Factors Predicting Success Rate Of Retrograde Ureteric Stenting In Managing Patients With Ureteric Obstruction- Our Experiences In A South Indian Tertiary Institute

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Citation

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Abstract

Objectives: To analyze various factors predicting success of retrograde ureteric stenting in managing patients with ureteric obstruction.

Methods: Between June 2010 and December 2011, 30 consecutive patients with ureteral obstruction including 11 bilateral cases were evaluated in our prospective study.

All cases of ureteric obstruction in which surgical intervention is required were included. However, bladder tumor obstructing bilateral ureteric orifices, previous cystectomy and diversion cases, iatrogenic trauma to ureter, renal transplant, pregnant women, carcinoma cervix infiltrating both ureteric orifices and trigone, medically unfit patients were excluded. In addition, extrinsic compression cases, congenital causes and ureteral strictures were also excluded. Failures in retrograde ureteral stenting were immediately treated with percutaneous nephrostomy.

Data such as age, sex, stone size, degree of hydronephrosis, creatinine values were analyzed using Chi-square test with Yates correction for statistical significance.

Results: There is statistical significant association between stone size and failure rate (P-value = 0.0014). In addition, there is a stronger association between degree of hydronephrosis and failure rate (P-value = 0.0014). Creatinine is normalized in 100% of unilateral cases and 78% of bilateral cases after 3 months. In the rest of bilateral cases, the creatinine values were significantly improved to near normal values.

Conclusion: There is a 95% success rate with retrograde ureteral stenting for intrinsic ureteral decompression. Severe hydronephrosis, large stone (>2cm), bilateral stones and patients presented with high creatinine levels were identified as predictors of failure with the stent. This study further strengthens the importance of prompt treatment of intrinsic ureteral obstruction patients with retrograde ureteral stent placement for early and prompt restoration of renal function.

INTRODUCTION

Obstructed ureter is an emergency warranting urgent surgical decompression. In recent years, Double-J stenting has gained popularity among urologists for urgent decompression of ureters. The alternative options available for urologists for decompression of ureters include external diversion by percutaneous nephrostomy. Selection of urgent decompression of ureters procedure is a debatable topic and is left to the surgeon's preference. In this prospective study, we attempt to analyze the factors predicting success of retrograde ureteric stenting in managing patients with ureteric obstruction.

MATERIALS AND METHODS

In this prospective study, we included 30 consecutive patients admitted to urology admissions unit, Sri Venkateswara Institute of Medical Sciences (SVIMS), Tirupati with ureteral obstruction including 11 bilateral cases between June 2010 and December 2011. Listed below are the inclusion and exclusion criteria used.

- **Inclusion criteria**

All cases of ureteric obstruction in which surgical intervention is required were included.

- **Exclusion criteria**

Patients with the following complications are exclude in this study.

1. Bladder tumor obstructing both ureteric orifices.
2. Patients with previous cystectomy and diversion procedures.
3. Iatrogenic trauma to ureter.
4. Renal transplant patients
5. Pregnant women
6. Carcinoma cervix infiltrating both ureteric orifices and trigone.
7. Medically unfit patients.
8. Other causes of extrinsic compression
9. Congenital causes.
10. Ureteral strictures

This study is cleared by SVIMS institutional ethical committee, IEC-162, dated-2-11-2011. A written informed consent is obtained from all the patients included in study.

Detailed history, clinical examination is done and following investigations are carried out like renal function tests, urine analysis, plain X-ray KUB and ultrasound abdomen. Non contrast CT scan abdomen was performed in cases where standard evaluation is not satisfactory.

Severity of hydronephrosis is graded on ultrasound as mild, moderate and severe. Patients with ureteral obstruction associated with infection, obstructive acute renal failure, or refractory pain are presented for the urgent decompression.

