Aggressive treatment of hemodialysis vascular

-an interventional radiologist's perspectives

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Vascular access sites interventions

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>200/Month/IR

5~10% Immature AVF

AVF Primary Failure

KDOQI-2019 Update (Clinical Maturation)

Fistula **never becomes usable** for hemodialysis or is abandoned before successful two-needle cannulation at adequate flow or unacceptable outflow pressure.

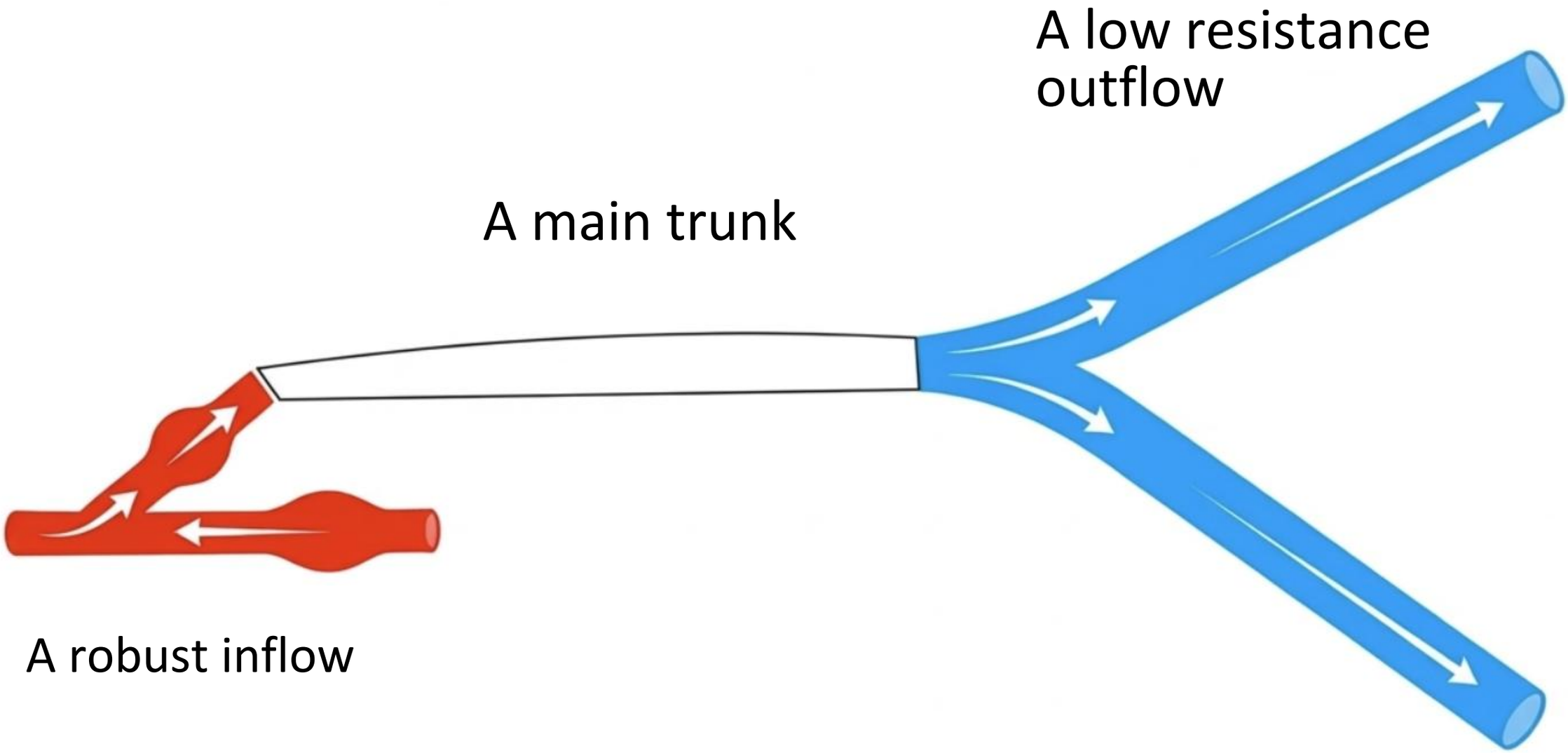
Expect maturation & cannulation feasibility during post-operative 4-6 weeks.

Cannulation readiness hinges on expert clinical assessment (look/feel/bruit/thrill), not rigid "rule-of-6s"-style thresholds.

Maturation in All Three Dimensions

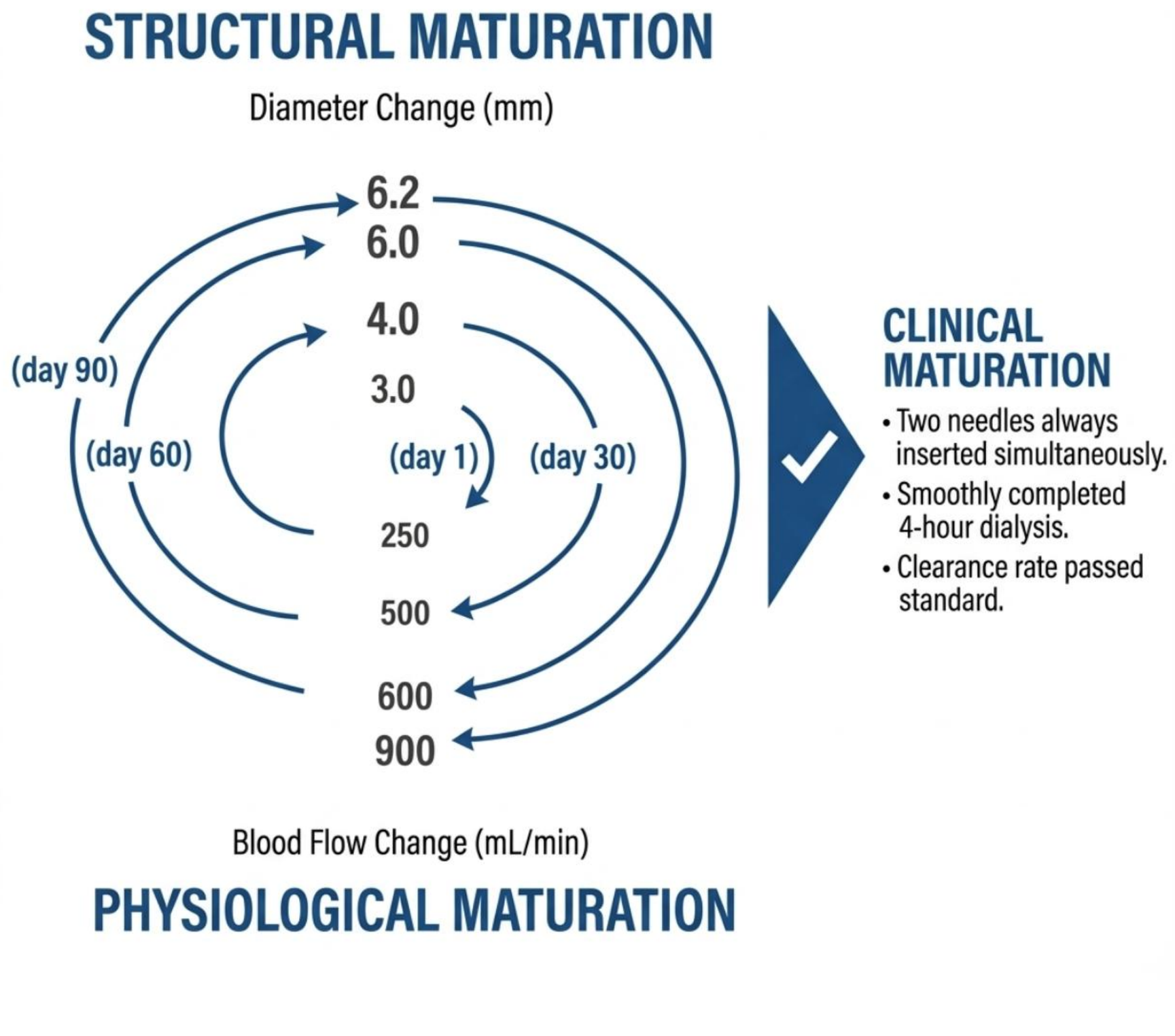
- **Clinical** KDOQI 2019 UPDATE
  - **Functional Success**
  - Successful 2-needle cannulation
  - Sustains prescribed Qb
  - Normal venous pressure
- **Anatomic**
  - **A straight main trunk**
  - Two separate segments of >4cm
  - Vessel depth: <6 mm
- **Physiological**
  - **High Blood Flow**
  - Strong pulsation over the arterial needling site
  - Low outflow resistance (Soft pulse with thrill)

