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Case Report

Cerebral Dural Arterio-Venous Fistula – Part II: Endovascular Therapy with Transarterial Embolization using Liquid Embolization Material

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Abstract

Case report of a 60 years old male patient with recent diagnosis of an occipital dural arteriovenous fistula classified Cognard Typ IV, treated by transfemoral cerebral angiography and embolization with liquid embolization material (Onyx).

Key words: cerebral dural arterio-venous fistula; digital subtraction angiography; endovascular; interventional radiology; embolization; onyx; transfemoral angiography; computer tomography (CT)

Introduction

Dural arteriovenous fistula (DAVF) is a type of AVM in which there is a communication between dural arteries and cerebral venous sinuses. These lesions constitute 10–15% of all cerebral AVMs and most of them seemed to be acquired, only some are congenital. There is a female to male ratio of 2:1 and most of them are diagnosed in the fifth and sixth decade. The distinguishing feature between DAVF and cerebral AVM is the fact that there is no parenchymal nidus and there is a dural arterial supply [1].

We demonstrate a case of a 60 year old man with recent diagnosis of an occipital dural arteriovenous fistula classified Cognard Typ IV, treated by transfemoral cerebral angiography and embolization with liquid embolization material (Onyx - composed of a mixture of ethylene–vinyl alcohol copolymer suspended in the solvent dimethyl sulfoxide (DMSO) – Tantalum is added for radiopacity).

Case Report

We present a case of a 60-year old male patient with recent diagnosis of an occipital dural arteriovenous fistula classified Cognard Typ IV, treated by transfemoral cerebral angiography and embolization with liquid embolization material (Onyx).

The therapeutic angiography was performed in intubation anesthesia, our interventional neuroradiologist took the common femoral artery as an arterial access supported by a 6-F-vascular lock, a 6-F-guiding catheter was positioned in the left maxillary artery (Figure 1), furthermore a distal access catheter was placed at the branch point of the middle meningeal artery(Figure 2). Using this guiding catheter a microcatheter was positioned at the origin of the fistula.

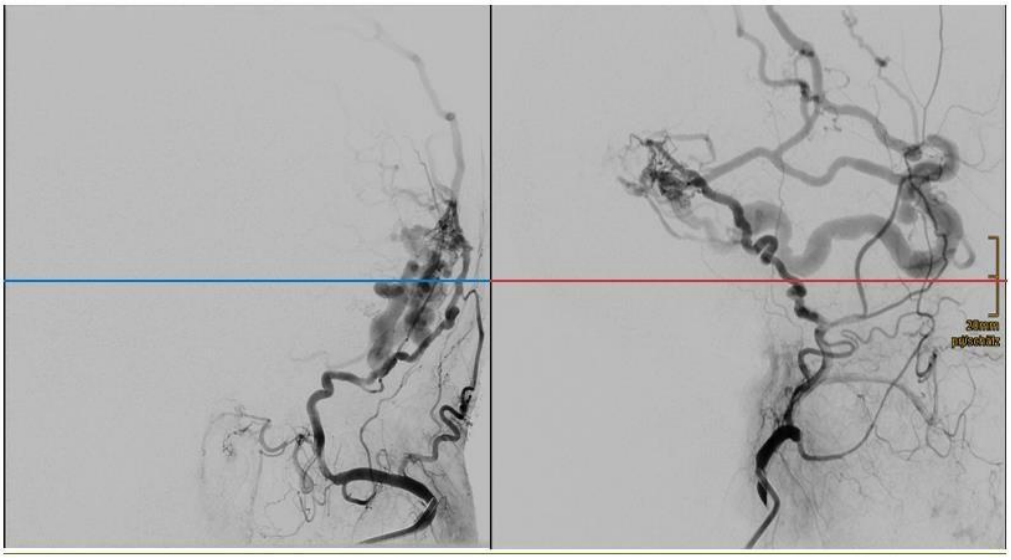

Figure 1: showing the catheter in the left maxillary artery a) ap position; b) side view

