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Surgical Management Of Stone In Anomalous Kidneys.

Anbalagan M^{1*}, Induja J², Prabhakaran P³, and Gnanasekaran T⁴.

¹Senior Resident, Department Of Urology, Madurai Medical College And Hospital, Madurai, Tamil Nadu, India.

²Assistant Professor, Department Of Urology, Madurai Medical College And Hospital, Madurai, Tamil Nadu, India.

³Assistant Professor, Department Of Urology, Madurai Medical College And Hospital, Madurai, Tamil Nadu, India.

⁴Associate Professor, Department Of Urology, Madurai Medical College And Hospital, Madurai, Tamil Nadu, India.

ABSTRACT

Incidence of anomalous kidneys – 3 – 6 / 1000 live birth. Incidence of stone in anomalous kidney higher. Factors predisposing to stone in anomalous kidneys are high PUJ, associated PUJO and infections. Surgical approaches for stone in anomalous kidney are endoscopy, RIRS, PCNL, mini-PERC, Lap assisted PCNL, Laparoscopy and Open ESWL. In our study we planned to analyse the efficacy of various treatment modalities in the management of stone disease in anomalous kidneys and also to study the stone Free Rate, mean operation time, mean hospitalisation time and complication rate in the various treatment modalities. This was a prospective observational study conducted in the Institute of Urology, Madras Medical College and Rajiv Gandhi Government General Hospital, Chennai from June 2016 – February 2018. A total of 40 patients who during the study period were included in the study. Patients with stone in anomalous kidney, horse shoe kidney, crossed fused ectopia, Pelvic kidney, Malrotated kidney and double moiety were included in the study while patients with recurrence, residual stone will be excluded. A total of 40 patients were enrolled in our study with mean age of 40 years ranging between 5-65 years. In our study population 21 were male and rest 19 were female patients. Anomalies encountered were as follows 18 had horse shoe kidney, 8 had pelvic Ectopia, 11 had malrotated kidney and 3 had double moiety. 18 patients having horse shoe kidney lap assisted PCNL was done. RIRS was done in 10 patients and three patients underwent open surgery. Pelvic ectopia was seen in 8 patients, 5 patients underwent Lap assisted PCNL, RIRS was done in 3 patients. Malrotated Kidney was present in 11 patients, PCNL was done 8 patients. RIRS was done in 3 patients. Double moiety was seen in 3 patients, PCNL was done 2 patients, RIRS was done in one patient. RIRS, Lap assisted PCNL, pyelolithotomy are useful and effective treatment modalities for stones in kidney with abnormal anatomy. According to the results of our study, PCNL & pyelolithotomy have a very high stone free rate with minimal complications but a longer stay compared to RIRS. Operative time of open surgery is shorter, but that of RIRS and PCNL is comparable. RIRS, though associated with lower stone free rate compared to PCNL, is associated with very short hospital stay and may be treatment of choice in stones of smaller size.

Keywords: kidney stone, anomalies.

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**Corresponding author*

INTRODUCTION

In spite of the fact that urologic surgical techniques used by urologists are becoming more and more minimally invasive and easier because of developing technologies, surgical approaches for the urinary stones in kidneys with abnormal anatomy are still confusing [1-3].

Kidney anomalies are seen in 300-1000 births [4, 5]. Impaired urine drainage increases stone formation in anomalous kidneys [6]. Factors predisposing to stone in anomalous kidneys are high PUJ, associated PUJO and infections. Stone management is important in anomalous kidneys. Shock wave lithotripsy (SWL) is a method used in management. SWL is a non-invasive method with stone clearance rate of 67.8% (54%-82%) [7], but impaired urine drainage and changed anatomic structure may worsen stone clearance [8]. Another method for management is percutaneous nephrolithotomy (PNL). PNL is the first choice for treatment of stones >2 cm in size, but serious complications can be encountered by using this process. It has a success rate of approximately 87.5%. The position of the patient and complications (pneumothorax, hemorrhage, nephro-pleural fistula) are disadvantages of PNL [9]. The other management options are laparoscopic pyelolithotomy and laparoscopy-assisted PNL. These methods are more invasive than endoscopic methods [10]. Retrograde intrarenal surgery (RIRS) was firstly used in the late 20th century, and its usage increased with advanced technology [11]. The development of flexible ureteroscope size and deflection technologies expanded RIRS usage areas. Serious complications are rarely seen in RIRS method. RIRS can be used for the treatment of anomalous kidney stones.

