

How I Treat AVM's



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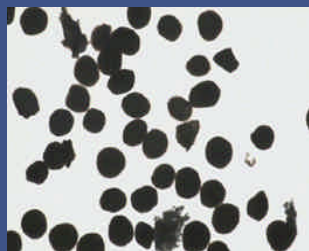


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Diagnosis, Tools and imaging

- Diagnosis: Clinical and Imaging
- Imaging: MRI, Colour Flow Doppler, Angiography with late venous phase, Direct Venography
- Embolisation: Coils, Alcohol, STD, Onyx sometimes particles
- Tools: Co-Axial and Tri-Axial catheter systems
- Ultrasound: Use frequently and use the shortest route

Polyvinyl Alcohol Foam Particles (PVA)



- Causes occlusion of vascular bed and obstructs inflow
- Over time the vessel may recanalise
- Seldom used in AVM
- Mainly utilised for tumour embolisation
- Very small particles causes skin necrosis

ONYX – Liquid embolic agent



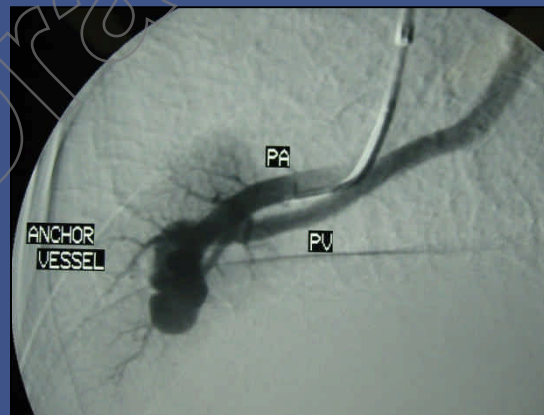
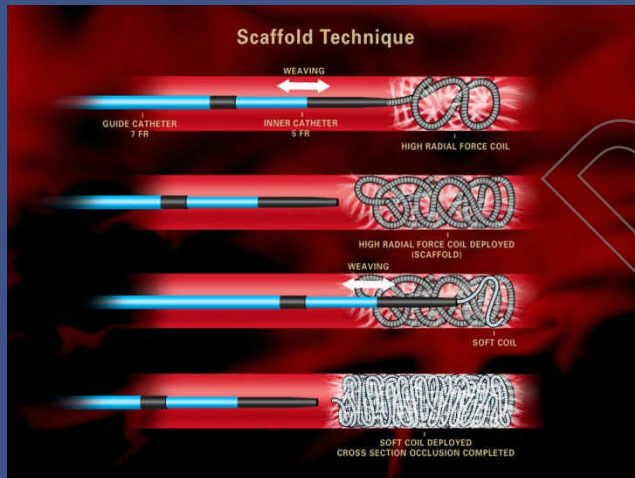
- Contact with blood causes precipitation
- Flows like lava outside solidify and inside continues to flow
- Penetrates deep into the nidus
- Effects smaller vessels with skin necrosis and nerve injury
- Discolour skin and mucosa black
- Patient smells of garlic for two weeks



Coils

Seldom used in VM's as it does not block distally and does not occlude the nidus.

Very effective in AVF's



Ethanol

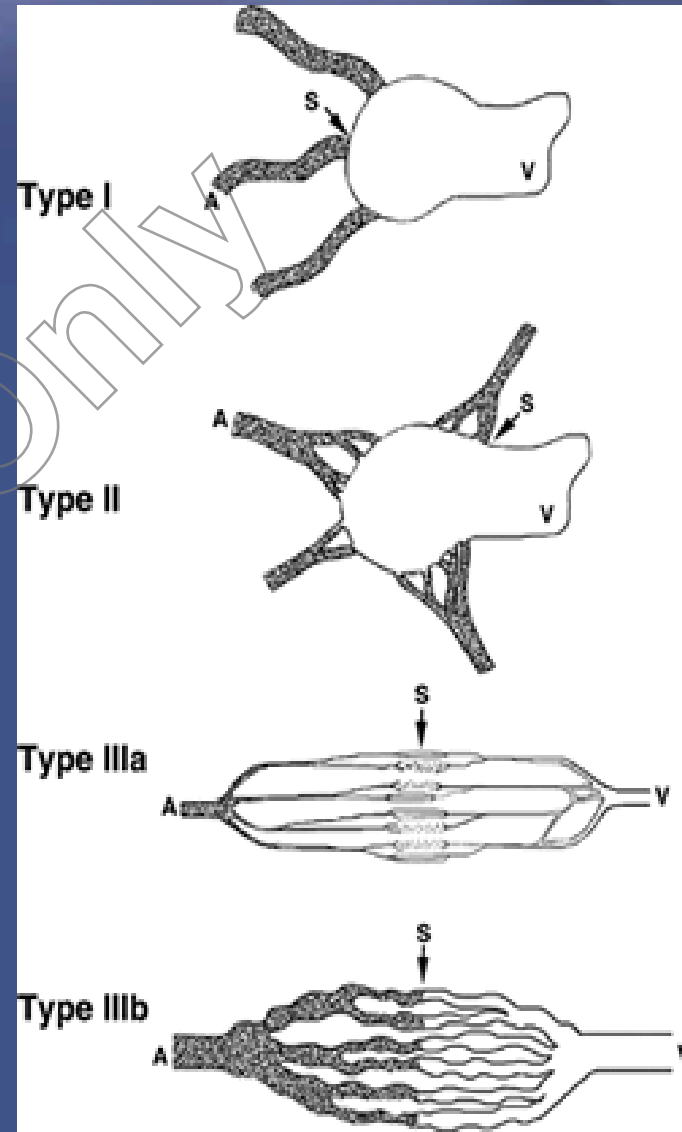
- Low viscosity, passes readily through the nidus of the AVM
- Super-selective catheterisation of nidus
- Never to be injected in the proximal feeding artery
- Excellent for direct nidal punctures
- Very painful use general anaesthesia
- Dose limitations with small doses at each treatment session to prevent complications

