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ORIGINAL ARTICLE

Antenatal renal pelvic dilatation and foetal outcomes — review of cases from a tertiary care center in Karachi, Pakistan

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Abstract

Objective: To determine the incidence of antenatal renal pelvic dilatation to evaluate antenatal resolution/ progression and post-natal outcome.

Methods: This retrospective study was conducted at the Aga Khan University Hospital, Karachi, and comprised data of all women found with renal pelvic dilatation in antenatal scans between January 2011 and December 2013. A cut-off of 5mm was used to diagnose renal pelvic dilatation. Renal pelvic dilatation was categorised into three groups: mild (5-6mm in second trimester and 5-9mm in third trimester), moderate (7-10mm in second trimester and 10-15 in third) and severe (more than 10mm in second trimester and more than 15mm in third trimester).

Results: Of the 13,337 scans, renal pelvic dilatation was found in 111(0.8%) cases. The overall mean maternal age was 28.5 ± 4.2 years. Renal pelvic dilatation was unilateral in 52(46.8%) and bilateral in 59(53.2%) cases. Post-natal scan was done in 61(55%) cases at the discretion of the neonatologist. A pathological finding was diagnosed in post-natal scan in 19(17.7 %) cases. Pelvi-ureteric junction obstruction was found in 6(5.4%) neonates, all in the severe renal pelvic dilatation category.

Conclusion: The incidence of renal pelvic dilatation was low and the outcomes were normal in majority of cases.

Keywords: Second trimester scan, postnatal hydronephrosis, pelviuretric junction obstruction, vesicouretric reflux, anteroposterior diameter. (JPMA 66: 1597; 2016)

Introduction

Renal pelvic dilatation (RPD) is one of the most common abnormalities detected on antenatal ultrasonography. The reported incidence is 1-5% of all pregnancies.[1-3] RPD may be unilateral or bilateral, but unilateral RPD is more common.[4-6] It is two times more common among male foetuses, with the male-to-female (M:F) ratio being 2.5:1.[7-9]

Different classification systems and cut-offs have been used for the detection of RPD.[10,11] The diagnosis is based on an increased anteroposterior diameter (APD) of renal pelvis in transverse plane.[12,13] Based on renal pelvic APD it can be further classified into mild, moderate and severe.[14,15] There is a lack of consensus amongst obstetricians and sonologists about the follow-up protocols and post-natal management in these infants.[16] One reason could be the uncertain prognosis as RPD may be a physiological phenomenon or may represent a broad spectrum of urological conditions. Other factors such as liquor abnormalities and marked progression in the follow-up scan help in devising a management plan.

The risk of post-natal pathology is well correlated to the antenatal RPD in local, regional and international studies.[17-19] A few studies have shown it to be a marker for aneuploidy as well, however, the likelihood ratio (LR) for detection of aneuploidies remains low.[14,20]

The current study was planned to determine the incidence of antenatal RPD to evaluate antenatal resolution/progression and post-natal outcome.

Patients and Methods

This retrospective study was conducted at the Aga Khan University Hospital (AKUH), Karachi, and comprised ultrasonography and medical records of all pregnant patients who delivered between January 2011 and December 2013. Prior approval was obtained from the institutional ethical review committee. The AKUH, a private-sector tertiary referral hospital, carries out more than 5,000 deliveries annually, of which a third are high-risk pregnancies. It has a well-equipped, 12-bed neonatal intensive care unit (NICU) and offers maternal and foetal medicine services. The hospital offers comprehensive medical record keeping services and expertise in medical coding using the International Classification of Diseases (ICD)-09 codes. All investigations and radiological reports are accessible via an online system. The hospital is moving towards electronic record keeping.

Routine anomaly scan is offered between 18-23 weeks to all women enrolled in antenatal care at the unit. For the

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purpose of this study, we screened the antenatal scans of all patients delivered at the centre for foetal RPD (minimum renal pelvic diameter of 5mm). Foetuses with renal pelvic dilatation of less than 5mm and those with other major abnormalities were excluded. All second and third trimester scans were performed by experienced radiologists and foetal medicine consultants using 3.5-5 MHz probe on Toshiba Xario machine (Tokyo, Japan) and Medison Accuvix V20 (Korea).

