Unilateral Duplex Collecting System with Incomplete Duplication of Ureter: A Case Report

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Abstract

Duplex collecting system is presence of two pelvicalacyleal system which is associated with single or double ureter. Duplication of the ureter is the most common anomaly of the urinary tract and it may be associated with other congenital anomaly or it may get injured during pelvic surgeries. In the present case report, we present a case of duplex collecting system with incomplete duplication of ureter on the right side in middle aged male cadaver. Embryological and clinical implications of duplex collecting system are discussed in the present study. This case report adds on to the literature and will be helpful and interesting for the surgeons.

Keywords: Duplication, Duplex collecting system, Bifid ureter, Pelvicalyceal system
Introduction

Ureter is a long muscular tube extending from renal pelvis to urinary bladder. Each ureter measures 25-30 cm in length and 3 mm in diameter. It is thick walled, narrow and continuous superiorly with funnel shaped renal pelvis. It runs along posterior abdominal wall and enters into pelvic cavity to open into the lateral angle of base of the urinary bladder [1].

Genitourinary system develops from intermediate mesoderm which forms mesonephric tubules which then join to form mesonephric duct. The ureteric bud arises from the mesonephric duct around 5th week of intrauterine life. The collecting part of the kidney develops from uretric bud and excretory part develops from the metanephric blastema. Successive division of the uretric bud give rise to the ureter, renal pelvis, major and minor calyces and collecting tubules. However, sometimes the uretric bud may divide before penetrating the metanephric tissue thus gives rise to bifid ureter [2].

Duplex collecting system is explained as the kidney with two pelvicalacyeal systems with single or bifid ureter (Incomplete duplication) or double ureter (complete duplication). Duplication of ureter may remain asymptomatic or it may cause repeated urinary tract infection, calculi or may get injured during pelvic surgeries. Duplicated ureter is commonly associated with other congenital anomalies of urinary tract such as anomalies of kidney, urinary bladder, renal vessels [3] or with other systemic anomalies such as hearing loss, anomalies of external ear [4].

Case report

A rare case of unilateral duplex collecting system with bifid ureter on right side in a male cadaver during routine cadaveric dissection in the Department of Anatomy was detected. The pelvicalacyeal system was studied by taking coronal section of kidney. There were two separate renal pelves on the right side one above the other, each giving rise to separate ureters. Two separate limbs of ureter on the right side are clearly distinguished. These two limbs of ureter running parallel to each other along posterior abdominal wall with medially placed ureter beginning from superior aspect of renal pelvis and laterally placed ureter from lower side of renal pelvis and later united with each other in the pelvic cavity. The measured length of upper and lower limb of right ureter from the hilum of kidney to the point of junction was 19 cm and 17 cm respectively. These two limbs unite 4.5 cm above urinary bladder to form single ureter which opened into the base of urinary bladder by single orifice. The diameter of both ureters was almost equal.

Single normal ureter measuring 23.5 cm from hilum to urinary bladder wall was noted on left side. The relations at the hilum of both kidneys were maintained with renal vein, renal artery
and renal pelvis from before backward direction but along with renal pelvis, renal vessels also bifurcated before entering into the hilum of kidney.

**Discussion**

Review of literature reported variable incidence of duplex collecting system with complete or incomplete duplication of ureter. Fraser FC et al reported that the occurrence of incomplete duplication is three times more common than complete duplication with a frequency of 1 in 500 individuals [5]. The study on urograms by Dahnert also found that the prevalence of partial duplication of ureter was three times common than complete duplication of ureter [6]. Similar opinion also given by Prakash et al in their study conducted on intravenous pyelograms of 50 cadavers. The ratio of partial duplication to complete duplication was 3:1 [7]. Whitaker and Danks found unilateral duplication was more common than bilateral duplication (6:1) [8]. Duplication is two or five times more common in females than in males [9]. Literature suggests that the occurrence of an incompletely duplicated ureter is more common in females and that too on the right side [10, 11].

During entire lifetime bifid ureter may remain asymptomatic or some complication 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 [12,13]. Lee et al reported a case of bilateral ureteric duplication in a 43 year old female who had recurrent urinary tract infections [14]. Nephrolithiasis is common in person with an incompletely duplicated duplicated ureter [15]. Kao et al had reported ureteral cancer in a duplicated ureter [16]. While Privette et al reported no increase in renal diseases in subjects with renal duplication [17].

Knowledge of anatomical variation of duplex pelvicalyeal system with duplicated ureter is of immense importance to surgeons operating on any kind of ureter. Also gynaecologists must be aware of such kind of variation so as to avoid accidental traumatic injury of ureter while performing operations. Alexander et al has reported a case of duplex ureter which got damaged during laparoscopic hysterectomy [18].
References

Figure 1: Anterior view of right kidney with bifid ureter and normal left kidney

Figure 2: Coronal sections of right and left kidney

Figure 3: Coronal section of right kidney showing two ureters with two pelcicalcyeal systems