

Laparoscopic Assisted Percutaneous Nephrolithotomy for Renal Pelvis Stone in a Crossed Fused ectopic Kidney: A Case Report

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Abstract

Crossed Renal Ectopia (CRE) is a relatively rare congenital renal anomaly. Management of stones formed within such anomalous renal architecture is a challenge for urological surgeons especially in the fused form of the anomaly (CFRE). There is an increasing trend for using percutaneous nephrolithotomy (PCNL) in such complicated cases. However, certain anatomical variants of this anomaly will make PCNL technically difficult especially when the path to the diseased kidney is blocked by the normal one. In this clinical report, we present a case of renal pelvis stone in a CFRE patient whose target pelvis position was technically difficult to reach by the fluoroscopy guided PCNL technique alone. To circumvent this difficulty, we successfully made use of the laparoscopic technology to visually navigate our way while creating the tract for the PCNL scope sheath in to the target renal pelvis.

Keywords: percutaneous nephrolithotripsy, laparoscopy, nephrolithiasis, crossed fused renal ectopia.

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Introduction

The urinary system can suffer from different congenital anomalies like renal agenesis, multiple kidneys, renal ectopia, and fusion defects. Procedural difficulty and compromised safety are expected when surgical intervention is indicated in patients with anomalous kidneys. The abnormal renal anatomy may contraindicate certain interventions or require modification of their classical procedural aspects.

Percutaneous nephrolithotripsy (PCNL) is a well established technique in the surgical management of nephrolithiasis. The conventional fluoroscopic guidance of PCNL

will be of limited value in ectopic anomalous kidneys due to the abnormal anatomical landmarks with consequent compromise of the procedure's safety. In this group of patients, laparoscopic assistance will provide direct visual guidance through the abnormal tissues during the percutaneous technique.

Case Presentation

A 30-year old male patient, previously healthy, presented to our urology outpatient clinic complaining of right loin pain of six month duration. It was colicky in nature and radiated to the epigastrium and lower abdomen. It was associated with occasional gross hematuria. A kidney, ureter, and bladder (KUB) x-ray was

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ordered and showed a 2x3 cm radio-opaque shadow in the right upper quadrant zone, consistent in density with a stone (figure 1).



Figure (1): A KUB X-ray showing a 2X3 cm stone in the right upper quadrant.



Figure (2): An IVU showing the hydronephrotic left crossed ectopic kidney in the right upper quadrant zone with its ureter crossing the midline at the lower level of L4

An ultrasound assessment, showed a picture of a crossed ectopic left kidney with a 3x2 stone formation inside. Further evaluation with an IVU showed crossed ectopia of the left kidney with a 3x2 cm stone resulting in a marked dilatation of the renal pelvis (figure 2).

The patient was scheduled for diagnostic cystoscopy and retrograde study of his renal system under laryngeal mask general anesthesia. Intraoperative findings showed that both ureteric orifices were in their normal anatomical site in the bladder. The left ureter was crossing the midline to the right side towards the ectopic kidney. The stone proved to be in the pelvis of the ectopic kidney that was severely hydronephrotic. A double J stent was inserted in the left ureter and a ureteric catheter inserted in the right one for further delineation of anatomy in subsequent radiologic studies. A postoperative reconstructed non-contrasted urinary tract CT was done and showed a left ureteric catheter crossing the midline to the right side and reaching the renal pelvis of the ectopic kidney which contained the stone. Both ureters were seen in the right paramedian zone down to the lower border of L5 where the left ureter starts crossing leftwards to enter the bladder normally. Both kidneys were fused together with the native right one lying slightly anterior (figure 3).

The anatomic abnormality of the ectopic kidney was explained to the patient in addition to the technical difficulty imposed by it. A plan was formulated to use laparoscopic assistance during the insertion of the PCNL access needle. The patient's consent was obtained and he was admitted for the procedure.

After the induction of general anesthesia with

muscle relaxation and end tracheal intubation, the patient was put first in the lithotomy position. The left double J catheter was replaced with a left access ureteric catheter and the patient was then repositioned supine.

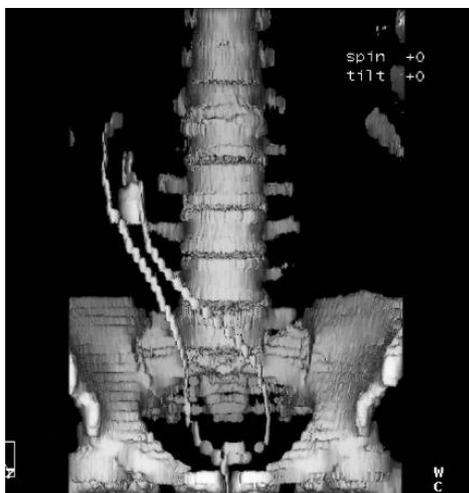


Figure (3): CT scan with reconstructed images showing the crossed and fused ectopic left kidney with the stone in its pelvis. Its ureter is crossing the midline at the lower level of L5.

