

Surgical management of renal calculi in cases of crossed renal ectopia: A rare case series



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ABSTRACT

Crossed renal ectopia is a rare congenital malformation. Only 36 cases of crossed renal ectopia with calculus have been recorded in literature, even a few cases of urolithiasis in them have been surgically managed. The majority of cases in literature have been published as single case reports. We conducted a retrospective study of all the crossed renal ectopia cases admitted and managed in our department in the past 2 years. Among them, only one was without fusion. Youngest patient was 32-year-old male with crossed left kidney with calculus in the left kidney. Both the patients underwent retrograde intrarenal surgery (RIRS). Oldest patient was 80-year-old female with a right crossed kidney with pelvic calculus, who underwent open pyelolithotomy. Post-operative period was uneventful in all cases with complete stone clearance. Patients undergoing RIRS had less post-operative pain and were discharged early compared to open pyelolithotomy. RIRS is a safe and effective modality of treatment and can be considered as the first choice for the management of calculus in crossed renal ectopia in properly selected cases. However, in cases of huge stone burden and difficult anatomy, laparoscopic/open pyelolithotomy is still an attractive option for clearing the stone in a single setting, even though it has comparatively more morbidity and longer hospital stay.

Key words: Crossed renal ectopia; Retrograde intrarenal surgery; Pyelolithotomy

INTRODUCTION

When a kidney is located on the side opposite that in which its ureter inserts into the bladder, the condition is known as crossed renal ectopia. Various types¹ of crossed renal ectopia include crossed ectopia with fusion, crossed ectopia without fusion, solitary crossed ectopia, and bilaterally crossed ectopia.

Crossed non-fused renal ectopia represents approximately 10% of all crossed ectopic kidneys.² The anomaly occurs more commonly in males with a ratio of 2:1, and left-to-right ectopia is seen 3 times more frequently than right-to-left ectopia.³ Even though the autopsy incidence has been calculated at 1 in 2000,⁴ the practical real-world incidence of renal calculi in crossed renal ectopia has not been conclusively asserted.

Till now, only 35 cases of crossed ectopic kidneys involving stones have been reported.⁵ Very few cases of crossed renal

ectopia with calculus have been recorded in literature and even a few cases of urolithiasis in crossed renal ectopia have been surgically managed. Most of the cases in the literature have been published as single case reports. We are reporting a case series of urolithiasis in crossed renal ectopia which were managed by surgical modalities of wide opposing spectrums such as retrograde intrarenal surgery (RIRS) and open pyelolithotomy in our institution, which have their own advantages and limitations.

METHODS

We conducted a retrospective study of all the crossed renal ectopia cases with calculi admitted and managed in our department in the past 2 years. Detailed case history, biochemical investigations, and contrast-enhanced computed tomography (CT) KUB/CT urograms were collected.

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Management of the calculus was done based on stone location, burden, anatomical factors, comorbidities, and patient preferences. The outcome was based on post-operative imaging and subjective symptomatic improvement.

Case 1

A 61-year-old male patient presented with a history of right colicky flank pain. There were no urinary symptoms and no comorbidities. On examination, there was a mild tenderness present in the right iliac fossa. Biochemical investigations were within normal limits and urine culture was negative. CT urogram revealed left kidney in the supraumbilical region in the right side with the left ureter seen inserting in the left vesicoureteric junction. Pelvis calculus measuring 18 × 12 mm (HU +1105) in the left side with perinephric fat stranding was present (Figures 1 and 2). The patient was diagnosed as left to right non-fused crossed renal ectopia with left renal pelvic calculus. The patient underwent left URS and DJ stenting and after 2 weeks, underwent left RIRS. After cystoscopy and placement of guidewire under

fluoroscopy guidance, 10/12 Fr access sheath over the 4/6.5Fr ureteroscope was negotiated into left ureteric orifice under the guidance of guidewire. Access sheath progressed till the ureteric course just proximal to the crossing over of ureter onto the right side could not be negotiated further due to acute angulation. 8.5 Fr flexible ureteroscope was introduced into the left ureteric orifice, under the guidance of guidewire and negotiated into renal pelvis. Calculus was visualized, and there was difficult angulation to approach the calculus. Using 30W Holmium laser and 200 mm laser, fiber lithotripsy was done. Fragmentation was good. The left ureter was stented with a 5 Fr DJ stent (Figures 3 and 4).

