Technical Tips and Tricks of TRI for Complex Coronary Disease

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TRI – Good vs. Bad Things

Advantages
Reduced bleeding risk
Reduced length of stay and costs
Early ambulation
Improved patient comfort
Obviates discontinuation of oral anticoagulant therapy
Same-day discharge possible
Disadvantages
Learning curve and different level of skill
Not routinely taught in fellowship programs
Limits guide catheter size, usually ≤7 Fr
Need to overcome unexpected anatomic variation
Persistent pain after the procedure
Possible greater radiation exposure to operator
Long-term consequences to radial artery (e.g., for re-access or for use as AVF) unknown

Difficult Access

- ✓ Radial Loop
- ✓ Access tortuosity
- ✓ Calcification
- ✓ Arteria lusoria

Lesion Complexity

- ✓ Left main intervention
- ✓ Bifurcation lesion
- ✓ Calcified lesion
- ✓ Tortuous and Angulated lesion
- ✓ CTO lesion

Difficult Access Anatomy

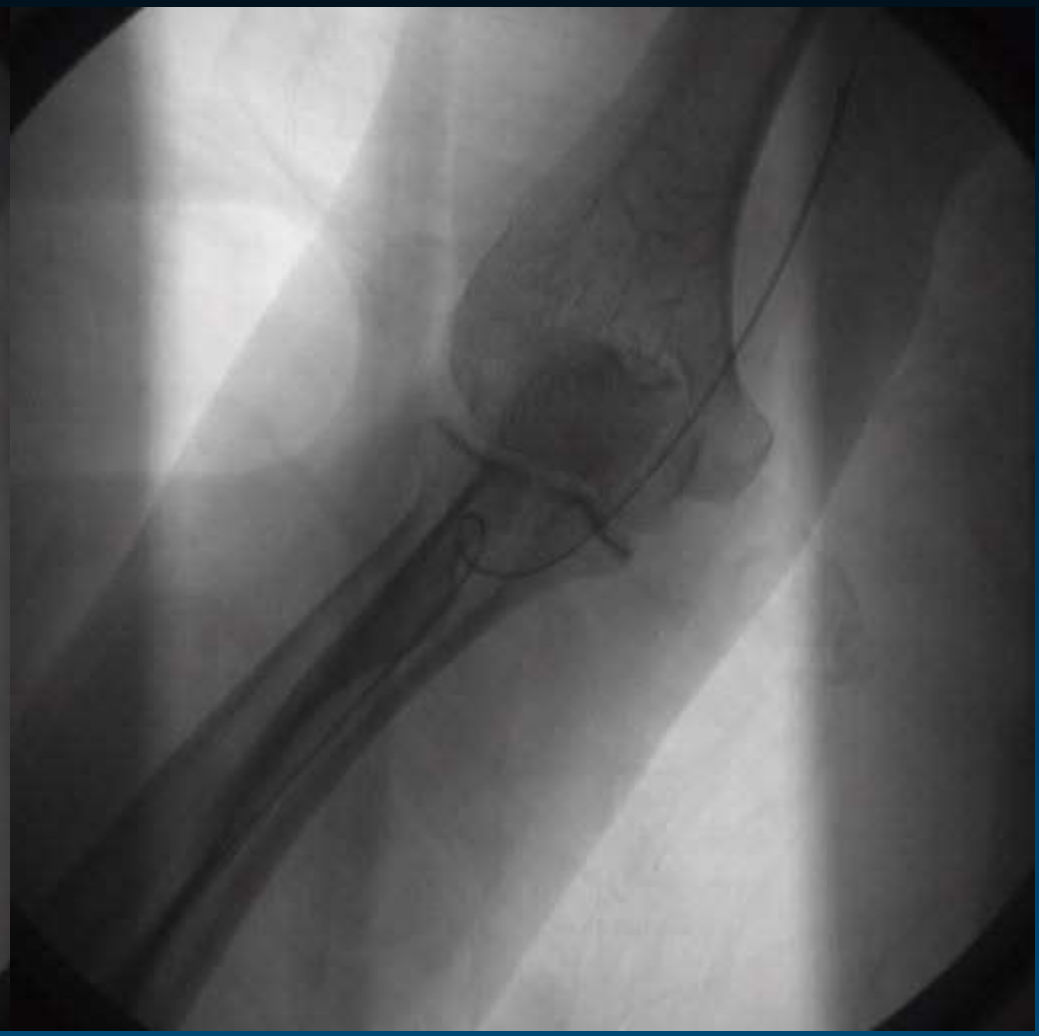
- ✓ Radial Loop
- ✓ Access tortuosity
- ✓ Calcification
- ✓ Arteria lusoria

How To Overcome Radial Artery Loop

Road map → 0.014” GW

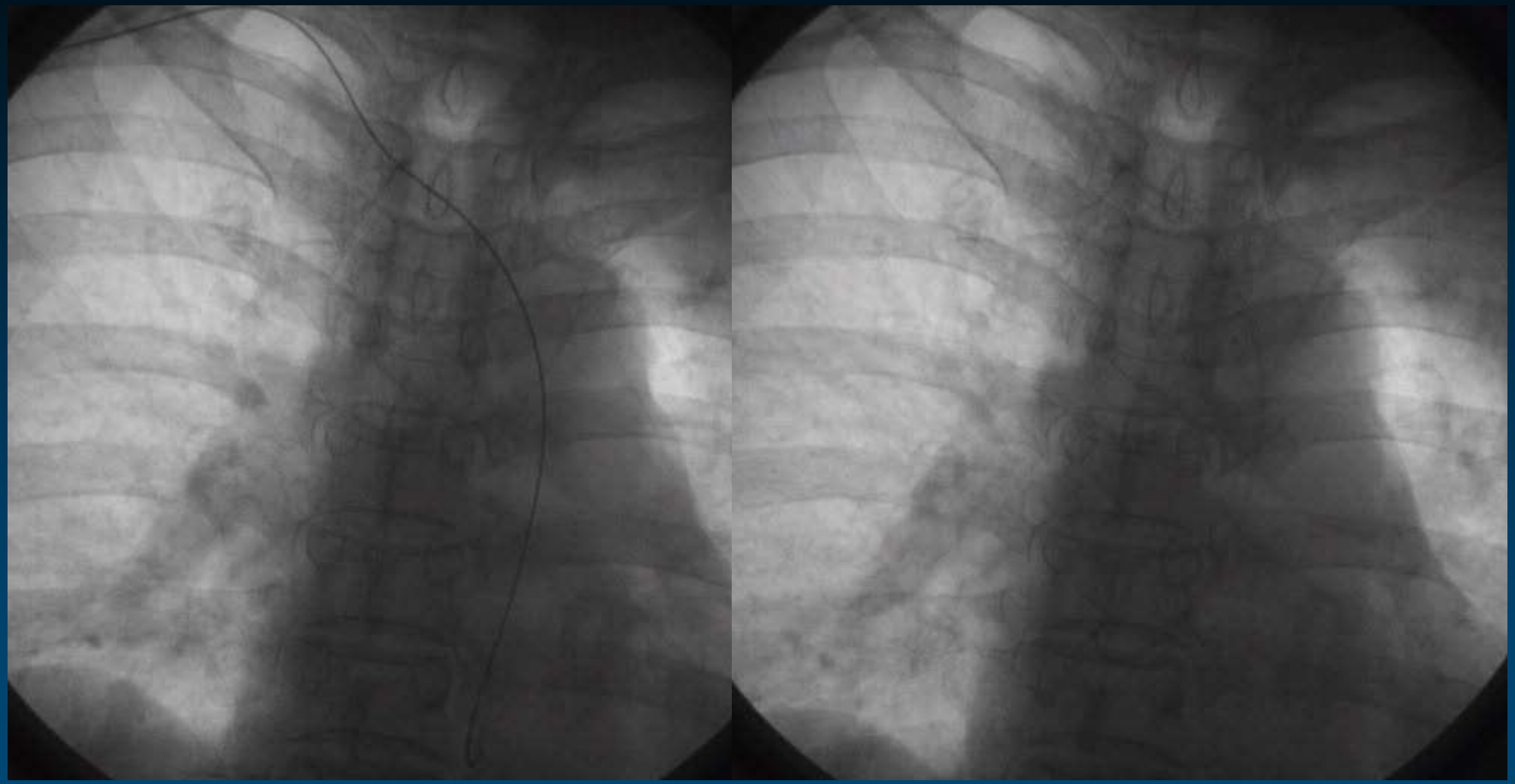
How To Overcome Radial Artery Loop

4 Fr JR (Glide) with a 0.014” GW



Pull & Clockwise rotation

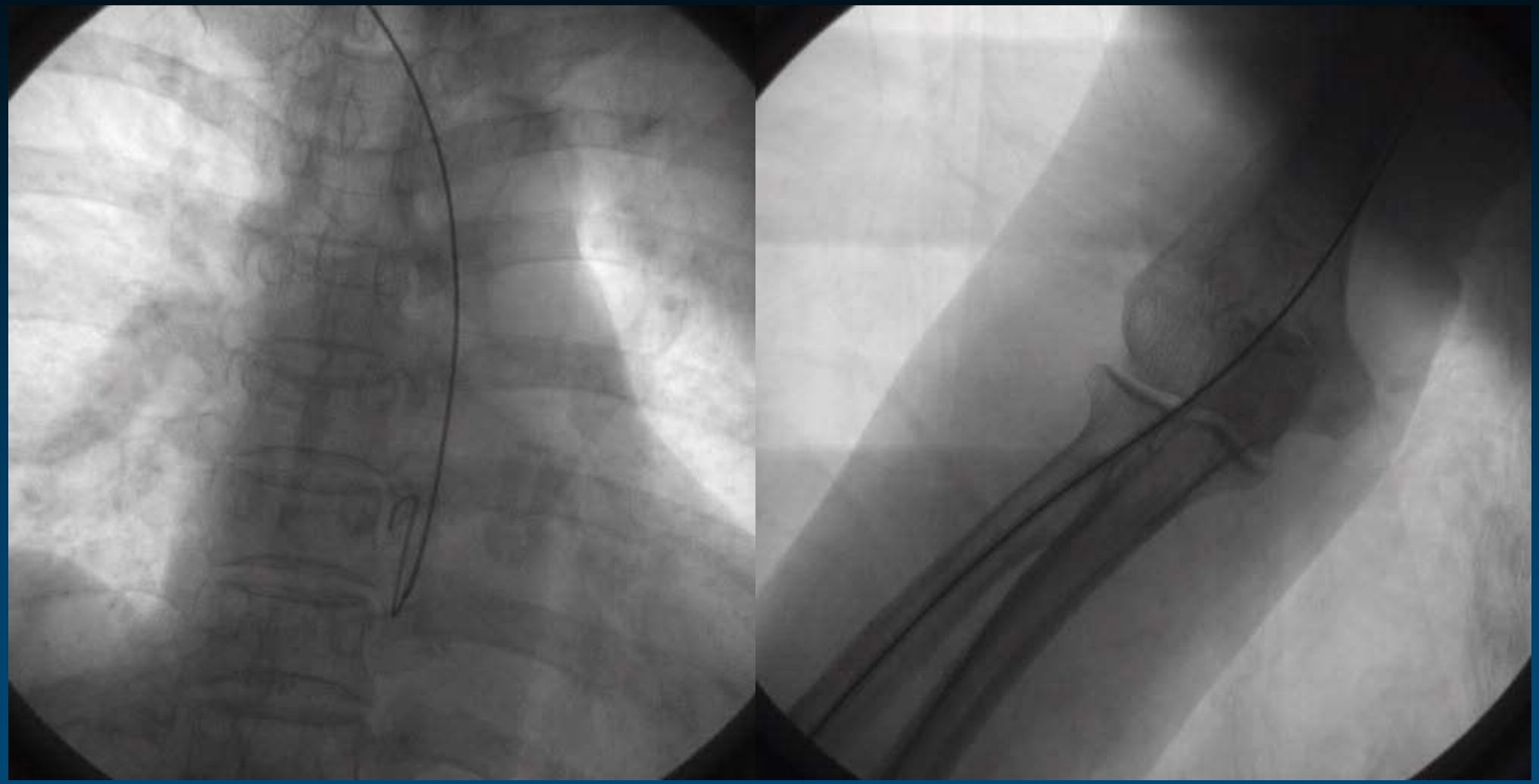
How To Overcome Radial Artery Loop



0.035” Terumo wire

4 Fr JR in aorta

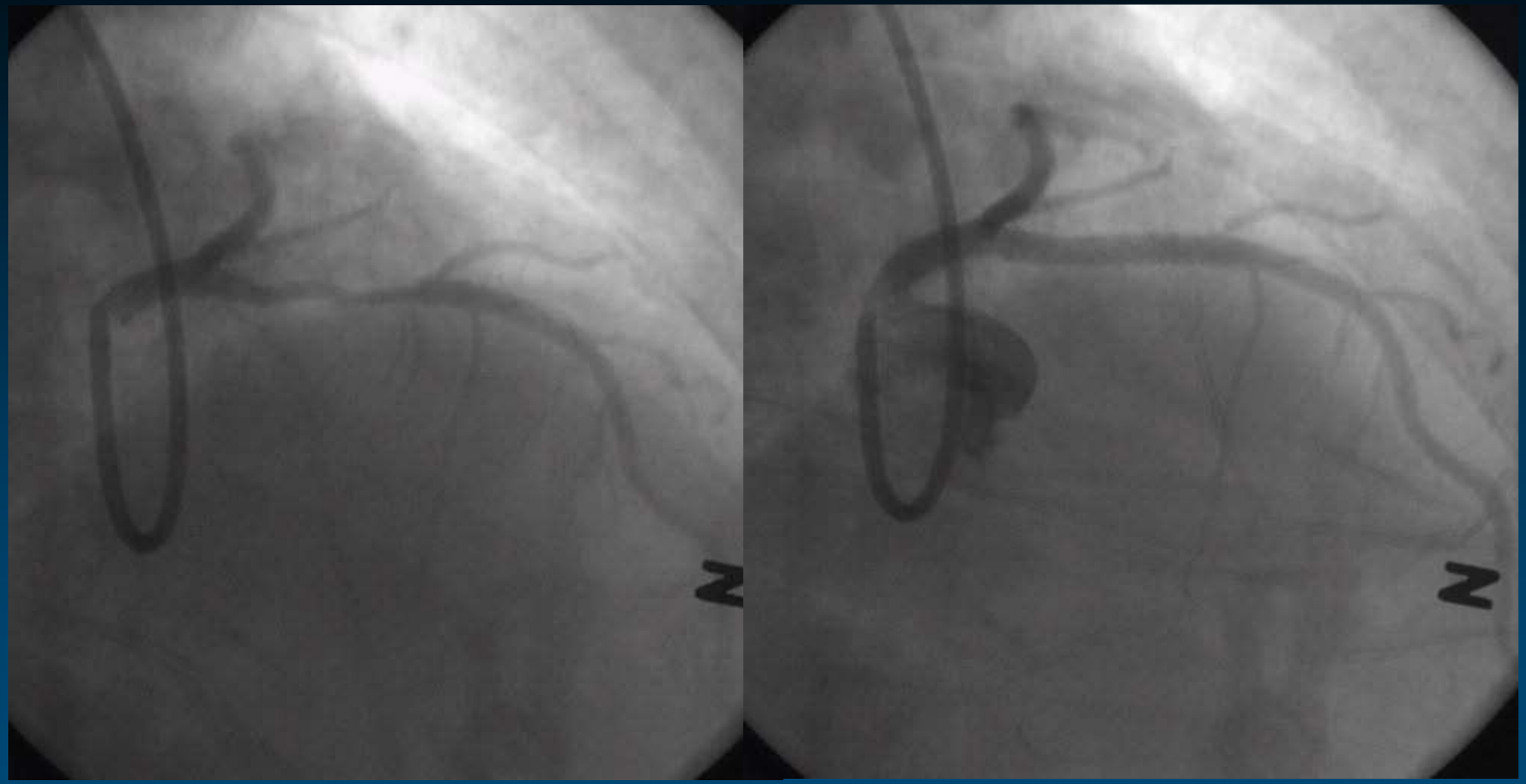
How To Overcome Radial Artery Loop



0.035” Amplatzer Extrastiff wire

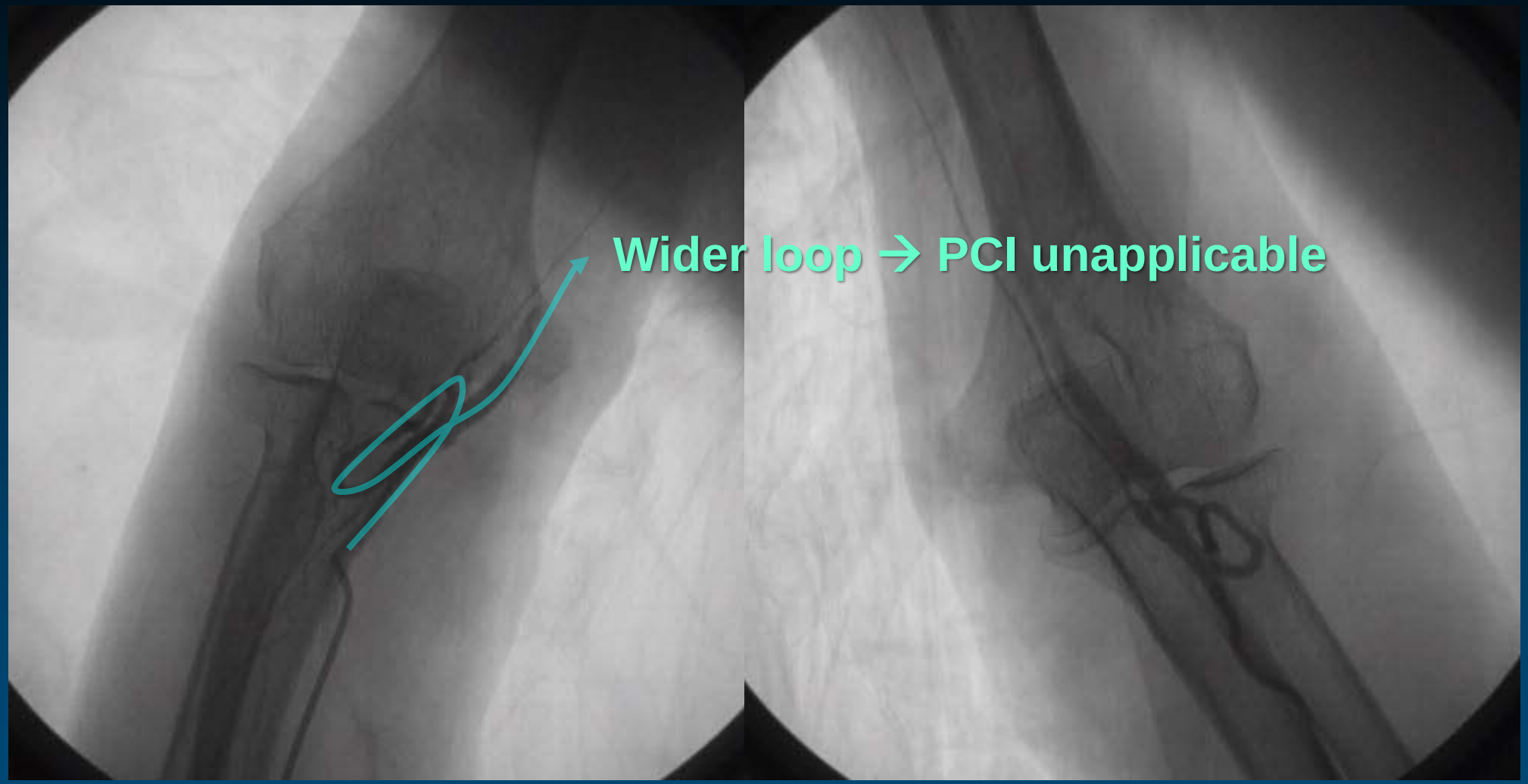
6 Fr Long Terumo sheath

How To Overcome Radial Artery Loop



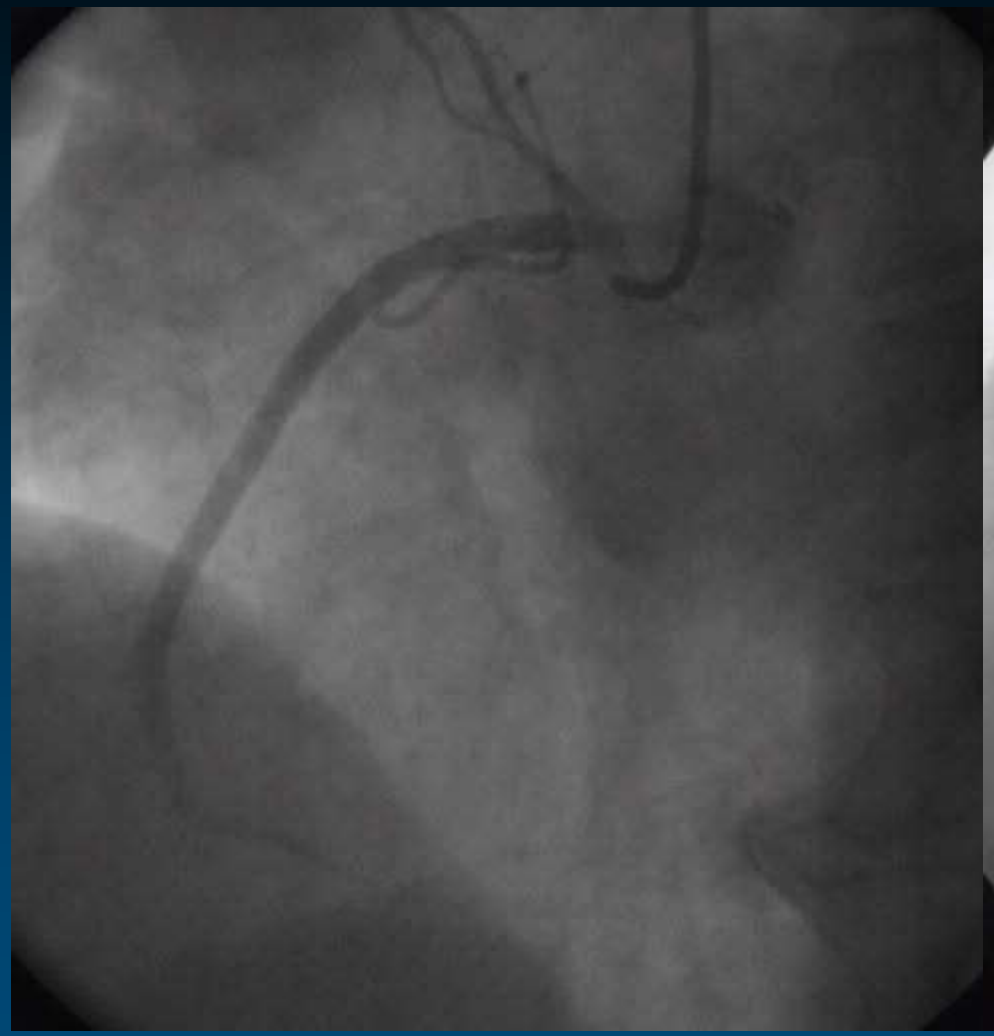
6Fr EBU intervention

Bilateral Radial Artery Loop



Sometimes, they have mirror image

High Take-Off Small Radial Artery



Somewhat sticky….

Small Side Road

Sometimes, You Can Do Angiogram with 4 Fr

4 Fr JL, LCA engagement with 0.035” Amplatzer Stiffwire Support

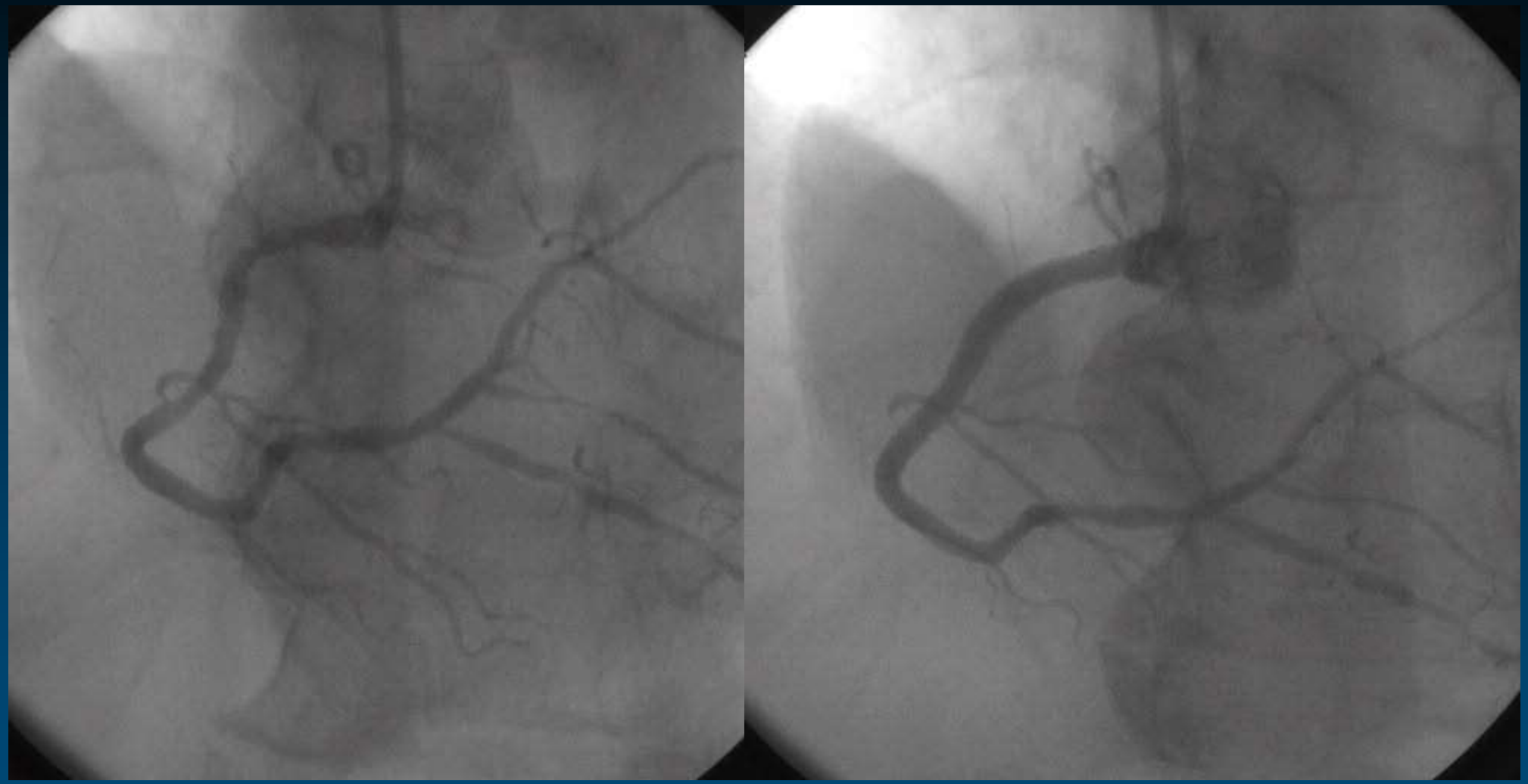
How to Manage Radial Rupture

Switch to Transfemoral?