All procedures were performed under spinal anesthesia or general anesthesia, with fluoroscopic C-arm guidance. Retrograde pyelography is performed previously to each procedure when it is possible to identify the ureteral meatus. This procedure is done using an open ended ureteral catheter. This catheter is then used to pass a 0.35 mm hydrophilic guide wire (Terumo Radio focus guide wire , straight 150cm, Terumo corporation, Tokyo) Terumo guide wire is re-exchanged with striped guide wire (indovasive,0.035 inches, 150 cm, Bio-Rad systems, Bengaluru)8.

A non hydrophilic polyurethane double-J ureteral stent (5fr, 6 fr, 26cm, Bio-Rad systems, Bengaluru) both ends open is used for double J stenting 9, 10 to advance the stent along the guide wire along with pusher.

Fluoroscopy is used to check whether the stent has reached the renal pelvis, then the guide wire is withdrawn slowly once it is in position. The adequate positioning of the double-J stent is confirmed by fluoroscopy at the end of procedure. Failures in retrograde ureteral stenting were immediately treated with percutaneous nephrostomy.

Patients kept hospitalized and daily flow chart including vitals, fluid input out put and laboratory data were collected. Patient's follow-up is done at 3-week intervals for 3 months. Each follow-up visit includes clinical examination, patient history evaluation, renal function, urine culture and ultrasound.

Research Methodology

- Pre-operative data such as age, sex, stone size, degree of hydronephrosis, creatinine values were analyzed.
- Renal function is assessed by measuring serum creatinine. Serum creatinine is measured before surgery, 48 hours, 3 weeks and 3months after stenting.
- Serum creatinine is assessed by modified Jaffe's test.
- Severity of hydronephrosis is graded on ultrasound as mild, moderate and severe.

Statistical analysis

1. Frequency of categorical variables will be expressed in percentages.
2. Statistical analysis is carried out using Paired Chi-square test with Yates correction. P-value < 0.05 is considered to be statistically significant.

RESULTS & DISCUSSION

In the study group of 30 patients, there are males (21 cases: 70%) then females (9 cases: 30%). Majority of the patients (i.e. 75% of the patients) included in this study are over 40 years old. Figure 1 and 2 illustrates gender and age distribution respectively.

