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Late presentation of supernumerary kidney in a 35-year-old man: a case report

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Abstract

The supernumerary kidney is the rarest of all renal anomalies, and few cases have been diagnosed and reported over the years. Supernumerary kidneys are most commonly located on the left side of the abdomen with associated pathologic conditions which include malformations of the upper urinary tract and genital tract. More importantly, it usually presents with either unusual abdominal mass or features of urinary tract infections which might pose diagnostic challenges due to infrequent occurrence. In this case report, we present a 35-year-old man with a right-sided unilateral supernumerary kidney complicated by pyelonephritis. He was treated with antibiotics, and the treatment outcome was satisfactory.

Keywords Renal anomalies, Supernumerary kidney (SNK), Intravenous urography (IVU), Magnetic resonance imaging (MRI)

1 Background

Supernumerary kidney (SNK) is extremely uncommon and is the rarest of all congenital anomalies of the kidneys with less than a hundred cases reported over the years [1]. Thus, owing to their infrequent occurrence and often asymptomatic nature, they frequently cause a diagnostic challenge and might be missed on routine clinical examinations. The true incidence of SNK varied widely based on geographic location and access to modern investigation equipment guided by a high index of suspicion. SNK is more often unilateral than bilateral; however, about five cases of bilateral SNK were reported in the literature [2]. Unilateral cases occur more commonly on the left side. Males and females are equally affected [3]. The SNK is an accessory organ that has its own collecting system, blood supply, and separate encapsulated tissue and developed from an abnormality between the nephrogenic cords into two metanephric blastemas [2].

Both the normal and SNK on the same side tend to be smaller than the contralateral kidney; hence, if missed, may be considered to be a pathologically small kidney.

Similarly, SNK is usually asymptomatic; however, it may predispose to pyelonephritis, hydronephrosis, and urinary tract calculi with patients presenting with loin pain, abdominal pain, and vomiting among other symptoms [4]. Imaging plays a key role in the diagnosis and enables assessment of associated pathologies which will guide the appropriate treatment of patients.

Finally, we present a case of right-sided SNK, incidentally found in a 35-year-old man who presented with abdominal pain and discomfort due to complications by pyelonephritis.

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2 Case presentation

A 35-year-old patient presented to a peripheral hospital with the complaints of right-sided abdominal pain and discomfort for 3 days. He was treated with analgesics and antibiotics after a urine sample was collected for microscopy, culture, and sensitivity (urine m/c/s), and an abdominal ultrasound scan was requested, the result of which showed a small right kidney (bipolar length of 8 cm). The result of urine m/c/s showed growth of Escherichia coli. He was then referred to Aminu Kano Teaching Hospital for further evaluation. A repeat abdominal ultrasound scan, computed tomographic urography (CT urography), urea, electrolyte, and creatinine, as well as urinalysis, were requested for further evaluation. Urea, electrolyte creatinine, and urinalysis were normal.

On physical examination, he was fully conscious and alert, not pale, not cyanosed, and afebrile. Mild right loin tenderness was elicited. Otherwise, the systemic review was normal.

Abdominal ultrasound scan showed two kidneys of normal shape, and outline on the right side with dimensions of 7.8 cm × 2.2 cm and 8.0 cm × 2.50 cm located in the right renal fossa and right lumbar regions, respectively, 4 cm apart (Fig. 1). Both kidneys showed normal parenchymal echogenicity. No calyceal dilatation was seen. The contralateral kidney was normal in position, shape, size (bipolar length of 11 cm), outline, and parenchymal echogenicity (Fig. 2). The remaining abdominal organs appeared within normal limits.

On CT urography, two kidneys were seen on the right side, one in the right renal fossa and the other inferior to it, measuring 8.4 cm and 8.6 cm in bipolar length, respectively. Both kidneys showed normal shape and outline. The left-sided kidney was normal in position, shape, and outline. It measured 11.8 cm in bipolar length (Fig. 3). All the kidneys showed prompt excretion of contrast medium. The visualized pelvicalyceal systems appeared normal. The right upper kidney showed a normally positioned ureter which emptied into the urinary bladder at the normal anatomical position. The right lower kidney was, however, malrotated with the pelvis oriented laterally. The ureter of the lower kidney crossed medially in its lower aspect and joined the ureter of the upper kidney to empty into the urinary bladder. The urinary bladder appeared within normal limits. An overall assessment of the right SNK was made. The patient recovered completely following the completion of antibiotics and resumed his normal life (Fig. 4).