Contrast fluoroscopic identification of the target kidney pelvis was done through a retrograde pyelogram. Renal laparoscopy was then carried out through regular access points. Under concurrent fluoroscopy, the access needle for the PCNL was laparoscopically guided into the target kidney pelvis uneventfully. The laparoscopic equipment was then removed, the access points were sutured, and the patient was put in the lithotomy position. The creation of the PCNL sheath tract was then done under fluoroscopic guidance using a high pressure nephrostomy balloon catheter (Nephromax[®], Boston Scientific, USA) over a guide wire (sensorwire[™], Boston Scientific, USA) inserted through the already placed 18-Fr access needle. Using the

pneumatic and ultrasound lithotripter (Swisslithelast master[™], Electro Medical Systems, Texas, USA), Top of Form Bottom of Form Fragmentation of the stone was done, and all stone fragments were removed and an ante-grade left double J stent was easily inserted.

As a further precaution against possible ureteric re-obstruction, a temporary left nephrostomy tube was placed (figure 4). The operation took about two and a half hours and was homeostatically uneventful. At the completion of the surgery, the patient was extubated in the supine position and sent to the post-anesthesia care unit. After a smooth one hour postoperative course with a mild to no pain score, he was discharged to the ward. The nephrostomy tube was removed in the ward after 6 uneventful hours. The patient was discharged home on the postoperative day. His outpatient follow-up was uneventful.



Figure (4): A KUB post PCNL showing no residual stones with left nephrostomy and double J in place.

Discussion

CRE is a relatively rare renal anomaly with an estimated incidence between 1:2000 to 1:7000 in autopsy series.¹ In clinical settings, CRE incidence is reported at about 1:10000.² It is the second most common renal fusion anomaly encountered following horseshoe kidney. It shows a slight male predominance (3:2) with more frequency of the left kidney crossing over to the right side with the fusion of the anomalous kidney to the normal one in 90% of cases.³

The causes of crossed ectopia remain unknown, but it is probably produced by abnormal development of the ureteric bud during the fourth to the eighth week of gestation.⁴ This embryologic mal-development of the crossing-over kidney with consequent fusion (in most cases) with the normal one, a mal-rotation and abnormal ectopic location can result in many renal anatomical configurations. These configurations can predispose the ectopic kidney to different pathologic conditions like Vesicoureteral reflux with frequent urinary tract infections, hydronephrosis with or without nephrolithiasis, and uroepithelial tumours.⁵

The altered geometry of the urine drainage system in CFRE can lead to urinary stasis which favours the development of renal stones.⁶ In a study from Japan, 15 of 166 cases of crossed renal ectopia were associated with urinary tract stones (Iwasaki 1988) .

Various interventional modalities, including open surgery, percutaneous procedures, extracorporeal shock wave lithotripsy (ESWL), and ureteroscopy, have been used in the management of nephrolithiasis in anomalous

kidneys. For stones smaller than 2 cm in diameter, ESWL is currently the preferred method of treatment. For larger stones and for those ones resistant to ESWL, percutaneous nephrolithotomy – if applicable – is the method of choice.⁷ PCNL offers advantages over open surgical approaches in terms of the lesser degrees of bleeding, post-operative pain, and consequently a shorter hospital stay. Scarring of the kidney will also be less due to a lesser degree of trauma.

The renal access difficulty due to complex renal configurations imparted by the anomalous renal anatomy will make the management of nephrolithiasis difficult and challenging to the urologist. Fluoroscopic guidance for the insertion of equipment of PCNL is likely to be of limited value because anatomically abnormal radiolucent tissues may interpose between the skin and the target location of the litho tome leading to tissue injury during the insertion of the access needle. These tissues can be of vital importance like blood vessels and renal tissue, depending on the merits of the case. In our patient, the position of the stone-containing ectopic kidney an tero-inferior to the normal one made it unlikely to reach the pelvis of the target kidney without injuring the normal one. The superimposition of the different soft tissue densities in the radiologic view limits the ability of the operator to distinguish between different tissue identities.

Laparoscopic guidance represents a practical solution to this technical problem. The leading part of the insertion needle in PCNL can be guided a traumatically under vision into the target kidney in a safe way. The added physiological aberrations imposed by laparoscopy are likely to be minimal and of no

clinical significance since the laparoscopic intervention serves a quick purpose and is short lived.