Figure 1

Gender distribution

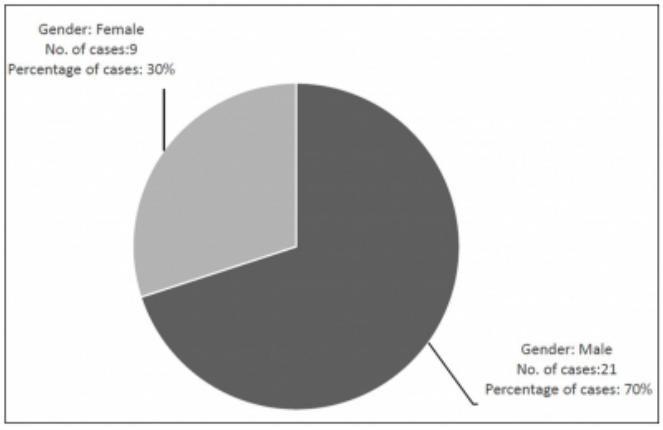


Figure 2

Age Distribution

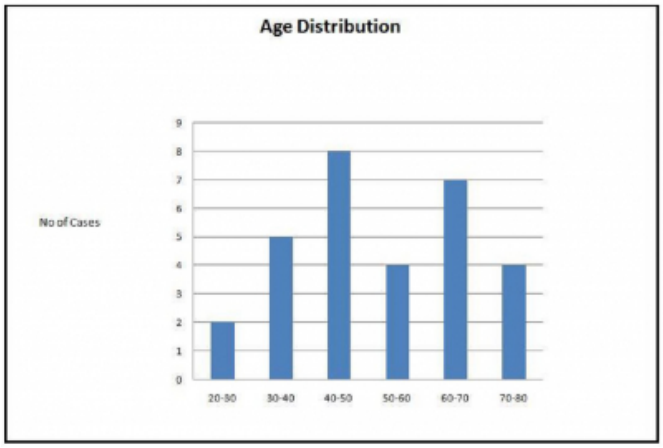


Figure 3

Laterality

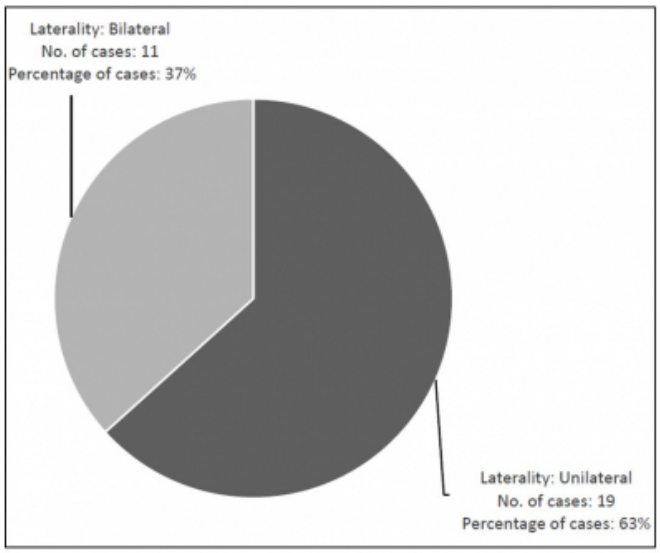
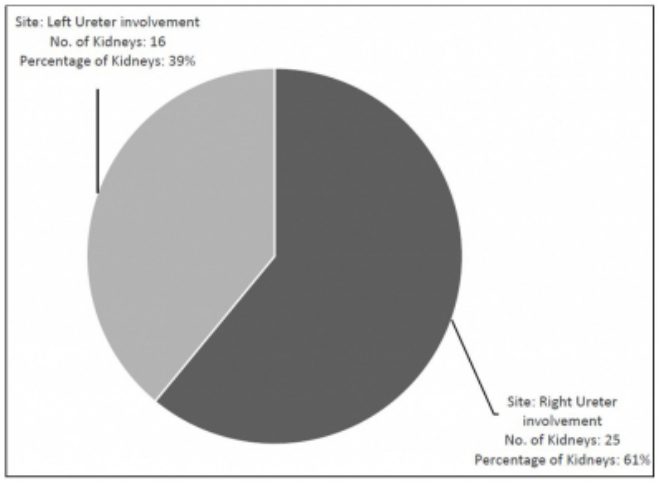


Figure 4

Ureter involvement rates



There are 19 cases presented with unilateral involvement and 11 cases presented with bilateral involvement (Figure 3). DJ stenting is performed in 41 ureters (that includes 19 unilateral and 11 bilateral cases). Of which, there are 61% of right ureters and 39% of left ureters (Figure 4).

Mild to moderate hydronephrosis were seen in 37 kidneys and severe hydronephrosis seen in 4 kidneys at the time of presentation (Figure5). Table 1 presents successful and failure stenting with various hydonephrosis severity.

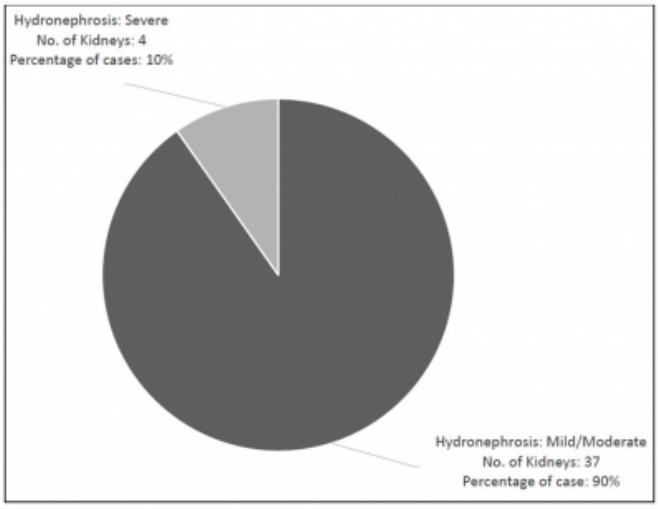
Table 1

Hydronephrosis and failure rates

Hydronephrosis severity	Successful stenting	Failure
Mild/Moderate	37	0
Severe	2	2

