Salvage Endovascular Procedures for Onyx AVM Treatment Failures: A World-Wide Experience

Nothing to Disclose

Onyx

- Is largely non-adhesive, but there are reports now of microcatheters still can become “glued” in place and left in.
- An embolic agent requiring DMSO to polymerize.
- Like its predecessor polymerizing embolic agents, IBCA/nBCA, they do not injure the endothelial cell, but are a “space occupying” embolic agent.
- The endothelial cell senses the decreased O2 tension in the occluded vessel and sends out Chemotactic Cellular Factor (macrophage migration to carry out embolic debris, “revascularization” result) and Angiogenesis Factor (new blood vessel formation i.e. revascularization the occluded vessel, “neovascular stimulation”).

- Hirayama KE. Embolization of (Brain) AVMs with Onyx: Clinical Pathologic Experience in 28 Patients. Neurosurgery. 2001 Jul; 48: 995. (Onyx late recanalizations have been described in brain AVMs.)


- (10.2% recanalization rate in resected specimens, no time frame given at time of resection)

- "Onyx AVH Embolotherapy: The Histologic tissue Changes. Tissue Inflammatory Response, Floutoscopy issues, & Endovascular Issues With Its Use", Molly Meeks MD, University of Arkansas, Little Rock, Medical Center – Vehi Symposium Nov 2014 Lecture. (All resected bead & coil AVMs 1 year post- Onyx emboli, recanalizations are routinely seen histologically in the resected specimens.)
Long-Term Pathologic Follow-Up of Cerebral AVMs Treated by Embolization with Bucrylate.

Dissolution of iBCA On Long-Term Follow-Up.
Rao VR, Mandalam KR, Gupta AK, Kumar S, Joseph S. AJNR 1989; 10: 135 – 141. (F/up up to 20 months post-iBCA embo, had partial recanalizations to complete resorption of iBCA in all patients)

Repermeation of Partially Embolized Cerebral AVMs: A Clinical, Radiologic, & Histologic Study.

Absolute Ethanol
- Non-polymerizing most powerful liquid sclerant embolic agent
- Precipitates the protoplasm of the endothelial cells and causes fractures at the level of the internal elastic lamina of the vessel wall.
- Progressive thrombosis due to platelet aggregation upon the demucosal vascular wall
- With the endothelial cell destruction, "Neovascular Stimulation" & "Recanalization" are noticeably absent
- Permanent of the vascular occlusion is now possible, therefore cures are a potential outcome.

Onyx

40 year old female with massive scalp AVM. Four Onyx embo sessions. No more endovascular access for Onyx deposition.

Cavernous RICA wire dissection requiring stenting. Microcatheter “Onyxed” in the RICA permanently.
AVM remaining without cure.
Yakes Type IIIb AVM

41 year old male with massive right scalp AVM causing pain and pulsatile tinnitus. Patient had severe coagulopathy due alcoholic cirrhosis.
12 year old female with massive Rt Face, Scalp, and Maxillary AVM. Multiple Onyx embos with massive Onyx deposition in the Rt temporalis, facial, and maxillary areas.

No further ability to inject any more Onyx.

Pt is now blind in her Rt eye, and still has unabated massive hemorrhages from the nasal & oral cavities.

Referred from London for definitive ETOH endovascular treatment due to her unremitting hemorrhages. After 13 ETOH direct puncture procedures, her bleeding has significantly diminished but continues. A resection of the Onyx will occur next admission to facilitate further ETOH embos.
Nasal & Upper Lip AVMs

- 11 month old female admitted for ethanol AVM endovascular repair of the multi-compartmental nasal & upper lip AVMs
- Intermittent nasal and oral hemorrhaging
- Incipient monal pain in upper lip and nasal area affecting eating and drinking
- Two months prior had Onyx embolization with no change in nasal & oral hemorrhages, nor in her pain syndrome
- Parents investigated other alternatives to Onyx embolization
Yakes Type IIIa AVM

34 year old female with large Rt pelvic AVM with Rt ureter obstruction secondary to ureteric hemorrhages. Multiple prior nBCA embos. No further arterial embo possible. Rt renal nephrostomy tube in place. Extensive pelvic neovascular stimulation phenomenon (Angiogenesis factor) with arterioles so small that no catheterization for nBCA embo possible. Pt then referred for ethanol embolotherapy for curative management.
- 40 year old female with massive Rt. abd/pelvis/thigh AVM s/p numerous Onyx emboss. Complications required Rt. high thigh amputation. The post-op wound would not heal due to significant venous hypertension secondary to massive residual AVM. The skin necrosed leaving an open wound from the Rt. pelvis to Rt. buttock area.

- Patient then suffered from repeated sepsis and hemorrhages requiring multiple hospitalizations for IV antibiotic Rx, wound care, and requiring 5-10 unit transfusions monthly.

- Patient eventually referred for definitive ethanol endovascular Rx due to unremitting problems of the above issues.
Since the end of 2 years of multiple ethanol and coil embol treatments, the last 5 years the patient has remained stable and free from the unremitting infections and hemorrhages.

Yakes Type IIa AVM
47 year old male with severe right buttock and thigh pain syndrome and weakness in right lower extremity
Massive Rt pelvis and thigh AVM
47 year old Female

- Severe pain in the Rt buttck, Rt pelvis, and Rt hip
- Pain with ambulating and sitting
- Prior Onyx embolizations to the Rt buttck and Rt thigh AVM components
- Worsening pain syndrome post-Onyx embolizations
- Now severely affecting patient’s ability to ambulate
- Sought an alternative to Onyx embolizations