Involution Rate of Multicystic Renal Dysplasia

Oded J. Kessler, MD*; Niza Ziv, MD§; Pinchas M. Livne, MD*; and P. Merlob, MD§

ABSTRACT. *Objective.* **To document the involution rate and long-term results of management of multicystic dysplastic kidney.**

Materials and Methods. **Data were collected retrospectively for all 23 infants (16 boys) with multicystic dysplastic kidney who were treated at our center over the last 19 years (1977–1995). The diagnosis was based on prenatal ultrasound in 18 patients and on palpable abdominal mass in 5, and confirmed in all patients by postnatal ultrasound and radioisotope scan. Voiding cystography was performed in 18 patients to exclude vesicoureteral reflux. Mean follow-up was 46 months (range, 3 months to 5 years) and included serum creatinine measurements and renal ultrasonography.**

Results. **Two groups of patients were identified. Ten (43.6%) with other urologic abnormalities (group A) and 13 patients without other urologic abnormalities (group B). Vesicoureteral reflux was observed in 4 patients. Nephrectomy was performed in 4 patients, all from group B. The other 19 patients were treated conservatively. Complete involution was observed in 8 patients in group A and 6 in group B after a mean follow-up period of 9.2 and 10 months, respectively. Two patients, 1 from each group, later underwent nephrectomy not because of no involution but because of an increase in the size of the kidney involved.**

Conclusion. **Patients with multicystic renal dysplasia have significant associated urologic malformations, and the natural history of the disease is unpredictable. All patients require appropriate investigation of the urinary tract and long-term follow-up.**

The most outstanding finding of the study is the much higher involution rate of multicystic renal dysplasia and the rate of associated urologic abnormalities than that reported in the literature. Surgery remains an option for the patients in the absence of no involution. *Pediatrics* **1998;102(6). URL: http://www.pediatrics.org/cgi/content/full/102/6/e73;** ***multicystic dysplastic kidney, surgery, conservative.***

ABBREVIATIONS. MCRD, multicystic renal dysplasia; UPJ, ureteropelvic junction; VUR, vesicoureteral reflux; UVJ, ureterovesical junction.

Multicystic renal dysplasia (MCRD) is the most common form of cystic disease of the kidney in childhood.[1] The increasingly widespread use of prenatal diagnostic techniques has revealed that MCRD is apparently even more prevalent than had been assumed.[2] The association of hypertension, malignancy, and incomplete involution in MCRD mandate long-term follow-up, and much controversy has surrounded the question of whether nephrectomy is indicated routinely on diagnosis.[3,4] To assess the natural history of this condition and, for purposes of proper management, the associated urinary malformations, we conducted a 19-year retrospective study of all infants with MCRD who had been diagnosed and treated in our tertiary care medical center.

From the Departments of *Urology, ‡Neonatology and §Radiology, Schneider Children's Medical Center of Israel, Beilinson Campus, Petah Tiqva; and Sackler Faculty of Medicine, Tel Aviv University, Tel Aviv, Israel.
Received for publication Jul 22, 1997; accepted May 28, 1998.
Reprint requests to (O.J.K.) Department of Pediatric Urology, Schneider Children's Medical Center of Israel, Petah Tiqva 49 202, Israel.

MATERIALS AND METHODS

We reviewed the charts and radiologic records of the 25 patients with MCRD who were diagnosed and treated at our center (Beilinson Campus and later at Schneider Children's Medical Center of Israel) between 1977 and 1995. Two patients died of nonurologic causes in the first week of life. In the present study, we refer to the 23 remaining patients. Nineteen patients were born at our center, and 4 were referred from other hospitals. The malformation had been noted on prenatal ultrasound in 18 patients (73.6%) and by palpation of an abdominal mass in 5. All patients underwent postnatal ultrasonography, and in all cases, the diagnosis was confirmed by renal radionuclide scan with technetium-99 m-dimercaptosuccinic acid. Two patients with suspected ureteropelvic junction (UPJ) stenosis also underwent renal scanning with diethylenetriamine-pentaacetic acid and Lasix. Voiding cystography was performed within 1 month of diagnosis in all but 3 patients.

Once vesicoureteral reflux (VUR) was documented and graded according to internationally accepted reflux classification, prophylactic antibacterial therapy was instituted. Serum creatinine level, blood urea nitrogen, electrolytes, and blood pressure were measured, and urine culture was performed. Long-term follow-up was primarily by ultrasonography. Cystography was repeated only in those patients with VUR at 2 and 3 years of age.

