

Clinical and Radiological Course of Simple Renal Cysts in Children

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OBJECTIVE	To evaluate the clinical and, particularly, radiological course of simple renal cysts in children.
MATERIALS AND METHODS	Children with simple renal cysts were retrospectively evaluated, especially for change in the cyst diameter during follow-up and complications. In addition, the rate of increase in cyst size per year was calculated, and those characteristics of the cyst were analyzed to predict aggressiveness.
RESULTS	Simple renal cysts were detected in 45 (21 male) patients. Mean ages at diagnosis and follow-up period were 7.4 ± 4.9 and 2.9 ± 1.8 years, respectively. Forty-one of the 45 patients were followed up for longer than 1 year. Diameter of the cyst increased in 20 (49%), decreased in 4 (10%), unchanged in 13 (31%), and disappeared in 4 (10%) of patients. The average size increase and average rate of enlargement in simple cysts were 0.3 mm and 1.0% per year, respectively. Furthermore, in 19 (95%) patients, the cyst size increased in the first 2 years. Among baseline parameters, only initial cyst size was an independent predictor of annual growth rates (beta = 0.628; $P < .001$). The relationship between the initial cyst size and annual growth rates was determined as positive ($r = 0.459$, $P = .003$). Two patients with large cysts developed severe complication in the first 6 months. One of these underwent nephrectomy because of rapid increase in cyst diameter (170 mm), renal artery/vein compression, and massive hematuria. In the other patient with severe loin pain regarding simple cyst (73 mm), percutaneous aspiration was performed.
CONCLUSION	Simple renal cysts in childhood tend to slowly increase in size. However, regular radiological follow-up might be important, especially in children with large size of cyst at diagnosis, because of more rapid increase in cyst size. UROLOGY 83: 433–437, 2014. © 2014 Elsevier Inc.

Renal cystic diseases have a broad range of hereditary, nonhereditary, and acquired conditions.^{1,2} Simple renal cysts are included in this pathology group and reported in adults and rarely in children.³ The increasing use of radiological testing has led to the diagnosis of more children with simple cysts.

The simple renal cysts are usually unilateral and solitary lesions and their pathogenesis has remained unknown.^{1,4} Simple cysts, which are usually asymptomatic, are incidentally discovered during investigation made for other symptoms; however, they become symptomatic occasionally.^{3,5} Diagnosis of a simple renal cyst is established on the basis of typical radiological findings with surrounding normal renal parenchyma, normal renal function, and no associated systemic illness or disorders.³

Although there have been studies conducted on natural history and growth pattern or sequential changes of simple renal cysts in adults,⁶⁻⁸ there has been no similar study on the said subject in childhood in recent years. Therefore, this study retrospectively assessed the clinical and radiological course of simple renal cysts, especially sequential changes in their size and number in children and analyzed their characteristics to predict aggressiveness.

MATERIALS AND METHODS

Patients

We retrospectively reviewed medical records of 45 patients, who were diagnosed with simple renal cysts using ultrasonography between January, 2001, and August, 2011, and followed up in our institution.

The simple cyst was defined as the anechoic homogenous lesion, which involves water content, and a sharp interface to the adjacent renal parenchyma, and does not have wall thickening, calcification, or distal enhancement, through ultrasonography.⁹ Cysts were classified according to the Bosniak renal cyst classification system.¹⁰

Patients with a family history of genetic cystic disorders such as autosomal-dominant polycystic kidney disease, tuberous

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sclerosis, and von Hippel-Lindau disease were excluded. Patients with abnormal renal function and cystic dysplastic kidneys were excluded, as well.

Clinical Data

Patient files of the children with simple renal cysts were assessed retrospectively in terms of age at diagnosis, gender, follow-up period, complaint and/or indication for the sonogram, urinalysis by dipstick and microscopy, serum creatinine level, the location of cyst, complications, and particularly the cyst diameter through ultrasonography during follow-up.

The transverse diameter of cyst in each patient was determined per year. The yearly increase in size was calculated separately in each patient. The aggressiveness of the cysts was analyzed by considering the relationship between increase in size and the other parameters at each measurement point. The relationship between the yearly increase in size and the other parameters (age, gender, serum creatinine level, and cyst size at initial visit) was analyzed.

