

Case Report

Traumatic Arteriovenous Malformation of the Superficial Temporal Artery

Abstract

Most of the vascular lesions on head and neck soft tissue are congenital, but a rare cause can be trauma. A 23-year-old man came to our clinic with a wide pulsatile tortuous mass in the left temporofrontal area. That mass was appeared since 10 years ago. Ten years before his coming to our clinic, he had a blunt trauma in that area. After that, a small wound appeared there and healed gradually. In clinical examination, mass was large and pulsatile, and a fine murmur was detected from it. In paraclinical examination, computed tomography scan with intravenous contrast and sonography revealed a vascular mass with arteriovenous (AV) fistula in soft tissue only in that area. We operated him and vascular mass completely excised without recurrency. Pathologic report was AV malformation (AVM). According to our study, also rare trauma is one of the causes of AVMs, and we able to resection it completely without recurrency.

Keywords: Arteriovenous malformation, hemangioma, superficial temporal artery, traumatic aneurism, traumatic arteriovenous malformations

**Mahmoud Omrani Fard,
Omid Yousofnejad,
Mohammadbagher Heydari¹**

From the Department of Surgery, Alzahra Hospital, Isfahan University of Medical Sciences, Isfahan, ¹Department of Surgery, Imam Reza Hospital, Kermanshah University of Medical Science, Kermanshah, Iran

Introduction

Scalp arteriovenous malformations (AVMs) are an exceptional group of vascular lesions with curious presentations and an elusive natural history.^[1] An AVM of the face or scalp is a rare abnormal fistulous connection between the feeding arteries and draining veins without an intervening capillary bed within the subcutaneous layer^[2-5] it is rare when compared with other subcutaneous or craniofacial vascular anomalies such as the hemangioma or venous malformations.^[6] Autopsy data suggests that there is an overall frequency of AVMs in 4.3% of the population.^[7] It usually presents in late childhood, adolescent, or early adulthood. It can also cause massive hemorrhages due to dryness of the overlying skin and injuries. The draining veins are grossly dilated and tortuous and may show variceal dilatation. The dilatation of vascular channels often results in deformity of the scalp and face that is usually not life-threatening but can causes substantial esthetic and social disturbances.^[8,9] Most of these lesions are congenital but trauma is a rare case, and ablation of traumatic lesions is possible but congenital lesions are prone to recurrency after excision. Although several studies were reported of this subject in length of times. For example, three cases

of STA aneurysms are presented Peick and *et al.* in 1988^[10] and Camargo *et al.* was described a case of a 44-year-old male patient who developed a large pulsating mass, extending from the preauricular region to the right parietotemporal, and frontal regions after a motorcycle accident in 2014.^[11]

Case Report

We report the case of a 23-year-old male referred to us with a 10-year history of left temporofrontal scalp swelling. The swelling was manifested by a headache and tinnitus in the left ear. The swelling had been gradually increasing in size to attain a giant size and was pulsatile nature there was the previous history of blunt head trauma when he was 12-year-old. First, he found an irregular small mass in his left forehead that became gradually spread. No visual disturbances or seizure was seen.

On examination, he was found to have a pulsatile soft tissue swelling over the left temporofrontal scalp which was slightly mobile over the underlying bone.

The mass was 12 cm horizontally and 6 cm vertically in diameter. A bruit was also demonstrated over the swelling [Figure 1].

Address for correspondence:

Prof. Mohammadbagher Heydari,
Department of Surgery, Imam Reza Hospital, Kermanshah University of Medical Science, Kermanshah, Iran.
E-mail: mohammadbagher_heydari@yahoo.com

Access this article online

Website: www.advbiores.net

DOI: 10.4103/2277-9175.210663

Quick Response Code:



How to cite this article: Fard MO, Yousofnejad O, Heydari M. Traumatic Arteriovenous Malformation of the Superficial Temporal Artery. *Adv Biomed Res* 2017;6:82.

Received: May, 2015. **Accepted:** November, 2015.

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.

