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POSTNATAL EVALUATION AND OUTCOME OF INFANTS WITH ANTENATAL HYDRONEPHROSIS

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Abstract: This study was done to evaluate the clinical outcome of infants who were diagnosed antenatally with hydronephrosis and also to determine whether there was any significant correlation between anterior posterior pelvic diameter (APPD) and urinary tract abnormalities detected. Data of 30 infants collected between January 2010 and May 2013 were analyzed retrospectively. Infants with the presence of APPD ≥5 mm on prenatal Ultrasound (US) scan after 20 weeks of gestation, at least 6-month follow-up and at least two postnatal US scans were included in the study and most patients underwent renal scintigraphy (n=28) and micturating cystourethrography (n=28). Of the 30 infants, 15 (50 %) had idiopathic or transient hydronephrosis. The second most common diagnosis was vesicoureteral reflux found in 6 (20%) infants, followed by ureteropelvic junction obstruction without significant kidney damage and Ureterovesical Junction obstruction 5 (16.66%). The relative risk of significant urologic abnormality according to the degree of antenatal hydronephrosis (ANH) was 20.25 for severe ANH, 1.5 for moderate ANH and 0.5 for mild ANH. There was a significant increase in the risk *per* increasing degree of hydronephrosis. In 5 out of 30 (16.6 %) infants, immediate surgery was required. These data support the need of antenatal detection and long term postnatal follow-up of infants with ANH.

Keywords: Hydronephrosis, APPD, Antenatal

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INTRODUCTION

Increasing use of antenatal sonography has resulted in more frequent reporting of fetal hydronephrosis. Antenatal hydronephrosis (ANH) one of the most common birth defects[1-4] and affects ≈1% to 5% of all pregnancies. Many of these urologic abnormalities would manifest later in life as pyelonephritis or even renal failure if these anomalies are not detected by prenatal ultrasonography (US) and subsequently managed.

The major limitation of the antenatal identification is that hydronephrosis does not necessarily imply obstruction and do not give any indication of the function of an affected kidney. In addition, it is apparent that some cases of hydronephrosis detected antenatally will spontaneously improve or resolve with no surgical intervention. Because of the lack of consensus regarding assessment of these infants, the postnatal approach to fetal renal pelvis enlargement remains doubtful[5].

This study was aimed at evaluating the clinical outcome of infants with antenatally diagnosed hydronephrosis. Our objective was to determine the correlation between the anterior posterior pelvic diameter (APPD) and the urinary tract abnormalities detected.

METHODS:

This was a retrospective study and we analyzed data of 30 infants collected between January 2011 and May 2014. Pre-natal US was performed by radiologists from different medical institutions and all the postnatal US scans were performed by radiologists of our institute.

Infants with the presence of APPD ≥5 mm on prenatal US scan after 20 weeks of gestation, at least 6 months of follow-up and at least two postnatal US scans were taken into the study. Infants who were prenatally diagnosed as having multicystic dysplastic kidney, polycystic kidneys, kidney agenesis or abdominal cysts were excluded from the study.

Based on the antenatal US measurement of renal pelvis diameter, hydronephrosis was classified into 3 groups: mild (APPD 5-9.9 mm), moderate (APPD 10-14.9 mm) and severe (APPD ≥15 mm).

The probability of significant urologic anomaly according to the degree of ANH was expressed as the relative risk ratio and data were calculated using calculator for confidence intervals of relative risk.

The postnatal US scan was first performed on days 2-3 or when first seen. After the initial US, 28 patients underwent renal scintigraphy during or soon after the first month, whereas micturating cystourethrography (MCUG) was done in 28 patients within 3 months of life. Two children were first seen at age 4 - 9 months and had 2 consecutive normal US scans, so renal scintigraphy and MCUG were not performed. Intravenous pyelography and magnetic resonance

imaging were performed in few cases, if needed, based on the results of renal scintigraphy and MCUG.

Results

A total of 30 infants were included in the analysis of whom 21 (70%) were boys and 9 (30%) were girls. Among the 30 infants, 16(53.3%) had mild, 9(30%) had moderate and 5 (16.7%) had severe hydronephrosis on antenatal US scan. Twenty (66.6%) infants presented with unilateral ANH and 10 (33.3%) infants with bilateral ANH. Most of the infants, 15(50%), had idiopathic or transient hydronephrosis. Vesicoureteral reflux (VUR) grade I-V was the second most common diagnosis which was seen in 9(30%) infants.

Table 1 shows postnatal diagnosis of infants with ANH according to the degree of fetal renal pelvic dilatation. Diagnosis of idiopathic or transient dilatation was established in 10(66.6%) infants with mild ANH, in 4(44.4%) infants with moderate ANH and in only 1(16.6%) infant with severe ANH. The relative risk of significant urinary tract anomaly according to the degree of antenatal hydronephrosis was 20.25 for severe ANH, 1.5 for moderate ANH and 0.5 for mild ANH.

