A female case with multicystic dysplastic kidney: new findings, genetic counseling, and literature review

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KEY WORDS

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ABSTRACT

The multicystic dysplastic kidney (MCDK) is the most common form of cystic kidney disease in children with unknown pathogenesis. Previously concomitant abnormalities such as heart, gastro-intestinal system, spine and the brain were reported with MCDK. We report a 15-day-old girl case with multicystic dysplastic kidney, distinct dysmorphic features and areview of the literature. We suggest that genetic counseling should take into consideration parental renal ultrasound and chromosome results as well as family history.

INTRODUCTION

The multicystic dysplastic kidney (MCDK) is the most common form of cystic kidney disease in children. It can be unilateral, bilateral, or segmental and probably results from atresia of the ureteral bud system during embryogenesis which occurs approximately is as many as 1 : 3600 and 1 : 4300 live births [1, 2]. In the presence of associated renal and/or non-renal structural pathology, the prenatal outcome was poor. Prenatally, the diagnosis of MCDK is only feasible using diagnostic ultrasound. In here, we report a 15-days-old girl case with multicystic dysplastic kidney, distinct dysmorphic features and a review of the literature.

CASE REPORT

The proband is a 15-day-old girl who was referred to our department for examination of the case because antenatal renal ultrasonography indicated multicysts in the left kidney and she was looking dysmorphic. She is the second child of healthy consanguineous parents. When she was born the father was 24 and the mother was 21 years old. Both parents are of Turkish origin. The family history, prenatal and neonatal history was unremarkable. The baby was born by normal spontaneous vaginal delivery at 36-37 weeks. Her weight was 3200 g (25-50th centile), height was 48 cm (10-25th centile) and head circumference was 35 cm (25-50th centile). She had round face, bitemporal narrowing, low-set ear, anteverted nares, long philtrum, fish-like mouth, high arched palate, and short neck (Fig. 1). The ultrasonography revealed several cysts in the left kidney with pyelectasia of the right kidney but the appearance of the renal parenchyma was otherwise normal. No other anomalies were detected in the genitourinary system.

Echocardiography showed atrial septal defect and pulmonary stenosis. Assessment of hormones and routine biochemical tests revealed serum concentrations within the normal range. Abdominal ultrasonography as well as computed tomography of the brain was normal. The GTG banded karyotype from peripheral blood cells of the child was 46,XX in all 20 cells analyzed.

DISCUSSION

The multicystic dysplastic kidney consists of cysts of varying number and size with small intervening islands of dysplastic parenchymal tissue, including immature glomeruli, primitive tubules and cysts derived from tubular and glomerular structures. The pathogenesis of MCDK is unknown; there is a possibly results that it from abnormal metanephros differentiation, probably due to disturbed connection of ureteric bud with renal blastema and abnormal division at the stage of metanephros.

Both numerical (trisomy 13, 18) and structural chromosomal abnormalities have been documented by Lazebnik et al. in association with extrarenal pathology especially the heart, gastrointestinal system, spine, and the brain being the most commonly involved. Whereas, the clinical relevance of fetal chromosome analysis in the presence of contralateral renal pathology is questionable, we advocate fetal karyotyping when extrarenal pathology is established [3].