Sheath Tip Landed In The Brachial Artery

6 Fr Long 25 cm Terumo sheath
+ External compression with BP cuff

How to Manage Radial Rupture



6Fr Transradial PCI for 10 minutes

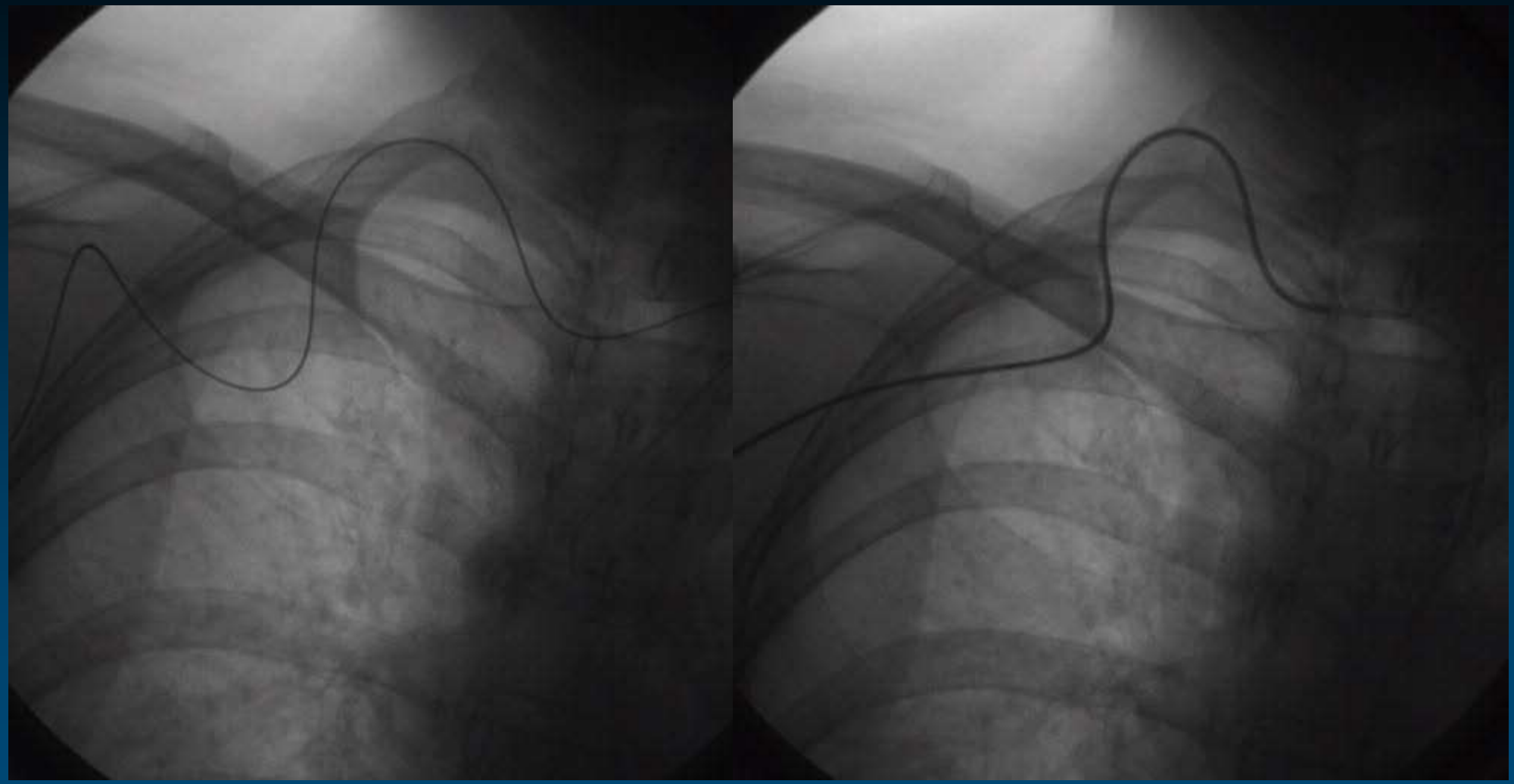
Sealed Radial Rupture After 10 Minutes PCI

If you feel any friction during guiding catheter entry in the RA
→ Immediately replace with long Terumo sheath (6-7 Fr)

How to Overcome Tortuosity ?

Axiilary Arterial Tortuosity

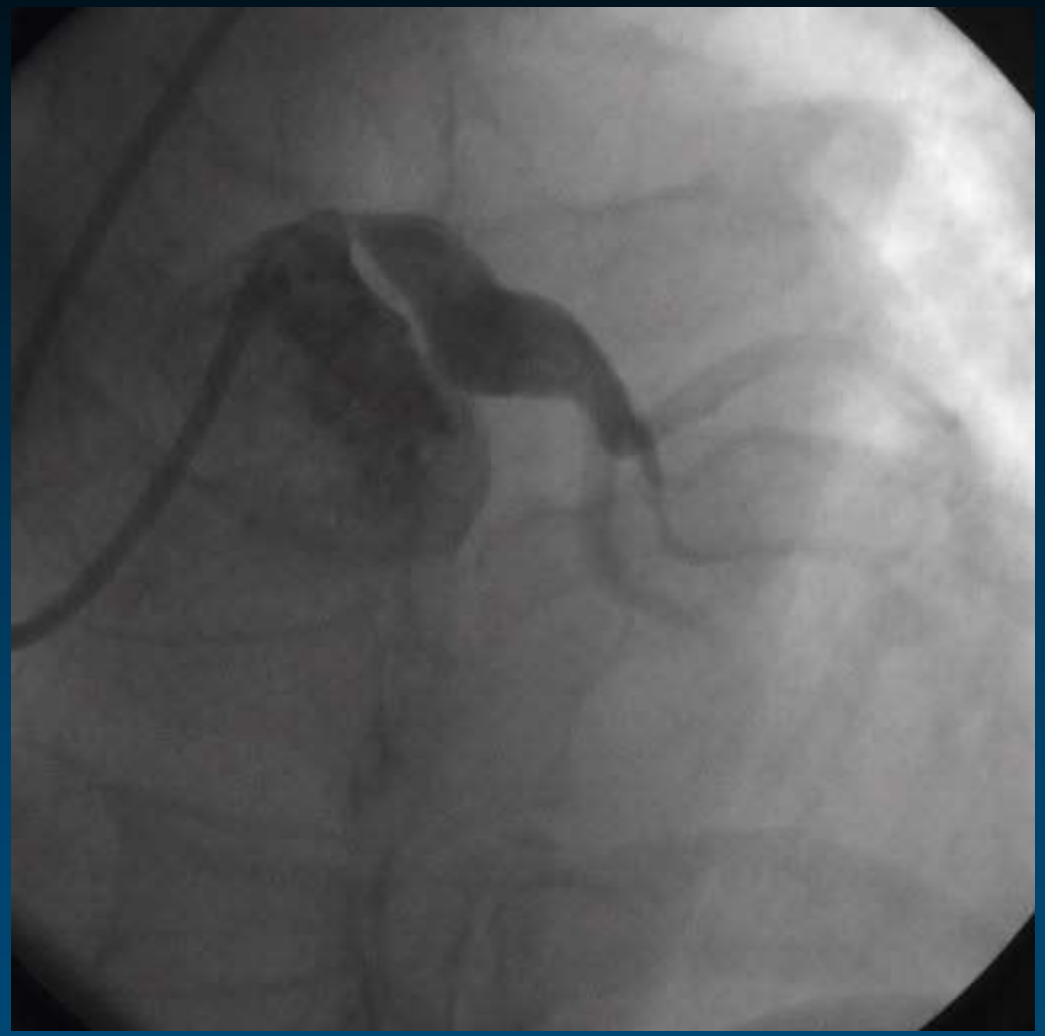
How to Overcome Tortuosity ?



Next, Subclavian tortuosity in the Same Patient

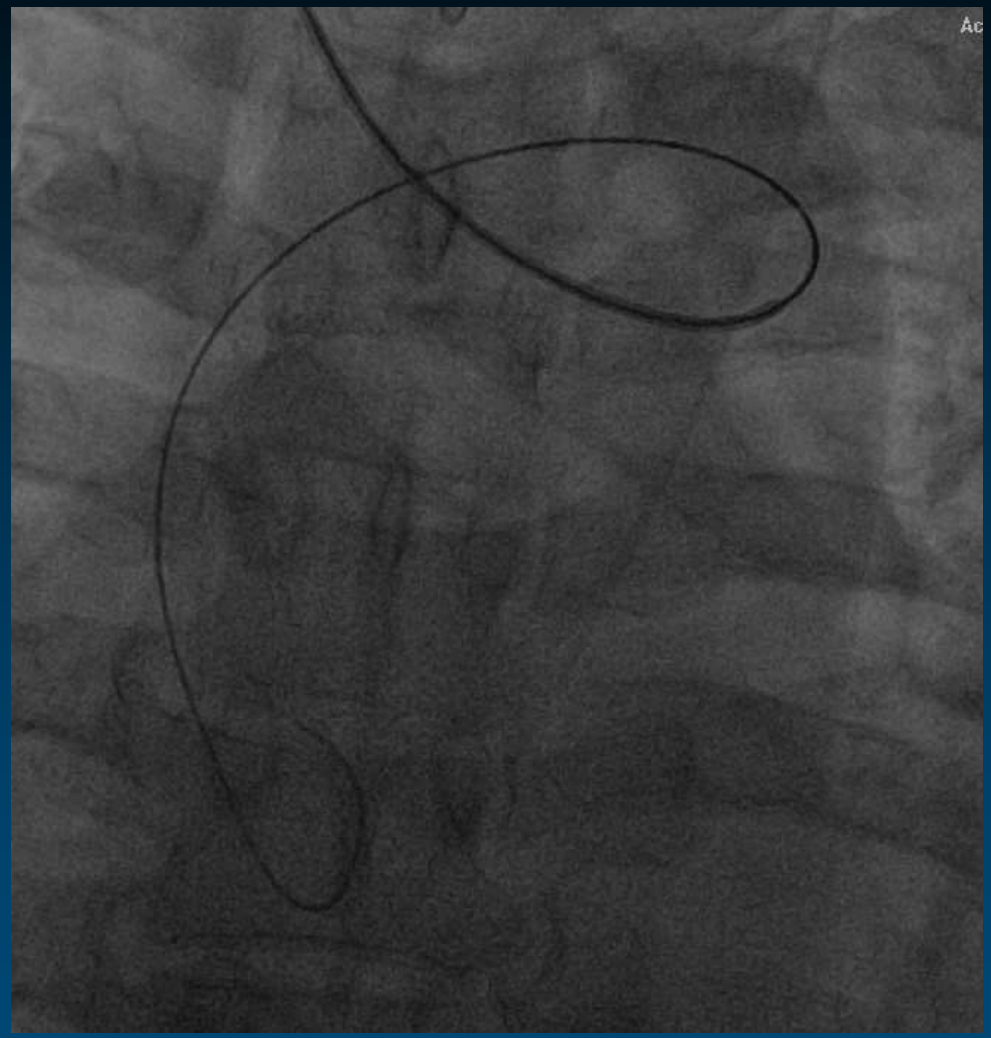
→ Overcame by an 0.035” Amplatzer Superstiff GW

How to Overcome Tortuosity ?



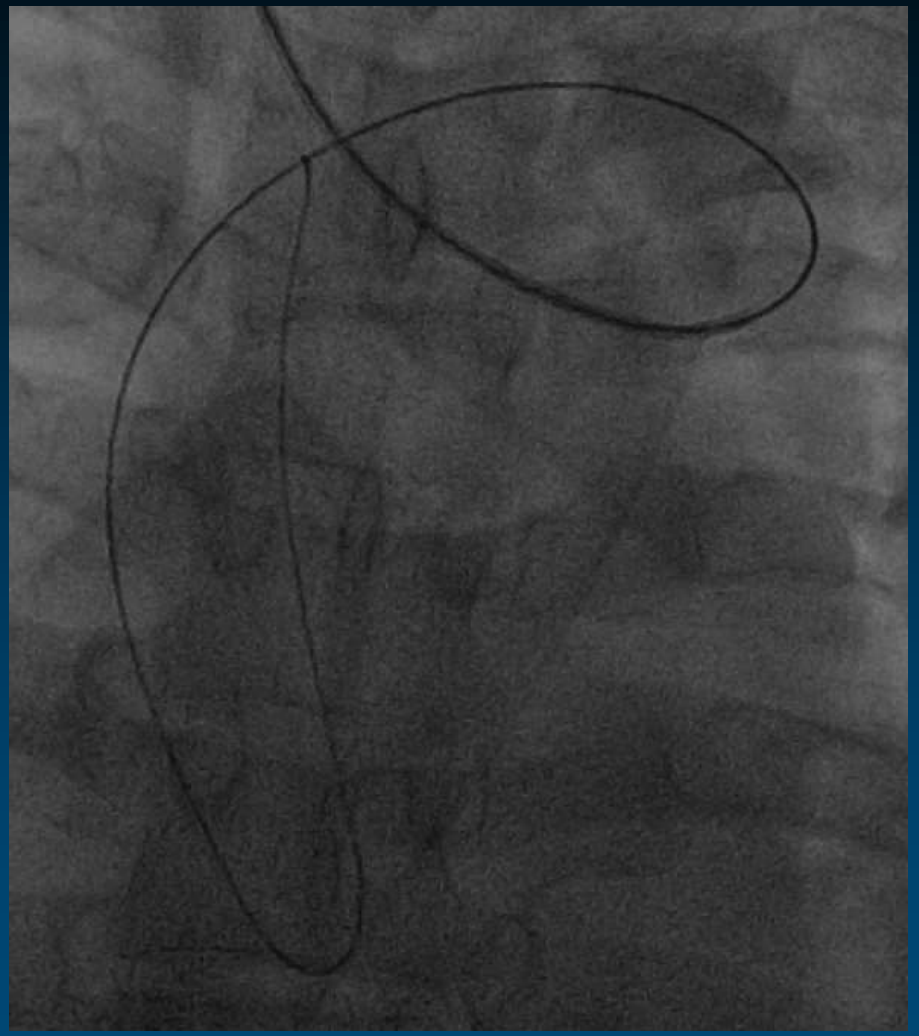
We performed angiogram and IVUS study…

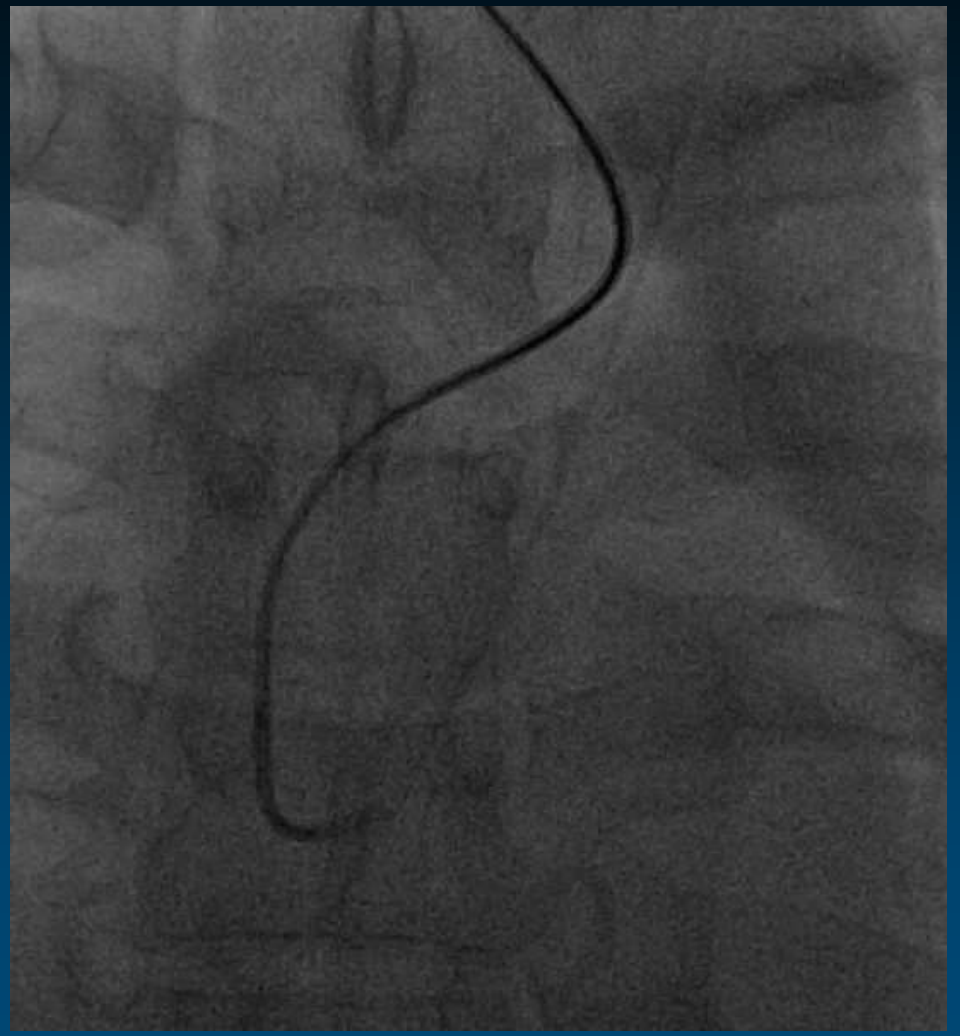
Difficulty from right radial access



What cause this curve?

