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Role of Prestenting Versus Non Prestenting in Outcomes of Retrograde Intrarenal Surgery in Renal Stones

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ABSTRACT

Background

To find out outcomes of patients who underwent retrograde intrarenal surgery with a ureteral access sheath and without ureteral access sheath in renal stones.

Methods

This is the prospective comparative study of seventy patients who underwent retrograde intrarenal surgery of renal stones ≤2 cm conducted at Chitwan Medical College, Bharatpur 10, Nepal between August 05, 2023 to February 04 2024 with a convenience sampling method Ethical approval was obtained from Institutional Review Committee (Reference No.: CMC-IRC/080/081-110). The patients age, sex, stone characteristics, operative time, post operative complications, stone free rate and hospital stay are compared between the Prestenting and Non Prestenting groups.

Results

The mean age of the patients in pre stenting group is 50.31years with standard deviation of 17.29 while in non Prestenting group is 45.55 years with standard deviation of 17.62 with no significant p value. The duration of operation time in Prestenting group is 69.06 minutes with standard deviation of 2.71 to that of 73.63 minutes with standard deviation of 6.88 which shows a significant p value. The stone free rate of Prestenting group is 90.62% while 86.84% in non Prestenting group with no significant p value.

Conclusions

The role of Prestenting in renal stones only decreases the operation time by facilitating the access sheath comfortably with no other significant differences.

Keywords: laser; miniaturization; post operative complications; stents.

INTRODUCTION

Ureteral access sheath (UAS) is used in retrograde intrarenal surgery (RIRS) to facilitate the scope up and down repeatedly that cut down the operative time, injury to the ureter, to pass down the dust stones and to extract the stones from baskets. It also decreases the intra-pelvic pressure provided the tip of UAS is near to pelvic ureteric junction.[1-6] The use of UAS can increase the ureteral injury rate if the size of the sheath does not cope with the diameter of ureter or force is applied. It is reported that 10% of ureter cannot be scoped due to small ureter or small ureteric orifice.[7] Late complications of pre ureteral stenting include urinary tract infections and stent syndrome. The role of pre ureteral stenting improves the stone free rate (SFR) is still a debatable issue which needs a scrutinizing studies to prove.[8, 9] The only proven benefits of preoperative ureteral stenting are used for passive dilatation of the ureter that helps to facilitate the UAS.[10] This study is to aim the outcomes of renal stones in RIRS using preoperative stenting or not.

METHODS

This is a prospective comparative study conducted in Chitwan medical college, Bharatpur 10, Nepal at urology department from August 05 2023 to February 04 2024 with a convenience sampling. All the patients coming to urology department that

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meets the following criteria are included in the study. The Inclusion Criteria are stones in kidney not more than 2cm, age more than 18 years and patients not in sepsis. The Exclusion Criteria includes age less than 18 years, anomalous kidneys, patients in renal failure, patients in sepsis, patients with pyonephrosis and secondary RIRS cases. The study is approved by Chitwan Medical College Institution Review Board (CMC-IRC number 080/081-110). The patients and patients' relatives are well explained about the procedure and informed consent are taken. The patients if wanted are allowed to withdraw from the study at any time. Total of 76 patients are enrolled in the study. Forty-four patients are enrolled in the Non Prestenting group. Out of which six patients (13.63%) could not be scoped and are discarded from the study. Thirty-two patients are enrolled in the Prestenting group. All the surgeries are performed by the single experienced urosurgeon. Simple lottery method was done at the uro-outpatient's door by the sisters. All the patients are subjected to plain computed tomography or/ contrast intravenous urogram. The maximum size of the stone and Hounsfield units (HU) are recorded.

All the Prestenting group are done in local anesthesia or intravenous anesthesia and sent the patients home on the same day. All these patients are subjected to RIRS after fourteen days.