Thorough preoperative radiologic investigation of the renal system is recommended in the surgical management of these cases. This includes the use of CT scanning, intravenous pyelography, and angiographic studies. Good patient selection is also important for the outcome of laparoscopic assistance in these patients. Those with history of extensive prior abdominal surgeries are not good candidates due to the laparoscopy-hostile peritoneal environment present in these patients.⁸

Laparoscopic assistance of the PCNL technique was first described for ectopic kidneys by Toth et al in 1993.⁹ Since then it has increased the safety of the PCNL technique and widened its spectrum of indications. Its use in crossed fused renal ectopia was first reported in 1996.¹⁰ Both PCNL and laparoscopy can be carried out by the same surgeon experienced in both procedures like in our case. Otherwise, laparoscopic help can be sought from another experienced surgeon. In this era of endourology mastering both skills should be an objective of urosurgical training programs.

An ectopic anomalous kidney will likely have abnormal geometry of its collecting system. This may hinder the spontaneous passage of stone fragments which if not attended to may become the nuclei for future stone formations. So, postoperative follow up should include meticulous radiologic studies to ensure the full clearance of stone fragments.

References

1. J Baniel, Glezerson G, Tobias M, Manning AJ. Crossed renal ectopia Scand J Urol Nephrol, 1991; 25: 241-244.
2. Guarino N, Tadini B, Camardi P, Silvestro L, Lace R, Bianchi M. The incidence of associated urological abnormalities in children with renal ectopia. J Urol 2004; 172: 1757-1759.
3. Yano et al. Abdominal aortic aneurysm associated with crossed renal ectopia without fusion: Case report and literature review. J Vasc Surg 37: 1098-1102.
4. Rickwood AMK, Harney JV. Anomalies of Renal Position and Fusion and Pelviureteric Junction Obstruction. In: Whitfield HN, Hendry WF, Kirby RS, Duckett JW. (eds.) Textbook of Genitourinary Surgery. Vol. 1. 2nd Ed. Oxford: Blackwell Science. 1998; 164-166 .
5. Patel TV, Singh AK. Crossed fused ectopia of the kidneys. Kidney International 2008; 73, 662.
6. Muttarak M, Peh WCG, Lerttumnongtum P. Clinics in Diagnostic Imaging (59); Singapore Med J 2001; 42 (3):139-141.
7. Matlaga BR, Kim SC, Watkins SL, et al. Percutaneous nephrolithotomy for ectopic kidneys: over, around, or through. Urology. 2006;67:513-517.
8. Matlaga BR, Kim SC, Watkins SL, Kuo RL, Munch LC, Lingeman JE. Percutaneous nephrolithotomy for ectopic kidneys: over, around, or through. Urology 67 (3): 513-517.
9. Tóth C, Holman E, Pásztor I, Khan AM. Laparoscopically controlled and assisted percutaneous transperitoneal nephrolithotomy in a pelvic dystopic kidney. J Endourol 1993; 7: 303-305.
10. Zafar FS, Lingeman JE. Value of laparoscopy in the management of calculi complicating renal malformations, J Endourol 1996; 10: 379-383.

إخراج جراحي عن طريق الجلد لحصاة كلوية من حوض كلية مُتَبَدِّة عابرة إلى جهة الكُلية المقابلة ومندمجة معها بمساعدة جهاز تنظير البطن: تقرير عن حالة طبية

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الملخص

تعد حالة الكُلية المُتَبَدِّة العابرة إلى الجهة المقابلة من حالات العيوب الخَلَقِيَّة النادرة. وتشكل معالجة الحصى المتكونة في مثل هذا النوع من الكلى ذي التركيب الشاذ والمعقد تحديًا علاجيًا للجراحي المسالك البولية، خاصة ذلك النوع الذي تكون فيه الكُلية المتبذرة مندمجة مع الكُلية المقابلة.

هنالك تَوَجُّه جراحي متزايد لاستخدام طريقة إخراج الحصى عبر الجلد في مثل هذا النوع المعقد من الحالات. على أية حال فإن بعض الأنواع من هذه الحالات الشاذة تجعل عملية إخراج الحصى عبر الجلد صعبة إجرائيًا خاصة عندما تقع الكُلية السليمة في المسار المستخدم للوصول إلى الكُلية المصابة.

في هذا التقرير السريري نقدم حالة مريض يعاني من حصاة في حوض كليته المتبذرة إلى الجهة المقابلة والمندمجة مع الكُلية هناك، ولم يكن من الممكن إجراء الإخراج الجراحي للحصى عنده عن طريق الجلد بمساعدة التنظير بالأشعة فقط. للتغلب على هذه الصعوبة استخدمنا بنجاح تقنية منظار البطن للقيام بصريًا بالملاحظة اللازمة في أثناء تحديد الطريق الآمنة لوصول الغمد المستخدم في العملية المذكورة إلى الكُلية المصابة؟

الكلمات الدالة: استخراج عن طريق الجلد، تنظير البطن، تحصّي الكُلية، الانتباز الكلوي العابر والمندمج.