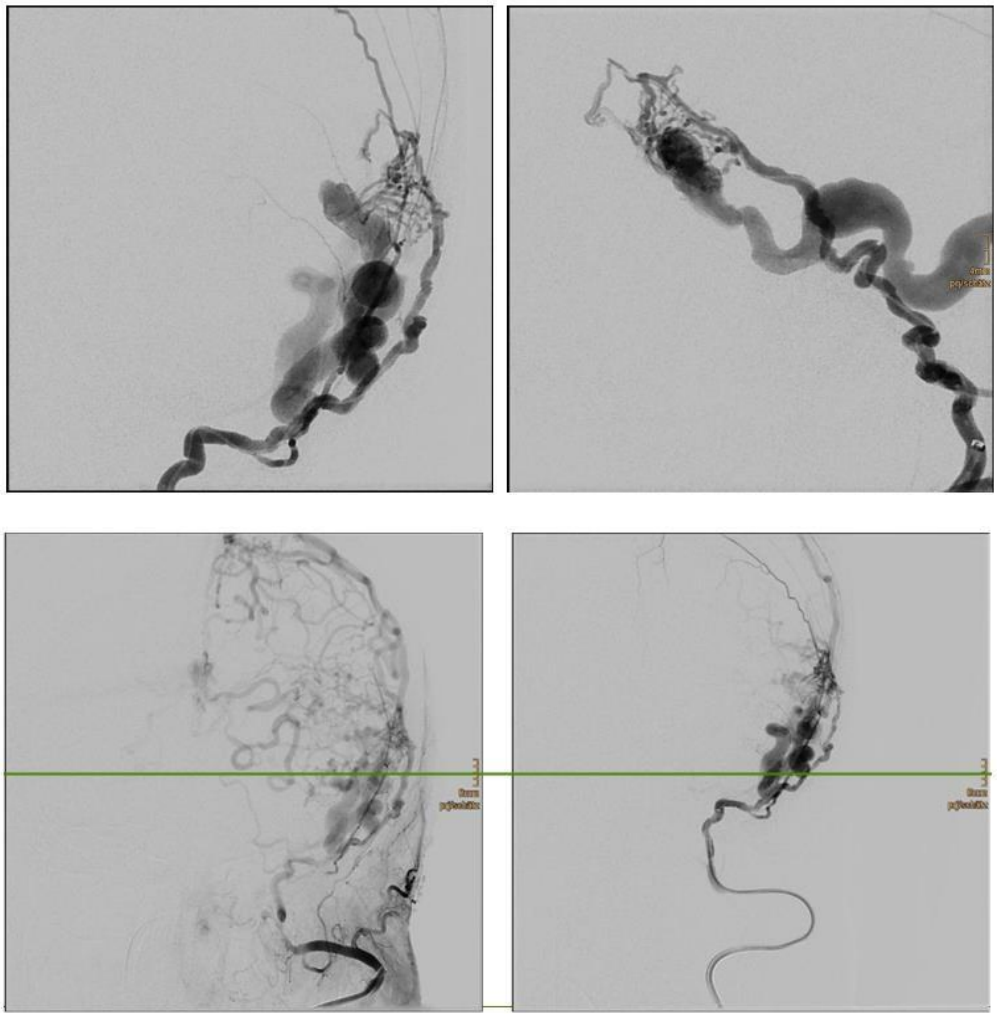

Figure 2: a/b showing the distal accesssecond catheter (ACCESS®) at the branch point of the middle meniongeal artery

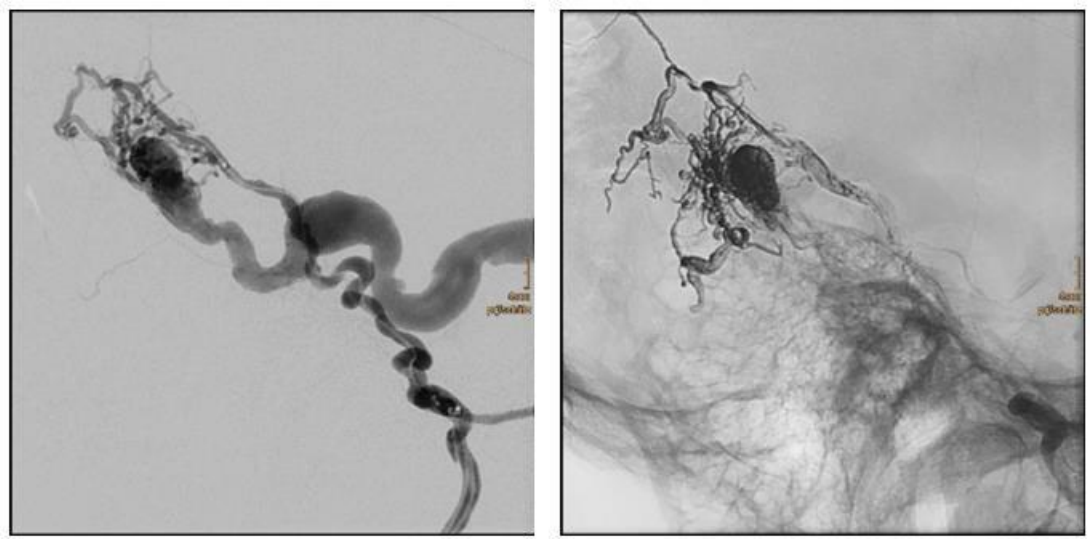

Figure 3: a positioning of the microcatheter in front of the arterial feeders; b digital subtraction angiography showing the veinsonyx cast with complete obliteration of the fistula

