

## Incomplete duplicated (bifid) left ureter – A case report

Ravindra Swamy S, Naveen Kumar, Jyothsna Patil, Ashwini Aithal P, Anitha Guru, Abhinitha P

Department of Anatomy, Melaka Manipal Medical College (Manipal campus), Manipal University, Manipal - 576104, Karnataka, India.

### \*Corresponding Author:

Name: Naveen Kumar

Email: [naveentonse@gmail.com](mailto:naveentonse@gmail.com)

**Abstract:** The ureter is subjected to natural variation such as duplication. The partial duplication forming bifidity is one of its rare congenital anomalies. We report here a case of unilateral left bifid ureter encountered during cadaveric dissection. The bifidity in the present case was at its greater extent and in the form of Y shaped with superior and inferior segments. Proximally, both the segments arose from the renal hilum. At pelvic brim, superior segment crossed the inferior segment superficially from medial to lateral. Both the segments united in the lesser pelvis at the level of bifurcation of internal iliac artery, about 1.5 inches above its opening into urinary bladder. Bifid ureter may be associated with the renal stones and other pathological conditions like gonadal dysgenesis. Knowledge of bifid ureter with the extent of bifidity is important during diagnostic approaches of associated disorders. Since the ureter is closely related to neighbouring vessels and organs, its detailed anatomy is essential in surgical and radiological interventional approaches.

**Keywords:** Duplication, bifid, variation, ureter

### INTRODUCTION

Ureters are pair of muscular tubes; convey urine from kidneys to the urinary bladder. Each ureter commences within the renal sinus by the union of major calyces. Funnel shaped dilatation at its commencement is known as renal pelvis [1]. Embryologically, ureters are developed as an elongation of the diverticulum of the mesonephric duct, known as ureteric bud. Repeated branching of its cranial end forms the major and minor calyces [2].

Duplication of the ureter is a congenital anomaly which accounts for 0.8 - 0.9% of incidence [3]. Complete duplication will have two separate orifices into the bladder. Incomplete duplication of the ureter, also termed as bifid ureter, is an uncommon congenital anomaly. In the bifidity of ureter, the proximal segments come from two different collecting systems but join to form one ureter before reaching the bladder. Developmentally, bifid ureter results from the divergence of ureteric bud as a result of early division before reaching the metanephric blastema [4]. Upper portion of the ureter maybe sometime double. But the duplication in its greater extent is rare [1].

Previous reported cases have mentioned the fact of higher incidence of right sided duplication than in the left side [5] and also higher in females than in males [6] without the mention of etiological basis.

Though the presence of duplicated or bifid ureter is an asymptomatic phenomenon, its presence cannot be ignored.

### CASE REPORT

During cadaveric dissection for structures of posterior abdominal wall, we noticed incomplete duplication of the ureter at the renal hilum of left kidney. The superior segment of it arose from the hilum as normal ureter, lying posterior to renal vessels. The inferior segment was originating at the lower end of the renal hilum, below the other hilar structures. At the commencement of both the segments, renal pelvis was not appreciable. Both the segments descended downward under cover of peritoneum. The superior segment was about 9 inches long and inferior segment was about 8.5 inches. In its abdominal course, the superior segment was lying medial to inferior segment. Upon its entrance to the pelvis, the superior segment crossed the inferior segment superficially from medial to lateral side [Fig 1a]. Opposite the bifurcation of left internal iliac artery both the segments united to form a single segment [Fig 1b]. The united part of the ureter was measuring about 1.5 inches long, opened into urinary bladder after crossed by the vas deferens [Fig 2]. This partial duplication that we observed in a male cadaver of formalin embalmed, aged near about 60 years and it was unilateral.

