CLINICAL CASE

LAPAROSCOPIC TRANSMESOCOLIC PYELOLITHOTOMY FOR PELVIC KIDNEY LITHIASIS - A CASE REPORT

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Abstract

The stone disease in a pelvic kidney is often difficult to treat due to the multiple anatomical anomalies. We have performed a laparoscopic pyelolithotomy for a large pelvic kidney stone with guided intraoperative flexible ureteroscopy. We have successfully performed a peritoneal transmesocolic laparoscopic pyelolitotomy to a 35-year old female patient with a 23 mm stone located in the collecting system of her right pelvic kidney. During the operation we also used a flexible ureteroscope to identify the stone due to an aberrant disposition of the right collecting system. Operative time was of 5 hours with no injury of major blood vessels. Postoperative recovery was four days with minimal abdominal pain, minimal abdominal drainage, no urine leakage in the peritoneal cavity and fast retrieval of gastrointestinal function. At this point the patient is stone free and the kidney has normal function demonstrated in a renal scintigraphy. Laparoscopic pyelolithotomy is a safe and efficient treatment option for stone disease with large calculi in ectopic pelvic kidney. The advantage of laparoscopic pyelolithotomy is that it has good functional results, with fast postoperative recovery, low complication rates and high stone free rate in one session.

Keywords*: Stone disease, renal ectopy, pelvic kidney, laparoscopic pelolithotomy*

Introduction

Pelvic kidney is one of the most encountered types of renal ectopia, with an incidence estimated to 1 in 3000 autopsies [1]. They appear due to a developmental anomaly such as teratogenic factors, genetic defects or anomalies of fusion between the ureteral bud and metanephrogenic blastemal [1,2]. A kidney in pelvic ectopia is usually malrotated in its axis with the pelvis placed anterior, prior to the parenchyma. The ureter is short, in accordance with the kidney's position and the vascular supply derives from the nearby iliac vessels (common or external) or from the aortic bifurcation [1,3]. Usually an ectopic kidney is diagnosed when various urinary symptoms occur that require additional examinations. Ureteral reflux, hydronephrosis and stone disease are common conditions associated to pelvic ectopic kidney [3]. The treatment of urolithiasis occurred in an ectopic kidney is always difficult due to the multiple anomalies associated: site and shape of the kidney and

collecting system, aberrant vascular supplies and its position related to other abdominal organs. The laparoscopic approach for large stones in pelvic kidney represents a therapeutic challenge. We are presenting the case of a large renal calculus in a pelvic ectopic kidney treated successfully by laparoscopic pyelolitotomy.

Case presentation

A 35-year old woman was admitted in our clinic complaining of lower abdominal pain located in the right iliac fossa and hypogastric region. From the patient's medical history we learned that three years before the actual episode the patient had a pregnancy, without any urologic impairment, for which she had a C-section. During the last year she was complaining of dull lower abdominal pain which increased its intensity over time.

The clinical examination marked out the abdominal pain located in the right iliac fossa which irradiated to the hypogastric region. The blood tests did not show any alteration – leucocytes, number of erythrocytes, hemoglobin, kidney and liver tests were in normal range. Urine analysis revealed that the patient had microscopic hematuria, proteinuria and leukocyturia, but with sterile urine culture.

Abdominal ultrasound showed that the right kidney was not found in its normal position in the lumbar space but it was situated in the upper part of the pelvis, with dimensions of 105/73/48 mm and a renal parenchymal index of 22 mm. In the collecting system there was a large calculus sawn as a bright hyperechoic image with posterior acoustic shadowing that measured 25/13 mm. The calculus was partially obstructing the ureteropelvic junction causing a grade I hydronephrosis. The right ureter was scarcely visible and had no other migrated calculi. The left kidney, ureter and the bladder had normal ultrasound structures.

The information brought by the ultrasonography was completed by the Uro-CT which described the right kidney in the upper part of the pelvis, anterolateral to the vertebral body of L4-L5 and lumbosacral joint, malrotated in the longitudinal axis, with the collecting system located anterior (Figure 1). The main arterial supply came from the aortic bifurcation and the venous drainage was made through the right common and external iliac vein. The ureter was short and sinusoid in shape, but had a normal caliber and a normal site of implantation in the bladder. At the renal pelvis site the calculus could be easily identified by the shape, the strong opaque intensity (963 Hounsfield Units) and the dimensions similar to ultrasound. The CT reconstructions helped us to visualize the shape of the right collecting system, which had a V shape with two main branches fused at their base, creating a small pelvis where the calculus was located (Figure 2).

