



TO DIAGNOSE ANTENATAL RENAL PELVIC DILATATION IN INDIA FOR POST NATAL OUTCOME - AN ANATOMICAL APPROACH

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| Dr. Roli Joshi | Assistant Professor, Department Of Anatomy, Saraswati Medical College, Unnao |
| Dr. Deepa Deopa* | Associate Professor, Department Of Anatomy, Government Medical College Haldwani *Corresponding Author |
| Dr. A K Singh | Professor And Head, Department Of Anatomy, Government Medical College Haldwani |
| Dr. Vinod Kumar | Professor And Head Of Department, Department Of Anatomy, Saraswati Medical College |

ABSTRACT As the renal anomalies are most common anomalies during gestation period to be found. Renal pelvis dilatation is one of it, diameter of renal pelvis in human fetus establishes normative patterns of their growth and size during the second and third trimester, in both genders and both side by classifying it in mild, moderate and severe. From obstetrics department 71 dead foetuses were collected, without any abnormalities to assess the pelvic dilatation and compare the data in both of sexes, sides and in second as well as third trimester. Student t test were used ($p < .05$) for statistical analysis. More common bilaterally in male gestational age above 20 weeks mainly severe cases are found relation with gender and gestational age is found to be nonsignificant while both right and left side in moderate and severe cases were found to be significant ($p < 0.001$). Our novel risks are useful for antenatal counseling at presentation. The low frequency of obstruction/vesicoureteral reflux and hydronephrosis in mild renal pelvic dilatation raises questions over the most appropriate investigation of these cases but further data are required before establishing definitive postnatal management pathways. We suggest the need for a large prospective multicenter study to collect individual patient parameters/results and search for additional prognostic indicators.

KEYWORDS : pelvic dilatation, hydronephrosis, vesicoureteral reflux, antenatal counseling.

INTRODUCTION

Renal pelvis dilatation (RPD) is the most common organ-specific fetal condition detected antenatally and one of the most difficult diagnostic challenges (1). As antenatal urinary tract obstruction may cause severe damage to the fetal kidney, it is the opinion of many obstetricians and pediatricians that the antenatal renal pelvic dilatation is on prenatal ultrasound examination. Hydronephrosis detected antenatally was first reported in the early 1980s (2). It occurs in approximately 1% of fetuses (range 0.6% to 4.3 %) (3). The RPD may be unilateral or bilateral, but unilateral RPD is more common. It is two times more common among male foetuses, with the male-to-female (M:F) ratio being 2.5:1. (4) Different classification systems and cut-offs have been used for the detection of RPD (5). The diagnosis is based on an increased anteroposterior diameter (APD) of renal pelvis in transverse plan. Based on renal pelvic APD it can be further classified into mild, moderate and severe (5,6). Renal pelvic dilatation is a fetal abnormality commonly detected at the 20th gestation week, [7]. Other factors such as liquor abnormalities and marked progression in the follow-up scan help in devising a management plan. The risk of postnatal pathology is well correlated to antenatal RPD in local, regional and international studies (8). Although fetal RPD > 15 mm is strongly associated with pathology such as urinary tract obstruction requiring postnatal treatment (9) while lesser degrees of fetal RPD (≤ 15 mm) may resolve spontaneously by early infancy or have no adverse long-term sequelae (10). There is a lack of consensus among clinicians as to the management of these mildly or moderately affected fetuses. Some recommend ultrasound, micturating cysto-urethrogram (MCUG), and a renogram whereas others limit invasive postnatal investigations to RPD above a certain size. The current study was planned to determine the incidence of antenatal RPD manually to evaluate antenatal resolution/progression with post-natal outcome and evaluate the need for postnatal treatment in children with prenatally detected Hydronephrosis in relation to the grade of RPD in north Indian populations. As there are very fewer studies have been done in India on this topic. This paper attempts to evaluate the renal pelvis diameters. In human fetuses, to provide a normative pattern of their growth during the second and third gestational trimester, as well as to correlate the development of the renal pelvis with fetal growth and concomitant development of the kidney.

