CASE REPORT
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Laparoscopic-assisted Percutaneous Nephrolithotomy in an Ectopic Pelvic Kidney: A Case Report

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Abstract

Ectopic kidneys are prone to anomalies including the presence of nephrolithiasis. Percutaneous nephrolithotomy (PNL) is the treatment of choice for patients with large or complex renal stones in ectopic kidneys. Due to its abnormal location, rotation and aberrant vasculature, it can be done with the aid of laparoscopy in the supine position. A 31-year-old female presented with a two-week, intermittent right lower quadrant pain with no associated signs and symptoms. Computed tomography stonogram showed an ectopic right kidney at the level of L3 to L5 with a 2.0x1.6x1.4 cm middle calyceal calculus (1478 Hounsfield units). The patient underwent cystoscopy, retrograde pyelography, and laparoscopic-assisted PNL on the right kidney with complete stone clearance. Laparoscopic-assisted PNL is deemed safe and effective for patients with large or complex renal stones in the ectopic kidney with excellent stone-free rates and minimal complications.

Keywords: Ectopic kidney, percutaneous nephrolithotomy, laparoscopy

Introduction

Ectopic kidney occurs when the kidney fails to ascend from the pelvis during embryogenesis (1). It is a rare developmental anomaly with an incidence of approximately 1 in 1000 births (1). The location of an ectopic kidney can be pelvic, iliac, abdominal, thoracic, or crossed or crossed fused; they are usually unilateral (2). Due to the abnormal rotation and aberrant vasculature, incidence of ureteropelvic junction obstruction and stone formation incidence are higher than the general population (2).

Stone disease in pelvic ectopic kidneys presents unique challenges to urologists because of differences in anatomy. Several modalities can be used depending on the size and location of the stone, including extracorporeal shock wave lithotripsy (SWL), ureteroscopy (URS), percutaneous nephrolithotomy (PNL), laparoscopy, and open stone surgery (3,4). PNL is widely used in the treatment of large and complex stones in patients with pelvic kidney. However, there are some differences in performing the operation, such as patient position and renal access, making it difficult for urologists (3).

We describe a case of successful treatment of stone disease in an ectopic pelvic kidney via laparoscopic-assisted percutaneous nephrolithotomy. This is the first reported case of this procedure in the country (Philippines).

Case Presentation

A 31-year-old female presented with a two-week intermittent, right lower quadrant pain with no associated signs and symptoms. The patient has no comorbidity and the physical examination is unremarkable. Initial laboratory work up of the patient were all within the normal range (hemoglobin 13.8 g/dL, white blood cell count 7.1 g/dL, creatinine 61.9 mol/L, no microscopic hematuria, pyuria or bacteriuria on urinalysis). Computed tomography stonogram showed an ectopic right kidney at the level of L3 to L5 with its hilum displaced anteriorly containing a 2.0x1.6x1.4 cm middle calyceal calculus with Hounsfield units of 1478 (Figure 1).

The patient was admitted for laparoscopic-assisted supine right PNL. In the dorsal lithotomy position, a 6 Fr ureteral catheter was then inserted retrogradely into the ectopic kidney. Scout film was taken (Figure 2) and retrograde pyelography showed a radio-opaque stone occupying the middle calyx. With the patient in the supine position, a 12 mm camera port was inserted through the left supraumbilical area, and pneumoperitoneum was created. A secondary 5

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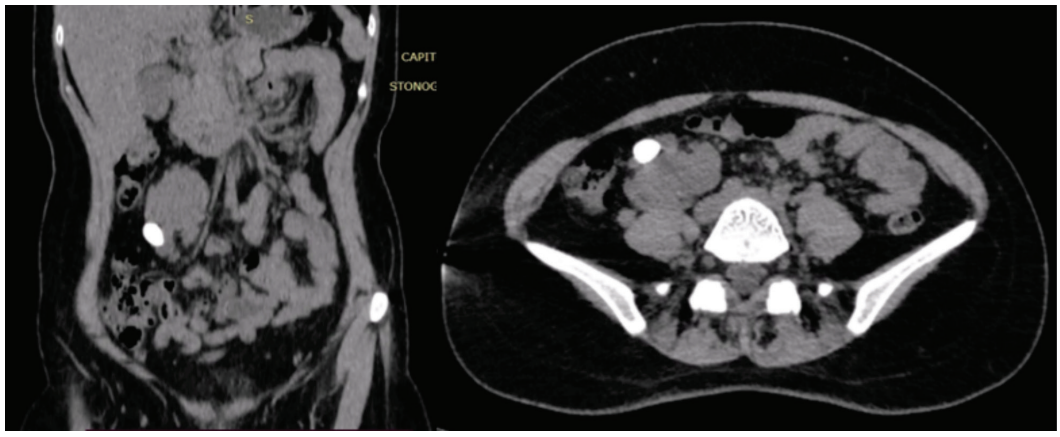


