

Dural arteriovenous fistula - Two cases presentation

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Abstract

Dural arteriovenous fistula (DAVF) are abnormal shunts between dural arteries and veins or venous sinuses of the dura mater. Also the connections may be between pachymeningeal arteries from cortical arteries and veins or sinus from dura mater. There are uncommon pathologic entities, 6-8 % from supratentorial vascular malformations, and about 20-30% of infratentorial vascular pathology (8). The incidence may be higher because only 10% are symptomatic. The clinical manifestations are very variable from simple cephalgia to major intracranial hemorrhagic ictus. The presentation is usually in the adult period, but are cited cases in childhood. In our country the diagnostic was difficult before the digital subtraction angiography (DSA) and the endovascular treatment was started in 2004 in our Department under coordination of professor Patrick Courtheoux from Caen, France.

Keywords: Dural arteriovenous fistula, tinnitus, endovascular

Introduction

Intracranial DAVF represent about 10-15 % of all cerebrovascular pathology but their incidence is underestimated because

the not all the fistulas become symptomatic. The main symptoms are pulsatile tinnitus, ocular pain, diplopia, exophthalmia and can culminate with acute intracranial hypertension and focal neurological signs due to intracranial hemorrhage. We present here two clinical cases which were solved by endovascular transarterial glue embolisation (9).

Case report 1

A.E., 41 y.o., woman, was admitted into the neurosurgical department presenting pulsatile tinnitus to right ear, retro auricular pain, vertigo and permanent cephalalgic syndrome. The general evaluation (EKG, blood tests, neurological exam, ophthalmologic exam, psychological exam, chest x-ray) was unremarkable. The patient had no relevant familial and pathological antecedents. The cranio-cerebral MRI and MRA show the arterialization of transvers and sigmoid right sinus and fistulous communication between right occipital artery and sagittal sinus. We decided to perform a cerebral four vessels (4 X) DSA which show type IIB DAVF under Cognard classification. Because in this type is 10-20% hemorrhagic risk, we decided to treat this patient by endovascular glue embolization.

Under local anesthesia, with EKG and NBP, SAO2 monitoring, we mounted a 6F guiding catheter into main branch of occipital artery and after this we performed two successive embolizations of the arterial feeding branch of the fistula. The micro

guidewire was Mirage and the micro catheter Magic 1.2 (Balt – France). The results was very good with completely closed of arterial feeders and a rapid post interventional symptomatology remission.

