

The role of VIR in malfunctioning HD fistulas

Dr. Joel Woodley-Cook

Overview

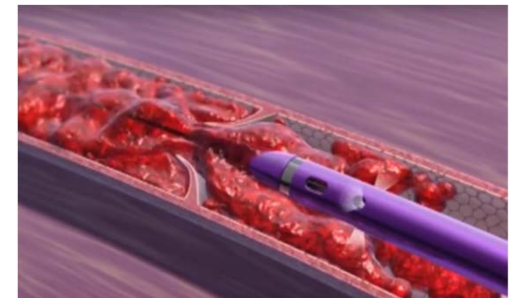
- Basic concepts
 - VIR
 - Angioplasty/stenting/thrombolysis
 - Fistula
 - HD lines
- Fistulas and patency
- Stenoses
- Intervention endpoints
- Monitoring and surveillance
- Cases (5)

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Basic concepts - VIR (vascular/interventional radiology)

- Treat the problem!
- Ultrasound and angiography
- Percutaneous transluminal angioplasty (PTA)
 - Scoring/cutting
 - Drug coated
- Stent deployment (stenting)
 - Bare metal
 - Covered
- Thrombolysis (de clot)
 - Mechanical
 - Pharmacologic (drugs - tPA)
 - Combination



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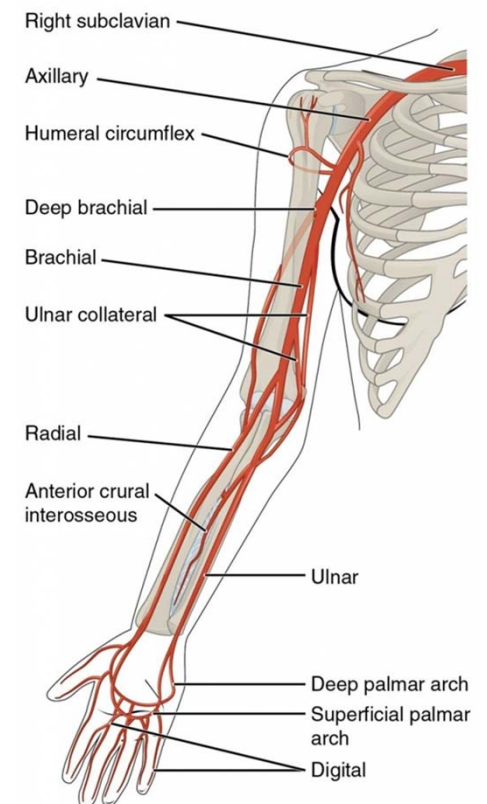
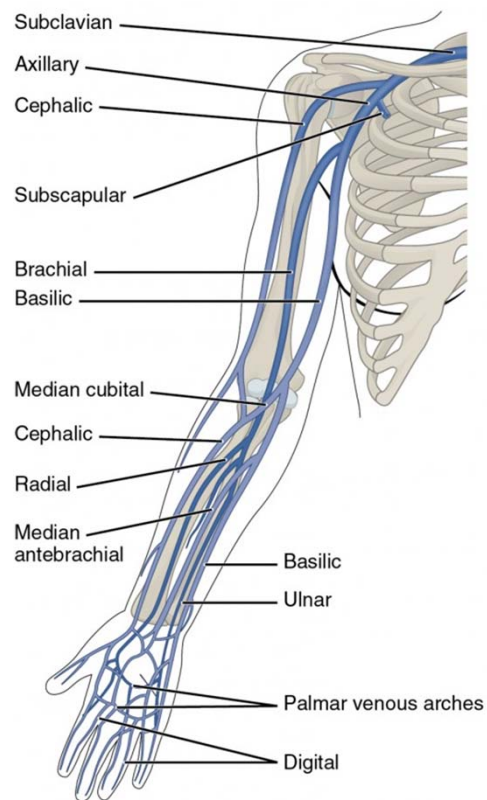
Basic concepts - Fistula