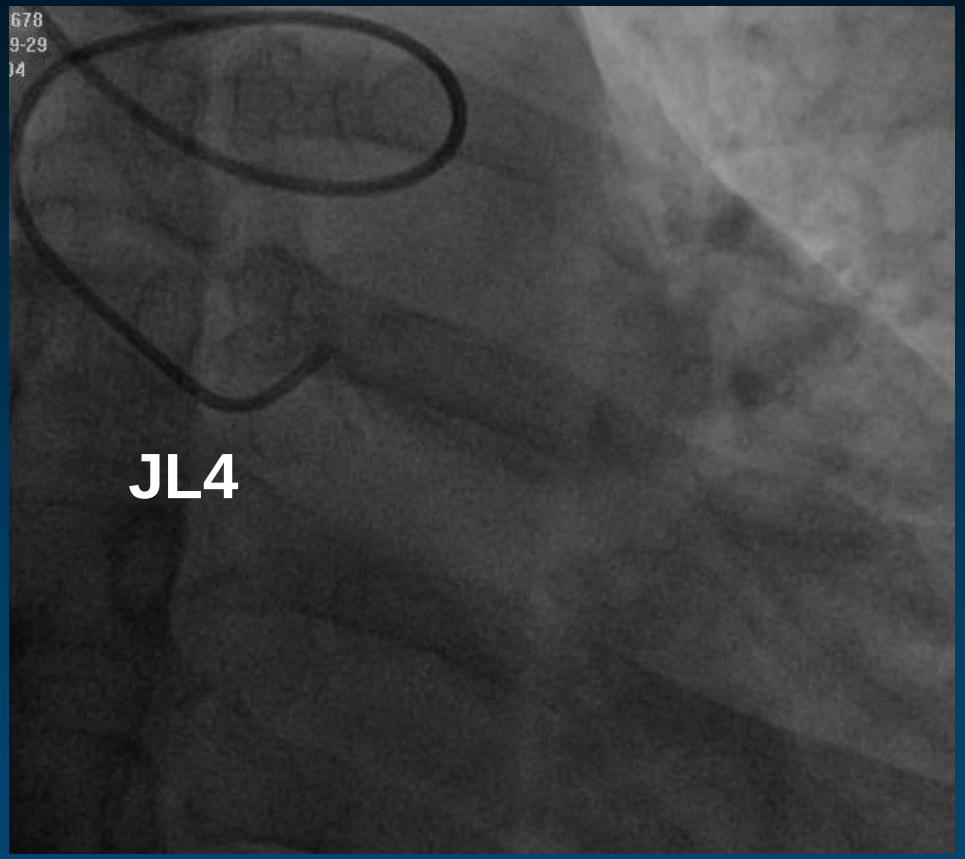
Difficult engagement

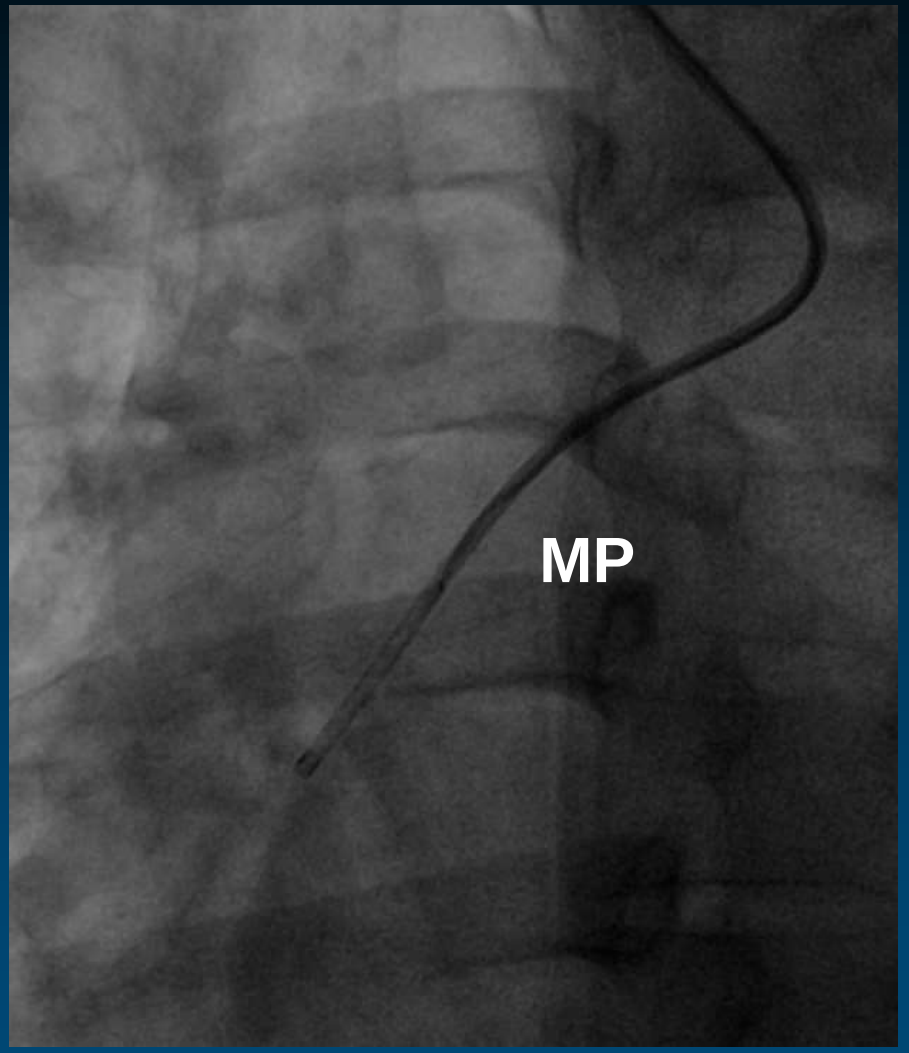




LCA engagement with Amplatzer stiff wire

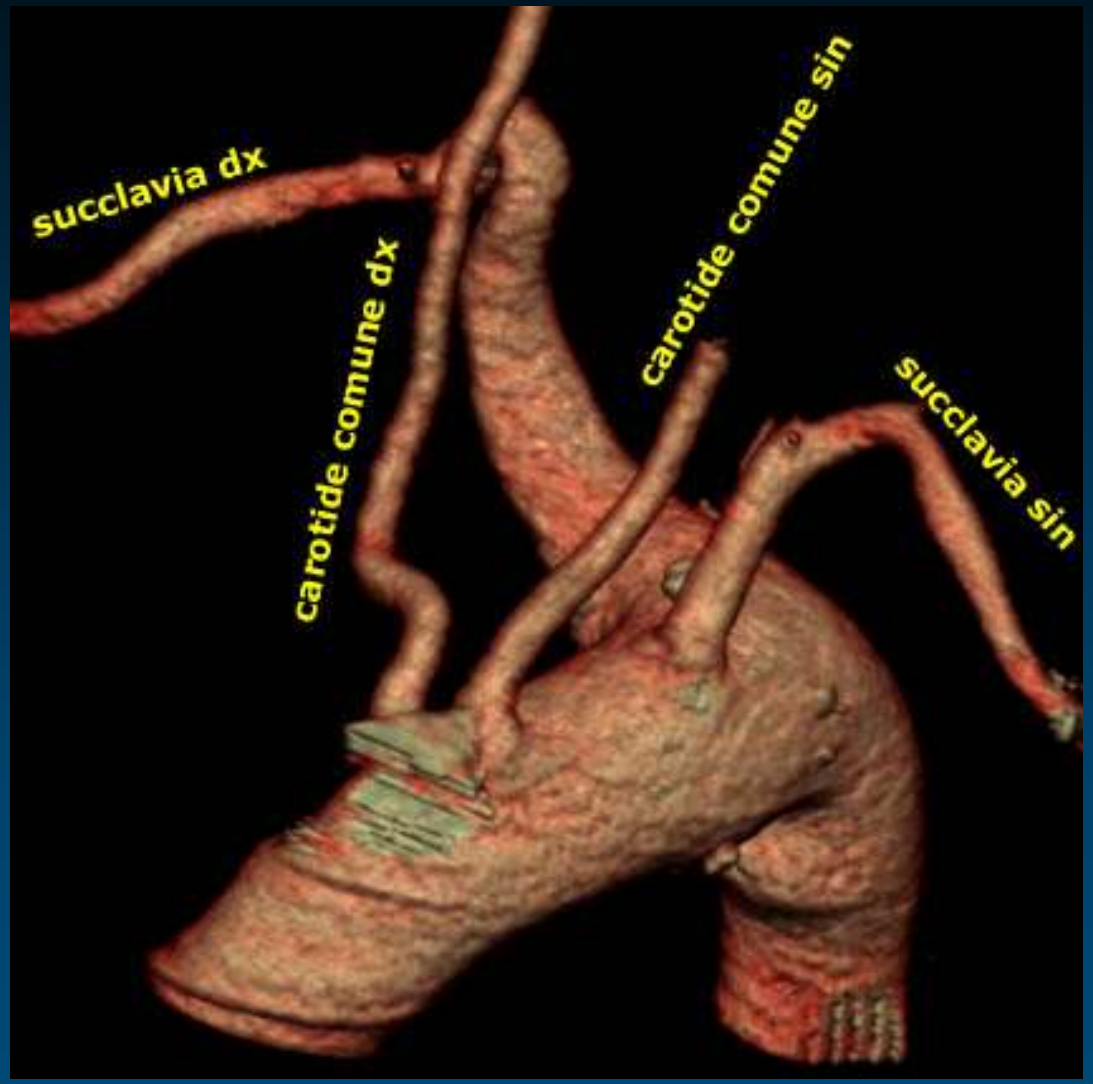
Both coronary angiogram





Difficult but possible

Arteria Lusoria

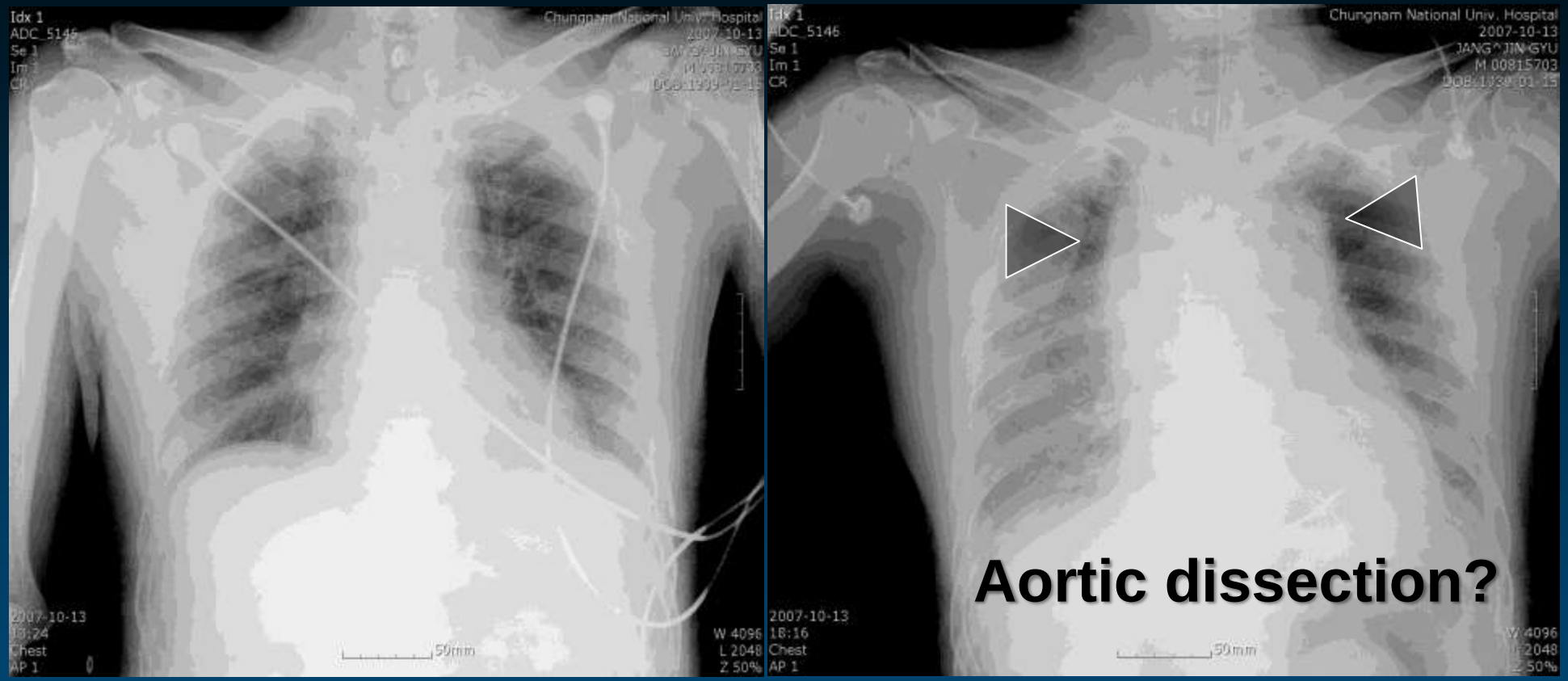


Anterior STEMI → Successful Primary Stenting and KB

But, Unexplained Shock After 1° Stenting

- LV EF≥40%, No MR, No VSD, No pericardial effusion

Unexplained Shock After 1° Stenting



Initial CXR

3 Hours After 1° Stenting

Nobody knows the mechanism of shock, except the assistance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JANG JIN GYU
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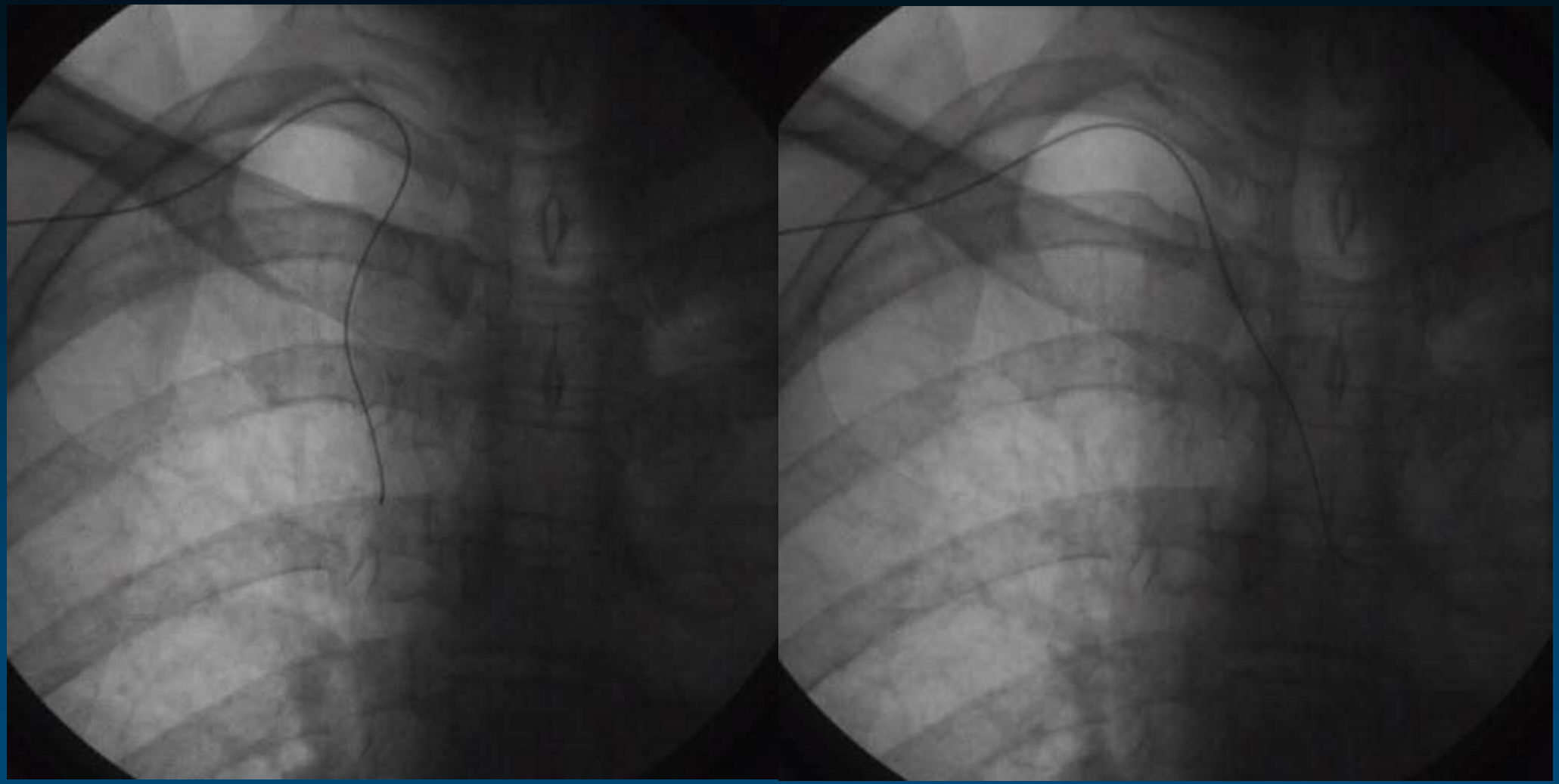
Be Careful When You Use Slippery Wire…



Do not Step Off Cardiac Silhouette !!!

Curved Terumo wire → Visit any side road

Angled-J Terumo wire is better

Lesion Complexity

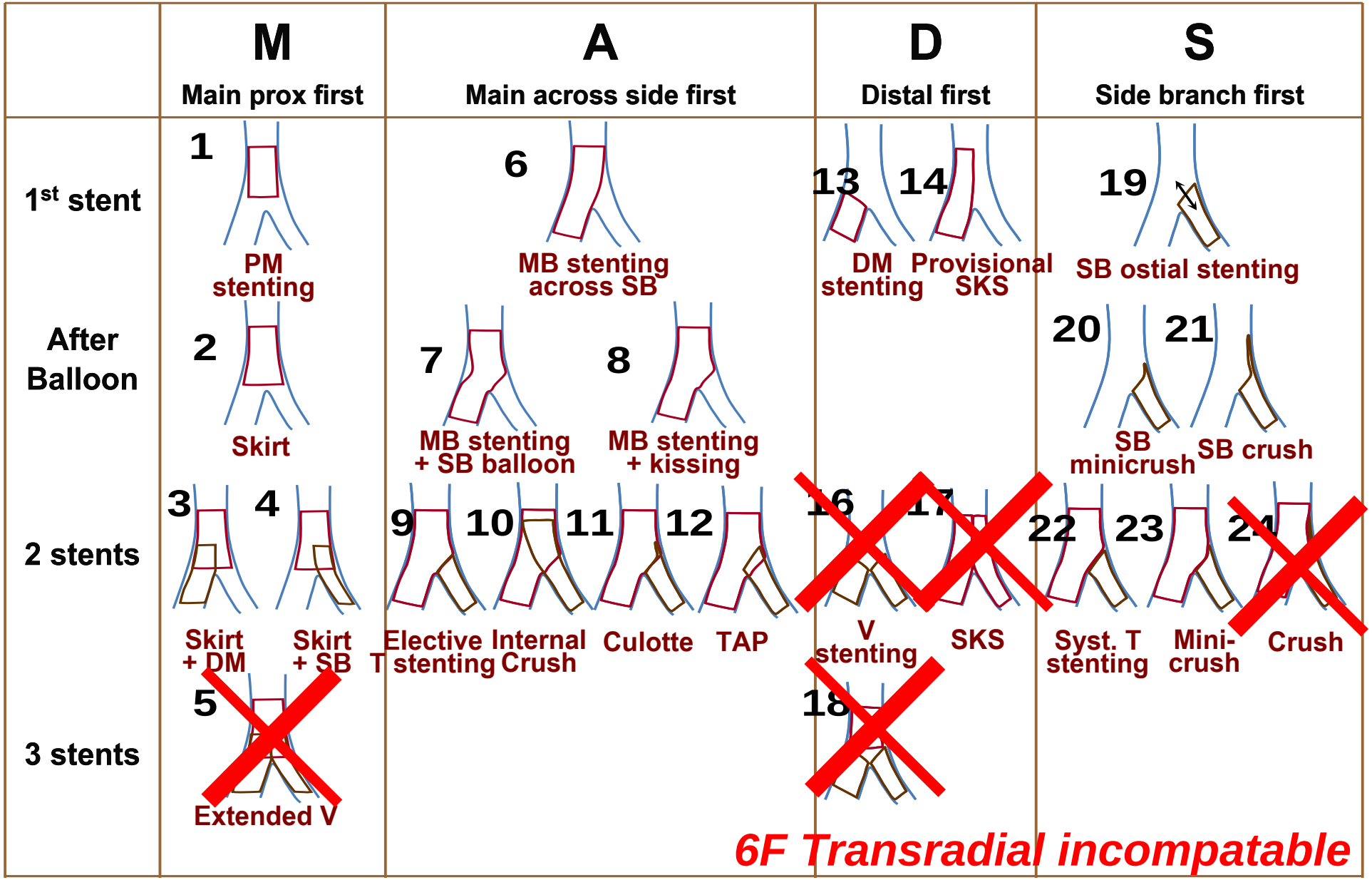
- ✓ Left main intervention
- ✓ Bifurcation lesion
- ✓ Calcified lesion
- ✓ Tortuous and Angulated lesion
- ✓ CTO lesion

Left Main Intervention

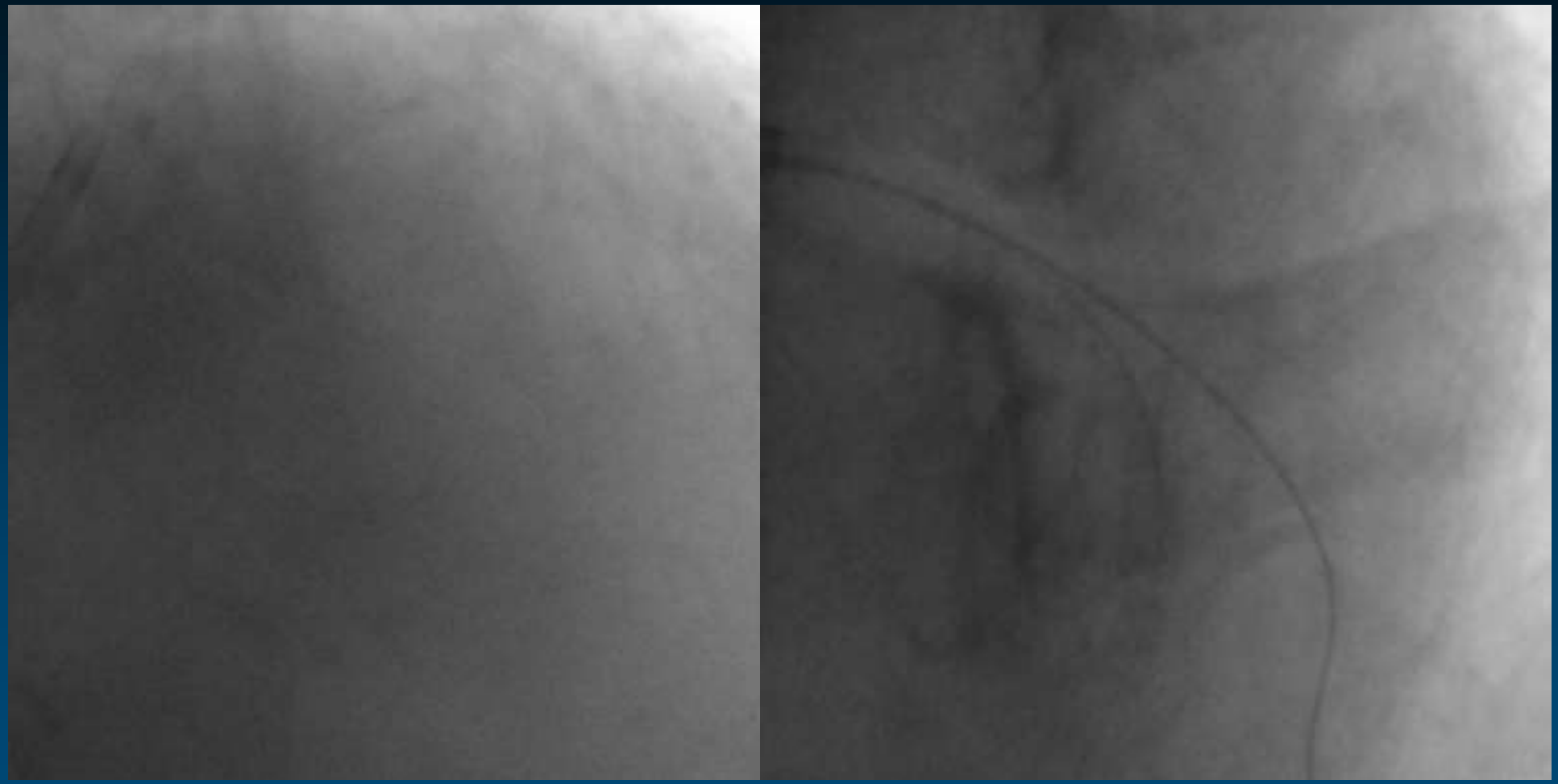
Who Is TFI Candidate?

- ✓ LV dysfunction
- ✓ Unstable hemodynamics
- ✓ Acute coronary syndrome
- ✓ RCA occlusion
- ✓ Trifurcation
- ✓ Calcified, Angulated lesion
- ✓ Need SKS or classic crushing

Bifurcation Lesion PCI

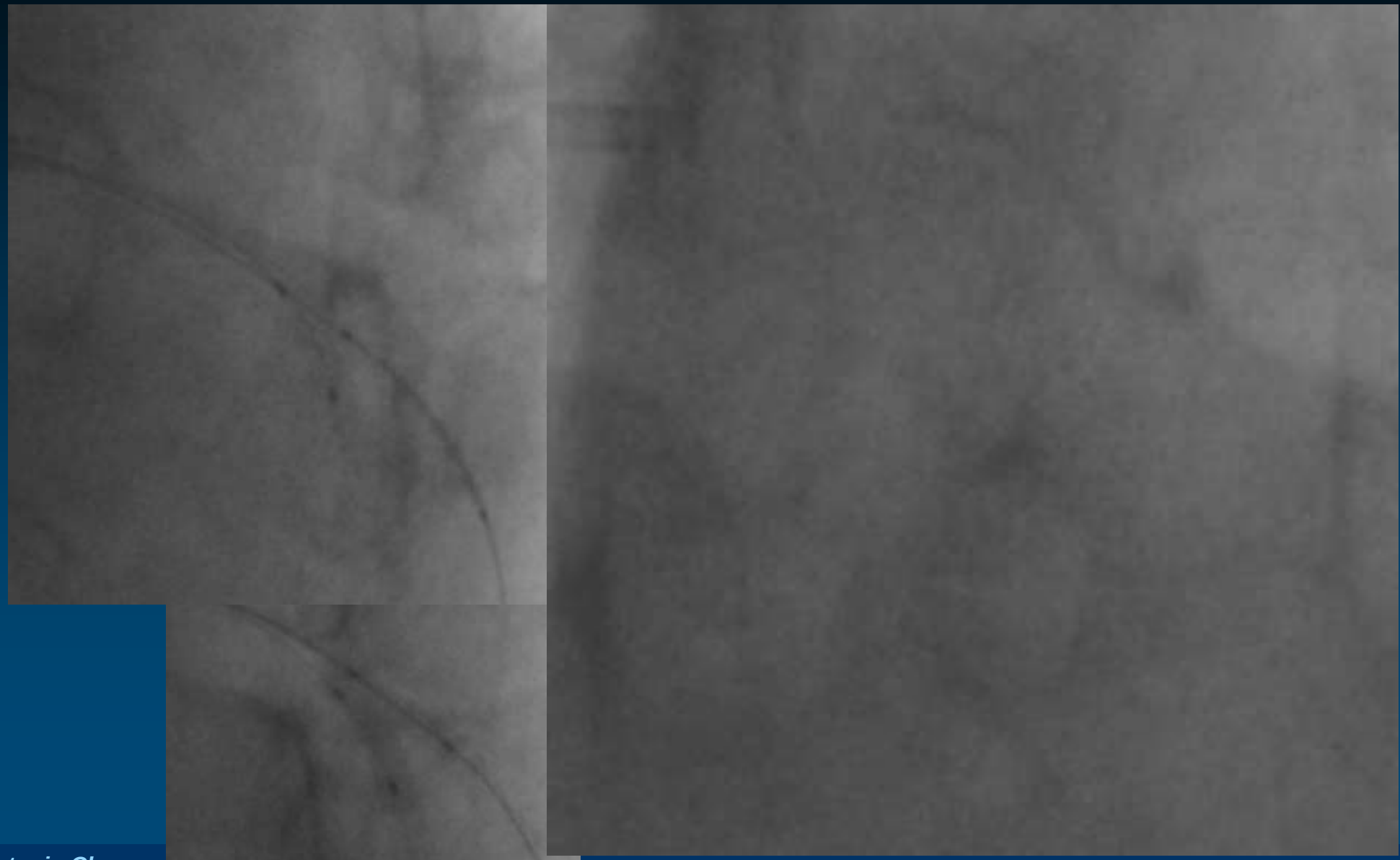


TAP Technique with 6 Fr TR



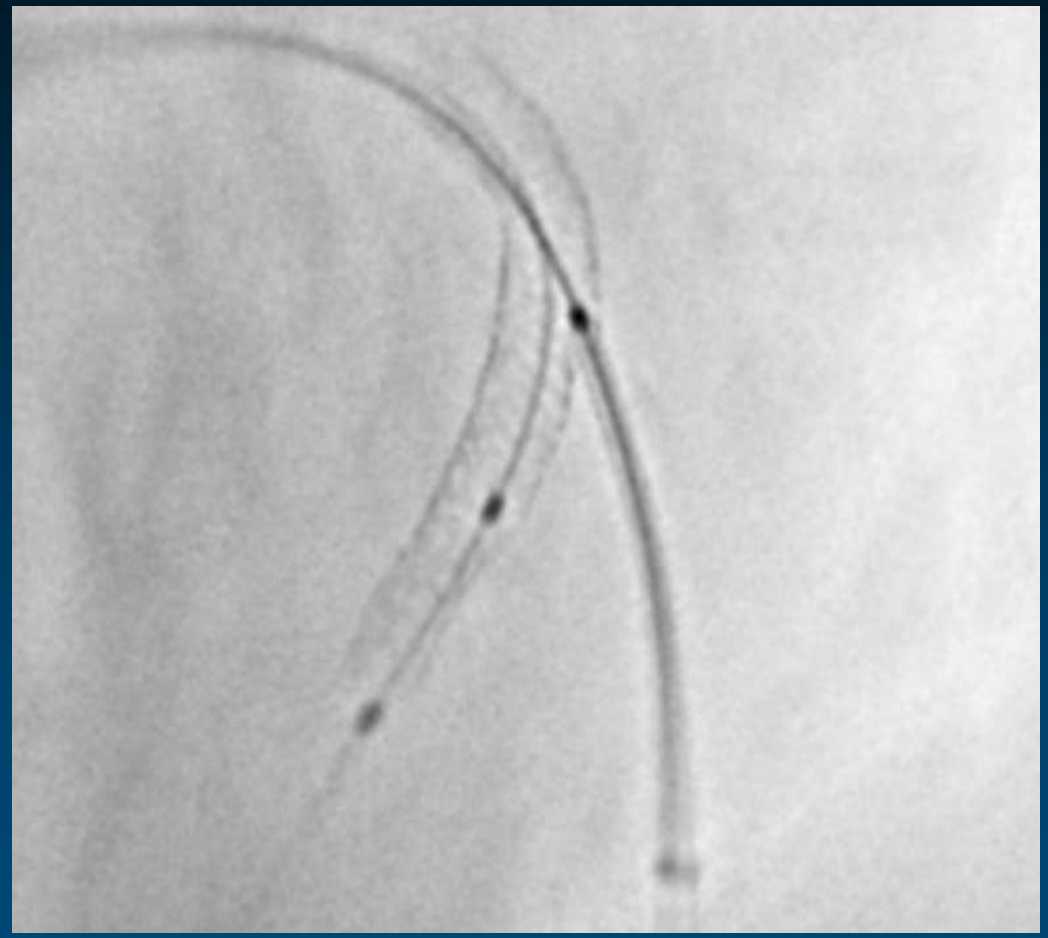
SB dissection after MB stenting

TAP Technique



For Proper Ostial Positioning for TAP

Stent Booster

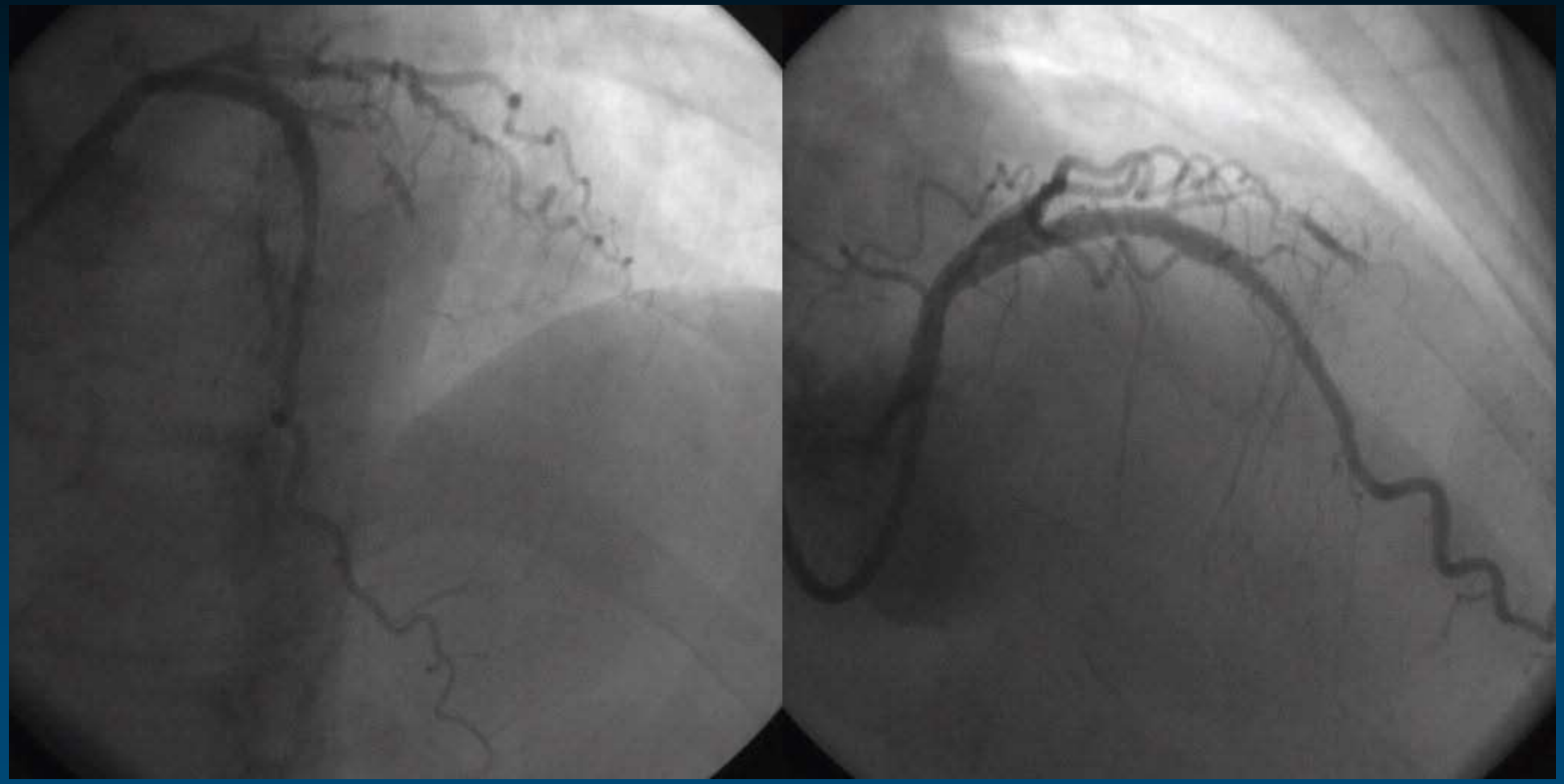


Inevitable Stent Protrusion to MB

Reverse Crushing

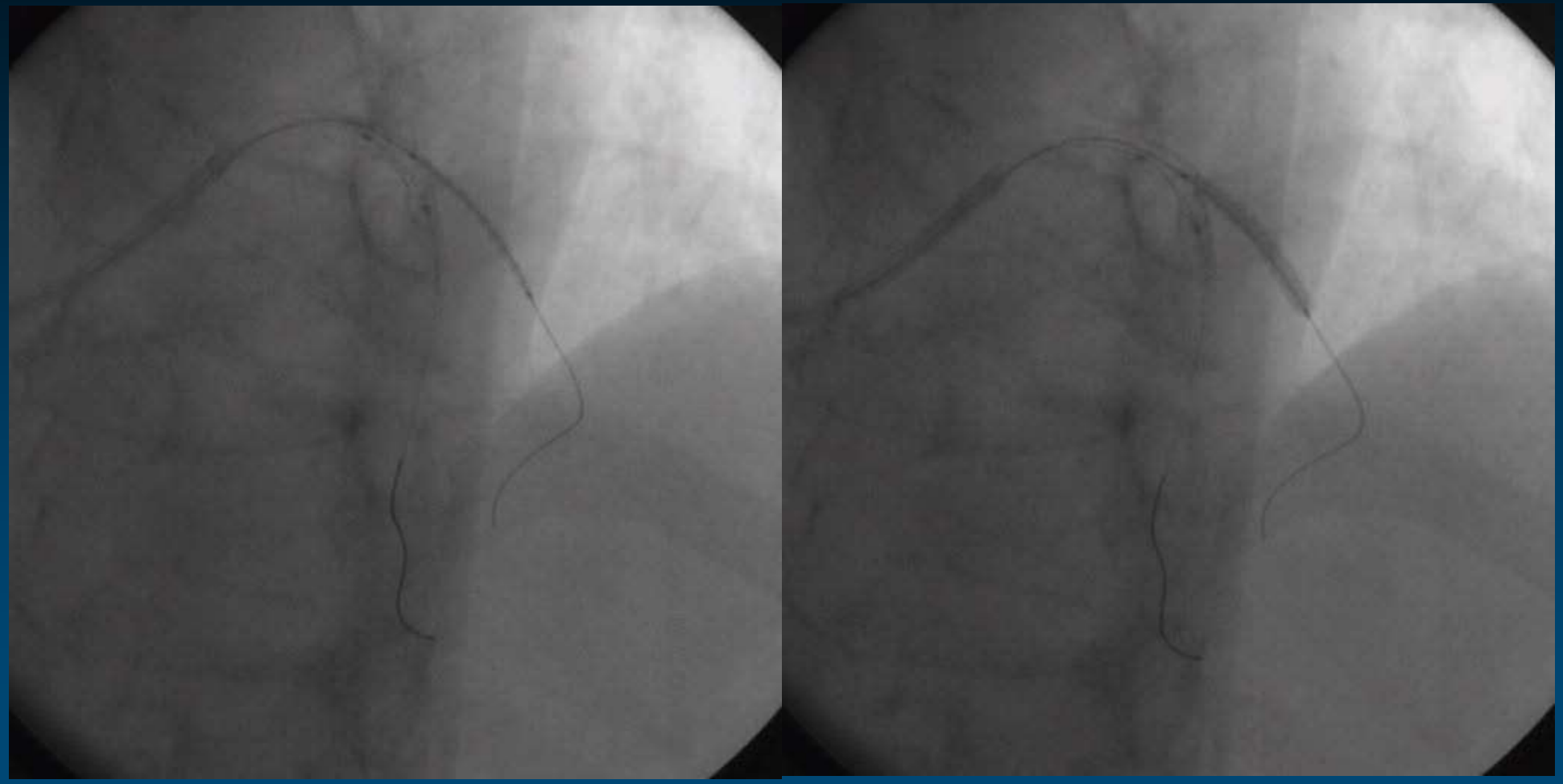
allows provisional SB stenting without strut protrusion