Treatment goal for immature AVF



Flow begets size, and size begets flow

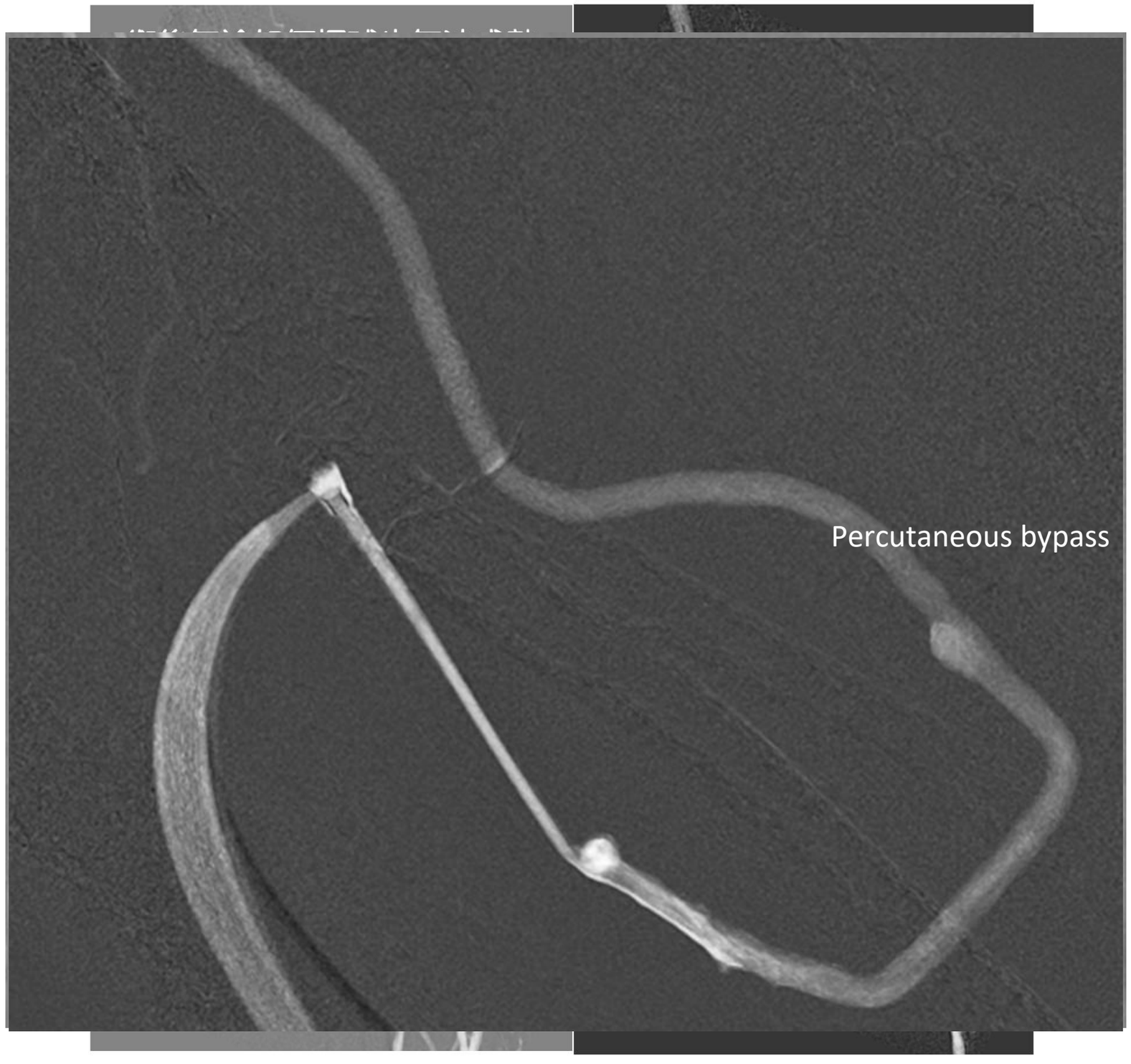
A continuous spiral of mutual reinforcement



Anatomical Lesions leading to primary failure

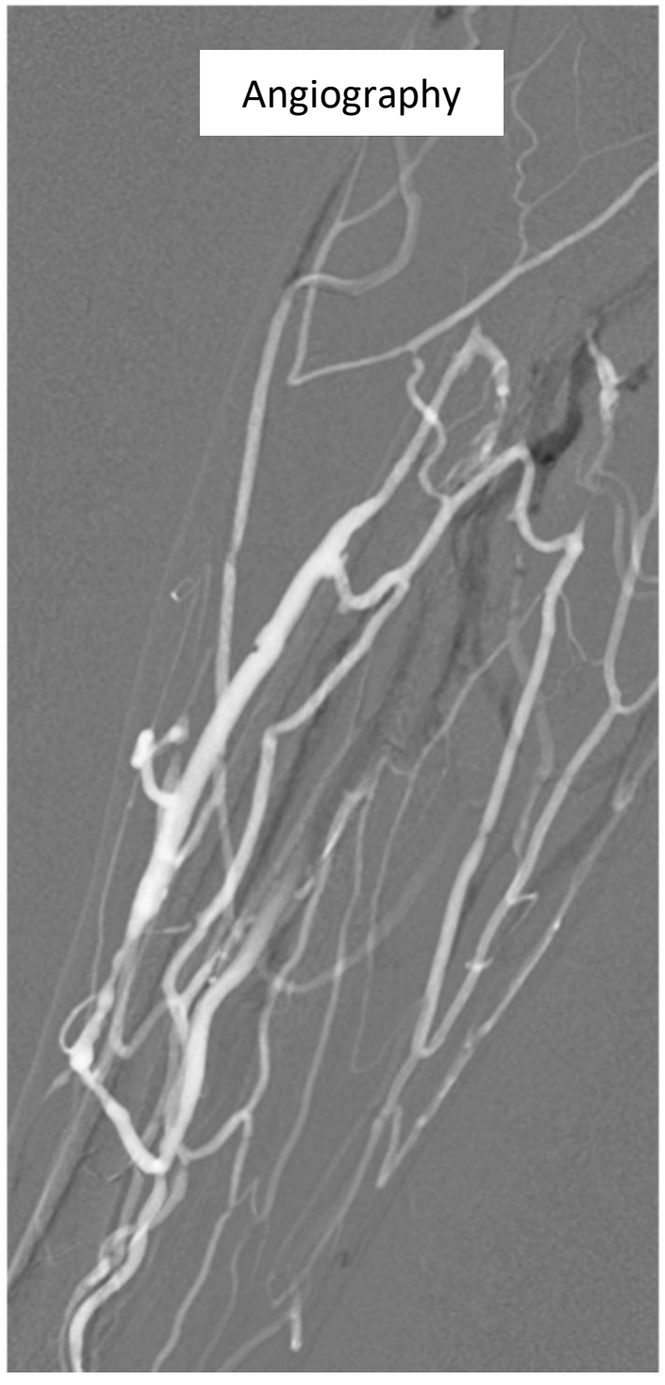
- Stenosis
- Acute/subacute thrombosis
- Fibrosis/obliteration/chronic thrombosis
- No visible vessel under ultrasound