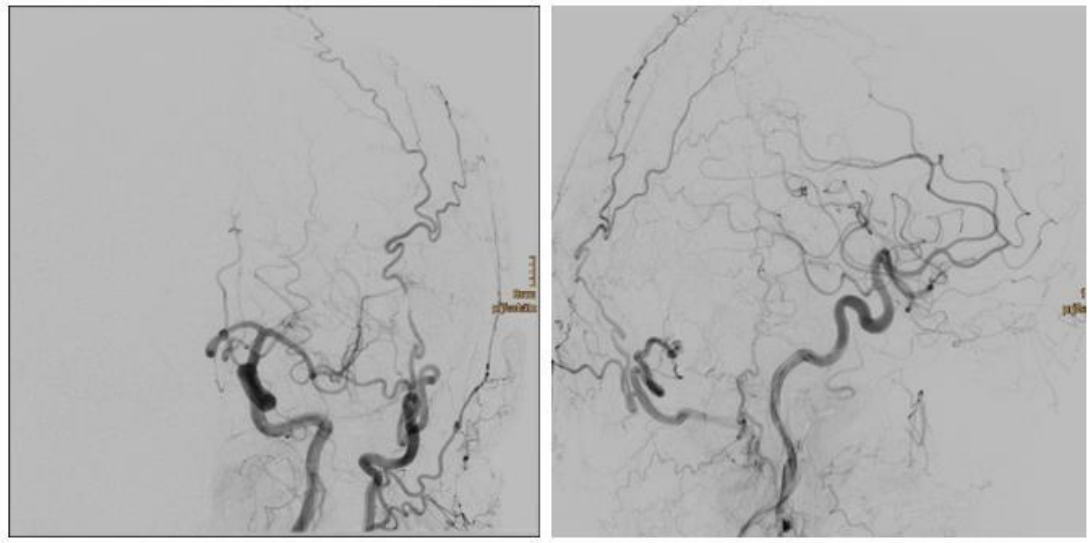

Figure 4: a/b (a ap-view; b side view) digital subtraction angiography of the left common carotid artery showing noresidual fistula;

Discussion

Our used technique of transarterial embolization is ideally used for high-grade DAVFs, such as those with direct cortical venous drainage, or in situations in which venous access is limited. There is a list of the advantages of the transarterial embolization technique:

(1) there is the possibility to occlude the arteriovenous fistula transition through a transarterial approach, decreasing the possibility of flow diversion into an alternate venous pathway.

(2) using this technique there is no limitation by venous access (e.g., stenotic or thrombosed venous sinuses).

(3) after the arterial pathway there is no higher risk of venous complications.

(4) transvenous embolization can be followed by secondary site as de novo DAVFs resulting of venous hypertension.

(5) by this technique specific complications to transvenous routes can be avoided (e.g., abducens nerve palsy from catheterization of the superior petrosal sinus). [1]

Using as superselective microcatheter angiography, three-dimensional, rotational angiography and a form of high-resolution flat-panel computed tomography (CT) known as “DynaCT” are recommended in defining the arterial and venous anatomy of a DAVF both before and after embolization. To prevent premature polymerization and contamination of diagnostic catheters and solutions, embolic agents such as Onyx should be handled on a separate table when not in use, furthermore a separate set of gloves should be used prior to handling these agents and at the end of the procedure prior to final diagnostic angiography. [1]

Onyx is one possibility of liquid embolization, it is composed of a mixture of ethylene–vinyl alcohol copolymer suspended in the solvent dimethyl sulfoxide (DMSO) – Tantalum is added for radiopacity- and first reports were published in the 1990, this drug is available in Europe since 1999.

Transarterial embolization technique is recommend in dural arteriovenous fistulas Cognard Typ IIb – V.

Classification of dural arteriovenous fistulas (Cognard):

I	Normal antegrade flow into dural sinus
II	a. Retrograde flow into sinus(es) b. Retrograde filling of cortical vein(s) c. Retrograde drainage into sinus(es) and cortical veins
III	Direct drainage into cortical veins without venous ectasia
IV	Direct drainage into cortical veins with venous ectasia >5 mm and 3x larger than diameter of draining vein
V	Drainage to spinal perimedullary veins

[2] There are some technical advantages by using ONYX:
1. less operator dependence from the interventional radiologist.
2. No wedged microcatheter position is required.
3. Different feeders can be occluded with a single injection from a single pedicle.

For planning the intervention the following points should be considered.
1. Where is the location of the point/points of the fistula?
2. Location of the feeding arteries?
3. How is the venous drainage pattern?
4. Where are the most promising pedicles to be injected?

After the embolization procedure an immediate cerebral CT scan is recommend, furthermore you should care about pain medication caused by the dural involvement and low-molecular weight heparin should be prescribed for 1 to 4 weeks to avoid venous thrombosis.[1]

Disclosure

All co-authors do not report conflicts of interest.

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