Curative Endovascular Management Strategies For Yakes Types IIb, IIIa, & IIIb AVMs

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Type I: A direct artery to vein fistula connection.

Type IIa: Multiple arteries/arterioles connecting to a typical "nidus" interconnecting vascular tubular structures that drain into out-flow veins. Endovascular techniques are done to the venous side of the nidus.

Type IIb: Same as Type IIa except the "nidus" drains into an aneurysmal vein single out-flow vein.

Type IIIa: Multiple in-flow arterioles shunting into an aneurysmal vein that has a single vein out-flow. Fistulae are in the vein wall.

Type IIIb: Multiple in-flow arterioles shunting into an aneurysmal vein with multiple out-flow veins. The fistulae (nidus) are in the vein wall.

Type IV: Multiple arteries/arterioles that branch in "en passage" fashion to form innumerable micro-fistulae that diffusely infiltrate the affected tissue. Because the tissue is viable and not devitalized, capillary beds must also be present admixed among the innumerable AVFs. The innumerable micro-AVF drain into multiple veins. The tissues normal post-capillary venous drainage then competes with the arterialized vein out-flow for drainage causing venous HTN in tissue.

Disclosure

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  - Consultant
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  - Travel expenses

33 year old male paraplegic with severe chest and shoulder pain syndrome due to thoracic and mediastinal AVM. Arterial collaterals from the R Thyro-Cervical Trunk to the L chest AVM at C-7 cervical spine level is the cause of the patient’s paraplegia.

This is a case of a Yakes Type IIb AVM being treated by transarterial “nidus” ETOH embolization, direct puncture “nidus” ETOH embolization, and direct puncture of the AVM out-flow aneurysmal vein with coil packing it to achieve cure.

Massive Lt intra-thoracic Yakes Type IIb Lt chest. Pt is paraplegic due to AVM collaterals coursing to Lt chest AVM from Rt Subclavian artery branches, thru The C-7/T-1 area injuring the spinal cord, coursing to the Lt chest AVM.
Giant vein aneurysms coursing thru C-7/T-1 spinal cord area injuring the spinal cord.

Massive vein aneurysms

Area of spinal cord injury

Arch DSA showing AVM “nidus” Above Vein aneurysm out-flow

Giant vein out-flow through Mediastinum to Rt chest.
Yakes Type IIb AVM "nidus" above aneurysmal vein

AVM arterial collaterals causing spinal cord injury and paraplegia at C-7/T-1

Post-ethanol embolization showing thrombosis

Direct puncture coil embolization into vein aneurysm using 5-.035 movable core J-wire
After placing an additional 48 Nester coils

Rt Subclavian DSA cure

Aortic arch injection demonstrating cure

Multiple in-flow arteries into an aneurysmal vein with single out-flow vein. Ethanol and/or coils can be curative.
43 yo male with post-prandial intestinal angina and 40 lb weight loss over 3 months. AVM at root of the mesentery supplied by the IMA.

Yakes Type IIIa AVM

SMA DSA branches supplying AVM and Lt colon & Sigmoid colon

Vein drainage into a single mesenteric vein. Yakes Type IIIa.

Eventual drainage into the Portal Vein

DSA thru IMA catheter

Microcatheter

DSA thru microcatheter advanced thru an 18 g needle percutaneously placed into the mesenteric vein.
Colies placed into the mesteric vein compartments

16 GDC coils placed
68 Cook fibered coils placed

Pre-coil embo DSA

Post-coil embo DSA showing AVm cure

5 yr IMA DSA F/up with Yakes Type Illa AVm cure

Portal vein intact
Type I: A direct artery to vein fistula connection.
Type IIa: Multiple arteries/arterioles connecting to a typical "nidus" interconnecting vascular tubular structures that then drain into out-flow veins.
Type IIb: Same as Type IIa except the "nidus" drains into an aneurysmal vein single out-flow vein.
Type IIIa: Multiple in-flow arterioles shunting into an aneurysmal vein that has a single vein out-flow. Fistulae are in the vein wall.
Type IIIb: Multiple in-flow arterioles shunting into an aneurysmal vein with multiple out-flow veins. The fistulae (nidus) are in the vein wall.
Type IV: Multiple arteries/arterioles that branch in "en passage" fashion to form innumerable micro-fistulae that diffusely infiltrate the affected tissue. Because the tissue is viable and not devitalized, capillary beds must also be present among the innumerable AVFs. The innumerable micro-AVF drain into multiple veins. The tissues normal post-capillary venous drainage then competes with the arterialized vein out-flow for drainage causing venous HTN or failure.

- 46 yo female with LLE quadraceps femoris weakness (thigh extensors).
- Exercise intolerance.
- Cardiac output of 14 l/min.
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14 yr arteriographic F/up
Coil occlusion cure.

Coil occlusion cure at 14 years

14 yr arteriographic F/up

Type I: A direct artery to vein fistula connection.

Type IIa: Multiple arteries/arterioles connecting to a typical “nidus” via multiple arterioles to a single vein draining. Vascular malformations that are shown skin coronaries.

Type IIb: Multiple arteries/arterioles connecting to the “nidus” via multiple arterial connections to connect to a typical “nidus” via a single vein draining. Vascular malformations that are shown skin coronaries.

Type IIIb: Multiple in-flow arteries/arterioles shunting into an aneurysmal vein with multiple out-flow veins. More challenging to treat with coils as the multiple veins must be treated.

Lt femur bone AVM
With multiple

Multiple vein out-flow
Yakes Type IIIb AVM
of the Lt Femur

Multiple in-flow arteries/arterioles shunting into an aneurysmal vein with multiple out-flow veins. More challenging to treat with coils as the multiple veins must be treated.
ALL have enlarged aneurysmal outflow vein(s) that allow for curative endovascular treatment by dense coil packing in the vein aneurysm(s). Additional ethanol injection into the partially coiled sac can ‘reflux’ ethanol into the AVFs in the vein wall to further sclerose the vein wall AVFs which may be additive to a long-term cure.