Recurred angina after LAD stenting



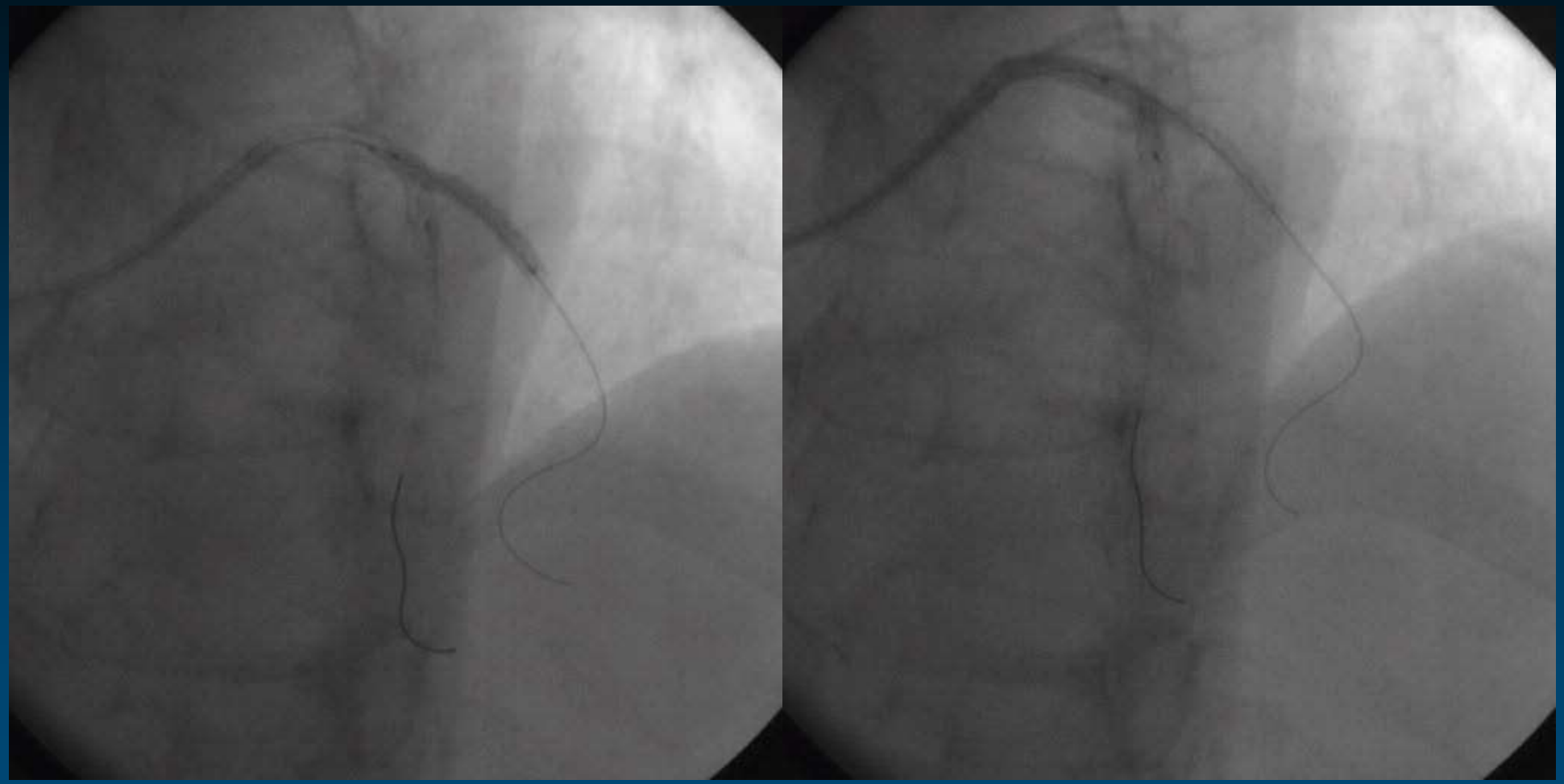
6 Fr EBU guiding

Reverse crushing (LAD 3.5 balloon + Dx DES 2.75×23mm)



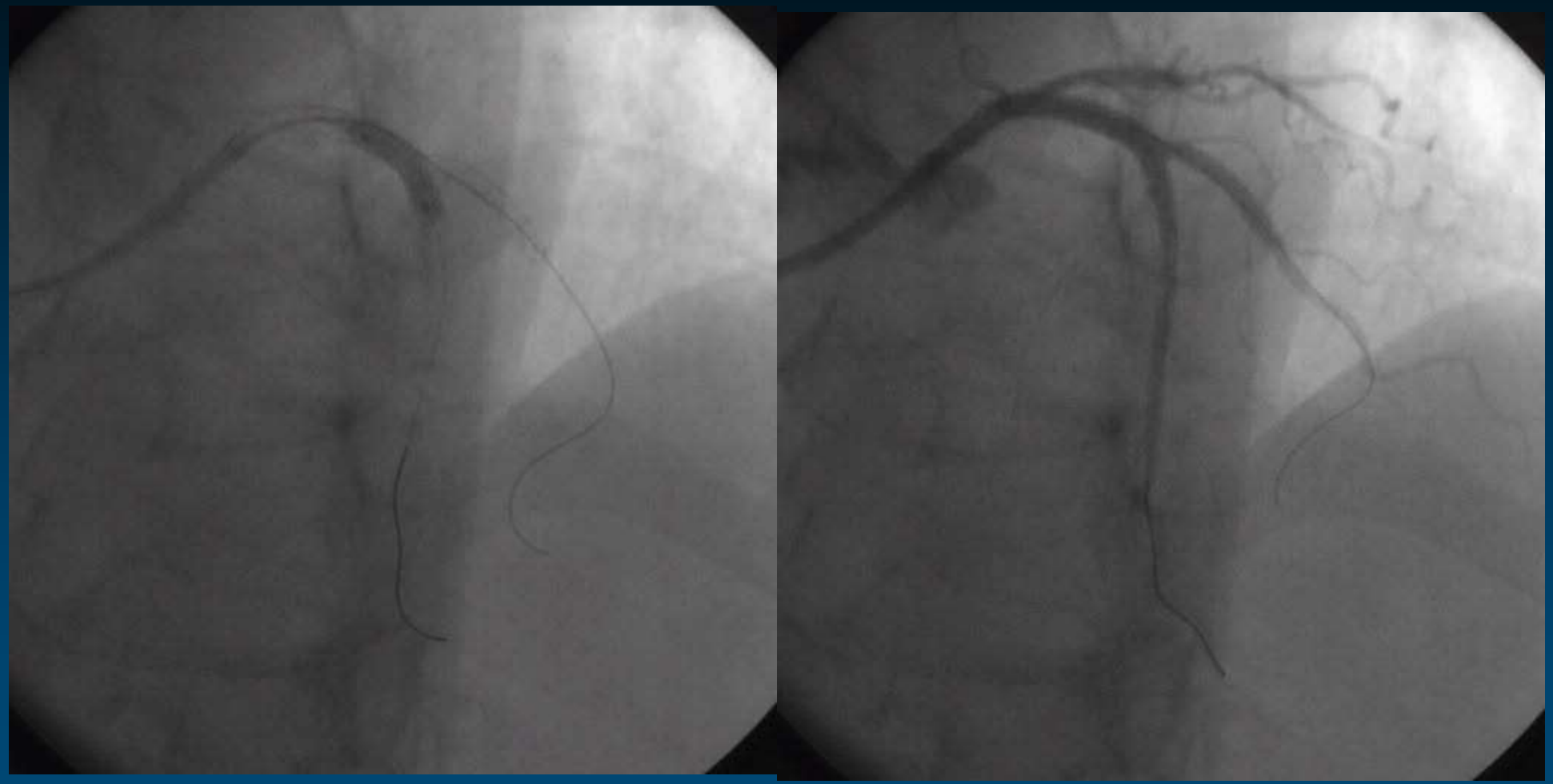
12 atm

Reverse crushing (LAD 3.5 balloon + Dx DES 2.75×23mm)



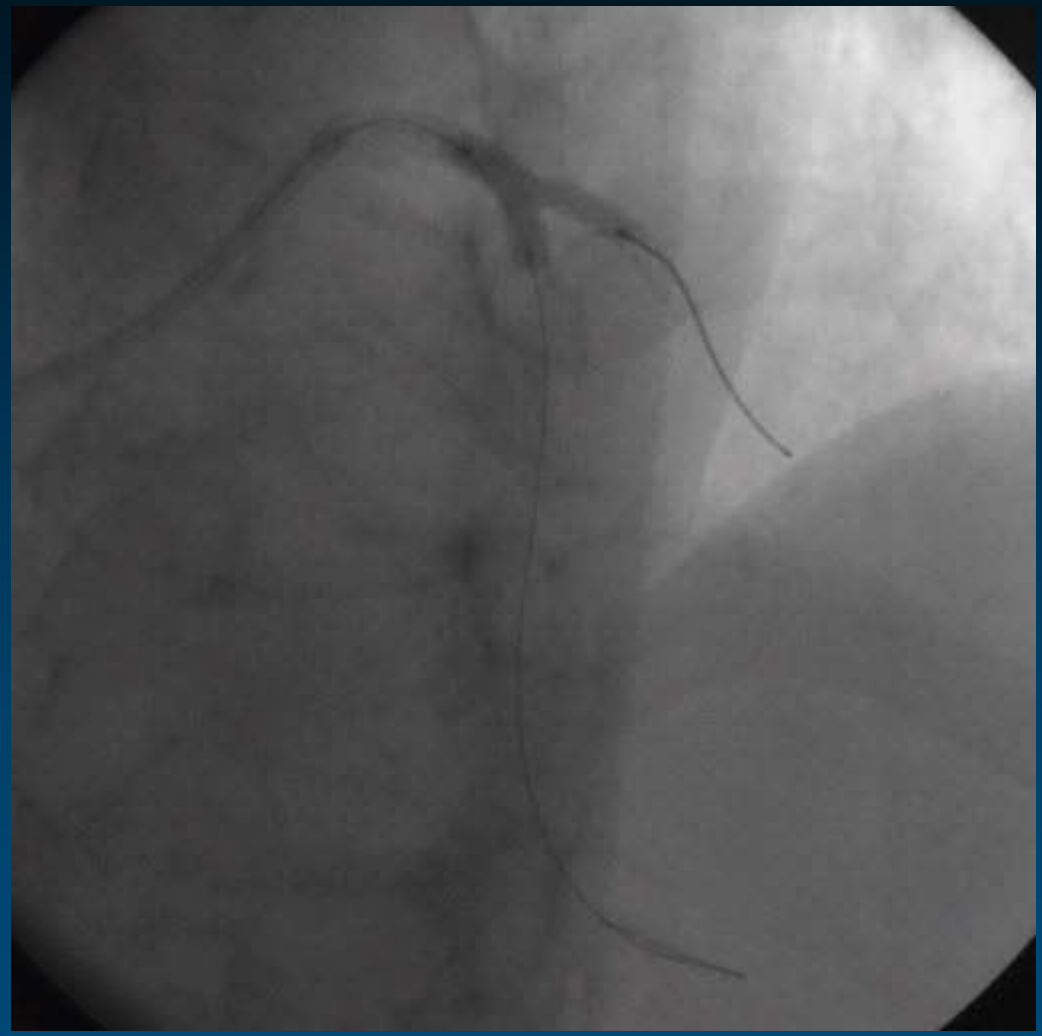
18 atm

LAD dilation with 3.5 mm balloon (18 atm)



Crush diagonal stent, 18 atm

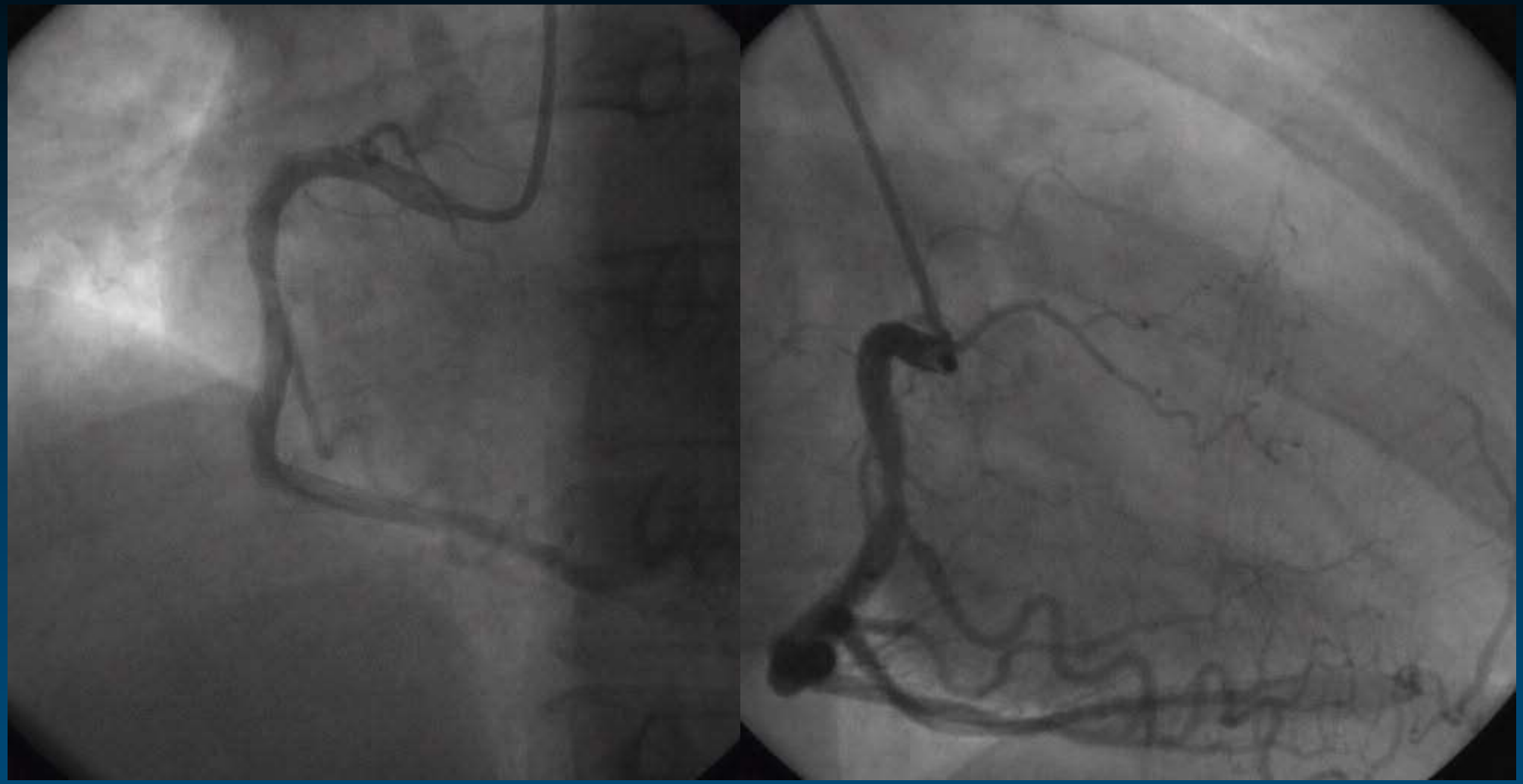
Dx rewire and the final kissing (3.0 mm + 2.75 mm)



Final angiogram

Mini Crushing for LAD Bifurcation with Transradial 6 Fr Guiding Catheter

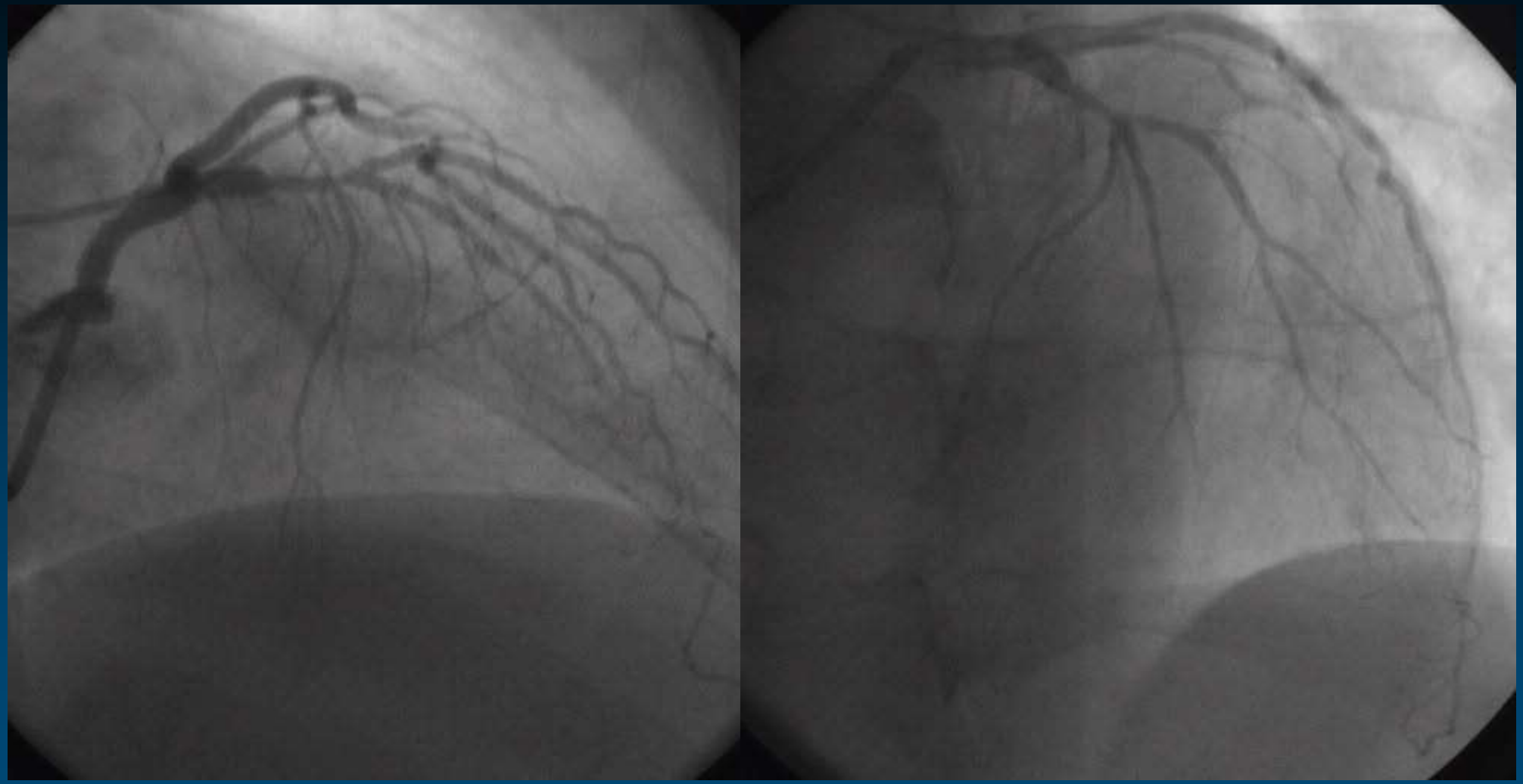
60YO woman, Unstable angina



LCA (Transradial, 6Fr EBU)

LAO caudal (spider)