3 Discussion

The embryogenesis of the supernumerary kidney (SNK) is poorly understood; however, many hypotheses have been proposed. More importantly, there are several embryological theories of the supernumerary kidney but none of them has been found to be plausible. Therefore, it is believed that the supernumerary kidney results from an abnormal division of the nephrogenic cord into two metanephric blastemas that then form two kidneys, in association with either a partially or completely

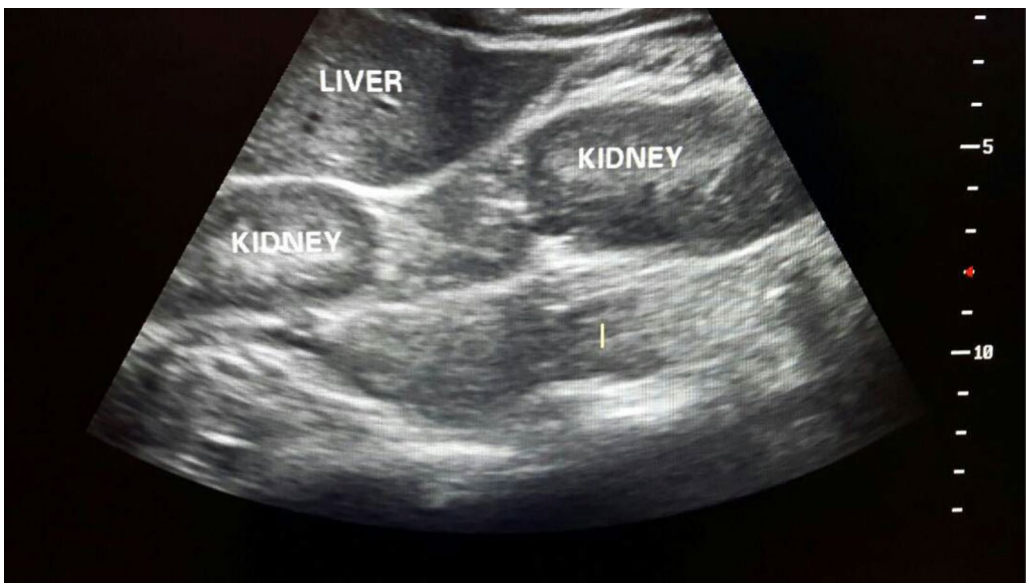

Fig. 1 Two kidneys of normal shape and parenchymal echogenicity on the right side

