



Unilateral Partial Duplication of Ureter–Congenital Anomaly

Üreter Ünilateral Parsiyel Duplikasyonu - Konjenital Anomali

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ABSTRACT

Purpose: The embryogenesis of the kidney and drainage system accounts for the development and frequency of congenital abnormalities.

Material and Methods: We collected 50 pairs of adult human kidneys to study the renal angioarchitecture from department of anatomy Madras Medical College, Chennai.

Results: Out of 50 pairs in one specimen of right kidney we observed duplication of ureter but the left kidney of same pair is normal. The unilateral duplication of ureter extends from renal pelvis to pelvic brim near the pelvic brim both the duplicated ureter joined later continue as single ureter and entering the urinary bladder. The incidence of partial duplication of ureter is 1% out of 100 kidneys. We also observed inferior segmental artery arising from the aorta as inferior aberrant artery which crosses the duplicated ureter posteriorly instead of going anteriorly.

Conclusion: Our study gives primary knowledge to the clinicians about the vascular variations associated with duplication ureter before planning a surgery.

Key words: Congenital, Ureter, Duplication, Aberrant Artery

ÖZET

Amaç: Böbrek ve drenaj sisteminin embriyogenezisi konjenital anomalinin gelişimi ve sıklığından sorumludur.

Materyal ve Metod: Renal damarların yapısını incelemek için Madras Medical College, Chennai anatomi bölümünden 50 çift yetişkin insan böbreği elde ettik.

Bulgular: Elli çift üzerinden; bir sağ böbrek örneğinde üreter duplikasyonu gözlemledik fakat aynı çiftin sol böbreği normaldir. Üreterin unilaterale duplikasyonu renal pelvisten, daha sonra tek bir üreter olarak devam eden ve mesaneye katılan duplike üreterin her iki pelvik ağzının yakınındaki pelvik ağıza kadar genişler. Üreterin kısmi duplikasyonunun insidansı 100 böbrek üzerinden 1'dir. Aynı zamanda anterior yerine posterior olarak giden duplike üreteri kesen, aorttan inferior anormal arter olarak oluşan, inferior segmental arteri de gözlemledik.

Sonuç: Çalışmamız ameliyatı planlamadan önce duplike üreter ile ilişkili vasküler varyasyonlar hakkında klinisyenlere önden bilgi vermektedir.

Anahtar kelimeler: Konjenital, Üreter, Duplikasyon, Anormal Arter

INTRODUCTION

Ureter arises from the renal pelvis on the medial aspect of each kidney before descending towards the bladder on the front of the psoas major

muscle. The ureters cross the pelvic brim near the bifurcation of the common iliac arteries. The ureters run postero-inferiorly on the lateral walls of the pelvis and then curve antero-medially to enter the bladder through the vesico-ureteric junction,

running within the wall of the bladder for a few centimetres (Larsen, 1998). The anomalies pertaining to the duplications of ureter and kidneys results from early division of ureteric diverticulum. The extent of duplication depends on how complete the division of ureteric diverticulum and metanephric blastema (Moore et al., 2009 & Sadler, 2010). Ureter duplication is a congenital condition in which the ureteric bud, the embryological origin of the ureter splits resulting in two ureters draining a single kidney. It is the most common renal abnormality occurring in approximately 1% of the population (Siomou et al., 2006). There are two types of complete and incomplete double renal pelvises and ureters. The first type has two ureters entering separately in to the urinary bladder. The second type two ureter are combined to form one ureter before entering urinary bladder (Limura et al., 2006). The most frequent anomalies associated with renal duplication include ureterocele, incomplete or complete ureteral duplication and ureteral ectopia.

MATERIAL and METHODS

In the present study, a total of 50 pairs (n =100) of adult human kidneys were studied for their angioarchitecture, out of which 40 pairs were obtained from post mortem specimens in the Forensic Laboratory of Madras Medical College and 10 pairs from the dissecting room cadavers in the Institute of Anatomy, Madras Medical College. The specimens comprised equally of both sexes, the age group ranging from 20-60 years. The specimens were meticulously dissected for the gross study. We observed unilateral partial duplication of ureter on right side in one specimen. Among the two ureters, the one placed medially was coming from the upper part henceforth called upper duct and the other placed laterally called lower duct was seen to be draining the lower part of kidney. The present study having clearance with Human ethical committee, Madras Medical College, Chennai.