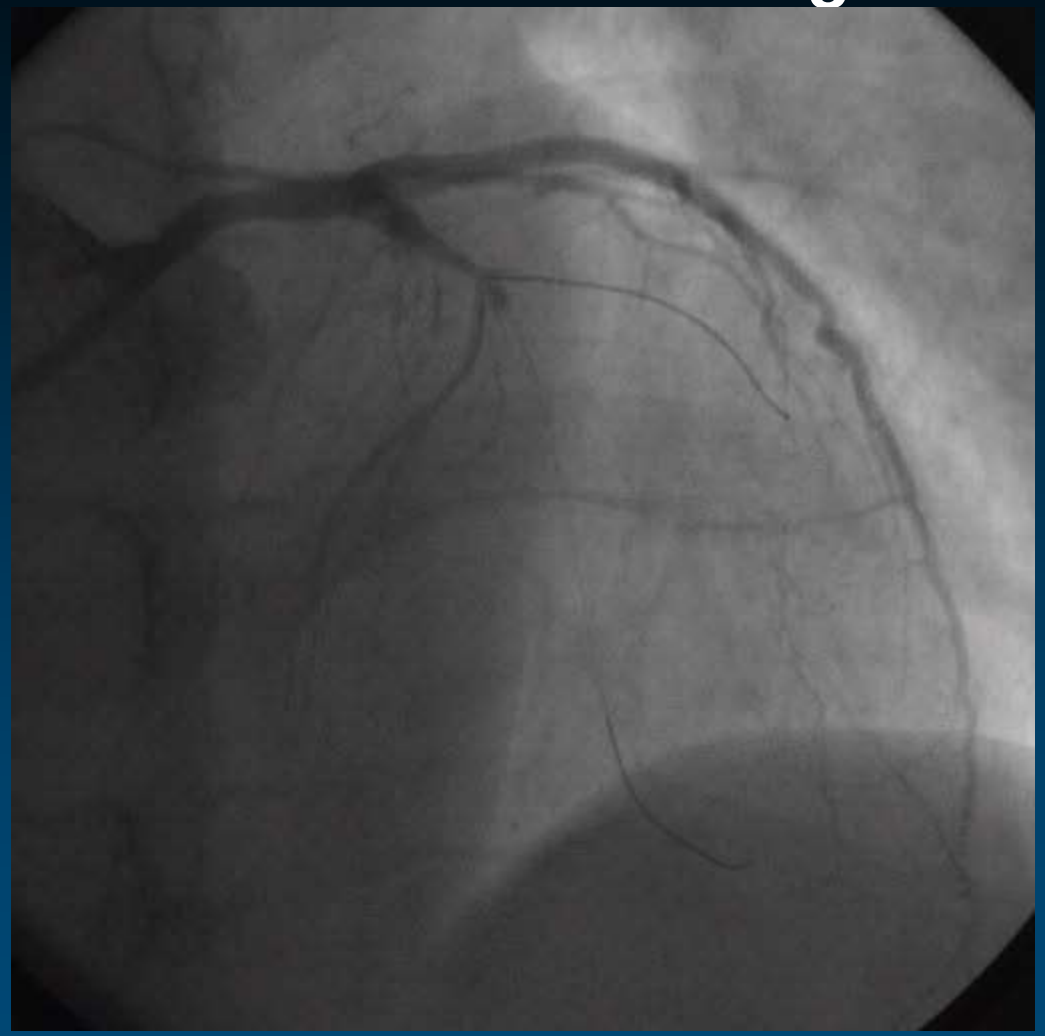
LCA



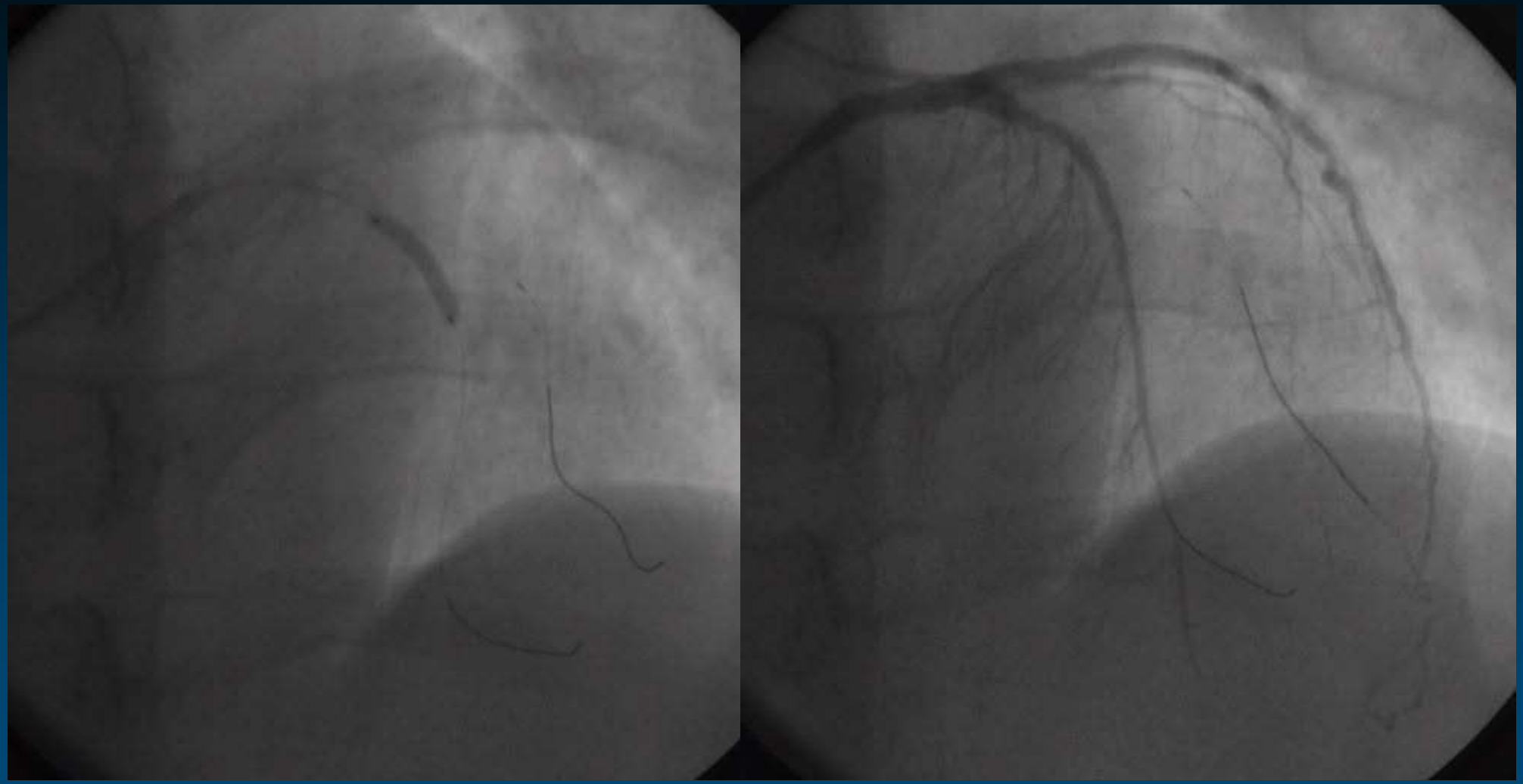
RAO cranial

LAO cranial

LAD and Dx wiring

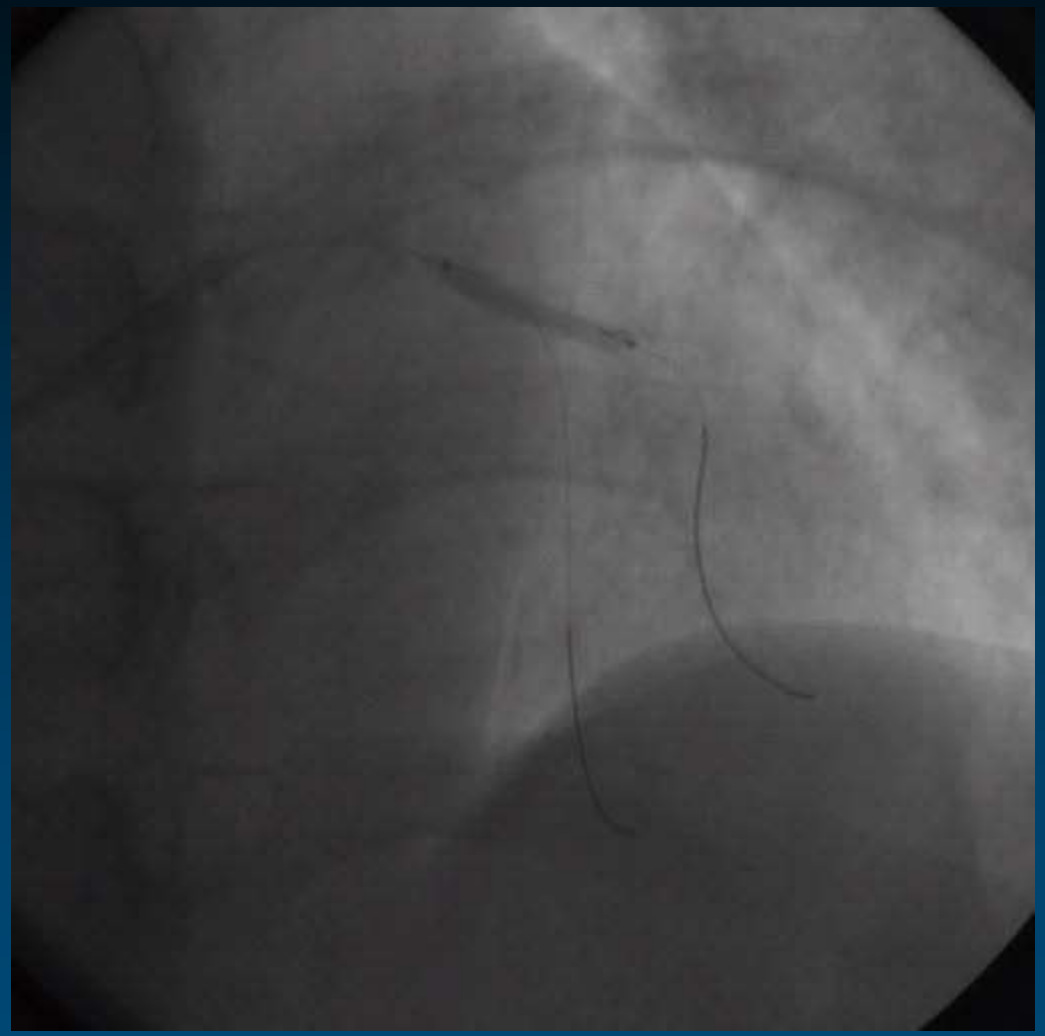


mLAD predilation



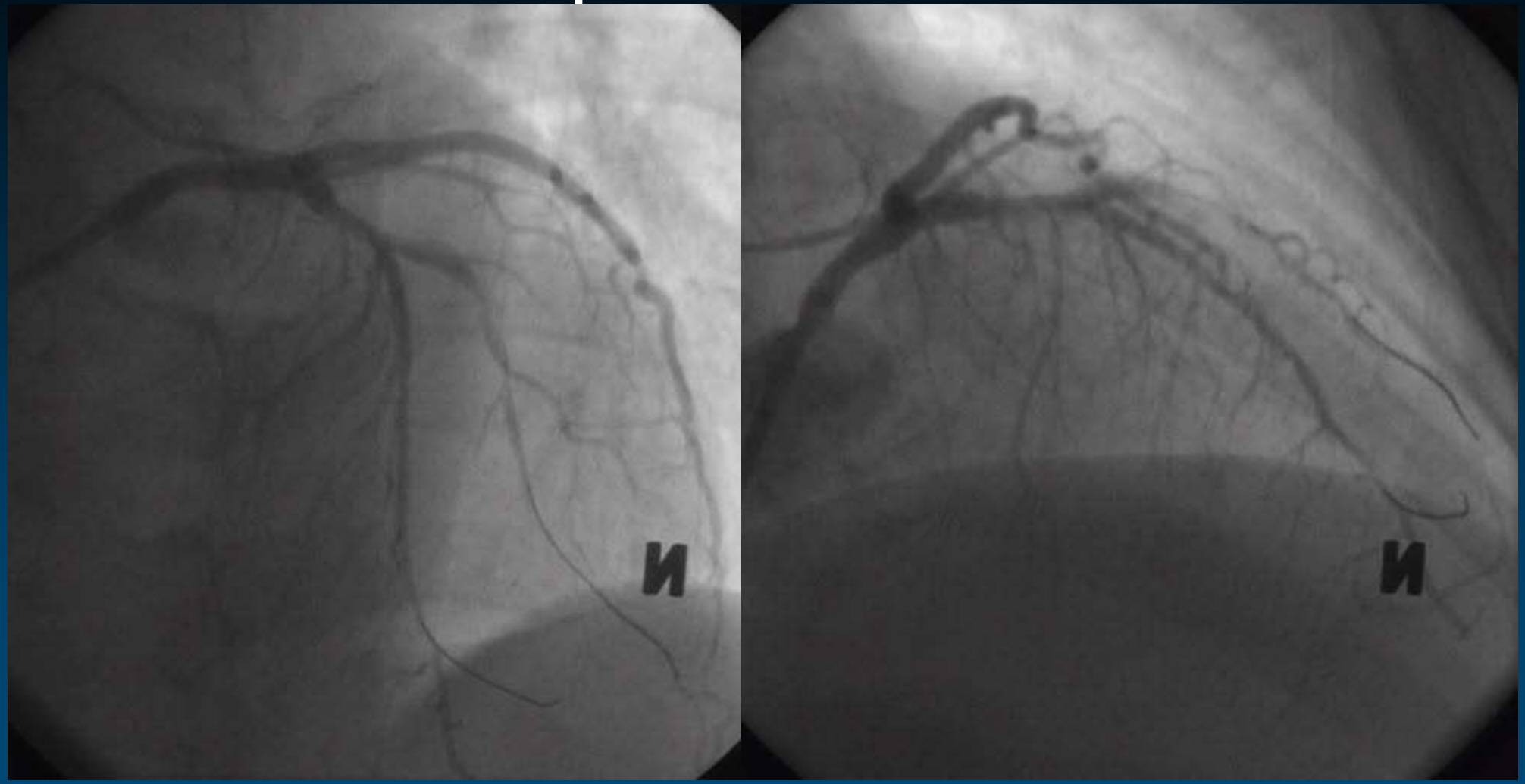
Splinter 2.5 × 20 mm, 10 atm

Dx Predilation



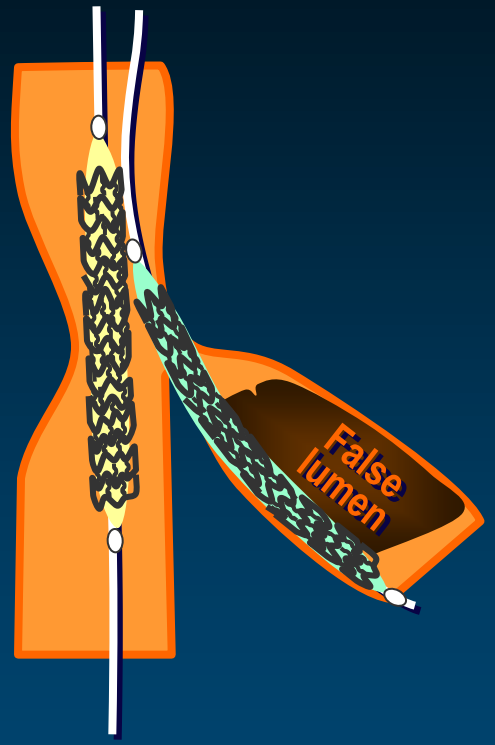
Splinter 2.5 × 20 mm, 10 atm

After LAD and Dx predilation



Which options can save diagonal ?

Stent cross-over and rewire ?