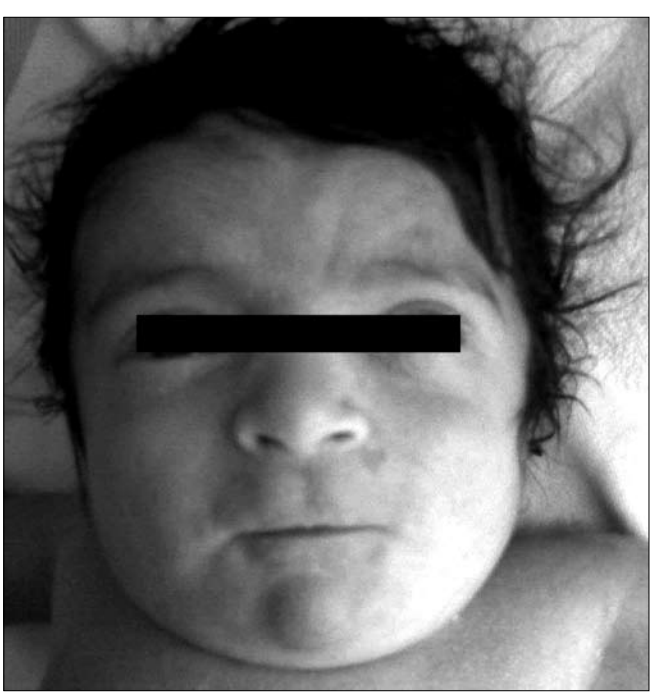

Fig. 1. Frontal view of the patient indicated round face, bitemporal narrowing, anteverted nares, long philtrum, and short neck.

MCDK usually occurs as a sporadic event but, rarely autosomal dominant inheritance and sib recurrence has been reported [4]. Furthermore, renal dysplasia, including UMCK, is reported in over 80 syndromes and multiple congenital anomaly disorders [5] such as hereditary renal A dysplasia (HRA), VATER association, Williams syndrome, 49,XXXXX syndrome, and branchiootorenal syndrome. Since non-renal abnormalities also are involved in these syndromes, it is essential to scan the entire fetus when MCDK is diagnosed.

In approximately 17-43%, there are also abnormalities of the contralateral kidney that should also be evaluated [1, 2]. The most common urological problem after MCDK seen prenatally was dilatation of the ureter (13%) of which 8% was contralateral. Postnatal examination showed that vesicoureteral reflux was the most common urological problem (13%] after MCDK, of which 8% was contralateral. This is somewhat lower than the percentages of contralateral vesicoureteral reflux reported in literature, which range between 11% and 28% [3, 6].

Contralateral renal and other concomitant abnormalities are important for the prognosis of children with MCDK. The incidence of extrarenal structural pathology in latest studies were very different. Associated extrarenal anomalies including mental retardation, congenital heart defects, genital, skeletal anomalies, neural tube defect, and esophageal atresia were found with an incidence of 5 to 35% [3, 6, 7]. In this report, we defined distinct dysmorphic and cardiac features in the literature for the first time.

The risk of tumor formation in children with MCDK is small, but certainly slightly increased; In view of these risks of 0.03-0.1% it does not seem advisable to remove every MCDK for prophylactic reasons [8]. Non-functional MCDK may be removed to avoid the risk of hypertension, infection or malignancy, although there is no consensus at present. An expectant non-intervention policy, on the other hand, makes long-term follow-up necessary as the risk of hypertension and malignancy is still uncertain.

More than 40 genes have been shown to be involved in murine kidney development [9]. However, in humans, the genes responsible for kidney development have remained elusive. Recent study suggests that heterozygous mutations in RET may be responsible for a significant fraction of humans with abnormal kidney development due to the high rate of RET mutation in fetuses with renal agenesis. Also they offered genetic screening for RET mutations in individuals who have had children born with abnormal kidneys or have miscarried a child with abnormal kidneys. Fletcher et al. suggest that *PAX2* may play a role in early ureteric obstruction and MCDK. Also according to a latest study, other genes including *TCF2*, *EYA1*, *SALL1*, and *SIX1* are less frequently affected [10].

It can be concluded that in the presence of unilateral MCDK, which is usually found on the left side, fetal outcome is determined by associated renal and/ or non-renal structural pathology. When detected on prenatal ultrasound, include a detailed ultrasound scan searching for associated abnormalities with special attention to the fetal heart and contralateral kidney. Chromosome studies should be offered when extra-renal systems affected, in these cases chromosome abnormalities can be detected approximately 3% of MCDK cases [3, 6]. Genetic counseling should take into consideration parental renal ultrasound and chromosome results and family history. Multicystic dysplastic kidney can be familial, but is most commonly a sporadic anomaly, so formal screening of relatives is not recommended. Prenatal knowledge of fetal unilateral MCDK allows optimization of diagnosis and treatment by the pediatric urologist after delivery.

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