



## Case Report

# Labial Arteriovenous Malformation (AVM) Treated by Embolization with Biological Glue: A Case Report from Dakar (Senegal)

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### Abstract

Arteriovenous malformations (AVMs) are the rarest and most serious of vascular malformations. Radiologically, the lesion consists of a vascular “nidus”, a cluster of abnormal vessels fed and drained by one or more arteries and veins dilated by increased flow. The treatment of peripheral AVMs is complex, and the choice of treatment is determined by multidisciplinary consultation, since several options are available. Embolization plays an important role in the therapeutic arsenal, and particularly the one combined with surgery.

**Keywords:** Arteriovenous Malformation; Embolization; Biological Glue; Dakar; Senegal.

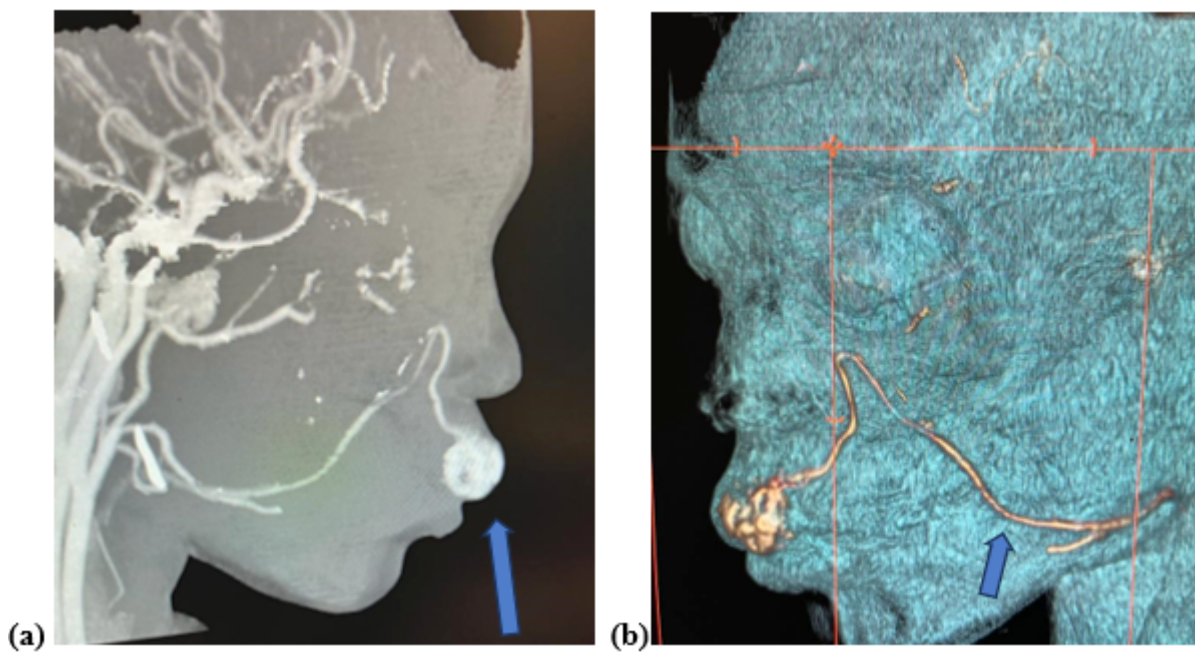
### Introduction

The arteriovenous malformations (AVMs) are the rarest and most serious of vascular malformations [1-2]. Radiologically, the lesion consists of a vascular “nidus”, a cluster of abnormal vessels fed and drained by one or more arteries and veins dilated by increased flow. This nidus allows arterial and venous vessels to communicate at full channel, with “early venous return” in arteriography [3].