Maternal medical records of the patients were further reviewed for maternal demographic history, newborn characteristics including gender, weight, Appearance, Pulse, Grimace, Activity, Respiration (APGAR) scores, post-natal investigations and management related to foetal RPD. Medical records of the infants were also reviewed for follow-up investigations. Post-natal investigations were performed in the first week of life whenever there was a clinical indication in the newborn or at the discretion of the paediatric team. Post-natal ultrasound was performed on the 3rd day of life. Investigations included ultrasound kidneys, renal scintigraphy (MAG-3) and micturating cystourethrogram (MCUG).

RPD was categorised into three groups: mild (5-6mm in second trimester and 7-9mm in third trimester), moderate (7-10mm in second trimester and 10-15 in third trimester) and severe (more than 10mm in second trimester and more than 15mm in third trimester).[10] Antenatal resolution was defined as a normal renal pelvic diameter of less than 5 mm and progression as an increase of at least 1mm diameter on subsequent follow-up scan at 32-36 weeks.

The data was recorded in a preformatted questionnaire. SPSS 19 was used for data analysis. Descriptive analysis was performed and frequencies and percentages were calculated for categorical variables. Mean and standard deviation (SD) was calculated for continuous variables.

Results

Of the 13,337 scans that were screened, RPD was found in 111(0.8%) cases. Of them, 87(78.4%) were boys and 24(21.6%) were girls. The overall mean maternal age was 28.5±4.2 years.

RPD was diagnosed on routine second trimester anomaly scan in 74(66.7%) cases and was an incidental finding in the third trimester in 37(33.3%) cases. In the cases diagnosed in the third trimester, the anomaly scan showed normal renal pelvic diameter. RPD was unilateral in 52(46.8%) and bilateral in 59(53.2%) cases. RPD resolved antenatally on follow-up scan in 85(76.5%) cases. The diameter increased on follow-up scan in 26(23.5%).

There were 3(2.7%) NICU admissions, all of whom were due to preterm respiratory distress. In 9(8.1%) of neonates, antibiotics were administered on the presumption of sepsis (Table).

There were 70(63%) mild, 26(23.42%) moderate and 15(13.5%) severe RPD cases. Mild RPD resolved in the antenatal period in 61(87.1%) cases. Post-natal scan was performed only in 29(41.4%) cases. Vesicouretric reflux

