
ORIGINAL ARTICLE**Management of Ureteric Calculi in Dhule City of North-western Maharashtra**

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Abstract:

Background: Urolithiasis, usually affecting people in the prime of life, causes significant morbidity and loss of productivity. Ureteric stones account for 2/3rd of all urinary calculi brought to attention of doctors. The damaging effects of the calculi may result in obstruction with dilatation of the urinary tract, leading to stasis and severe infection. **Aims and Objectives:** To evaluate patients with urinary stones with regards to the incidence, age, sex, clinical presentation, site, size, side, management and their complications. **Material and Methods:** It was a prospective study carried out by Department of Surgery at Annasaheb Chudaman Patil Memorial Medical College, and Hospital Dhule for a period of two years. Patients were selected after they were diagnosed as having ureteric calculi. The patients were treated by conservative or surgical methods, and the outcome was monitored. Statistical analysis of the data was done for obtaining results. **Result:** The majority of the patients were males with peak age group in the second and third decade. Pain in abdomen or loin tenderness was the most common presenting symptom. Most of the patients were treated by conservative medical management. Endourological procedures were the most commonly performed surgical intervention. **Conclusion:** Most of the patients with ureteric calculi present with pain

in abdomen and majority can be treated by medical management. With the availability of better facilities the requirement for open surgery is decreasing and endourological procedures are becoming the means of surgical intervention. Complications are minimal with surgical expertise for endourological procedures.

Key words: Ureteric Calculi, Endourological Procedures, Open Surgery Conservative management

Introduction:

Urinary stones have afflicted humankind since antiquity, with the earliest recorded examples being bladder and kidney stones detected in Egyptian mummies dated to 4800 BC [1]. The treatment of ureteric stones has undergone a remarkable revolution in the last 20 years. The traditional diagnostic tools of KUB radiograph and intravenous urography remain the most useful methods of evaluation. Majority of ureteric stones pass without any surgical intervention. Earlier open ureterolithotomy used to be the mainstay of surgical stone management. Today, the treatment options include stenting, ESWL, percutaneous nephrolithotomy, retrograde ureteroscopy, laparoscopic ureterolithotomy and occasionally open ureterolithotomy [2]. Stone fragmentation by ESWL and percutaneous nephrolithotomy and endoscopic tech-

niques has revolutionized stone management [3]. Ureteric stones account for 2/3rd of all urinary calculi brought to attention of doctor [4]. It is an unique study as such a study has never been performed in this part of Maharashtra which is considered as a stone belt (for urinary calculi).

Material and Methods:

This is a clinical study of 577 patients of ureteric calculi coming to surgery OPD, of Annasaheb Chudaman Patil Memorial Medical College, and Hospital Dhule. This study was carried out over a period from July 2009 to June 2011, i.e., over a period of 24 months out of 5390 patients attending the outpatient department (OPD). Data sheets (DS) were used for recording the patient parameters like Name, Age, Sex, Address, presenting complaints, clinical findings, past history, Family history, specific urological history etc.

In this study Patients were selected after they were diagnosed as having ureteric calculi on the basis of history, physical examination, routine and supportive investigations like ultrasonography and KUB radiograph. Pelviureteric junction and ureterovesical junction were also taken into consideration during the localization of calculi. Patients categorized as male and female were given different scorings. Patients were also given scoring for symptoms and the type of management undertaken. The scoring system was followed for easy analysis of the data.

The modalities of treatment for the patients were medical (conservative), open ureterolithotomy and endourological procedures. Patients with medical management were followed till 6 weeks. Postoperative care was me-

ticulously followed for surgical patients to monitor complications. Medical management included treating the patient with smooth muscle relaxants like dicyclomine hydrochloride, alpha-1 adrenergic blockers and prostaglandin synthesis inhibitors. For patients with two calculi at the same site, the largest calculus was taken into consideration for analysis. Patients with bilateral ureteric calculi were considered as separate patients for right and left ureteric calculi. Symptomatic patients with calculus in the upper 1/3rd, middle 1/3rd, lower 1/3rd of ureter, pelviureteric junction and ureterovesical junction and patients with ureteric calculi of all age groups were included in this study. Patients with vesical calculus, patients with any bladder mass benign or malignant and patients with symptomatic benign and malignant prostatic enlargement were excluded from this study. The statistical analysis was carried out by statistical package for social sciences (SPSS) and chi square test was applied to know the statistical significance.

Results:

The new ureteric calculus rate of whole study was 107 per thousand OPD population (577/5390) as shown in table 1..

Table 1: Rate of Incidence

Population attending OPD	5390
No. of new patients of ureteric calculi in 2 years	577

The maximum number of patients were found to be in the age group between 21-40 years i.e., 355 (61.53%) (Table 2)

Table 2 - Frequency Distribution of Age Groups

Age Group	Frequency	Percentage
≤10	8	1.39
11—20	44	7.63
21—30	181	31.37*
31—40	174	30.16*
41—50	94	16.29
51—60	62	10.75
61—70	9	1.56
71—80	5	0.87
Total	577	100

The sex distribution revealed that the majority of patients were males i.e., 422 (73.14%) and females were 155 (26.86%). Total number of patients with pain in abdomen or loin tenderness were 526 (91.16%) where as 51 (8.84%) patients did not have pain in abdomen, Most of the patients had calculi in lower 1/3rd of the ureter and at ureterovesical junction on USG (Table 3).

