Article is available online at http://www.webio.hu/por/2006/12/1/0046

CASE REPORT

Prenatal Diagnosis of a Giant Congenital Primary Cerebral Hemangiopericytoma

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Congenital primary intracranial hemangiopericytomas are exceptionally rare tumors. We present a case of a fetus, with the prenatal sonogram at 33 weeks of gestation revealing a large cerebral tumor. Because of the enlarged head, a cesarean section was performed. The tumor was confirmed by postnatal ultrasound, magnetic resonance imaging (MRI) and biopsy. Elevated intracranial pressure and hemorrhage led to death on the 11th day. Autopsy revealed a 10x9 cm large inhomogeneous tumor located centrally, mainly in the posterior fossa. Histology showed a hypercellular and hypervascular tumor with extended necrosis and high mitotic rate. The tumor cells were positive for vimentin and CD34 antigens and negative for several neurological markers, desmin and CD31. The diagnosis of a congenital primary cerebral hemangiopericytoma was confirmed. (Pathology Oncology Research Vol 12, No 1, 46–49)

Key words: congenital brain tumors, infantile hemangiopericytoma

Introduction

Congenital brain tumors are rare, with an incidence of 1.1-3.6 per 100,000 newborns and are responsible for 0.004-0.18% of deaths in children under the age of 1 year.[1-5] Congenital tumors make up 0.5-1.5% of brain tumors diagnosed during infancy.[6] Although other systems exist, the preferred method of classification differentiates: definitely congenital (present at birth or within the first 2 weeks of life), probably congenital (producing symptoms in the first year of life), and possibly congenital tumors (beyond the first year of life).[2] Congenital brain tumors can cause spontaneous intracranial hemorrhage in utero or dystocia during delivery, and might be diagnosed by prenatal sonography.[3]

Congenital brain tumors are different in their etiology, histologic type, topographic distribution, clinical presentation and prognosis from those occurring after the first year of life. The neoplasms consist of a variety of histologic types, the most common being teratomas, which represent one-third to one-half of the total. The next most common tumors are medulloblastomas, followed by astrocytomas, choroid plexus papillomas and ependymomas.[4] Congenital primary cerebral vascular tumors and hemangiopericytomas are even less common, only a few cases have been reported.[7-12]

We present the imaging and histological findings of a rare congenital tumor, discovered in a fetus at 33 weeks of gestation, which was diagnosed on a routine prenatal sonogram. In the postnatal period several imaging methods were performed. Histological diagnosis of hemangiopericytoma was made at autopsy.

Clinical history

A 31-year-old female, gravida 2, para 0, at 33 weeks' gestation was admitted to our department with high temperature (39.2°C) and right kidney pain. Her uneventful prenatal course included normal sonograms at 8, 18 and 24 weeks of gestation. These were reviewed after the abnormal sonogram at week 33 in order to see if the tumor was seen in retrospect, however, the previous sonograms were normal.

Received: Oct 18, 2005; *accepted:* Nov 20, 2005
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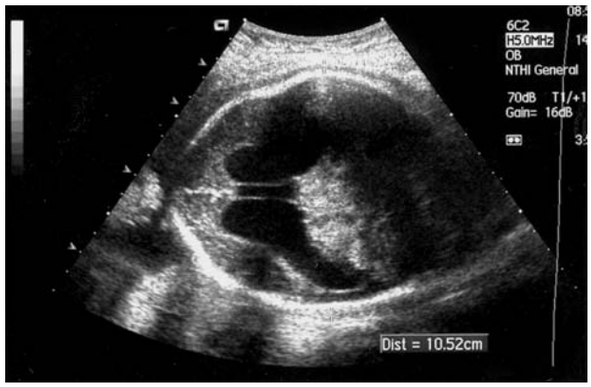

Figure 1. *Dilated ventricles on prenatal sonogram at 33 weeks of gestation*

Sonographic findings (at 33 weeks of gestation)

Targeted sonography performed because of the mother's kidney pains diagnosed fetal macrocephaly. The measurements found were greater than 2 standard deviations above the mean. Increased echogenicity of the brain parenchyma with dilatation of the lateral ventricles was seen on longitudinal and transverse sections through the fetal head (*Figure 1*). The average diameter of the left ventricle measured 20 mm. A large mass measuring 9x8 cm in diameter occupied the posterior and part of the medial fossa (*Figure 1*). Polyhydramnion and right pyelectasis of the mother were also observed.

