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ANTENATAL HYDRONEPHROSIS: HOW SIGNIFICANT IS IT?

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Abstract

Aim: To assess the outcome of antenatally reported renal anomalies on ultrasonography (USG) in the immediate postnatal period & to find correlation of urogenital anomalies with other congenital defects.

Methods: Prospective study conducted in a tertiary care centre in Mumbai over a period of 18 months in 45 babies whose antenatal USG had anomalies of urinary system. USG was done on day 3 of life along with a head to toe examination and systemic assessment.

Results: Thirty babies (66.7%) had pyelectasis and 15 (33.3%) had hydronephrosis on antenatal ultrasonography. Out of 42 babies with anteroposterior pelvic diameter (APPD) of <10 mm antenatally, 36 (85.7%) had normal postnatal scans whereas only 6 babies (14.3%) had abnormal postnatal ultrasonography. As opposed to this, all the 3 babies whose antenatal APPD was > 10 mm, had abnormal postnatal sonography. (p = 0.006). Also, a significant correlation was observed between ear, cardiovascular and urinary system abnormalities.

Conclusion: This study highlights that APPD of upto 1 cm on antenatal ultrasonography is within physiological limits and does not indicate significant renal anomaly. Most of such lesions resolve spontaneously during the course of their natural development.

Key Words: antenatal hydronephrosis, postnatal sonography, developmental variation

Introduction

Congenital anomalies account for 20-30% of perinatal deaths and an even higher percentage of perinatal morbidity. (1) Studies have shown that the genitourinary system is one of the most common systems to have congenital anomalies, being only second to the central nervous system. (2,3) However, the utility of early diagnosis of renal anomalies is debatable, as the natural course of development for some of these lesions is unknown and there is a considerable variation in the range of normal dimensions of the fetal urinary tract. A study done by Sotiloye et al, Nigeria (4) showed that antenatal ultrasonography (USG) can be a useful tool to diagnose renal anomalies when employed judiciously by trained, accredited and regulated radiologists. We undertook this study to assess the outcome of antenatally reported renal anomalies on USG in the immediate postnatal period & to find correlation of urogenital anomalies with other congenital defects.

Methods and Materials

This was a prospective study conducted in a tertiary health care centre in Mumbai. All the healthy newborns of mothers whose antenatal ultrasonography had evidence of any renal anomalies were enrolled. Details were recorded in a predefined proforma. History was obtained from the mother regarding the time within which first urine was passed by the baby after birth; whether there was straining or excessive crying while micturition; nature of urinary stream and flow and, in male babies, evidence of ballooning of the prepuce on micturition.

Gestational age at birth was estimated by the New Ballard Score. Weight was taken on a digital weighing scale and the babies were divided into two categories depending on the birth weight as those with weight > 2.5 kg (normal) and those with birth weight ≤ 2.5 kg (low birth weight). Length of the newborn was determined with the help of a standardised infantometer. Head to toe examination of the baby was carried out to look for any obvious external congenital anomalies. Detailed examination of the four major systems- respiratory, cardiovascular, abdominal and central nervous system was carried out. Babies having abnormal cardiovascular findings were subjected to two dimensional echocardiography (2D Echo) by a senior cardiologist at the institute.

Reports of antenatal sonographies (done by different radiologists, at different gestational ages) of the mothers showing genitourinary system anomalies in the fetus were reviewed. Renal anomalies reported were as pyelectasis when there was dilatation of the renal pelvis as measured by the anteroposterior pelvic diameter (APPD) in mm without the evidence of calyceal dilatation or cortical thinning and hydronephrosis when there was renal pelvis dilatation along with dilatation of the calyceal system with or without cortical atrophy. All these newborns were subjected to postnatal ultrasonography of the genitourinary system by a single senior radiologist specialised in neonatal scans on day 3 of life irrespective of the clinical symptomatology in the baby. The anteroposterior diameters of the renal pelvis (APPD) were compared. Maternal details like age at the time of present pregnancy, parity, medical illnesses, addictions were reviewed. In case of multigravidas, details of similar anomalies of the genitourinary system in previous babies were inquired upon. Results were analysed using Fischer?s Chi- Square test; findings were considered significant when p value was less than 0.05.

Results

Forty five babies were enrolled in study, all of whose antenatal ultrasonographies had reported abnormalities of the genitourinary system. All of these had anomalies of the kidneys whereas the ureters, bladder and urethra were reportedly normal. Thirty babies (66.7%) had pyelectasis and 15 (33.3%) had hydronephrosis on antenatal ultrasonography. Out of these 45 newborns, 36 babies (80%) had no abnormality on the postnatal ultrasound done on the third day of life and both their kidneys with the rest of the genitourinary system were normal. Of the 9 babies (20%) who had abnormal postnatal ultrasounds, 7 had pelviureteric junction obstruction (PUJ obstruction) (77.8%) and 2 babies

(22.2%) had vesicoureteric junction obstruction (VUJ obstruction), with their postnatal ultrasonographies still showing the presence of hydronephrosis.

