Laparoscopic pyelolithotomy in a horseshoe kidney

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ABSTRACT

The horseshoe kidney is the most frequent renal anomaly, with a prevalence of 0.25% and a male to female ratio of 2:1. In this article we aimed to report a 50-year-old man who had left kidney stones accompanied with a horseshoe kidney. In this case percutaneous nephrolithotomy was deemed to be a risky procedure due to malrotation of the pelviocalyceal system and possible interposition of bowel loops between kidney and the abdominal wall. Therefore, we preferred laparoscopic pyelolithotomy. At the end of the procedure, the patient was stone-free. We observed no complication. The patient was discharged after 72 hours. We assume that laparoscopic pyelolithotomy is a safe and effective approach for renal pelvic stone in case of horseshoe kidney.

Key words: Horseshoe kidney; laparoscopy; pyelolithotomy.

Introduction

Horseshoe kidney is one of the most frequently seen congenital renal fusion anomaly with an incidence of 1/400. It is 2-fold more prevalently seen in men.^[1,2] In 95% of the cases fusion involves lower part of the kidneys. Most of the patients are asymptomatic. However in symptomatic cases symptoms are generally caused by accompanying infections, obstruction, and stone formation. In 20% of the cases with horseshoe kidneys stone formation is seen which is the most frequent indication for surgical intervention.^[3,4]

During fetal development, if the kidneys do not complete their normal anatomical rotation, pelvis is situated in front of the kidney, and ureter enters into pelvis at a higher level than its normal insertion site leading to the formation of a horseshoe kidney. This anatomical alteration constitutes a risk for formation of renal stones which are refractory to spontaneous passage. Even though extracorporeal shock wave lithotripsy has yielded successful outcomes, in cases with higher stone burden same success rates can not be achieved. Inferiorly situated calyces, caudal, and medial location of the lower calyces, anterior position of kidneys relative to their normal anatomical location do not only adversely effect the response of the kidneys to ESWL, but also complicate percu-

taneous interventions.^[5] Conventionally, stone in a horseshoe kidney together with anatomical obstruction carries an indication for an open surgery. Nowadays, in line with the development of laparoscopic surgery, this indication has been thought only for complex stones.^[6,7]

In this article we present a patient diagnosed as horseshoe kidney with left renal pelvic stones who underwent laparoscopic (LP) pyelolithotomy in our clinic.

Case presentation

A 50-year-old male patient consulted to our outpatient clinics of urology with complaints of bilateral flank pain recurring for the last one month. He had undergone right percutaneous nephrolithotomy (PNL) 7 years ago. Otherwise, his anamnesis did not reveal any other operation, and chronic disease. His physical examination was unremarkable, and his body mass index (BMI) was 22 kg/m². Complete urinalysis disclosed leukocytosis, and erythrocytosis. On urine culture media any bacterial growth was not observed. On direct urinary radiograms (KUBs) three radiopacities were detected. One of them measuring 5 cm in diameter was observed within the renal pelvis, and the other two 1 cm radiopacities were localized in the lower pole (Figure 1). On abdominal ultrasonogram, a staghorn stone extending from

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Figure 1. Preoperative direct urinary system radiogram

Figure 2. Intravenous pyelogram obtained at 15. min

the middle portion of the left kidney up to the lower pole, and moderate-severe dilatation of the left renal collecting system were observed. On IVP, both kidneys were functional, and an image consistent with horseshoe kidney was detected. Besides, a total of three radiopacities were observed on urograms. One of them had a diameter of 5 cm, and filled the left renal pelvis completely, the other two radiopacities were localized in the lower pole the largest one being 1 cm in diameter. (Figure 2). On abdominal computed tomograms (CTs), an image consistent with horseshoe kidney with united lower poles in front of the aorta, and a normal right renal collecting system were observed. In addition severely hydronephrotic left kidney together with three radiopacities situated along a segment beginning from proximal ureter up to the renal pelvis, the largest one with dimensions of 55 x 25 mm were found (Figure 3). Surgical technique to be applied was explained to the patient, and his informed consent was obtained. Then he was hospitalized in our clinic for laparoscopic lithotripsy.

