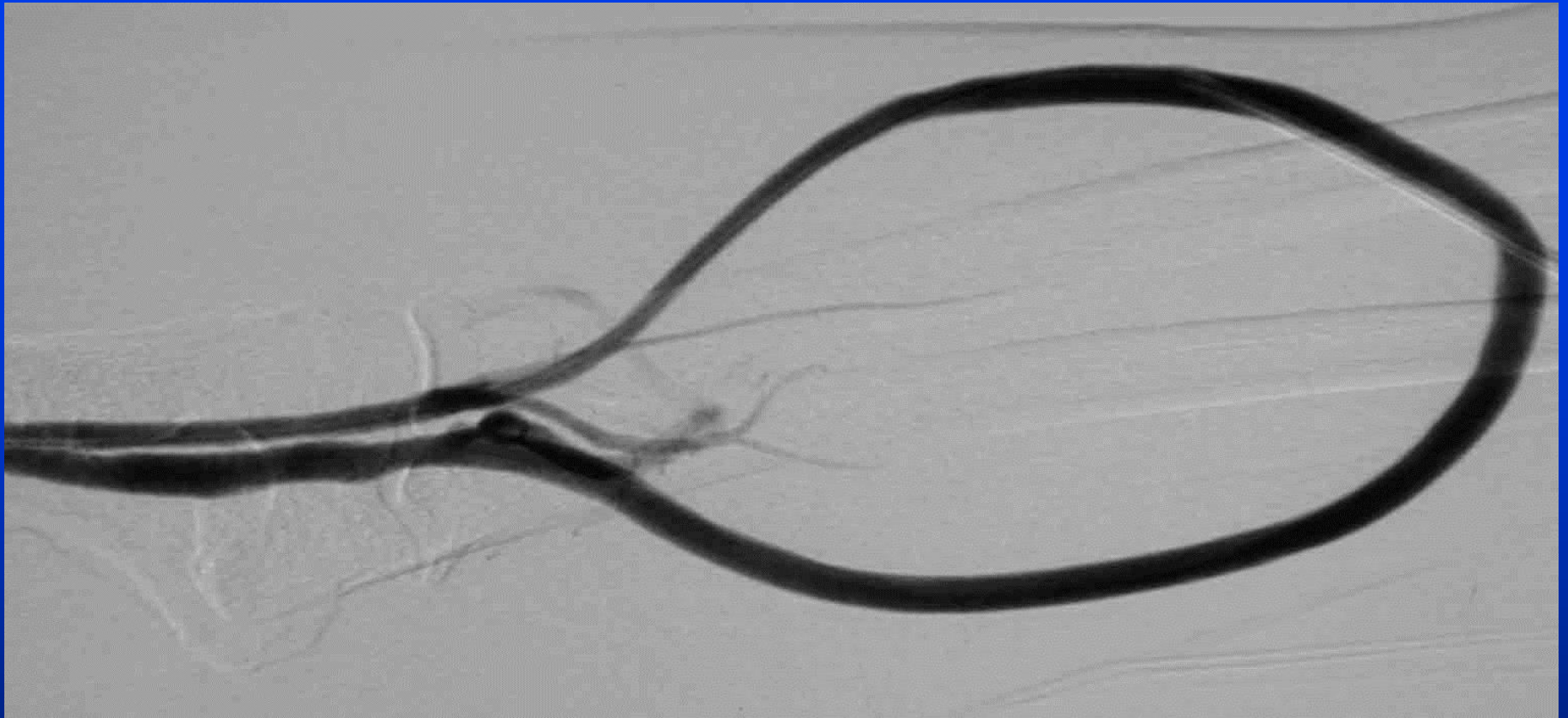


- Case 1-Declot not
- Case 2-Immature fistula
- Case 3-Curious catheter
- Case 4-Frightening fistula
- Case 5-CVS catastrophe
- Case 6-Frightening fistula 2
- Case 7-Bleeding BVT
- Case 8-Clotted new graft
- Case 9-PA in UA fistula
- Case 10-Bleeding CSL
- Case 11-SG in CSL
- Case 12-Graft blowout (long)
- Case 13-Graft w friends
- Case 14-Cold hand
- Case 15-Poor flow (long)
- Case 16-Bumpy BVT
- Case 17-Swollen hand
- Case 18-“A little pregnant”
- Case 19-Steal
- Case 20-Arch rival
- Case 21-Arch enemy
- Case 22-Declot plus
- Case 23-Declot plus 2
- Case 24-Immature fistula 2
- Case 25-Immature fistula 3
- Case 26-This is US

Case 1

- Called regarding pt known to IR
- LUA graft (tapered as are all in Philly)
- ~6 months old
- Has had two prior visits for “declot” each time found to be patent and “VOS” PTA
- Third call in as many months:
 - “clotted”
 - Pt c/o steal sx



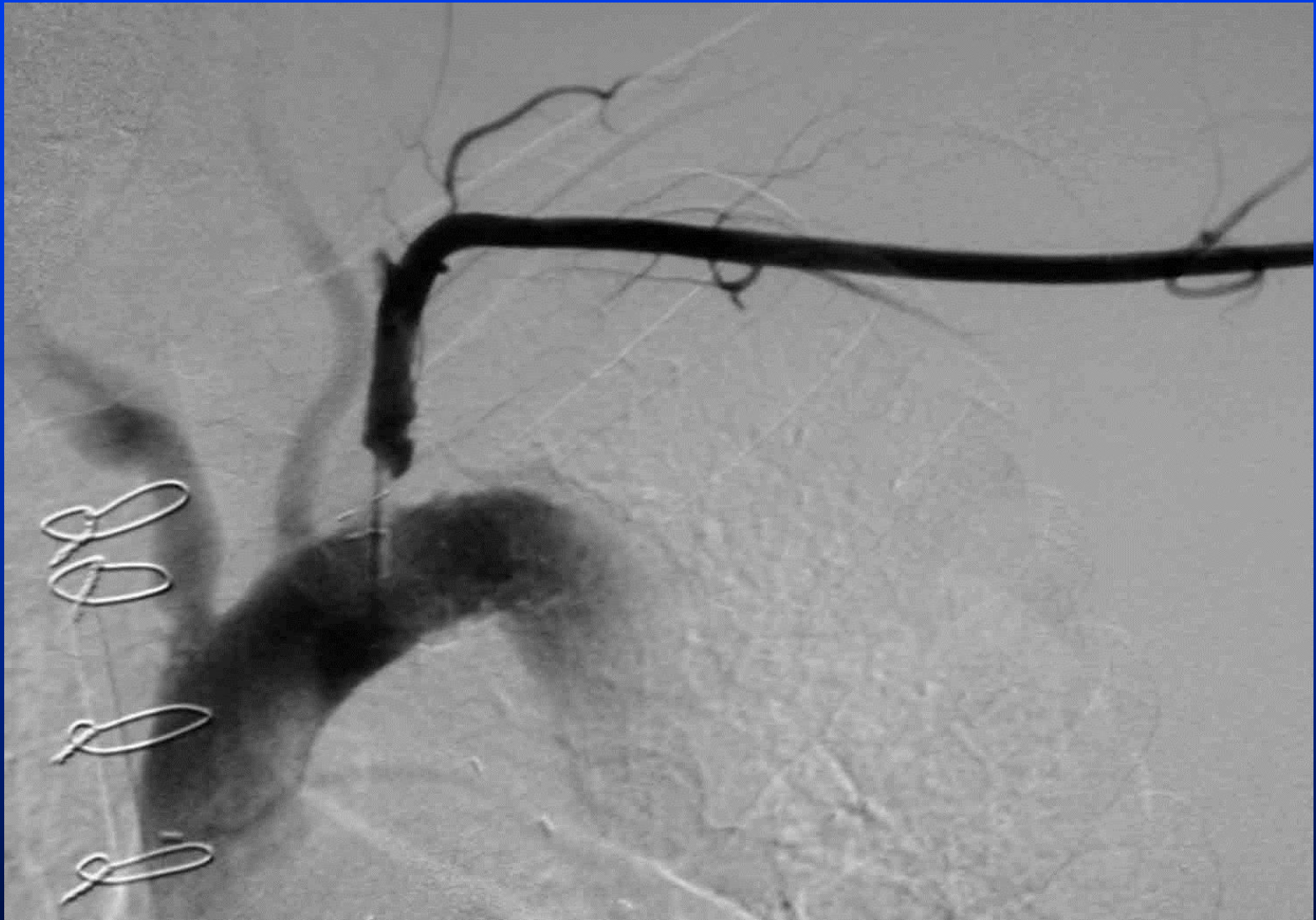
From this image we can learn:

There is an inflow problem (unless inflow occluded eg BP cuff)

There is no outflow problem

The taper is way too long, this is a relatively new graft

Either the operator did not know what they were doing, or they had figured it out before puncture



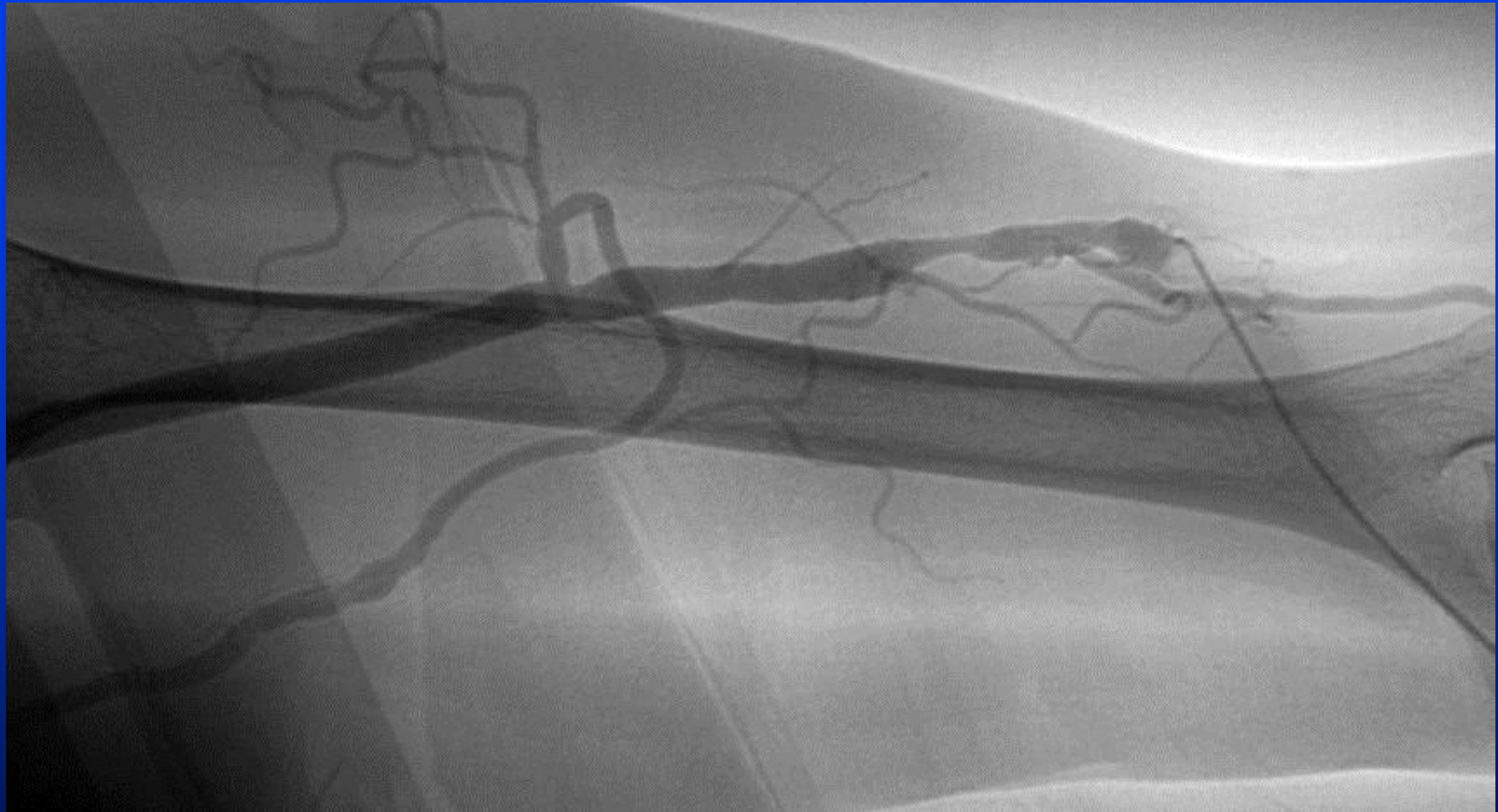
Options?



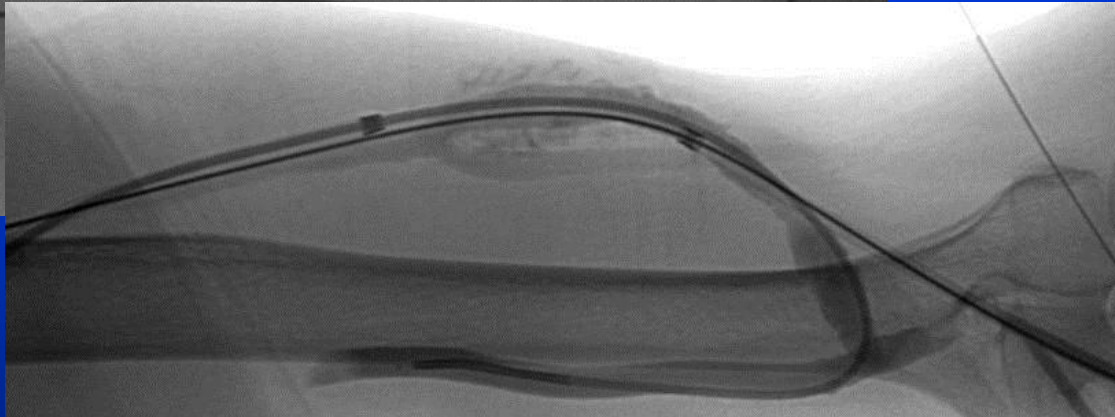
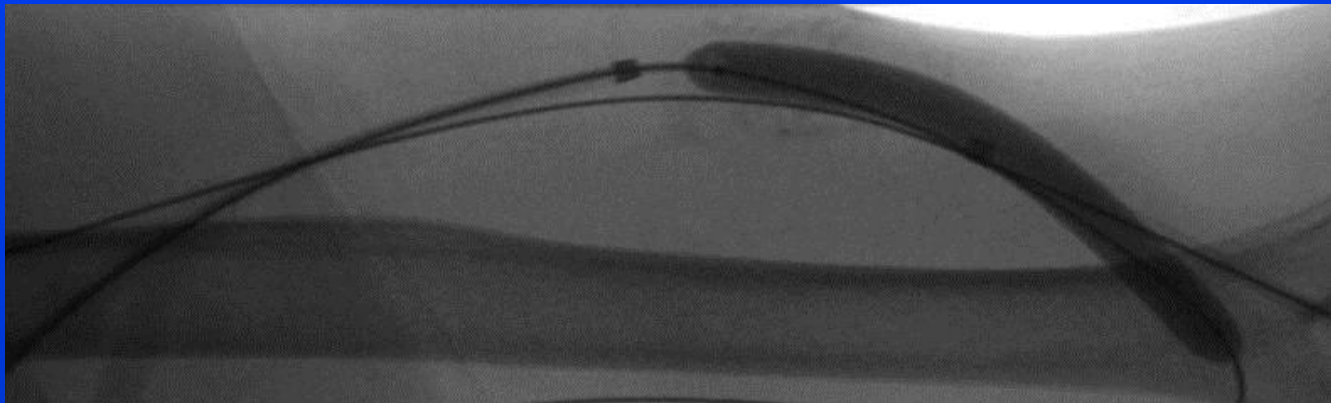
Immediate return of thrill, steal sx resolved

Cases

Case 2



Immature LUA fistula



Report: accessory vein likely will need ligation or embolization

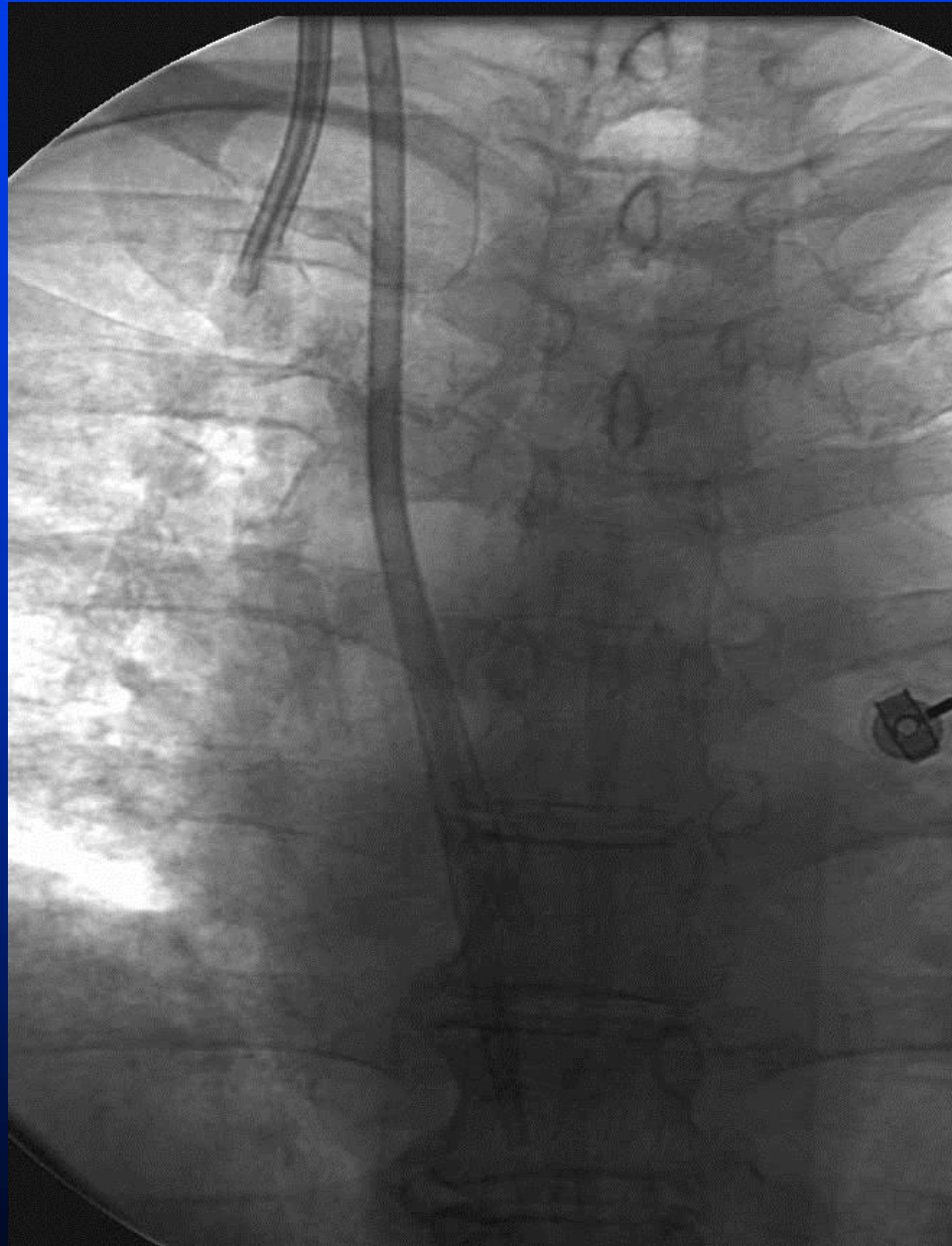


3 yr f/u-no other interventions, now with low flow

Cases

Case 3

~400 lb
TDC placement for
ARF



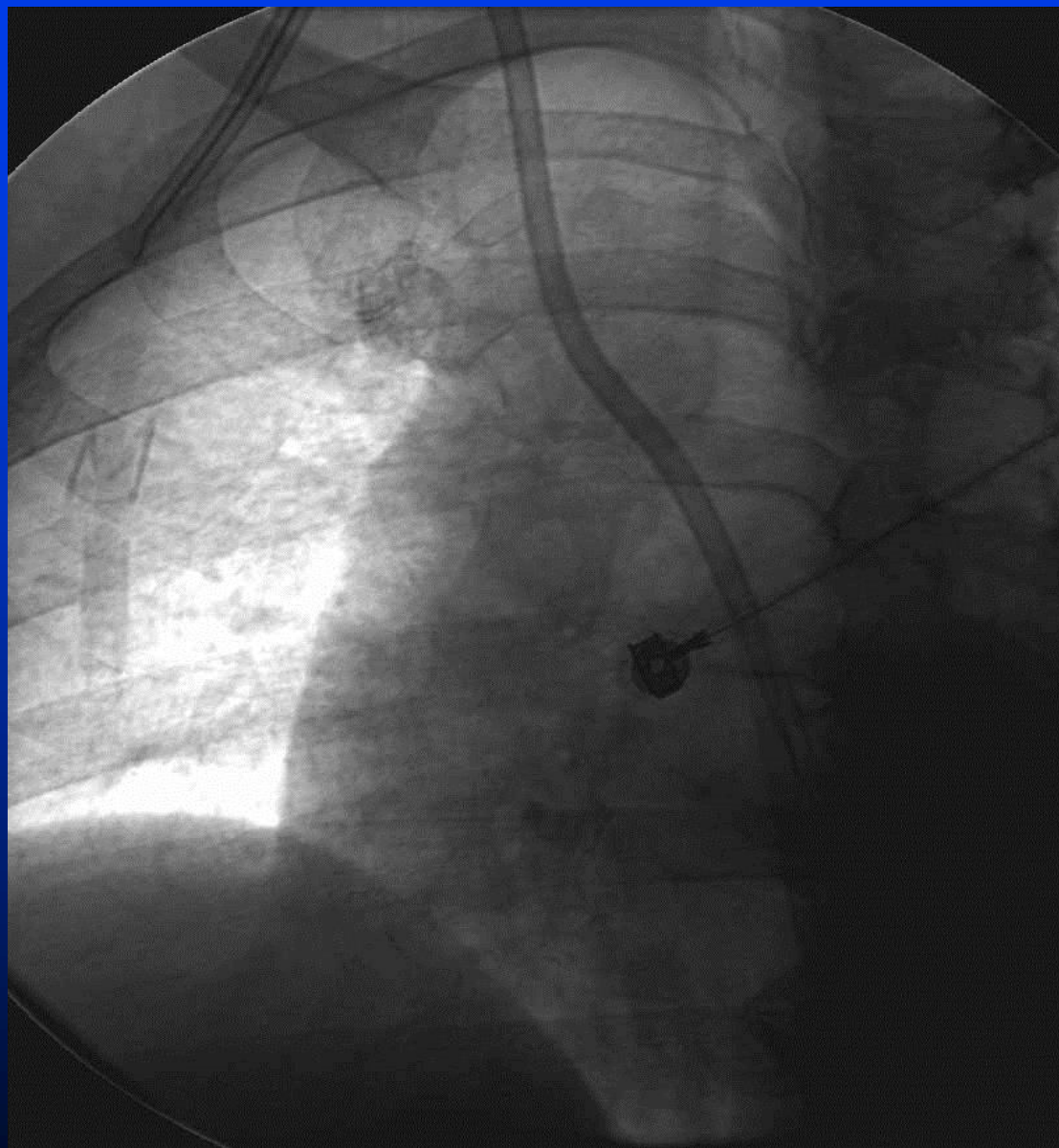
The catheter is:

1. Too high
2. Too low
3. In good position
4. Other

Best way to further evaluate

1. Contrast injection
2. Another view
3. Transduce catheter
4. Pass a guide wire
5. IVUS
6. CT
7. MRI
8. PET scan

Oblique view



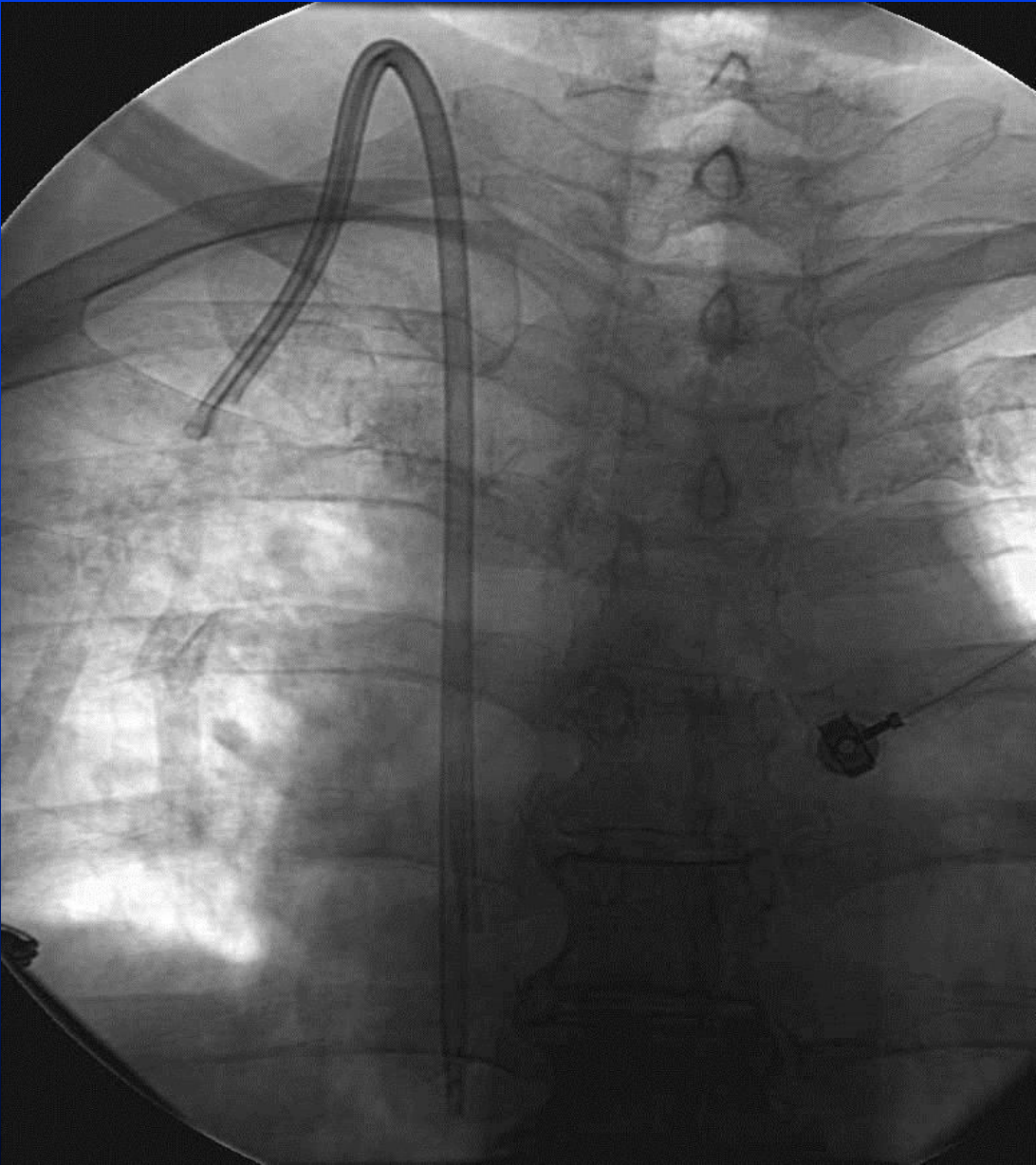
Catheter is in

1. Aorta
2. SVC
3. Right atrium
4. Left BCV
5. Right BCV
6. Azygos vein
7. Mediastinum

Catheter in this position

1. Is dangerous
2. Will not work at all
3. Will not work optimally
4. Will work well
5. Should be removed immediately

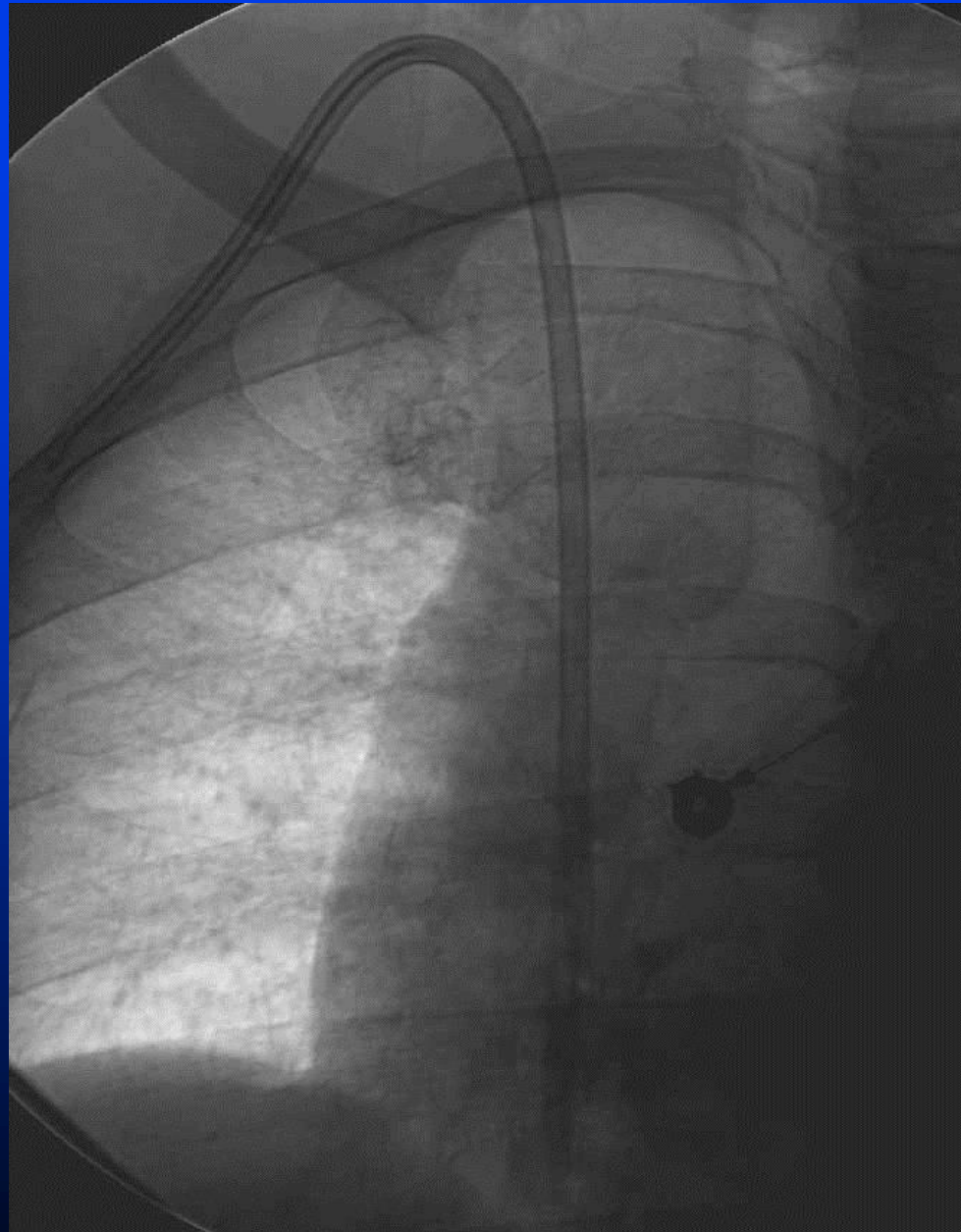
After repo



Catheter is in

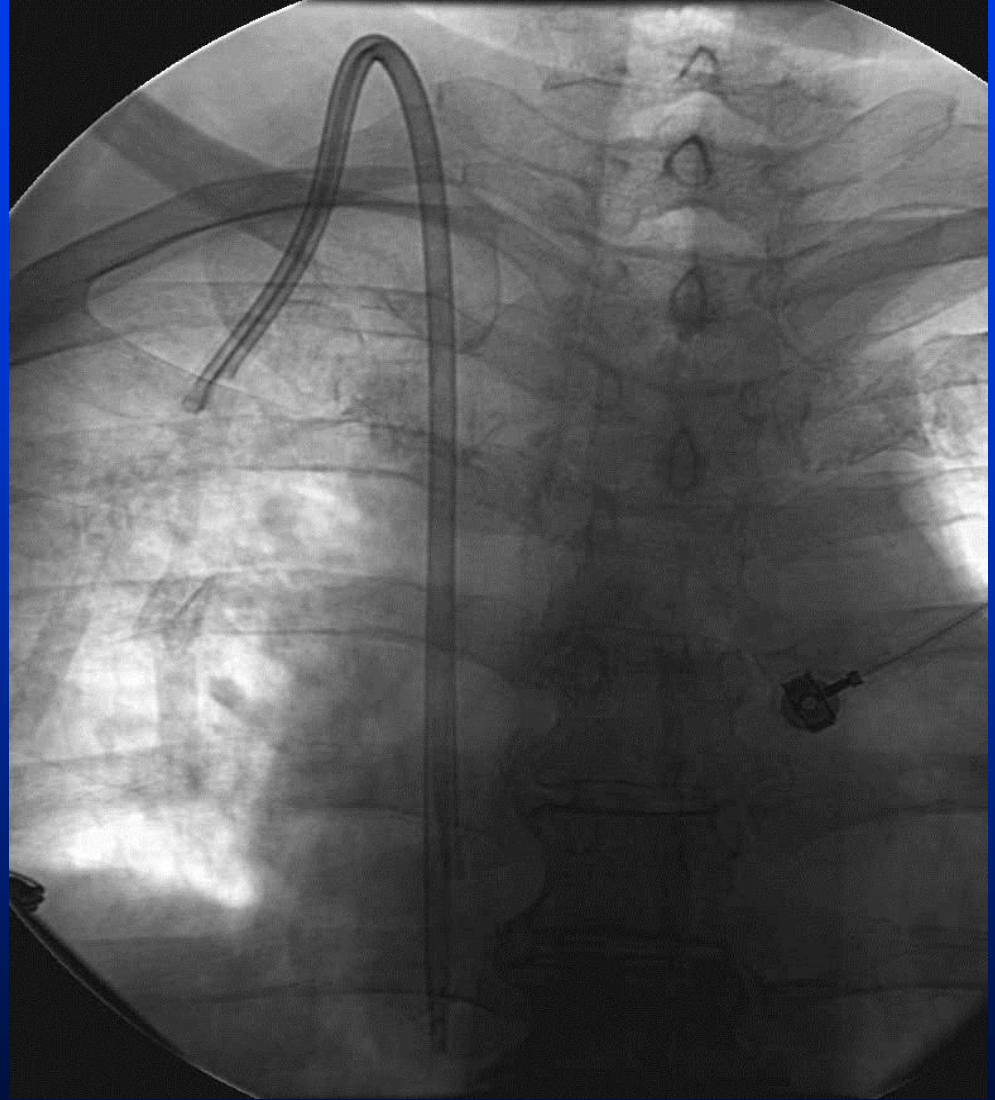
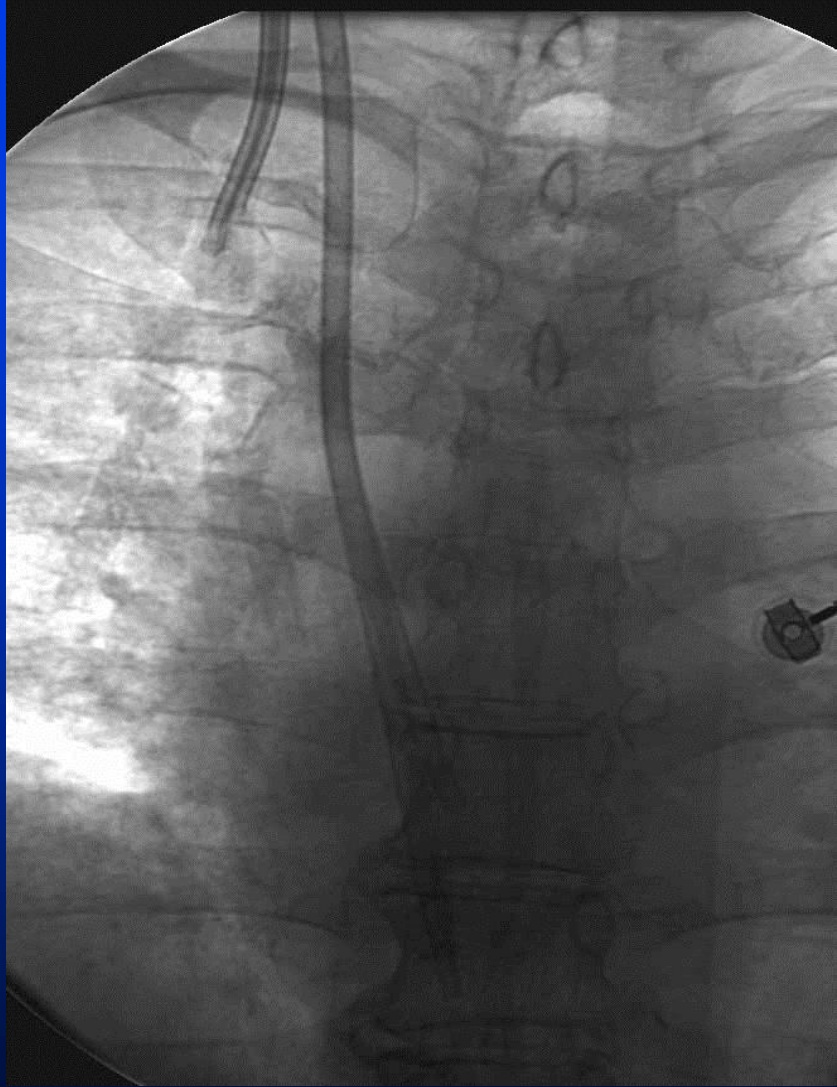
1. Aorta
2. SVC
3. Right atrium
4. Left BCV
5. Right BCV
6. Azygos vein
7. Mediastinum

Oblique view



Adequate flow can be confirmed by

1. Aspiration with 10 mL syringe, filling in ≤ 2 sec
2. Aspiration with 10 mL syringe, filling in ≤ 3 sec
3. Aspiration with 20 mL syringe, filling in ≤ 2 sec
4. Aspiration with 20 mL syringe, filling in ≤ 3 sec
5. Aspiration with 60 mL syringe, filling in ≤ 2 sec
6. Aspiration with 60 mL syringe, filling in ≤ 3 sec



Cases

Case 4

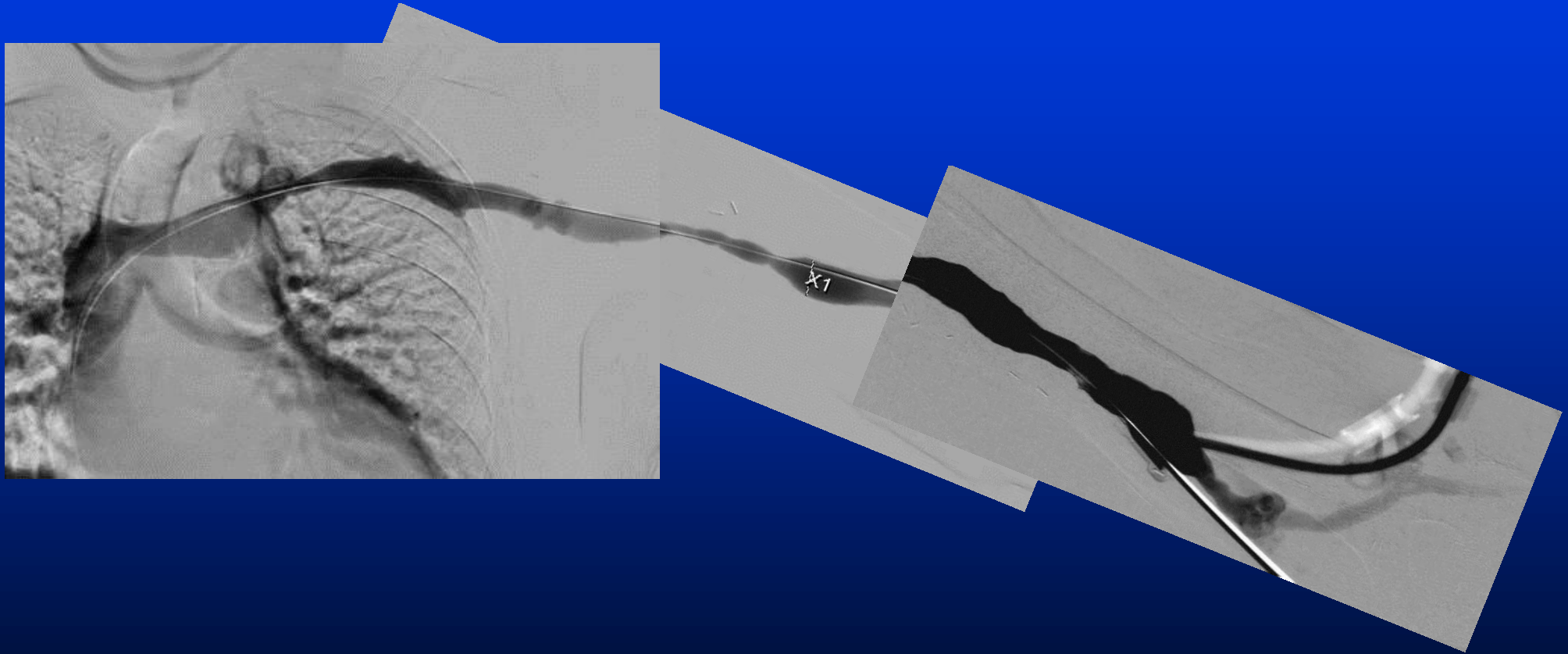
Patient with
LUA BVT
referred for
pulsatility and
enlarging
aneurysms

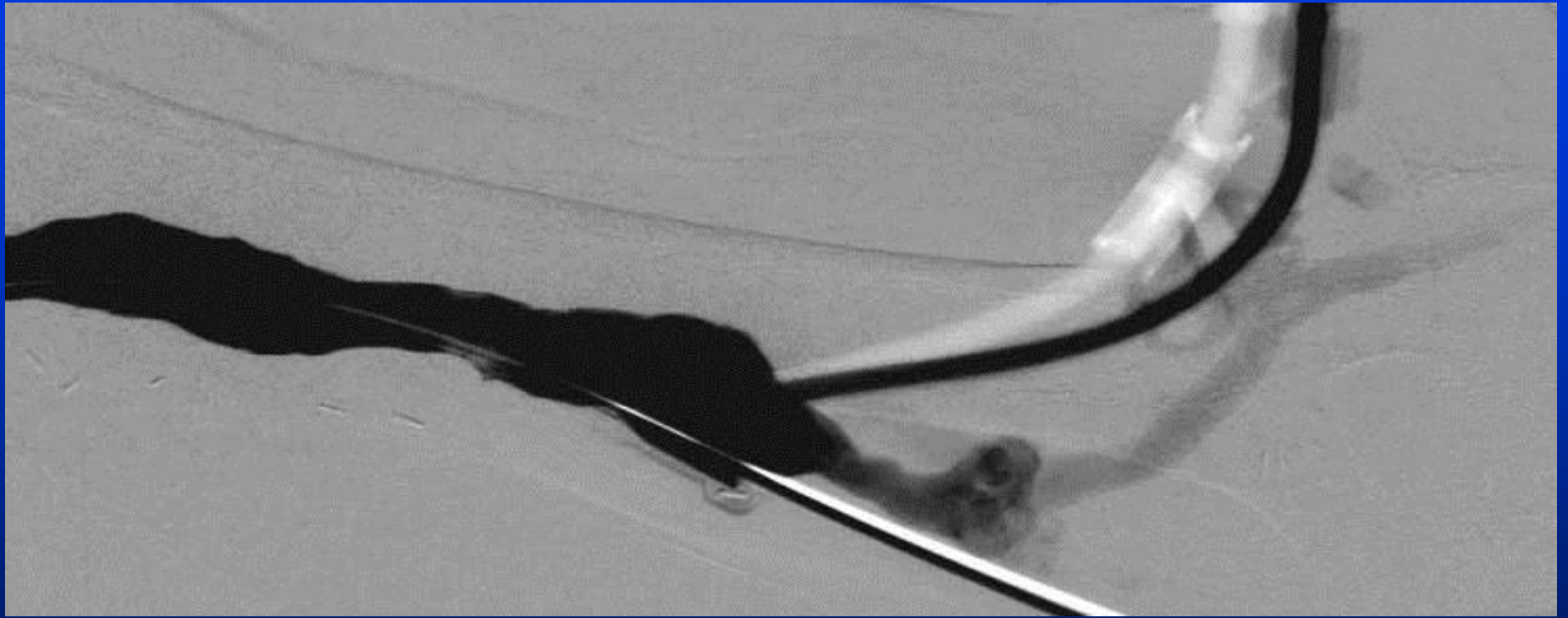


What should be done for this pt?

1. Fistulogram and PTA of outflow stenosis
2. Fistulogram and stent/stent graft of outflow stenosis
3. Fistulogram and stent graft of aneurysm
4. Immediate surgical consultation
5. Refer to surgery clinic

Immediate surgical consultation and review of prior fistulogram





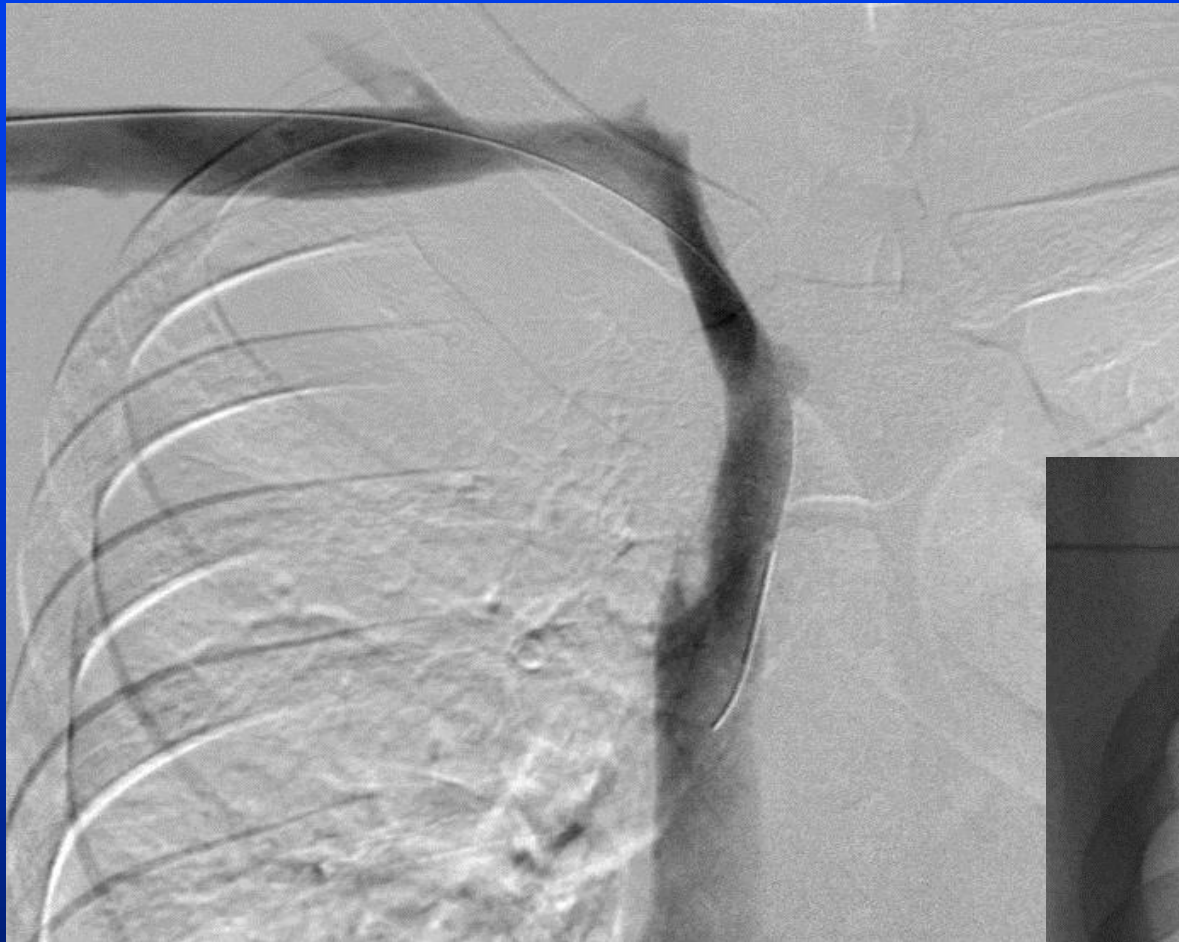
Pt has usable basilic vein on right and no CVS. Best surgical option is:

1. Interposition grafting
2. New graft in same location
3. Fistula on right, abandon
4. Graft on right, abandon

Multidisciplinary discussion at bedside w pt, surgeon, IR and nephrologist. Anastomosis not felt salvageable for interposition thus only salvage option on right would be a graft. Since pt has good vein for BVT on right, this is felt preferable. Pt received TDC and went to OR within hours where fistula was ligated and segment removed. New BVT next week.

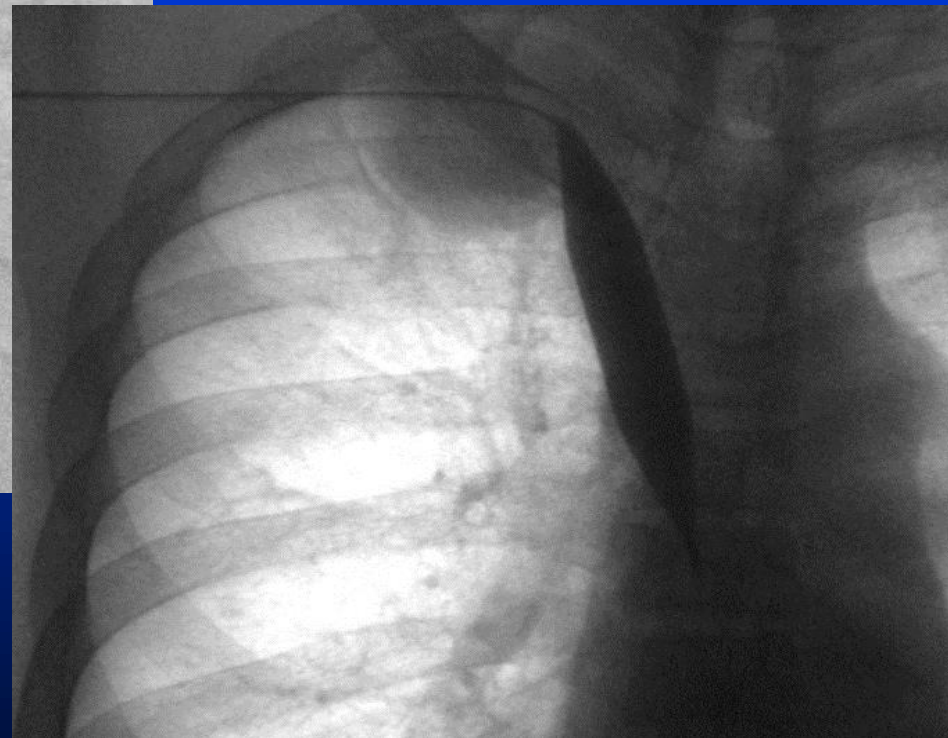


Case 5



Post PTA 16 mm Atlas

18 mm Atlas





Mild drop in BP



Tamponade x 2 (5 min each)



Custom 18 mm Zenith



8 month F/U

Cases

Case 6



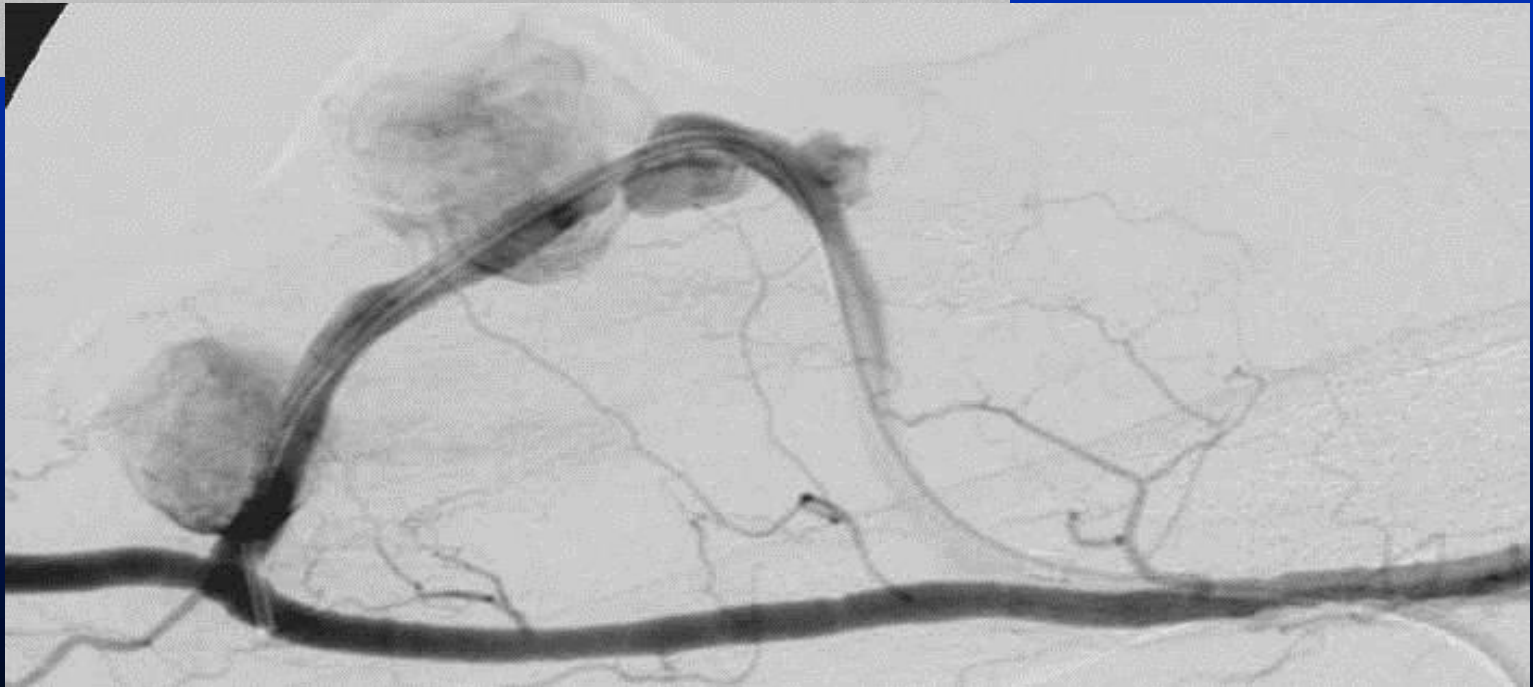
Time bomb

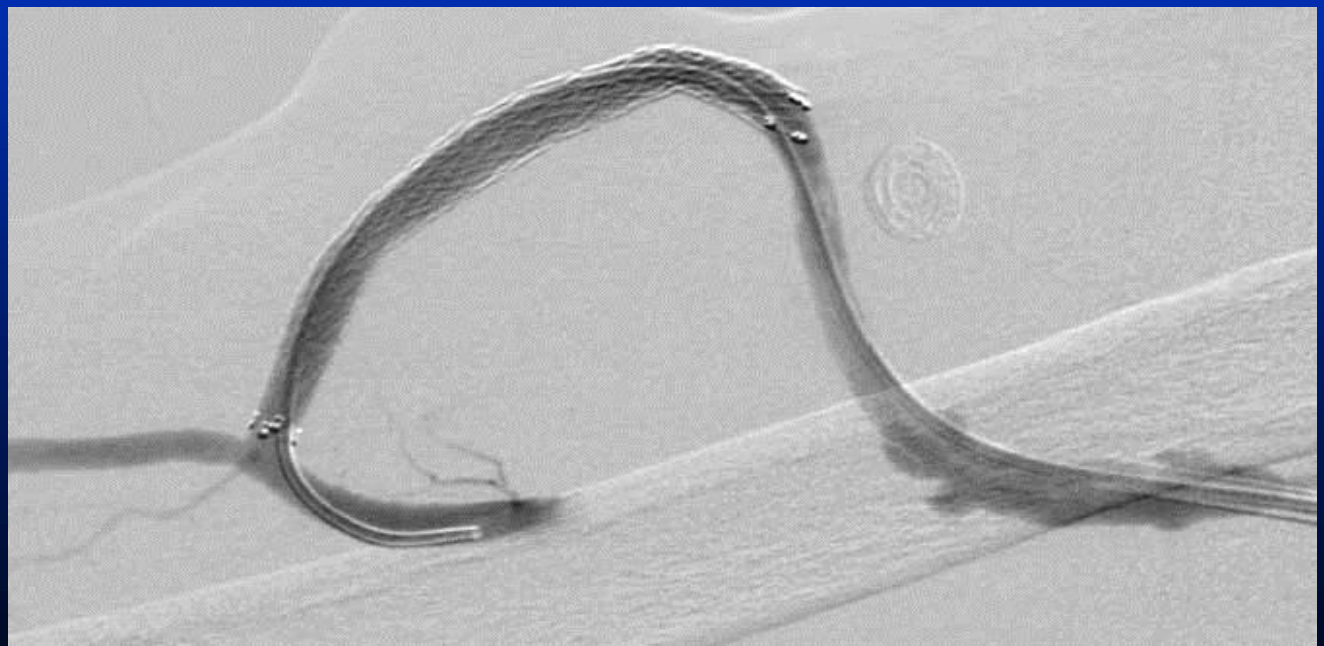
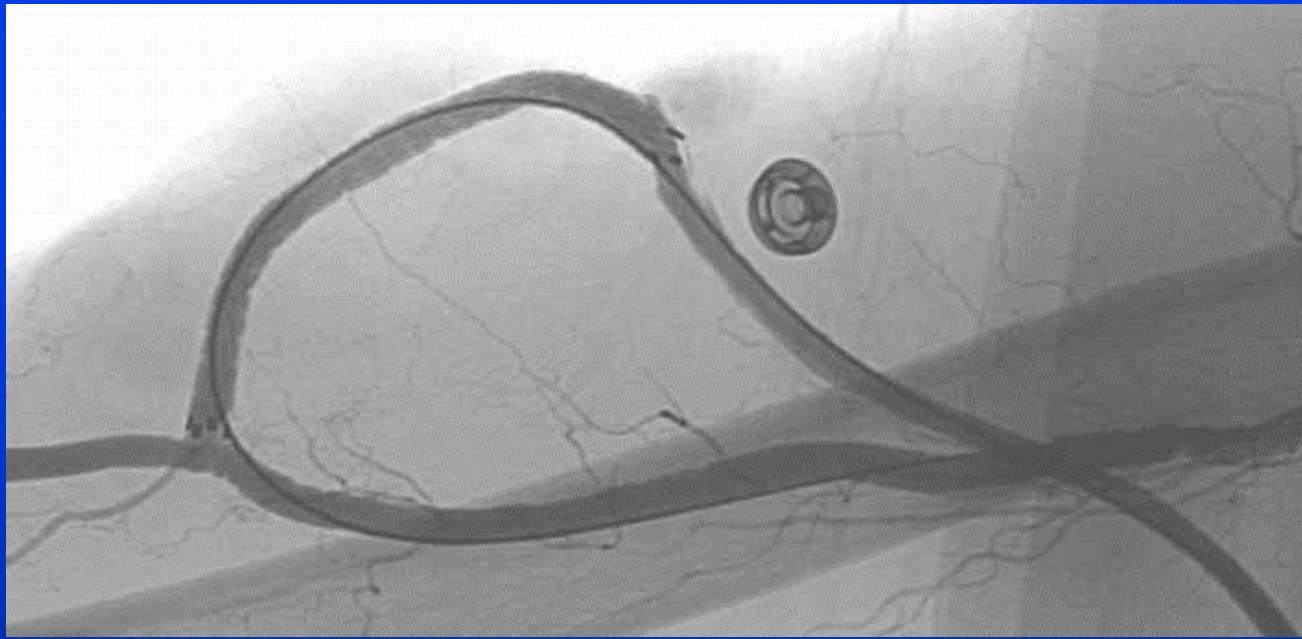
Cases

