



Complex CTO intervention in CHIP

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Director APCTO



- Research grant from Asahi Intecc and Vascular Solutions
- Consultant work for Abbott, Boston.



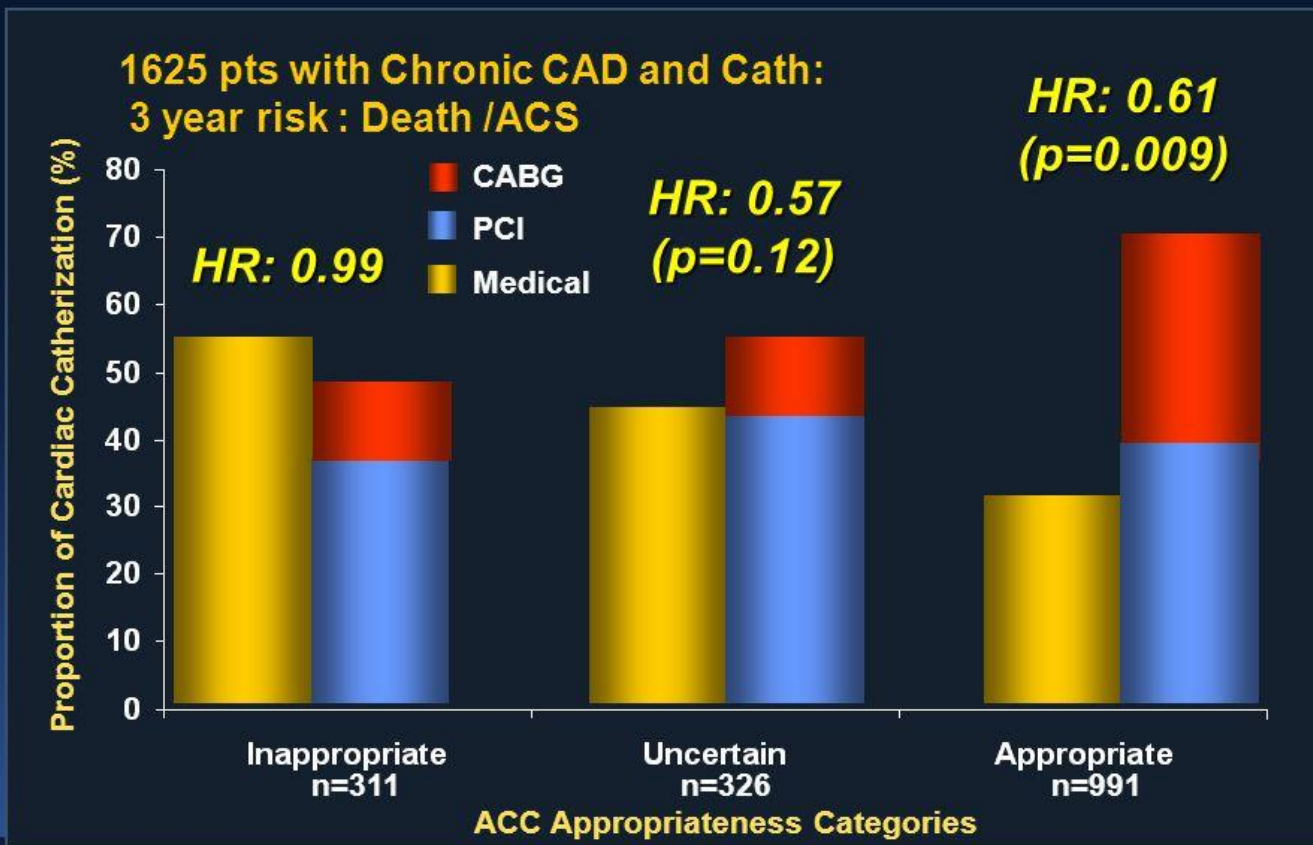
What is CHIP

- TCT 2014 Ajay Kirtane presented concept of the Complex High risk Indicated Patient.
- This is not a currently treated group of patients they are either untreated, undertreated or maltreated.
- Its an expansion of our work load to take on patients turned down by surgical options.

Only 0.6 of appropriate use criteria cases were treated



Underuse and Adverse Outcomes

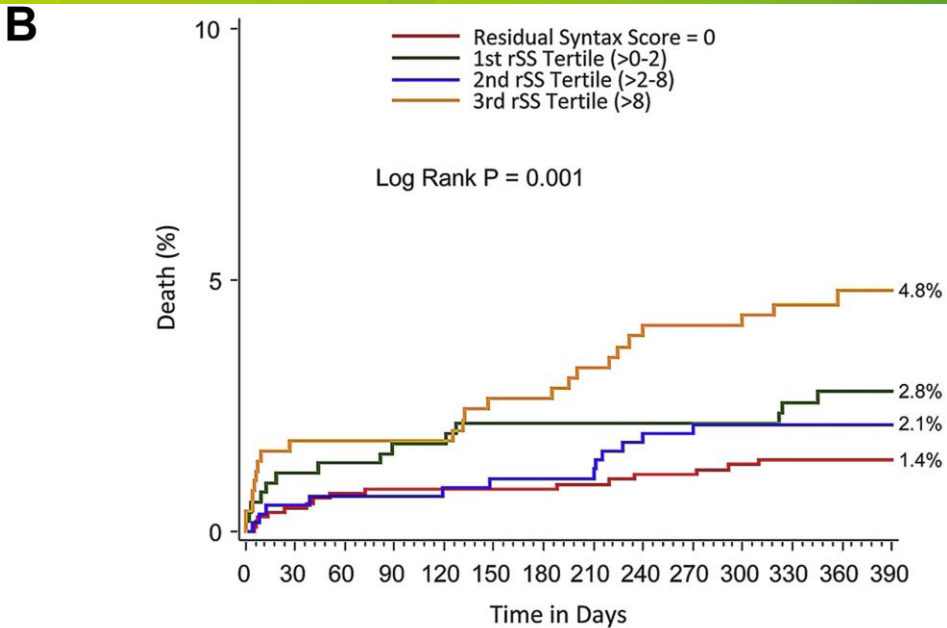
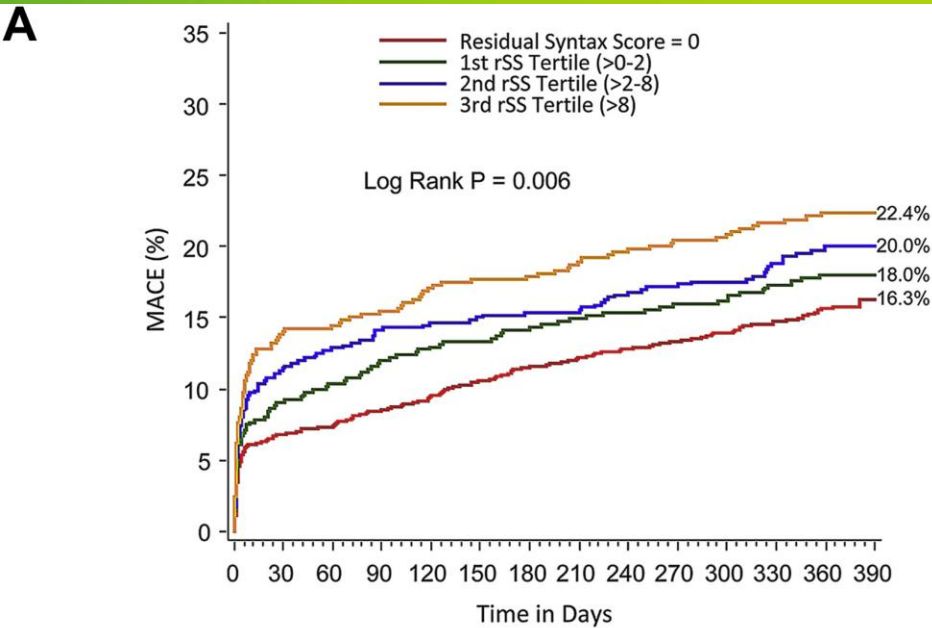


Conclusion.



1. We are not treating all the patients who should be treated.

Genereux et al JACC –residual syntax score predicts poor outcome



Number at Risk:

	0	90	180	270	360
rSS = 0	1084	966	931	909	649
1st rSS Tertile	523	445	433	422	304
2nd rSS Tertile	578	482	474	463	330
3rd rSS Tertile	501	408	396	382	275

Number at Risk:

	0	90	180	270	360
rSS = 0	1084	1047	1044	1038	756
1st rSS Tertile	523	494	490	488	355
2nd rSS Tertile	578	558	555	549	408
3rd rSS Tertile	501	473	469	460	330

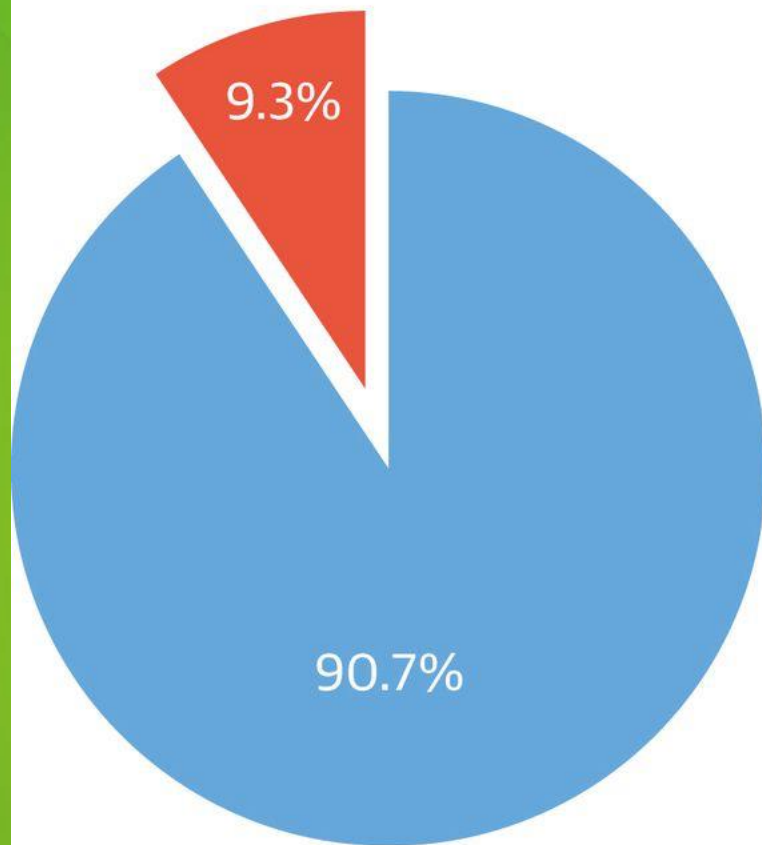


Conclusion.

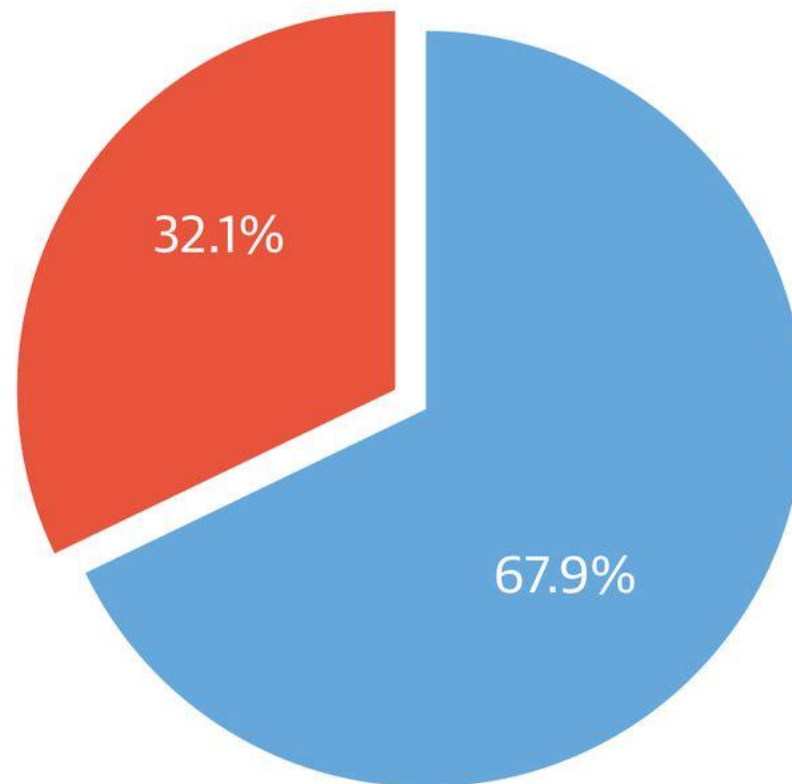
1. We are not treating all the patients who should be treated.
2. Those we undertreat left with residual ischemia do worse.

Yeh et al JACC 2017

CTO with CTO PCI



CTO with Non-CTO PCI



- Concordance Between PCI and Territory of Ischemia
- Discordance Between PCI and Territory of Ischemia



Conclusion.

1. We are not treating all the patients who should be treated.
2. Those we undertreat left with residual ischemia do worse.
3. Where there is a CTO and we leave it there is a one in three chance we have not treated the ischemic territory.



Conclusion.

1. We are not treating all the patients who should be treated.
2. Those we undertreat left with residual ischemia do worse.
3. Where there is a CTO and we leave it there is a one in three chance we have not treated the ischemic territory.
4. We need to do CHIP CTO.

84/male, Ex-smoker



- PHx:
 - DM/HT/hyperlipidemia
 - Obstructive sleep apnea on CPAP since 2003
 - IHD

Long standing Hx of IHD

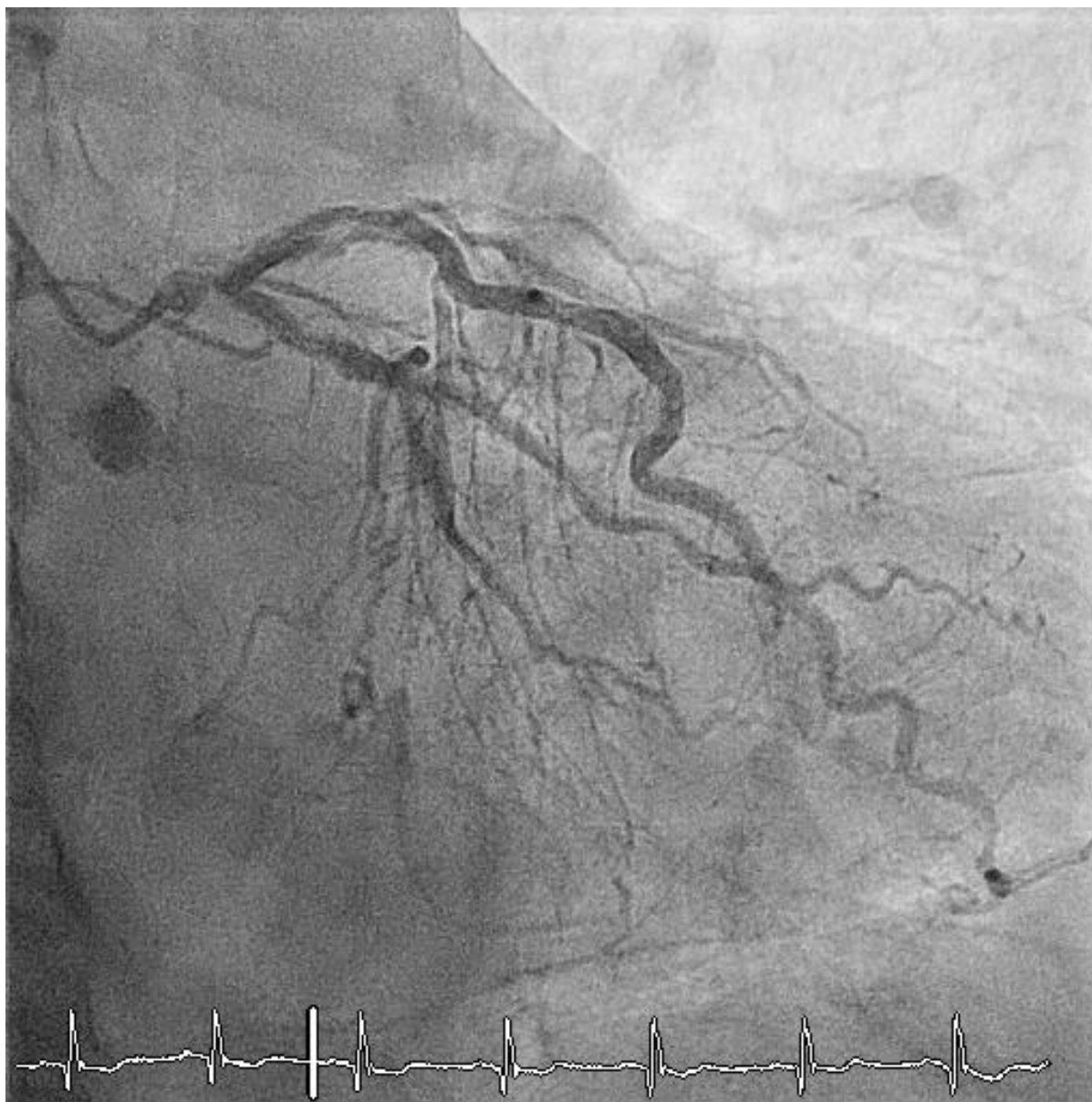
- PTCA to LAD in 1994 for Angina
- Coro 13/2/2003 for angina with +ve Thallium scan
 - Patent LAD stent
 - pLCx 80% , OM1/OM2 80%, OM3 subtotally occluded
 - mRCA totally occluded with collaterals from LAD
 - PCI x OM1 with cypher 2.25x33mm, OM2 with BMS 2.5 x 16mm
- Repeated Thallium scan 19/8/2003: reversible defect in inferior territory

In 2017 (14 years after last coro)



- Mild degree angina symptom on extreme exertion
- Presented with worsening typical Angina radiate to neck
- Echo: 40%, hypokinetic inferior wall
- Baseline Creatinine 124 umol/L









RCA



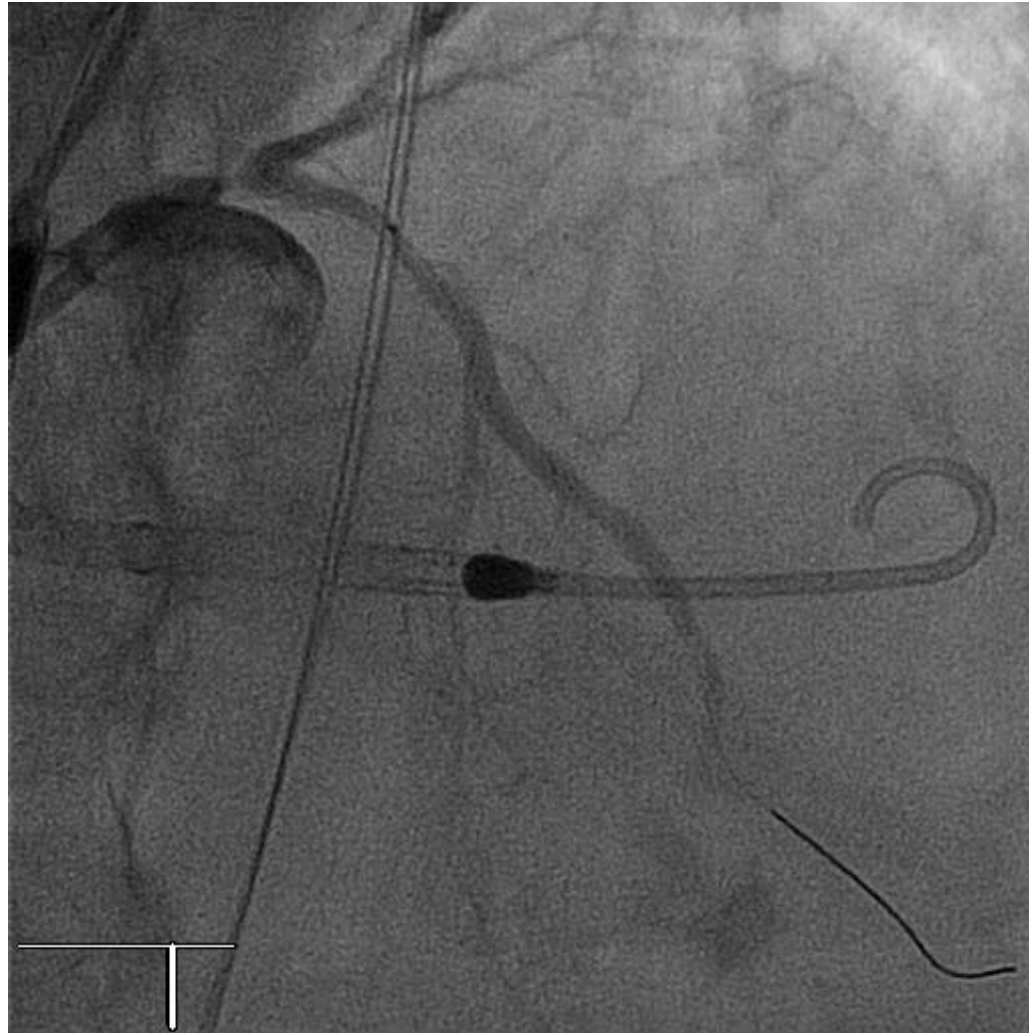


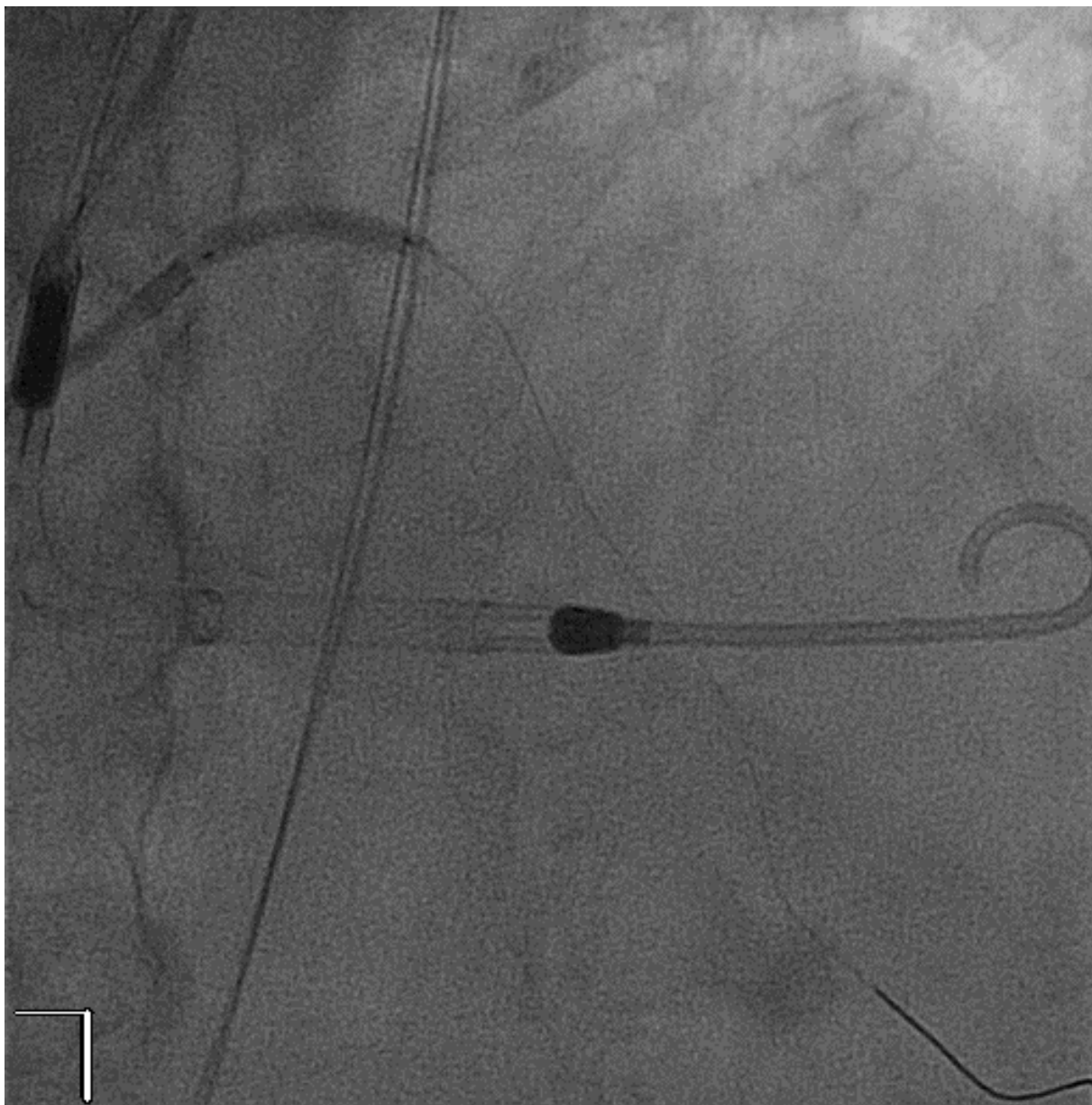
- SYNTAX I Score: 39.5
- SYNTAX II Score
 - PCI : 45.4 with 22.7% 4 year Mortality
 - CABG: 48.7 with 28.7% 4 year Mortality
- Euroscore II : in-hospital mortality 4.5%