Clinical course

Because of the elevated temperature, pain and the pyelectasis, antibiotic treatment was given intravenously to the mother. Upon consultation with a neurologist and neonatologist, a cesarean section was performed to allow the possibility of a future operation on the newborn. The Apgar scores were 4 and 6 at 1 and 5 minutes after the delivery, respectively. The birth weight of the male infant was 2370 g, the height 48 cm, the head circumference 39 cm.

The newborn was transferred to the perinatal intensive care unit. Postnatal sonography and magnetic resonance imaging (MRI) revealed a 9x8 cm large, inhomogeneous, well circumscribed mass located centrally, mainly in the posterior fossa. The brainstem was severely compressed (*Figure 2*). Needle biopsy was performed which indicated a malignant tumor with extensive necrosis on the frozen section. The following day apnea developed and the infant died on his 11th day of life.

Autopsy

At autopsy no evidence of dysmorphism was observed externally. With the exception of the cerebrum, no developmental abnormalities or tumors were detected in the internal organs. The brain weighed 490 g and contained a large solid mass measuring 10x9 cm in diameter. The tumor was located centrally, mainly in the posterior fossa, elevating the tentorium (*Figure 3a*). It was covered by a thin vasculated capsule and compressed the cerebellum (*Figure 3b*). After removing a small, 1x1-cm-sized sample from the tumor for preliminary histology, the brain was immersed in formalin in toto and further dissected after 7 days. Although the tumor was found tightly attached to the dura (*Figure 3c*), it could easily be removed since there was no infiltration of the brain parenchyma. The removed multinodular tumor showed a rather inhomogeneous, brownish-yellow cut surface (after formalin fixation), with extensive areas of necrosis (*Figure 3d*).

Histology showed a hypercellular and hypervascular tumor with extensive necrosis and high mitotic rate (4-5 mitoses/10 high power fields). It was quite homogenous in composition, with the exception of the necrotic areas. The tightly packed ovoid to fusiform cells were arranged around ramifying blood vessels (*Figure 4a*). A silver stain showed the tumor cells to be located outside the vessels.

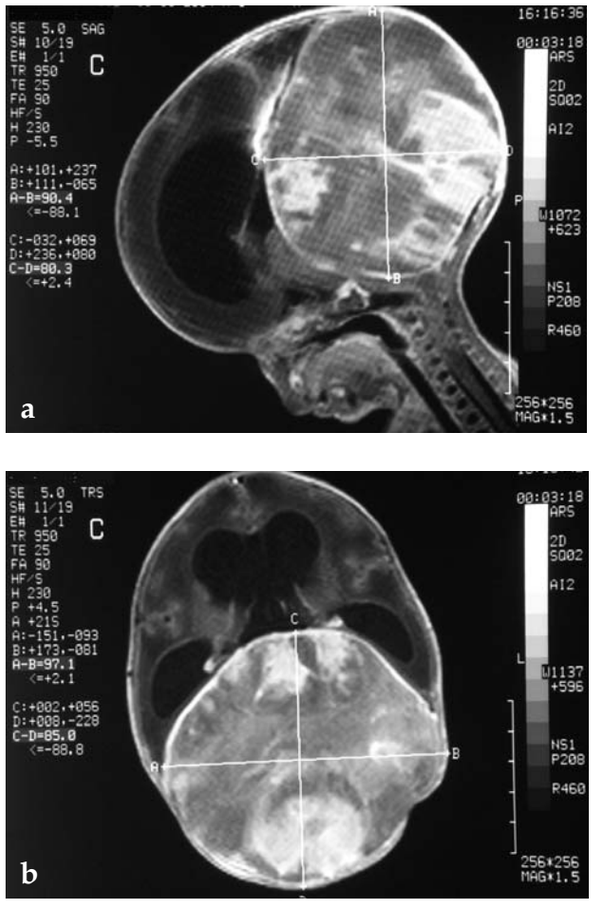

Figure 2. *Postnatal MR images. Large tumor located in the posterior fossa measuring 9x8 cm in diameter, and ventricular dilatation*