Case 2

A 32-year-old male patient presented with a history of right flank pain associated with burning micturition and increased frequency of micturition. He had a history of right URSL and B/L DJ stenting, 1 month back for right ureteric calculus, in another center before presenting to us. On examination, he had tenderness in the right lumbar region. His biochemical investigations were within normal limits and urine culture



Figure 1: CECT image of Case 1



Figure 3: Fluoroscopy image of Case 1: fURS with guidewire visible



Figure 2: CECT 3D reconstruction of Case 1

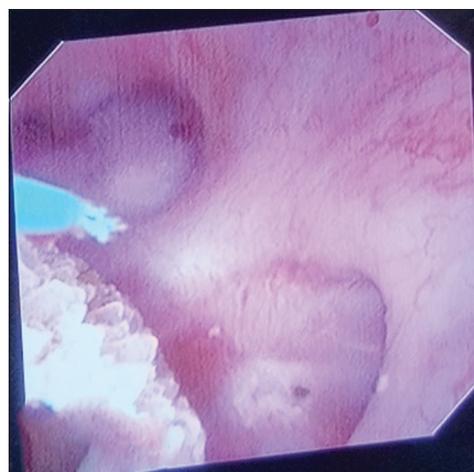


Figure 4: Endoscopic view of calculus and laser fibre

was negative. His contrast-enhanced CT urogram revealed a crossed-fused left kidney with fusion noted at L5 with pelvis facing anterior. A calculus measuring 13 × 10 mm (HU +1419) was noted in the left lower pole with minimal lower pole calyceal dilatation, with bilateral DJ stent *in situ* (Figures 5 and 6). Similar to the first case, the patient underwent left RIRS, calculus was completely fragmented and cleared, and 5 Fr DJ stent was placed (Figure 7).

Case 3

An 80-year-old female patient presented with left flank pain associated with complaint of burning micturition and an episode of hematuria. She had a known case of type 2 diabetes mellitus and systemic hypertension on medication. On examination, there was tenderness present in the left lumbar region. Her biochemical investigations were normal except for raised random blood sugar. Her urine culture was negative. Her contrast-enhanced CT showed crossed and fused kidney (L type) noted in the left renal fossa with fusion noted at the level of L3 vertebra and pelvis facing anteriorly. Calculus measuring 2 × 2.3 cm

(HU + 1188) was noted in renal pelvis with extensive periureteric fat stranding (Figure 8). Considering the advanced age of the patient and associated comorbidities and the patient's preference to clear the calculus in a single setting, open pyelolithotomy was done. Calculus was removed and 5 Fr DJ stent was placed (Figures 9-11).

RESULTS

A total number of cases were three (n-3). The youngest patient was 32 years old, and oldest was 80 years.