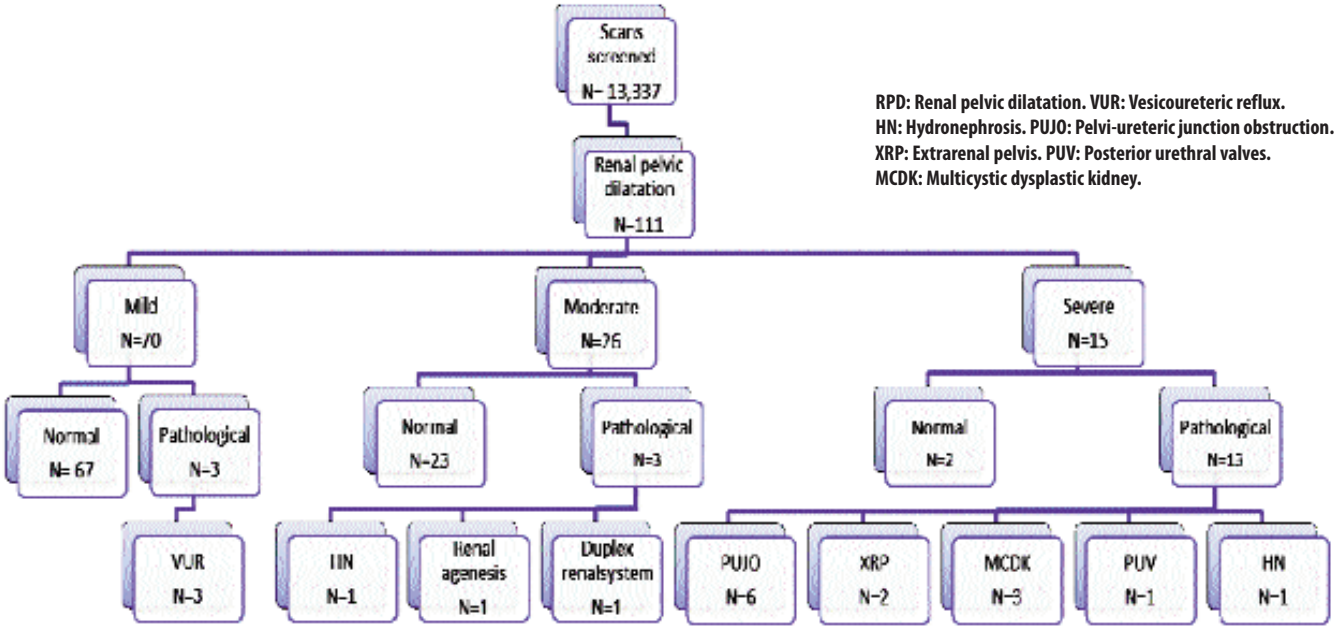

Figure-1: Outcome of RPD in 111 cases.

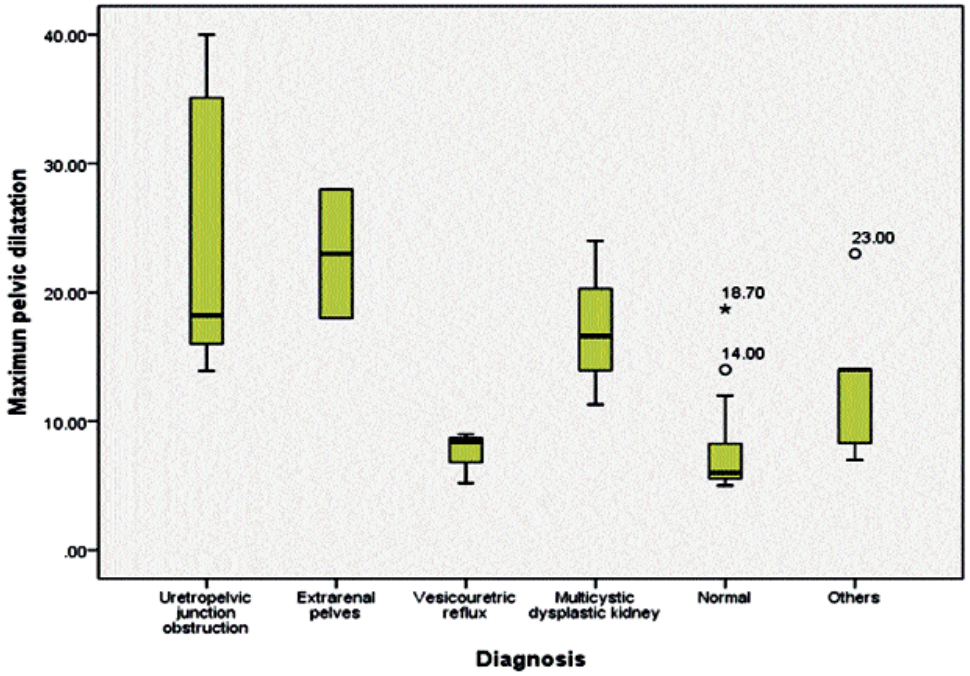

Figure-2: Box plot showing the antenatal pelvic dilatation in different pathologies. The maximum, minimum and inter-quartile range in ureteropelvic junction obstruction is higher than in all other pathologies. * and o denote outliers.

was diagnosed in the post-natal period in 3(4.3%) neonates in this category.

Outcomes were normal in the moderate RPD category in 23(88.5 %) neonates. Post-natal scans were done in 17(65.3%) cases. None of the infants in this category underwent any treatment.

In the severe RPD group, pathological finding was diagnosed on postnatal scans in 13(86.7%) patients. Post-natal scan was done in all patients in this category. Renal scintigraphy was performed in 6(40%) of these infants; of them, an additional MCUG was performed in 4(66.67%) infants. Moreover, 2(13.3%) infants required surgical correction of pelvi-ureteric junction obstruction (PUJO) in the post-natal period, of whom 1(50%) infant underwent pyeloplasty alone, while the other underwent percutaneous nephrostomy (PCN) placement followed by pyeloplasty (Figure-1).