Figure 1. Coronal and axial cuts of the computed tomography stonogram showing the anteriorly rotated ectopic right kidney with a 2 cm middle calyceal calculus

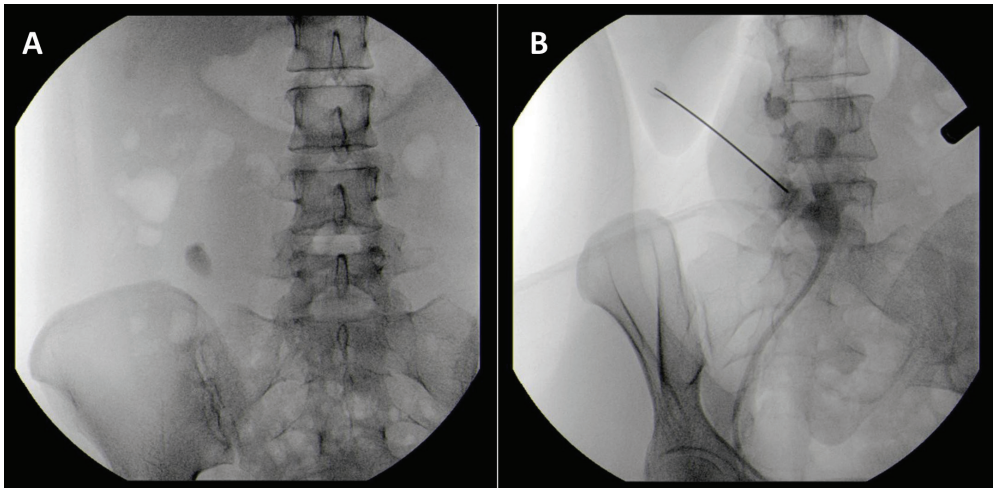


Figure 2. (a) Scout film showing the 2 cm middle calyceal calculus on the right ectopic kidney, (b) Retrograde pyelogram and access at the middle segment of the right kidney using an 18-gauge Chiba needle

mm working port was inserted at the right subcostal anterior axillary area, and another 5 mm assist port was inserted at the left lower quadrant midway between the anterior superior iliac spine and the umbilicus (Figure 3). Dissection was done to bring down bowel overlying the kidney to expose the renal parenchyma and the renal pelvis. The calyceal stone was accessed via direct puncture in the middle segment of the right kidney using an 18-gauge Chiba needle (Figures 2 and 4). A 0.038″ flexible tip guidewire was inserted, and Amplatz renal dilators were used for access dilation up to 28 Fr under fluoroscopic and laparoscopic guidance. A 24 Fr nephroscope was introduced and the stone was fragmented using ultrasonic lithotripsy with complete stone clearance (Figure 4). A 6 Fr x 24” Double J stent was left in place and antegrade nephrostogram showed no extravasation of dye or filling defect (Figure 4). PNL incision site was converted to a 10 mm, working port, and the nephrostomy site was closed with continuous suture with V-loc 3-0. The Jackson-Pratt drain was placed and exteriorized over the PNL incision site to observe



Figure 3. Trocar placement: 12 mm port in the left supraumbilical area, 5 mm working port in the right subcostal anterior axillary area and another 5 mm assist port in the left lower quadrant midway between the anterior superior iliac spine and the umbilicus