RESULTS

Of the 23 children with newly diagnosed MCRD, 16 were boys. Fourteen multicystic kidneys were on the left, eight were on the right, and one was crossed ectopic to the right. Patient age at presentation was birth to 3 months. Five patients presented with flank mass.

Another urologic anomaly was found in 43.6% of the patients, including four (22% of the cohort) with contralateral VUR (grade II/V, 3 patients; grade III/V, 1 patient) (Table 1). The VUR resolved spontaneously in all 4 patients by 24 to 36 months, and all were free of urinary tract infections during follow-up. Among the patients without contralateral VUR, other problems of the contralateral kidney included ureterovesical junction (UVJ) obstruction (1 patient) and UPJ obstruction (2 patients), suspected on initial ultrasonography and confirmed by subsequent radiologic examination (Table 1). The UVJ obstruction

TABLE 1. Prevalence of Contralateral Renal Abnormalities in Patients With MCRD

	No. of Patients		
	VUR	UPJ Obstruction	UVJ Obstruction
Right MCRD (n = 8)	2	2	—
Left MCRD (n = 14)	2	—	—
Left crossed ectopic (n = 1)	—	—	1
Total cases	4	2	1
(%)	(22)	(8.7)	(4.3)

and 1 case of UPJ obstruction were corrected surgically at ages 2 weeks and 5 days, respectively; in the second case of UPJ obstruction, renal scan with Lasix showed good renal function and T½ (half-life of the wash out of the isotope) of 12 minutes that remained stable on follow-up with no deterioration in renal function. Other associated anomalies are presented in Table 2.

Nephrectomy was performed in 4 patients with no other urologic abnormalities, all diagnosed before 1985. Diagnosis was confirmed by postoperative pathologic study that showed the multiple cysts lined by cuboidal cells surrounded by immature stroma. Primitive tubules and glomerular structures are present as islands of cartilage and fibromuscular tissue. The 19 patients diagnosed after 1985 were treated conservatively. Follow-up ranged from 3 months to 5 years. Complete involution was noted in 14 patients (73.6%) after a mean of 9.6 months (3 to 28 months) (Table 3). Three patients showed no change in kidney size (mean follow-up period of 18 months; range, 8 to 24 months) and still are under observation, and 2 (1 from each group) underwent nephrectomy after 36 and 48 months because of a 1-cm increase along the longitudinal axis of the kidney involved. No hypertension or neoplastic changes were found, and renal function was normal in all.

DISCUSSION

This retrospective study of infants with MCRD yielded several interesting findings. The prevalence rate of MCRD in our hospital during the period of study was 1 in 3310 live births (3/10 000) for the 23 patients who were included in the study. Most of the cases of MCRD (73.6%) were diagnosed by prenatal ultrasound that became available routinely in 1982. A second urologic abnormality was noted in 43.6% of patients; the most common was VUR in the contralateral kidney (22.1% of patients). None of the patients had urinary tract infection. Complete involution occurred after a mean of 9.6 months in 63.1%. Follow-up revealed normal renal function and no hypertension or malignancy in any of the patients.

TABLE 2. Other Anomalies in Patients With MCRD

	No. of Patients
VATER association	1
Undescending testis	3
Tetralogy of Fallot	1
Transposition of great vessels	1
Total	6 (27%)

Today fetal genitourinary anomalies are being detected with increasing frequency with the aid of prenatal ultrasound.[5–7] This was true for 115 (47%) of the 245 cases registered at the National Multicystic Kidney Registry.[8] Indeed, the most common reason for referral of the patients in the present study was a prenatal diagnosis of a renal abnormality.

Several previous studies have documented a variety of contralateral renal anomalies in patients with MCRD. The most significant is bilateral disease, which may be fatal.[9] Other anomalies, found in 20% to 80% of patients, are UPJ obstruction, horseshoe kidney, segmental ureteral disparity, pyelonephritis, hydroureteronephrosis, renal agenesis, and glomerulonephritis.[10–19]