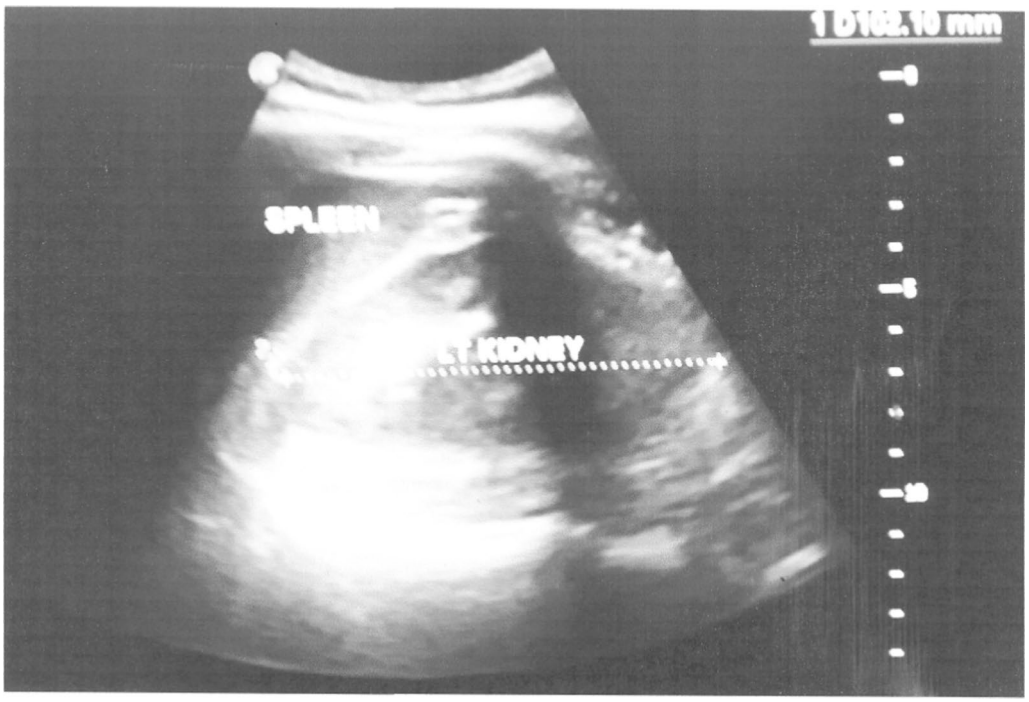

Fig. 2 Abdominal ultrasonogram showing the left kidney in its normal position

duplicated ureteral bud at the 5th–7th week of gestation [4]. The SNK is usually located on the left side, caudal to the ipsilateral kidney when drained by a bifid ureter and cranial when the ureters are separate [4]. In this patient, the two kidneys were on the right side drained by separate ureters which united distally before insertion into the urinary bladder, and the findings are concordant with another review in 14 years old and 20 years old [1, 5]. In the literature, there are few reports of the right supernumerary kidney with or without fusion to the ipsilateral kidney [1]. In very rare cases, the supernumerary kidney is combined with horseshoe and other associated renal anomalies which include complete urethral duplication, urethral ectopia,, vaginal atresia, duplication of the penis, horseshoe kidney, Wilms tumor, and renal cell carcinoma [5, 6]. In addition, others are coarctation of the aorta, hypertensive encephalopathy, abdominal mass, and colonic tumor [5]. The ureter of the supernumerary kidney more frequently traverses as a bifid ureter but rarely may intersect independently as a separate ureter, and drains to the urinary bladder by the Weigert–Meyer principle.[5] Surprisingly, in this index case, no associated anomaly was found.

The diagnosis of SNK is made using an abdominal ultrasound scan, intravenous urography (IVU), computed tomographic urography (CT urography), and magnetic resonance imaging (MRI), IVU, CT, and MRI are particularly useful in determining the nature of the collecting system, the blood supply to the SNK, and any associated anomalies. This patient was diagnosed by using abdominal ultrasound, IVU, and CT urography.

An SNK may be of the same size, larger, or more commonly smaller than the usual kidney. It functions normally, possesses a normal shape and capsule, and is either not attached to or loosely attached to the normal kidney by a narrow stratum of fibrous structure [1]. It may be located in front, below, above, or behind the normal kidney. (1) Other recognized location for supernumerary kidneys includes the iliac or sacral regions. (2) In this patient, both the SNK and the ipsilateral kidney were smaller than the contralateral kidney; the lower kidney was missed in the initial ultrasound scan, prompting the diagnosis of the unilateral small kidney.

The complications of SNK include hydronephrosis, pyelonephritis, pyonephrosis, and renal and ureteral calculi [6]. In a review, Suguna et al. [7] reported an ectopic SNK which presented as an inguinal hernia while Bernik et al. reported a case that presented as a para-umbilical mass [8]. This patient presented with pyelonephritis confirmed by urine m/c/s and was treated with antibiotics with a satisfactory outcome.