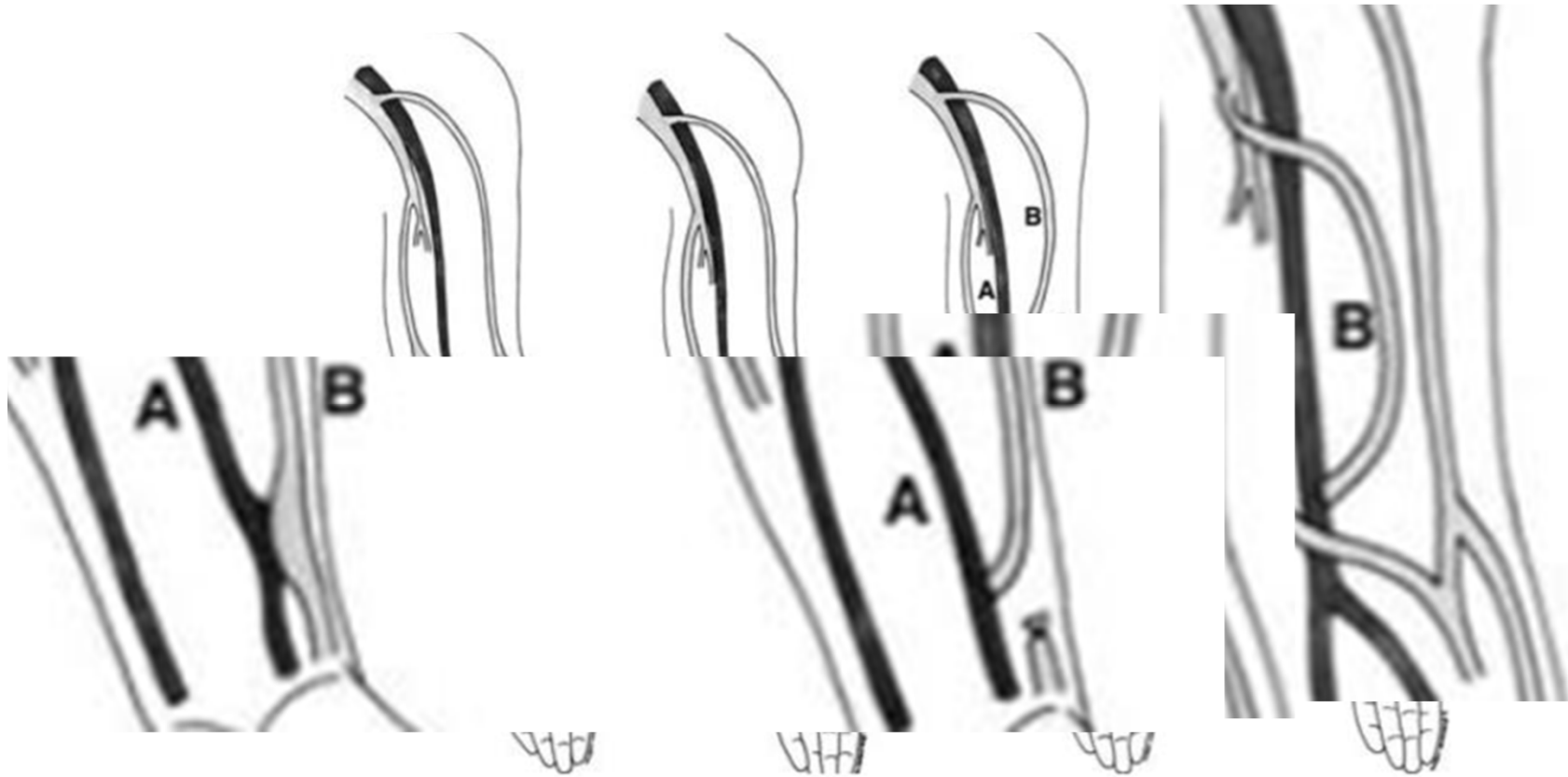
- 4 main types

- Radiocephalic
 - Side to side
 - End to end
- Brachiocephalic
- Basilic vein transposition

- Dialysis circuit

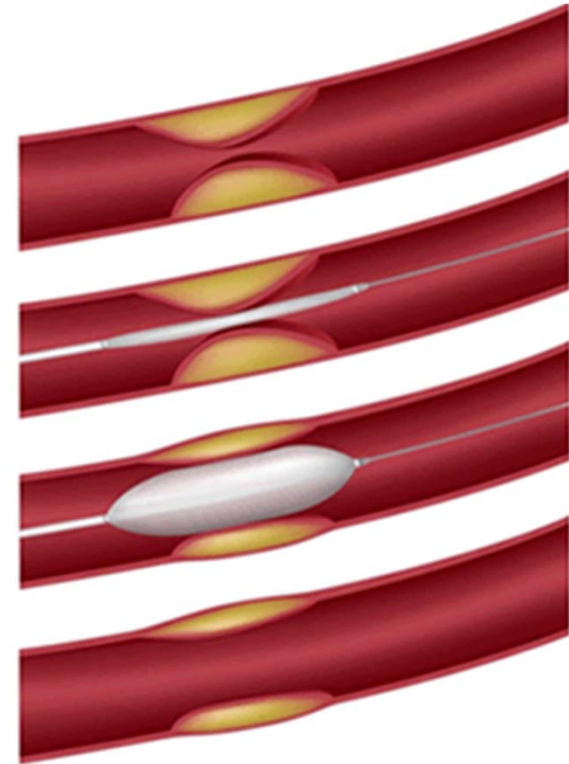
- Inflow artery to the central veins (SVC)





Fistulas and Patency

- Up to 65% one year patency rates after creation
- Up to 85% patency rates with angioplasty
- The older the fistula at the time of first treatment, the better
- Dysfunctional brachiocephalic fistulas require more frequent interventions than radiocephalic
- “Dialysis three times per week and angioplasty three times per year”



