

THORACIC INLET PATHOLOGY (IN PATIENTS WITH AV ACCESS)

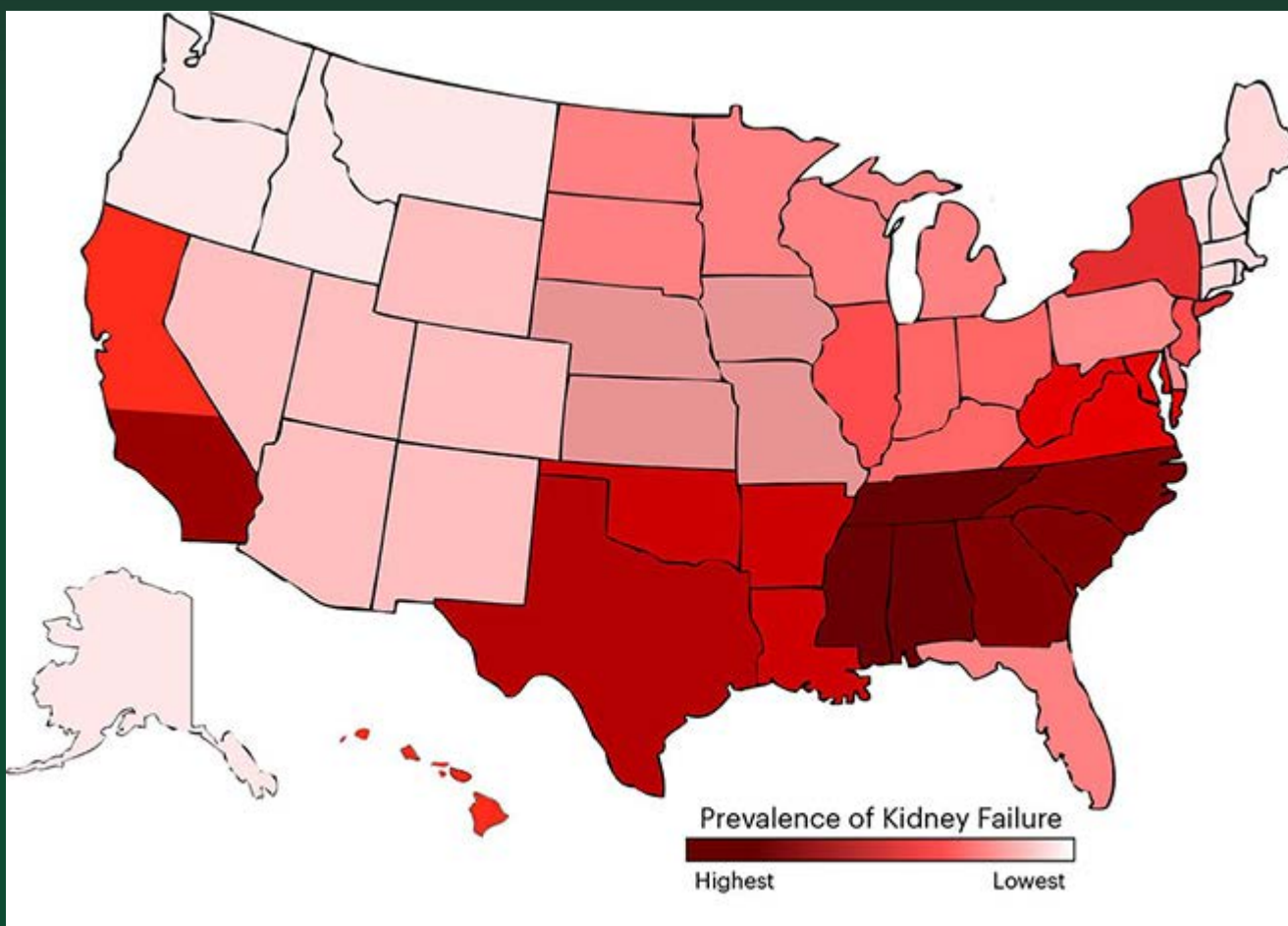


Karl A. Illig, MD
2018 VASA Annual Meeting
New Orleans, LA

AV Access Outflow Obstruction: **CONFLICTS OF INTEREST**

- **None**

AV Access: **THE PROBLEM**



What can go wrong:

OUTFLOW OBSTRUCTION

- Any access depends on unimpeded flow centrally – lack of obstruction.
- Obstruction will:
 - Increase pressure (bleeding, swelling, pain)
 - Reduce flow (increased recirculation, inefficient dialysis, thrombosis)

ETER

STRONG MEMORIAL HOSP.

30-11-2009

ILLIG, KARL, A.