Surgical technique

Under general anesthesia, while the patient laid down on his right side, a Veress needle was inserted at the level of umbilicus

Figure 3. Computed tomography scan of horseshoe kidney with nephrolithiasis

through the lateral edge of the rectus abdominis muscle, and intraperitoneal cavity was entered. Carbon dioxide was insufflated into the peritoneal cavity to create pneumoperitoneum. With the aid of Visiport® Spin Window, intraabdominal cavity was entered through a 12 mm-trocar. A total of 3 trocars with a diameter of 10 mm was placed. Priorly, descending segment

Figure 4. a-d. Intraoperative photographs. (a) Dissection of the renal pelvis. (b) Extraction of the stone from the renal pelvis. (c) Removal of three intrarenal stones. (d) Suturing of renal pelvis

Figure 5. Postoperative direct urinary system radiogram

of the left colon was separated from the Toldt membrane down to the splenic flexura, and retroperitoneal space was entered. Gerota fascia was opened, and renal pelvis was dissected, and explored. (Figure 4a). Renal pelvis was incised vertically for 3 cm. Then firstly renal pelvic stone measuring 5 cm in diameter, then 2 lower pole stones the largest one being 1 cm in diameter were held with a laparoscopic grasper, and taken out. (Figure 4b, c). Pelvis was closed with continuous 4.0 vicryl sutures (Figure 4d). Any intraoperative complication did not develop. Stones were placed in an endobag, and trocar access tract was dilated for 1 cm so as to take the stones outside. A drain was placed inside the loge.

Operative time, and duration of hospitalization were 150 min, and 3 days, respectively. Total amount of bleeding was 100 cc. Any procedural complication was not detected, and complete stone-free status was achieved. Postoperative control radiograms did not reveal any residual stone fragments (Figure 5).

Discussion

Stone disease is the most frequently encountered problem in horseshoe kidneys. In calculous kidneys with congenital anomalies, treatment is more challenging, and altered renal anatomy requires different anatomical approaches. These management modalities include ESWL, PNL, flexible ureterorenoscopy, laparoscopy, and open surgery. Even though ESWL and PNL are most frequently used methods in the treatment of stone disease, suboptimal results have been obtained in some circumstances.

Stone-free rates in horse-shoe kidneys after ESWL procedures have ranged between 28, and 80 percent. Besides ESWL can be safely performed for stones smaller than 2 cm, and in patients with lighter stone-burden whose urinary drainage is not blocked.^[8,9] For patients with relatively heavier stone burden most of the time, an additional treatment modality can be required apart from ESWL.^[10,11] Our case had a heavier stone-burden (55 x 25 mm) so we didn't prefer ESWL.

In anomalous kidneys, laparoscopy has been used alone or in combination with other endoscopic procedures. Laparoscopic management of stone disease in a patient with a horseshoe kidney was firstly performed by Maheshwari et al in 2004.^[12] Though for renal stones measuring 2 cm or greater, PNL is a proper treatment alternative, in anomalous kidneys it can lead to serious complications.^[13-16] Unusual anatomical positions of anomalous kidneys (medial location of renal pelvis, and lower pole in horseshoe kidneys might prevent approach of nephroscope to these anatomical structures during PNL), abnormal renal, and calyceal orientation, pathological communications

between calices, collecting system, and upper ureteral segment, presence of aberrant vessels, relative immobility of the horseshoe kidney which restricts maneuverability of rigid instruments, and abnormal anatomical relationship of horseshoe kidney with other adjacent organs, and especially with intestinal system result in development of complications, and procedural failure.^[13] During PNL procedure performed for the extraction of stone(s) in a horseshoe kidney, one should be very careful about abnormal relationship of pelvicalyceal system with surrounding adjacent organs, and refrain from the risk of injuring neighbouring organs especially the colon.^[14]

Since flexible URS has a higher success rates for stones smaller than 2 cm, we didn't prefer to use this system for our case with a heavier stone burden.

In our case, we preferred to perform LP in consideration of heavy stone burden, and absence of an extrarenal pelvis, and an aberrant vessel crossing over renal pelvis, possibility of easy access to stones, and extraction of the stone as a single piece without resorting to fragmentation which might ensure complete stone-free rates.

The outcomes of LP were firstly published by Gaur et al.^[17] LP performed for the management of staghorn stones was also reported by Gaur et al.^[18] In a meta-analysis conducted in 2013, the authors considered PNL, and LP as safe, reliable, and effective treatment modalities in large solitary stones bigger than 2 cm, and reported demonstrated shorter operative, and hospital stay times, lesser blood loss, and less frequent postoperative febrile states for PNL procedures. Stone-free rates were found to be 98.7 (158/160), and 89.4% (153/171), respectively (p:0.006).^[19] LP can be a proper alternative in the presence of stones larger than 2 cm together with ureteropelvic junction stenosis, and in patients with anomalous kidneys, and in morbidly obese individuals where. ESWL, and other endourological interventions have lower procedural success rates.^[19]

Thanks to the development in laparoscopic techniques, and instruments, and increasingly accumulating experiences of the surgeons in laparoscopic surgery, this minimally invasive approach has become a realistic alternative in the management of stone disease in anomalous kidneys.^[20]

Laparoscopic method is a safe, and effective approach in the management of cases with horseshoe kidney, and renal pelvic stones larger than 2 cm.

Informed Consent: Written informed consent was obtained from patient who participated in this case.

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