Pathologies with PUJO had a higher maximum dilation of the renal pelvis (mean 23mm±11 mm, range 13.9-40mm). The ranges in other pathologies were: extra-renal pelvis (18-28mm), vesicoureteric reflux (5.2-9mm), multicystic dysplastic kidney (11.3-24mm). The mean range in the normal outcome group was 7.0±3.25mm (Figure-2).

Table: Maternal and neonatal characteristics.

Maternal characteristics	
Mean Maternal age in years (SD)	28.5 (4.2)
Parity n (%)	
Primi	47 (42.3)
Multi	64 (57.7)
Maternal Comorbids n (%)	
GDM	16 (14.4)
Others	13 (11.7)
Mean Gestational age at the scan in weeks (SD)	25 (5.7)
Neonatal Characteristics	
Mean Birth weight in kg (SD)	3 (0.58)
Gender	
Male n (%)	87 (78.4)
Female n (%)	24 (21.6)
Mean apgar score at 1 minute (SD)	7.82 (1.0)
Mean apgar score at 5 minute (SD)	8.85 (0.9)
NICU admission n (%)	3 (2.7)
Antibiotic administration n (%)	9 (8.1)

SD: Standard deviation.
GDM: Gestational diabetes mellitus.
NICU: Neonatal intensive care unit.

Discussion

The incidence of RPD in our obstetric population was 0.8 %. The previous reported prevalence of RPD was in a range of 1-4.5% of pregnancies.[1-3] Some authors have reported prevalence to be as high as 18% when a lower cut-off of 3mm for diagnosis was used.[21] In some studies, the prevalence was found to be as high as 2-2.8%.[22-25] Chudleigh et al. have reported the incidence to be 0.7% in a routine low-risk population.[20] Ahmad et al. also reported similar findings.[26] Both are comparable to the incidence in our study population. The wide variation in reported incidence may be attributed to the difference in cut-offs used for the diagnosis of RPD and the difference in study populations.

Studies have reported a higher detection rate of RPD among male infants.[7,9] Although the overall M:F ratio in our review was 3:1, the ratio was remarkably higher in the severe RPD group, i.e. 14:1. Kumar et al. in their retrospective review reported an overall male-to-female ratio of 1.6:1 and 5:1 in the severe RPD group,

demonstrating male predilection in severe RPD.[27]

In the current study, a cut-off of 5mm for the diagnosis of RPD was used. Other authors have used similar cut-offs in their reviews.[17,26,28-30] The Foetal Medicine Foundation in the United Kingdom (UK) also advocates a cut-off of 5mm while National Health Service (NHS) foetal anomaly screening programme of the UK defines RPD above or equal to an APD of 7mm.[11,31] There is a general lack of consensus amongst radiologists, foetal medicine practitioners and paediatric urologists regarding the diagnostic criteria of RPD. The Society of Foetal Urology (SFU) criteria for the diagnosis were only used by 2.9% of foetal medicine specialists in a survey in 2012.[15,16] In 2014, a multidisciplinary consensus meeting, involving eight societies with an interest in the diagnosis and management of RPD, was held in Maryland, United States to standardise the criteria for diagnosis of RPD.[10] Their cut-offs were comparable to the earlier reported SFU criteria and defined a cut-off of 4mm at 16-27 weeks. The lower cut-offs have a high sensitivity for diagnosis of post-natal pathology. Nevertheless, the specificity is low and using these cut-offs carries the risk of generating unnecessary anxiety among the parents.

The outcomes in our review were normal in 95% of cases in mild RPD, 88% in moderate RPD and 13% in severe RPD. Antenatal resolution was seen in 76.6% of cases. Other authors have reported a similar resolution rate.[25,26,28] A multivariable retrospective review by Longpre et al. in 2012[32] reported similar results with a high rate of pathology in initial severe RPD. They also reported that an APD of less than 1.93cm has a positive predictive value of 88% for resolution. A meta-analysis by Lee et al. showed an 88.3% risk of pathology with severe RPD which is consistent with our results (86.6%).[18]

The mean RPD in babies with PUJO in our review was (23mm range 13.9mm-40mm). These results are consistent with an earlier review by Coplen et al.[33]

In our review only two infants underwent surgery (1.8%), which is much lower than what earlier reviews have defined, some as high as 25-40%.[4,14,32] The difference in rates is likely due to the varied range of follow-up in different studies. Since this was a retrospective review, all the information regarding follow-up was taken from the medical records and some of the infants may have had surgery in another facility.

