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Original Article

Outcome Of Pediatric Hydronephrosis Diagnosed By Ultrasound

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تحديد المخرجات من تشخيص مرض استسقاء حوض الكليه الولادى بواسطة الموجات فوق الصوتية عند الاطفال

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الملخص العربي:

الهدف :إن الغرض من هذه الدراسة هو تحديد النتائج المكتشفه عند الرضع والاطفال اللذين تم تشخيصهم بمرض استسقاء حوض الكلية عن طريق الموجات فوق الصوتية.
خطوات البحث: تم دراسة 46 رضيع وطفل اقل من 11 سنه تم لديهم تشخيص استسقاء حوض الكلية في الفترة مابين أبريل 1995إلى أبريل 2000، وجرى تقييم نتائج متابعتهم خلال فتره لا تقل عن 12 شهرا.
النتائج : تم تحديد46 طفلا32 من الذكور:14 من الإناث متوسط اعمارهم عند تشخيص استسقاء حوض الكلية ± 1.10 0.27سنة وتم تشخيص 58٪ من المرضى عند الولادة .28طفلا كان الاستسقاء من جانب واحد 60.8)٪ (من الحالات، وعلى الأقل كان الاستسقاء فى حوض الكلية بنسبه معتدلة أو شديدة في 43.4) 20٪ (من الكلى المتضررة .وبما لايقل عن 22طفلا 46من 47.8) ٪ (طفلا اختفي الاستسقاء من عندهم خلال فترة المتابعه ،بينما استمر الاستسقاء عند 24 طفلا 52.1٪ .
الخلاصة : أن أهم ميزة نحصل عليها من معرفة الأطفال المصابين باستسقاء ولادى فى حوض الكلى عند اجراء فحص الموجات فوق الصوتية هي القدرة على التقييم في الوقت المناسب لبدء تحديد شدة الاصابه وبدايه المتابعه ومنع التدهور التدريجي في وظيفة الكلى

ABSTRACT

Objectives: The purpose of this study was to determine the outcome of infants with a history of hydronephrosis diagnosed by ultrasound.

Methods: In a five-year period from April 1995 to April 2000, 46 infants and children < 11 years of age with diagnosis of neonatal hydronephrosis were evaluated and followed for at least 12 months.

Results: 46 children were identified (32 male: 14 female). The mean age at diagnosis of hydronephrosis was 1.10 ± 0.27 years and 58% of the patients were diagnosed at birth. The hydronephrosis was unilateral in 28 (60.8%) of cases, and hydronephrosis was at least moderate or severe in 20 (43.4%) of affected kidneys.
At last follow-up, the abnormality had resolved in 22 out of 46 (47.8%) available patients, 24 (52.1%) had persistent hydronephrosis.

Conclusion: We conclude that the most important advantage of knowing that the children has ultrasound findings of persistent hydronephrosis is ability to begin timely evaluation to identify severity of hydronephrosis and prevent progressive deterioration of renal function.

Keywords: *Hydronephrosis, ultrasound, outcome*

INTRODUCTION

Thyroid Hydronephrosis is one of the common anomalies detected during fetal ultrasound evaluation. [1] counseling for antenatal hydronephrosis has gained popularity and more and more parents attend these clinics to find out the outcome. [2] .Infants with neonatal hydronephrosis can have a range of abnormalities including ureteropelvic junction obstruction (UPJO), ureterovesical junction obstruction, megacystis megaureter, or vesicoureteral reflux (VUR).

The second and third entities are fairly uncommon and, therefore, pediatric patients who have hydronephrosis and a normal voiding cystourethrogram (VCUG) are presumed to have UPJO. This abnormality occurs in approximately 1 in every 2,000 live births and accounts for approximately half of the cases of prenatal hydronephrosis.[3,4]

In most cases, neonatal hydronephrosis and presumed UPJO gradually resolves without surgical

intervention. There is a strong correlation between the Society of Fetal Urology (SFU) grading of hydronephrosis and the likelihood of spontaneous resolution: Grade I resolves in approximately 50% of patients, and grades II, III, IV hydronephrosis resolve in 36%, 16%, and 3% of cases, respectively.[3]

However, in current practice, there is little information about the natural history of hydronephrosis and the time for resolution, in antenatal ultrasound screening for pregnant women. Moreover, there are few guidelines regarding frequency of follow-up visits and referral to urology for more extensive study such as performance of renal radionuclide scans and possible decision for surgery in children with hydronephrosis who are

cared for by general pediatricians and pediatric nephrologists. Additionally, the value of clinical markers such as birth history, urinary tract infection (UTI), and severity of the hydronephrosis as a guidance in predicting patients likely to require urological evaluation has not been adequately studied.