Table 3 outlines some of the findings from previous studies on MCRD. One outstanding feature is the significant incidence (22.1%) of VUR. A similar incidence was found in the present study on voiding cystography during the first month of life. The question of routine use of voiding cystography in MCRD has not yet been resolved. Some authors support this practice,[9] whereas others such as Gough and associates[27] do not, based on the assumption that VUR generally is benign. We found that all of our affected patients had complete resolution of the VUR by age 36 months, and there was no breakthrough infection in those receiving prophylactic antimicrobial treatment. However, because of the high likelihood in MCRD of contralateral VUR, which is life-threatening in the presence of pyelonephritis, routine voiding cystography should be considered. Moreover, the high incidence of VUR in the asymptomatic siblings of children with reflux has made routine screening of this group an accepted practice for many clinicians.[28] When performed properly, voiding cystography is a safe procedure. We prefer the contrast media VCUG as the first test to get the best anatomic details. However, follow-up VCUG can be performed with either contrast or isotope, with the latter causing less irradiation. Prophylactic antimicrobial therapy is warranted in children with proven VUR. The presence of a single kidney mandates a more active approach in the form of prophylactic antibiotic treatment to prevent possible renal damage of the single kidney.

Despite reports of associated malignancy and hypertension in MCRD, the trend toward conservative management is gaining momentum because of the possibility of spontaneous involution. Our review of the literature, however, indicated only a 33% rate of complete involution in one study.[29] Cumulative data on 380 patients with MCRD revealed that only 189 (49.7%) had ultrasonographic involution (Table 3). In the Multicystic Kidney Registry study of 260 patients with MCRD, who were managed nonoperatively and followed for varying periods up to 5 years, 31% of the kidneys were undetectable by age 3 years and 54% by age 5 years.[3] A higher involution rate was noted in our study, 14 of 19 patients (73.6%) who were treated conservatively. This high involution rate is similar to the 75% rate reported by Orejas and colleagues[20] in a small group of patients not diagnosed prenatally, but much higher than the rate

TABLE 3. Review of Literature on MCRD

Reference	No. of Patients	Diagnosed Prenatally	Observation Only	Involution	Contralateral VUR*
Deklerk et al (1977)[19]	7				2/7
Dungan et al (1990)[15]	14	14	7	5	
Orejas et al (1992)[20]	12		12	9	
Richwood et al (1992)[21]	44	44	39	20	
Atiyeh et al (1992)[9]	49				9/49
Kamal (1992)[22]	24	17			0/10
Strife et al (1993)[23]	81	28	48	7	5/44
Flack and Bellinger (1993)[24]	29	21			8/29
al Khaldi et al (1994)[25]	44	44			20/30
Kaneko et al (1995)[26]	7	5	1		3/7
Gough et al (1995)[27]	62	62	25	8	12/62
Wacksman et al (1993)[3]	441	288	260	140	28/65
Total	814	518	380	189	87/303
Percentage		63	46.6	49.7	29.4
Present study	23	73.6		73.6	22.1

* Reflux was studied only in the patients who underwent voiding cystography.

(49.7%) obtained from all previous studies taken together (Table 3).

In conclusion, all patients with MCRD should be screened for urologic abnormalities of the contralateral kidney. Regarding management, 17% of the our patients underwent nephrectomy compared with 41% in the multicystic kidney registry. Therefore, nephrectomy is an eventual option that should be explained to the parents. Most nephrectomies in the registry were performed at 7 to 12 months of age because there was insufficient parenchyma to allow reconstruction. This age is similar to the mean time to complete involution in our patients (9.6 months).

