

Determination of Mode of Treatment in Various Size of Ureteric Stone

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Abstract: Stone do not usually form in ureter, but drop down from pelvi-calyceal system. They tend to increase in size in urinary passage. Smaller size stone pass spontaneously by medical therapy. But some stone may obstruct the urinary passage and produce complications. So, interventions require in these patients. The aim of the study is to assess the different size of the calculus which can be managed conservatively and which cannot be managed conservatively. This observational study was conducted at surat municipal institute of medical education and research, surat at department of general surgery from July 2017 to January 2018. Result of the study is that stone size less than 8 mm usually cleared with conservative management and stone size more than 8 mm usually require surgical interventions. The conclusion of the study is that initially all patient was treated conservatively. Most of the small (size<8 mm) stone were managed conservatively. If patient does not respond to medical management maximum up to 4 week then should be treated with surgical intervention. Stone > 8 mm size usually requires surgical intervention. There is no side effect of medical management and no major post operative complication of surgical intervention.

Keywords: Ureteric stone, tamsulosin, ureteroscopic removal of stone(urs)

1. Introduction

Ureteric calculi is always renal origin. They are commonly of elongated shape. They can get impacted at various narrow junction i.e. pelviureteric junction, where ureter crosses the iliac vessels, where ureter crosses vas deferens, where ureter penetrates outer layer of bladder muscle, in the intramural portion of ureter near the ureteric orifice. Stone less than 8 mm size may pass spontaneously. But some stone may cause complications like obstruction, hydronephrosis, infection, impaction, ureteral stricture.

A number of factors must be considered in determining the optimal treatment for patients with ureteral calculi. These factors may be grouped into four broad categories: stone factors (location, size, composition, presence and duration of obstruction); clinical factors (symptoms severity, patient's expectations, associated infection, obesity, coagulopathy, hypertension and solitary kidney); anatomical factors (horseshoe kidney, ureteropelvic junction obstruction and renal ectopia); and technical factors (available equipment, expertise and cost). [1] These factors need to be considered in helping to select the treatment that will achieve maximum stone clearance with minimal morbidity to the patient.

Advances in ureteroscope design and ongoing development in extracorporeal shock wave lithotripsy have resulted in a change in the use of treatment modalities in the management of ureteric stones.[2,3].

Shock wave lithotripsy, introduced by chaussy and colleagues into routine clinical practice in 1982[4], is now the most widely used method of managing renal and proximal ureteral calculi. Ureteroscopy combined with intracorporeal lithotripsy is rapidly becoming a first line therapy [5] for ureteric stone which can not be managed conservatively.

In this study we have treated all patients initially with medical management i.e. flush therapy and then if patient not respond to it then surgical intervention done with ureteroscope and if needed combined with intracorporeal lithotripsy.

2. Literature Survey

Most patients with ureteral stones will become stone free without active intervention. A meta-analysis of the AUA Ureteral stone Clinical Guideline Panel found spontaneous passage of upto 98% for stones less than 5mm (maximum diameter).

Predicting stone passage helps to set the threshold for intervention. Miller et al developed a model from prospective data of 75 patients monitored for spontaneous stone passage, to aid the prediction of time to stone passage for ureteral stones upto 6 mm. They found that small, more distal stones on the right side were more likely to be passed. Patient gender or age, and degree of pain had no effect on the outcome. Spontaneous stone passage occurred in 95.1% and 91.5% of stones upto 2 mm and upto 4 mm in diameter, respectively. The average time to stone passage was 8, 12, 22 days for stones upto 2 mm, upto 3mm and 4-6 mm on size respectively.[6]

The treatment strategy of watchful waiting with ultrasound follow-up is an appealing and efficacious approach for ureteral stones with a diameter of <7mm. Ureteral stone of less than 4 mm in diameter have a chance of over 80% to pass spontaneously[7].