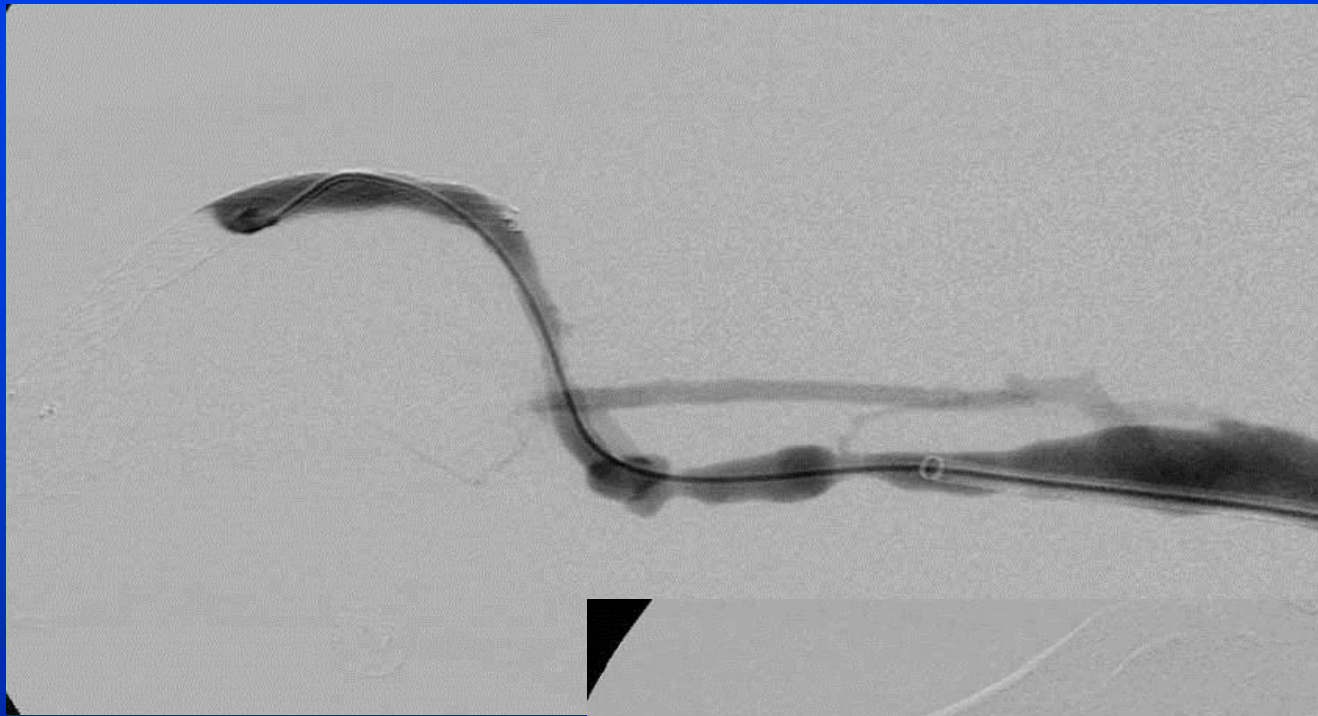
Case 7



6 month old BVT,
bleeding, hematomas

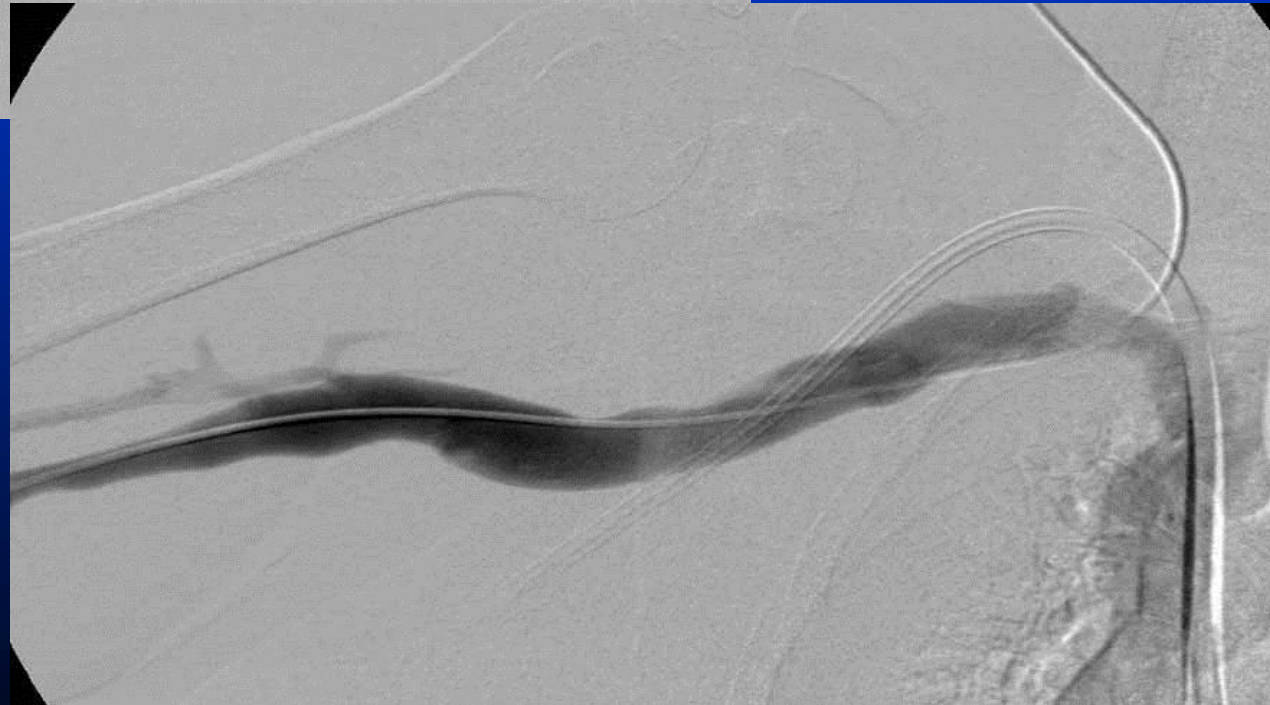


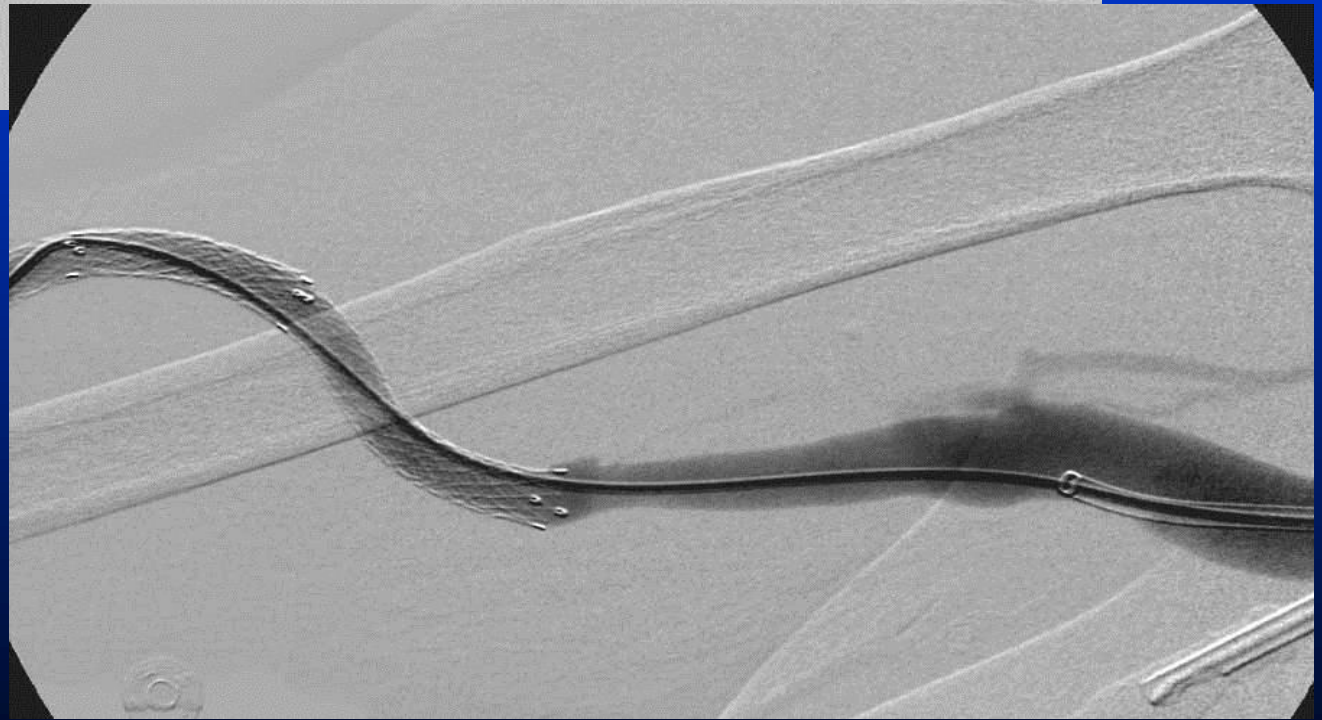
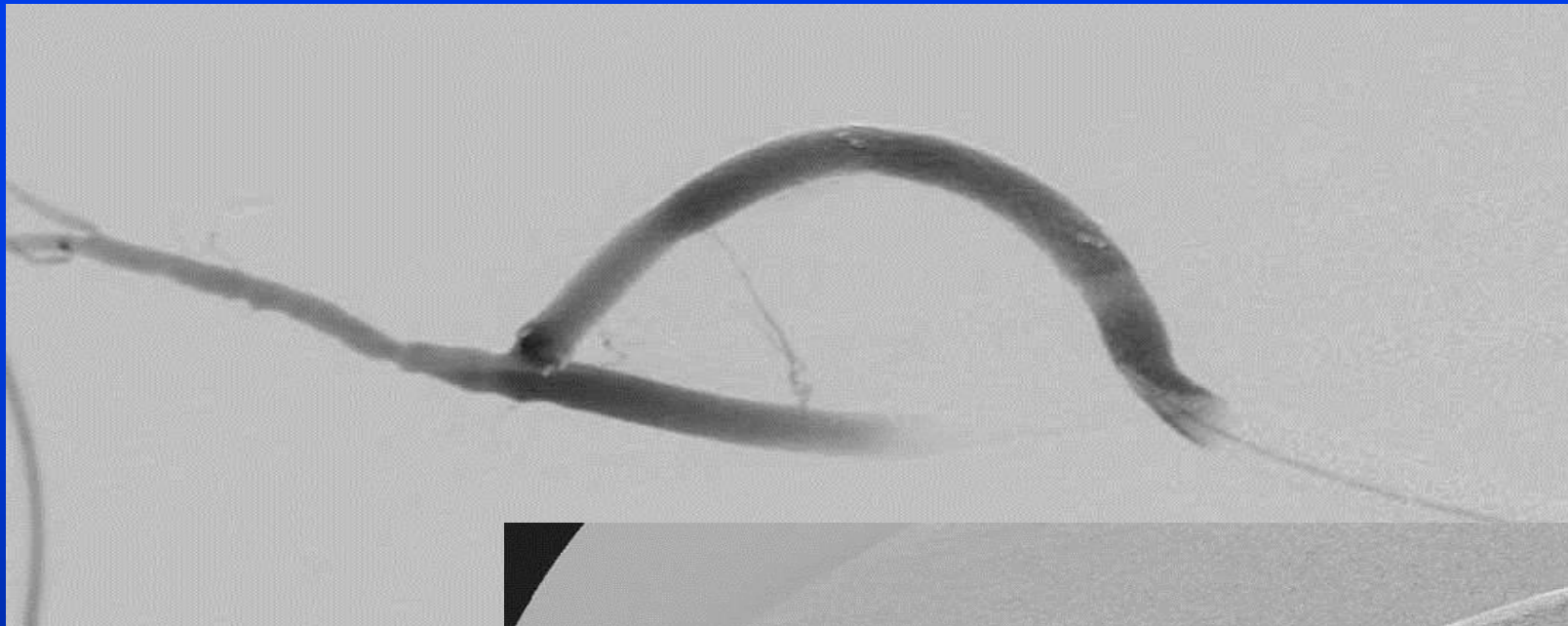




Jugular access

3 mo f/u; all resolved except one at end of stent-graft

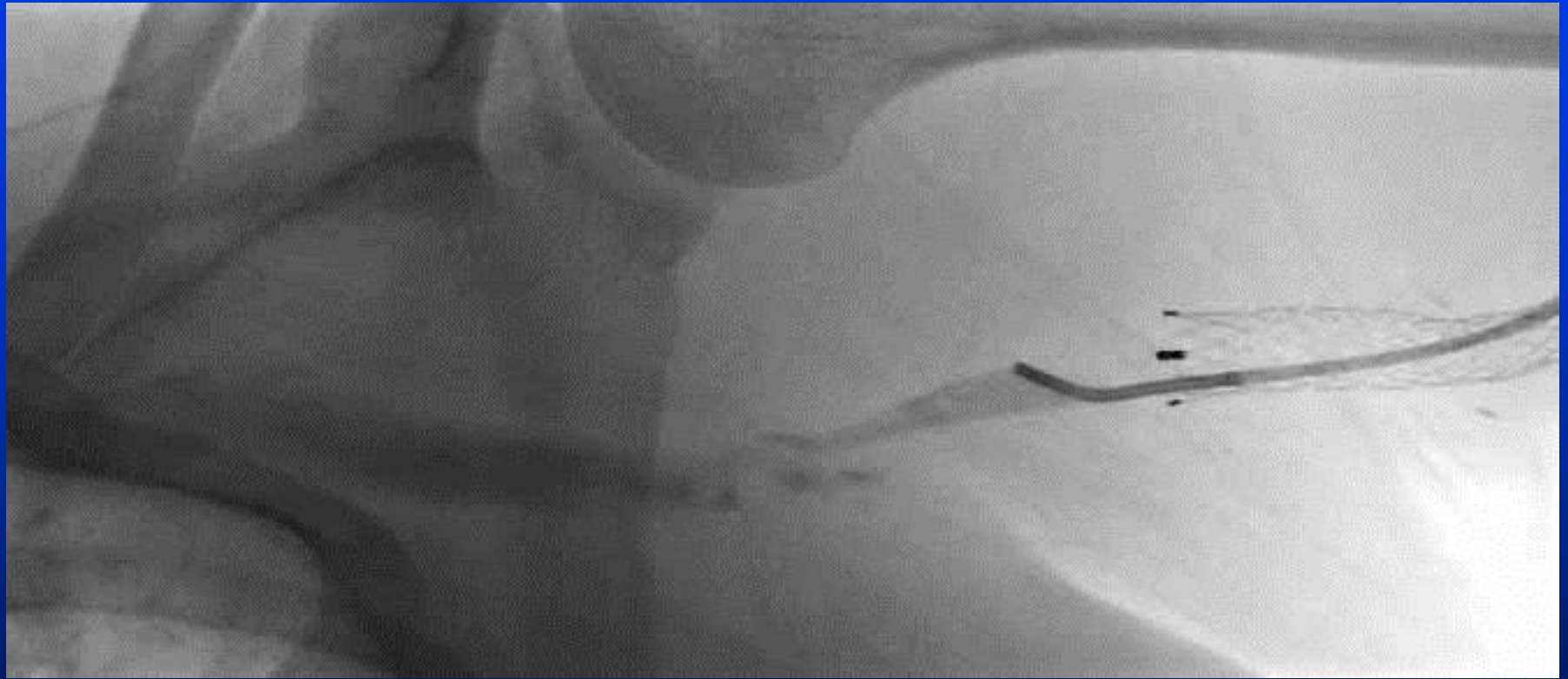




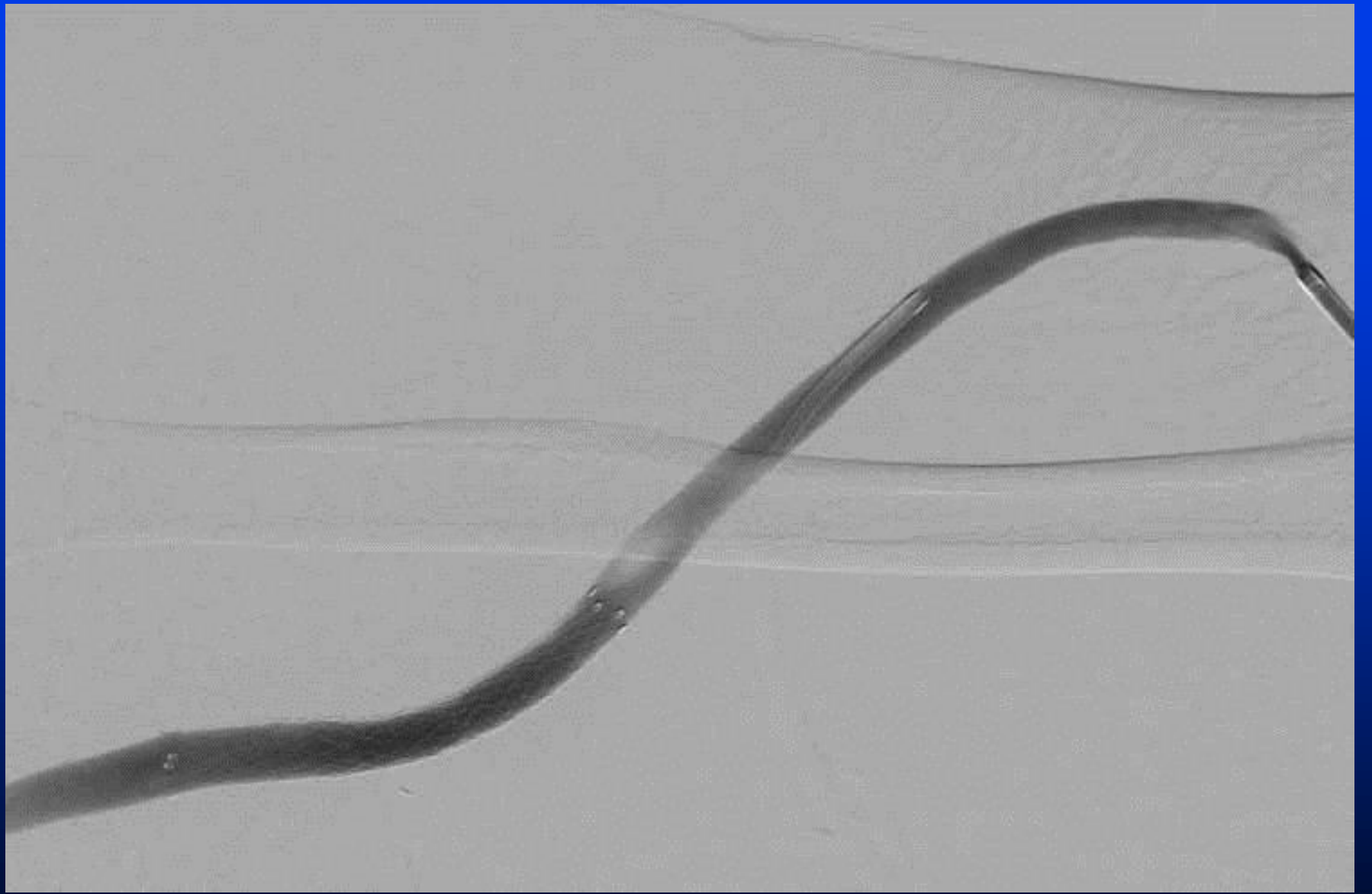
Cases

Case 8

- LUA graft created just over a month ago
- Clotted 6 days
- Failed declot at freestanding center 2 d ago







Results of Early Declotting (SIR definitions)

	<30 days	31-60 days	p
Technical success	74%	80%	NS
90 day primary patency	0%	15%	NS
Median primary patency	7d	16d	NS
Median secondary patency	17d	82d	0.016
Graft survival	38d	149d	NS



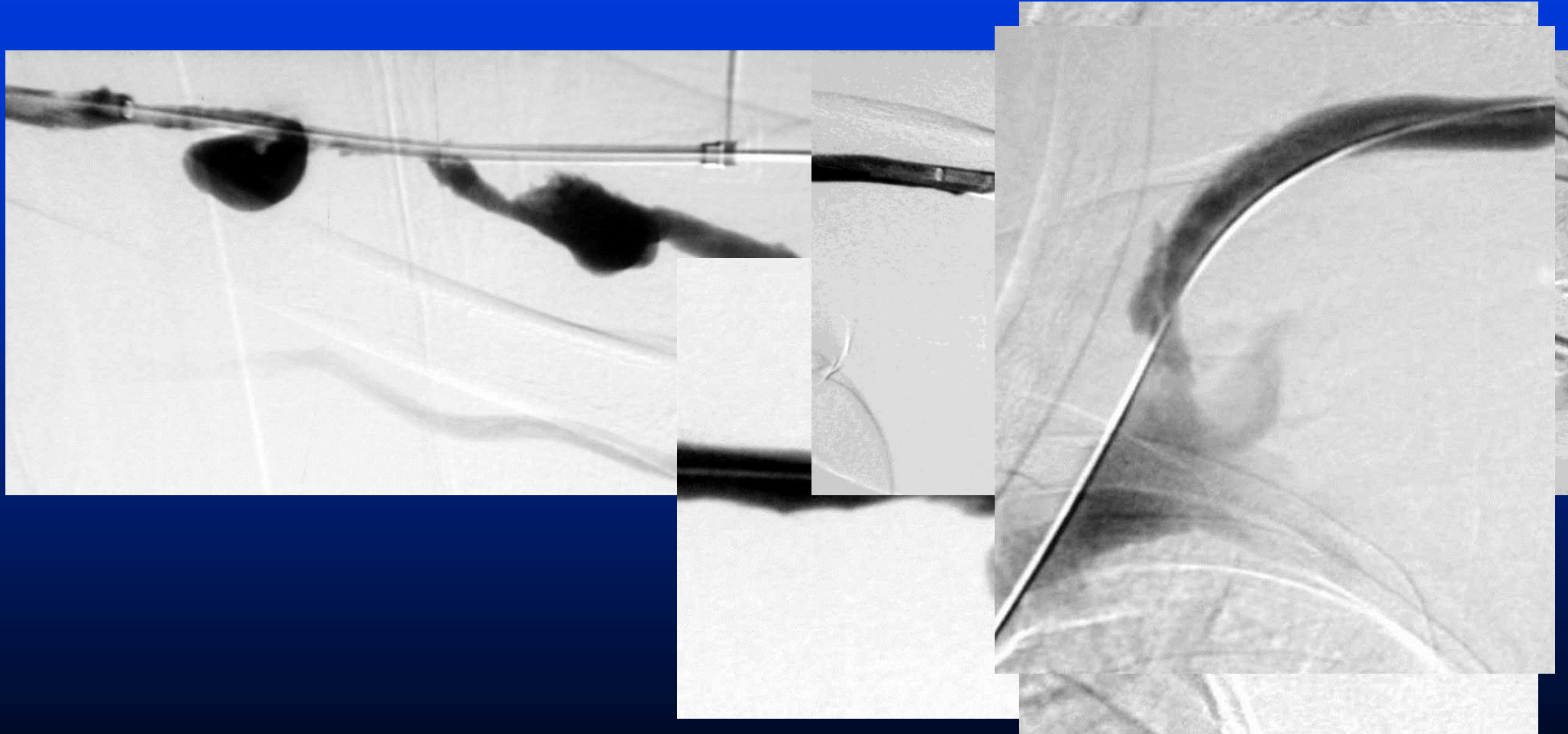
Companion Case



Cases

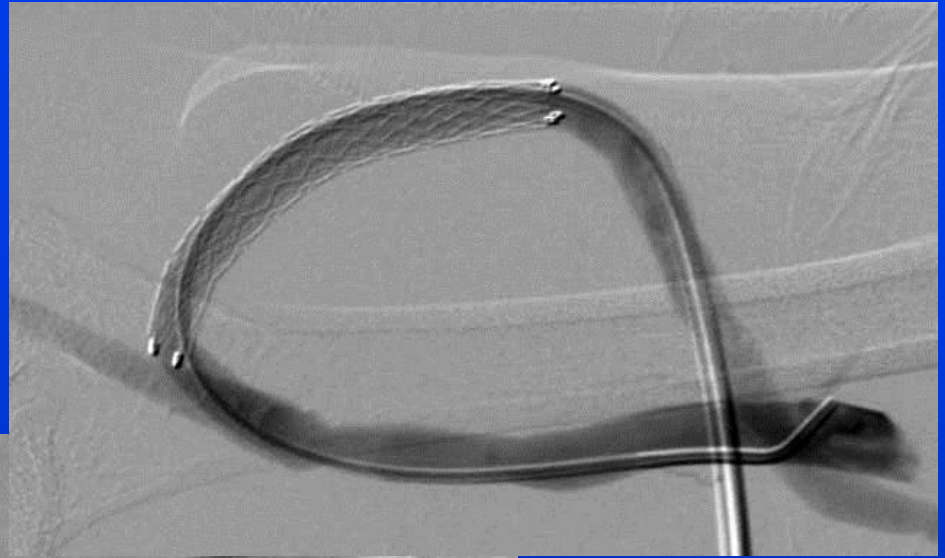
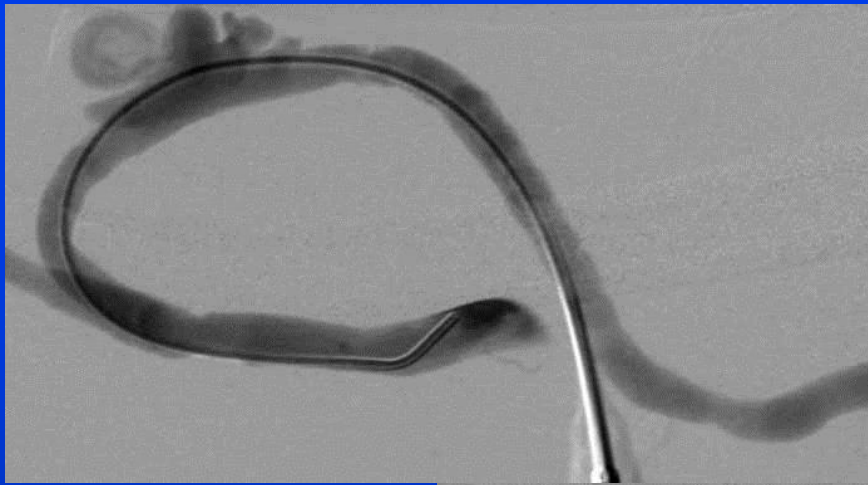
Case 9

New pseudoaneurysm in LUA fistula



Cases

Case 10



Uncontrolled
bleeding from
CSL



4 mo FU during declot; clotted again w failed declot and
access abandoned 2 mo later

Cases

Case 11



Pt from OSH w/endograft placed for CSL several months prior

Cases

Case 12

A patient with a left upper arm dialysis graft experiences blowout of the graft during dialysis.

You are called stat. You should:

1. Apply direct pressure but not so much that graft is occluded
2. Tell dialysis unit to call surgery
3. Deliberately thrombose the graft
4. Apply enough direct pressure to stop bleeding without regard to graft patency

You obtain hemostasis and the graft clots. You should now:

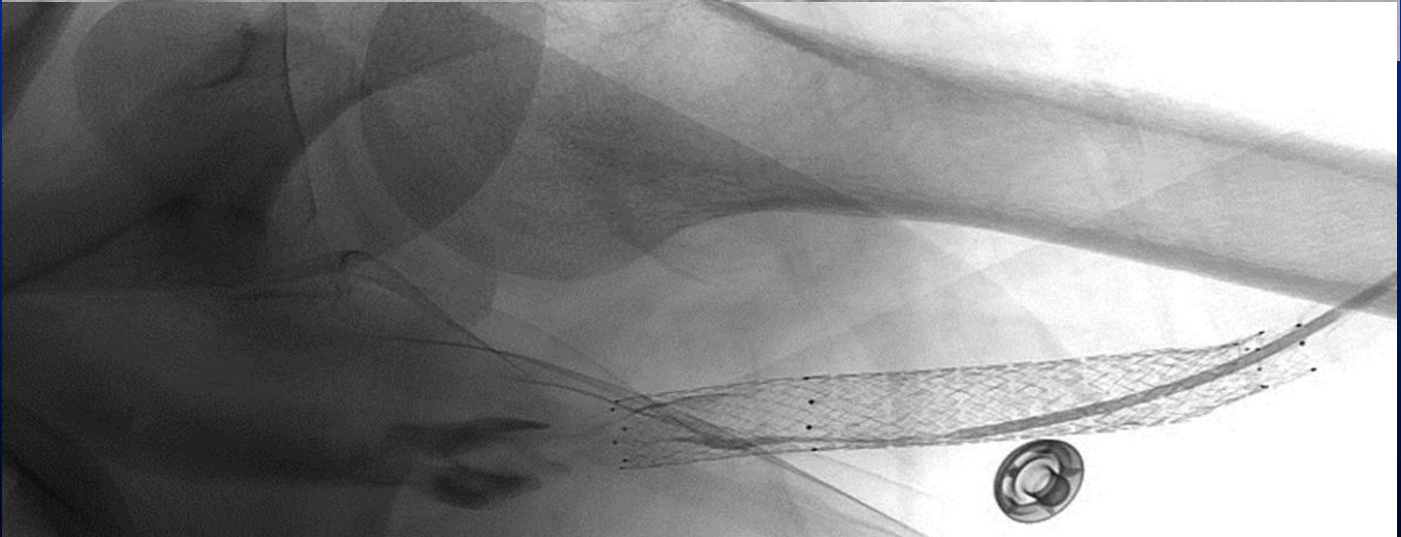
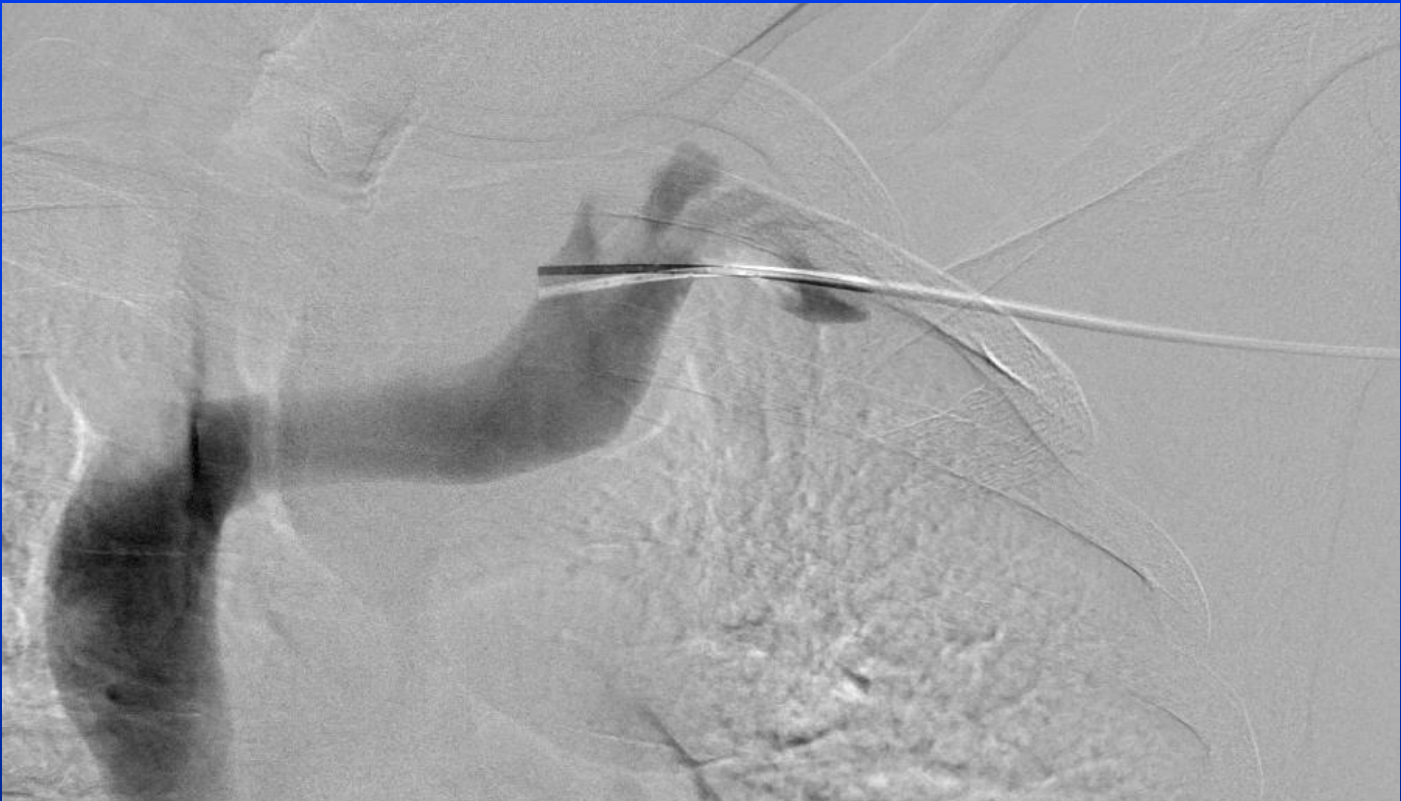
1. Have a multidisciplinary discussion regarding the patient's options
2. Take the patient to IR and declot
3. Abandon the access, place a tunneled catheter, and refer to surgery
4. Tell the dialysis unit to call surgery for further management

A multidisciplinary discussion and careful access-directed physical examination reveals the patient has few if any remaining access options

1. IR has nothing to offer this patient
2. IR options exist however have significant limitations
3. Surgery is proven better than IR for this patient
4. Surgical options exist that have no limitations
5. No surgical options exist

