



RISK FACTORS PREDICTING FAILURE OF RETROGRADE URETERAL STENT INSERTION IN MANAGEMENT OF CALCULOUS URETERAL OBSTRUCTION. OUR TERTIARY INSTITUTE EXPERIENCE.

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ABSTRACT **Background:** Calculus ureteric obstruction is known to cause significant morbidity if not intervened early. DJ stenting is an established practise for relieving calculus ureteric obstruction.

Objectives: Analysis of risk factors predicting failure of retrograde ureteric stenting in managing patients with calculus ureteric obstruction.

Methods: This is retrospective study of cases between August 2014 and April 2015. Ninety eight patients of calculus ureteral obstruction including 16 bilateral cases were evaluated in our study. All cases of calculus ureteric obstruction who undergone DJ stenting surgical procedure were included in this study. Renal transplant patients, medically unfit patients, previous cystectomy and diversion procedures, ureteric strictures were excluded from this study. Data elements extracted from the records such as age, sex, stone size, degree of hydronephrosis, and creatinine values. Data was analyzed and Chi-square test with Yates correction was used to determine statistical significance.

Results: We observed from our data that factors predicting failure of retrograde DJ stent insertion were large stone (>2cm), severe hydronephrosis and high baseline creatinine levels. Statistically significant association is noted between large stone size (> 2cm) and failure rate (P-value .00001). After 3 months, creatinine values were normalized (<1.5) in 98 % of unilateral and 69% of bilateral cases. Creatinine values were improved to near normal values in remaining cases.

Conclusion: We conclude that stone size>2cm, as an independent significantly strong predictor of procedural failure. Hence, prompt and early relief of ureteric obstruction restore renal function and reduces morbidity in patients with ureteral obstruction.

KEYWORDS : Calculus ureteric obstruction, DJ Stenting, factors predicting failure.

INTRODUCTION

Ureteric obstruction is emergency in urology requiring urgent intervention to relieve obstruction. The options available are DJ stenting and percutaneous nephrostomy. Selection of procedure depends on surgeon preference. In recent years, DJ stenting has gained popularity for urgent decompression of ureter. Early intervention of ureteric obstruction reduces significant morbidity. In our study, we analysed factors that predicted failure of DJ stenting in managing patients with calculus ureteral obstruction.

MATERIAL AND METHODS

This study was conducted at Urology Department, Sri Venkateswara Institute of Medical Sciences (SVIMS), Tirupati, Andhra Pradesh, India. Period of study was between August 2014 to April 2015. Ninety eight patients (114 ureteral units) presented with calculus ureteric obstruction and undergone DJ stenting surgical procedure during the above period were included. Renal transplant patients, medically unfit patients, previous cystectomy with diversion procedures and ureteric strictures were excluded from this study.

Of 98 patients (114 ureteral units) with obstructive urolithiasis, sixteen were bilateral cases. Patients records were reviewed for medical history, physical examination findings and laboratory investigation reports with main focus on complete blood profile, complete urine examination, blood urea, serum creatinine and serum electrolytes. Reports of radiological investigations like abdominal ultrasonography, plain x-ray KUB (for degree of hydronephrosis, side and site, size of calculi) were reviewed. CT scan KUB reports also reviewed if available. Fetal urology grading system was used to grade hydronephrosis¹⁰.

Data such as age, sex, degree of hydronephrosis, stone size, serum creatinine values were analysed. Serum creatinine was measured preoperatively, 48 hours, 3 weeks and 3 months following stenting. Ultrasound was used to grade hydronephrosis as mild, moderate and severe.

Statistical analysis was performed on the data using chi-square test with Yates correction. P value<0.05 was considered to be statistically significant.

It was noted that DJ stenting was performed under fluoroscopic C-arm guidance using double- J ureteral stent (polyurethane, non-hydrophilic)⁹. In ureteral stenting failure cases, percutaneous nephrostomy was performed. Patient was followed at 3 weekly interval for 3 months. Renal function tests were repeated 48 hrs after procedure, at 3 weeks and 3 months. At each visit history, physical examination, renal function, urine culture and ultrasound were performed.

Stent malfunction was defined as continuous flank pain with recurrent episodes of acute renal colic, one or more attacks of pyelonephritis, persistent hydronephrosis or elevated serum creatinine¹¹.

RESULTS & DISCUSSION

Ninety eight patients were in the study group as per inclusion and exclusion criteria. Males were 78 and females were 20. Most of the patients in the study group were above 30 yrs of age. Eighty two cases were unilateral and 16 cases were bilateral. DJ stenting was successfully performed in 101 ureteral units (including 16 bilateral cases). Mild to moderate hydronephrosis was noticed in 72 kidneys and severe hydronephrosis in 12 kidneys. Proximal ureter obstruction was documented in 32 ureteral units (28.07%), mid ureter in 41 ureteral units (35.96%), distal ureteric in 19 ureteral units (16.66%), and vesico ureteric junction obstruction in 22 ureteral units (19.28%). Stone size distribution is presented in Table 1.

Table 1: Stone size distribution in the cohort

Stone size	Ureteral units	Percentage
<=2cm	99	86.84%
>2cm	15	13.15%

It was noted that DJ stenting failed in 5 out of 99 ureteral units with stone size <= 2cm (small stone cohort). Where as, 8 out of 15 ureteral units failed with stone size more than 2cm (large stone cohort). Stone size and failure rate were analyzed using 2x2 contingency table illustrated in Table 2.