The identified limitations in our review were a retrospective design, short-term follow-up and post-natal investigations not being carried out in all neonates. These were mainly due to limited financial resources of the parents restricting prolonged follow-ups. Nevertheless, the study highlights the importance of identifying and reporting RPD in the antenatal scans and the need for a follow-up scan in third trimester and post-natal period. Mild RPD with resolution in the third trimester scan is more likely to be a normal variant. Using a 5mm cut-off in the second trimester with a follow-up scan in the third trimester is the most valid approach at present. Post-natal evaluation is recommended if RPD persists or shows progression. These results will help in counselling the prospective parents regarding RPD.

Conclusion

The incidence of RPD was found to be very low and outcomes were normal in 95% of cases.

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Conflict of Interest: None.

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References

1. Ek S, Lidefeldt KJ, Varricio L. Fetal hydronephrosis; prevalence, natural history and postnatal consequences in an unselected population. Acta Obstet Gynecol Scand. 2007; 86:1463-6.
2. Garne E, Loane M, Wellesley D, Barisic I. Congenital hydronephrosis: prenatal diagnosis and epidemiology in Europe. J Pediatr Urol. 2009; 5:47-52.
3. Mallik M, Watson AR. Antenatally detected urinary tract abnormalities: more detection but less action. Pediatr Nephrol. 2008; 23:897-904.
4. Asl AS, Maleknejad S. Clinical outcome and follow-up of prenatal hydronephrosis. Saudi J Kidney Dis Transpl. 2012; 23:526-31.
5. Plevani C, Locatelli A, Paterlini G, Ghidini A, Tagliabue P, Pezzullo JC, et al. Fetal hydronephrosis: natural history and risk factors for postnatal surgery. J Perinat Med. 2014; 42:385-91.
6. Tombesi MM, Alconcher LF. Short-term outcome of mild isolated antenatal hydronephrosis conservatively managed. J Pediatr Urol. 2012; 8:129-33.
7. Coco C, Jeanty P. Isolated fetal pyelectasis and chromosomal abnormalities. Am J Obstet Gynecol. 2005; 193:732-8.
8. Estrada CR, Jr. Prenatal hydronephrosis: early evaluation. Curr Opin Urol. 2008; 18:401-3.
9. Signorelli M, Cerri V, Taddei F, Groli C, Bianchi UA. Prenatal diagnosis and management of mild fetal pyelectasis: implications for neonatal outcome and follow-up. Eur J Obstet Gynecol Reprod Biol. 2005; 118:154-9.
10. Nguyen HT, Benson CB, Bromley B, Campbell JB, Chow J, Coleman B, et al. Multidisciplinary consensus on the classification of prenatal and postnatal urinary tract dilation (UTD classification system). J Pediatr Urol. 2014; 10:982-98.
11. Pilu G, Nicolaides KH. Diagnosis of fetal abnormalities: The 18-23-week scan. Taylor & Francis; 1999.
12. Cockell AP, Chitty LS. Mild renal pelvis dilatation: implications and management. Fetal and Maternal Medicine Review. 1998; 10:153-61.
13. Sinha A, Bagga A, Krishna A, Bajpai M, Srinivas M, Uppal R, et al. Revised guidelines on management of antenatal hydronephrosis. Indian J Nephrol. 2013; 23:83-97.
14. Corteville JE, Gray DL, Crane JP. Congenital hydronephrosis: correlation of fetal ultrasonographic findings with infant