Table 4 -Frequency distribution of site of calculi in ureter

Site	Frequency	Percentage
Upper 1/3 rd of ureter	150	26.00
Middle 1/3 rd of ureter	29	5.03
Lower 1/3 rd of ureter	186	32.24*
Pelvi-ureteric junction	32	5.55
Ureterovesical junction	180	31.20*
Total	577	100.00

Majority of patients had stone size in the range of 3-7 mm on USG (Table 4).

Table 4 - Frequency distribution of size of calculi

Size (mm)	Frequency	Percentage
3-7	312	54.07*
7-11	193	33.45
11-15	41	7.11
15-19	21	3.64
19-23	7	1.21
23-27	2	0.35
27-31	1	0.17
Total	577	100

In all 311(53.89%) patients had stone in right side of ureter and 266 (46.10%) patients had stone in left side of ureter out of 577 ureteric calculi patients.

In the current study 444 patients were treated by medical management (Table 5) and 133 by surgical treatment i.e., endourological and open surgical (Table 6).

Table 5 -Frequency distribution of Size of stone and management

Size group In mm	Management		Total
	Medical	Surgical	
3—6	207*	7	214
6—9	217*	16	233
9—12	20	53*	73
12—15	0	26*	26
15—18	0	20	20
18—21	0	4	4
21—24	0	4	4
24—27	0	2	2
10	0	1	1
Total	444*	133	577

Significant Association of size groups of stone and management methods ($P < 0.001$)

Table 6 - Frequency distribution of Treatment Modality

Treatment Modality	Frequency	Percentage
Medical	444*	76.95
Endourological procedures	129	22.36
Open surgical	4	0.69
Grand Total	577	100.00

Double J stenting was the most commonly performed single endourological procedure followed by Ureterorenoscopy (URS) as shown in Table 7 and URS with DJ Stenting as the most commonly performed combined endourological procedure as shown in Table 8.

Table 7 - Frequency distribution of single endourological procedure

Surgical procedure	Frequency	Percentage
DJ Stenting	17	47.22
URS	13	36.11
RIRS	1	2.78
PCNL	2	5.56
ESWL	3	8.33
Grand Total	36	100.00

Table 8 - Frequency distribution of combined endourological procedures

Endourological procedures	Count	Percentage
URS with DJ Stenting	53*	56.99
PCNL with DJ Stenting	38	40.86
PCNL with DJ stenting with URS	2	2.15
Grand Total	93	100.00

DJ Stenting-Double J Stenting, URS- Ureterorenoscopy, RIRS-Retrograde ureteroscopic Intra Renal Surgery, PCNL- Percutaneous Nephrolithotomy, ESWL- Extracorporeal Shock Wave Lithotripsy.

Overall 353 patients passed calculi after medical treatment as shown in Table 9.

Table 9 - Size of stone & passes of calculi after medical treatment

Size group (mm)	Passed Calculi		Surgical	Total
	No	Yes		
3—6	35	172*	7	214
6—9	44	173*	16	233
9—12	12	8	53	73
12—15	0	0	26	26
15—18	0	0	20	20
18—21	0	0	4	4
21—24	0	0	4	4
24—27	0	0	2	2
27—30	0	0	1	1
Total	91	353	133	577

Significant Association of size groups of stone and patients Passing calculi after medical treatment was noticed. (P< 0.001)

Post-operative complications were seen in 14 (10.53%) patients and in 119 (89.47%) patients there was no post-operative complication. At the end of the study period out of 577 patients 90 (15.60%) patients were lost to follow up

Discussion:

The commonest age group reported by most of the series for the presentation of ureteric calculi is between 20-40 years [5]. Soucie et al 1994, Pearle et al, 2005 have reported that stone disease typically affected adult men more commonly than adult women [6,7]. Our study has similar report. Reid Morse 1991, have reported incidence of 17% in the upper 1/3rd of the ureter, 11% in middle 1/3rd of the ureter and 72% in the lower 1/3rd

of the ureter [8]. Our series has a incidence at ureterovesical junction, ahead of lower 1/3rd of the ureter. Miller and Kane have reported that in patients with ureterolithiasis, depending on the stone size and location, approx 80% would pass the stone spontaneously if given an opportunity [9]. After medical management, 79% of our patients have passed calculi. Morse and Resnick (1991) have shown in a series of 378 patients that 200 patients had stone on left side. Most of the series have found calculi with equal frequency on either side [8]. In our study frequency has been more on right side. Morse and Resnick (1991) have reported 87% had loin pain [8]. In our series 91% had pain in loin. The likelihood of stone passage by size varies widely in the literature from 71–98% for stones under 5 mm in the distal ureter to 25–53% for stones 5–10 mm in the same location [10]. Coll et al. in their study have reported the stone passage rate for stones of all sizes of 48% for proximal stones, 60% for mid-ureteral stones, 75% for distal stones, and 79% for stones located at the ureterovesical junction [11]. We could not study specific site of calculi and their passage in detail due to improper medications by patients and their irregular follow up the following conditions most likely call for surgical intervention [12].