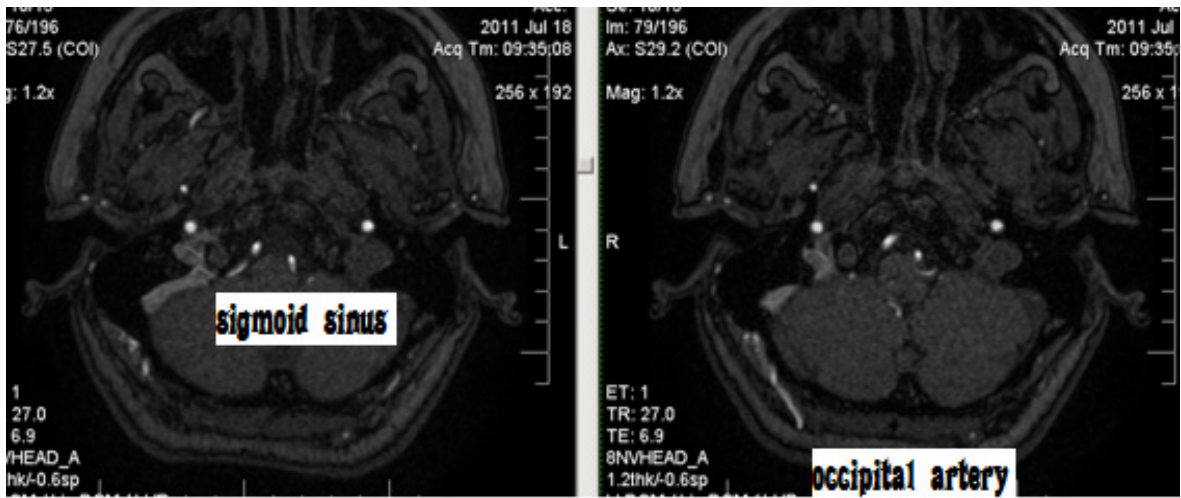


Figure 1

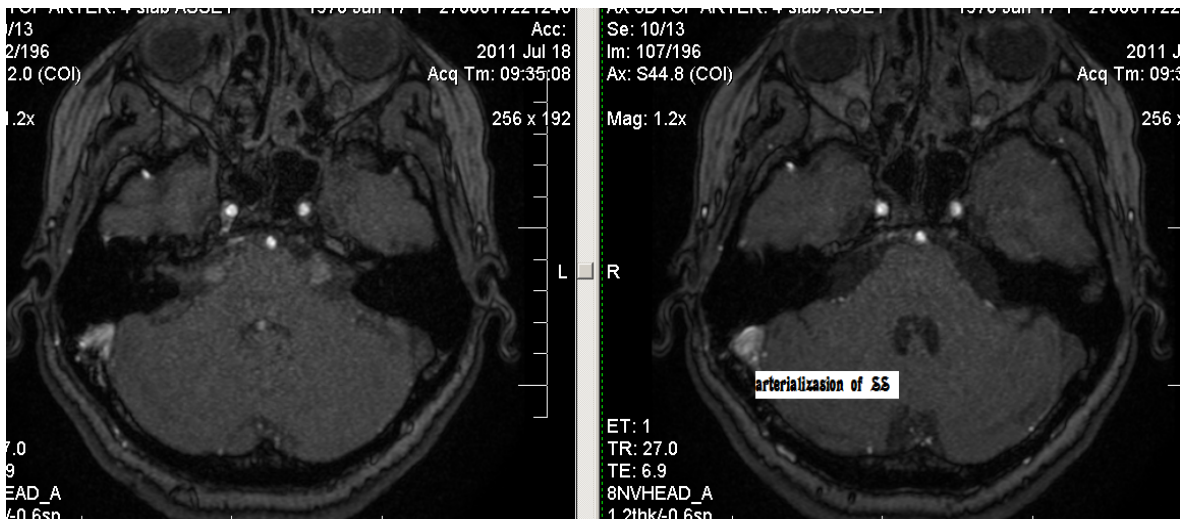


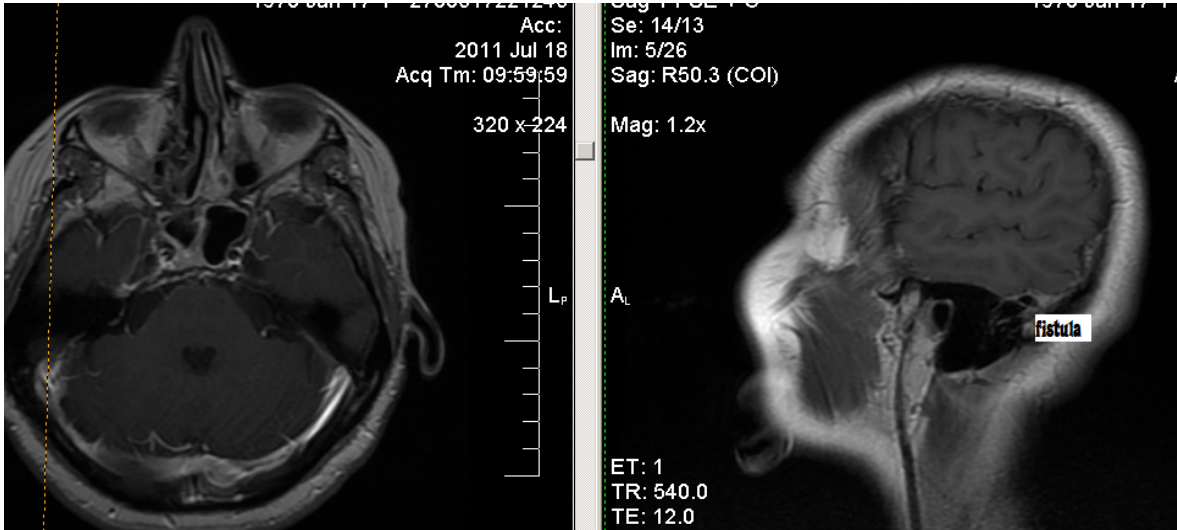
Figure 2



Figure 3



Figure 4



Figures 1, 2, 3, 4 MRI and MRA show on arterial TOF sequences arterializations of the sigmoid sinus, SS and the communication by fistulous feeders from occipital artery