Therapeutic Issues

- Complete destruction of the nidus of a VM is the only potential cure
- Ameliorating the clinical symptoms should be the goal in treating problematic AVM
- Improper treatment often rapidly stimulates quiescent VM's making the condition worse

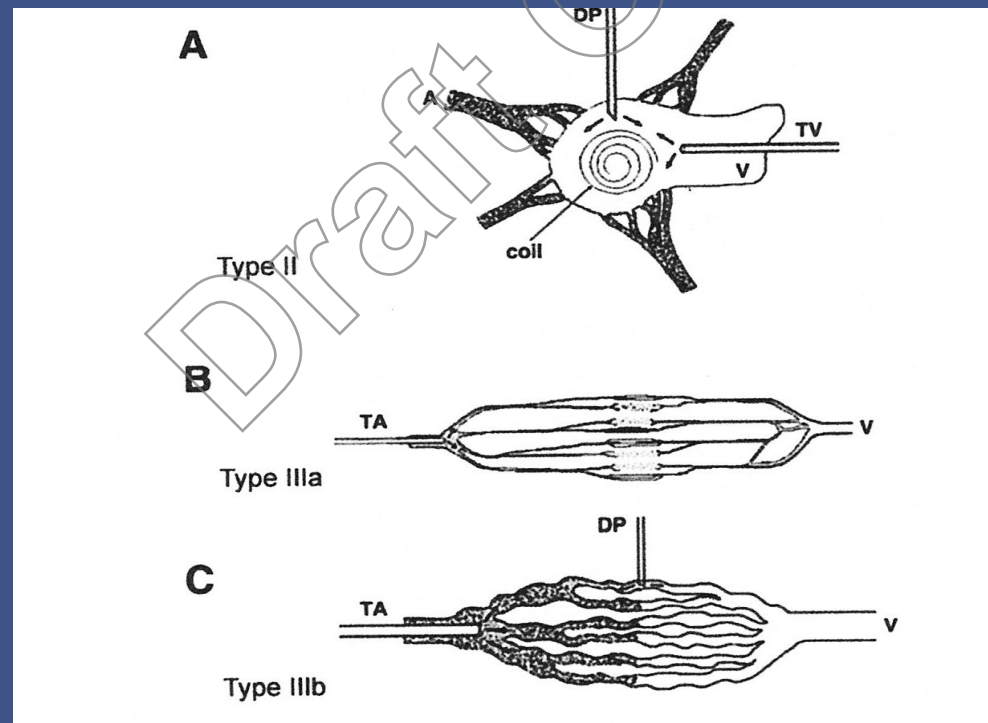
"Do" Working Classification

- Type 1. = AVF single artery or no more than 3 arteries with single vein
- Type 2. = Arteriovenous fistula – arterial component is plexiform - single vein
- Type 3a. = Arteriovenous fistula with non dilated fistula
- Type 3b. = Arteriovenous fistula with dilated fistula



