

Research Letter

Prenatal ultrasonographic characterization of a giant fetal sacrococcygeal immature teratoma with four-dimensional ultrasound

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A 28-year-old woman, Gravida 2 Para 1, was referred to our institution because conventional ultrasound (US) imaging identified a mass arising from the fetal rump at 20 weeks of gestation. A four-dimensional (4D) US (Voluson 730 Expert, General Electrical Imaging Systems, Kretztechnik, Zipf, Austria) was performed to further define the extent of the lesion. The involvement of a mixed solid-cystic tumor mass measuring 2.5 cm × 2.2 cm with the sacrum, coccyx, and ischium could be clearly seen in the rendered images without evidence of intrapelvic involvement and/or spinal anomalies (Fig. 1A). The patient was examined again at 22 weeks of gestation and by then the tumor had grown to twice the size of when it was first noted at 20 weeks (Fig. 1B). At 28 weeks of gestation, 2D US revealed a rapidly growing heterogeneous tumor (Fig. 1C). The 4D rendered images showed a gigantic lobulated mass of discrete margins measuring greater than 16 cm × 13 cm × 12 cm with a relatively large proportion of solid components containing scattered hyperechoic areas arising from the fetal buttocks (Fig. 1D). There was placentomegaly; polyhydramnios; and key features of developing fetal heart failure, including cardiomegaly, minimal ascites, a dilated inferior vena cava, and reversed flow of ductus venosus; and umbilical venous pulsations. Pulsed Doppler showed the resistance index (RI) of flow velocity waveforms of the tumor arteries was 0.63. The 3D color power angiography provided a spatial perfusion display of angioarchitecture network of highly vascularized tumor that parasitized blood supply from the iliac and/or sacral vascular systems (Fig. 2). The patient was diagnosed with a giant sacrococcygeal

teratoma (SCT) with developing fetal heart failure. The risk of continuing with the pregnancy were explained and, following counseling, a cesarean delivery was performed at 28 weeks of gestation. A female infant weighing 2,230 g was delivered with Apgar scores of 2 and 6 at 1 minute and 5 minutes, respectively (Fig. 3). Fetal blood examination showed white blood cells of 9,289/mm³, hemoglobin level of 7.4 g/dL, and platelet count of 175,000/mm³. The alpha-fetoprotein level was 356,549 ng/mL.

The newborn underwent emergency surgical resection on the third day after delivery because of uncontrolled vascular “steal” phenomenon. Unfortunately, the baby died of cardio-respiratory failure on the third postoperative day despite successful complete surgical resection. Histopathologic diagnosis of the resected specimen was immature teratoma, Grade 3 with many immature neuronal components present, and more than four foci per low-power field.

Optimal management of fetal SCT requires accurate imaging of the precise involvement, the content, vascularity of the tumor, and cardiovascular stability of the fetus. Also, antepartal differentiation of mature, immature, and potentially malignant types of SCT is very important, particularly at early-mid pregnancy when the patient may consider termination of the affected pregnancy [1]. Although antenatal reliable differentiation is not possible by US [2], a highly vascularized mass and rapidly growing huge tumor with predominantly solid components was often recognized in cases with an immature or malignant histology [1]. Interestingly, although the blood flow RI (varied from 0.60 to 0.70) was lower in the malignant/immature SCT than in the mature SCT, however, compared, for example, with malignant ovarian tumor in adult women, the much lower RI cutoff level (<0.40) was not observed in this case and other literature reports [1].

