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Crossed renal ectopia: A case report and review of the literature

Youssef Maachi *, Mouftah Babty, Jaafar Fouimtizi, Amine Slaoui, Tareq Karmouni, Khalid EL Khader, Abdelatif Koutani, Ahmed Ibn Attya AL Andaloussi

Mohammed V University of Rabat Faculty of Medicine and Pharmacy of Rabat, Morocco

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ABSTRACT

Rarely occurring at birth, crossed renal ectopia is an abnormality in which both kidneys occupy the same side of the body while one ureter - its length based on kidney location - traverses across midline to graft into opposite-side bladder.

McDonald and McClellan classified renal ectopia into 4 types.

Solitary crossed renal ectopia (SCRE) is an extremely uncommon abnormality of the urinary system. To date, only 35 instances have been documented in published literature. Typically, these cases are detected by chance during patient assessments for related issues such as genitourinary, cardiovascular, hematological or vertebral abnormalities.

1. Introduction

Solitary crossed renal ectopia (SCRE) is a congenital abnormality resulting from the fusion of unilateral renal agenesis and renal ectopia.[1] Typically, SCRE patients are asymptomatic and discovered incidentally during evaluations for genitourinary, cardiovascular, hematological or vertebral deficiencies.[1–4] Usually found through routine ultrasound screenings or autopsies.

2. Case presentation

A 62-year-old female patient with previous history of sigmoid adenocarcinoma treated by surgery followed by adjuvant chemotherapy, presenting right sided flank pain for about one month without other urinary nor gastro intestinal symptoms.

Abdominal x-ray show a double j stent in *the right kidney and the ureter carrying out a decussation at the level of the midline, to come to settle on the left bladder side* (Fig. 1).

The non contrast CT scanner showed a single right kidney with double pyelocliceal system and hydro-nephrosis of the lower moiety, with a 6mm left ureteral pelvic stone, the right ureter carrying out a decussation at the level of the midline, to come to settle on the left bladder side.

This was associated left renal agenesis. She was referred to our institution for additional care.

The clinical examination showed right flank tenderness with a soft abdomen without fever.

The biological assessment carried out found normal CBC and renal function with a negative CRP The urinary dip stick is negative.

A ureteroscopy with fragmentation and stone extraction and double J stenting is performed.

The post operative follow up was unremarkable allowing discharge on Day 1.

3. Discussion

Renal ectopia that involves the kidney being situated on the side opposite to where its ureter is inserted into the bladder is known as crossed renal ectopia. McDonald and McClellan have categorized this condition into four subtypes, namely: (i) crossed renal ectopia with fusion; (ii) crossed renal ectopia without fusion; (iii) simple cross-fused renal ectopia; and (iv) bilaterally crossed renal dystonia (Fig. 2).

SCRE refers to the condition where one side has renal agenesis and the ureter that drains from the only remaining kidney is displaced contralaterally.

To date, the literature has only reported 34 patients with SCRE.[1–6] Male individuals were prevalent with a ratio of 2:1 and left to right ectopia occurred twice as frequently compared to right to left. Our patient had single right kidney accompanied by left to right renal ectopia.

Our uncommon patient presented with a crossed renal ectopia on

* Corresponding author. Mohammed V University of Rabat Faculty of Medicine and Pharmacy of Rabat, Morocco.
E-mail address: ucef777@gmail.com (Y. Maachi).

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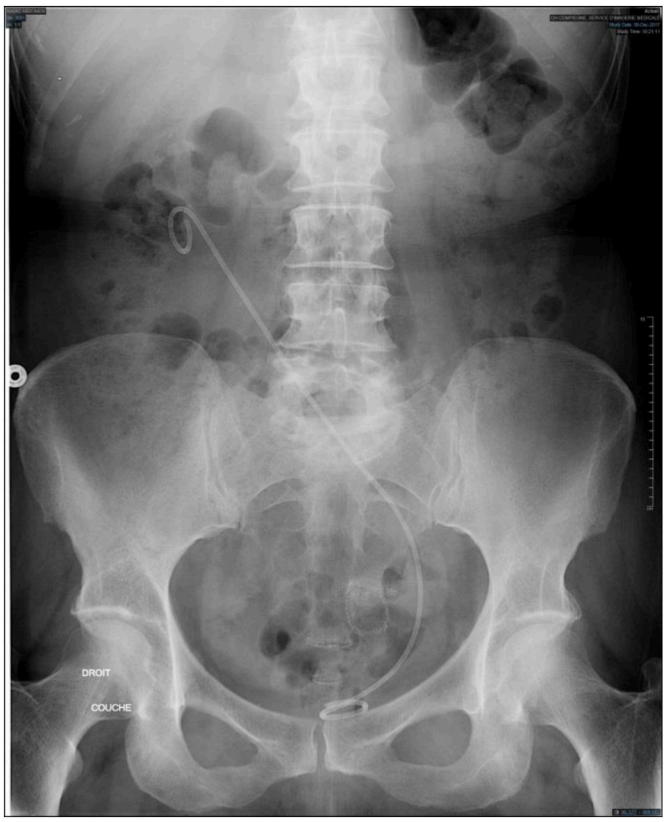