Four levels of VA Treatment for anatomic lesions leading to immaturity

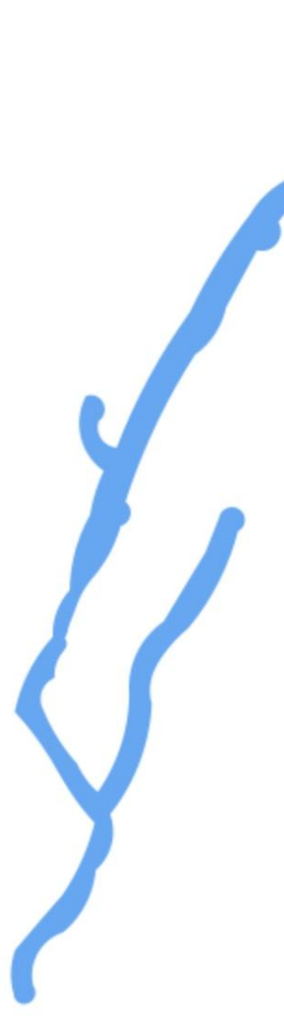


Only segments with good elasticity engorged over time

Incomplete main trunk

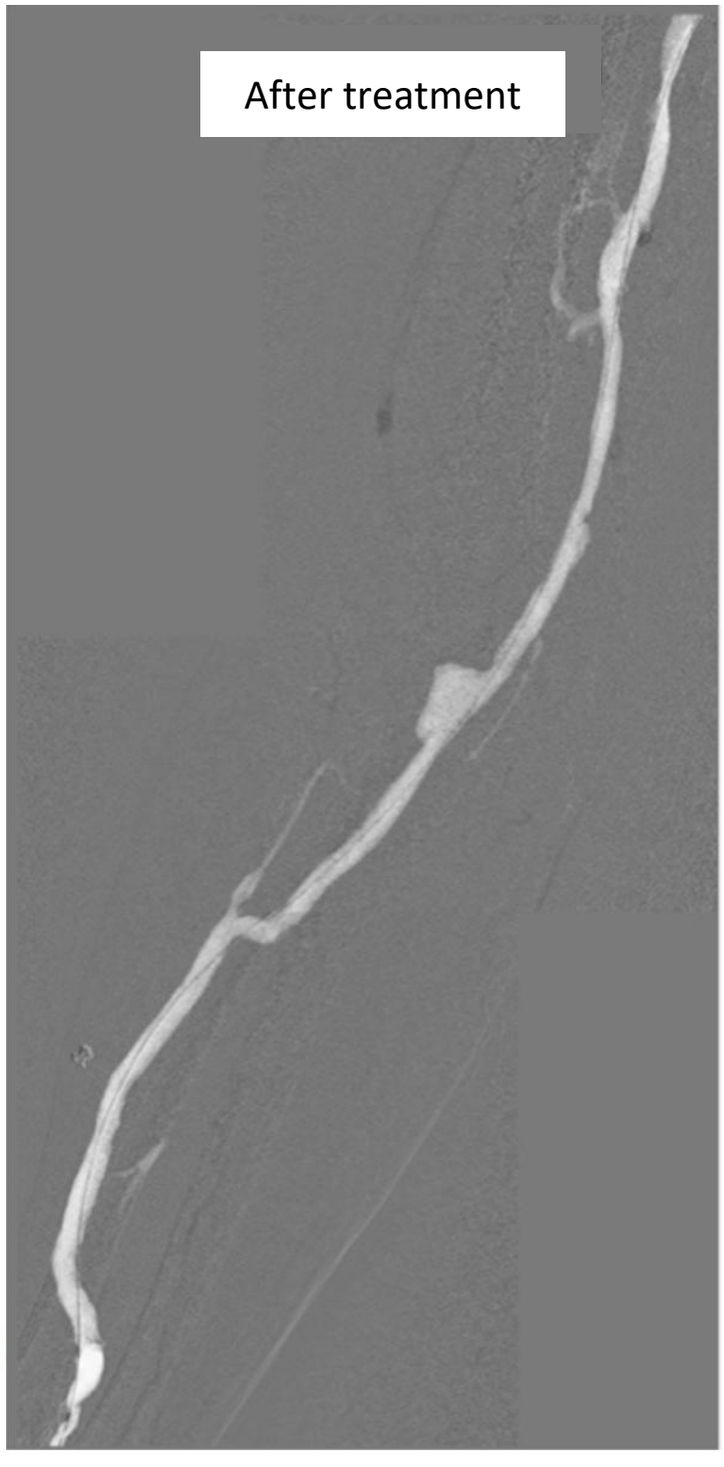


Simplified AVF illustration



Stenosiis

A straight main trunk



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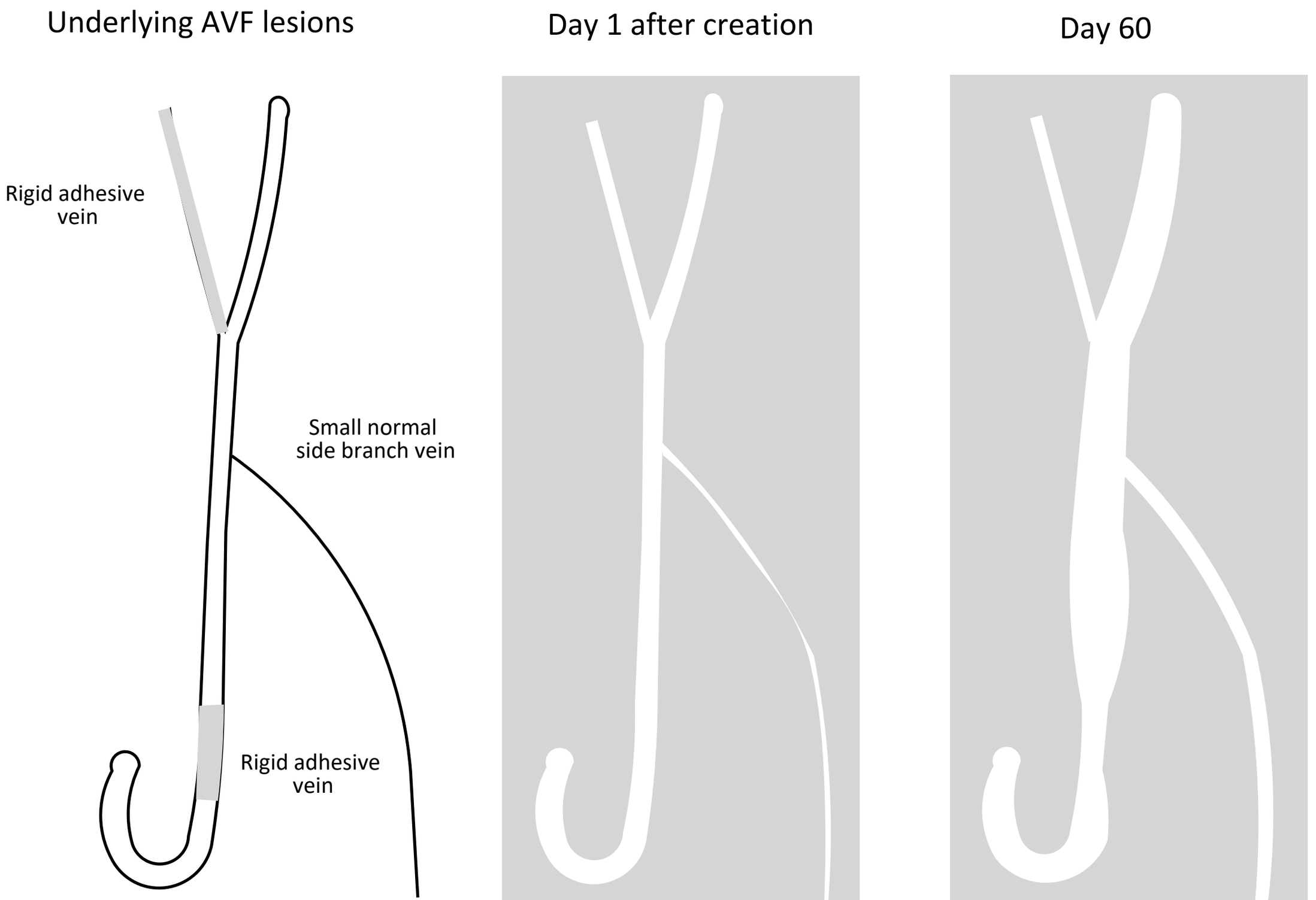
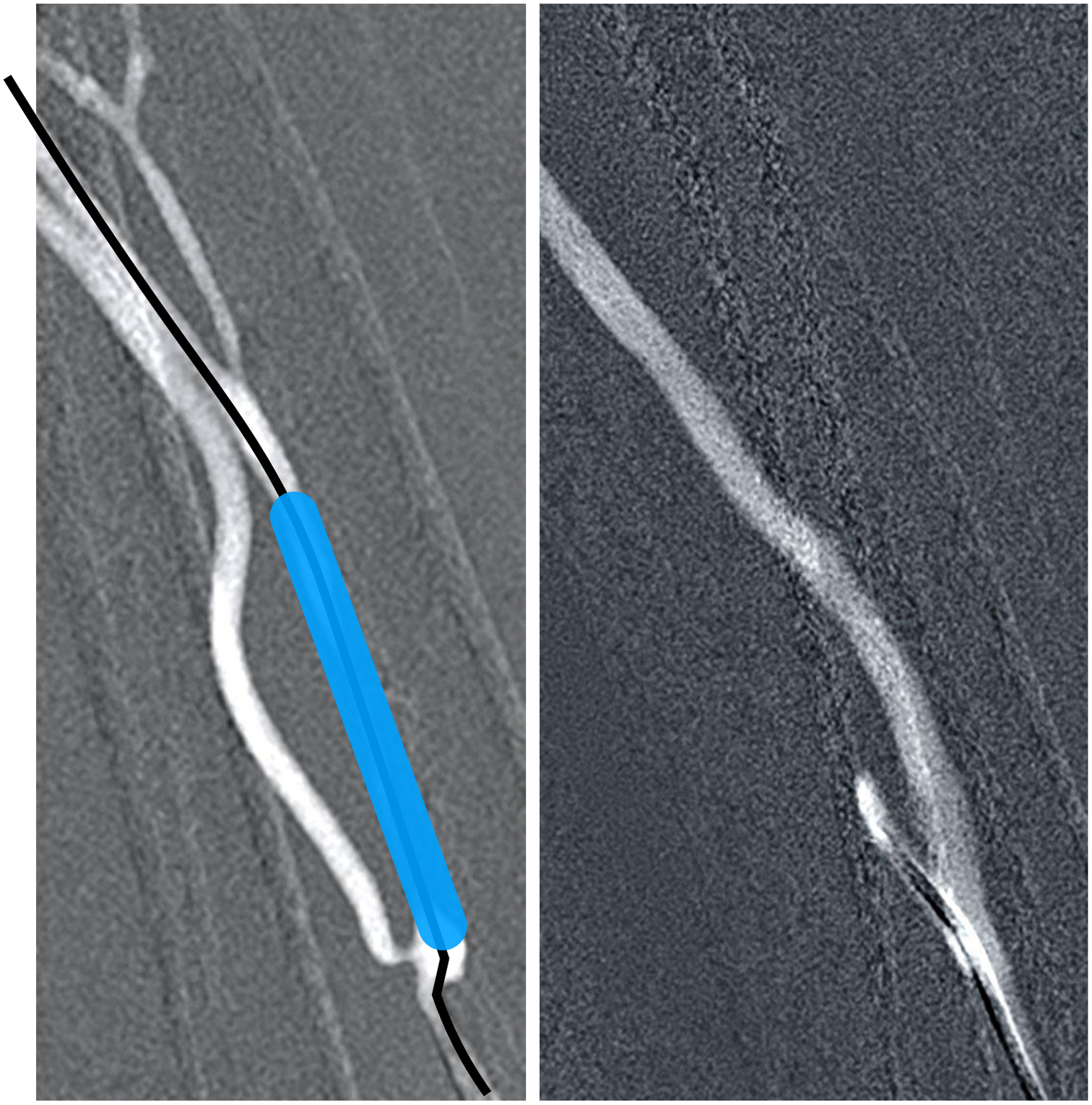
Only segments with good elasticity engorged over time

