Original Research Paper

Volume - 15 | Issue - 08 | August - 2025 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Urology

BREAKING STONES ACROSS BOUNDARIES: PCNL IN CROSS-FUSED RENAL ECTOPIA-A RARE ANATOMICAL CHALLENGE

Dr. Shweta Rao — M.Ch Urology Resident, Dept. of Urology, Kle's Jawaharlal Nehru Medical College, Belgaum.

Dr. Vishal Kadeli — Associate Professor of Urology, Dept. of Urology, Kle's Jawaharlal Nehru Medical College, Belgaum.

ABSTRACT **Background:** Cross-fused renal ectopia (CFRE) is a rare congenital anomaly in which both kidneys are located on the same side of the midline and fused together, often resulting in abnormal renal orientation and vascular supply. The occurrence of nephrolithiasis in such patients is not uncommon due to anomalous drainage and stasis, but surgical management poses unique challenges. Percutaneous nephrolithotomy (PCNL) in CFRE is rarely reported in literature due to technical complexity. **Case Presentation:** We report a case of a 65 year-old male presenting with [flank pain and intermittent hematuria, found to have a large renal calculus in a cross-fused ectopic kidney located on the left side. Imaging with contrast-enhanced CT and 3D reconstruction delineated the fused moiety, stone burden, and anomalous vasculature. A carefully planned PCNL was performed under fluoroscopic guidance in the supine position, achieving complete stone clearance with no intraoperative complications. **Conclusion:** PCNL in patients with cross-fused renal ectopia is feasible and safe with meticulous preoperative planning and imaging. Awareness of anatomical variations and individualized surgical strategies are critical to achieving optimal outcomes in such complex cases.

KEYWORDS : Cross-fused renal ectopia, kidney congenital anomaly, percutaneous nephrolithotomy

INTRODUCTION

Crossed renal ectopia is a rare congenital anomaly characterized by the presence of both kidneys on the same side of the body. Despite their abnormal location, the ureters usually maintain their normal trajectory, with the ectopic ureter crossing the midline to reach its typical insertion site in the bladder. This condition is broadly classified into two categories: crossed fused renal ectopia (CFRE) and crossed non-fused ectopia. Among these, CFRE is the more frequently encountered variant.[1]

The prevalence of CFRE has been reported to be approximately 1 in 7,500 based on autopsy data and around 1 in 1,000 in live births.[2–7] The condition is more common in males and most often involves a left-to-right fusion pattern. Many cases remain clinically silent and are discovered incidentally during imaging for unrelated abdominal or urinary tract complaints.[3]

Although frequently asymptomatic, CFRE may be associated with a variety of urological complications. The most commonly reported include nephrolithiasis, pelviureteric junction obstruction, urinary tract infections, renal dysplasia, and occasionally, renal neoplasms. Anatomical abnormalities such as malrotation, anomalous vasculature, and aberrant drainage patterns contribute to urinary stasis, thereby predisposing patients to stone formation and infection.

Early recognition of these anomalies is critical, especially when planning surgical interventions such as percutaneous nephrolithotomy (PCNL), as the altered anatomy poses unique diagnostic and technical challenges. Proper preoperative imaging and individualized surgical planning are essential to ensure successful outcomes and minimize the risk of complications.

CASE REPORT

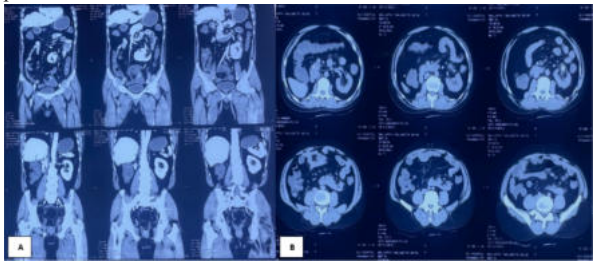
A 65-year-old male presented to the urology outpatient department with complaints of mild, intermittent left flank pain for several weeks. The pain was dull-aching in nature and not associated with fever, nausea, vomiting, hematuria, or urinary disturbances. The patient had no significant past medical or surgical history, and there were no known comorbidities or drug allergies.

On clinical examination, the patient was afebrile, with stable vital signs and a soft, non-tender abdomen. Routine laboratory investigations, including renal function tests, were within normal limits (serum creatinine: 1.01 mg/dl, blood urea: 24 mg/dl). Urine microscopy revealed microscopic hematuria and pyuria, with 1494 RBCs/HPF and 37 WBCs/HPF.

