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Case Report

# Crossed nonfused renal ectopia with variant blood vessels: a rare congenital renal anomaly

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ABSTRACT

Crossed renal ectopia is a rare congenital anomaly, where one of the kidneys crosses the midline and lies opposite to the site of its normal ureteral insertion. Ninety percent of crossed ectopic kidneys are fused to their ipsilateral uncrossed kidney. Crossed renal ectopia without fusion is rare. We present the case of a 53-year-old male with an unusual incidental finding of crossed nonfused renal ectopia, with the left ectopic kidney lying anterior to the right kidney without fusion. The ectopic kidney had dual arterial supply: one from the aorta and another from the right renal artery. It also demonstrated dual venous drainage; a main left renal vein and an accessory renal vein. The main left renal vein joined the right renal vein to form a common renal vein before draining into the inferior vena cava. The accessory renal vein joined the left testicular and left lumbar veins to drain into the inferior vena cava. Multiple bilateral nonobstructing renal calculi were also noted. Although the patient was asymptomatic, the authors highlight potential complications related to the above-mentioned condition and the importance of identification of the findings.



## Introduction

Crossed renal ectopia (CRE) is an uncommon congenital renal anomaly, where the ectopic kidney crosses the midline and is located contralateral to its normal position, and may be fused to the normal kidney or remains nonfused [1].The ureter of the ectopic kidney enters the bladder at its normal position. The blood supply to the kidneys in such cases shows many variations [2,3]. Although, it is often symptomless and found incidentally, it may be associated with urolithiasis, hydronephrosis, recurrent urinary tract infections, and vesicoureteral reflux. This article presents a case review of an incidental finding of crossed nonfused renal ectopia with anomalous blood vessels, in a male patient undergoing computed tomography (CT) scan for evaluation of a hepatic cyst.

## Case report

A 53-year-old male, who was referred for evaluation of a hepatic cyst, underwent CT scan of the chest, abdomen, and

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pelvis. The scout radiograph showed absence of the normal renal outline on the left side, and an ectopic renal shadow was identified on the right side below the right kidney (Fig. 1). Pulmonary and hepatic hydatid cysts were noted along with cholelithiasis; however, the below-discussed findings regarding the kidneys were observed.

The right kidney was visualized in its normal position, but the left kidney was found on the right side, anterior to the right orthotopic kidney, and seen distinctly separate from it with no evidence of fusion (Fig. 2). The left kidney also appeared to be malrotated, with the hilum facing anteriorly. Multiple small nonobstructing calculi were noted in both kidneys. A small simple renal cyst measuring about 1.7 × 1.3 cm was also seen in the lower pole of the ectopic kidney. The ureter of the ectopic kidney descended on the right side for a short distance before crossing the midline, just below the bifurcation of the abdominal aorta and anterior to the right common iliac artery, to its normal position of insertion into the left side of the urinary bladder.

The arterial supply showed marked variation. The ectopic left kidney was noted to have a dual blood supply with the supplying arteries going through the renal capsule instead of the normal route through the renal hilum. The left renal artery originated from the aorta just lateral to the origin of the inferior mesenteric artery, ascending in a spiral manner and entering the left ectopic kidney in the lower pole by piercing the renal capsule (Fig. 3). The second artery, arising as a branch from the right renal artery about 4 cm from its origin, supplied the upper pole of the ectopic kidney (Fig. 4). The right kidney was supplied normally by the right renal artery originating from the aorta. Dual venous drainage of the ectopic kidney was also noted with one main left renal vein seen emerging from the renal hilum of the ectopic kidney and joining the right renal vein to form a short confluence before draining into the lateral aspect of the inferior vena cava (IVC) on the right side (Fig. 5). Another smaller accessory renal vein was seen emerging from the mid pole of the ectopic kidney, and joining the left testicular and left lumbar veins to drain into the IVC on the left side (Fig. 6).

There was also considerable variation in the drainage of the testicular veins. As mentioned above, the left testicular, left lumbar, and the left accessory renal veins joined to form a common trunk, which drained directly into the IVC (Fig. 6). The right testicular vein drained into the main left renal vein instead of the IVC (Fig. 7).

