Outcome of Isolated Antenatal Hydronephrosis

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Objective: To define the clinical outcome in isolated antenatal hydronephrosis (ANH), defined as pelviectasis without vesicoureteral reflux or urinary tract obstruction.

Study Design and Patients: We analyzed prospectively gathered data from patients with isolated ANH. Pelviectasis, graded using the anterior-posterior diameter reference criteria, was defined by the status of the more severely affected kidney. Urinary tract obstruction was ruled out by diethylenetriamine pentaacetic acid scan when clinically indicated. Statistical differences were analyzed using the McNemar and χ² tests.

Results: Isolated ANH was defined in 63 patients. The first postnatal ultrasonogram (mean±SD age, 18.4±17.8 days) revealed resolution of ANH in 16 (25%), mild pelviectasis in 34 (54%), and moderate or severe pelviectasis in 13 (21%). Ultrasonogram at the last follow-up visit (23.3±14.8 months) in 57 patients demonstrated normal pelvic diameter or mild pelviectasis in 47 (82%) (P=.002). In the 13 patients with moderate or severe neonatal pelviectasis, severity decreased in 11 (85%). Deterioration of any grade of pelviectasis occurred in only 3 (5%) of 57 patients. Renal growth, measured by renal length, was normal in all 57 patients.

Conclusion: Isolated ANH resolves or improves in most patients during the first 2 years of life.

Eighty-six infants with ANH were identified among patients referred to the HSC Newborn Renal Clinic. Vesico-ureteral reflux, ureteropelvic junction obstruction, and posterior urethral valves were demonstrated in 18 (21%), 4 (5%), and 1 (1%) of these infants, respectively. Thus, 63 patients were given a diagnosis of isolated ANH.

The outcome of antenatal pelviectasis in neonates with isolated ANH was determined by means of renal ultrasonography at a mean age of 18.4 ± 17.8 days. The first postnatal ultrasonogram, obtained no earlier than 5 days of age, revealed resolution of antenatal hydronephrosis in 16 (25%) of the 63 patients. Of the remaining patients, 21 (33%) and 26 (41%) had unilateral or bilateral pelviectasis, respectively. In 34 affected patients (54%), pelviectasis was mild. In a minority of patients, the degree of pelviectasis was moderate (9/63 [14%]) or severe (4/63 [6%]). These data are consistent with previous studies demonstrating that a large proportion of isolated ANH resolves or is mild in severity by the time of the first postnatal ultrasonography.5-7

To provide further insight into the outcome of isolated ANH, we measured renal pelvic diameter and size at least twice during a mean follow-up of 23.3 ± 14.8 months (range, 3-55 months). Six patients who were unavailable for follow-up demonstrated complete resolution of ANH on the first postnatal renal ultrasonogram, leaving 57 infants in whom follow-up data were available. In these 57, there was an overall improvement in pelvic diameter with decreased severity of pelviectasis in 30 (64%) of the 47 patients with mild, moderate, or severe pelviectasis (P = .002). All 10 patients with a normal pelvic diameter postnatally and who were available for follow-up had normal ultrasonographic findings at the time of the last study (Table). Of the 47 remaining patients, pelviectasis disappeared in 25 (53%), improved in 30 (64%), and was stable in 14 (30%). Deterioration from any grade of pelviectasis occurred in only 3 (5%) of 57 patients. The DTPA scans in these 3 patients with a new occurrence of moderate pelviectasis showed normal results, indicating the absence of an obstructing lesion. Measurement of renal length at each follow-up ultrasonogram demonstrated normal renal length in all 57 patients, confirming that abnormal pelvic diameter was not associated with abnormal renal growth. Taken together, these data demonstrate that isolated ANH resolves without intervention in most patients and, irrespective of severity, does not interrupt linear growth of the kidney.