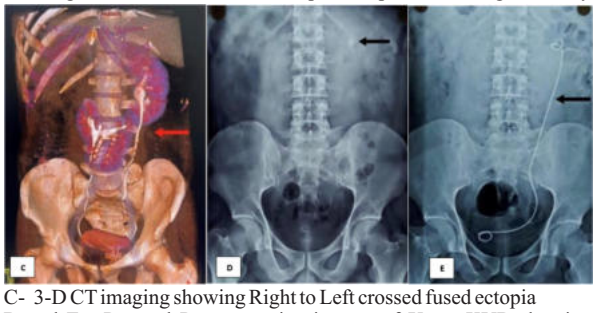
Radiological Evaluation

Initial ultrasound of the abdomen suggested an absent right kidney in the renal fossa. A contrast-enhanced CT scan with urography and 3D reconstruction revealed a right kidney located ectopically in the left lumbar region, lateral to the aorta, fused to the lower pole of the orthotopic left kidney-consistent with a diagnosis of cross-fused renal ectopia. The renal pelvis was malrotated with anteriorly facing hila. The right moiety demonstrated a duplex collecting system, with both ureters joining at the pelviureteric junction and draining via a single ureter into the urinary bladder on the right side.

The left moiety of the fused renal unit was normal in size and location but showed mild pelvicalyceal system dilatation due to a pelvic calculus measuring approximately 1.3 × 0.9 × 1.3 cm (HU ~1006). No other structural anomalies were noted in the ureters or bladder. Both moieties showed prompt contrast excretion, and renal function was preserved.



A and B – sagittal and axial sections of contrast enhanced CT scan showing a stone in crossed renal ectopia with pelvis showing anteriorly



C- 3-D CT imaging showing Right to Left crossed fused ectopia
D and E - Pre and Post operative images of X-ray KUB showing clearance of stone and placement of DJ stent

Surgical Procedure

After informed consent and appropriate preoperative preparation, the patient underwent cystoscopy and retrograde pyelography to delineate the anatomy further. A ureteric catheter was placed in the left moiety to facilitate pelvicalyceal system opacification. The patient was then positioned prone, and percutaneous access was obtained under fluoroscopic and ultrasound guidance into the dilated system of the left

renal moiety.

Tract dilation was performed up to 24 Fr, and a rigid nephroscope was introduced. Intraoperatively, a single pelvic calculus was visualized, fragmented using a pneumatic lithotripter, and removed completely. Thorough inspection confirmed complete clearance. A 6 Fr DJ stent was placed, and a nephrostomy tube was left in situ.

Postoperative Course

The patient recovered uneventfully. Postoperative imaging confirmed complete stone clearance, and the nephrostomy tube was removed on postoperative day 2. He was discharged in stable condition on day 3 with a plan for DJ stent removal after four weeks.

DISCUSSION

Cross-fused renal ectopia (CFRE) is an uncommon congenital renal anomaly characterized by both kidneys being located on the same side of the spine and fused together. Despite this ectopic positioning, the ureter of the crossed kidney typically crosses the midline to enter the bladder on its anatomically correct side.[1] This anomaly is more commonly observed in males and often remains asymptomatic, with many cases diagnosed incidentally during imaging for unrelated conditions.[2]

In CFRE, malrotation of the renal pelvis, abnormal calyceal orientation, and anomalous vascular supply are frequently encountered. These alterations often result in impaired urinary drainage, predisposing the patient to complications such as nephrolithiasis, urinary tract infections, and pelviureteric junction (PUJ) obstruction.[3] The presence of a stone in such anatomically complex kidneys requires meticulous preoperative planning and adaptation of standard surgical approaches.