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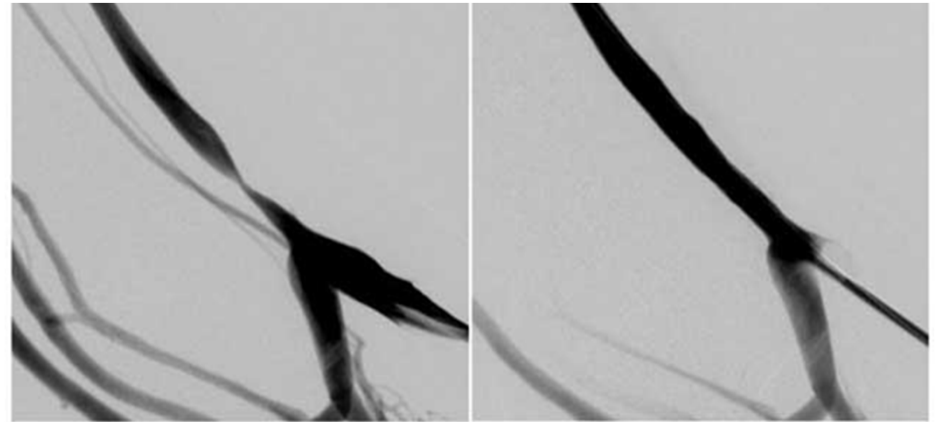
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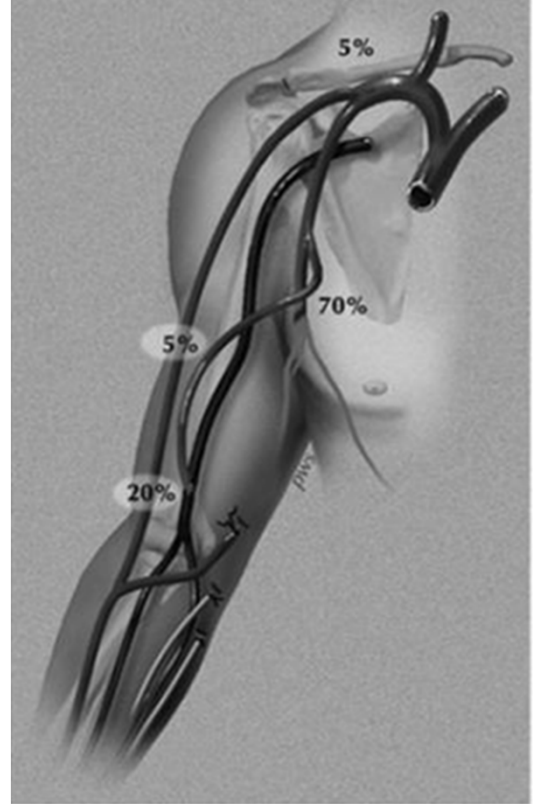
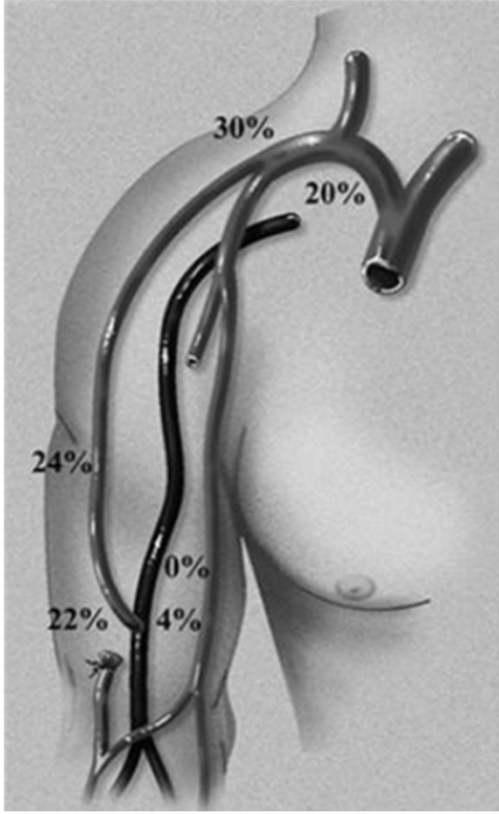
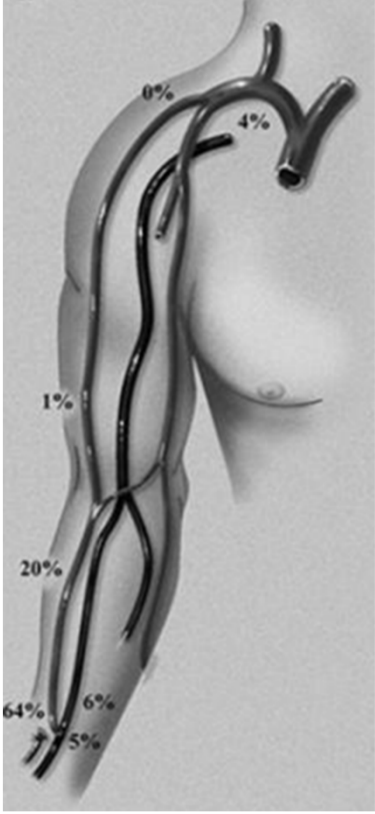
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Basic concepts - Stenosis

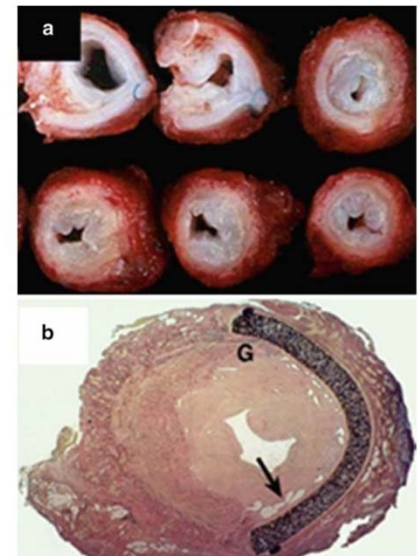
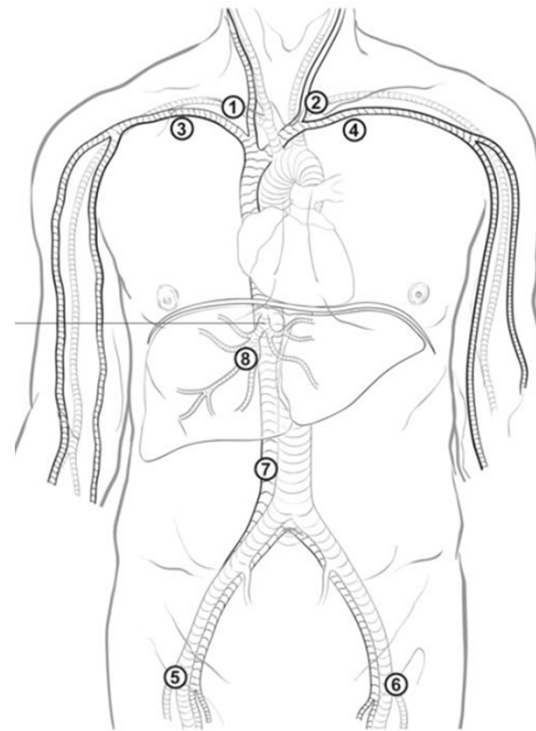
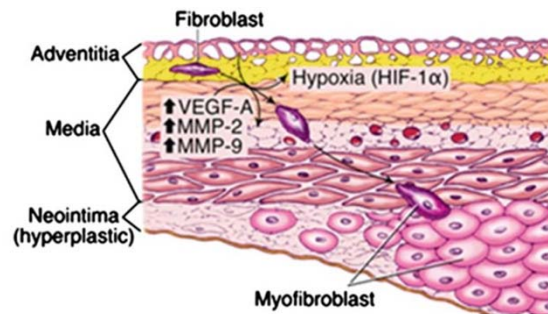
- Area of narrowing along the circuit
 - Location depends on the type of fistula
- $\geq 50\%$ diameter
- Clinical examination
- Ultrasound
- Angiography





Why all this stenosis?