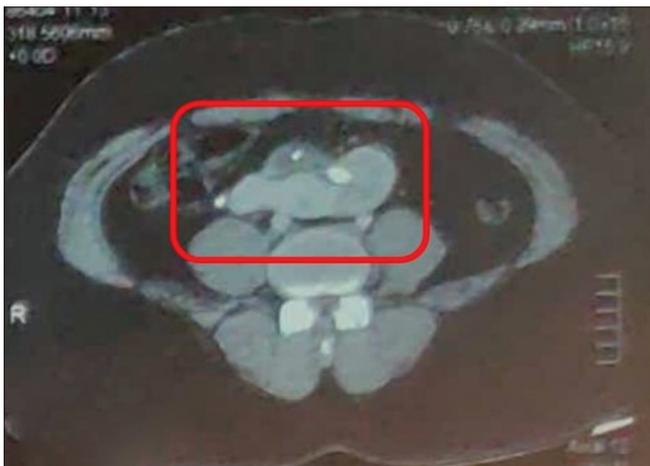


Figure 5: CECT image of Case 2



Figure 7: Fluoroscopy image of case 2 showing ureteral access sheath and FURS



Figure 8: CECT image of Case 3

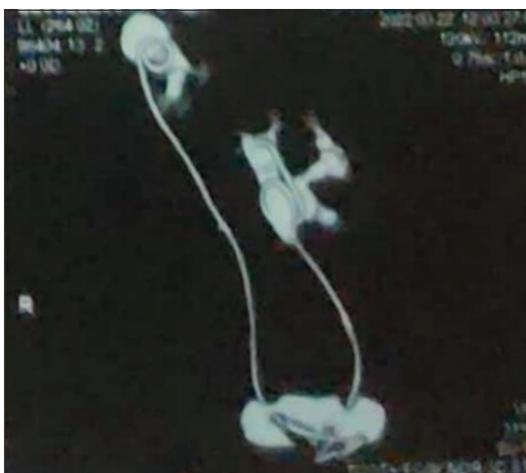


Figure 6: CECT 3D reconstruction of Case 2

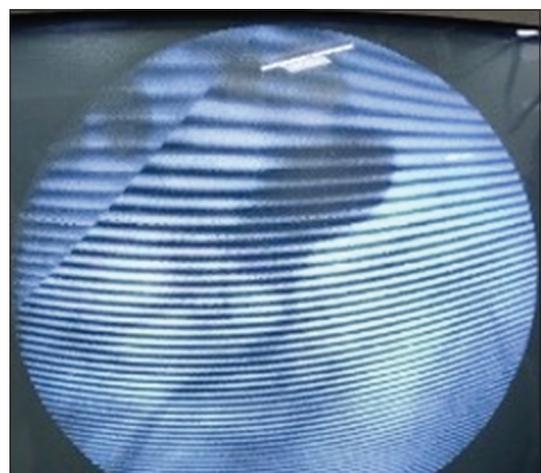


Figure 9: Retrograde pyelogram of Case 3

Table 1: Summary of characteristic features of Crossed ectopic kidney and calculi

	Case 1	Case 2	Case 3
Type	Left to right	Left to right	Right to left
Fusion	Non-fused	Fused	Fused
Stone dimension	18×12 mm	13×10 mm	23×20 mm
Stone location	Renal pelvis	Lower pole	Renal pelvis
Stone density (HU)	+1105	+1419	+1188
Pelvis orientation	Facing right side	Facing left side	Facing anterior (L type)

Table 2: Post-op follow up and outcome

	Case 1	Case 2	Case 3
Post-operative course	Uneventful	Uneventful	Uneventful
Calculus	Cleared	Cleared	Cleared
Foleys catheter removal	POD 1	POD 1	POD 4
Drain removal	-	-	POD 5
Discharge	POD 2	POD 2	POD 6
Condition at discharge	Asymptomatic	Asymptomatic	Asymptomatic

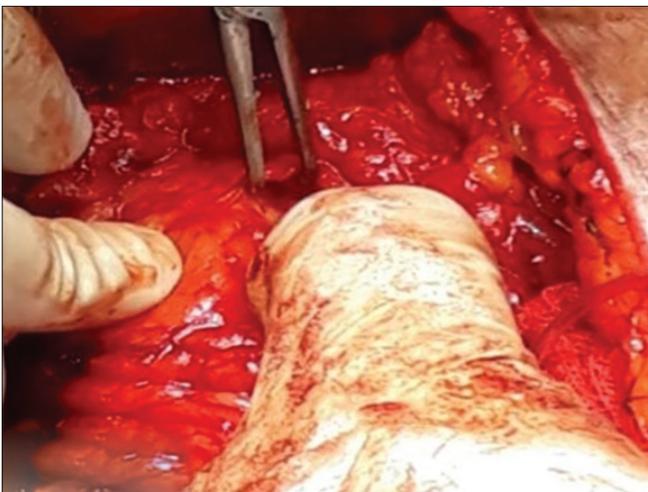


Figure 10: Intraoperative image of case 3 showing pyelolithotomy

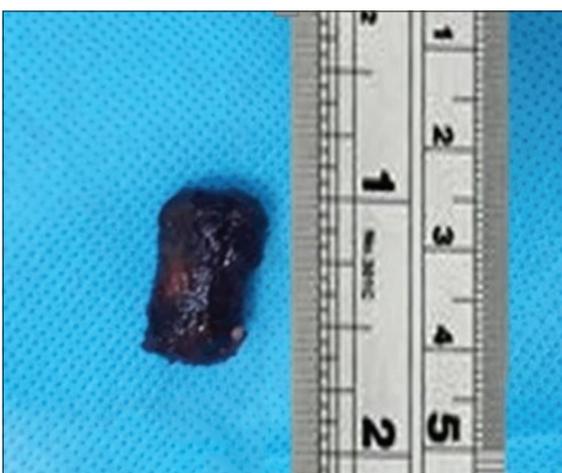


Figure 11: Calculus extracted after open pyelolithotomy in Case 3

Males were the predominant gender, correlating with literature.³ Left to right crossed renal ectopia was the most common type and fused type of crossed renal

ectopia was more common, also correlating with literature.^{2,3} Largest stone dimension was 2.3 cm and most dense stone was +1419 HU.