In our study we planned to analyse the efficacy of various treatment modalities in the management of stone disease in anomalous kidneys and also to study the stone Free Rate, mean operation time, mean hospitalisation time and complication rate in the various treatment modalities.

MATERIALS AND METHODS

This was a prospective observational study conducted in a tertiary care teaching hospital for a period of two years. A total of 40 patients who during the study period were included in the study. Ppatients with stone in anomalous kidney, horse shoe kidney, crossed fused ectopia, Pelvic kidney, Malrotated kidney and double moiety were included in the study while patients with recurrence, residual stone will be excluded.

Modality of treatment was selected based on Size, location, density of stone, Type of anomaly and Surgeon's preference. All patients followed up after discharge. Stone free rate determined by plain CT KUB taken during review (POD 10-14). IBM SPSS version 24.0 was used for statistical analysis.

RESULTS

A total of 40 patients were enrolled in our study with mean age of 40 years ranging between 5-65 years. In our study population 21 were male and rest 19 were female patients.

In our study group right side stone was present in 26 patients and left side was present in 24 patients. Mean Stone Size was 23mm ranging from 10 – 39 mm and anomalies encountered were as follows 18 had horse shoe kidney, 8 had pelvic Ectopia, 11 had malrotated kidney and 3 had double moiety.

To start with in 18 patients having horse shoe kidney lap assisted PCNL was done in 5 patients where mean stone size was 22 mm (14-30mm), mean operating time was 84 mins (64 – 103 mins) and stone free rate was 94.6%. The mean hospitalisation days was 4.2 days (2.9 – 5.8 days). RIRS was done in 10 patients and among which mean stone size was 13 mm (10-16mm), mean operating time was 71 mins (56 – 87 mins) and stone free rate was 78.3%. The mean hospitalisation days was 4.2 days (2.9 – 5.8 days). Three patients underwent open surgery where mean stone size was 30 mm (21-39mm), mean operating time was 61 mins (46 – 86 mins) and stone free rate was 97.3%. The mean hospitalisation days was 5.6 days (4 – 7.5 days).

Pelvic ectopia was seen in 8 patients, 5 patients underwent Lap assisted PCNL where mean stone size was 21 mm (12-30mm), mean operating time was 85 mins (66 – 104 mins) and stone free rate was 100%. The mean hospitalisation days was 3.9 days (3.1 – 4.7 days). RIRS was done in 3 patients and

among which mean stone size was 14 mm (10-18mm), mean operating time was 79 mins (57- 101 mins) and stone free rate was 80.4 %. The mean hospitalisation days was 1.9 days (1.5 – 2.3 days)

Malrotated Kidney was present in 11 patients, PCNL was done 8 patients where mean stone size was 22 mm (15-30mm), mean operating time was 74 mins (55 – 93 mins) and stone free rate was 86.5%. The mean hospitalisation days was 4.8 days (3.5 – 6.1 days). RIRS was done in 3 patients and among which mean stone size was 13 mm (10-16mm), mean operating time was 78 mins (66 – 90 mins) and stone free rate was 79.6%. The mean hospitalisation day's was 1.8 days (1.4 – 2 days)

Double moiety was seen in 3 patients, PCNL was done 2 patients where mean stone size was 19 mm (13-25mm), mean operating time was 71 mins (57 – 85 mins) and stone free rate was 93.2%. The mean hospitalisation day's was 8 days (3.5 – 6.1 days). RIRS was done in one patient and stone size was 13 mm, operating time was 49 mins and stone free rate was 80 %. The hospitalisation day's was 2 days.