A decision is made to offer thrombectomy and stent graft placement as needed

1. Heparin is contraindicated and should not be given
2. 3000 units of heparin should be given after the pullback venogram
3. 3000 units of heparin should be given before accessing the graft
4. 10,000 units of heparin should be given after the pullback venogram
5. 10,000 units of heparin should be given before accessing the graft

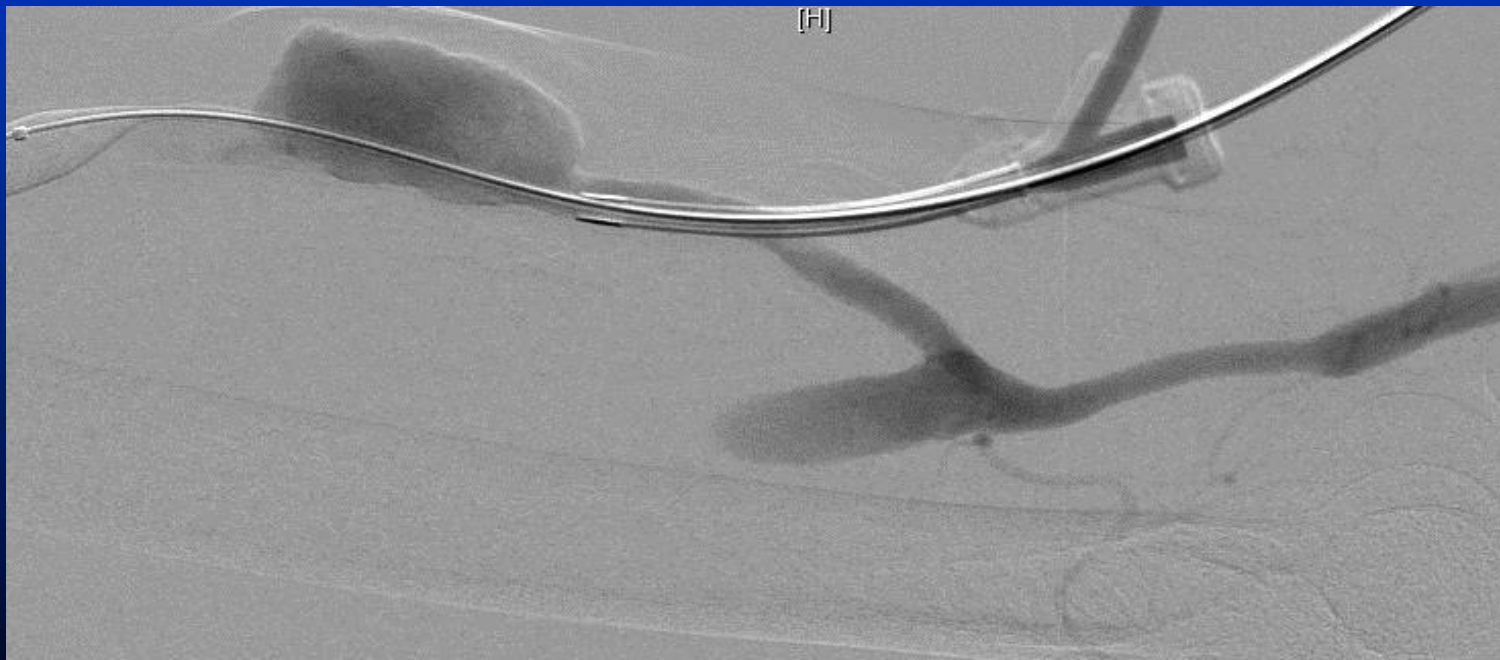


Pullback venogram is done in order to

1. Look for untreatable central stenosis
2. Establish central extent of clot
3. Determine status of central veins
4. Determine location of venous anastomosis (in a graft)
5. All of the above

This pullback venogram

1. Shows extensive central clot warranting overnight thrombolysis
2. Shows mild extrinsic compression of the left brachiocephalic vein
3. Shows left subclavian vein stenosis
4. Shows SVC occlusion
5. Is normal



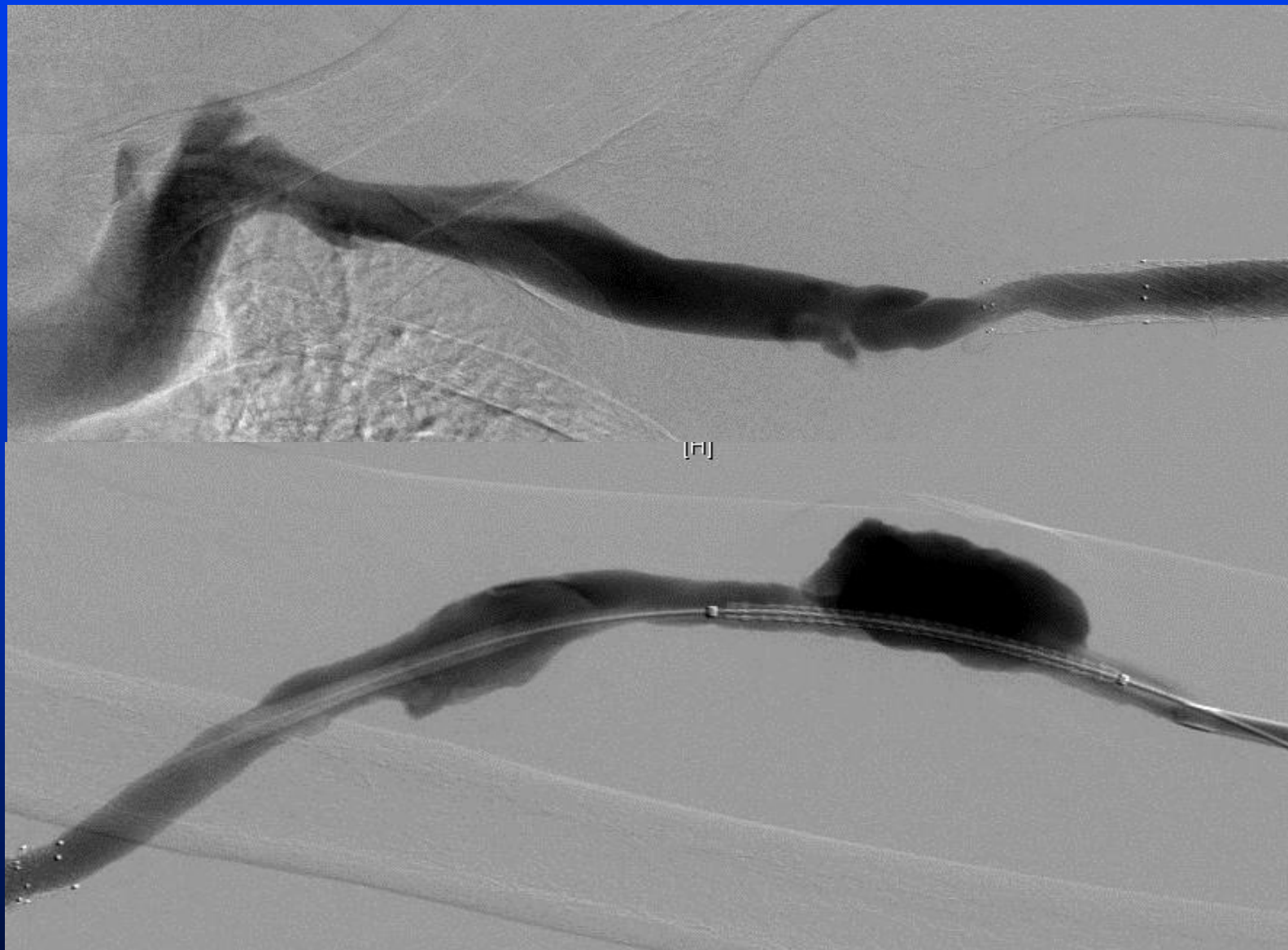
After PTD thrombectomy

Next step should be:

1. Place stent graft
2. PTA venous outflow
3. Further PTD thrombectomy and aspiration
4. Pull sheaths and obtain hemostasis
5. Refer to surgery

Appropriate alternatives to a blowback run which might decrease risk of blowout include

1. Catheterizing artery retrograde
2. Femoral catheterization and brachial arteriography
3. Antegrade brachial puncture for arteriography
4. Radial artery catheterization for arteriography



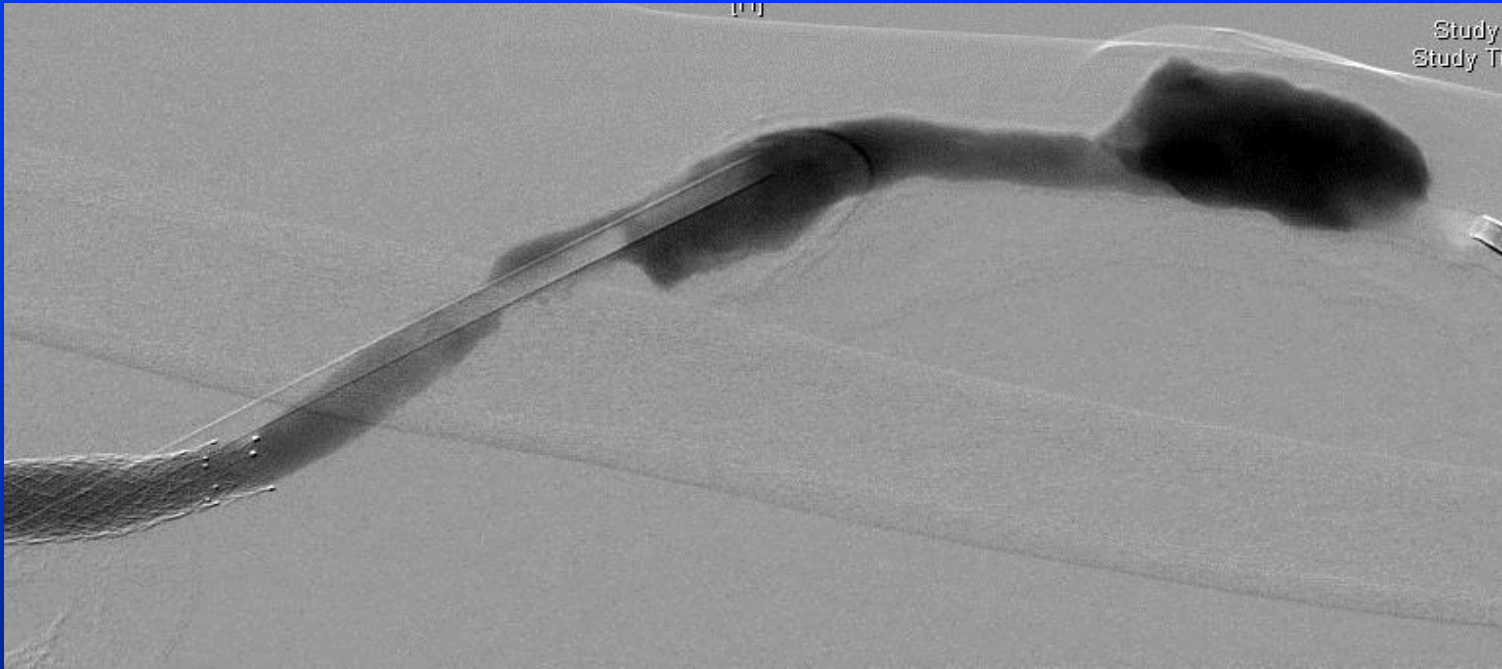
After further PTD thrombectomy and outflow PTA

The lesion shown in the arterial limb is a/an:

1. Aneurysm
2. Pseudoaneurysm
3. Technically neither a pseudoaneurysm nor aneurysm since it is in a graft, which by definition has no vascular layers
4. None of the above
5. All of the above

This cannulation site lesion (CSL):

1. Should be stent-grafted immediately
2. Should be treated with a bare metal stent immediately
3. Should be referred to surgery
4. Should be left alone, as it is no longer bleeding and outflow problems are resolved
5. One can argue #1 or #4



Patient begins bleeding from CSL, repeat fistulogram done with steri-strips maintaining hemostasis; thrill in access

This cannulation site lesion (CSL):

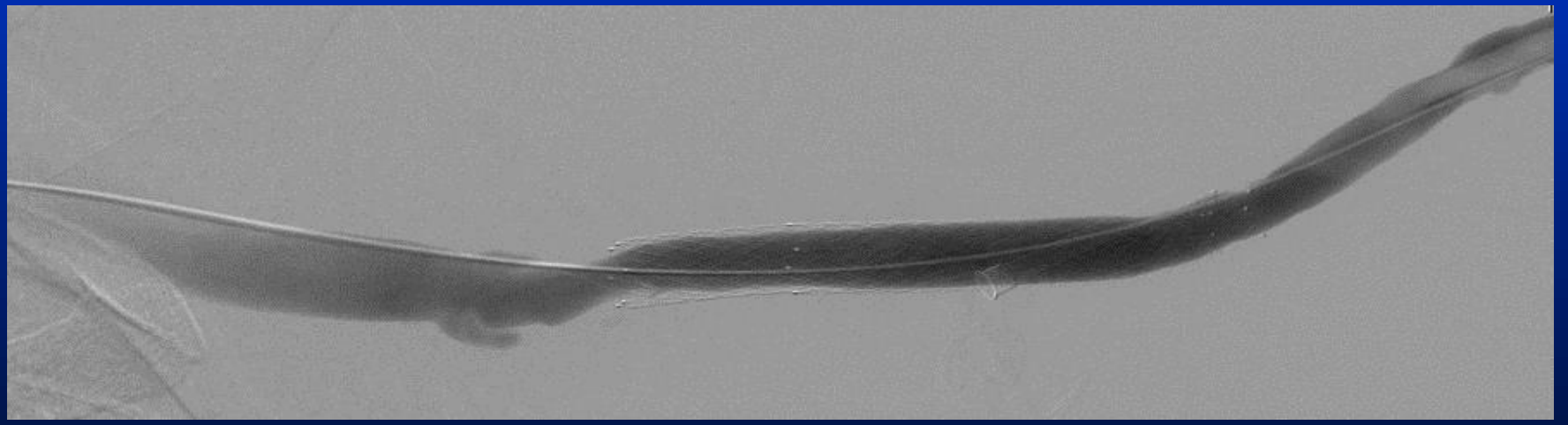
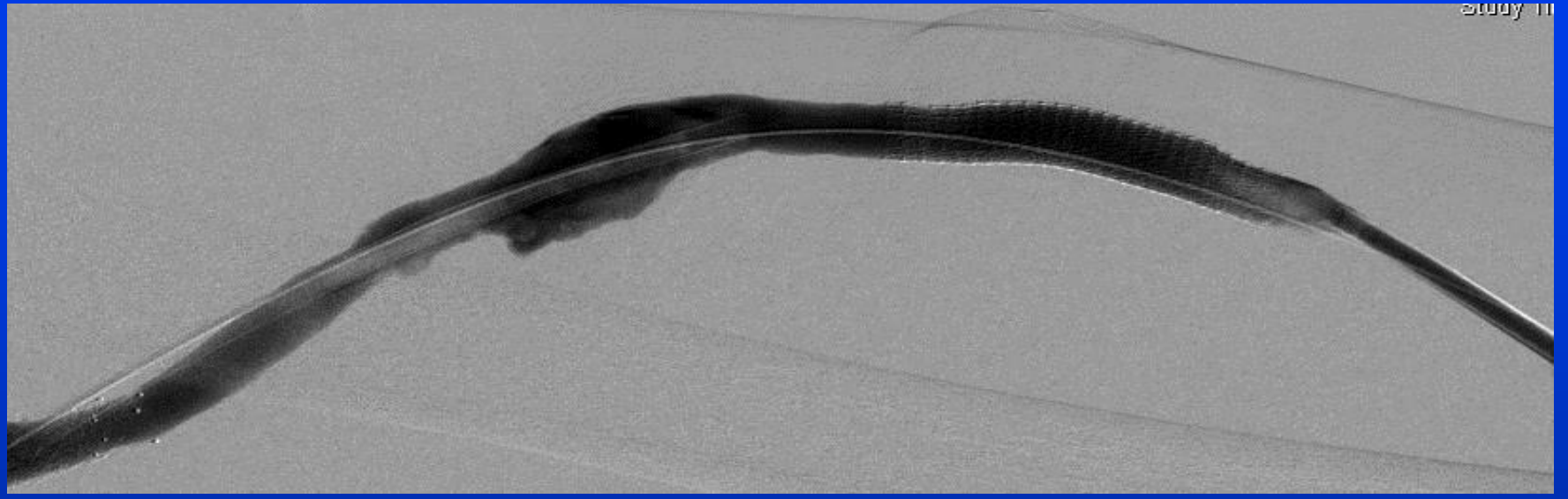
1. Should be stent-grafted immediately
2. Should be treated with a bare metal stent immediately
3. Should be referred to surgery
4. Should be left alone, as it is no longer bleeding and outflow problems are resolved
5. One can argue #1 or #4

The best device in this location is probably

1. Jostent (balloon expandable)
2. Atrium (balloon expandable)
3. Fluency (self expanding)
4. Flair (self expanding)
5. ViaBahn (self expanding)
6. Viatorr (self expanding)

True or False: All of these devices would be off-label in this location

1. True
2. False
3. True, and this is a nasty trick question



ViaBahn placed

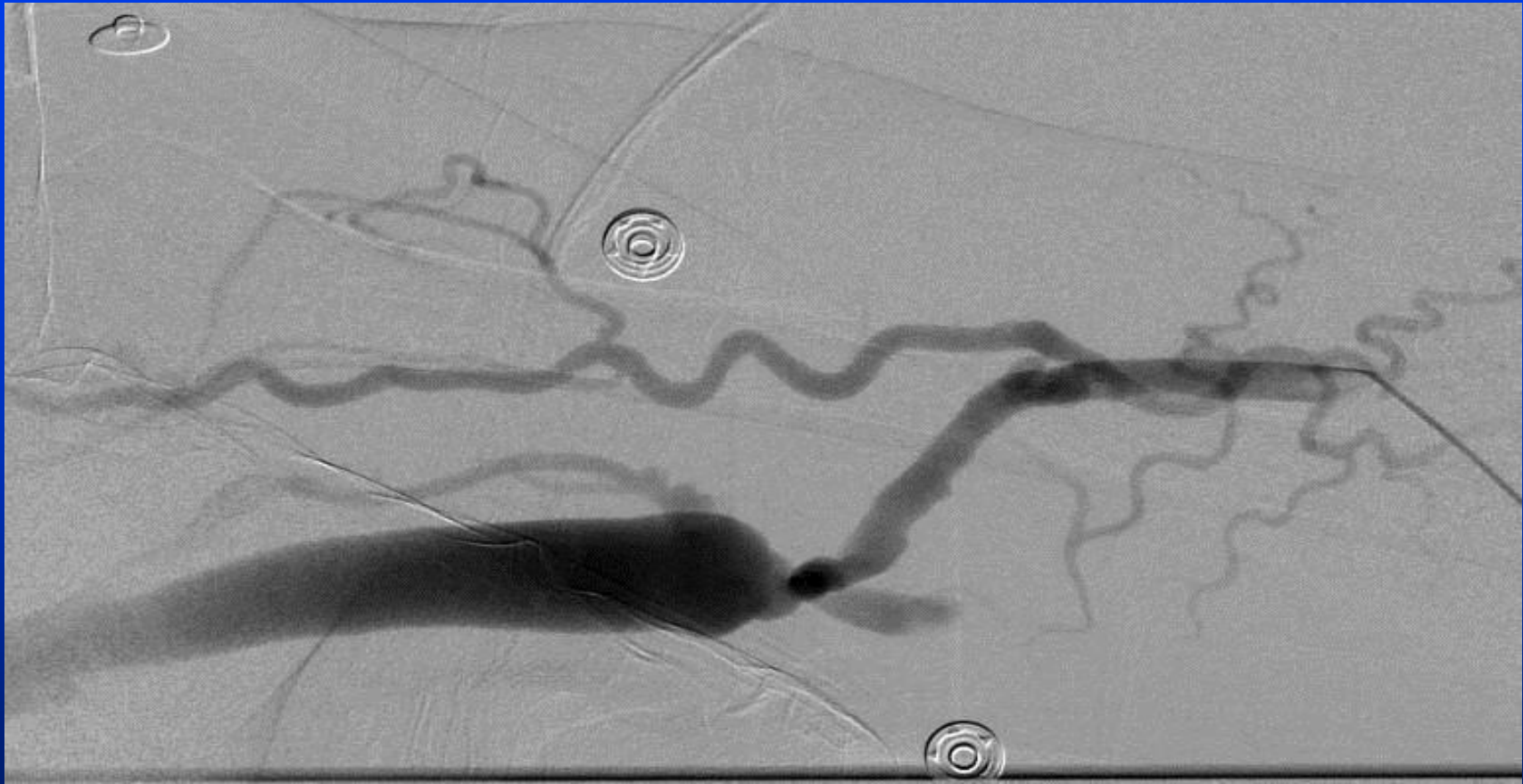
Long term viability of this access

1. Is compromised by this device
2. May be limited due to late issues with device
3. Is the same as surgical interposition
4. Is probably more limited by outflow stents than anything else

There is an increased risk of infection for this device in this location

1. True
2. False
3. Depends on how you word the question

Case 13



LUA graft, prolonged bleeding

Fistulogram shows:

1. No lesion
2. Venous outflow stenosis
3. Intragraft stenosis
4. Other



Post PTA

Opacified veins indicate:

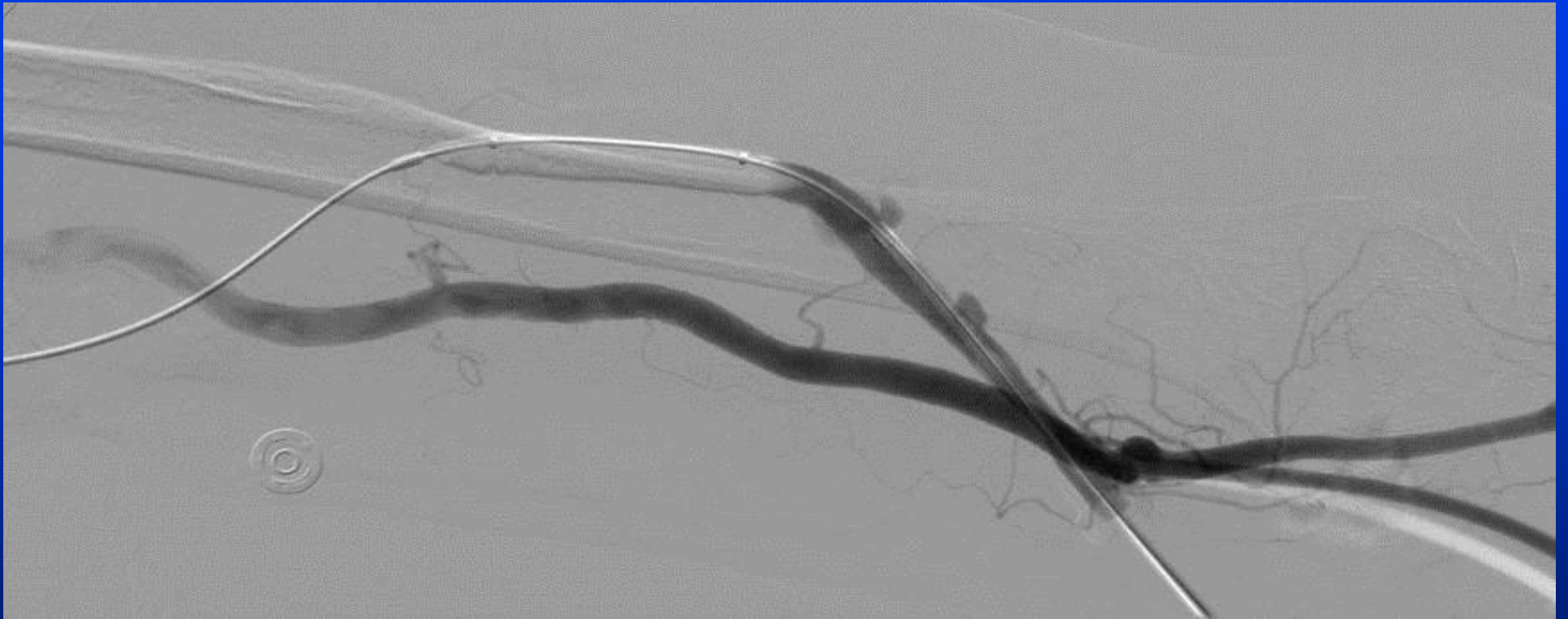
1. Residual stenosis, repeat PTA
2. Residual stenosis, place stent
3. Residual stenosis, place stent-graft
4. Graft-to-vein fistula

Treatment is:

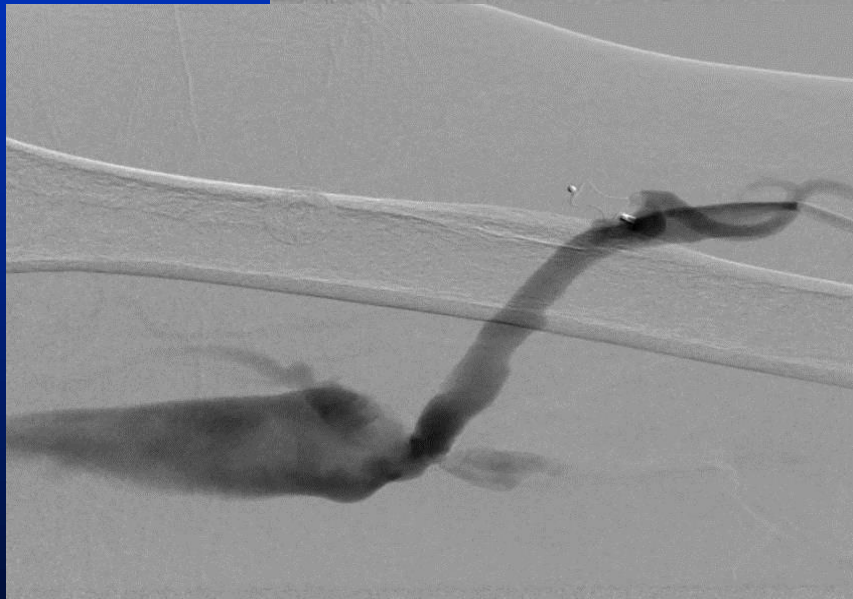
1. Indicated, embolize
2. Indicated, stent graft
3. Indicated, tamponade
4. Not indicated
5. No evidence basis at present

Potential reasons to treat:

1. Stealing flow from graft
2. Increased risk of thrombosis
3. Contributing to bleeding problems
4. Arm swelling
5. All of the above



Balloon tamponade (failed)



Amplatzer



Coils

Algorithm

- Assess symptoms
 - If clearly symptomatic, treat
- Treat cause first
 - PTA VOS
 - Consider endograft for CSL (GVF associated with CSL)
- Embolize of persistent
 - Beware-high flow: tourniquet or BP cuff helps
 - Measure flow pre- and post

Margoles and Trerotola, JVA 2012

Cases

Case 14

ESRD, LUA graft and cold hand, worse on dialysis

What is the suspected diagnosis?

1. Venous outflow stenosis
2. Peripheral vascular disease
3. Arterial embolus
4. Vasculitis
5. Steal

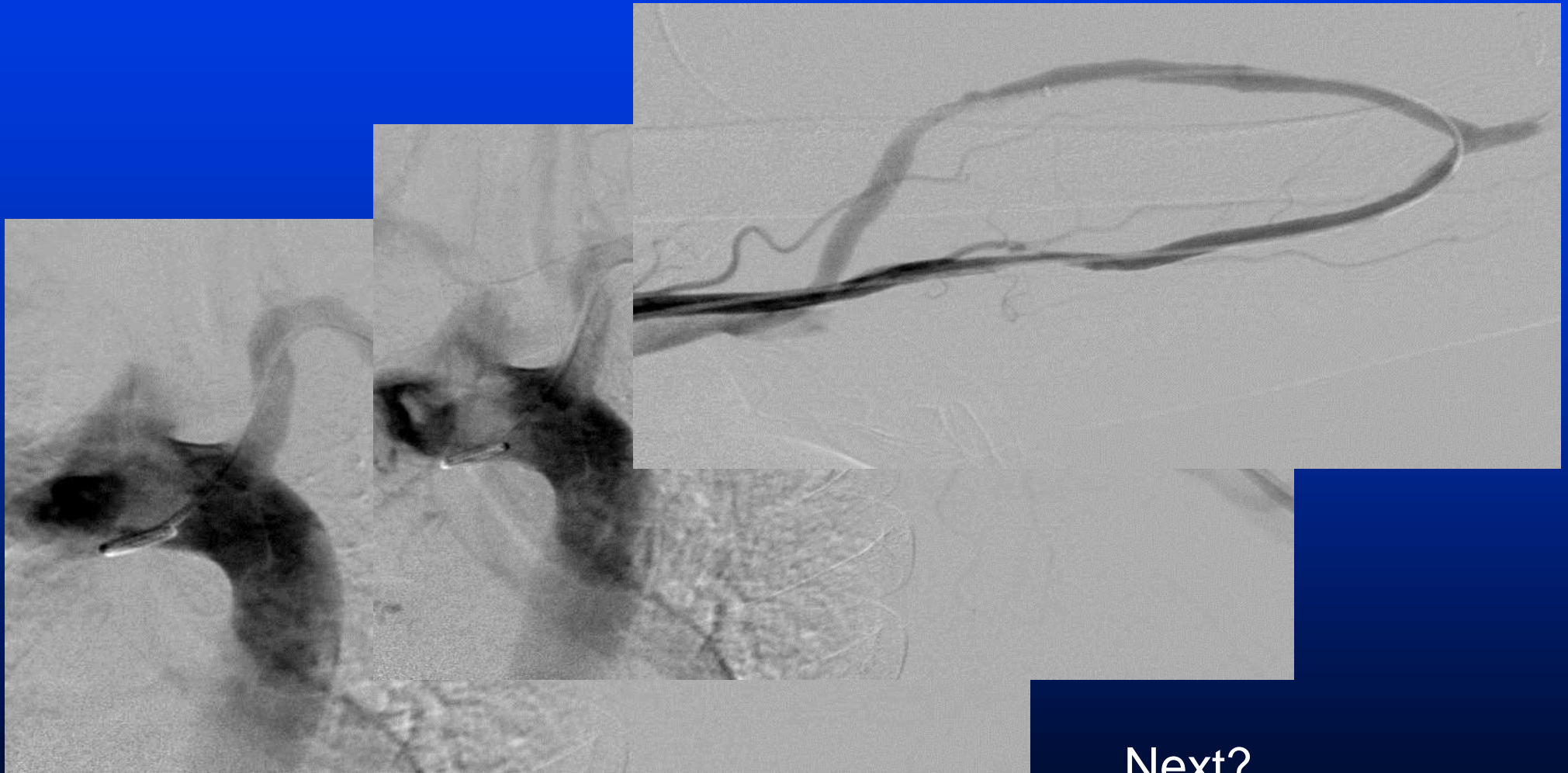
How is this diagnosis usually made?