REFERENCES

1. Glassberg KI, Stephens FD, Lebowitz RL, et al. Renal dysgenesis and cystic disease of the kidney: a report of the Committee on Terminology, Nomenclature and Classification Section of Urology, American Academy of Pediatrics. *J Urol*. 1987;138:1085–1092
2. Steinhart JM, Kuhn JP, Eisenberg B, Vaughan RL, Maggioli AJ, Cozza TF. Ultrasound screening of healthy infants for urinary tract abnormalities. *Pediatrics*. 1988;82:609–614
3. Wacksman J, Phipps L. Report of the Multicystic Kidney Registry: preliminary findings. *J Urol*. 1993;150:1870–1872
4. Gordon AC, Thomas DF, Arthur RJ, Irving HC. Multicystic dysplastic kidney: is nephrectomy still appropriate? *J Urol*. 1988;140:1231–1234
5. Hashimoto BE, Filly RA, Callen PW. Multicystic dysplastic kidney in utero. Changing appearance on US. *Radiology*. 1986;159:107–109
6. Mandell J, Blyth BR, Peters CA, Retik AB, Estroff JA, Benacerraf BR. Structural genitourinary defects detected in utero. *Radiology*. 1991;178:193–196
7. Bronshtein M, Yoffe N, Brandes JM, Blumenfeld Z. First and early second-trimester diagnosis of fetal urinary tract anomalies using transvaginal sonography. *Prenat Diagn*. 1990;10:653–666
8. Wacksman J. Dilemma of the multicystic kidney. *Prob Urol*. 1990;4:574–582
9. Atiyeh B, Husman D, Baum M. Contralateral renal abnormalities in multicystic-dysplastic kidney disease. *J Pediatr*. 1992;121:65–67
10. Glassberg K, Filmer R. Renal dysplasia, renal hypoplasia, and cystic disease of the kidney. In: Kelalis P, King L, Belman A, eds. *Clinical Pediatric Urology*. Philadelphia, PA: WB Saunders; 1985:922–971
11. Greene L, Feinzaig W, Dahlin D. Multicystic dysplasia of the kidney: with special reference to the contralateral kidney. *J Urol*. 1971;105:482–487
12. Walker D, Fenell R, Garin E, Richard G. Spectrum of multicystic renal dysplasia. *Urology*. 1978;11:433–436
13. Pathak I, Williams D. Multicystic and cystic dysplastic kidneys. *Br J Urol*. 1964;36:318–331
14. Gipson T, Anderson E, Bradford W. Multicystic renal dysplasia: pathologic and clinical observations in 22 cases. *Clin Pediatr*. 1976;15:896–901
15. Dungan J, Fernandez M, Abbitt P, Thaigarajah S, Howards SS, Hogg WA. Multicystic dysplastic kidney: natural history of prenatally detected cases. *Prenat Diagn*. 1990;10:175–182
16. Kyau M. Roentgenologic triad of congenital multicystic kidney. *Am J Roentgenol*. 1973;119:710–719
17. Uehling D, Barber K. Unilateral multicystic kidney. *J Urol*. 1966;96:286–289
18. Kleiner B, Filly R, Mack L, Callen P. Multicystic dysplastic kidney: observations of contralateral disease in the fetal population. *Radiology*. 1986;161:27–29
19. De Klerk D, Marshall F, Jeffs R. Multicystic dysplastic kidney. *J Urol*. 1977;118:306–308
20. Orejas G, Malaga S, Santos F, Rey C, Lopez MV, Merten A. Multicystic dysplastic kidney: absence of complications in patients treated conservatively. *Child Nephrol Urol*. 1992;12:35–39
21. Richwood AM, Anderson PA, Williams MP. Multicystic renal dysplasia detected by prenatal ultrasonography. Natural history and results of conservative management. *Br J Urol*. 1992;69:538–554
22. Kamal K. Multicystic-dysplastic kidney and contralateral urologic abnormalities. *J Pediatr*. 1992;122:501
23. Strife JL, Souza AS, Kirks DR, Strife CF, Gelfand MJ, Wacksman J. Multicystic dysplastic kidney in children: US follow-up. *Radiology*. 1993;186:785–788
24. Flack CE, Bellinger MF. The multicystic dysplastic kidney and contralateral vesicoureteral reflux: protection of the solitary kidney. *J Urol*. 1993;150:1873–1874
25. al Khaldi N, Waston AR, Zuccollo J, Twining P, Rose DH. Outcome of antenatally detected cystic dysplastic kidney disease. *Arch Dis Child*. 1994;70:520–522
26. Kaneko K, Suzuki Y, Fukuda Y, Yabuta K, Miyano T. Abnormal contralateral kidney in unilateral multicystic dysplastic kidney disease. *Pediatr Radiol*. 1995;25:275–277
27. Gough DCS, Postlethwaite RJ, Lewis MA, Bruce J. Multicystic renal dysplasia diagnosed in the antenatal period: a note of caution. *Br J Urol*. 1995;76:244–248
28. Noe HN. The long-term results of prospective sibling reflux screening. *J Urol*. 1992;148:1739. Part 2
29. Avni EF, Thoua Y, Lalmand B, Didier F, Droulle P, Schullman CC. Multicystic dysplastic kidney: natural history from in utero diagnosis and postnatal follow-up. *J Urol*. 1987;138:1420–1424

Involution Rate of Multicystic Renal Dysplasia

Oded J. Kessler, Niza Ziv, Pinchas M. Livne and P. Merlob

Pediatrics 1998;102;e73
DOI: 10.1542/peds.102.6.e73

Involution Rate of Multicystic Renal Dysplasia

Oded J. Kessler, Niza Ziv, Pinchas M. Livne and P. Merlob

Pediatrics 1998;102;e73
DOI: 10.1542/peds.102.6.e73