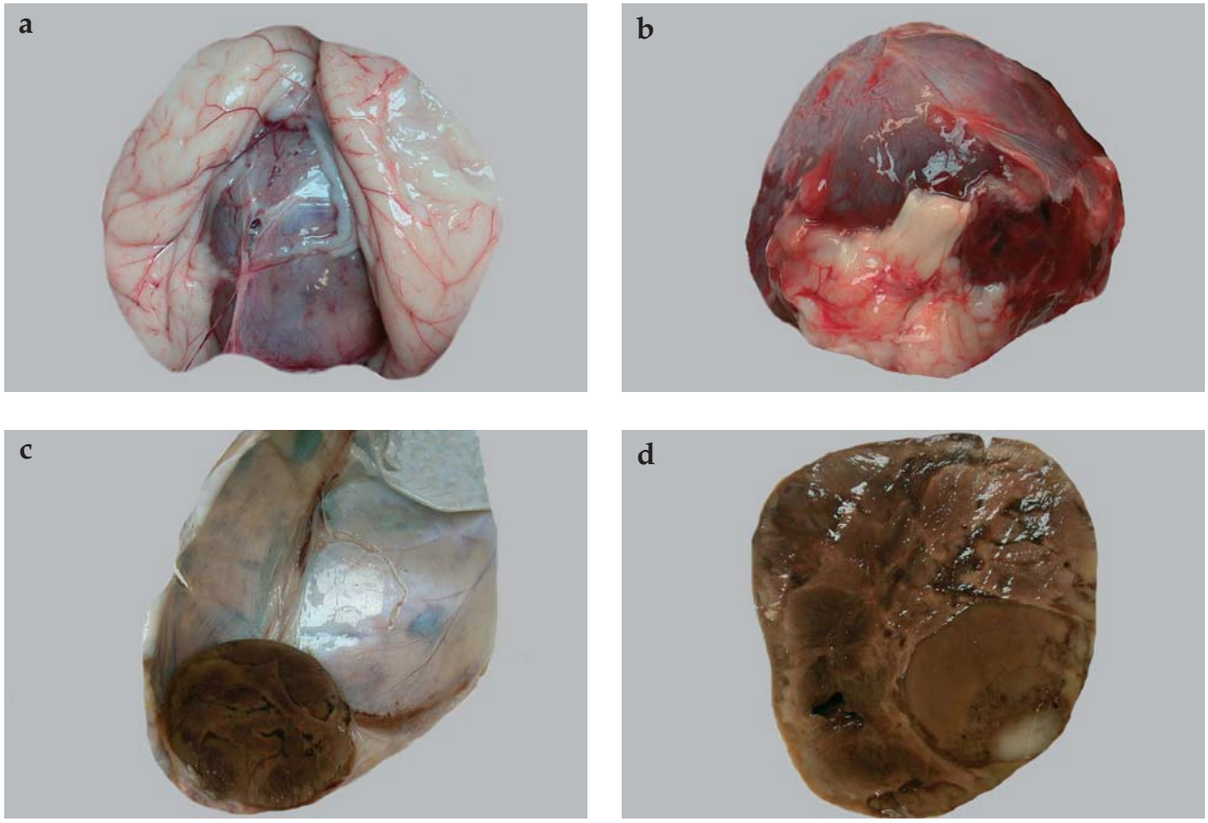

Figure 3. *At autopsy the tumor was located in the posterior fossa* ***(a),*** *compressing the cerebellum and brainstem* ***(b),*** *attached to the dura* ***(c).*** *Extended necrotic areas were seen on cross section* ***(d).***

Immunohistochemistry was negative for neurogenic markers as glial fibrillary acidic protein (GFAP), neuron-specific enolase (NSE), synaptophysin, S-100, and for several further antigens as cytokeratins (AE1/AE3, CK7, 8, 19 and 20), epithelial membrane antigen (EMA), and desmin. In contrast, vimentin was strongly and diffusely positive in all the tumor cells (*Figure 4b*), as was CD34 (*Figure 4c*). Factor VIII-related antigen and CD31 stained the vessel endothelium only. Ki67 staining confirmed the high proliferative activity of the tumor, reacting with 40-50% of the tumor cells (*Figure 4d*). Surveying the whole cut surface and examining several sections from various areas of the tumor, no further structural elements suggestive of a teratoma were revealed. The final diagnosis of a congenital primary cerebral hemangiopericytoma was confirmed.

Discussion

Congenital hemangiopericytomas (HPCs) are very rare soft tissue tumors, originating from the pericyte, a perivascular modified smooth muscle cell.[13] HPCs have been classified into adult and infantile variants, which are two independent entities.[14] Infantile HPC is most often located in the deep, dermal or subcutaneous tissue and is generally benign.[14,15] In our patient, however, the high mitotic rate, increased cellularity, necrosis and hemorrhage were indicative of malignancy.

