

## Functional Medicine

Supernumerary Kidney With a Horseshoe Component<sup>☆</sup>Ali Fathollahi<sup>\*</sup>

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## ABSTRACT

We report a case of supernumerary kidney consisting of 4 renal moieties and including a horseshoe kidney. A 40-year-old woman presented complaining of intermittent vague abdominal pain and heaviness for a few years. Ultrasonography of the urinary tract revealed 2 kidneys on the left side and horseshoe kidneys located distal to them. The right horseshoe kidney was of small size. Further imaging revealed 4 renal moieties. Three moieties were on the left side and the other was attached to the most distal moiety on the left, forming a horseshoe kidney.

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## Introduction

Supernumerary kidney is an extremely rare abnormality, and to our knowledge there is only 1 case reporting it along with a horseshoe kidney.<sup>1</sup> The true incidence of this anomaly cannot be calculated because of its infrequent occurrence. We report a case of supernumerary kidney consisting of 4 renal moieties and including a horseshoe kidney.

## Case presentation

A 40-year-old woman presented with intermittent vague abdominal pain and heaviness. She could not remember the exact time of onset of her symptoms but explained that she had visited physicians a few times for this problem over the last few years. Her genitourinary history was also significant for a spontaneous stone passage that had occurred 3 years ago. Her physical examination did not reveal any significant finding. Hematologic and biochemical investigations were within normal limits.

Ultrasonography of the urinary tract revealed 2 kidneys on the left side and horseshoe kidneys located distal to them. The right horseshoe kidney was small in size.

She underwent further imaging evaluation with computed tomography and excretory urography, which showed the following findings: on the left, there are 3 kidneys. The inferior pole of the most rostral kidney (110 mm × 44 mm) is fused to the upper pole of another moiety (80 mm × 44 mm; *Figs. 1, 2*). This second moiety is

malrotated with its renal pelvis oriented laterally, resembling a sigmoid crossed ectopic kidney; however, unlike crossed ectopia, both ureters travel on the left (with the more rostral kidney's ureter being more medial than its caudal counterpart). On the excretory urogram, ureters join together distally before reaching the bladder, but both are deviated laterally in their course by a more distal kidney.

Moreover, there is another malrotated kidney on the left side, with a separate pelvicalyceal system (72 mm × 49 mm), which makes parenchymal connection in the midline with another right-sided renal moiety (44 mm × 32 mm) at the level of L3-L4 to make a horseshoe component (*Figs. 1–3*). The left ureter in this horseshoe kidney crosses midline to enter the bladder on contralateral side. The right ureter opens to the right of bladder normally.

The imagings did not reveal any pathologic process, so we determined to observe the patient and follow her with periodic laboratory tests, including urinalysis and renal function tests.

## Discussion

Supernumerary kidney is a rare congenital anomaly of the urinary tract. The true incidence of this anomaly cannot be assessed exactly because of its extreme infrequency.

