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ORIGINAL ARTICLE

Surgical management of urinary stones with abnormal kidney anatomy

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Abstract 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. The objective of this article is to determine the treatment options in these kidneys. For this purpose, between 2005 and 2015, we retrospectively evaluated patients operated for urolithiasis with various congenital renal anomalies in five referral urology clinics in our country. Of the 178 patients (110 male, 60 female), 96 had horseshoe kidneys, 42 had pelvic ectopic kidneys (PEKs), and 40 had isolated rotation anomalies (IRAs) of the kidney. We evaluated the patients for stone-free rate (SFR), mean operation time, mean hospitalization time, and complication rate. In horseshoe kidney, SFRs for retrograde intrarenal surgery (RIRS) and percutaneous nephrolithotomy (PNL) groups were 72.2% and 90%, respectively. In PEKs, these rates were 83.6% and 100% for RIRS and laparoscopic pyelolithotomy, respectively. SFRs in kidneys with IRA were 75% for RIRS and 83.3% for PNL. The mean operation time for RIRS and PNL groups in horseshoe kidney was 40.5 ± 11.2 minutes and 74.5 ± 19.3 minutes, respectively. In PEKs, these times were 52.1 ± 19.3 minutes and 53.1 ± 24.3 minutes for RIRS and laparoscopic pyelolithotomy, respectively. Mean operation time in kidneys with IRA was 48.7 ± 14.4 minutes for RIRS and 53.2 ± 11.3 minutes for PNL. Mean hospitalization times for RIRS and PNL groups in horseshoe kidneys were 1.4 ± 0.7 days and 2.2 ± 1.4 days, respectively. In PEKs, these times were 2.7 ± 1.8 days and 1.9 ± 0.4 days for RIRS and laparoscopic pyelolithotomy, respectively. Mean operation time in kidneys with IRA was 1.5 ± 0.9 days for RIRS and 1.8 ± 0.6 days for PNL.

Conflicts of interest: All authors declare no conflicts of interests.

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The results of our study showed that RIRS could be used in all of types of abnormal kidneys with small- and medium-sized renal calculi safely and satisfactorily.

Introduction

Nowadays, surgical techniques used by urologists are becoming more and more minimally invasive and easier because of developing technologies. However, surgical approaches for the urinary stones in kidneys with abnormal anatomy are still confusing. In current stone guidelines, there is also no clear suggestion and treatment modality in regards to the stone treatment in these kidneys. On the contrary, the recommendations for stone therapy in the kidneys with normal anatomy are clearly stated in the stone guideline of the European Association of Urology (EAU). The EAU guideline for urolithiasis recommends extracorporeal shockwave lithotripsy (SWL) as a first option for renal stones smaller than 2 cm, except for the lower pole stones with unfavorable risk factors. For stones larger than 2 cm, percutaneous nephrolithotomy (PNL) is recommended as the gold standard option. PNL is also reported to be a good option for $<$2 cm cystine stones, $<$2 cm SWL refractory stones, or $<$2 cm residual stones following open surgery. On the other side, miniperc ($<$20F), or ultraminipec with smaller tract size, expanded the use of PNL technique for smaller stones in the area of SWL with comparable stone-free rates (SFRs) and fewer complications to the standard PNL [1,2]. For stones smaller than 2 cm, retrograde intrarenal surgery (RIRS) has been gaining much attention because it offers significantly lower risk of complications and sufficient SFRs. SFRs were reported to be $>$80% for both miniperc and RIRS techniques [2].

Nowadays, SWL, ureterorenoscopy (URS), RIRS, PNL, laparoscopy, and open surgical procedures are used for the treatment of the stones in congenital anomalies kidney. However, there is no clear consensus on which treatment modalities should be used in these kidney stones. The purpose of this article is to determine the treatment options for kidney stones in kidneys with congenital anomalies. For this purpose, we retrospectively evaluated patients who were operated for urolithiasis because of various congenital renal anomalies in five referral urology clinics in our country.

Patients and methods

Between 2005 and 2015, we retrospectively evaluated patients who underwent operation for urolithiasis with various congenital renal anomalies in five referral urology clinics in our country. The data were collected from retrospective reviews of hospital and physicians' office records and through phone interviews with patients. We recorded direct urinary system graphy, intravenous urography, ultrasonography, computerize tomography, urine analysis, if necessary urine culture, complete blood count, serum biochemistry, and coagulation test. Additionally, we recorded several intraoperative and postoperative factors such as stone size, stone location, type of congenital anomalies in kidney, operative techniques, final SFR, additional procedure requirement, postoperative hemorrhage, hospitalization time, and complication rate.

The types of congenital anomalies of the kidney were horseshoe kidney (HSK), pelvic ectopic kidney (PEK), and isolated rotation anomaly (IRA) of the kidney. An experienced surgical team on urolithiasis performed all operations. Laparoscopic pyelolithotomy (Lap P) was performed in 9 patients, RIRS was performed in 101 cases, and PNL was performed in 68 patients.

RIRS technique

Under general anesthesia with the lithotomy position, rigid ureteroscopy using a 7.5F rigid ureteroscope (Karl-Storz Endoskope Berlin GmbH, Berlin, Germany) was routinely performed prior to flexible ureteroscopy. Then, a hydrophilic guide wire was placed into the renal pelvis via the rigid ureteroscope. A 9.5—11.5F ureteral access sheath (Boston Scientific) was placed if possible. Flexible ureteroscopy (Karl-Storz Flex X2; Karl-Storz) was used for RIRS. The stones were fragmented with a holmium laser (Medilas H, h20-1518; Dornier MedTech Laser GmBH, Weßling, Germany) using 170—200 μm laser fibers. A JJ catheter was inserted at the end of the procedure if there was a grade 1 or higher ureteral injury described by Schoenthaler et al [3]. The JJ catheters were removed 15 days after the operation. All procedures were performed under direct videoscopic and fluoroscopic guidance.

PNL technique

Under general anesthesia with the lithotomy position, a retrograde 5F ureteral catheter was inserted into the patient's ureter in the lithotomy position. The upper tip of the catheter was placed at the renal pelvis or within the upper pole calyx for the seeing that collecting system. A 16F urethral catheter was inserted into the bladder and tied to the ureteric catheter in order to avoid dislocation. After this procedure, the patient was placed in the prone position. Percutaneous access was achieved under C-arm fluoroscopic guidance. An 18-gauge puncture needle was inserted into the selected calyx. A j-tipped curved guide wire (0.035 inch) was placed into the collecting system, preferably in the upper calyx or ureter. Teflon Amplatz dilatators were used for the dilatation of the nephrostomy tract. Nephroscopy was done with a 24F semirigid