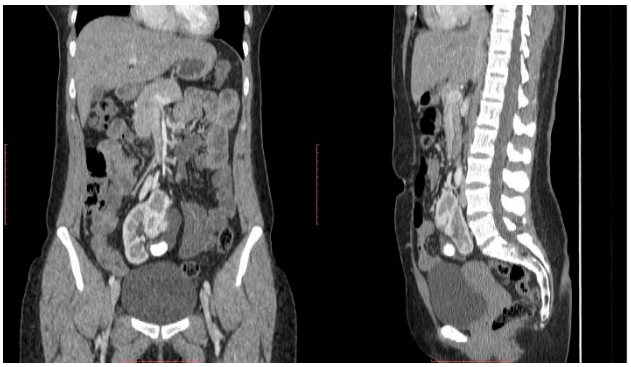

Figure 1 - CT scan showing the stone in the collecting system of the pelvic

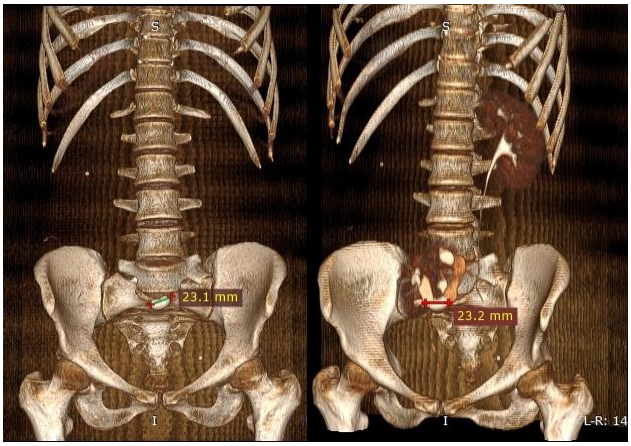

Figure 2 - Reconstruction of the urinary system showing the stone location

After a thoroughly assessment of the case and a detailed discussion with the patient, we have decided to perform a laparoscopic pyelolithotomy under general anesthesia. The first step was to insert a double-J stent by retrograde endoscopy to facilitate the postoperator healing. We have inserted the first port under the umbilicus and created the pneumoperitoneum at a gas pressure up to 12

mmHg. After a brief inspection of the abdominal cavity, we have placed the other three ports: two ports of 10 mm on the left pararectal line (one lateral to the umbilical port and one on the lower pole of the line) and one 5 mm on the lower pole of the right pararectal line. Then we placed the patient in a 30 degree Trendelenburg position slightly tilted on the left side.

After the dissection of peritoneal adhesions we found the kidney in retroperitoneal space. We dissected the right mesocolic space with respect for the colic vessels, which let us uncover the right kidney surrounded by the perirenal fat. We have identified the renal pelvis and made a small incision through which we have introduced a flexible ureteroscope in order to identify the calculus. We have located the stone posteriorly, at the crossing between the two branches of the renal pelvis and the ureter. Taking precautions not to injure any vascular supplies of the kidney we have incised the renal pelvis and after dislodging the calculus (Figure 3) we removed it and closed the pelvis with a 3-0 polyglycolic separate suture. At the end we placed a drain tube through the 10 mm port hole from the lower left side and exsufflated the gas from the peritoneum. Due to a hemorrhage at the site of the upper left port we also placed a Foley catheter inflated with 15 cc of serum and left it to compress the port site for 6 hours. Total time of the operation including the placement of the stent was about five hours.

Figure 3 - Pelvic kidney stone extracted

The postoperative recover time was four days while the patient had minimal pain, the urine output was normal and the gastrointestinal tract regained its normal function. During this period we have made some ultrasound assessments which showed us that the kidney was stone free, the double-J stent was correctly placed and the collecting system was not dilated. Also there were no abdominal collections in the peritoneal cavity, in Douglas or Morrison spaces. The abdominal drainage, exteriorized through the abdominal tube, was minimal in the first day after the operation and then in the next two days it stopped (Figure 4). We removed the tube in the third postoperative day and then in the fourth day the patient was discharged from the hospital. On the tenth postoperative day we removed the suture wires and then 20 days later we reassessed the patient and decided to remove the double-J stent. We have then followed-up the patient with urine examination, urinary culture, ultrasound every 6 months.

Figure 4 – Sites of port placement (postoperative view)

At this moment the patient is stone free, the blood tests and urine analysis showed no disorders. Chemical analysis of the stone revealed that its composition was calcium oxalate dihydrate.