Table 1: Summary Of Published Cases Of PCNL In Cross-fused Renal Ectopia

Author & Year	Patient Age/Sex	Type of CFRE	Stone Characteristics	Imaging Modality Used	Surgical Approach	Outcome
Bansal et al., 2024 (Int Surg J)	35/M	Left-to-right fused ectopia	1.8 cm lower pole calculus	CT KUB + IVP	PCNL via prone access	Complete clearance; no complications
Bhansali et al., 2022 (Cureus)	30/F	Right-to-left fused ectopia	3.0 cm staghorn calculus	CECT + CT Angiography	PCNL with tract dilation (28 Fr)	Successful; minor hematuria resolved
Chau et al., 2020 (Urol Ann)	28/M	Right fused ectopic kidney	2.5 cm renal pelvic stone	CT IVP	PCNL via anterior access	Clear; no postoperative complications
Li et al., 2018 (Urology Case Reports)	40/M	Fused crossed ectopia (L-shaped)	2.2 cm multiple calyceal stones	3D CT Reconstruction	PCNL with single puncture	Successful; DJ stent placed postoperatively
Present Case (2025)	61/M	Right-to-left fused ectopia	1.3 cm pelvic stone (left moiety)	CECT + 3D CT Urography	PCNL in prone position with DJ stenting	**Successful clearance; uneventful recovery**

Although ureteroscopy and extracorporeal shock wave lithotripsy (ESWL) are considered for smaller stones, PCNL remains the preferred modality for achieving complete clearance in cases of moderate to large renal calculi.[4] However, CFRE presents unique challenges during PCNL due to altered anatomical relationships, malrotated calyces, and the proximity of ectopic kidneys to bowel or major vessels. Thus, preoperative imaging-especially contrast-enhanced CT with 3D reconstruction and CT angiography-is essential for mapping the collecting system and vascular anatomy.[5]

In our case, the patient presented with a 1.3 cm pelvic stone in the left moiety of a right-to-left cross-fused ectopic kidney. The renal pelvis was malrotated and located anteriorly. CT urography with 3D reconstruction proved crucial in determining safe access for percutaneous intervention. Fluoroscopic and ultrasonographic guidance were employed to gain access to the pelvicalyceal system without injuring adjacent viscera. A single puncture PCNL was performed in the prone position, and the stone was successfully fragmented and removed. Postoperative recovery was uneventful.

Several cases of PCNL in CFRE have been reported in literature. Bansal et al. (2024) described successful PCNL in a 35-year-old male with left-to-right fused ectopia, highlighting the importance of careful access planning.[6] Bhansali et al. (2022) managed a 3 cm staghorn calculus in CFRE using PCNL with minor postoperative hematuria.[7] These reports, along with our case, reaffirm the safety and efficacy of PCNL in managing calculi in anomalous kidneys when performed with proper preoperative evaluation and technical precision.

Our case further contributes to the limited but growing body of evidence supporting PCNL as a viable and effective treatment modality in patients with CFRE, even in anatomically challenging presentations.

REFERENCES:

1. Bauer SB. Anomalies of the kidney and ureteropelvic junction. In: Wein AJ, Kavoussi LR, Novick AC, Partin AW, Peters CA, editors. *Campbell-Walsh Urology*. 11th ed. Philadelphia: Elsevier Saunders; 2016. p. 3022–43.
2. Cremona G, Marra G, Cianci V, Pomara G, Panzarella T. Crossed fused renal ectopia: report of two cases and review of literature. *Pediatric Radiology*. 2001;31(5):348–52.
3. Chudley AE, Bouchard S, Mutton D. Crossed renal ectopia with fusion: report of a case and review of the literature. *Clinical Pediatrics (Philadelphia)*. 1983;22(7):488–90.
4. Türk C, Petřík A, Sarica K, Seitz C, Skolarikos A, Straub M, et al. EAU Guidelines on Interventional Treatment for Urolithiasis. *European Urology*. 2016;69(3):475–82.
5. Mittal P, Sharma P, Sharma R. Cross-fused renal ectopia with nephrolithiasis treated by PCNL: challenges and outcomes. *Journal of Endourology Case Reports*. 2020;6(2):123–6.
6. Bansal M, Suryavanshi M. Crossed fused renal ectopia with renal calculi: a case report. *International Surgery Journal*. 2024;11(2):653–5.
7. Bhansali A, Gandhi D, Naik K, Shah S. Large renal calculus in a patient with crossed fused ectopic kidney managed with percutaneous nephrolithotomy: a case report. *Cureus*. 2022;14(12):e33021. doi:10.7759/cureus.33021
8. Chau YP, Jain P, Mishra S. PCNL in an anomalous crossed fused ectopic kidney: a rare case and review of technique. *Urological Annals*. 2020;12(3):286–9.
9. Li J, Xu Y, Hu W, Chen H. Percutaneous nephrolithotomy in a patient with L-shaped cross-fused renal ectopia. *Urology Case Reports*. 2018;21:1–3. doi:10.1016/j.eucr.2018.07.002