Yakes Type I, IIb, IIIa, IIIb

The Retrograde Vein Approach

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Type I: A direct artery to vein fistula connection.

Type IIa: Multiple arteries/arterioles merging to form an interconnecting vascular structure that then drain into a single out-flow vein.

Type IIb: Similar to Type IIa except the “nidus” discharges 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: Similar to Type IIIa except the “nidus” drains into an aneurysmal vein with multiple out-flow veins. Fistulae are in the vein wall.

Type IV: Multiple arteries/arterioles that branch in “en passage” fashion to form innumerable micro-fistulae that diffuse into the affected tissue. Because the tissue is viable, capillary beds must also be present admixed among the innumerable AVFs. The innumerable AVFs drain into multiple veins. The tissue’s normal post-capillary venous drainage competes with the arterialized vein out-flow for drainage causing venous hypertension.

Treatment options

- Type I (AVF)—Coils/plugs
- Type IIa (classic AVM nidus)—ETOH cath or direct
- Type IIb (classic nidus with single outflow vein)
  - ETOH cath or direct with coil packing of vein
- Type IIIa (aneurysmal vein single outflow)
  - Curative coil packing of vein
- Type IIIb (aneurysmal vein multiple outflow)
  - Coil packing of vein
- Type IV (diffuse infiltrating) 50/50 ETOH/contrast

Venous Predominant Lesions

- Yakes I
  - Direct A-V connection
  - Pulmonary AVM
  - Coils, plugs
  - Simplest to treat

Yakes Type IIb AVM

A “nidus” is still present, but instead of multiple out-flow veins draining from the nidus, there is a single aneurysmal out-flow vein.

Two endovascular approaches are curative for this Type IIb AVM.

- Like Type Ila, transarterial and direct puncture into nidus ethanol embolizations are curative.
- Like Type IIIa & Type IIIb:
  - Transvenous retrograde vein approach
  - Direct puncture of the vein aneurysm with complete coil packing is also curative.
Yakes Type IIb AVM

Direct puncture and coils—cured

Transcatheter/Retrograde vein

Yakes Type IIIa AVM

Multiple in-flow arteries into the aneurysmal vein wall (the vein wall is the “nidus”) with single out-flow vein. **Ethanol and/or coil packing in the vein sac can be curative.**
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.
Yakes Classification of AVMs
- Only classification system in which architecture informs treatment and produces consistent cures.
- Venous predominant lesions are now curable in a high percentage of cases!

Treatment options
- I (AVF)—Coils/plugs
- IIA (classic AVM nidus)—ETOH cath or direct
  - IIB (classic nidus with single outflow vein)— ET OH cath or direct with coil packing of vein
  - IIIa (aneurysmal vein single outflow)—curative coil packing of vein
  - IIIb (aneurysmal vein multiple outflow)—Coil packing of vein
- IV (diffuse infiltrating) 50/50 ETOH/contrast