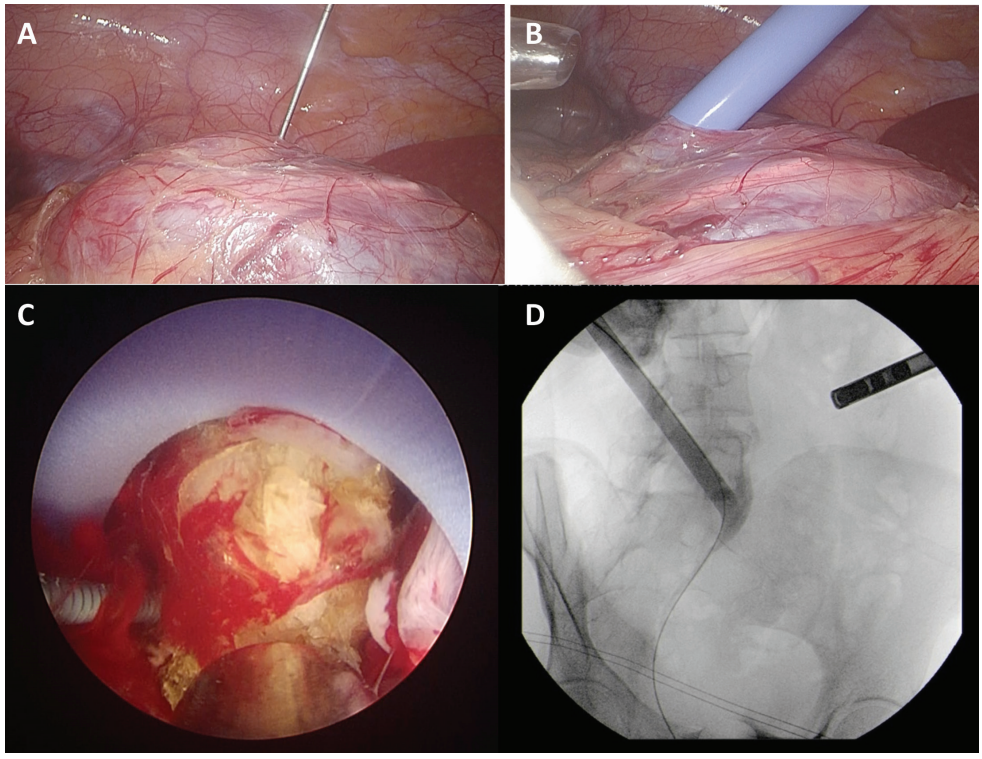


Figure 4. (a) Access on the middle segment of the right ectopic kidney via an 18-gauge Chiba needle (laparoscopic view), (b) 28 Fr Amplatz type renal sheath inserted after access and dilation (laparoscopic view), (c) 2 cm middle calyceal calculus fragmented with ultrasonic lithotripter, (d) Antegrade nephrostogram showing complete stone clearance

for possible post-operative site bleeding. All other trocar port incisions were closed. The procedure is completed, and kidney, ureter, and bladder X-ray confirmed Double J stent placement.

The operative time was 2 hours with a blood loss of 200 cc. The patient had no subjective complaints post-operatively and repeat renal function tests were within normal range on the first post-operative day (hemoglobin 12.6 g/dL, white blood cell count 8.8 g/dL, creatinine 47.7 mol/L). The Foley catheter and the Jackson-Pratt drain were removed on the third post-operative day. Puncture site remained dry throughout and the patient was discharged well on the fourth post-operative day. The patient followed up after 3 months, and the Double J stent was removed. Renal ultrasound showed no residual fragments, and urinalysis, as well as renal function tests, remained within normal limits.

Informed consent of the patient was obtained from the institution's review board as one of the requirements of the study prior to its approval.

Discussion

The location of an ectopic kidney poses a challenge to urologists, especially if the ectopic kidney presents with a pathology such as large stones. Care should be taken during surgery as ectopic kidneys are usually surrounded by vital structures such as bowel and large vessels (4). Treatment depends on the size and location of the stone. If the stone burden is small (<2 cm), SWL or URS may be done, but for patients with a large or complex stone burden, PNL is the recommended treatment (5).

PNL is already an accepted treatment modality in anatomically normal kidneys, but ectopic pelvic kidneys require a different and more complicated approach for PNL (3). It is usually done under laparoscopic guidance and in the supine position with access either in the renal pelvis or calyx (6).

The reason behind this approach is that the ectopic pelvic kidney is in the retroperitoneum, with interposing bowel loops anteriorly, just like in our patient, and the ascending colon is right on top of the pelvic kidney (6). Prone position and fluoroscopy access were also not suitable due to the presence of bowel and bony pelvis that were wrapped around the ectopic kidney (3). The standard approach for this population has not been established yet, but there are already multiple reports demonstrating excellent results with this approach at different centers around the world (2-6). Both our experience and the literature deem laparoscopic-assisted PNL safe and effective in the treatment of renal stones in this population with excellent stone-free rates and minimal complications (2-6).

Conclusion

Ectopic kidneys with stones present an uncommon and challenging case to urologists. Advancement in treatment, such as the laparoscopic-assisted PNL, shows that even complex stone cases can be managed in a minimally invasive approach safely and effectively with minimal complications.

Ethics

Informed Consent: Informed consent of the patient was obtained from the institution's review board as one of the requirements of the study prior to its approval.

Footnotes

Authorship Contributions

Surgical and Medical Practices: K.A.K., L.A.H.F., H.J.B.Z., G.D.R.S., Concept: K.A.K., L.A.H.F., H.J.B.Z., G.D.R.S., Design: K.A.K., L.A.H.F., H.J.B.Z., G.D.R.S., Data Collection or Processing: K.A.K., L.A.H.F., H.J.B.Z., G.D.R.S., Analysis or Interpretation: K.A.K., L.A.H.F., H.J.B.Z., G.D.R.S., Literature Search: K.A.K., L.A.H.F., H.J.B.Z., G.D.R.S., Writing: K.A.K., L.A.H.F., H.J.B.Z., G.D.R.S.

Conflict of Interest: No conflict of interest was declared by the authors.

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