1. Noninvasive lab tests
2. Physical examination
3. Arteriogram
4. Fistulogram
5. 1+2
6. 1+3
7. 1+4
8. 2+3
9. 2+4
10. 3+4

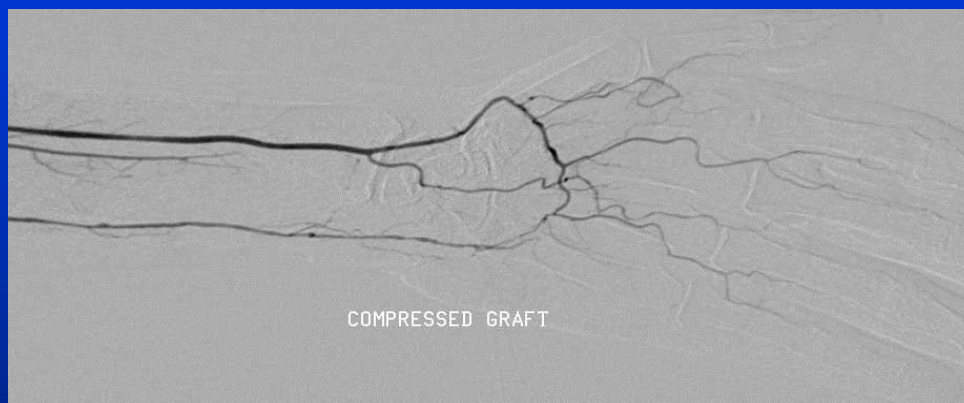
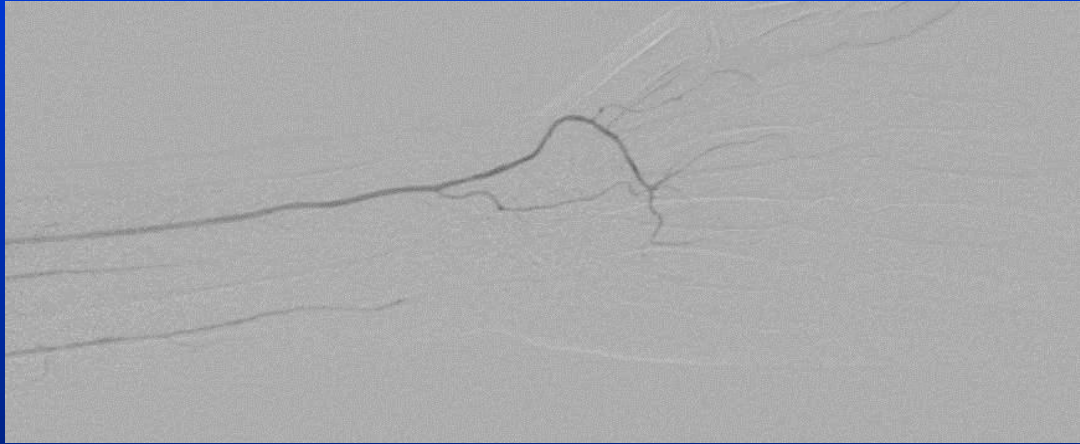
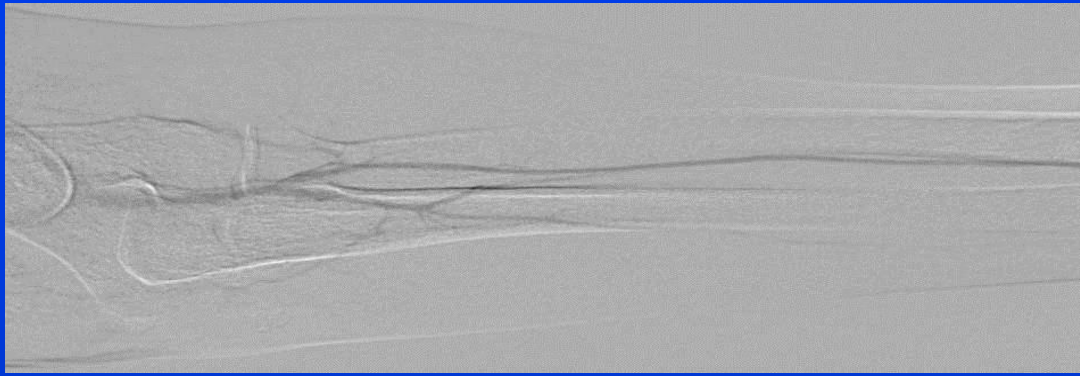
What is the role of the IR study?

1. Make the diagnosis
2. Plan surgical treatment
3. Look for culprit lesion

ESRD, LUA graft and cold hand, worse on dialysis



Next?



What is the diagnosis?

1. Steal with no treatable lesion
2. Steal with a culprit lesion in the graft
3. Steal with a culprit lesion in the artery
4. Steal with a remote inflow stenosis

Pt was sent home without intervention. Discussed at access conference and brought back for pressure measurement



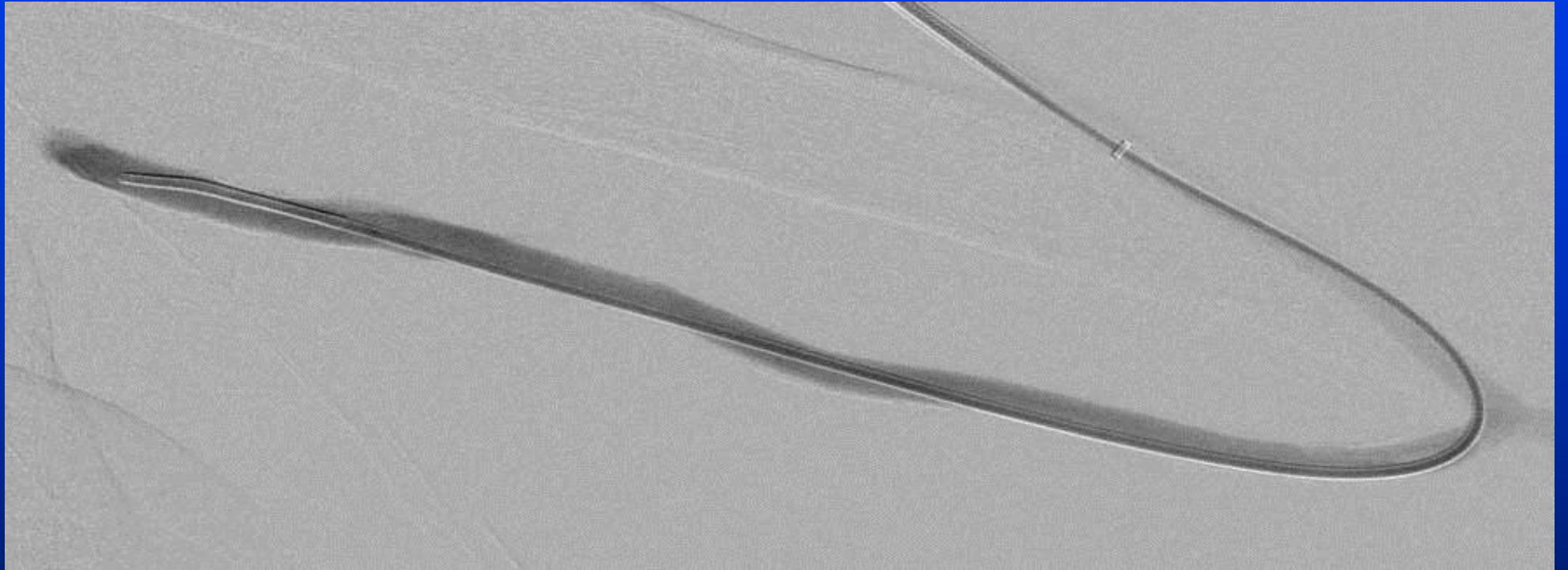
Δ 30 mmHg systolic and mean-next?

Treatment should be:

1. Stent brachial artery stenosis
2. Surgical revision of access
3. PTA of brachial artery stenosis

If this pt has associated venous outflow stenosis you should:

1. Treat it
2. Treat it only if associated clinical indicator, eg high pressures
3. Use flow measurement and treat if <600 mL/min
4. Use flow measurement and treat if <400 mL/min

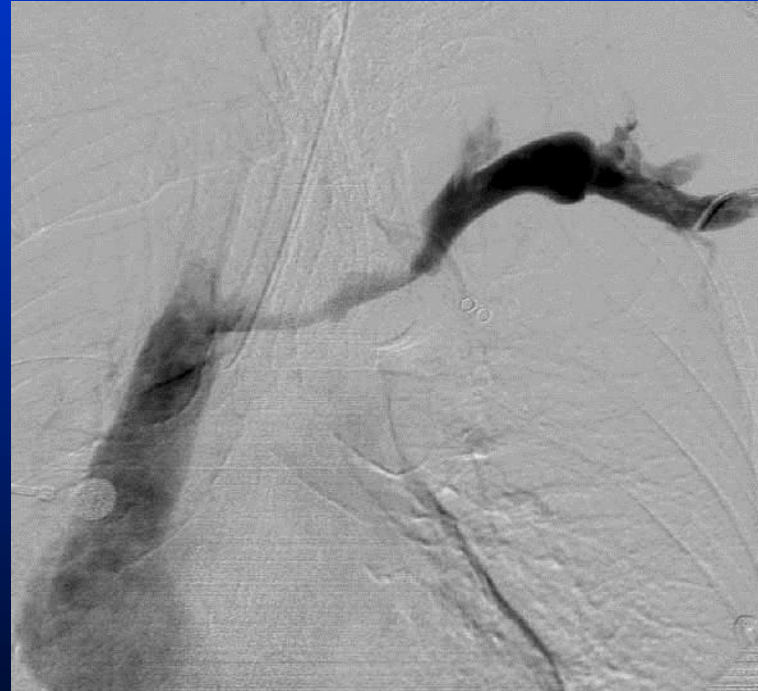
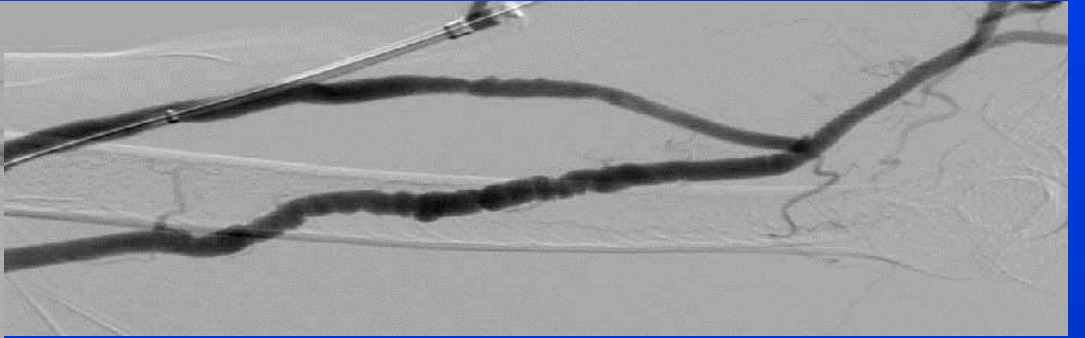


Post PTA 6 mm- Δ 10 mmHg systolic and 2 mmHg mean

Cases

Case 15

Hemodialysis access with poor flow



What access type is this?

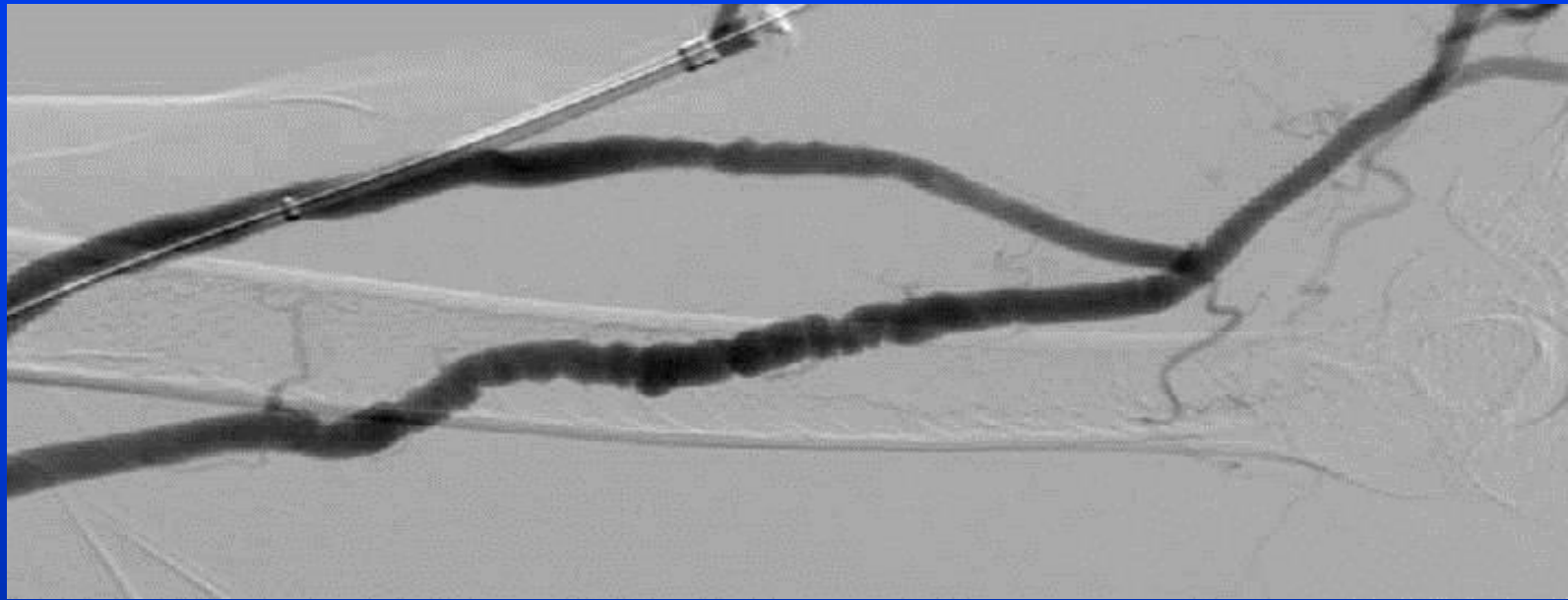
1. Graft
2. Brachiocephalic fistula
3. Radiocephalic fistula
4. Cephalic vein transposition
5. Basilic vein transposition

What is cause of poor flow?

1. Central venous stenosis
2. Perianastomotic stenosis
3. Swing point stenosis
4. Brachial artery disease

The brachial artery disease is:

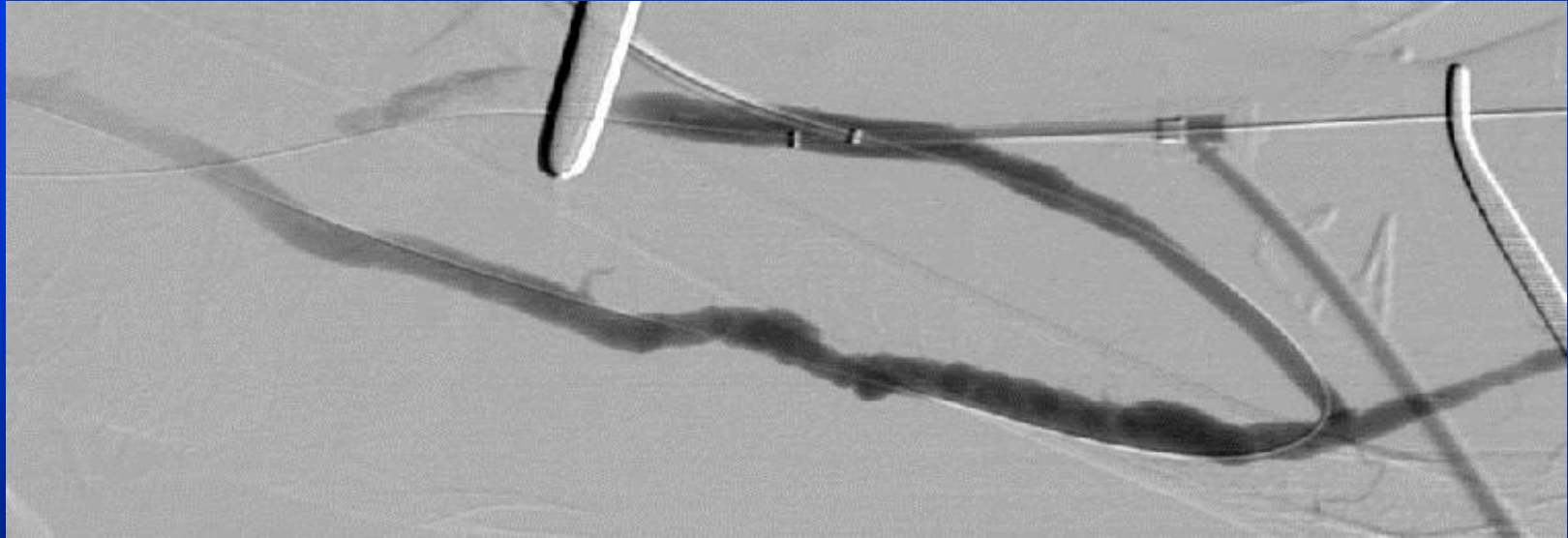
1. FMD and should be ignored
2. FMD and should be treated if pressure gradient
3. Spasm and NTG should be given
4. Atherosclerotic disease and should be treated if pressure gradient
5. Atherosclerotic disease and should be ignored



Post PTA

The response to PTA helps make
the diagnosis

1. True
2. False



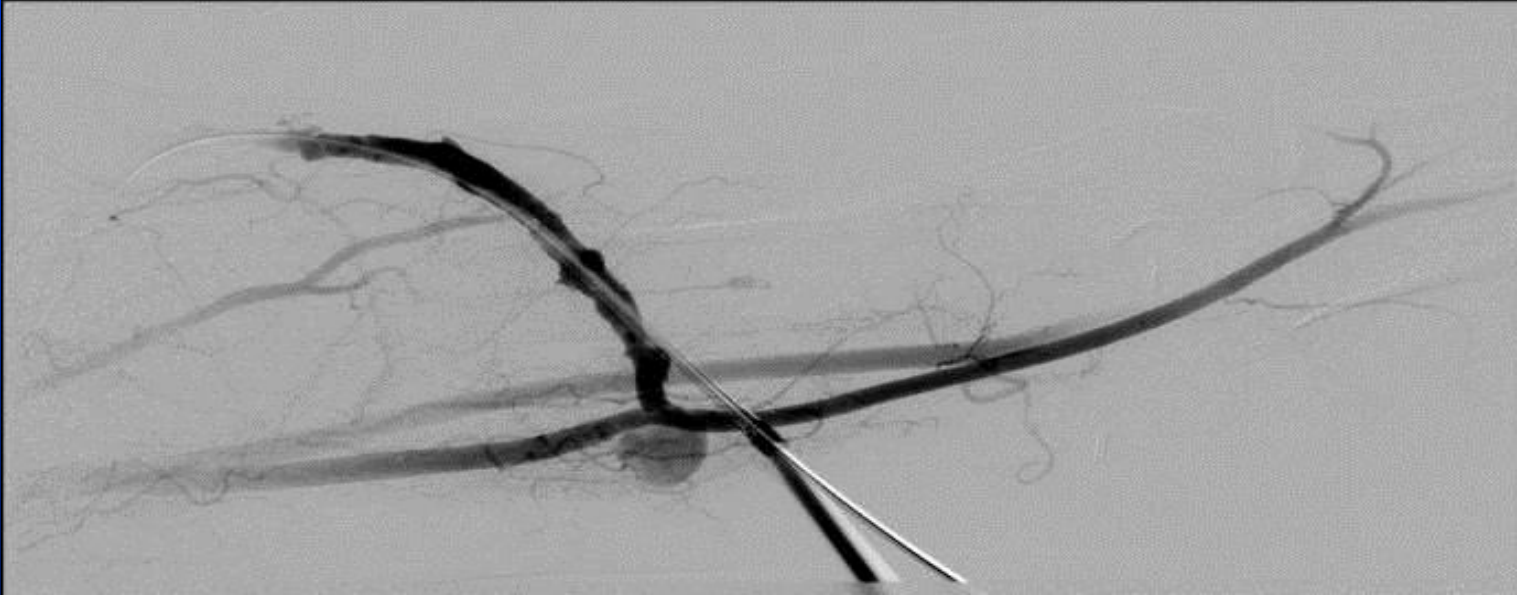
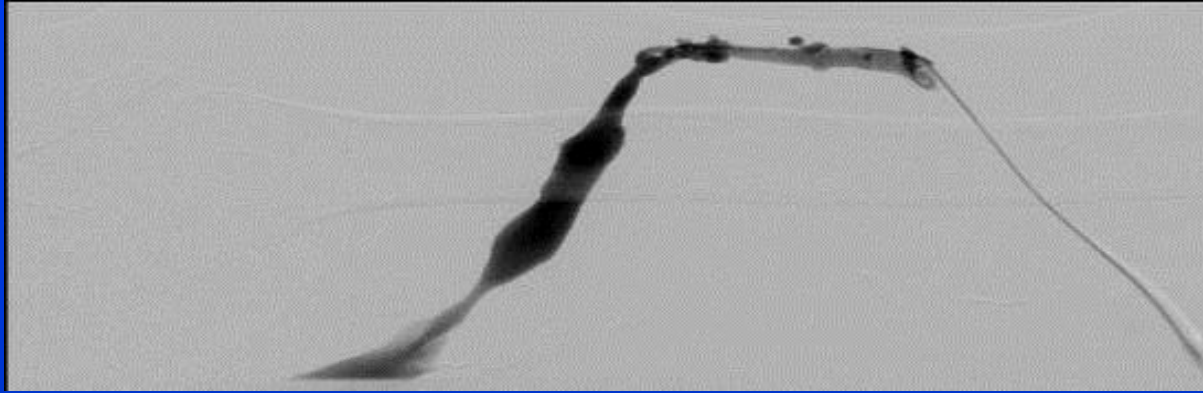
3 month FU

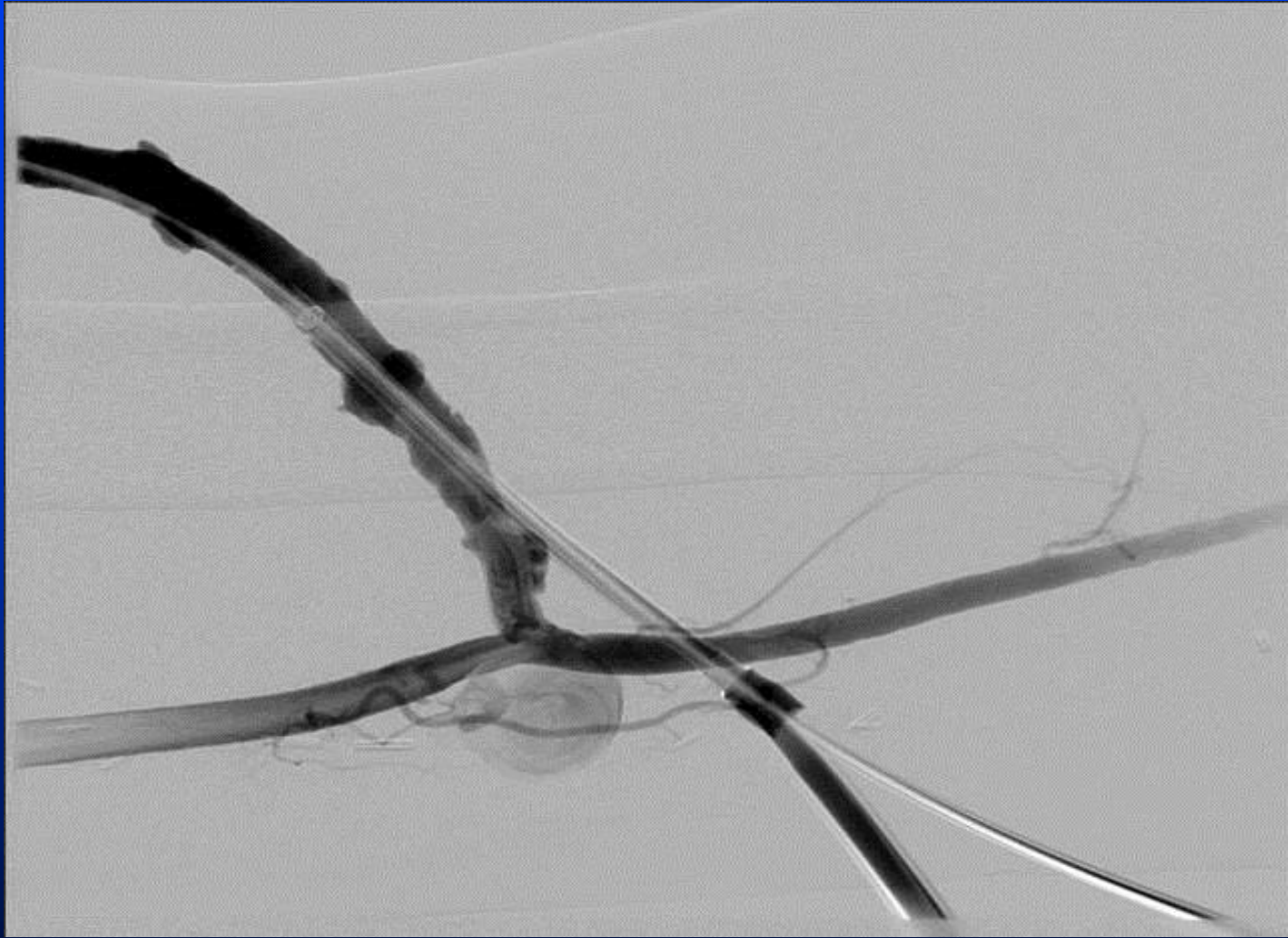
Long term patency

1. Should be excellent, better than usual access PTA
2. Should be poor, worse than usual access PTA
3. Who the heck knows?

Case 16

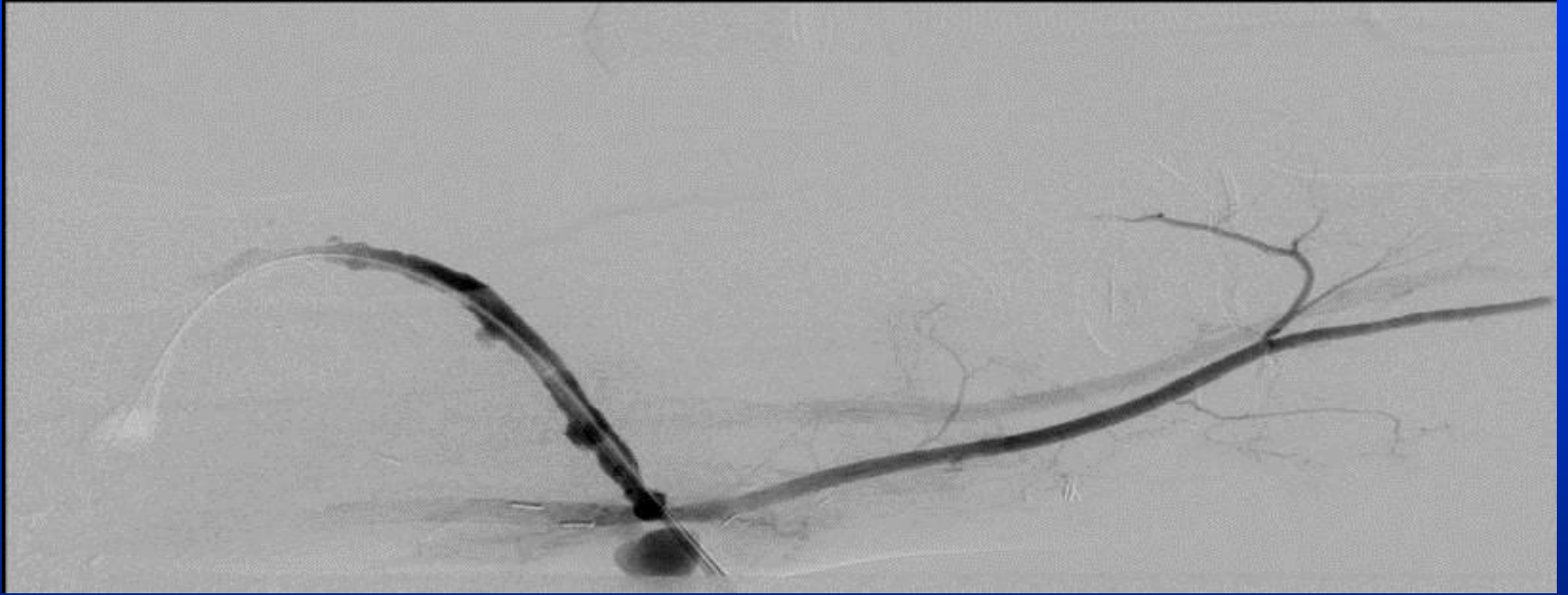
LUA BVT, poor flow, palpable mass near anastomosis