Stenting is done with ureterorenal scope (Wolf 9.8fr) with the help of Terrumo guide wire (size: 0.035"; length: 150cms, Type: hydrophilic). A 5/6 fr JJ stent is used. All the RIRS cases are done with Karl Storz flexX2 with accessible sheath of 9.5/11.5 Fr or above. The sample size is calculated with 95% confidence interval with margin error of 10%. The prevalence of stone is around 94%. With this the sample calculated will be 32 by Cochrane formula: $n = Z^2pq/e^2$ so, in each arm of patient's number will be at least 32.[11] Antibiotics prophylaxes with 3rd generation cephalosporin are used in all cases and all the cases are operated in sterile urine. Patients are positioned in the lithotomy position. Ureterorenal scope is used to place a hydrophilic guide were till pelvis under the C-arm fluoroscopy. Another stiff guide wire is placed in the ureter and UAS is glided till to negotiate the vesico-ureteric junction. Then the flexible ureterorenal scope is accommodated till the stone is visualized. Holmium: yttrium-aluminum-garnet (Ho: YAG) laser is used generated by Lumenis Pulse 100 Watt with 200-µm laser fiber. Dusting method is used in all cases with frequency of 25-35; energy of 0.2-0. 4joules.At the end of the surgery pop dusting or pop corning is used. All the cases are concluded by placing a JJ stent of 5/6 fr. after proper visualizing the ureter confirming that there is no ureteral injury. A plain kidney ureter bladder (KUB) x-ray is done prior to sending the patient home. The JJ stent is removed at 4 weeks of time. The patient is called at two weeks of interval for ultrasonography. The stone less than 4mm is defined as stone free rate. The stone more than 4 mm is called again after two weeks of interval and repeat ultrasonography is done. The stone more than seven mm is subjected to plain CT scan.

Fever with documented culture positive is defined as urosepsis. All statistical analyses were performed using SPSS version 20. All the quantitative data's means are compared with independent T-test wherever applied. The qualitative data's mean is compared as frequencies and percentage. Normally and non-normally distributed data are presented as mean plus/ minus standard deviation. A p-value less than 0.05 are considered statistically significant for all tests.

RESULTS

The mean age of the patients in pre stenting group is 50.31years with standard deviation of 17.29 while in non Prestenting group is 45.55 years with standard deviation of 17.62 with no significant p value. Similarly, gender and co-morbidities of the patients (Table 1).

Table 1. Patient's demographic data.

Variables	Prestent Group (n = 32) n(%)	Non Prestent Group (n = 38) n(%)	p-value
Age (years), mean ± SD	50.31±17.29	45.55 ± 17.62	0.26
Gender			
Male	20 (62.5%)	23 (60.52%)	0.531
Female	12(27.5%)	15 (39.48%)	
Co-morbidities			
Fit and well	27(84.37%)	28 (73.68%)	0.383
Mild systemic diseases	5 (15.63%)	10 (26.32%)	

The characteristics of the stones are shown in the following table with none of them having significant p-value in two groups (Table 2).

Table 2. Stones characteristics.

Variables	Prestent Group (n = 32) n(%)	Non Prestent Group (n = 38) n(%)	p-value
Size of Stone (mm)±SD	13.36±2.62	14.73±2.41	0.025
Stone category			
Less than 10mm	3(9.37%)	1(2.64%)	0.041
10-15mm	20(62.5%)	18(47.36%)	
≥16mm	9(28.13%)	19(50%)	
Location of stone			
Upper Calyx	11(34.37%)	10(26.32%)	0.82
Middle Calyx	3(9.38%)	6(15.78%)	
Lower Calyx	2(6.25%)	5(13.15%)	
Pelvis	13(40.62%)	14(36.85%)	
Proximal Ureter	3(9.38%)	1(2.64%)	
Multiples	-	2(5.26%)	
Hounsfield stone (HU± SD)	1181.53±109.84	1208.61±140.11	0.378

The duration of operation time in Prestenting group is 69.06 minutes with standard deviation of 2.71 to that of 73.63 minutes with standard deviation of 6.88 which shows a significant p-value. The operation time was calculated after the UAS was inserted and till after concluding the placement of JJ stent.