MATERIAL AND METHOD

The study was conducted at the Department of Anatomy, in Haldwani and Saraswati medical college unnao. The 142 kidneys of 71 foetuses (male 42 and female 29) were obtained from Obstetrics and

Gynaecology Department. This work is done during the period of four years (2013 to 2017). With due regards on ethical ground foetuses were preserved in 10% formalin. Dissection was done anterior abdominal wall was opened and urinary tract was seen, the fetal kidneys were removed together with the ureter, bladder. The following fetal renal pelvis measurements were taken with the help of a magnifying lens and a digital vernier caliper anteroposterior diameter of the renal pelvis (**FIGURE- 1**) No abnormalities of the urinary tracts on macroscopic inspections were found in these foetuses. Gestational age was measured by Crown rump length and by hospital records of foetuses.



FIGURE- 1: Showing the dilatation of renal pelvis, and kidney was taken out to measure dilatation by yellow line with the help of digital vernier caliper the anteroposterior diameter of foetal kidney was measured

RESULT

Among the 71 foetus with 142 ureters we had divided those according to measurement into anteroposterior diameter as dilatation were classified in following types-

- 7-9.9 mm- MILD
- 10-14.9 mm - MODERATE
- And ≥ 15 mm- SEVERE

We categorized them into gestational age (20-30 & 30-40 weeks) as seen in **TABLE 1**, gender (male & female) in **TABLE 2** and side (right & left) in **TABLE 3** also seen in **FIGURE 2 & 3** with unilateral and bilateral pelvic dilatations. 38 foetuses found to be dilated bilaterally and 26 to be unilaterally.

TABLE -1 Correlation of Pelvic Diameter At Different Gestational Age

| DIVISION | GESTATIONAL AGE (WEEKS) | N | MEAN | SD | SDM | V | SE | P-VALUE |
|----------|-------------------------|----|-------|------|------|------|------|---------|
| Mild | 20- 30 | 6 | 7.9 | 0.72 | 0.30 | 0.51 | 0.34 | = 0.17 |
| | 30-40 | 12 | 8.39 | 0.69 | 0.19 | 0.48 | | |
| Moderate | 20-30 | 8 | 12.86 | 1.34 | 0.47 | 1.7 | 0.58 | = 0.65 |
| | 30-40 | 14 | 12.6 | 1.29 | 0.34 | 1.66 | | |
| Severe | 20-30 | 26 | 18.9 | 2.11 | 0.37 | 4.47 | 0.63 | = 0.52 |
| | 30-40 | 36 | 18.51 | 2.7 | 0.45 | 7.5 | | |

We did not find any foetus having pelvic dilatation with gestational age less than 20 weeks. In above TABLE 1 we can define that severely dilated ureter are maximum in number and this is more in late age as 30-40 weeks of gestation. And no significance is seen among any of gestation age with severity.

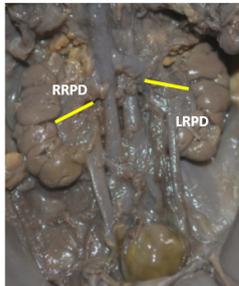


FIGURE 2- Bilateral renal pelvic dilatation (RPD) is seen on both right (R) and left (L) side in both kidney of 36 weeks gestational age of male human foetus

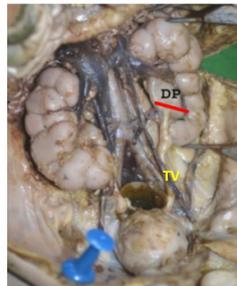


FIGURE 3- Unilateral left sided dilated pelvis (DP) is seen in kidney of 28 week gestational age male human foetus with testicular vein (TV) is seen.

