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Case Report

A triple kidney: Coexistence of normal left kidney and mal-rotated horseshoe anomaly: A rare case report ☆,☆☆

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ABSTRACT

The occurrence of triple kidneys, involving a normal kidney and a malrotation horseshoe kidney, is an extremely infrequent condition. This case report demonstrates a triple, mal-rotated horseshoe kidneys coexist with an upper junction stone, alongside a normal left kidney showing normal Doppler vascularity, as observed in an ultrasound examination for 18-year-old male complaints of diffuse periumbilical pain and burning micturition. Laboratory investigation revealed normal creatinine level, and presence of urinary tract infection. Management option for this case are antibiotic therapy and surgical intervention for horseshoe kidney stone. Regular monitoring of kidney function, other radiographic imaging studies, and follow-up to assess the efficacy of the treatment, and detect any further complications are essential.

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Introduction

There is a wide spectrum of congenital anomalies affecting the kidneys and urinary tract, ranging from ectopic kidneys to the potentially life-threatening condition of bilateral renal agenesis. These abnormalities are often identified either during the antenatal period or shortly after birth, but they can also be discovered in adults with varying levels of severity [1]. Supernumerary kidney is a rare congenital anomaly of the urinary system, comprises the presence of an extra- kidney in conjunction with the typical both kidneys, with less than 100 documented cases worldwide in the literature [1–3].

Supernumerary kidney can be totally isolated from the normal kidney or connected by loose areolar tissue, and it is often smaller and less functional than normal kidneys [1]. To our understanding, the horseshoe kidney is reasonably common, finding around 1 in 5 hundred adults; nevertheless, the incidence of supernumerary kidney with associated horseshoe kidney, is extremely rare, with less than five occurrences in the literature internationally [1,4–6].

Case presentation

A 18-year-old male patient admitted to medical care at a private medical center complaining of diffuse periumbilical pain for the last two days and burning urination. On general examination, a mildly tender palpable mid abdomen mass was observed, while other systemic examinations were unremarkable. The patient had no history of vomiting, changes in bowel habit, or presence of melena stool. Additionally, the patient had previously received treatment at a referral hospital for recurrent urinary tract infections. Lab investigations revealed: Creatine was within the normal range (0.7 mg/dL). The urine appears turbid and yellow in appearance. The acidic reaction of the urine is also within the expected range. The absence of nitrites suggests the absence of nitrite-producing bacteria in the urinary tract, which is a negative result. There is no visible blood in the urine. The analysis also shows the presence of 8-10 white blood cells per high-power field, indicating inflammation or infection in the urinary tract. The presence of bacteria suggests a possible urinary tract infection, and further investigation, such as a urine culture, is recommended. A few epithelial cells are present, which is considered normal as they are shed from the urinary tract lining. Additionally, the significant amount of amorphous urate crystals raises the possibility of an excess of uric acid in the urine and renal stone. Abundant mucous (+++) in the urine suggests an increased amount of mucus production, which can occur in response to inflammation or infection in the urinary tract.

Subsequent abdominal pelvic ultrasound examination was performed using B-mode and Doppler techniques. The B-mode ultrasound revealed the presence of three renal structures. The left kidney appeared normal in size, shape, and echotexture, blood perfusion with no evidence of calculi or hydronephrosis (Fig. 1). On the right side, during evaluation of the retroperitoneal space, renal tissue was seen anteriorly to the aorta and was initially mistaken by lymph node enlargement such as may be seen in lymphoma or metastatic nodal enlargement. A horseshoe kidney anomaly was observed at the mid abdomen, characterized by the fusion of the lower poles of both kidneys by an isthmus crossing the midline anterior to the great abdominal vessels (aorta and inferior vena cava) (Fig. 2), with noted abnormal rotation of the kidneys shifts the renal pelvis and ureter anteriorly demonstrating mild hydronephrosis of the right moiety due to an upper ureteropelvic junction (UPJ) stone measured approximately (6.30 × 2.93 mm) in diameter and showed posterior acoustic shadowing (Fig. 3). Furthermore, the Doppler examination demonstrated normal vascular flow in the left kidney, while the horseshoe kidney displayed aberrant vascular patterns due to its malrotation. Spectral doppler imaging revealed normal Doppler indices (Fig. 4).

Discussion

Supernumerary kidneys are accessory reniform kidneys that have their own vascular, collecting system, and encapsulated

