



ORIGINAL RESEARCH PAPER

Urology

FACTORS PREDICTING STONE CLEARANCE AFTER PRIMARY URSL FOR URETERIC STONES.

KEY WORDS: Ureteric colic, Ureterscopy, Urolithiasis

Dr Prakhyath M	Senior Resident, Department Of Urology, Institute Of Nephro Urology, Bengaluru.
Dr Sanjay RP	Associate Professor, Department of Urology, Institute of NephroUrology, Bengaluru.
Dr Keshavmurthy R	Professor, Department of Urology , Institute of NephroUrology , Bengaluru.

ABSTRACT	Introduction And Aim: Ureteric colic is a common emergency in urology, often requiring operative intervention. Retrograde ureteroscopy (URS) is the most common treatment, with options including primary, staged, or deferred URS after ureteric stent placement. This study aims to identify predictors of successful stone clearance during the initial procedure. Results: Two hundred patients were included in the study. The patient demographics are detailed in Table 1. The mean age was 40.5 ± 11 The mean stone size was 7.1 mm ± 3.2. The ureteral stone locations were proximal 24% (n= 48), mid 26% (n = 52), and distal 50% (n =100). The mean WCC, CRP, and serum creatinine were 9.9(109/L), 26.9 mg/L, and 1.2mg/L respectively. Conclusion: This study identified predictors of successful primary ureteroscopy (URS) for managing ureteral calculi, with a primary URS success rate of 77%. Positive predictors include stone size < 7mm, distal ureteral location, single stone. While negative predictors are elevated CRP, stone size > 10 mm, and proximal ureteral location. These findings offer valuable insights for urologists in operative planning and counselling of patients pre operatively.
----------	---

INTRODUCTION AND AIM

Ureteric colic is a common emergency in urology, often requiring operative intervention. Retrograde ureteroscopy (URS) is the most common treatment, with options including primary, staged, or deferred URS after ureteric stent placement. The choice of approach depends on various clinical and stone-related factors. For ureteric stones, medical management may involve supporting stone passage, while non-medical options include shock wave lithotripsy (SWL), ureteroscopy (URS), and uretrolithotomy. The approach depends on factors like surgeon preference, resource availability, and clinical conditions. Primary URS is advantageous as it eliminates the need for additional procedures and reduces stent time, improving resource efficiency and patient quality of life(5). However, a deferred or staged approach may be preferred in cases of urinary tract infection (UTI), unfavorable ureteric anatomy, or other patient-specific factors, especially when an elective setting is more suitable. This study aims to identify predictors of successful stone clearance during the initial procedure.

fragmented using pneumatic lithotripter and the equipment used was decided by the operating surgeon.

Numerical data are presented as mean ± standard deviation. Categorical data are given as percentages. The odds ratios (OR) and 95% confidence intervals (CI) were calculated using multivariate analysis. Statistically significant results were then included in the multivariate regression analysis to determine independent risk factors.

RESULTS

Two hundred patients were included in the study. The patient demographics are detailed in Table 1. The mean age was 40.5 ± 11 The mean stone size was 7.1 mm ± 3.2. The ureteral stone locations were proximal 24% (n= 48), mid 26% (n = 52), and distal 50% (n =100). The mean WCC, CRP, and serum creatinine were 9.9(109/L), 26.9 mg/L, and 1.2mg/L respectively.

Stone clearance following the index procedure was achieved in 77% (n= 154). This was 23/48 (47%) in proximal stones, 39/52(75%) mid ureteric stones and 92/100 (92 %) in distal stones. Stone clearance was confirmed on post-operative X-Ray KUB.

Factors associated with stone clearance at primary URS were evaluated. Multivariate regression analysis confirmed proximal stone location ,Elevated CRP , White cell count and larger stone size(p < 0.01) showed trends toward predicting multiple procedures .Age, Gender and serum creatinine did not predict the number of procedures (p > 0.01).

