Causes and Outcome of Antenatal Hydronephrosis Detected in the Third Trimester At Queen Alia Hospital

Jwaher Al-bderat MD, Najwa Sunaa MD*, Ola Imam MD***

ABSTRACT

Objective: To determine the clinical features and postnatal outcome of all antenatally detected hydronephrosis cases.

Methods: A retrospective review of the collected data for all infants with antenatal hydronephrosis who were seen at Queen Alia Hospital during the period between Feb 2010 and April 2013. The degree of hydronephrosis was defined as mild, moderate, severe, based on the antero- posterior pelvic diameter that was measured after 30 weeks of gestation. Patients were divided into group I (with unilateral hydronephrosis) and group II (with bilateral hydronephrosis and ureteric dilatation). Post natal evaluation and follow up was uniformly done. Causes and clinical outcomes were compared between the two groups.

Results: A total of 80 infants enrolled in this study. Fifty seven (71%) were male and 23 (29%) were female with a male : female ratio (2.5:1). The left kidney was more commonly involved (left: 34, right: 18). Group Ī had 52 patients, 4 (8%) required surgery. Group II had 23 patients, 7 (30%) required surgery. Transient hydronephrosis was the commonest cause of antenatal hydronephrosis (33%) followed by pelviureteric junction obstruction (PUJO) (31%), and vesicouretral reflux (27%). Posterior urethral valve and vesicouretral junction obstruction were seen in (4%), (3%) respectively.

Conclusions: Antenatal hydronephrosis requires close follow up during antenatal and postnatal period. Patients with mild unilateral and bilateral antenatal hydronephrosis run a relatively benign course and require limited, infrequent ultrasonography follow up. Those with bilateral moderate to severe hydronephrosis require extensive or further work up and close follow up.

Key words: Antenatal hydronephrosis, Antero posterior pelvic diameter, Ultrasonography, Micturating cystourethrogram, Vesicouretral reflux.

JRMS December 2015; 22(4): 73-77 / DOI: 10.12816/0018568

Introduction

Antenatal Hydronephrosis (ANH) is one of the commonest congenital abnormalities detected on routine antenatal ultrasonography (US). US screening during pregnancy has resulted in increasing recognition of fetal hydronephrosis. Fetal kidneys can usually be visualized by mid pregnancy, and most of the urinary tract abnormalities are detected during routine US performed between 18-20 weeks gestation. Depending on diagnostic criteria and gestation, the prevalence of (ANH) range from 0.6 to

From The Departments of:
*Pediatrics, Queen Alia Military Hospital, (QAMH), Amman-Jordan
**Radiology, (QAMH)
Correspondence should be addressed to Dr. J. Al-bderat, (QAMH), E-mail:dr_jwaher889@yahoo.com
Manuscript received Augest 26, 2014. Accepted December 18, 2014

5.4%.[1-6] Prenatal US detection of fetal genitourinary abnormalities was first reported in 1970 by Garret *et al*.[7] ANH is reported in 1%-5% of pregnancies,[8,9] and it is the most common fetal anomaly diagnosed in utero.[2] It is identified by a renal pelvic diameter (RPD) of more than 4mm in the second trimester and more than 7mm in the third trimester, on antenatal US.[10] It represents a wide range of diagnosis from transient benign condition to conditions that can significantly affect renal function and result in significant morbidity.[11] Early diagnosis and treatment are important to preserve kidney function and prevent the progression to chronic kidney disease. Although the demonstration of ANH has several potential benefits, the detection of any potential abnormalities during pregnancy is a source of stress to the parents, for that, prenatal consultations between the relevant specialists is useful in decreasing parental anxiety and help in postnatal management. This study was performed at Queen Alia Hospital (QAH) Amman-Jordan to determine the causes and clinical outcome for those infants with ANH and to identify the infants who need more investigations.

Methods

A retrospective review of the collected data for all infants with ANH seen at Queen Alia Hospital. Amman –Jordan. During the period between Feb 2010 to April 2013. ANH was defined depending on antenatal US that was performed after the 30 weeks gestation. Patients were divided into group (I) with (unilateral hydronephrosis) and group (II) with (bilateral hydronephrosis and those with dilated ureter). The degree of ANH was graded by pelvic diameter according to the antero-posterior diameter classification as mild, moderate, severe if the APD was 7-9, 10-15, and more than 15 mm respectively. A total of 80 infants were seen at QAH with ANH, they had postnatal US within 7-10 days of life, repeated US at 6 weeks of age to confirm the presence of hydronephrosis. An early US and micturating cystourethrogram (MCUG) was performed within 48 hours of life for those with suspected lower urinary tract obstruction, and in those with bilateral severe hydronephrosis or severe hydronephrosis in a single kidney. MCUG was performed after 6 weeks of life in those who had evidence of postnatal hydronephrosis by US at 1 and 6 weeks postnatally or if there was ureteric dilatation detected by US. All infants with ANH who underwent MCUG were given prophylactic antibiotic.