outcome. Am J Obstet Gynecol. 1991; 165:384-8.
15. Nguyen HT, Herndon CD, Cooper C, Gatti J, Kirsch A, Kokorowski P, et al. The Society for Fetal Urology consensus statement on the evaluation and management of antenatal hydronephrosis. J Pediatr Urol. 2010; 6:212-31.
16. Zanetta VC, Rosman BM, Bromley B, Shipp TD, Chow JS, Campbell JB, et al. Variations in management of mild prenatal hydronephrosis among maternal-fetal medicine obstetricians, and pediatric urologists and radiologists. J Urol. 2012; 188:1935-9.
17. Al-Shibli AI, Chedid F, Mirghani H, Al Safi W, Al-Bassam MK. The significance of fetal renal pelvic dilatation as a predictor of postnatal outcome. J Matern Fetal Neonatal Med. 2009; 22:797-800.
18. Lee RS, Cendron M, Kinnamon DD, Nguyen HT. Antenatal hydronephrosis as a predictor of postnatal outcome: a meta-analysis. Pediatrics. 2006; 118:586-93.
19. Ali S, Ali L. Etiology and Postnatal Management of Prenatal Hydronephrosis: A Study of Two Teaching Hospitals of Khyber Pakhtunkhwa. Pak J Med Res. 2014; 53:39.
20. Chudleigh PM, Chitty LS, Pembrey M, Campbell S. The association of aneuploidy and mild fetal pyelectasis in an unselected population: the results of a multicenter study. Ultrasound Obstet Gynecol. 2001; 17:197-202.
21. Hoddick WK, Filly RA, Mahony BS, Callen PW. Minimal fetal renal pyelectasis. J Ultrasound Med. 1985; 4:85-9.
22. Benacerraf BR, Mandell J, Estroff JA, Harlow BL, Frigoletto FD, Jr. Fetal pyelectasis: a possible association with Down syndrome. Obstet Gynecol. 1990; 76:58-60.
23. Corteville JE, Dicke JM, Crane JP. Fetal pyelectasis and Down syndrome: is genetic amniocentesis warranted? Obstet Gynecol. 1992; 79:770-2.
24. Morin L, Cendron M, Crombleholme TM, Garmel SH, Klauber GT, D'Alton ME. Minimal hydronephrosis in the fetus: clinical significance and implications for management. J Urol. 1996; 155:2047-9.
25. Sairam S, Al-Habib A, Sasson S, Thilaganathan B. Natural history of fetal hydronephrosis diagnosed on mid-trimester ultrasound. Ultrasound Obstet Gynecol. 2001; 17:191-6.
26. Ahmad G, Green P. Outcome of fetal pyelectasis diagnosed antenatally. J Obstet Gynaecol. 2005; 25:119-22.
27. Kumar S, Walia S, Ikpeme O, Zhang E, Paramasivam G, Agarwal S, et al. Postnatal outcome of prenatally diagnosed severe fetal renal pelvic dilatation. Prenat Diagn. 2012; 32:519-22.
28. Jaswon MS, Dibble L, Puri S, Davis J, Young J, Dave R, et al. Prospective study of outcome in antenatally diagnosed renal pelvis dilatation. Arch Dis Child Fetal Neonatal Ed. 1999; 80:F135-8.
29. Mandell J, Blyth BR, Peters CA, Retik AB, Estroff JA, Benacerraf BR. Structural genitourinary defects detected in utero. Radiology. 1991; 178:193-6.
30. Srinivasan HB, Srinivasan N, Dhungel P, London R, Lampley C, Srinivasan G. Natural history of fetal renal pyelectasis. J Matern Fetal Neonatal Med. 2013; 26:166-8.
31. Kirwan D. The NHS Fetal Anomaly Screening Programme (NHS FASP). 2010. 18+ 0 to 20+ 6 Weeks Fetal Anomaly Scan National Standards and Guidance for England. 2010.
32. Longpre M, Nguan A, Macneily AE, Afshar K. Prediction of the outcome of antenatally diagnosed hydronephrosis: a multivariable analysis. J Pediatr Urol. 2012; 8:135-9.
33. Coplen DE, Austin PF, Yan Y, Blanco VM, Dicke JM. The magnitude of fetal renal pelvic dilatation can identify obstructive postnatal hydronephrosis, and direct postnatal evaluation and management. J Urol. 2006; 176:724-7.