Patients undergoing RIRS had less post-operative pain and were discharged early (POD 2) compared to open pyelolithotomy (POD 6). Stones were completely cleared in all cases (Figure 12). All patients were asymptomatic at the time of discharge. Stent removal was done under local anesthesia for all the cases, RIRS cases after 2 weeks, and pyelolithotomy after 4 weeks.

DISCUSSION AND REVIEW OF LITERATURE

As cases of crossed renal ectopia are rare, management should be tailored specifically to each patient and each has unique anatomical challenges. The armamentarium includes shockwave lithotripsy, URS/RIRS, percutaneous nephrolithotomy (PCNL), and open/laparoscopic pyelolithotomy/nephrolithotomy. EAU guidelines for urolithiasis,⁶⁻⁸ even though does not specifically deal with the crossed renal ectopic kidney calculus, reiterate the above in cases of calculus in pelvic and ectopic kidney.

In a case published by Somiya *et al.*,⁹ a 69-year-old woman with two 14-mm renal stones in cross-fused renal ectopia underwent retrograde ureterorenoscopic lithotripsy. The patient had no complications, and follow-up computed tomography after 3 months showed only a 5-mm renal stone.

In another case reported by Amin *et al.*,¹⁰ 31-year-old male shows right crossed-fused renal ectopia with a large 2.7-cm calculus in the upper pole. The calculus was surgically removed by PCNL.

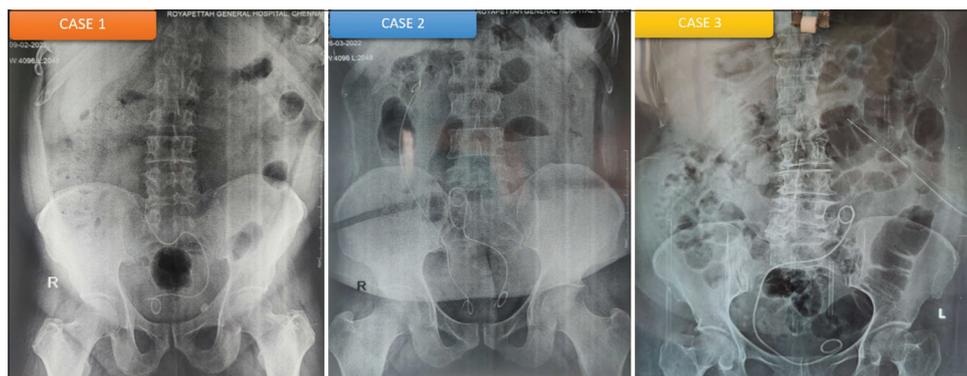


Figure 12: X-RAY KUB on POD 2

Cao et al.,⁵ reported a case in which S-shaped right-to-left crossed-fused ectopic kidney with many stones in the left (normal) renal pelvis (largest 9-mm), underwent PCNL. They also did a review of literature since the year 1937 and found out that PCNL was the most performed procedure by which seven cases were treated. It was followed by RIRS in three cases. ECIRS, laparoscopic pyelolithotomy, and nephrectomy were present in one case each. Residual stones were present in four cases (eight cases not mentioned about stone clearance). Three cases required second surgery to clear the residual stones (seven cases did not follow-up).

CONCLUSION

As it is a very rare condition, we cannot rely on guidelines. We must treat each case taking into consideration various stone and patient factors. RIRS is the latest operative technique in the armamentarium to treat urolithiasis. It appears to be an attractive modality and first choice for these complex anatomical cases, which can be treated with minimal morbidity for the patient with reduced hospital stay; hence, it was done in our first two cases (Tables 1 and 2).

However, we must be cautious in selecting the cases, taking into consideration, the presence of any acute angulations which limit the accessibility of flexible ureteroscope ($>270^\circ$) and the stone burden which limits the use of flexible ureteroscopy and laser lithotripsy.

In cases that are not favorable for RIRS, like large stone burden and with complex malrotation of pelvis, open/laparoscopic pyelolithotomy and laparoscopic-assisted PCNL have to be done, for complete stone clearance in a single setting. Especially in cases with the presence of other significant comorbidities, hence, it was done in our third case.

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PP- Clinical decisions, reviewed the literature and manuscript preparation; **KS-** Concept, coordination, interpretation, and publication work; **DS-** Concept of the study, prepared first draft of manuscript; **SMD-** Data collection and interpretation, preparation of manuscript.

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