When there was evidence of vesico-ureteric reflux (VUR) or multicystic dysplastic kidney, 99m Tc-labelled dimercaptosuccinic acid (DMSA) scans were performed. If there was no VUR inspite of ureteric dilatation detected by US, and in those with renal deterioration or worsening of hydronephrosis detected by US and manifested by increasing in APD with thinning of the cortex, 99m Tc-labelled mercaptoacetyl triglycine (MAG 3) renograms was done to rule out upper or lower urinary tract obstruction. Follow up was performed by serial US and radionuclide scan to assess differential function when required for a variable period after birth. All US examinations were reviewed by a single pediatric radiologist to decrease inter-reviewer variability. Clinical characteristics and outcome were evaluated and compared between the two groups relative to the degree of postnatal hydronephrosis. Statistical analysis was done using Fisher's exact test and Chi-square test. The difference in outcome was considered significant when the P value was less than 0.05.

The use of patient's data in this study was approved by the ethical committee of the Jordanian Royal Medical Services.

Results

Among 80 infants registered, 5 infants were excluded from this study because of lacking data and loss of follow up, leaving 75 infants in this study group. The mean follow-up was18.5 months (range, two month - 36 months). Fifty seven (71%) were males. Twenty three (29%) were females with a male: female ratio (2.5:1). The left kidney was more commonly involved than right kidney (left: 34, right: 18). Group I (unilateral hydronephrosis) had 52 infants and only 4 (8%) required surgery. Group II (bilateral hydronephosis and uretric diltation) had 23 patients and 7(30%) required surgery.

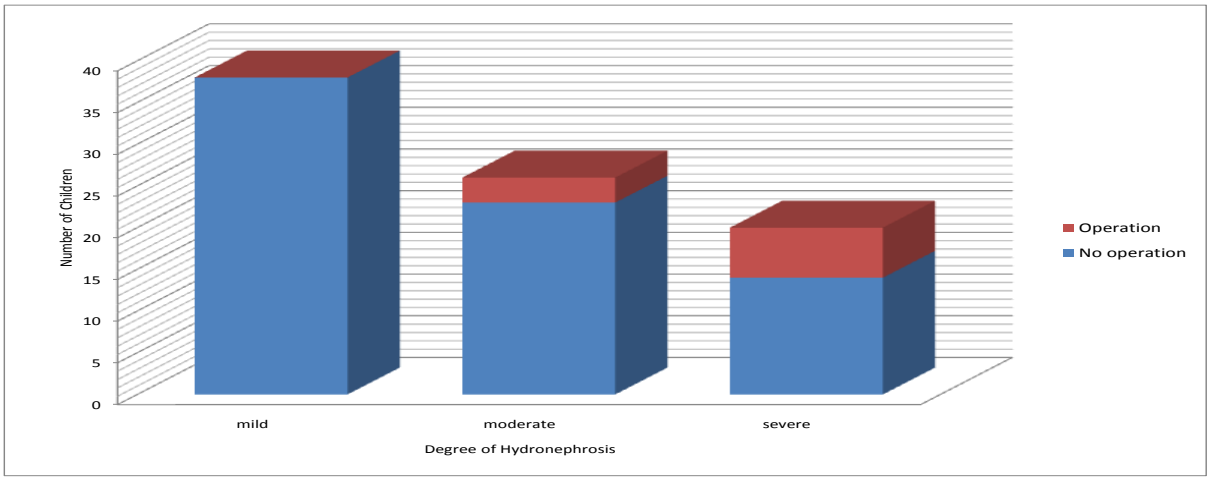

Fig. 1: Postnatal out come versus the degree of hydronephrosis (p value less than 0.05).

Table I: Causes and outcome of postnatal hydronephrosis, 52 infants in group I 4(8%) infants required surgery, 23 infants in group II 7(30%) infants required surgery.

Groups	Diagnosis	Total number	Surgery
Group(I)	Transient hydronephrosis	25	Nil
	UPJO	12	2
	VUR	12	Nil
	VUJO	2	2
	MCKD	1	Nil
Group(II)	UPJO	11	2
	VUR	8	1
	PUV	2	2
	VUJO	1	1
	VUR+UPJO	1	1
Total	ALL diagnosis	75	11

Table II: Outcome in group I based on APD measured after 30 weeks of gestation.

Antenatal APPD measurement	Total	Surgery
7-9 mm (mild)	30	Nil
10-15 mm (moderate)	15	1
More than 15 mm (severe)	7	3

Table III: Outcome in group II based on APD measured after 30 weeks of gestation.

