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Original Research Article

A prospective study antenatally detected hydronephrosis and their postnatal evaluation and management

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ABSTRACT

Background: Detection of urologic anomalies prenatally permits fetal interventions that avoid complications in rare cases of bladder outlet obstruction with oligohydramnios even though their final benefits still remain controversial. To analyse the incidence of ureteropelvic junction (UPJ) obstruction in antenatally detected hydronephrosis cases.
Methods: This prospective study was conducted February 2019 to August 2019 at the Institute of Child Health and Hospital for Children Egmore, Chennai. All the cases of hydronephrosis which were detected antenatally and those children presented with hydronephrosis in the neonatal period were taken for this study. Totally 58 cases were analyzed in the study, among that 32 cases detected antenatally with UPJ obstruction. Their epidemiology and their immediate postnatal findings (USG abdomen by 3-7 days, IVP and DTPA by 4-6 weeks) were recorded and the percentage of cases in which pelvic-ureteric junction obstruction was significant.
Results: Among the cases that were diagnosed to have hydronephrosis antenatally (46), 69% (32/46) had UPJ obstruction, 21% (10/46) had bilateral hydronephrosis, 6.5% (3/46) had vesicoureteric reflux and rest had other anomalies (1/46).
Conclusions: Antenatal hydronephrosis (ANH), one of the most common abnormal findings on the antenatal ultrasound (US), continues to increase as the standard of care includes the 2nd trimester US. US is the mainstay of the postnatal evaluation and voiding cystourethrogram may be safely reserved for high-grade ANH or dilated distal ureter. New urinary biomarkers may offer promising potential for more accurate risk stratification in the near future.

Keywords: Child, Diagnostic imaging, Hydronephrosis, Prenatal diagnosis

INTRODUCTION

Hydronephrosis is the most common congenital condition that is detected by prenatal ultrasonography. Moreover, the widespread use of prenatal ultrasonography results in increased recognition of hydronephrosis.[1] The detection of fetal hydronephrosis presents a diagnosis and therapeutic dilemma.[2] Despite previous studies on this issue, there is an insufficiency of knowledge concerning the pathophysiology of fetal hydronephrosis and of its natural history in the infants and there is consensus on how to manage an infant with prenatally detected hydronephrosis.[3] The diagnosis of fetal pelvis dilatation and its natural history postnatally is best understood if understand that the definition of hydronephrosis has undergone a sea change. Traditionally hydronephrosis was defined as dilatation of the pelvicalyceal system due to partial or complete obstruction.[4] However, all these three terms are used interchangeably and are used to describe a dilated pelvicalyceal system regardless of its etiology. The antenatal ultrasound screening is most commonly performed at 18-20 week of gestation.[5] The

sonologist should be vigilant in the antenatal period to differentiate a dilated collecting system from the hypoechoic sonolucent pyramids which may mimic hydronephrosis.[6] Once the diagnosis of a dilated collecting system is made, it should be objectively described using one of the various classification systems.[7] With the sophisticated ultrasound machines with better resolution detecting smaller dilatations of the renal pelvis, the cut-off value of the renal pelvis dilatation necessitating cognizance and achieving clinical significance has been a matter of debate.[8] In the early '80s, a threshold value of 10 mm indicated the need for further investigations in the postnatal period.[9,10]

Aim of the study was to analyze the incidence of ureteropelvic junction (UPJ) obstruction in antenatally detected hydronephrosis cases.

METHODS

This Prospective study was conducted February 2019 to August 2019 at the Institute of Child Health and Hospital for Children, Egmore, Chennai. All the cases of hydronephrosis which were detected antenatally and those children presented with hydronephrosis in the neonatal period were taken for this study. Totally 58 cases were analyzed in the study, among that 32 Cases detected antenatally with UPJ obstruction. Their epidemiology and their immediate postnatal findings (USG abdomen by 3-7 days, IVP and DTPA by 4-6 weeks) were recorded and the percentage of cases in which pelvic-ureteric junction obstruction was significant. Inclusion criteria were patients antenatally detected hydronephrosis with postnatal confirmed UPJ obstruction. Exclusion criteria were other cases of bilateral hydronephrosis, vesicoureteric reflux, and dysplastic system.

Antenatally detected hydronephrosis

The clinical presentation of the pelvic-ureteric obstruction has dramatically changed since the advent of maternal ultrasonographic screening. Before the routine fetal ultrasound, the commonest presentation was abdominal flank mass. 50% of abdominal masses in newborns are of renal origin with 40% being secondary to pelvic-ureteric obstruction. The newborns also present with abdominal pain, urinary tract infections, irritability, vomiting, and failure to thrive. Fetal urinary tract dilatation is present in approximately 1 in 100-200 pregnancies. The male to female ratio is 3: 1 and usually sporadic. The left kidney is commonly involved. Dilatation of the urinary tract can be secondary to obstructive or non-obstructive causes. The various obstructive causes include pelvic-ureteric junction obstruction (44%), VUJ obstruction (21%), multicystic dysplastic kidney, ureterocele/ectopic ureter, duplicated collecting system (12%), posterior urethral valves (9%) and hydrometrocolpos. The non-obstructive causes include physiological dilatation, vesicoureteric reflux (14%), prune belly syndrome, renal cyst, and megacalicosis.

