An example of pitfall in superficial AVM or “another old things to be remembered”

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26 yo woman living in Tunisia

- Medical history started when she was 10 yo with a bleeding of the posterior scalp
- During adolescence appeared a thrill at the upper part of the neck
- During her pregnancy, vascular dilations developed at the level of the scalp and neck
- Cerebral angiography was performed and read by two French INR who concluded to a « complex » AVF of the scalp and neck

After delivering, she presented two episodes of bleeding of the scalp, and was treated in Tunis

- Three sessions of pre-operative embolizations of the superficial temporal arteries and occipital arteries
- Followed by scalp resection and skin reconstruction

MRI clearly showed arterialized veins of the scalp and neck

Pre-operative embolizations of the temporal arteries
Surgical resection of the scalp

Evolution went towards skin necrosis infection and recurrent bleeding

Finally, she was transferred to Lariboisière for treatment of her “scalp” AVM

- Reviewing the first angiography as well as the cerebral MRI, it appeared that the diagnosis of scalp AVM was wrong
- Making even dangerous her first interventions

Nobody would contest the fact that the veins of the scalp are arterialized

But does that mean that the AV shunts are necessarily inside the scalp which defines scalp AVM?

- A scalp AVM require necessarily 2 things
  - The first vein to be opacified should be a vein of the scalp
  - The major arterial supply must be arteries of the scalp i.e. superficial temporal arteries and scalp branch of the occipital arteries

The right temporal superficial artery had a normal diam that is inconsistent with the diagnosis of giant AVF of scalp
While the major supply was the middle meningeal arteries (that supply the dura-mater)

And the first vein being opacified are the dural sinus which defines a dural AVF

And those data were available on the 3DTOF

- The main arterial dilations came from the two middle meningeal arteries

And apart of the superficial venous dilations there was an intracranial venous opacification: occipital sinus

- How a dural AF can drain into veins of the scalp mimicking a scalp AVM?

There is a constant emissary vein that anastomoses sigmoid sinus to suboccipital vein

- If the sinus is incompetent, a high flow DAVF could drain into the emissary vein and finally into the vein of the scalp

We faced this disposition in a different case of a DAVF of the sigmoid sinus where sigmoid sinus was thrombosed
We repeated the angiography: these are the Onyx cast previously injected in normal temporal and occipital arteries.

Left middle meningeal artery injected a giant DAVF of the torcular and the occipital sinus.

Draining into the emissary vein that reached the suboccipital vein and finally the vein of the scalp.

The scalp branch of the left occipital artery is normal: its meningeal branch is dilated filling the part of the DAVF on the left marginal sinus.

Confirmation was given by the participation of the transdural anastomoses internal-dural arteries that never exist in scalp AVF.

Right ICA.
Also through the left VA

Phlebograms of the right ICA and middle meningeal arteries showed the thrombosis of both lateral sinuses

So, the AV shunts are located exclusively in the dura-mater

Through a transvenous and transarterial approaches, we occluded the torcular, occipital and marginal sinus

Those sinus were not functional for the drainage of the brain

Leading to the cure of the DAVF and to the resolution of the scalp venous dilation
Right CCA control injection

Left VA injection

And bleeding of the scalp stopped
• However, the initial surgery was totally wrong

3 months control angiography

The correct diagnosis was
• Giant (juvenile type) DAVF involving the torcular, occipital sinus and marginal sinuses
• Course of those juvenile DAVF is very different than the standard DAVF: it started in childhood while the usual DAVF develop in mature adults
• They had a high flow while usual DAVF have restricted flow
My message is old but useful to be remembered

- The location of any AVF is given by the location of the first vein being opacified: in an AVF of the scalp, the first vein is always superficial.

A vein of the scalp can be punctured through the skin

There is a link between venous territory and arterial territory

- Scalp and its vein are supplied by arteries of the scalp: superficial temporal artery, skin branch of the occipital artery.
- When there is a shunt in the scalp, those arteries are first dilated.

Thank you for your attention!