



# Multidisciplinary Approach in Management of Giant Residual Scalp Arterio-Venous Malformation- Way To Go

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## Abstract

Scalp arterio-venous malformations are rare, representing less than 10% of all AVM's. Management of these AVM's is difficult as they are high flow vascular lesions, complex anatomy and there is need for cosmetic correction after excision. Incomplete excision can lead to massive bleeding, recurrence, and scalp necrosis. That is the reason management of these lesions need multidisciplinary approach involving neurosurgeon, interventional radiologist, and plastic surgeon. Treatment includes combination of surgical excision, embolization with cosmetic reconstruction.

**Keywords:** Scalp Arterio-Venous Malformations; Massive Bleeding; Cosmetic Reconstruction; Extracranial Scalp; Lesion; Angiography; Zygomatic Region; Cirroid Aneurysm; AVM Treatment

## Abbreviations

AVMs: Arteriovenous Malformations; STA: Superficial Temporal Artery; ECA: External Carotid Artery.

## Introduction

Extracranial scalp arteriovenous malformations (AVMs) are relatively rare, accounting for only 10 % of cases of AVMs. They are vascular aberrations that develop during the fetal period and result from failure of embryonic vasculature to differentiate into arteries and veins. These lesions are either congenital or traumatic. It is an abnormal fistulous communication between feeding arteries and draining veins without intervening capillary bed. The draining veins can dilate and causes esthetic problem. It usually presents in late childhood, adolescent, or early adulthood. It can also cause massive hemorrhages due to dryness of the overlying

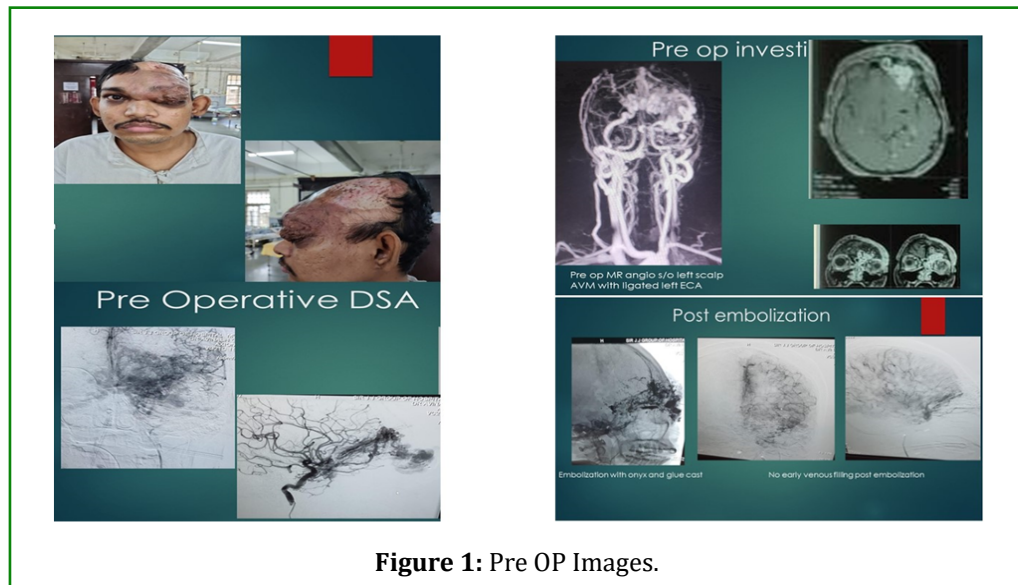
skin and injuries. In this report we describe importance of multidisciplinary management involving neurosurgeon, plastic surgeon, and an interventional radiologist for management of a recurrent/ residual scalp arteriovenous malformation in a young adult male [1].