For reprints contact: reprints@medknow.com



Figure 1: Preoperative view

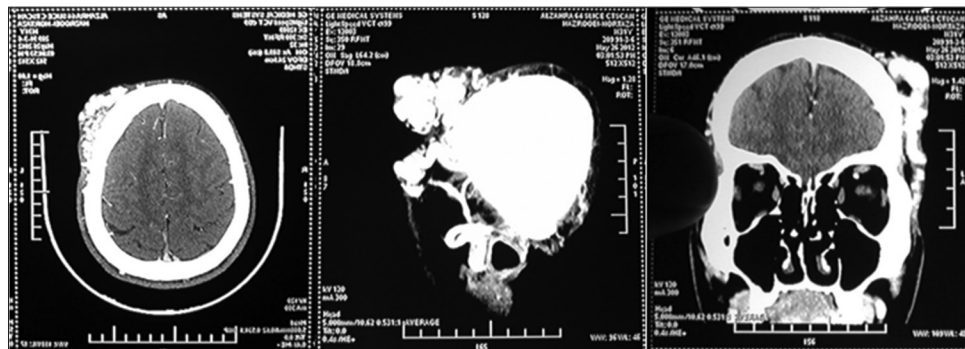


Figure 2: Computed tomography scan with intravenous contrast revealed no intracranial lesion with high velocity blood flow from superficial temporal artery

Examination of cardiovascular system was essentially within normal limits. Hematological and biochemical parameters were also normal. Chest X-ray and electrocardiography showed no abnormality.

A preliminary ultrasound and color Doppler of scalp was done which suggested features of pseudoaneurysm over the same region with no intracranial extension and with high velocity blood flow from superficial temporal artery. Computed tomography (CT) scan with intravenous (IV) contrast of head showed evidence of abnormal filled vessels involving the scalp on the left side in temporofrontal region. There was no intracranial extension of the lesion and intracranial AVM. In ventricles, too, was not seen any significant abnormality [Figure 2].

The patients went to many clinics and were told him that because of congenital origin, surgery is not effective. However, we advised him to surgery after explaining calculated risks. *En bloc* resection of involved scalp was performed, and primary closure with split thickness skin graft was done. Excised soft tissue was sent to the department of pathology for histopathological examination, Alzahra Hospital, Isfahan. Histopathological data confirmed the diagnosis as AVM of superficial temporal artery postoperatively [Figures 3-5].

The patient was followed for 6 months. Clinically, the patient was relieved of symptoms with minimal scars [Figures 6 and 7].

Discussion

An AVM of the scalp or face is an abnormal fistulous connection between the feeding arteries and draining veins, without an intervening capillary bed in the subcutaneous layer.^[12] Krayenbuhl and yasargil in a review of 800 AVMs from literature, and their own clinical material found extra cranial AVMs to account for only 8.1% of the cases various terminologies are in vogue.^[13]

Arteriovenous aneurysm, cirroid aneurysm, racemose aneurysm, aneurysm by anastomosis plexiform angioma, aneurismal varix, arteriovenous fistula, abnormal arteriovenous communication and have been known for centuries.

They are normally supplied by the superficial temporal artery and occipital arteries and occasionally by dural arteries which penetrate the cranial vault. Venous blood drains mainly through scalp veins or via dural sinuses. New investigation in our study is relationship between trauma and AVM. The location of AVM was left temporofrontal scalp. Due to existing previous blunt trauma in the same location, it seems that trauma is the main factor of the lesion.^[14]

Rapid growth is due to intratumoral hemorrhage or malignancy. Other symptoms and sings of scalp AVM range from a simple disfiguration to a life-threatening hemorrhage. Tinnitus and occasional headache and bruit are usually present which were present in our case.^[15]

