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Cavernous Hemangioma of the Clivus: Case Report and Review of the Literature

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Osseous hemangiomas are benign bone tumors that are most commonly found in the calvarium and vertebral bodies. Hemangiomas of the skull base usually are found in the temporal bone. Hemangioma of the clivus is extremely rare and only one case in the basi-sphenoid region [1] and two cases in the body of the sphenoid have been reported [1, 2]. We present the clinical and radiologic findings of an osseous hemangioma of the clivus.

Case Report

A 37-year-old woman had had headaches over a period of several years. She had no history of trauma, but in September 1989 she had sudden onset of severe frontal headache and numbness in her extremities, which later resolved spontaneously. She was admitted to another hospital, where a CT examination showed a clival tumor. She was referred to our hospital for surgery in August 1990.

At that time she had mild headache but no neurologic signs. Multidirectional tomography and CT showed clival enlargement and rough bony trabeculae of the clivus, which had a honeycomb pattern (Fig. 1A). There was no lytic or sclerotic change of the clivus. A T1-weighted sagittal MR image (Fig. 1B) showed ballooning of the clivus, in which normal bone marrow signal was totally replaced by iso- to slightly hypointense signal. Multiple small areas of high signal intensity were scattered throughout the clivus, and a large area of high signal intensity was seen in the anterior and inferior portion of the ballooned clivus. On a T2-weighted image (Fig. 1C), large areas of high signal intensity were seen where corresponding areas on the T1-weighted image were slightly hypointense, indicating fatty tissue. The remaining portion of the clivus was hyperintense. The ventral portion of the pons was flattened by the enlarged clivus. After IV administration of gadopentetate dimeglumine, the tumor enhanced markedly in a homogeneous fashion (Fig. 1D).

Angiography showed a moderately hypervascular tumor fed by the left ascending pharyngeal artery (Fig. 1E). The anterior superior portion of the tumor stained faintly on the left internal carotid arteriogram.

Most of the clivus was replaced by a hard tumor, which tended to bleed. Microscopic examination revealed that the tumor contained rough bony trabeculae, fatty tissue, dilated blood vessels, and connective tissue (Fig. 1F). The histologic diagnosis was cavernous hemangioma.

Discussion

Osseous hemangiomas are benign tumors that usually involve the flat bones and spine; they comprise nearly 1% of all primary bone tumors. Hemangiomas of the skull represent

about 0.2% of all bone tumors and about 10% of the primary benign tumors of the calvarium [3]. Autopsy findings have shown that hemangioma of the spine represents about 10.7% of benign tumors in that location [4]. However, hemangiomas of the skull base are rare and most arise from the temporal bone.

A case of hemangioma of the basi-sphenoid region was reported by Vincent and Bergeat in 1939 [1], who described the plain radiographic findings. Although Suss et al. [2] described the CT findings of a hemangioma arising from the sphenoid body, that tumor was not cavernous but capillary. Our case is of a cavernous hemangioma.

In establishing the radiologic diagnosis, the most characteristic signs of a vertebral hemangioma are the ballooning, honeycombing, and vertical supportive strands in a vertebral body of overall decreased density [4]. On CT, the honeycomb pattern also is demonstrated because the vertical trabeculae are imaged in cross section [5]. On MR imaging, intraosseous hemangiomas show a mottled increased signal on T1- and T2-weighted images. Chemical shift images and histopathologic studies reveal that fatty tissue causes the increase of signal intensity of T1-weighted images [6]. The pathogenesis of fatty tissue in intraosseous hemangioma is not well known [6]. It is postulated that the markedly high signal intensity on T2-weighted images is probably caused by pooling blood and/or slowly flowing blood.

In our case, the tumor was large, involving nearly the entire clivus, producing ballooning and a honeycomb pattern on multidirectional tomographs and CT scans. However, a polka-dot pattern was not visualized because of the lack of vertical trabeculae, probably related to minimal weight-bearing stress on the clivus. On MR images, the hemangioma produced ballooning that was confined to the clivus. Both T1- and T2-weighted MR images showed a mottled high-intensity mass. Although selective "fat" and "water" images were not obtained, the area of high intensity (anterior and inferior portions of the tumor) on T1-weighted images seemed to be fatty tissue. Small, multiple scattered areas of high intensity on T1-weighted images were difficult to recognize on T2-weighted images, probably because of the decreased spatial resolution inherent in T2-weighted images and the partial volume effect of the adjacent area of hyperintensity. These findings are characteristic of osseous hemangioma.