Radial access for PCI

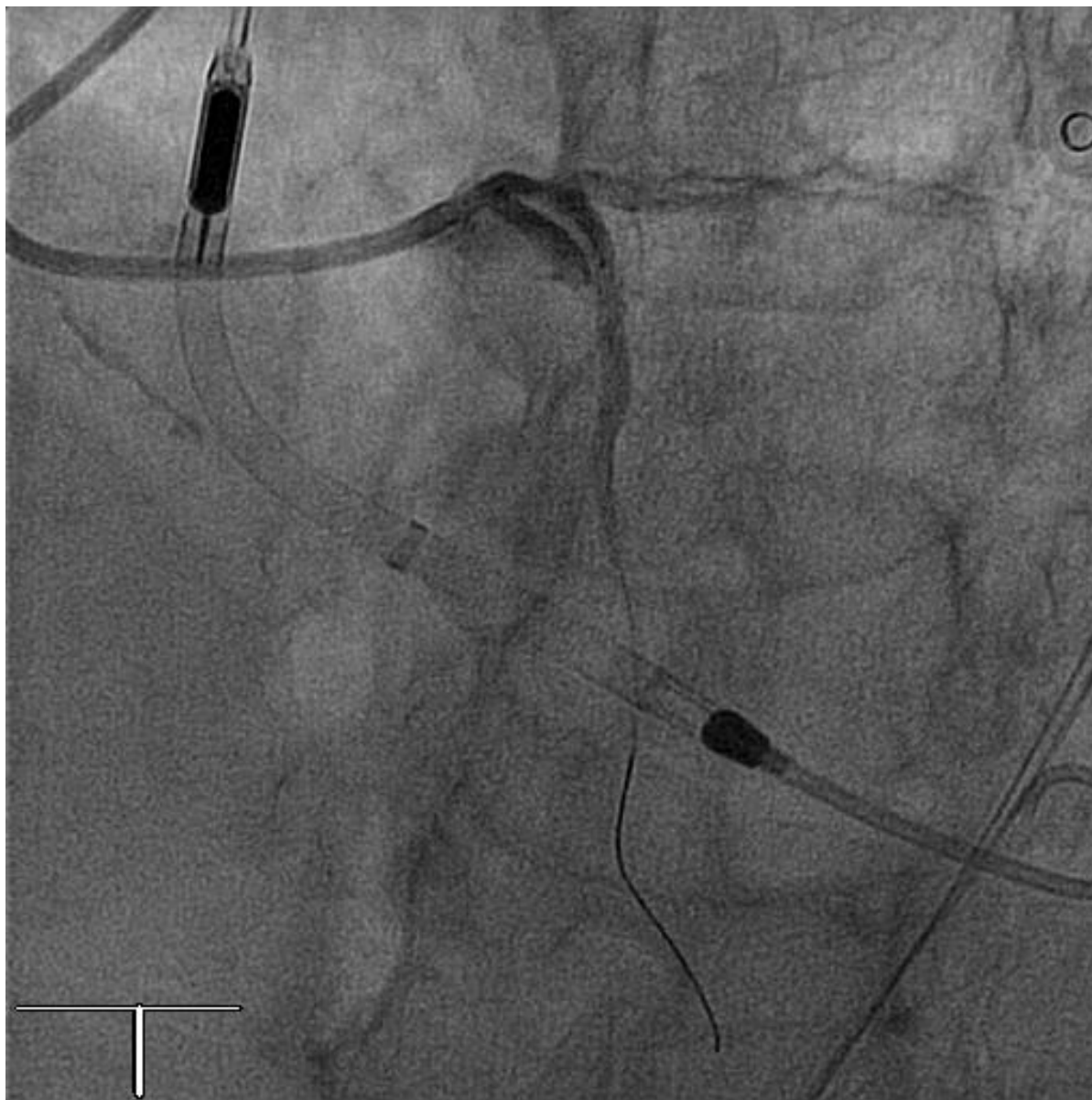


Impella via Left Femoral access





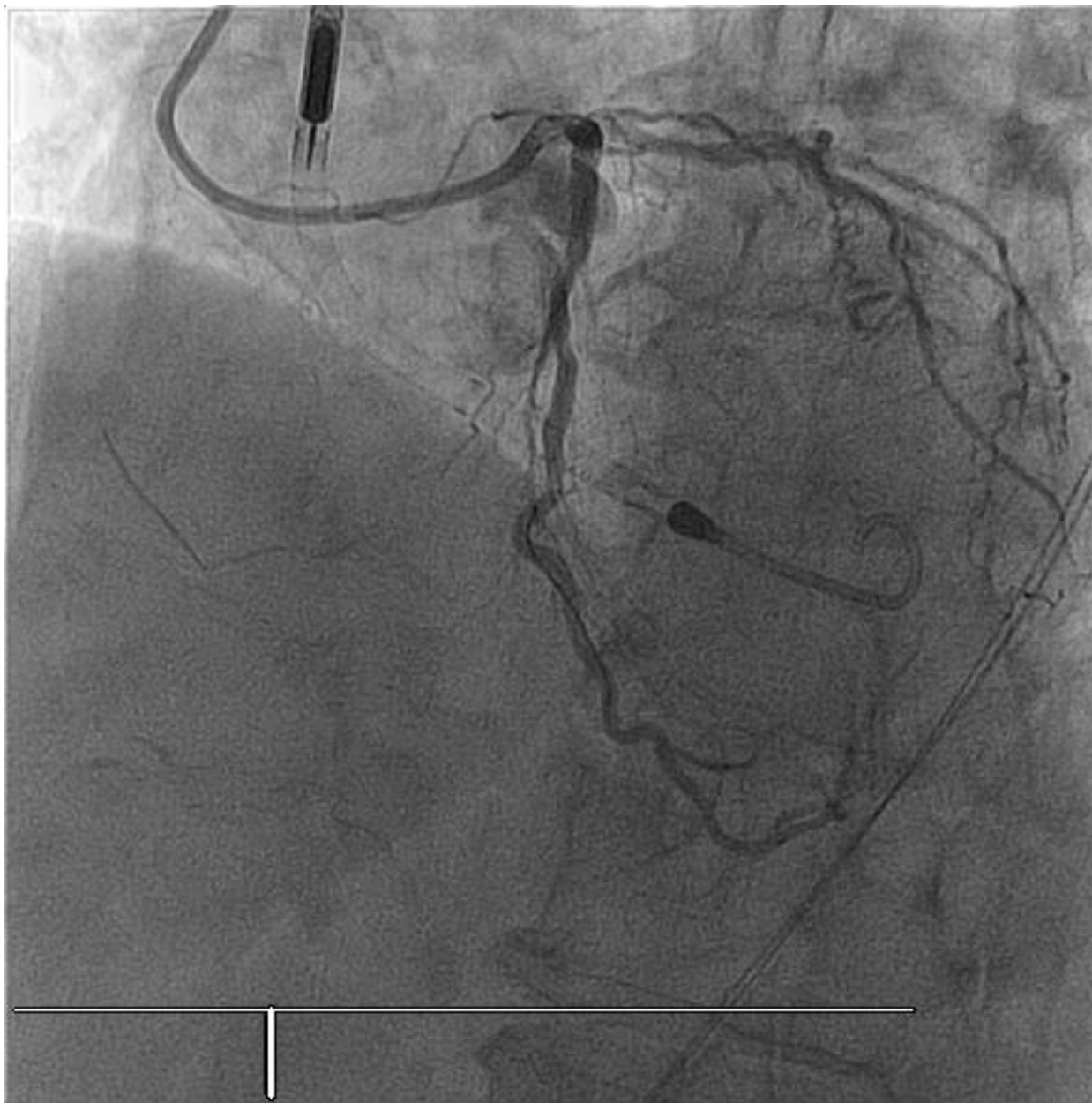
3.0 x 20mm SC balloon @ 12 atm

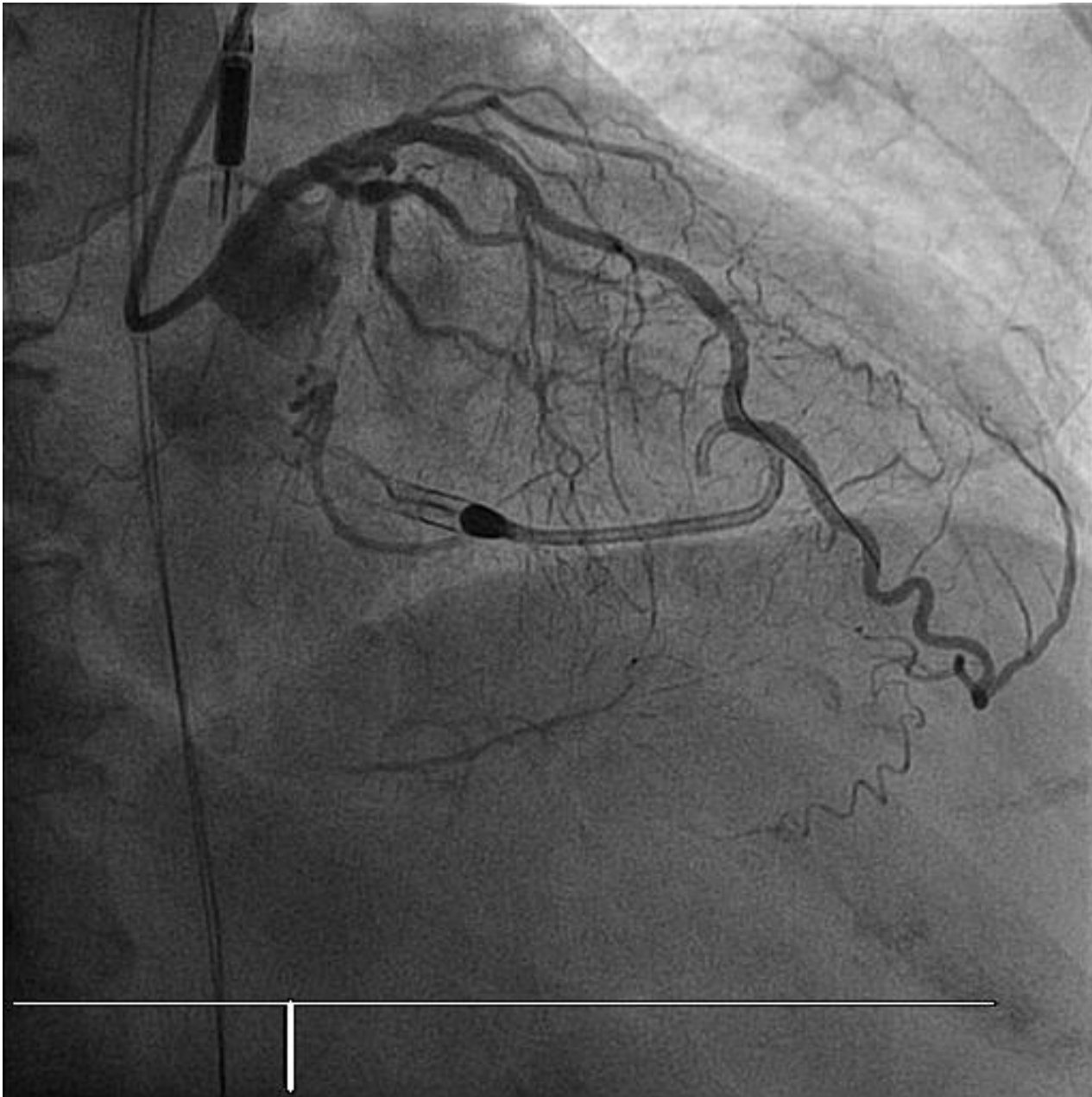


3.0 x 24mm DES

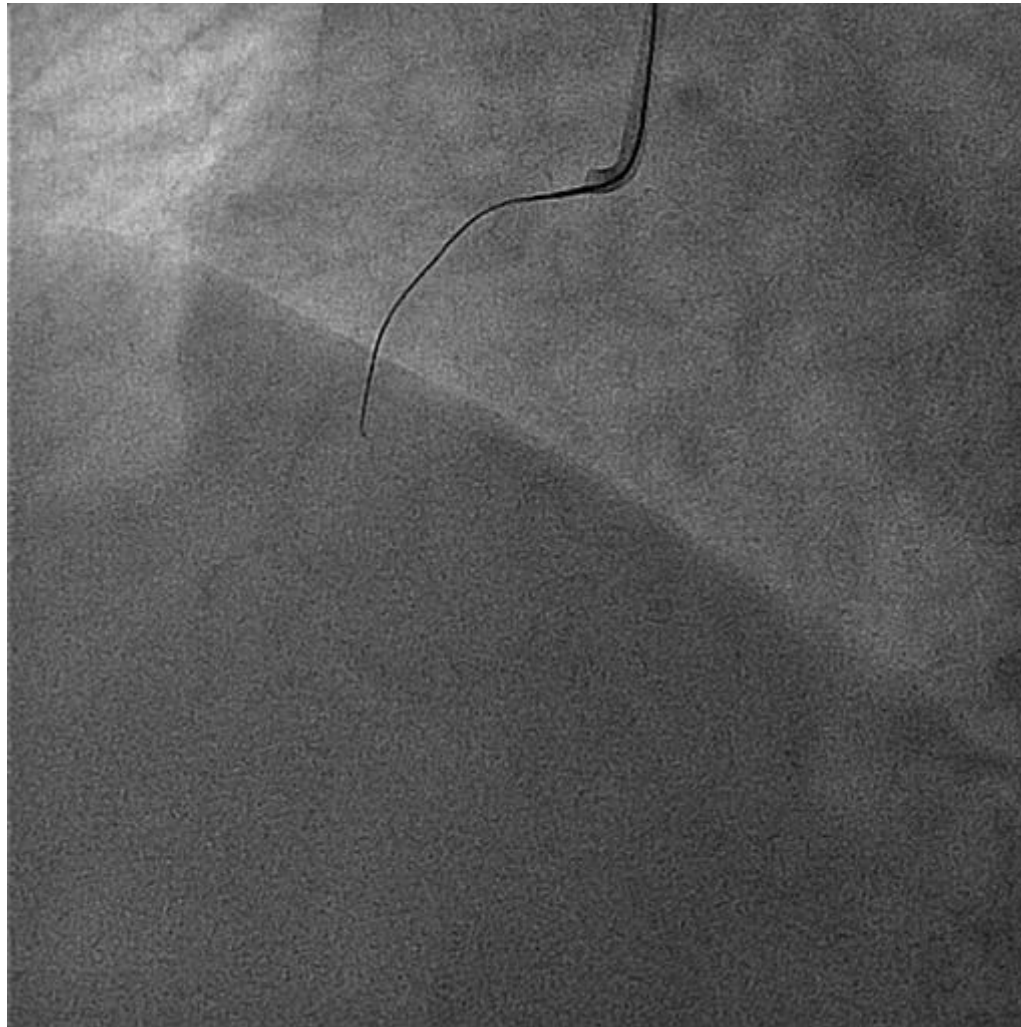


Post-dilated NC 3.5mm at LAD @ 26 atm, NC 4.0mm at LMS @ 26 atm under IVUS guidance