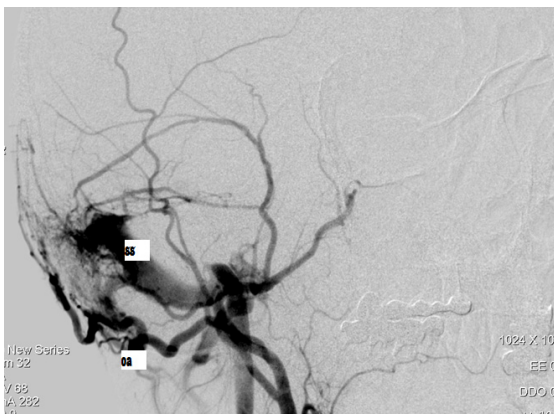


Figure 5 DSA showing the type IIb DAVF

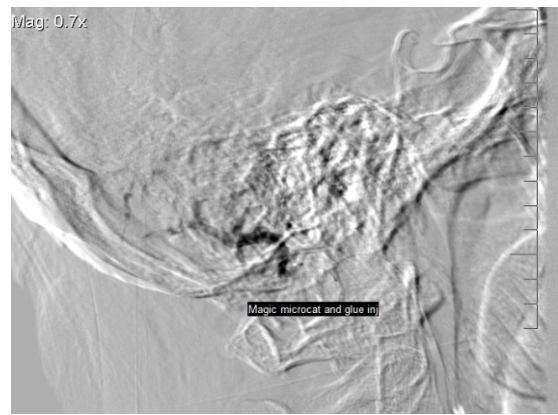
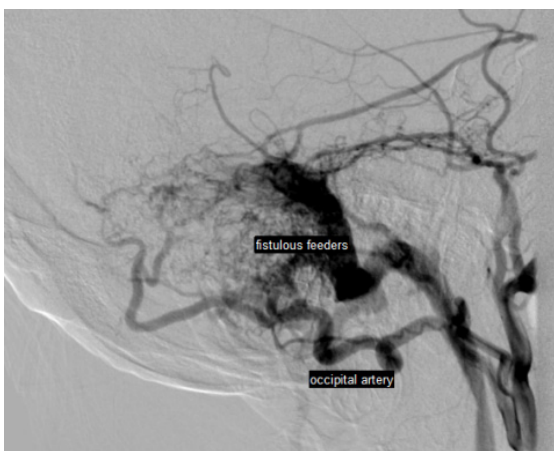


Figure 6 A, B pre and postinterventional aspect with cast of glue in occipital artery



A

Case report 2

P.M., 72 y.o., woman, was addressed to our department for progressive right eye axial exophthalmos, decreased of visual acuity of right eye, vascular episcleral congestion, head pain. From pathological history we remark obesity, arterial hypertension, pulmonary chronic disease. The internal medicine consult adjust treatment for hypertension and pulmonary disease. We also performed an MRA in the

suspicion of spontaneous carotid-cavernous fistula because the patient denied any head trauma or injury. The MRI show normal cavernous sinus aspects with dilated right superior ophthalmic vein (SOV) and right eye exophthalmos. Finally we performed 4XDSA. The internals right and left carotid artery didn't show any connections with cavernous sinus but the endovascular exploration show very interesting fistula

between superior branches of internal maxillary artery and the venous drain of the SOV. We decided to treat this fistula by trans arterial endovascular embolization by mounted 1.2 Magic microcatheter into internal maxillary artery and perform a single glue injection. The imagistic and clinic outcome was favorable, after 24 hours the patient was discharged.