On the contrary, most stones with a diameter >8 mm will ultimately necessitate intervention. The spontaneous passage rate depends on the stone burden as well as its location. The overall passage rate is 25% for proximal ureter stone, 45% for the midureter stone and 70% for distal ureter stones,

provided that the mean diameter does not exceed 7 mm. [8][9]

Recently a number of studies investigated the effect of various drugs on spontaneous stone expulsion of distal ureteral stones. These drugs included analgesics, anti-inflammatory drugs, calcium antagonists such as nefedipine and alpha blockers such as tamsulosin. Of the above mentioned agents tamsulosin seems to be especially promising in preliminary studies.[10]

Ureteroscopy started as a therapeutic approach in selected centers has become the standard therapeutic option for the past decade. Ureteroscopy has changed our perception and eventually our treatment strategies of ureteral stones. Ureteroscopy was first described from one of the pioneers in urology, Hugh Hampton Young back in 1912[11], but it was not been until the late 70's that it became a standardized procedure[12]. Alone in the USA the ureteroscopic procedures have increased by 83% in the past 10 years.[13]

The clinical outcome of ureteroscopy has been improved considerably over the years. The stone free rates used to be 72% and 90% for proximal and distal ureteral calculi till 1996[14]. The review of the latest literature shows that the stone free rates with use of semi rigid or flexible ureteroscopes have been increased to 90-100% for distal ureteral calculi and to 74% for proximal ureteral stones [15]. Moreover an impressive 95% of the patients have stone free after a single procedure[16]

Acute intraoperative complications of ureteroscopy have been reported with a rate of 9% and 11% for distal and proximal stones, respectively [14], including ureteral avulsion, intussusceptions, perforation, false passage, mucosal abrasion, extravasation, thermal injury, equipment malfunction, and bleeding[17]. Postoperative complications are rather rare(1%) and include urinary retention[18], ureteral strictures, vesicoureteral reflux, and postoperative steinstrasse along with ureteral obstruction[17]. Most of the intraoperative complications are handled with a prolonged postoperative stenting of ureter[19]. The only exception to this approach is the avulsion of the ureter which requires an immediate operative intervention(i.e. autologous transplantation or ureteral reconstruction with small bowel)[20].

Methods/ Approach

This is the observational study done at surat municipal institute of medical education and research, surat in department of general surgery during the time period of july 2017 to January 2018.

Inclusion criteria

- Age ≥ 18 years
- Stone size between 3 to 14 mm
- Normal renal function
- Both genders are considered

Exclusion criteria

- Age < 18 years
- Pregnant women
- Patient presenting with urinary tract infection

- Patient with deranged renal function
- Patient with bleeding disorder.

A total of 62 patient was included in this study. In this study, initially we have treated all the patient with medical management that is hydrotherapy and tamsulosin. Patients who did not respond to medical management after 4 weeks were treated with ureteroscopic removal of stone and if needed intracorporeal lithotripsy.

3. Results

In our study initially all 62 the patient treated with medical management. If the patient did not respond to medical management within 4 weeks then they were treated with URS. Mean expulsion time of stone by medically treated patient is 18±4 days. Demographic and clinical characteristic of our study is described in Table 1.

Table 1

	Patient treated with hydrotherapy and tamsulosin (n=37)	Patient treated with URS(n=25)
Mean patient Age in Years	38.2 years	34.8 years
Sex(Male:Female)	32:5	17:8
Stone Size 3-7 mm	36	7
Stone size 8-14 mm	1	18

Clearance of the stone by medical management or surgical intervention in relation with the size of stone is described in Table 2