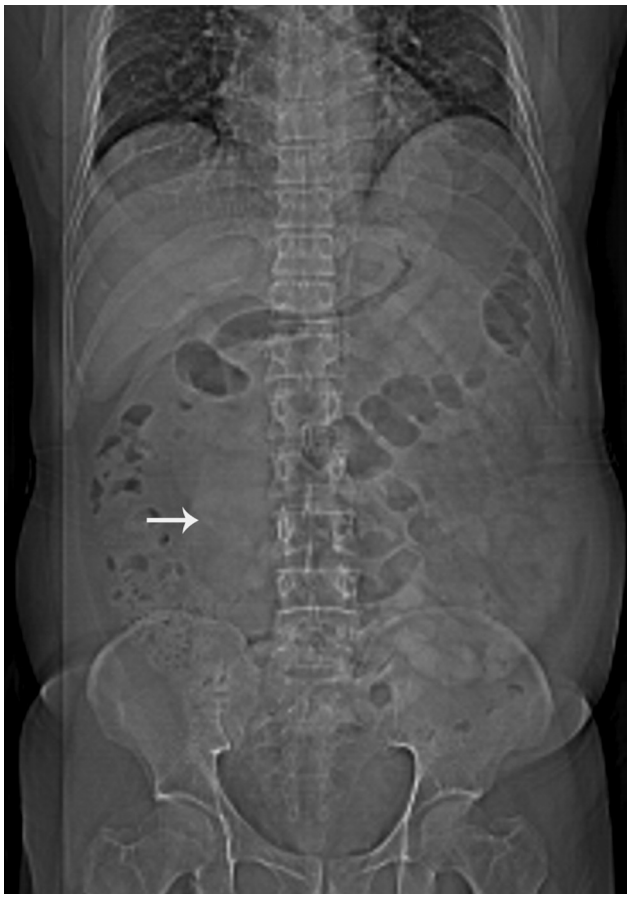

**Fig. 1 – Scout radiograph showing absence of the left renal shadow and an ectopic renal shadow on the right side (arrow).**

## Discussion

CRE is a rare congenital anomaly in which a ureter crosses the midline from an ectopic kidney, which lies opposite of its normal location, to insert in its usual location in the urinary bladder. The autopsy incidence of CRE is reported as 1:7000. The incidence of nonfused CRE; however, has been reported to be 1 in 75,000 autopsies, which is about 10 times lower than that of the fused ectopia [3]. CRE is more common in men with a male to female ratio of 1.4:1 and is 2-3 times more frequent with the ectopic kidney on the right side than on the left side [4].The ectopic kidney is mostly found to be malrotated. CRE has been classified into 4 types by McDonald and McClellan [5]: *type A*, CRE with fusion; *type B*, CRE without fusion; *type C*, solitary CRE; and *type D*, bilaterally CRE.

In type A, the ectopic kidney crosses over to the opposite side and fuses with the normally located kidney. Commonly, the upper pole of the inferiorly positioned ectopic kidney fuses with the lower pole of the normally positioned kidney. The ureter of the ectopic kidney crosses the midline and enters the bladder in its usual position. It is further divided into the following subtypes: (1) unilateral fused inferior renal ectopia with the upper pole of the crossed ectopic kidney fusing with the lower pole of the orthotopic ipsilateral kidney; (2) sigmoid or S-shaped kidney in which the crossed kidney lies inferiorly with the renal pelvis facing laterally and the normally positioned kidney lies superiorly with the pelvis facing medially; (3) unilateral lump or cake kidney with fusion occurring over a wide margin, and both renal pelvises directed anteriorly; (4) L-shaped kidney in which the ectopic kidney lies inferiorly and transversely fusing with the lower pole of the normal kidney; (5) unilateral disc kidney in which the fusion occurs along the medial border of each pole; and (6) unilateral superior crossed fused ectopia type in which the lower pole of the superiorly positioned ectopic kidney fuses with the upper pole of the normally positioned kidney. It is the least common type.

In type B of CRE, the ectopic kidney crosses the midline, but each unit is separate and no fusion of renal parenchyma is