Giant lateral sinus pericranii

Case report

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A case of giant lateral sinus pericranii, which presented in a patient during early childhood as a soft, collapsible mass and gradually grew until it reached $13 \times 9 \text{ cm}$ when the patient was 36 years of age, is reported. The patient underwent successful surgery and the lesion was totally excised. The results of diagnostic tests (computerized tomography scanning, magnetic resonance imaging, cerebral angiography, and sinosography) and surgery-related problems are presented and discussed.

KEY WORDS • sinus pericranii • angiography • sinosography • computerized tomography • magnetic resonance imaging

Sinus pericranii is a relatively rare vascular anomaly of the cranial vault. Usually it is described as a round, soft, tumorlike lesion that is fluctuant, nonpulsatile, easily compressible and collapsible, and located in the midline along the superior sagittal sinus (SSS) and mainly in the frontal region.\textsuperscript{2,11,14} We present an unusual case of giant sinus pericranii located laterally in the temporal region in an adult.

Case Report

History. This 36-year-old man presented with a compressible left parietotemporoparietal soft-tissue mass that became engorged when his head was placed horizontally and receded when it was upright. The lesion was noticed in early childhood and the diagnosis of hemangioma was presumed. At 23 years of age, the patient noticed that the mass was growing and experienced a sense of heaviness and pulsation when his head was in a horizontal position. The lesion continued to enlarge over the ensuing 13 years and fear of trauma and cosmetic concerns induced the patient to seek medical attention.

Examination. The patient’s physical examination was unremarkable and no history of trauma to the head could be elicited. The tumor measured $13 \times 9 \text{ cm}$ (Fig. 1) and it was possible to palpate a craterlike bone depression under the scalp. Computerized tomography (CT) scanning demonstrated a left parietal, extracranial soft-tissue mass with underlying bone erosion (Fig. 2 left). Magnetic resonance (MR) imaging revealed the lesion to be slightly hypo-intense on T₁-weighted and hyperintense on T₂-weighted images (Fig. 2 center), which raised the possibility of a fluid-containing lesion. A study performed after gadolinium administration demonstrated an irregular, heterogeneous, high-intensity signal (Fig. 2 right). Cerebral angiography revealed an abnormal vascular network, which filled during the venous phase through multiple venous channels that emptied into the left transverse and sigmoid sinuses (Fig. 3 left). Percutaneous injection of contrast material into the lesion (Fig. 3 right) demonstrated a vast pericranial sinus that drained mainly into the intracranial sinuses, with minor participation of the scalp veins.

Operation. After induction of general anesthesia in the patient, a large, horseshoe-shaped incision was made through full soft-tissue thickness in the left occipitoparietotemporal area, and gradual subperiosteal elevation of the flap was begun. A bluish, blood-filled sac located between the pericranium and galea came into view. In the region of the bone depression the pericranium was easily elevated from the bone, without any visible venous communications. Closer to the base of the skull, in the retroauricular region, multiple, sievelike holes in the bone were exposed, with their caliber varying from 0.1 to 3 mm in diameter. We transected the thin-walled emissary veins that exited from these holes and encountered significant difficulties in our effort to arrest the associated bleeding. The thin-walled vessels burst on bipolar coagulation and attempts to pack the bone holes with wax were also unsuccessful, because the wax did not adhere to the bone channels that were lined by the soft tissue. Finally the bleeding
was controlled by elevating the patient's head and torso. The sac of the pericranial sinus was then easily dissected from the galeal flap and resected, together with the peri-
cranium. The bone defect was filled with methacrylate, which polymerized in situ and provided definitive hemo-
postoperative Course. The postoperative course was uneventful and the patient was discharged 2 days post-
surgery, with good cosmetic results. Postoperative CT scans demonstrated fair cranial reconstruction. The histo-
pathological studies of the surgical specimen showed that the wall of the sac was formed from connective tissue with an inner collagen lining. At follow-up evaluation 1 year later the patient was found to be normal.