TABLE -2 Correlation of Pelvic Diameter in Both Gender

| DIVISION | GENDER | N | MEAN | SD | SDM | V | SE | P-VALUE |
|----------|--------|----|------|------|------|------|------|---------|
| Mild | Male | 5 | 8.6 | 0.7 | 0.34 | 0.61 | 0.41 | = 0.068 |
| | Female | 4 | 7.75 | 0.5 | 0.25 | 0.25 | | |
| Moderate | Male | 14 | 12.9 | 1.4 | 0.38 | 2.05 | 0.58 | =0.86 |
| | Female | 8 | 12.8 | 1.17 | 0.41 | 1.38 | | |
| Severe | Male | 23 | 19.2 | 2.4 | 0.52 | 5.81 | 0.72 | = 0.89 |
| | Female | 17 | 19.3 | 2.1 | 0.51 | 4.48 | | |

Total 42 male and 29 female foetuses having dilated ureter it means it occurs more commonly in males while no significant relation is seen with gender of foetuses as shown in TABLE 2.

TABLE -3 Correlation of Pelvic Diameter in Both Sided Pelvis

| DIVISION | SIDE | N | MEAN | SD | SDM | V | SE | P-VALUE |
|----------|-------|----|------|------|------|------|------|---------|
| Mild | Right | 7 | 8.27 | 0.8 | 0.33 | 0.7 | 0.41 | = 0.9 |
| | Left | 11 | 8.28 | 0.92 | 0.27 | 0.85 | | |
| Moderate | Right | 7 | 11.5 | 1.06 | 0.4 | 1.14 | 0.52 | < 0.00 |
| | Left | 15 | 13.1 | 1.13 | 0.29 | 1.28 | | |
| Severe | Right | 30 | 18.1 | 2.7 | 0.5 | 7.7 | 0.61 | < 0.00 |
| | left | 32 | 18.9 | 2.1 | 0.37 | 4.47 | | |

In above TABLE 3 among 102 ureters, 44 are of right and 58 left side in mild no significance relation if found while in moderate and severe cases the p value found to be highly significant between right and left sided ureter.

DISCUSSION

Morphologic alterations of the fetal renal pelvis are frequently detected using prenatal Ultrasound and only 1-2% (5).we also found the cases having gestation age >20 week and more cases in late trimester (7). In our study it is more common in males (4), found bilaterally more common (3). Renal pelvis dilation could be a premature sign of Hydronephrosis or otherwise may indicate other abnormalities such as vesicoureteral reflux, megaureter, or pyeloureteral syndrome. Hydronephrosis is most commonly assessed by the Society of Fetal Urology grading system or by APDRP(9,12), Completeness of follow up for RPD was similar for studies based on routinely screened fetuses some studies lacked information on completeness of postnatal RP size assessment. Only six reported the postnatal RP size that was used to diagnose (13). Reported results for multiple categories (5 to 9 mm; 10 to 14 mm; 15 to 19 mm, and >19

mm) (13). These differences raise the possibility that some “persistent” RPD cases may have been considered normal (i.e. resolved) in other centers. The third-trimester threshold value for the anteroposterior renal pelvis diameter of 7 mm is the best ultrasound criterion to predict postnatal renal abnormalities with a positive predictive value of 69%. A renal pelvis dilatation during the second trimester of pregnancy can be used as a warning sign for urinary tract malformation, and should not be ignored even if there is no further progression in the third trimester, because this finding may reveal a significant urologic abnormality in 12% of cases (14). There was no statistical significant difference between the sides either in males (P <.81) or in females (P <.33) and There was no significant statistical difference between the sides in either males (P <.82) or females (P <.33). There was no significant difference in the mean longitudinal diameter between male and female fetuses (P <.9) (15). The risk of any postnatal pathology per degree of antenatal Hydronephrosis was 11.9% for mild, 45.1% for moderate, and 88.3% for severe (16).

CONCLUSION

Many parents show less interest in a specific diagnosis during antenatal ultrasound, but rather want to know the prognosis and whether their child will need medical treatment after birth, e.g. long-term antibiotic therapy or surgery if they have diagnosed the moderate or severe type of dilatation. Intrauterine fetal-amniotic shunting is a viable treatment alternative for these patients. The incidence of renal pelvic dilatation was low and the outcomes were normal in mild type of pelvic dilatation cases. Therefore, it is important for the urologist and obstetrician to understand differential diagnosis and clinical implications in order to offer an accurate counseling to the parents. This article suggest that radiologist must do the screening if any mother is founded having dilated pelvis foetus and these type of scanning must be included in practice.

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