- Neointimal hyperplasia → fibrosis
- Catheters
 - Venous injury
 - Inflammation
 - Hemodynamics
- Fistulas
 - Hemodynamics
 - Venous injury



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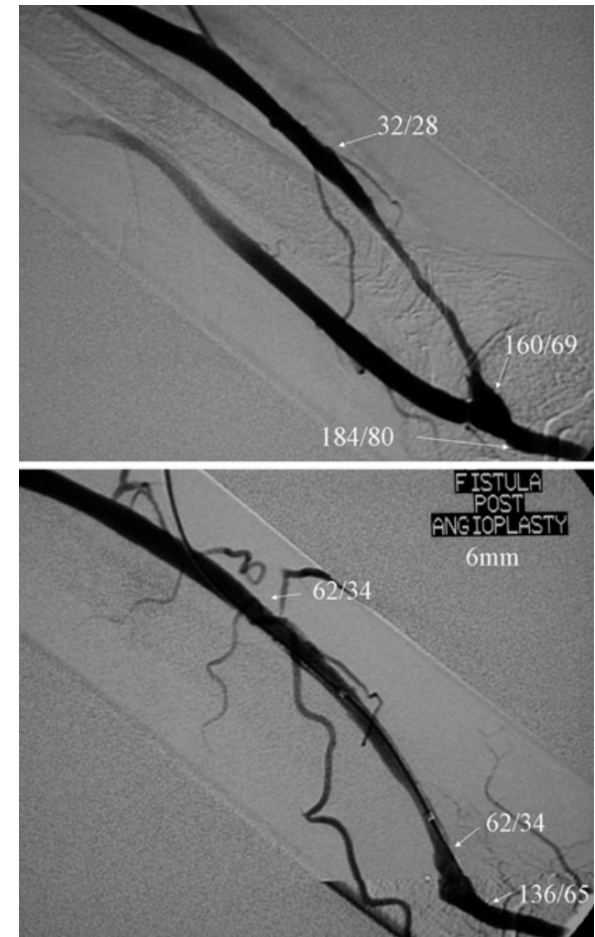
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Intervention endpoints

- Anatomic
 - Residual stenosis $\leq 30\%$ relative to adjacent vein***
- Clinical
 - Palpable continuous thrill
- Hemodynamic
 - Drop in systolic pressure $\leq 30\%$ along the fistula (not including the anastomosis)
 - Drop in systolic pressure ≤ 10 mmHg across the lesion



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Monitoring and Surveillance

- Monitoring

- Arm swelling
- Change in access bruit or thrill
- Prolonged Bleeding
- Difficult cannulation

- Surveillance

- Device based methods (flow rate, recirculation, change in venous pressures)

Monitoring

- Physical exam

- Each HD session

- **Look**

- Chest and upper arms: swelling or collateral veins or aneurysms

- **Listen**

- Bruit/pulse with a stethoscope

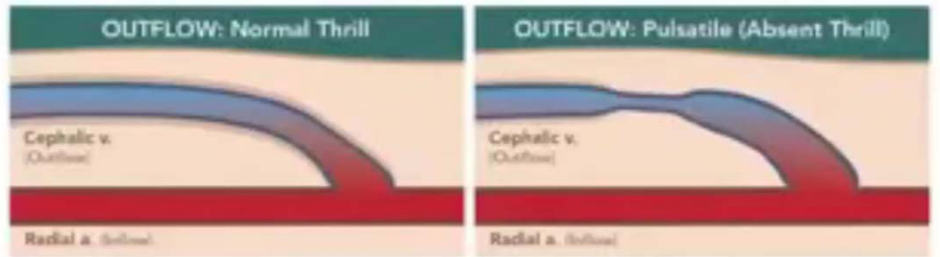
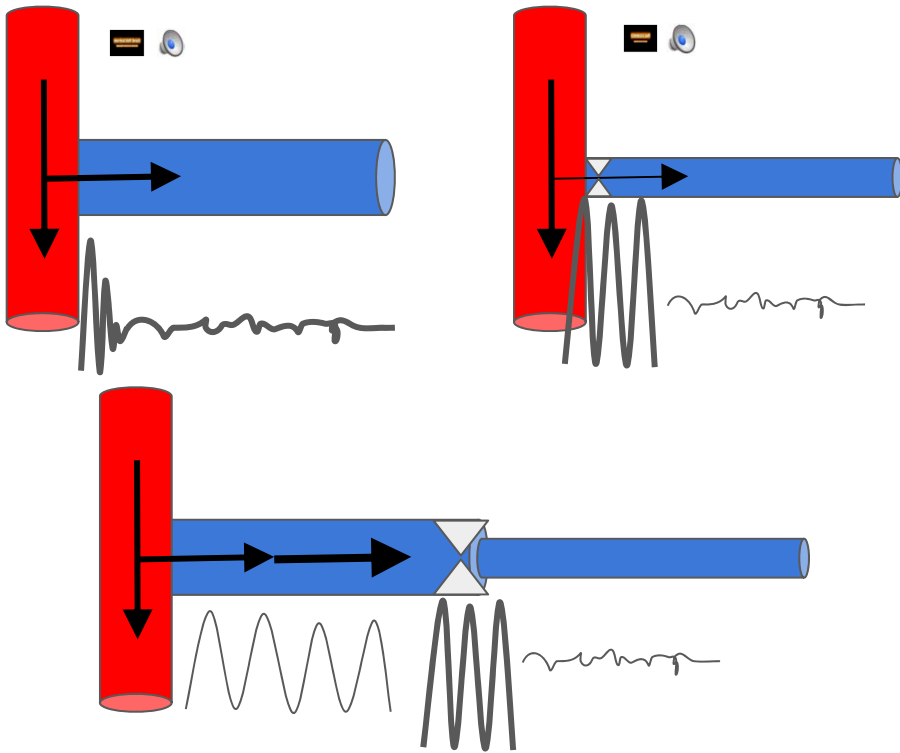
- **Feel**