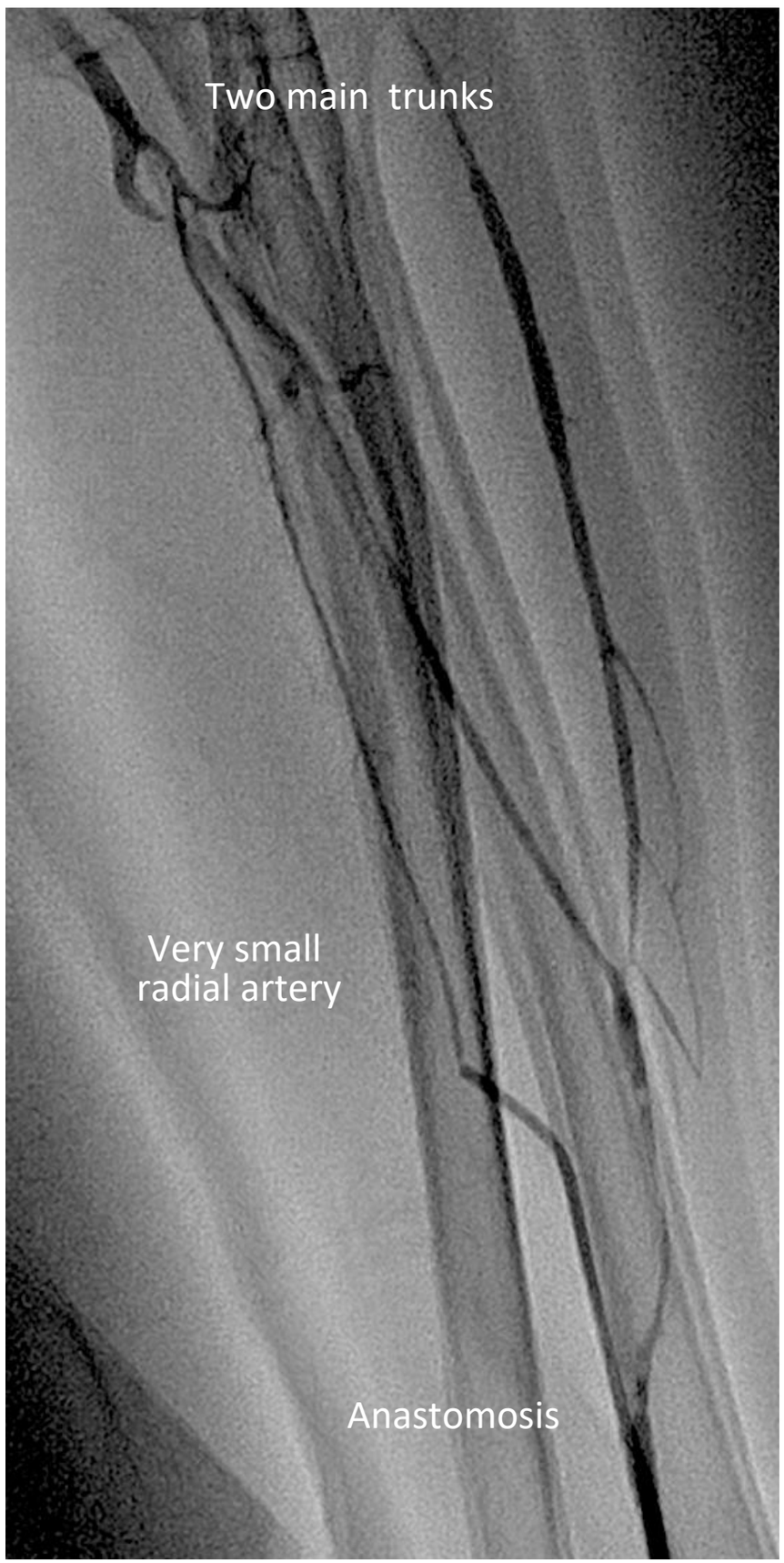


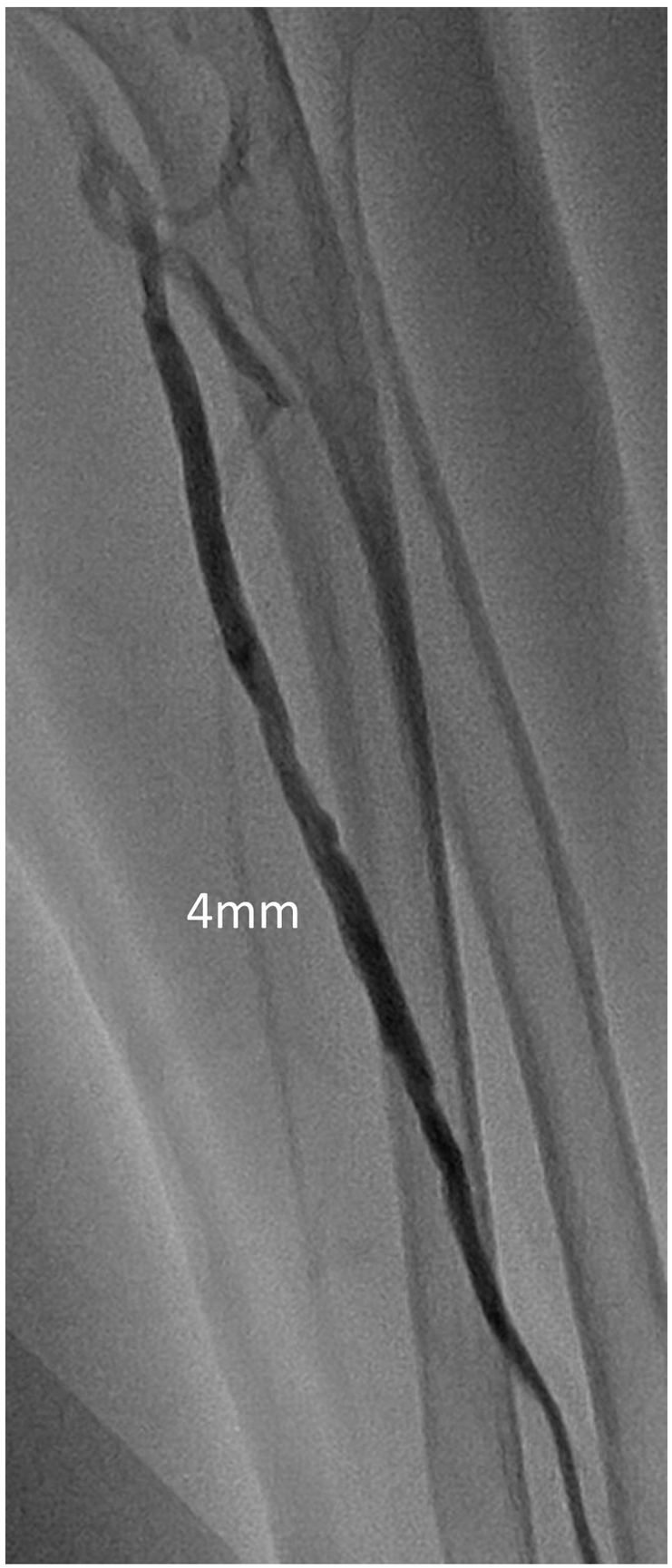
Stenosis-1

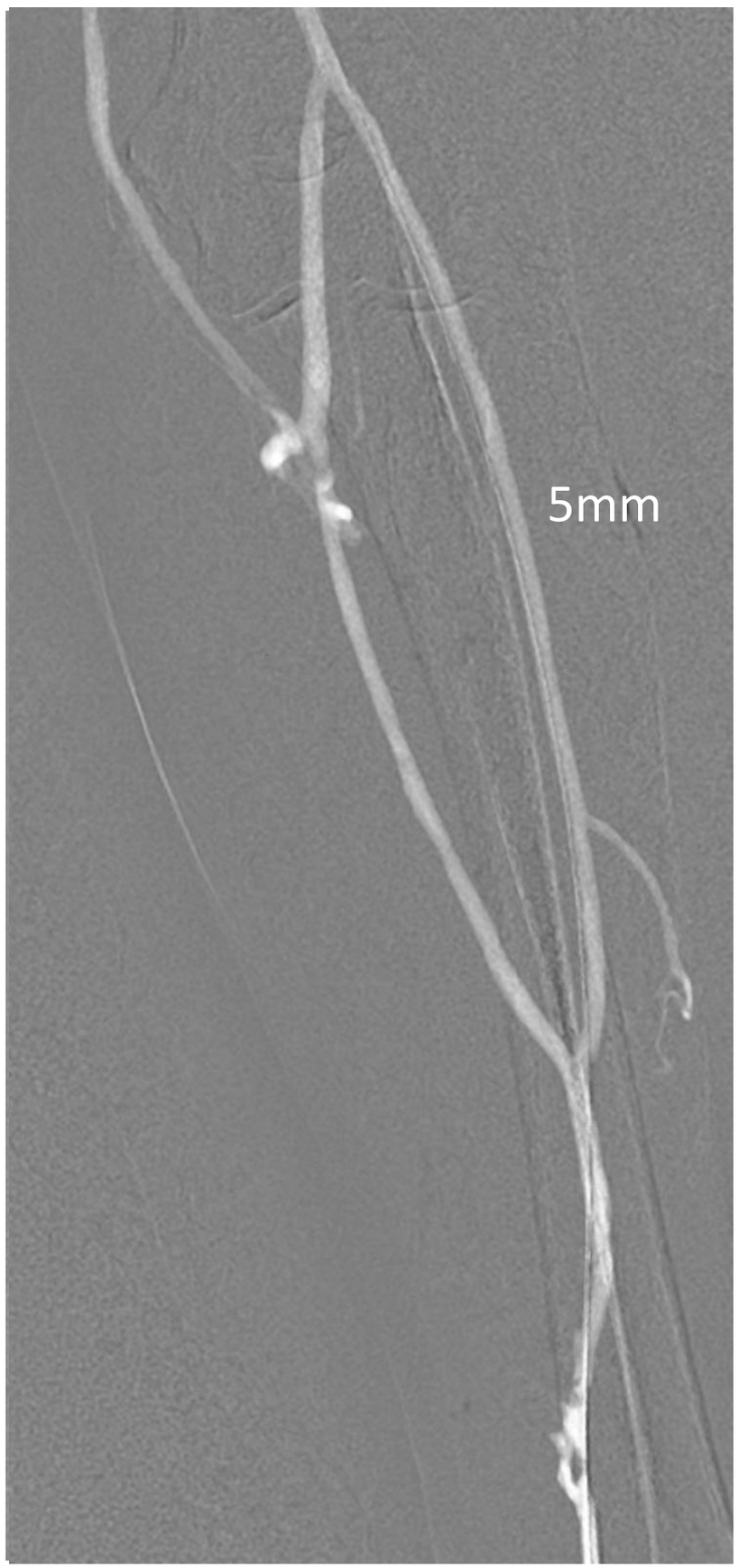
Balloon dilatation for stenosis (Level 1)



