

Unilateral incomplete duplication of the left ureter: a case report

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ABSTRACT

Embryological defects in the development of the kidney cause a unilateral duplicated ureter. It may predispose an individual to the formation of ureteric stones at the junction of the duplicated ureter due to the acute angle formed at the point of union, increasing the likelihood of the “yo-yo reflux” phenomenon, urinary stasis, and recurrent urinary tract infections. The case report is a 39-year-old adult male cadaver who had a unilateral duplicated left ureter with a “V” shape at the vesicoureteral junction. The case was discovered during a routine dissection of the abdominal region at the gross anatomy laboratory of the College of Medicine and Health Sciences, University of Rwanda. Although a duplicated ureter may be asymptomatic, it is implicated in the development of ureteric calculi and ureteric infections and increases the susceptibility to potential iatrogenic injury during surgical procedures.

Keywords: Duplicated Ureter, Urinary Stasis, Yo-Yo Reflux, Anatomical Variation, Case Report

INTRODUCTION

Incidence of a duplicated ureter occurs in approximately 1 in 20 people, representing one of the most common urinary tract anomalies. Complete duplication occurs when two ureters arise from the same kidney and drain separately into the bladder. In contrast, a partial duplicate occurs when two proximal branches drain the renal pelvis but join together distally to form a common ureteric trunk before it empties into the urinary bladder [1,2]. A frequently observed issue in a dysfunctional renal collecting system is when the ureteric orifice is misplaced, resulting in the implantation of the ureter from the lower pole into the bladder with a shorter tunnel. This positioning increases vulnerability to vesicoureteral reflux.

Furthermore, the anatomical location of the ureter at the upper pole increases its susceptibility to conditions such as ureteroceles and blockage at the junction where it connects with the bladder [3]. According to prior research, there is a higher incidence of ureter duplication in females when compared to males [4]. A duplicated ureter may not exhibit any noticeable symptoms, but it could lead to recurring urinary tract infections or the development of calculi. Moreover, it increases the patient's susceptibility to potential iatrogenic harm during a surgical intervention [5]. With the help of diagnostic imaging tools, some of these anomalies have been identified and reported [6,7,8,9], but few studies have documented the gross findings [10,11,5,3,12] of this anomaly in post-mortem studies in Rwanda.

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Received: 24th October 2023; **Accepted:** 17th February 2024.

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Citation for this article: M. Umunbonwa; T. Ndayishime; V. Archibong et al. Unilateral incomplete duplication of the left ureter: a case report. Rwanda Medical Journal, Vol. 81, no. 1, p. 157-160, 2024. <https://dx.doi.org/10.4314/rmj.v81i1.18>

This is why our findings are worth reporting.

CASE PRESENTATION

This case was seen during a routine dissection of the abdomen of a 39-year-old adult male cadaver performed at the gross anatomy laboratory of the College of Medicine and Health Sciences, University of Rwanda. The abdomen was dissected following the steps outlined in the grant dissector handbook of Sauerland [13].

Two ureters were observed emerging from the left kidney. After cleaning and excising the left kidney, we observed that the aberrant ureter leaves the kidney at the superior pole and drains the Superior major calyx, while the main ureter drains the rest of the kidney at the hilum of the kidney (Figure 1). Both ureters joined at the pelvis shortly before entering the urinary bladder to open through a single ureteral orifice (Figures 2 and 3).

The relationships to the ureters were the left testicular vein (LTA), left genitofemoral nerve (LGFN), and the psoas major muscles (PM). The normal anatomical relationship was observed at the hilum for the main ureter (MU), where the renal vessels lie anterior to the main ureter, but the aberrant ureter (AU) exited at the superior pole of the kidney and had no renal pelvis. The bladder was dissected, and the anterior wall was cut to access the trigone. The ureteric orifices and the urethra orifice were documented (Figure 3).

