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Case Report
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# Partial Duplication of Y-Shaped Ureter: a Case Report

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**ABSTRACT**

**Introduction:** ureteral abnormalities, particularly duplications, present intriguing challenges in clinical practice due to their diverse clinical presentations and potential complications. This case report highlights an anatomical alteration involving incomplete ureteral duplication in a 46-year-old female patient who presented symptoms resembling renal colic. Through computed tomography, incomplete duplication was diagnosed, revealing fusion of the ureters above the bladder dome, referred to as a Y-shaped configuration. Embryologically, such anomalies arise from the development of the ureteric bud, resulting in partial bifurcation before reaching the metanephric blastema. Clinical consequences may include uretero-ureteral reflux and stenosis of the ureteropelvic junction (UPJ) at the lower pole.

**Keywords:** Anatomy; Ureters; Y-shaped; Anatomical variation.

## Introduction

The ureters are structures of the urinary system that measure from 25 to 30cm in length with a narrow lumen of approximately 1.5 to 6 mm in diameter[1]. They are bilateral retroperitoneal ducts that transport urine from the renal pelvis to the urinary bladder[2]. The ureters curve medially, pass obliquely through the posterior wall of the bladder, and insert into its base. There is a physiological valve at the ostium of each ureter that efficiently prevents urinary reflux, thus avoiding infections[3].

Congenital anomalies of the urinary tract and kidney represent approximately 20% to 30% of all prenatal anomalies. Among them is ureteral duplication, which exhibits a higher incidence in females[4,5]. Ureteral duplication, a congenital malformation, can manifest as either incomplete/partial or complete, and depending on its characteristics, it can lead to asymptomatic conditions or complications such as urinary tract infections and vesicoureteral reflux[2,6].

In complete duplication, there are two collecting systems for a single kidney, and both insert into the bladder, which can result in vesicoureteral reflux and infection. In partial duplication, the ureters merge before reaching the urinary bladder, causing only one branch to be inserted into the bladder. It is called "Y-shaped" when the junction of the ureters occurs above the bladder dome, and "V-shaped" when it occurs at the level of the intramural segment, reducing the occurrence of urine reflux[6,7,8].

Thus, this study aims to report a case of incomplete duplication of the left ureter, addressing its potential causes and associated clinical implications.

## Case Report

A 46-year-old female patient, without comorbidities, sought specialized urology care due to intense pain resembling abdominal colic. According to the reported characteristics, the pain was acute, focused on the lumbar region, intermittent, prolonged, and intense. Additionally, the patient also reported dysuria, polyuria, and a mild degree of hematuria. Based on these findings, diagnostic hypotheses of urinary tract infection (UTI) or nephrolithiasis were considered. Furthermore, no other alterations were noted in the physical examination; therefore, laboratory tests were requested to better understand the condition. After the laboratory analysis, the diagnostic hypothesis of UTI was discarded, as the analyzed parameters were within normal limits. Subsequently, an abdominal and pelvic computed tomography (CT) scan with contrast was requested, which ruled out the suspicion of nephrolithiasis. However, the mentioned examination revealed a significant anatomical alteration: the patient presented incomplete duplication of the left ureter, as shown in the following images (Figures 1, 2, and 3).


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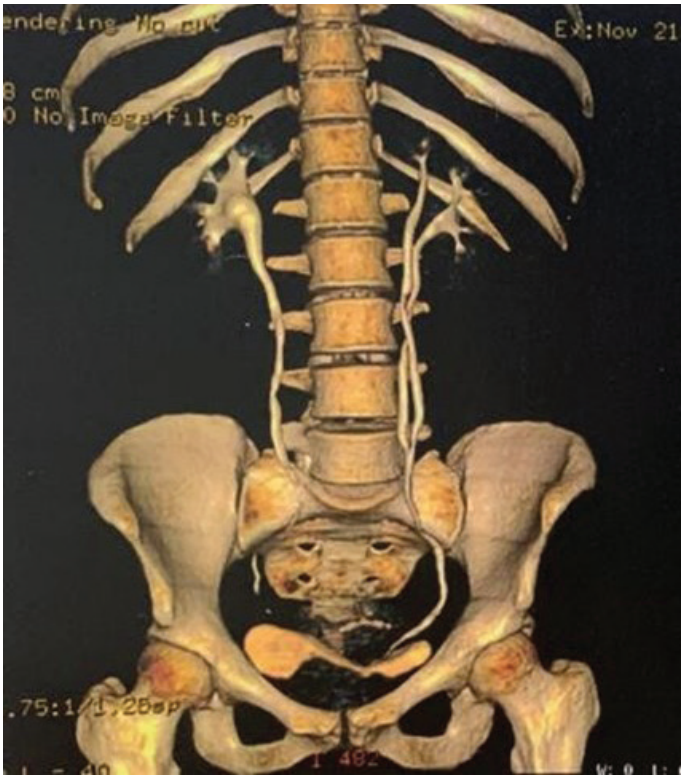