## Case Report

30 years old male presented to us with gradually increasing mass lesion on left forehead extending over eyelids for past 12 years. There were 3-4 episodes of spontaneous bleeding from it which was controlled with pressure. He was also operated for the same lesion twice in other hospitals without success. He also underwent partial embolization of it and ligation of external carotid artery 1 year back when he presents with massive bleeding from it, by interventional radiologist at our institute. But even though bleeding was controlled, lesion kept on increasing after that. On examination there was a

large 12 \*7\*3 cm irregular, pulsatile non reducible swelling over left upper eyelid and fronto-parietal region. Scar of

previous surgery can be seen over the skin.



**Figure 1:** Pre OP Images.

On radiological examination, non contrast CT scan of brain revealed soft tissue component with mild tortuosity in the extracranial soft tissue scalp anteriorly on left side. MR angiography was suggestive of arteriovenous malformation of scalp involving left upper eyelid and frontoparietal region which was supplied by reformed left superficial temporal artery through external carotid artery collaterals. Digital

subtraction angiography was done, showing glue cast in left frontal, orbital and zygomatic region with residual slow flow left frontal intraosseous AVM supplied by reformed left STA and Dural branches of ophthalmic artery, draining through angular vein into right external jugular vein. Left ECA was seen occluded at its origin.



**Figure 2:** Intra OP and post OP images.

As this was residual large AVM multidisciplinary approach was planned involving interventional radiologist for embolization of residual part, then neurosurgery team to completely excise the AVM and then plastic surgery team for post excision cosmetic reconstruction. So, treatment plan was,

**Part 1:** Embolization with onyx and glue cast

**Part 2:** Excision of AVM

**Part 3:** Cosmetic Reconstruction

Embolization with onyx and glue cast was done before subperi cranial excision of AVM was done.

Excision of left upper eyelid with preservation of 8 mm lid

margin. This defect was reconstructed using left anterolateral pedicle thigh flap based on descending branch of lateral circumflex femoral, as scalp flap was not feasible due to scar of previous surgery. As left ECA was ligated, harvested flap reconstruction was done by anastomosis of pedicular artery and accompanying vein with right facial artery and vein using left long saphenous vein as interposition graft.

The pathological diagnosis of the patient was consistent with AVM. The histopathological specimen contained various well-developed arteries and dilated veins in the connecting tissue. The patient was discharged with no postoperative problems.

## Discussion

AVM of the scalp is not common. The vascular malformation of the scalp is an abnormal arteriovenous communication within subcutaneous fatty layer. It is also called as cirroid aneurysm, plexiform angioma, scalp arteriovenous fistula, arteriovenous aneurysm, and arteriovenous malformation. Pathogenetically they are either congenital or traumatic, congenital more common. Persistence of connections of the embryonal capillary vessels results in formation of these AVM's. Main arterial feeder in scalp AVM's is External carotid artery or occipital artery depending on the location [2,3].

Clinical presentation depends on location of AVM, can be persistent headache, bleeding, or bruit. DSA is gold standard investigation for diagnosis as well as planning the treatment.

Management of these lesions is difficult as they are high flow, complex vascular lesions. Also, as they present with cosmetic deformity needing cosmetic correction. There is no consensus in management of these lesions. Treatment has gradually evolved from surgical excision to endovascular management. But in cases like ours combined approach is needed for complete removal of AVM.

Scalp avm's have tendency to progress over the time, complete excision is always the goal. Prognosis is good in complete excision. Incomplete treatment can lead to scalp necrosis and bleeding.

Persistent throbbing headache, bleeding and hemorrhage are most common indications for treatment. Management includes surgical excision, embolization, vessel ligation and sclerosant injection. Surgical excision is best treatment but carries risk of massive intraoperative bleeding. Preoperative embolization reduces intraoperative bleeding. Post excision of AVM these patients also need acceptable cosmetic correction. So multidisciplinary approach involving neurosurgeon, interventional radiologist, plastic surgeon is important in such large scalp AVM's [1-3].

## Conclusion

The aim of scalp AVM treatment is to give the patient's comfort by eliminating the symptoms. Multidisciplinary team approach consisting of Interventional radiologist, neurosurgeon, plastic surgeon, and ophthalmic surgeon is essential for treatment of complex scalp AVM involving the face to achieve a cosmetically acceptable result.

## References

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