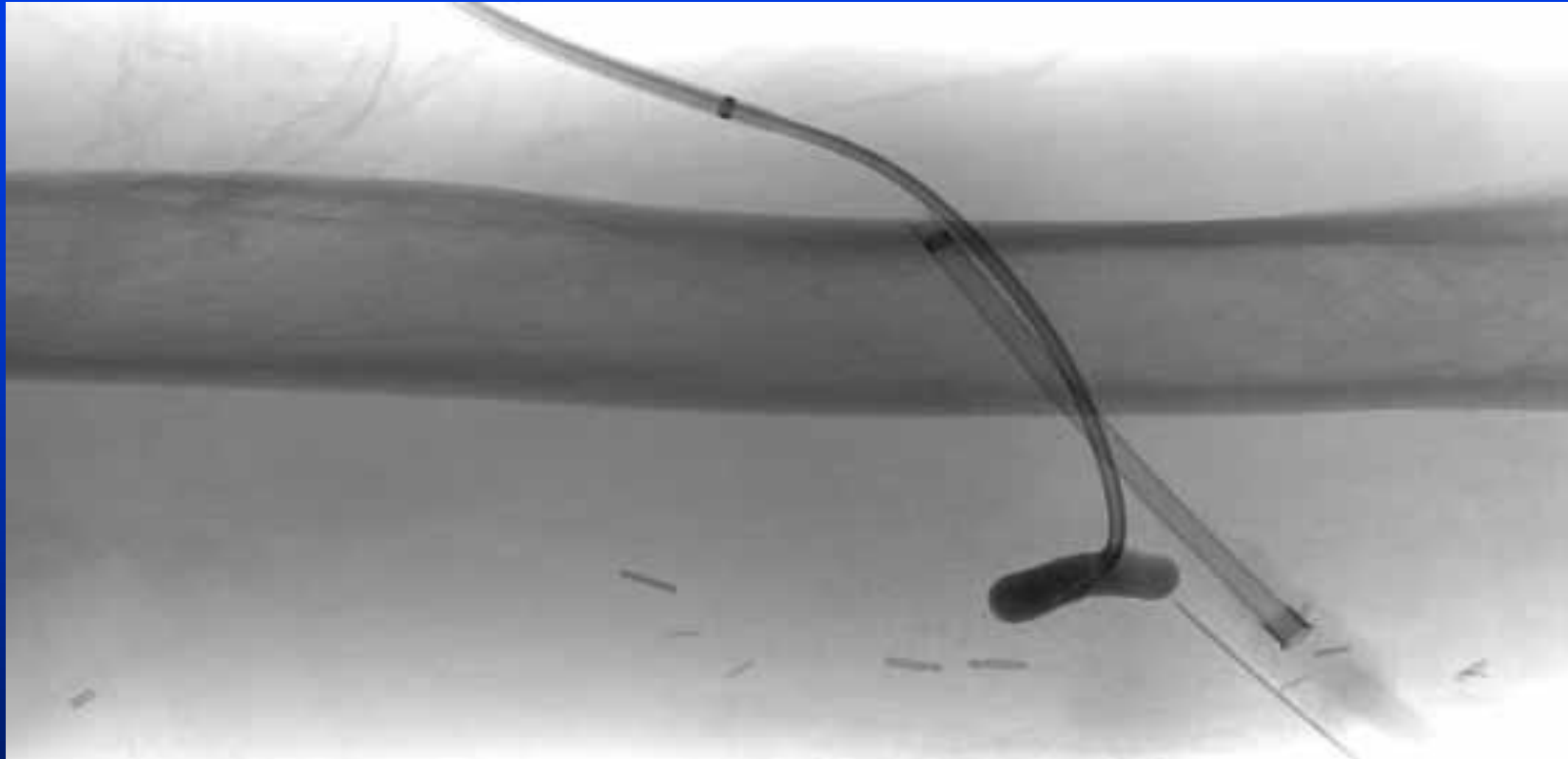




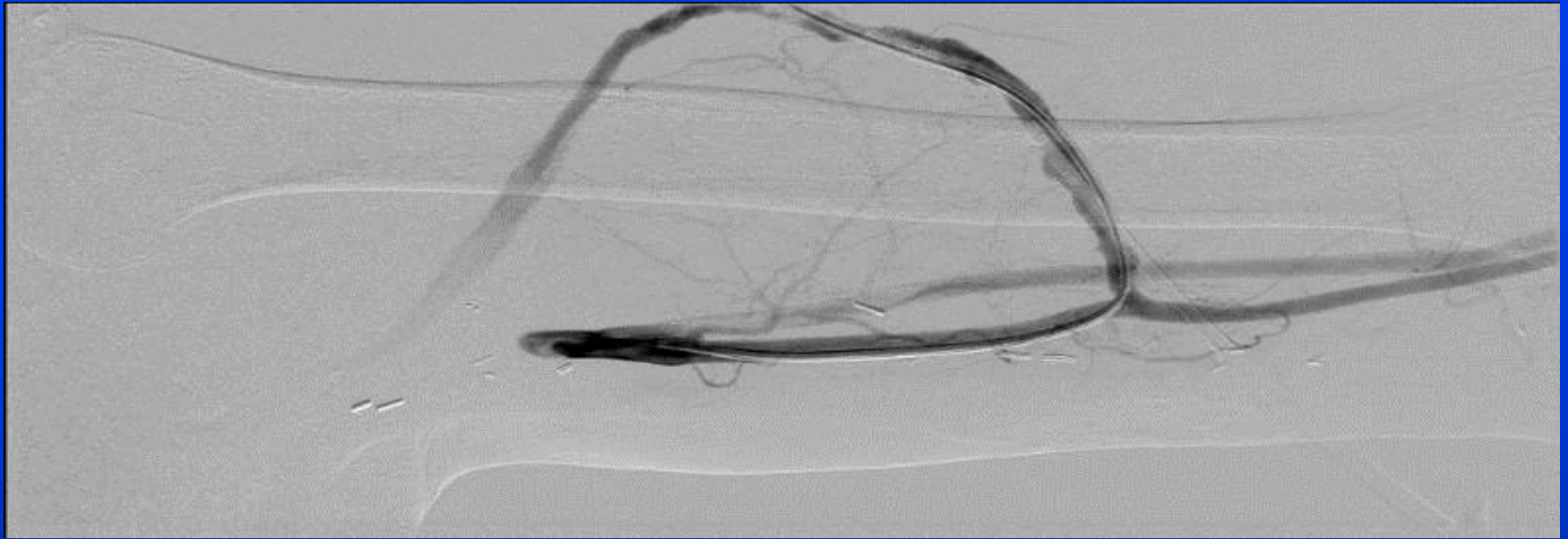
Post PTA



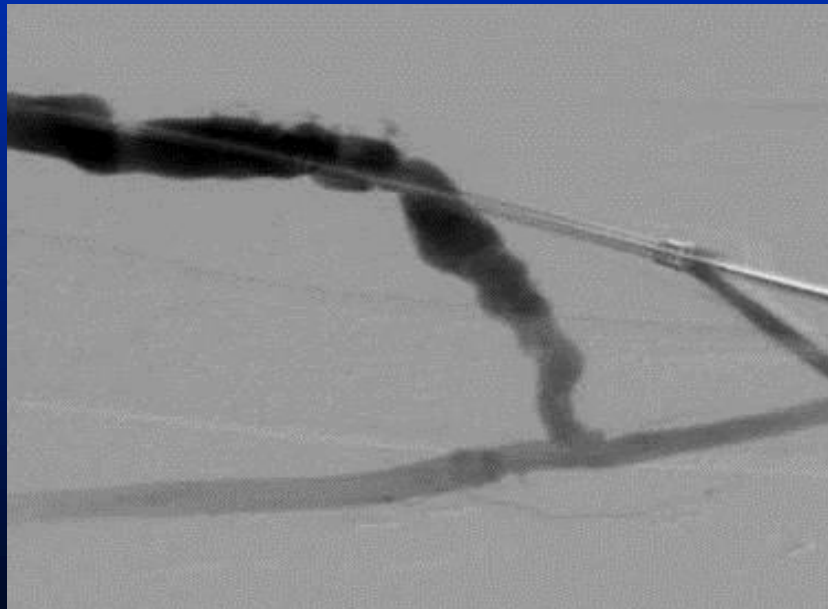
Post PTA-options?



Thrombin 800 units



Post thrombin

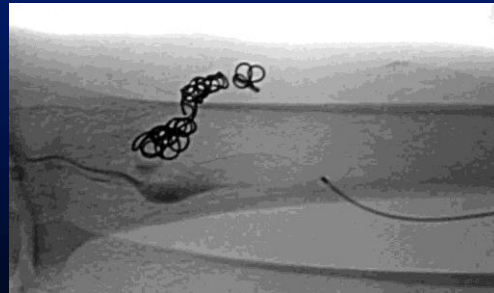


8 month FU

Cases

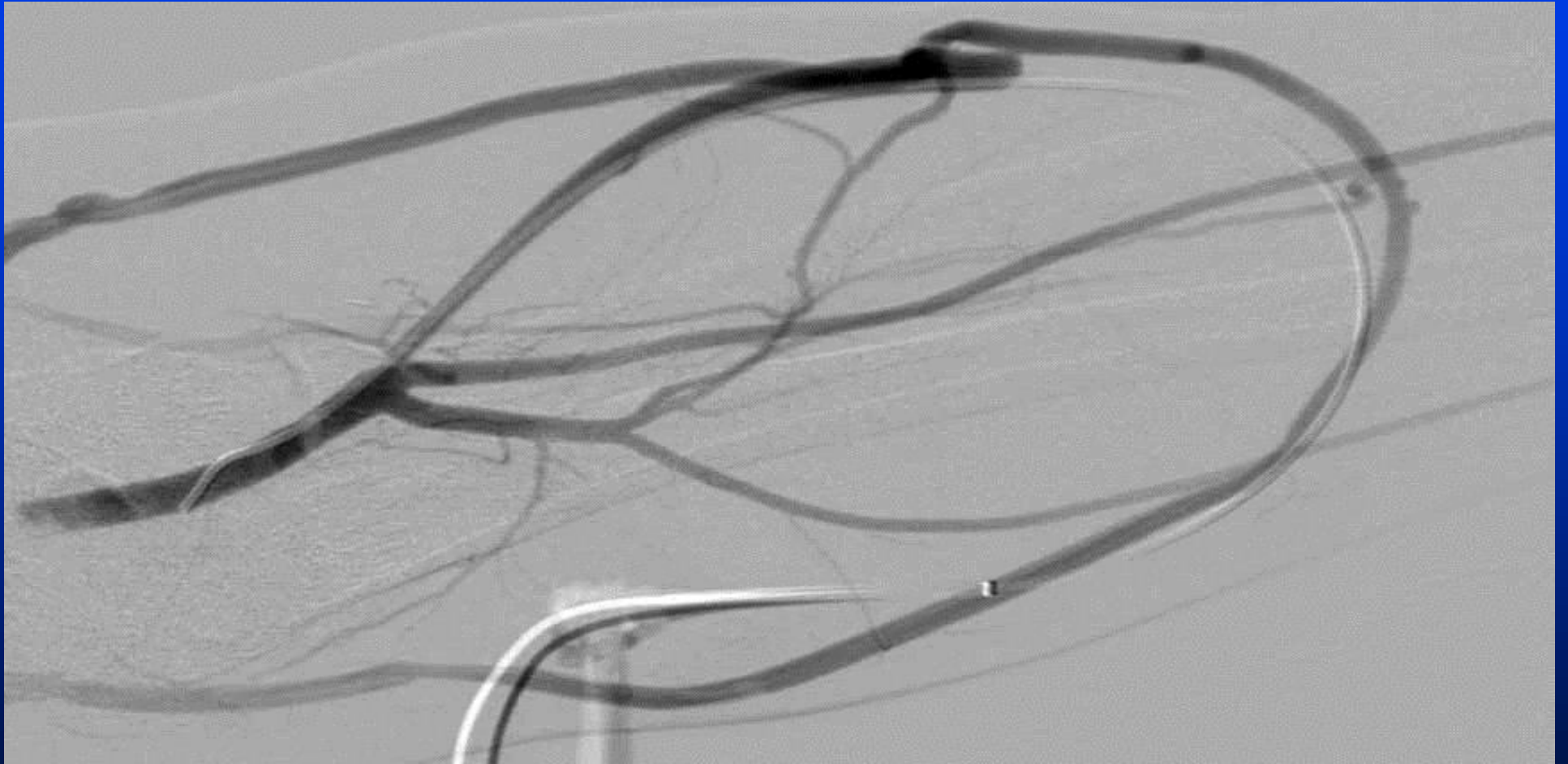
Case 17

Hand swelling with old fistula

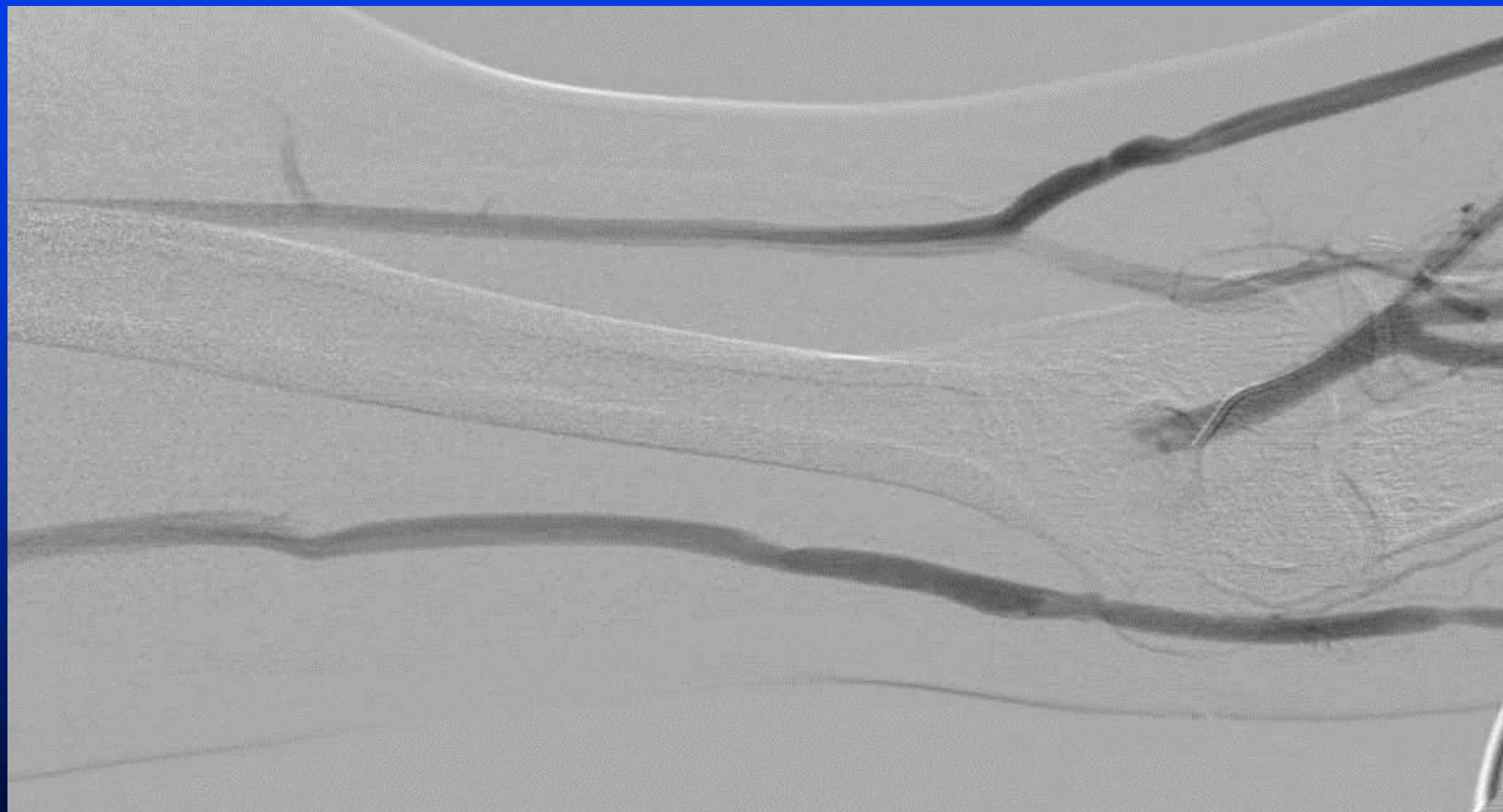


Cases

Case 18



Review study, develop plan





Cases

Case 19

Recently placed RUA
dialysis graft, ischemic
fingers

Clinical evaluation?

Diagnostic testing?

Treatment?



Extra credit: incidence of anomaly, importance







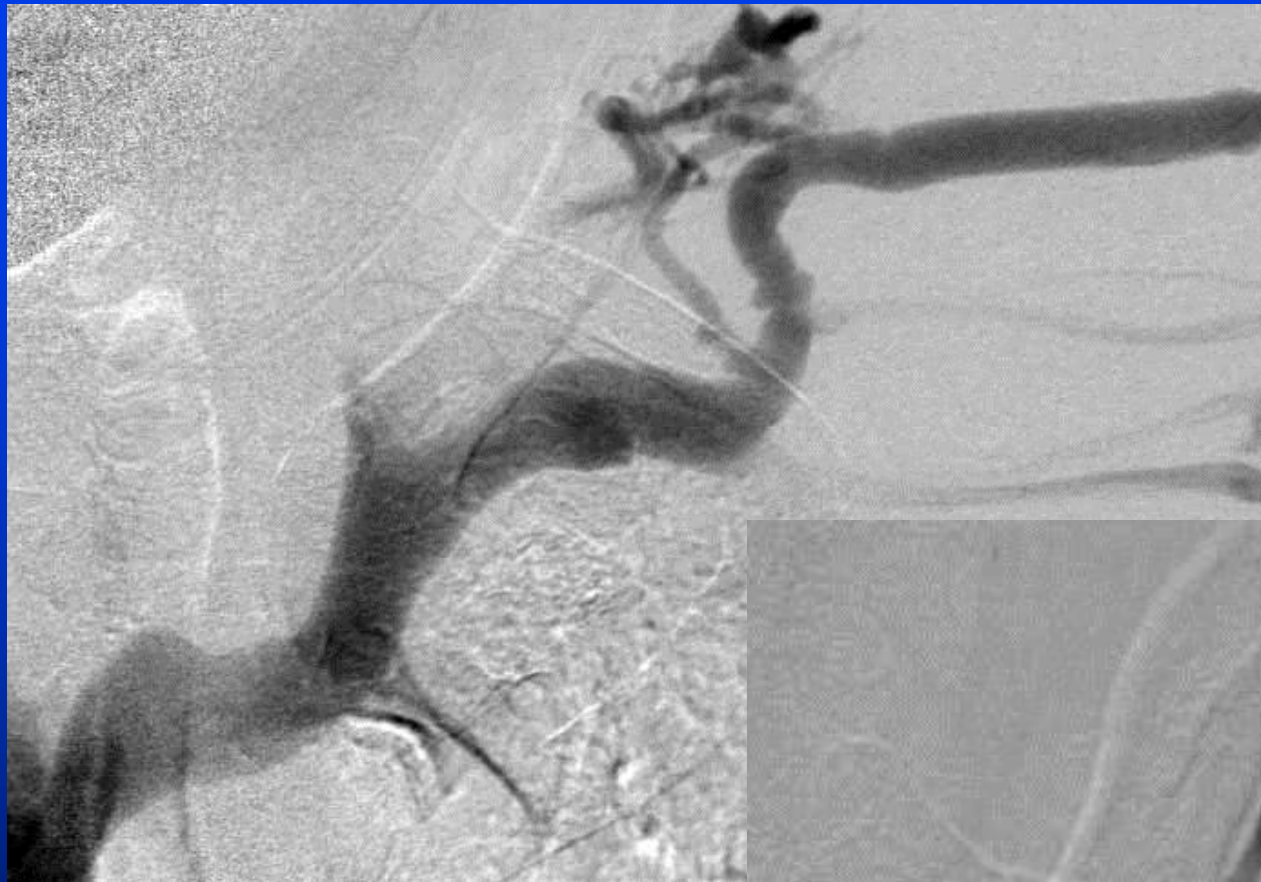
Treatment?

Any technical considerations?