- Palpate bruit/pulse

- Water-hammer: At and upstream of the stenosis

- Elevated arm: Upstream distension, downstream collapse





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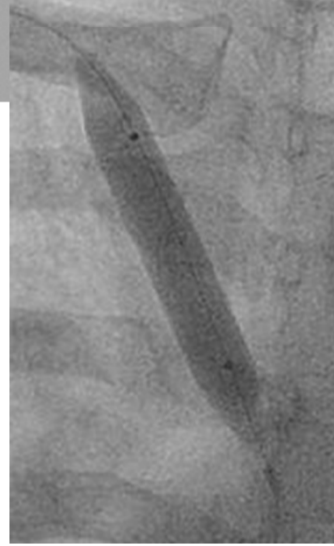
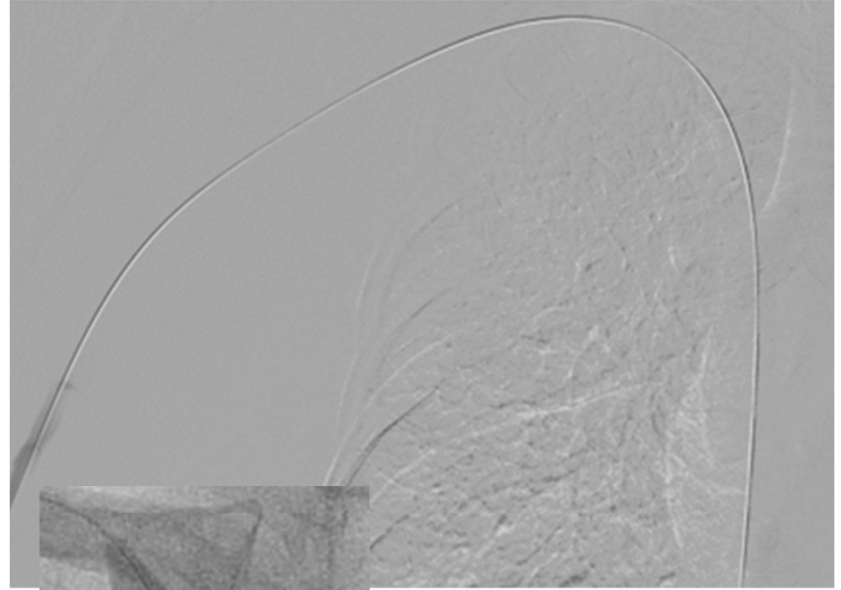
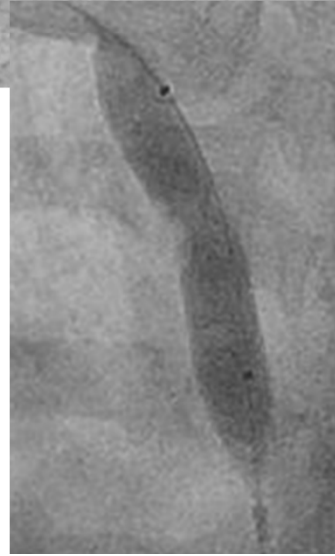
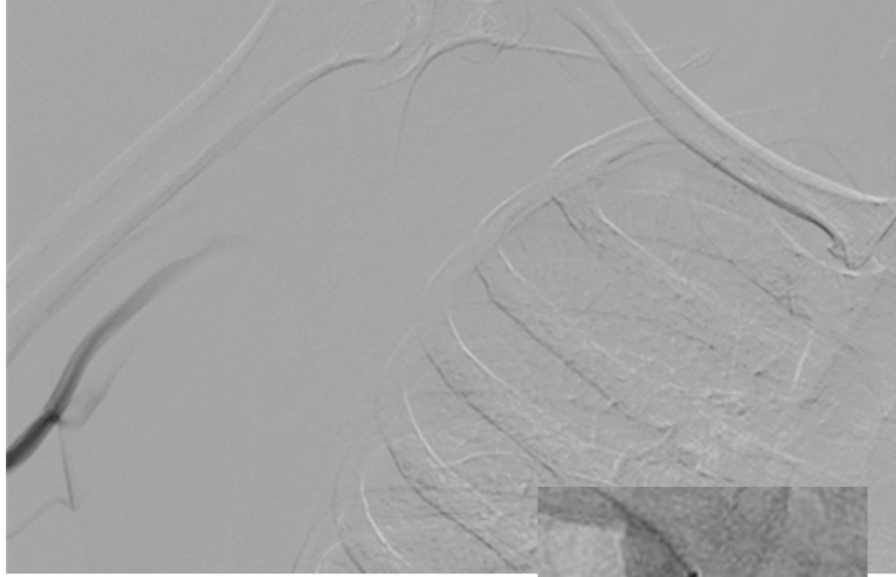
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Cases

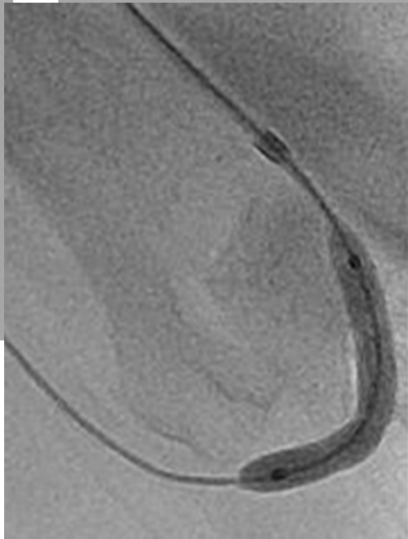
Case 1

- Right brachiocephalic fistula
- Prior right internal jugular dialysis line
- Right arm and mild facial swelling