right



ROT
1

ANG
-1

T-mask:
0.50

T-image:
2.50

T-run:
14:44:09

RUN
1
11

MASK IMAGE

IANA VDSH

DERIVED/SECONDARY/SINGLE PLANE/SINGLE A

Tampabay Vascular Center
10/28/2015
1:27:07 PM

GABBARD

03/31/1938
M

46 
87 

65 kVp
5.43 mA

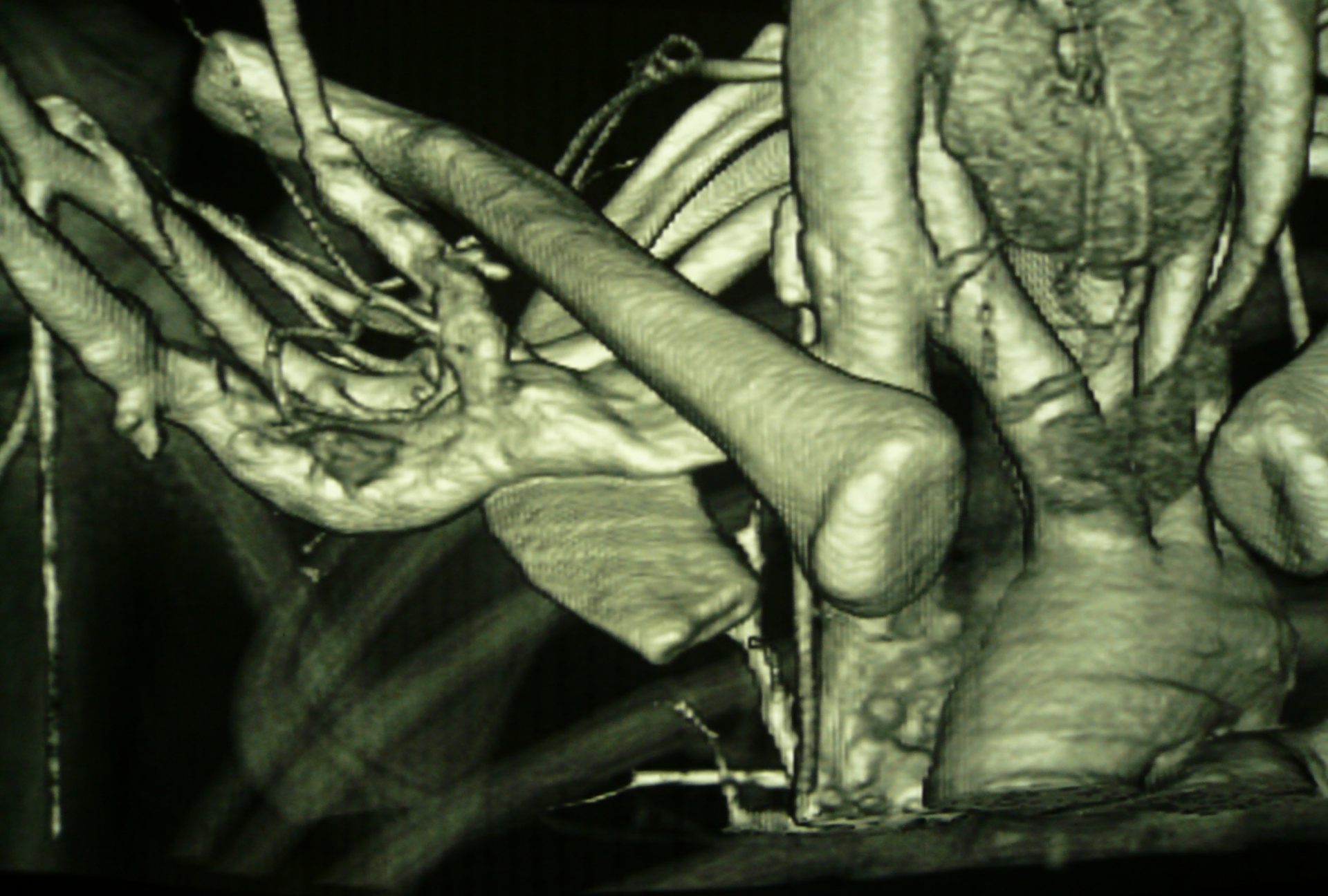
4



OEC







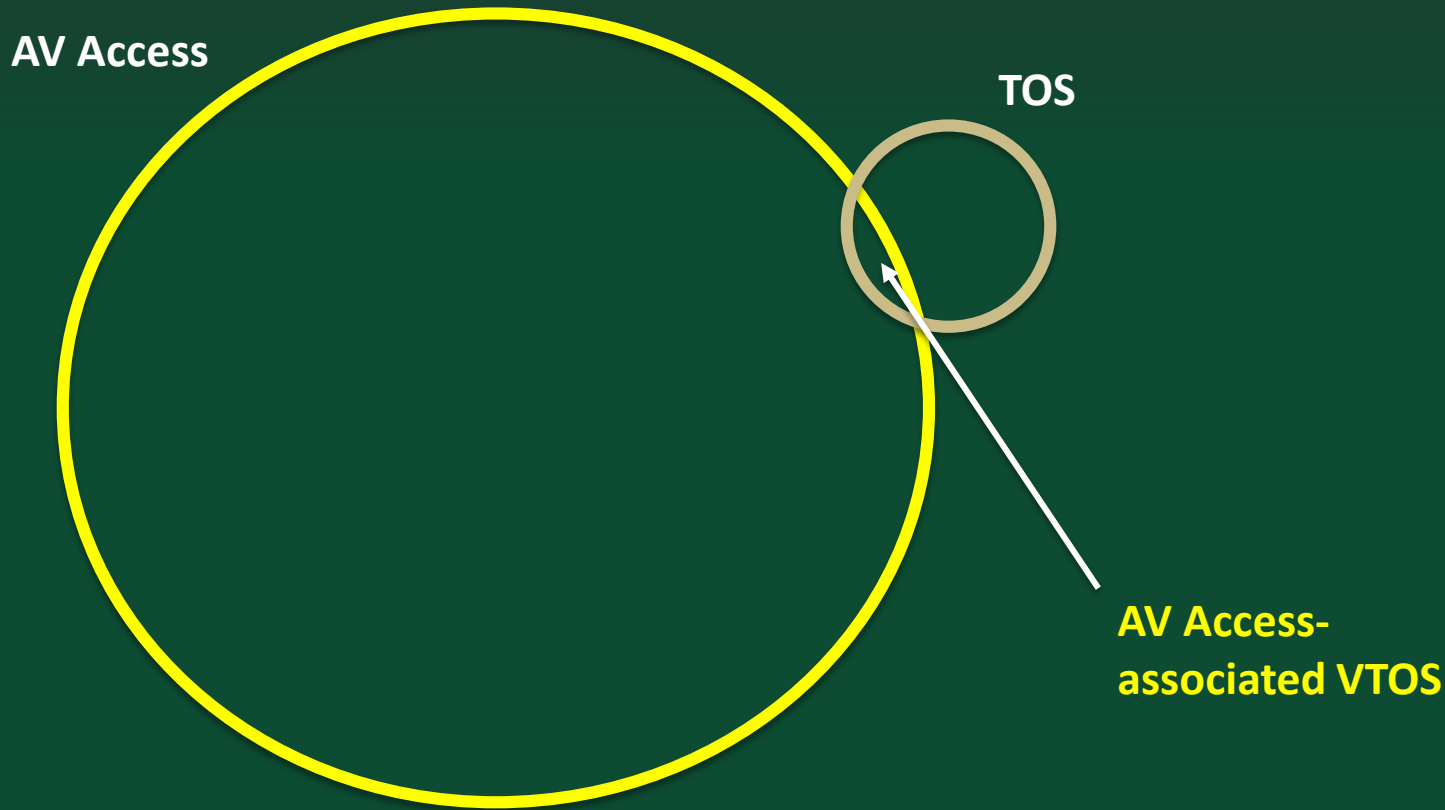
Courtesy Wallace Foster, MD
(Brisbane, AU)

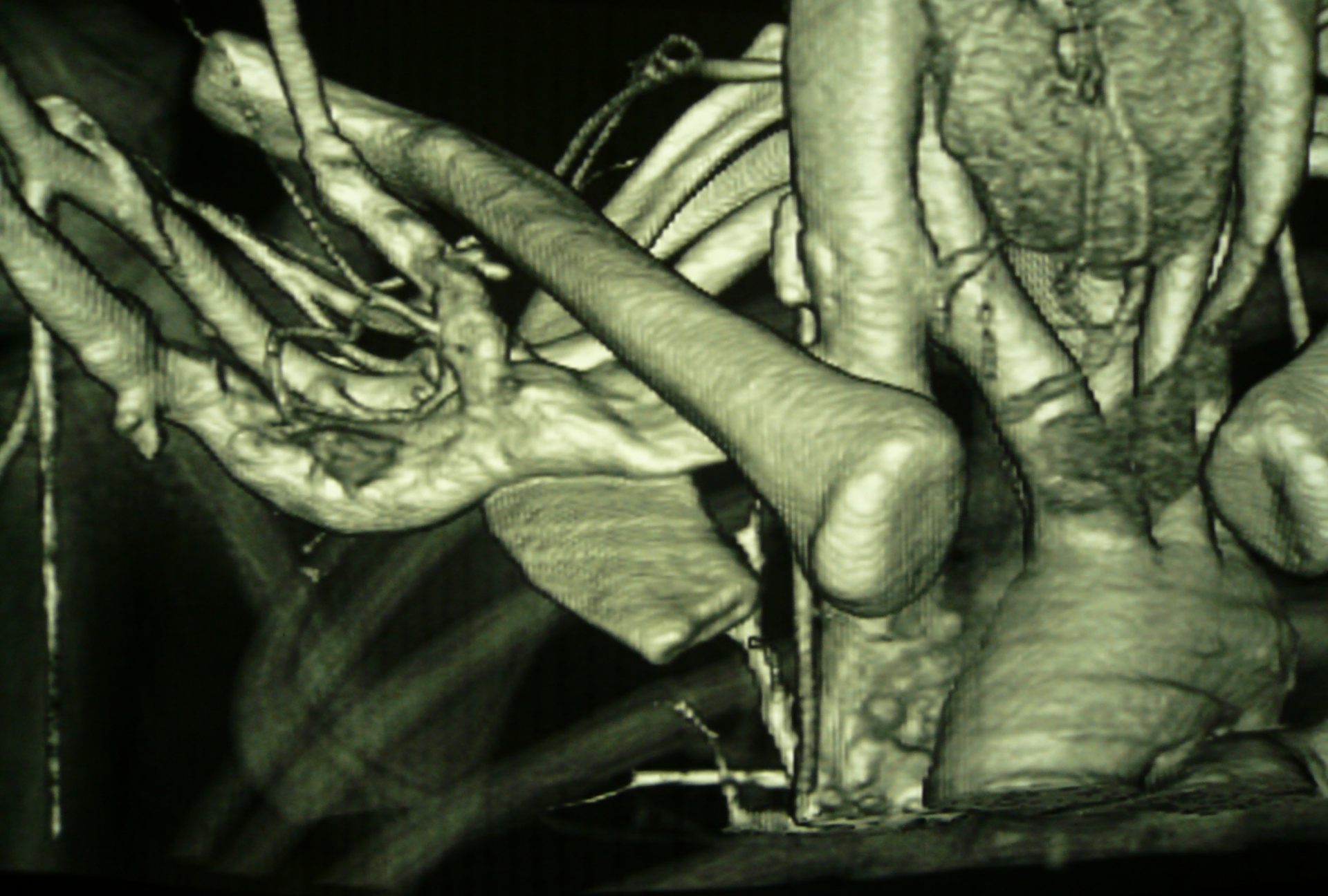


PRE INTERVENTION

SP STENT

What can go wrong: CCJ STENOSIS WITH AV ACCESS





Courtesy Wallace Foster, MD
(Brisbane, AU)

AV Access Outflow Obstruction:

THE WORLD OF THORACIC OUTLET Sx

- Bony decompression (usually first rib resection) is required for long-term patency
- Stents in this area will be crushed without decompression
- Stents do not do well even after decompression

0°

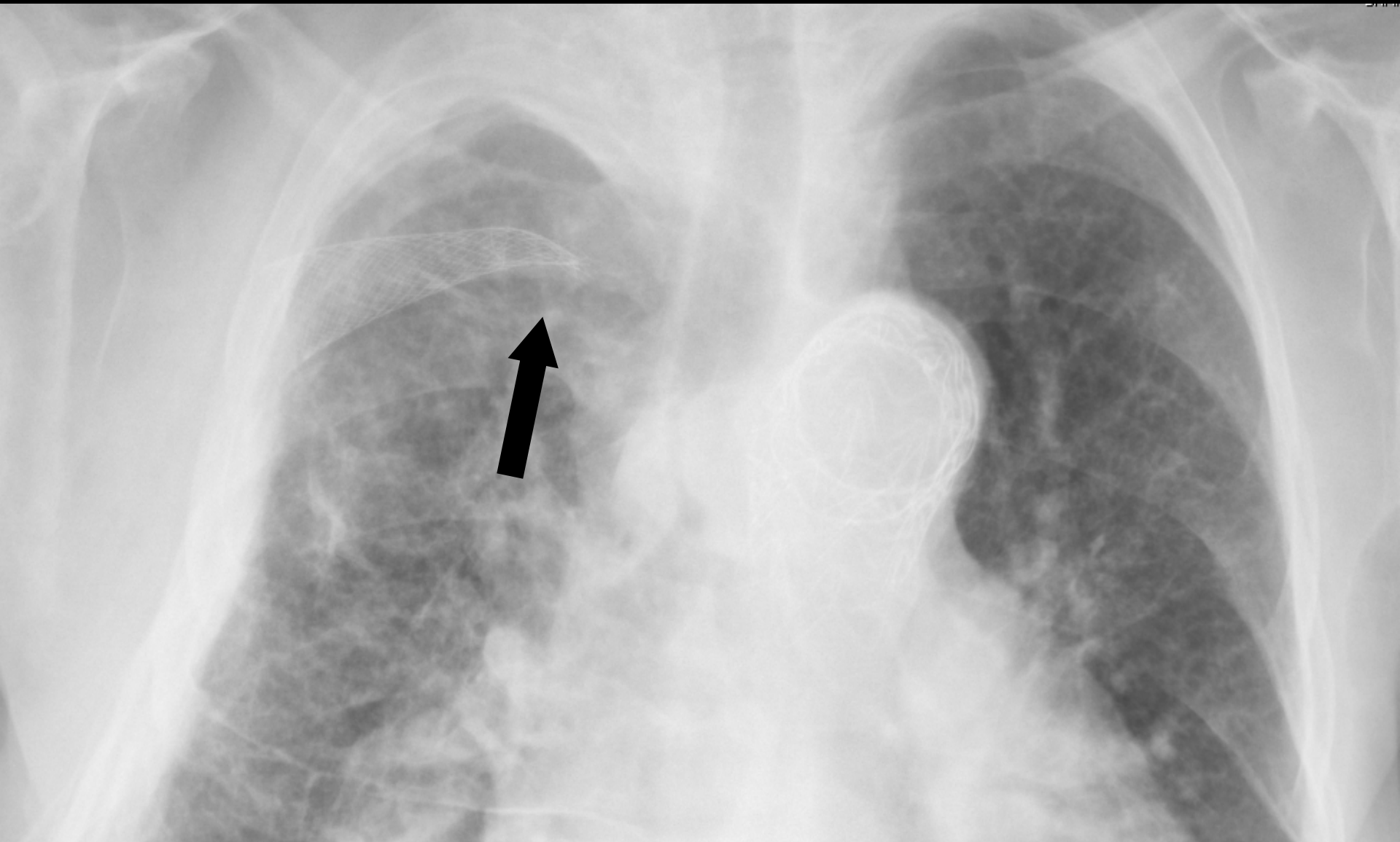
0°

FD 48 cm



Right

Post PTA



AV Access Outflow Obstruction:

THE WORLD OF AV ACCESS

- Bony decompression (usually first rib resection) is required for long-term patency
- Stents in this area will be crushed without decompression
- Theoretically (and probably empirically) stents do better after bony decompression

AV Access Outflow Obstruction:

THE WORLD OF AV ACCESS

- **Bony decompression (usually first rib resection) is required for long-term patency**
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AV Access Outflow Obstruction:

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AV Access Outflow Obstruction:

THE WORLD OF AV ACCESS

- Bony decompression (usually first rib resection) is required for long-term patency
- Stents in this area will be crushed without decompression
- **Theoretically (and probably empirically) stents do better after bony decompression in patients with an AV fistula (high flow)**

AV Access Outflow Obstruction: **CCJ STENOSIS and AV ACCESS**

- **University of Rochester**
- **University of South Florida**
- **(Dialysis Access Institute, Orangeburg SC):**

- **Decompress Thoracic Outlet**
- **If stenotic, plasty and stent**
- **If occluded, try to cross, consider surgical revascularization if good risk**





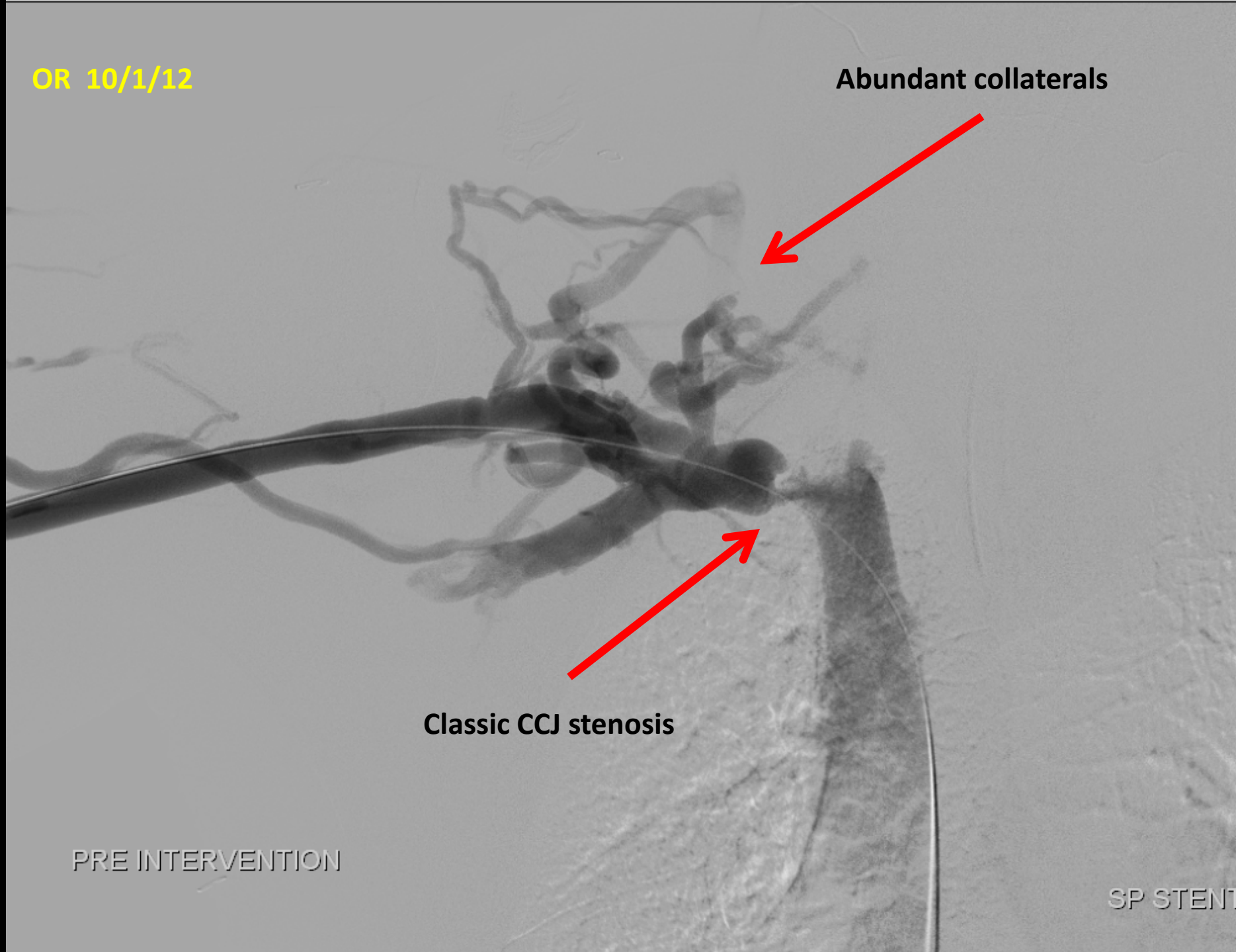
OR 10/1/12

Abundant collaterals

Classic CCJ stenosis

PRE INTERVENTION

SP STENT

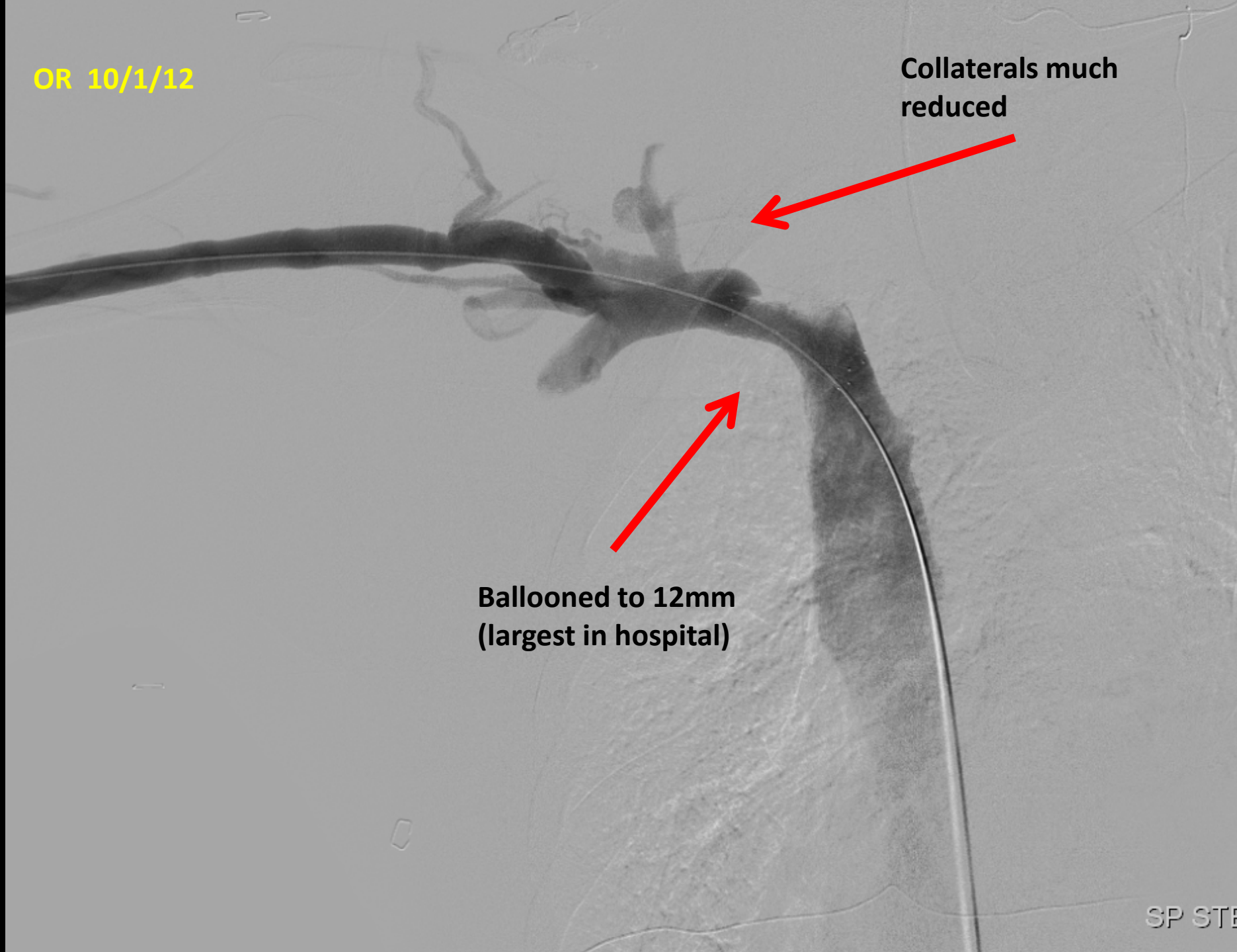


OR 10/1/12

Collaterals much
reduced

Ballooned to 12mm
(largest in hospital)

SP STE



TAMPA GENERAL HOSPITAL

11/08/2012

3:36:05 PM

1°

CRA

1°

LAO

46

87

VENOGRAM LEFT SVC

000013456389

ILLIG

3 min fl time

left

Collaterals

Prior stent

Residual
stenosis

OR 11-8-12

64 kVp
4.61 mA

5

OEC



TAMPA GENERAL HOSPITAL

11/08/2012

3:53:59 PM

1° CRA

1° LAO

46

87

VENOGRAM LEFT SVC

000013456389

ILLIG

3 min fl time

left

Collaterals
gone!