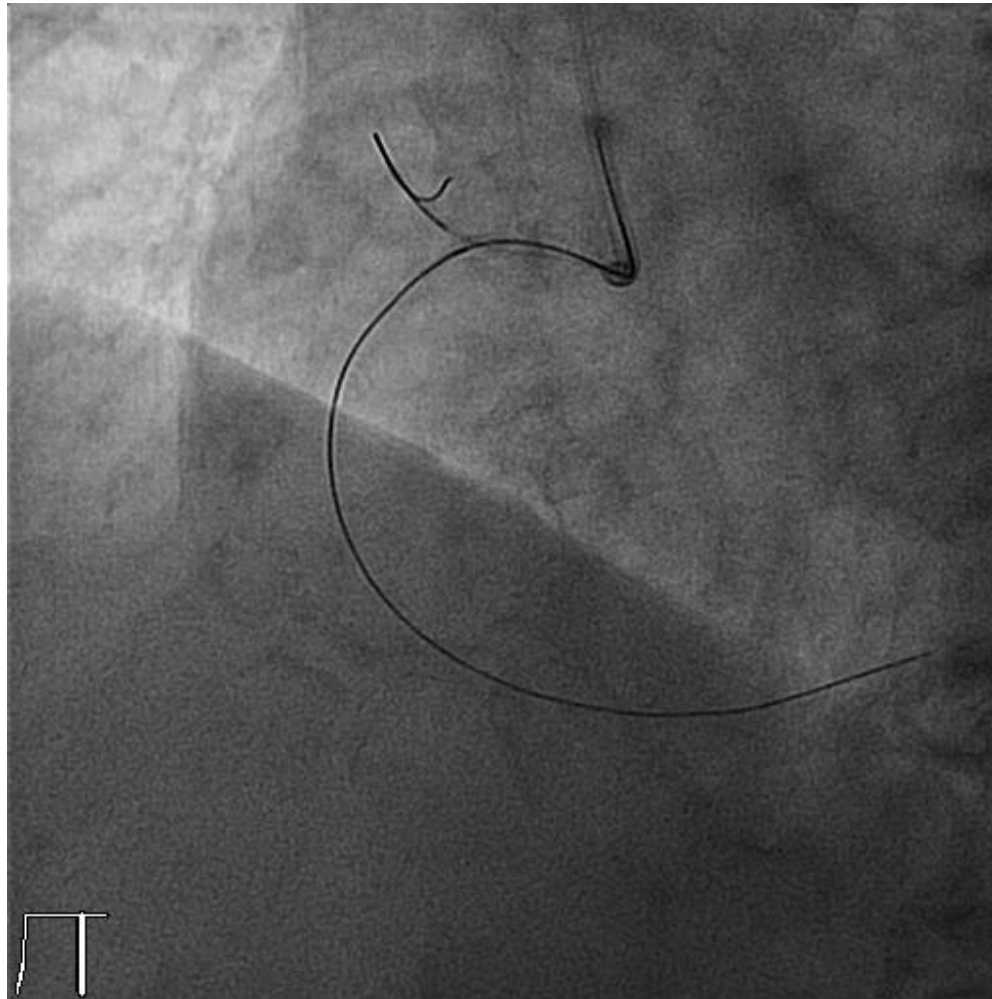


IL3.5 guide 7Fr, Fielder XT-A, then Gaia 2nd

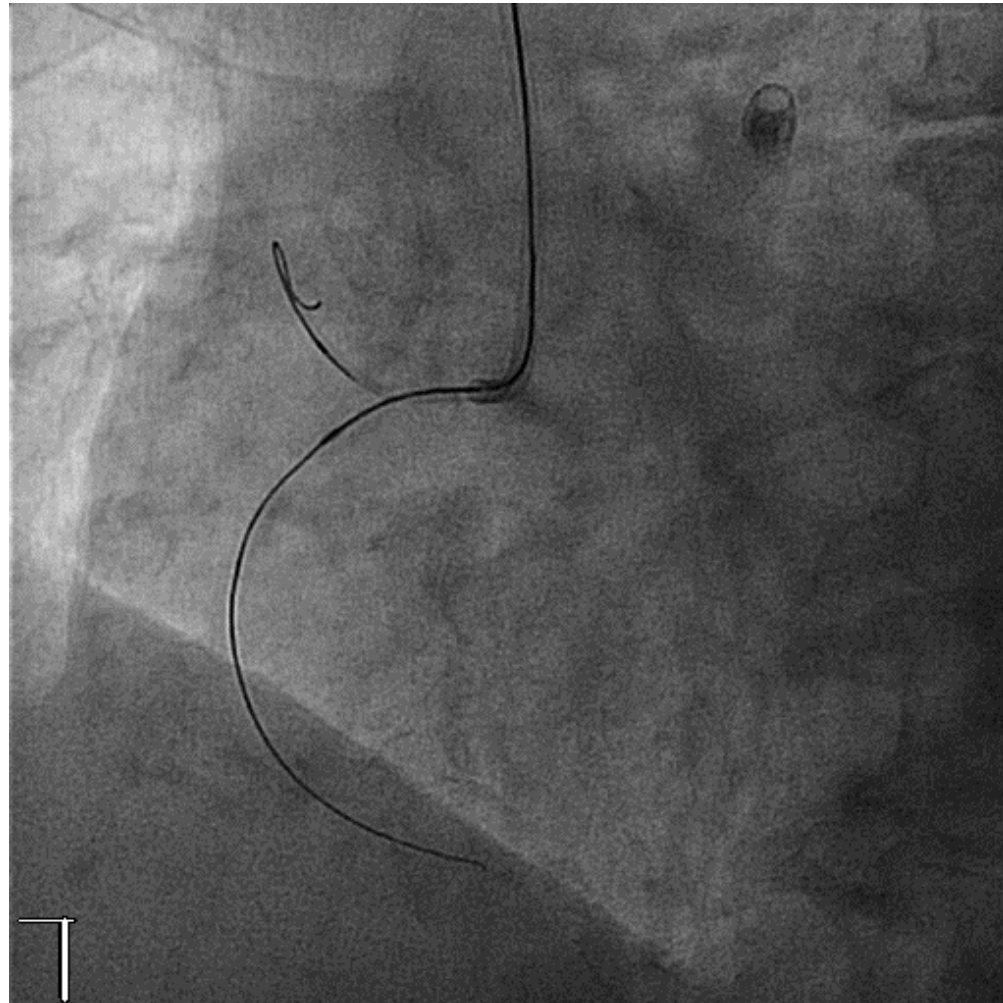


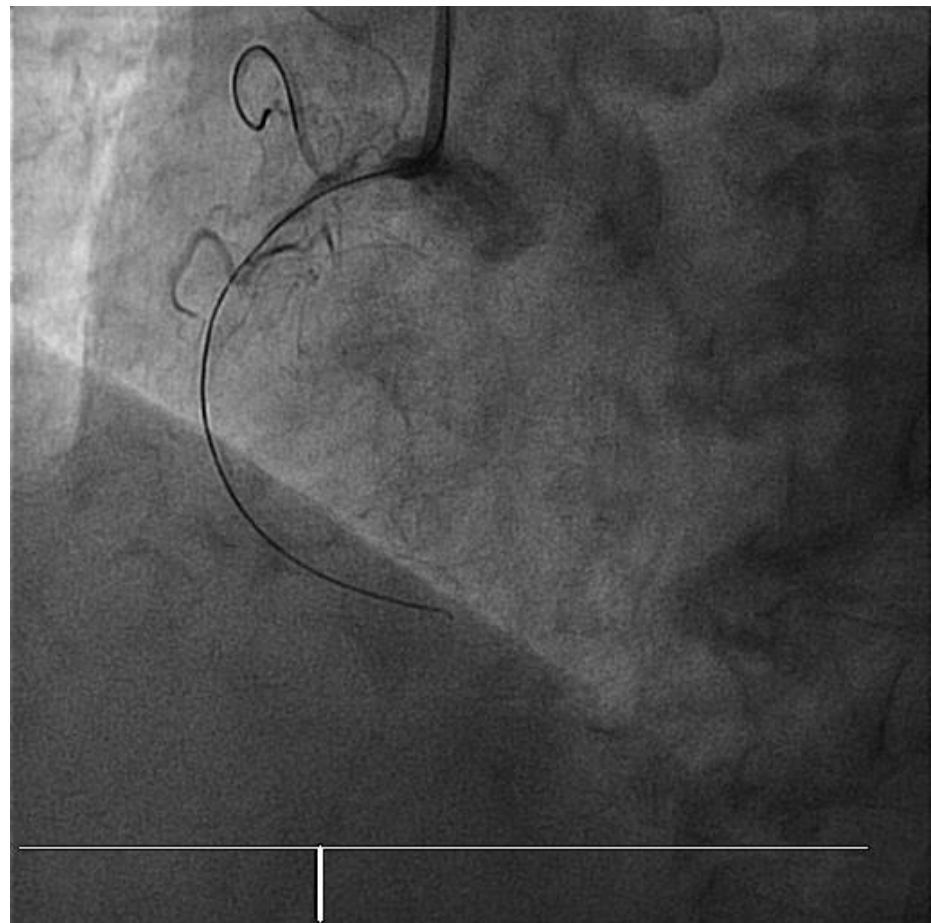
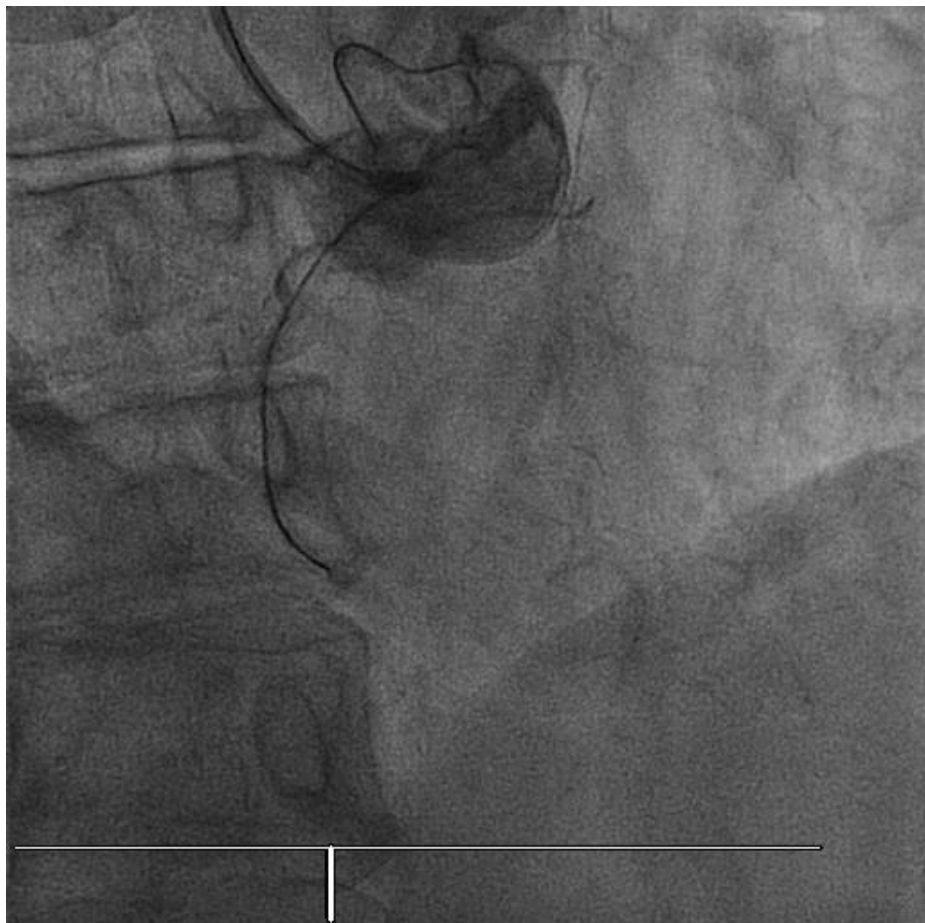


