

# Intraosseous Cavernous Hemangioma of the Frontal Bone

## —Case Report—

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### Abstract

A 32-year-old man presented with a primary intraosseous cavernous hemangioma manifesting as a small painless swelling of the right forehead. Radiography revealed a radiolucent osteolytic lesion in the right frontal region. Bone window computed tomography demonstrated a 1.5 cm mass between the outer and inner tables just lateral to the right frontal sinus. The outer and inner tables were thin and partially defective, but without bone fracture. Magnetic resonance imaging revealed a small mass lesion with bone erosion of the posterior table of the frontal bone. Preoperative examination yielded no final diagnosis. En bloc resection was performed. The histological diagnosis was primary intraosseous cavernous hemangioma. Total resection is recommended for definitive diagnosis of intraosseous tumor.

Key words: cavernous hemangioma, skull base, intraosseous tumor

### Introduction

Primary intraosseous cavernous hemangioma (PICH) is a rare benign skeletal tumor, which occurs at all ages, but is more common in middle age, with a peak around the fourth decade of life,<sup>6-10)</sup> and accounts for 0.7% of all osseous neoplasms.<sup>1)</sup> PICH most commonly occurs in the spinal vertebral column. PICH of the cranium is rare and causes only 0.2% of all osseous neoplasms,<sup>14)</sup> and 7% of all skull tumors.<sup>8)</sup> The parietal and frontal bones are the most common sites of involvement.<sup>1-14)</sup> The pathogenesis is unknown, but is believed to be either congenital or related to previous trauma.<sup>3)</sup> We describe a case of PICH of the frontal bone, involving the bony component of the frontal sinus, which was completely removed without injury to the frontal sinus mucosa.

### Case Report

A 32-year-old man came to our hospital with a swelling above the right eyebrow persisting for 1 year. He had no history of head trauma. The swelling was painless and slowly growing, and he had no other

complaints or neurological deficits. Physical examination found the swelling was hard and immobile, but not tender or pulsatile, and the covering skin was freely mobile and normal in appearance. Radiography showed a radiolucent osteolytic lesion in the right frontal region. Bone window computed tomography (CT) demonstrated a 1.5 cm mass between the outer and inner tables just lateral to the right frontal sinus (Fig. 1). The outer and inner tables were thin and partially defective, but without

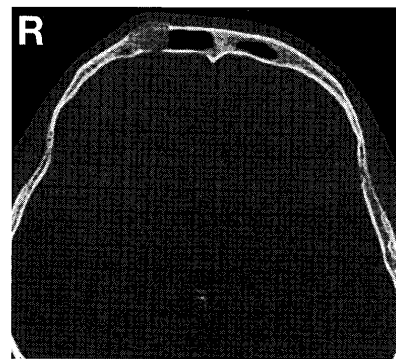
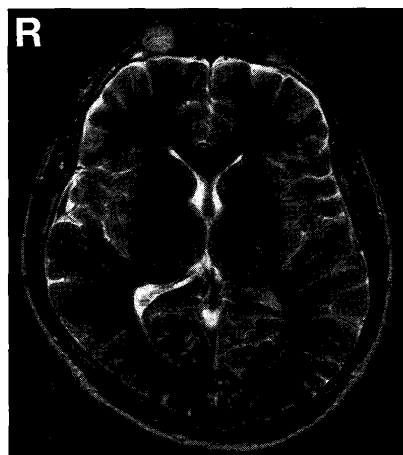


Fig. 1 Bone window computed tomography scan demonstrating a 1.5 cm mass between the outer and inner tables just lateral to the right frontal sinus.

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**Fig. 2** T<sub>2</sub>-weighted magnetic resonance image revealing a small mass lesion in the right frontal sinus with bone erosion of the posterior table of the skull.



**Fig. 4** Photomicrograph showing thin-walled vascular channels lined by a thin layer of endothelial cells interspersed among bony trabeculae. Hematoxylin and eosin stain, ×100.



**Fig. 3** Intraoperative photographs of the tumor before excision (upper) and after removal (lower), showing the intact dura and mucosa.

bone fracture. Magnetic resonance imaging revealed a small mass lesion in the right frontal sinus with bone erosion of the posterior table of the skull (Fig. 2).

The lesion was removed en bloc, and the circumferential normal part of the surrounding bone was also removed, retaining the mucosa and inner table of the frontal sinus intact (Fig. 3). The frontal sinus mucosa was covered with a pericranial flap. The bone defect was reconstructed with a titanium mesh implant. Histological examination of the specimen revealed osseous cavernous-type hemangioma (Fig. 4).

## Discussion

Hemangiomas are histologically classified into cavernous and capillary types.<sup>12)</sup> Cavernous-type hemangioma is an enlarged mass of blood-filled sinusoidal channels that have eroded and displaced normal tissues. In contrast, capillary-type hemangiomas consist of multiple tufts of capillaries arranged in radiating loops or lobules.<sup>14)</sup> Calvarial hemangiomas arise from vessels in the diploic space, and receive additional blood supply from branches of the external carotid artery that originate inside the skull vault. The middle meningeal and superficial temporal arteries provide the main blood supply for these tumors.<sup>2)</sup> Cranial PICHs are localized to the calvarium in 70% of cases, particularly the parietal and frontal bones.<sup>14)</sup> Neurological deficits are unusual, since these tumors tend to expand externally, though intracranial expansion has been reported.<sup>8)</sup> The diagnosis is rarely made preoperatively, and is most often established during exploratory surgery.

The classical radiographic characteristics of intraosseous hemangioma arising from various anatomical locations, including the cranium, include an expansive, well-circumscribed area of rarefaction with a sunburst pattern of trabeculations radiating from a common center,<sup>4)</sup> with a honeycomb or soap-bubble configuration en face or on axial views.<sup>1)</sup> These characteristics are better defined by CT, especially for smaller lesions that are not obvious on radiographs.<sup>4-7)</sup> The cortex can be greatly expanded, leaving a thin bony shell, although the periosteum remains intact, in contrast to osteogenic sarcomas, which destroy the bone cortex and invade the periosteum and surrounding soft tissues. There is usually no reactive sclerosis at the margins.

PICH is a slowly growing, benign, nonencapsulated lesion. Invasion through the dura is extremely rare. PICH appears as soft, rubbery, vascular tissue separated by thin bony trabeculae. Intraoperatively, the lesion has the appearance of "moth-eaten" bony interstices or white coral filled with vascular soft tissue. These trabeculations are the result of reactive osteoclastic and osteoblastic bone remodeling in response to the stress created by the enlarging vascular neoplasm, and appear continuous with the normal surrounding bone.<sup>5)</sup>

Cavernous-type PICH consists of thin-walled vascular channels lined by a single layer of flattened endothelial cells interspersed among the bony trabeculae.<sup>13)</sup> Capillary hemangiomas, which are the other, less common form of hemangioma, consist of radially directed capillary loops lined by a single layer of cuboidal endothelial cells. Some hemangiomas are mixed types that contain elements of both cavernous and capillary patterns. Capillary hemangiomas may progress to cavernous hemangioma. Gross total surgical excision is generally recommended to minimize cosmetic deformity and to obtain a definitive diagnosis.<sup>1,5,7,11)</sup> The surgical treatment of choice is en bloc excision and establishment of normal bony margins by drill curettage.

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