NICE

OR 11-8-12

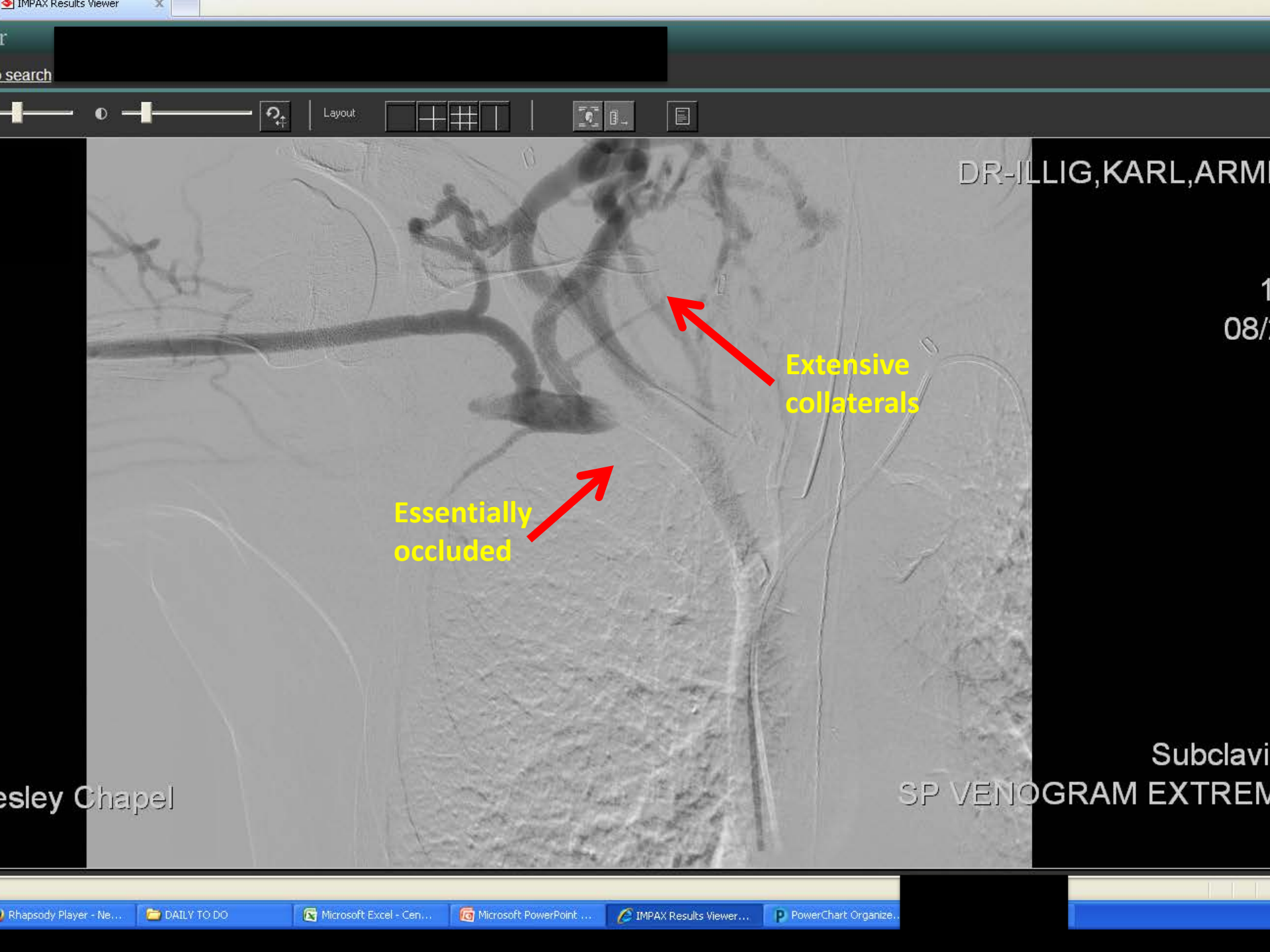
64 kVp

4.74 mA

21

OEC





IMPAX Results Viewer

search

Layout

DR-ILLIG, KARL, ARM

1 08/

Extensive collaterals

Essentially occluded

Subclavi SP VENOGRAM EXTREM

esley Chapel

Rhapsody Player - Ne...

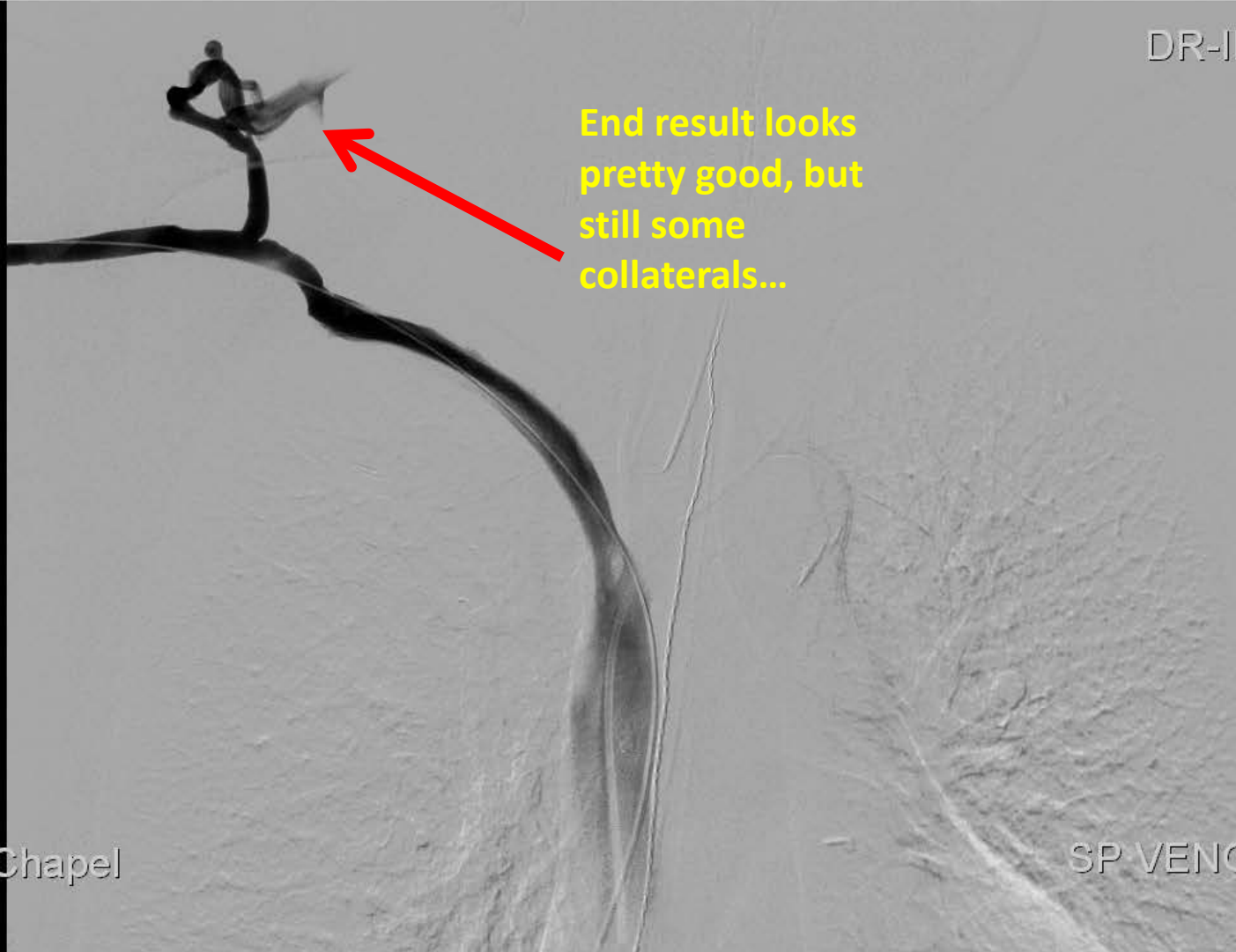
DAILY TO DO

Microsoft Excel - Cen...

Microsoft PowerPoint ...

IMPAX Results Viewer...

PowerChart Organize..



End result looks pretty good, but still some collaterals...

DR-ILLIG, KARL, A

7925
Capital Wesley Chapel
512

Sub
SP VENOGRAM EXT

NOT FOR CLINICAL DECISION

TAMPA GENERAL HOSPITAL

08/29/2013

5:02:27 PM

RUE ANGIO
000100028942

E00

0°

1°

CRA



**Extensive
collaterals**

Port SCV

11C

**Essentially
occluded**

Lossy

OEC



NOT FOR CLINICAL DECISION

TAMPA GENERAL HOSPITAL

08/29/2013

5:58:41 PM

RUE ANGIO
000100028942

E00

0°

1°

CRA

46

87

No more
collaterals!

2 14mm stents (partial
prolapse into IJ)