Anchoring balloon 1.25mm, 1.2mm, 1.0mm



Turnpike Gold with Anchoring balloon



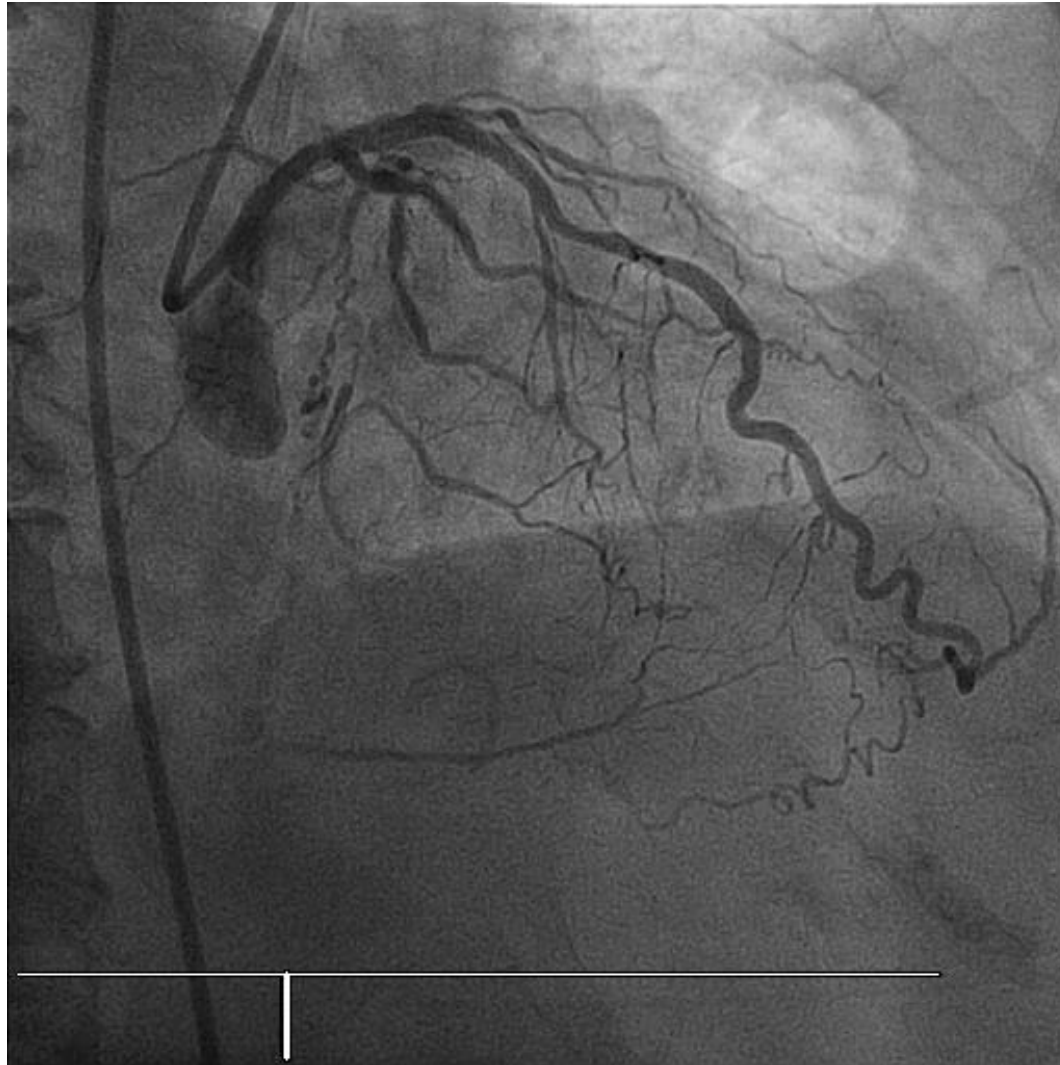


Stage PCI

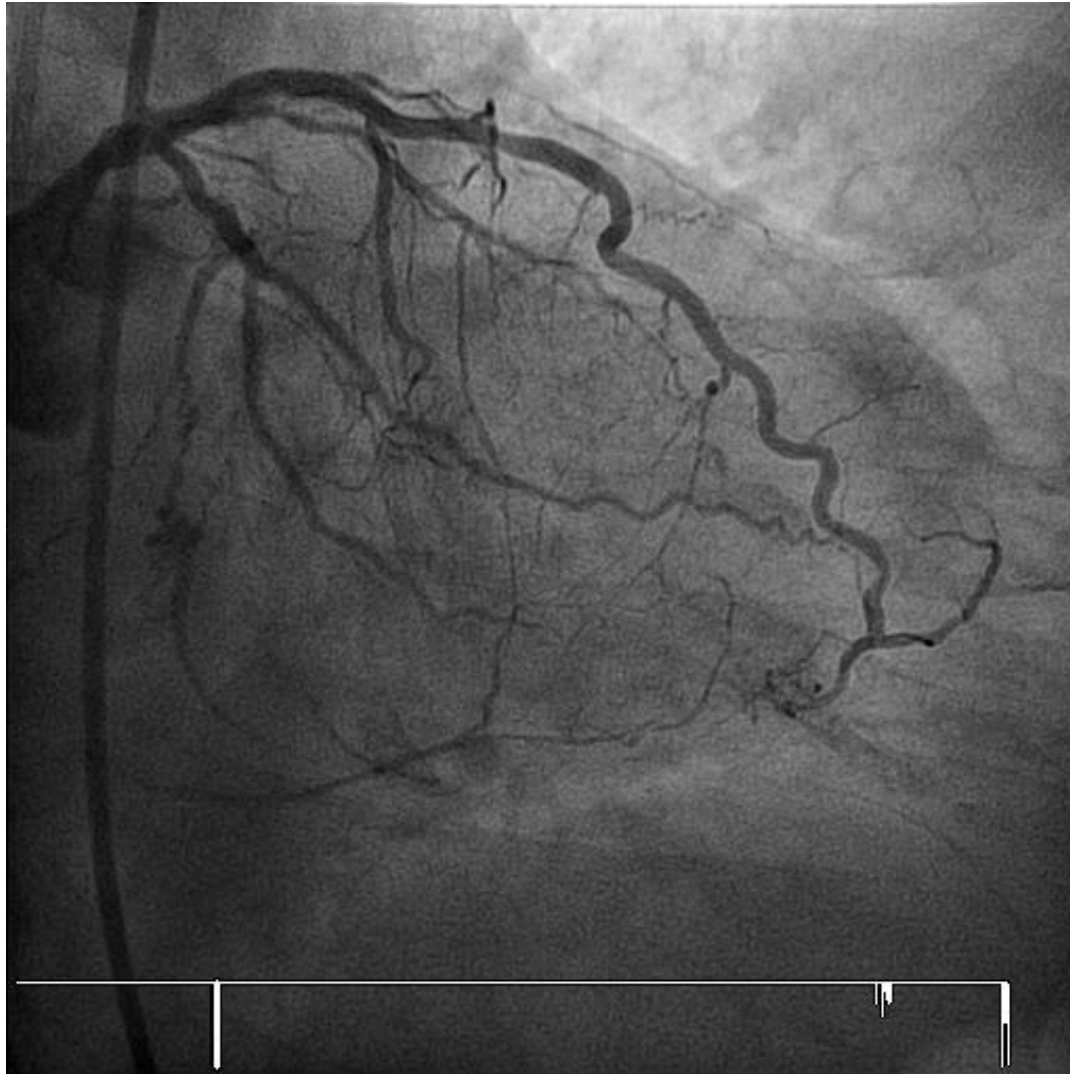
- 2 months later

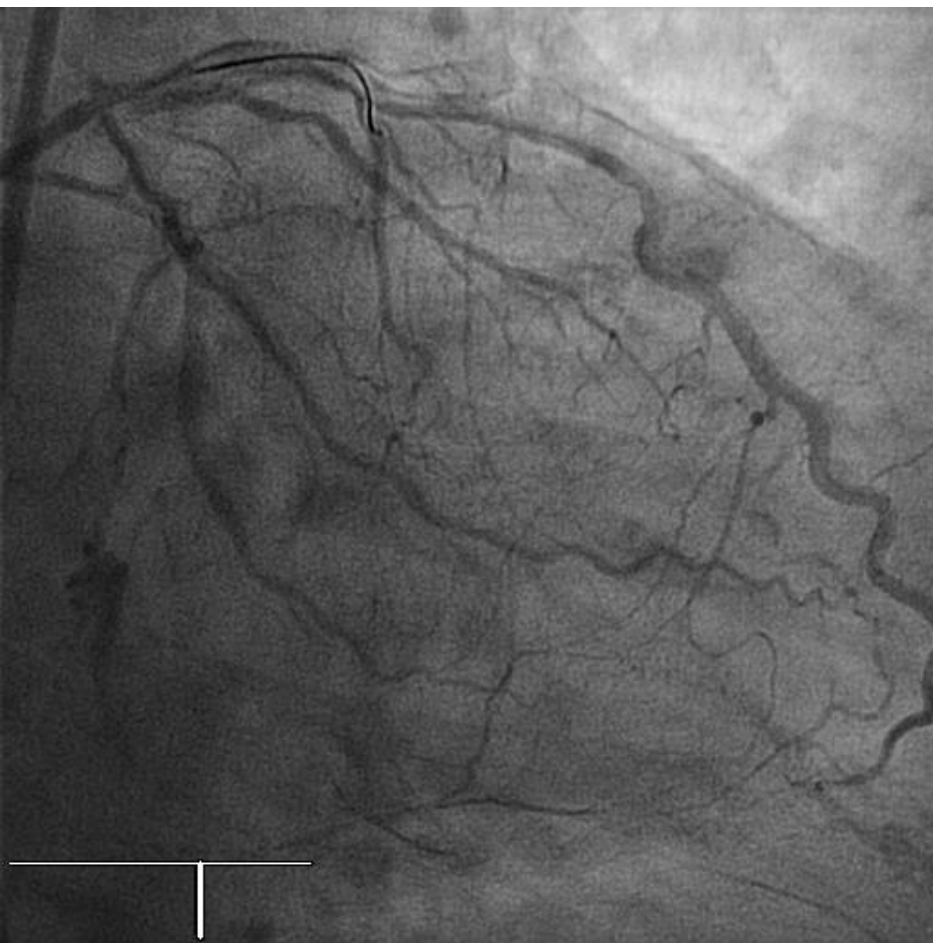


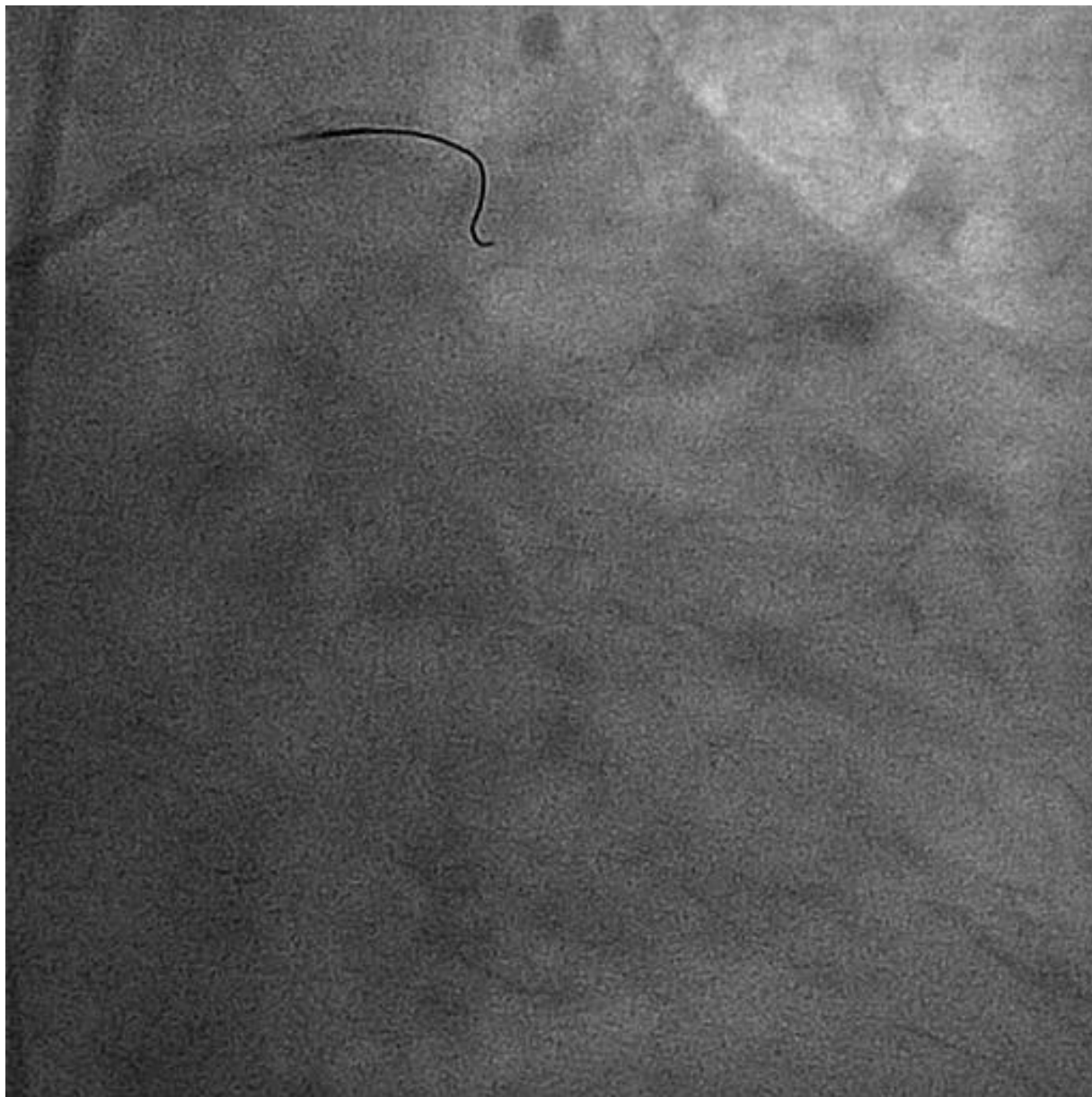
Channel shot



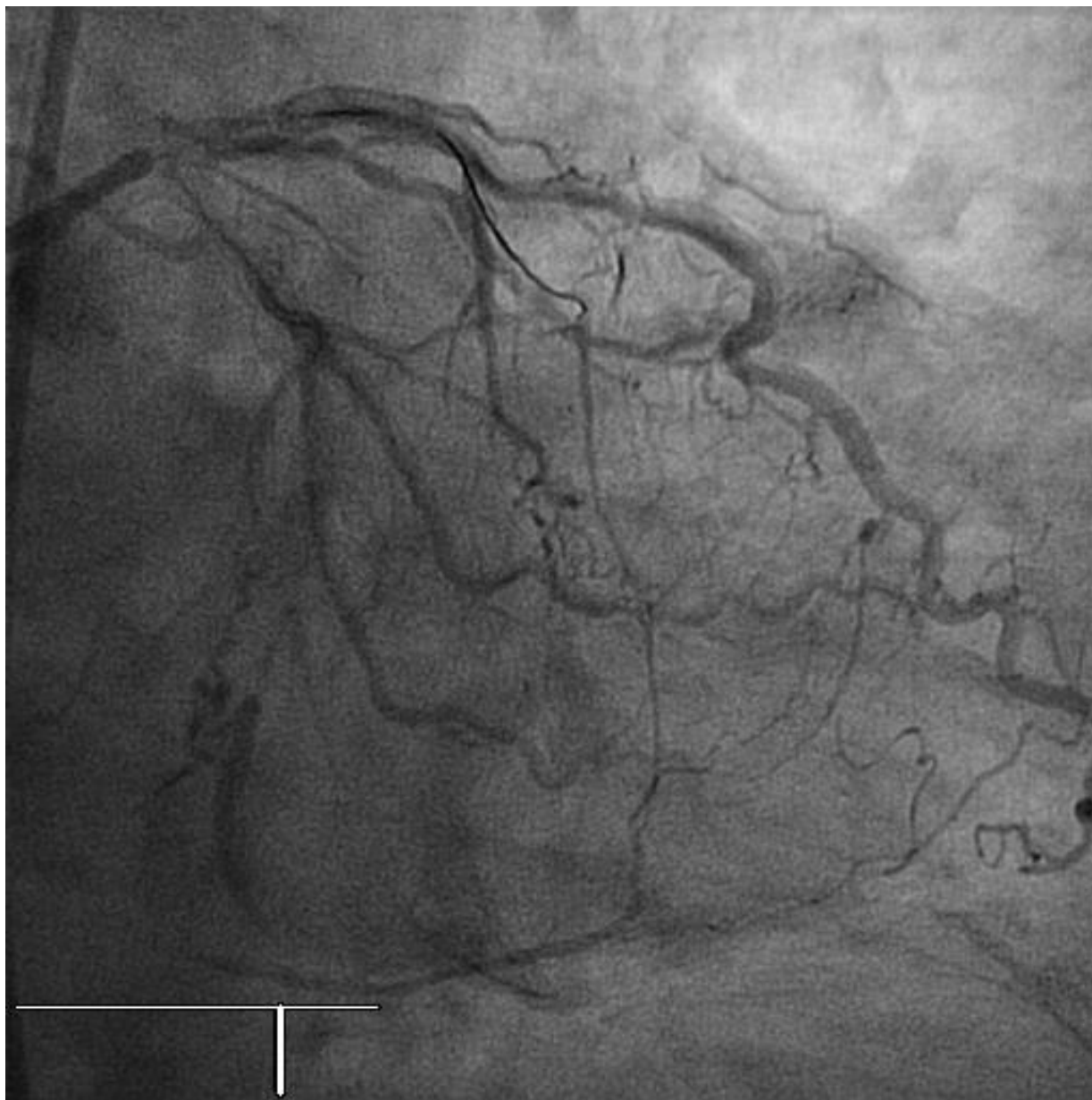
RAO Caudal

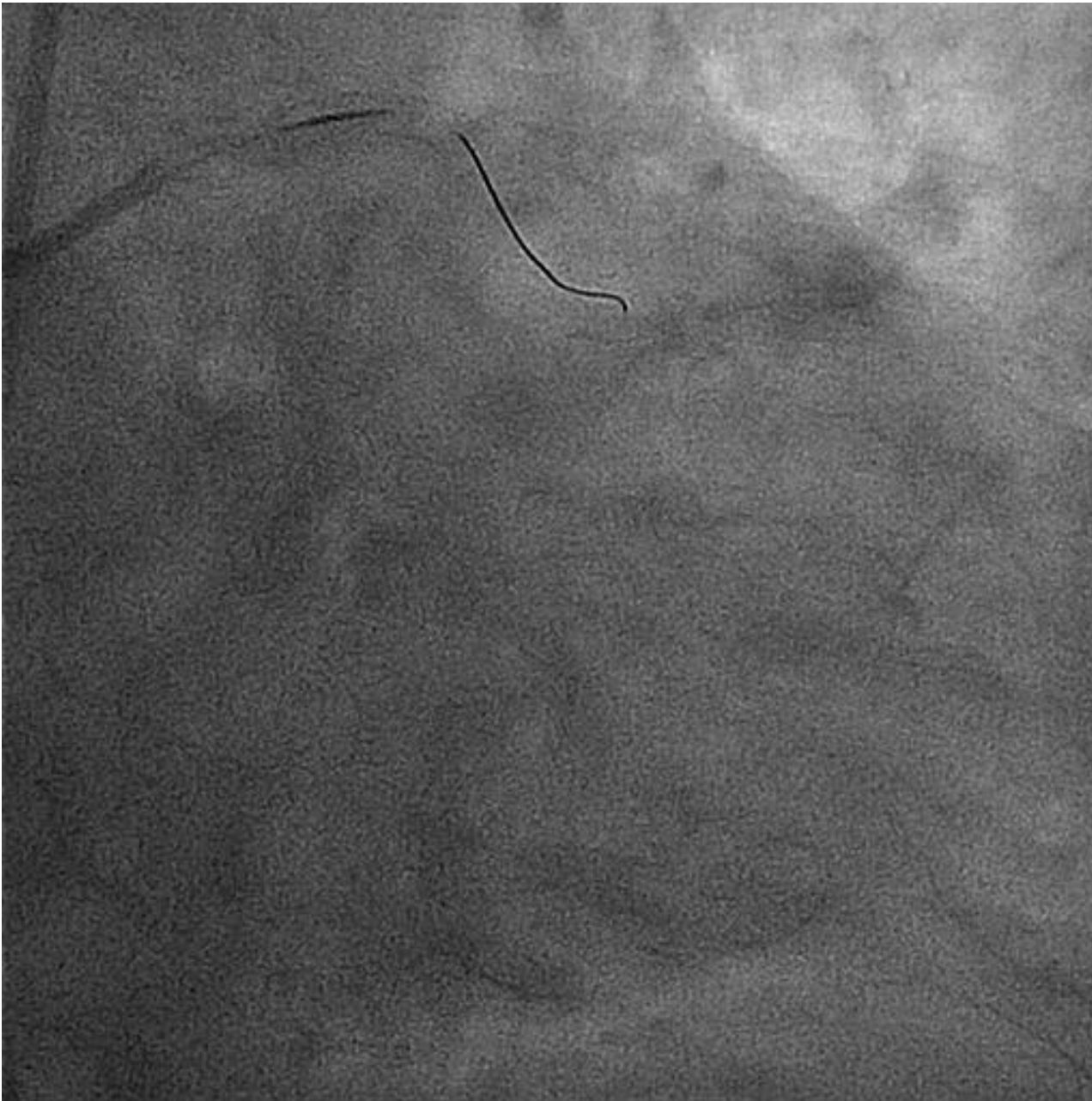


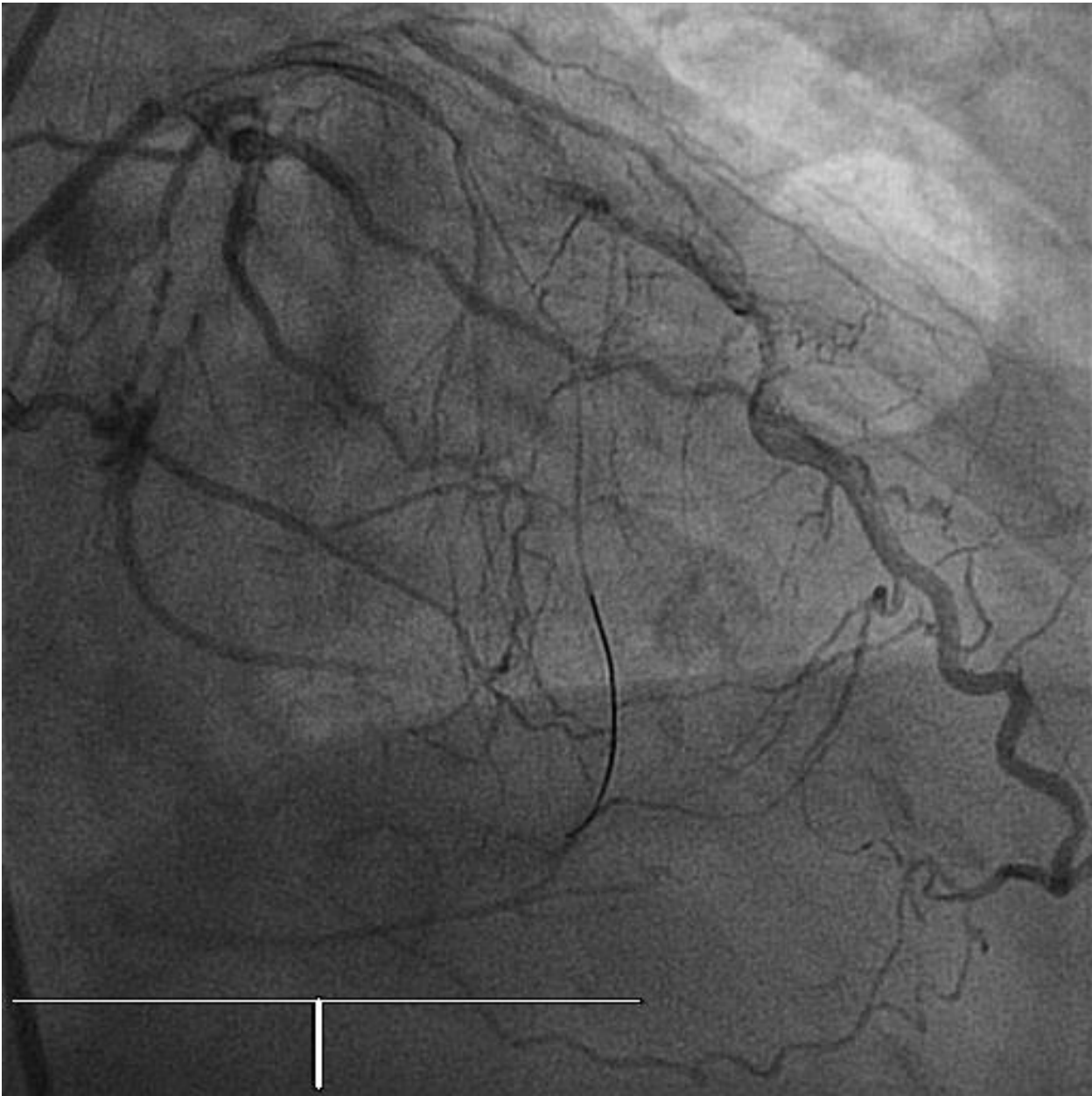




Samurai RC wire



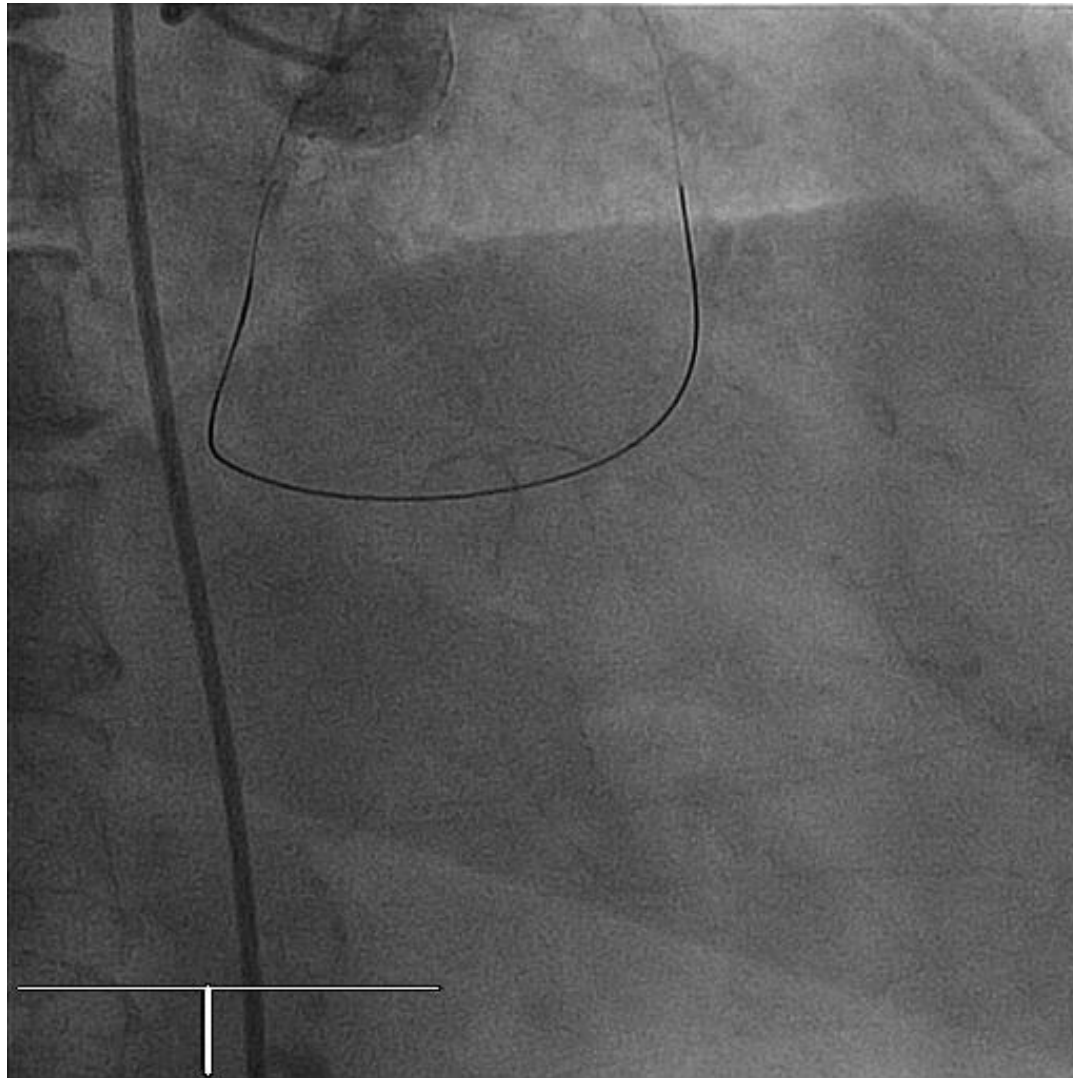


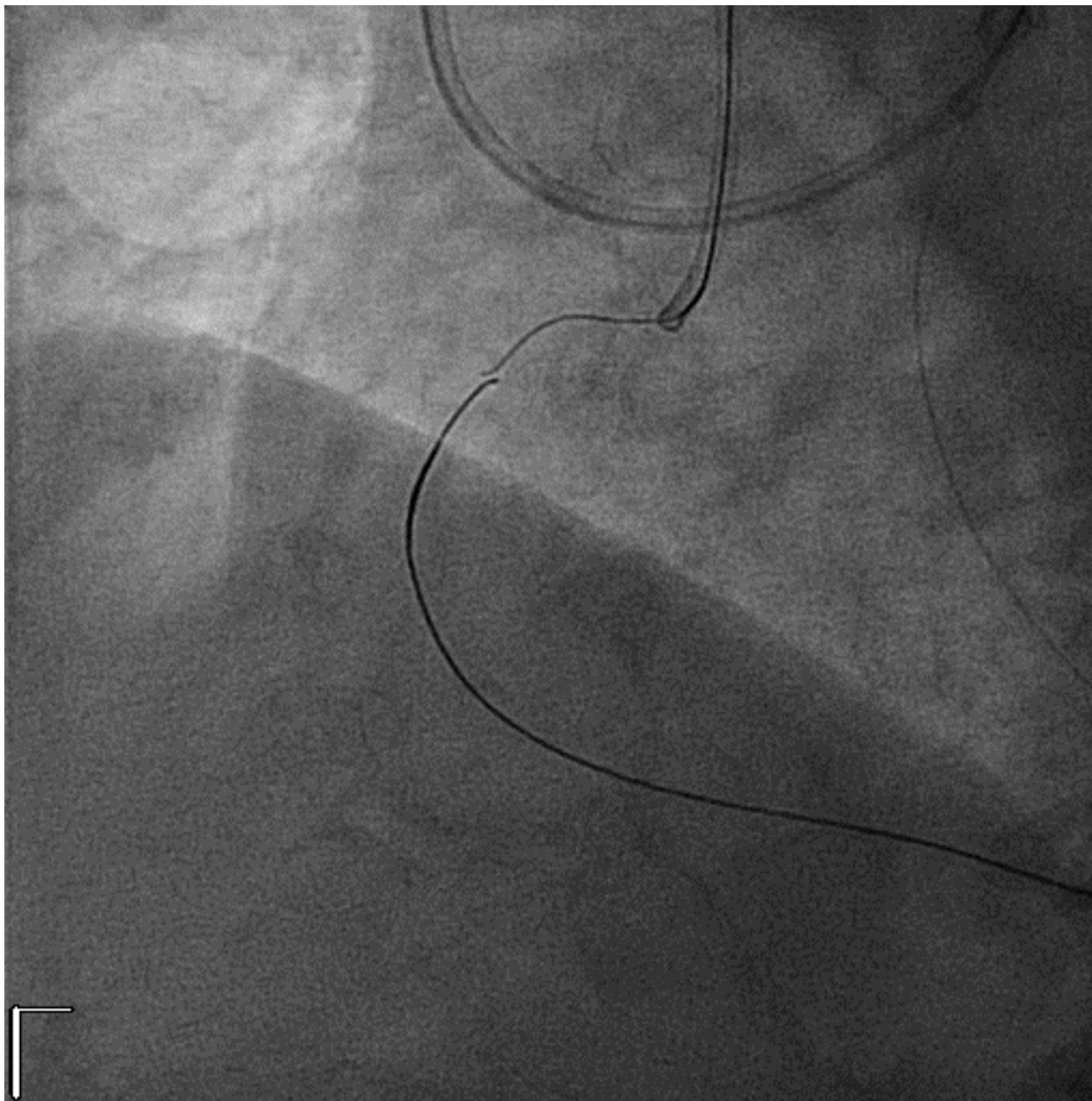






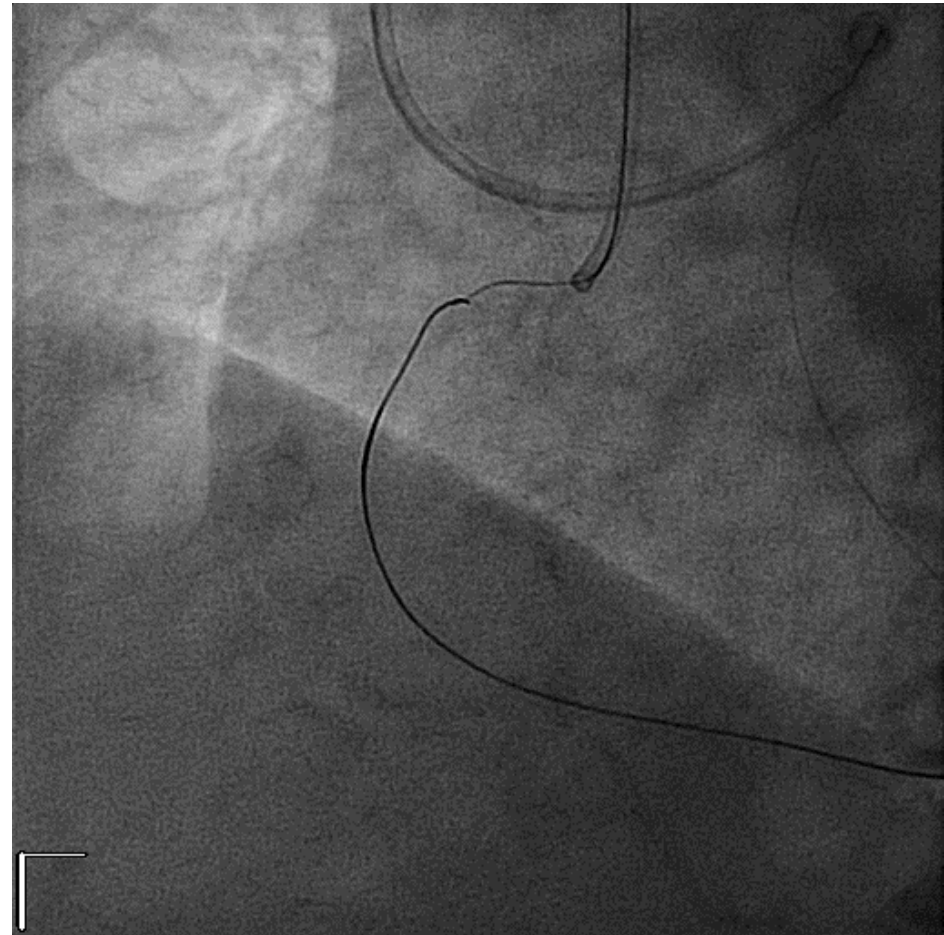
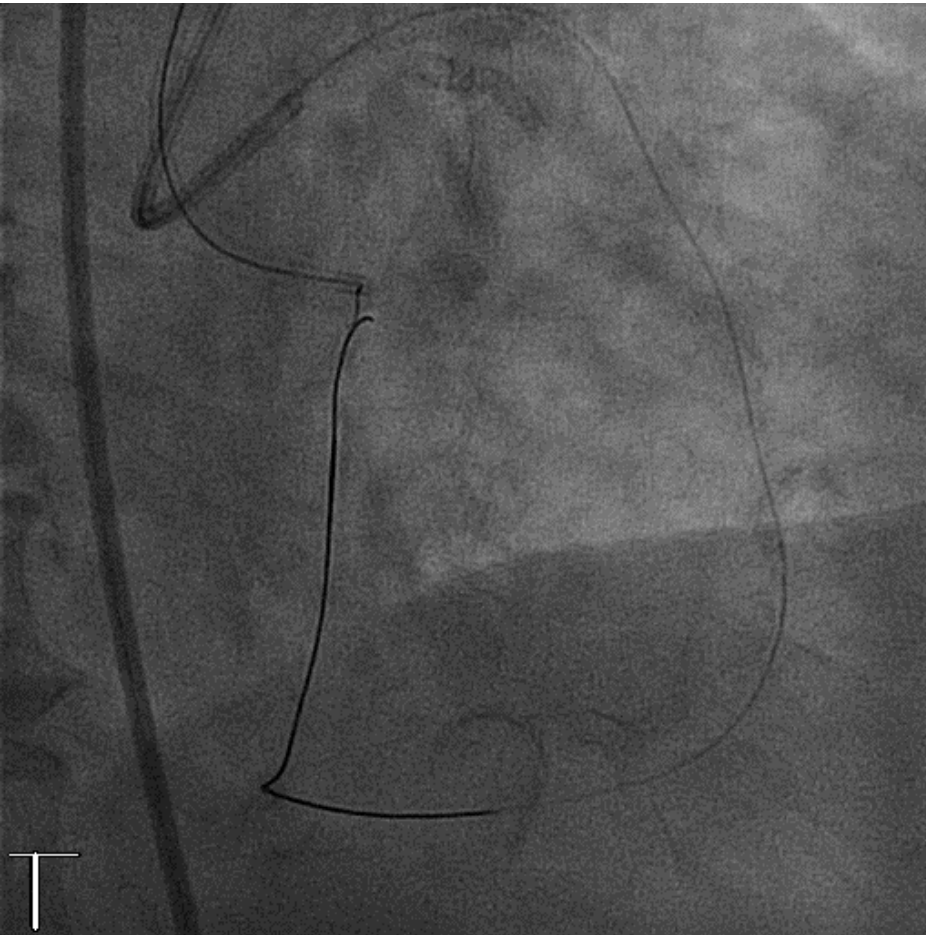
XT-R failed to enter pRCA