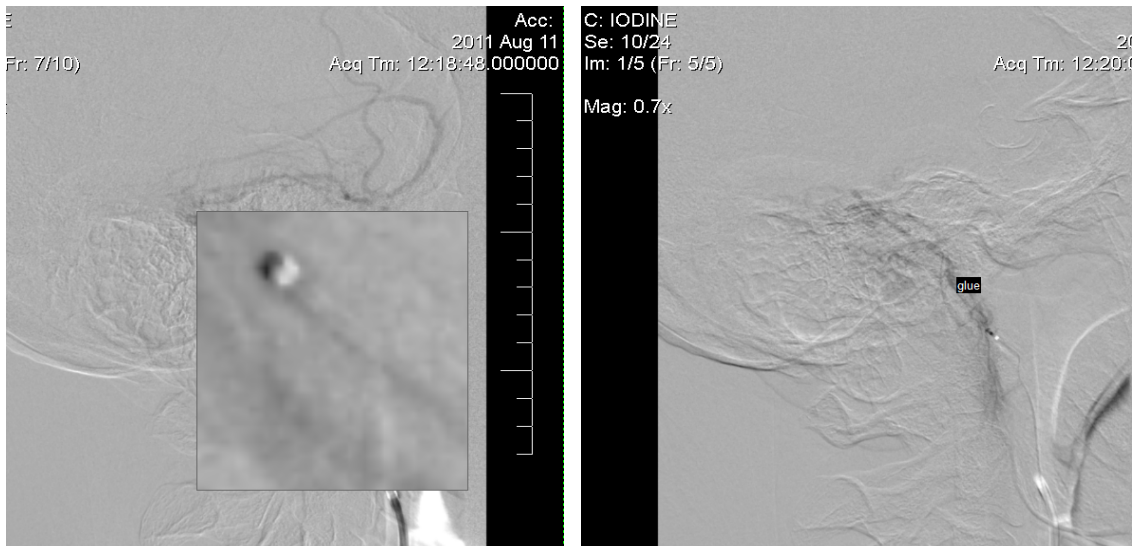


Figure 7 the Magic 1.2 microcatheter and the glue injection into the feeders

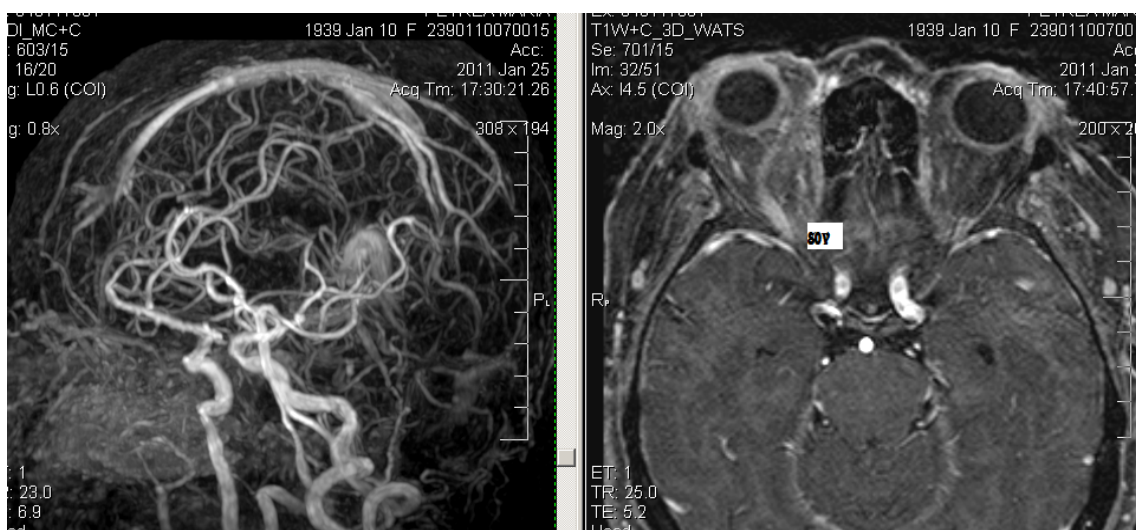


Figure 8 MRI and MRA, various dilatation of superior ophthalmic vein SOV

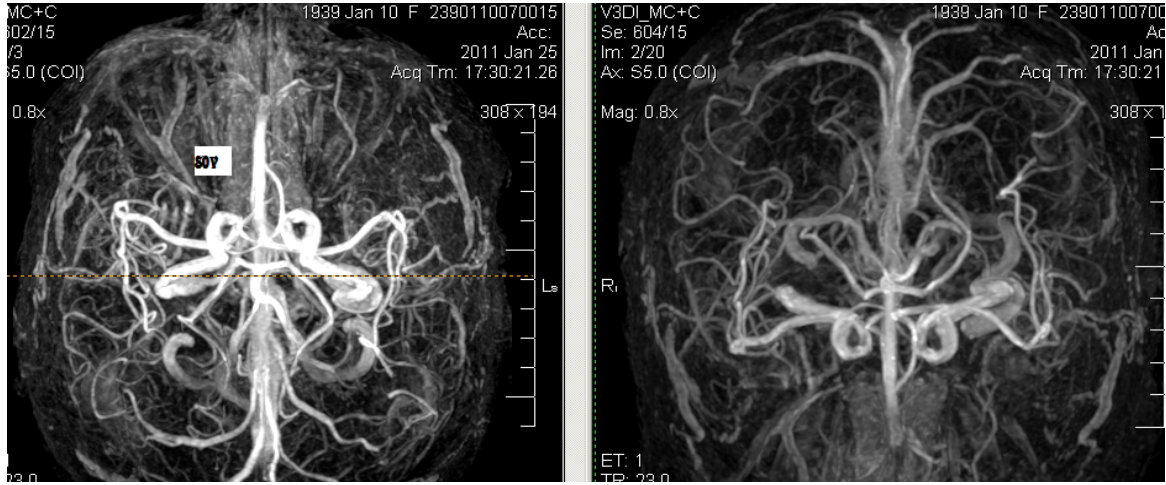


Figure 9 the main aspect in MRA

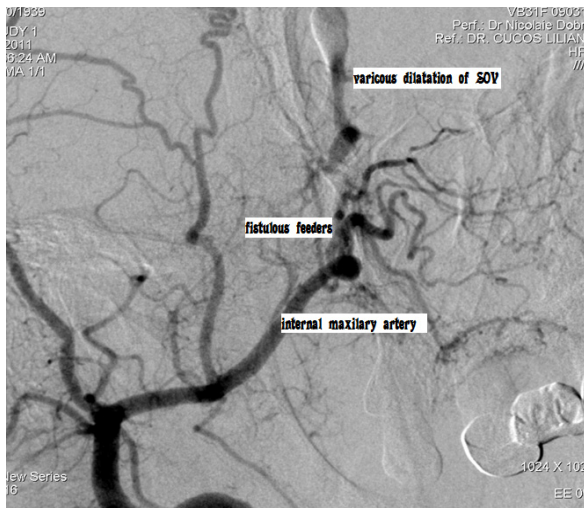


Figure 10 DSA of external right carotid artery showing the DAVF between internal maxillary artery and superior ophthalmic vein bay transdural feeders

Discussion

Is important to know that DAVF can appear in any sites of the dura mater. The symptomatologies depend by localization and the venous system of drainage. There is a large variety of treatments: surgery, endovascular (trans arterial or trans venous), gamma knife, or a combination of all of this approaches (6).

The first case was classified into type IIB and the second is a particularly type I fistula with drainage in dural vein connected with SOV. Concerning the classification of DAVF, there are two authors – Borden and Cognard (tables I si II) which are frequently used (3, 4). The Borden type classification is easier to use concerning the clinical aspects, while Cognard classification is more anatomic and imagistic type.



