Case Report of a Non-Functional Ectopic Kidney in Crossed Fused Renal Ectopia on [^{99m}Tc] Tc-DMSA Renal Scintigraphy: A Rare Entity

Zakaria Ouassafrar[ORCID1*], Abdel Amide Gbadamassi[ORCID1,2], Halima Batani[ORCID1], Hafsa Bensimimoun[1], Amal Guensi[ORCID1]

1Nuclear Medicine Department, Ibn Rochd University Hospital Center, Casablanca, Morocco

2Laboratory of Mechanics and High Energy Physics, Faculty of Sciences Ain Chok, Hassan Second University of Casablanca, Morocco

Swiss Journal of Radiology and Nuclear Medicine - www.sjoranm.com - Rosenweg 3 in CH-6340 Baar, Switzerland

Abstract

Introduction: *Crossed fused renal ectopia is a rare congenital malformation, with an estimated incidence of 1 in 7'500 live births. It occurs more frequently in males and represents the second most common renal fusion anomaly after the horseshoe kidney.*

Case report: *Static renal scintigraphy with [^{99m}Tc]Tc-DMSA is considered the gold standard for confirming the diagnosis and ruling out the presence of a single kidney. We report the case of a 2-year-old child, born from a consanguineous marriage, followed for failure to thrive and recurrent episodes of pyelonephritis. The 99mTc-DMSA scan revealed a left pelvic ectopic kidney, fused with the right kidney at the mid-portion and upper pole. Relative renal function was almost entirely provided by the right kidney.*

Conclusion: *Crossed fused renal ectopia is a rare congenital renal anomaly. Renal scintigraphy with [^{99m}Tc]Tc-DMSA remains the most reliable method for confirming the diagnosis and assessing renal function.*

Keywords: *Crossed fused renal ectopia, Congenital renal anomaly, Ectopic kidney, [99mTc] Tc-DMSA scintigraphy*

*Corresponding author: Zakaria Ouassafrar - received: 24.10.2025 - peer reviewed, accepted and published: 30.11.2025

Introduction

Congenital anomalies of the kidneys encompass a wide spectrum of conditions, ranging from essentially asymptomatic variants to severe and potentially life-threatening pathologies, and account for approximately 10–12% of malformations identified in adults [1]. Ectopic and fused renal anomalies are congenital urinary tract malformations resulting from disruptions in normal embryological renal migration.

There are two main types of fused renal anomalies: the horseshoe kidney and crossed fused renal ectopia [2]. Crossed fused renal ectopia is a congenital malformation with an estimated incidence of 1 in 7'500 live births, showing a higher prevalence in males. It is considered the second most common renal fusion anomaly after the horseshoe kidney and is characterized by the presence of an ectopic kidney that crosses the midline, fusing with the contralateral orthotopic kidney and appearing as a single enlarged renal mass [3].

Static renal scintigraphy with technetium ^{99m}-labeled dimercaptosuccinic acid ([^{99m}Tc]Tc-DMSA) is the gold standard for confirming crossed renal ectopia and ruling out a solitary kidney [4]. The aim of this study was to

highlight the contribution of [^{99m}Tc]Tc-DMSA renal scintigraphy in detecting crossed fused renal ectopia, particularly in cases where ultrasonography was inconclusive.

Case Report

A 2-year-old child, born from a first-degree consanguineous marriage, was evaluated for failure to thrive and a history of recurrent pyelonephritis, which required multiple hospitalizations during the first two years of life. No other significant medical, surgical, or congenital history was reported by the parents. Initial abdominopelvic ultrasonography revealed a right ectopic kidney in the pelvic region, with no visualization of the left kidney. In this context, a renal scintigraphy with [^{99m}Tc]Tc-DMSA was indicated to confirm the suspected congenital anomaly and to assess potential cortical sequelae resulting from previous episodes of pyelonephritis.

Examination Protocol

Static renal scintigraphy was performed following the intravenous injection of 0.5 mCi of [^{99m}Tc]Tc-DMSA. Images were acquired using a dual-head gamma camera equipped with a low-energy high-resolution collimator (Siemens Symbia-Intevo), combined with a low-dose CT scanner (SPECT/CT).

The study was conducted four hours after tracer injection, under the following conditions: patient in the supine position, matrix 128 × 128, and zoom factor 1. Static images were obtained in the posterior, anterior, right posterior oblique, and left posterior oblique projections, each lasting approximately 5 to 10 minutes.