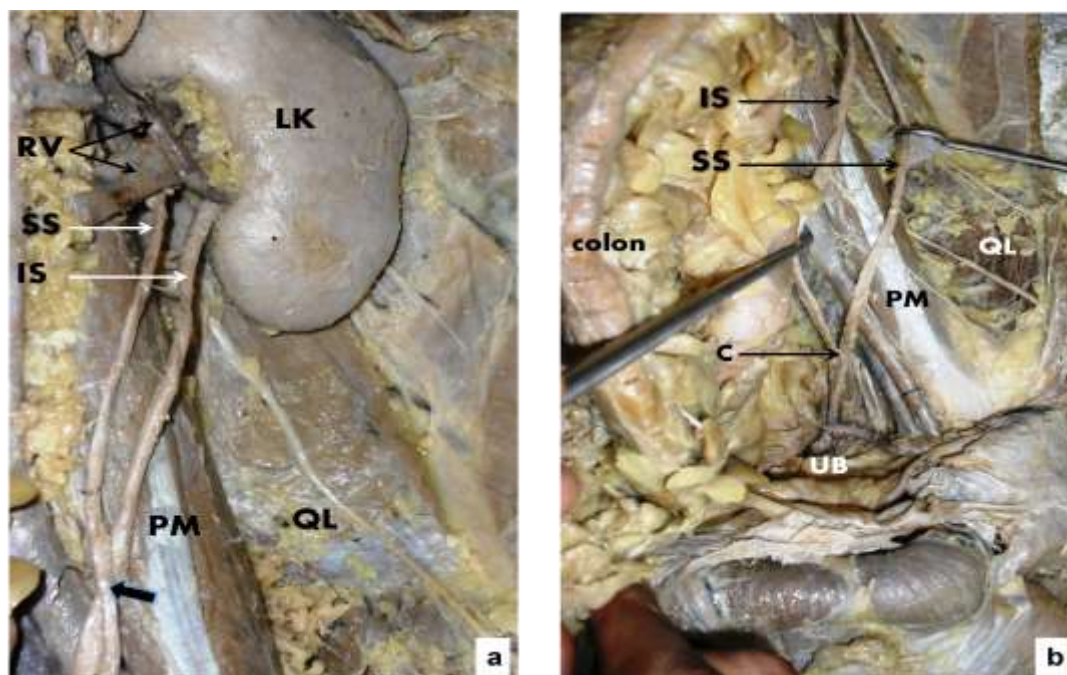


Fig-1a & b: showing the superior (SS) and inferior (IS) segments of the left bifid ureter draining the left kidney (LK), its cross over (thick arrow in fig 1a) and confluence (C in fig 1b). PM- left psoas major muscle, QL- left quadrates lumborum muscle. RV- renal vessels, UB- urinary bladder.

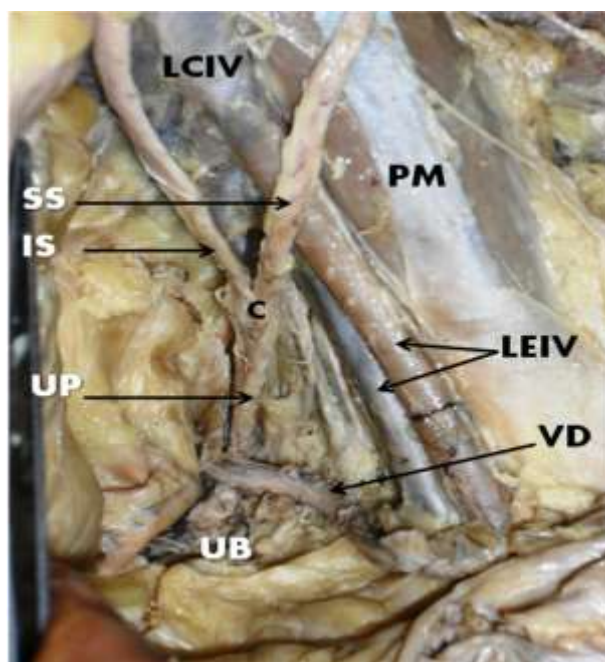


Fig-2: showing the formation of united portion (UP) of bifid ureter at confluence(C) by the union of superior (SS) and inferior (IS) segments and its termination into urinary bladder (UB) after being crossed by vas deferens (VD). LEIV- left external iliac vessels, LCIV- left common iliac vessels

## DISCUSSION

Variations in the renal collecting system have great clinical perspective for radiologists during therapeutic approaches as in cystoscopy and retrograde pyelography [7]. Ureter shows frequent variation either anatomically or pathologically. Anatomical variations are often congenital, resulting from the developmental

errors. Pathological variants can manifest urinary obstruction, renal failure and infections [8]. Presence of bifid ureter generally encountered as an asymptomatic condition during renal surgeries, anatomical dissection or during autopsy procedures. However, its presence may be associated with the diagnosis of renal stones [9], pyelonephritis and uretero- hydronephrosis diseases [10]

and in certain pathological conditions like gonadal dysgenesis [11].

