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Incidental right renal agenesis in a 23-year-old patient: A case report

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Abstract

Renal agenesis refers to the congenital absence or complete failure of development of one or both kidneys. It occurs when the kidneys fail to form during embryonic development. This case report describes the presentation of a 23-year-old male patient who experienced sporadic episodes of abdominal pain on the right side and occasional episodes of hematuria. Diagnostic investigations, including ultrasonography and magnetic resonance imaging scans, confirmed the diagnosis of right renal agenesis. The management of the patient in this case report involved close monitoring of renal function and regular follow-up visits. Initially, the patient was followed for a period of 3 months and based on the patient's clinical status and any associated risk factors, it was determined that a follow-up schedule of visits every 6 months is appropriate. This interval allows for ongoing assessment of renal function and facilitates early detection of any potential complications or changes in kidney health. This case highlights the importance of early diagnosis, comprehensive management, and long-term monitoring in individuals with renal agenesis.

Keywords

Renal agenesis, incidental, unilateral, congenital anomaly

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Introduction

Renal agenesis, a congenital condition, arises from the disruption of normal embryonic kidney development during the early stages of gestation. It occurs when one or both kidneys fail to form properly. The intricate process of kidney development begins around the fifth week of gestation during embryological development.[1] At this stage, the pronephros, mesonephros, and metanephros sequentially form, with the metanephros being responsible for the development of the permanent kidneys. However, in cases of renal agenesis, this intricate process is interrupted, leading to the absence or underdevelopment of one or both kidneys.[1] The most common form is unilateral renal agenesis, where only one kidney fails to develop, while bilateral renal agenesis, the absence of both kidneys, is much rarer and typically incompatible with life. Unilateral renal agenesis is often asymptomatic and may go undiagnosed until later in life, when incidental findings during medical investigations shed light on the condition.[1–3]

Although the exact etiology of renal agenesis is not fully understood, it is believed that both genetic and environmental factors contribute to its development. Mutations in certain genes, such as Rearranged during Transfection (RET) and Bone Morphogenic Protein 4 (BMP4), have been implicated in some cases of renal agenesis.[1] Additionally, maternal exposure to teratogenic substances, maternal diabetes, and maternal smoking during pregnancy have also been suggested as potential risk factors.[2,3]

The clinical implications of renal agenesis can vary depending on the presence or absence of the contralateral kidney and any associated abnormalities. Individuals with unilateral renal agenesis generally lead normal lives without significant renal complications, as the remaining kidney compensates for the loss of function. However, the absence of a one kidney may predispose individuals to certain renal

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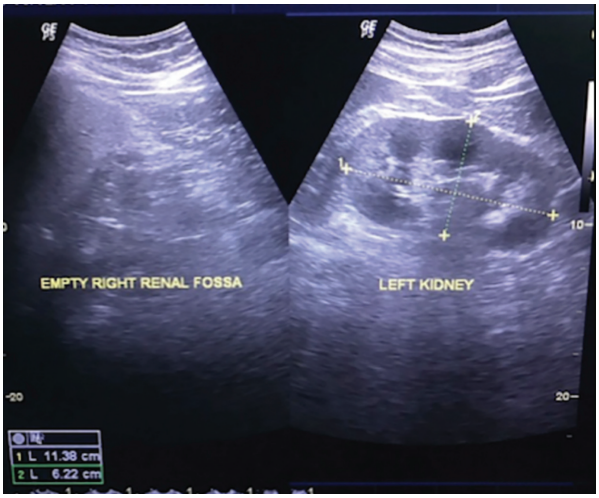

Figure 1. Kidney ultrasound showing an empty right renal fossa with compensatory hypertrophy of the left kidney. No ectopic kidney was found.