HPCs should be differentiated from congenital hemangioblastomas,[16] which might be similar by neuroimaging, pathology and even by histology. CD34 is positive in both tumor types. CD31, however, is mainly reactive in hemangioblastomas and not in HPCs,[17] as it was in our case. Hemangioblastomas frequently contain von Hippel Lindau (3p26) mutations.[18]

At least 50% of congenital brain tumors are teratomas,[1,2,6] astrocytomas account for 25% of the cases, while other tissue origin is extremely rare.[2,3] Teratoma, the most common congenital intracranial tumor, was excluded by autopsy and the very extensive pathomorphological workup in our patient. It was confirmed that no other components besides the relatively uniform neoplastic cells formed the tumor. Sonography is commonly used and has been for many years in order to image a fetus and to alert an obstetrician to any abnormalities. Further, prenatal MRI can also be helpful for the characterization of fetal brain neoplasms and other entities, even though MRI and CT are mainly postnatal options. The prognosis of HPC of the

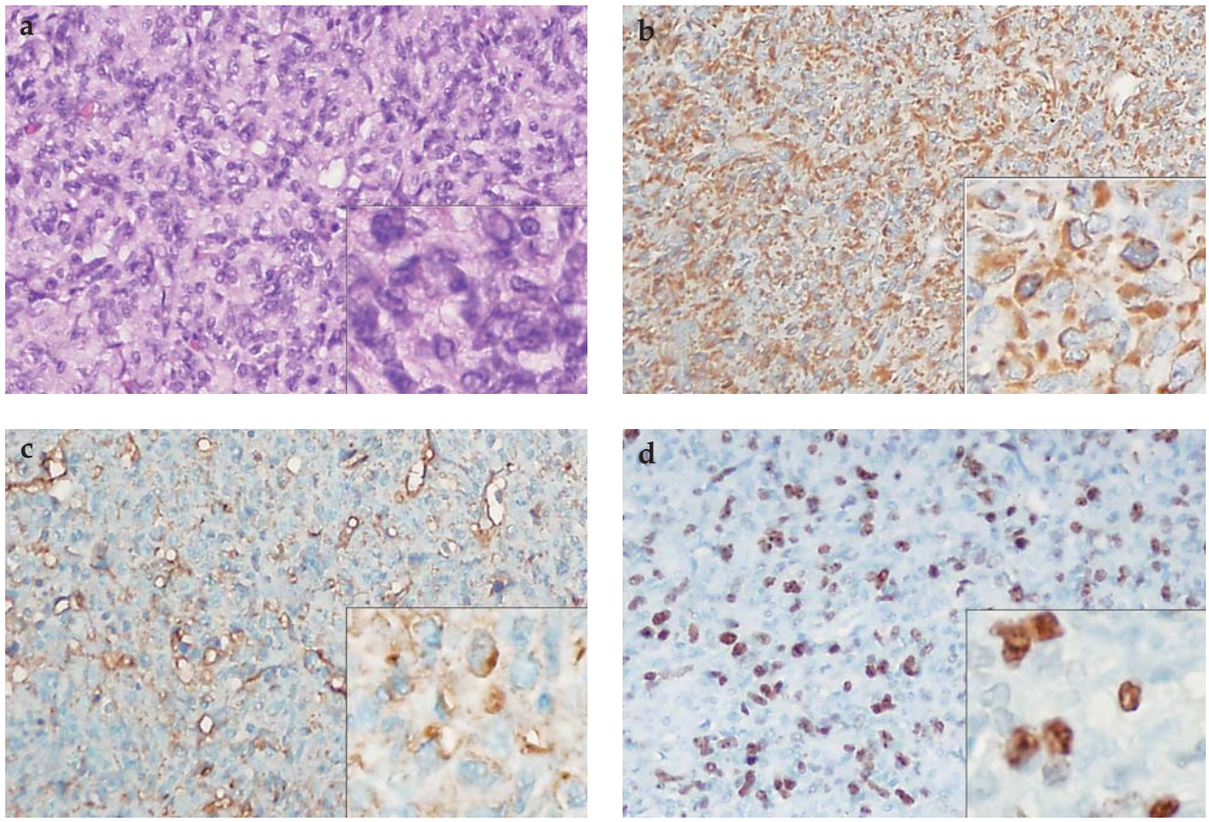

Figure 4. *Histology shows homogenous tumor with ovoid to spindle-shaped cells by H&E* ***(a).*** *Vimentin* ***(b)*** *and CD34* ***(c)*** *were detected in the tumor cells by immunohistochemistry. 40-50% of the tumor cells were Ki67-positive* ***(d.)*** *x 200, inset: x 450*

infantile type is generally benign, although cases with metastasis and unusual localization might prove different.[14,17] In our patient, however, the intracranial localization, the extreme size, and the histology all presented a very poor prognosis.

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