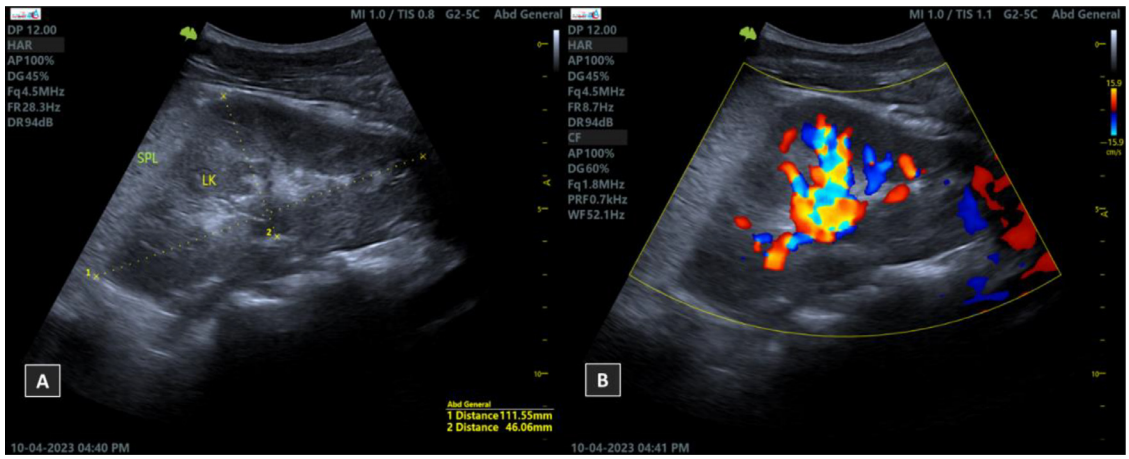

Fig. 1 – (A) shows normal left kidney at left renal fossa beneath to the spleen. (B) Shows normal blood perfusion by color doppler.

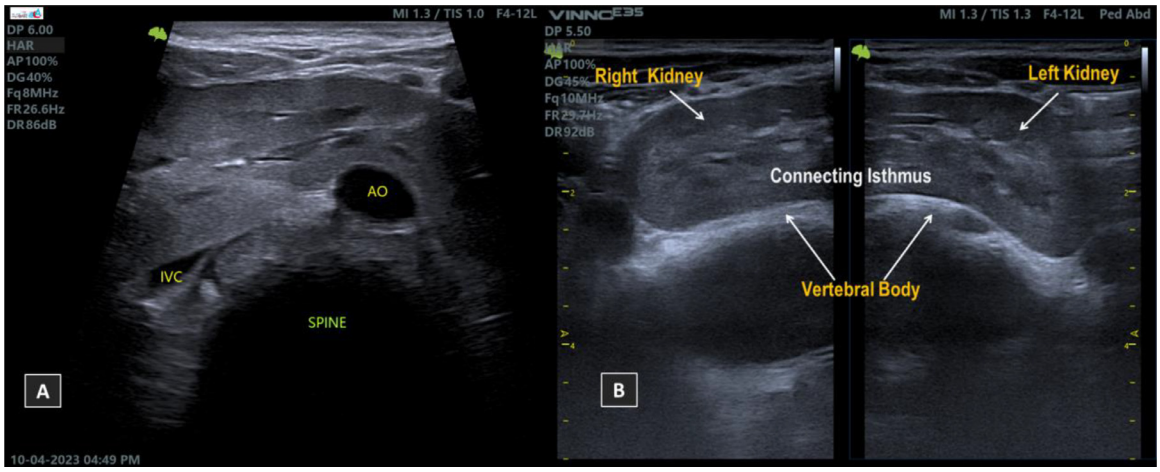

Fig. 2 – (A) shows sonographic picture of horse horseshoe kidney crossing the main abdominal great vessels (AO, Abdominal Aorta and IVC, inferior vena cava) as illustrated resting on the spine. (B) full combined image for horseshoe kidney.

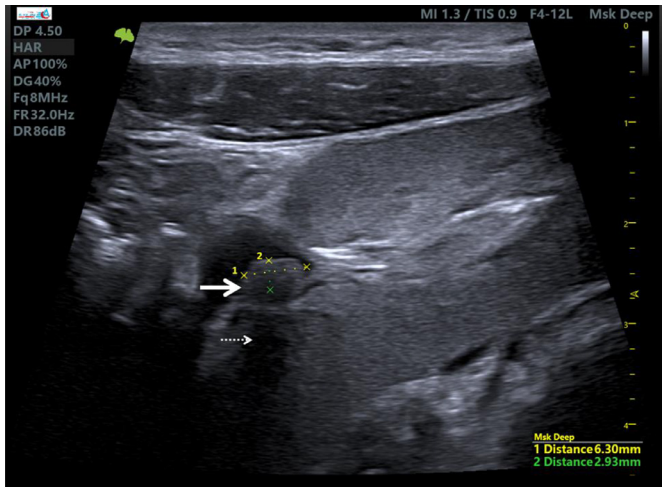

Fig. 3 – Shows an obstructive ureteropelvic junction (UPJ) stone *(Hard arrow)* anteriorly casting faint with the posterior acoustic shadowing *(dotted line)* and resulted of mild hydronephrosis.