Figure 11 DSA in arterial time with the precocity of SOV

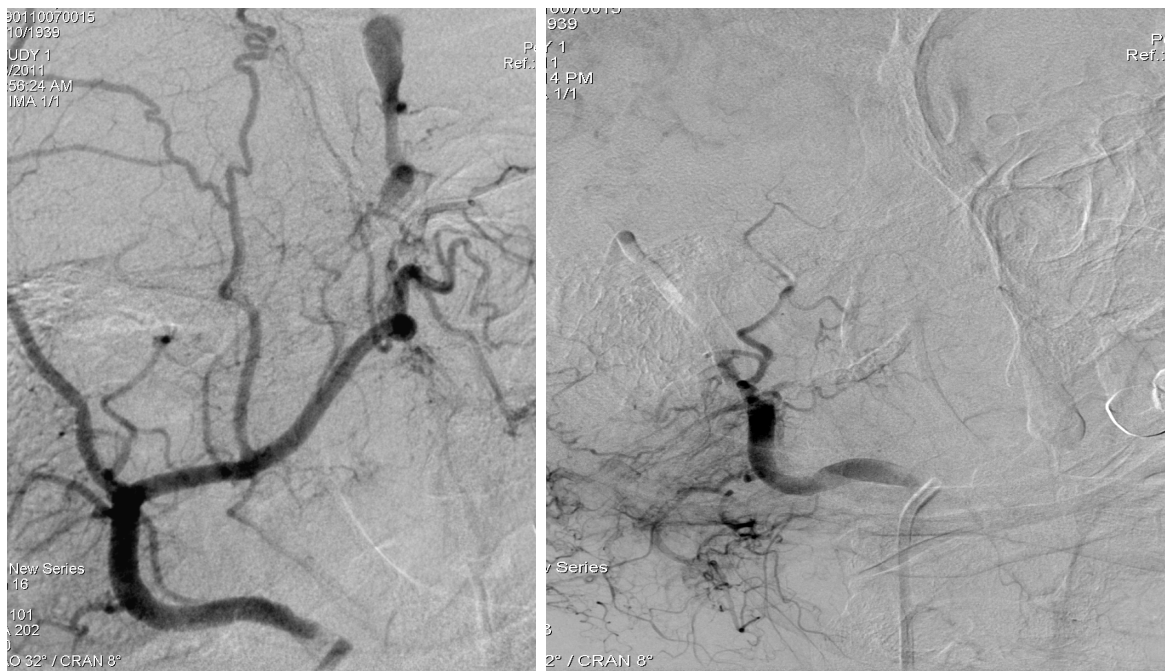


Figure 12 pre and post neurointerventional aspects

TABLE 1

Borden Classification

Type I DAVF drainage into a dural venous sinus or meningeal vein with normal anterograde flow. Usually benign clinical behaviour.

Type II Anterograde drainage into dural

venous sinus and onwards but retrograde flow occurs into cortical veins.

May present with haemorrhage.

Type III Direct retrograde flow of blood from the fistula into cortical veins causing venous hypertension with a risk of haemorrhage.

Table 2
Cognard Classification

Type I Normal anterograde flow into a dural venous sinus.

Type IIa Drainage into a sinus with retrograde flow within the sinus

Type IIb Drainage into a sinus with retrograde flow into cortical vein(s)

Type IIa+b Drainage into a sinus with retrograde flow within the sinus and cortical vein(s)

Type III Direct drainage into a cortical vein without venous ectasia

Type IV Direct drainage into a cortical vein with ectasia >5mm and 3x larger than the diameter of the draining vein

Type V Direct drainage into spinal perimedullary veins

The etiology and natural course are still subjects to debate. There are cited head trauma, infections, surgery, as potential etiology. Also venous thrombosis can initiated the arterial recruiting. The developing and maturation of this feeder can generate DAVF. Under opinion of majority authors, any symptomatic fistula must be treat due to hemorrhagic and intracranial hypertension risk. The pattern of venous drainage must be carefully studied because is considered predicting of the hemorrhagic risk. In large series (117 patients) witch were observed conservational for none interventional considered fistula, 47% were reevaluated angiographic for symptomatology modification, in 2% from this it show modifications of venous reflux in the sense of aggressive and hemorrhagic risk (2). So we consider that endovascular reevaluation is very useful when the symptomatology is changed.

In the majority of studies angiography is

the main intervention in diagnostic and treatment planning of DAVF. It si very important to know the arterial feeders system and also the pattern of venous drainage. The angiographycal technique must include the early arterial phase and the late venous drainage in DSA manner or non subtracted, also selective acquisitions are very usefulness to prepare the endovascular approach. In the first case we performed a microcateterisaton of distal branches of occipital artery with Magic 1.2 micro catheter and after this we establish the exactly points of glue injections. Also is very important to study simultaneously internal and external carotid artery. In other situation we can do a DSA acquisition of ICA (internal carotid artery) store like reference image and after this we superimpose the ECA (external carotid artery), this technique so called dual angiography (competitive angiogram) to see the normal brain supply and the pathologic veins drainage because in the most aggressive fistulae drain retrograde by leptomenigeal-cortical channels. After Houser et al the most exposed to hemorrhage are DAVF located in the anterior cranial fossa and tentorium.

Another interesting complication of DAVF is the hydrocephalus due to increased blood pressure in the sinuses with a consecutive decreased absorbtion of CSF. Anyway the majority of patients with DAVF, like in our cases, are admitted with severe cephalalgic syndrome as direct cause of high intracranial venous pressure.

The second case is very interesting because the terminal meningeal branches of internal maxillary artery drain into venous channels connected with SOV (superior ophthalmic vein) without direct connexion with cavernous sinus.

Another aspect of this kind of pathology is that the diagnostic and treatment arsenal are relatively recent. We talk about the firsts description from Djindjian and Castaigne in the late 1970s and the fisiopathology was widely studied by the La Salpêtrière, French school. The treatment evolves simultaneously with the endovascular treatment devices and the new digital image systems.

In our Neurosurgical Department we use a single C-arm system with flat panel and 3D capability which is very versatile as in diagnostic both in endovascular treatment.

Conclusion

DAFV are very interesting pathological entities. The treatment is complex in most case is endovascular by arterial or venous way but sometimes is necessary the surgery to complete the cure or to evacuate a hemorrhagic post rupture hematoma. Empirical techniques such Matas compression of carotid or occipital artery were cited to stimulate the thrombosis of fistula. The meticulous angiographic study of venous drainage is the key of treatment.

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