Prenatal diagnosis of fetal bilateral adrenal carcinoma

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ABSTRACT

Fetal malignancies that are capable of metastasizing to other fetal organs and the placenta are exceedingly rare. Fetal tumors are suspected on ultrasonography in the presence of structures of abnormal shape or size that are occasionally associated with polyhydramnios and hydrops. Most of the large abdominal masses detected antenatally are renal in origin, although adrenal tumors should also be kept in mind in their differential diagnosis. We report a case of a large-for-gestational-age fetus with abdominal distention secondary to bilateral adrenal carcinoma, polyhydramnios and placental enlargement. Postmortem histological findings included nesidioblastosis, (i.e. hyperplasia of the cells of the islets of Langerhans) and adrenocortical cytomegaly, suggestive of a form of Beckwith–Wiedemann syndrome. Copyright © 2005 ISUOG. Published by John Wiley & Sons, Ltd.

CASE REPORT

A 31-year-old, gravida 2, para 1 woman with an uneventful prenatal course presented at 26 weeks' gestation with rapid abdominal growth and uterine tenderness. Ultrasound examination showed severe polyhydramnios and a female fetus with large complex bilateral multicystic abdominal masses (Figure 1). The abdominal circumference was on the 95th percentile, while the other fetal measurements were within the normal range. An ovoid, irregular and heterogeneous mass with a maximum longitudinal diameter of 74 mm was noted at the level of the lumbar region. A central hyperechoic area surrounded by multiple small, rounded, anechoic, non-confluent areas was evident. These masses mimicked multicystic kidneys which could not be identified as separate organs. The fetal bladder was seen to be full. There was no evidence of fetal hydrops, and no other structural abnormalities were detected. Color Doppler ultrasonography could not detect renal arteries, and no blood flow signals were identified inside the mass. An enlarged placenta (width 50 mm) was also noted. A normal female fetal karyotype had been established at 12 weeks' gestation when the patient underwent chorionic villus sampling because of maternal anxiety.

Twenty-four hours after admission the patient underwent spontaneous preterm labor. A female newborn was delivered vaginally, and died shortly after birth. The infant weighed 1575 g and had Apgar scores of 1 and 0 at 1 and 5 min, respectively.

Clinical examination revealed a large-for-gestational-age neonate, and large intrabdominal masses were noted. The remainder of the physical examination was unremarkable, except for a clitoromegaly. Pathology revealed two retroperitoneal masses (right $8 \times 4 \times 1.5$ cm, weight 47 g; left $12 \times 7 \times 2$ cm, weight 159 g), multilobular and encapsulated, occupying most of the abdominal cavity. Both masses surrounded the kidneys without compromising them (Figure 2). The tumors were heterogeneous with areas of necrosis, hemorrhage and calcification. Histological sections looked typical of adrenal carcinoma, which was confirmed by immunohistochemical analysis. Metastases were detected in both fetal lungs, the peritoneum and ovaries. Examination of the pancreas revealed $\beta$-cell hyperplasia and nesidioblastosis. Fluorescence in situ hybridization (FISH) analysis performed for Beckwith–Wiedemann syndrome was negative.

DISCUSSION

To our knowledge this is the first report describing the ultrasonographic features of fetal adrenal carcinoma. Although autosomal recessive polycystic kidney disease was suspected because of bilateral enlarged multicystic masses resembling enlarged kidneys, polyhydramnios and a full fetal bladder made the diagnosis unlikely.
Ultrasound image of the fetal abdomen showing bilateral, large and complex masses in the transverse (a) and longitudinal (b) planes.

Figure 1 Ultrasound image of the fetal abdomen showing bilateral, large and complex masses in the transverse (a) and longitudinal (b) planes.

Fetal malignancies that are capable of metastasizing to other fetal organs, the placenta and, hypothetically, the mother, are exceedingly rare. The major histological types found among fetal congenital tumors are: teratomas, nephroblastomas, cardiac rhabdomyomas and neuroblastomas. Although rare, reports of these benign tumors can be found in the literature. Prenatal diagnosis of adrenal masses is a diagnostic challenge. Among the differential diagnosis of both cystic and solid adrenal masses are congenital neuroblastoma, lung sequestrations, hemorrhages, mesoblastic nephroma and duplications of the urinary or intestinal tract. Congenital neuroblastoma is the most common abdominal tumor diagnosed in neonates. The most frequent ultrasound appearance is that of a homogeneous solid tumor, but a variety of mixed solid and cystic patterns have been described, usually associated with internal hemorrhage. Lung sequestration, on the other hand, is a malformation of the branching pulmonary bud defined as nonfunctional pulmonary tissue; around 10% of them are subdiaphragmatic in the adrenal gland area. Adrenal hemorrhage is not an uncommon finding in the ill neonate. Prenatally it has been associated with neuroblastoma and Beckwith–Wiedemann syndrome; its ultrasound appearance follows a changing pattern, from an irregular hyperechoic mass in the acute phase to a heterogeneous solid cystic appearance in the resolution phase. Congenital mesoblastic nephroma is a rare infantile renal tumor, with 80% of the cases being reported within the first month of life. On ultrasound imaging it appears as a hypoechoic tumor with an echogenic rim (the so-called ‘ring sign’) or as a homogeneous or heterogeneous solid mass with no discernible rim. Distinction must take into account masses arising from adjacent organs, especially the liver or adrenal gland.

Beckwith–Wiedemann syndrome is characterized by excessive growth macrosomia, macroglossia, visceromegaly, structural anomalies (omphalocele) and an increased risk of developing embryonal tumors during childhood (e.g. Wilms’s tumor, hepatoblastoma, neuroblastoma, rhabdomyosarcoma, adrenal carcinoma). Most cases of Beckwith–Wiedemann syndrome are sporadic and cytogenetically normal. The disease shows a wide clinical variability, and though intrauterine cases have been frequently reported, this condition remains undiagnosed prenatally in the vast majority of cases. In order to gain uniformity a practical definition has been suggested, the more consistent intrauterine findings being polyhydramnios, placental enlargement, unspecific...
abdominal distention and fetal overgrowth. Additional prenatal findings reported, with a frequency between 15% and 60% of cases, include kidney anomalies, vis- ceroemgalas, macroglossia, abdominal wall defects, cardiac malformations and hydrops fetalis11.

It is not known whether cases of intra-abdominal malignancy associated with a single manifestation of Beck- with–Wiedemann syndrome represent incomplete forms of the disease10. Consistent with the previously reported cases of prenatally diagnosed Beckwith–Wiedemann syn- drome are the finding of an enlarged abdominal circumference and polyhydramnios usually attributed to macroglos- sia, omphalocele, or excess of urine production13, which were not present in our case; and postmortem histologi- cal finding of nesidioblastosis, adrenocortical cytomegaly, and the presence of an adrenal carcinoma. Molecular genetic analysis could have shed light, especially in the absence of other striking postnatal features such as an abdominal wall defect and macroglossia, but it was not available.

In recent animal research, arsenic has been implicated as an in-utero inducer–promoter of adrenal tumors, although the high rate of tumors in the control offspring and the failure to report the results by litter of origin, preclude the acceptance of that finding14.

We suggest that this case could be a prenatal presen- tation of an incomplete form of Beckwith–Wiedemann syndrome, the most prominent feature being the fetal bilateral adrenal carcinoma associated with polyhydram- nios at an early gestational age.

REFERENCES