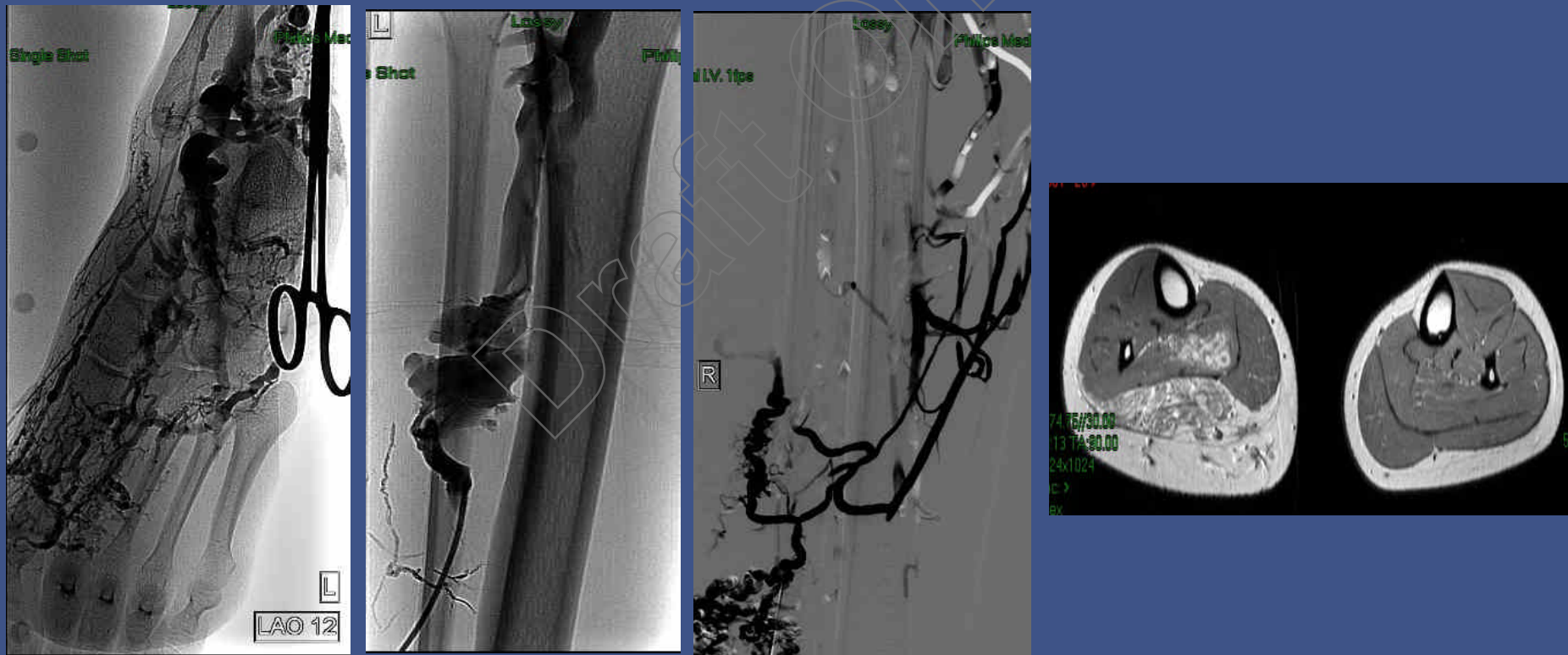
"Do" Treatment Diagram

- Type 1 – Coil embolisation via arterial supply or direct puncture with or without compression or balloon occlusion
- Type 2 – Direct puncture with or without compression and coiling
- Type 3a & 3b trans-arterial approach with Onyx or Glue



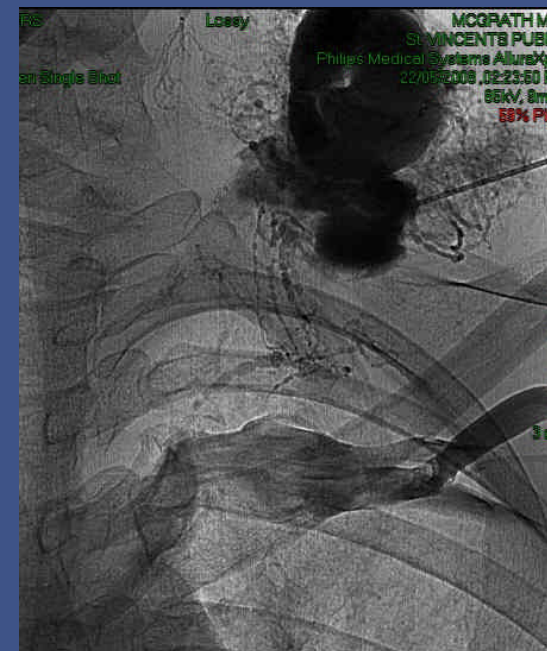
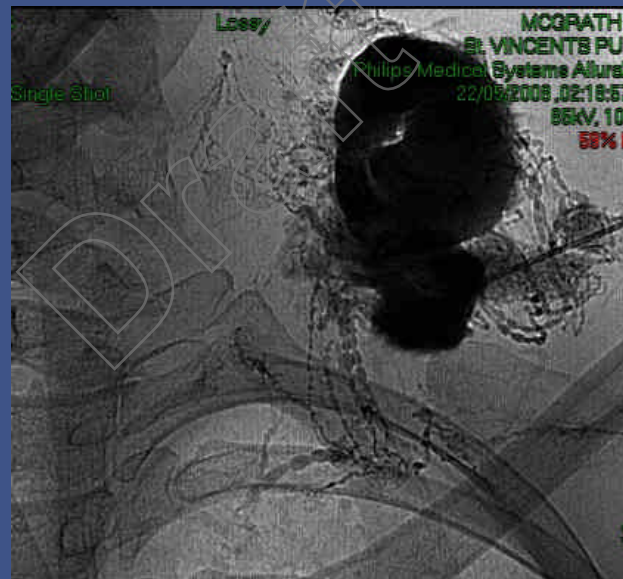
Example: Venous Malformations

