

Available online at [www.sciencedirect.com](http://www.sciencedirect.com)

ScienceDirect

journal homepage: [www.elsevier.com/locate/radcr](http://www.elsevier.com/locate/radcr)

## Case Report

# Malrotation of an iliac ectopic kidney with pyelo-ureteral duplication: An incidental three-in-one congenital anomaly ☆☆☆

Ibrahima Niang, MD<sup>a,\*</sup>, Ndiaga Seck Ndour, MD<sup>b</sup>, Mamadou Ly, MD<sup>a</sup>, Abdourahmane Ndong, MD<sup>c</sup>, Ndeye Bigué Mar, MD<sup>d</sup>, Khadidiatou Ndiaye Diouf, MD<sup>a</sup>, Cheikh Tidiane Diop, MD<sup>e</sup>, Abdoulaye Dione Diop, Professor<sup>a</sup>, Sokhna Ba, Professor<sup>a</sup>

<sup>a</sup> Radiology Department, Fann University Hospital Center, Dakar, Senegal

<sup>b</sup> Urology Department, Aristide Le Dantec Hospital University Center, Dakar, Senegal

<sup>c</sup> Department of Surgery, Gaston Berger University Saint-Louis, Senegal

<sup>d</sup> Anatomy Lab, UFR Santé, Thies University, Thies, Senegal

<sup>e</sup> Radiology Department, Albert Royer Hospital, Dakar, Senegal

## ARTICLE INFO

## Article history:

Received 18 September 2020

Revised 14 December 2020

Accepted 15 December 2020

## Keywords:

Iliac renal ectopia

Pyelo-ureteral duplication

Renal malrotation

CT-scan

Congenital anomalies

## ABSTRACT

Renal ectopia is a rare congenital anomaly that mostly occurs in the pelvic area. An ectopic kidney is usually associated with other anomalies such as a malrotation. We report the case of a 15-year-old male who consulted after a blunt abdominal trauma. A left iliac renal ectopia was incidentally discovered. This ectopic kidney was associated with a malrotation, and a pyelo-ureteral duplication. Iliac renal ectopia should be dissociated from other abdominal renal ectopias, and its association with other renal malformations should be further investigated.

© 2020 The Authors. Published by Elsevier Inc. on behalf of University of Washington.

This is an open access article under the CC BY-NC-ND license

(<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

## Introduction

Renal ectopia is a rare birth anomaly with an incidence of 1 in 3000 [1]. Renal ectopia can occur in different parts of the body, such as in the abdomen, in the pelvis, in the iliac, or in the

thorax [2]. Renal ectopia can be associated with other renal or extrarenal abnormalities [3].

We report the case of a 15-year-old male who consulted for a blunt abdominal trauma. An iliac renal ectopia on the left side was incidentally discovered. This ectopic kidney was associated with malrotation, and a pyelo-ureteral duplication.

☆ Competing Interest: The authors declare no competing interest.

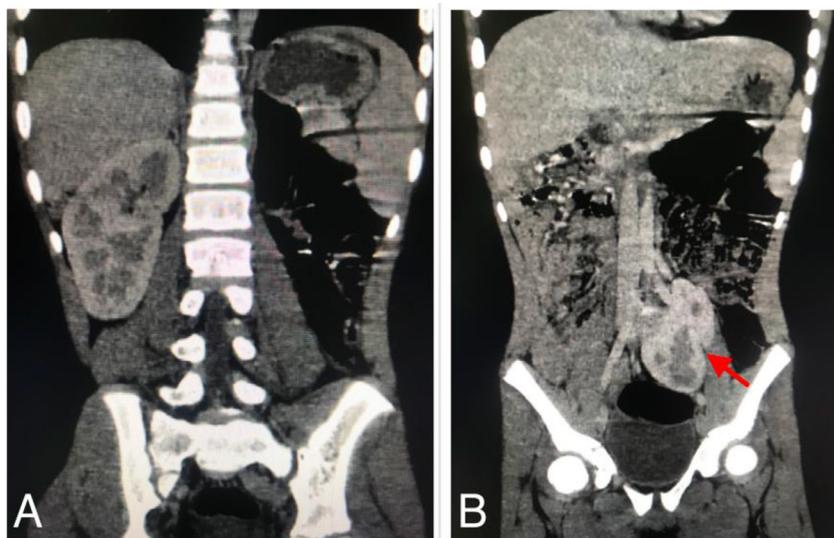
☆☆ Acknowledgments: The authors thank Mrs Fatou Diack who kindly accepted to edit the English language during the revision of the manuscript.

\* Corresponding author.

E-mail address: [niangibrahimaniang@gmail.com](mailto:niangibrahimaniang@gmail.com) (I. Niang).