Table 2: Stone size and failure rate in 2x2 contingency table

	Successful stenting	failure
Stone size <= 2 cm	94	5
Stone size > 2 cm	7	8

Association of stone size and failure rate of stenting is determined using chi-square statistical test. There is a significant association between stone size and failure rate is observed with Yates correction is 25.4684 and p-value is <0.00001.

In the small stone cohort, 3 out of 5 failures were due to non identification of ureteric orifice, 1 out of 5 due to multiple kinks and 1 out of 5 due to eccentrically placed orifice. Percutaneous nephrostomy was performed in all failed cases irrespective of stone size.

Serum creatinine levels are between 1.5 to 3 in 70 patients and more than 3 in 28 patients. Preoperative creatinine was between 1.5 to 3 in 70 out of 82 unilateral cases. Preoperative creatinine was more than 3 in all bilateral cases and 12 out of 82 unilateral cases.

In one third of unilateral patients, serum creatinine levels dropped below 1.5 after 48hrs and normalised after 3 weeks of stenting in 82 % of the cases. 98% of unilateral cases, serum creatinine was normalised after 3months post stenting. In remaining cases, serum creatinine levels were noted to be between 1.5 to 3mg% after 3months of post stenting.

In bilateral patients, no drop in creatinine values below 1.5 was noted after 48 hrs. However, 38% of patients, serum creatinine levels dropped below 1.5 after 3weeks. In 69% of bilateral cases, serum creatinine levels were normalised after 3 months and values documented as between 1.5 to 3 mg% in the remaining cases.

Calculus ureteric obstruction is relatively common urological emergency. The main goal of treatment is urgent decompression of the blocked upper urinary tract for these patients^{4,5}. This can be performed with retrograde placement of ureteral DJ stents. This procedure was known to have high success rates and low complication rates.

Yossepowitch¹ reported a success rate of 94% in intrinsic cases of ureteral obstruction who has undergone retrograde ureteral stenting. They concluded that type of obstruction, level of obstruction and degree of hydronephrosis were the only predictors of stent function at 3months period. Wenzler² reported 88% success rate in retrograde ureteral stenting cases secondary to intrinsic obstruction. They concluded causes of high failure rates as male patients, high serum creatinine levels and severely obstructed kidneys. In a similar study reported by Danilovic³ reported failure rates of 9% due to intrinsic causes. Our data analysis revealed stone size more than 2 cm, severe degree of hydronephrosis, bilaterality and higher base line creatinine levels as useful predictors of procedural failure. In our study, over all success rate was about 89% and with 11% failure rate. Our study results were comparable to other published studies in the literature^{1,2,3,6,7,8}. In addition, large stone size(>2cm) was found to be statistically significant independent predictor of failure.

CONCLUSION

Retrograde ureteral stenting for calculus ureteral obstruction successfully relieves obstruction and preserves renal function. Our study supports large stone size > 2cm, as independent significantly strong predictor of procedural failure. Early intervention in the form of ureteral stenting to relieve obstruction facilitates prompt recovery of renal function for better outcomes.

Conflict of interest

Authors declare no conflict of interest.

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REFERENCES

1. Yossepowitch O, Lifshitz D, Deckel Y, et al. Predicting the success of retrograde stenting for managing ureteral obstruction. *J Urol* 2001; 166:1745-9.
2. Alexandre Danilovic, Ioannis M. Antonopolous, JoseLMesquita, Antonio. M. Loucon. Likely hood of retrograde double J stenting accordingly to obstructive pathology, international brazil *J urology* 2005 Vol. 31 (5): 431-436.
3. Wenzler D, Kim S, Rosevear H, et al. Success of ureteral stents for intrinsic ureteral obstruction. *J Endourol* 2008; 22:295-9.
4. Joshi HB, Adams S, Obadeyi OO, Rao PN: Nephrostomy tube or "JJ" ureteric stent in ureteric obstruction: assessment of patient perspectives using quality-of-life survey and utility analysis. *Eur Urol*. 2001; 39: 695-701.
5. Zimskind PD, Kelter TR, Wilkerson SL: Clinical use of long-term indwelling silicone rubber ureteral splints inserted cystoscopically. *J Urol*. 1967; 97: 840-4.
6. Vernon M Pais, Jr., Jac W. Strandhoy, Dean G. Assimos, Patho physiology of urinary tract obstruction *Cambellwalsh urology 9th edition*, pg-1195- 1226
7. Benchew, John d densted, *Ureterscopy and retrograde ureteral access* , *Cambellwalsh urology 9th edition*, pg-1508-1526,
8. Benchew, John d densted, *Access, Stents, and Urinary Drainage-Advanced endo urology complete clinical guide*, pg-29-52
9. John S. Lam and Mantu Gupta, *Urinary Stone Disease: Ureteral Stents The Practical Guide to Medical and Surgical Management*, pg-465-495
10. Ultrasound grading of hydronephrosis: introduction to the system used by the Society for Fetal Urology. Fernbach SK, Maizels M, Conway JJ: *Pediatric Radiology* 1993; 23: 478-80.
11. Ricordoamiyoaka, Manoj monga Ureteral stent discomfort etiology and management *IJU*, pg455-460