

## Current Management of Ureteric Stones.

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**Abstract:** Ureteroscopy has rapidly replaced surgery in the treatment of ureteric stone. Since calculi located in the upper ureter lie within the reach of conventional extra corporeal shock wave treatment, ureteroscopy has gained wider acceptance for stones situated distally in the iliac or pelvic ureter. Ureteroscopy has an edge in the patients who have large and obstructing calculi with poor renal function. Historically, active intervention for ureteric stones was restricted to blind basketry and open surgery. Over the last 2 decades, this has changed with the advent of extra corporeal shockwave lithotripsy (ESWL) and ongoing improvements in endourology, and revolutionized the management of ureteric stones, virtually eliminating the need for open surgery. ESWL introduced by Chaussy and colleagues in 1980 is now the most widely used management option for renal and proximal ureteric calculi. However, ureteroscopy (URS) with laser lithotripsy with its higher success rates and faster time to stone free status, is rapidly becoming first line therapy for ureteral calculi.

### INTRODUCTION

The changes that have taken place in the management of urinary calculus disease during the last decade and a half, have been truly remarkable. Whereas, in the past the urologist was faced with only two management options, to operate or not to operate, the numbers of therapeutic choices now have vastly increased. The development of newer endourological instruments meant that calculi could now be managed by lesser invasive means. The ultimate concept of management of stones, 'non invasion', has become possible with the increasing use of extra corporeal shock wave lithotripsy (ESWL) worldwide.

### SPONTANEOUS PASSAGE

Most patients with ureteral stones will become stone free without active intervention. A meta-analysis of the AUA Ureteral Stones Clinical Guideline Panel found spontaneous passage of upto 98 % for stones less than 5 mm (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, whilst half of all stones of atleast 4 mm required intervention regardless of their position. The average time to stone passage was 8, 12 and 22 days for stones upto 2 mm, upto 3 mm and 4-6 mm on size, respectively.

Cummings et al developed an Artificial Neural Network (ANN) to try to predict outcomes with respect to spontaneous passage or intervention. The outcome for 76% of test subjects, including all of the cases of spontaneous passage of stones, was accurately predicted. The most important variables for spontaneous passage of stones, in descending order, were: the duration of symptoms, degree of hydronephrosis and position of the stone, but not stone size. The surprising exclusion of stone size as a variable casts some doubt on the performance of this method, since stone size has long been regarded as one of the most important determinants of the probability of spontaneous passage.

Advances in the understanding of the physiology of the ureters and the pathophysiology of ureteral obstruction has led to the search for pharmacological agents to aid the conservative management of distal

ureteric stones. The major factors associated with calculus retention include ureteral muscle, spasm, submucosal edema, pain and infection with in the ureter. More recently, it has been demonstrated that specific adrenoreceptor subtypes (1A/ 1D) are prevalent in the distal ureter. These findings support the use of a combination of pharmacological agents to accelerate the passage of distal ureteric calculi- NSAIDs for analgesia and reduction of inflammatory edema, steroids to reduce edema, antibiotics to treat infection, and most recently, tamsulosin to decrease ureteral peristalsis with a consequent decrease in intraureteral pressure and an increase in fluid transport ability.

In addition to the probability of spontaneous stone passage, the effects of unrelieved obstruction and the patient's wishes should be considered when electing for conservative management. Holm-Nielsen et al (1981) found that more than one third of patients with unrelieved unilateral ureteral obstruction lasting longer than 4 weeks developed irreversible renal damage. Clinical or radiographic parameters did not aid prediction of renal damage. Paschel et al (1999) found that from the patient's viewpoint, achieving a stone free state as soon as possible is the ultimate goal and that even when they were asymptomatic, the awareness of the residual stone fragments and fear of colic was a source of discomfort and this affected their activities of daily living.

### ESWL

ESWL has been shown to be an effective, non-invasive modality for the clearance of ureteric calculi, which can be done on an outpatient basis with intravenous sedation or analgesia. However, with technological advances in ureteroscopes and laser equipments, recent studies have reported that stone free rates are not as high as for URS and laser lithotripsy. In addition, time to stone free status is longer. Variables affecting the efficacy of ESWL are shown in Table 1.

**Table 1:** Variable affecting efficacy of ESWL

- Experience of operator
- No of shocks
- Fluoroscopy time
- Large stones > 15 mm
- Impacted stones
- Monohydrate / Cystine stones
- Unfavorable anatomy
- After 2 unsuccessful treatments
- Localization difficulties
  - o Small stones
  - o Obesity
  - o Stents

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Pace et al 8, in their series of 1593 ureteral stones treated, reported stone free rates of 68% , 76% and 77 % after the 1st, 2<sup>nd</sup> and 3<sup>rd</sup> treatment respectively. Upper and mid ureteric stone free rates were significantly higher than distal ureter treatment respectively Success rate were also higher for smaller stones (10 mm or less = 74 % versus 11 to 20 mm = 43%). They also showed that ureteral pre-stenting appears to decrease the stone free rate. The AUA ureteral stones clinical guidelines panel found stone-free rates for stones < 10 mm were 85 % and 87 % in the distal and Proximal Ureter respectively. For Stones > 10 mm, the stone free rate was 76 %.

