CASE REPORT

Unilateral Isolated Duplicated Ureter

M Thayabaran[1], K M T D Weerasekara[1], N Gopal[1]

[1]*Department of Human Biology, Faculty of Health-Care Sciences, Eastern University, Sri Lanka*

Abstract

Ureteric duplication is the most common anomaly of the urinary system that may be asymptomatic or associated with clinical findings. These cases of duplication of ureters are found during radiographic imaging of the abdomen and pelvic region or accidentally during the dissection of cadavers. The aim of the study was to report a congenital anomaly in the urinary system in cadaveric dissection. During routine cadaveric dissection in the Department of Human Biology of the Faculty of Health-Care Sciences, Eastern University, Sri Lanka, we noted a left-sided unilateral bifid renal pelvis with incompletely duplicated ureter in an approximately 60-65 years old male cadaver and the two segments of ureter unite 5cm before draining into the urinary bladder by a single ureteric orifice. Right-sided kidney and ureter were normal. Both the ureters opened in the urinary bladder with a single opening as usual.

Knowledge of the anatomical variations of the urinary system is important for anatomists, radiologists, urologists, and surgeons during radiological interventional procedures, laparoscopic or open surgical procedures.

Keywords: Unilateral, Duplication, Kidney, Renal pelvis, Ureter

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Corresponding author
Mythreye Thayabaran
E-mail: mythreyet@esn.ac.lk

Introduction

The ureters are bilateral narrow muscular tubular structures, approximately 25-30 cm long that extend from the renal pelvis to the urinary bladder. Each ureter begins the ureteropelvic junction of the kidney where it lies posterior to the renal vein and the artery in the hilum. Then it passes vertically downward on the psoas major muscle and crosses in front of the genitofemoral nerve. After crossing the pelvic brim at the bifurcation of the common iliac artery, it enters the urinary bladder on the posterior aspect of the trigone (1). Duplication of the ureter is one of the most common congenital anomalies of the urinary system. It may be incomplete or complete duplication and such duplication can be either unilateral or bilateral (2). The occurrence of incomplete duplication of the ureter is three times more common than the complete duplication of the ureter with a frequency of one in 500 cases. The occurrence of unilateral duplication of the ureter is 1 in 125 individuals while the occurrence of bilateral duplication of the ureter is 1 in 800 individuals (3). Duplication of ureters can be associated with a variety of clinical findings such as abnormalities of the kidney, renal vessels, and urinary bladder (4) and it may remain asymptomatic throughout life and incidentally encountered during radiographic imaging of the abdomen and pelvic region or accidentally during routine cadaveric dissection (3,5). However, it may cause renal calculi, urinary tract infections, pyelonephritis, and stenosis, and may get injured during various abdominal and pelvic surgeries (6). Although the incidence of bifid ureters and their occurrence were stated globally, we couldn't find any reported cases in in Sri Lanka.

Case Report

In the routine dissection of cadavers in the Department of Human Biology of the Faculty of Health-Care Sciences, Eastern University, Sri Lanka, we noted a unilateral incompletely duplicated ureter in an approximately 60-65 years old male cadaver.

Anterior abdominal wall was opened by performing midline incision through the linea alba and the abdominal cavity was opened then the abdominal viscera and parietal peritoneum were removed to approach the posterior wall. On the right side, the ureter was normal with no abnormalities throughout its origin, course, relation, and termination.

On the left side, a normal appearing kidney with incomplete duplication of the ureter was observed (Figure 1). Duplicated ureters coursed down over the posterior abdominal wall running parallel to each other and joined together in a single ureter. The laterally located segment started from the lower part of the renal pelvis, and the medially located segment started from the upper part of the renal pelvis. The medial segment measured 17.6 cm while the lateral segment measured 15.5 cm from the hilum to the point of junction where they fused to become a single ureter. The length of the ureter measured 10 cm from point of union of two segments from the lower pole of the left kidney. Both segments coursed downward over the posterior wall and united at a distance of 5cm before draining into the urinary bladder by a single ureteric orifice. Apart from incomplete duplication of the left ureter, there

were no associated anomalies related to the genitourinary system.

