

Response of Nifedipine Administration in Multi – Ethnic Patients of Ureteric Calculi in a United Arab Emirates Hospital

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ABSTRACT

Introduction: Ureteric stones are a common problem, but diuretics tend to exhaust the patient. Nifedipine, a calcium channel blocker is being prescribed by urologists all over the world, except in UAE hospitals. Our study was aimed at verifying the claimed efficacy of Nifedipine in UAE patients, comprising of multi-national population.

Materials and Methods: 120 ureteric stone patients of both sexes were randomly divided into a Nifedipine and NSAID treated group A (study group) and a control group receiving NSAID alone.

Results: Nifedipine administration resulted in expulsion of ureteric stone much earlier and to a significant extent as compared to controls ($p < 0.001$). Nifedipine achieves about 75% success in expelling ureteric stones less than 1cm size in UAE patients.

Conclusion: Nifedipine can be successfully used to expel

ureteric calculi in UAE patients not suffering from any cardiac ailment.

Key Words: Expulsion, Nifedipine, Ureteric stone.

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INTRODUCTION

Urinary stone is a common and recurrent ailment and as old as human civilization. The oldest known urinary stone was found in a mummy dated 4800 BC. Twelve percent of people have urinary stone during their life time and recurrence rate reaches about 50%. Stone disease is among the most painful conditions. The debilitating effects of kidney and ureteral stones are quite substantial¹. Normally, urine contains many dissolved substances. At times, these may become concentrated in the urine and form solid crystals. These crystals can lead to the development of stones when materials continue to build up around them, much as a pearl is formed in an oyster. Stones formed in the kidney are called kidney stones. Ureteral stone is a kidney stone that has left the kidney and moved down into the ureter².

Earliest possible removal of urinary stone is desirable because of the following reasons:

- Complete blockage of the urinary flow from a kidney decreases glomerular filtration rate (GFR) and, if it persists for more than 48 hours, may cause irreversible renal damage³.
- If ureteric stones persist after four weeks, there is a 20% risk of complications, including hydronephrosis, deterioration of renal function, sepsis and ureteric stricture^{3,4}.
- Infection can be life-threatening^{3,4}.
- Kidney function impairment may also occur^{3,4}.

Interventional methods of treatment are quite costly and patients are also reluctant to accept. Medical expulsion of stone is popular among the patients and patients quite readily agree to this non-surgical form of treatment⁵.

- Nifedipine has been used by urologists all over the world with good results^{6,7,8}. It is a short acting, dihydropyridine class of calcium channel blocker. It acts by blocking the calcium channels in smooth muscle cells, thus relaxing them⁹.

Rationale

Urinary stone is quite common in UAE patients. About 40 – 50 patients per month report at urology OPD of the Gulf medical university college hospital (GMCH) in Ajman, UAE.

Most of the patients are cured by medicines alone: surgery is not required. Nifedipine is being used in other parts of the world to expel ureteric stones, but no study using nifedipine to expel ureteric stone has been taken up in United Arab Emirates (UAE) so far.

OBJECTIVE

- To verify the effectiveness of calcium channel blockers (nifedipine¹⁰) in expelling ureteric calculi in patients reporting at the urology OPD of GMC hospital located in Gulf Medical University, Ajman, UAE.

PATIENTS AND METHODS

Study settings: Department of Urology, GMC Hospital & Research Centre, Ajman, United Arab Emirates (UAE)

Study population: All 120 Patients, both male and female, visiting Department of Urology GMC Hospital and Research Centre, Ajman, UAE.

Research design: A cross sectional prospective study was carried out in 120 patients of both sexes, with ureteric calculi reporting to urology OPD & Emergency room of Gulf medical University, GMC hospital, Ajman, UAE. This was an open label research design in which the patients were in full knowledge of the medication being provided.

Inclusion Criteria¹¹:

- All patients (males as well as females) above the age of 18 years presenting with a ureteric stone of size ranging from 0.5cm to 1cm.
- All such stones occupying the upper, middle and lower segments of the ureter.

Exclusion Criteria¹¹:

- Patients already having been operated for ureteric stone.
- Patients less than 18 years of age.
- Patients already on antihypertensive medications excluding Calcium channel blockers (CCBs).
- Patients intolerant to Nifedipine.
- Stone size larger than 1 cm.
- Patients with renal failure or serum creatinine > 3mg/dl
- Anatomical defect of urinary tract
- Patients with risk factors for urosepsis, such as prolonged obstruction and associated infection.
- Cardiac patients suffering from hypertension, angina, MI, arrhythmias, heart failure etc.

Sample size: A total of 120 patients of both sexes (60 patients each, in the study as well as the control groups). The sample size has been calculated after taking into consideration the following facts:

According to available clinical research reports, about 68% patients have spontaneous ureteric stone expulsion. However, 77% expulsion rate has been recorded with addition of Nifedipine by other researchers¹⁴.

- With a minimum sample size of 60 + 60 patients, the difference in these figures becomes statistically significant.
- Considering the power of the study as 80%, the sample size is appropriate.