Table 2

Size of stone	Medical treatment (n=37)	URS (n=25)
3-7 mm	36	7
7-14 mm	1	18

Effect of treatment according to stone size is described in table no. 3

Table 3

Stone size in mm	Stone removed by medical treatment	Stone removed by URS	Total
3	5(100%)	--	5
4	9(100%)	--	9
5	20(100%)	--	20
6	1(25%)	3(75%)	4
7	1(25%)	3(75%)	4
8	1(20%)	4(80%)	5
9	0	3(100%)	3
10	0	4(100%)	4
11	0	3(100%)	3
12	0	2(100%)	2
13	0	2(100%)	2
14	0	1(100%)	1
Total	37	25	62

Post operative complications occur during URS are describe in Table no 4

Table 4

Complications	Number of cases
Hematuria	1
Fever	1
Ureteral injury	0
Uneventful	23

In our study, stone clearance rate of medical management is 100% when stone size range of 3-5 mm. Stone clearance rate of medical management is 23.07% when stone size range of 6-8 mm and clearance rate is 5% when stone size range of 8-14 mm.

Stone clearance rate of URS is 100% in stone size range of 9-14 mm.

4. Discussion

In our study, we have taken 62 cases. All were initially treated with hydrotherapy and tamsulosin. After 4 weeks if patient not respond to medical treatment then treated with URS.

In our study, medical treatment shows 100% clearance rate in 3-5 mm size stone. But as the size of stone increase more than 5 mm, clearance rate of medical treatment decrease and requirement of URS increase. Watchful waiting is done with medical treatment in stone size 6-8 mm, but URS is beneficial in size range of 6-8 mm if not improved medically. Stone size range 9-14mm definitely required URS as they are not removed by medical treatment.

So, the size of the stone is an important determinant of passage through the ureter and the ureterovesical junction, the narrowest part of the ureter. Spasm, oedema and infection may hinder the stone passage.

Ureteric colic, associated with stone, is the manifestation of the visceral pain that is referred to somatic region corresponding to the spinal segment of sympathetic supply of ureter. Increased intraluminal pressure due to calculus obstruction and increased lactic acid production resulting from smooth muscle spasm may have part in this event. Watchful waiting is appropriate for small stone not causing acute symptoms and can pass spontaneously[21] although it may occur at the expense of some discomfort to the patient. Spontaneous passage depends upon stone size, shape, location and associated ureteral edema (which is likely to depend on the length of time that a stone has not progressed).

Ureteral calculi 4-5 mm in size have a 40-50% chance of spontaneous passage. In contrast, calculi > 6 mm have less than 5% chance of spontaneous passage. Majority of stones that pass do so within a 6 weeks period after the onset of symptoms.[22] smaller, more distal and right sided stones are more likely to pass spontaneously[23][24]. However, the expectant approach may result in complications, such as infection of urinary tract, hydronephrosis and renal function defects.[24] In present study, there is 100% clearance rate with conservative management in size range 3-5 mm and upto 8 mm size there is chance of clearance with conservative management.

Two other studies conclusions are also important for our discussion:

Cervenakov et al, concluded that the treatment by alpha1 blocker considerably decrease not only lower ureteric tract symptoms (LUTS) but also helped to accelerate the passing

of minor calculi from the terminal parts of ureters of 80.4% of patients. They also suggested that alpha1 blockers potentiate the spasmolytic action of drugs used in standard methods of treatment [25].

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, and provided particularly good control of colic pain.[26] Addition of tamsulosin to conventional treatment is beneficial in terms of clearance of lower ureteral stones and this effect was more evident for larger stones, especially when combined with shock wave lithotripsy[27]

Alpha1- blockers decreased the number of ureteral colic episodes and the intensity of pain during spontaneous passage at lower ureteral calculi. Also, it was beneficial to patients' quality of life.[28]

5. Conclusion

In our study, there is 100% success rate with conservative management upto the stone size 5mm. There is 100% success rate of URS in patients who did not respond to conservative management. Watchful waiting should be done with conservative treatment upto the size of 8 mm. Stones >8mm size have no chance of removal by conservative management, they require intervention.

There is no side effect of medical management. Patient treated with URS had no or minimal post operative complication.

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