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Case Report

Pelvic kidney with double, venous drainage ☆

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ABSTRACT

An ectopic kidney is defined as an atypically placed kidney, due to improper migration from the fetal pelvis, during embryogenesis. The presented CT scan of 72-year-old male with pain and visible hematuria reveals that the right kidney is located in the pelvis. The ectopic kidney has malrotation with a calcified artery and 2 veins. One draining in the right common iliac vein and the other connected to the left common iliac vein—near the bifurcation of vena cava inferior. Usually, pelvic ectopy is asymptomatic. However, it may lead to elevated blood pressure, increased risk of stone formation, infections, and traumatism, due to the atypical anatomical position. Variations in the anatomy of the kidney and its vascular supply are of clinical importance. It is possible to encounter a radiological, surgical, or cancer case, such as the presented.

Introduction

The incidence of the ectopic kidney is 1:1112 births [1]. It is defined as an atypically placed kidney, due to improper migration from the fetal pelvis, during embryogenesis.

Ectopic kidney may be thoracic, abdominal, lumbar, or pelvic [2]. Usually, pelvic ectopy is asymptomatic. However, it may lead to elevated blood pressure, increased risk of stone formation, infections, and traumatism, due to the atypical anatomical position. Clinically, it may be presented as spasmatic pain in the lumbar region, hematuria, drug-resistant hypertonia, or inflammation signs [2]. The distal aorta mostly supplies them [3].

Case report

A 72-year-old male with recurrent pain in his right lower abdominal part. Accompanied by spasms lasting for 3-4 days before the exam. The patient had an episode of visible hematuria. He got scared and decided to consult the oncology department. He has a history of lung cancer with partial resection of the left lung. The patient suffers from hypertension. Sterile urine sample, with erythrocytes, urea levels are normal. Native CT scan with a spiral protocol. No contrast is used due to high levels of creatinine (190 μmol/L). Informed consent for publication was obtained.

☆ Patient consent for publication

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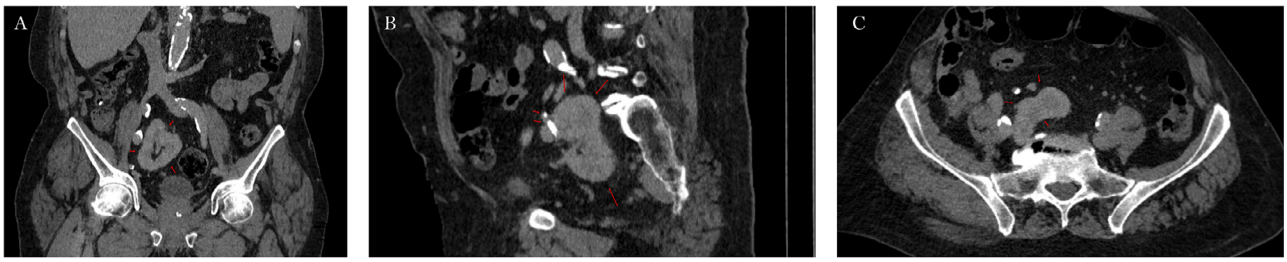

Fig. 1 – (A) In coronal view: the right kidney in the pelvis. (B) In sagittal view: the right kidney is in front of the sacrum and L5, part of the calcified renal artery is also present. (C) Axial scan through the upper renal pole.

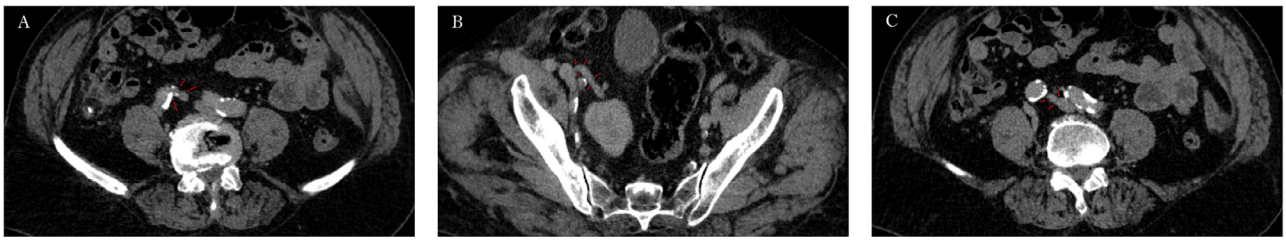

Fig. 2 – (A) In axial view: the renal artery's connection to the right common iliac artery. (B) Axial image of the lower kidney vein connected to the right common iliac vein. (C) Axial CT scan of the upper renal vein connected to the left common iliac vein, almost at the vena cava inferior bifurcation level.