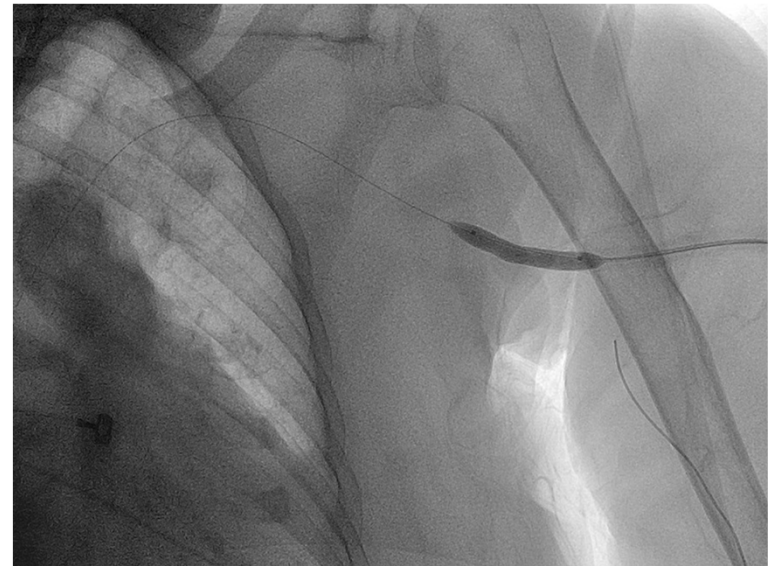
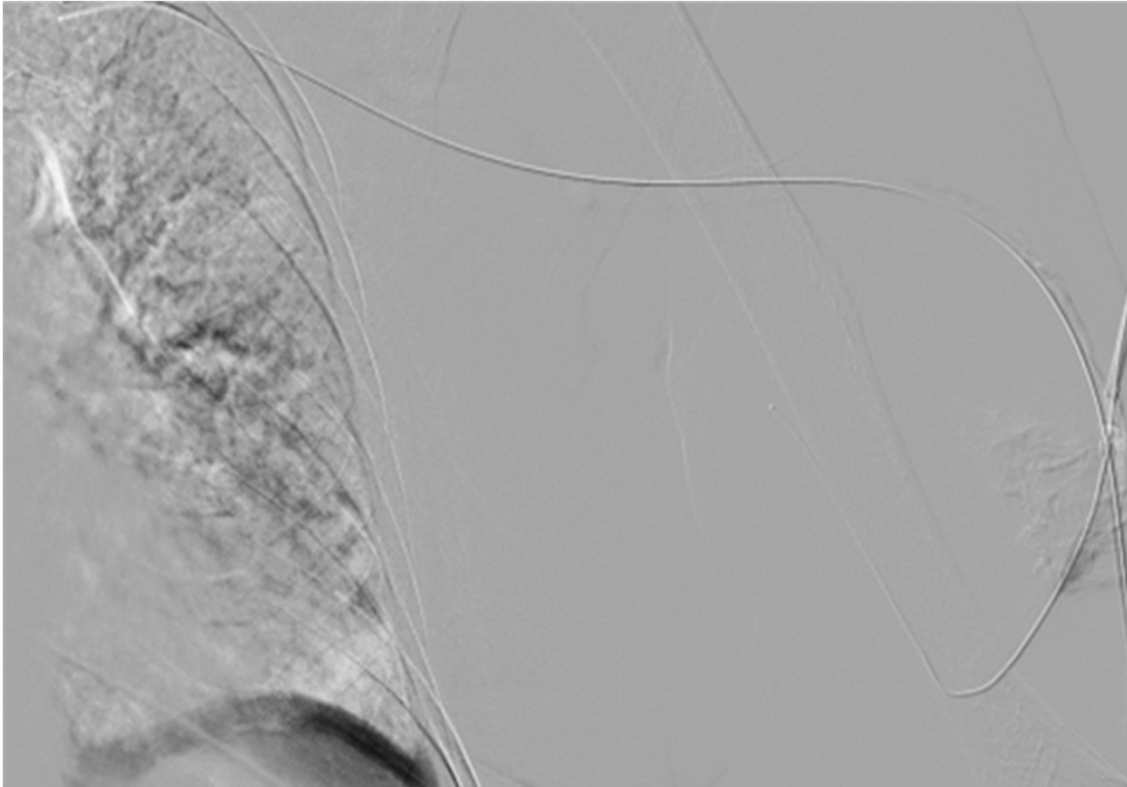
Case 2