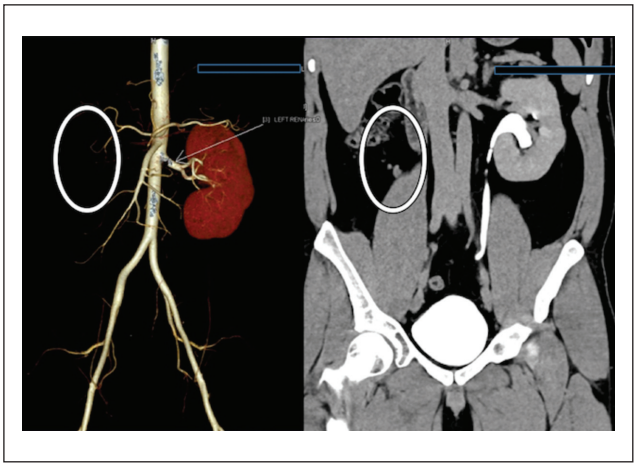

Figure 2. The MRI revealed a normal course of the left kidney and ureters, with no evidence of a right kidney or ectopic kidney. The left kidney was observed to be dilated, measuring 14.2 cm, and no other congenital abnormalities in the abdomen were noted during the scan.

conditions, such as renal stones, hypertension, or chronic kidney disease later in life due to increase of workload on a single kidney.[4]

In this case report, our objective is to emphasize the rarity of incidental renal agenesis in adulthood. The incidence of this condition is estimated to be very low, at approximately 0.1% in adults of black ethicity.[4,10] We also discuss the management and implications of unilateral renal agenesis for the long-term health and well-being of the affected individual. Increased awareness of this condition is crucial for early detection, appropriate management, and counseling of patients diagnosed with renal agenesis.

Therefore, this case report serves as a reminder to healthcare professionals to consider renal agenesis as a possible underlying condition when encountering patients with unrelated symptoms or during routine diagnostic evaluations. Most cases are identified incidentally, meaning they are discovered unexpectedly during investigations for unrelated issues or during routine medical evaluations. Additionally, some cases may present with vague symptoms that may not immediately point to renal agenesis, highlighting the importance of maintaining a high level of clinical suspicion.

Case report

A 23-year-old male patient presented to the Family Medicine clinic with a history of intermittent right-sided abdominal pain. The pain had been occurring over the past few months and was characterized as dull and crampy. The patient reported that the pain would frequently exacerbate after physical exertion or prolonged periods of standing. Additionally, the patient experienced occasional episodes of hematuria (blood in the urine). Notably, there was no significant history of trauma or other urinary tract symptoms. The patient had an unremarkable medical history with no family history of kidney disease or congenital anomalies, and he denied any consanguinity in his family. On physical examination, the patient appeared healthy and was in no apparent distress. Vital signs, including blood pressure and heart rate, were within the normal range. Abdominal examination revealed no palpable masses or tenderness. There was no flank or costovertebral angle tenderness appreciated during the examination. Examination of the genitourinary system, including the external genitalia and testes, was unremarkable.

Laboratory investigations, including a complete blood count, comprehensive metabolic panel, and urine analysis, yielded results within normal limits. Renal function tests, including serum creatinine (63.6 µmol/l) and blood urea nitrogen (5.8 mmol/l), were normal, indicating preserved kidney function. Urinalysis revealed occasional red blood cells without significant proteinuria or leukocyturia.

Based on the patient's clinical presentation and initial laboratory findings, further diagnostic investigations were warranted to evaluate the patient's renal anatomy and identify any potential underlying abnormalities, considering the possibility of a ureteric stone.

A renal ultrasound was conducted, and the results revealed an empty right renal fossa, indicating the absence of the right kidney (Figure 1). However, compensatory hypertrophy of the left kidney was observed, with a measurement of approximately 14 cm in size and dilated calyces. These findings suggest that the left kidney had enlarged to compensate for the missing right kidney. The ultrasound results prompted the need for further evaluation and assessment.

To gather more detailed information, an Magnetic Resonance Imaging (MRI) of the abdomen and pelvis was

conducted (Figure 2). The MRI findings confirmed the absence of the right kidney and ruled out the presence of an ectopic kidney, which refers to a kidney located outside of its normal position. The left kidney and ureters were visualized and hypertrophied with dilated calyces.