Stenosis-2


Two main trunks
Very small
radial artery
Anastomosis

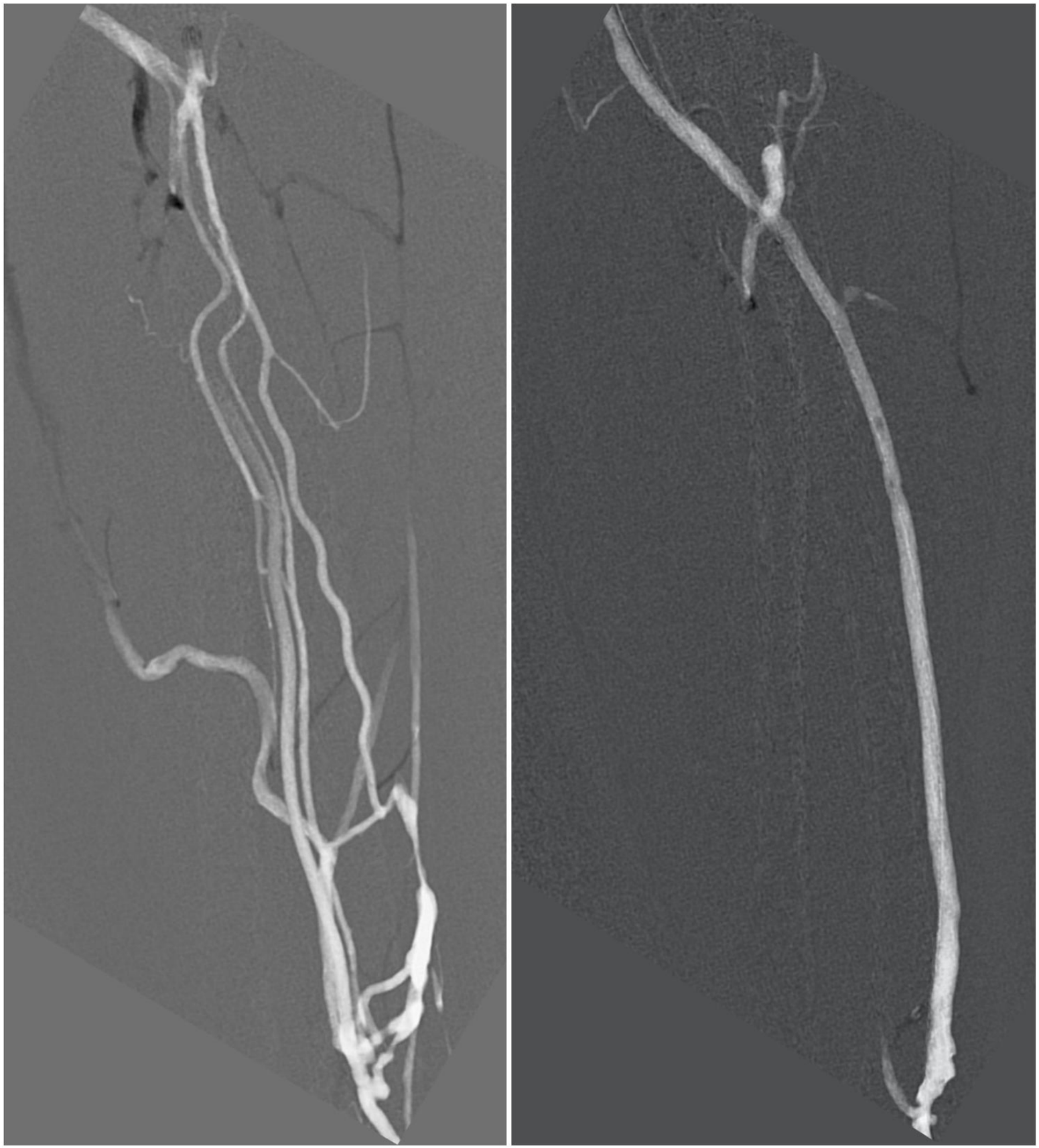

4mm

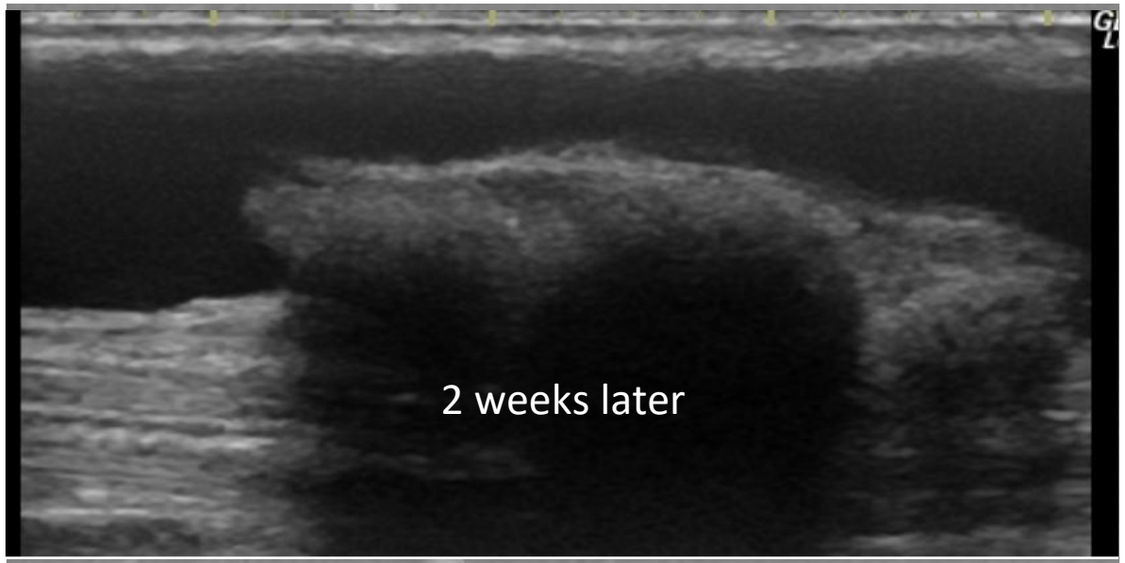

5mm

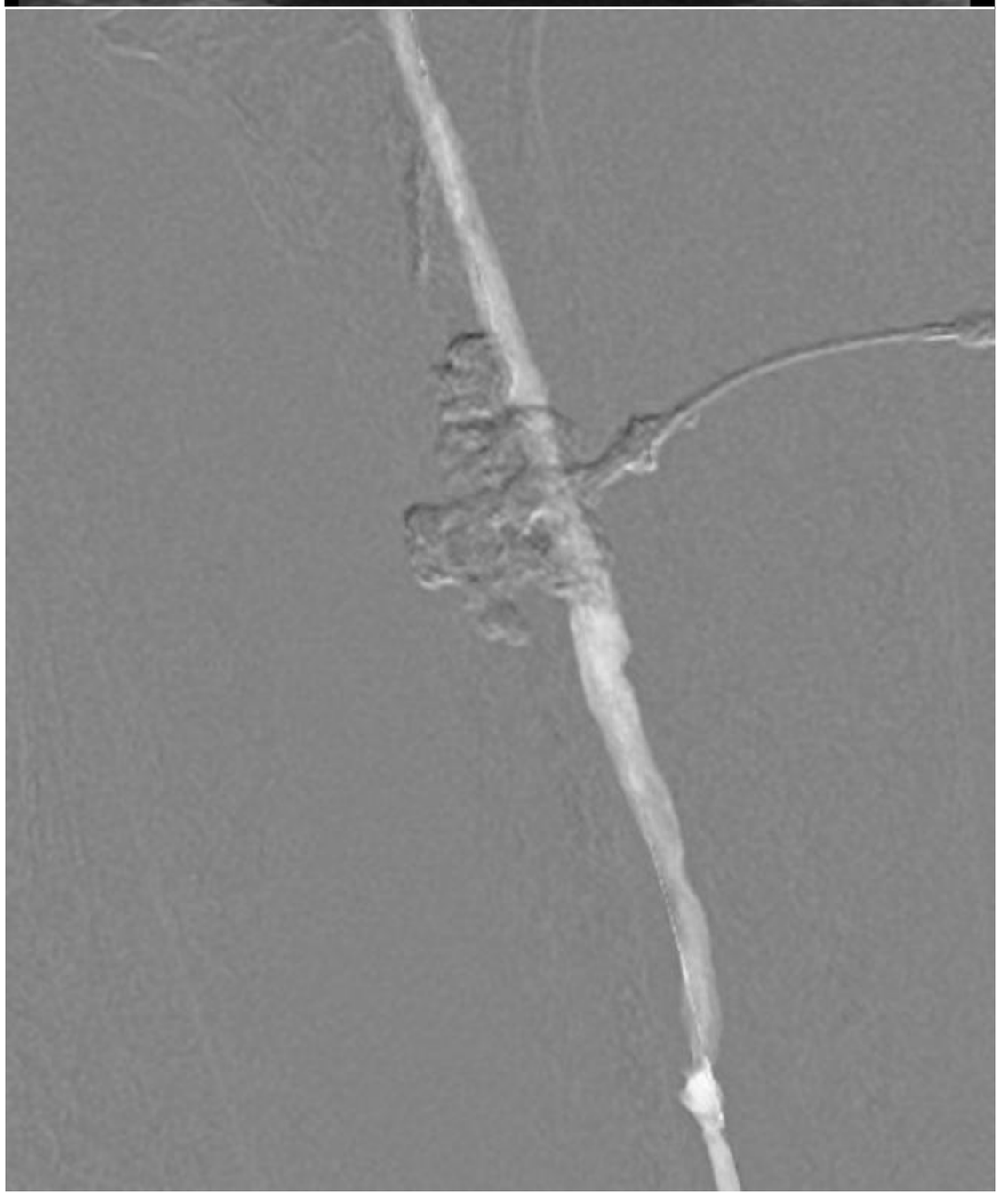

AVF rested for 2 weeks

Level 3 technique for fibrosis/chronic occlusion

Catheter-directed wiring for recanalization



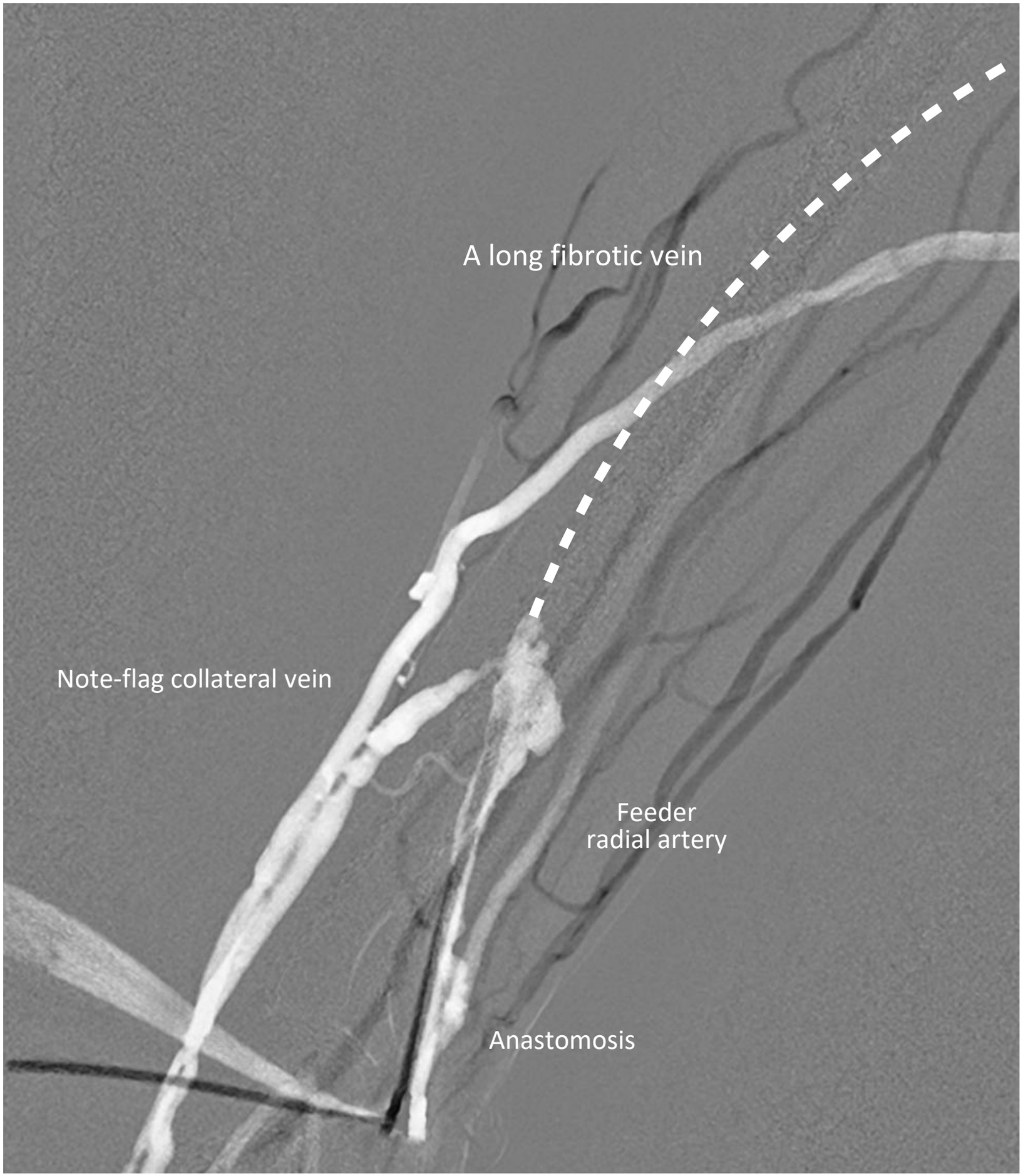