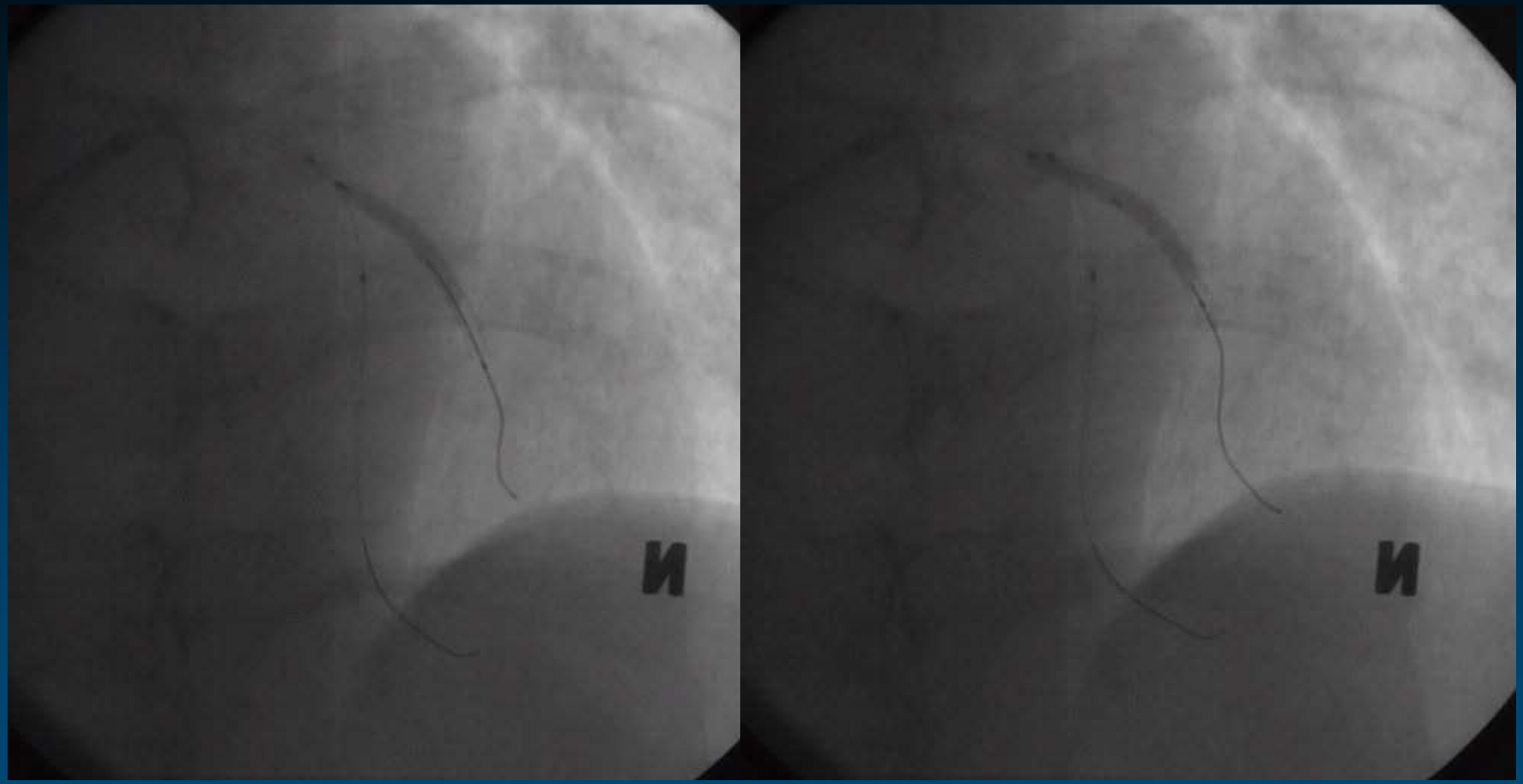


Crushing will be safe, But can't work in 6 Fr

Stepwise mini crush in 6 Fr guiding

Unsure about Dx saving

Diagonal stenting while keeping LAD balloon

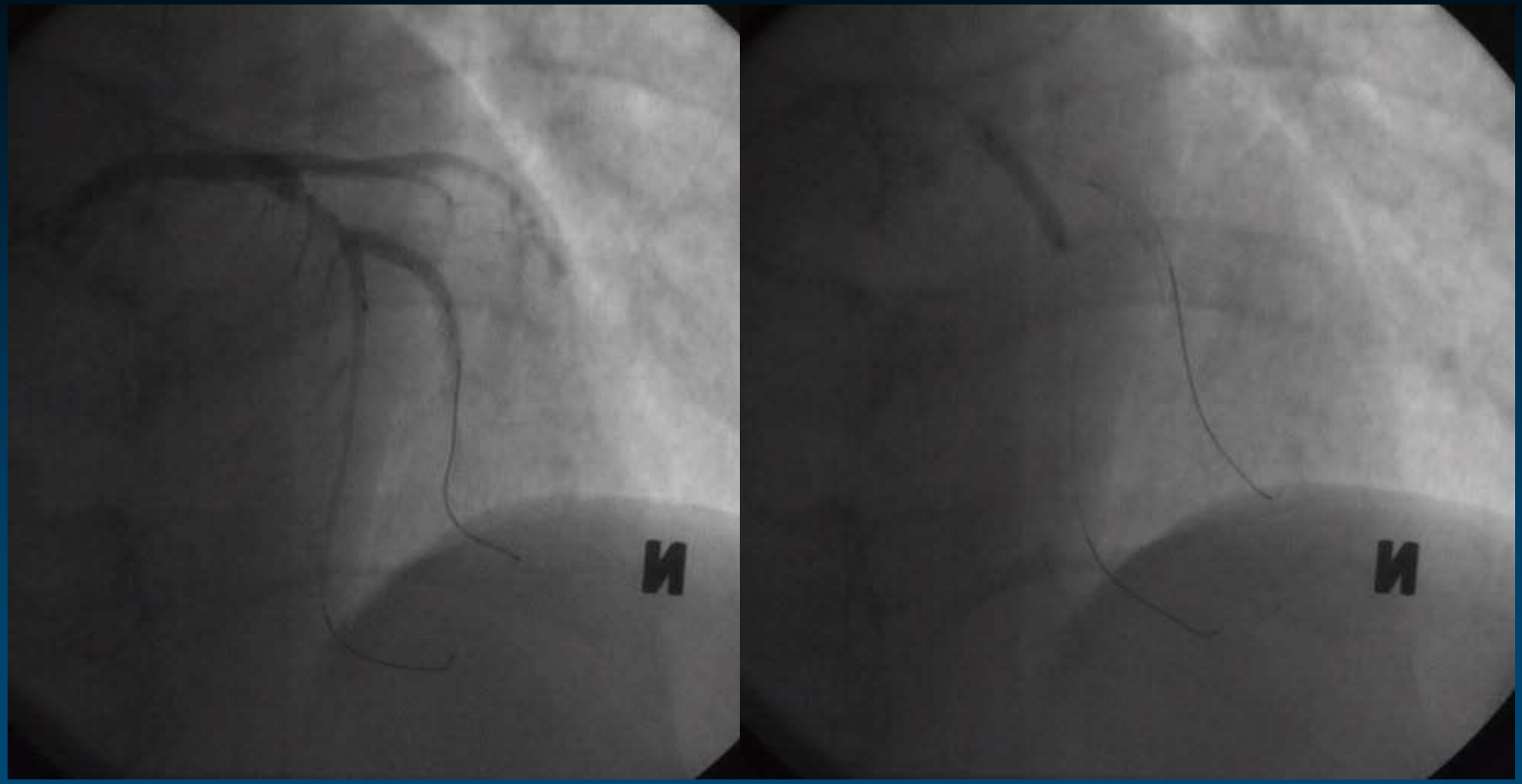


Dx; DES 2.5 × 28 mm, 12 atm

LAD; Splinter 3.0 × 20 mm, back up

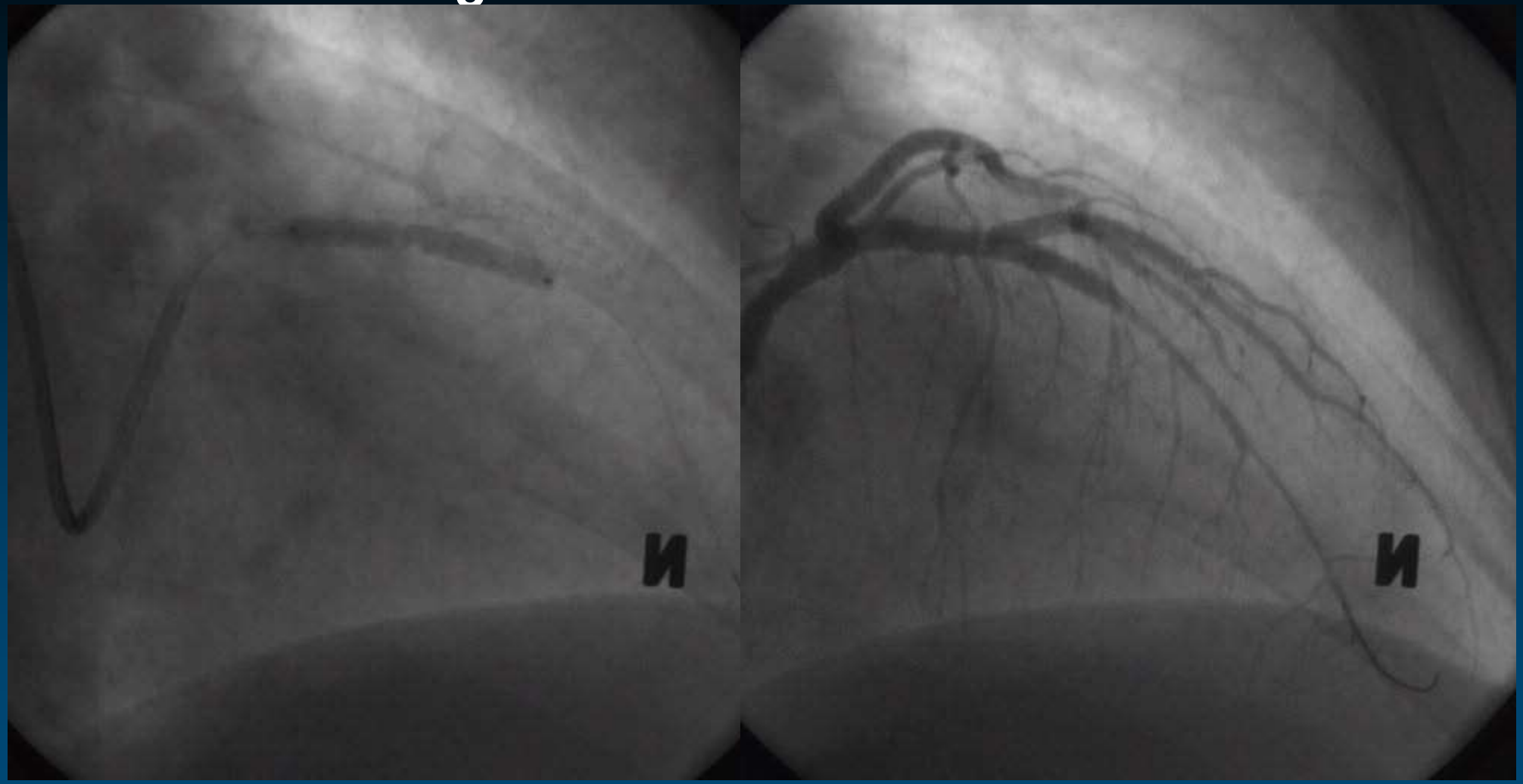
18 atm

Crush diagonal stent



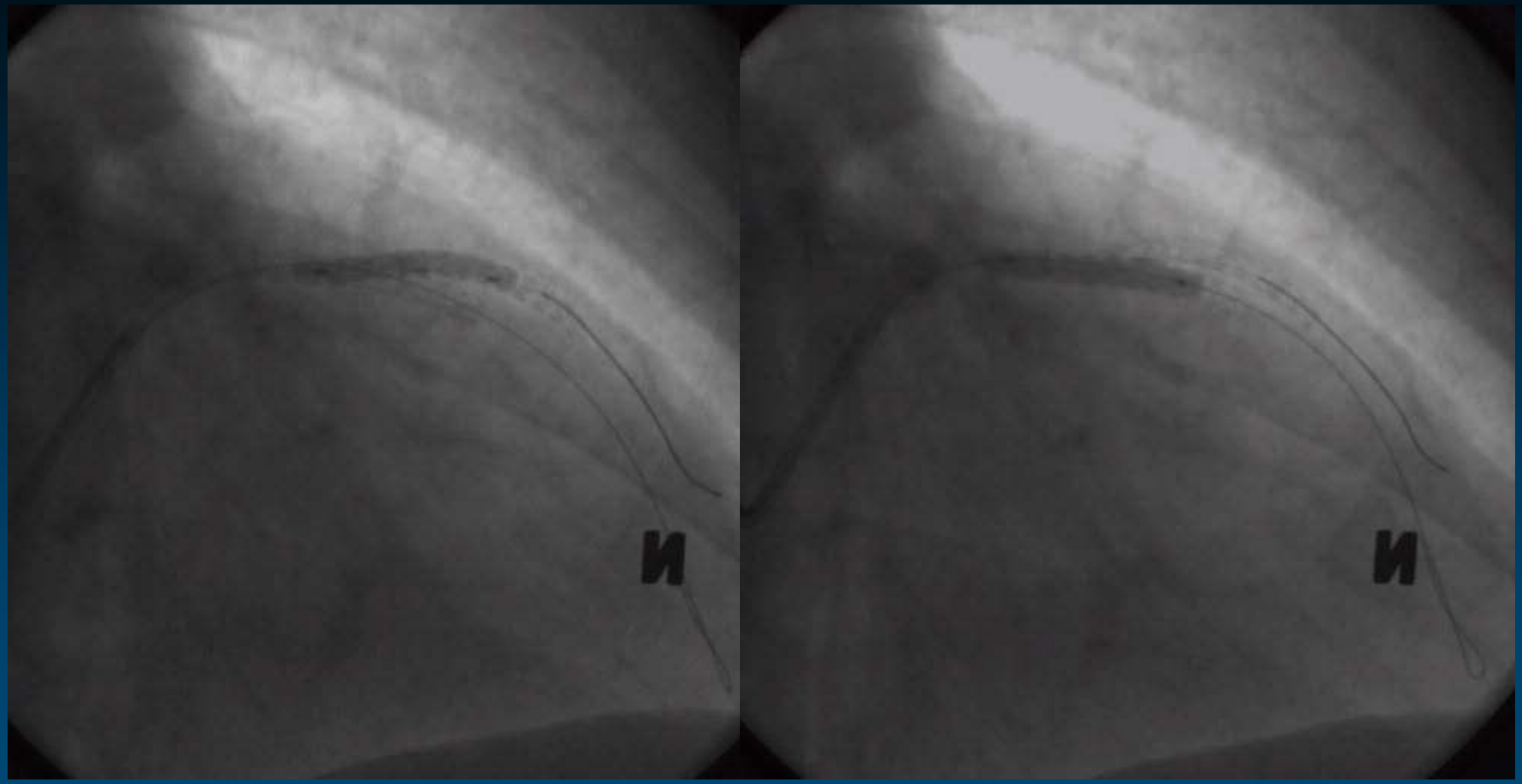
Splinter 3.0 × 20 mm, 16 atm

mLAD stenting



DES 3.0 × 28 mm, 12 atm

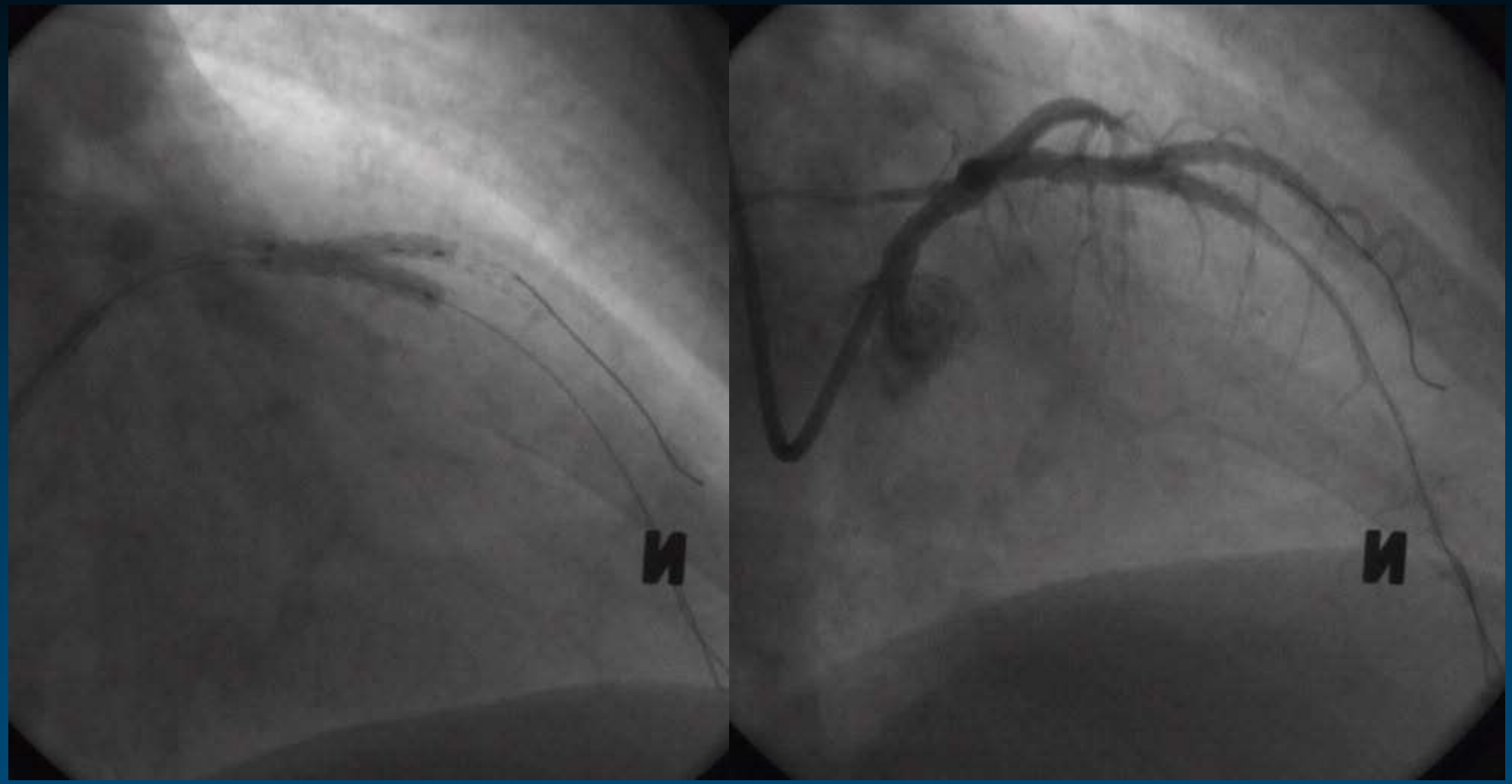
Diagonal Rewiring



Splinter 2.5 × 20 mm, 20 atm

Splinter 3.0 × 20 mm, 20 atm

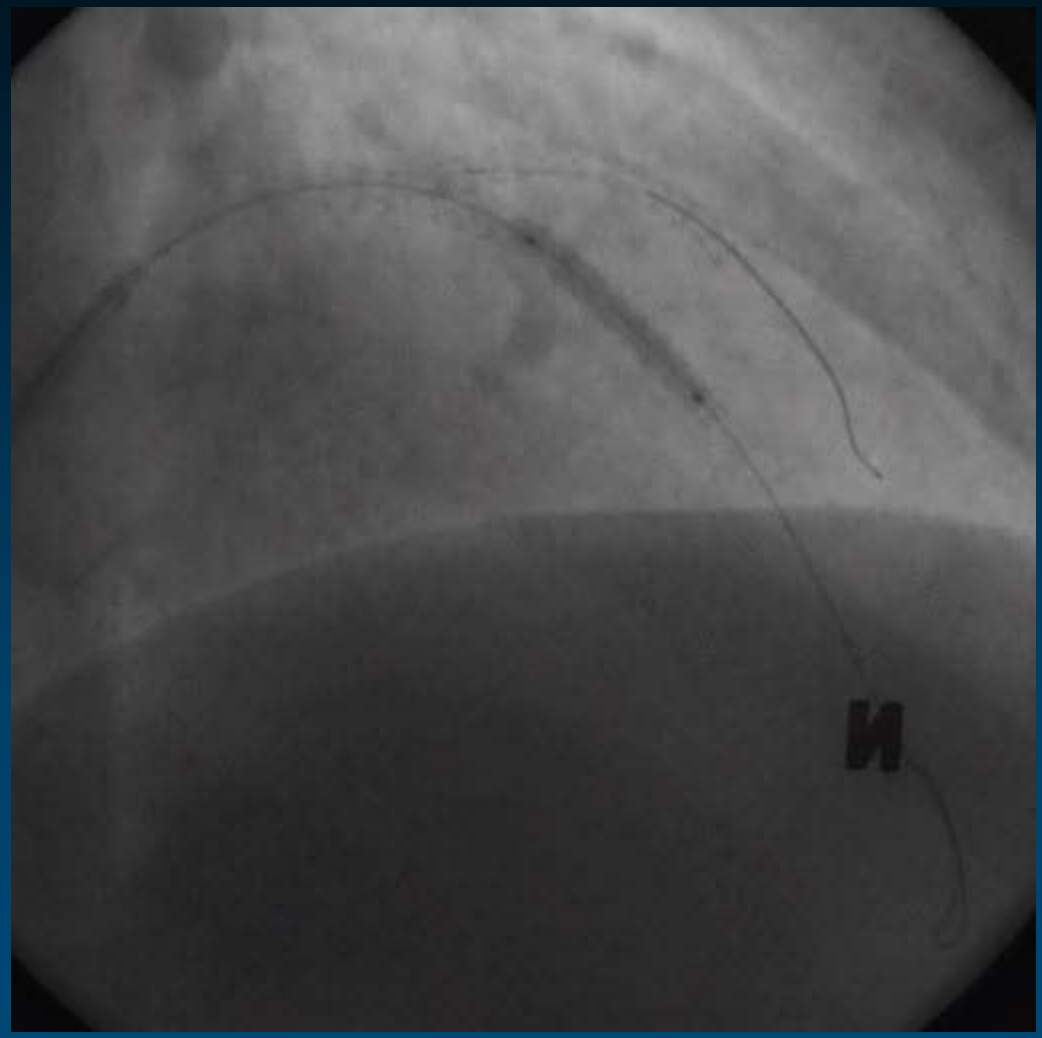
Kissing balloon dilatation



LAD; Splinter 3.0 × 20 mm, 12 atm

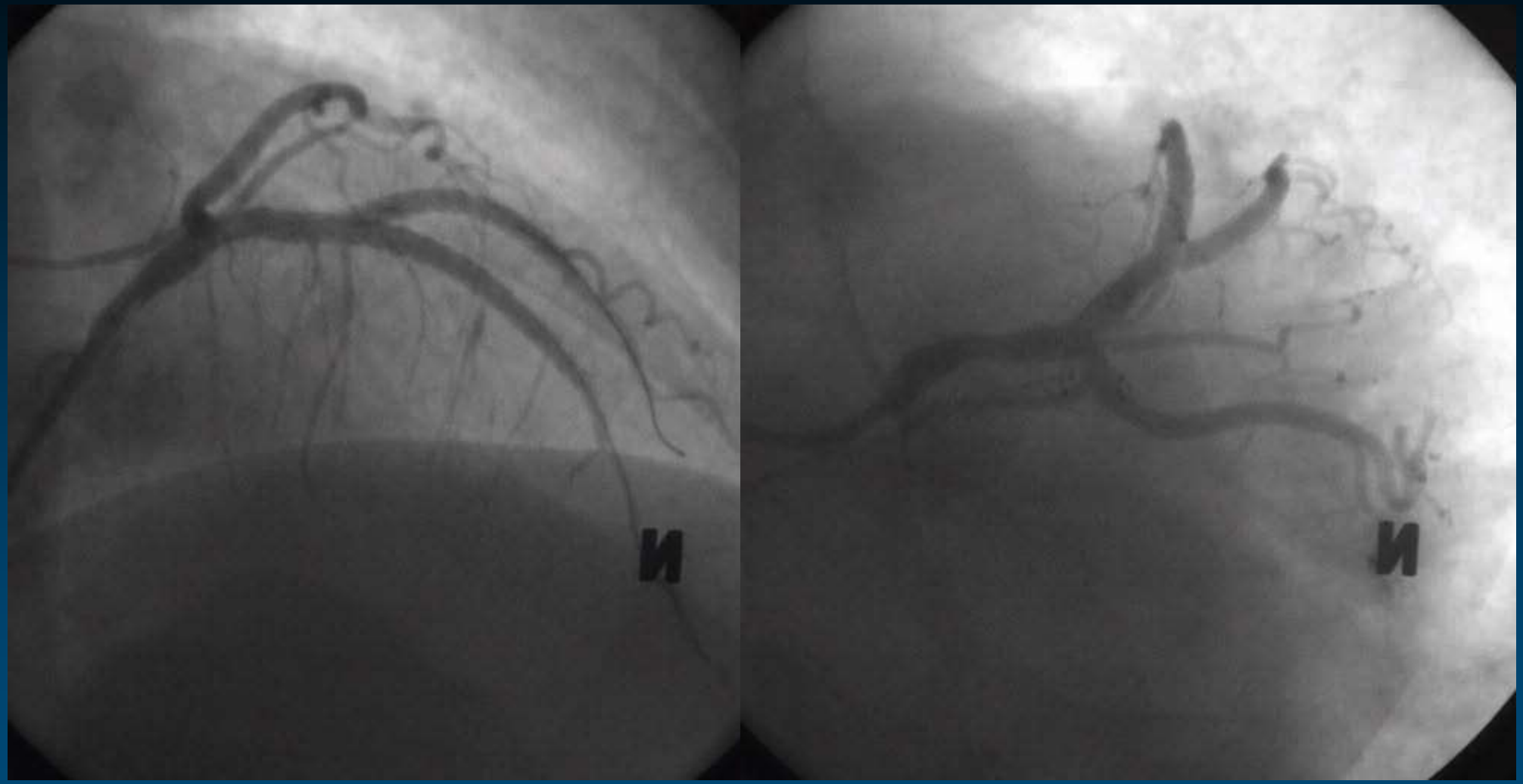
Dx; Splinter 2.5 × 20 mm, 12 atm

mLAD stenting



DES 2.5 × 18 mm, 12 → 16 atm

Final angiogram



Transradial Rotational Atherectomy

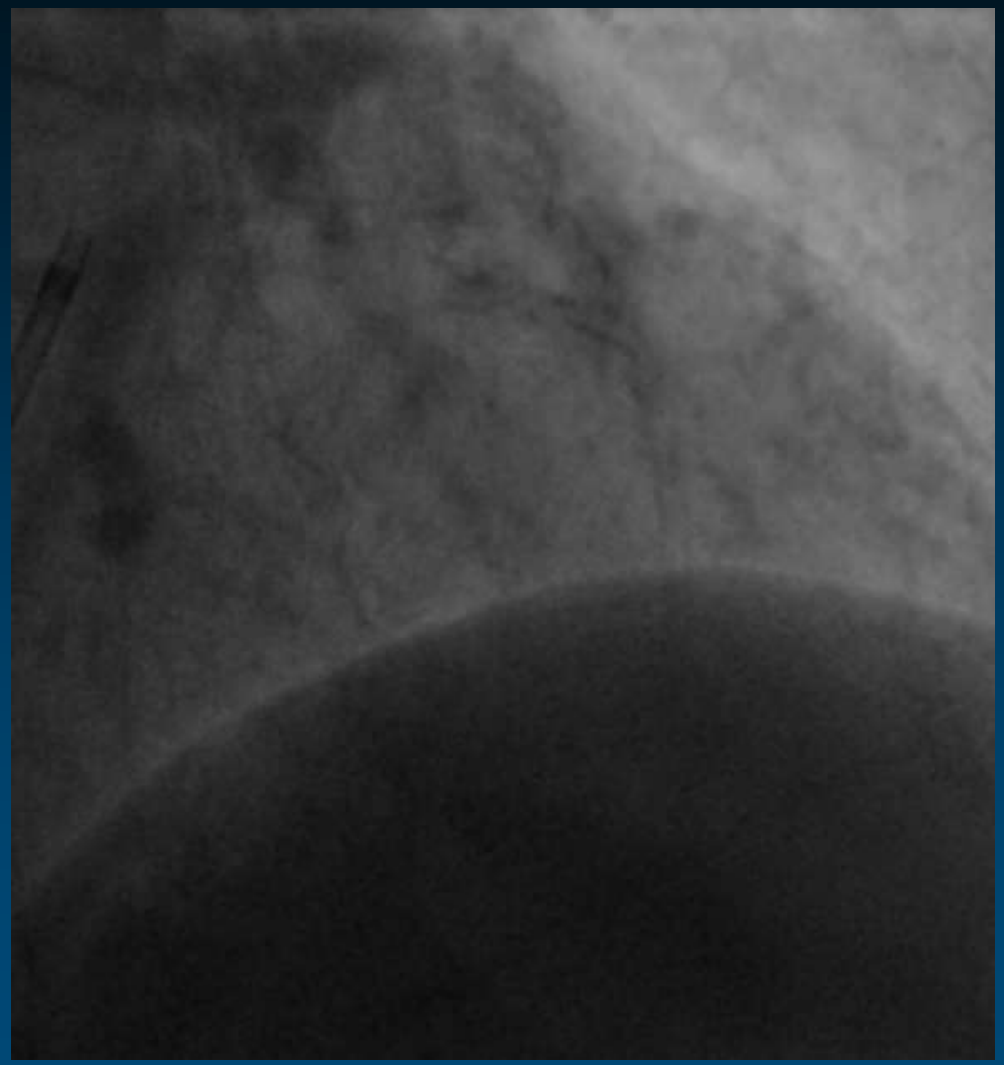
For the Calcified Lesion

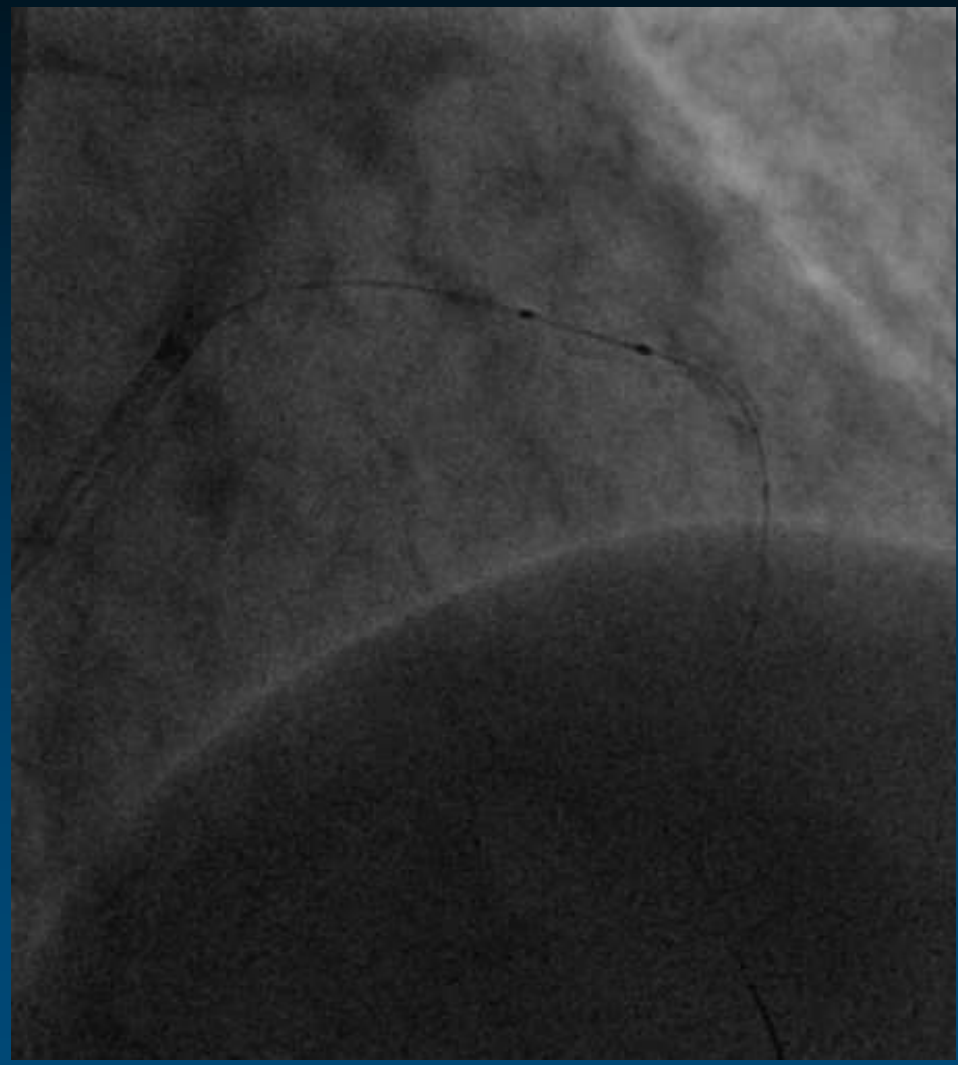
✓ **5 Fr Guiding catheter**
- 1.25 mm burr O.K.
- 1.5 mm burr possible, but contrast study limited

✓ **6 Fr Guiding catheter**
- 1.5 mm burr O.K.
- 1.75 mm burr possible, but contrast study limited

✓ **7 Fr Guiding catheter**
- 2.0 mm burr possible

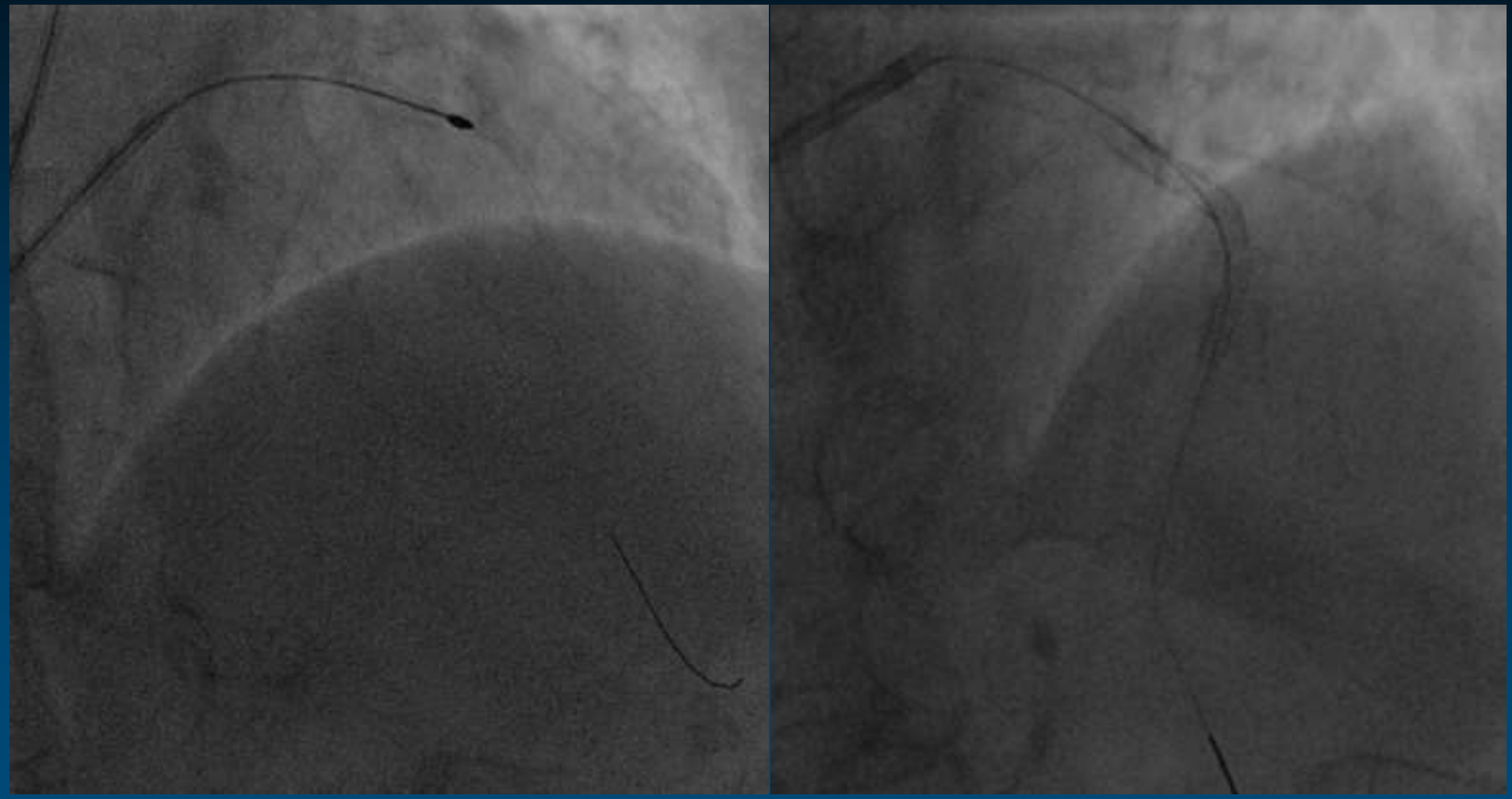
74 YO woman, Unstable angina





Transradial 6 Fr EBU guiding

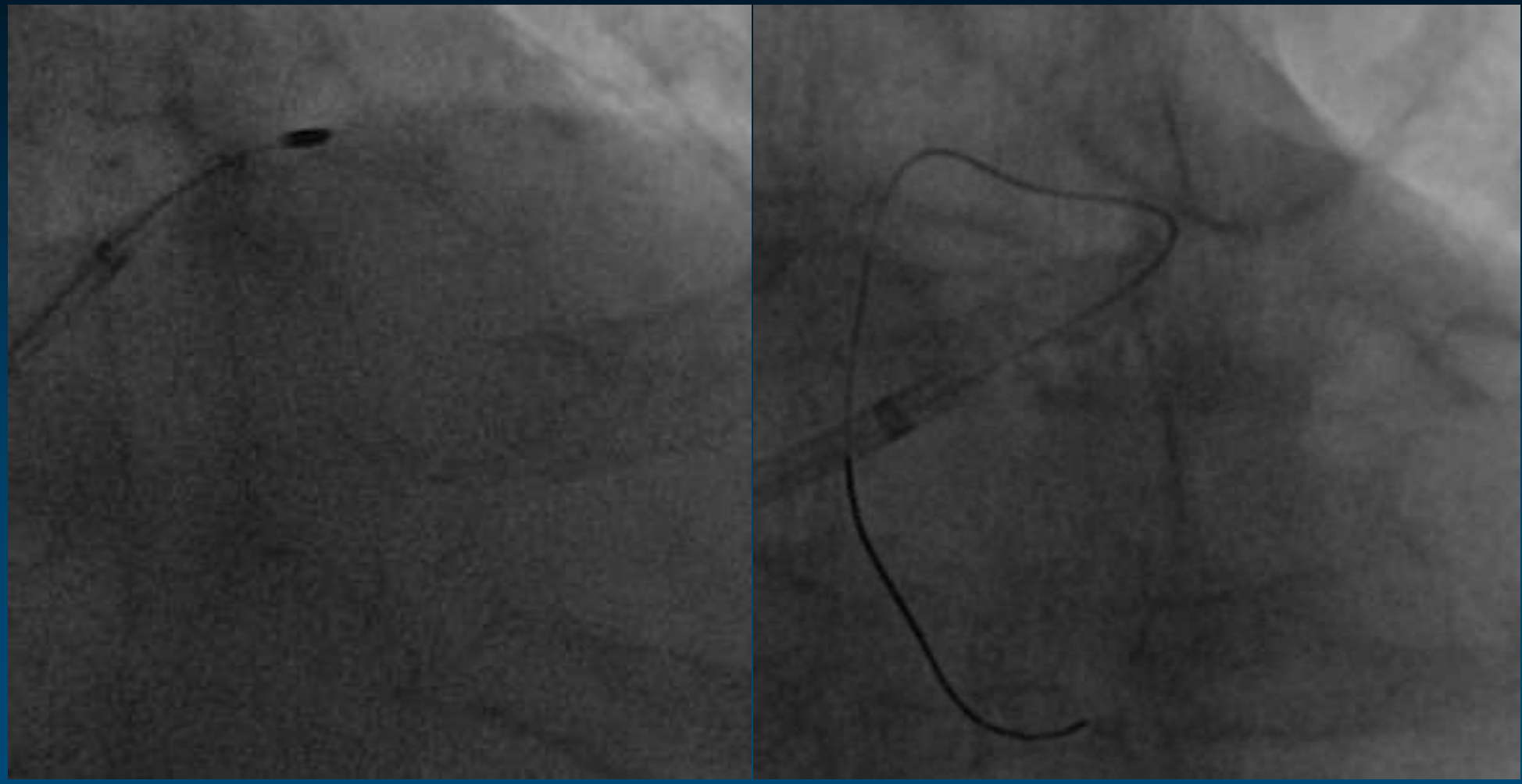
Rotablation with 1.5 mm burr & stenting



82 YO woman, Stable angina

Tranradial 7 Fr EBU guiding

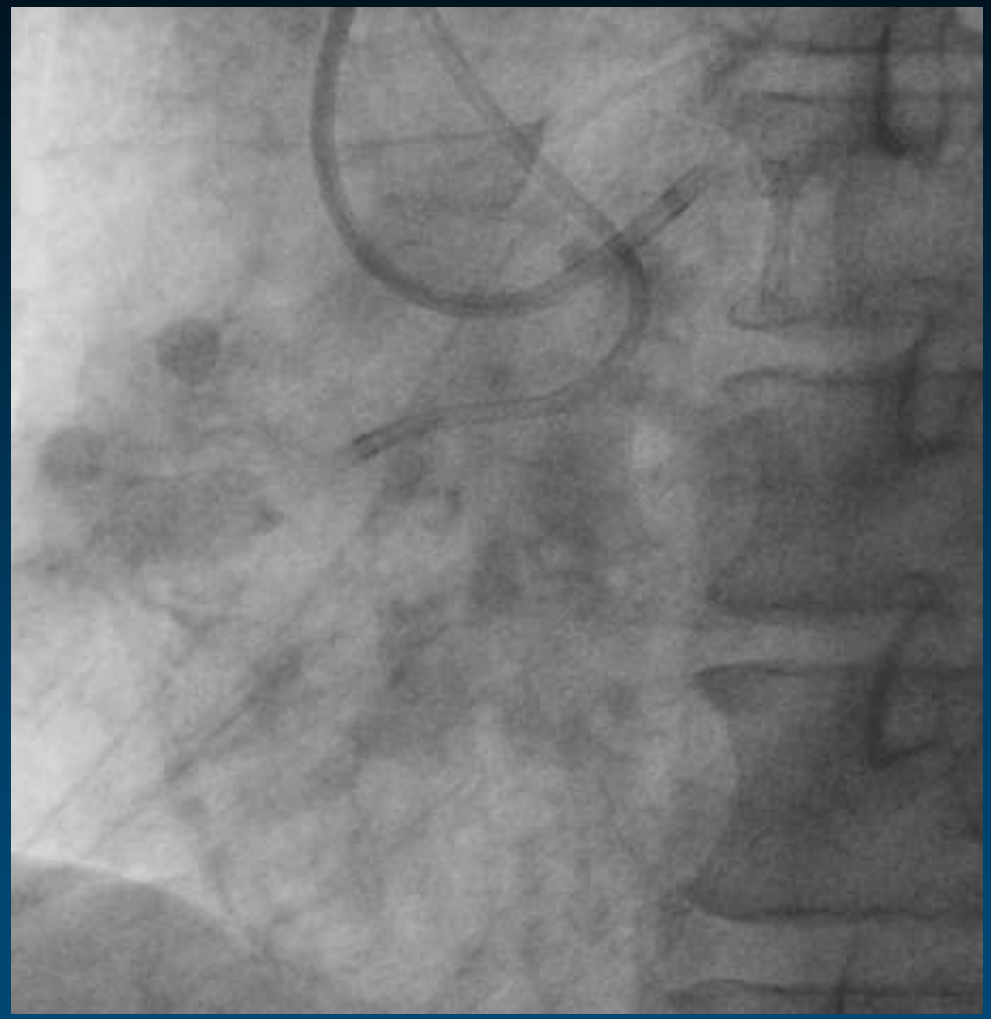
Rotablation with 1.5 mm burr & stenting

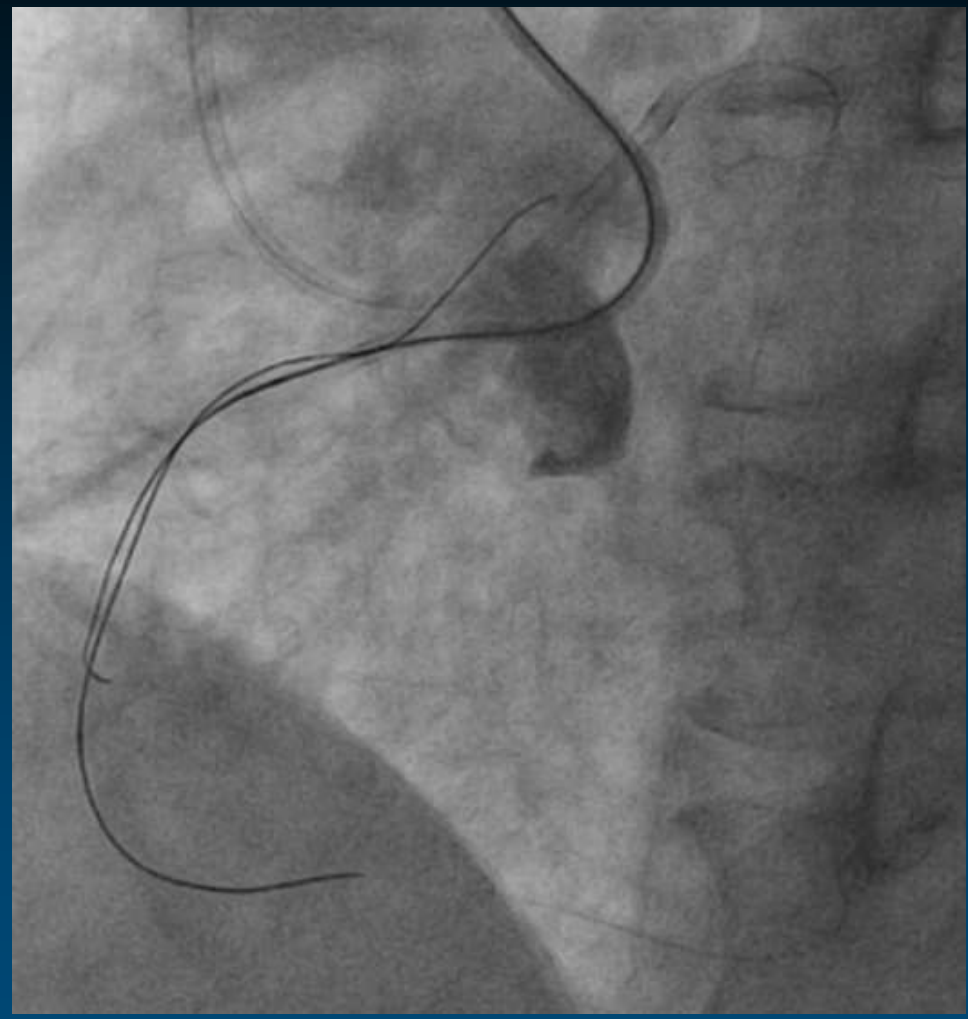


Compatibility of CTO Technique
With Various Size of Guides?