<https://doi.org/10.1016/j.radcr.2020.12.041>

1930-0433/© 2020 The Authors. Published by Elsevier Inc. on behalf of University of Washington. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)



**Fig. 1 – Abdominal CT scan with contrast in coronal view. (A) Right kidney in normal position and emptiness of the left renal compartment. (B) Left kidney in ectopic position in front of the left iliac vessels. The left kidney is deformed with a cleft (red arrow) at its middle part.**

### Case report

This is a 15-year-old male with no particular medical history who was seen after a road traffic accident. The patient presented with abdominal pain in the right hypochondrium. He had no fever or vomiting. His blood pressure was 120/70. The physical examination revealed no tenderness or palpable mass.

No injuries to the liver, spleen, or other organs were detected by the abdominal CT scan with contrast that was performed. Moreover, the CT scan did not detect any contrast extravasation, pneumoperitonum, or peritoneal effusion.

However, the CT scan revealed a left ectopic kidney located in front of the iliac vessels. This kidney was smaller than the contralateral one with irregular shape and a cleft in the middle (Fig. 1B)

The CT-scan also revealed a malrotation with a forward-facing renal hilum (Fig. 2). The excretory phase of the CT scan showed 2 nondilated ureters (excretory cavities) (Fig. 3A). The upper ureter fused with the lower ureter at the pyelon level, forming a common distal ureteral orifice joining the bladder trigone (Fig. 3B). There was 1 single renal artery that originated from the aorta, and that was located 1 cm away from the iliac bifurcation. The left renal vein was located behind the right common iliac artery, and it drained into the inferior vena cava (Fig. 4). There was no traumatic injury to the kidneys. The kidney on the right side was without anomalies and in a normal position (Fig. 1A).

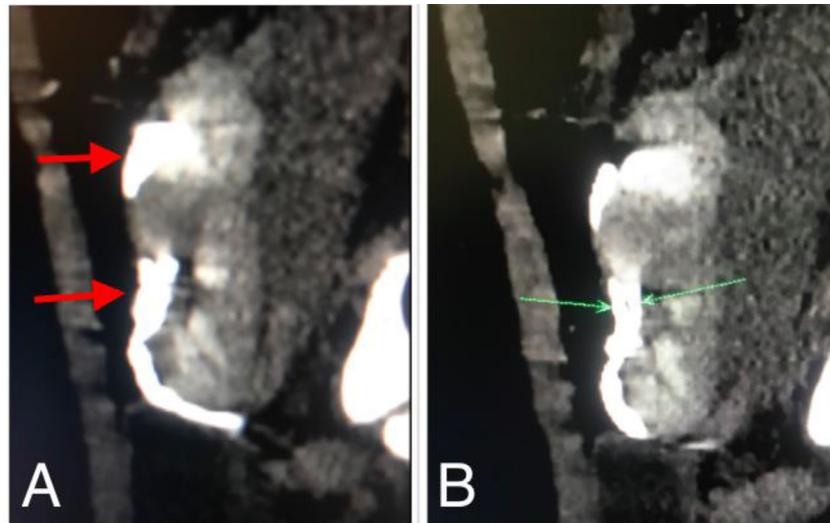
Conservative management was performed with some analgesic. The follow-up was uneventful.



**Fig. 2 – Abdominal CT scan in 3D reconstruction, anterior view, showing malrotation of an ectopic kidney with an anterior hilum (white arrow).**

### Discussion

Renal ectopia is a birth anomaly that occurs during embryogenesis when the kidneys fail to ascend, and is more frequently



**Fig. 3 – Abdominal CT scan with injection in the late phase, focus on the left kidney. (A) show the 2 pyelons (red arrows). (B) shows the 2 ureters forming a single terminal ureter.**



**Fig. 4 – Abdominal CT scan with contrast, focus on the left kidney and iliac vessels, showing the left renal vein (white arrow) passing behind the right common iliac artery (red arrow).**

localized in the pelvic area [4]. In addition, iliac ectopias are often diagnosed either as pelvic or abdominal ectopias although they are between those 2 areas located in the front of the iliac vessels [5]. The iliac ectopia should be considered as a sepa-

rate entity by radiologists during imaging examinations. Renal ectopias are most often asymptomatic, and are discovered incidentally [6]. In our patient, the incidental finding occurred after an abdominal trauma. Even if there was no traumatic injury to the kidney, it is important to note that ectopic kidneys are more exposed to trauma because they are not protected by the ribs of the posterior thoracic wall [7]. Patients with ectopic kidneys are also prone to complications such as vesicoureteral reflux, urinary tract infections, kidney stones, all of which could be an opportunity to discover an ectopia [1]. Renal ectopias are most often located on the left side, which was the case for our patient [8].

Pyelo-ureteral duplications are congenital anomalies with an incidence of approximately 0.7%, and are most often discovered incidentally [9,10]. Pyelo-ureteral duplication can be incomplete or complete [11]. In the incomplete form, also called bifid ureter, the 2 ureters join and form a single distal ureter that drain into the bladder. This can cause a dilation of the 2 pyelons if there is an obstruction beyond the fusion of the 2 ureters. Our patient presented with an incomplete type.