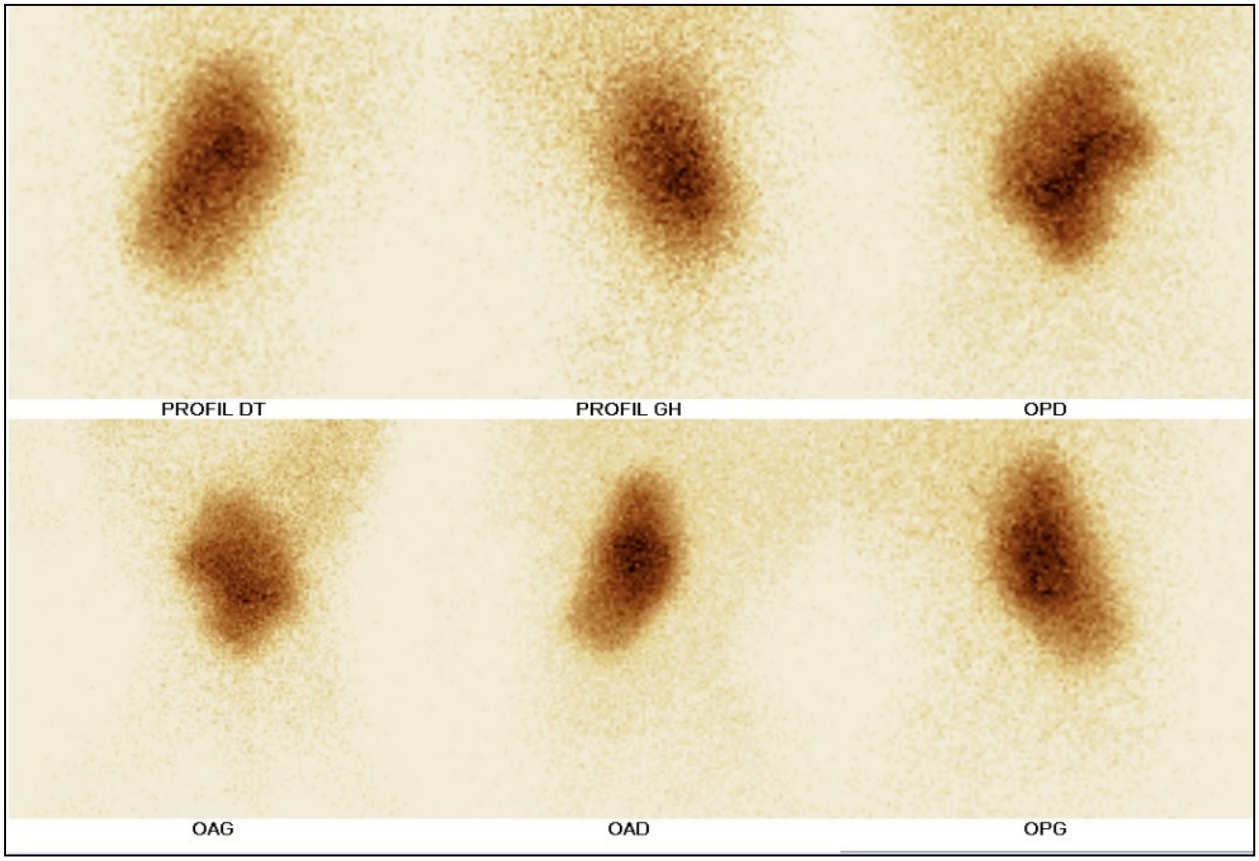

Figure 1: Different views of 99mTc-DMSA renal scintigraphy

Imaging results (Fig.1)

The analysis of the scintigraphic images obtained four hours after radiotracer injection focused on the number of kidneys visualized, their location, size, tracer uptake intensity, the presence of cortical abnormalities, and the calculation of relative renal function.

The study revealed two renal formations located in the pelvic region, consistent with bilateral ectopia. Posterior oblique projections allowed better delineation of the two structures, showing a left ectopic pelvic kidney located below the right kidney (Fig. 1).