2 weeks later



Remodeling AVF for Deformities

Eighth note

Caput medusa


A long fibrotic vein
Note-flag collateral vein
Feeder
radial artery
Anastomosis

Level 3 Recanalization of the fibrotic lesion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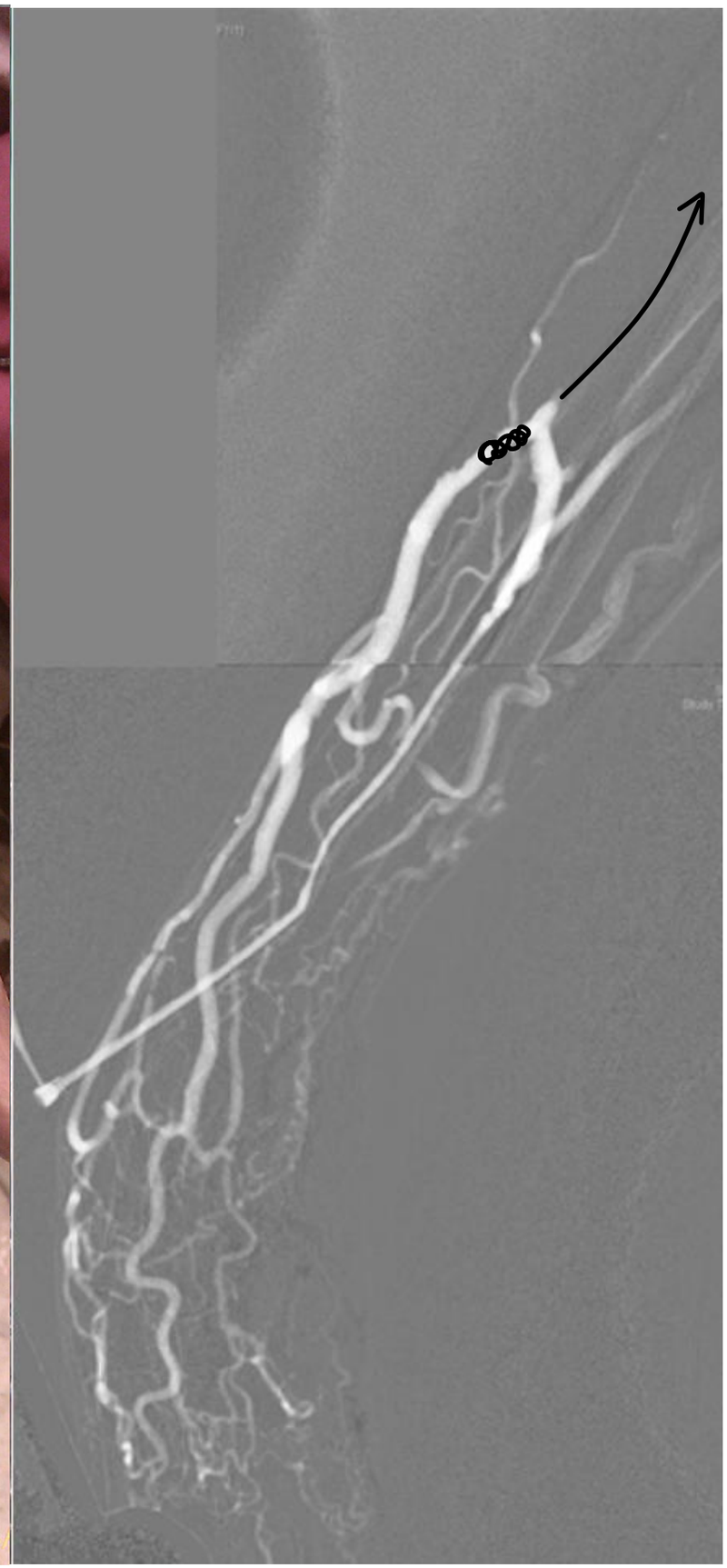
Eighth note deformity with peripheral venous hypertension