In our literature survey, we observed that, the first ever case of partial duplicated ureter in the form of inverted Y shaped or caudal bifidity was reported by Juvara in 1913. The author has named the junction where the doubling commences from the single ureter as 'confluence' [12]. Ansari et al, reported a case of unilateral bifid ureter [13]. But in their case, both the limbs of bifid ureter united just before the entrance into urinary bladder at vesicoureteric junction. Presence of bilateral double ureter as a rare case was reported by Rahabu et al. [7].

Vargau et al in their study reported 3.8% of incidences of bifid ureter, which was remarkably higher than earlier reported prevalence [4]. Kusum et al reported a case of bifid left ureter, associated with renal vascular anomalies [14]. In their case bifid ureter joined each other about 1cm above the pelvic brim which was higher level when compared to our case.

#### CONCLUSION

Variant ureteric pattern can be identified on antenatal ultrasonography, enabling early medical and surgical intervention. Familiarizing the anatomical variant forms of ureter is necessary for the urologists, nephrologists and radiologists in order to prevent iatrogenic injury to the ureter during surgical interventions.

#### REFERENCES

1. Standring S; In Gray's Anatomy. 38<sup>th</sup> ed. Edinburgh, London: Churchill Livingstone; 2005:1285-1288
2. Moore KL, Persaud TVN; The Developing Human. Clinically Oriented Embryology. 8th Ed., New Delhi, Elsevier. 2008; 244-245.
3. Schlusser RN, Retik AB; Ectopic ureter, ureterocele, and other anomalies of the ureter. In: Wein AJ, ed. Campbell-Walsh Urology. Vol 4. 9<sup>th</sup> ed. Philadelphia, Pa: Saunders Elsevier; 2007:3383-422.
4. Vargau M, Iliescu DM, Ionescu C, Bordei P; Morphological aspects of the bifid ureter. ARS Medica Tomitana, 2013; 4(75): 223 -228
5. Khin PP, Srigit Das, Israa MS, Azian Latiff, Norzana Ghafar, Fariyah Haji Suhaimi; Accessory renal vessels at the upper and lower pole of the kidney: A cadaveric study with clinical implications. Morphological study, Bratisl lek listy. 2010; 111(5): 308-10
6. Rege VM, Deshmukh SS, Borwankar SS, Gandhi RK; Blind Ending Bifid Ureter. Journal of Postgraduate Medicine, 1986; 32 :233-35
7. Rahabu MM, George JL, Flora MF; Bilateral double ureters and accessory renal vessels in a Tanzanian male cadaver: A rare urinary system variation. International Journal of Anatomical Variations, 2011; 4: 164-166
8. Park JM; Normal development of the urogenital system. In: Wein AJ, ed. Campbell-Walsh Urology. Vol 4. 9<sup>th</sup> ed. Philadelphia, Pa: Saunders Elsevier; 2007:3121-48.
9. Burych MP; Renal excretory sector. Surg.Radiol.Anat, 2002; 24:201-204
10. Chalouhy E, Harram R, Ezzo G; Various aspects of Uretero-Ureteral reflux in incomplete ureteral duplication, Journal of Medicine Libnan, 1992; 40: 16-21
11. Haider M Al Attia; Cephalad renal ectopia, duplication of pelvicalyceal system and patent ductus arteriosus in an adult female. Scand J Urol Nephrol, 1999; 33:257-259
12. Juvara ME; Appareil urinaire. Vices de conformation. Uretère droit double, l'uretère supplémentaire s'abouchant à la vulve, à droite de l'orifice urétéral. Bull. Mem. Soc.Chir, 1913; 39: 100
13. Ansari MM, Joshi DS, Rahaman MA; Unilateral bifid ureter and its clinical significance- A case report. Int.J Med res Health Sci, 2013; 2(2):312-316
14. Kusum R, Gandhi, Hemlata VV, Abu U, Siddiqui RN, Wabale A; retro-aortic left renal vein associated with a partially bifid left ureter - case report. Eur. J. Anat, 2014; 18 (1): 42-44