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Spontaneous Hemorrhage in Medulloblastomas

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Spontaneous hemorrhage into an intracranial neoplasm is relatively uncommon, usually occurring in metastatic lesions, glioblastomas, or pituitary adenomas [1–4]. Hemorrhage into medulloblastoma is reported to be extremely rare. We present two cases of hemorrhage into medulloblastoma with computed tomographic (CT) findings.

Case Reports

Case 1

A newborn girl was delivered vaginally by vacuum extraction following fetal cardiac deceleration and a prolonged second stage of labor. The baby had a right-sided cephalohematoma and right facial palsy as well as opisthotonos. Noncontrast CT demonstrated hemorrhage into enlarged lateral ventricles and a high-density area in the right cerebellopontine angle suggesting an intraparenchymal hematoma (fig. 1A). CT 4 days after birth was essentially unchanged, but, because of a decreasing hematocrit, the cerebellar hematoma was evacuated. The baby continued to deteriorate, and, 10 days after birth, CT was repeated. It demonstrated a high-density mass in the right cerebellum, larger than before, which enhanced homogenously after administration of intravenous contrast material. The patient remained stable for 3 weeks and then deteriorated further. CT 1 month after birth showed an enlarged enhancing mass compressing the fourth ventricle (figs. 1B and 1C). Surgery demonstrated a right cerebellar hematoma with clusters of medulloblastoma cells within it as well as adjacent solid areas of medulloblastoma. The infant died 4 days after surgery of respiratory arrest resulting from involvement of the brain stem by tumor.

Case 2

A 9-year-old boy was well until 6 months before admission, at which time he developed periodic headaches, most common in the morning, located in the occiput, and relieved by Tylenol and rest. One day before admission, the patient developed nausea, vomiting, and ataxia. Contrast CT demonstrated a large left cerebellar mass of both high and low density (fig. 2). (Noncontrast scanning was not performed.) Surgery demonstrated a large necrotic medulloblastoma with a central hemorrhage. The postoperative course was uneventful and radiotherapy was begun.

Discussion

Medulloblastoma is a neoplasm that arises in the neuroepithelial roof of the fourth ventricle and is composed of poorly differentiated germinative cells. These neuroepithelial cells form the external granular layer within the cerebellar hemispheres by migrating upward and laterally [5]. Therefore, although most medulloblastomas are midline in the fourth ventricle, they can occur anywhere along this path of migration as far laterally as the cerebellopontine angle. The CT characteristics of medulloblastomas are reported to be typical for the tumor whether midline or lateral, usually demonstrating slightly increased density that enhances uniformly after administration of contrast material [6]. However, this pattern is not pathognomonic for medulloblastoma, with a similar appearance occurring with ependymomas and cerebellar astrocytomas.

Pathologically, medulloblastoma is described as a soft, friable, fairly well demarcated neoplasm with hemorrhage, cyst formation, and calcification being uncommon [5]. In fact, hemorrhage into medulloblastoma was thought to be so rare that one author stated: "Hemorrhages do not occur in this tumor." [7] Other major references do not mention intratumoral hemorrhage in medulloblastoma [5, 8, 9]. However, there are eight reported cases of spontaneous hemorrhage into this tumor [1, 2, 10–13]. In addition to these cases of spontaneous hemorrhage, there are reports of hemorrhage into medulloblastomas after surgery and/or radiation therapy [14–16].

Although rare in medulloblastoma, the incidence of massive intratumoral hemorrhage in brain tumors has been reported as 3%–7.5% [16, 17]. Zimmerman and Bilaniuk [1] described three CT patterns of intratumoral hemorrhage: (1) solid hematoma, indistinguishable from hematomas from other causes except for contrast enhancement of contiguous or remote masses or contrast enhancement along the margin of the hematoma; (2) central hemorrhage into a necrotic tumor or into a less active but solid part of the tumor; and (3) hemorrhagic infarction, from small peripheral to total tumor infarction. Case 1 had a type 1 pattern of

