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

Ruqiya Afroz, Shafia Shakoor, Muhammad Sohail Salat, Shama Munim

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, pelviureteric junction obstruction, vesicoureteric reflux, anteroposterior diameter. (JPMA 66: 1597; 2016)
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). 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. Vesicoureteric reflux

**Figure-1:** Outcome of RPD in 111 cases.
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 MCU 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.

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

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. Some authors have reported prevalence to be as high as 18% when a lower cut-off of 3mm for diagnosis was used. In some studies, the prevalence was found to be as high as 2-2.8%. Chudleigh et al. have reported the incidence to be 0.7% in a routine low-risk population. Ahmad et al. also reported similar findings. 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.

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).
demonstrating male predestination in severe RPD.

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. 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. 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. 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. 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. A multivariable retrospective review by Longpre et al. in 2012 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%).

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.

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%. 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**

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