Statistics

A multivariate linear regression model was used to examine the relationship between the dependent variable and potential variables. Annual growth rate was entered as dependent variable. The independent covariates included gender, age, creatinine level, and initial cyst size. In addition, Pearson correlation analysis was used to determine the relationship between numerical variables correlated with aggressiveness of the renal cyst. Mann-Whitney *U* test was used to assess group differences in terms of continuous variables. Statistical significance was considered at $P < .05$. All data were shown as mean \pm standard deviation (SD) or frequency per observation.

RESULTS

The Characteristic Findings in Children With Simple Renal Cyst

Simple renal cyst was detected in 45 (21 boys) patients using ultrasonography. Table 1 illustrates characteristics of the patients. Mean age at diagnosis was 7.4 years (SD, 4.9; range, 0.2-17.8), and mean follow-up period was 2.9 years (SD, 1.8; range, 0.5-7.0). Fifty-eight percent of the cysts were present in the right kidney, usually in its upper pole.

Thirty-one (69%) patients were diagnosed during ultrasonographic evaluation, which was performed because of abdominal pain (29%), urinary tract infection (20%), obesity (13%), and hematuria (7%). Fourteen patients (31%) were diagnosed incidentally during ultrasonographic evaluation made for other medical problems, such as voiding dysfunction, history of renal tumor in family, prenatal cyst, and diabetes mellitus. The most common concomitant disease in patients with cyst was obesity (13%). Urinalysis was normal in most of the patients (84%).

Change in Cyst Diameter During Follow-up Ultrasonographic Examinations

Forty-one of the 45 patients were followed up for longer than 1 year. Of 41 patients, maximum diameter of cyst

Table 1. Characteristics of patients

Details	Value
Total population	45
Age at presentation (y)	
Mean (range)	7.4 \pm 4.9 (0.2-17.8)
Follow-up (y)	
Mean	2.9 \pm 1.9
Male	21 (47%)
Indication for ultrasound	
Abdominal pain	13 (29%)
Urinary tract infection	9 (20%)
Obesity	6 (13%)
Hematuria	3 (7%)
Other	14 (31%)
Urinalysis	
Normal	38 (84%)
Pyuria	3 (7%)
Hematuria	3 (7%)
Proteinuria	1 (2%)
Serum creatinine (mg/dL)	0.5 \pm 0.2
Increase in size of cyst	20 (49%)
Treatment	
Observation	43 (96%)
Aspiration	1 (2)
Nephrectomy	1 (2)
Localization	
Right kidney	
Upper pole	11 (24%)
Lower pole	5 (11%)
Interpolar	10 (22%)
Left kidney	
Upper pole	8 (18%)
Lower pole	4 (9%)
Interpolar	7 (16%)

increased in 20 (49%) patients, decreased in 4 (10%), and remained unchanged in 13 (31%) patients. Interestingly, the cyst disappeared in 4 (10%) patients during follow-up. In 41 patients, mean maximum diameter of the cysts increased from 18.8 mm to 20.0 mm during almost a 3-year follow-up period. The average size increase and average rate of enlargement in all simple cysts ($n = 41$) were 0.3 mm and 1.0% per year, respectively. In 20 patients having the increase in the cyst size, these values were 5.7 mm and 3.8% per year, respectively. Furthermore, in 19 (95%) of patients having the increase in the cyst size, size of cyst increased within the first 2 years after detection of the cyst. During follow-up period, the number of cysts did not increase in patients, who were included in the study.

To determine the cyst characteristics predicting the growth rates, several parameters including gender, age, creatinine level, and initial cyst size were examined. Of the baseline parameters examined, linear regression analysis revealed that only initial cyst size was an independent predictor for annual growth rates ($\beta = 0.628$, $P < .001$; Table 2). The relationship between the initial cyst size and annual growth rates was determined to be positive ($r = 0.459$, $P = .003$). In addition, the relationship between the initial cyst size and final cyst size was also determined to have positive correlation

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