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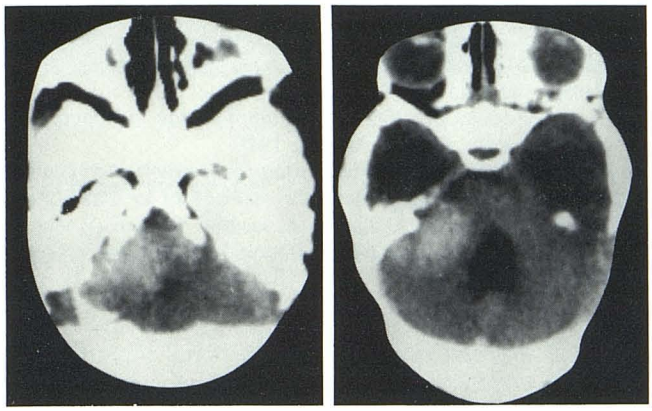
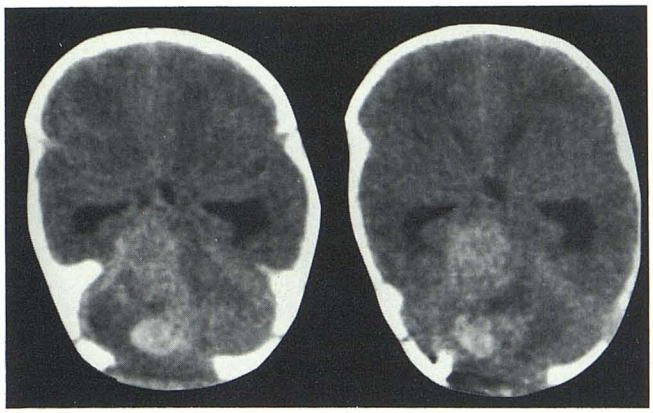


A



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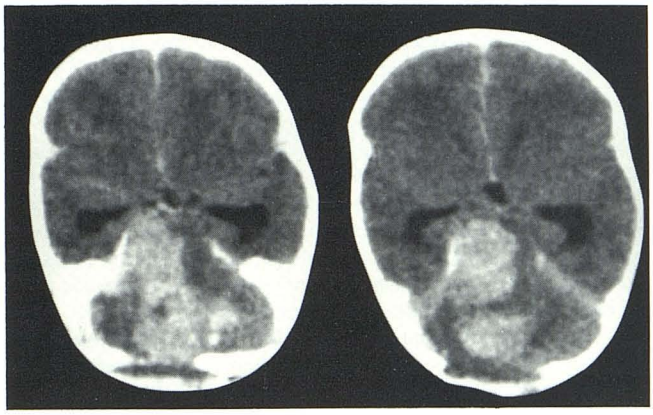

C

Fig. 1.—Case 1. **A**, Noncontrast CT at birth shows increased density in right cerebellopontine angle with little mass effect and hydrocephalus. Noncontrast (**B**) and contrast (**C**) scans 1 month later. Further enlargement of high-density right cerebellar mass now involving midline structures and left cerebellum. Lesion enhances after contrast administration. Fourth ventricle is obliterated and hydrocephalus is present. There was "hematoma" evacuation 3 weeks earlier.

intratumoral hemorrhage—a solid clot indistinguishable from hematoma due to other causes except for an atypical location and contrast enhancement. Case 2 demonstrated a type 2 pattern—bleeding into a necrotic part of the tumor.

The incidence of brain tumors in the first 2 years of life is surprisingly high, with most of these tumors probably congenital and usually large by the time they are detected [18–21]. The absolute number of brain tumors in the first 2 years of life is equal to other pediatric age groups. In one series of 203 pediatric brain tumors detected by CT during a 3 year period, 23 (11%) were in infants under 2 years of age [17]. Five of these were medulloblastomas, four of which appeared as solid isodense lesions on noncontrast CT. This appearance of a medulloblastoma as an isodense lesion on noncontrast CT would explain why only the hemorrhagic part of the tumor was seen on the initial CT scan in case 1.

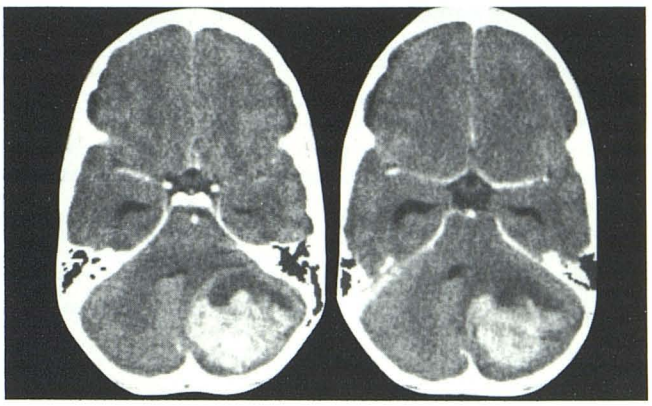

Fig. 2.—Case 2. CT after contrast enhancement. Large mixed density left cerebellar mass. Fourth ventricle is compressed and shifted. Hydrocephalus is present.

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