	7Fr	6Fr	5Fr
parallel wire			
with 1 micro-catheter	○	○	○
with 2 micro-catheters	○	○	×
tornus	○	○	○
IVUS guide			
with 2nd wire	○	○	0,010” wire
with 2nd wire + micro-catheter	○	×	×
2 OTW balloons	○	×	×
2 monorail balloons	○	low profile	0.010 balloon

58 YO man, Failed antegrade case





Both Radial, 7 Fr EBU and 6 Fr AL1

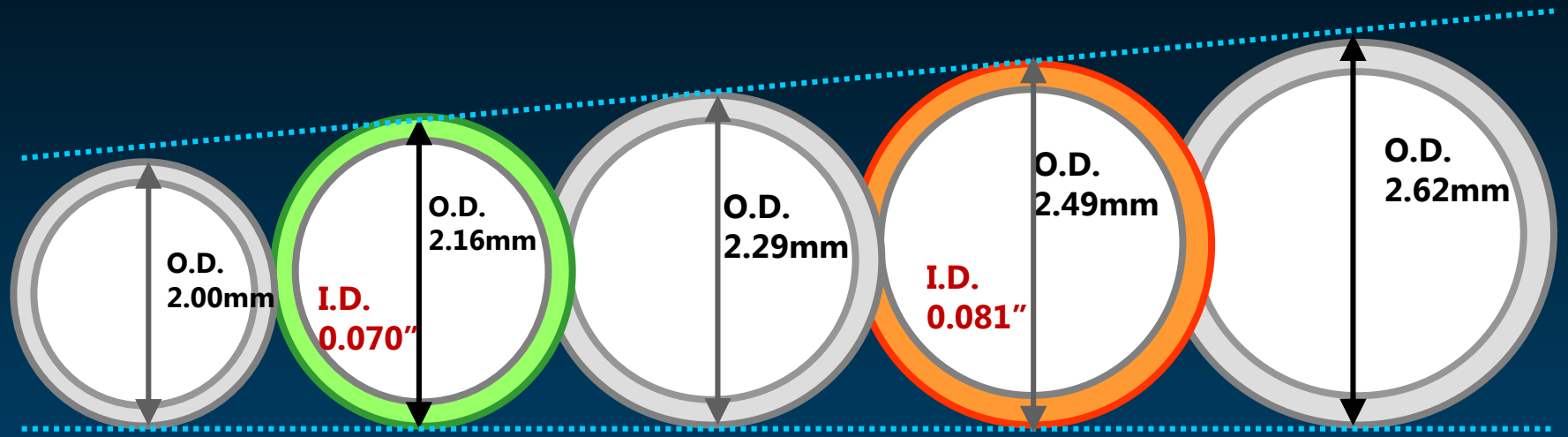
Retrograde reverse CART

Three DES implantation

Sheathless Transradial PCI

Sheathless vs. Sheath

Radifocus Introducer II vs. Medtronic Launcher



4Fr Sheath Introducer

6.5Fr SheathLess Eaucath

5Fr Sheath Introducer

7.5Fr SheathLess Eaucath

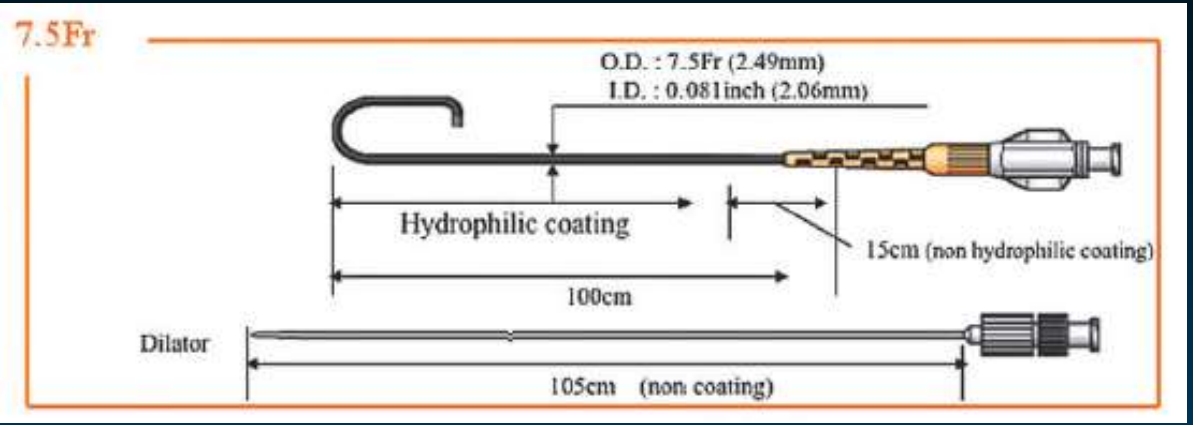
6Fr Sheath Introducer

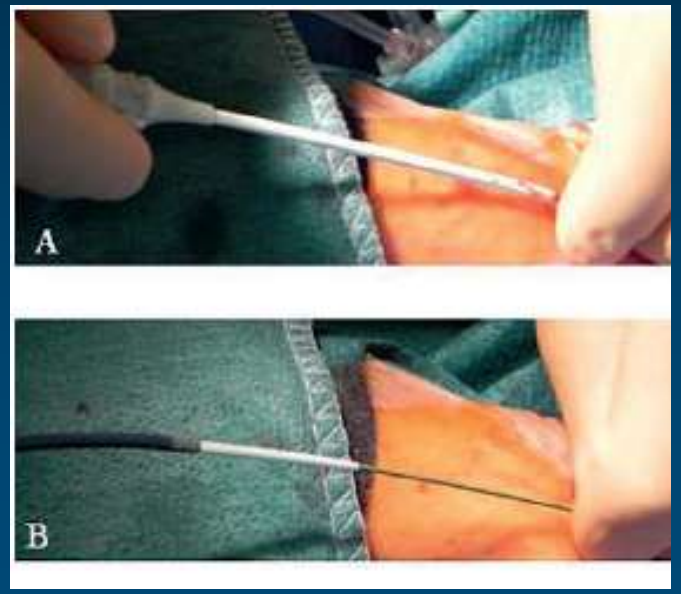
4.5Fr sheath
6 Fr guiding

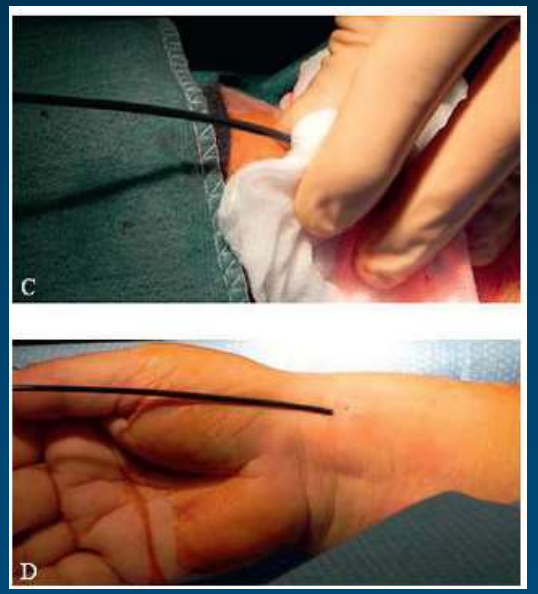
5.5Fr sheath
7 Fr guiding

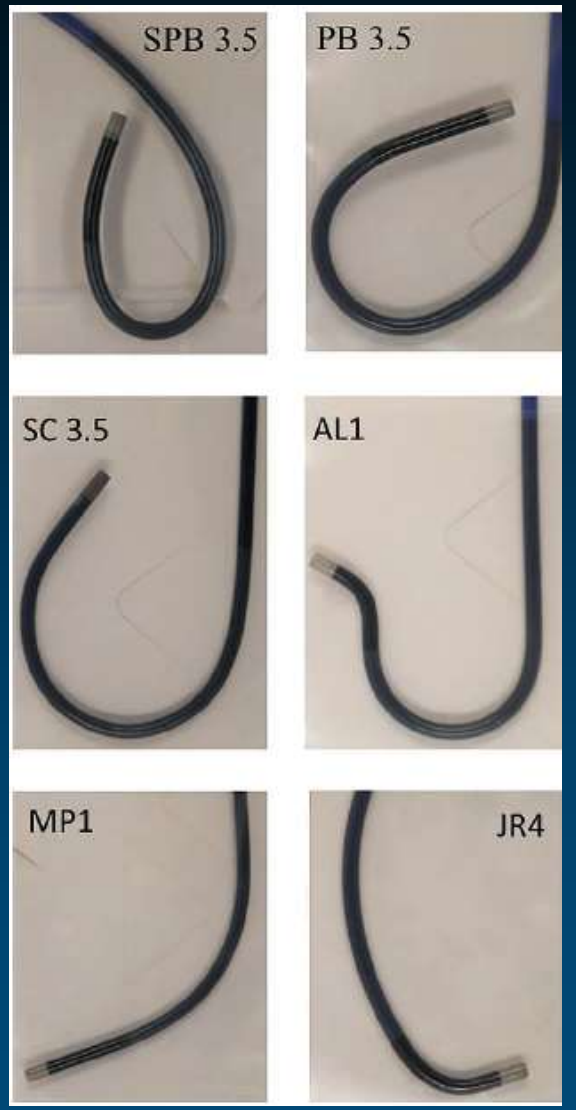
Heart, Lung and Circulation, Volume 22, Issue 3, 2013, 188 - 192

Sheathless Catheters

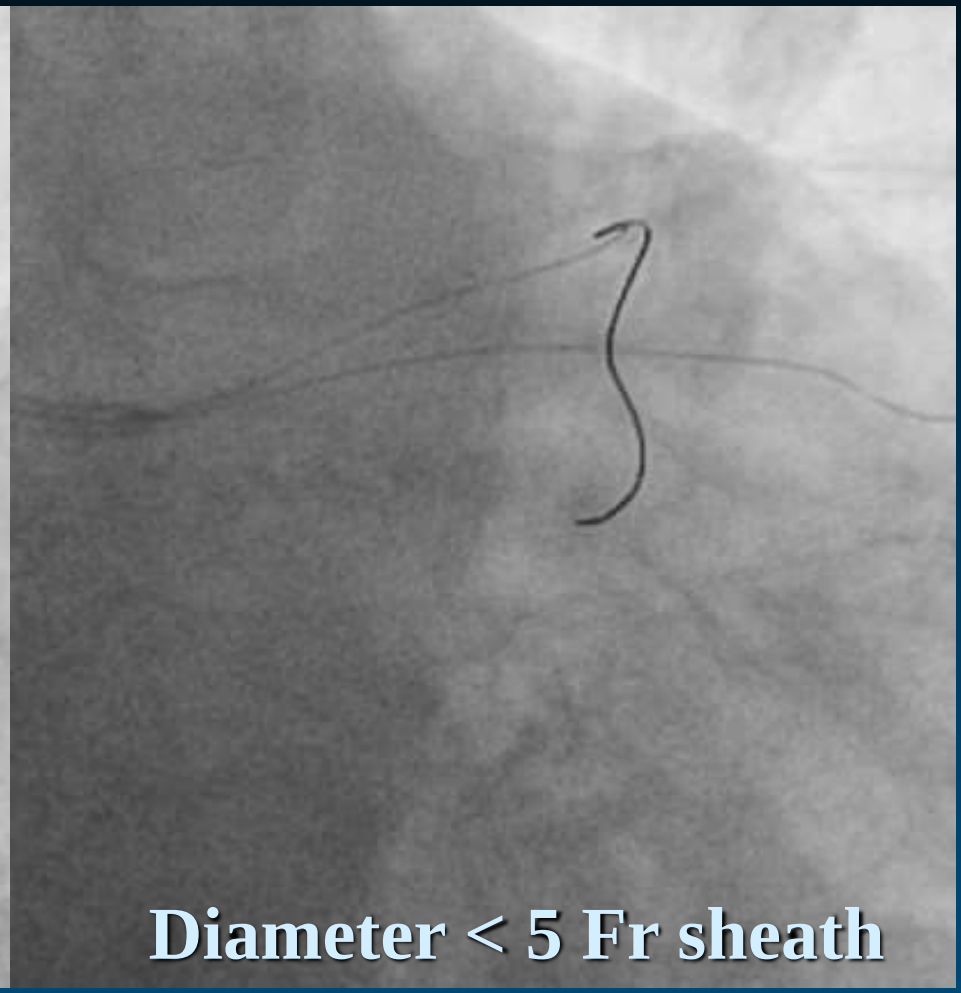








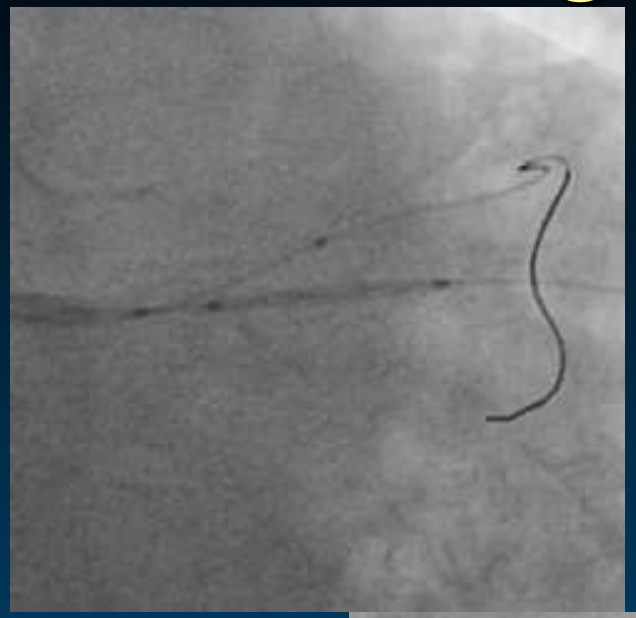
61 yo, Unstable angina



6.5 Fr sheathless PB

6.5 Fr sheathless JL

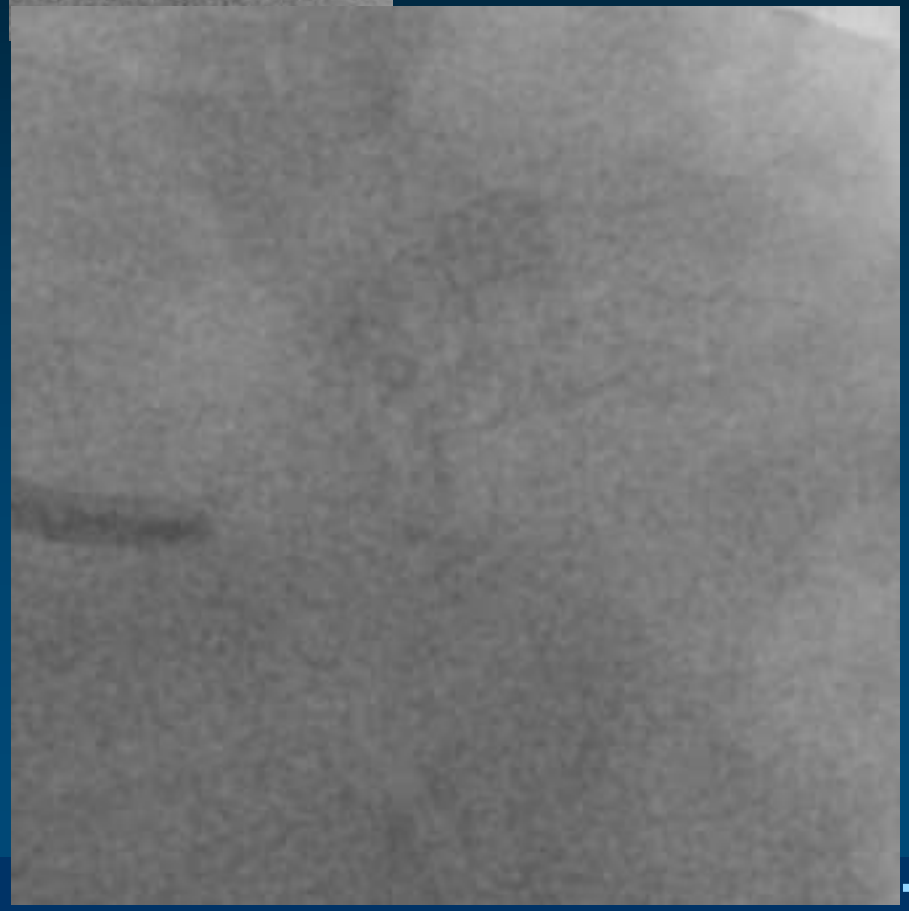
Crushing with 6.5 Fr Sheathless



Dx DES
3.0×15

LAD DES
4.0×15

Final kissing
4.0 & 3.0

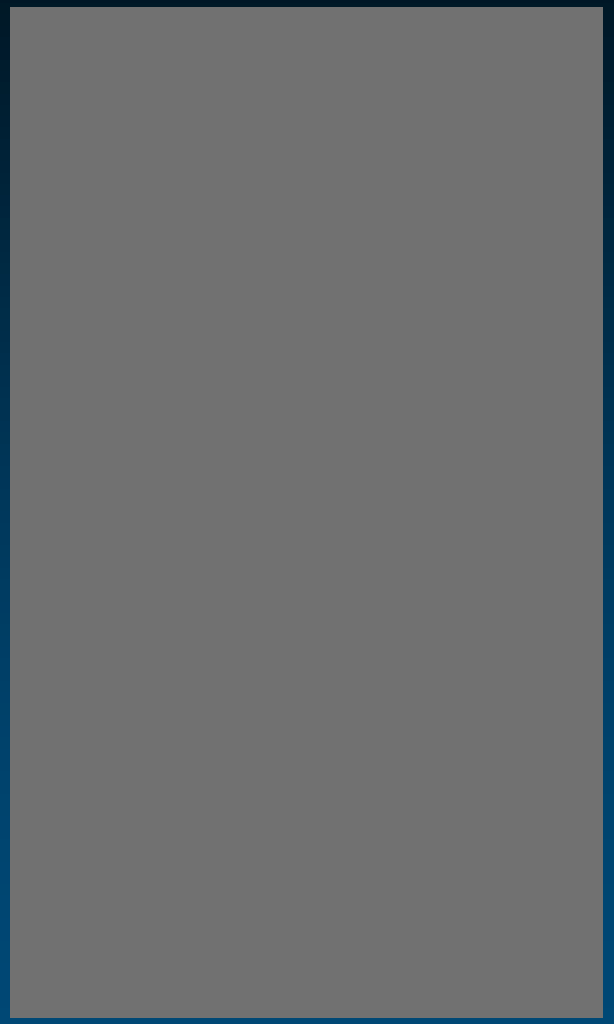


Transradial Noncoronary Intervention

- ✓ **Carotid stenting**
  - Routine vs. Specific situation
- ✓ **Subclavian stenting**
  - CTO or Tortuous anatomy
- ✓ **Renal stenting**
- ✓ **Iliac stenting**
  - Useful for iliac CTO
  - 110 cm shuttle sheath
- ✓ **EVAR & TEVAR**
  - Chimney, Sandwich, Octopus
- ✓ **BTK angiogram**
  - 150 & 180 cm MP catheter

Difficult Carotid Intervention

Tortuous proximal anatomy



Slippage to the ascending aorta

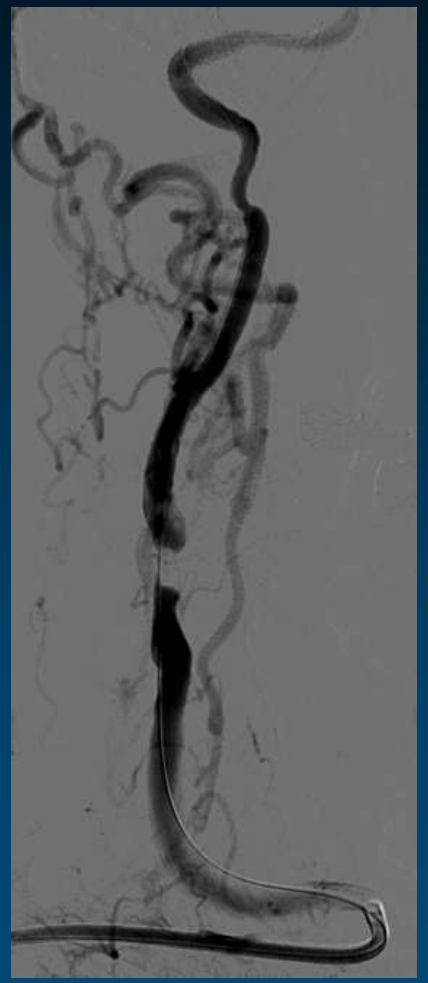
Tortuous proximal anatomy with ECA occlusion

