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Case Report

Misdiagnosed Case of Scalp Arteriovenous Malformation

Abstract

Scalp arteriovenous malformations (AVMs) are abnormal vascular lesions that can be treated safely and effectively, with surgical or endovascular approaches. Because of their complex vascularity, the detailed preoperative evaluation must be carefully performed. Here, we present a case of scalp AVM that required two operations as a result of a misdiagnosis because of inadequate preoperative assessment.

Keywords: *Arteriovenous malformation, scalp, surgery*

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Introduction

Scalp arteriovenous malformations (AVMs) are congenital or acquired abnormal vascular lesions that may develop because of trauma, and sometimes have an intracranial component.[1,2] The clinical findings include pulsatile mass, headache, local pain, burning sensation, tinnitus, bleeding, and esthetic problems, independent from the etiological factor.[1,3,4] Here, we present a case of scalp AVM that required two operations as a result of a misdiagnosis because of inadequate preoperative assessment.

Case Report

A 23-year-old female patient was admitted to a plastic surgery clinic because of an esthetic problem caused by swelling on the scalp, which started 1 year previously and gradually worsened in the most recent 6 months. She underwent surgery under local anesthesia without guidance using an imaging method. Bleeding started at the beginning of the operation, and the procedure was terminated. Five months after the first operation, she suffered from increased swelling of the lesion. She was seen by another physician, and cerebral magnetic resonance imaging (MRI) was performed [Figure 1a]. The physician felt that it was a simple skin lesion that could be completely removed under local anesthesia. She underwent a second surgery and experienced severe hemorrhaging. Later, she was referred to our clinic. Her physical examination revealed a painful mass lesion measuring 5 cm × 4 cm × 4 cm in the left parietal region at the vertex level. She did not have any complaints except for her esthetic problem. The results of her neurological examination were normal. A vascular malformation at the scalp was considered, and a cerebral MR angiography was performed and revealed a vascular mass lesion, which was located in the left parietal region and supplied by the branches of the left external carotid artery for which venous drainage could not be clearly identified [Figure 1b]. Therefore, we performed a conventional cerebral angiography and detected AVM in the left parietal region that was supplied via the branches of the left temporalis superficial artery, left meningeal media artery, and right temporalis superficialis artery [Figure 1c]. The lesion did not have an intracranial component and had no direct drainage vein into the dural sinuses. The patient was surgically treated under general anesthesia in the supine position, and her head was elevated at a 30° angle. The skin flap was removed with a horseshoe incision considering the vascularization of the scalp. The vascular lesion in the soft tissue was dissected, and the malformation was revealed. Initially, the supplying arteries of the lesion were closed. Later, the lesion was completely removed along with its nidus. The bone underlying the lesion had become thin; hence, the periosteum was cauterized with bipolar coagulation. Hemorrhaging from the bone was controlled with monopolar coagulation and bone wax. The

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skin flap was closed without the need for an additional plastic intervention. The histopathological diagnosis was as AVM [Figure 2a-c].

Discussion

Scalp AVMs are the abnormal vascular links between the supplying arteries and drainage veins without the presence of a capillary bed located in the subcutaneous tissue.[4] Lesions usually begin from the subcutaneous tissue and may lead to progressive deformities. Scalp AVMs have rarely been reported in literature. The current literature regarding scalp AVMs includes only case reports or case series conducted with a small number of patients.[4-6] These vascular lesions have been referred to by different names in literature including cirsoid aneurysm, aneurysm serpentinum, aneurysm racemosum, plexiform angioma, arteriovenous fistula, and AVM.[7-10]

These lesions may be congenital or may develop after trauma.[6,8,11,12] Acquired AVMs may be due to pregnancy, hormonal changes, or trauma. They are usually seen during childhood, adolescence, and early adulthood.[3] Although headache, local pain, burning sensation, tinnitus, and bleeding have been the most commonly reported symptoms, esthetic concerns are also associated with these lesions. The gold standard imaging method is still conventional angiography, although cerebral MRI, computed tomography of the brain, tomography, and MR angiography are effective, noninvasive imaging methods. Angiography is required for the assessment of all collateral links, the presence of an intracranial component, vascular supply of the posterior circulation, venous drainage, and association with sinuses.[3,4,13,14]