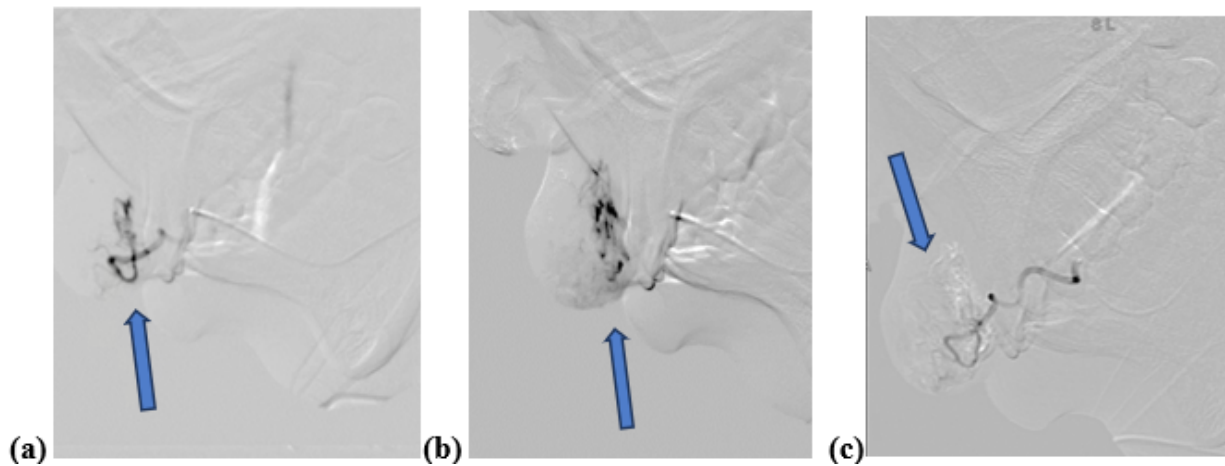
Despite major advances in the management of vascular malformations, the treatment of AVMs remains highly complex and requires a multidisciplinary approach. Complete eradication of the nidus is potentially the only effective treatment, but it happens to be often difficult or impossible. Surgical resection alone carries a high risk of life-threatening bleeding. Interventional radiology (embolization) is a recognized and effective treatment option, either alone or in combination with surgery [4]. Several embolization agents are available, and we report a labial AVM effectively treated by embolization with biological glue. The aim is to describe the technique used and analyze its immediate findings.

## Case Presentation

A 13-year-old girl presented with a nodular swelling of the left upper hemilip that had been evolving for several years. On palpation, the nodule was firm with a small flutter. A vascular malformation was therefore suspected, and a facial angioscan was performed secondarily to confirm the diagnosis. The protocol included multiphasic helical acquisitions after injection of an iodinated contrast medium, followed by multiplanar and 3D reconstructions. They showed an AVM of the upper lip, fed exclusively by the left superior labial artery (figure 1). No draining vein was visualized. The diagnosis of a simple AVM with a main arterial afference was accepted. After multidisciplinary consultation, it was decided to perform embolization treatment. The treatment was performed in a multipurpose angiography suite. After a right femoral vascular approach using the Seldinger method and under aseptic conditions, a catheterization of the left external carotid artery was performed with a Cordis™ Cobra probe, followed by angiography showing the vascular blush at the level of the upper lip, fed exclusively by the superior labial artery. Microcatheterization of the latter with a Progreat™ 2.4 French (Fr) microcatheter mounted on a 0.014 neurovascular microguide was performed, followed by angiography to rule out off-target embolization. Selective embolization was finally performed with 2 cc of a mixture containing 1 cc of biological glue (Glubran®) and 4 cc of radio-opaque oil (Lipiodol Ultra Fluide®). The catheterization material was continuously perfused with glucose serum. Angiograms at the end of the procedure showed disappearance of the vascular blush at the level of the upper lip, confirming the immediate success of embolization (figure 2). There were no complications during the procedure, and the immediate after-effects were straightforward.



**Figure 1:** Facial angioscan with 3D MIP (a) and 3D surface (b) reconstruction. Arteriovenous malformation of the upper lip (long arrow), fed mainly by the superior labial (short arrow).



**Figure 2:** Subtraction angiography after selective microcatheterization of the left upper labial artery: arterial blush in the upper lip disappearing after embolization with biological glue mixed with lipiodol.

## Discussion

The arteriovenous malformations (AVMs) are the rarest and most serious of vascular malformations [1-2]. They may appear in childhood or later, in adolescence or young adulthood. In our patient, the AVM actually revealed itself in adolescence.