The aim of the study is to assess the outcome of fetal hydronephrosis, segregate them into simple groups so that the milder ones could be favorably counseled. At the same time, patients with more serious type could be informed about the importance regarding regular follow-up, prompt evaluation and timely intervention whenever necessary. The data from this study can be useful for the physicians involved in the counseling of these parents pre and postnatal.

Objective:

The aim of this study was to determine the efficacy and accuracy of FNAC in diagnosis of thyroid swellings in our surgical department and compare and matching, accuracy, sensitivity, specificity, positive predictive value and negative predictive value of the results in various thyroid swellings in correlation with histologic diagnosis.

MATERIAL AND METHODS

The study was conducted in all pediatric patients followed by one pediatric nephrologist with different presentation at different ages diagnosed with neonatal hydronephrosis at our institution between 1995 and 2000 and followed by the Division of Pediatric Nephrology.

The clinical data were collected on pre-approved data collection sheets, the information
was identified, and the sheet linking the study number with the individual patient was stored
in a secure location.
The project was reviewed and approved by the Institutional Review Board.
A database maintained at the Division of Nephrology, which includes patient gender, age, and chief complaint was scanned to identify patients with "UPJ obstruction," "hydronephrosis," or "obstructive uropathy." The review of charts with these three diagnostic terms was done to ensure complete ascertainment of patients with hydronephrosis and presumed UPJO.

Children were included in this review if they had: (1) hydronephrosis without hydroureter detected in a postnatal ultrasound and a negative VCUG; or (2) hydronephrosis without hydroureter in the absence of UTI and absence of a documented negative VCUG because of parents refusal of the study.

The standard recommendation at this institution is to perform a VCUG in any newborn or infant under 3 months of age with confirmed hydronephrosis. In addition, patients had tqaqqqqo be followed for a minimum of 12 months to be eligible for inclusion in the study.
Cases were classified as mild, moderate, or severe hydronephrosis on the basis of the findings of their initial ultrasonographic examinations using the classification criteria of Mandell.[15]

The following data were recorded for patients: date of birth, gender, presence of prenatal hydronephrosis, gestational age/birth weight, history of perinatal complications or UTI, severity of hydronephrosis, age at diagnosis, unilateral or bilateral disease, serial ultrasounds, and outcome, namely resolution of hydronephrosis, persistent hydronephrosis, or referral to urology. The time from diagnosis to each outcome was then calculated by month.

Severity of hydronephrosis of each renal unit was recorded based on the radiology report as mild, moderate or severe. Outcome was recorded as improving, worsening, stable, or resolved.

Statistical Methodology

Frequency tables (number, percent) were mainly calculated for all the measurements

Comparability tests were measured in the study using chi-square test for categorical variables, like sex, etc. and t-test for continuous variables, like age levels. Significance was detected at p value < 0.05

RESULTS

Patients Demographics:

Table (1) shows the sample characteristics of hydronephrosis cases:

The total 46 patients, 26 (56%) had mild hydronephrosis, while 20 (43%) had moderate and severe hydronephrosis, with average age at diagnosis 1.10 ± 0.26 years range from 0.0 to 6 years, 32 (70%) were male patients and 14 (30%) were female patients. Serum creatinine average was 38.58± 2.39 micromoles range from 20 to 29 micromoles and serum creatinine average follow up was 51.74± 9.82 micromoles range from 23 to 223 micromoles.