- Foam Sclerotherapy
- Compression
- Elevation of the leg to protect deep system



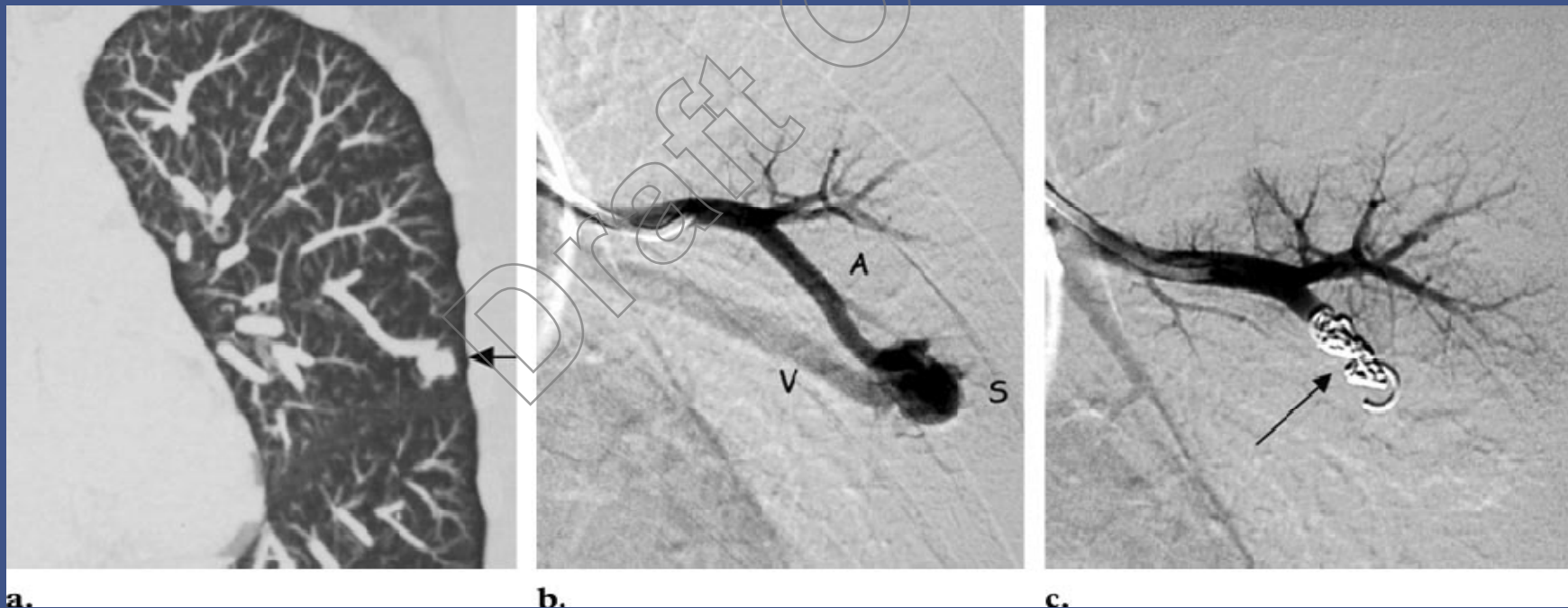
Example: Lymphatic Malformation

- Direct puncture under ultrasound guidance
- Aspirate lymphatic fluid
- Replace the same volume plus 1ml with contrast and do a lymph - angiogram
- Aspirate the contrast and inject the same volume foamed STD.