Table1. Postnatal diagnosis in infants with antenatal hydronephrosis according to the degree of fetal renal pelvic dilatation

	Degree of antenatal hydronephrosis		
Postnatal diagnosis Total	Mild hydronephrosis	Moderate hydronephrosis	Severe hydronephrosis
No anomaly detected (idiopathic or transient 15(50%) dilatation)	10	4	
Extrarenal pelvis 2(6.66%)			2
UPJO (0%-39% RKF) 2(6.66%)		1	
UVJO 3(10%)		1	2
VUR grade I		1	1

2(6.66%)			
VUR grade II-III	1	1	
3(10%)			
VUR grade IV-V			1
1(3.33%)			
Ureterocele + hypofunction of 1 kidney			1
1(3.33%)			
PUV			
1(3.33%)			
Total	15(50%)	9(30%)	6(20%)
30			

VUR = vesicoureteric reflux; UPJO = ureteropelvic junction obstruction; UVJO = ureterovesical junction obstruction; PUV = posterior urethral valve; RKF = residual kidney function

Table 2 shows infants with antenatal hydronephrosis requiring surgical intervention. Immediate surgery was required during follow-up period in 5(16.6%). of those who required immediate surgery, 3 infants had severe and 2 infants had moderate ANH. None of the children with mild ANH required surgical intervention. After 6-12 month follow-up, 2 (6.6 %) infants had progression of hydronephrosis without the need of surgery

Table 2. Infants with antenatal hydronephrosis requiring surgical intervention

Urological abnormality requiring surgical intervention	Total 5
UPJO with hypofunction of 1 kidney	1(20%)
VUR III-V with hypofunction of 1 kidney	2(40%)
UVJO	1(20%)

PUV	
1(20%)	

VUR = vesicoureteric reflux; UPJO = ureteropelvic junction obstruction; UVJO = ureterovesical junction obstruction. PUV= posterior urethral valve.

DISCUSSION

In recent years, there has been an increase in the number of patients diagnosed with hydronephrosis on fetal US scan. Prenatal sonography enables early recognition of urological abnormalities that otherwise would not have been identified until later in life, when usually the symptoms of pyelonephritis occur[6,7].

We analyzed the clinical outcome in a group of 30 infants with ANH. Our study has confirmed that children with moderate to severe ANH are at a greater risk of postnatal urinary tract anomaly, as pointed out by other investigators[8]. In contrast to some authors, we did not find a significant risk of anomaly in the group with mild hydronephrosis[9 -11].

The risk of pathologic postnatal outcome of ANH may be quantified by the measurement of APPD. As expected, this analysis confirmed that severe ANH carried a significant risk of postnatal pathologic outcome (20.25) We also demonstrated a significant risk of pathology in moderate ANH group (1.5). The relative risk of urologic abnormality was not significant in the group with mild ANH (0.5).

These data indicate that thorough postnatal diagnostic management should be considered when encountering an infant with moderate to severe ANH. Nevertheless, an infant with mild ANH should not be considered clinically insignificant, but can be categorized as carrying a low risk of surgical intervention. We would like to point out that among 15 infants with mild ANH, 5 (33.3%) had urinary tract anomaly (among them there were 2 infants with VUR, 1 infant with UVJO, 2 with extra renal pelvis).

The probability of detecting urinary abnormalities depends solely on the experience and skill of the sonographer and is usually better late in gestation, when the fetus is larger and an anomaly is easier to image[12]. In our study, most of the abnormalities on fetal US scans were detected in the late second and third trimester of pregnancy.

It has been reported that most structural abnormalities of urinary tract are characterized by hydronephrosis, which is generally assumed to be obstructive. Often, however, hydronephrosis is not caused by obstruction; examples include VUR, abnormalities of ureteropelvic and ureterovesical junction, and multi-cystic dysplastic kidney. Vesicoureteral reflux and UPJO were the most common diagnoses, as reported in the literature[9,13,14].

As expected, patients with moderate and severe ANH presented a higher risk of surgical intervention. In our study group, 5 (16.6%) infants required immediate surgery: 3 presented with severe and 2 with moderate ANH. These results are similar to those found in the literature[9,15,16].