If a honeycomb pattern is visualized by either CT or multidirectional tomography, and increased mottled signal is dem-

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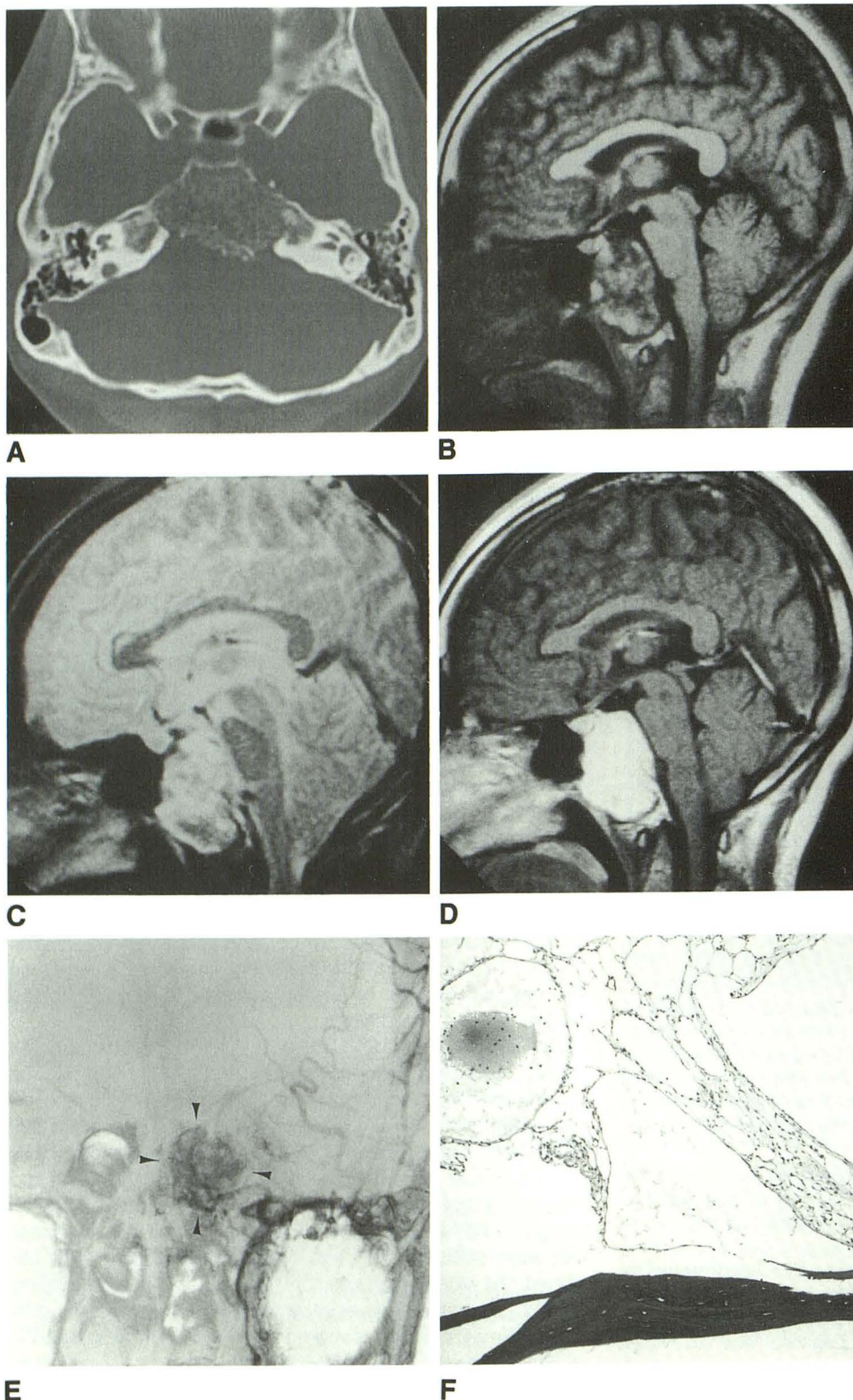


Fig. 1.—37-year-old woman with clival tumor.

A, CT scan shows enlargement of clivus and honeycomb pattern in tumor.

B, Sagittal T1-weighted MR image (IR 2500/500/30) shows mottled high-intensity areas in tumor.

C, Sagittal T2-weighted MR image (SE 2000/120) shows heterogeneous high-intensity mass of clivus. High-signal-intensity areas on T1-weighted image are seen as slightly low signal intensity.

D, Sagittal T1-weighted contrast-enhanced MR image (SE 500/30) shows marked enhancement of tumor.

E, On the left external carotid arteriogram, the tumor shows dense stain (arrowheads) fed by ascending pharyngeal artery.

F, Photomicrograph of tumor shows rough bony trabeculae, dilated blood vessels, fatty tissue, and connective tissue. (H and E $\times 75$)

onstrated on both T1- and T2-weighted images, a diagnosis of osseous hemangioma of the clivus should be considered.

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