Original Research Paper

Volume - 12 | Issue - 02 | February - 2022 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Urology

RETROGRADE INTRARENAL SURGERY VERSUS PERCUTANEOUS NEPHROLITHOTOMY TO TREAT RENAL STONES 2-3 CM IN DIAMETER

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ABSTRACT

Introduction: Retrograde intrarenal surgery(RIRS) Performed using flexible scope marked new era in urology.Today even staghorn calculus treated via RIRS.The recommended treatment for larger stones is percutaneous nephrolithotomy(PCNL).Hence which is first line management for larger stones remains controversial

Aim & Objective: To compare the success and complication rates of PCNL and RIRS.

Methods And Materials: SOURCE OF DATA : Patients undergoing PCNL and RIRS SURGERY 2-3 CM Stone.STUDY DESIGN: prospective study. PERIOD OF STUDY: From May 2020 to June 2021 GROUP 1 – PCNL Patients, GROUP 2 – RIRS PATIENTS .SAMPLE SIZE:50 .

Results: Stone free rate (SFR) Were 96% in PCNL group and 80% in RIRS group .The respective complication rates(evaluated using the clavien system) were 13.5% and 8.8%.

Conclusion: RIRS affords a comparable success rate , cause fewer complications than PCNL and seems to be promising alternative to PCNL, Further trails are needed to confirm the study.

KEYWORDS :

INTRODUCTION

Retrograde intrarenal surgery (RIRS) performed using a flexible ureterorenoscope marked the beginning of a new era in urology. RIRS renders smaller kidney stones more accessible and upper urinary tract tumors treatable, using minimally invasive methods [1]. RIRS first used to treat small stones[2] Initially, medium and then larger stones were treated via RIRS [3].The recommended treatment for larger stones is percutaneous nephrolithotomy (PNL) [4, 5], which affords very good success rates [6] but potentially causes high-level morbidity. Some urologists have suggested that RIRS, which is associated with fewer complications and less morbidity, should be used to treat large stones also. Indeed, the EAU guidelines mention that RIRS is the first choice of some surgeons who treat larger stones [4, 5]. Although PCNL is an established method for treatment of renal stones, the complications are potentially hazardous. PCNL may be associated with Grade 4 renal trauma [7]. We compared RIRS and PNL that were used to treat larger kidney stones. Specifically, we compared the success rates and complications of these two minimally invasive methods that were used to treat kidney stones 2-3cm in diameter.

AIM & OBJECTIVE:

To compare the success and complication rates of PCNL and RIRS.

MATERIALS AND METHODS

Study Period- Between May 2020 and June 2021,

Study Size- 50 patients with renal pelvic stones 2-3cm in diameter were treated in our department.

Study Design- Prospective study ,50 patients (25PNL, 25RIRS) were prospectively evaluated. Patients treated using PCNL constituted Group 1 and those treated via RIRS Group 2.

Inclusion Criteria-
All patients above 18 years who came to meenakshi medical college.

Exclusion Criteria-History of previous stone surgery

Study Technique

F-URS Technique-

All F-URS procedures were performed under general anesthesia with patients in the lithotomy position. Prior to flexible ureteroscopy, rigid ureteroscopy was routinely performed to passively dilate the ureter and to place a hydrophilic safety guidewire (0.035-inch) that was advanced to the renal pelvis with fluoroscopic assistance. Next, a ureteral access sheath (9.5/11 F) was passed over the guidewire through the ureteropelvic junction. A flexible ureterorenoscope (Flex-X2, Karl Storz, Tuttlingen, Germany) was inserted into the renal pelvis within the ureteral access sheath. Kidney stones were fragmented to dust with the aid of a holmium laser (Ho YAG Laser; Dornier MedTech, Munich, Germany).

PCNL Technique -

A ureteral catheter was placed, via rigid cystoscopy, with the patient in the lithotomy position. Next, percutaneous access was achieved with the aid of a C-arm fluoroscopic device, with the patient in the prone position, using an 18-gauge needle and a guidewire. The ureter was dilated up to 30 F using Amplatz dilators. Stones were fragmented using a pneumatic lithotripter (LithoClast; EMS, Nyon, Switzerland) and retrieval graspers inserted through a rigid nephroscope (26 F, Karl Storz). A nephrostomy tube was placed at the end of the procedure. Tubes were removed on postoperative days 1-2 and patients were discharged home the next day.

The groups were compared in terms of stone diameters, success rates, operative times, intraoperative fluoroscopy times, differences between preoperative and postoperative serum creatinine levels, and complication rates, using the modified Clavien grading system. Also, hospital stays (in days) were compared.

All patients underwent low-dose helical computed tomography (CT) of the abdomen prior to operation. Patients were reevaluated using ultrasound and xray kub 1 month after surgery to determine residual stone status. Residual stones <2mm in diameter were considered to be "clinically insignificant residues."

RESULTS

- Mean patient age was 45.6 years in Group 1 and 48.2 years in Group 2 (P=0.546). Mean stone diameters were similar in both groups (26+0.3cm versus 2.3+0.4cm,).
- In Group 1, 24 patients were stone-free 1 month postoperatively; and in Group 2 was 20.
- The complete stone-free rate was 96% in the PCNL group and 80% in the RIRS group 1 month postoperatively (P=0.061).The clinically insignificant residual stone (<2mm) rate was thus 3% in Group 1 and 7.5% in Group 2 (P=0.471).
- The residual stone (≥2mm) rate was 8% in the RIRS group, but no significant residual stones were noted in the PNL group. The mean operative time was 63+22min in the PNL group and 81+41min in the RIRS group (P<0.001).
- The mean fluoroscopy time was 38+14 s in the PNL group and 18+9s in the RIRS group (P<0.001).
- The mean decrease in hemoglobin level was 1.4+0.9 g/dL in the PNL group and 0.3+0.1g/dL in the RIRS group (P<0.001).
- The mean difference between the postoperative and preoperative creatinine levels was 0.24+0.19mg/dL in the PNL group and0.11+0.08 mg/dL in the RIRS group (P<0.001).

