

FETAL MAGNETIC RESONANCE IMAGING OF BILATERAL CYSTIC RENAL DYSPLASIA

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Renal dysplasia, defined as abnormal parenchymal development from anomalous differentiation of metanephric tissue, implies irreversible renal damage. The functional capacity of an affected kidney depends upon the extent and severity of the dysplasia. Conglomerates of disorganized epithelial structures surrounded by abundant fibrous tissue characterize a dysplastic kidney. Cortical cysts are often, but not necessarily, present [1].

Fetal renal disease is commonly encountered in second-trimester anomaly screening. Detailed sonographic examination shows the enlarged cystic fetal kidneys as well as the oligohydramnios. Magnetic resonance imaging further aids in the diagnosis of fetal kidney anomalies.

In this case, we report a prenatal magnetic resonance imaging diagnosis of a fetus with cystic renal dysplasia.

A 26-year-old patient was admitted to the outpatient clinic at 23 weeks' gestation. She was married to her second-degree relative. Family history was negative for polycystic renal disease. Sonographic examination of the fetus revealed a single umbilical artery, polydactyly in both feet (Figure 1) and left hand, right kidney 33 × 15 mm, and left kidney 36 × 21 mm. Both kidneys were enlarged and filled the whole retroperitoneal space (Figures 2 and 3). The sonography showed that both kidneys were polycystic and enlarged. Bilateral renal anteroposterior diameters were within normal limits. Fetal biometric measurements were: biparietal diameter 22 weeks and 4 days, femur length 22 weeks and 1 day; and amniotic fluid volume was normal. Fetal echocardiographic examination revealed normal results. The termination of pregnancy was performed by vaginal and oral misoprostol administration after obtaining the written informed consent of the family.



Figure 1. The polydactyly observed in the foot.

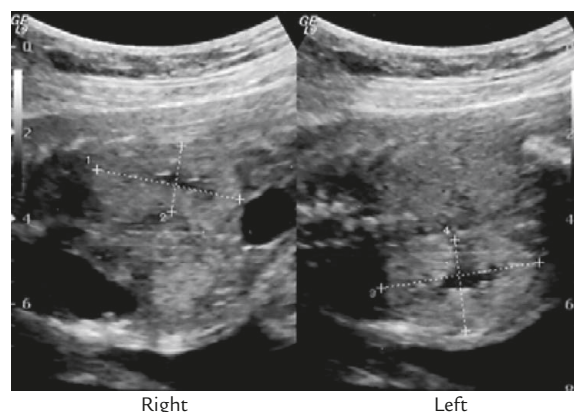


Figure 2. The sonographic sagittal images of the fetal kidneys. Both kidneys are enlarged and cystic in nature; the renal pelvis diameters are normal.



Figure 3. The sonographic appearance of the transverse images of the kidneys.



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Pathologic examination of the fetus demonstrated the following findings: sole length 35 mm, crown-rump length 165 mm, polydactyly in both feet and left hand, right kidney $3.5 \times 2.5 \times 1.5$ cm, and left kidney $3.2 \times 1.9 \times 1.3$ cm. The outer surfaces of the kidneys had millimetric cysts. Microscopic examination of the kidneys revealed bilateral cystic renal dysplasia (Figure 4).

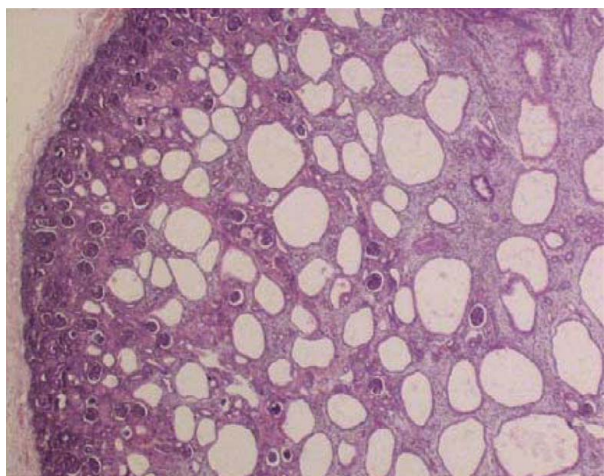


Figure 4. Cystic spaces and scattered fetal glomeruli in the renal parenchyma (hematoxylin and eosin, 25 \times).

The other organs showed normal macroscopic and microscopic features. The umbilical cord was 20 cm in length and had one umbilical artery and vein. The fetal karyotype was 46,XX. Magnetic resonance imaging of the fetal kidneys revealed enlarged hyperintense kidneys filling the abdomen and is demonstrated in Figure 5.

Most fetal renal anomalies are diagnosed by high-resolution sonographic examination in the second trimester. Approximately 10% of all urologic anomalies detected on prenatal sonographic screening are due to multicystic dysplastic kidney.

Multicystic dysplastic kidney is an idiopathic renal disorder. The etiology is believed to be obstruction of the ureter in the early stage of embryogenesis. In most cases of this renal disorder, the upper ureter is atretic and rarely has continuity with the renal pelvis. Histopathologic examination reveals multiple cysts of varying sizes and dysplastic renal tissue [2,3].

