Calvarial hemangioma with blood supply from branches of the internal carotid artery

Case report

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The sources of blood supply of calvarial hemangiomas are not well established angiographically but have been reported to derive from the middle meningeal artery. A case is presented in which both the external and the internal carotid arteries supplied the hemangioma. The protean arteriographic picture is explained in terms of the various tissues the tumor involves (galea, calvarium, or meninges).

KEY WORDS  •  hemangioma  •  skull  •  arteriography  •  carotid artery

The radiographic appearance of calvarial hemangiomas often presents typical features, and the lesion can be properly diagnosed on plain skull roentgenograms. In the rare case in which arteriography has been performed, branches of the external carotid artery have been reported to supply the lesion. In the case we are reporting, the internal carotid artery contributed to the blood supply and led to the incorrect preoperative diagnosis of meningioma.

Case Report

This 17-year-old girl was admitted to the surgical service of the American University Hospital of Beirut with a chief complaint of a progressively enlarging bony protuberance of the forehead and mild intermittent frontal headaches of 4 years' duration. The patient had hit her head against a swinging door when she was 13 years old, but there were no immediate sequelae to the injury. Two months later, however, she noted a painless swelling at the site of the injury which continued to grow until her present admission.

Examination. A globular bony protuberance measuring 10 × 8.5 cm occupied the entire anterior left frontal area. It was nontender to palpation and nonadherent to the overlying tissues. The neurological examination was normal. X-ray films of the skull showed a large outgrowth of the left frontal bone extending posteriorly to the coronal suture, involving the frontal sinus anteriorly, and crossing the midline (Fig. 1). The mass was radiolucent, exhibited sclerotic borders and parallel bone spiculations. There was involvement of the outer as well as inner table of the skull. A left common carotid arteriogram (Figs. 2 and 3) showed a 3 cm shift of the pericallosal artery across the midline and a considerable shift posteriorly. The blood supply of the tumor came mainly from the superficial temporal artery although some contribution from the middle meningeal artery was noted. In addition, there was defi-
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Fig. 1. Plain skull films. Left: Anteroposterior view. Note invasion of the roof of the frontal sinus. Right: Tangential view. Note the destruction of the skull tables, the parallel striations, and the invasion of the roof of the frontal sinus.

Bone blood supply from the internal carotid artery, through the fronto-polar artery and the supraorbital branch of the ophthalmic artery. There was no tumor stain. Two large veins draining the tumor were seen in the venous phase. These joined the superior sagittal sinus.

Operation. A 10 × 10 × 8.5 cm extradural mass was found invading the left frontal sinus crossing the midline and extending posteriorly 2 cm beyond the coronal suture. The inner table was destroyed, and the tumor bulged inward for a distance of 5 cm. The underlying dura was adherent to the tumor and was very vascular. A block resection of the mass was carried out (Fig. 4 left) leaving the dura intact. The histology revealed bone trabeculae enclosing thin-walled dilated vascular spaces (Fig. 4 right). The diagnosis was cavernous hemangioma. The patient's postoperative course was uneventful.

Discussion

The appearance of calvarial hemangiomas on plain skull films has been described ex-
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tensively in the literature, and is said to be diagnostic. However, in the occasional case, differentiation from a meningioma is difficult. Our case presented unusual features: the sclerotic border of the lesion with the parallel rather than the radial arrangement of the spicules, and the large intracranial extension with equal involvement of the outer and the inner tables of the skull. These suggested a meningioma rather than a hemangioma.

In reviewing the literature, we found that reports of arteriographic studies on hemangiomas of the calvarium were rare.

Davis, et al., reported a case of a hemangioma studied by arteriography in which the blood supply to the lesion was through the middle meningeal and the superficial temporal arteries. Sargent, et al., reported a case where no evidence of blood supply from the internal carotid artery was seen and commented that rarely does a prominent tortuous middle meningeal artery feed the neoplasm. Lombardi and Larini reported two cases in which the middle meningeal artery supplied the hemangioma. One similar case was reported by Paillas and Legre and another by Simmons and Wolpert. We did not come across any report of the internal carotid artery contributing blood supply to the lesions, as occurred in our case.

It appears that the arteriographic picture of calvarial hemangiomas depends on the structures involved by the tumor. When the lesion is restricted to the calvarium, an arterial supply from the middle meningeal artery is the rule. If the galea is involved, blood supply from the superficial temporal artery and/or the posterior occipital artery can be expected. When the tumor becomes adherent to the meninges, some supply from the internal carotid artery may be established. Large
veins in the lesion that filled and emptied early in arteriographic series have been described.²⁴ However, in our case, these appeared late, 7 seconds after injection, possibly because of the large size of the tumor in which the contrast material was pooling. It has been noted⁵⁷ that occasionally the diploic veins around the lesion are not dilated in hemangiomas as they are in meningiomas. At times “one vein of derivation” is seen,⁷ but in the case we report there were two.

Summary
We have presented a case of a calvarial hemangioma showing unusual features on the plain skull roentgenograms suggesting a meningioma. Carotid arteriography revealed partial vascularization from branches of the internal carotid artery. The angiography of calvarial hemangiomas has been reviewed. The blood supply seems to vary with the structure involved whether it be galea, calvarium, or meninges.

References

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