18C

Lossy

OEC



60 Year old Male, ESRD

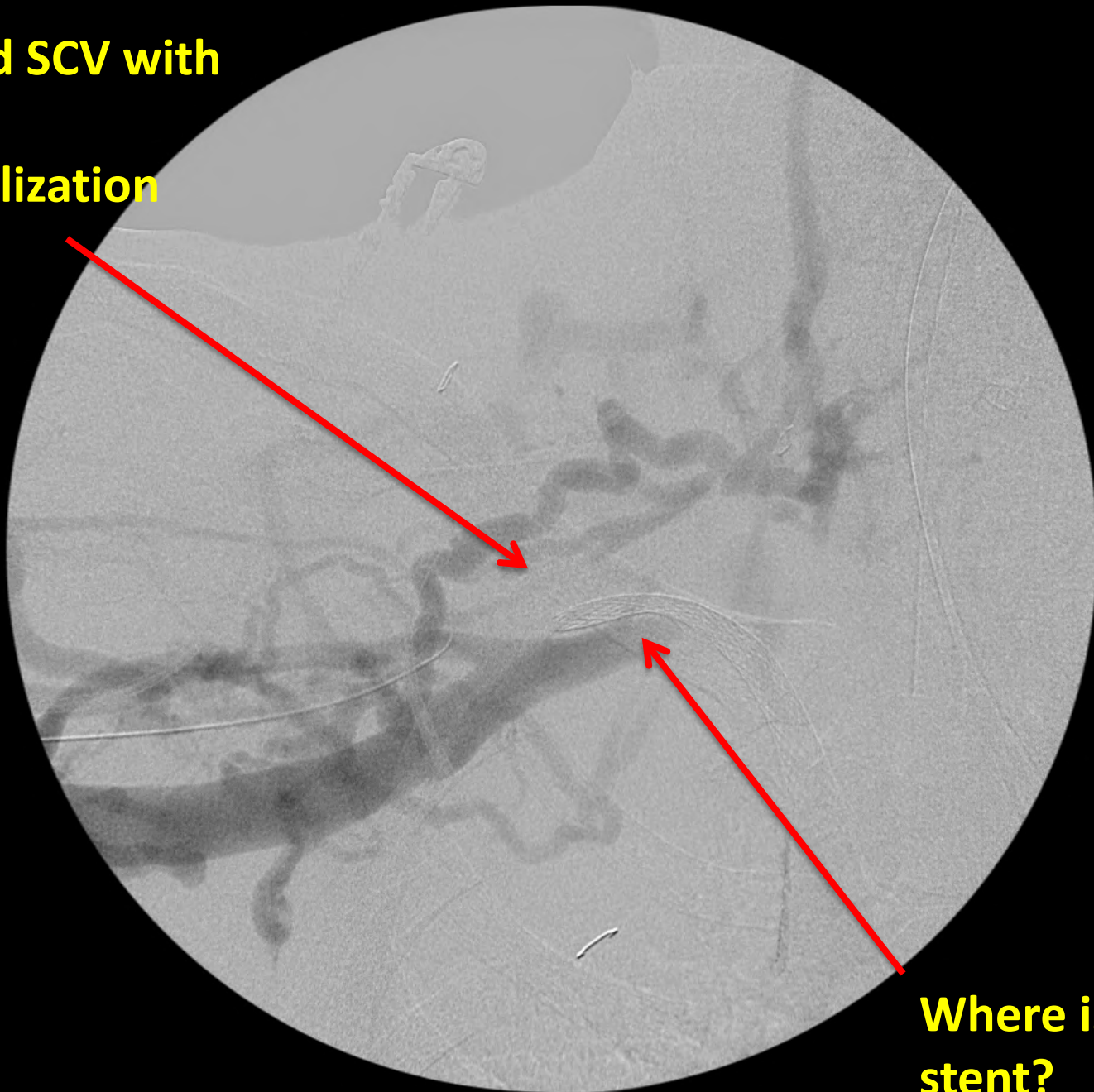
Right axillary based AV graft

**Severe arm swelling, high pressures,
recirculation**

**Occluded SCV at stented CCJ – unable to cross
in outpatient access center via the arm**



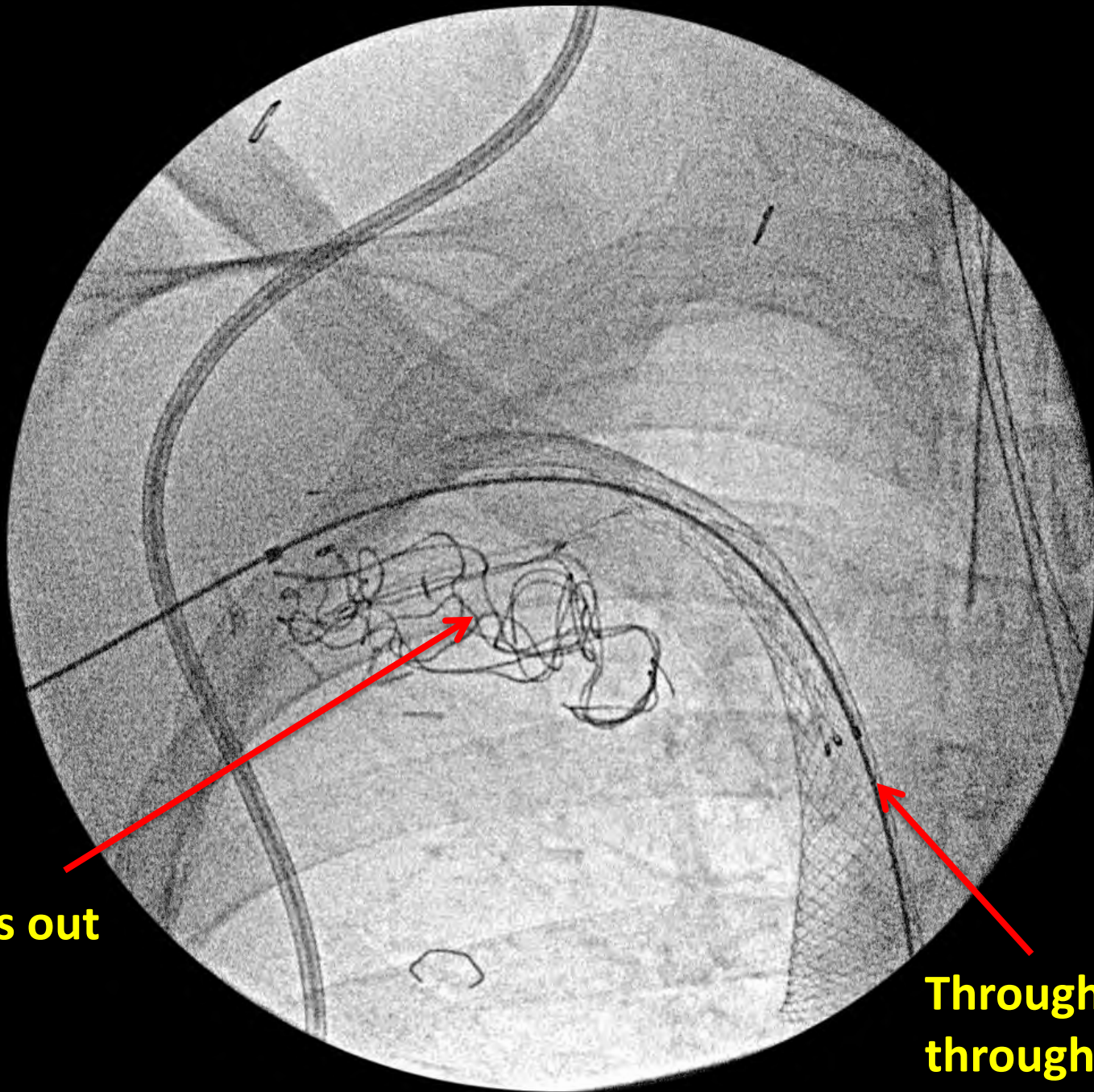
**Occluded SCV with
massive
collateralization**