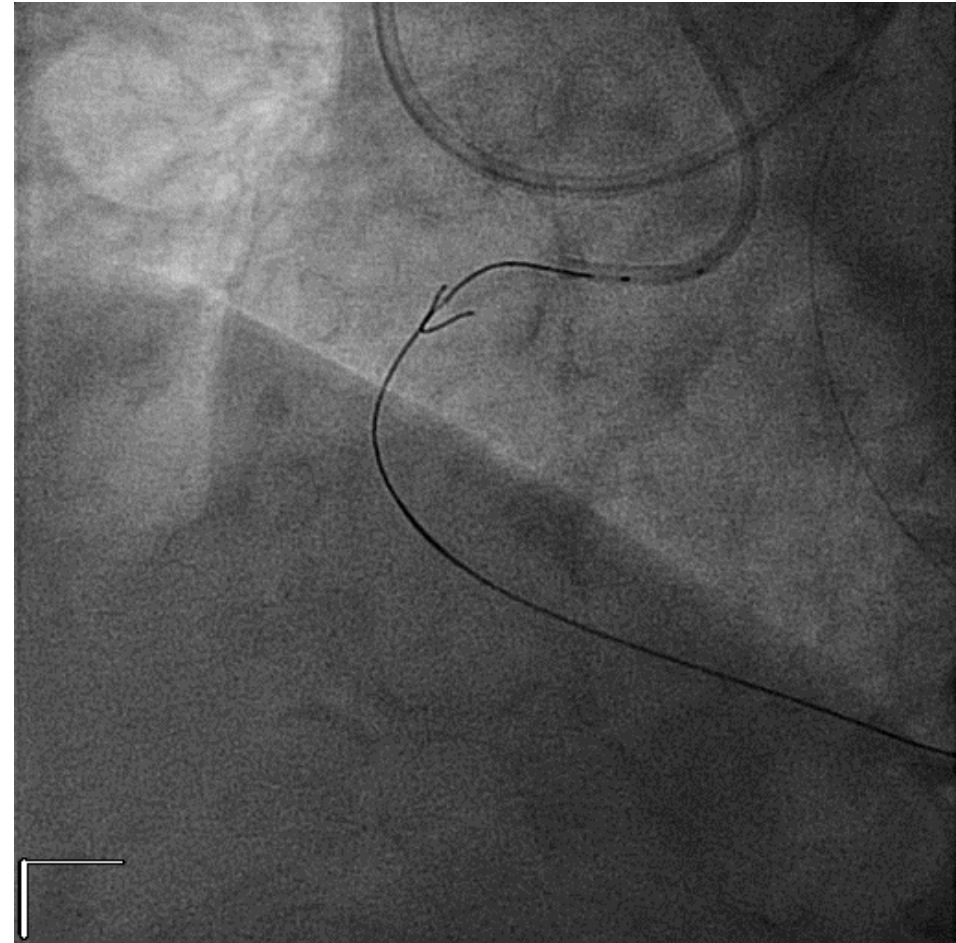
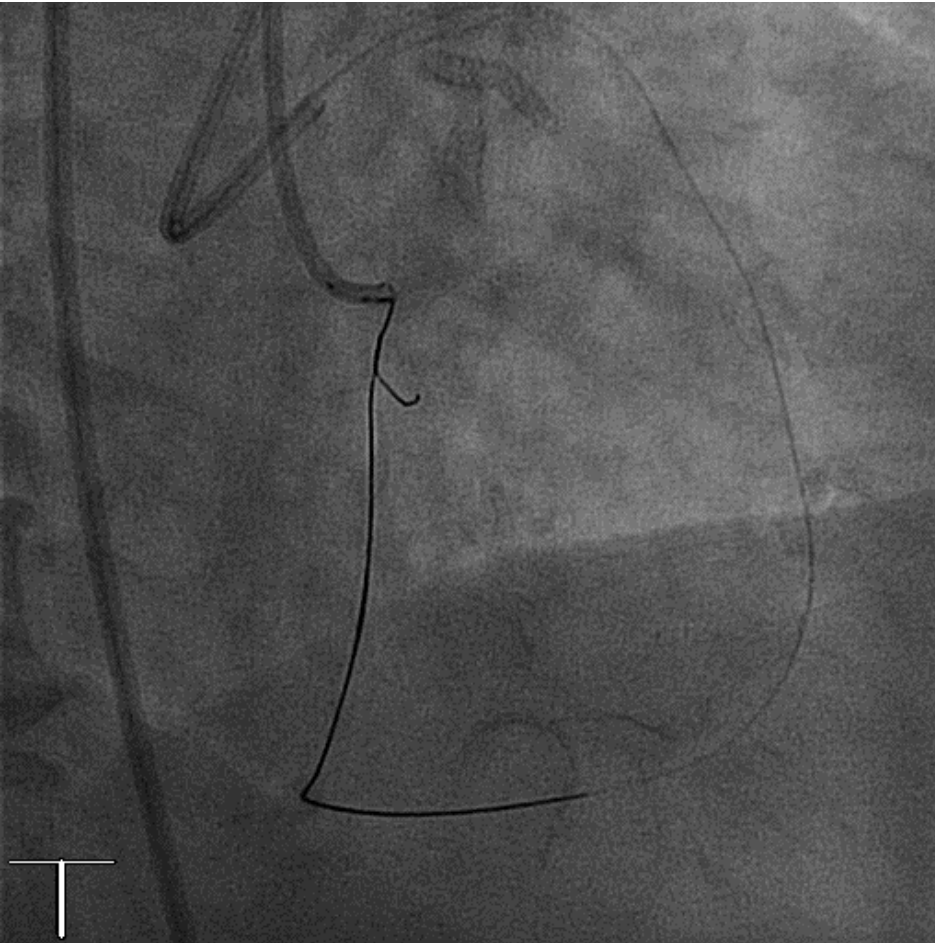


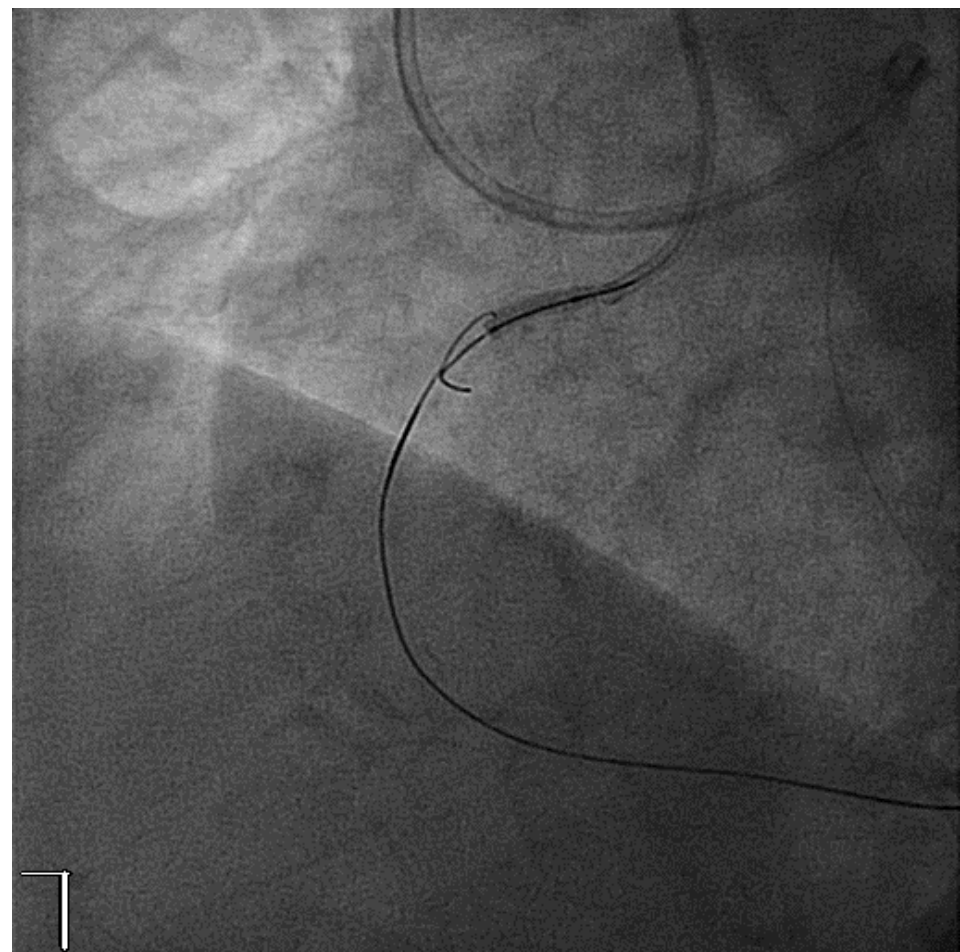
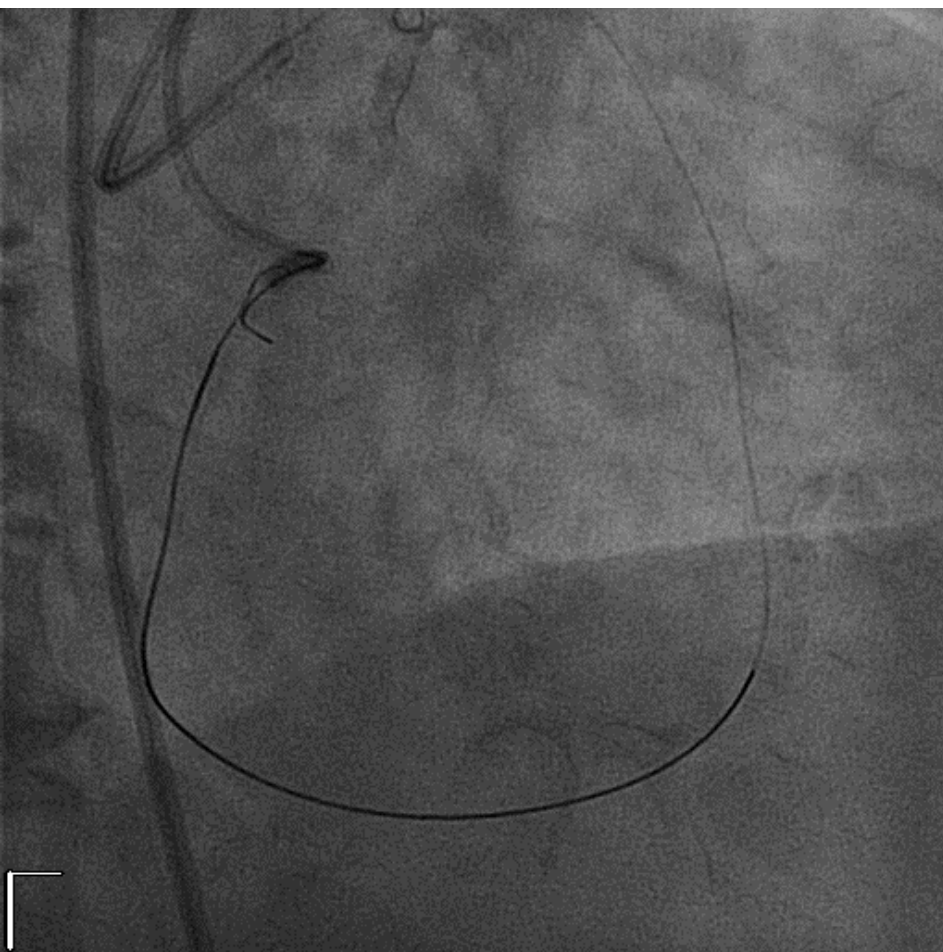
Antegrade: XT-A
Retrograde: UB3

Wiring to pRCA with UB3 but failed

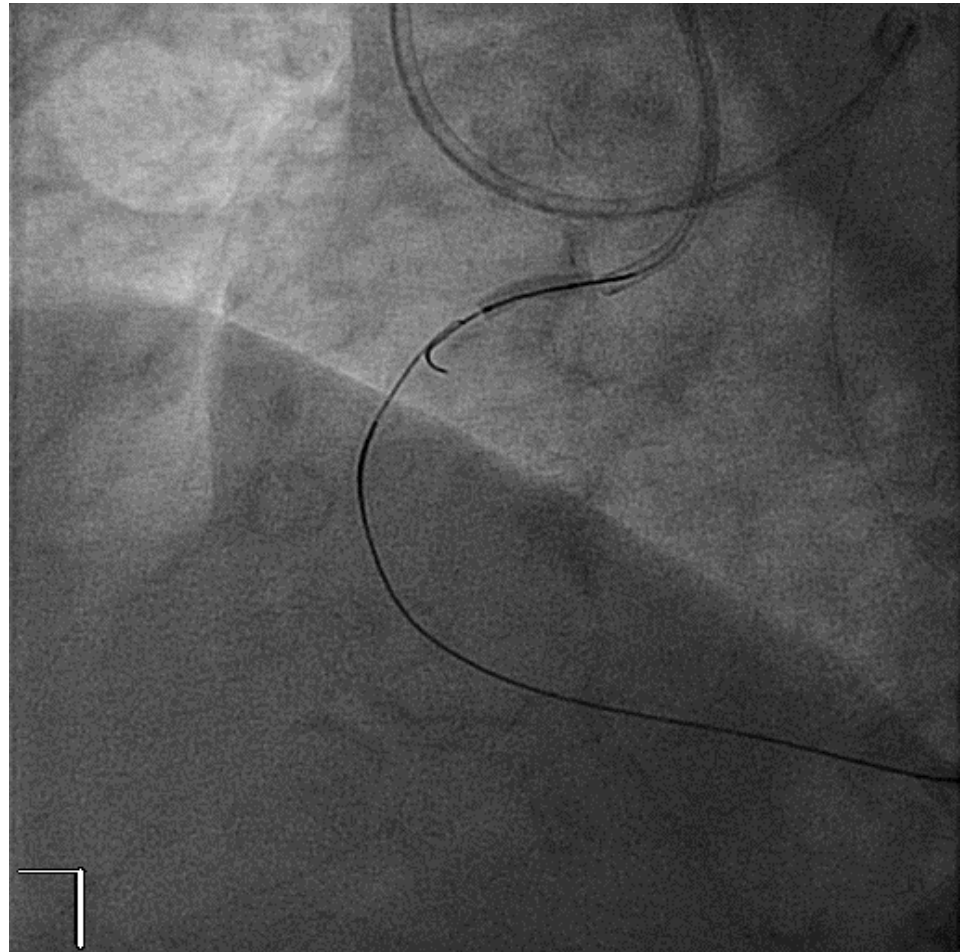
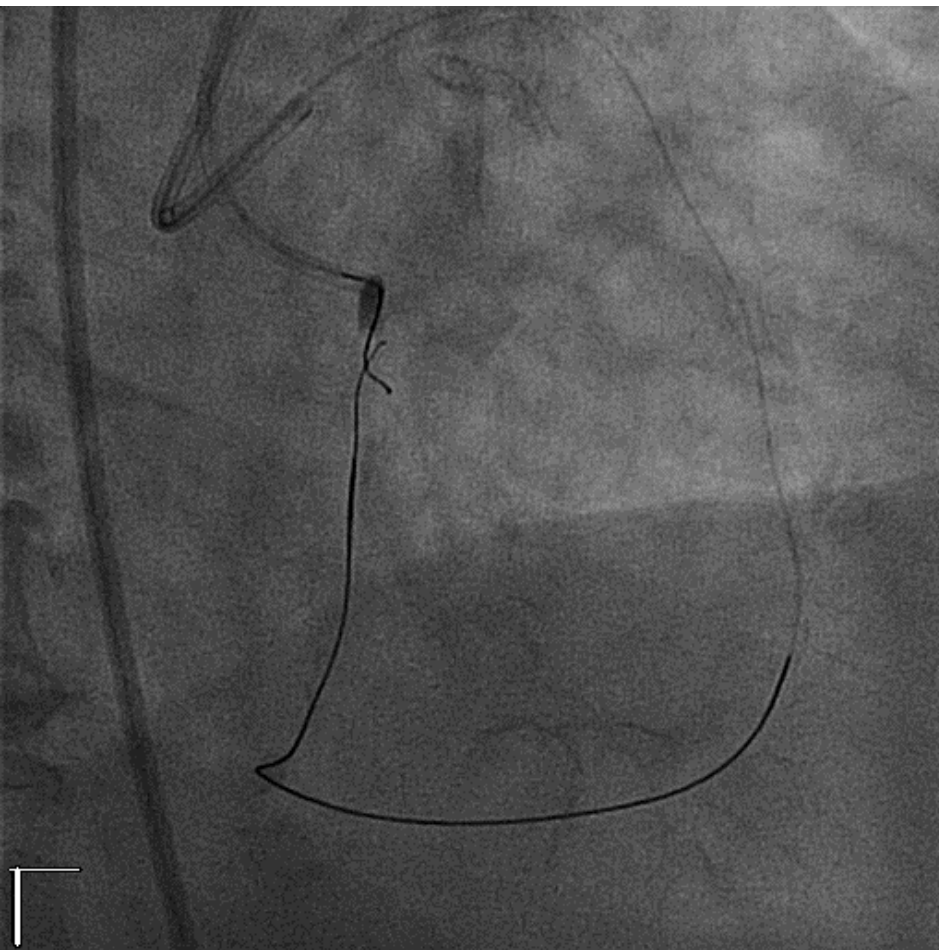