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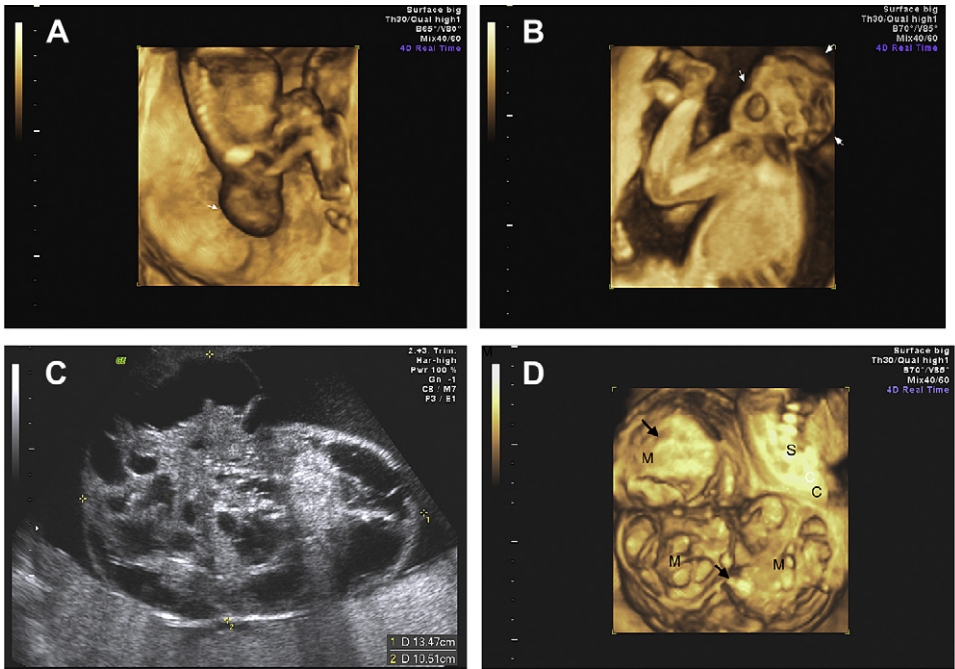


Fig. 1. A virtual reality rendition of fetal sacrococcygeal teratoma. (A) A small heterogeneous mass (arrow) measuring 2.5 cm × 2.2 cm is detected on the external sacrococcygeal surface at 20 weeks. Note the intact structure of spine. (B) The mass (arrows) has grown to a medium-sized mass (4.1 cm × 6.0 cm) at 22 weeks. (C) Two-dimensional ultrasound shows a large mixed cystic-solid echogenic mass with acoustic shadowing. (D) Four-dimensional rendering image shows the mass rapidly growing to a gigantic lobulated mass measuring greater than 16 cm × 13 cm × 12 cm with a relatively large proportion of solid components containing scattered hyperechoic areas (arrows). C = coccyx; M = mass; S = sacrum.

The 4D US provides a live virtualized image with spatial angioarchitecture network in the form of a realistic portrait of the fetal immature SCT that is easier to understand than a conventional image for parents [3]. We recommend all fetuses affected with SCT undergo combined 2D Doppler and

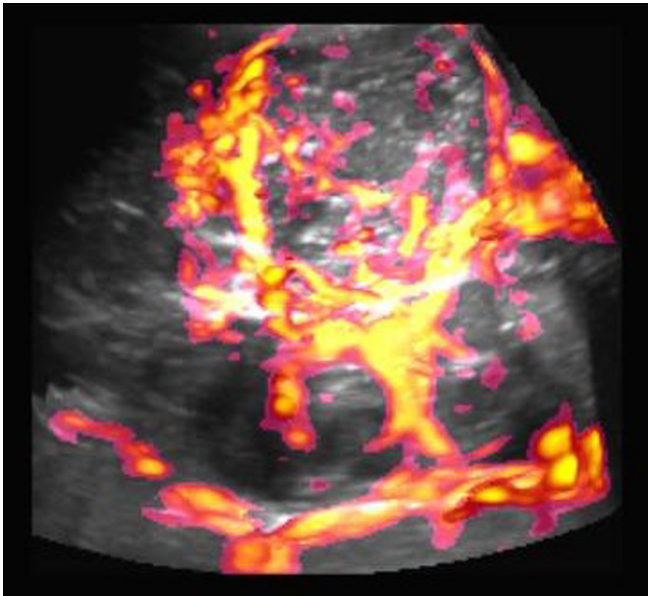


Fig. 2. Three-dimensional color power angiography provides a spatial perfusion display of angioarchitecture network of highly vascularized immature sacrococcygeal teratoma.



Fig. 3. Photograph of female neonate at the time of delivery shows a gigantic lobulated sacrococcygeal teratoma (posterior view).

4D US to assess the exact tumor involvement, content, vascularity, and cardiovascular stability to optimize pre-, peri-, and postnatal management.

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