The patient was initially prescribed paracetamol for pain management, and this treatment proved to be effective as the abdominal pain subsided. The positive response to paracetamol indicated that the pain experienced by the patient was likely not directly related to the absence of the right kidney. As a result, the patient's overall well-being improved, and during the follow-up visit, he reported feeling fine.

Initially, based on the patient's clinical status and any associated risk factors, the patient was followed for a period of 3 months. The patient was educated to come in once every 5 years for a kidney ultrasound and to follow up on clinical status.

During the visit, the physician assessed the patient's compliance with their recommendations. The patient demonstrated good adherence to the guidance provided, which included maintaining a kidney-safe diet by avoiding foods high in potassium and processed foods. The patient reported actively limiting their salt intake and incorporating fresh fruits, vegetables, lean proteins, and whole grains into their daily meals.

Discussion

Right renal agenesis is an exceptionally rare congenital anomaly, and the incidence of right renal agenesis is approximately one case per 1000 births.[1,5] Renal agenesis, characterized by the absence of one or both kidneys during embryonic development, has limited reported cases in the country.

The presentation of right renal agenesis can vary widely among individuals. In this case, the patient presented with occasional right-sided abdominal pain and occasional hematuria.[5] These symptoms, although nonspecific, raised suspicion of an underlying renal abnormality and prompted further investigation.[6] It is essential to maintain a high index of suspicion for congenital renal anomalies, including renal agenesis, particularly in patients presenting with abdominal pain or urinary abnormalities.

Diagnosis of right renal agenesis relies on imaging studies to evaluate renal anatomy.[7] However, the lack of widespread availability of advanced imaging modalities in Tanzania can pose a challenge in diagnosing such cases. In this instance, the use of ultrasonography and MRI scans aided in confirming the diagnosis by demonstrating the absence of the right kidney.[8,9] These imaging modalities provide detailed visualization of the renal structures and play a crucial role in accurately diagnosing renal agenesis.

The identification of this case report highlights the importance of raising awareness among healthcare professionals about the existence and diagnosis of such rare congenital anomalies. Early detection and diagnosis are crucial for appropriate management and counseling of affected individuals and their families. Additionally, efforts should be made to improve access to advanced diagnostic imaging modalities, ensuring timely and accurate identification of renal anomalies.

The management of right renal agenesis focuses on close monitoring of renal function and the prevention of complications. Regular follow-up visits and renal function tests are essential to assess the compensatory hypertrophy and functioning of the remaining kidney.[10,11] Patient education plays a vital role in promoting renal health, emphasizing the importance of adequate hydration, a balanced diet, and the avoidance of nephrotoxic substances. Moreover, multidisciplinary collaboration among urologists, nephrologists, and primary care physicians is crucial for providing comprehensive care to individuals with renal agenesis.[10]

Combining the information, it is evident that the identification of rare congenital anomalies like right renal agenesis highlights the need for increased awareness among healthcare professionals. Early detection and diagnosis of such conditions are vital for appropriate management and counseling of affected individuals and their families. Efforts should be made to improve access to advanced diagnostic imaging modalities to ensure timely and accurate identification of renal anomalies. The long-term outcomes of individuals with congenital solitary functioning kidneys can be better than previously reported, and early diagnosis, promoting a healthy lifestyle, and monitoring serum uric acid levels can potentially improve prognosis. Regular follow-up visits, renal function tests, patient education, and multidisciplinary collaboration are essential for the effective management of renal agenesis.

Conclusion

Renal agenesis is a condition characterized by the absence of one or both kidneys. The clinical presentation can vary, and individuals with renal agenesis may remain asymptomatic or experience intermittent symptoms such as abdominal pain or hematuria. The diagnosis of renal agenesis is typically made through imaging studies. Management of renal agenesis involves close monitoring of renal function with follow-up visits every 6 months. It is important to note that individuals with unilateral renal agenesis can lead normal lives with preserved renal function. However, further research is needed to gain a better understanding of the long-term implications and outcomes associated with this condition, including the potential financial burden related to regular renal function testing for these patients.

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Author contributions

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Informed consent

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