According to our findings, the risk of uropathy and associated morbidity was remarkably correlated with the magnitude of fetal APPD. We therefore suggest that infants with severe ANH should undergo post-natal US scan before discharge from the hospital. The initial postpartum US examination should be per-formed several days after delivery in order to avoid a falsely normal-appearing kidney during the first 24 hours of life[17]. In this group, a comprehensive diagnostic treatment should be administered as soon as possible. Infants with moderate and mild hydronephrosis should undergo postnatal US within the first month of life. Although the risk of urologic abnormality is lower in moderate group compared to severe ANH group invasive diagnostic procedures might be necessary for both severe and moderate groups. Primary debate is focused on diagnostic approach in infants with mild ANH[16,18,19]. Based on our results, invasive diagnostic procedures are not required in all infants with mild ANH; we propose a follow-up protocol consisting of US investigations every 1 to 3 months during the first 6 months of life. If dilatation persists or progresses past 6 months, renal scintigraphy and/or MCUG should be performed. If US scan is normal after 6 months, prolonged follow-up is not justified.

All infants with ANH with or without significant urologic abnormality need strict clinical surveillance for urinary tract infection and US surveillance for possible progression of APPD during infancy.

Finally, we would like to stress the importance of quantification of fetal renal pelvis dilatation (in millimeters) since some of the US findings (not included in our investigation) were just descriptive. Despite the degree of ANH, the gynecologist should refer all infants with ANH to pediatric nephrologist, preferably during the first month of life or during the first week in case of severe ANH.

REFERENCES

1. Blyth B, Snyder HM, Duckett JW. Antenatal diagnosis and subsequent management of hydronephrosis. J Urol 1993; 149: 693-8.

2. Gunn TR, Mora JD, Pease P. Antenatal diagnosis of urinary tract abnormalities by ultrasonography after 28 weeks gestation: incidence and outcome. Am J Obstet Gynecol 1995; 172: 479-86.

3. Livera LN, Brookfield DS, Egginton JA, *et al*. Antenatal ultrasonography to detect fetal renal abnormalities: a prospective screening programme. BMJ 1989; 298: 1421-3.

4. Sairam S, Al-Habib A, Sasson S, *et al*. Natural history of fetal hydronephrosis diagnosed on mid-trimester ul-trasound. Ultrasound Obstet Gynecol 2001; 17: 191-6.

5. Estrada CR. Prenatal hydronephrosis: early evaluation. Curr Opin Urol 2008; 18: 401-3.

6. Elder JS. *In utero* ultrasonography impact on urology. J Endourol 1992; 6: 279-81.

7. Corteville JE, Gray DL, Crane JP. Congenital hydronephrosis: correlation of fetal ultrasonographic findings with infant outcome. Am J Obstet Gynecol 1991; 165: 384-8.

8. Coelho GM, Bounada MCF, Pereire AK, Figueiredo BF. Outcome of isolated antenatal hydronephrosis: a prospective cohort study. Pediatr Nephrol 2007; 22: 1727-34.

9. Lee RS, Cendron M, Kinnamon DD, Nguyen NT. Antenatal hydronephrosis as a predictor of postnatal out-come: a meta analysis. Pediatrics 2006; 118: 586-93.

10. Morin L, Cendron M, Crombleholme TM, *et al*. Minimal hydronephrosis in the fetus: clinical significance and implications for management. J Urol 1996; 155: 2047-9.

11. Thomas DF, Madden NP, Irving HC, Arthur RJ, Smith SE. Mild dilatation of the fetal kidney: a follow-up study. Br J Urol 1994; 74: 236-9.

12. Fugelseth D, Lindemann R, Sande HA, Ref-sum S, Nordshus T. Prenatal diagnosis of urinary tract anomalies. The value of two ultrasound examinations. Acta Obstet Gynecol Scand 1994; 73: 290-3.

13. Woodward M, Frank D. Postnatal management of antenatal hydronephrosis. BJU International 2002; 89: 149-56.

14. Aksu N, Yavascan O, Kungin M, *et al*. Postnatal management of infants with antenatally detected hydroneph-rosis. Pediatr Nephrol 2005; 20: 1253-9.

15. Wollenberg A, Neuhaus TJ, Willi UV, Wisser J, Outcome of fetal renal pelvic dilatation diagnosed during the third trimester. Ultrasound Obstet Gynecol 2005; 25: 483-8.

16. Babu R, Sai V. Postnatal outcome of fetal hydronephrosis: implications for prenatal counselling. Indian J Urol 2010; 26: 60-2.

17. Laing FC, Burke VD, Wing VW, Jeffrey RB, Hashimoto B. Postpartum evaluation of fetal hydro-nephrosis: optimal timing for follow-up sonography. Radiology 1984; 152: 423-4.

18. Harding LJ, Malone PS, Wellesley DG. Ante-natal minimal hydronephrosis: is its follow-up an unnecessary cause of concern? Prenat Diagn1999; 19: 701-5.

19. Lim DJ, Park JY, Kim JH, Paick SH, Oh SJ, Choi H, Clinical characteristics and outcome of hydronephro-sis detected by prenatal ultrasonography. J Korean Med Sci 2003; 18: 859-62.