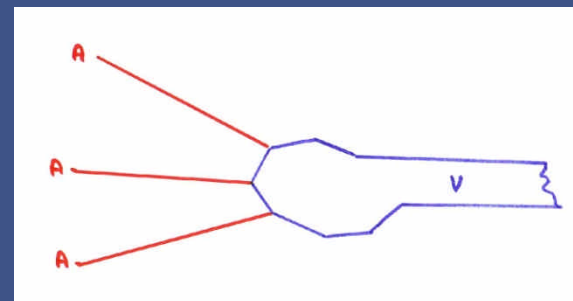
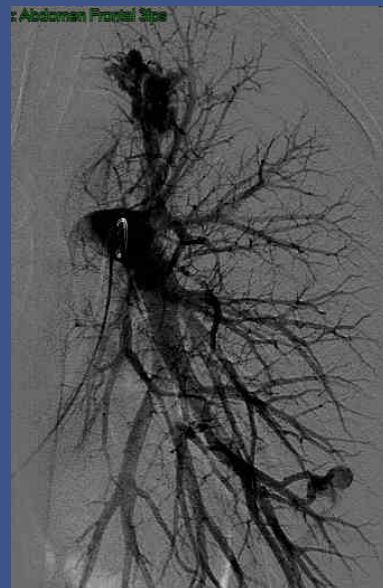
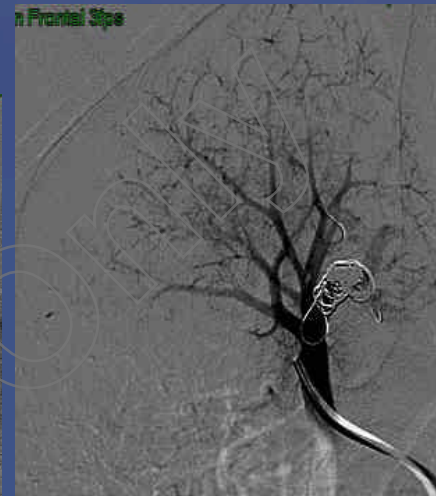


Example: AVF Type 1 (Lung AVM)

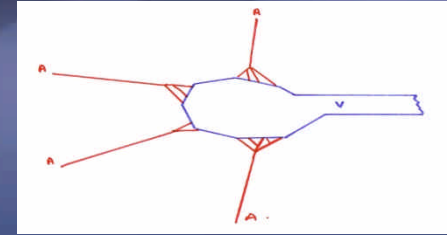
- High flow
- Single artery and vein (Do type 1)
- Coil embolisation
- Same everywhere is the body



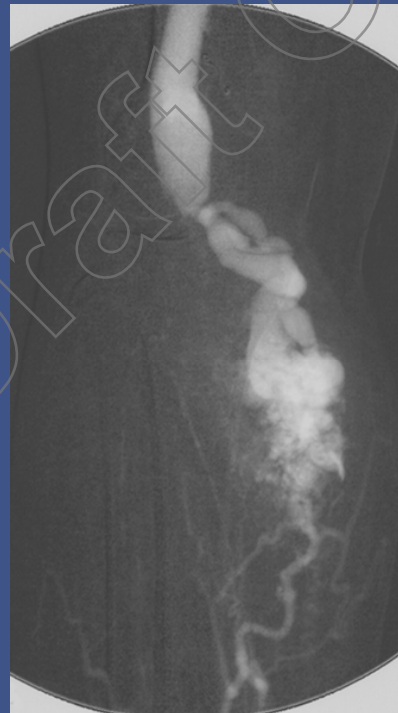
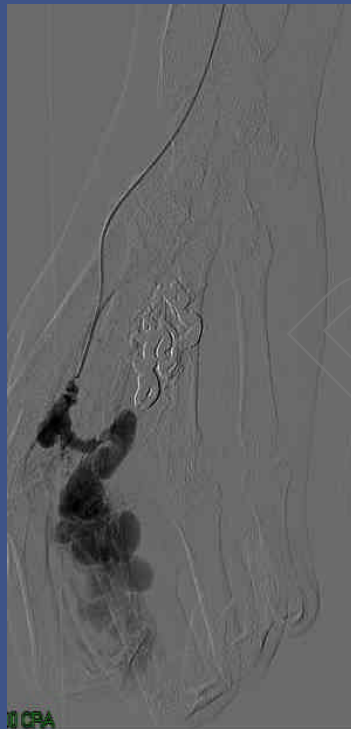
Example: Type 1 AVF (simple or complex)