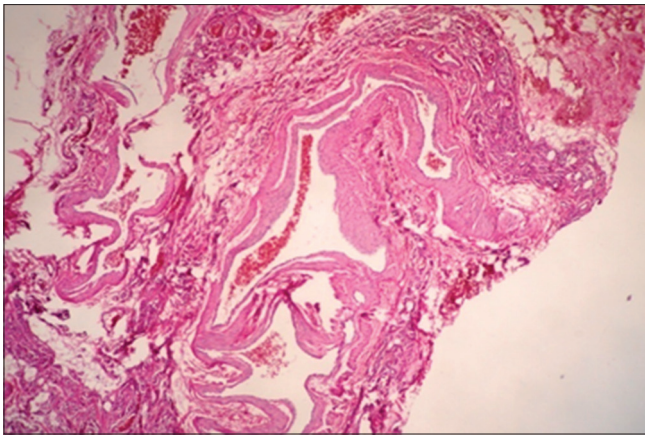


Figure 3: Photomicrograph revealed a mixture of blood vessels. The size of blood vessels' lumens varies ($\times 40$)

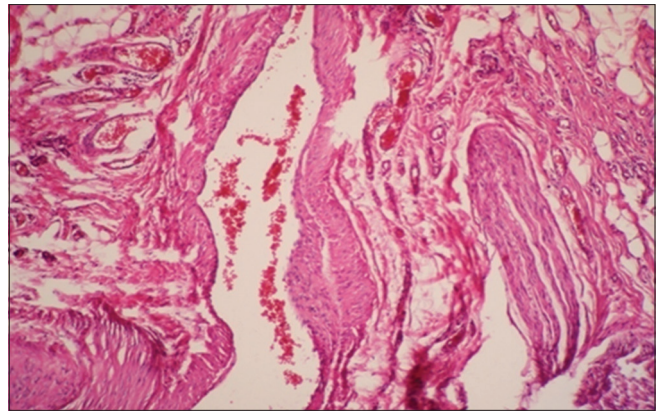


Figure 4: Photomicrograph revealed a mixture of blood vessels separated by connective tissue and fat ($\times 100$)

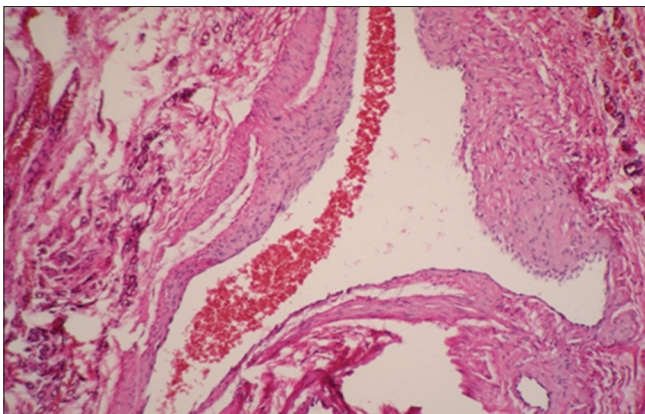


Figure 5: Photomicrograph revealed thick wall vessels ($\times 100$)

Fisher Jeffers *et al.* in 24 patients with AVM of the scalp reported 38% of the lesions were preceded by trauma without no focal neurologic deficits or intracranial involvement just similar to our case.^[2]

CT scan with IV contrast or CT angiography is a very useful investigation in imaging of these lesions. They revealed the lesions, exclude an intracranial component and demonstrate the related adjacent bony structures which may be important in surgical planning. Magnetic resonance imaging also aids in identifying any intracranial extension or involvement neither of which were found in our cases. Selective angiography must be done to rule out other differentials such as aneurysms, sinus pericranii, venous malformation, and cavernous hemangioma.^[14]

The ideal treatment is complete excision of the AVM although in the most times is impossible. It requires a complete knowledge of the feeding arteries and draining veins and the nidus of AVM. Because of the difficulty of complete resection, recurrency is common. When possible, the AVMs are removed in one piece because conservative excision increases the amount of bleeding and the operating time. Thus, total excision of the AVM lesion is essential for permanent cure. Although another



Figure 6: Postoperative frontal view of patient

treatment is surgery as an adjunct to embolization therapy.^[15-20]

Anyway, in our study, primary hypothesis was the traumatic cause of AVM. Important result is that although complete resection and relief in congenital AVM are impossible in traumatic, we can complete AVMs resect and recurrency is rare.