MATERIALS AND METHODS

A prospective study conducted for a period of 1 year from February 2023 to February 2024. The sample size was calculated considering the power of the study 80%, a margin of error 10%, a confidence level of 95%, and a probability value of 0.5. Study to be conducted over a period of 12 months which gives population size of 192. 200 patients were included .The inclusion criteria were patients with ureteric calculi diagnosed on CT renal stone protocol, age > 18, and managed with ureteroscopy during admission. Exclusion criteria were conservative management with medical expulsion therapy.

The study examined the clinical course of patients who met the inclusion criteria, collecting data on stone characteristics such as location (proximal, middle, or distal ureter), size (measured as the maximal diameter on various imaging planes), number of stones (single or multiple). Additionally, the study evaluated the impact of demographic factors (age and gender) and clinical factors (white cell count, C-reactive protein levels, and serum creatinine) in predicting the success of stone clearance.

All procedures were performed using semi-rigid 6.5Fr and 8/9.5 Fr ureteroscopes as available and stones were

39/52(75%) mid ureteric stones and 92/100 (92 %) in distal stones. Stone clearance was confirmed on post-operative X-Ray KUB.

Factors associated with stone clearance at primary URS were evaluated. Multivariate regression analysis confirmed proximal stone location ,Elevated CRP , White cell count and larger stone size($p < 0.01$) showed trends toward predicting multiple procedures .Age, Gender and serum creatinine did not predict the number of procedures ($p > 0.01$).

VARIABLES	VALUES
TOTAL PATIENTS	200
STONE CLEARED PATIENTS	154 (77%)
MEAN AGE	40.5+/- 11
MEAN STONE SIZE	7.1+/- 3.2 mm

VARIABLE	VALUE (STONE CLEARED)	P VALUE FOR 95% CI
GENDER		>0.01
MALE	118(90)	
FEMALE	82(64)	

AGE		>0.01
<40 YEARS	101(87)	
>40 YEARS	99(77)	

Table 3 : Stone Characteristics

VARIABLE	VALUE(STONE CLEARED)	P VALUE FOR 95% CI
STONE SIZE		<0.01
7-10 mm	140(120)	
>7mm	60(34)	
STONE LOCATION		<0.01
PROXIMAL	48(23)	
MIDDLE	52(39)	
DISTAL	100(92)	
NUMBER		<0.01
SINGLE	147(130)	
MULTIPLE	53(24)	

Table 4 : Lab Values

VARIABLE	VALUE(STONE CLEARED)	P VALUE FOR 95% CI
WBC	130(122)	<0.01
<10000CUMM	70(32)	
>10000CUMM		
CRP	139(125)	<0.01
<20	61(29)	
>20		
S. CREATININE	111(98)	>0.01
<1.2MG/DL	89(56)	
>1.2MG/DL		

DISCUSSION

This study identifies key predictors for the success of primary URSL in treating ureteric calculus. Positive predictors for successful stone clearance include stone size less than 7mm, distal ureteral location with single stone. Negative predictors include elevated CRP and white cell count, stone size greater than 10 mm, and proximal ureteral location. These findings help the urologist in preoperative planning and counselling of the patients regarding chances of requirement of multiple procedures.

There are limited studies that examine clinical and stone factors predicting stone clearance at primary URSL surgery. The Clinical Research Office of Endourological Society (CROES) Global study reports a pre-stenting rate of 11.9% in patients with ureteric stones.

The CROES Global study shows that pre-stenting rates are generally low, but some centers routinely use pre-URS stents. Lumma et al. reported on 550 ureteroscopies with an 88.4% pre-stenting rate, finding that pre-stenting improved stone-free rates (SFRs) and reduced complication rates. The greatest improvement in SFR was observed in mid and proximal ureteric stones (67.1% vs.34.5%).(6)

Navetta et al. (421 ureteroscopies) and Shields et al. both found that pre-stenting did not lead to increased stone-free rates (SFRs) or improved stone clearance during ureteroscopy.(9,10)

Elevated CRP and WBC was associated with a trend toward requiring multiple procedures, likely because it reflects a concomitant urinary infection and likely chance of patient going into sepsis This may influence management decisions, often leading to primary stent insertion followed by interval ureteroscopy (URS).