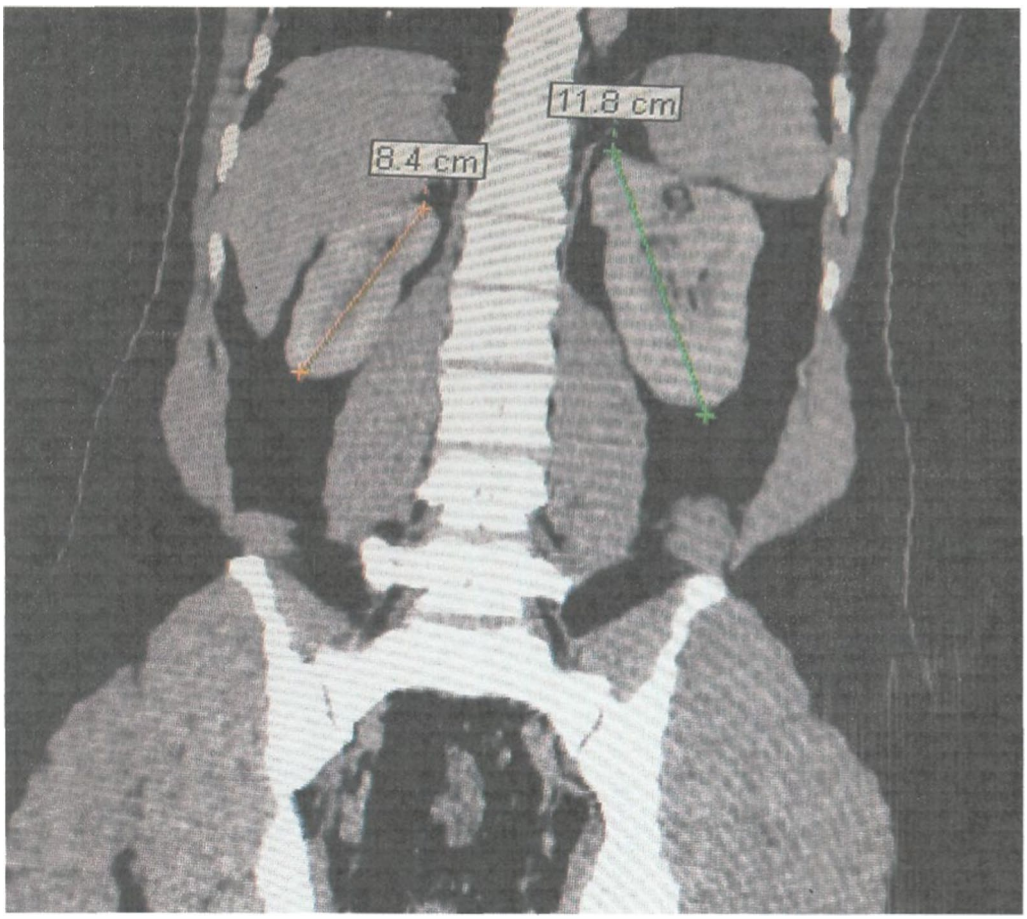

Fig. 3 Coronal reformatted non-contrast computed tomogram showing the left kidney and the right upper kidney. The right upper kidney measured 8.2 cm in bipolar length while the left kidney measured 11.8 cm in bipolar length

The management of patients with SNK depends on associated symptoms and the functioning of the renal moieties. In the absence of symptoms, no treatment is needed; however, regular follow-up is advised. On the other hand, if the kidney has abnormal functioning, nephrectomy may be necessary [6]. In this patient, only antibiotic treatment was necessary based on the finding on urine m/c/s.

4 Conclusions

A 35-year-old man presented with 3 days history of the right loin pain and discomfort. An initial diagnosis of a unilateral small kidney based on an ultrasound scan that missed the SNK was made. However, further evaluation confirmed an SNK on the right side as the cause of the unilateral small kidney, and laboratory investigation diagnosed a urinary tract infection as the cause of the patient's symptoms.