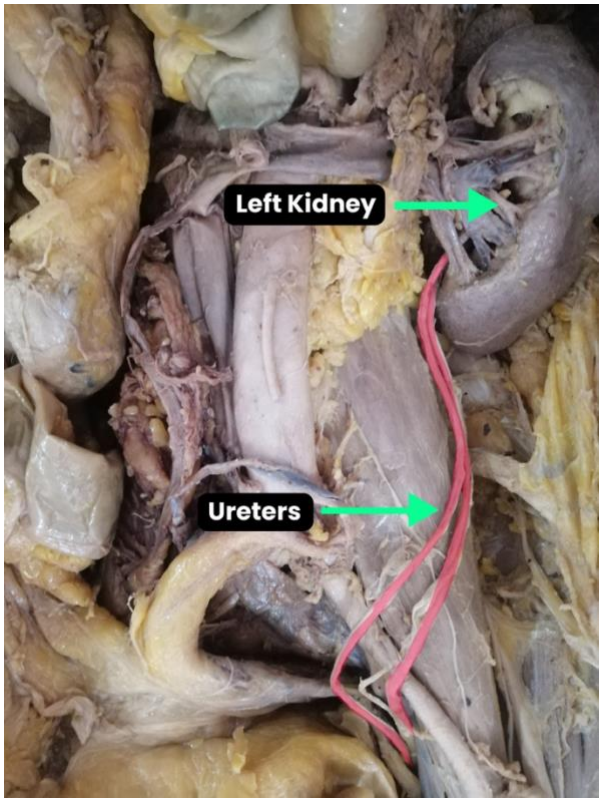

Figure 1: Left side incomplete duplication of the ureter

In this case, there is no accessory renal artery. Pelvis and kidney size were normal in the left kidney. Other abdominal and pelvic viscera structures were examined and there was no other associated abnormality in this case.

Discussion

This study was to report a congenital anomaly in the urinary system in cadaveric dissection. The urinary system during fetal life was formed by pronephros, mesonephros, and metanephros. Pronephros has a rudimentary state, without any function, and in the fourth week of fetal life, they disappear. The mesonephros appears in humans at 3 to 4 weeks and is drained by a pair of mesonephric (Wolffian) ducts, which grow caudally to open into the posterior wall of the primitive urogenital sinus. During the 5th week of intrauterine life, a pair of ureteric buds sprout from the distal mesonephric ducts and induce the overlying sacral intermediate mesoderm to develop into the metanephros or permanent kidneys. The permanent kidneys are composed of two functional components, the excretory portion, and the collecting portion. The ureteric bud bifurcates when it comes in contact with the metanephric blastema, induced by glial cell line derived neurotrophic factor (GDNF) giving rise to the ureter, renal pelvis, major and minor calyces, and collecting tubules. Occasionally, the lack of GDNF or premature bifurcation of the ureteric bud gives rise to a Y-shaped duplication ureter (4). Early splitting of the ureteric bud gives rise to duplication of the ureter. Duplication of the ureter may be complete or incomplete and incomplete duplication is also known as the bifid ureter. In the bifid ureter, the ureters may join at a variable distance away from the kidney of their course and may open through a common ureteric orifice into the bladder (5, 6). Case reports are indicating that bifid ureter was associated with other diseases such as Goltz syndrome, high cephalad kidney, duplication of the pelvis, ectopic ureter, contralateral quadrifid ureter and L3 hemivertebra (7,8,9). However, in this case, unilateral incomplete bifurcation of the left kidney ureter was not associated with any renal or systemic anomalies. According to the case of Das et al. an incomplete duplication of the ureter without concomitant congenital anomalies was found in the cadaver of an adult female, as in our case (9). Duplication of ureter can lead individuals

to urinary tract infections and hydronephrosis due to its abnormal anatomy and potential functional disturbances in urine flow and drainage (1). Previous studies have shown that there are many diseases related to this anomaly. Nephrolithiasis is one such most common anomaly in individuals with an incomplete duplication of the ureter (8). Sarver & Memo reported ureteral carcinoma in a duplicated ureter (10). However, individuals with bifid ureters may remain asymptomatic throughout their lives. Knowledge of the various anatomical changes of the ureters and kidneys helps in recognizing different diseases and is of great importance in urologic surgical procedures.

Conclusion

Incomplete duplication of the ureter is a developmental abnormality in the genitourinary system. Awareness of the chances of congenital variations of the ureter will reduce the incidence of any intraoperative or postoperative complications while doing any radiological, laparoscopic, and open surgical procedures. Individuals with bifid ureters may remain asymptomatic throughout their lives, However, the persons might have suffered from a renal complication in the past, which may not have been recorded.

Competing interests

The authors have no competing interests to declare.

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