The decreased stone clearance rate for proximal stones is likely due to the increased likelihood of retropulsion during ureteroscopy (URS). Similarly, multiple and larger stones often require a staged procedure to achieve complete clearance.

CONCLUSION

This study identified predictors of successful primary

ureteroscopy (URS) for managing ureteral calculi, with a primary URS success rate of 77%. Positive predictors include stone size < 7mm, distal ureteral location, single stone. While negative predictors are elevated CRP, stone size > 10 mm, and proximal ureteral location. These findings offer valuable insights for urologists in operative planning and counselling of patients pre operatively. The increased rate of stone clearance and decreased complication rate with pre-stenting must be balanced against the economic cost of additional procedures and the significant morbidity associated with ureteric stents.

REFERENCES

1. Daudon M, Haymann J-P, Estrade V et al (2023) 2022 Recommendations of the AFU Lithiasis Committee: Epidemiology, stone analysis and composition. *Progen Urol J l'Association Fr d'urologie la Soc Fr d'urologie* 33(14):737-765
2. Trinchieri A (2008) Epidemiology of urolithiasis: an update. *Clin Cases Miner Bone Metab [Internet]* 5(2):101-6. Available from: <https://pubmed.ncbi.nlm.nih.gov/22460989>
3. Loeff S, Saluja M, Rice M (2018) Review of acute symptomatic urolithiasis in Auckland. *NZ Med J* 131(1469):44-50
4. Fwu C-W, Eggers PW, Kimmel PL, Kusek JW, Kirkali Z (2013) Emergency department visits, use of imaging, and drugs for urolithiasis have increased in the United States. *Kidney Int [Internet]* 83(3):479-86. Available from: <https://pubmed.ncbi.nlm.nih.gov/23283137>
5. Zargar-Shoshtari K, Anderson W, Rice M (2015) Role of emergency ureteroscopy in the management of ureteric stones: analysis of 394 cases. *BJU Int [Internet]* 115(6):946-50. <https://doi.org/10.1111/bju.12841>
6. Assimios D, Crisci A, Culkun D et al (2016) Preoperative JJ stent placement in ureteric and renal stone treatment: results from the Clinical Research Office of Endourological Society (CROES) ureteroscopy (URS) Global Study. *BJU Int* 117(4):648-654
7. Lumma PP, Schneider P, Strauss A, Plothe KD, Thelen P, Ringert RH et al (2013) Impact of ureteral stenting prior to ureterorenoscopy on stone-free rates and complications. *World J Urol [Internet]* 31(4):855-9. Available from: <https://pubmed.ncbi.nlm.nih.gov/22037634>
8. Scarneciu I, Lupu S, Pricop C, Scarneciu C (2015) Morbidity and impact on quality of life in patients with indwelling ureteral stents: a 10-year clinical experience. *Pakistan J Med Sci [Internet]* 31(3):522-6. Available from: <https://pubmed.ncbi.nlm.nih.gov/26150836>
9. Navetta AF, Elmekresh A, Doersch K, Durdin TD, Machen GL, Cohen A et al (2019) Preoperative ureteral stenting prior to ureteroscopy for management of urolithiasis does not impact the postoperative return for unplanned care. *Urol Ann [Internet]* 11(3):282-6. Available from: <https://pubmed.ncbi.nlm.nih.gov/31413507>
10. Sj M, Bv G, Reid G, Orlando G-M (2009) Impact of preoperative ureteral stenting on outcome of ureteroscopic treatment for urinary lithiasis. *J Urol [Internet]* 182(6):2768-74. <https://doi.org/10.1016/j.juro.2009.08.043>
11. Tran TY, Hernandez Bustos N, Kambadakone A et al (2017) Emergency ureteral stone treatment score predicts outcomes of ureteroscopic intervention in acute obstructive uropathy secondary to urolithiasis. *J Endourol* 31(9):829-834