Does Ureteral Access Sheath Decrease Infective Complication Rate in Retrograde Intrarenal Surgery?

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A retrospective study was done in patients undergoing Retrograde Intrarenal Surgery (RIRS) from June 2015 to May 2019 to evaluate the correlation between use of ureteral access sheath (UAS) and postoperative infectious complication rate. Total of 97 patients were included among which UAS was used in 73 (75.2%) cases. Infectious complications were seen in 18 (18.5%) cases. There was no significant association between postoperative urinary tract infection (UTI) and use of UAS (p 0.123), as well as other risk factors such as comorbidities (p 0.279), stone size (p 0.264) or operative duration (p 0.556). However, previous history of UTI was significantly related to postoperative infectious complications (p 0.002). This study highlights the importance of identifying such patients and counselling them regarding the possibility of increased morbidity postoperatively.

Keywords: Retrograde Intra Renal Surgery (RIRS), ureteral access sheath, Urinary Tract Infection (UTI).

Management of renal stone by surgical means is mainly achieved by retrograde intrarenal surgery (RIRS) and percutaneous nephrolithotomy (PNL).[1] RIRS has become a standard procedure for renal calculi less than 20 mm in size due to its least morbidity and higher stone free rate (SFR) in comparison to extracorporeal shockwave lithotripsy (SWL).[2,3] However, RIRS is associated with complications such as pain, urinary tract infection (UTI), sepsis, prolonged hospital stay,[4] ureteral injury, bleeding and inability to reach calculus.[5] Use of ureteral access sheath (UAS) has been found to be a factor responsible for reducing infection rate in RIRS.[6,7] In this study, we investigate whether UAS

decreases post-operative infective complication rate in RIRS.

Materials and Methods

A retrospective study was done including all patients that underwent RIRS in our center from June 2015 to May 2019. Data were collected for age, gender, stone size, comorbidities, antiplatelet use and history of urinary tract infection within 6 months. Patients with positive urine culture were treated with culture specific antibiotics for 7 days and genuine effort was made to operate after the urine became sterile. RIRS was done by consultant urologists in standard fashion. Only 10 of the patients were pre-stented with double J (DJ) stent. 9.5/11F UAS was placed under fluoroscopic guidance over 0.035-inch glidewire. Whenever, UAS could not be negotiated, flexible ureterorenoscope (fURS) was back loaded over the glidewire directly. 7.5F fURS and 200nm laser fiber at different energy settings were used for lithotripsy. All cases were stented at the end of procedure.

Intraoperative and post-operative records regarding operative duration, use of UAS and occurrence of urinary tract infection (UTI) were noted. UTI in our study is defined as any symptomatic patients with significantly positive urine culture. Hospital admission records were retrieved to see if patients were re-admitted due to infective complications within 30 days of RIRS. Missing records were collected from patients over telephone interview asking for any episode of fever within 30 days of surgery.

Statistical Package for the Social Sciences (SPSS©) version 20 was used. Descriptive statistics was used to present the patient and intra-operative characteristics. Chi-square test and Fischer exact test were used to find association between post-operative UTI and factors such as UAS, comorbidities, stone size and operative duration with p value < 0.05 taken as significant.

Results

A total of 97 patients were included in the study. The patient characteristics are outlined in **Table 1**. 30 patients had co-morbidities and 3 patients were on anti-coagulant therapy which was stopped a day prior to surgery. 13 patients had history of UTI within 6 months prior to procedure and UAS were used in 73 out of 97 patients. Among the patients, 61 were male and 36 females, with mean age of 43.1 ± 15.2 years. Average stone size was 14.3 ± 5.0 mm and mean operative duration was 71.7 ± 29.0 minutes.

Infective complications all in the form of non-obstructive pyelonephritis diagnosed clinically with or without growth in urine culture classified as Clavien-Dindo grade II, occurred in 18 out of 97 patients (18.5%) which were managed with intravenous antibiotics.[8] None of the patients had to be managed in high dependency unit (HDU) or underwent intervention. The relation between postoperative UTI and other factors such as comorbidities, stone size more than 10 mm, operative duration more than 90 minutes, use of UAS and previous history of UTI were evaluated **(Table 2)**.

Particular	**n (%)**
Total patients	97 (100)
Male / Female	61 / 36
Co-morbidities	
Hypertension	22 (22.7)
Diabetes Mellitus	14 (14.4)
Hypothyroidism	7 (7.2)
On anti-platelets	3 (3.1)
History of urine infection	13 (13.4)
Post-operative UTI	18 (18.5)
Ureteral access sheath (UAS)	73 (75.2)

Table 1. Patient Characteristics (n = 97)

Factors	**No.**	**Post-op UTI**	**p value**
Comorbidities	30	4	0.279[*]
No ureteral access sheath	24	7	0.123[†]
Previous history of UTI	13	7	0.002[†]
Large stone size (> 10 mm)	69	10	0.264[†]
Long operative duration (> 90 minutes)	13	1	0.556[*]

[†] Chi square test, [*] Fischer exact test

Table 2. Correlation between risk factors and post-operative UTI

Among them, only previous history of UTI was found to be significantly associated with p value of 0.002. Out of 18 infective complications, only one was pre-stented. However, given its small number, multivariate analysis could not be done to draw any conclusion regarding their association.

Discussion

Even though, RIRS is considered a safe procedure with several advantages, postoperative infectious complication has been reported to range between 1.7% and 18.8%.[9-11] In our study, the rate of infectious complication was 18.5%. It seems that risk of post-operative infection is not nominal and complete avoidance of infection could not be possible even after preoperative prophylactic antibiotic. Various risk factors to infections were evaluated in this study like comorbidities, no use of UAS, previous history of UTI, stone size and operative duration; out of which only previous history of UTI showed significant correlation. UAS is thought to reduce intra renal pressure during RIRS and indirectly reduce infectious complication rate by avoiding pyelovenous and pyelolymphatic backflow of endotoxins released following fragmentation of infected stones.[6,7] However, high pressure irrigation rather than use of UAS may contribute to dissemination of infection.[11,12]

A prospective study done in PNL by Troxel SA and Low RK, found that there was significant correlation between elevated intra renal pressure and post-operative fever.[1,13] Similar to our study, Baseskioglu B also found preoperative infection history as a risk factor for developing postoperative UTI.[9] He also found residual stone and comorbidity to be a risk factor but unfortunately, we could not include residual stone in our study because of the lack of data.

Our study has some limitations. As this is a retrospective study, all the inbuilt constraints are inevitable. Also because of small number of patients, it might not include all potential variables and risk factors making multivariate analysis difficult. Nonetheless, this study highlights the importance of identifying patients with history of UTI and provides an insight regarding counselling of these patients about possibility of increased morbidity due to infective complications post-operatively.

Conclusion

Ureteral access sheath does not decrease infective complication rate in retrograde intrarenal surgery. Also, comorbidities, stone size and operative duration were not related to postoperative infectious complications. However, in our study only history of previous urinary tract infection was significantly associated with postoperative infectious complications.

Conflict of Interest

None

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