Based upon the renal anteroposterior pelvic diameter (APPD) on the antenatal ultrasonography, babies were grouped in two categories- those with mean APPD ≤ 10 mm and others with mean APPD > 10 mm. Out of the 45 babies, 42 (93.3%) had mean APPD ≤ 10 mm; and only 3 babies (6.7%) had mean APPD > 10 mm. Postnatally when these babies were scanned, of the 42 babies whose APPD was ≤ 10 mm, 36 babies (85.7%) had normal postnatal scans whereas only 6 babies (14.3%) had abnormal postnatal ultrasonography. As opposed to this, all the 3 babies whose antenatal APPD was > 10 mm, had abnormal postnatal sonography, which was a significant observation (p = 0.006).

Out of the 45 babies, 3 babies (6.7%) had congenital abnormalities of the external ear, namely unilateral ear hypoplasia, nodular pinna and preauricular tag with narrow external auditory meatus. These babies showed abnormality in both antenatal and postnatal ultrasonography. This correlation is also significant (p = 0.006). Four babies (8.9%) had abnormal 2D echo suggestive of congenital heart disease. Abnormalities included patent ductus arteriosus in 2 cases, pulmonary stenosis and atrial septal defect. These babies showed abnormality in both antenatal and postnatal ultrasonography. (p =0.001) None of the 45 babies had any symptoms related to the genitourinary system & no abnormalities of the external genitalia, skull, spine, skin, eyes, nose or extremities. No significant correlation was observed between gestational age at birth, gender of baby, birth weight, any of the maternal factors and the occurrence of genitourinary system anomalies.

Discussion

In recent years there has been a considerable increase in the number of babies diagnosed as having fetal pyelectasis and hydronephrosis, which constitute the two most commonly reported anomalies on the antenatal ultrasonography. However, no fixed guidelines are followed on antenatal ultrasonography regarding the dimensions of APPD to be considered abnormal while reporting. Our study showed that, when antenatal APPD was ≤ 10 mm 85.7% had normal postnatal scans whereas all 3 babies with APPD > 10 mm, had abnormal postnatal sonography. This highlights that APPD of upto 1 cm (≤ 10 mm) on antenatal ultrasonography is within physiological limits and does not indicate significant renal anomaly. Most of such lesions resolve spontaneously during the course of their natural development. Similar findings were observed in the study done by Grignon et al (5) that Grade I hydronephrosis (APPD <1 cm) was physiological. Sidhu et al (6) had also conducted a systematic analysis of data extracted from 25 articles which revealed overall resolution of pelviectasis in milder cases of isolated antenatal hydronephrosis [IAHN] (APPD <12 mm). In contrast, IAHN of higher severity (APPD>12 mm) resolved with a lower frequency. In a study carried out by Johnson et al (7), 94.7% patients with APPD ≤ 9 mm had normal postnatal scan. All infants postnatally found to have obstructive hydronephrosis had an APPD of > 15 mm.

Out of the 9 babies who had abnormalities in their postnatal ultrasonographies in our study, 7 (77.8%) had pelviureteric junction obstruction (PUJ obstruction) and 2 babies (22.2%) had vesicoureteric junction obstruction (VUJ obstruction),with their postnatal ultrasonography still showing the presence of hydronephrosis. These findings correlated with the studies done by Ismaili et al (8), Johnson et al (7), and Gunn et al (9), all of which had PUJ obstruction as the most common anomaly.

Three babies with abnormalities in both antenatal & postnatal scans had congenital abnormalities of the external ear in our study. Kohelet et al (10) in their study detected urinary tract abnormalities in 6 (8.6%) infants with isolated preauricular tags. In yet another study by Leung et al (11) renal ultrasound was performed on 69 children with preauricular sinus in which 3 children (4.3%) were found to have significant renal anomaly.

Considering the significant association of genitourinary with ear and cardiovascular abnormalities, it would be beneficial to investigate these systems in case of a postnatal ultrasound showing genitourinary anomalies as we found a significant association with cardiac disease and ear anomaly.

Having said the above, there may be certain cases with significant urinary tract anomalies but their incidence is very small as compared to the overall incidence of congenital genitourinary anomalies. Most of the anomalies reported are transient, representing a normal developmental phase in the embryogenesis of the urinary system while others are mild defects which tend to remain stable and hardly ever have an effect on the functioning of the kidneys. The latter variety is mostly detected as an incidental finding. The highlight of this study is that most of the 'reported anomalies' on the antenatal ultrasound scans are actually transient phases in the development of the urinary system. As we know that, to date, there are no uniform guidelines which are being laid down regarding dimensions of the genitourinary tract on the fetal sonography to define the normal against the abnormal system. In the absence of such data, there is a considerable degree of observer variability among the reporting sonologists as to giving a report of antenatal sonography. In the dilemma of may be missing a congenital renal anomaly, many a times an overzealous sonologist reports even a small fullness of the renal pelvis as pyelectasis or hydronephrosis. When such a report is forwarded, the consulting obstetrician refers the expectant parents to paediatrician for further evaluation. Not considering the background of the normal development, the baby, as soon as it is born, is subjected to a battery of investigations like sonography, voiding cystourethrography, renal radioisotope scans, renal function tests, and so on. Understanding of the psychological burden of the prospective parents is needed.

Conclusion

Hydronephrosis on antenatal ultrasonography may represent a normal developmental variation in embryogenesis of the urinary system. However it is significant only if the anteroposterior pelvic diameter (APPD) is ≥ 10 mm.

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