		Overall	Mild	Moderate and severe	P Value
Distribution		46	26 (56%)	20 (43%)	
Age (years)	Mean ± SE Range	1.10 ± 0.26 0.0 - 6	1.46 ± 0.40 0.0 - 6	0.63 ± 0.28 0.0 – 4	0.0981
Sex (%)	Male Female	32 (70%) 14 (30%)	20 (43%) 6 (13%)	12 (26%) 8 (17%)	0.2162
Serum Creatinine (micromoles)	Mean ± SE Range	38.58 ± 2.39 20 – 90	39.16 ± 2.63 20 – 73	37.78 ± 4.48 20 – 90	0.792
Serum Creatinine in following up (micromoles)	Mean ± SE Range	51.74 ± 9.82 23 – 223	38.54 ± 3.31 23 – 66	86.90 ± 21.57 24 – 233	0.1961

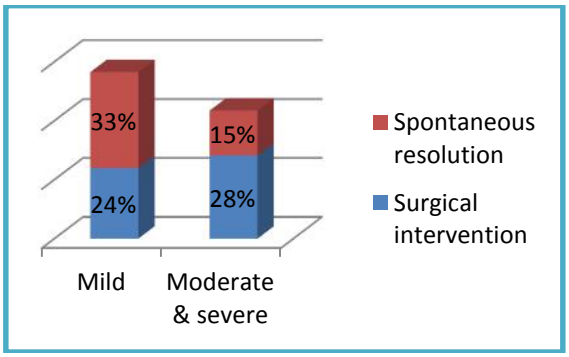

Figure 1 showed outcome of hydronephrosis.
Mild hydronephrosis patients had 26 patients and only 11 (24%) required surgery. Moderate and severe hydronephrosis patients had 20 patients and 13 (28%) required surgery. The difference in outcome between the groups was statistically not significant (P value= 0.1267).

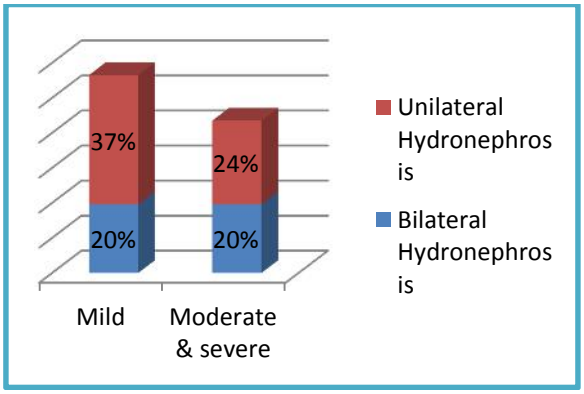

Figure 2 showed 18 (40%) had bilateral hydronephrosis, ureteric dilatation or bladder wall thickening in mild hydronephrosis and in moderate and severe hydronephrosis, while 28 (60%) had isolated unilateral hydronephrosis in mild, moderate and severe hydronephrosis with no significance difference between both P value=0.4744.

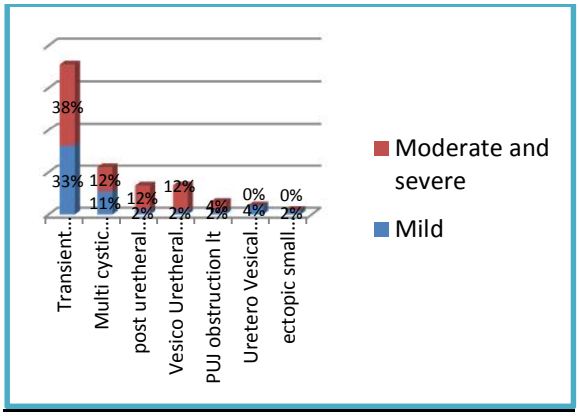

Figure 3 showed outcome of hydronephrosis
Transient hydronephrosis recorded 15/26 patients in mild hydronephrosis patients and 10/20 patients in moderate and severe patients followed by Multi-cystic dysplastic kidney (MCDK) recorded 5/26 in mild patients and 3/20 in moderate and severe patients, Vesico uretheral reflux (VUR) and Uretero vesicle junction obstruction 1/26 in first group and 3/20 in second group. There was no significant difference between both groups in diagnosis (P value= 0.1714).