Conclusion

In the primary management of face and scalp AVMs, trauma as an uncommon cause should be noticed. Obtaining a careful history is necessary. After diagnosis, complete resection is possible with minimum recurrency.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient (s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.



Figure 7: Postoperative lateral view of patient

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

- Gupta R, Kayal A. Scalp arteriovenous malformations in young. *J Pediatr Neurosci* 2014;9:263-6.
- Fisher-Jeffes ND, Domingo Z, Madden M, de Villiers JC. Arteriovenous malformations of the scalp. *Neurosurgery* 1995;36:656-60.
- Khodadad G. Arteriovenous malformations of the scalp. *Ann Surg* 1973;177:79-85.
- Schultz RC, Hermosillo CX. Congenital arteriovenous malformation of the face and scalp. *Plast Reconstr Surg* 1980;65:496-501.
- Coleman CC Jr, Hoopes JE. Congenital arteriovenous anomalies of the head and neck. *Plast Reconstr Surg* 1971;47:354-64.
- Ella B, Lanotte A, Sedarat C, Fricain JC. Arteriovenous malformation (AVM) of the maxilla complicated by a local pathogen infection. *BMJ Case Rep* 2013;2013. pii: bcr2012007617.
- McCormick WF, Schochet SS Jr. *Atlas of Cerebrovascular Disease*. Philadelphia, PA: WB Saunders Co.; 1976. p. 422.
- Nagasaka S, Fukushima T, Goto K, Ohjimi H, Iwabuchi S, Maehara F. Treatment of scalp arteriovenous malformation. *Neurosurgery* 1996;38:671-7.
- Stillman RM, Powers JC, Fitzgerald JF. Cosmetic excision of an isolated extracranial arteriovenous malformation using Gelfoam embolization. *Br J Surg* 1977;64:784-5.
- Peick AL, Nichols WK, Curtis JJ, Silver D. Aneurysms and pseudoaneurysms of the superficial temporal artery caused by trauma. *J Vasc Surg* 1988;8:606-10.
- Camargo Júnior OD, de Abreu MF, de Abreu GC, Gabriel SA, da Silva IM. Traumatic arteriovenous fistula of the superficial temporal artery. *J Vasc Bras* 2014;13:39-42.
- Hasturk AE, Erten F, Ayata T. Giant non-traumatic arteriovenous malformation of the scalp. *Asian J Neurosurg* 2012;7:39-41.
- Huber P. *Krayenbuhl/Yasargil cerebral Angiography*. 2nd Completely Rev. ed. New York: Thieme Medical Publishers, Inc.; 1983: P373.
- Li F, Zhu S, Liu Y, Chen Y, Chi L, Chen G, *et al.* Traumatic arteriovenous fistula of the superficial temporal artery. *J Clin Neurosci* 2007;14:595-600.
- Marotta TR, Berenstein A, Zide B. The combined role of embolization and tissue expanders in the management of arteriovenous malformations of the scalp. *AJNR Am J Neuroradiol* 1994;15:1240-6.
- Berenstein A, Scott J, Choi IS, Persky M. Percutaneous embolization of arteriovenous fistulas of the external carotid artery. *AJNR Am J Neuroradiol* 1986;7:937-42.
- Barnwell SL, Halbach VV, Dowd CF, Higashida RT, Hieshima GB. Endovascular treatment of scalp arteriovenous fistulas associated with a large varix. *Radiology* 1989;173:533-9.
- Clarisse J, Gozet G, Cornil JP, Jamin M, Delandsheer JM, Laine E. The fluid plastic embolization: An experimental study – Report of two cases of arteriovenous fistula. *J Neuroradiol* 1975;2:29-38.
- Olcott C 4th, Newton TH, Stoney RJ, Ehrenfeld WK. Intra-arterial embolization in the management of arteriovenous malformations. *Surgery* 1976;79:3-12.
- Kasdon DL, Altemus LR, Stein BM. Embolization of a traumatic arteriovenous fistula of the scalp with radiopaque Gelfoam pledgets. Case report and technical note. *J Neurosurg* 1976;44:753-6.