**Figure 1.** Frontal view of the incomplete left-sided duplication, showing the union of the ureters in the lower middle third of the ureteral course.
(Source: Image extracted from the medical record).

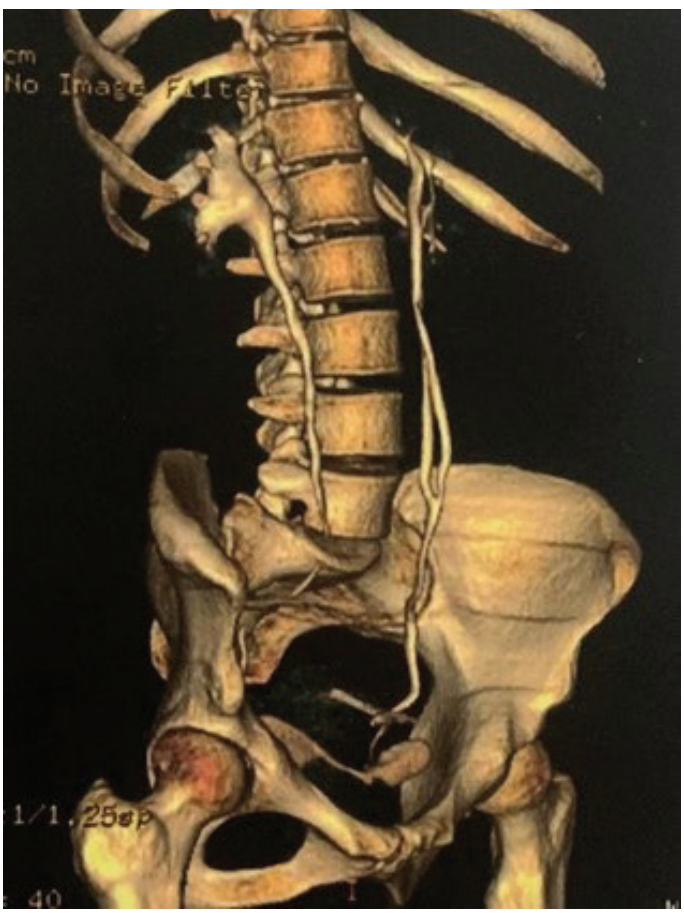

**Figure 2.** Right laterolateral view of the incomplete left-sided duplication, in which the union of the ureters is observed in the lower middle third of the ureteral path (Source: Image extracted from the medical record).