Discussion

Sinus pericranii is a relatively rare vascular anomaly of the cranial vault, with more than 100 cases described in the literature. The largest series were presented by Arrues, et al.,1 in 1956 (five cases), by Ohta, et al.,11 in 1975 (five cases), by Zlotnik, et al.,17 in 1977 (six cases), and by Vinas, et al.,14 in 1994 (14 cases). The sinus pericranii is usually described as “a small, circumscribed fluctuating vascular swelling of the scalp that communicates with the intracranial venous system.”2,7,8,14 There are numerous terms used in the literature to describe this entity; these include, among others, varix simplex, varix racemosus, varix herniosis, cirsoid aneurysm, aneurysm by anastomo-
sis, venous angioma, varix cirsoides, fistule osteo-vascu-
laire, venous tumor of the cranial bones, and venous vari-
cosities of the skull.11,14–16

The nature and cause of this malformation remain un-
clear. Both congenital and acquired origins are accepted. The hypothesis of a congenital origin of sinus pericranii is supported by observations of associated anomalies, such as cerebral aneurysmal venous malformations,8 systemic angiomases,7 and cavernous hemangiomas.11,12,14 On the other hand, trauma is believed to be a possible causative factor in acquired cases.6,11,16 One of the criteria for establishing the origin of this anomaly is the type of tissue lining the sac; an endothelial lining is characteristic of a con-
genital sinus pericranii, whereas the acquired lesion has a connective tissue lining.5

The morphological appearance of sinus pericranii is better defined than its etiology. Its distinguishing feature is the presence of abnormal communications between an

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**Fig. 1.** Preoperative photographs of the patient’s scalp. *Left:* Photograph of the patient in a horizontal position showing the mass bulging in the left parietotemporoccipital region and delineated with a broken line. *Right:* Photograph of the patient with his head and torso elevated; the lump has receded, demonstrating a crater-like depression in the left parietal bone.

**Fig. 2.** Neuroradiological studies. *Left:* Axial CT scan with bone window demonstrating a left posterior parietal extracranial soft-tissue lesion, eroding the outer table of the calvaria and thinning the diploic space and inner table. *Center:* Axial T2-weighted MR image (TR 3000 msec/TE 80 msec) demonstrating a hyperintense mass consistent with a fluid collection. *Right:* Coronal T1-weighted image after administration of gadolinium, demonstrating incomplete enhancement of the sinus contents.

**Fig. 3.** Angiographic studies of the brain. *Left:* Late venous phase of a left carotid angiogram in frontal projection demonstrating multiple dilated tortuous venous channels draining into the ipsilateral transverse and sigmoid sinuses. *Right:* Percutaneous sinu-
sography, anteroposterior view, demonstrating the fully opacified pericranial sinus and its draining veins.
extracranial blood-filled sac and intracranial venous sinuses through fenestrations in the cranial vault, which contain emissarial veins. The size of this anomaly, as reported in the literature, usually varies from 1 to 6 cm in diameter. In a series of 14 cases reported by Vinas, et al., the mean size of the sinus pericranii was 2.2 cm. As a rule, this malformation is asymptomatic and surgery is performed for a cosmetic reason or as a prophylaxis for possible complications of trauma such as hemorrhage and/or air embolism. Surgical removal is usually not difficult, with hemorrhaging generally controlled by means of bipolar coagulation of the emissary veins or plugging of the bone holes with wax. However, a report has been published describing massive venous hemorrhage from sinus pericranii during an attempted removal, requiring termination of the surgery. In that case, the sinus pericranii measured 4 × 10 cm, which is larger than is usually reported. Kurosu, et al., presented a case in which sinus pericranii participated in cerebral venous drainage to compensate for a hypoplastic SSS. It was postulated that transection of the emissary venous channels to the sinus pericranii might cause obstruction of the cerebral venous flow.

Unusual features in our case of sinus pericranii were its giant size and posterolateral location in the parietotemporal region. The significant difficulties in attaining hemostasis during surgery were ascribed mainly to the huge size of the lesion. Sinus pericranii is the likely diagnosis in a patient with a nontender, nonpulsating, fluctuant subgaleal mass overlying dural venous sinuses, the size of which depends on head position. Full collapse of the lesion when the patient is upright and the presence of bone erosion are characteristic of this entity. Although this is a benign lesion, the anomaly has a tendency to grow gradually, and, as in our case, it may become enormous, demanding surgical treatment. The patient with this anomaly should be thoroughly evaluated before surgery. The imaging workup should include CT and MR studies, angiography, and percutaneous sinusography. Computerized tomography scanning is the modality of choice for visualizing the degree and extent of bone erosion. Magnetic resonance imaging best demonstrates the characteristic features of the content of the sinus and may exclude the presence of a coexisting vascular anomaly. Cerebral angiography outlines the vascular supply to the lesion and the pattern of cerebral venous drainage. Percutaneous sinusography demonstrates the capacity and extent of the sinus cavity.

In cases of large sinus pericranii the surgeon should be prepared for significant hemorrhage from emissary veins. An effective technique for hemorrhage control may be elevation of the patient’s head and torso, but the surgical team should be primed for detection and treatment of complications such as an air embolism.

References

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