Tips And Tricks Of Complex Peripheral AVM Endovascular Treatment With Onyx

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Vascular Malformations
- Congenital Hemangiomas
- Venous Malformations
- Lymphatic Malformations
- Vascular Malformations (AVMs) with (AVFs)
- Combined Vascular Malformations

Symptoms
- Diffuse pulsation or thrill caused increased arterial flow, hyperemia, distended venous drainage
- Cause distal ischemia
- Atrophic changes in the fingers
- Decreased sensation and movement
- Ulceration or frank gangrene
**ONYX Injection Technique**

- Co-axial system: Catheter (4F), microcatheter & microguidewire

- **Onyx/Squid**
  - 1.5 ml mix of Onyx
    - Onyx 15, 155-F900-000
    - Onyx 24, 155-F700-000
  - 1.5 ml mix of DMSO
  - 1.1 ml two locks delivery syringe
    - 2 ml syringe Onyx, 1 syringe Onyx L

**Onyx Preparation**

1. Shake Vial 20 minutes
2. Push Catheter
3. Load distal space with DMSO
4. Overwrench catheter hub
5. Connect Onyx Syringe vertically
6. Dispense DMSO 0.25ml / 40 secs
7. Push catheter prior to filling distal space

**Rebar Microcatheters**

- Marathon
  - And UltraFlow Flow-directed Microcatheters
- Mirage, X-pedien, SilverSpeed Guidewires
General Anesthesia

Treatment

- Surgery or debulking surgery combined by per/pre embolization or amputation is not feasible as these lesions tend to be diffuse and cross normal tissue planes
- Trans venous
- Trans arterial
- Percutaneous venous
- Combination of techniques and agents

Other Techniques, Advices

- At AVMs having high flow shunts (AVF) and arterial aneurysms it is more safe to use;
- ONYX %18 without diluting with DMSO but flushing the lumen,
- ONYX %34 to occlude giant arterial aneurysms.
- External compression (bandaging)

Plug and Push Technique

Right Shoulder AVM

37/F R Shoulder, pain and swelling
High-flow AVM of the left forearm
Arterial Aneurysm

27-y.F, onyx cast at the neck of the aneurysm, total exclusion of the
aneurysm from the circulation

High-flow AVM of the left forearm
Venous Aneurysm

27-y.F, Pain, swelling, varicosity, thrill, congestive heart failure

Pre-embolization

Post-embolization

18-y Male, right gluteal local low-flow VM, pain, swelling & varicosity

AVM, 18y Female
Previously embolized
Location: basis of left foot, metacarpal
area
Origin: Lateral and medial plantar
branches of posterior tibial artery

ONYX Modified Technique

- Dilute ONYX %18 by DMSO;
  ( %60 ONYX %18 +%40 DMSO)
- Use magnified (small field) during injection,
- Flush microcatheter via DMSO when injection
  finished without reflux
- Extra 1-2 DMSO syringes should be on the table

Modified Technique
Modified Technique

Right forearm High-flow AVM
30-y F, Previous surgeries,

Right Hand Palmar AVM
28 y M. Onyx embolization

Modified Technique

Right forearm High-flow AVM
Angiostructure/Cast of Onyx

Left Upper Extremity Hemangioma
MR and DSA
5y F will be followed
Right upper extremity Hemangioma
21 y Male, Onyx embolization

Pre-embolization
Post-embolization

Right hemi-pelvic and R lower extremity hemangiomatosis, 2005

Right hemi-pelvic and R lower extremity hemangiomatosis, 2006

Onyx Embolization of R foot, 4th Session

Right hemi-pelvic and R lower extremity hemangiomatosis,

Post emb.control
Complications

- Nontarget embolization cause damages to muscle nerves or skin,
- Pulmonary arteries,
- Relux to main arteries may cause severe ischemia.

Skin burns result of non-target embolization

Pulmonary Embolism

- Venous reflux may occur when Onyx passes through fistulous component of VM's before polymerization

Conclusion

Treatment of complex peripheral AVMs with Onyx is the best choice especially when the lesions have arterial supply even high or low flow.