Discussions

As we showed in the introduction, the renal ectopia has some specific features of vascular supply, architecture of the collecting

system and the length and trajectory of the ureter. Stone disease is one of the most frequent conditions found in ectopic kidney due to reflux and pelviureteral junction obstruction, which generate the favorable conditions to produce calculi [1,4]. Small stones (maximal diameter of 20 mm) can be efficiently treated by minimal invasive means like shock wave lithotripsy and retrograde ureteroscopy. On the other hand, large stones (diameter over 20 mm) or failure of ESWL and endoscopy, require a more aggressive treatment that includes surgical approach [5]. Open surgery is one of the most effective procedures with a high stone-free rate, but its results are overshadowed by the postoperative pain, prolonged ileus duration and infectious complications [6,7].

Laparoscopic approach was always regarded as an optimal alternative to open surgery. Although an ectopic kidney could pose some tactical challenges, laparoscopic pyelolitotomy was performed successfully in some cases and proved to have good results. The first laparoscopic approach for a calculus in an ectopic kidney was published by Chang and Dretller in 1996, when they successfully removed a 2 cm calculus from the pyelon of a left pelvic kidney [4].

Over time the laparoscopic pyelolitotomy demonstrated to have several advantages compared with other procedures (ex. endoscopy, open surgery): safe access to the collecting system, high stone free rate in one session, low intraoperative rate of complication, low rate of postoperative morbidity [6,8].

Although there are no standard procedures for ectopic kidney lithiasis, laparoscopic pyelolithotomy on a pelvic kidney may be indicated when the renal pelvis is located anterior or medial [4,5] or when there is a concomitant pelviureteral junction obstruction, that caused the stone disease, which needs to be repaired [8,9]. In our case the renal pelvis was located anterior so we preferred a peritoneal approach that eased our access to the kidney. Sometimes if the renal pelvis is located anterior or lateral it is preferred a retroperitoneal laparoscopic approach. Bozkurt et al. published a case where 21 mm calculus was removed from a right pelvic kidney with the pelvis situated anterior [10]. The decision on whether to approach the kidney trans or retroperitoneal must be taken based on the local anatomy and particularities shown by the CT scan.

Also, the transmesocolic approach or mobilization of the colon with the reveal of retroperitoneal space must be decided based on the anatomical particularities. In our case the transmesocolic approach was convenient due to the favorable position of the right colic vessels. Gupta et al. published a similar case where the pyelon was approached through the mesocolon, due to the small amount of fat in the mesocolon which made the colic vessels easier to identify [6]. Also, Sohail et al. presented a case of transmesocolic percutaneous nephrolithotripsy assisted by laparoscopic means. Although the colon mobilization is a safe maneuver, the transmesocolic approach can be a safe way to expose the renal pelvis, which also reduces the operative time [4,5,8].

The double-J stent that we have placed before the surgery had multiple roles. The main purpose was to drain the kidney postoperative, but also to identify easier the ureter and pelviureteral junction. Although the stent can be placed intraoperative we preferred to place it preoperative, under the same anesthesia with the patient in lithotomy position, to reduce the operative time. In our case the patient had a good postoperative evolution, but sometimes complications like urinary leak with subsequent uroperitoneum, prolonged fever or sepsis due to urinary infection may occur after laparoscopic pyelolitotomy [5,9].

Alternative procedures that require laparoscopic assistance are percutaneous nephrolithotripsy (PCNL) and anatrophic nephrolithotomy. Although the stone free rate for these procedures can be similar to laparoscopic pyelolithotomy they are indicated in case of inaccessible renal pelvis due to lateral or posterior kidney rotation. Kamat et al. recommended to avoid nephrolithotomy as much as possible and to adopt a nephron sparing procedure [4]. In a comparative study which included laparoscopic pyelolithotomy (LP), percutaneous nephrolithotripsy and SWL, Hoening et al. found that stone free rate is higher in laparoscopic pyelolithotomy (100%) than in PCNL (95%) and SWL (52-78%) with low hospital stay (1-2 days for LP vs. 3-5 days for PCNL) although the operative time was higher for LP (2-5 hours) [11]. In a similar

analysis Gandhi et al found that the stone free rate was similar for both laparoscopic pyelolithotomy and PCNL (90%) although each procedure had its own limitations and complications [5]. Tuğcu et al. also found that laparoscopic pyelolithotomy and PCNL could have similar results although there were some differences regarding the operative time, mean hospital stay, estimated blood loss and mean postoperative analgesic requirement [8].

Conclusions

Laparoscopic pyelolithotomy is a safe and efficient treatment option for the treatment of large calculi in ectopic pelvic kidney. The usefulness of laparoscopic approach for this type of calculi was demonstrated based on the high stone free rate in one session compared with other endourological procedures. The advantage of laparoscopic pyelolithotomy is that it has good functional results with fast postoperative recovery and low complication rates.

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