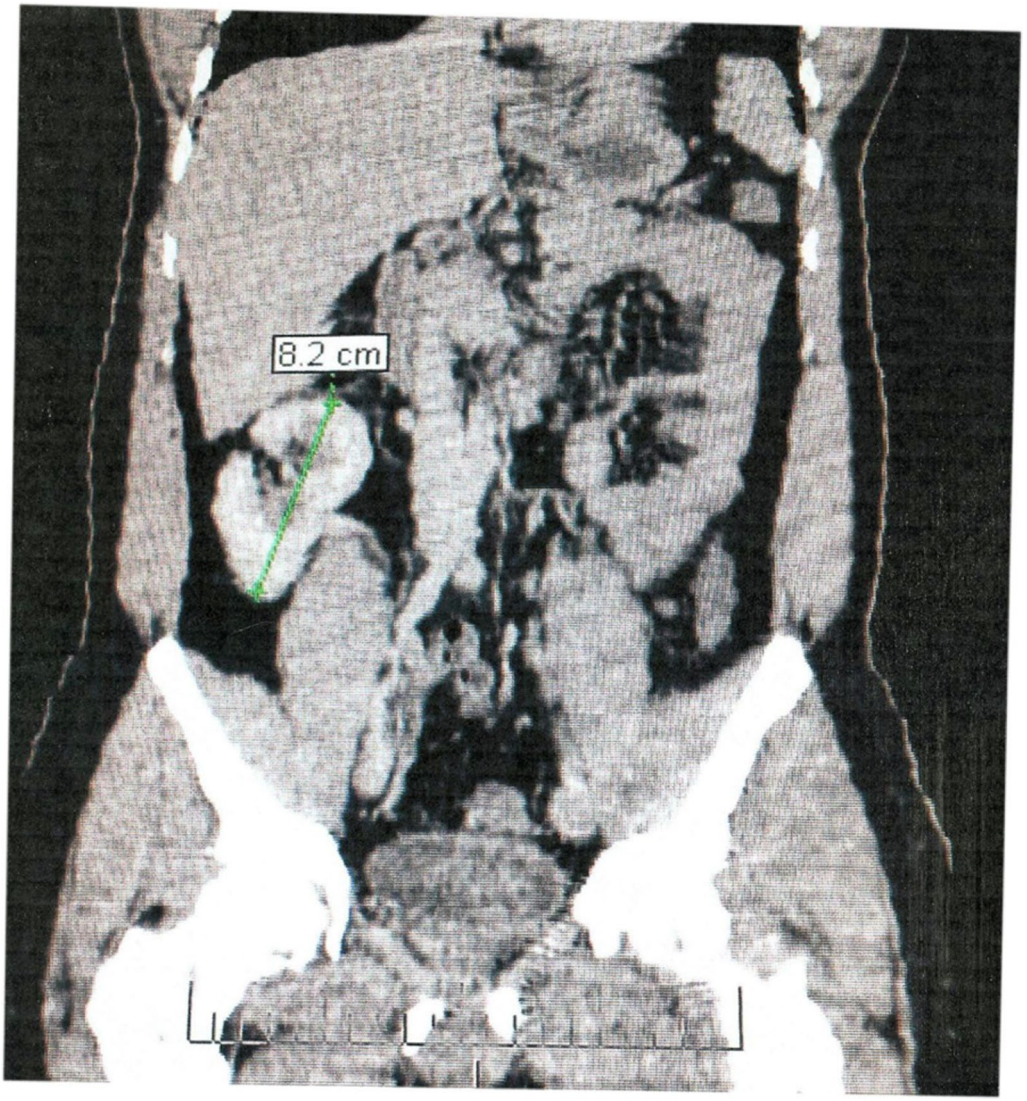

Fig. 4 Coronal reformatted computed tomogram showing the right lower kidney which measured 8.2 cm in bipolar length

Abbreviations

SNK Supernumerary kidney
IVU Intravenous urography
MRI Magnetic resonance imaging

Author contributions

The list of authors' contributions, credits, and other information are as follows: AT contributed to manuscript reviewing and editing, literature review, editing and critical appraisal for intellectual content, and final approval of the version to be published; MAS contributed to review of USS and CT scan and critical reviewing and editing for intellectual content; RMW revising it critically for important intellectual content, manuscript preparation, final approval of the version to be published, and agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved; and LOO contributed to review of CT scan and critical reviewing, editing for intellectual content literature review and critical reviewing, and editing for intellectual content.

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Availability of data materials

This is not applicable to this research work.

Declarations

Ethical approval and consent to participate

The ethical approval was waived by the ethical committee of AMINU KANO TEACHING HOSPITAL (AKTH) of Nigeria. This study was conducted in compliance with the guidelines of the Helsinki Declaration on biomedical research in human subjects. Confidentiality of the identity of the patients and personal health information was maintained. The ethical review was waived by the ethical committee.

Consent for publication

The consent for publication was obtained by the patient. The consent of the was sought for the publication.

Competing interests

The authors have no conflict of interest in the publication of this manuscript.

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