Impossible ECA engagement

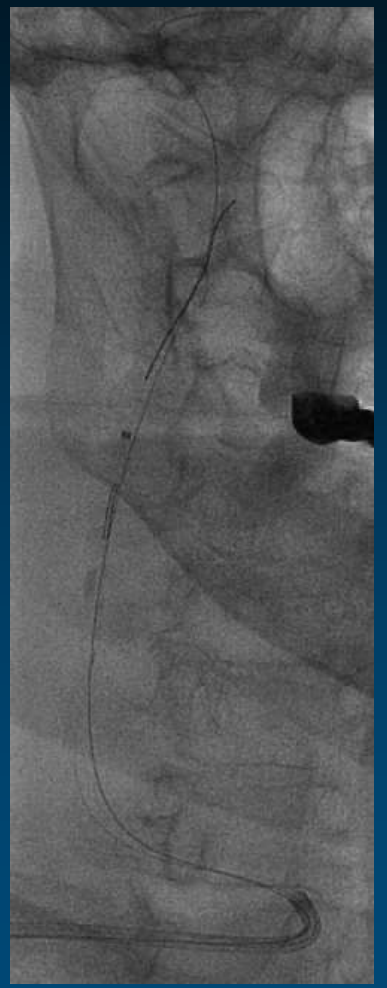
Transradial Carotid Stenting

With distal filter protection

Transradial
7 Fr IMA



Buddywire

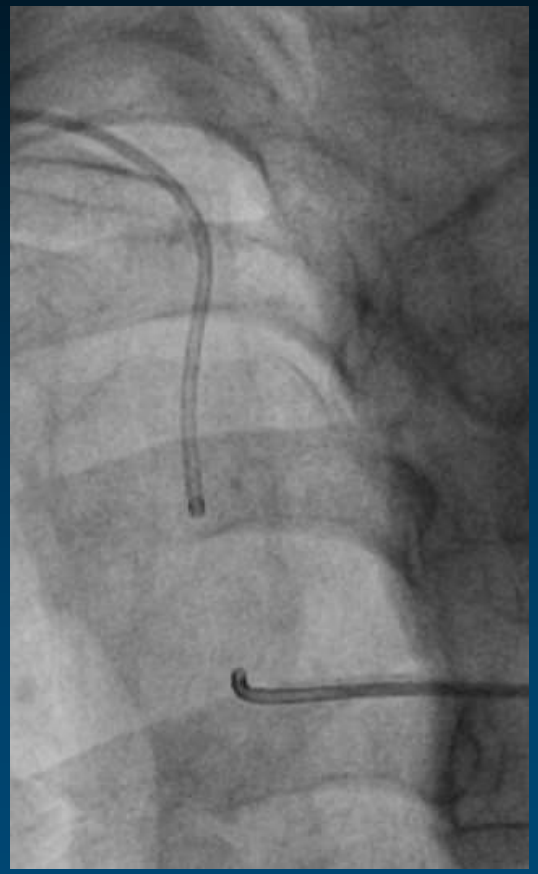


Filtering

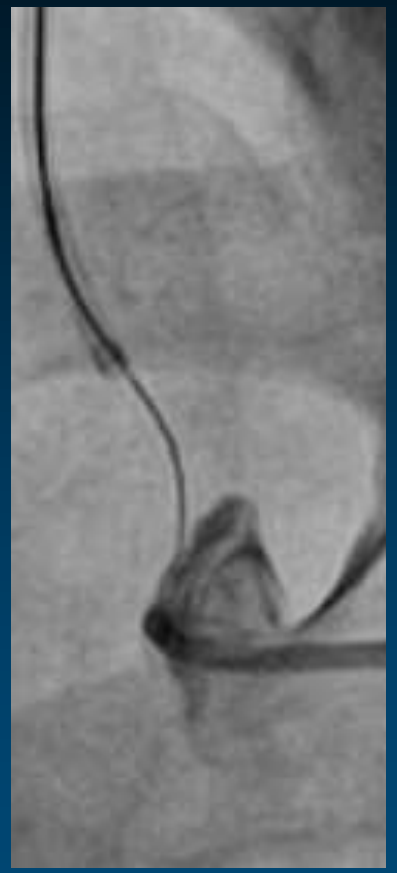
Stenting

Right Brachiocephalic CTO

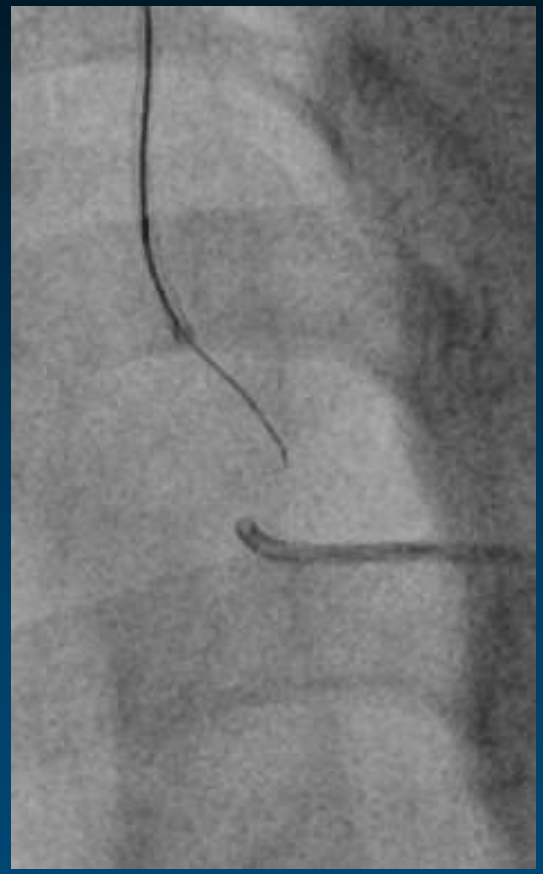
Arm claudication and Dizziness



TR 5 Fr MP



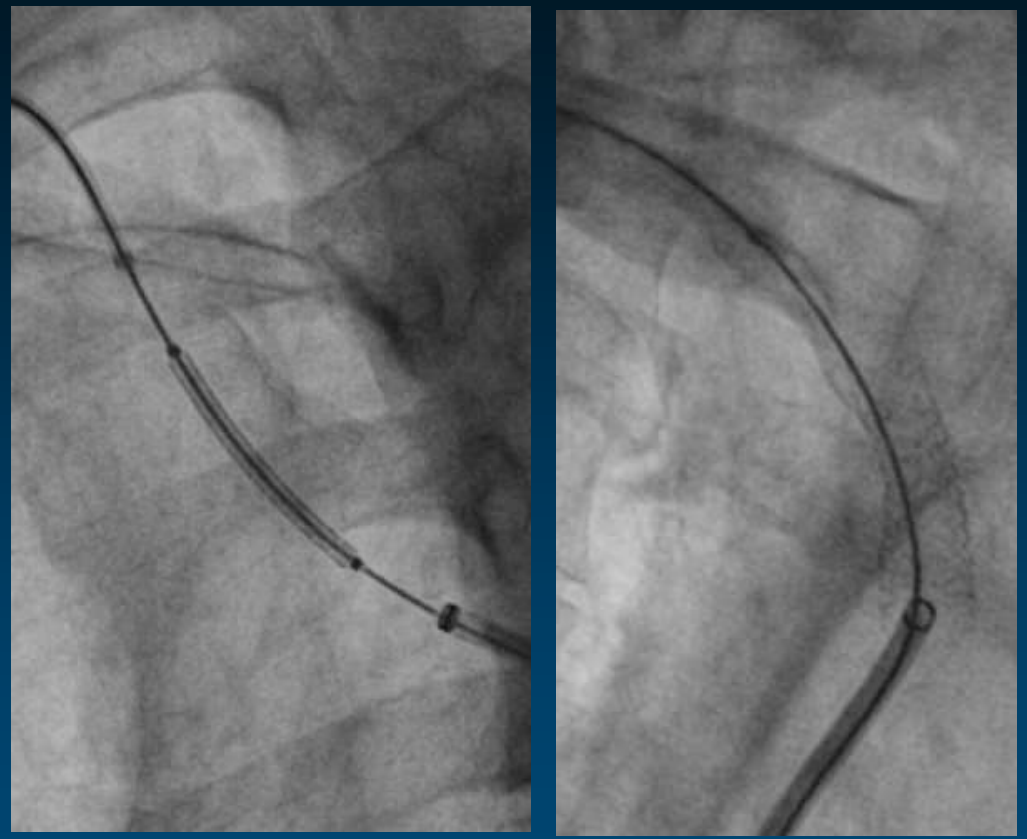
Astato



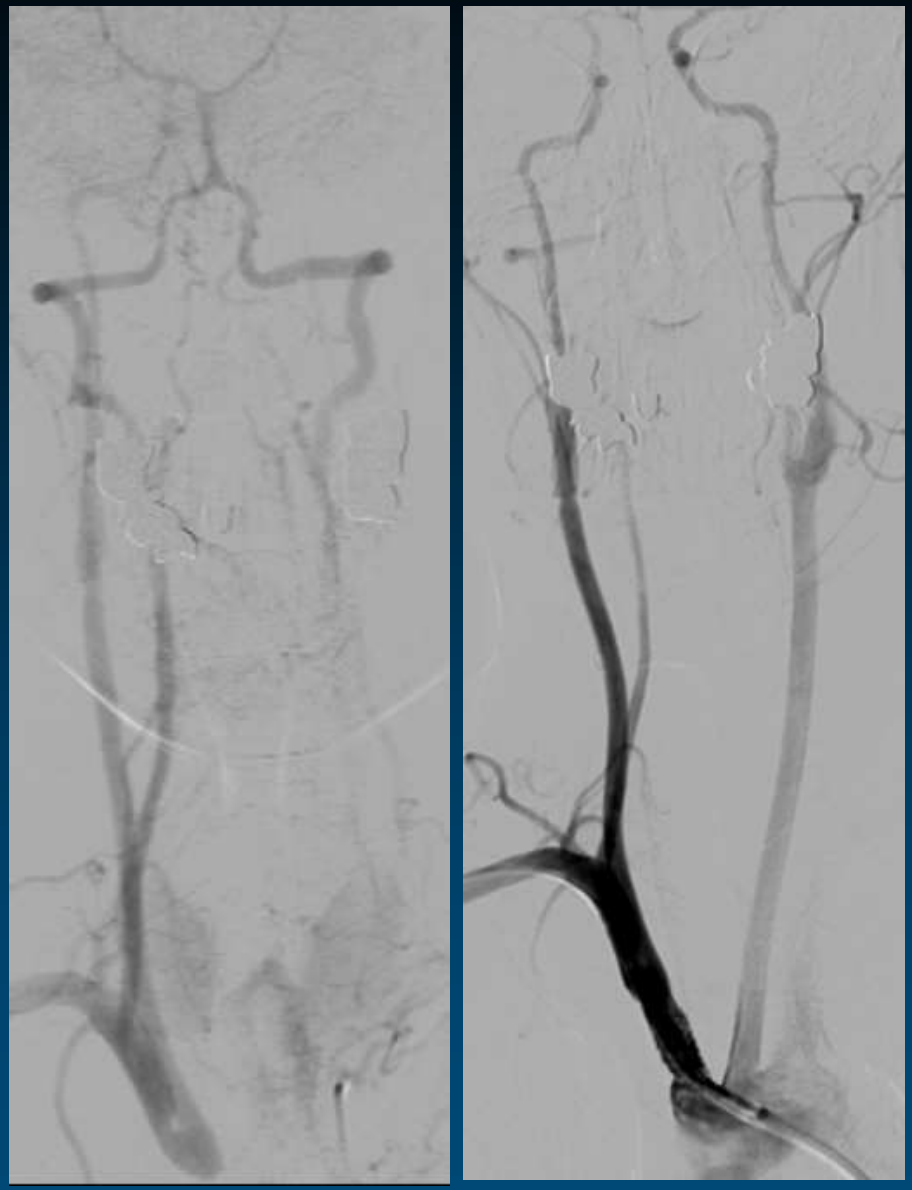
Snare at iliac

Wire Externalization

Powerful backup support



Stenting



Pre

Post

Transradial Approach

for Aortoiliac CTO

Conventional routes for iliac CTO

Drawback

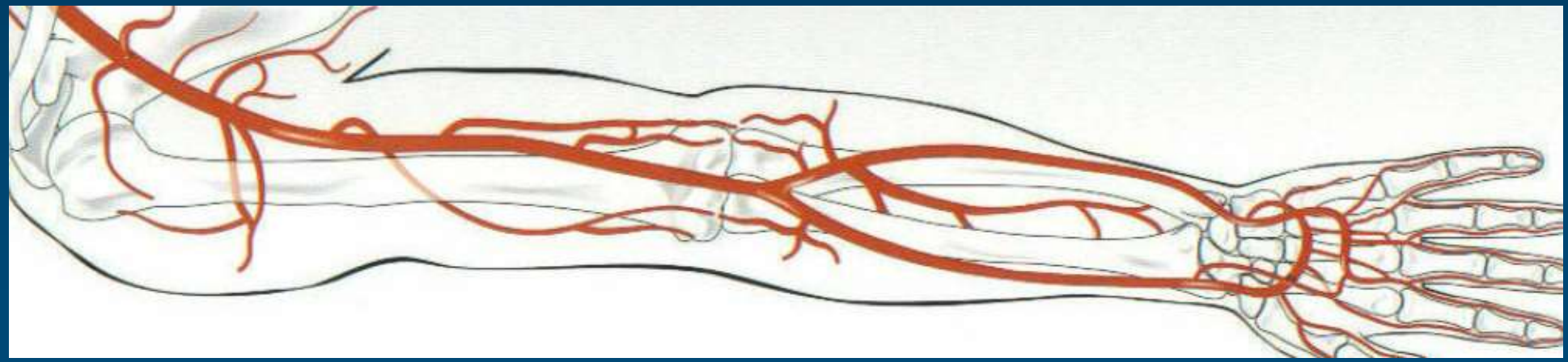
Brachial approach for iliac CTO

- **Single route for hand**

  → potentially lethal ischemic complication

- **Difficult for hemostasis**

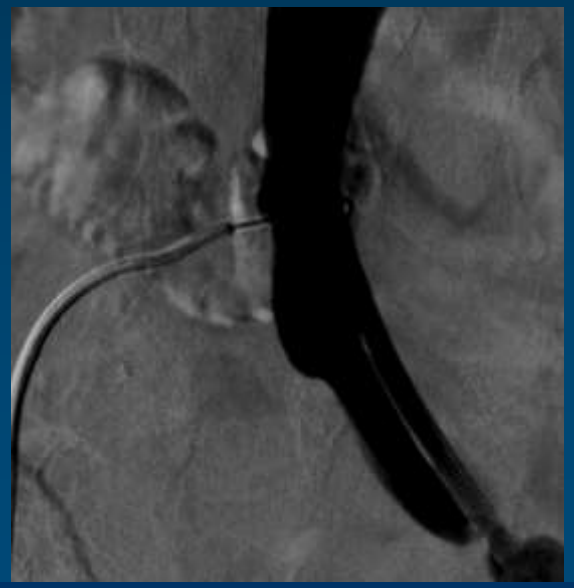
  → more bleeding complication

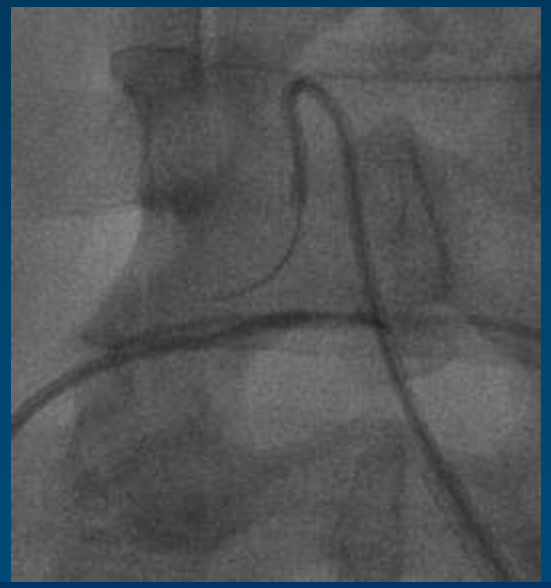


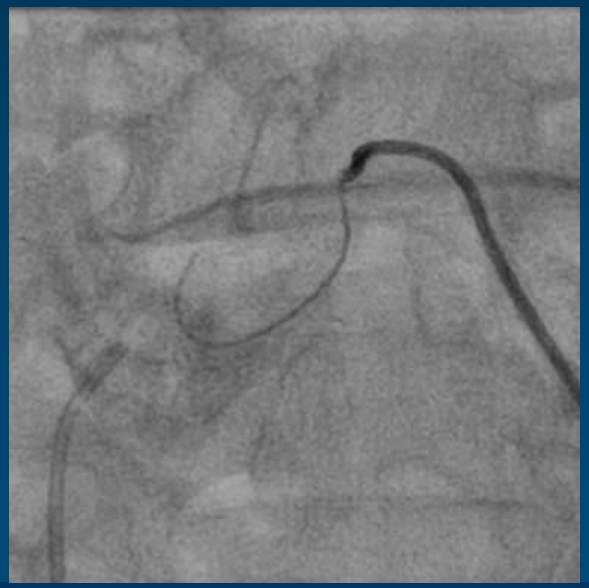
Drawback

Both femoral approach for iliac CTO

- More bleeding complication
- Less back up support, especially
  - stumpless CTO or hostile aortoiliac angle
- Difficult for angulated or calcified iliac arteries
- Hemostasis → perfusion disturbance or thrombosis







Transradial approach for iliac CTO

Pros & Cons

- **Disadvantages**
  - **Smaller arterial caliver → smaller sheath**
  - **Too long to reach**
  - **Subclavian or aortic tortuosity**
  - **More radiation hazard to operator**

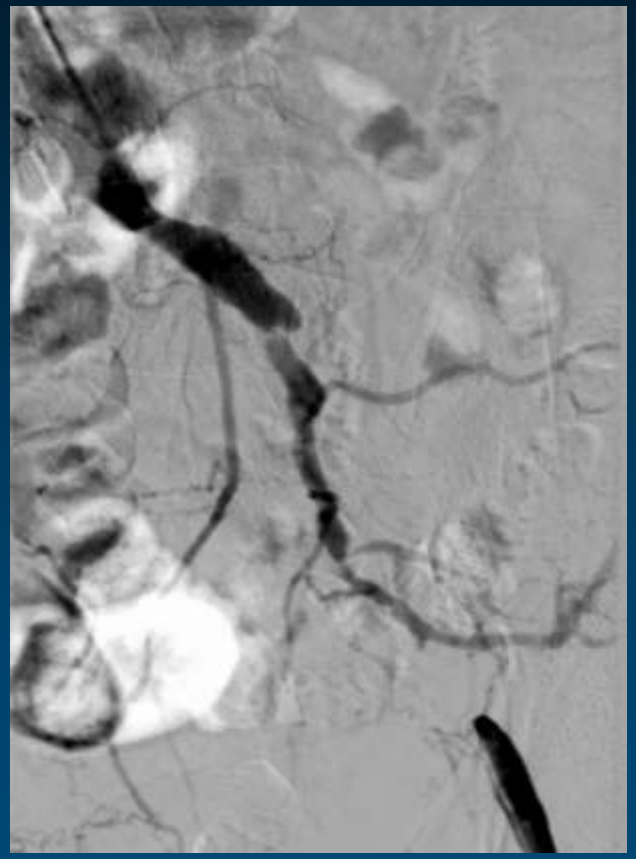
- **Advantages**
  - **Less bleeding complication**
  - **Longer and slender devices available**
  - **Powerful perpendicular back up support**

Advance of TR approach for iliac CTO

- **Longer and slender devices**
  - **Sheath; 110 long long shuttle, 5 Fr**
  - **Catheter; 125 cm head hunter, 5 Fr**
    150 cm MP, 4 Fr
  - **Microcatheter; 150 length**
  - **Guidewire; 0.035” Terumo / 0.014” GW**



Transradial approach for iliac CTO

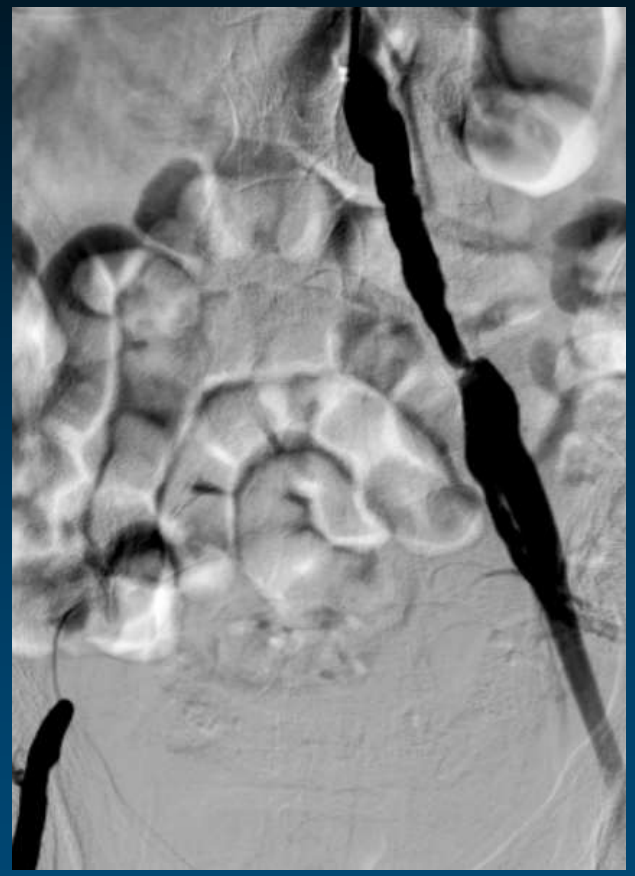


TR 5 Fr with 125cm MP
TF 7 Fr long sheath

SAFARI (CART)
Antegrade wire externalization

65 yo man, Fontaine IIb claudication

5 Fr 110cm shuttle, 4 Fr MP, 0.035” stiff Terumo



Transradial 5 Fr 110 cm shuttle
Transfemoral 7 Fr long sheath

SAFARI (CART)
antegrade wire externalization

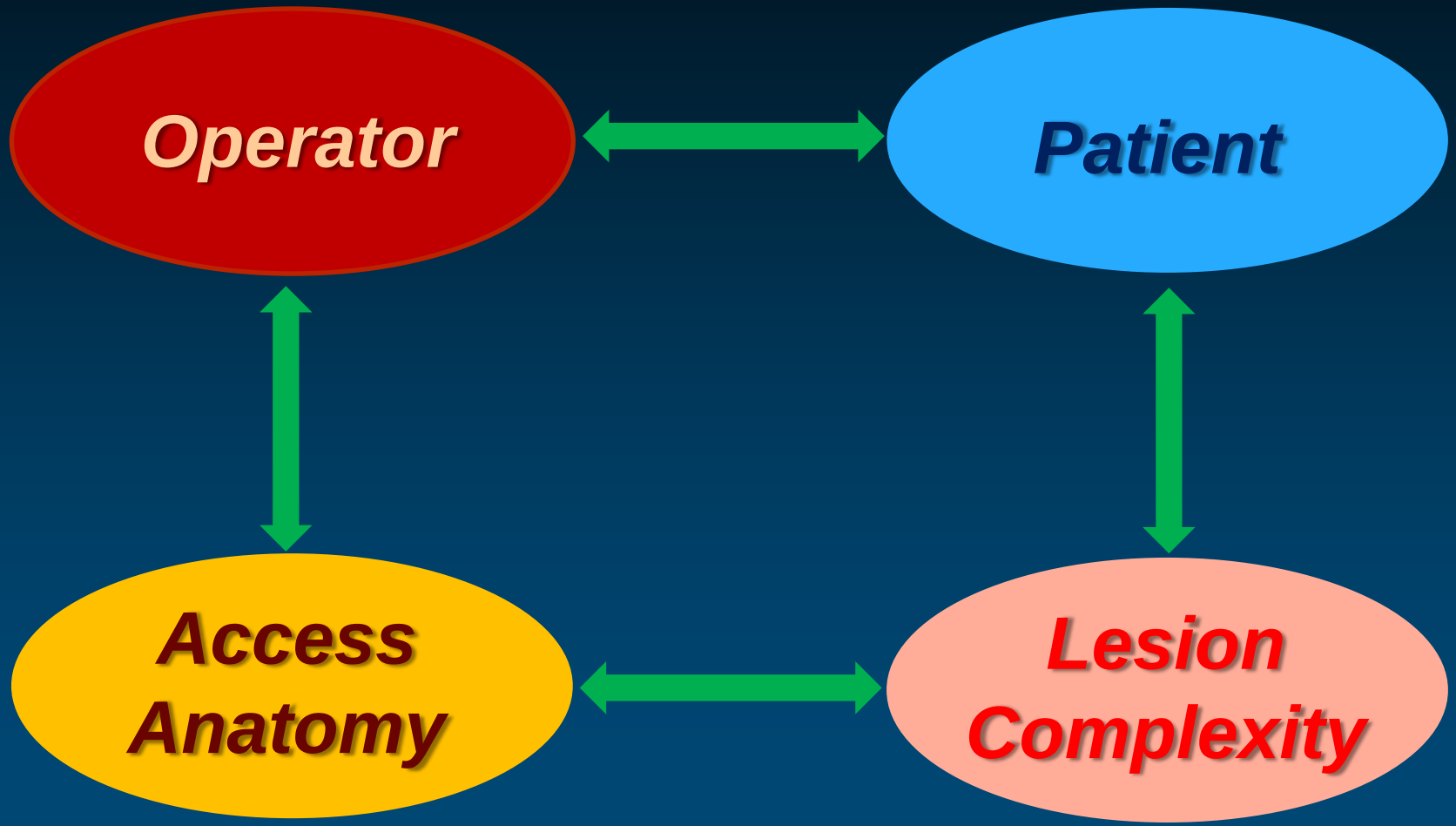
65 yo man, Fontaine IIb claudication

5 Fr 110cm shuttle, 5 Fr MP, 0.035” stiff Terumo

Kissing with two 7.0x40mm

Kissing with SE Smart
Right; 9.0x80 mm & 7.0x100 mm
Left; 10.0x80mm

TRI Difficulties Caused By…

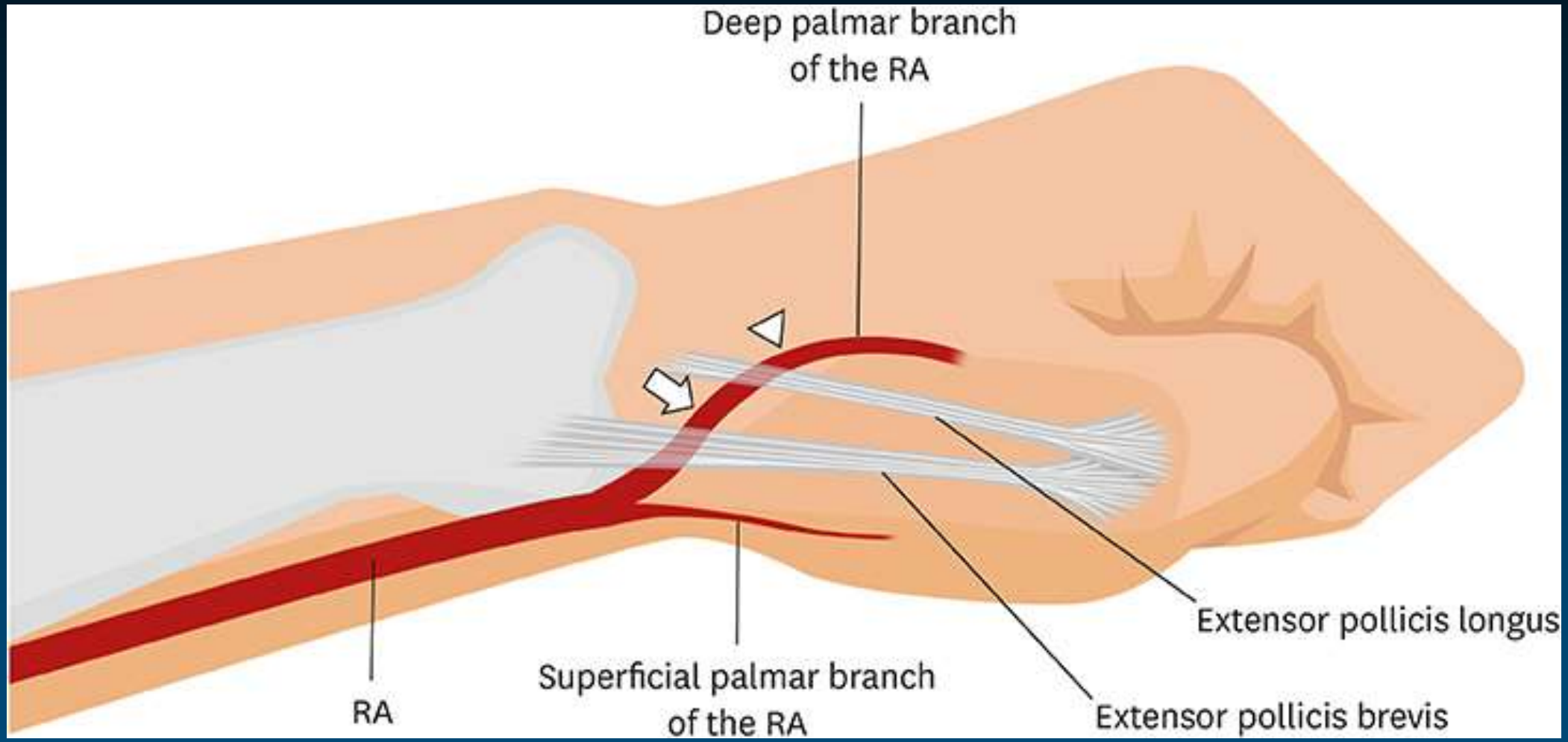


Conclusion

Which stent do you prefer?

Additional Access Route for TRA

Distal Radial Approach Via Anatomical Snuffbox



Roh JH & Lee JH, Korean Circ J. 2018 Dec;48(12):1131-1134.