Cases

Case 20



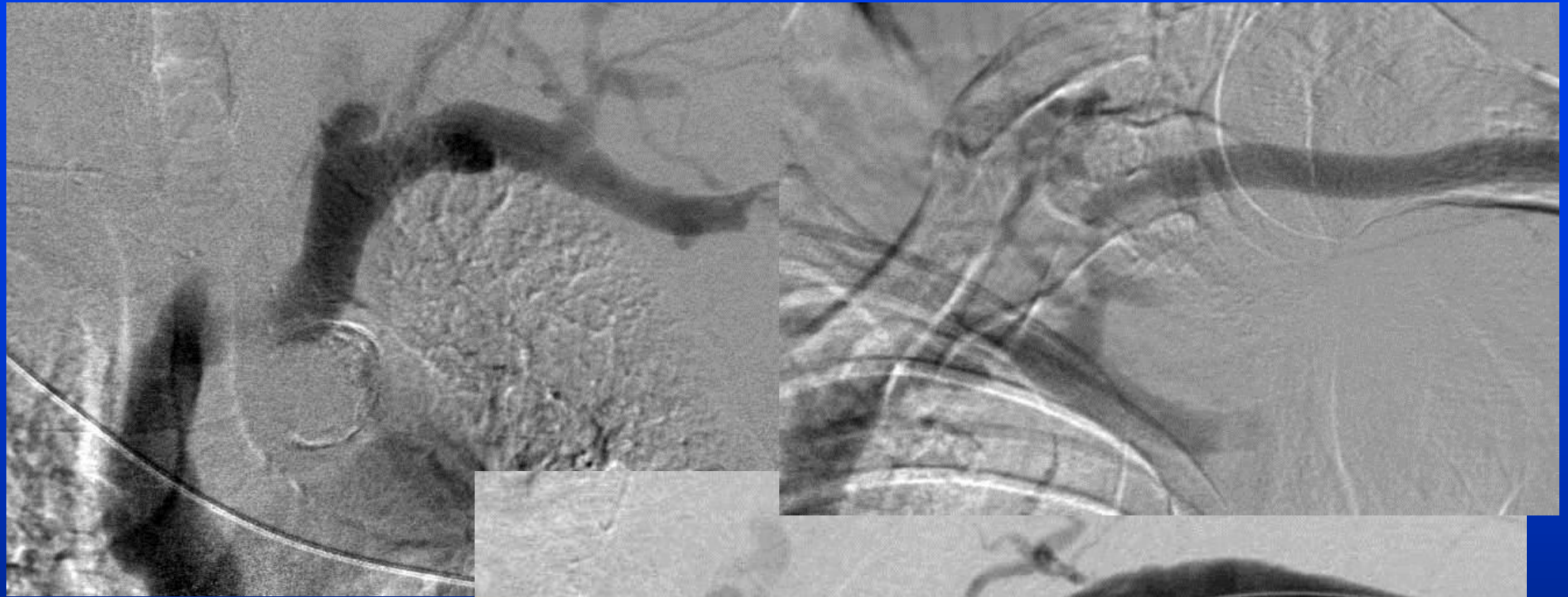
3-12-07





6-27-07





9-26-07 PTA
terminal arch

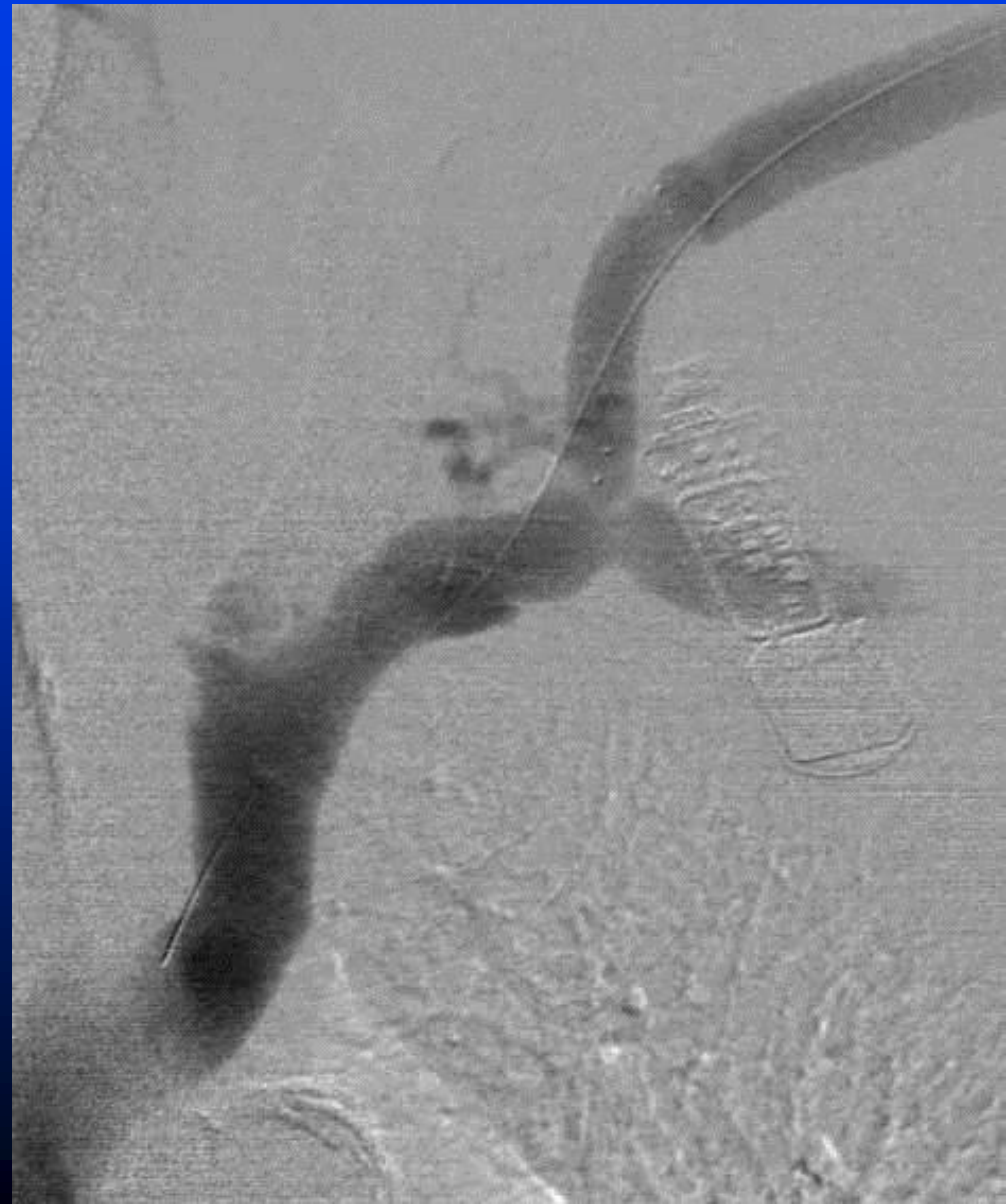


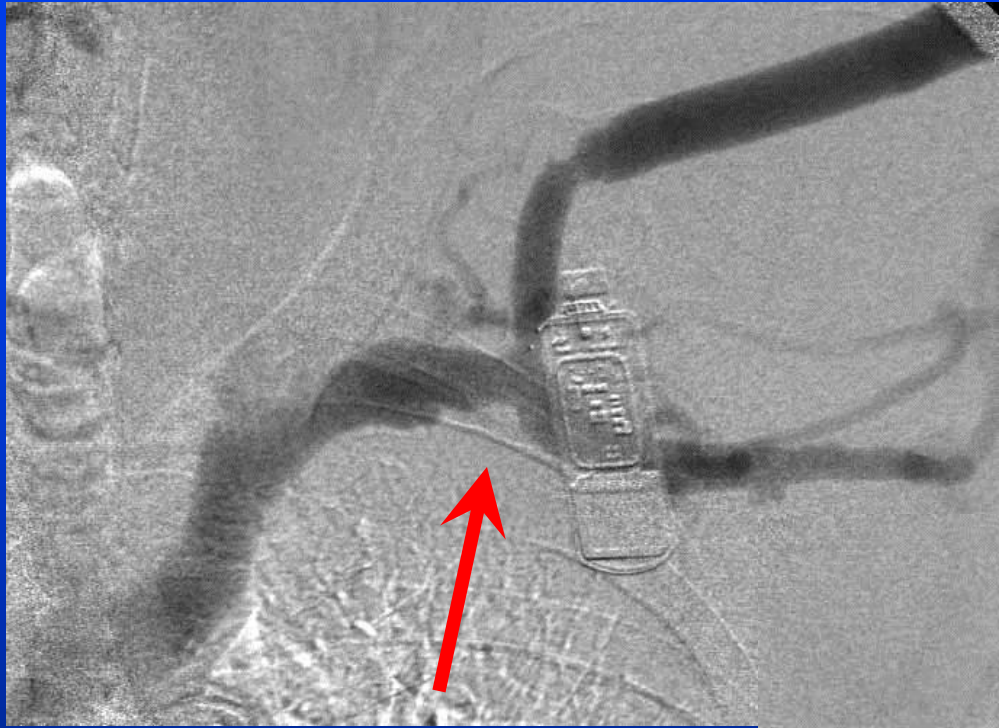


11-27-07
Stent placed for
rupture post PTA
with failed
tamponade



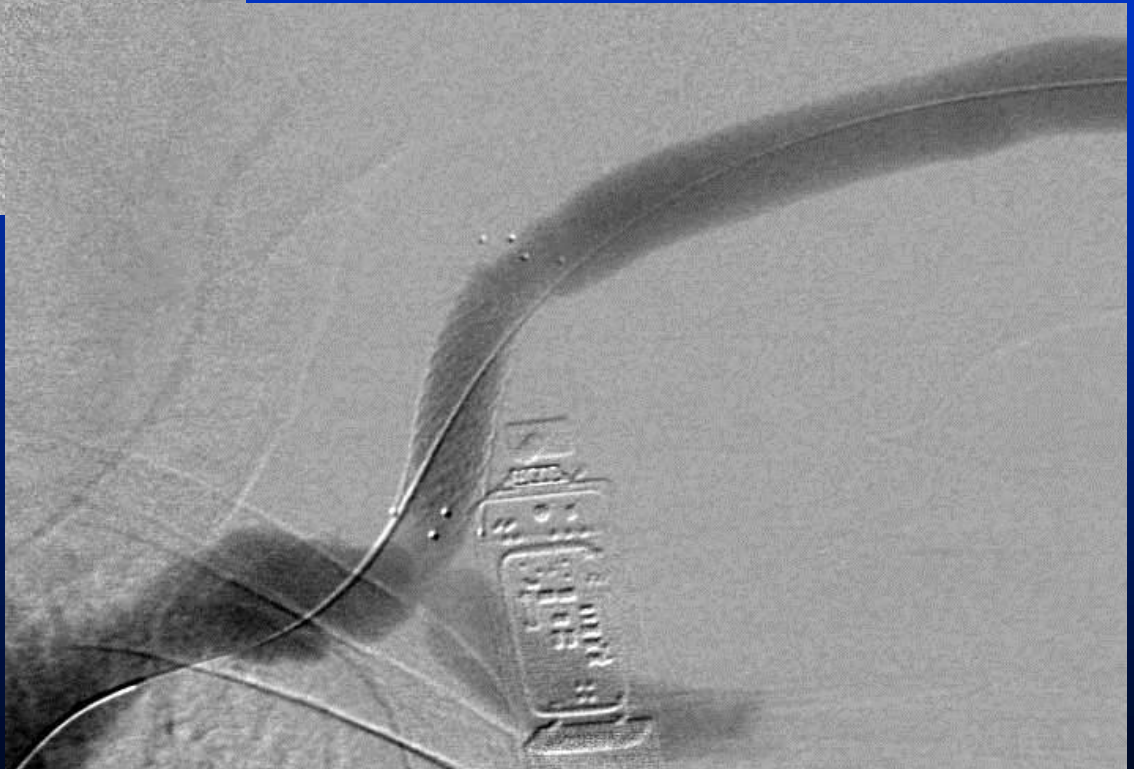
4-29-08 PTA candy-
wrapper restenosis



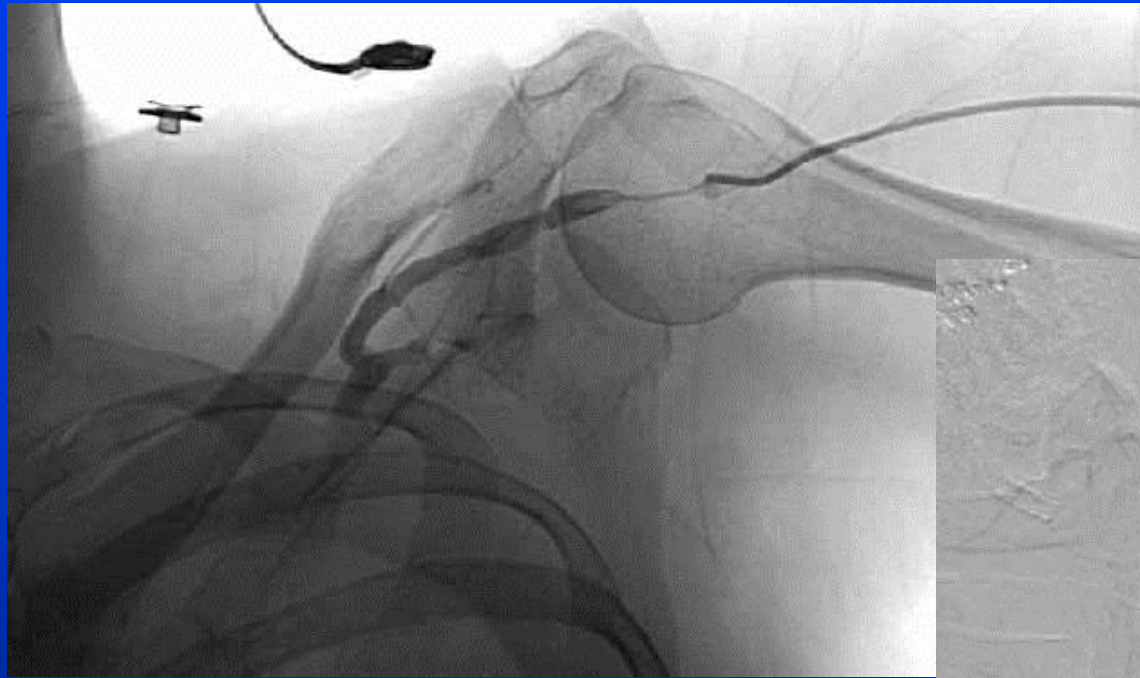


11-20-08 PTA
candy-wrapper
restenosis

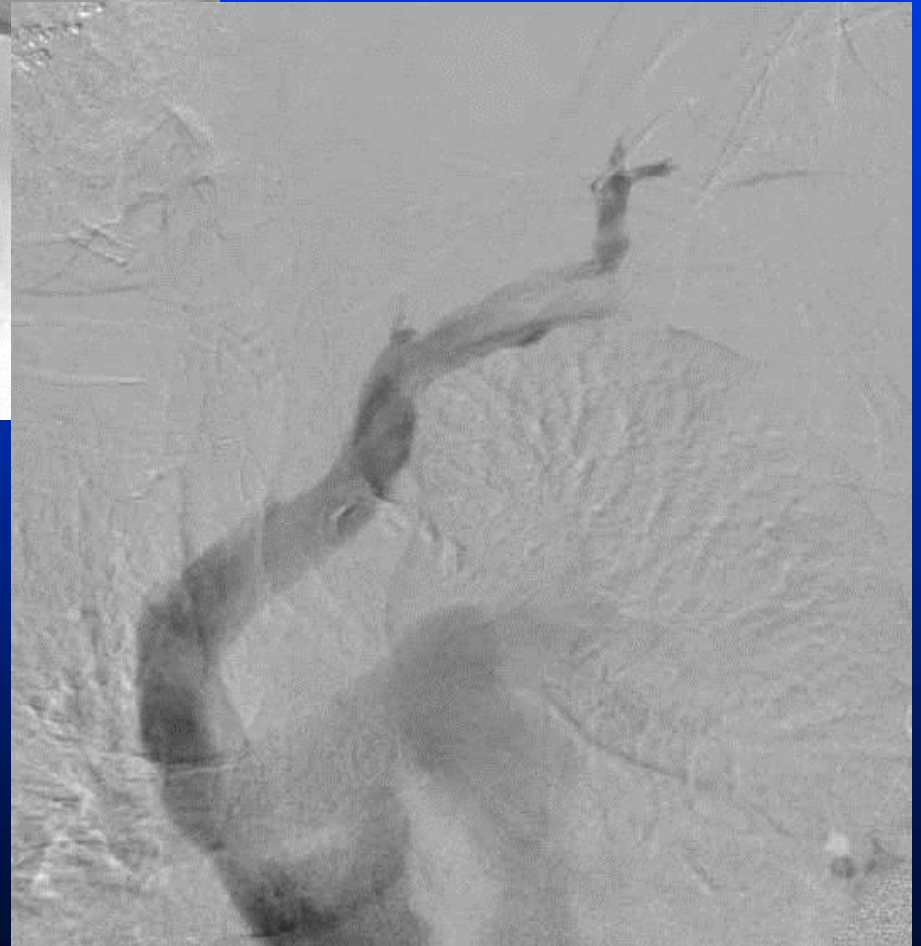
Cases



Case 21

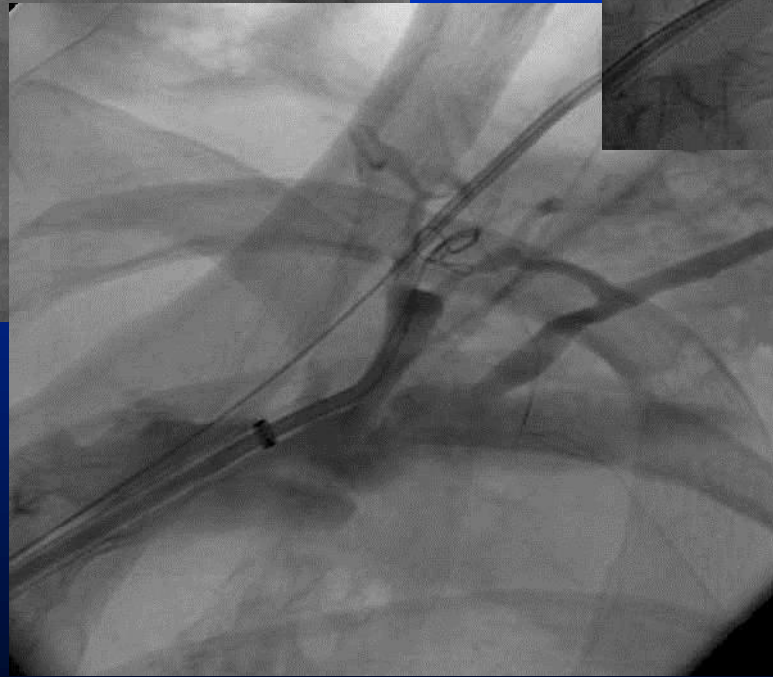
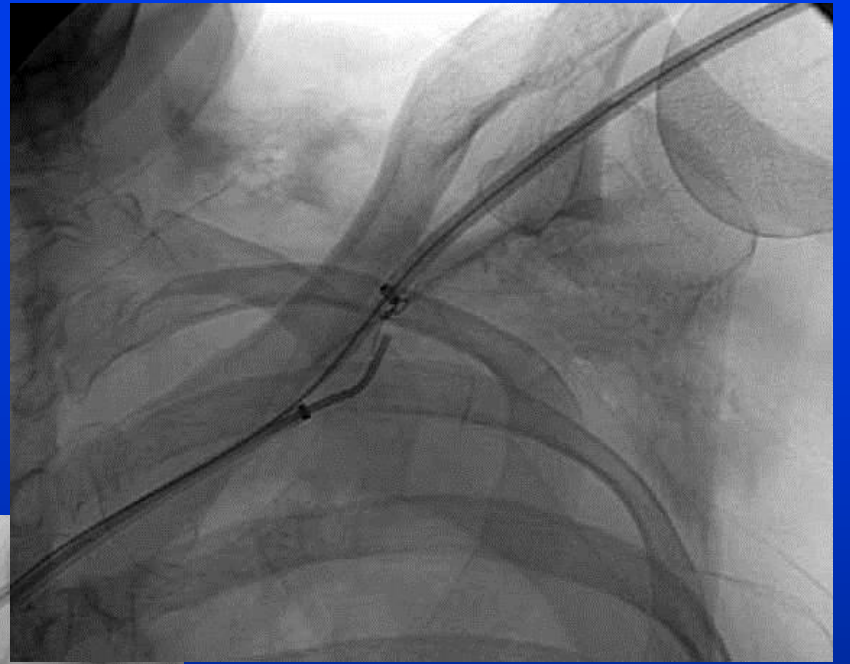


Clotted LUA BCF
Pullback venogram



PTD caught in vein,
operator pulled
instead of
disconnecting and
turning
counterclockwise,
unable to cross from
above. Femoral
approach

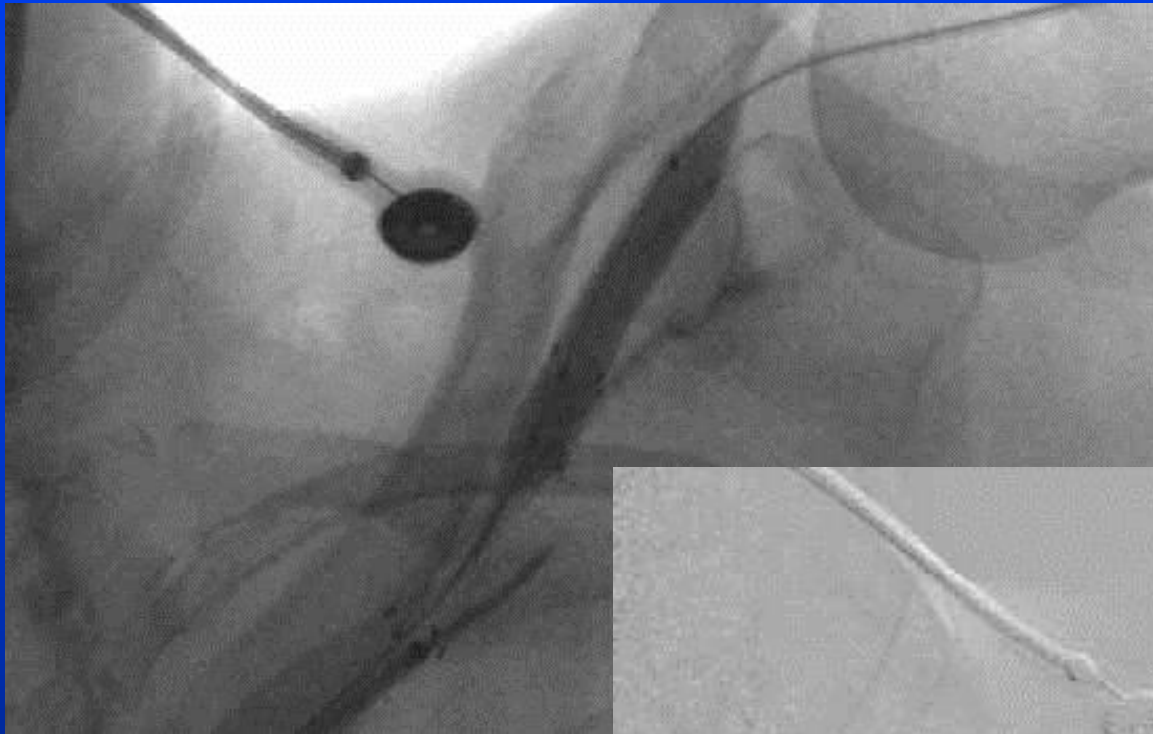




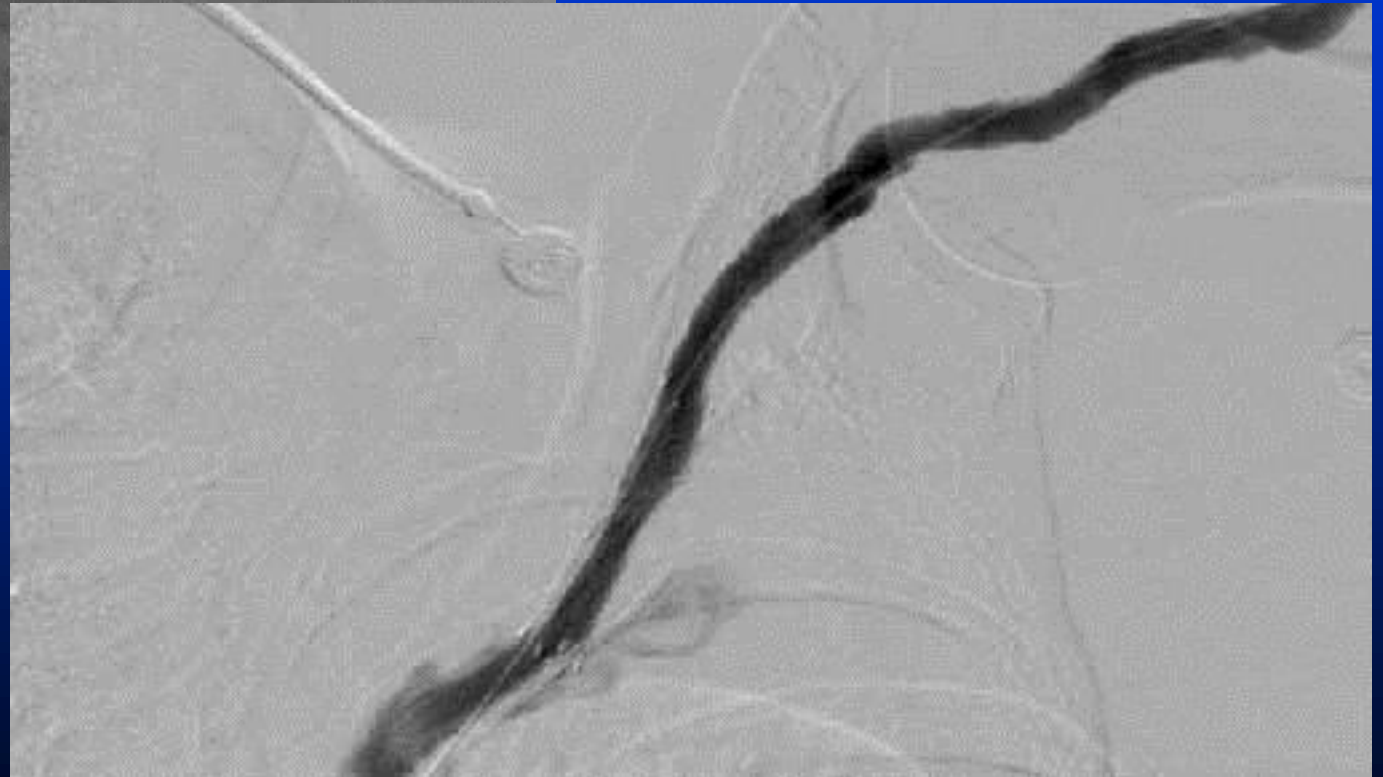
Rendezvous

Fluency covered stent (off-label)





Uncovered stent

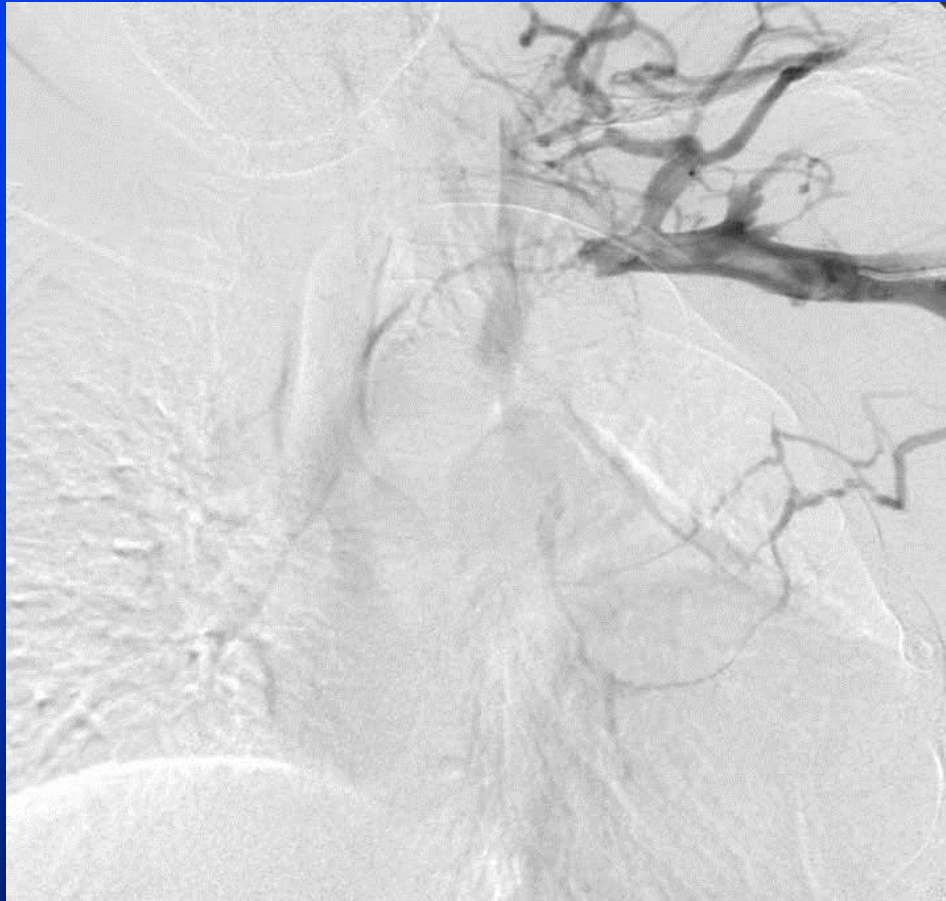




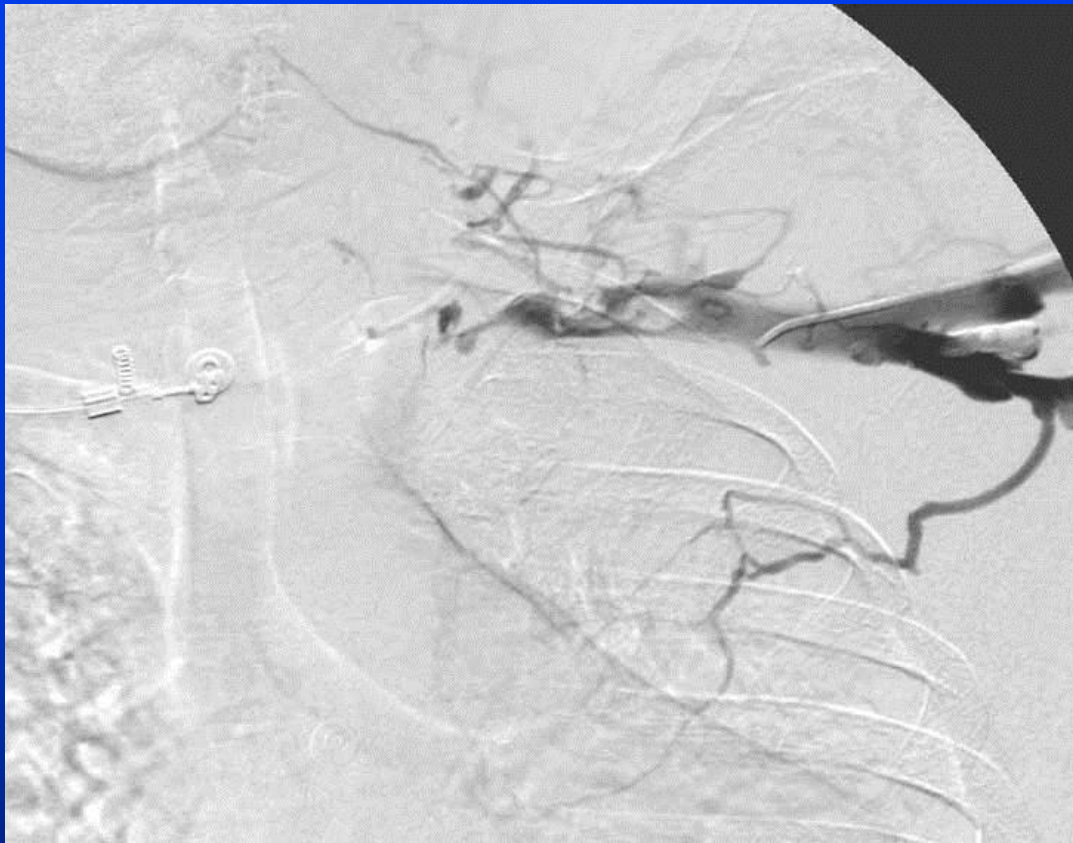
Note stent position with respect to axillary vein: Primum non nocere

Cases

Case 22



Clotted LUA graft,
OSH placed stents
VOS

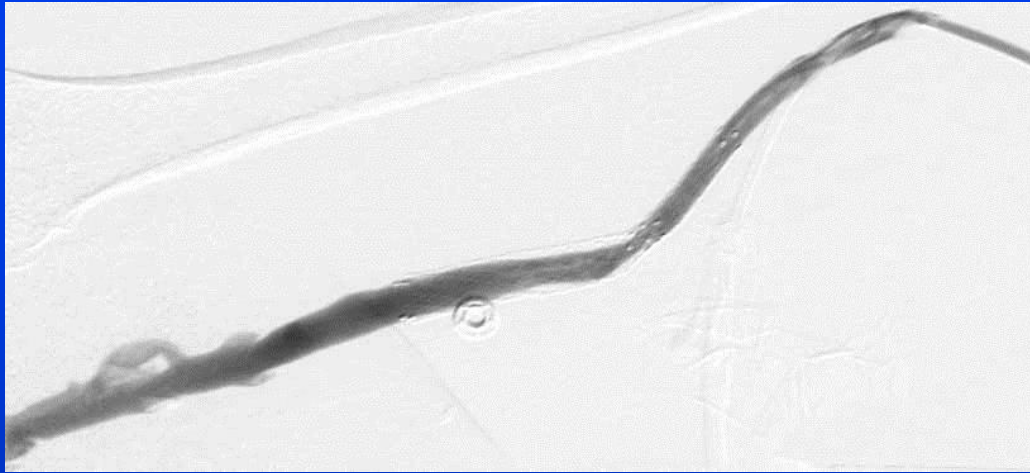


Post 24 hour tPA infusion

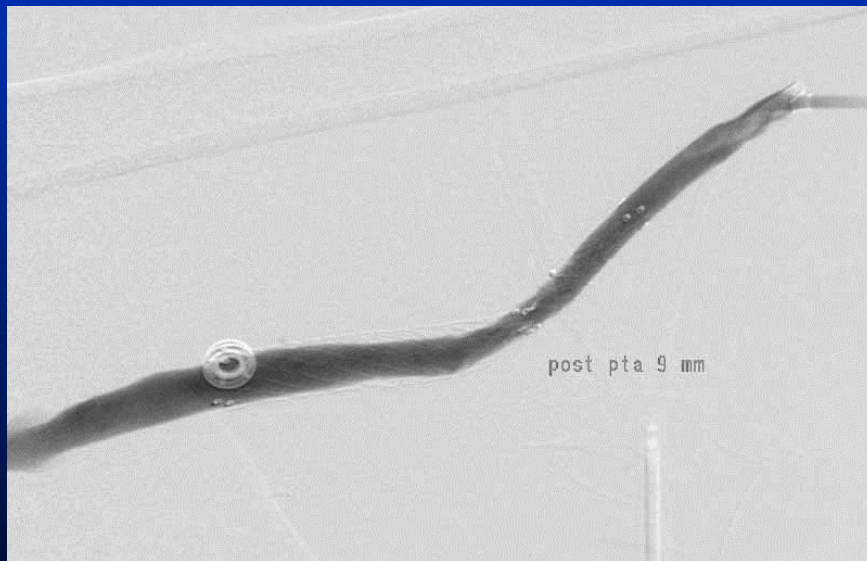


Post PTD



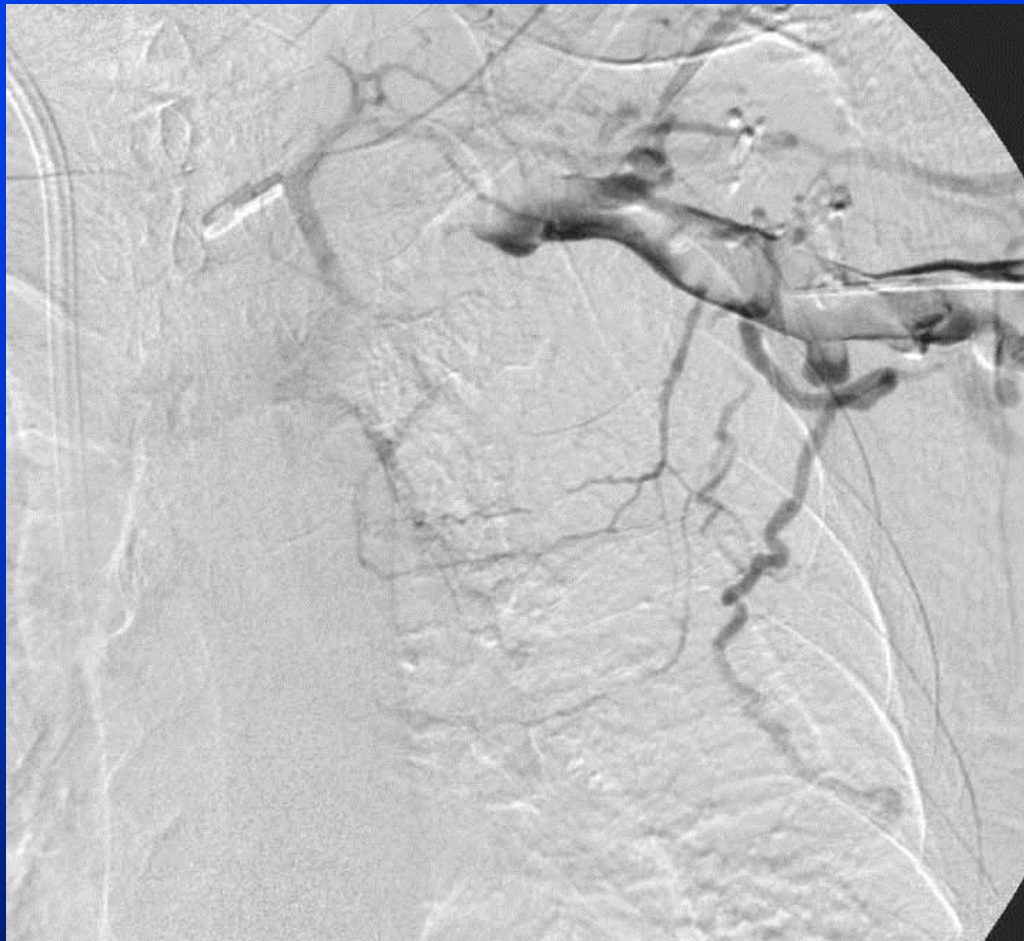


PTD declot, PTA restenosis VOS

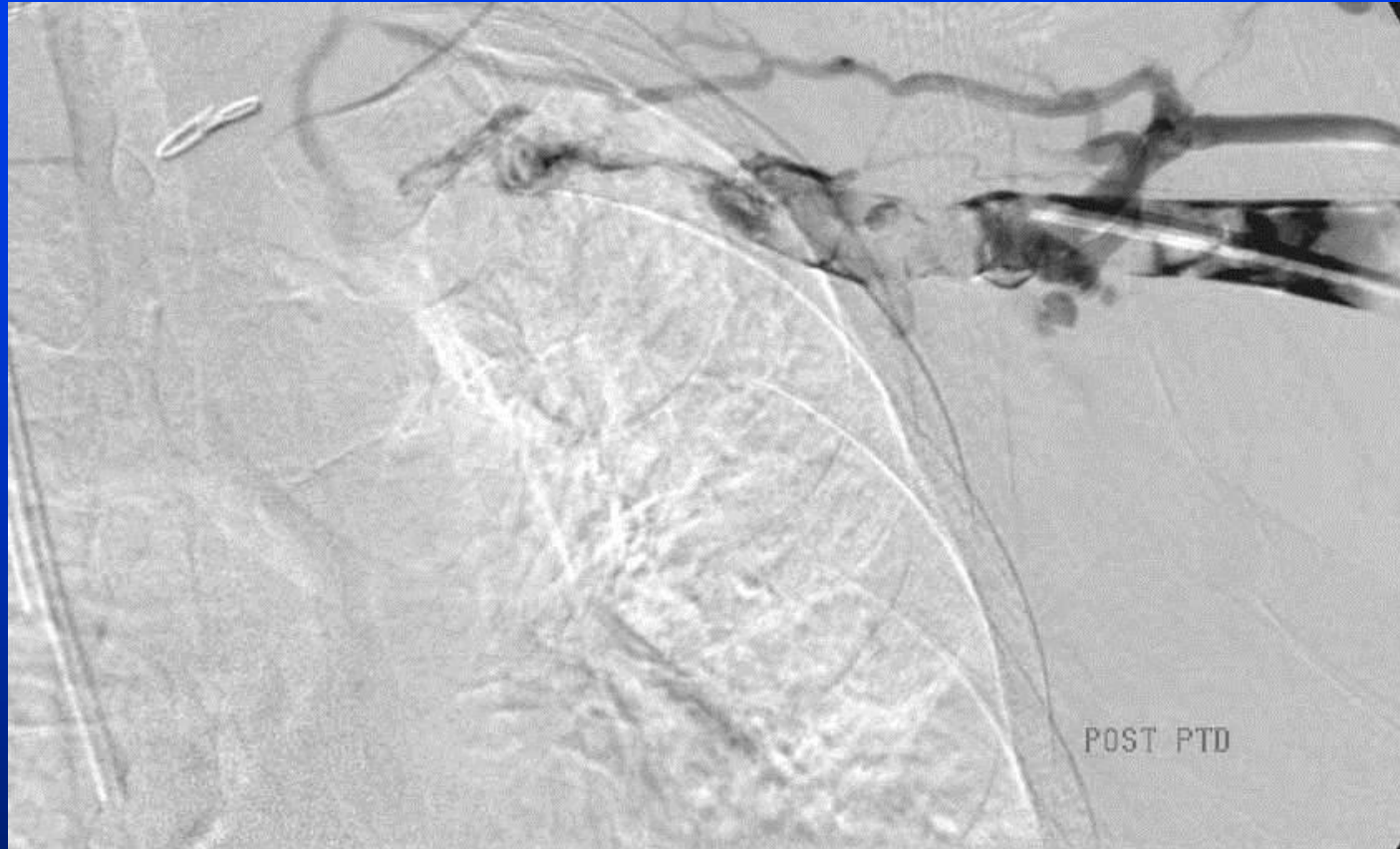


Cases

Case 23



Clotted LUA graft, OSH
placed stents VOS, 2d
post abdominal surgery



Tried PTD, AngioJet, aspiration, all failed, access abandoned

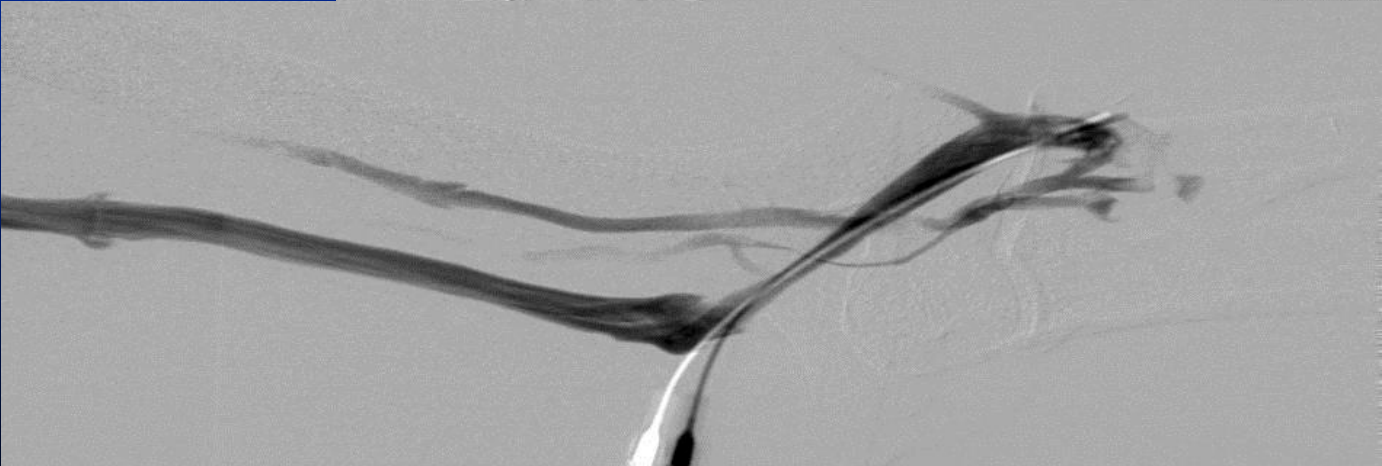
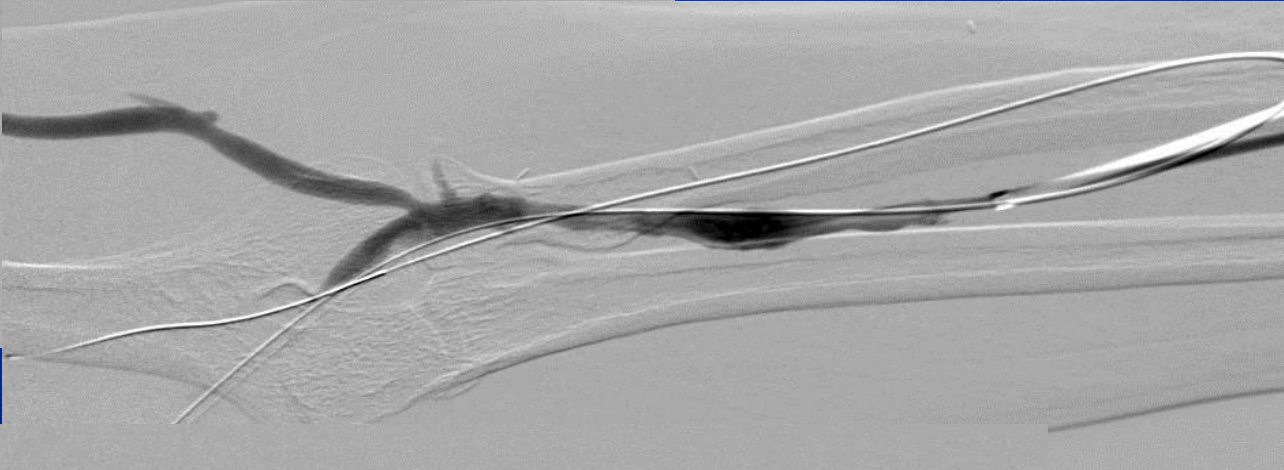
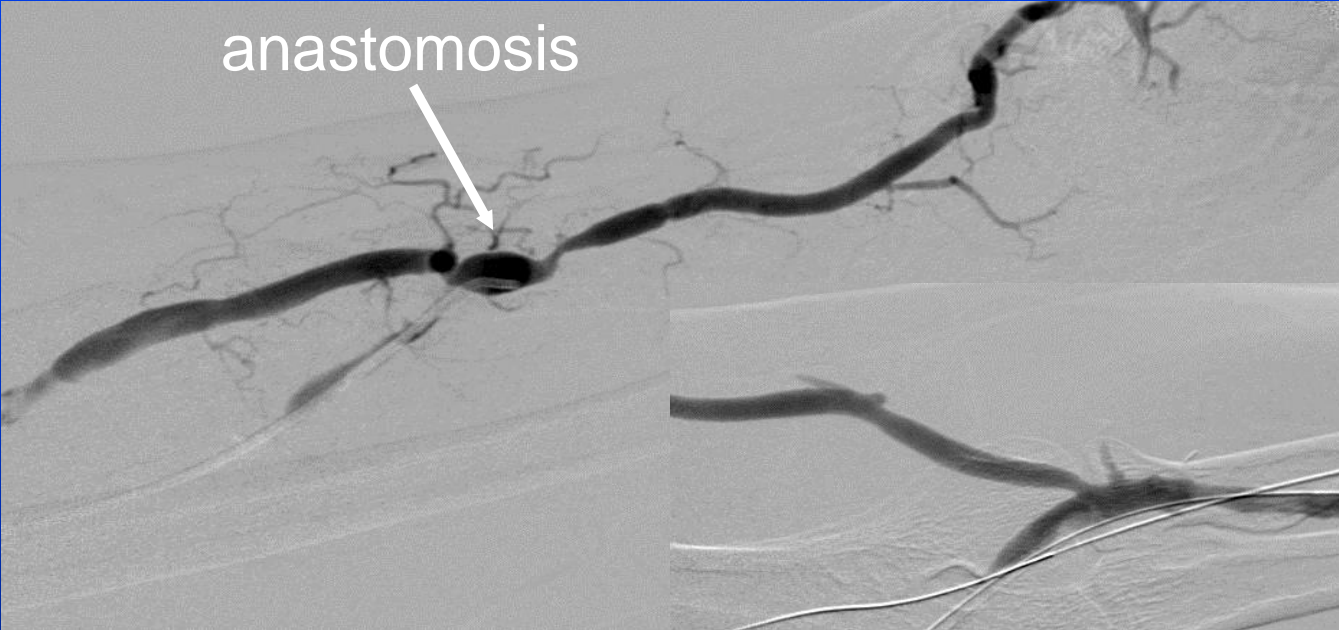
Cases

