Treating Complex AVM Cases With Multiple Embolic Agents


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Conflicts of interest

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Embolisation agents

- Gelfoam
- Embozene
- DSM
- PVA
- Amplatzer Vascular Plugs
- Ethanol (-gel)
- NBCA
- EVOH
- Pushable Coils
- Detachable Coils

EVOH: Unique properties

- Standard AVM agent is liquid (EVOH or Ethanol)
- EVOH: active distribution even against blood stream
  - As opposed to passive, flow-related distribution (NBCA, Ethanol)
  - From transvenous to arteries possible
- Don’t use it like glue: „plug & push technique“
- CM-injection in DSA is flow-passive as well......
  - DSA-images may not display the complete angio-anatomy
  - AVM nidus is larger than visualised in DSA

Ethylene Vinyl Alcohol Copolymer (EVOH)

- Plastic: liquid monomer → solid polymer
  - Dissolution of DMSO
- Slow polymerization
  - Very controlled process
  - Longer procedure time, higher radiation dose
- Radioopaque (micronized Tantalum / Iodine)
- Different preparations are available
  - Onyx 34, 18
  - Squid 34, 18, 12
  - PHIL 35%, 30%, 25%

Right-sided pelvic AVM, DSA in 2007
Asymptomatic → watchful observation
Right-sided pelvic AVM: MRA in 04/2018
Massive progress, venous flow-related aneurysm enlargement

Very painful dilated draining veins at perineum

Numerous feeding arteries from both internal iliac arteries

Transvenous retrograde injection: 2 venous drainages
→ Good chance to occlude the outflow

Venous outflow almost occluded

Plug & Push technique from transarterial
To build a solid plug: 7 vials, liquid 34
Plug & Push technique from transarterial Filling phase: 12 vials Squid 18

Plug & Push technique from transarterial Deep penetration: 14 vials Squid 12

Complete occlusion in one session

“Finishing” with direct-puncture ethanol

Residual AVM in stage II AVM after EVOH embolisation

Ulceration healed after 4 months with ethanol injections
Endovascular treatment of peripheral AVM

- According to angio anatomy
  - Type I (AVF), e.g. pulmonary AVM/AVF in HHT
    - Quite simple (Coils, AVP)
  - Type II with dominant venous outflow
    - Transvenous + retrograde treatment options
    - Good long-term results when venous outflow occluded
    - EVOH, as adjunct: coils/AVP for flow-modulation
  - Type III, diffuse, net-like „Nidus“, multiple venous drainages
    - Direct puncture, i.a., i.v.
    - Difficult to treat
    - EVOH + „finishing“ with ethanol (?)
    - MEK1 inhibitors, PI3KCA pathway modulators (?)
    - Sometimes palliative results
  - Wrong technique worsens situation (PVA, coils etc.)!

Summary

- AVM angioanatomy decides agent
  - Type I (e.g. in HHT): plug, coil
  - Type II (with DOV): transvenous occlusion
  - Type III (nidus as network): EVOH, finishing with ethanol
- Be familiar with all agents

Thank you for your attention