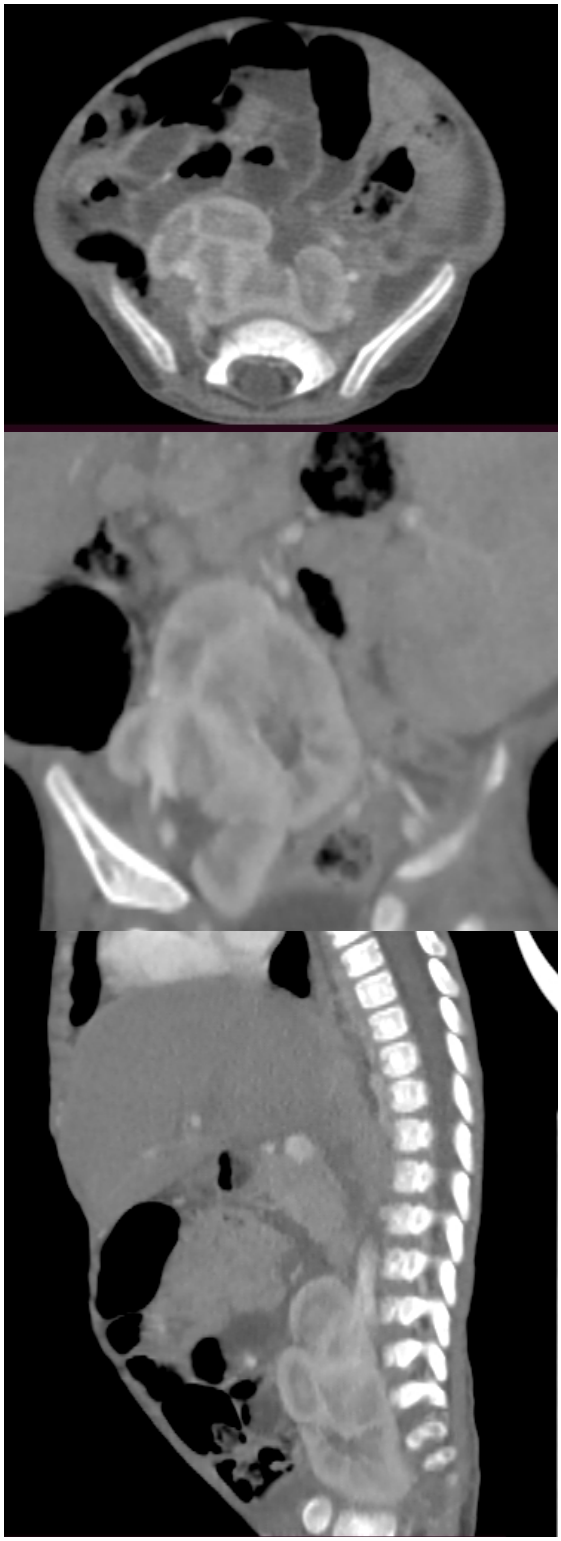

Figure 2: Thoraco-abdominal computed tomography image

The left kidney exhibited mildly homogeneous tracer uptake, indicating residual functional activity, with no obvious parenchymal abnormalities or focal defects suggestive of scarring or dysplasia.

Furthermore, the images demonstrated a fusion of the left kidney with the right kidney at the mid-portion and upper pole, consistent with a crossed fused pelvic renal anomaly (Fig. 1).

Relative renal function assessment showed that function was almost entirely provided by the right kidney (96%), indicating severely reduced function of the left kidney.
Overall, these findings support the diagnosis of a congenital renal malformation combining pelvic renal ectopia and crossed renal fusion, with impaired functional activity of the left kidney.
Complementary CT imaging revealed external rotation of both kidneys, and the left ureter crossed the midline before entering the bladder on the left side (Fig. 2).

Discussion

Crossed fused renal ectopia is a very rare congenital malformation. The exact incidence of crossed fused ectopia remains unknown, as most patients are asymptomatic; it occurs in approximately 1 in 1'000 live births. After the horseshoe kidney, crossed fused ectopia is the most common renal fusion anomaly, characterized by the abnormal migration of one kidney to the opposite side and its fusion with the contralateral kidney during development. This anomaly results from abnormal renal ascent during embryogenesis, with fusion occurring at the renal pelvis [5].
In this condition, as observed in our patient, both kidneys are located on the same side, usually fused, with two distinct ureters originating from each kidney. The ureter from the crossed kidney returns to the opposite side before entering the bladder.
Imaging plays a key role in congenital renal disorders, facilitating accurate diagnosis. Ultrasonography is often used for initial detection and assessment due to its rapid acquisition, lack of radiation, low cost, and ease of use [5]. However, renal scintigraphy, particularly static imaging with [^{99m}Tc]Tc-DMSA, is the gold standard for confirming crossed renal ectopia and ruling out a solitary kidney [4].
Diagnosis can be challenging, especially in children, as ultrasonography has several limitations. Computed tomography (CT) or intravenous urography, although more sensitive and precise, are associated with significant radiation exposure [6]. DMSA renal

scintigraphy provides a reliable method for diagnosing and characterizing complex congenital renal anomalies, offering functional information essential for appropriate clinical management [7]. It also provides crucial data for detecting cortical defects in children with vesicoureteral reflux or recurrent urinary tract infections, as demonstrated by Ditchfield and Nadel in a large cohort of 129 children [8].

