

Case Report

Unilateral duplex collecting system with incomplete duplication of ureter - a case report

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ABSTRACT

Duplex collecting system is presence of two pelvicalyceal system which is associated with single or double ureter. Bifid ureter is one of the variations related to congenital anomalies of urinary system which are many times an incidental finding. A bifid ureter may be found in association with other congenital anomalies and defects. In the present case report, we present a case of bifid ureter with duplex collecting system and with no other associated congenital anomaly. The embryological and clinical correlations of duplex collecting system are discussed in present paper.

Keywords: Bifid ureter, Duplex kidney, Pelvicalyceal system

INTRODUCTION

Ureter is a long tubular structure extending from renal pelvis to urinary bladder, measuring 25-30 cm in length and 3-4mm in diameter. It has thick muscular wall and a narrow lumen. Superiorly it is continuous with funnel shaped structure called renal pelvis through which it communicates with secreting part of kidney. Inferiorly it opens into the lateral angle of the base of the urinary bladder.¹

Duplications of the ureter represent one of the most common anomalies of the urinary tract. Duplex collecting system is explained as the kidney with two pelvicalyceal systems, which may have either single or bifid ureter (partial duplication) or double ureter draining separately into the urinary bladder (complete duplication). A duplicated ureter is commonly found in association with other congenital anomalies and defects.

Also double ureter and duplex system have potential for future complications, such as the collecting system obstruction, urolithiasis, ureterocele, and vesicoureteral

reflux.²⁻⁵ Hence, their early detection may be helpful in better management and increased survival rates.

CASE REPORT

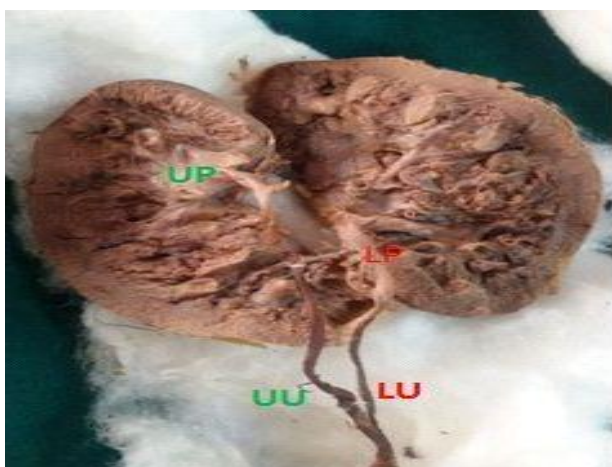
A rare case of unilateral bifid ureter with two pelvicalyceal systems was detected on the right side in a female cadaver aged approximately 60 years during routine cadaveric dissection in the Department of Anatomy, UCMS, Delhi.

Coronal section of the kidney was taken and pelvicalyceal system was studied. On the right side, at the commencement two separate limbs of the right-side ureter could be distinguished. The two limbs coursed down over posterior wall of abdomen and later united with each other below the level of pelvic brim. The upper limb measured 19.5 cm while lower limb measured 17.5 cm from the hilum to the point of junction, and then they unite 3cm above the urinary bladder to form a single ureter which opened in to bladder wall by a single orifice. Ureters crossed each other two times in their entire course (Figure 1).



RUU- right upper ureter, RLU- right lower ureter, LU-left ureter, UB-urinary bladder, Arrow showing junction of RUU and LUU

Figure 1: Showing right kidney (RK) with incomplete bifid ureter and left kidney (LK) with normal single ureter.



Upper pelvis (UP) continuing as upper ureter (UU); Lower pelvis (LP) continuing as lower ureter (LU)

Figure 2: Coronal section of right kidney showing two pelvicalyceal system.