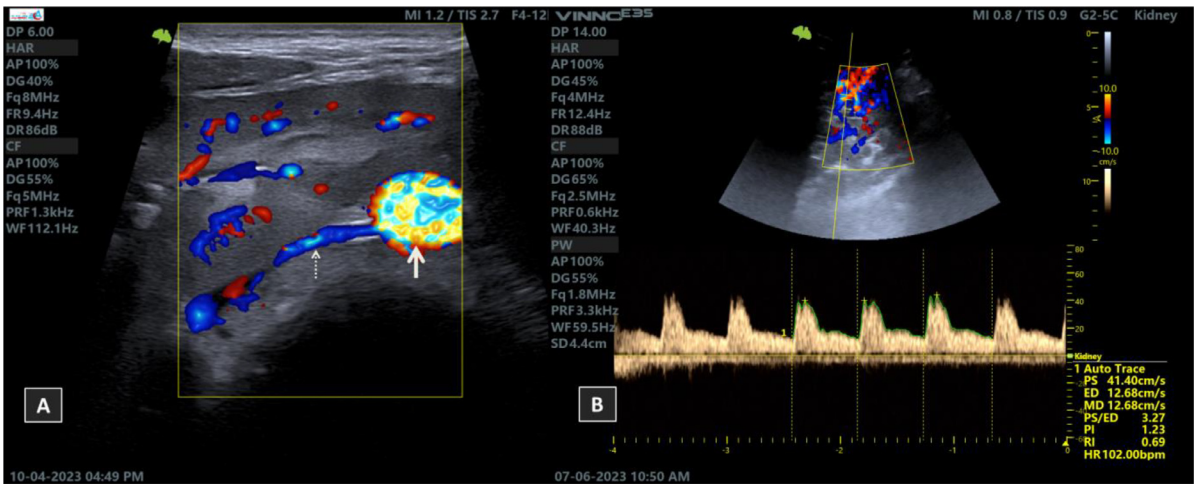

Fig. 4 – (A) shows normal blood flow within horseshoe kidney and right renal artery *(small arrow)* originated from the abdominal aorta *(Bold arrow)*. (B) demonstrate normal spectral flow indices: (PSV: 41 cm/sec, RI: 0.69).

parenchyma, it can be associated with other abnormalities such as horse shoe kidneys [7]. Embryologically, in conjunction with either a partially or completely duplicated ureteral bud at the fifth to seventh week of gestation, the abnormal division of the nephrogenic cord into two metanephric blastema's, which subsequently form two kidneys, is generally thought to be the cause of supernumerary kidneys [1]. Associated congenital malformations include ureteral stricture, vaginal atresia, complete duplication of the urethra and penis, ectopic ureteral opening, horseshoe kidney, imperforate anus, ventricular septal defects, meningomyeloceles, and aortic coarctation and disorders of sexual development and cloacal anomaly [7–11]. Supernumerary kidneys have no underlying clinical significance, they are frequently associated with urolithiasis, pyonephrosis, infections, or hydronephrosis [12]. Nowadays, supernumerary kidneys are often identified through the use of magnetic resonance imaging (MRI), computed tomography (CT), technetium- 99m mercaptoacetyltriglycine scintigraphy (Tc-99m MAG3), Tc-99m DTPA (Diethylenetriaminepenta Acetic Acid) scintigraphy, or ultrasound. [13–16]. In this case report the patients complain from diffuse periumbilical pain for the last 2 days and burning urination, the laboratory investigation demonstrate significant amount of amorphous urate crystals raises the possibility of an excess of uric acid in the urine and renal stone and abundant mucous (+++) in the urine suggests an increased amount of mucus production, which can occur in response to inflammation or infection in the urinary tract, ultrasound examination for abdomen was performed and confirmed the diagnosis of supernumerary left kidney associated with horse shoe one. The left kidney appeared normal in size, shape, and echotexture, blood perfusion with no evidence of calculi or hydronephrosis and a horseshoe kidney kidneys, with noted abnormal rotation of the kidneys shifts the renal pelvis and ureter anteriorly demonstrating mild hydronephrosis of the right moiety due to an upper ureteropelvic junction (UPJ) stone. There are several case reports documented in the literature, identified through various radiographic imaging modalities, Nimkar et al [6] report a similar case in 41 years male and diagnosed by CT, Jamshidian et al [7] describe another case in 35 years male complain of ambiguous and sporadic left flank pain, Adeloma et al [17] describe another case in 25-year female with similar clinical presentation to our case diffuse periumbilical pain of two days duration. Fathollahi et al [5] documented a case in a 40-year-old female experience heaviness and intermittent nebulous abdominal pain for several years confirmed by ultrasound, IVU (intravenous urography) and CT (computerized tomography).

The management choice is determined by the presence of function in the supernumerary kidney, as well as the symptoms and complications. Asymptomatic cases are regularly monitored to promptly identify any abnormalities or complications within the kidney, surgical intervention may be required for patients with associated certain complications. In our case report, the triple horseshoe and mal-rotated kidneys complicated with urinary tract infection and presence of renal stone in horseshoe one, so utilizing antibiotics and considering surgical extraction of the kidney stones are management approaches to be contemplated. Furthermore, regular evaluation of kidney function, imaging studies, and follow-up to assess the efficacy of the treatment, detect any further complications, and alter management as needed.

Conclusion

This case highlights the rare occurrence of triple kidneys, including a normal left kidney and mal-rotated horseshoe kidney, along with an upper junction calculous. The use of ultrasound imaging played a crucial role in diagnosing the anatomical abnormalities and associated stone. Further research and understanding of such rare renal anomalies are necessary to guide appropriate management strategies.

Patient consent

Written informed consent was obtained from the patient for publication of both case report and accompanying image of this case report.

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