

## What Is Your Diagnosis?



Figure 1—Lateral radiographic view of the head of a 17-month-old rhesus macaque with a midline mass on the top of its head.

### History

A 17-month-old sexually intact male rhesus macaque (*Macaca mulatta*) was examined because of a midline mass on the top of its head. This monkey was housed in a peer group consisting of 9 other age-matched rhesus macaques. The well-circumscribed, fluctuant, soft-tissue mass measured  $4.5 \times 2.8 \times 2.2$  cm and appeared cystic, with an anechoic center and hyperechoic borders, during ultrasonography. A large volume (20 ml) of blood was easily aspirated from this area. The observed behavior of the monkey and results of physical examination were otherwise considered typical. A radiograph of the head was obtained (Fig 1).

Determine whether additional imaging studies are required, or make your diagnosis from Figure 1—then turn the page ▶

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Supported by National Institutes of Health grant NIH-RR05080.

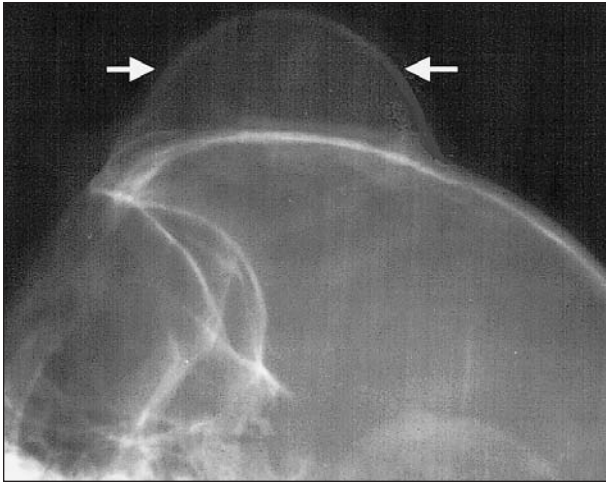


Figure 2—Lateral radiographic view of the head of the monkey described in Figure 1, obtained 6 weeks after the original image. Arrows indicate boundaries of a mineralized soft-tissue mass.

## Diagnosis

**Radiographic diagnosis**—Soft-tissue mass outlined with a periosteal reaction overlying the frontal bone.

## Comments

The asymmetrical, dome-shaped, 40-mm-wide and 16-mm-thick mass extended caudally 25 mm from the midline of the frontal bone to a point just cranial to the coronal suture. A radiograph obtained 6 weeks after initial examination revealed that the borders had ossified to almost fully encapsulate the mass (Fig 2). Differential diagnoses included an infectious process, arteriovenous malformation, neoplasia, or hematoma. However, infectious processes and malignant neoplasms of bone are typically more destructive and proliferative than this lesion.

We were able to aspirate blood from the mass for 3 months after initial examination. Results of CBC performed on aspirated blood were similar to those of blood collected from the femoral vein and were within reference ranges; RBC and WBC aspirated from the mass appeared normal. These 2 observations suggested that fresh blood was flowing continuously through the mass. Degenerate blood cells and serosanguineous fluid would typically be aspirated from a resolving hematoma.

To determine whether the mass represented a vascular anomaly or communicated with the vasculature of the brain, magnetic resonance imaging was performed 3 months after the initial examination. An elevation of the periosteum was evident within the lateral boundaries of the mass; however, the inner and outer tables of the frontal bone above and below the mass were intact (Fig 3). Increased signal intensity within portions of the mass, evident on T1-weighted images following IV administration of gadopentetate dimeglumine, was consistent with capillary blood flow through the soft-tissue center of the mass. The mottled appearance of the contrast images was consistent with granulation tissue. Regions of signal void indicated a lack of blood flow, which can occur as a result of necrosis or nonvascularized fibrin deposits, both of which are consistent with a diagnosis of organizing hematoma. The

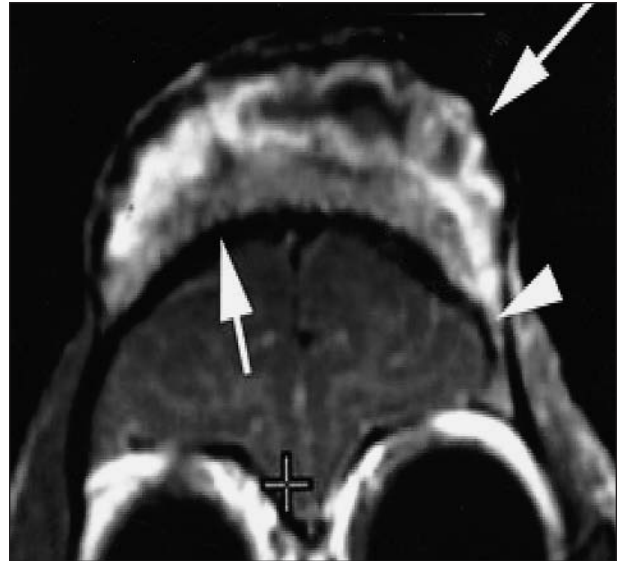


Figure 3—A T1-weighted magnetic resonance image of the skull of the monkey described in Figure 1, obtained after IV administration of gadopentetate dimeglumine. The mass is apparent between the inner and outer tables of the frontal bone (arrows). Contrast enhancement (increased signal intensity) of the central portion of the mass suggests capillary blood flow within viable granulation tissue. The incongruity along the right border of the mass (arrowhead) is a result of partial volume averaging of the curved surface of the flat frontal bone within the image slice and not a defect in the inner and outer tables of the frontal bone.

mass did not contain large blood vessels, and we did not detect a direct communication of blood flow between the mass and the brain.

The final diagnosis was a resolving, ossifying, subperiosteal hematoma of the skull (cephalhematoma) with organization of the hematoma and formation of granulation tissue. Although aspiration of apparently fresh blood from the mass supported a diagnosis of vascular anomaly more so than cephalhematoma, lack of large or abnormal blood vessels or flow voids on the magnetic resonance images did not. Moreover, the mass continued to mineralize so that the central portion was eventually replaced with bone. In a previous report, fresh blood was aspirated from 7 of 8 cephalhematomas in juvenile squirrel monkeys.<sup>1</sup>

Although cephalhematomas are considered diagnostic of ascorbic acid deficiency in juvenile squirrel monkeys (*Saimiri sciureus*),<sup>1,3</sup> the monkey described in this report was fed a commercial monkey chow fortified with ascorbic acid and various types of produce, and serum ascorbic acid concentration was within reference limits. Thus, trauma was considered the most likely cause of the cephalhematoma. No further treatment was recommended, and the monkey continues to grow and develop normally in its peer group.

1. Kessler MJ. Cephalhematomas due to suspected ascorbic acid deficiency in young squirrel monkeys (*Saimiri sciureus*). *J Med Primatol* 1980;9:314–318.

2. Demaray SY, Altman NH, Ferrell TL. Suspected ascorbic acid deficiency in a colony of squirrel monkeys (*Saimiri sciureus*). *Lab Anim Sci* 1978;28:457–460.

3. Blackwell CA, Manning PJ, Hutchinson TC, et al. Cranial hyperostosis of squirrel monkeys (*Saimiri sciureus*). *Lab Anim Sci* 1974;24:541–544.