Figure 1: Table comparing the outcome of different anomalies

	HSK (n=18)			Pelvic Ectopia (n=8)		Malrotated kidney (n=11)		Double moiety (n=3)	
	Lap. PCNL	RIRS	Open	Lap PCNL	RIRS	PCNL	RIRS	PCNL	RIRS
Patient numbers	5	10	3	5	3	8	3	2	1
Age (years)	39.1±15.1	41.4±12.7	43.6±13.4	38±13.6	41±12.7	38±16.8	39.5±17.2	28.7±12.4	31.4±13.5
Sex	3	6	1	2	1	4	2	1	1
Male	2	4	1	3	2	4	1	1	
Female									
SIDE									
Right	3	6	2	4	2	6	2	1	0
Left	2	4	1	1	1	2	1	1	1
STONE LOCATION									
Pelvis	1	5	3	2	2	5	2	1(UM)	1(UM)
Upper Pole	1	2	-	-	-	1	-	1(UM)	
Interpole	1	2	-	2	1	1	1	-	
Lower Pole	2	1	-	1	-	1	-	-	
Mean Stone Size (mm)	22±8	13±3	30±9	21±9	14±4	22±8	13±3	19±6	13
Stone Free Rate	94.4%	78.3%	97.3%	100%	80.4%	86.5%	79.6%	93.2%	80%
Mean operation time (mins)	84±20	71±15	61±15	85±19	79±22	74±19	78±12	71±14	49
Mean hospitalisation (days)	4.2±1.3	1.8±0.6	5.6±1.9	3.9±0.8	1.9±0.4	4.8±1.3	1.8±0.5	4.5±1.3	2

DISCUSSION

A total of 40 patients were enrolled in our study with mean age of 40 years ranging between 5-65 years. In our study population 21 were male and rest 19 were female patients.

In our study group right side stone was present in 26 patients and left side was present in 24 patients. Mean Stone Size was 23mm ranging from 10 – 39 mm and anomalies encountered were as follows 18 had horse shoe kidney, 8 had pelvic Ectopia, 11 had malrotated kidney and 3 had double moiety.

To start with in 18 patients having horse shoe kidney lap assisted PCNL was done in 5 patients. RIRS was done in 10 patients. Three patients underwent open surgery. HSK is the most frequent congenital genitourinary anomaly. It is observed in 1 in every 400 births. The kidney stone is present in 20% of HSK patients [5, 6]. One of the methods used for kidney stone management in HSK patients is SWL. Limited urine drainage and excessive stone-skin distance decrease success of SWL [12]. PNL is the most used method, but serious complications can be seen⁶. RIRS is another treatment method. In 2005, Weizer et al⁴ reported 75% stone-free rate in HSK patients who have <2 cm sized kidney stones. No complication reported. In 2010, Molimard et al [13] reported 53% stone-free rate in 17 HSK patients.

Pelvic ectopia was seen in 8 patients, 5 patients underwent Lap assisted PCNL. RIRS was done in 3 patients. Ectopic kidney is seen in 1 in every 2200 to 3000 births. The anterior positioning of the renal pelvis, high insertion of the ureter and renal vascularization impair calyx drainage, increase stone formation risk. Injury risk of aberrant veins, neighboring abdominal organs and nerves make surgery difficult in EK patients [14]. Demirkesen et al [15] reported 38% stone-free rate in EK patients after 3 sessions of SWL. Talic et al [16] reported 82% stone-free rate in 14 EK patients. In another study, 75% stone-free rate for RIRS was reported in 4 SWL failed EK patients.

Malrotated Kidney was present in 11 patients, PCNL was done 8 patients. RIRS was done in 3 patients. Malrotation is a rare condition and occurs due to dystopia and abnormal blood circulation. EK and HSK anomalies usually accompany with anterior rotation. There are rare number of studies about kidney stone management in Malrotation patients. Mosavi-Bahar et al [17] reported 81% success rate with no major complication in 5 M patients. Binbay et al [18] reported 77.3% success rate in 44 malrotation patients of 6 centers. In our study, 100% success was achieved in one patient after 2 sessions with no minor and major complication seen.

Double moiety was seen in 3 patients, PCNL was done 2 patients. RIRS was done in one patient. RIRS and PNL are the most popular methods used in anomalous kidney stone treatment. In a study comparing RIRS and PNL for the treatment of anomalous kidney stones, Singh et al [19] reported an algorithm-based approach. This approach was shaped according to factors like stone size, stone location, spatial calyceal orientation and the pelvicalyceal drainage system. In our study, we aimed to show our RIRS experience in kidney stones with different renal anomalies.

CONCLUSION

RIRS, Lap assisted PCNL, pyelolithotomy are useful and effective treatment modalities for stones in kidney with abnormal anatomy. According to the results of our study, PCNL & pyelolithotomy have a very high stone free rate with minimal complications but a longer stay compared to RIRS. Operative time of open surgery is shorter, but that of RIRS and PCNL is comparable. RIRS, though associated with lower stone free rate compared to PCNL, is associated with very short hospital stay and may be treatment of choice in stones of smaller size.

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