## URETEROSCOPY

Advances in ureteroscopic technology with the introduction of small caliber semi-rigid and flexible ureteroscopes combined with the introduction of Holmium YAG laser have improved the stone free rates following URS while decreasing the complications. The Ho-YAG laser is less penetrative than other laser modalities (0.5-1.0 mm) and acts to destabilize stones, creating small stone fragments (<2 mm) and fine dust. It is now considered the state of the art, and supercedes all other lithotrities for ureteric calculi.

In many series, stone free rates after URS were over 90 %, often approaching 100 %. Time to stone free status is also shorter than of ESWL- Bierkens et al reported comparable stone free rates, but the time taken was a mean of 42 days for ESWL and 2 days for URS respectively.

Parker et al 10 (2004) found that in proximal ureteric stones, the efficiency quotient for stones less than 1 cm for URS and ESWL was 0.79 and 0.51, respectively. For stones 1 cm or greater, URS had an efficiency quotient of 0.72 and ESWL of 0.46. The URS group required fewer days to be stone free (8 versus 25.5 day). URS was also found to be more cost effective, with significantly lower charges for URS (9378 US dollars versus 15,583 US dollars).

For distal ureteric stones, strohmaier et al has similarly found a significant difference in the efficacy of ESWL monotherapy vs URS. In many studies the cost of ESWL monotherapy and URS are similar. From a procedural standpoint, both options have similar duration (less than 1 hr) and potentially similar associated morbidities (both are outpatient procedures). With the lower efficiency of ESWL, the cost of followup is likely to be higher because further imaging and clinic visits may be required to ascertain the stone free status of the patient. This taken together with the retreatment required for stones not cleared by ESWL monotherapy, and we can see that for most centres, URS while being invasive, may be the more cost effective option.

While URS, is an invasive procedure and the Ho-YAG laser can cause thermal damage to the urothelium, its safety has been shown. Sofer et al reported laser related complications of less than 1 %, with stone free rates of 97-100%. The incidence of ureteral trauma and perforation after ureteroscopy was as high as 15% and 15-30 % respectively, but is likely to be less with the advent of smaller gauge ureteroscopes and ureteral access sheaths, and greater experience

today.

## ALTERNATIVES

Percutaneous antegrade ureteroscopic access is a viable treatment option for upper ureteral stones, in cases where ureteroscopic management is not possible. This approach comes with a high stone free rate, but may be associated with significant risks and increased fluoroscopy.

Another alternative is laparoscopic ureterolithotomy. Indications include stones that cannot be assessed ureteroscopically, calculi that cannot be fragmented with minimally invasive modalities or who need simultaneous treatment of other urinary tract conditions; large (>2 cm) impacted stones is also a relative indication.

In the modern age, there is almost no place for open ureterolithotomy in property equipped endourological centres.

When considering the choice of intervention for ureteric calculi, the following should be taken into account: stone burden, stone site, interval to stone free status, invasiveness, cost effectiveness, and ultimately, the patient's preference.

In recent years, the outcomes for endoscopic management of ureteric stones in all ureteric sites is increasingly better and is now equal if not better than ESWL and may be more cost effective.

Where endourological methods fail, laparoscopic ureterolithotomy can replace the open approach in most cases.

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## LITERATURE REVIEW

### *Prevalence of Risk Factors for Coronary Artery Disease in the Community in Eastern Nepal – A Pilot Study*

*Sarathi Kalra\*, Smiti Narain\*, Prahlad Karki\*\*, et al. JAPI, May 2011, vol. 59, pg 300-303*

*Coronary artery disease is a major cause of morbidity and mortality in Nepal, however, there are very few published reports of prevalence of various risk factors for coronary artery disease in the community from Nepal. We evaluated 140 adult subjects by simple randomization from all wards in the community in Dharaan, a small city located in the foothills in eastern Nepal. After exclusion of subjects with insufficient data, 119 subjects were included for the final analysis. Age ranged from 35 to 86 (mean 54.1± 10.5) years and there were 63 males and 56 females. Various parameters which were studied included : history of diabetes mellitus, hypertension, coronary artery disease, smoking, hereditary history, family history; measurement of blood pressure, anthropometric parameters such as body mass index and waist hip ratio and biochemical parameters such as random blood sugar and serum cholesterol. The prevalence of various risk factors for coronary artery disease was found to be : hypertension – 42 (35.3%), diabetes mellitus – 19 (15.9%), history of current smoking – 46 (38.7%), hypercholesterolemia – 15 (12.6%), sedentary life style 56 (47.1%), body mass index > 25 kg m<sup>2</sup> - 40 (33.6%) and central obesity 50 (42.1%). Approximately one third of the subjects had more than one risk factor. **Conclusions:** The study highlights prevalence of various risk factors for coronary artery disease in the community. Since majority of the risk factors are modifiable, timely intervention can help in reducing morbidity and mortality due to this disease.*