Figure 5

Hydronephrosis and failure rates



Using Chi-square test, we observed a statistical significant association between the degree of hydronephrosis and failure rate (P-value = 0.0014).

Table 2 presents the ureteic obstruction site distrbution and number of kidneys involved. There is large protion of the patients presented with proximal ureteric obstruction i.e. 17 kidneys (41%) followed by the distal ureteric in 9 kidneys (22%), vesico ureteric junction in 8 kidneys (20%) and mid ureteric in 7 kidneys (17%).

Table 2

Distribution of site of ureteric obstruction in the study group

Site of ureteric obstruction	No of Kidneys	Percentage
Proximal Ureter involvement	17	41
Mid Ureter involvement	7	17
Distal Ureter involvement	9	22
Vesico Ureteric junction	8	20

Table 3 and Figure 6 presents the stone size and associated stenting failures and success. It is observed that majority of the kidneys (90%) presented with stone size less than 2 cm have successful stenting.

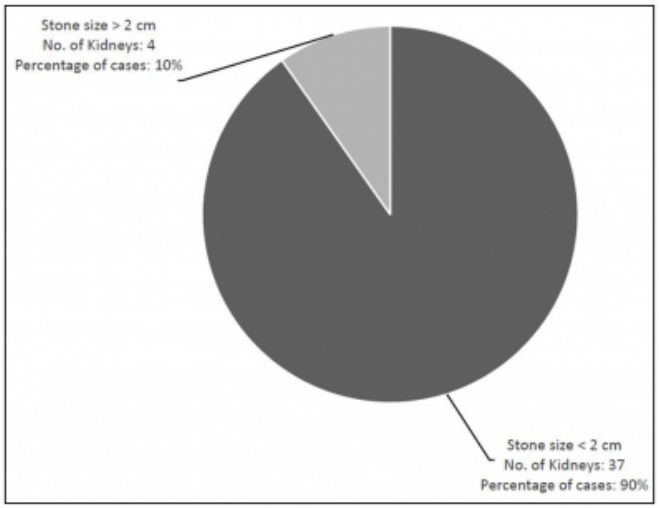
Table 3

Stone size and its associated failure rates

Stone size	Successful stenting	Failure
Stone size < 2 cm	37	0
Stone size > 2 cm	2	2

Figure 6

Stone size and its associated failure rates



No failures in <2cm stone size cases and 50% failure rate in cases with stone size more than 2cm

There is a statistical significant association is observed between stone size and failure rate (P-value = 0.0014).

Figure 7 and Table 5 illustrates the distribution of creatinine levels in unilateral and bilateral cases in preoperative and postoperative periods. Table 5 presents the unilateral and bilateral cases and their percentages at preoperative, postoperative creatinine values.

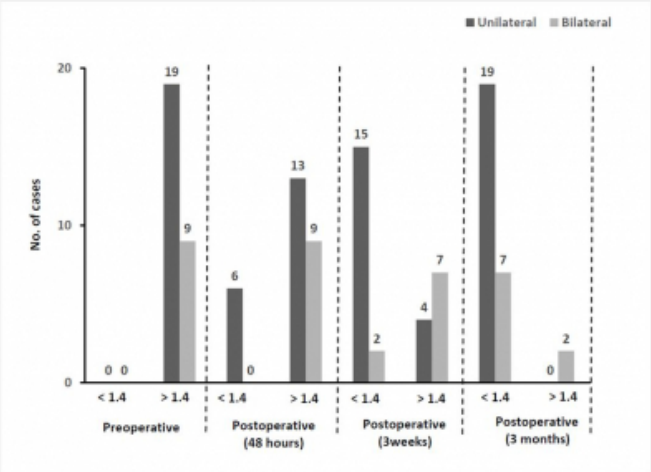
Table 5

Illustration of creatine levels in unilateral and bilateral cases in preoperative and postoperative periods.