**Where is this
stent?**

**Wire (from below)
through interstice,
about to snare**

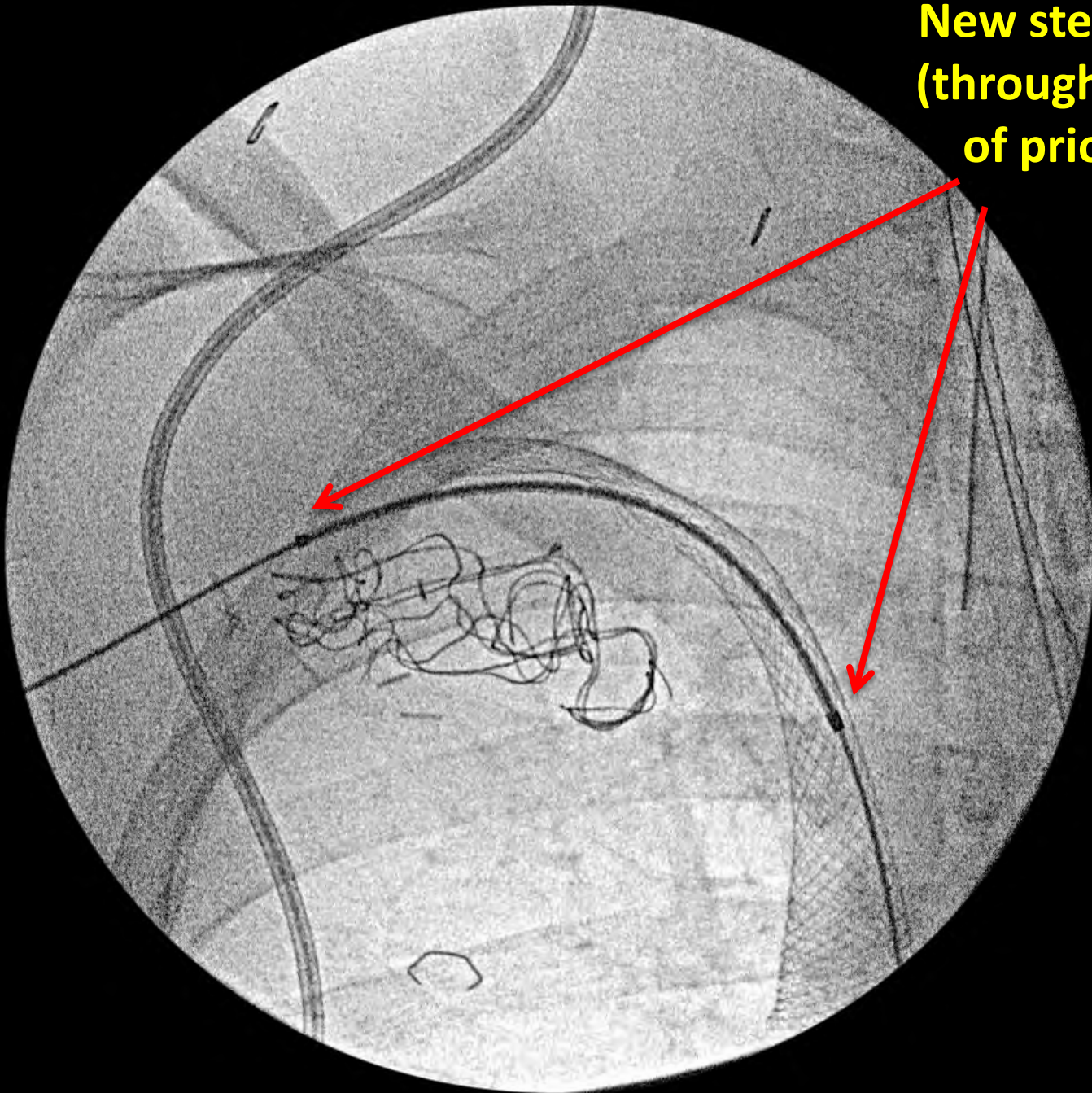


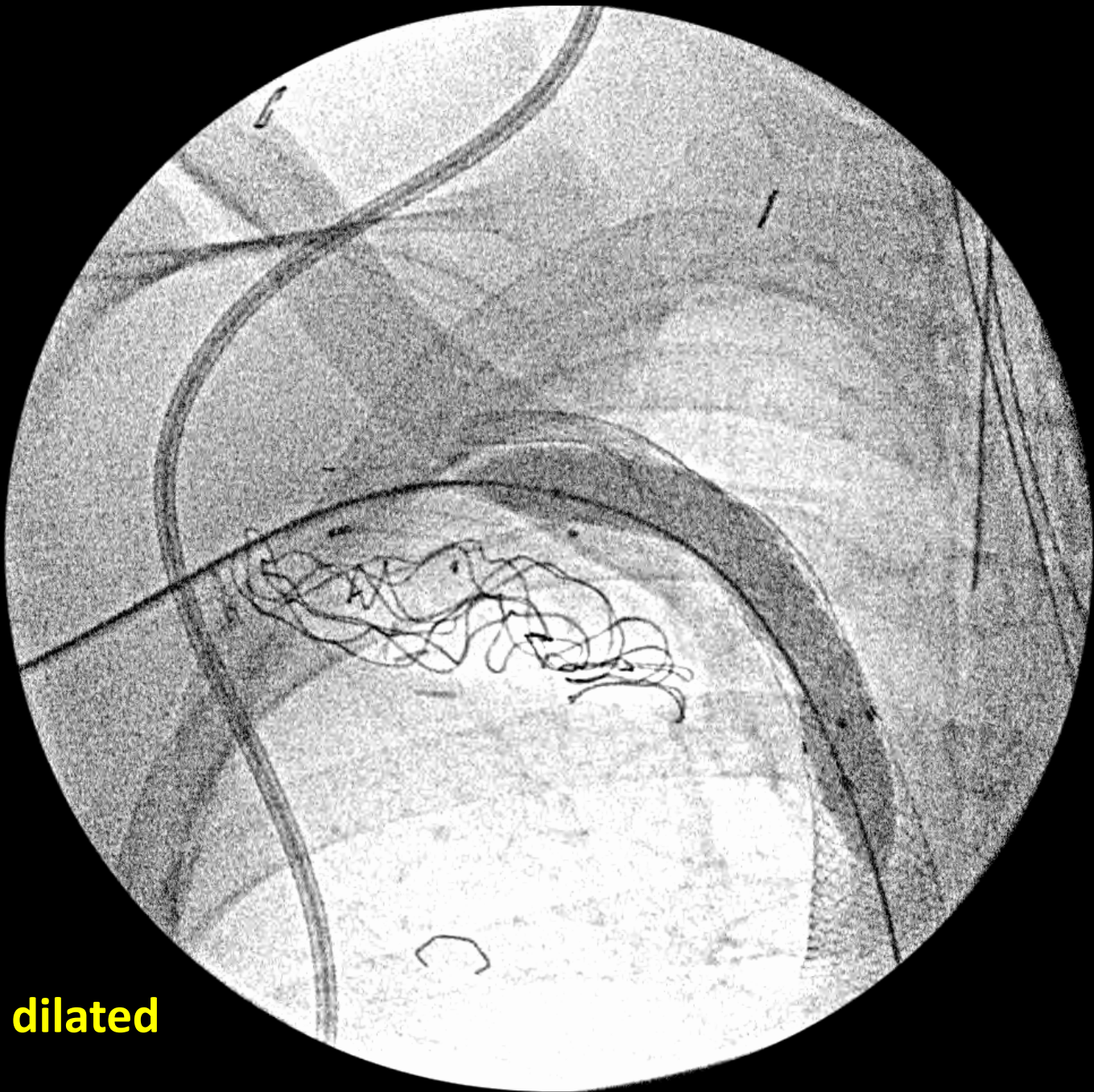


Rib is out

Through-and-through wire

**New stent in place
(through interstice
of prior, crushed
stent)**

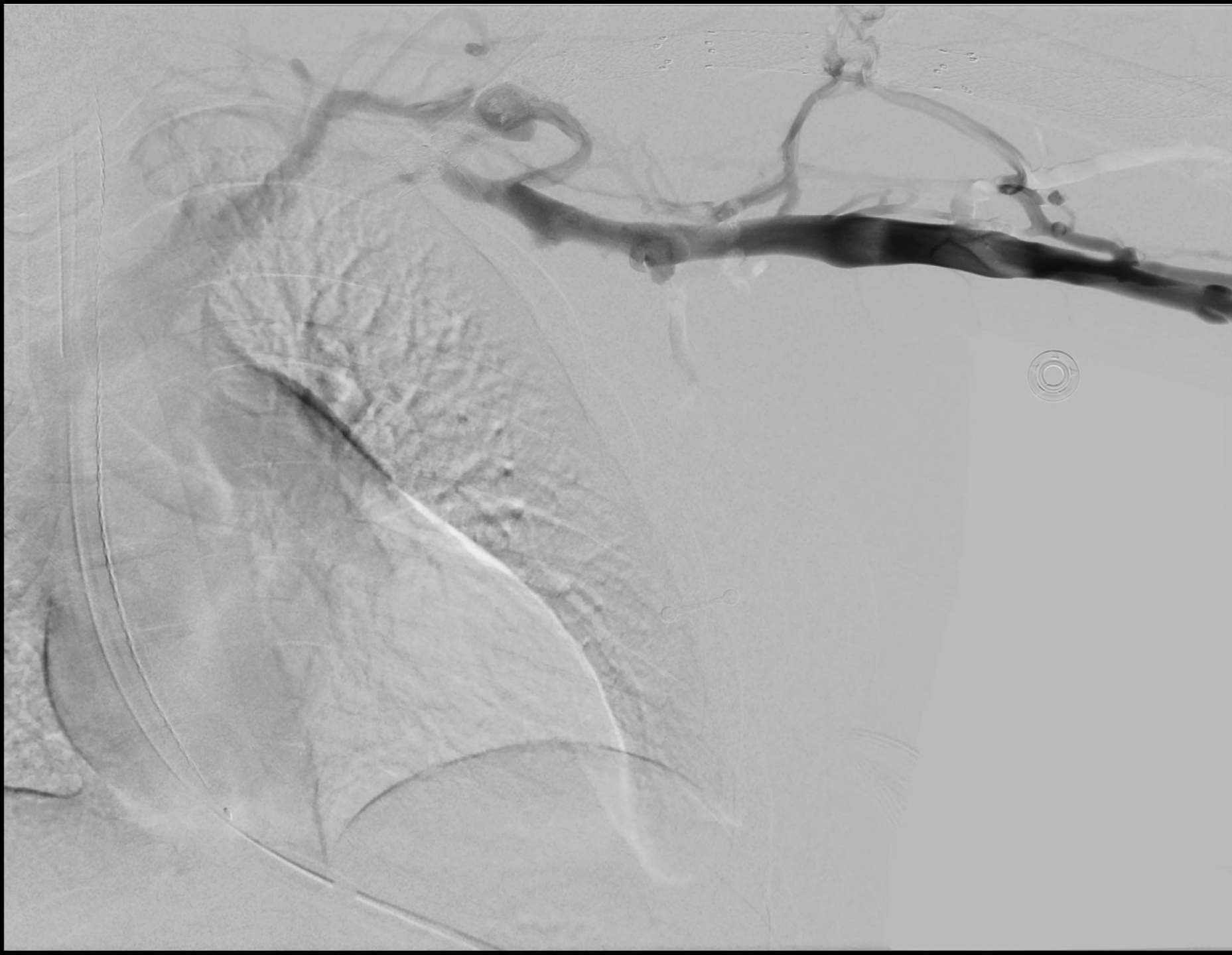




Being dilated



Success!



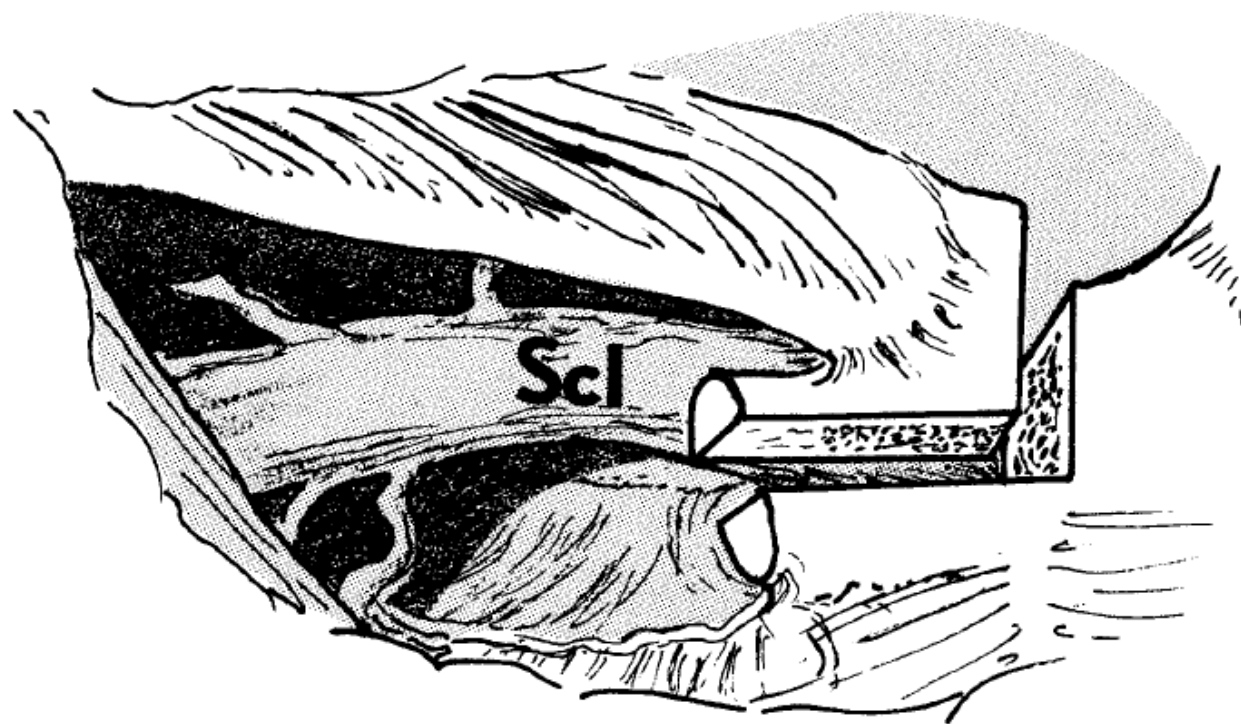


Fig. 1. Subclavicular incision after fibers of pectoralis major muscle have been split, and subclavian vein can be seen at bottom. First rib has been removed, and stump of rib attached to sternum has been split lengthwise into sternum at right angle up to sternal notch. *Scl*, Subclavian vein.