In the complete type, both ureters are independent and are connected separately to the bladder, and a ureteral obstruction only causes dilation of the homologous pyelon.

Renal ectopia is often associated with various renal vascular abnormalities [5]. In our patient, there was a single artery that originated in the aorta, 1 cm above the iliac bifurcation. This low origin of the renal artery can help in the differential diagnosis between congenital renal ectopia and renal ptosis, where the renal artery has a normal origin [12].

In our patient, the renal vein was located behind the right common iliac artery. This positioning is related to the iliac posturing of the kidney. This disposition is seemingly not as compressive as would be the case of a retro-aortic renal vein which can cause compression of the renal vein located between the aorta and the spine [13]. Renal artery duplicity is also reported as another vascular abnormality that may be associated with renal ectopia [14].

Double excretory cavities are often associated with abnormalities of the size and the form of the renal parenchyma [11]. In our patient, the ectopic kidney was smaller than the contralateral one, and it presented with a cleft in the middle. Renal malrotation is the anomaly that is most often associated with renal ectopia because they both occurs at the same time during embryogenesis [12,15].

In our patient, because of the absence of urinary symptoms, a simple urological consultation was recommended because of the potential risk of infection or a lithiasis event. A surgical treatment is not indicated, unless complications arise [8].

---

### Author's contribution

IN wrote the manuscript with input of AN, ML, and KND. IN, NBM, and CTD edit the illustrations. NSN is following up the patient. SB and ADD supervised the work. All the authors have read and approved the final version of the manuscript.

---

### Patient consent

The patient's father has signed an informed consent form

---

### REFERENCES

- [1] Xu YE, Hendahewa R. A rare presentation of an ectopic kidney with pyelonephritis mimicking appendicitis. *J Surg Case Rep* 2019;2019(11):rjz342.
- [2] Sakamoto K, Kojima Y, Takeda R, Terai K, Matsuda M. Solitary pelvic kidney encountered during laparoscopic colectomy. *J Minim Access Surg*. 2005;1(3):133–5.
- [3] Rodriguez MM. Congenital anomalies of the kidney and the urinary tract (CAKUT). *Fetal Pediatr Pathol* 2014;33(5–6):293–320.
- [4] Aslam F. Pelvic renal ectopia, an incidental finding. *BMJ Case Rep* 2017;2017 bcr2016218894. Publié le 2 mars. doi:10.1136/bcr-2016-218894.
- [5] Kara E, Oztürk NC, Ozgür A, Yıldız A, Oztürk H. Ectopic kidney with varied vasculature: demonstrated by CT angiography. *Surg Radiol Anat*. 2011;33(1):81–4.
- [6] Pal DK, Jain P, Banerjee M. Bilateral pelvic kidneys: a rare anomaly. *J Case Rep* 2016;6(3):411–4.
- [7] Tsao Y-T, Lin S, Lin Y-F, Chu P. Pelvic ectopic kidney with acute pyelonephritis: wolf in sheep's clothing. *Am J Emerg Med* 2008;26(4):517.e3–517.e4.
- [8] Engelhardt PF, Lusuardi L, Riedl CR, Riccabona M. The pediatric pelvic kidney—a retrospective analysis. *Aktuelle Urol*. 2006;37(4):272–6.
- [9] Privett JTJ, Jeans WD, Roylance J. The incidence and importance of renal duplication. *Clin Radiol* 1976;27(4):521–30.
- [10] Smith P, Dunn M. Duplication of the upper urinary tract. *Ann R Coll Surg Engl* 1979;61(4):281–6.
- [11] Didier RA, Chow JS, Kwatra NS, Retik AB, Lebowitz RL. The duplicated collecting system of the urinary tract: embryology, imaging appearances and clinical considerations. *Pediatr Radiol* 2017;47(11):1526–38.
- [12] Singer A, Simmons MZ, Maldjian PD. Spectrum of congenital renal anomalies presenting in adulthood. *Clin Imaging* 2008;32(3):183–91.
- [13] Heidler S, Hruba S, Schwarz S, Sellner-Zwiebauer Y, Hoeltl W, Albrecht W. Prevalence and incidence of clinical symptoms of the retroaortic left renal vein. *Urol Int* 2015;94(2):173–6.
- [14] Ohtsuka A, Kikuta A, Taguchi T, Murakami T. Ectopic kidney in front of the right common iliac artery and its blood vascular supply—a case report. *Okajimas Folia Anat Jpn* 1993;70(1):29–34.
- [15] Muttarak M, Sriburi T. Congenital renal anomalies detected in adulthood. *Biomed Imaging Interv J [Internet]* 2012. [cité 15 août 2020];8(1). Disponible sur: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3432226/>.