Preoperative creatinine	Unilateral	Percentage	Bilateral	Percentage
<1.4(Normal)	0	0	0	0
>1.4	19	100	9	100
Postoperative creatinine (48hours)				
<1.4(Normal)	6	31.5	0	0
>1.4	13	68.5	9	100
Postoperative creatinine (3weeks)				
<1.4(normal)	15	79	2	22.22
>1.4	4	21	7	77.78
Postoperative creatinine (3 months)				
<1.4(Normal)	19	100	7	77.78
>1.4	0	0	2 (1.6,1.76)	22.22

Figure 7

Creatinine values



As per the modified Jaffes test, normal creatinine range in males is 0.8 to 1.4 and females is 0.7 to 1.3.

DJ stenting is successful in all unilateral (19) and 9 out of 11 bilateral cases. Post-operative normalization of creatinine postoperatively is an index of recovery of renal function. DJ stenting is unsuccessful in 2 units due to failure of identification of meatus in one case and failure of passage of guide wire in other case. Percutaneous nephrostomy is done in these 2units.

Pre-operative creatinine is abnormal in all cases. Pre-operative creatinine is 1.4 to 3 in 8 out of 19 unilateral cases. Preoperative creatinine is more than 3 in all bilateral cases and 11 out of 19 unilateral cases.

Renal function recovered with normalization of creatinine values in 31.5% of unilateral cases after 48 hours of stenting. Creatinine levels were normalized in 79% of unilateral cases and 22.22% of bilateral cases after 3 weeks. Creatinine levels were normalized in 100% of unilateral cases and 77.7 % (7 out of 9) of bilateral cases after 3 months. Two bilateral cases with abnormal creatinine values after 3months were 1.6 and 1.76.

Failure of upper urinary drainage represents a relatively common urologic emergency. The only goal of treatment for patients with upper urinary tract obstruction with renal failure should be urgent decompression of the blocked upper tract. Urgent temporary decompression when warranted, is performed with retrograde placement of ureteral stents procedure have an established track record with high success rates and low complication rates.

In this study, Creatinine is normalized Post DJ stenting in 100% of unilateral cases after 3 months and 78% of bilateral cases. In the rest of bilateral cases, the creatinine values were significantly improved with near normal values (1.6, 1.76). Relieving the kidney obstruction by successful DJ stenting resulted in near normalization of kidney function.

Wenzler et al described in their study that failure rates are low (22%), 37% failure rate in severe obstructed kidneys and high failure in male patients and presented with high creatinine levels1. Yossepowitch et al described in their study that failure rates are low in intrinsic causes (23%), 75% failure rate in severe obstructed kidneys2. Danilovic et al claimed overall low failure rates (9%) and higher failure rate in severely obstructed kidneys 3.

This study results are comparable to the above mentioned studies. Overall failure rate of 5% to 100% failure rate in severely obstructed kidneys and high failure rates in patients presented with severe renal function impairment. The higher success rates in this study is probably because of small sample size and different population group.

CONCLUSION

Retrograde ureteral stenting for intrinsic ureteral compression is successful in 95% of our study group patients. Severe hydronephrosis, large stone (greater than 2cm), bilateral stones and patients presented with high

creatinine levels were more likely to have treatment failure with a stent. Complications were rare. This study reinforces the importance of retrograde placement of ureteral stents in all patients with intrinsic ureteral obstruction to unblock the kidney for early and prompt restoration of renal function.

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