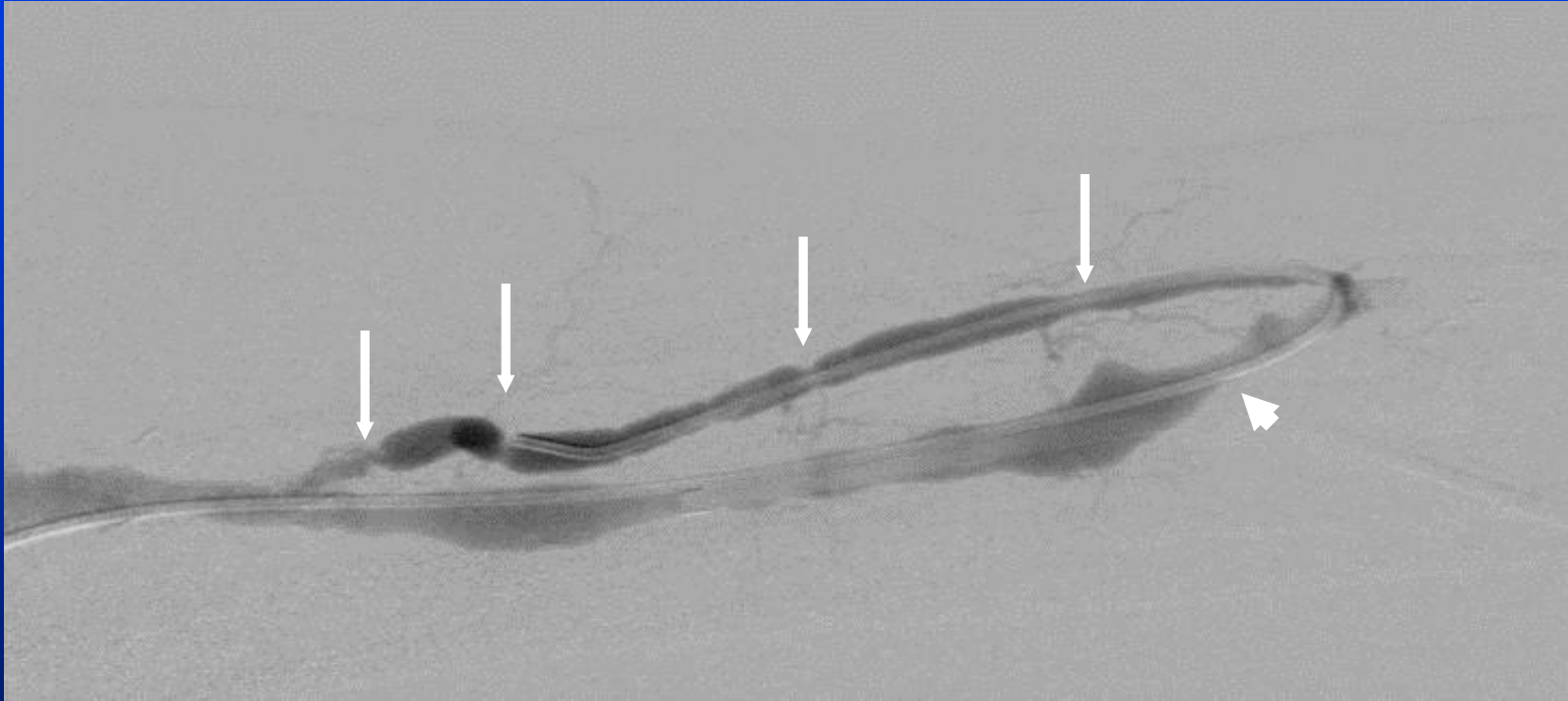
Case 24

anastomosis



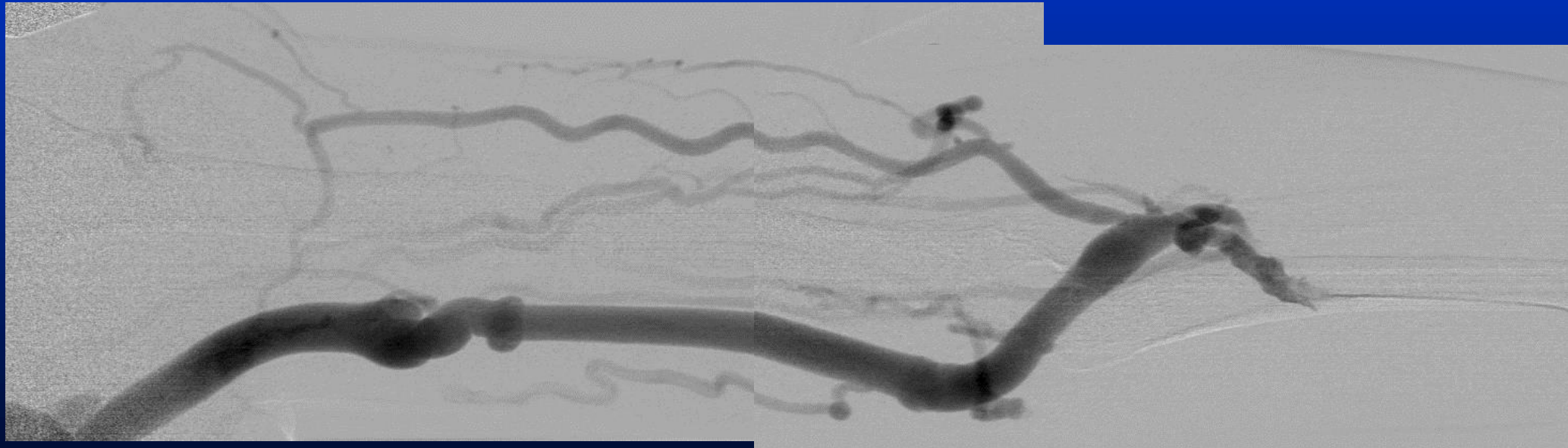
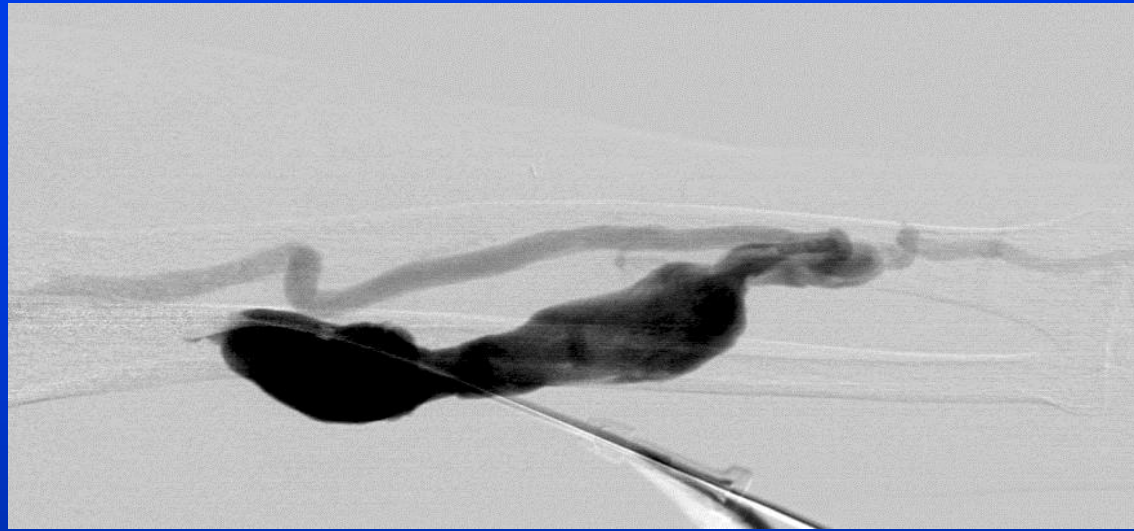
6 week old
forearm fistula





PTA of perianastomotic stenosis and cephalic vein to 6 mm, note spasm in radial artery (arrows) and significant recoil at PTA site (short arrow)

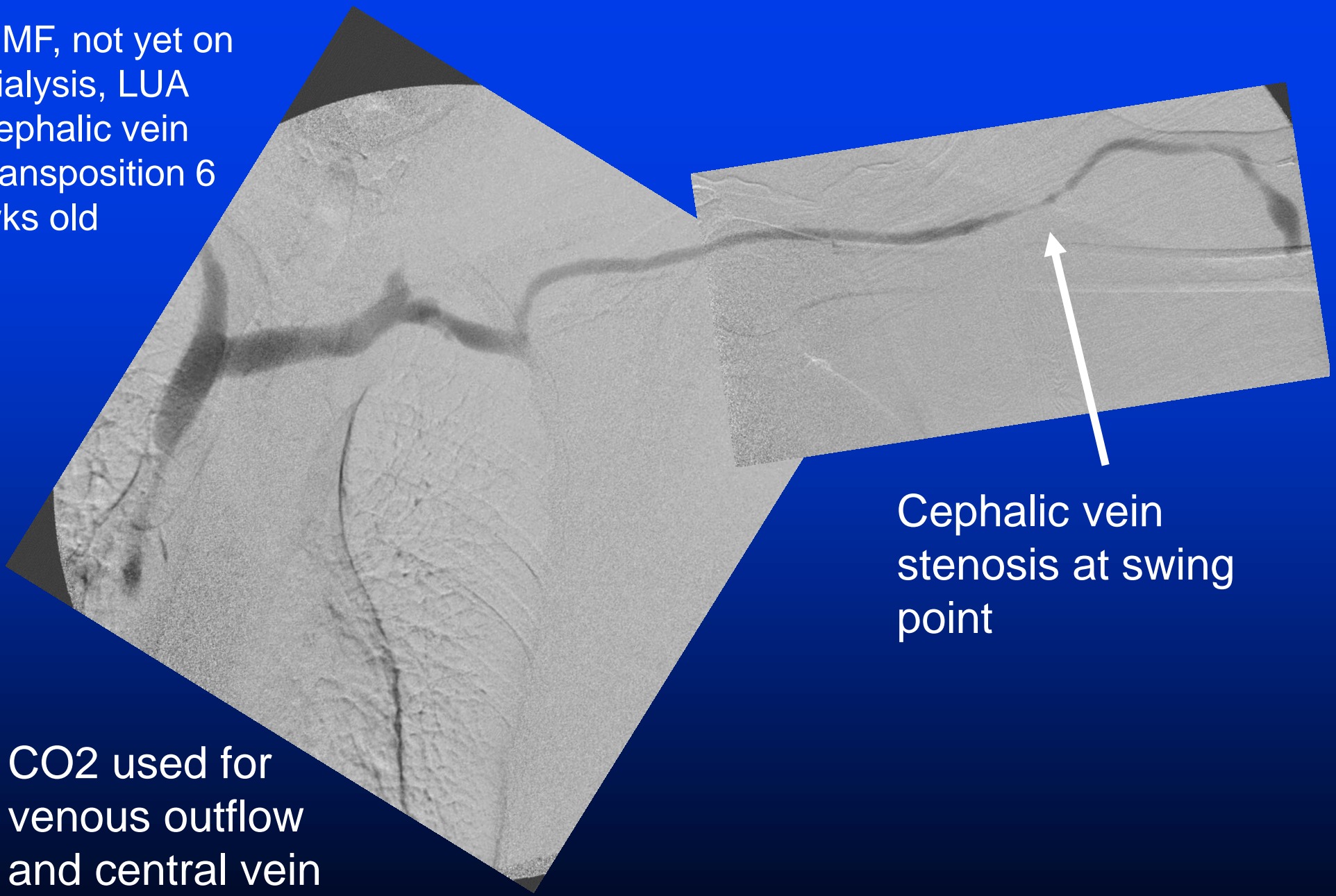
30 month
F/U-no
interval
interventions
and in use
for dialysis



Cases

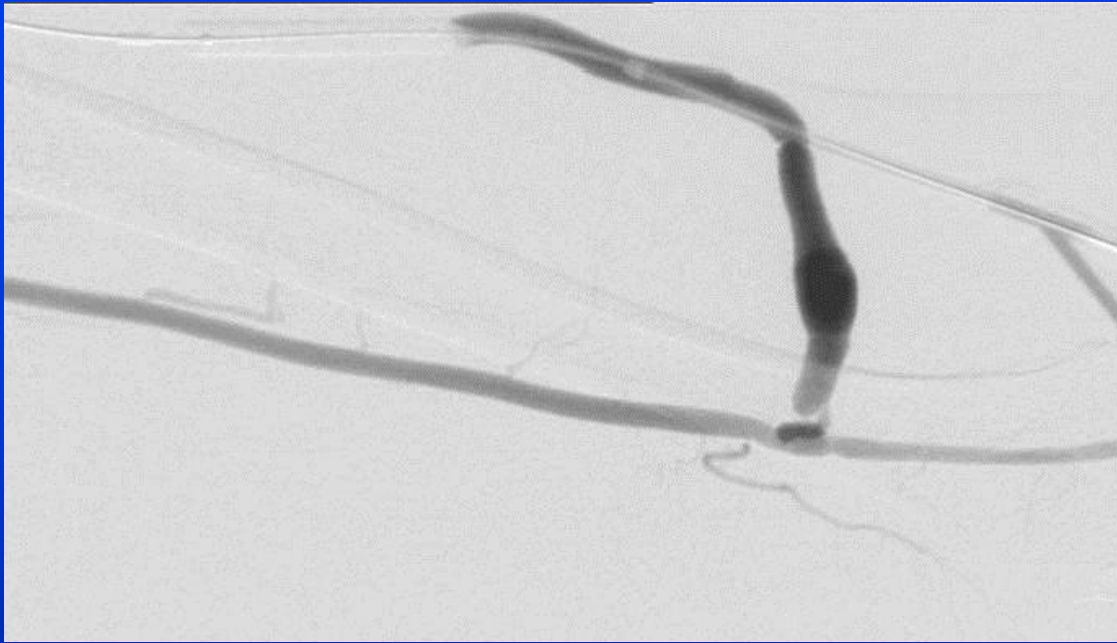
Case 25

NMF, not yet on dialysis, LUA cephalic vein transposition 6 wks old

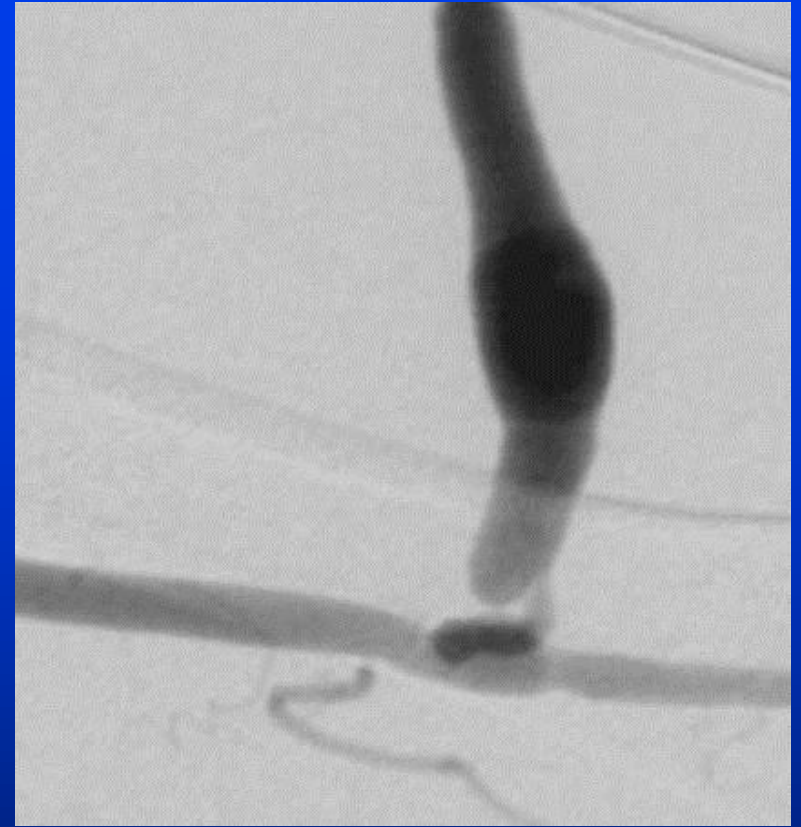


Cephalic vein stenosis at swing point

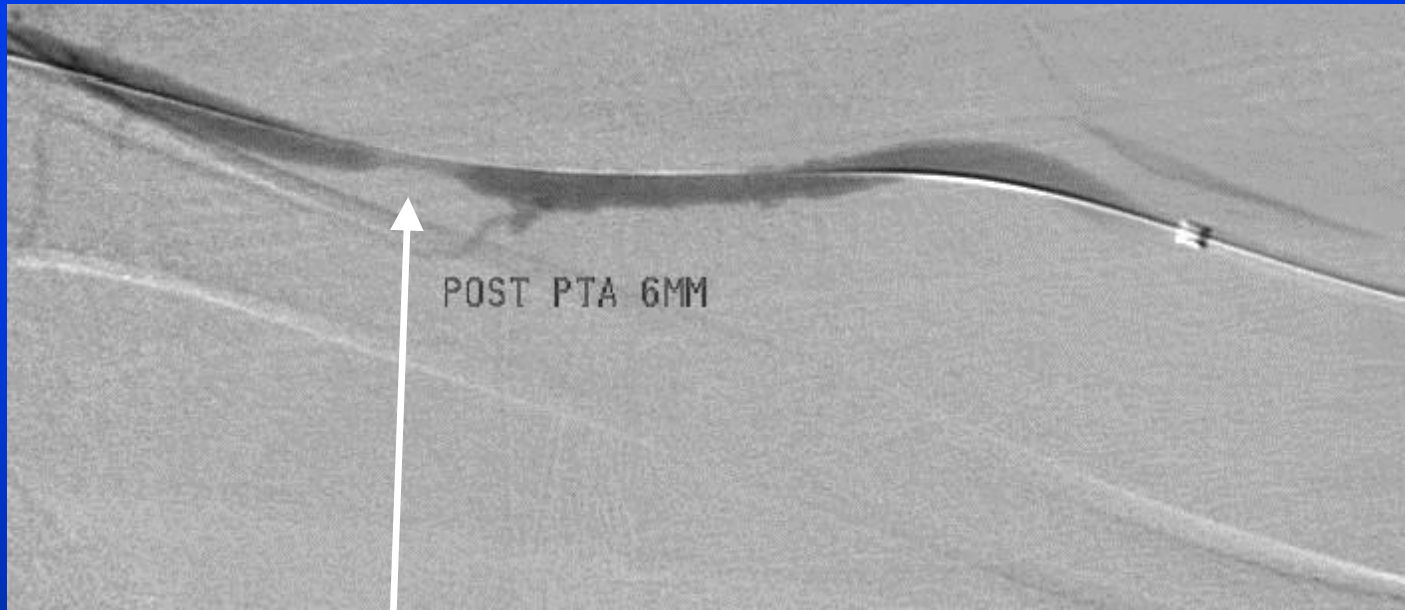
CO2 used for venous outflow and central vein imaging



1/4 strength Visipaque
used to evaluate
anastomosis and arterial
inflow, here shown with
reflux shot during PTA of
cephalic vein stenosis.
Total volume <10 mL for
entire procedure.

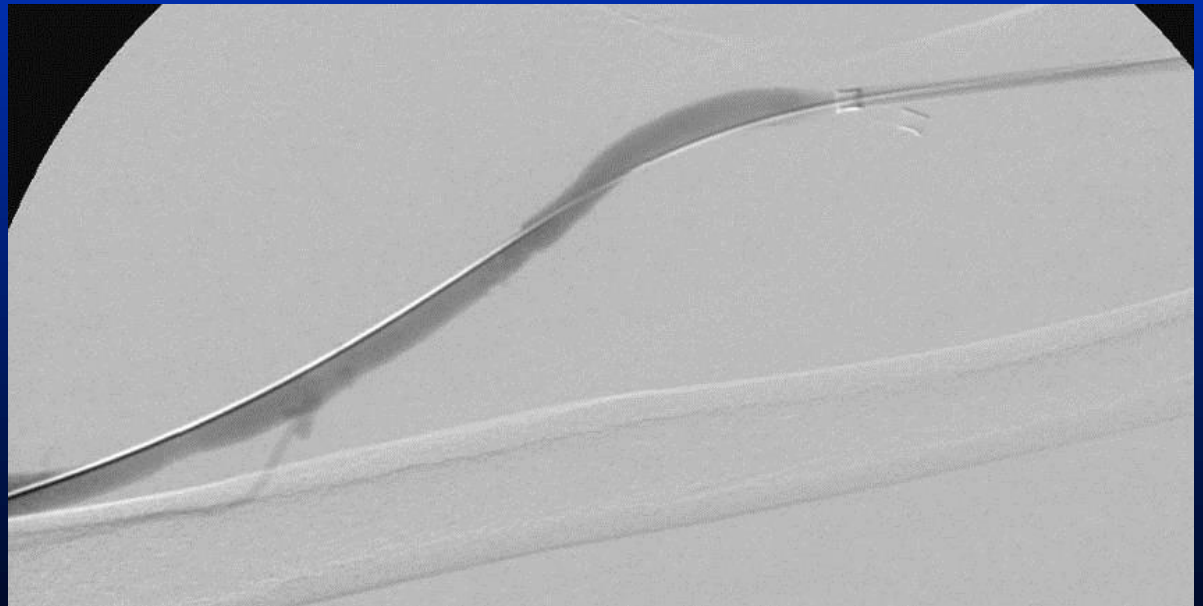


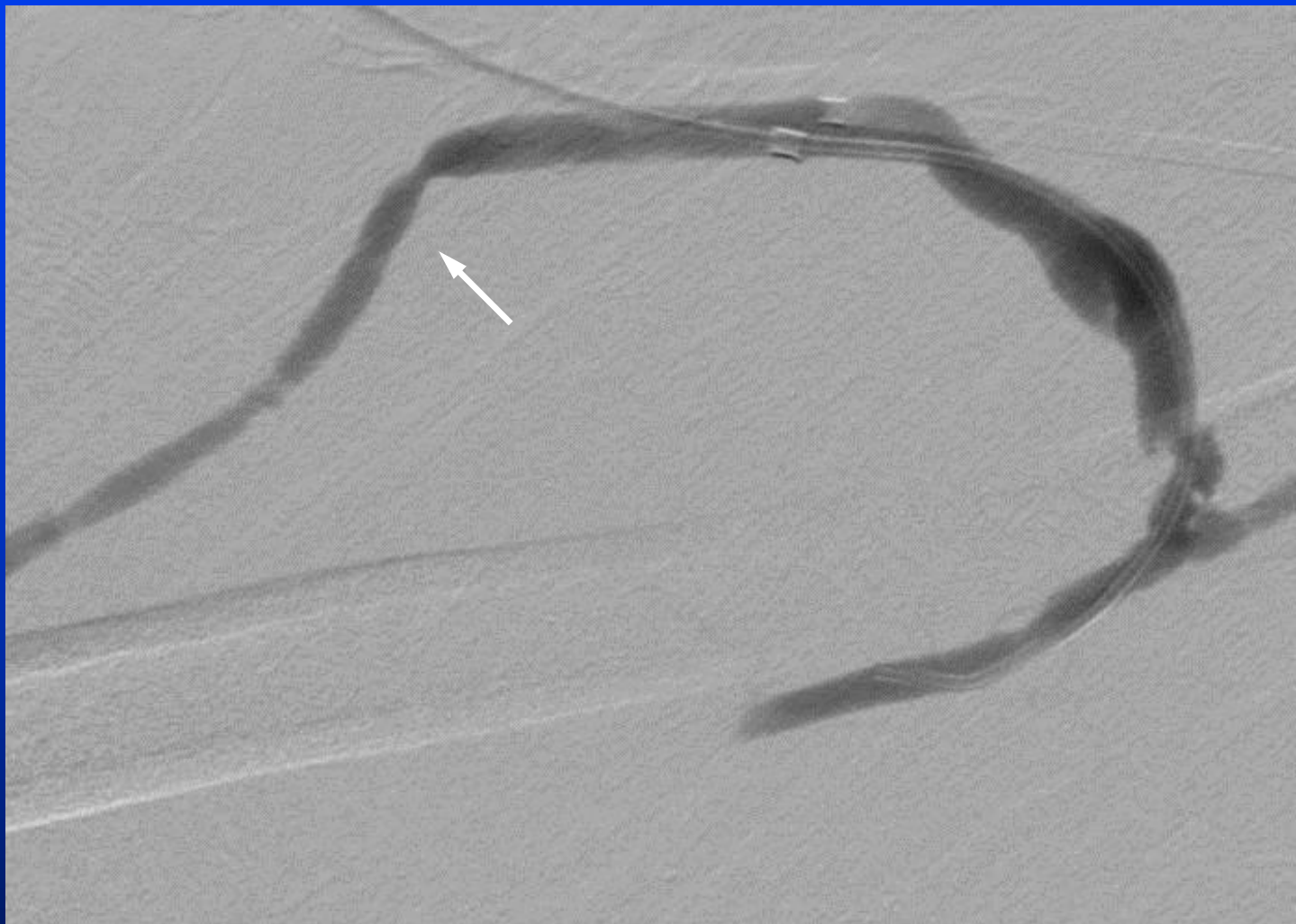
branch patch anastomosis



Not present on initial
film-spasm-no
response to
nitroglycerine

Repeat 6 mm PTA
to treat refractory
spasm





After 6 mm PTA of perianastomotic stenosis. Mild non-flow limiting spasm (arrow). Irregular appearance related to branch patch. Access matured and is in use currently.

Cases

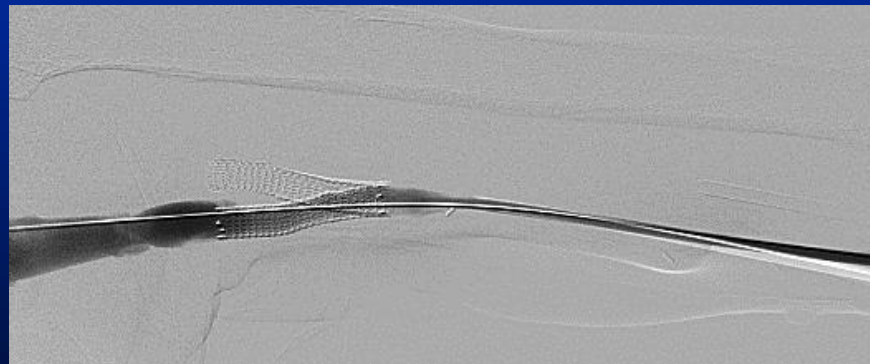
Case 26



LUA BVT,
recurrent SP
stenosis (1
month). US
guided
puncture.



8x50 ViaBahn placed



2nd 8x50 ViaBahn placed. Flow 810 mL/min.

What is
responsibility to
pt? Institution?

Management
post-op?

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