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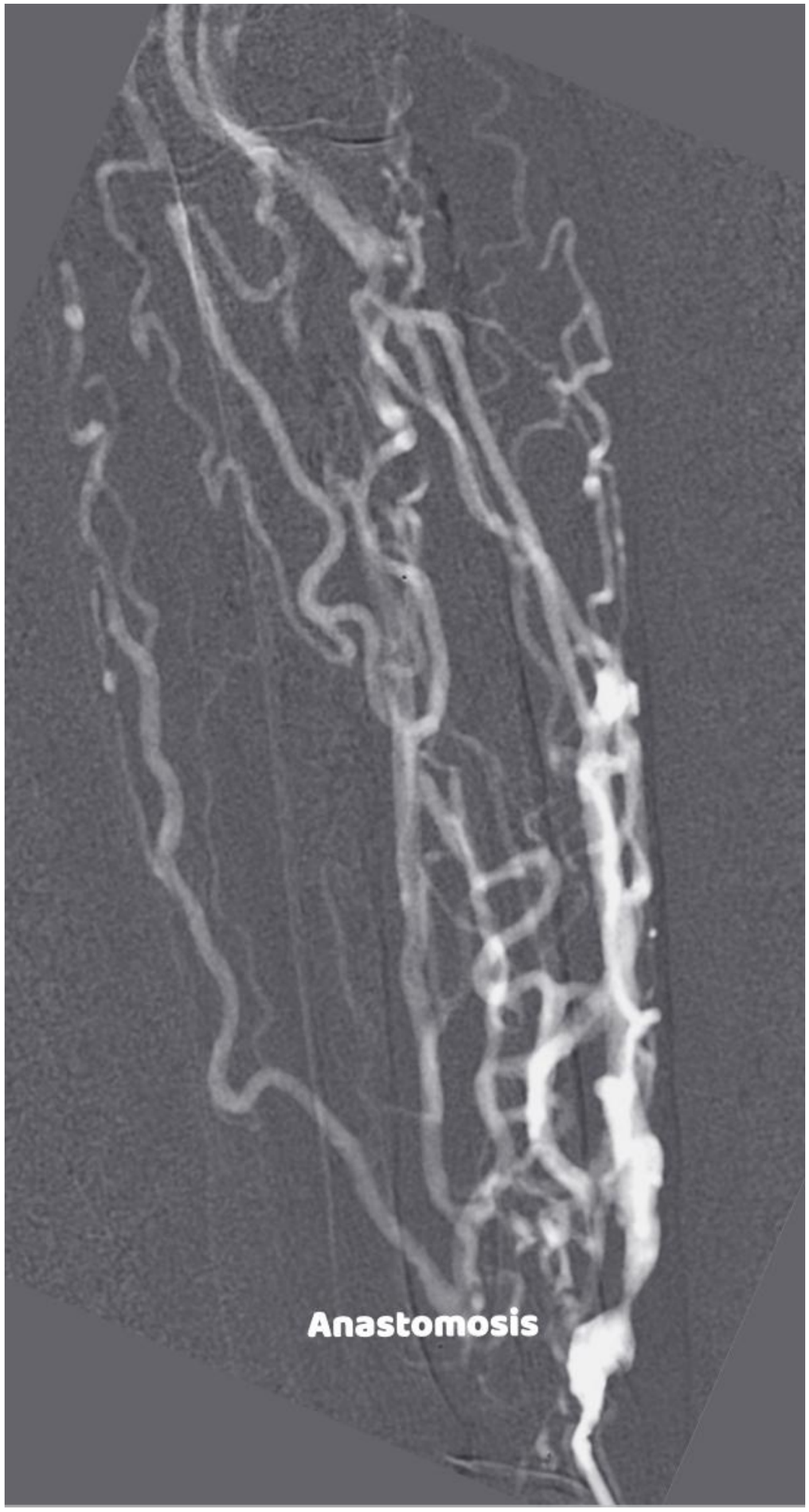
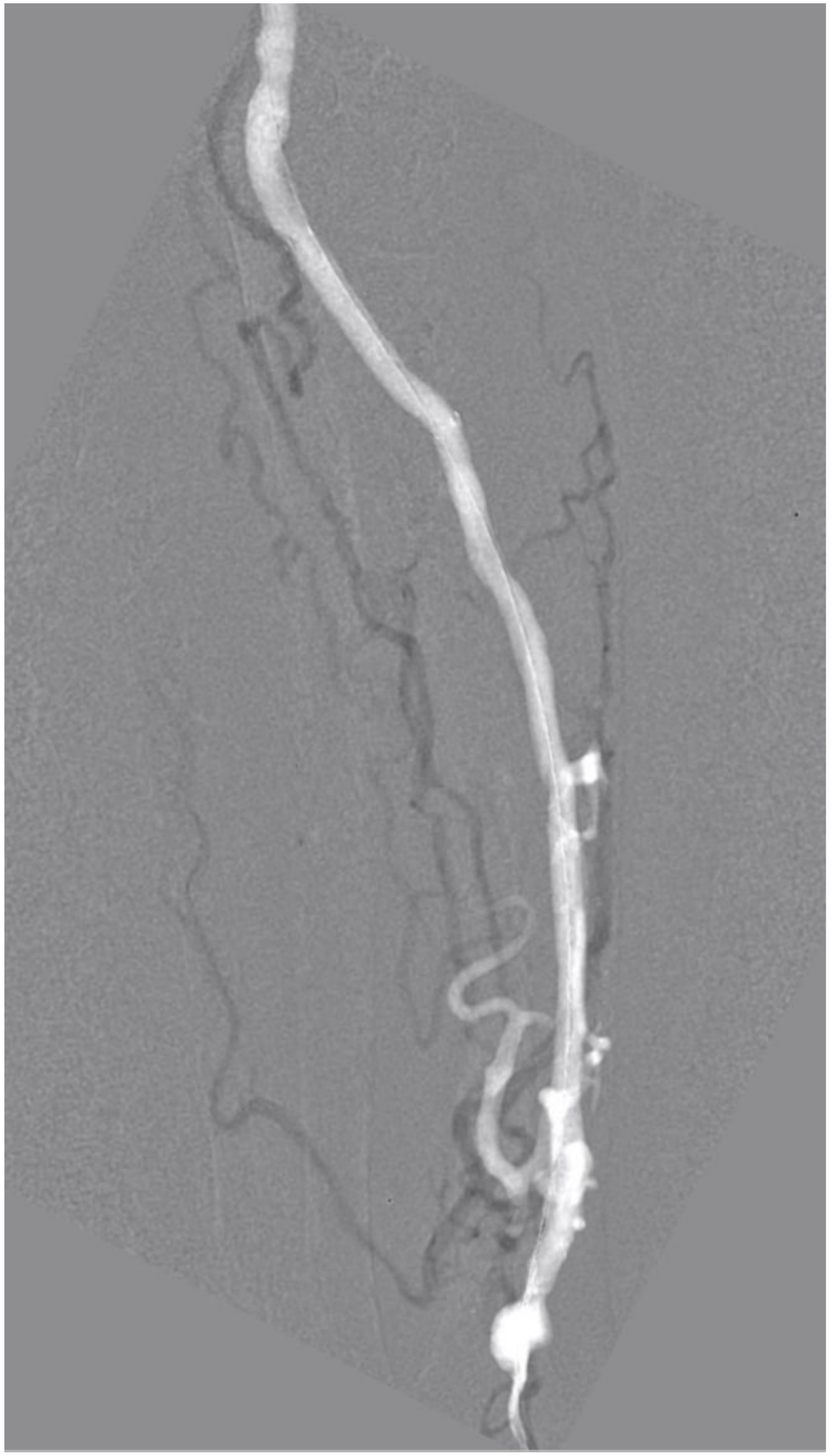
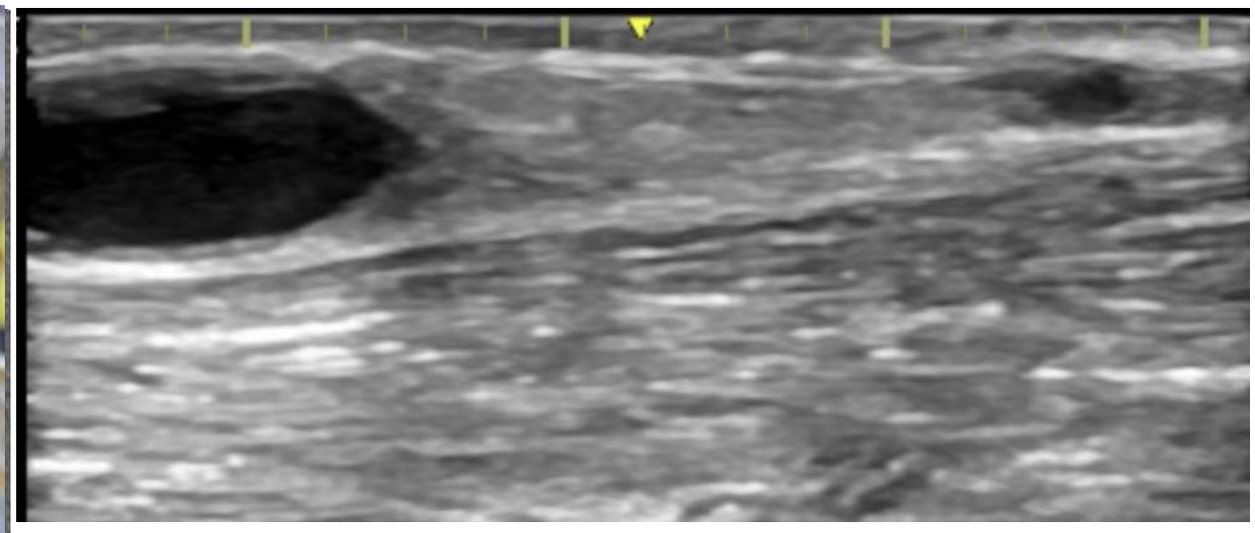
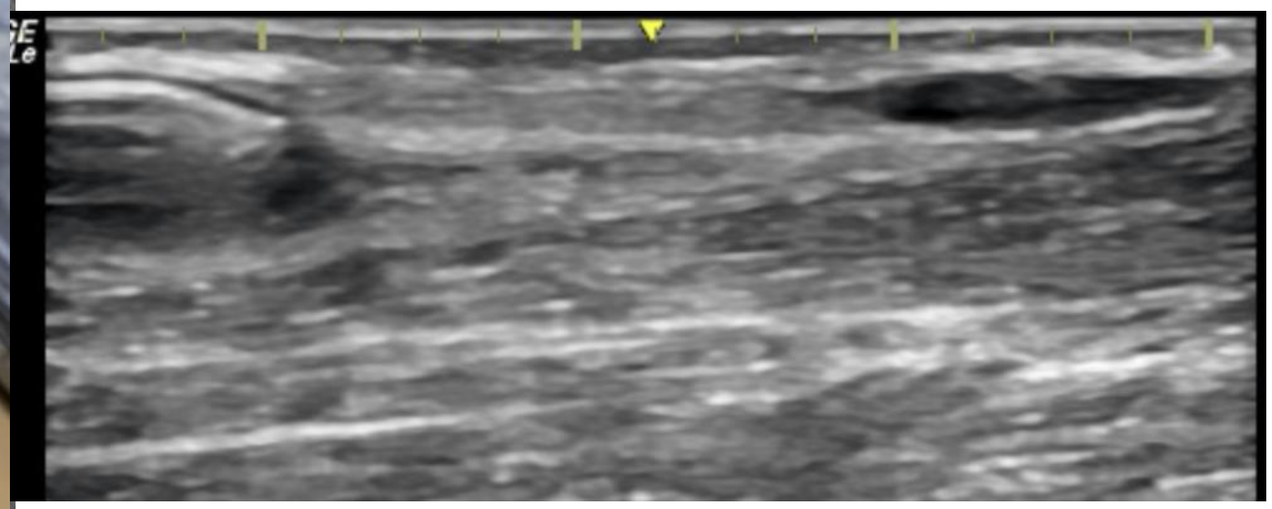
One-step inter vascular tunnel creation with stent graft insertion (Level 4)

