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Anatomy

MORPHOMETERIC STUDY OF CORRELATION BETWEEN HUMAN FOETAL URETER AND GESTATIONAL AGE

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ABSTRACT **Introduction:** Foetal ureter is developed by ureteric bud shows many developmental changes. Normal morphometery of the fetal ureter at all three trimesters of development was studied to get insight into the morphometery of fetal ureter. It is necessity for correlation with its development in increased gestational age and pathological changes for normal functioning of urinary system in fetal life.

Methods: Measurements of the length of the ureter from pelvi-ureteric junction to vesicoureteric junction and diameter also taken at mid of ureter in three divided gestational age groups.

Results: The length of the ureter from the pelvi-ureteric junction and at gestational age of all three groups at right side 2.12, 3.80 and 5.09 and diameter is 0.21,0.38 and 0.49 while length on left is 2.24,4.06 and 5.28 and the diameter is 0.27, 0.47 and 0.52. There was highly positive correlation in between the length of foetal ureter and gestational age. The length of left ureter is more than right.

Conclusion: Significant positive linear relationships exist between gestational week and the morphometery, the length and the diameter of ureter was found. The present study will be helpful in understanding the architecture of Foetal ureter and add to the existing knowledge regarding its development, its relation with gestational age and pathogenesis.

KEYWORDS : Ureteric Bud, Gestational Age, Pelvi-ureteric Junction

INTRODUCTION

Ureter is developed by stalk of ureteric bud which arises from the posterior medial wall of mesonephric duct at its lower part junction with cloaca in 2nd month of development. The ureteric bud will also give rise to the future major and minor calyces and the collecting tubules of the kidney (1). It grows dorsocranially and penetrates into the metanephric blastema with its loose cranial end, by 28 to 35 days of development. As the mesonephric duct and ureter are absorbed into the base of the bladder, by this the rotation occurs so that the ureter meets the bladder cephalad to the point at which the mesonephric duct meets the urethra (2). Function of ureter is to Transports urine from renal pelvis of kidney to bladder and to Prevents the backflow of urine when pressure is high during urination. At 28 d gestation with ureteric bud formation the urogenital sinus separates from the cloaca and fuses with the metanephric duct. Between 5 and 7 wk, the ureter becomes occluded, recanalization begins in the middle of the ureter, and by 8 wk, the structure is patent (3).The muscular tissue in the intravesical portion of the ureter is present only in fetuses between 22 and 24 weeks. This study provides a description of development of various components of the human ureter and provides reference data for correlating it to the Gestational age of the fetus.

MATERIAL AND METHOD

65 foetuses without congential variation, obtained from the Obstetrics and Gyanecology Department of Dr Sushila Tiwari Hospital, Government Medical College Haldwani. We had taken the foetal age from the scans from hospital records. After the abdominal dissection Ureter was identified, hilum and its course was traced downwards to the bladder by doing the fine dissection, the urinary bladder with both the kidneys and ureter, are taken out and parameters of ureter by electronic vernier caliper in millimeter as Length of both Ureter as seen in Figure 1. It is taken from the hilum of kidney to the entry point of bladder. (intravesical part) and Diameter of At the midpoint of both ureters. We have divided the foetus in three groups G1 (group1), from 10 to 20weeks, G2 (group2) from 20 to 30 weeks, and G3 (group3) from 30 to 40 weeks.

Figure- 1 Measurement of ureteric length and diameter with the help of vernier caliper

OBSERVATION AND RESULT

Statistic evaluation was also done by using statistical analysis was carried out using Statistical Package for Social Sciences (SPSSInc; Chicago, IL, version 22.0 for windows). Descriptive statistics was used to define all parameters. Morphological parameters length and diameter of ureter was correlated with divided gestational age groups by using one way ANOVA test within and between the groups. P value of <0.05 was considered significant

Table-1: Changes In Right And Left Ureter Of Foetus Parameters (length And Diameter) With Different Gestational Age(ga) Groups

PARAMETERS	GA (Wks)	N	RIGHT URETER					LEFT URETER				
			MIN	MAX	MEAN	SD	P VALUE	MIN	MAX	MEAN	SD	P VALUE
LENGTH (cm)	10-20	15	1.60	2.60	2.12	0.31	0.000	1.60	2.80	2.24	0.34	0.000
	20-30	23	2.30	5.60	3.80	1.13		2.50	5.80	4.06	1.16	
	30-40	27	3.40	6.40	5.09	0.89		2.80	6.80	5.28	1.00	
DIAMETER (cm)	10-20	15	0.10	0.40	0.21	0.06	0.000	0.10	0.50	0.27	0.11	0.000
	20-30	23	0.20	1.10	0.38	0.19		0.20	1.20	0.47	0.23	
	30-40	27	0.30	0.80	0.49	0.14		0.30	0.80	0.52	0.14	

By the above TABLE 1 the sinigificant correlation is found in between the both ureteric length and ureteric diameter of both left and right ureter in all three trimester.

Mean ureter length gives increasing trend according to gestational age of foetus. Same pattern was found in both ureter. Mean rise in length of left ureter (Lt U L) was more than length of right ureter (Rt U L) and rise in length of ureter found increasing fastly in group 2 (G2).the length and diameter of left ureter is more than the right.

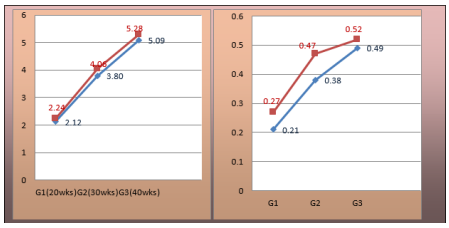

Figure-2 length &diameter Of Right And Left Ureter Versus Different Age Groups Of Foetuses

By using linear regression method, we found strictly positive correlation between gestational age of foetus with right is 76.9 % and left is 79 % ureteral length. There was increase of per unit of 0.573 in right and 0.657 in left ureter length. While linear regression coefficient of ureteric diameter of right is 78.2% and of left is 80.2% per unit increase in right is 0.532 and in left is 0.63.in our study we found that as the gestational age increases the length and diameter of ureter is increased.and it increases more during second trimester.

DISCUSSION

In study carried out by Islam (4) and Magoma et al (5) on adult cadavers in relation to the length and obliquity of the intravesical part, shows the length mean of left ureter is more than right. Significant positive linear relationships exist between gestational week, and distal and intravesical ureteral wall thickness of the mesenchymal and smooth muscle growth to the length of the intravesical ureter in fetuses seen by Oswald(6) .Ankolekar (7) also told that length and diameter of foetus also increases with age which correlates our study.In the study of Martis (8)on fetuses, the intravesical length was found to vary from 1 mm to 6 mm and Intravesical ureteral wall thickness increased from 131.77 ± 113.52 µm, at 9-12 weeks to 451.5 ± 77.1 µm at week 39.. Costa et al (9) analyzed the structural difference between normal and anencephalic fetal ureters. Ureteral luminal area, thickness, and diameter were measured The ureteral luminal area, diameter and thickness were significantly smaller in anencephalic fetuses, indicating the possible effect of lesions of the cerebrum with resultant loss of brain control on ureteric nerves supplying the structures of the ureter.

CONCLUSION

In this study the data shows that ureteric length and diameter must increase with gestational age. Data from this study can be used for a more accurate assessment of cases with abnormal lower urinary tract development. As this studies are very hard to find in country. If in scanning the length is not found to be raised in second and third trimester then any congenital anomaly may be ruled out. It is also helpful for obstetricians for saving and good quality of life postnataly. This data would significantly contribute to the existing literature on the intra uterine development of human ureter.

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