Setup the scene for reverse CART

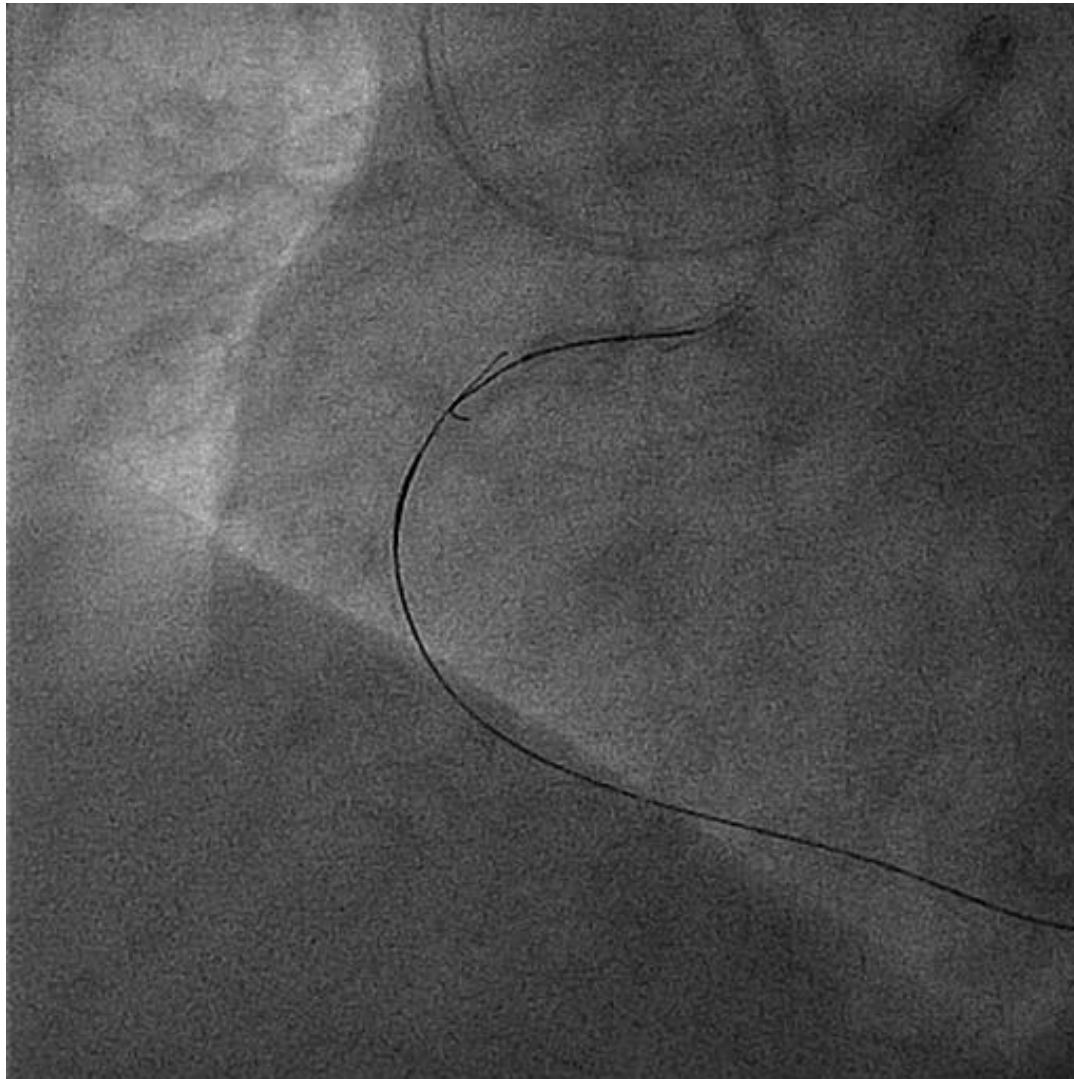




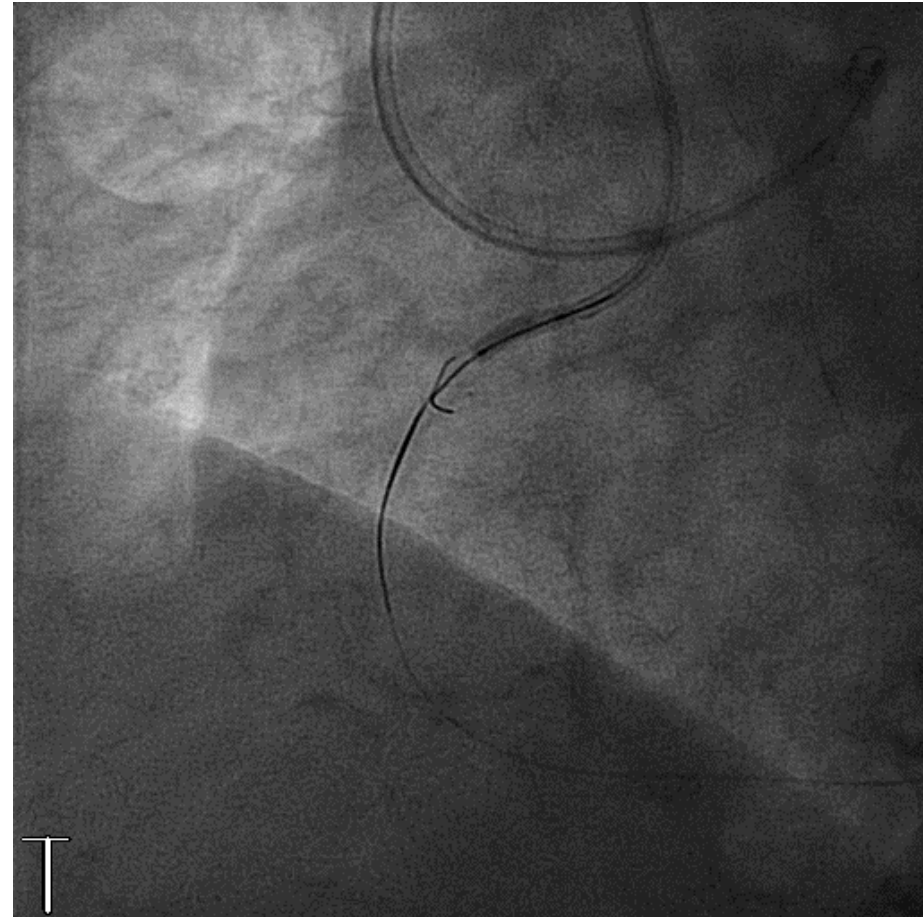
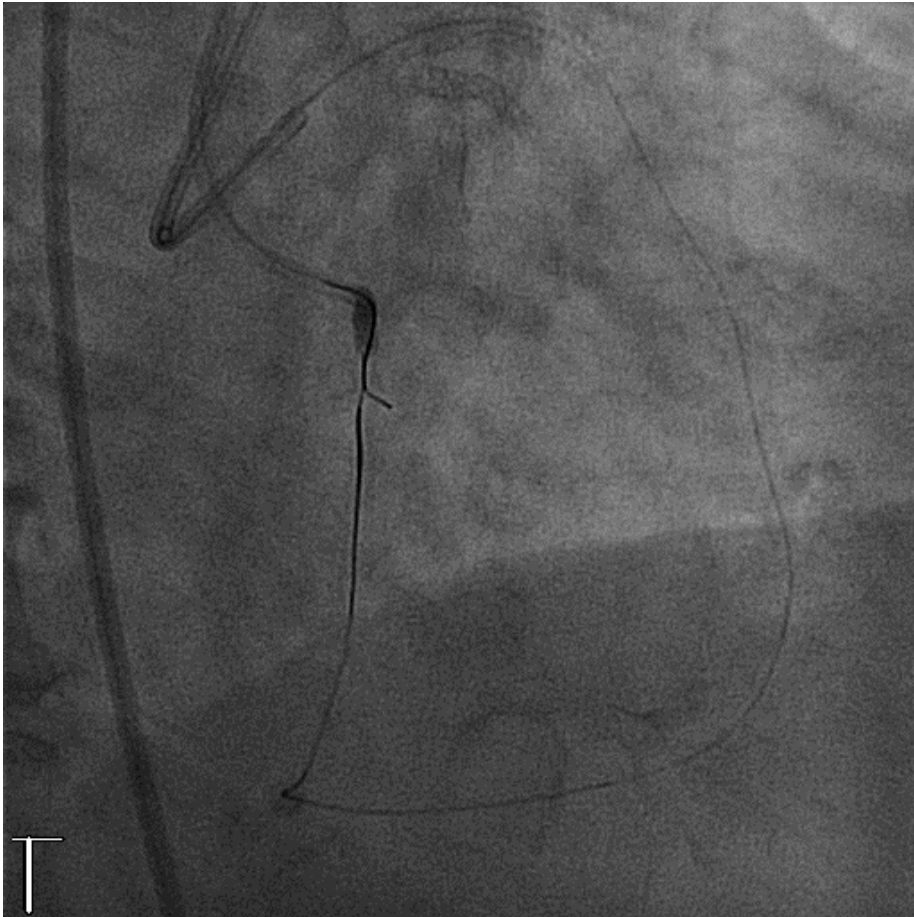
Retrograde: Gaia 2nd



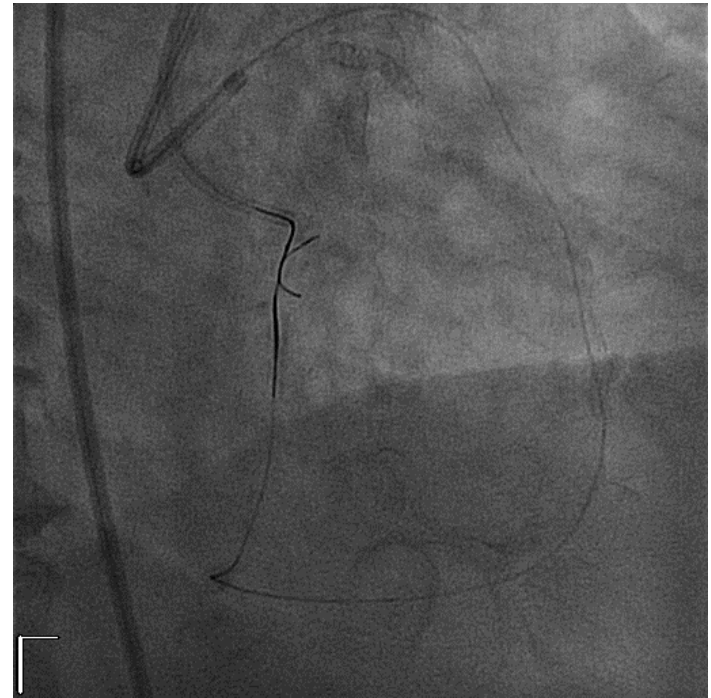
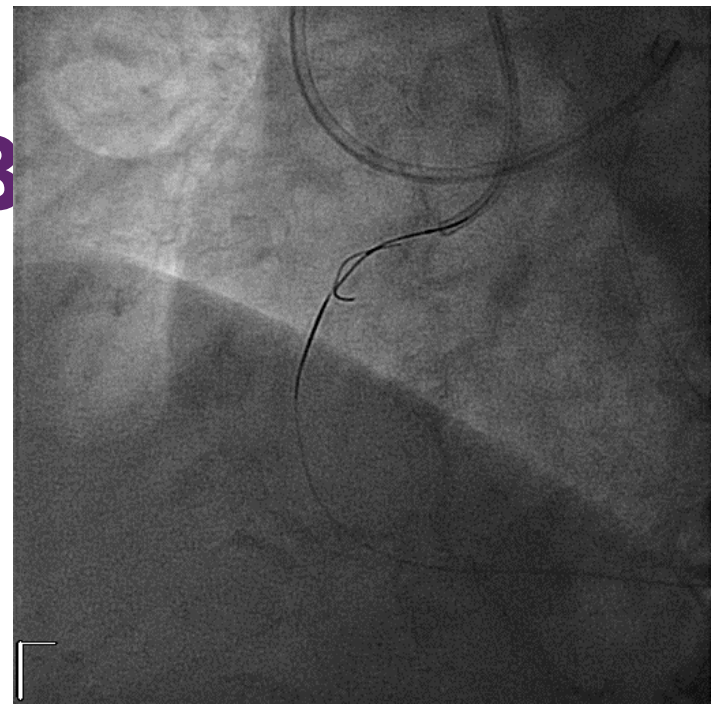
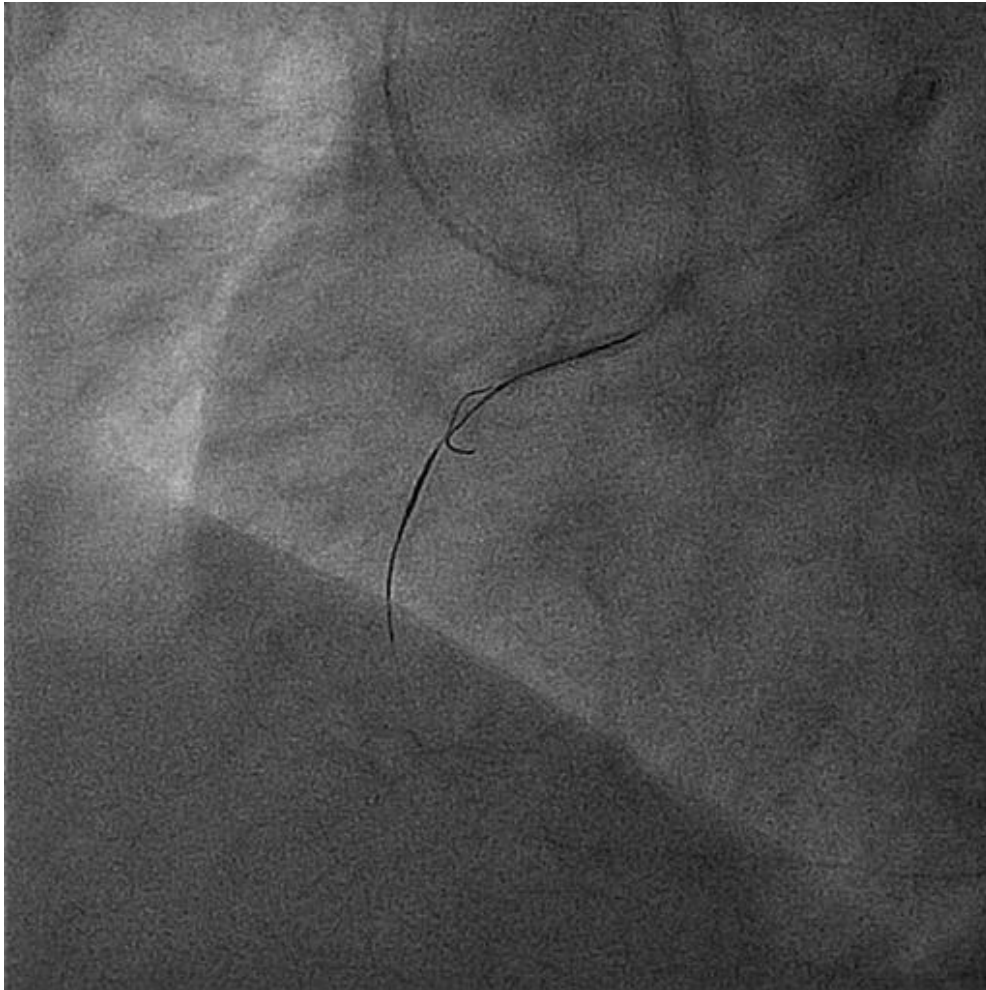
EBW



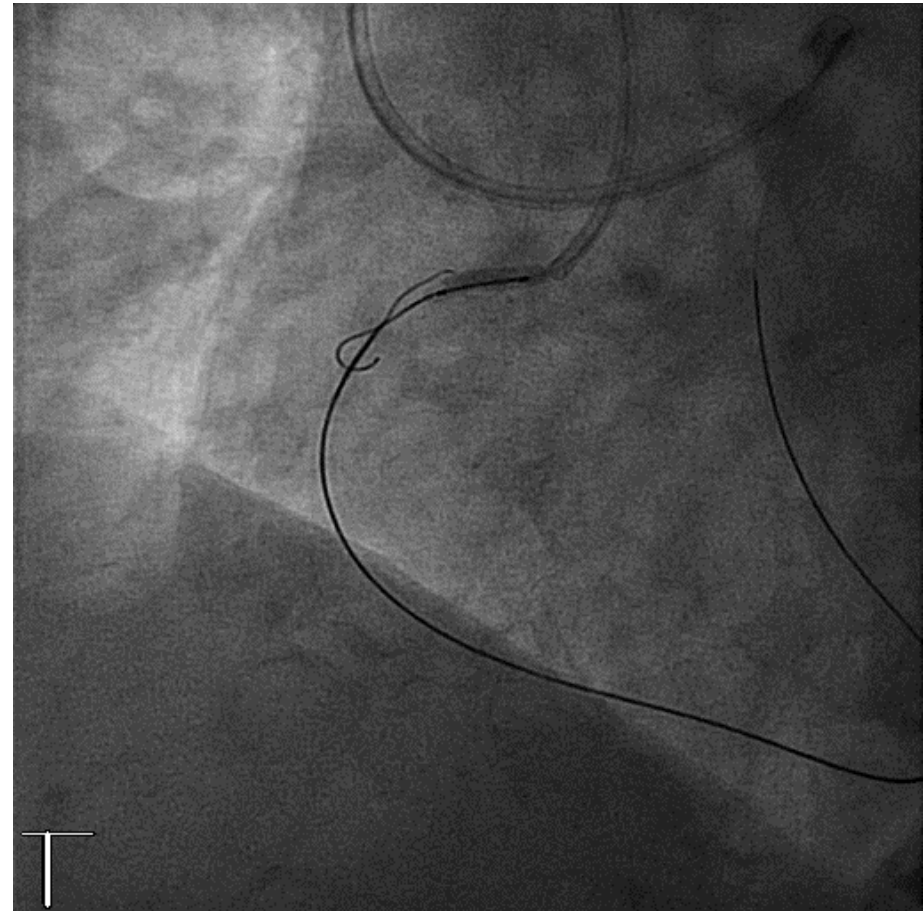
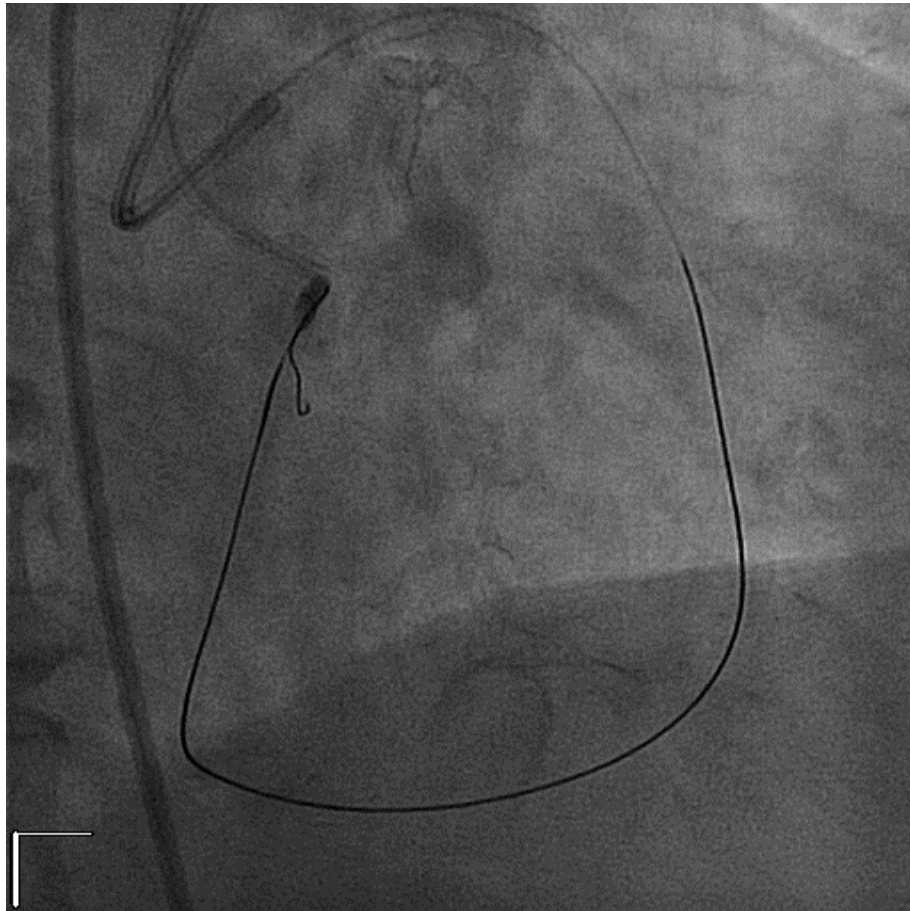
Another EBW but failed

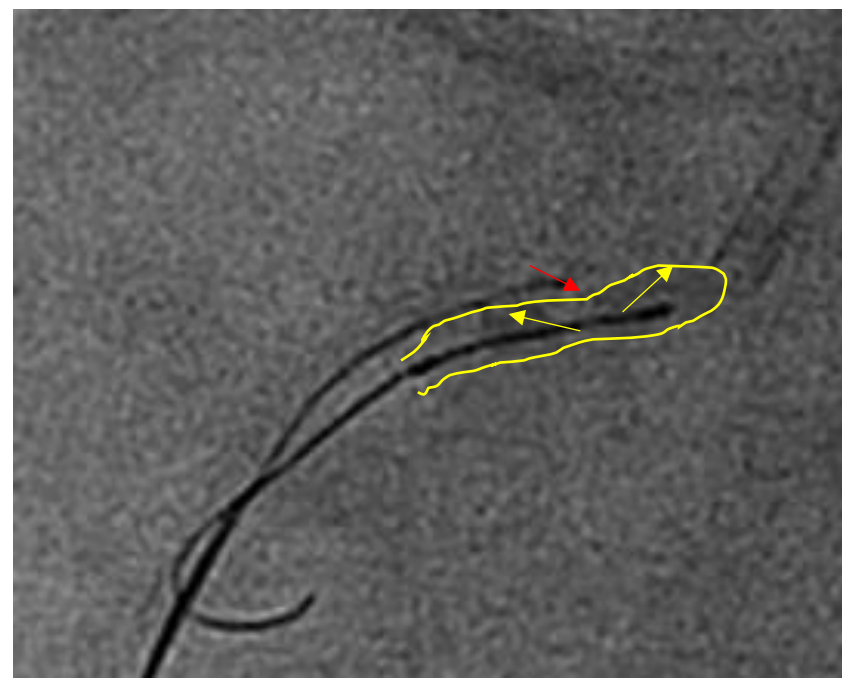
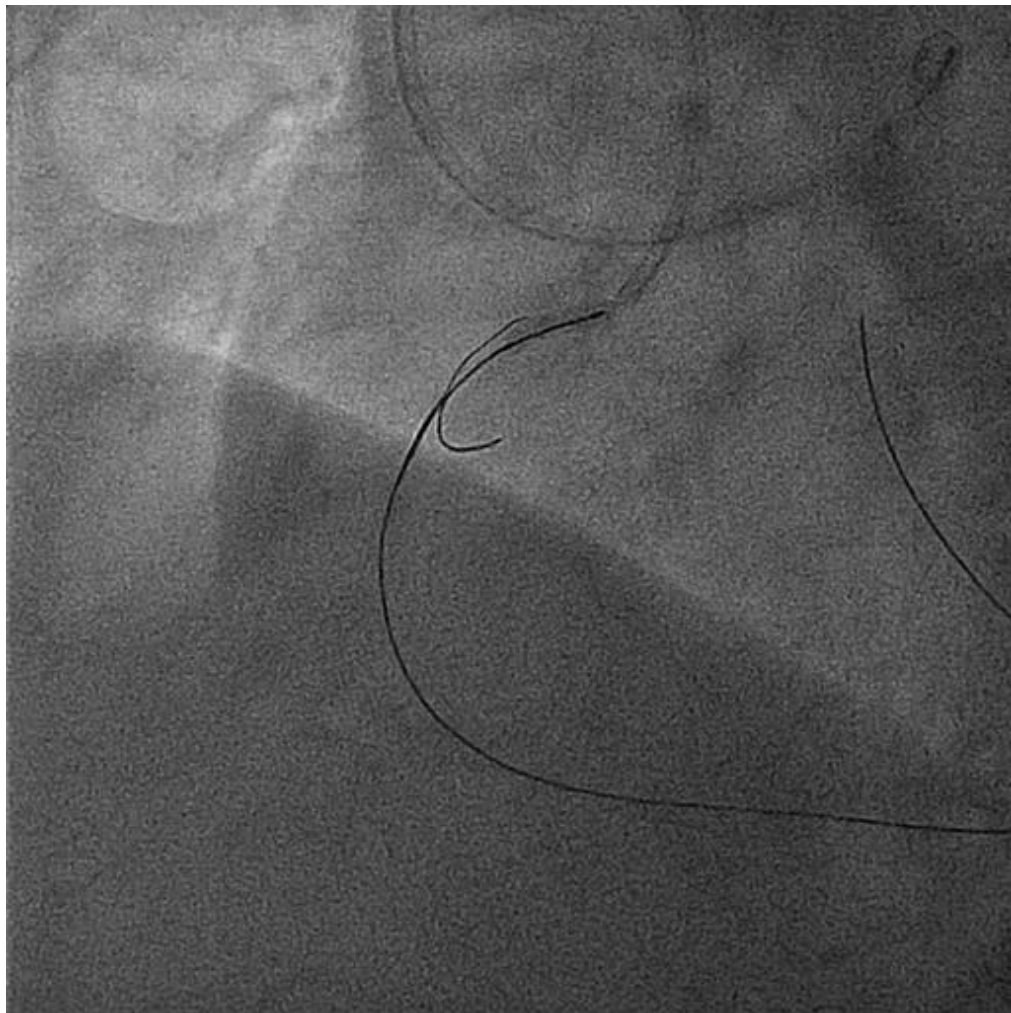