- The mean hospital stay was 2.3+1.3 days in the PNL group and 1.1+0.4 days in the RIRS group (P=0.032).
- Complication rates determined using the Clavien grading system were 13.5% in the PNL group and 8.8% in the RIRS group(P=0.520) .

Table -1 Patient Demographics And Operative Parameters

	GROUP 1	GROUP 2	P
AGE(YEARS)	45.6	48.3	0.546
STONE DIAMETER(CM)	2.6	2.3	0.151
GENDER(M/F)	21/25	20/25	
STONE FREE RATE(%)	96	80	0.061
OPERATIVE TIME(min)	63	81	<0.001
FLUOROSCOPY TIME(S)	38	18	<0.001
DECREASE IN HEMOGLOBIN LEVEL(MG/DL)	1.4	0.3	<0.001
CHANGE IN CREATININE LEVEL(MG/DL)	0.24	0.11	0.039
HOSIPTAL STAY(DAYS)	2.3	1.1	0.032

Table-2 Complications Assessed Using The Modified Clavien Grading System

	GROUP 1	GROUP 2
GRADE 1	5	3
GRADE 2	3	4
GRADE 3		
A	1	0
B	1	0
GRADE 4		
A	0	0
B	0	0
GRADE 5	0	0
TOTAL	10(8.8%)	7(13.5%)

DISCUSSION

The European Association of Urology urolithiasis guidelines recommend PCNL as first-line therapy for treatment of large kidney stones [4, 5].

Haggag et al. used PNL to treat 40 patients with renal pelvis stones 2.5cm or greater in diameter. The stone-free rate was 80% [8]. Our stone-free rate was 95.5%, thus higher than that of Haggag et al., attributable to the fact that the stones of our cohort were larger than those of the patients treated by Haggag et al.

Singh et al. treated renal pelvis stones >3cm in diameter via either PCNL or retroperitoneoscopic pyelolithotomy. Each group contained 22 patients. The stone-free rate was 72.7% 1 day postoperatively and 95% 3 months later [9]. Zeng et al. used minimally invasive PCNL (featuring small tracts and instruments) to perform 13,984 procedures over 20 years. The mean stone diameter was cm and the stone-free rate was 78.6%. However, after "second looks," that rate increased to about 90% [10]. Thus, the success rate was lower than ours. The principal difference between the two studies is that Zeng et al. created smaller tracts to reduce morbidity. We used RIRS instead of PNL, to the same end, and our success rate was good. We believe that RIRS is a suitable alternative when low morbidity is prioritized.

Giusti et al. treated kidney stones >2cm in diameter via RIRS. A total of 162 patients had an average stone diameter cm. The success rate was 87.7% with an average of 1.48 operative sessions per patient. RIRS was considered to be safe and effective when used to treat kidney stones >2 cm in diameter [11]. Hyams et al. used RIRS to treat 120 patients with kidney stones 2-3 cm in diameter. Of these, 63% had residual stones <2 mm in diameter and 83% residual stones <4 mm in diameter. The complication rate was 6.7%, and 78% of patients were treated in the outpatient clinic [12]. Bryniarski et al. compared PNL and RIRS that were used to treat kidney stones >2 cm in diameter. Each group had 32 patients; the success rates were 94% in the PNL group and 75% in the RIRS group [13]. Akman et al. compared RIRS and PNL that were used to treat kidney stones 2–4 cm in diameter. Similar to what was found by Bryniarski et al., the success rate in the RIRS group was 73.5% compared to 91.2% in the PNL group [14]. The RIRS success rate was similar to ours (80.6%). The cited authors also recommended RIRS as an alternative to PNL, when kidney stones >2 cm in diameter were to be treated.Fluoroscopy time is important when choosing the optimal treatment. Prolonged exposure to X-rays harms both surgeon and patient. The protective maxim used is termed ALARA ([exposure is to be] as low as reasonably achievable) [15]. PNL is associated with greater exposure to X-rays than is RIRS. Reduced X-ray exposure renders patients less prone to falls in hemoglobin levels and is associated with shorter hospital stays. Thus, RIRS has certain advantages compared to PNL. However, PNL is associated with considerably higher stone-free rates and shorter operative times.

Several investigators have attempted to maximize the efficacy of methods used to treat large-diameter kidney stones and enhance safety. Miernik et al. [16] combined flexible ureterorenoscopy with placement of a ureteral access sheath with a large-diameter lumen and semirigid ureteroscopy, to treat kidney stones >2cm in diameter. The stone-free rate was comparable to that attained via PNL, and the cited authors concluded that their combination therapy could serve as an alternative first-line therapy. Hamamoto et al. combined RIRS with mini-PNL, to exploit the advantages of either method. Of the three groups of patients, one arm underwent mini-PNL, one arm RIRS, and one the combination therapy. The latter group experienced shorter operative times and the stone-free rate was the highest of all three groups [17].

Several limitations of our study are apparent. These are the retrospective nature of our work, the relatively small patient cohort, and the lack of randomization. However, we believe that we haveaddressed an important "grey area" of daily urological practice

CONCLUSION

- In patients with renal pelvis stones 2-3 cm in diameter, PCNL has been regarded as the optimum method.
- However, RIRS affords a comparable success rate, causes fewer risks of complications, and seems to be a promising alternative to PCNL when larger stones are to be treated.
- Prospective randomized controlled trials are needed to confirm these findings.

Conflict Of Interest - None declared.

Source Of Funding - None.

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