Radiologically, the lesion consists of a vascular “nidus”, a cluster of abnormal vessels fed and drained by one or more arteries and veins dilated by increased flow. This nidus allows arterial and venous vessels to communicate at full channel, with an “early venous return”. Our patient’s CT scan showed a single arterial afference, but no early drainage vein was visualized. In principle, AVMs must be differentiated from simple arteriovenous fistulas, which communicate artery and vein(s) without the interposition of a nidus, and have a very different evolutionary profile [3]. Macroscopically, the lesion shows an increase in the caliber and number of vessels in the tissue, with vessels becoming visible to the naked eye, too numerous and sometimes ulcerated [3]. Histologically, an AVM is made up of arteries and veins of recognizable structure, generally with a media thickness proportionate to their lumen, a variable contingent of capillaries and numerous unclassifiable vessels, also with a media thickness proportionate to their lumen but with an abnormal structure, neither arterial nor venous, and a disorganization or virtual absence of elastic structures [5-6]. Treatment of AVMs remains highly complex, and must be undertaken after multidisciplinary consultation. Complete eradication of the nidus is potentially the only effective treatment, but it is often difficult or impossible. Surgical resection alone carries a high risk of life-threatening haemorrhage. Interventional radiology with embolization is a good

therapeutic option, either alone or in conjunction with surgery. [4]

The role of embolization is threefold. Either it represents the first step in a complete therapeutic protocol involving radiosurgical treatment of a complex AVM. In this case, the aim of embolization is to reduce arterial flow, facilitating complete surgical excision in areas at high risk of bleeding. The second advantage, if you are familiar with the surgical protocol chosen, is to authorize aggressive embolization of the nidus area, since almost immediate surgical excision will avoid the risks associated with embolization, particularly for the skin. In all cases, embolization must respect the arterial network required for reconstruction. The third indication for embolization is symptomatic and progressive AVMs for which, because of their complexity, full radiosurgical treatment cannot be proposed. In this case, the aim of embolization is to reduce arterial flow, offering only partial and incomplete treatment, but in some cases improving symptomatology. The indication for embolization in our patient had been decided after consultation with the surgeon, who was not in a position to perform an exeresis. The aim was therefore to perform a complete embolization of the nidus and afferent artery.

The procedure can be performed under local or general anaesthetic, typically using a femoral arterial approach. Hyperselective catheterization of nidus-feeding arterial pedicles is performed using 2 to 3Fr coaxial microcatheters with hydrophilic microguides or flow-dependent microcatheters [4]. Our technique was identical in terms of catheterization equipment, with a valved introducer in the right common femoral artery, followed by microcatheterization of the feeder artery using a 2.4 Fr microcatheter mounted on a 0.014 hydrophilic microguide. The

various embolization agents commonly used are: ethanol, biological interaction adhesives (Histoacryl®, Glubran®), controlled-release or flow-dependent microcoils and microparticles.

Biologically interacting adhesives are used in combination with lipiodol (radiopaque oil), enabling them to be visualized under fluoroscopy and their fluidity to be managed according to their dilution. The ionic and radical polymerization of this type of glue requires the use of non-ionic solutes such as glucose serum, so as not to block the inside of catheters, which must be continuously rinsed. If polymerization takes place too early, occlusion may be too proximal without exclusion of the nidus. Conversely, if the mixture is too fluid, there is a risk of rupture due to arterial hyper pressure on a distal venous occlusion. [4] We used Glubran ® diluted one-quarter with lipiodol, to reach the nidus and avoid embolization either too distal or too proximal.

A review of the literature reveals few series, mainly retrospective, and numerous case reports, testifying to the difficulty of evaluating these treatments. It is therefore difficult in the light of the literature to determine the efficacy of one emboligenic agent over another, but overall, the largest series of patients were treated with ethanol, particularly in North American studies. European teams are more inclined to work with biologically interacting adhesives [4]. Complication rates also vary widely from one series to another, but even in highly trained teams, the rate is around 10%. These are mainly skin necroses requiring appropriate dermatological management. The more complex are sensory or motor nerve complications linked to direct vascular damage (vasa nervorum) or indirect damage linked to inflammatory processes in contact with the embolization zone. In most cases, these nerve complications are transient [4]. Immediate results were very satisfactory in our patient, with no complications. The embolization with biological glue resulted in good immediate results.

## Conclusion

The management of AVMs remains complex and difficult. The embolization is a good therapeutic option, either alone or in conjunction with secondary surgery. The present case study shows the immediate success of biological glue.

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