Antenatal APPD measurement	Total	Surgery
7-9 mm (mild)	8	Nil
10-15 mm (moderate)	8	2
More than 15 mm (severe)	7	5

Outcome versus the degree of antenatal hydronephrosis was demonstrated in (Fig. 1). The rate of operation increased as the degree of hydronephrosis increased. Causes of ANH and their outcome after postnatal evaluation were summarized in Table I. Twenty five infants (33%) of those in group I were found to have transient hydronephrosis in which hydronephrosis resolved spontaneously on the first or on follow up postnatal ultrasonograohy evaluations. Uretropelvic Junction Obstruction (UPJO) and Vesico Uretric Reflux (VUR) were equally seen in 12 (16%) infants for each in this group. Surgical management was required in 2 out of 12 with UPJO, and none of those with VUR in group I required surgery. Multicystic kidney disease was seen in one infant (1%). Vesico Uretral Junction Obstruction VUJO was seen in 2 infants (3%) in group I and all of them required surgery.

In group II UPJO has been demonstrated in 11 infants (15%) and 2 of them were managed surgically. VUR was seen in 8 infants (11%), one of them managed surgically. Two infants (3%) were diagnosed to have posterior urethral valve and both required surgery. One infant (1%) had VUJO and needed surgery. Vesicouretral reflux and PUJ was diagnosed in the same infant (1%). Table II and III summarized subgroups of group I

and II according to the grades of hydronephrosis. Mild hydronephrosis detected in 38 infants and none of them were operated. Moderate hydronephrosis seen in 23 infants and 3 of them required surgery. Surgery indicated in 8 out of 14 infants with severe hydronephrosis.

Discussion

The rate of postnatal pathology is directly related to the severity of ANH. Domenstrable postnatal pathology will be identified in fetuses with ANH in 11% of those with mild hydronephrosis, 45% of those with moderate hydronephrosis, and 88% of those with severe hydronephrosis.[12] In most cases, there were persistant postnatal renal abnormalities when the APD of the fetal renal pelvis measured more than 5mm at 20 weeks, > 8mm at 20-30 weeks, and > 10mm at > 30 weeks of gestations.[7,13-15] Thus the importance of antenatal US is not only to detect ANH ,but also to determine the specific investigation and management that the patients might need.

In our study males were more frequently affected than females which was similarly seen in other studies.[16-18] Although the effect of kidney side on their outcome is not clearly examined, in this study Left kidney was more commonly involved than the right which also show similarities to the other studies.[17] It has been shown that US assessment performed shortly after birth or during the first 48 hours of life may underestimate the degree of hydronephrosis relative to later follow up.[19-21] In this study the early postnatal US was performed after the first week of life for those with mild to moderate unilateral hydronephrosis, in contrast to other studies where US done within the first 4 days of life[17,18] to avoid a false negative results due to oliguria in the first week of life. The management of ANH has changed from early surgical intervention to a close observation and follow up for any renal deterioration and progression of hydronephrosis. In our study, of the 38 infants seen with mild unilateral hydronephrosis, none of them required any surgical intervention. This finding is consistent with other studies,[22,23] that most of infants with mild isolated hydronephrosis with or without VUR will undergo spontaneous resolution, and operative intervention was not required in this group of patients. In contrast to those with moderate or severe hydronephrosis, where surgery was required in 4 (8%) patients in group I, and 7 (30%) patients in group II, which is comparable to other studies findings.[16-18,23] The most common detected causes of ANH were transient hydronephrosis (33%) which was similarly seen in other studies[22] followed by PUJO (31%), and VUR in (27%). Posterior urethral valve seen in (3%), VUJO also seen in (4%). The high incidence of transient hydronephrosis seen in our study is in contrast to other studies,[16-18] this is because our center is not tertiary or referal care center as those in other studies.

The Limitations of the Study

The small numbers of the study, and many infants were excluded because they lost their follow up. In addition to the heterogeneity of the study where the cause of ANH had been verified like in those with multicystic dysplastic kidney, VUR, PUV which were included in the present study. Also the decision for surgical interventions might be variable and could bias the results as no protocols were uniformly used and cases were not seen by a single pediatric surgeon, as there is an important practice variability between pediatric nephrologists and urologists in the management of children with ANH, and the lack of treatment guidelines which was mentioned by Braga LH, *et al* [23] in their national Canadian survey. However new guidelines were published and revised by Sinha A, *et al*. [24]

Conclusion

Antenatal hydronephrosis require close follow up during antenatal and postnatal period. Patients with mild unilateral and bilateral antenatal hydronephrosis runs a relatively benign course and require limited and infrequent ultrasonography follow up. Those with bilateral moderate to severe hydronephrosis require extensive work up and close follow up, and need more surgical interventions to preserve their renal function. Transient and physiological hydronephrosis is still the commonest cause of ANH.

Acknowledgment

We would like to thank Dr. Issa Hazaa (senior consultant of pediatric nephrology) for reviewing this manuscript.