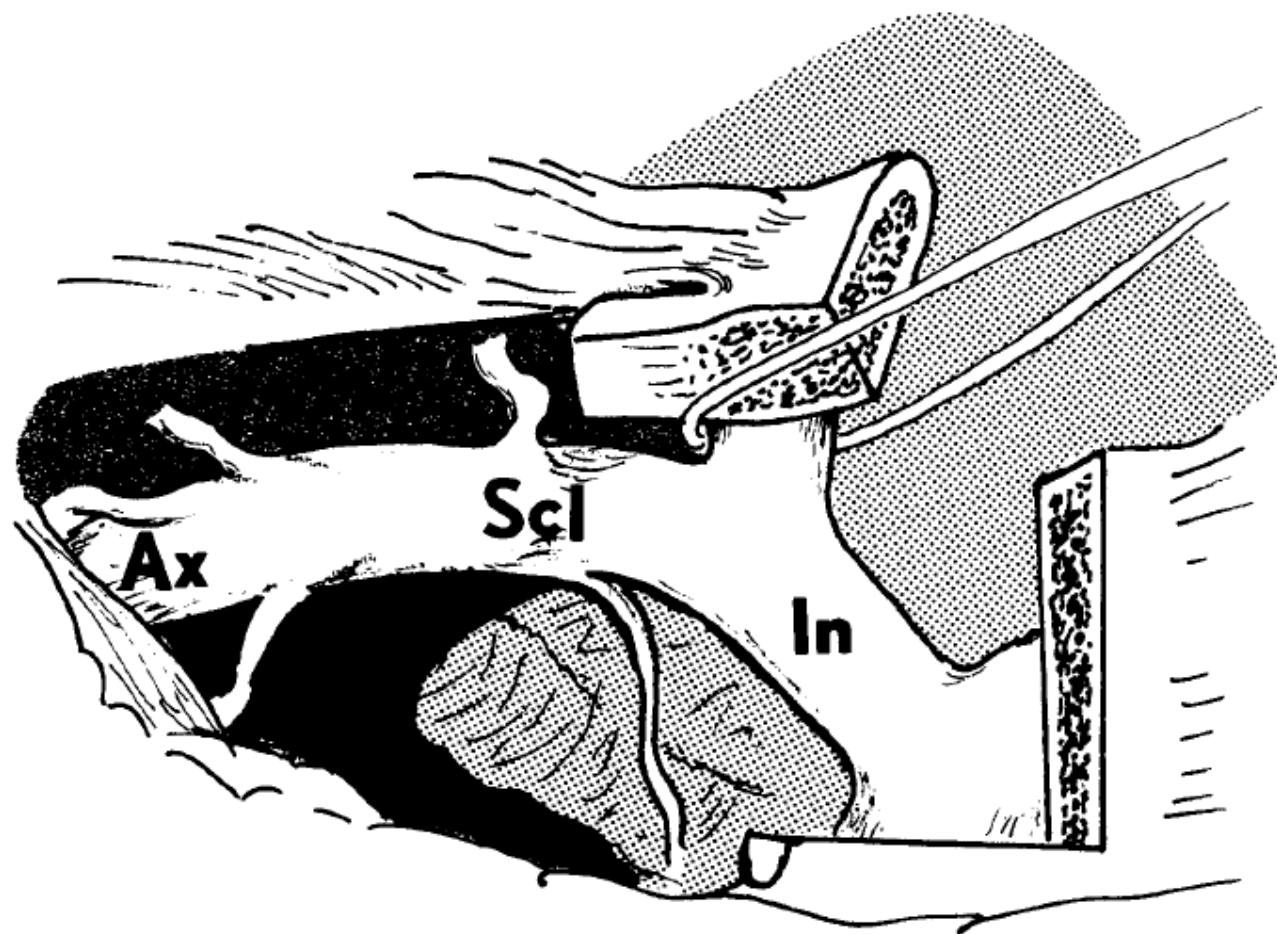


Fig. 2. Exposure of axillary and subclavian-innominate vein segment with internal jugular vein looped after it has been dissected. Exposure is obtained extrapleurally. Ax, Axillary vein; Scl, subclavian vein; In, innominate vein.

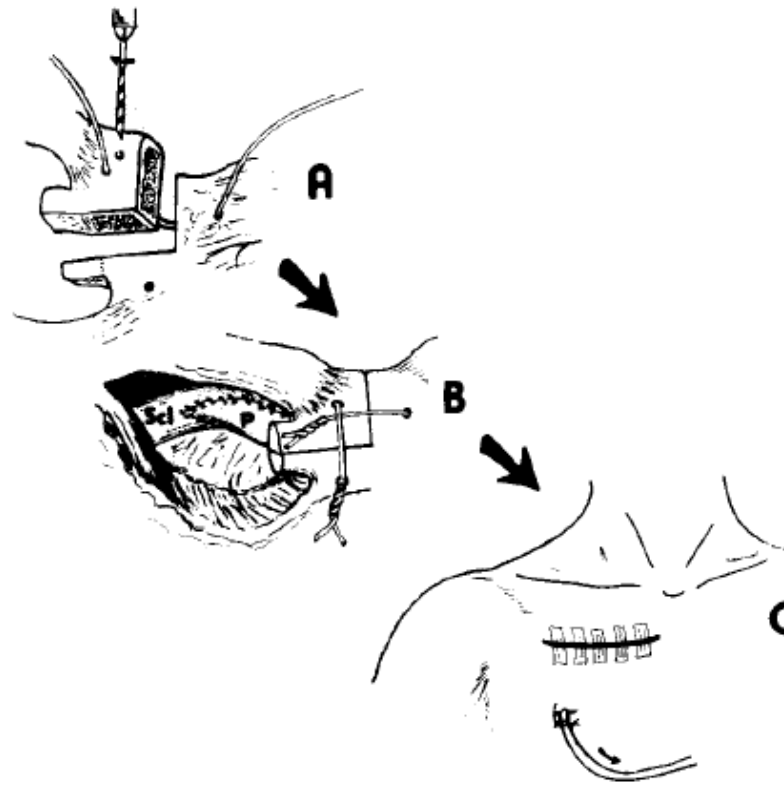
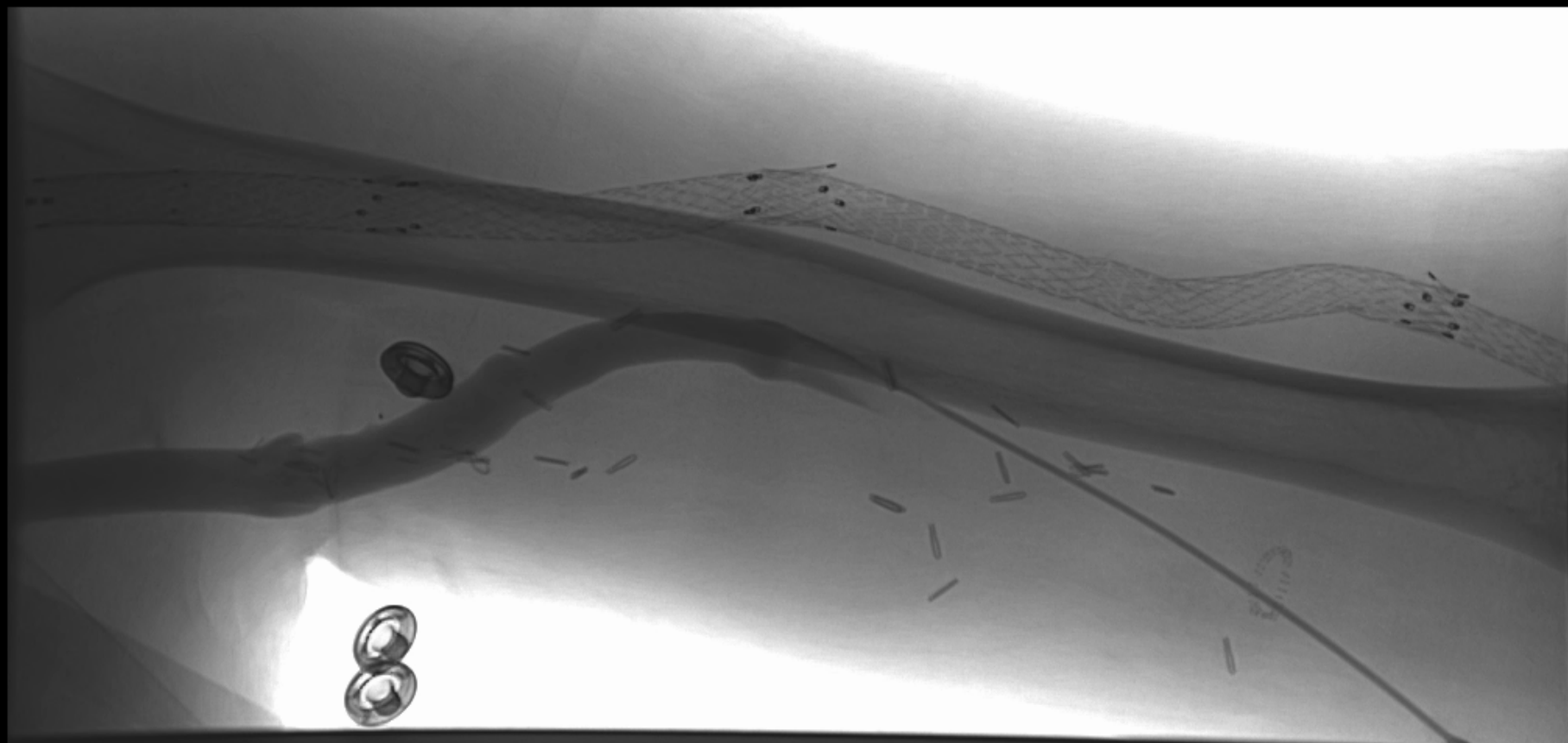


Fig. 4. Repair of incision. A, With drill, perforations are made in separated segment of manubrium and also in body of sternum. Two stainless steel wire stitches are passed laterally and vertically with those perforations. B, Sternum repaired and subclavian vein is shown in background after obstruction was treated with placement of patch. C, Operation is completed. Sump drain is left in extrapleural space, and incision can be seen in subclavicular position. *Scl*, Subclavian vein; *P*, vein patch.