The patient was subjected to plain KUB X-ray prior sending home and asked to follow up at 2nd, 4th and 6th week for ultrasonography of KUB region. If a stone is more than 4mm the patient is subjected for plain CT KUB. The stone free rate of Prestenting group is 90.62% while 86.84% in non Prestenting group with no significant p value. The post operative complications and hospital stay (Table 3).

Table 3. Operation Time, Post Operative Complications, Stone Free Rate.

Variables	Prestent Group (n = 32) n(%)	Non Prestent Group (n = 38) n(%)	p-value
Duration of Operation (minutes)±SD	69.06±2.71	73.63±6.88	0.001
Post operative Complications			
No Complications	28(87.5%)	30(78.95%)	0.271
Fever	3(9.37%)	5(13.15%)	
Mild Haematuria	1(3.13%)	2(5.26%)	
Sepsis with no support	0	1(2.64%)	
Stone Free rate			
No Stones	26(81.25%)	29(76.32%)	0.625
≤ 4 mm	3(9.37%)	4(10.52%)	
5-7mm	1(3.13%)	2(5.26%)	
≥8mm obstructive symptoms	2(6.25%)	3(7.9%)	
Hospital stay (Days)±SD	4.22±1.40	4.24±1.42	0.958

DISCUSSION

RIRS is nowadays is a prime modality for treatment of renal calculi. The SFR of RIRS is lower than percutaneous nephrolithotomy (PCNL) but higher than extracorporeal shock wave lithotripsy (ESWL). RIRS is safer but PCNL is more preferable for staghorn/multiples stones of 2 cm.[12-15] The UAS insertion improves the SFR remains obscure in renal stones of 1-2cm.Jones P et al were the first to report a insertion of ureteral stent after a failure of initial ureterorenoscopy later followed by staged ureterorenoscopy with a success of extraction of calculi.[15, 16] The subsequent results by Jones P et all show the similar results but all these shows the SFR of smaller ureteric or renal stones.[8, 17-21] Previous studied showed the stone size and location of stone to be important predictors for SFR. [22, 23] The ureteral stenting allows the passive dilatation of the ureter. This allows the bigger size of UAS to accommodate.[9] Although the use of a larger UAS improved accessibility, there was still no significant difference in SFRs between groups. We prefer the use of UAS size 9.5/10.5 fr because there is no difference in SFRs or complications. The other benefit of larger UAS is to increase the flow of irrigating fluid and thus reducing the intrarenal pressure. The larger the size of UAS has no advantage in RIRS.[5, 24] In my study the smaller UAS has no difference in the ureteric injury and has acceptable post operative complications. The RIRS has wider range of SFR from 50-96%.[23] This depends on how the SFR is defined. Different studies defined as a stone clearance of 2mm[25] or 4mm.[26] It also depends upon the imaging modality. Plain radiograph and ultrasonogram has lower sensitivity of 12% and 78% respectively.[27, 28]CT scan has a higher sensitivity and specificity but the patient's increased exposure to radiation makes the use of plain radiography or ultrasound more favorable. In our study the SFR in both Prestenting and non Prestenting is 90.62%

and 86.84% respectively at interval of 6th week of surgery and has no significant p-value. This means that UAS has no role in improving SFR. The SFR was defined as 4mm in our study which resembles the other studies too.[17, 18] Hyeong et al.[9] and Sung et al.[29] both reported that preoperative ureteral stenting was not significantly associated with stone clearance. However, Netsch et al.[17] and Kawahara et al.[18] both found that preoperative ureteral stenting improved the SFRs after RIRS. These differences in the studies needs to be scrutinized and has to be addressed.

Limitations

The limitation of our study is a single center based with single surgeon operated and with due a short period of time that might bring the biasness. The post operative complications in our study of Prestenting and non Prestenting group were comparable with other studies and shows that Prestenting status really does not help to minimize the post operative complications.[17-19, 30] None of our cases have ureteral injury.

CONCLUSIONS

Prestenting in RIRS only facilitate to pass UAS easily reducing the operation time with no significant change in SFR and post operative complications.

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