Another EBW : Sion B

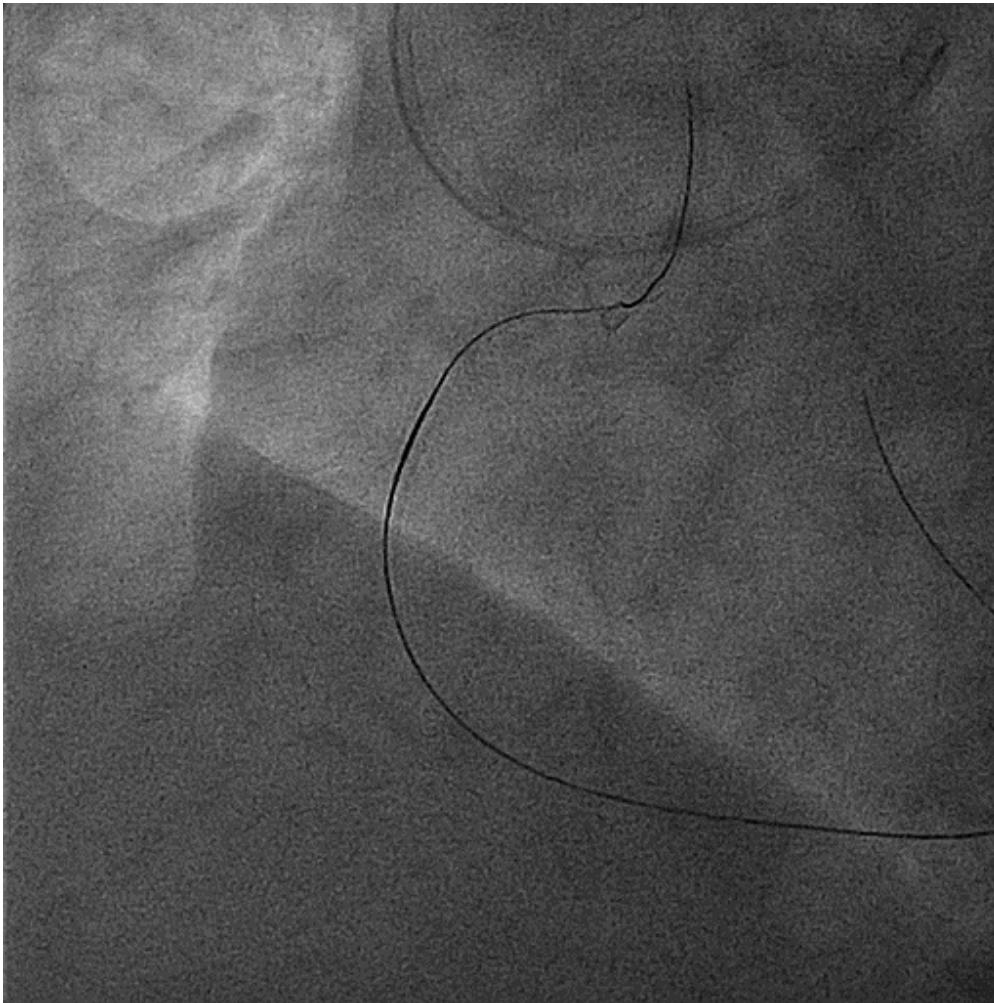


Reverse CART at side Balloon wiring

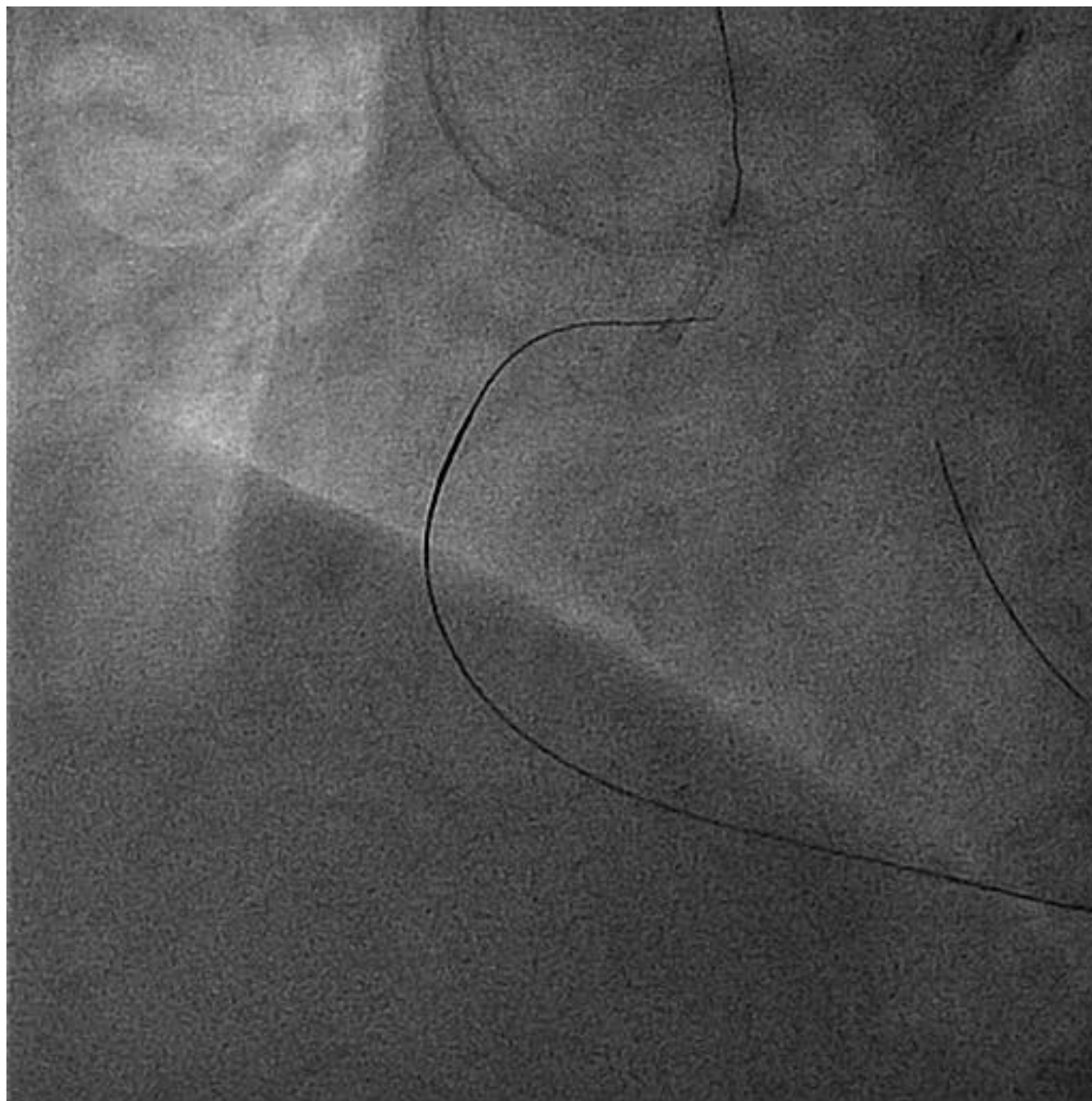




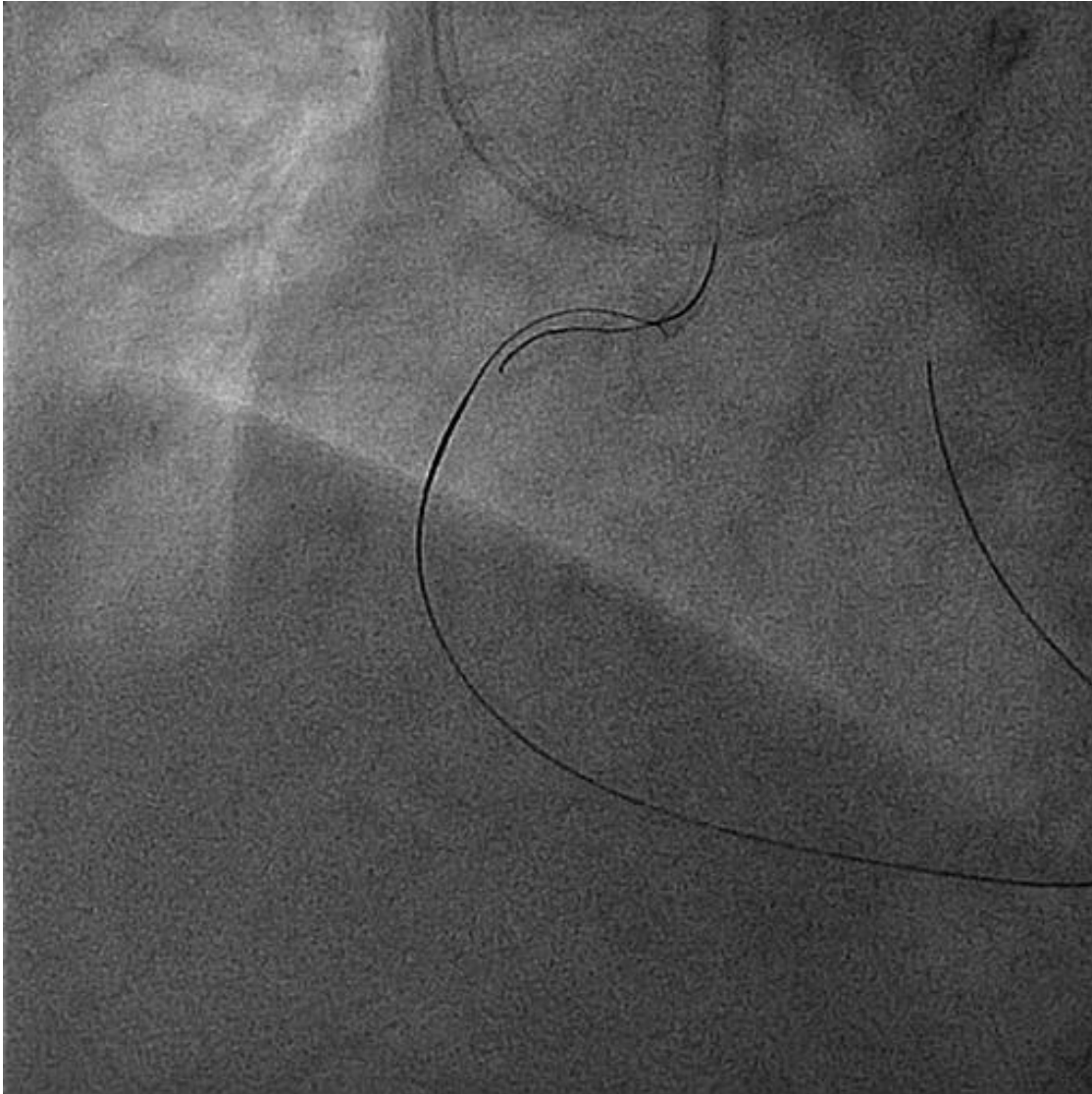
Is Wire in Aorta!?



Antegrade IVUS

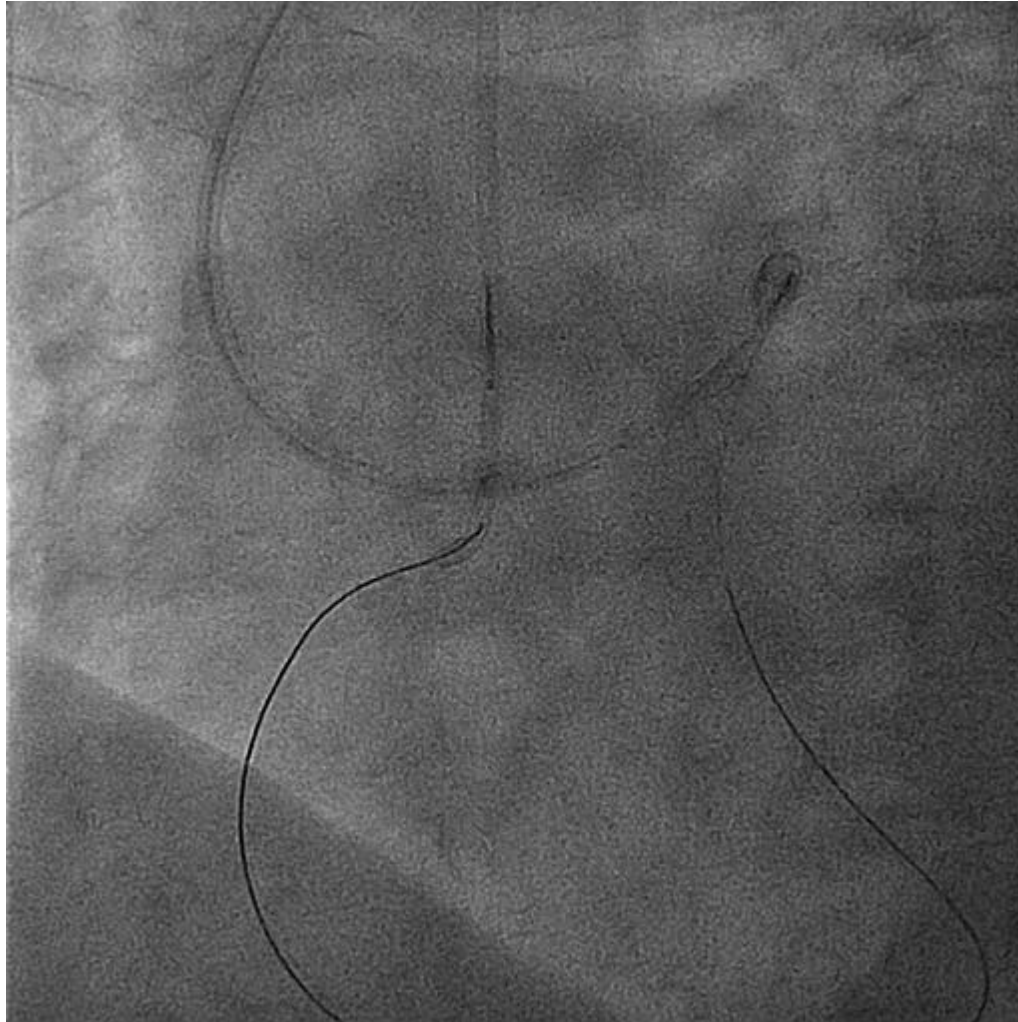


Change to JR4.0 guide

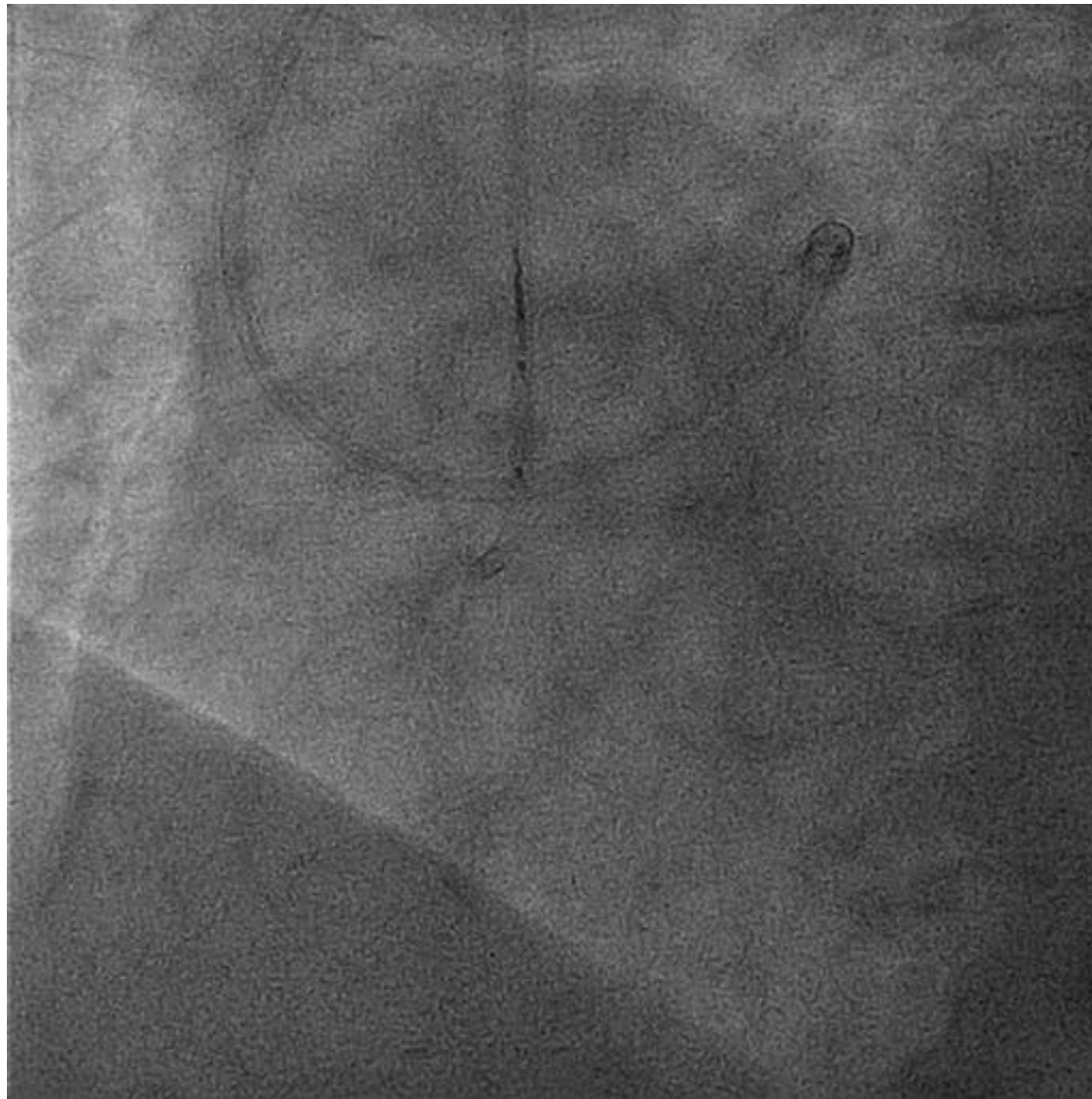


- Retrograde : Conquest Pro, Antegrade: Sion blue
- Move the guide at the position above the wire On RAO and LAO view
- Turn the conquest pro upward and wire the guide

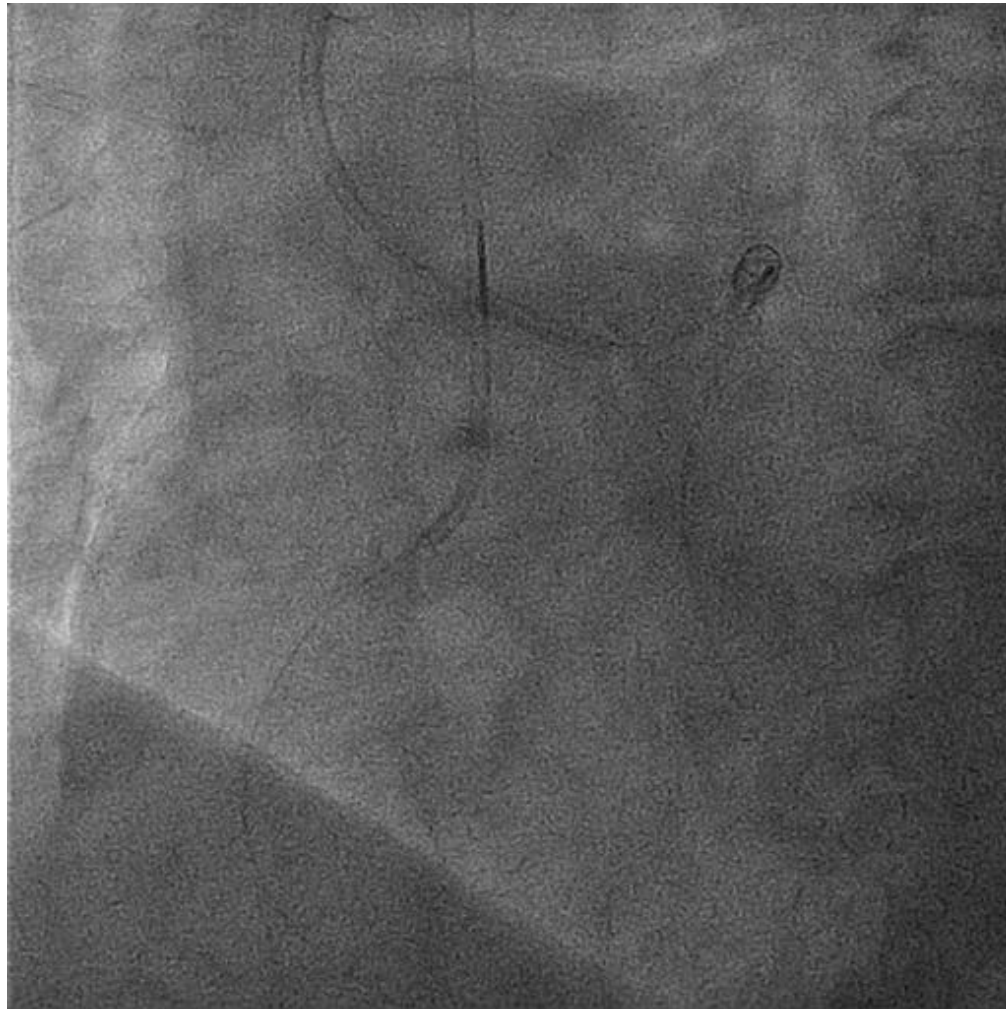
Advance the retrograde Crosair beyond the trapping balloon



