studies by De Sio¹⁴.

In terms of analgesia there was no statistically significant number in Group A as compared to Group B. In this study 20% patient in group A and 36% patients in group B required analgesic. Tamsulosin can be used in association with ESWL for larger ureteral calculi, to achieve a higher stone clearance rate. Because the patient symptoms and stone size do not predict loss of renal function, and because there is no clear time threshold for irreversible damage, intervention should be considered in any patient with ureteral obstruction unless the ability to closely monitor renal function is available

Conclusion

Medical therapy should be given to the uncomplicated distal ureteric stone of size less than 8mm. Tamsulosin is far better drug compared to watchful waiting management in terms of stone expulsion rate.

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Conflict of interest: No

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