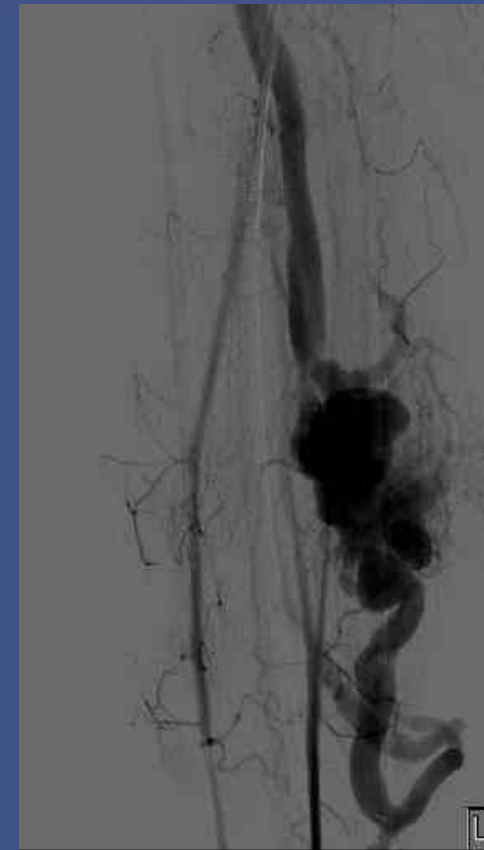
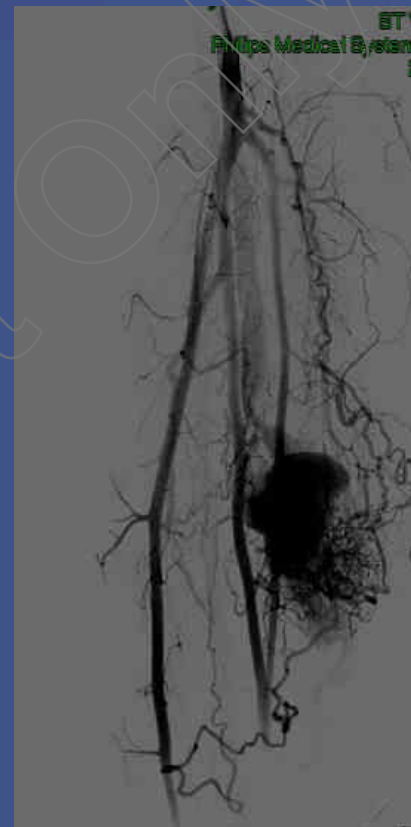
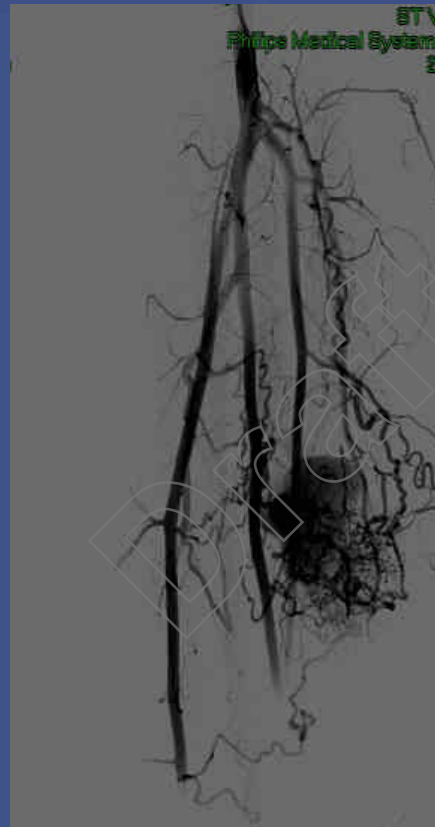
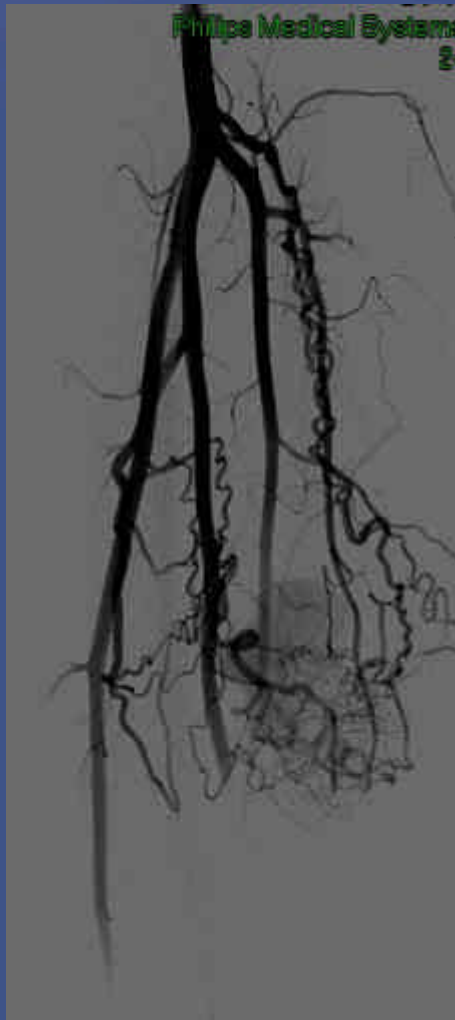
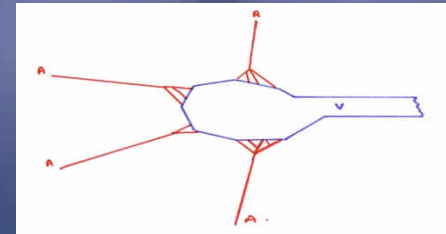
Do Type 2. AVM