Previous work by Hiraoka and colleagues4 suggested that left kidney involvement and male sex are potential risk factors for more severe degrees of ANH. To determine the relevance of these observations to our cohort of patients, we compared the degree of hydronephrosis as a function of the side of kidney involvement and sex. An analysis of severity in 126 kidneys from 63 patients across all severity groups demonstrated that pelviectasis on first postnatal ultrasonogram was worse in the left kidney compared with the right kidney (degree of pelviectasis, left vs right kidney: normal, 37% vs 61%; mild, 46% vs 30%; moderate, 11% vs 10%; severe, 6% vs 0%; P = .02). Despite these differences, analysis of the change in pelvic diameter in a given left or right kidney over time demonstrated a statistically indistinguishable rate of improvement (P = .56). Thus, congenital differences in pelvic diameter related to the side of kidney involvement do not determine outcome in the severity of pelviectasis.

Although male sex has previously been associated with severity of pelviectasis, analysis of neonatal pelviectasis in our population of 40 boys and 23 girls failed to demonstrate a statistically significant difference in severity of pelviectasis between the sexes (P = .19). Consistent with these results, boys and girls showed similar degrees of improvement on follow-up ultrasonography (P = .70). Thus, sex did not predict initial severity of pelviectasis or outcome in our patients.
to the frequent identification of fetuses with ANH. Investigation of the underlying etiology of ANH after birth defines a subgroup of patients with isolated ANH in whom there is no demonstrable associated abnormality in the kidney or lower urinary tract. The pathogenesis of pelvic dilatation in these patients is undefined but may be related to transient anatomical obstruction of the pelvis and ureters, failure to completely recanalize the ureter in utero, or persistence of a ureterovesical membrane.

In contrast to patients with severe grades of pelviectasis, clinical outcome beyond infancy has not been defined in patients with milder grades of pelviectasis. However, pediatricians and pediatric nephrologists are faced with providing advice regarding long-term prognosis in these affected patients. The data in our study provide information regarding outcome by the end of a mean time of 23 months in patients with the entire range of severity. Our results demonstrate that isolated ANH with normal pelvic diameter is stable during the ensuing 2 years. We also show that mild pelviectasis is stable in most patients, normalizes in a significant minority, and deteriorates to a moderate grade of severity in less than 20%.

Despite this deterioration, we could find no evidence of obstruction or interference with renal growth in these patients. Our results in patients with moderate or severe grades of pelviectasis are consistent with a recent report demonstrating spontaneous resolution or improvement in 78% of patients and a normal glomerular filtration rate in all 16 patients. Thus, these results suggest a favorable outcome for patients with isolated ANH. However, our study and those of others do not address long-term renal outcome in these patients.

The design of our study limited our ability to provide information regarding the relationship between the grade of pelviectasis in utero and postnatal outcome. However, several studies have previously demonstrated that pelvic diameter in utero is correlated with pelvic diameter after birth. Our study also failed to systematically assess renal function at the biochemical level. However, our results demonstrate a very high rate of spontaneous resolution, coupled with normal longitudinal renal growth in all patients and with other published data demonstrating normal glomerular filtration rate in moderately and severely affected patients, suggest a strong likelihood that serum creatinine levels are normal in our patients.

Many congenital anomalies causing hydronephrosis are highly associated with male sex. Our study demonstrated a predominance of boys with isolated ANH (male-to-female ratio, 1.7:1). Despite the higher incidence of isolated ANH in boys, we could not demonstrate a statistically significant difference in outcome between boys and girls. These findings suggest that the management of isolated ANH in boys and girls does not need to be sex specific.

Although the left (compared with the right) kidney has been shown to be more highly affected by ANH, the effect of the side of kidney involvement on outcome has not been previously examined. Our study confirmed the higher incidence of isolated ANH in the left kidney and demonstrated similar rates of improvement in hydronephrosis over time in left compared with right kidneys. Although these findings provide additional insight into the possible genetic mechanisms that determine ANH, our results suggest that the side of kidney involvement does not determine clinical outcome.

**CONCLUSIONS**

In most patients, isolated ANH is stable or improves over time. By a mean follow-up of 23 months, only 8% of patients have moderate or severe grades of pelviectasis, and all patients demonstrate normal renal size for age. These results suggest that isolated ANH is a relatively benign condition requiring limited, infrequent ultrasonographic monitoring in all but severe cases.

**REFERENCES**