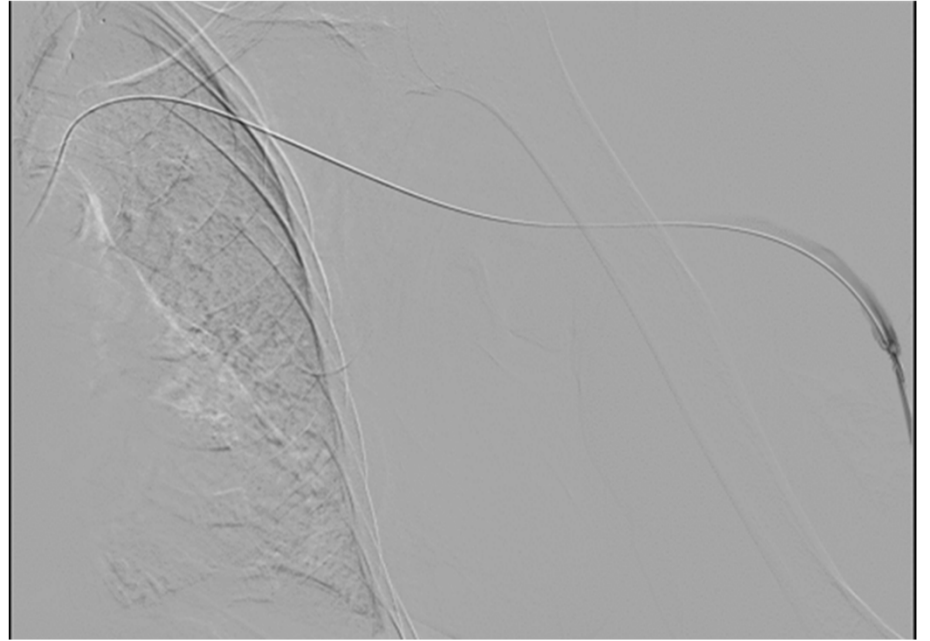
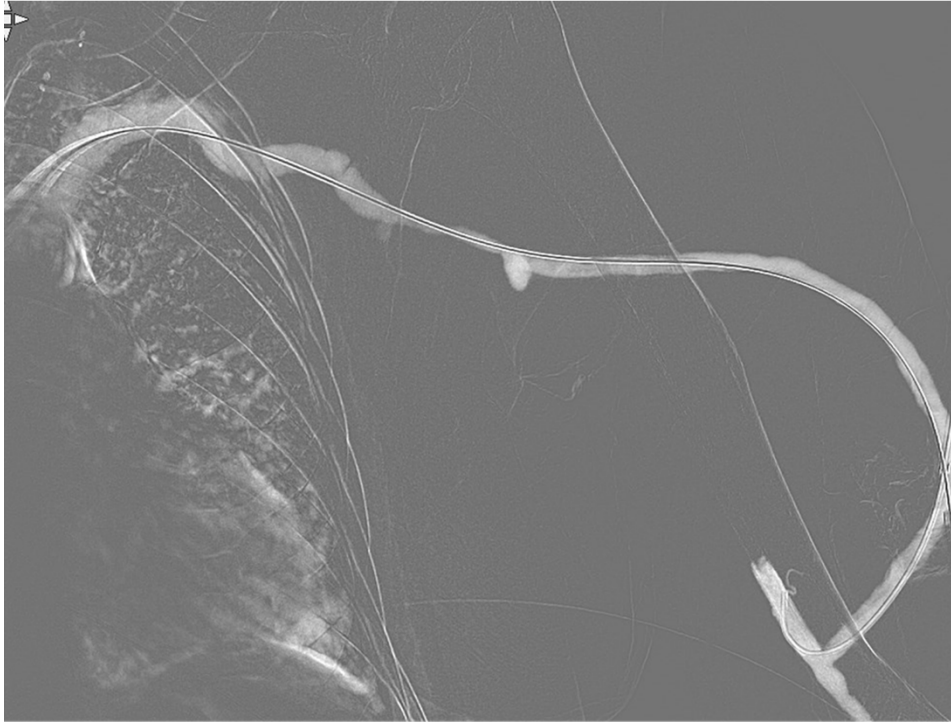
- Left brachiocephalic fistula
- Poor thrill distal to the anastomosis
- Difficult cannulation



Case 3

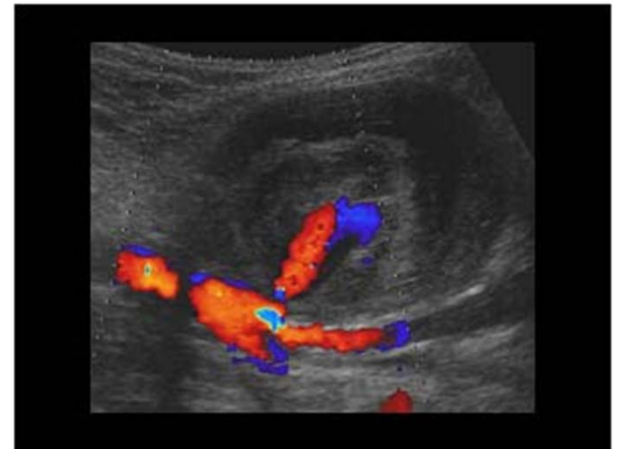
- Left brachiocephalic graft
- No fistula pulse, no flow on ultrasound





Case 4

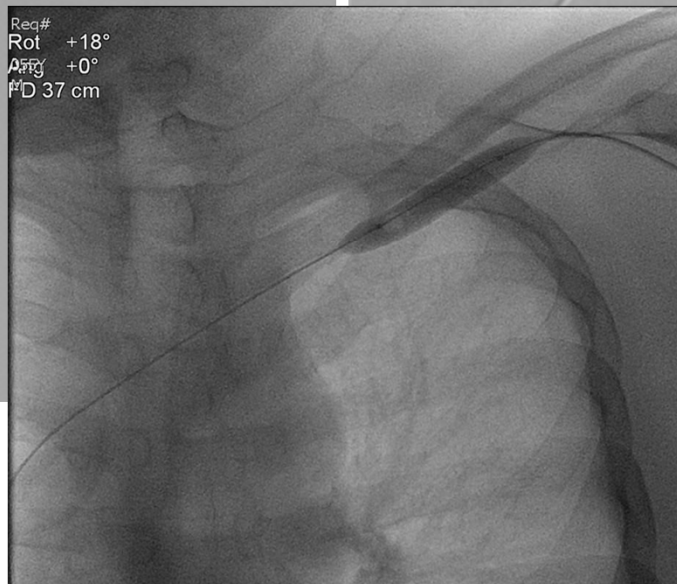
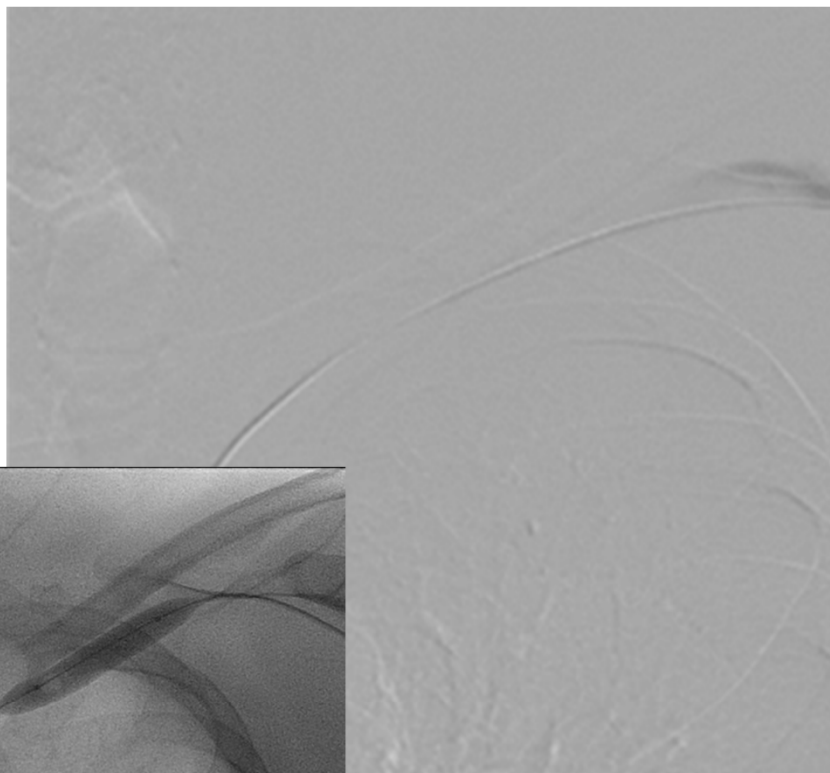
- Left brachiocephalic fistula with a progressively expanding pulsatile mass near a cannulation site