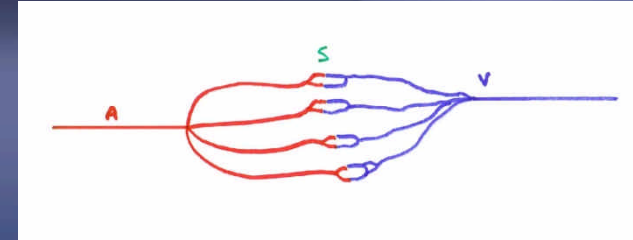
- Multiple arterioles shunt into a single venous component
- Target is the venous component
- Alcohol, vein compression or transvenous coil embolisation to reduce amount of ethanol and to stabilise the thrombus



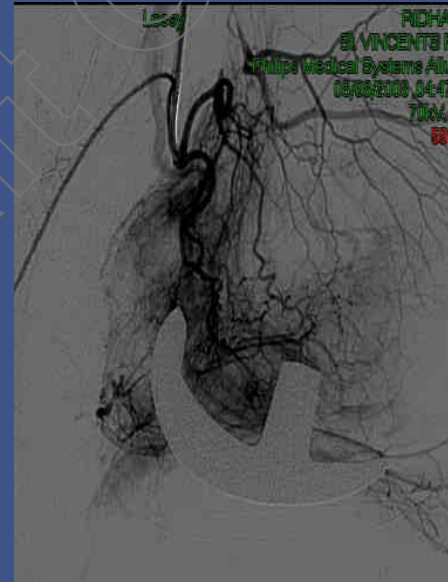
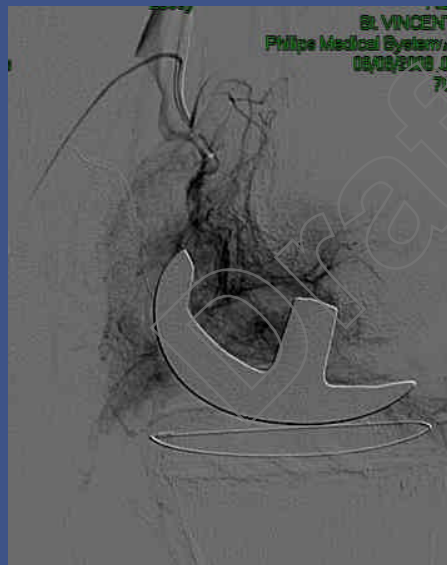
Example: Type 2 AVM



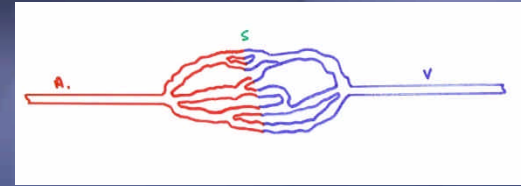
Example: Type 3a. AVM



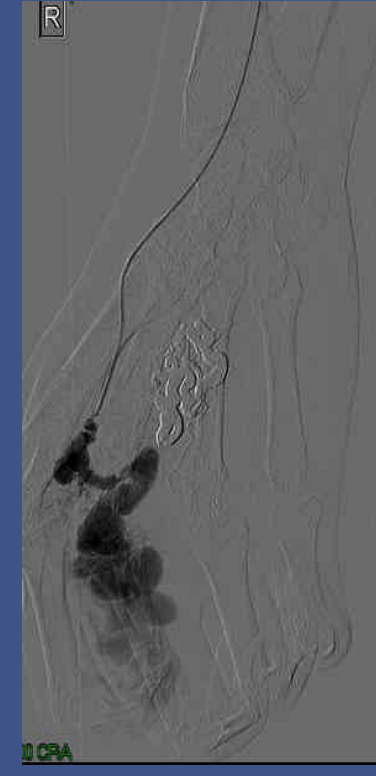
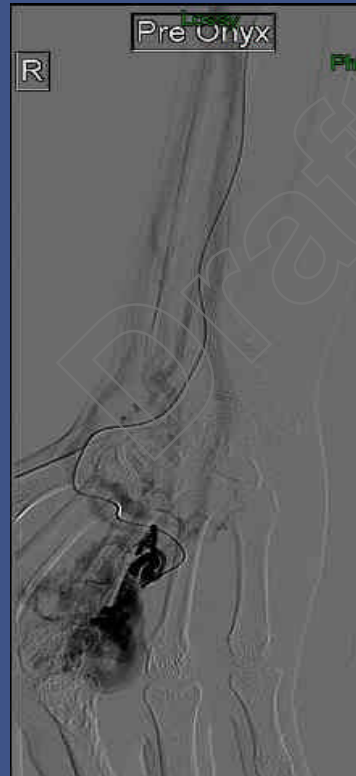
- Arteriovenulous AVM with non dilated fistula
- Multiple fine shunts are present and appears as a blush on angiography
- Transarterial approach only as the fistulas is too fine to puncture directly
- Onyx