Prenatal sonographic examination detects most cases of multicystic dysplastic kidney and magnetic resonance imaging may aid in the diagnosis. Magnetic resonance imaging findings are superior compared with ultrasonography when pathology is situated in the retroperitoneal region. Evaluation of renal or extrarenal

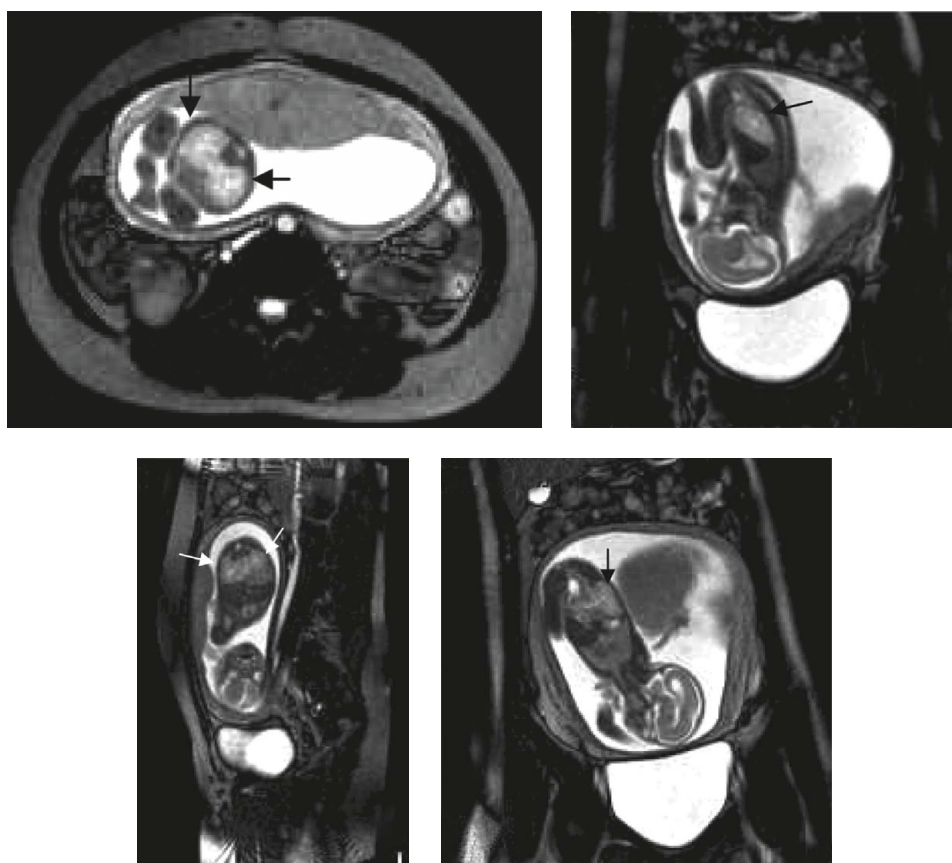


Figure 5. Axial, coronal and oblique sagittal magnetic resonance imaging of the fetus. Both kidneys are enlarged with hyperintense images (HASTE [half-Fourier acquisition single-shot turbo spin-echo] sequence; repetition time/echo time, 8000/900; field of view, 250 mm; flip angle, 90°; slice thickness, 4 mm).

origin of a mass or confirmation of presence or absence of renal agenesis are some examples. Renal agenesis is associated with a lack of amniotic fluid, which makes ultrasonographic imaging difficult [4]. In this case, magnetic resonance imaging showed only enlarged kidneys filling the abdomen and did not supply any information regarding the polycystic or dysplastic nature of the underlying pathology.

In a retrospective study including 97 cases of multicystic dysplastic kidney, 60% of cases demonstrated shrinkage, 25% total involution and 16% underwent nephrectomy [5].

Magnetic resonance imaging is a valuable additional method to ultrasonography of the fetal urinary tract if resolution of ultrasound is impaired because of oligohydramnios or technical deterioration [6]. Poutamo et al [6] reported correct diagnosis of urinary tract anomalies in 15 fetuses with sonography and in 20 fetuses with magnetic resonance imaging. Both methods enabled correct diagnosis in 12 fetuses, only sonography in three fetuses and only magnetic resonance imaging in eight fetuses.

Evaluation of the fetus with a suspected severe or lethal renal anomaly is often problematic, particularly in the early second trimester. Physicians may struggle to arrive at an accurate diagnosis when visualization is limited by severely decreased amniotic fluid volume or fetal position. This is especially difficult before 24 weeks of gestation, when management decisions may be made with only limited information. Magnetic resonance imaging has the potential to be a valuable addition to sonography for the diagnosis of fetal renal

abnormalities that are complicated by oligohydramnios. However, there are only a small number of reported cases of fetal renal agenesis diagnosed by magnetic resonance imaging, and these have involved mostly third-trimester cases and the magnetic resonance imaging appearance of fetal kidneys, rather than also incorporating fetal bladder findings [7].

References

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