Treatment of scalp AVMs is difficult because of various factors such as the complex vascular anatomy, large collateral links, high-flow rate, and cosmetic factors. The aim of the treatment is complete elimination of the lesion from circulation. Treatment options include surgical excision, ligation of the supplying arteries, embolization via a transarterial or transvenous route and intralesional injection.[5,6,7,15-18] Untreated lesions tend to progress and thus, may lead to severe cosmetic or social problems, although they are not life-threatening.[1] Endovascular treatment includes embolization through a transarterial or transvenous route. The side effects of endovascular treatment include tenderness in the lesion area, hyperemia, necrosis, and hair loss. Moreover, embolizing agents may transfer to the general circulation.[5,17,19] Complete recovery may not be obtained with embolization because of large collaterals.[8,12] On the other hand, some published reports have presented cases that have been treated successfully and completely with endovascular methods. However, embolization is usually performed preoperatively in order to reduce blood loss during the operation.[3,5,6,11,19] Sclerosing agents such as tetradecyl sulfate, absolute alcohol, and a thrombogenic coil may be administered into the lesion. Endovascular treatment or combined endovascular and surgical treatment are effective methods in selected cases.[19-21] Surgical treatment was reported as an effective and safe treatment method in the studies by Chowdhury *et al*. (11 cases) and El Shazly and Saoud (9 cases).[3,4] The treatment method should be selected according to various factors including the patient age, presence and types of symptoms, presence of an intracranial component, vascular complexity of the lesion, skin thickness, and presence of an ulcer on the skin.

The current case involved a vascular pathology that was initially operated on without consideration of preoperative evaluation, leading to intraoperative hemorrhaging. Growth of the lesion was reported within 5 months following the first surgical intervention. The absence of an imaging technique during the first procedure was a shortcoming not caused by us. We did not encounter a similar case in literature showing enlargement of a lesion because of an attempt to eliminate the lesion. The enlargement of the lesion was probably due to the intralesional hemorrhage. We would like to emphasize that mass lesions in the scalp should not be operated

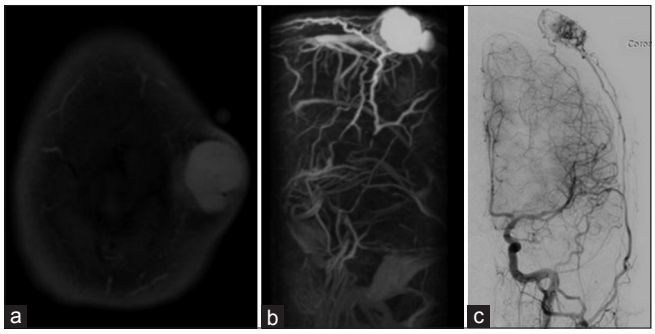

Figure 1: (a) Magnetic resonance image of the lesion. (b) Magnetic resonance angiography of the lesion revealing a vascular mass lesion. (c) Cerebral angiographic imaging of an arteriovenous malformation in the left parietal region

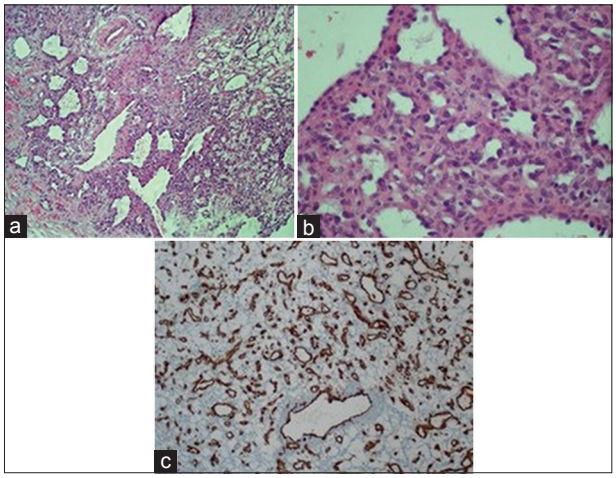

Figure 2: (a) A large number of vessels in narrow stromal edema are monitored. The thick muscular layer of the wall in some of the blood vessels can be identified (H and E, ×100). (b) Solid endothelial cell proliferation is present between vessel structures with identifiable lumens (H and E, ×400). (c) Immunohistochemically widespread CD34 positivity (QBEnd/10, ×100)

on without preoperative meticulous evaluation. These malformations can be intraoperatively eliminated together with the supplying and draining vessels without causing various cosmetic side effects such as hair loss.

Scalp AVMs may be treated safely and effectively with a surgical approach following a detailed preoperative evaluation. Conventional angiography is necessary for assessing the presence of an intracranial component and the association of the lesion with the dural sinuses in treatment planning for scalp AVMs.

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Conflicts of interest

There are no conflicts of interest.

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