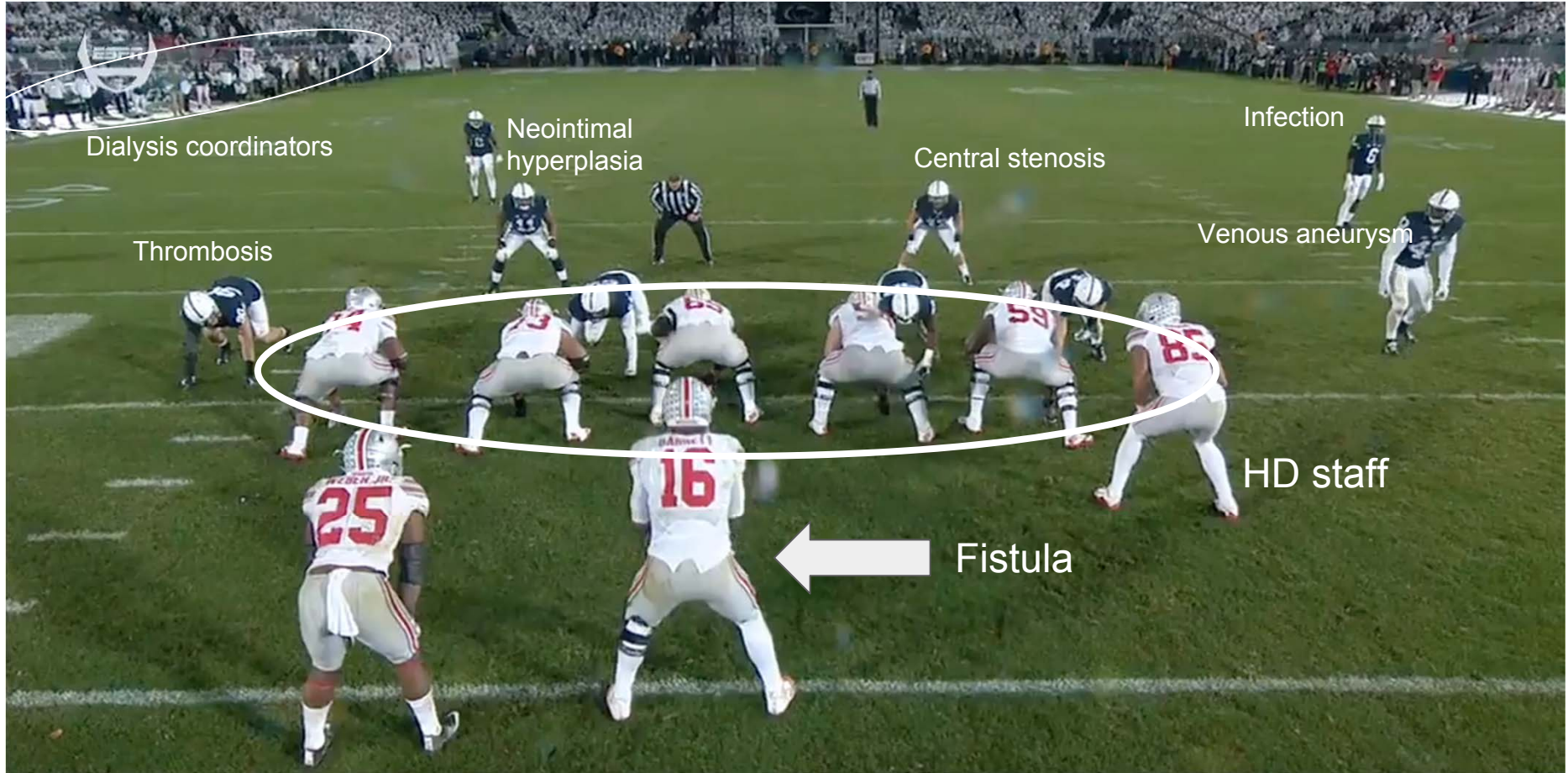




Case 5

- Left brachiocephalic fistula
- High venous pressures and prolonged bleeding with waterhammer pulse





Dialysis coordinators

Neointimal hyperplasia

Central stenosis

Infection

Thrombosis

Venous aneurysm

HD staff

Fistula