Graded the fetal hydronephrosis into 5 grades as grade I- detectable renal pelvic dilatation, grade II- dilatation greater than 1 cm, grade III, IV- a further degree of pyelectasis with dilatation greater than 1.5 cms and grade V– association with the atrophic cortex.

Dilatation of the collecting system can occur in the absence of obstruction and is termed as physiological hydronephrosis. Typically, the ureter is of normal caliber and is not seen. But if dilated the size of the ureter is also assessed ultrsonographically and graded 1-3 according to ureteral size width <7 mm, 7-10 mm, >10 mm respectively.

Statistical analysis

The statistical software namely SAS 9.2, SPSS 15.0, Stata 10.1, MedCalc 9.0.1, Systat 12.0 and R environment ver. 2.11.1 were used for the analysis of the data and Microsoft Word and Excel have been used to generate graphs, tables, etc.

RESULTS

Most of the antenatally detected UPJ obstructions were found to be male children (around 65%). The ureteropelvic junction obstruction is found to be predominantly lateralized to the left side (i.e. around 68%). No cases were detected with bilateral PUJ obstruction in this study (Table 1).

Table 1: Demographic data of patients.

Variable	Antenatally detected cases with PUJ obstruction	Cases that were operated
Sex		
Male	21	5
Female	11	2
Total	32	7
Side		
Right	10	2
Left	22	5
Total	32	7

Among the cases that were diagnosed to have hydronephrosis antenatally (46), 69% (32/46) had Ureteropelvic junction obstruction, 21% (10/46) had bilateral hydronephrosis, 6.5% (3/46) had vesicoureteric reflux and rest had other anomalies (1/46). Table 3: Among the 32 cases, 12 cases were found to have an anteroposterior diameter of the renal pelvis 10 - 15 mm and 13 cases with 15-20 mm and 7 cases with >20 mm. All of the cases detected >20 mm was treated surgically (Table 2).

Table 4 Among the 32 cases detected antenatally with ureteropelvic junction obstruction, 25 cases (i.e. around 79%) were treated conservatively with chemoprophylaxis and follow up. Among 25 cases managed conservatively with chemoprophylaxis, 12 cases resolved spontaneously, and 13 cases were found to have minimal hydronephrosis and were closely monitored. Rest 7 cases were operated upon and managed. In center, authors use the anterolateral approach, extraperitoneal dismembered Anderson-Hynes pyeloplasty with stent.

Table 2: Split up of antenatally detected hydronephrosis.

Anomalies	No. of cases	Percentage
UPJ obstruction	32	69
Bilateral hydronephrosis	10	21
Vesicoureteric reflux	3	6
Others	1	4

Table 3: Ultrasonographic findings antenatally and postnatally.

Antenatal USG findings	Antero posterior diameter		
	10-15 mm	**15-20 mm**	**>20 mm**
Mild (2/32)	2	0	0
Moderate (18/32)	8	9	1
Severe (12/32)	2	4	6

Table 4: Follow up of antenatally detected ureter pelvic junction obstruction in postnatal period.

Management	No. of cases	Percentage
Surgical	7	10.3
Conservative	25	39.06
Operated	7	10.3
Spontaneous resolution	12	18.75
On chemoprophylaxis and constant follow up	13	20.31

DISCUSSION

Among the antenatally detected hydronephrosis, 69% of cases had ureteropelvic junction obstruction in this case study. There is quite a large variation in the percentage of cases that had bilateral hydronephrosis i.e. in this study it is 21% of cases whereas in Haralambous et al study it is only 3%.[11] In this case study, the sex ratio of the antenatally detected UPJ has a male predominance i.e. 65: 35. In a study conducted by Hawthorne et al there is still a higher male predominance i.e. 76:24.[12] About 70% of the cases, detected antenatally with ureteropelvic junction obstruction are found on the left side in this study similar to that of the study conducted by Johnston et al.[13] In this present study among the cases found to have severe UPJ obstruction antenatally, and 50% required surgery whereas in a study conducted by Evans et al only 25% required surgery.[14] Among the 32 cases that were detected antenatally with UPJ obstruction, 79% of them were treated conservatively with Josephson S et al, only 59.3% of cases detected antenatally were treated conservatively.[15] According to Kass et al study there is a quite high percentage of the cases resolved postnatally i.e. around 55%.[16] Whereas in a study conducted by Keller et al there is a quite low percentage of cases are reported. Besides the diagnosis of hydronephrosis, the antenatal ultrasonography should document the amniotic fluid level, degree of urinary bladder distension; it's emptying and wall thickness visualization of the ureter, presence of normal or any abnormality in the opposite kidney and the echogenicity of the kidneys.[17] These additional findings often contribute to establishing the postnatal diagnosis. In cases of posterior urethral valves, the level of amniotic fluid is a significant predictor of renal function and clinical outcome. The most common cause of ANH is transient HN which resolves as time goes.[18] UPJ obstruction is the most common underlying pathology of ANH and its incidence ranges from 10 to 30%.[19] The level of ureteral obstruction can be as low as a ureterovesical junction (UVJ). UVJ obstruction usually, not always, causes dilation of the entire ureter, which is called as hydroureter.[20]

CONCLUSION

Most of the cases diagnosed to have unilateral hydronephrosis antenatally could be managed conservatively. Only around 20% of the cases required surgical management. The anteroposterior pelvic diameter in postnatal ultrasonography is considered a vital parameter to decide the mode of treatment. (i.e. observation, chemoprophylaxis with close monitoring or surgery).

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