Fig. 1. Abdominal x-ray show a double j stent in *the right kidney and the ureter carrying out a decussation at the level of the midline, to come to settle on the left bladder side.*

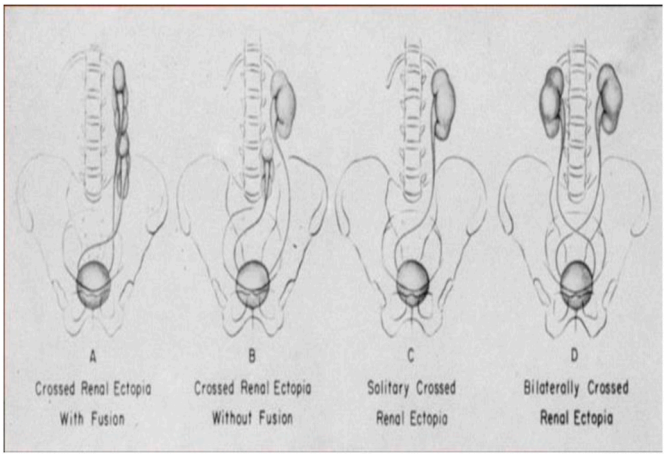

Fig. 2. Renal ectopia Classification (*McDonald and McClellan)*.

their single kidney, accompanied by pyelocaliceal and ureteral duplicity in the case of SCRE.

The precise cause of crossed ectopia is not identified embryologically. There are many theories about it, but none has been proven so far.

Multiple theories, numbering eight in total,[7] have been proposed to explain the underlying causes of aberrant development. Among these hypotheses are genetic factors and teratogenic influences, as well as abnormal rotation at the caudal end during embryonic growth.

From the 4th to the 8th week of intrauterine life, there is significant development and formation of both metanephric blastema and ureteric bud.

Several embryological theories have been suggested to explain renal ectopia, including: (i) displacement of the metanephros and ureter due to pressure from umbilical arteries; (ii) wandering of the ureter causing induction of contra lateral metanephros; (iii) attraction by strong forces toward the opposite metanephros; and (iv) deviation in median axis of renal vasculature.[8,9]

The incidental diagnosis of SCRE is a commonly observed phenomenon. A majority of documented cases in literature have been linked to orthopedic deformities, genital abnormalities, hematological disorders and anorectal malformation.[4–6,10,11]

Cryptorchidism or absence of the vas deferens is the prevailing genital abnormality among males, while vaginal atresia or a unilateral uterine anomaly prevails in females.

Additionally, urological complications such as urinary infections, renal calculi and obstruction of the ureteropelvic junction are commonly associated with ectopic kidneys. This is due to their abnormal shape, malrotation and irregular vasculature.[1,5]

Individuals with crossed ectopic anomalies are typically asymptomatic and may be discovered incidentally through autopsy, perinatal ultrasound screening or bone scanning. However, our case diagnosed experiencing renal colic symptoms.

Ultrasonography and radionuclide scintigraphy using 99mTc-dimercaptosuccinic acid (Volkan et al., 2003) can diagnose SCRE in asymptomatic cases, while excretory urography and multi-detector three-dimensional (3D) computed tomography (CT) urography are great for identifying renal ectopia. However, our patient was diagnosed with left-to-right ectopia through ABDOMINAL CT-SCAN without contrast and diagnostic cystoscopy.

The majority of people with SCRE do not need treatment, but our patient had to be treated due to the size and location of the stone causing renal colic.

SCRE patients have a favorable prognosis, as malignancy is rare. In fact, the incidence of renal cell carcinoma in a solitary crossed ectopic kidney during the CT era is estimated to be 1 in 22 million..[12]

4. Conclusion

The SCRE disorder is exceedingly uncommon, with only 35 cases having been reported in the literature prior to our patient. Although typically an incidental diagnosis, we present a unique manifestation of SCRE featuring right kidney pyelo-calicielle and ureteral bifidity.

The gold standard diagnostic investigations for SCRE are CT urography or magnetic resonance urogram. Typically, the treatment required for individuals with SCRE relates to associated abnormalities rather than renal issues. In our patient's case, initial treatment involved addressing a ureteral stone.

CRediT authorship contribution statement

Youssef Maachi: Conceptualization, Investigation, Writing – original draft, Writing – review & editing. **Mouftah Babty:** Resources. **Jaafar Fouimtizi:** Resources. **Amine Slaoui:** Data curation. **Tareq Karmouni:** Validation. **Khalid EL Khader:** Validation. **Abdelatif Koutani:** Supervision. **Ahmed Ibn Attya AL Andaloussi:** Validation.

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