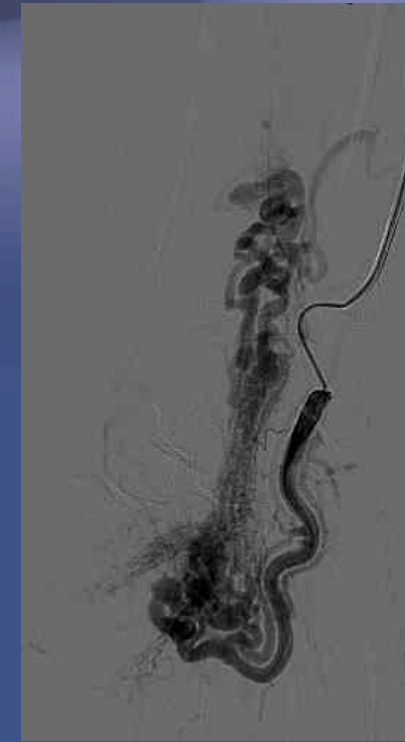
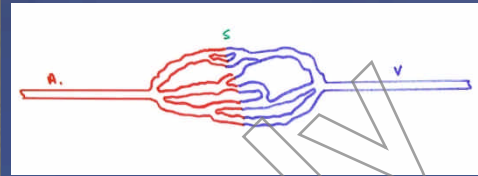
Example: Type 3b. AVM

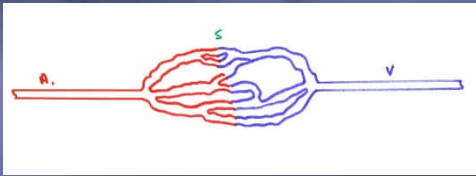


- Arteriovenous AVM
- Multiple shunts between arterioles and venules with dilated fistulas
- Transarterial approach only with Onyx
- Direct approach is discouraged as alcohol may leak into adjacent tissues

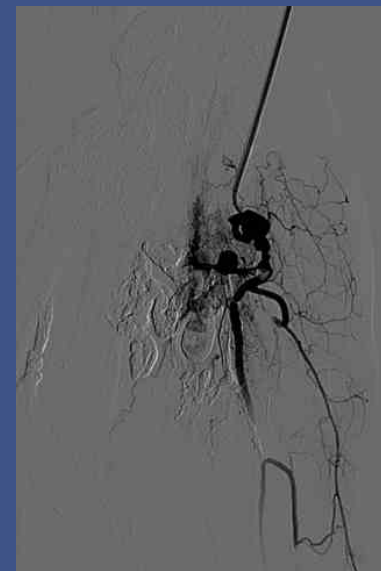
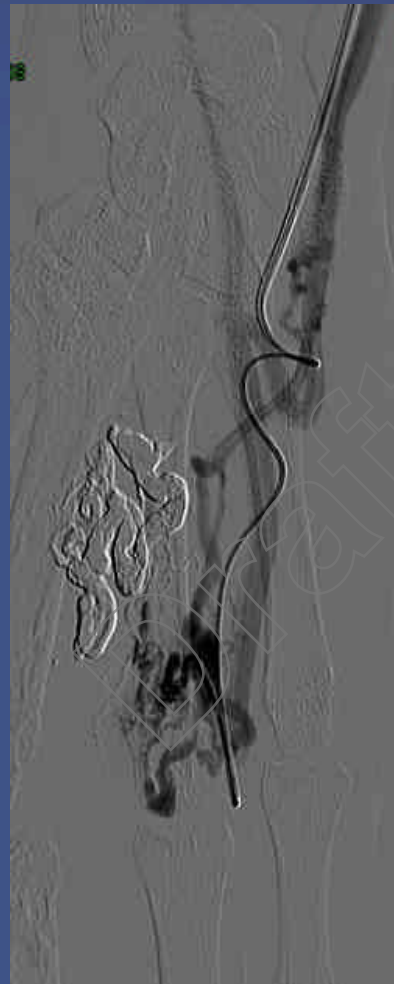


Example: Type 3b AVM





Example: Type 3b AVM



Adverse Effects

- Tissue necrosis
- Nerve injury
- Haematological effects: Intravascular thrombosis and consumption of clotting factors
- Pulmonary embolism
- Haemoglobinuria
- Systemic effects of alcohol

Conclusion

- Diagnose AVM's clinically and with MRI
- Check coagulation parameters on patients with large AVM's
- Use Steroid before and after treatment to prevent compartment syndrome
- Never coil a proximal feeding artery except if it is an AVF
- Careful when you use Alcohol
- Do not attempt to get a perfect result