In absence of infection of significant obstruction with the calculus of more than 5 mm in size, which does not progress in the 4-6 weeks, impacted ureteric calculi with associated infection, obstructing calculi causing frequent and recurrent colics, if calculi are causing significant obstruction when the function of the contra lateral kidney is compromised, if the pat-

tern of impaired function is similar to that of complete obstruction, with impairment of all aspects except urinary dilution [13]. Medical management includes dilution of urine, *in-vivo* with a sufficient intake of water to obtain the urine volume of 2.5-3 liter a day, reduce the tendency to calcium crystallization by lowering urine saturation of calcium oxalate and increasing the limit of stability of calcium oxalate [14]. A decrease in dietary protein, in particular, animal protein, is a global recommendation for all stone formers [15]. The use of hormones, nonsteroidal anti-inflammatory, calcium channel blockers, corticosteroids, and alpha adrenergic antagonists have all been used to try to expedite stone passage [16].

In most of the reported series there remain, from 1 to 10% of patients who would require open removal of the calculi [17, 18]. In our series, less than 1% have required open removal. The most common reason for intervention has been poor pain control, calculi causing obstructive features followed by non progression after an adequate period of observation. Indications for open ureterolithotomy or laparoscopic ureterolithotomy includes failed attempt to extract calculi with endoscopic manipulation or ESWL [19]. Indications for open ureterolithotomy in our series of patient have included failed attempt to extract calculi with endoscopic manipulation. For stones ≥ 1 centimeter in diameter ESWL, PCN and ureteroscopy are all acceptable choices [20]. PCNL is a less commonly used treatment option usually reserved for proximal, large ureteral stones in selected cases [21]. The goal of ballistic lithotripsy in the ureter is to generate fragments that are smaller

enough to permit spontaneous passage (less than 2mm), more often larger fragments have to be removed with a basket or stone graspers [22]. More recent reports suggest less favorable results of ESWL for larger ureteral calculi (>10 mm), with reported stone-free rates of 32–51 % [23-25].

The 1997 American Urological Association (AUA) guidelines have stated that open surgery for ureteral calculi should not be a primary procedure [26]. Skrepetis (2001) has reported a mean hospital stay of 8 days for open ureterolithotomy [27]. The mean duration of hospital stay in our study for open ureterolithotomy has been 7.5 days. Reid M Morse have reported a mean duration of hospital stay of 4.7 days for endoscopic manipulations [8]. Mean duration of hospital stay of 6 days has been observed in our patients for endoscopic manipulations. Risk factors that have been associated with strictures are ureteral perforation, incomplete stone removal, and impaction of greater than 2 months [28]. In our study the post operative complications has been infection as seen by UTI in 6 patients, fever in 5 patients and wound infection in 2 patients. Post operative complications for open ureterolithotomy include wound infection and urinary tract infection [27]. Our patients who have undergone open surgery have developed wound infection. Grasso et al have reported on the complication rate for his series of 560 patients who underwent any type of ureteropyeloscopy. The reported incidence of pain, fever, false passage, and urinary tract infections have been 5.5%, 1.4%, 0.4%, and 1.6%, respectively [29].

Another possible complication of ureteral tear could be the migration of the stone or fragment

through the mucosal tear and the formation of a stone granuloma and subsequent ureteral stricture [30]. At the end of the study after 2 years 16% of the patients were lost to follow up.

Conclusion:

1. The new ureteric calculus rate of whole study is 107 per thousand populations in OPD patients of ACPM medical college, Dhule.
2. Ureteric calculi show a peak incidence in the 2nd and 3rd decade accounting for 62% of the cases.
3. Ureteric calculi are seen in as young as 8 months old child and as old as 76 years.
4. Male preponderance has been noted with male to female ratio of 3:1.
5. Pain in loin has been the main presenting symptom in 91% of the patients.
6. Right sided (54%) preponderance has been seen over the left side.
7. Highest incidence of ureteric calculi has been found in the lower 1/3rd of ureter (32%) followed by UVJ (31%).
8. Patients with the stone size <9mm can be given a trial of medical management provided clinical and radiological parameters are taken into consideration.
9. Endourological procedures are the most commonly performed surgical interventions.
10. Ureteroscopic intervention is the most commonly performed endourological procedure.
11. Open surgery is still a practiced modality of treatment for complicated cases and indicated only as a salvage procedure.
12. UTI and FEVER are the most common post

operative complications.

13. With the availability of better facilities the requirement for open surgery is decreasing.

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