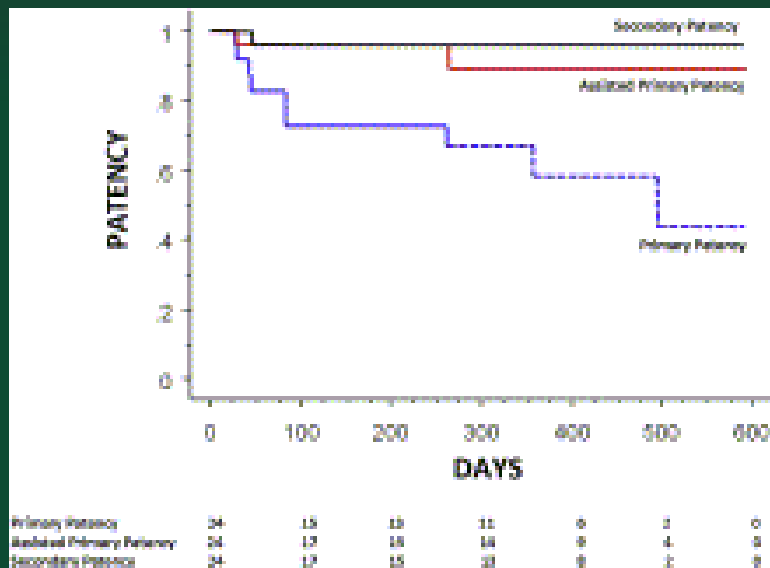
CCJ Decompression:

RESULTS

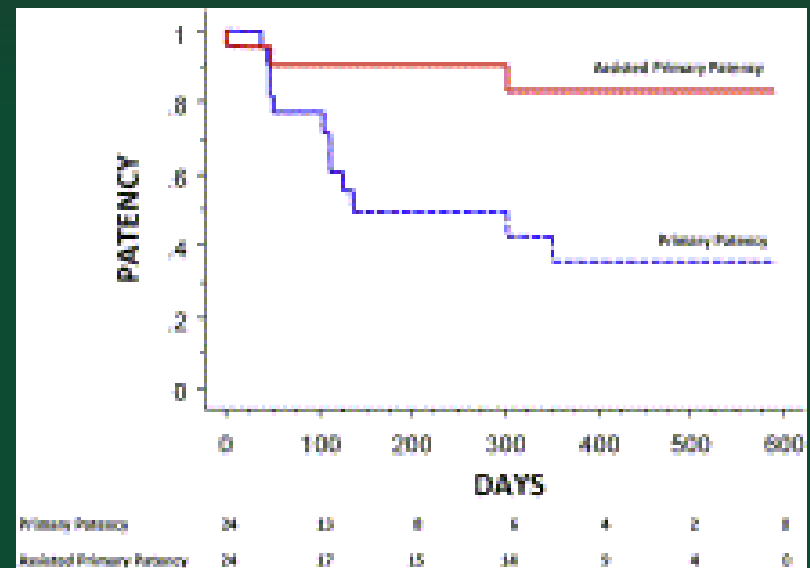
- July 2012-December 2013: 24 patients
- 1 year APP fistula 85%, inflow 89%
- Patients extremely happy

Illig: Annals Vasc Surg 2015;29(4):698-703.

CCJ Decompression: RESULTS



Central reconstruction



Access

Illig: Annals Vasc Surg 2015;29(4):698-703.

CCJ Decompression:

RESULTS

- As of May, 2018, our group has treated 103 patients with CCJ outflow obstruction ipsilateral to a functioning AV access:
- Rochester: 5 FRR, 29 complex
- Tampa: 58 FRR, 11 complex

Glass: *Annals Vasc Surg* 2011:640-5

Illig: *Seminars Vasc Surg* 2011:113-8

Illig: *Annals Vasc Surg* 2015:698-703

Wooster, Edwards in review/submitted AVF

CCJ Decompression:

RESULTS

- 7 interposition grafts
- 3 “Molina exposures”
- Vast majority of interventions have been endovascular

Glass: *Annals Vasc Surg* 2011:640-5

Illig: *Seminars Vasc Surg* 2011:113-8

Illig: *Annals Vasc Surg* 2015:698-703

Wooster, Edwards in review/submitted AVF

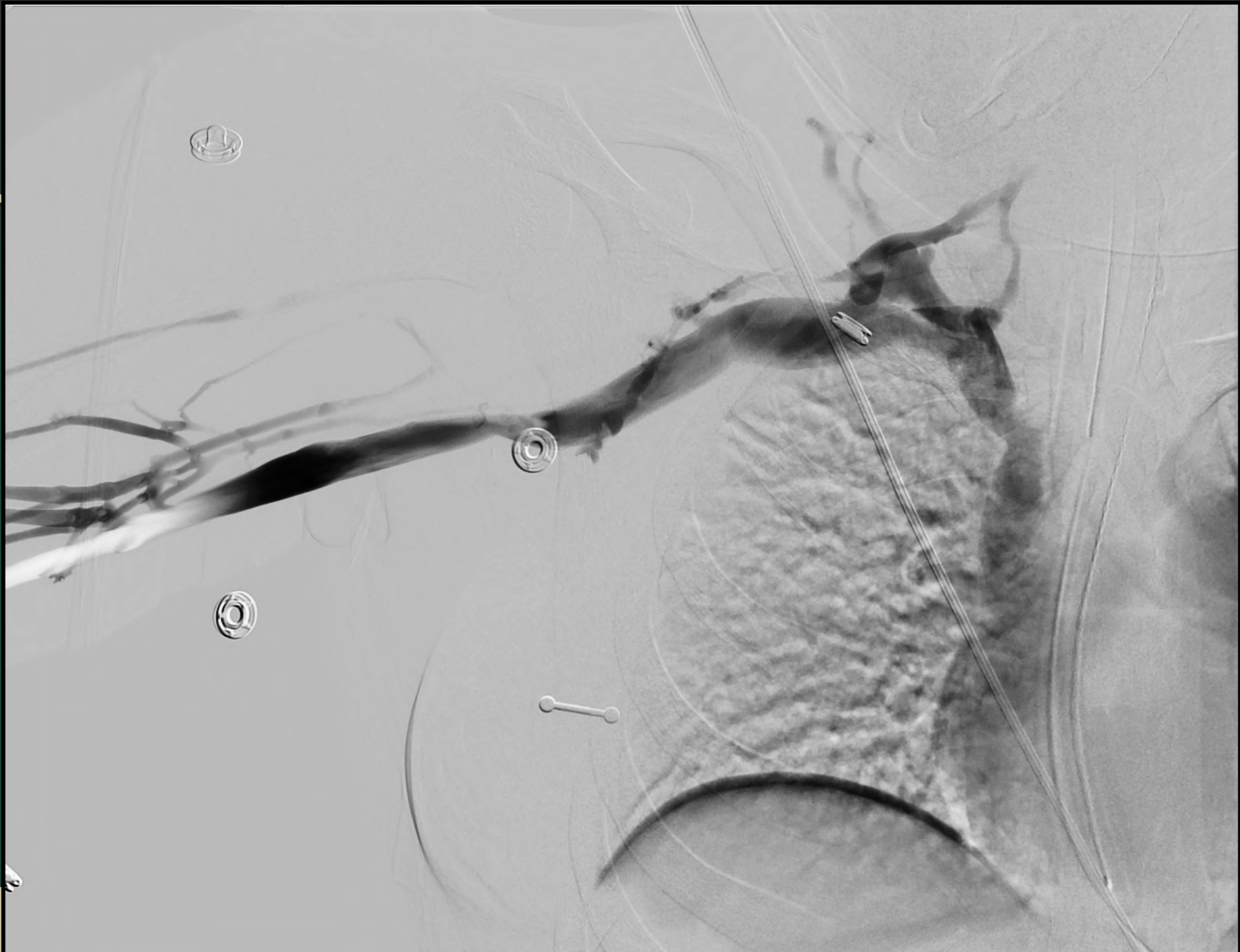




CCJ Decompression:

OUR CURRENT PRACTICE

- **Current indications:**
 - Swelling, pain, dysfunction
 - Stent in situ
 - Recurrent venoplasties needed – subjective



CCJ Decompression:

FUTURE PLANS

- **Plans:**
 - Better followup of existing cohort
 - Better case-cohort comparison (Orangeburg)
 - Prospective randomized trial (Orangeburg)

Troubleshooting after AV Access:

WHAT CAN WE FIX?

- **Outflow stenosis: Big swollen arm, high pressures, inefficient dialysis**
 - Soft tissues? Plasty or stenting
 - Resistant? Surgical correction
- **LOOK FOR LESIONS AT THE CCJ: Venous TOS, will not get better with endoluminal correction. Remove the first rib or clavicle.**

What are your allergies? _____

Risk factors: Do you smoke? ☐ YES ☒ NO if yes, packs/day: _____ Year quit: _____
Do you drink? ☐ YES ☒ NO if yes, drinks per day: _____ per week: _____
Do you use recreational drugs? ☒ YES ☐ NO Describe: _____
Do you have COPD? ☒ YES Are you on oxygen? ☐ YES

What is/was your occupation?

DIVINE being

RETIRED? ☐ YES ☒ NO

Page 2





