Retrograde intrarenal surgery in Nepal: an early experience

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ABSTRACT

With the advancement in technology and miniaturization of instruments, retrograde intrarenal surgery (RIRS) with flexible ureteroscope is gaining popularity. Flexible ureteroscope is introduced into renal collecting system through the urethra. Holmium YAG (Ho-YAG) Laser fiber of different sizes is introduced through the ureteroscope and renal stones are pulverized. Removal of renal stones less than 15 mm in size with RIRS has sharply reduced post operative morbidity. This is a Prospective study comprised of 58 RIRS performed from January 2013 to July 2013. Preoperative investigations like full blood count (FBC), renal function test (RFT), serological investigations, urine culture, intravenous urogram or CT-urogram, chest ray and electrocardiogram were done in all patients. Renal stones less than 15 mm in size were included for RIRS. Intra renal stones were treated with 7.5 Fr flexible ureteroscope (Flex - X2) using Holmium-YAG laser. Mean stone burden in our study was 10.5±3.3 mm. Out of 32 male patients, 29 (90.6%) required pre-stenting before RIRS and all 58 patients with successful dusting of stones in single sitting were discharged on next day. Retrograde Intrarenal Surgery is advanced and successful technique and a viable alternative to Extracorporeal Shock Wave Lithotripsy (ESWL) and Percutaneous Nephrolithotomy (PCNL) in the treatment of selected intrarenal stones with minimum morbidity.

Keywords: Flexible ureteroscopy, Renal stones, Retrograde Intrarenal Surgery (RIRS), Holmium YAG Laser

INTRODUCTION

Extracorporeal Shock wave Lithotripsy (ESWL) has revolutionized the treatment of renal stones but success rate of stone clearance is decreasing with its new generation compared to original HM3 lithotriptor.[1] Percutaneous Nephrolithotripsy (PCNL) is now the gold standard for the treatment of kidney stones bigger than 2 cm in size but with a possibility of substantial morbidity. Technology has miniaturized medical equipments. With the ever growing interest worldwide "natural orifice surgery",[2] RIRS nowadays is gaining popularity. Continuous evolution and advancement of ureteroscope has made it possible to access almost all locations in the kidney through its natural routes. Decreased caliber, improved deflection system and development of accessory devices for flexible ureteroscope has made possible to manage most of the intrarenal pathology with less morbidity than percutaneous surgery or open surgery.

Retrograde Intrarenal Surgery has been introduced in the EAU guidelines also for the management of intrarenal stones. In many institutions RIRS is being used for the treatment of renal stones even bigger than 20 mm.[3] RIRS is tremendously helpful in the management of renal stones less than 15 mm, failed ESWL, stones in calyceal diverticula, residual stones after PCNL or open surgery and stones in anomalous kidney.[4-6]

MATERIAL AND METHODS

From January to July 2013, 58 RIRS was performed in Grande International Hospital, Kathmandu. Preoperative investigations done were- full blood count (FBC), renal function test (RFT), serological investigations, urine culture, intravenous urogram or CT-urogram (Fig 1), chest x-ray and electrocardiogram were done in all patients. Renal stones less than 15 mm in size were included for RIRS. All patients were admitted on the days of surgery and RIRS was done exclusively under general anesthesia. Patients were kept in lithotomy position. At first 6 Fr. semirigid ureteroscope was introduced into ipsilateral ureter and retrograde pyelogram (Fig 2) was done. Ureteric Access Sheath (Cook Flexor - 12/14 x 35 cm) was introduced over 0.035" Terumo guide wire up to the L3-L4 level. Patients with failed Ureteral Access Sheath (UAS) insertion were stented with 6 Fr double-J (DJ) stent and procedure was postponed for 2 weeks. Flexible ureteroscope (Flex-X2) was introduced through the UAS (Fig 3). Stones bigger than 10 mm in lower calyx were entrapped with 1.7 Fr. Nitinol basket (N-Gage cook) and brought to more accessible calyx (either middle or upper). Ho-YAG laser was applied using 200 and 365 micron fiber. Energy applied for stone pulverization ranged from 4.8W to 12W. Once stones were pulverized completely and not visualized in image intensifier procedure was ended (Fig 4) with insertion of 6 Fr DJ stent which was removed between 2 to 4 weeks.