RESULTS

We collected 50 pairs of adult human kidneys from Department of Anatomy and Forensic laboratory of Madras Medical College to study their angioarchitecture. Out of 50 pairs we observed one specimen with unilateral partial duplication of the ureter on right side which is a congenital anomaly but the ureter on left side is normal. The duplicated ureter extended in its course from renal pelvis to the pelvic brim, near the pelvic brim which have united and later opens in to urinary bladder on the right side normally (Figure-1). In the same case we found the lower segmental artery arising as inferior aberrant artery from the aorta and crosses posterior to the ureter instead of anterior to the ureter and dividing into two branches supplying the kidney (Figure-2).



Figure 1. Unilateral partial duplication of ureter united at the level of pelvic brim and continues as single ureter, inferior segmental artery arising from the aorta as inferior aberrant artery crosses posteriorly to the ureter instead of anterior to

DISCUSSION

Renal duplication signifies the co-existence of two ureters separately draining the corresponding moieties of the kidney into the urinary bladder, which can present as an ectopic ureter or as an ureterocele. Duplication can be complete or incomplete (Konstantinos Velaoras, 2012). Incomplete ureteral duplication is

ascribed to premature branching of a single ureteric bud during antenatal development. The point at which these two ureters join is dependent on when bifurcation took place; the most common point is in the lower third of the ureter (Rickwood et al., 2008). In our study the duplicated ureter have united at the level of pelvic brim which is in agreement with the literature. Verna et al. observed the association of uretero-ureteral reflux and uretero-pelvic junction obstruction of lower pole of kidney with renal angiomyolipoma and incomplete duplication (Verna et al., 1997). Combining Nation's autopsy series and Campbell's series the projected incidence of ureteral duplication is 1 in 125 or 0.8%. Further it is noted that the frequency is more

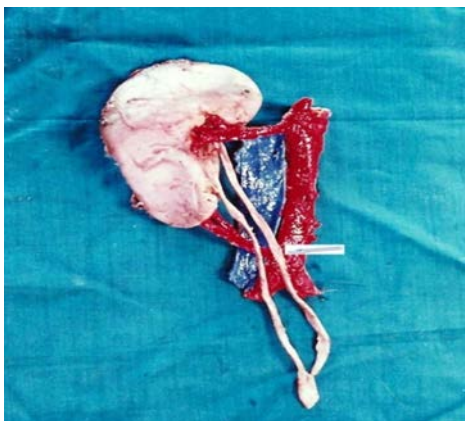


Figure 2. Unilateral partial duplication of ureter united at the level of pelvic brim and continues as single ureter, inferior segmental artery arising from the aorta as inferior aberrant artery crosses posteriorly to the ureter instead of anterior to s.

in females than males with a ratio of 1.6:1 or 62% of females (Nation EF, 1944 and Campbell, 1967). In our study the incidence of ureteral duplication is 1 in 100 or 1%. Nation observed 109 cases of duplication of ureters in 16,000 autopsies with an incidence of 0.68% (Nation EF, 1944). Literatures stated a case of kidney with double ureters was observed in a 5-month-old baby and it was successfully transplanted to a 25-year-old recipient (Genyk et al., 1999). A complete or incomplete double pyelocaliceal system is identified in 0.8% of post-mortem examinations which in turn have

close incidence with our study (Androulakakis, 1993 and Nepple et al., 2010). Among the two ureters, the one placed medially was coming from the upper part as upper duct and the other placed laterally called lower duct was seen to be draining the lower part of kidney and both joined at the level of pelvic brim. MacConaill observed bilateral double ureters which were fusing in the lower part. On both sides the hemiureters proceeded from separate pelvis, the lower pelvis draining the greater part of the kidney. The upper duct described a helical course with the lower duct and drained smaller upper part and on both sides opening into bladder as single ureter (MacConaill, 1928). Unilateral duplication of ureter occurs about six times more often than bilateral and incomplete duplication is three times more common than the complete. The individuals of affected parents are more prone for the duplication of ureters and thereby its complications. Thus the Weigert-Meyer law was obeyed by the two ureters (Whonamedit, 2010 and Pujari et al., 2011). But in our study we also observed the inferior segmental artery arising from the aorta as inferior aberrant artery crosses the unilateral duplicated ureter posteriorly instead of anterior which is not discussed in the previous literatures. This study reveals not only the congenital anomaly like unilateral duplication of ureter but also vascular variations associated with duplication of ureter will give more knowledge to the clinicians.

CONCLUSION

This study reveals not only the congenital anomaly like unilateral duplication of ureter but also vascular variations associated with duplication of ureter will give more knowledge to the clinicians before planning a surgery.

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Conflict of interest: None

The authors declare that they have no conflict of interest relevant to this article.

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