Single normal ureter measuring 23.5 cm from hilum to bladder wall was noted on left side. Coronal section of kidney revealed duplication of pelvicalyceal system on right side. There were two separate renal pelvises on right side, one above the other, each giving rise to a ureter. The relationship of both the pelvises was maintained with the renal vein and artery as the sequence vein, artery and pelvis in before backward direction. The duplicated ureters were running parallel to each other, with the laterally placed ureter beginning from the superiorly placed renal pelvis and the medially placed ureter beginning from the renal pelvis located below the superior

one. After crossing the pelvic brim they joined each other just above the bladder and continued as a single ureter before opening into the urinary bladder. The diameter of both the ureters was almost equal (Figure 2). The opening of the ureter into the bladder did not show any abnormality. Examination of the other thoracic, abdominal, and pelvic viscera and other structures revealed no other gross morphological anomaly.

DISCUSSION

Genitourinary system develops from intermediate mesoderm which forms mesonephric tubules which then join to form mesonephric (Wolffian) duct. The ureteric bud arises from the mesonephric duct around the 5th week of intra uterine life. The caudal part of mesonephric duct and ureteric bud get incorporated into the posterior wall of urogenital sinus at around 7th week. The medial rotation results in placing the opening of the ureteric bud above and lateral to that of the Wolffian duct. The ureteric bud grows and penetrates the metanephric tissue and subsequently forms renal pelvis which on division gives rise to major and minor calyces. Thus, the collecting system including ureter, pelvis, major and minor calyces originate from the ureteric bud and metanephric tissue forms kidney that is glomerulus, capsule and nephron tubules. However, sometimes the ureteric bud and metanephric tissue may divide before penetrating and then may give rise to a bifid ureter with having a single opening into the bladder and duplex kidney which may join with each other.

Review of literature reveals variable incidence of duplex collecting system, associated with complete or incomplete duplication of ureter. Dahnert conducted a study on urograms and found that the prevalence of partial duplication of the ureter was three times commoner than complete duplication of the ureters.⁶ Prakash et al. were also of similar opinion according to their study conducted on intravenous pyelograms of 50 cadavers. Partial duplication is to complete duplication was in the ratio of 3:1 respectively in their study.⁷

Siomou et al conducted a study on 774 children of less than 6 years age of either sex. They found that a duplicated collecting system was two times more common in girls as compared to boys. Out of 63 children having duplicated systems, they observed that duplicated system was present unilaterally in 81% and bilaterally in 19% of children.⁸ Whitaker and Danks also found unilateral duplication more common than bilateral duplication (6:1).⁹ Rege VM et al. believed bifid ureter was more common in females and was found to be present often on the right side.¹⁰ Similar finding was obtained in the present study.

During entire lifetime, bifid ureter may remain asymptomatic, so it is of academic interest only. However, some complications like recurrent urinary tract infection, calculi, uretero ureteric reflux, ureteric stenosis,

urinary lithiasis, pyelonephritis and non-functioning of kidney have been reported to be existing with bifid ureter.¹¹⁻¹³ The most common complication of a duplicated collecting system is reflux. The exact nature depends on the type of system involved as for example reflux associated with partially duplicated systems is ureteroureteric reflux and complete duplicated systems is usually associated with vesicoureteric reflux.

Knowledge of anatomical variations of this kind of duplicated collecting system is of immense importance to surgeons or urologists operating on any kind of pathology of ureter. Also, gynecologists must be aware of such kind of variation so as to avoid accidental traumatic injury of ureter while performing hysterectomy. Radiologists must also be aware of all kinds of variations of ureter to correctly interpret the radiographs.

CONCLUSION

Review of literature suggests that duplication of ureter is seen very infrequently. It may be an accidental radiological finding in a patient or may be detected during autopsy. If at all the symptoms of duplicated ureter present then it may have variable clinical manifestations. Therefore, it is suggested that clinicians should be aware of existence of partial or complete duplication of ureter when a patient is presenting with complains of recurrent urinary tract infections or urinary reflux disorders or hydronephrosis or urolithiasis, to treat the patient appropriately for a long term healthy survival of patient.

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