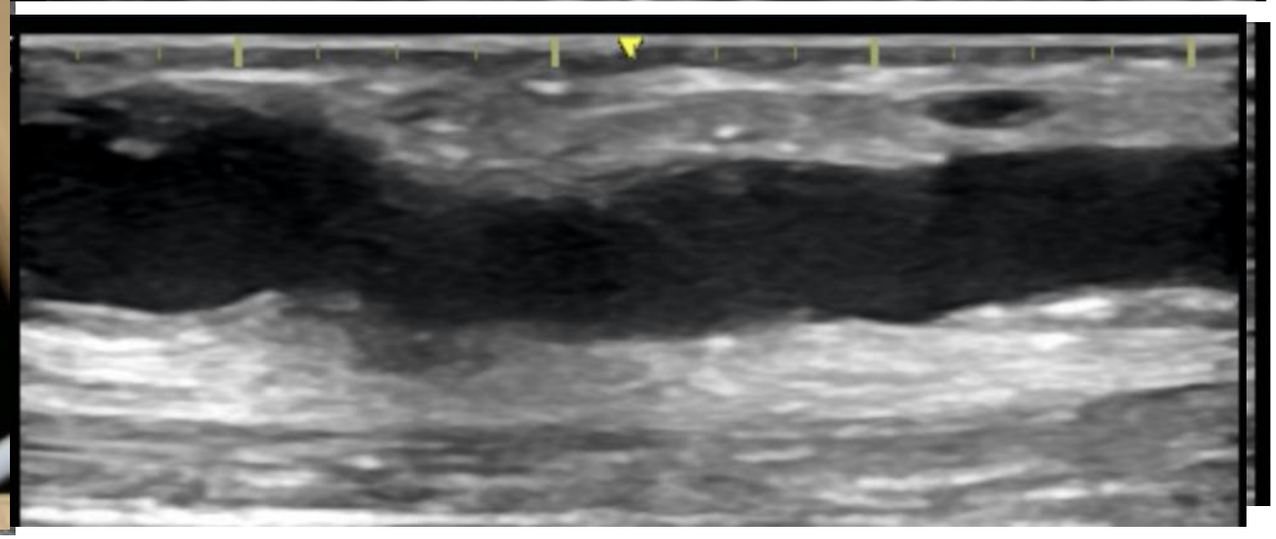

Anastomosis



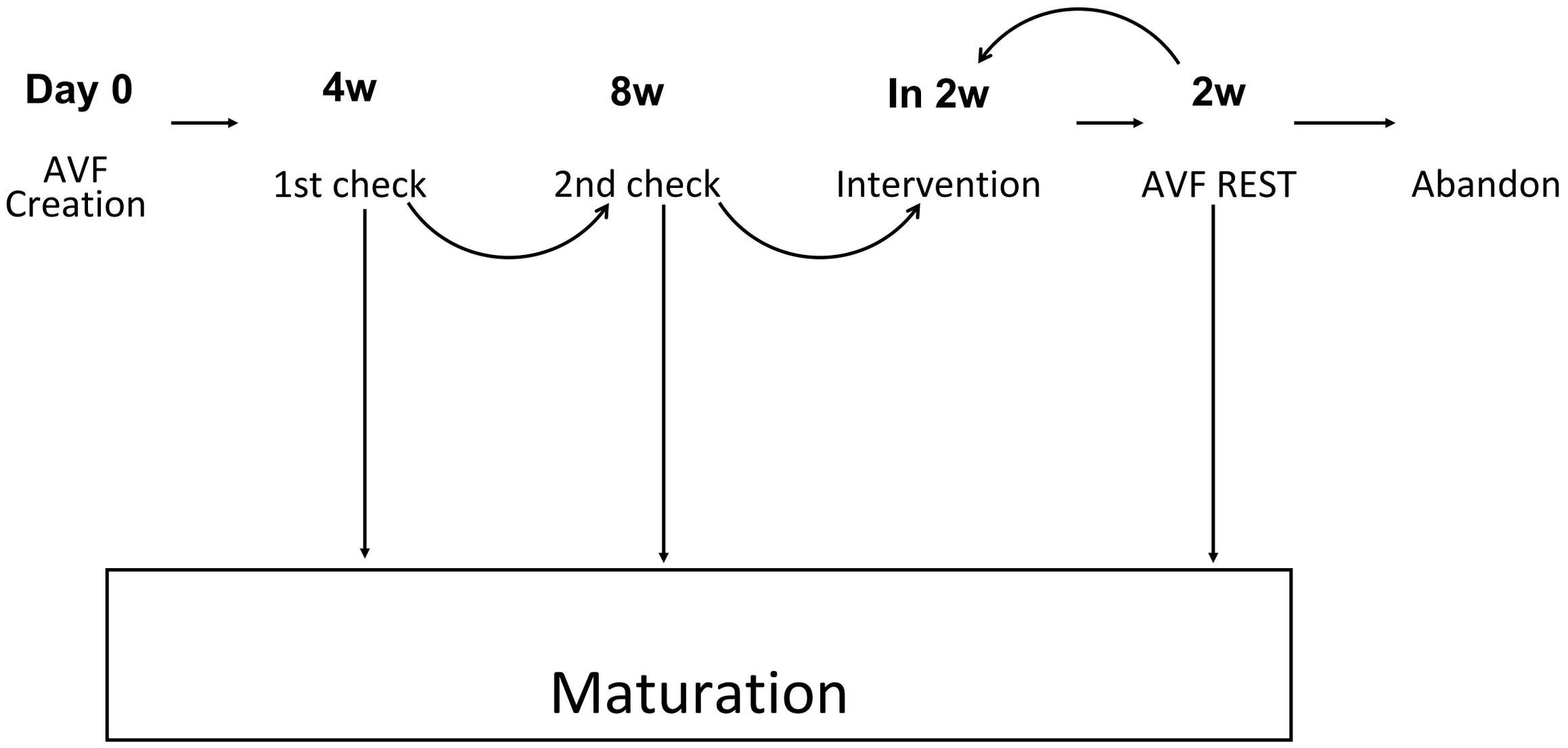
Bare intervascular bypass without stent graft (level 4)







Maturation timetable



Endovascular Salvage of Immature Autogenous Hemodialysis Fistulas: Study Results

Citation: Liang H-L, et al. *Cardiovasc Intervent Radiol*. 2014;37:1209–1216.

Immature AVF Types & Treatment (N=58)

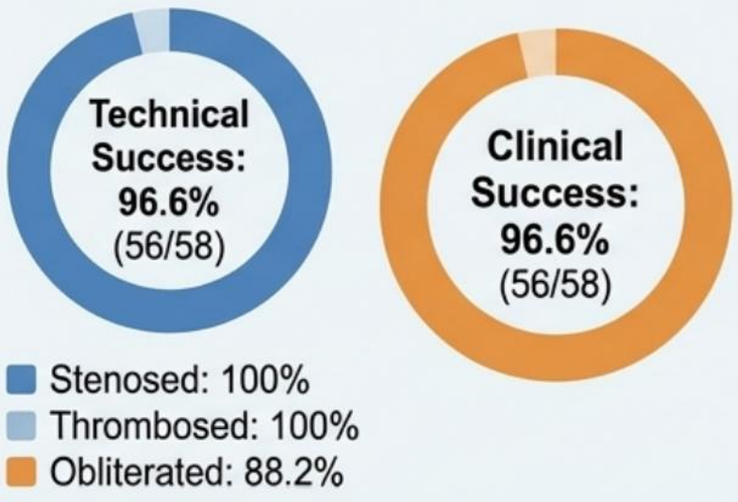
Stenosed (n=29, 50%)

Thrombosed (n=12, 20.7%)

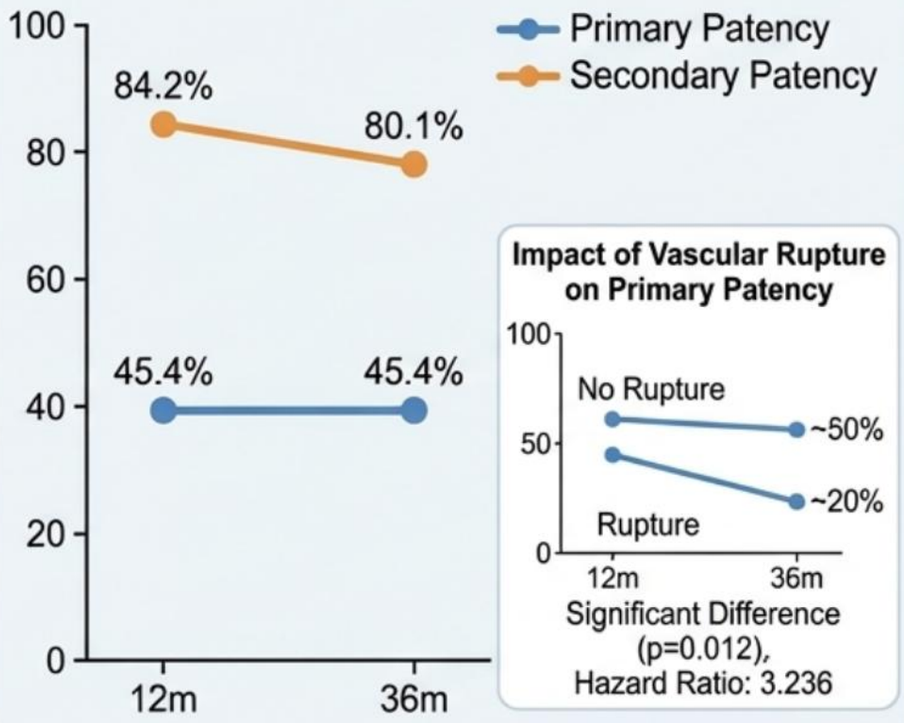
Obliterated (n=17, 29.3%)

→ Percutaneous Angioplasty (PTA)

Immediate Treatment Outcomes



Long-Term Patency Rates (%)



Impact of Vascular Rupture on Primary Patency

Significant Difference (p=0.012), Hazard Ratio: 3.236

Complications & Predictors

Vascular Rupture: 12.1% (7/58)

→ Predictive of Shorter Primary Patency

No Significant Difference in Patency:

- Between 3 Lesion Types (p=0.075, 0.093)
- With/Without Residual Side Branches (p=0.527, 0.644)

Key Conclusion

PTA effectively prolongs immature AVF lifetime with high technical success. Long-term secondary patency is acceptable, but vascular rupture is a significant predictor of poor primary patency.

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Official Line Account