DISCUSSION

The urinary system is derived from the intermediate mesoderm, specifically referred to as the nephrotome. The nephrotome gives rise to various formations, including the gonads, a segment of the adrenal glands, the reproductive system, and renal structures (pronephric, mesonephric, and metanephric ducts), in addition to ureters [14]. The mesonephric ducts or the Wolffian ducts, develop on the left and right sides of the body at 4th week of gestation. These ducts then approach the lower lumbar region and form a part of the posterior wall of the definitive bladder when they fuse to the anterolateral walls of the cloaca, giving rise to the ureteric buds (metanephrogenic diverticulum) at around 5th week of gestational age [15,16]. The metanephros, which is the ultimate mature kidney in adults, develops towards the conclusion of the fifth week. Simultaneously, during this period, the ureteric bud generates structures such as collecting ducts, papillary ducts, calyces, renal pelvises, and ureters [1].

Normally, The ureteric bud only branches out when it enters the metanephric blastema, but, in this case, a report where there was an incomplete duplication of the left ureter means that the ureteric buds bifurcated before meeting the metanephric blastema [17,16,18]. In some cases, there is a complete duplication of the ureter, which occurs if two separate ureteric buds are formed from the mesonephric ducts on one side of the body [17,16,18]. In cases where there is

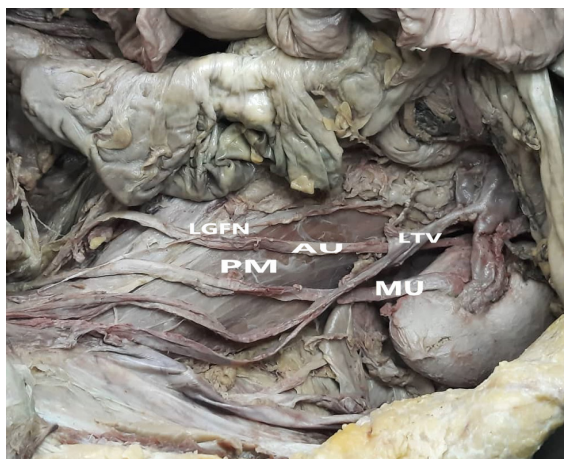


Figure 1: Main ureter (MU), left testicular vein (LTV), aberrant ureter (AU), left genitofemoral nerve (LGFN), and psoas major muscle (PM).



Figure 2: Duplicated left ureter (LU), right ureter (RU), and urinary bladder (UB).

an incomplete bifid ureter, the union can occur at the vesicoureteric junction (ureter in “V”) or close to the midway of its path (ureter in “Y”) [19]. In this case report, the union occurred at the vesicoureteric junction (ureter in “V”).

Although an incomplete ureteral duplication may be asymptomatic, [2] it may predispose an individual to the formation of ureteric stones at the junction of the duplicated ureter due to the acute angle formed at the point of union [20,5]. Some authors have documented symptomatic patients in cases of complete ureteral duplication [21,22]. Another consequence of an incomplete ureteral duplication is that it increases the likelihood of the “yo-yo reflux” phenomenon, where urine travels from one ureter to another without reaching the bladder, resulting in urinary stasis and predisposing the individual to infections [23,24]. A study by Ozdogan et al. [23] documented the “yo-yo reflux” in a 6-year-old patient who had a history of recurrent urinary tract infections. Another study by Gupta et al. [24] documented a “yo-yo reflux” case in a 32-year-old patient. Ureteral duplication has been implicated in cases of iatrogenic injury during surgical operations [20,25,12]. Ureteric lesions are estimated to occur in 0.5-1% of pelvic surgeries [26], out of which 52-82% occur during gynecological surgeries [25], and this is an indicator of why there is a predominance of case reports in females than males [27].

CONCLUSION

The case report presented the ureter in a “V” shape where the union occurred at the vesicoureteral junction. Although an incomplete unilateral ureteral duplication may be asymptomatic, it may predispose an individual to ureteric stones, urinary stasis, frequent urinary tract infections, yo-yo reflux phenomenon, and iatrogenic injuries during surgical interventions.

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