References

1. **Mallik M, Watson AR.** Antenatally detected urinary tract abnormalities: More detection but less action. *Pediatr nephrol* 2008; 23: 897-904.
2. **Dudley JA, Haworth JM, McGraw ME, *et al.*** Clinical relevance and implications of antenatal hydronephrosis. *Arch Dis Child Fetal Neonatal Ed* 1997; 76(1):F31-34.
3. **Kim EK, Song TB.** A study on fetal urinary tract anomaly: Antenatal ultrasonographic diagnosis and postnatal follow-up. *J Obstet Gynecol Res* 1996; 22:569-573.
4. **EK S, Lidefeldt KJ, Varricio L.** Fetal hydronephrosis; Prevalence, natural history and postnatal consequences in an unselected population. *Acta Obstet Gynecol Scand* 2007; 86(12):1463-1466.
5. **Livera LN, Brookfield DS, Egginton JA, *et al.*** Antenatal ultrasonography to detect fetal renal abnormalities: A prospective screening programme. *BMJ* 1989; 298:1421-1423.
6. **Sairam S, Al-Habib A, Sasson S, *et al.*** Natural history of fetal hydronephrosis diagnosed on mid-trimester ultrasound. *Ultrasound Obstet Gynecol* 2001; 17(3):191-196.
7. **Garret WJ, Grunwald J, Robinson DE.** Prenatal diagnosis of fetal polycystic kidney by ultrasound. *Aust N Z J Obstet Gynecol* 1970;10:7-9.
8. **Nguyen HT, Herdon A, Cooper C, *et al.*** The Society for Fetal Urology consensus on the evaluation and management of antenatal hydronephrosis. *J Paediatr Urol* 2010; 6:212-231.
9. **Pates JA, Dashe JS.** Prenatal diagnosis and management of hydronephrosis. *Early Hum Dev* 2006; 82(1):3-8.
10. **Westera J, Lambrianides A Jon-Paul Meyer.** The management of antenatal hydronephrosis detected on routine prenatal ultrasound. *JCU* 2013;0(0) 1-5.
11. **Lee RS, Cendron M, Kinnamon DD, *et al.*** Antenatal hydronephrosis as a predictor of postnatal outcome: A meta-analysis. *Paediatrics* 2006; 118 (2): 586-593.
12. **Cachat F.** Antenatally detected hydronephrosis: practical approach for hydronephrosis. *Rev Med Suisse* 2005; 7: 509-512.
13. **Narchi H, Amirlak I.** Antenatal hydronephrosis. *J Arab Neonatal Forum* 2006; 3:33-39.
14. **Brophy MM, Austin PF, Coplen DE.** Vesicoureteral reflux and clinical outcomes in infants with prenatally detected hydronephrosis. *J Urol* 2002; 168: 1716-1719.
15. **Assadi F, Schloemer N.** Simplified Diagnostic Algorithm for Evaluation of Neonates with Prenatally Detected Hydroneohrosis. *IJKD* 2012; 6: 284-290.
16. **Safaei Asl A, Maleknejad Sh.** Clinical Outcome and Follow-Up of Prenatal Hydronephrosis. *Saudi J Kidney Dis Transpl* 2012; 23(3): 526-531.
17. **Lim DJ, Park JY, Kim JH, *et al.*** Clinical characteristics and outcome of hydronephrosis detected by prenatal ultrasonography. *J Korean Med Sci* 2003;18:859-862.
18. **Docimo SG.** Re: Optimal timing of initial postnatal ultrasonography in newborn with prenatal hydronephrosis. *J Urol* 2003; 169(4):1474.
19. **Docimo SG, Silver RI.** Renal ultrasonography in newborns with prenatally detected hydronephrosis: why wait? *J Urol* 1997;157(4):1387-1389.
20. **Yang Y, Hou Y, Niu ZB, *et al.*** Long-term follow-up and management of prenatally detected, isolated hydronephrosis. *J Pediatr Surg* 2010; 45(8): 1701-1706.
21. **Cheng AM, Phan V, Geary DF, *et al.*** Outcome of Isolated Antenatal Hydronephrosis. *Arch Pediatr Adolesc Med* 2004; 158:38-40.
22. **Babu R, Sai V.** Postnatal outcome of fetal hydronephrosis: Implications for prenatal counselling. *Indian J Urol* 2010; 26:60-62.
23. **Braga LH, Ruzhynsky V, Pemberton J, *et al.*** Evaluating practice pattern in postnatal management of antenatal hydronephrosis: a national survey of canadian pediatric urologists and nephrologists. *Urology* 2014; 83(4):909-914.
24. **Sinha A, Bagga A, Krishna A, *et al.*** Revised guidelines on management of antenatal hydronephrosis. *Indian J Nephrol* 2013; 23(2):83-97.