Duration of study: 6 months from the date of approval of the proposal from the institutional ethical committee.

Study instrument & validation procedure: The study was carried out with the help of diagnosis by history and investigations

and treatment with & without Nifedipine (a calcium channel blocker). No questionnaire was used in this study. The investigation instruments such as CT scan & ultrasound etc. are already considered as validated. A clinical data information sheet was used to fill relevant clinical details of the patient.

Ethical issues

All patients were informed in detail about this study and their role; an informed consent was obtained. Gulf medical University Ethical Committee clearance was obtained prior to the study.

METHODOLOGY¹²:

Diagnosis was made based on history and radiological investigations, namely, ultrasound & spiral C-T Scan of the abdomen. Other urinary & hematological investigations such as routine urine examination, kidney function tests and blood sugar were also performed.

Patients were randomly divided into two groups:

- Group A (study group on Loxoprofen (NSAID)+ Nifedipine (calcium channel blocker) and
- Group B (control group on NSAID Loxoprofen alone).

Group A patients were prescribed tablets of Nifedipine and Loxoprofen (NSAIDs).

Group B subjects were prescribed. Loxoprofen (NSAIDs) only. Tablet Rowatinex which contains olive oil was added to both groups to add bulk to the treatment prescription and patient satisfaction.

Doses of these drugs were as per requirement, literature¹², manufacturer directives and clinical judgment. Nifedipine dose ranged from 5 to10 mg. Loxoprofen dose was between180-360 mg (3-6 tablets per day), as per the formulation and requirement. Rowatinex dose varied between 1- 2 tablet three times a day.

Patients were followed up in OPD for 3 months on fortnightly basis for stone expulsion, which was monitored by history, ultrasound examination, X rays and spiral CT during and at the end of the study. Imaging modalities like Ultrasound, X-ray and CT scan were used electively according to situation and requirement to reduce cost of treatment.

Surgical intervention was advised in patients with recurrent attacks of colic, urinary tract infection and unchanging location of stone along with increasing hydronephrosis. New patients were included time and again, to compensate for patients who left study or were excluded.

Data analysis & storage

The data were analyzed using SPSS 21 software, with the help of Z test for proportion.

Simple percentage calculations were done in an excel sheet master chart.

Table 1: Age and gender – wise distribution of ureteric calculus patients

Age group	Number of patients studied (n=120)							
	Study group [A] (n=60)				Control group [B] (n=60)			
	Male	%	Female	%	Male	%	Female	%
18 - 30	16	26.66	15	25	18	30	16	26.66
31 - 40	10	16.66	11	18.33	9	15	11	18.33
40 - 50	2	3.33	4	6.66	2	3.33	3	5
51 - 60	2	3.33	-	-	-	-	-	-
> 61	-	-	-	-	1	1.66	-	-

Table 2: Time taken for Expulsion of ureteric stone in both sexes

	Time and % of expulsion of ureteric stone (days)			
	Study group [A] (n=30)		Control group [B] (n=30)	
	Days	% success	Days	% success
Males (n=20)	28.68±2.46	66.66	>90	4
Females(n=24)	19.76±2.38	80	>90	5

RESULTS

Equal number of males and female patients of ureteric calculus were included in the study in both, study as well as control groups. Maximum number of patients belonged to 18 to 30 years age group, which is significantly higher number than in older patients ($p < 0.001$). Minimum patients were in 50+ age group which is statistically significant ($p < 0.001$). Incidence of ureteric calculus was not significantly different in both sexes (Table 1) in both the groups.

Average stone expulsion in females was achieved much earlier (≈ 20 days vs. 29 days; $p < 0.05$) and to a higher extent (80% vs. 66%; $p < 0.05$) as compared to the males which is statistically significant.

The control group patients were not able to expel ureteric stones before 3 months. Only 4 to 5 percent patients experienced spontaneous stone expulsion. On the contrary, 73% patients of study group successfully passed out their ureteric stones, in less than 3 weeks. This contrast is highly significant ($p < 0.001$)

DISCUSSION

Ureteric stones are reported usually at emergency room rather than in OPDs. Ureter has to be relaxed and the stone needs to be flushed out by higher water intake. Since the stone size was less than 1cm in all patients, medical management was preferred, rather than surgical.

Calcium channel blockers (CCBs) are preferred by urologists to relax ureter, for easy expulsion of a ureteric stone.^{11,12} Nifedipine is a commonly used CCB in other countries. That is why we tried it out on our patients. The results obtained were quite similar to what has been reported in various other studies. According to other researchers, Nifedipine use has led to 77% expulsion^{11,12} while in our present study, 73% patients got their stones removed through urethra.

However, Nifedipine should not be used in cardiac patients, as deaths have been reported in such patients¹³.

CONCLUSION

Nifedipine can be successfully used to expel ureteric stones in UAE patients not suffering from any cardio – vascular disorder, achieving about 75% cure rate.

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