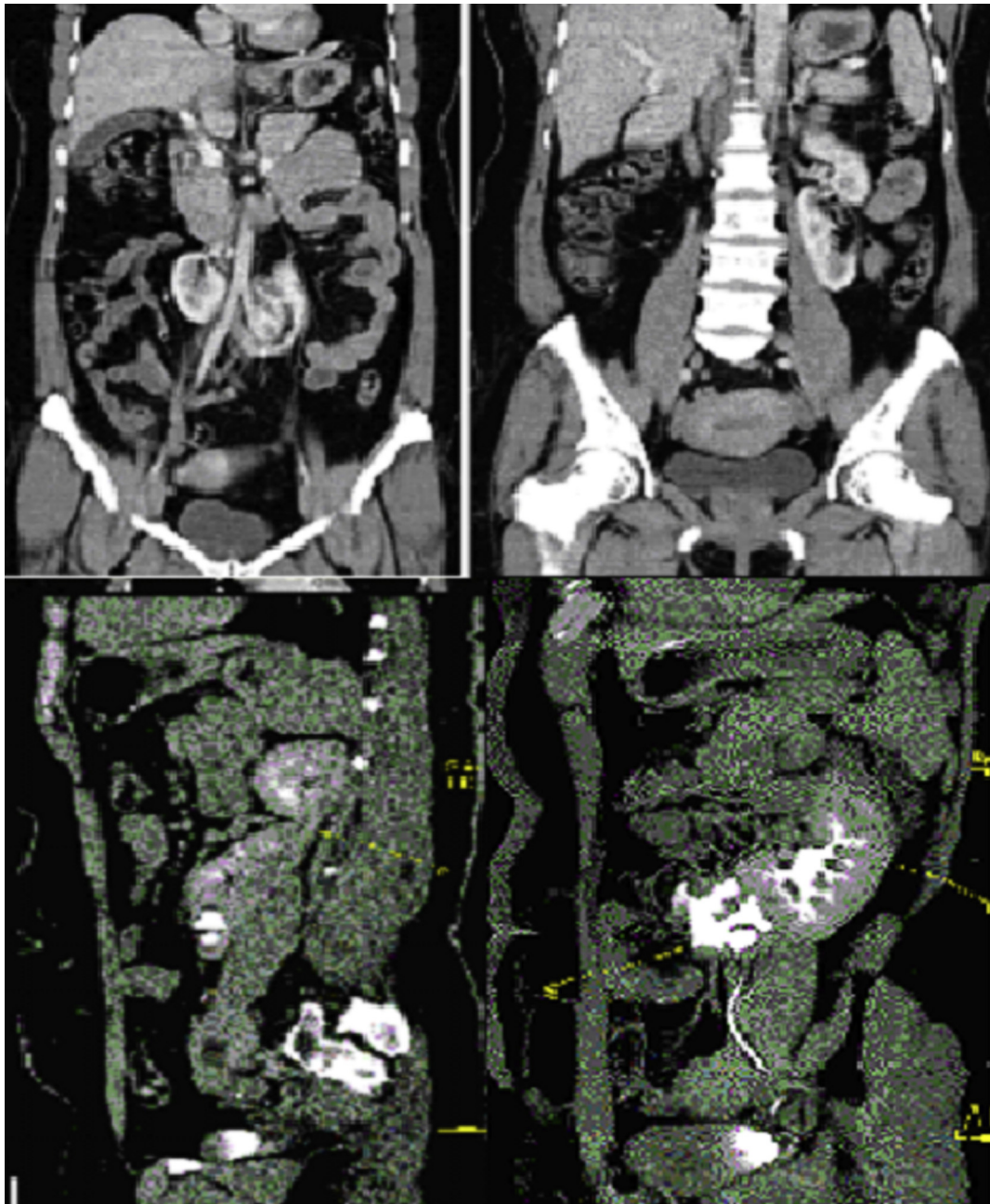
The embryologic basis for this anomaly is thought to be the abnormal division of the nephrogenic cord into 2 metanephric blastemas that then form 2 kidneys, in association with either a partially or completely duplicated ureteral bud.<sup>2</sup>

The supernumerary kidney needs to be differentiated from the more commonly occurring duplex kidney, which is defined as having 2 pelvicalyceal systems that are associated with a single ureter or with double ureters.<sup>3</sup> The supernumerary kidney, in contrast, is thought to be an accessory organ with a separate arterial supply, venous drainage, collecting system, and distinct encapsulated tissue.

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**Figure 1.** Abdominopelvic CT scan (Coronal and Sagittal view).

It may be either totally separate from the normal kidney or connected to it by loose areolar tissue acting as a bridge between the 2 kidneys.<sup>2</sup>

The supernumerary kidney is most often seen on the left side of the abdomen. It usually is located caudal to the ipsilateral kidney when drained by a bifid ureter and cranially when the ureters are separate.

The Weigert-Meyer law for duplex fused kidneys was obeyed by the supernumerary ureter in most fully-documented cases of double ureters.<sup>2</sup> However, in this case, the ectopic kidney on the left is caudal, although the ureters on the left travel separately.