DISCUSSION

The term of hydronephrosis although is clearly descriptive, it does not by itself mention the underlying etiology such as uretero pelvic junction obstruction, vesico ureteric reflux, posterior urethral valve, etc. For a treating physician, in addition to the etiology, it is also essential to know the natural history of the disease. On the other hand, for the parents, obstetricians, pediatricians, and urologists who are involved in the antenatal counseling, it would be easy if the fetal hydronephrosis outcomes are explained in a clear and simple way based on the sonographic findings rather than the potential differential diagnoses.

Extensive use of prenatal ultrasound has led to an increased rate of diagnosis of neonatal hydronephrosis, of which UPJO is the most frequent cause.[4] The postnatal imaging and management of children with hydronephrosis and presumed UPJO is debated due to the high number of cases that resolve without intervention.

This study showed that more than half of cases of hydronephrosis detected in the neonatal period or early childhood resolved spontaneously over 30 months. While the remaining of these patients had transient worsening at some time point, they all ultimately resolved. This would underestimate the rate of resolution of hydronephrosis and likely lend further support to our conservative recommendations.

The initial severity of the lesion at the time of diagnosis and presence of the hydronephrosis at birth were the only two factors that predicted failure to resolve. The recent time period (1997–2000) of our study reflects the inclusion of children who had prenatal sonograms and reflects the outcomes of hydronephrosis under current standards of antenatal care when the majority of women receive prenatal sonograms regularly during pregnancy.

To our knowledge, this study represents the largest cohort of patients with hydronephrosis followed exclusively by a medical service. In children with hydronephrosis, the question of timing of follow-up imaging studies and their management has significant implications for routine pediatric health care. This study provides support for the practice of monitoring children with hydronephrosis for a longer period of time without mandatory early intervention or referral to urology.

Twenty-three percent of neonates followed for 6 years in one study[5] and 7% of neonates with unilateral hydronephrosis followed for 5 years in another ultimately required surgical intervention.[6,7]

In our study, only 48% resolved out of the total 46 caseses. Mild hydronephrosis patients had 26 patients and only 11 (24%) required surgery. Moderate and severe hydronephrosis patients had 20 patients and 13 (28%) required surgery. Furthermore, a few of the children that ultimately resolved had transient worsening, which is interesting although in those children with hydronephrosis that worsens need urgent referral and surgical evaluation. In children with posterior urethral valves, it is suggested that ultrasound imaging be done every 4 months for the first year of life.[8]

Our data support the need for less frequent ultrasound examinations in children with hydronephrosis
secondary to presumed UPJO. We suggest that in the absence of severe disease or renal parenchyma thinning, the physician can choose to follow the children with serial sonography every 6–12 months for the first 2–3 years of life and observe for improvement. Most children who do require pyeloplasty usually do so within the first 2 years of life.[9]

We have characterized the patients as having hydronephrosis due to presumed UPJO. The later entity requires confirmation with nuclear medicine studies. Thus, a 99mTc-Mag3 renal radionuclide scan with furosemide washout is often part of the assessment of children with moderate to severe hydronephrosis.[10,11]

A large meta-analysis by Sidhu et al. showed that Grade I-II hydronephrosis was about 5 times more likely to resolve as compared to higher severity lesions.[12] Similarly, in our study, hydronephrosis that was mild to moderate resolved in 32% of patients, compared to 15% of children with moderate to severe hydronephrosis.

This supports the claim that severity of hydronephrosis predicts failure of the lesion to resolve. However, Onen and colleagues found that even with more severe lesions, two-thirds of patients still do not require surgery.[13]

In our study, children were referred both immediately after birth and later in life for evaluation of their hydronephrosis. This could potentially influence our results because the follow-up time period may be different physiologically in terms of kidney development from the time of birth compared to that same interval later in life.

Our aim is to focus on the role of general pediatricians and pediatric nephrologists
in the care of children with hydronephrosis. The outcomes of those managed by urologists would be the subject of an independent study.

CONCLUSION

The results suggest that prolonged monitoring is suitable for the majority of children with neonatal hydronephrosis. Our study provides an approach for primary care physicians and pediatric nephrologists to manage hydronephrosis by allowing a longer observation period for spontaneous resolution in following-up ultrasounds.

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