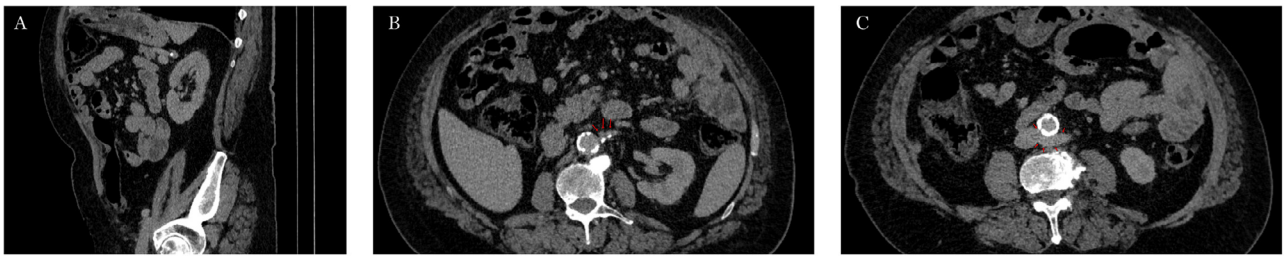

Fig. 3 – (A) In coronal view: the left kidney is at its normal level. (B) Axial CT scan: the separation of the left renal artery from the aorta. (C) Axial CT scan: left renal vein is connected to the left side of vena cava above the bifurcation, behind the aorta.

Results

The presented CT scan reveals that the right kidney is located in the pelvis, in front of the sacrum and fifth lumbar vertebrae. It is also near the iliac bone and has a slightly enlarged size and normal parenchyma. We can see that the kidney has a deformation in its upper pole, where it appears flattened. The ectopic kidney has malrotation, with its hilum pointing at the iliac bone (Fig. 1). The ureter on the right side is short, curved, and without detectable obstructions. A calcified right renal artery, with a curved lumen, originating from the right common iliac artery, is visible. The ectopic kidney has 2 veins. One draining in the right common iliac vein and the other connected to the left common iliac vein—near the bifurcation of vena cava inferior (Fig. 2).

The left kidney is in its normal anatomical position, with normal ureter length and separation of the artery from the abdominal aorta. The vein on the left side is connected to the vena cava's left side above the bifurcation (Fig. 3). The urinary bladder has a normal CT appearance. No new or enlarged metastatic lesions have been observed in this patient. With no other complaints and no visible progression of the lung cancer, the patient is suggested for follow-up, restaging CT scan in 6-12 months.

Discussion

Kidneys and their vessels originate from the mesoblast. It expands from cranial to caudal and completes its development after 3 phases: pronephros, mesonephros, and metanephros. The third phase gives rise to permanent kidneys. Initially, they are localized at the ventral portion of the sacrum and are close to each other. Along with abdominal and pelvic growth and decreased body inclination, they ascend and reach their permanent sites by coming in contact with the adrenal gland at the ninth week [3–5].

The presented case has malrotation, which is usually associated with pelvic ectopy. First, hila face ventral aspect. However, during ascent, it displays a 90-degree medial turn. The hilus of a kidney that attained its final permanent position faces an anterolateral aspect. During the ascent, they proceed through a bifurcation formed by the umbilical arteries. If one of the kidneys fail to pass this point, it remains within the pelvis next to the common iliac artery [3,5].

The patient suffers from hypertension, which is to no surprise. The CT images show that the right renal artery is curved and calcified. Information about potential variants in renal location and renal vasculature, and appearance on CT is important for radiologists, surgeons, and clinicians. Multiple renal arteries are the most common variant among ectopic cases, with an incidence rate of 20%-30%. Considering the increase of renal transplants and laparoscopic techniques, detailed knowledge of ectopic kidneys is essential [6,7]. The presented case has a single renal artery.

The tortuous ureter often associated with a pelvic kidney hinders the flexible ureteroscope's deflection, potentially limiting access. Laparoscopy-guided intervention permits the kidney's visual exposure, enhancing safe puncture and tract placement integral to percutaneous nephrolithotomy [2]. When renal ectopia or horseshoe kidney is detected, associated renal and urinary anomalies and structural extrarenal malformations should be evaluated. Patients need long-term follow-up and should be examined regularly for potential complications [8].

Conclusion

As the incidence of unilateral renal ectopia is not very slim, it is possible to encounter a radiological, surgical, or cancer case, such as the presented. Variations in the anatomy of the kidney and its vascular supply are of clinical importance. The case illustrates a different kind of blood supply for the pelvic kidney.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.radcr.2020.12.023.

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