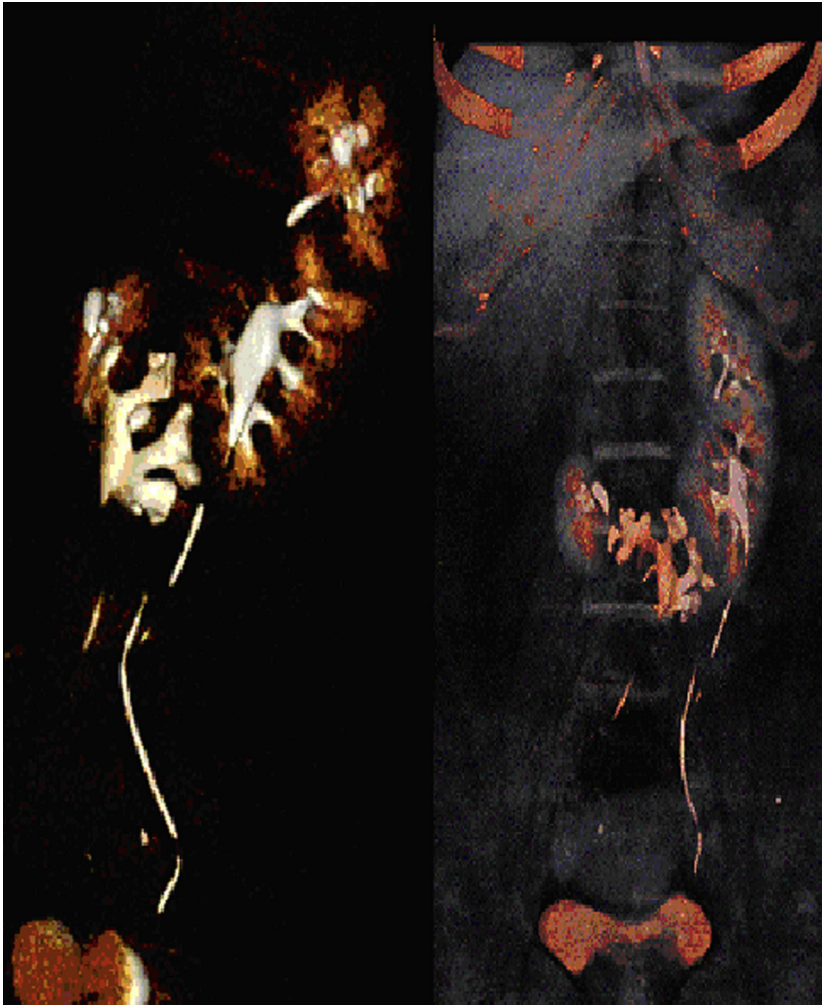
A few anomalies have also been associated with supernumerary kidneys such as ureteral atresia, vaginal atresia, horseshoe kidney,<sup>1</sup>

complete duplication of urethra and penis with ectopic ureteral opening into the vagina or introitus,<sup>3</sup> imperforate anus, ventricular septal defects, meningomyeloceles, and coarctation of the aorta.<sup>1</sup>

Intravenous urography, ultrasonography, nuclear scintigraphy (for function), computed tomography, and magnetic resonance imaging are the imaging studies which can delineate the diagnosis of supernumerary kidney.<sup>4</sup>

Symptoms have been noted in about two-thirds of the cases of supernumerary kidney. The most commonly associated pathologies include hydronephrosis, pyelonephritis, pyonephrosis, renal and ureteral calculi, carcinoma, papillary cystadenoma, and Wilms tumors.

Furthermore, management of this condition depends on symptoms and the function of the renal moieties. If the patient is



**Figure 2.** 3-D Abdominopelvic CT scan showing 4 kidney moieties.



**Figure 3.** Intravenous Pyelogram.

asymptomatic or has minimal symptoms, as in our case, no treatment is required, but regular follow-up may be advised. On the other hand, if the kidney is diseased or nonfunctional, nephrectomy is usually the preferred procedure.<sup>5</sup>

### Conclusion

Although supernumerary kidney is much more likely to be accompanied with other anomalies of the urinary tract, making this diagnosis per se is not an indication for any intervention.

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