Some old things about arterio-venous lesions that are still true and useful to be remembered

Pr Emmanuel Houdart

Department of neuroradiology
_Hôpital Lariboisière, Paris, France_
Disclosures

• None
39 yo man with abdominal pain due to this recto-vesical AVM fed by right internal iliac artery
In his initial hospital, surgeon believed intelligent to ligate the right internal iliac artery…

And pain did not disappear…
Consulted afterwards at Lariboisière
Initial 6 months after ligation
This is a totally predictable evolution

- It is a pity to see that a simple rule has not been understood in the XXI century
- A proximal (arterial) occlusion never benefits to patient: it worsens the situation and makes more difficult further treatment
Artery: high pressure system

Vein: low pressure system

Shunt
Arterial occlusion constantly leads to shunt re-injection through anastomoses because low pressure persists and attracts them.
AVF of subclavian artery
Proximal occlusion with coils: the rule has not been understood by some radiologists...
And 3 months later, the shunt is re-opacified through anastomosis

- Patient was sent to surgeon
- Who clipped proximally the anastomoses
- So as...
After surgery, AV shunt is re-injected through other anastomosis.
Purpose of the treatment in AVM is to occlude shunt that means to go up to the vein.
Rules to correctly occlude

• Occlude at the right point: AV shunt means often occlusion of the first mm of the vein
  – First recognize the angioarchitecture
  – Use the correct embole to occlude definitively the shunt
Recognize the shunts!

- Usual classification calls a single shunt « AV fistula » and multiple shunt « AV malformation »
- It is stupid as it confuses the sign and the etiology
All AV shunt should be called fistula

• Fistula = channel in latin
• An early venous return means that there is lacking peripheral resistances i.e. a fistula between artery and vein
• However, fistulas are angiographically different
3 types of fistulas

AV

AI V

AI VI
Arterio-venous fistula

- Unique communication
- Shunt is recognized by caliber change: vein is larger than artery
Choice of embol

- Depends on functionality of vein, length, flow
- Balloon, coils, glue, gel solution
- Objective: dense casting of shunt
Cyanoacrylate was used to fill the vein and the shunt.
Very high flow AVF of renal artery after kidney resection
Coils by venous approach under temporary arterial clampage with non detachable balloon followed by detachable balloon in artery
Arteriolo-venous fistula (AlV)

- Numerous arteries connecting a single vein
- Occluding this vein at the contact of the shunts will lead to cure
Intracranial dural arterio-venous fistula (AlV) cured with one coil placed into the collecting vein
Facial arteriovenous fistula (AlV) : how to get the vein ?
Direct puncture of the facial vein in front of the AV shunt and injection of glue under external compression
A single glue injection leads to the cure
Post-traumatic AlV fistula of Scarpa
Puncture of the vein and glue injection under temporary iliac clampage
30 yo man

- Rapid evolution of pulsatile tinnitus, facial edema followed by facial nerve palsy

- Revealing an arteriovenous fistula of the pterygoid plexus: no access through direct puncture
Transarterial E° was risky due to potential anastomosis with ophtalmic artery however distal catheterization showed that all shunts reach the same venous compartment.
Transvenous access through jugular puncture, steam-shaped 5 Fr sheath, 5 Fr cath, microcath
Second step: find the correct primary venous compartment
Embolization

- First: injection of liquid coil to restrict the venous outflow
- Then a cocktail
  - 50% Ethibloc
  - 25% Ethanol
  - 25% Lipiodol
Anatomical and clinical cure
Arteriolo-venular fistula (AlVf)

- The most complex fistula
- The most difficult to treat
- Always use liquid embol: cyanoacrylate or Onyx°
AlV1 fistula : brain AVM

• Superiority of Onyx for curative embolization

• Cure is to suppress all the shunts without possibility of recurrence
Usually treated by Onyx injection through a detachable tip microcatheter
Arteriolo-venular fistula (Al VI) of facial area

- Usually the most difficult to cure by $E^\circ$ alone
To conclude

• AV fistula are the most difficult vascular lesions to treat and those which require the longest training
• Understanding the angioarchitecture and knowledge of the embolic agents are mandatory before to start treatment of such lesions
• Proximal occlusion is a non-sense