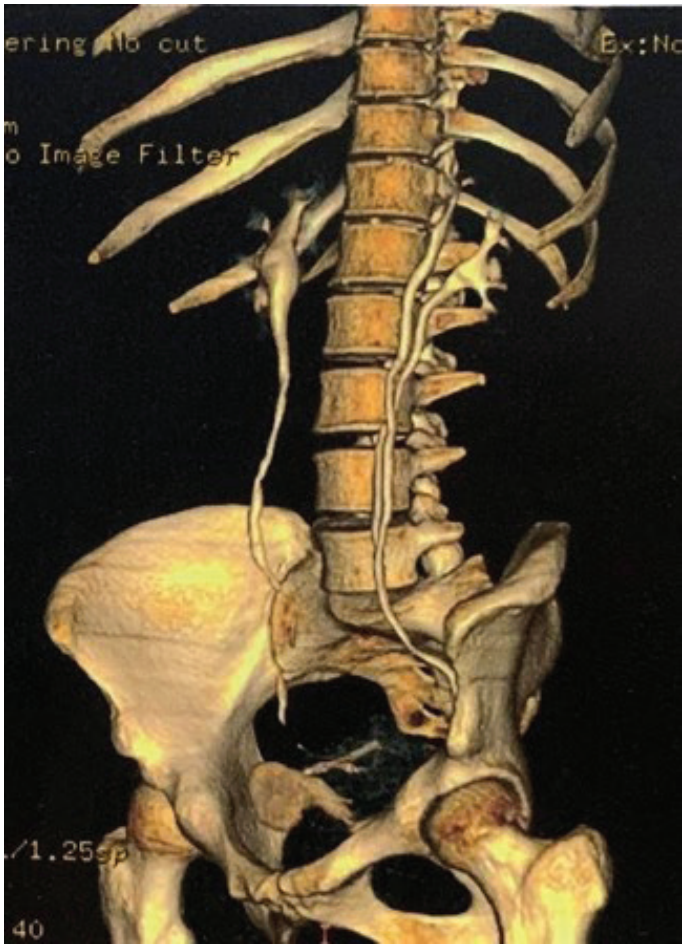

**Figure 3.** Left laterolateral view of the incomplete left-sided duplication, showing the junction of the ureters in the lower middle third of the ureteral pathway. (Source: Image extracted from the medical record).

## Discussion

From the analysis of the CT images, it was possible to confirm the patient's unilateral incomplete duplication of the urinary collecting system on the left side. According to Maranhão *et al.*[8], in cases of incomplete duplication, two ureters from the same side merge at any level between the kidney and the bladder to form a single ureter that empties into the base of the bladder, with the fusion commonly occurring in the lower middle third of the pathway. In the present case, the junction of the ureters occurred at a level above the bladder dome, characterized as a "Y-shaped" ureter.

Regarding possible causes, here is an example of a congenital alteration. Embryologically, the genitourinary system develops from the differentiation of the intermediate mesoderm, which forms the mesonephric duct (Wolffian duct). The ureteric bud emerges from the mesonephric duct around the 5th week of intrauterine life. The ureteric bud grows and penetrates the metanephric tissue. Consequently, the collecting system, including the ureter, pelvis, and major and minor calyces, originates from the ureteric bud, while the metanephric tissue forms the kidney[9]. However, in some situations, duplication of the collecting system can occur when a single ureteric

bud branches before reaching the metanephric blastema[10,11], resulting in a double ureter with a single opening into the bladder.

In terms of clinical manifestations, incomplete duplication is frequently linked to ureteroureteral reflux and stenosis of the ureteropelvic junction (UPJ) at the lower pole of the kidney[8,10]. In more severe cases, this condition may lead to recurrent UTI and the development of kidney stones in the obstructed kidney. Furthermore, it can impair the functionality of the affected organs, partially or completely.

Knowledge of anatomical variations of this kind is important for surgeons or urologists operating on ureteral pathologies. Additionally, gynecologists must be aware of such variations to avoid accidental traumatic injury to the ureter during hysterectomy procedures. Radiologists must also be aware of all types of ureteral variations to accurately interpret radiographs[11].

## Conclusion

Ureteral anomalies are conditions typically associated with embryological alterations. If not diagnosed and treated appropriately, they can lead to serious consequences for the patient, such as, for example, organ failure within the urinary system. Furthermore, it is important to emphasize that CT imaging serves as an important tool in diagnosing congenital anomalies, guiding better clinical and surgical therapeutic decisions.

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## Mini Curriculum and Author's Contribution

1. Larissa Luana Lopes Lima: writing of the manuscript and orthographic revision of the manuscript.
2. Dhiego Alves de Lacerda: writing of the manuscript and orthographic revision of the manuscript.
3. Caio Felipe Alves Correia: writing of the manuscript.
4. Kaylane Lucena de Andrade: writing of the manuscript.
5. Andreza de Freitas Araújo: writing of the manuscript.
6. Jalles Dantas de Lucena: writing and final review of the manuscript.
7. Francisco Orlando Rafael Freitas: writing of the manuscript, conception and design of the study.

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