Currently, DMSA scintigraphy is recommended as the reference technique to confirm the presence and localization of an ectopic or fused kidney, assess cortical function, and visualize the functional anatomy of fused kidneys, complementing other imaging modalities such as excretory urography and CT [7]. This information is essential for planning therapeutic management and clinical follow-up of children with congenital renal anomalies.

Conclusion

Crossed fused renal ectopia is a rare congenital renal anomaly. Renal scintigraphy with [^{99m}Tc]Tc-DMSA remains the most reliable method for confirming the diagnosis and assessing renal function.

Correspondence to:
Zakaria Ouassafrar
Nuclear Medicine Department, Ibn Rochd University Hospital Center, Casablanca, Morocco

Authors' contributions:

1. Zakaria Ouassafrar: Conceptualization, investigation, data curation, writing – original draft.
2. Abdel Amide Gbadamassi: Methodology, supervision, writing – review & editing.
3. Halima Batani: Formal analysis, visualization.
4. Hafsa Bensimimou: Formal analysis, visualization.
5. Amal Guensi: Supervision, project administration, validation

Declarations

Consent for publication: The authors clarify that written informed consent was obtained and the anonymity of the patient was ensured. This study submitted to Swiss J. Rad. Nucl. Med. has been conducted in accordance with the Declaration of Helsinki and according to requirements of all applicable local and international standards.

- Competing interests: No competing interests.
- Funding: No funding resources.
- Ethical Approval: Not Applicable
- Consent for publication: Informed consent taken
- Availability of data and materials: Not Applicable
- Acknowledgements: Not applicable.

Disclaimer/Publisher's Note:

License Policy:

SJORANM-LinkedIn:

Check out our journal's *LinkedIn* profile with over 10K registered followers from the Radiologic & Nuclear Medicine Imaging field: LinkedIn

References

1. Mudoni A, Caccetta F, Caroppo M, Musio F, Accogli A, Zacheo MD et al. Crossed fused renal ectopia: Case report and review of the literature. J Ultrasound. 2017;20:333–7.https://doi.org/10.1007/s40477-017-0245-6
2. Dehesa A, Zugazaga A, De Miguel MB, et al. Evaluation of a crossed fused renal ectopia in a paediatric patient using 99mTc-DMSA SPECT/CT. Rev Esp Med Nucl Imagen Mol. 2016;35(6):406-408. https://doi.org/10.1016/j.remn.2016.01.003
3. Loganathan AK, Bal HS. Crossed fused renal ectopia in children: a review of clinical profile, surgical challenges, and outcome. J Pediatr Urol. 2019 Aug;15(4):315-321. https://doi.org/10.1016/j.jpurol.2019.06.019
4. E.H.A.L. Bathily, M.S. Djigo, O. Diop, K. Guèye, G. Thiaw, B. Ndong, et al. Ectopie rénale croisée: quand la scintigraphie rénale infirme le diagnostic de rein unique évoqué à l'échographie et à la TDM. Médecine Nucléaire. 22023; 87: 0928-1258. https://doi.org/10.1016/j.mednuc.2023.01.102
5. Mudoni A, Caccetta F, Caroppo M, Musio F, Accogli A, Zacheo MD, et al. Crossed fused renal ectopia: case report and review of the literature. J Ultrasound. 2017; 20(4):333-337.https://doi.org/10.1007/s40477-017-0245-6
6. Loganathan AK, Bal HS. Crossed fused renal ectopia in children: A review of clinical profile, surgical challenges, and outcome. J Pediatr Urol. 2019;15:315–21. https://doi.org/10.1016/j.jpurol.2019.06.019
7. Moon EH, Kim MW, Kim YJ, Sun IO. Crossed Fused Renal Ectopia: Presentations on 99mTc-MAG3 Scan, 99mTc-DMSA SPECT, and Multidetector CT. Clin Nucl Med. 2015 Oct;40(10):835-7. https://doi.org/10.1097/RLU.0000000000000937
8. Ditchfield MR, Nadel HR. The DMSA scan in paediatric urinary tract infection. Australas Radiol. 1998;42:318–20. https://doi.org/10.1111/j.1440-1673.1998.tb00530.x