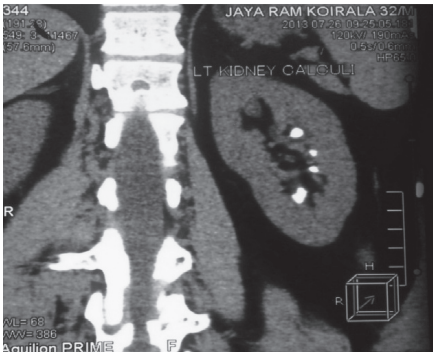

Fig.1. Preoperative Imaging

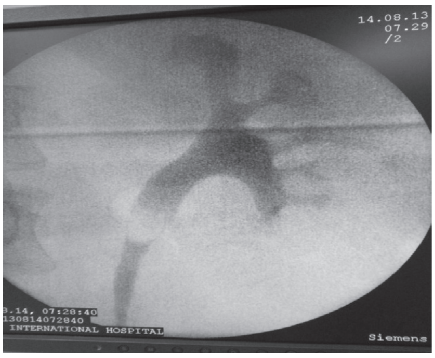

Fig.2. Intraoperative pyelogram

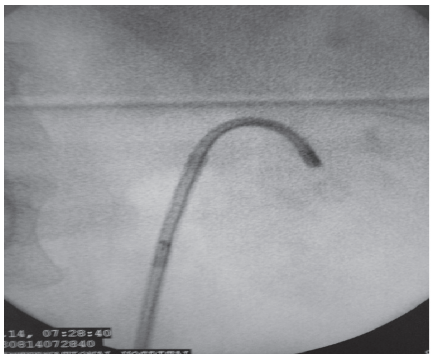

Fig.3. Intraoperative image

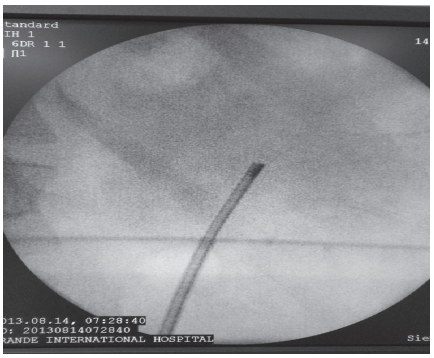

Fig.4. At the end of procedure

RESULTS

A total of 58 renal units with a mean age of 38.6±14.2 years underwent RIRS in our center. Female to male ratio was 1:1.2 and mean stone size was 10.5±3.3 mm. Stones were located in renal pelvis in 24 cases (41.4%), upper calyx in 5 (8.6%), middle calyx in 7 (12.1%), lower calyx in 16 (27.6%), pelvis and lower calyx in 3 (5.2%) and more than one calyx in 3 cases (5.2%). Laterality of stones was almost similar in both sides (Right 50% and left 48.7 % while bilateral renal stones were found in 1.3% patients. Single renal stone was in 87.9 % and in 27.6% patient stone was in lower calyx

In our study preoperative DJ stenting was required in male and female 90.6% and 23% respectively *(P value 0.001).* In all patients 6 fr DJ stent was kept at the end of RIRS.

This study has shown that all stones were pulverized in single sitting and no one required any ancillary second procedure except removal of DJ stent after 2 weeks. Interestingly even in our early experience also first flexible ureteroscope needed its replacement only after 32 cases.

DISCUSSION

New design of flexible ureterorenoscope, improved visibility and smaller size but more durable than previous models has made possible the treatment of different intrarenal pathology.[7] Flexible ureteroscopy in prepubertal age also is a safe procedure.[8-10] Its maximum use in adults is treatment of primary or after failed ESWL and residual stones after PCNL or open surgery. In case of complex renal anatomy where multiple punctures are required during PCNL, RIRS is better alternative. Though some studies were unable to prove significant difference between ESWL and RIRS in stone clearance but use of Ho-YAG laser energy is able to fragment any type of hard renal stones and it is safe and effective in the treatment of lower calyceal stones.[1,11-13] In patients with high body mass index (BMI) where stone free rates (SFR) are less with ESWL, RIRS is the better option. Turhan C et al[9] in their study had shown that in patient with normal BMI or Obese patient, SFR after RIRS is not significant. In study by Johnson BG et al[3] SFR after single and second RIRS for stones between 10 to 20 mm success was achieved in 89% and 91% respectively but in our study SFR was achieved in 100% patient. Better SFR in our study can be due to cases selected with normal intrarenal structure and relatively small sized stones in our early experience. So now RIRS has also become a viable alternative to ESWL and PCNL.[2] Ureteric stricture post RIRS ranges from 0.2 to 1.9% and ureter avulsion during ureteroscopy range from 0% to 0.6%[12-14] but in our study we have not found any injury of

Table-1: Stone characteristics and outcomes

Size	Mean ≤10 mm >10 mm	10.5±3.3 mm 34(58.6%) 24(41.4%)	
Renal unit	Right Left Bilateral	29 (50%) 28(48.3%) 1(1.7%)	
Location	Pelvis Upper calyx Middle calyx Lower calyx Pelvis and lower calyx More than 1 calyces	24(41.4%) 5(8.6%) 7(12.1%) 16(27.6%) 3(5.2%) 3(5.2%)	
Numbers	Single Multiple	51(87.9%) 7(12.1%)	
Indication for RIRS	Primary Residual of previous surgery	50(86.2%) 8(13.8%)	
Preoperative DJ stent requirement	Male Female	29(90.6%) 3(23%)	*p=0.001*

the ureter. To see the rate of ureteric stricture associated with RIRS needs long term follow up. Grasso et al[3] found in their 352 RIRS, only 11% required preoperative stenting or any form of ureteral dilatation but in our study 55% cases and in case of males even 90% required preoperative stenting. Herndon CD et al[10] in their study had only 21% post-ureteroscopy stenting. RIRS has just been introduced in Nepal as a new technique on a regular basis. May be in our learning period we are more skeptical to dilate and use force to insert UAS, so prestenting and post operative DJ stenting is 55.1% and 100% respectively. Study published by Sabnis et al[15] has also shown that requirement of preoperative DJ stenting may be due to relatively small size ureter in our population. The cost of flexible ureteroscope is also a very important issue.[16] With the advancement in technology and experience of urologists maintenance cost of flexible ureteroscope has come down. Use of UAS during RIRS prolongs not only life of flexible ureteroscope but also helps to decrease the intrarenal pressure during surgery and to remove stone fragments.[17,18] Keeping flexible ureteroscope in its straight position during stone fragmentation by relocating stones to upper or middle calyces also reduces the chance of instrument damage.[19] In present study stones analysis was not done because stones were dusted and left in situ to be passed spontaneously. Till date ESWL and PCNL were used for the treatment of such stones but now RIRS is a viable alternative.

This study had shown that RIRS is safe and effective treatment for less than 15 mm renal stones of any location. Preoperative DJ stenting is only prerequisite of the treatment in learning period. Randomized control trial with more number of cases will address the real necessity for preoperative DJ stenting.

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