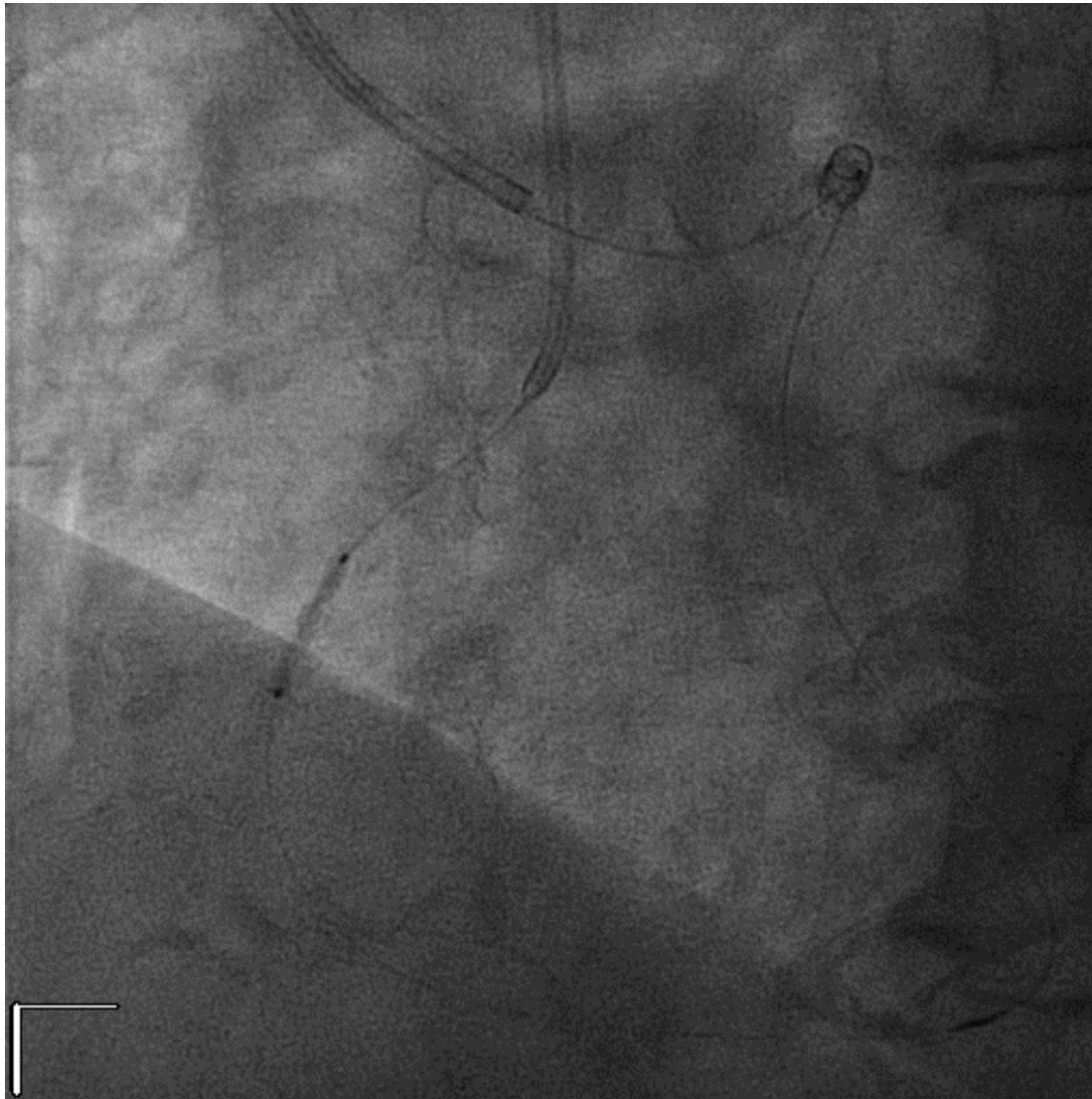
Exchange to RG3



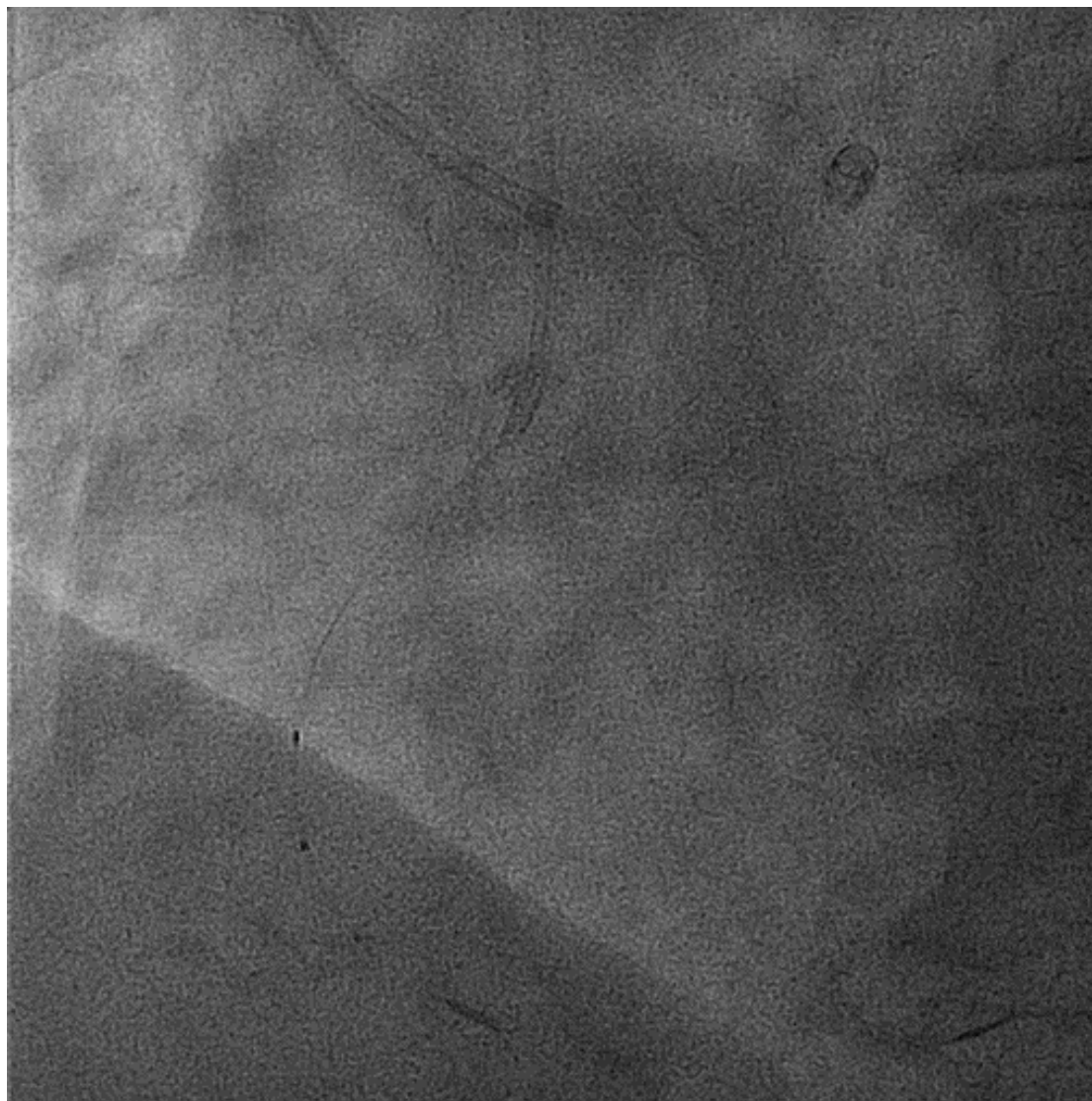
Disengage retrograde guide and pulled back the retrograde crosair



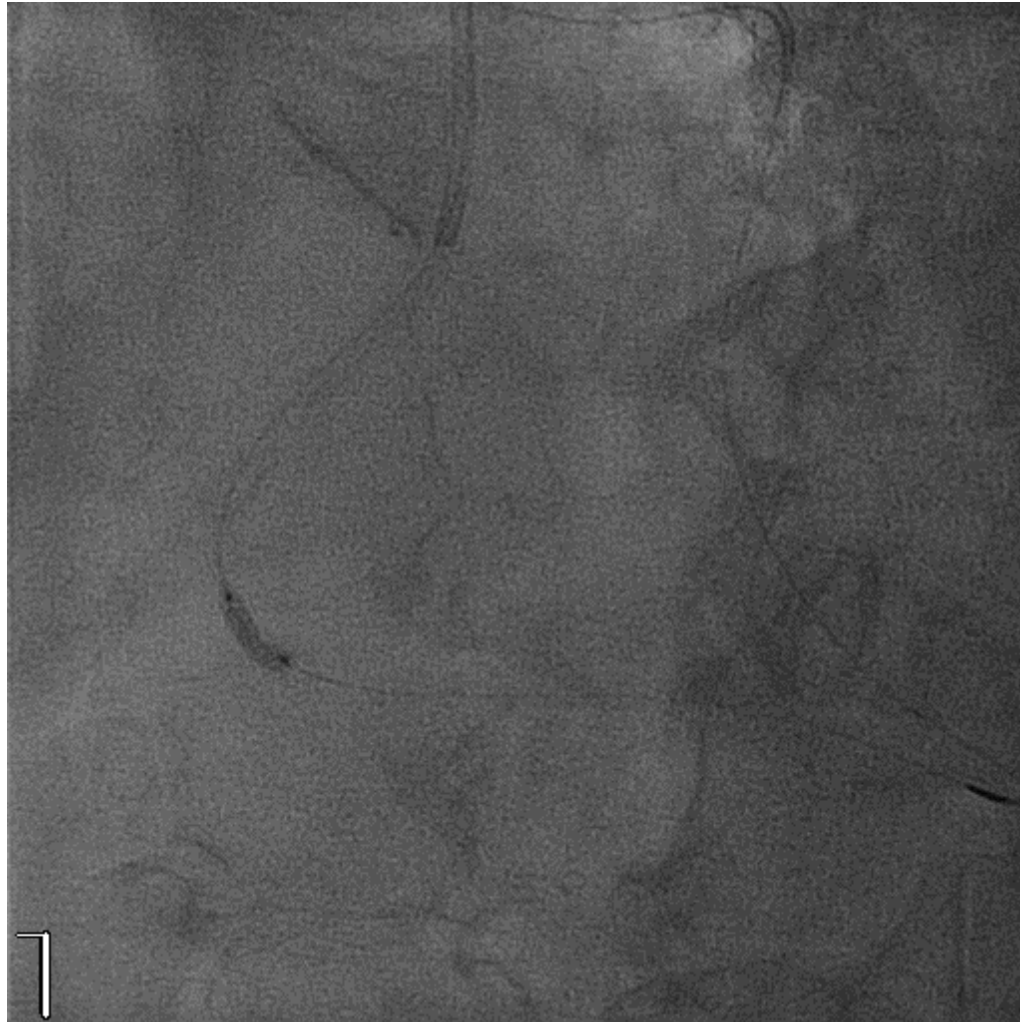
1.0mm balloon, 2.0mm balloon



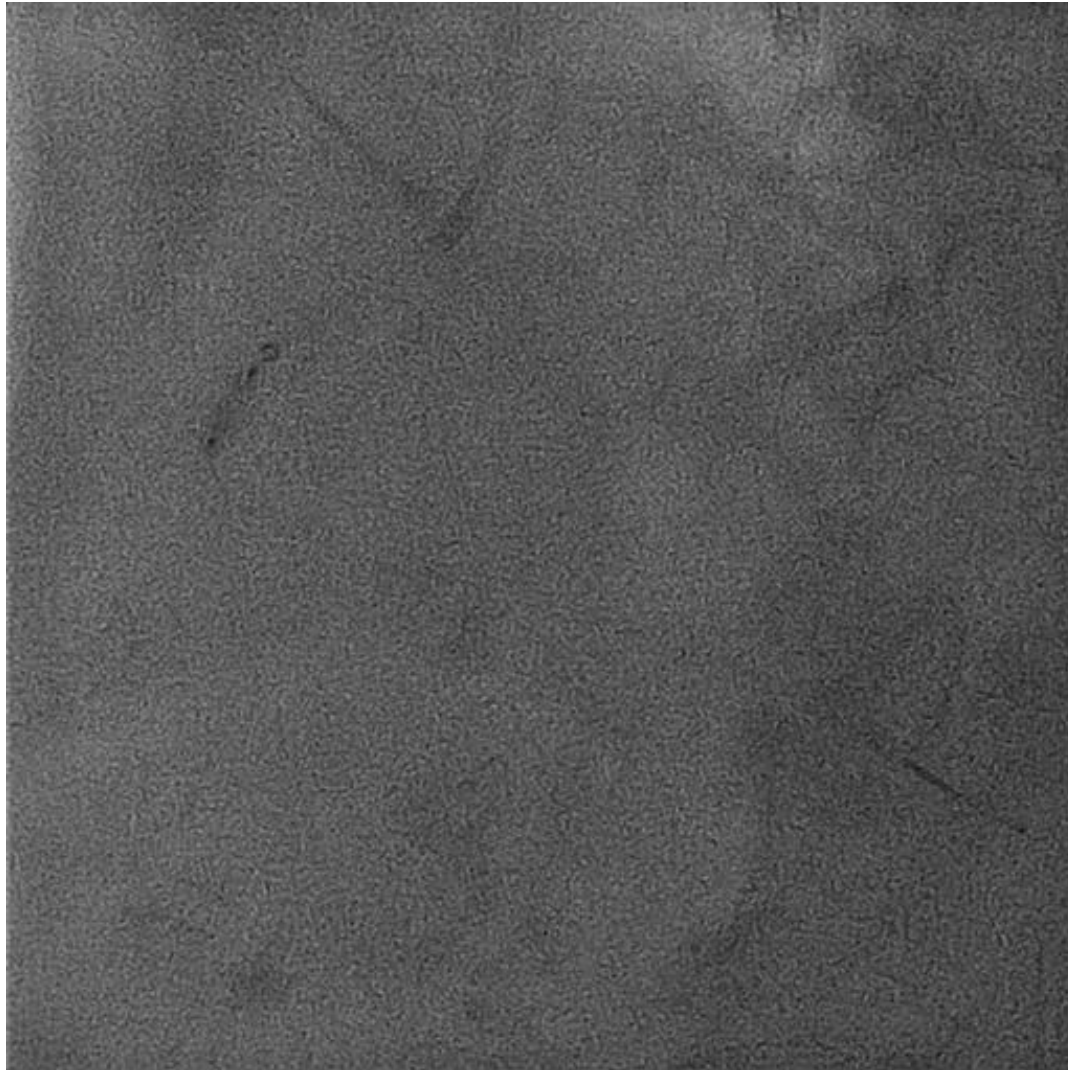
IVUS



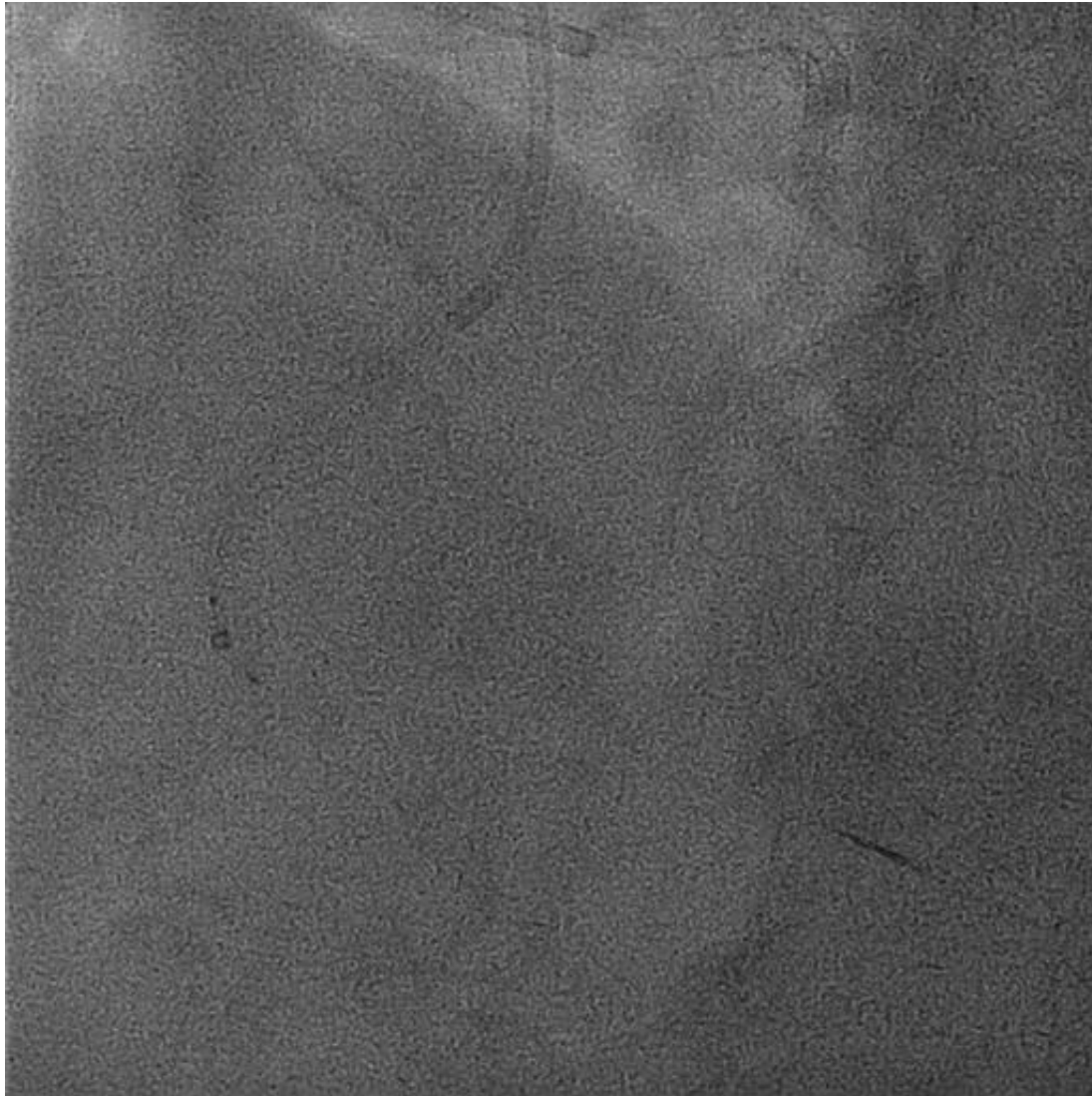
Dilated whole p-dRCA with NC 2.5mm balloon @ 16 atm



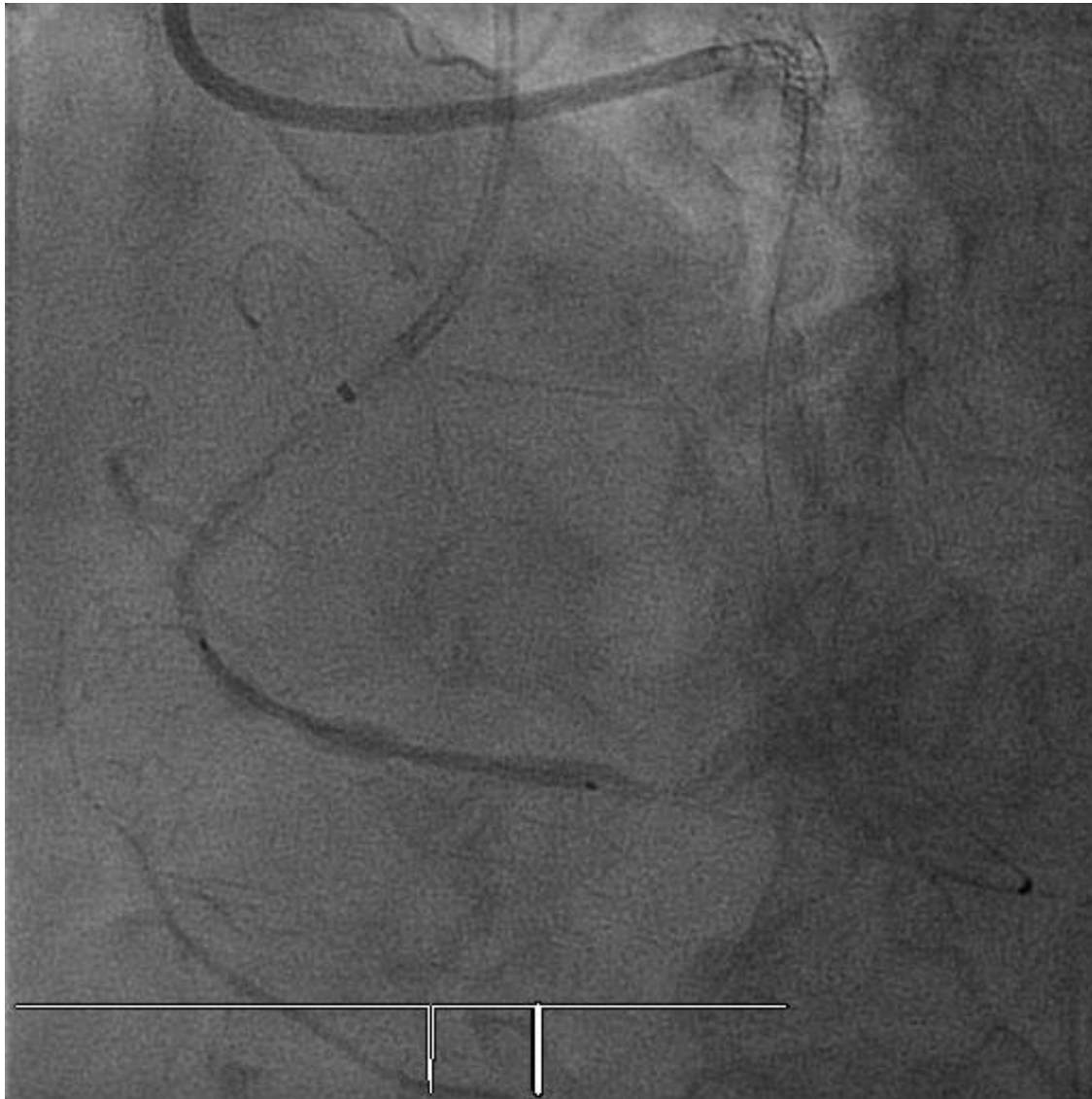
Stent didn't go in beyond mRCA, and guideliner didn't go with distal anchoring balloon technique



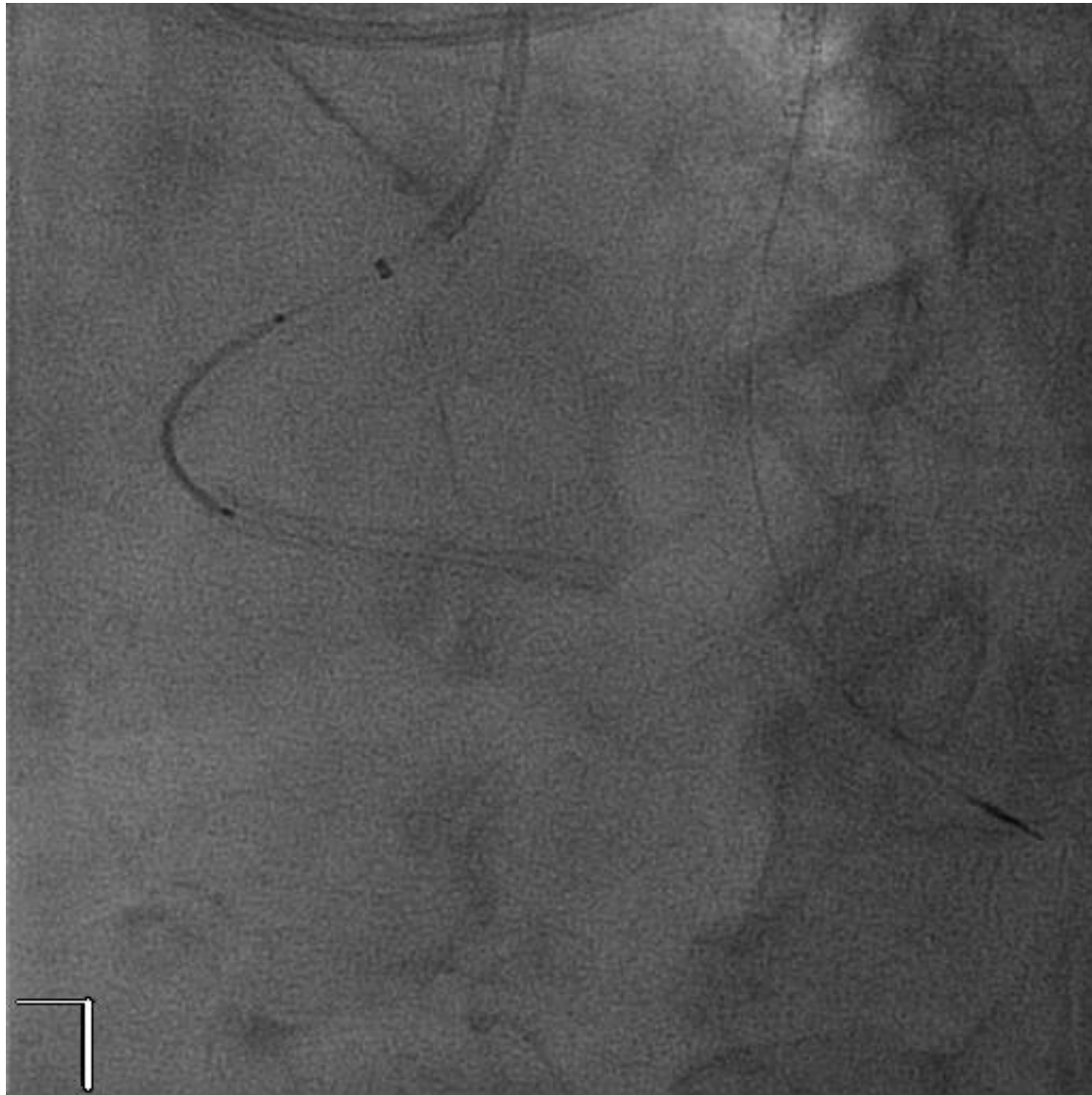
Sequential advancement



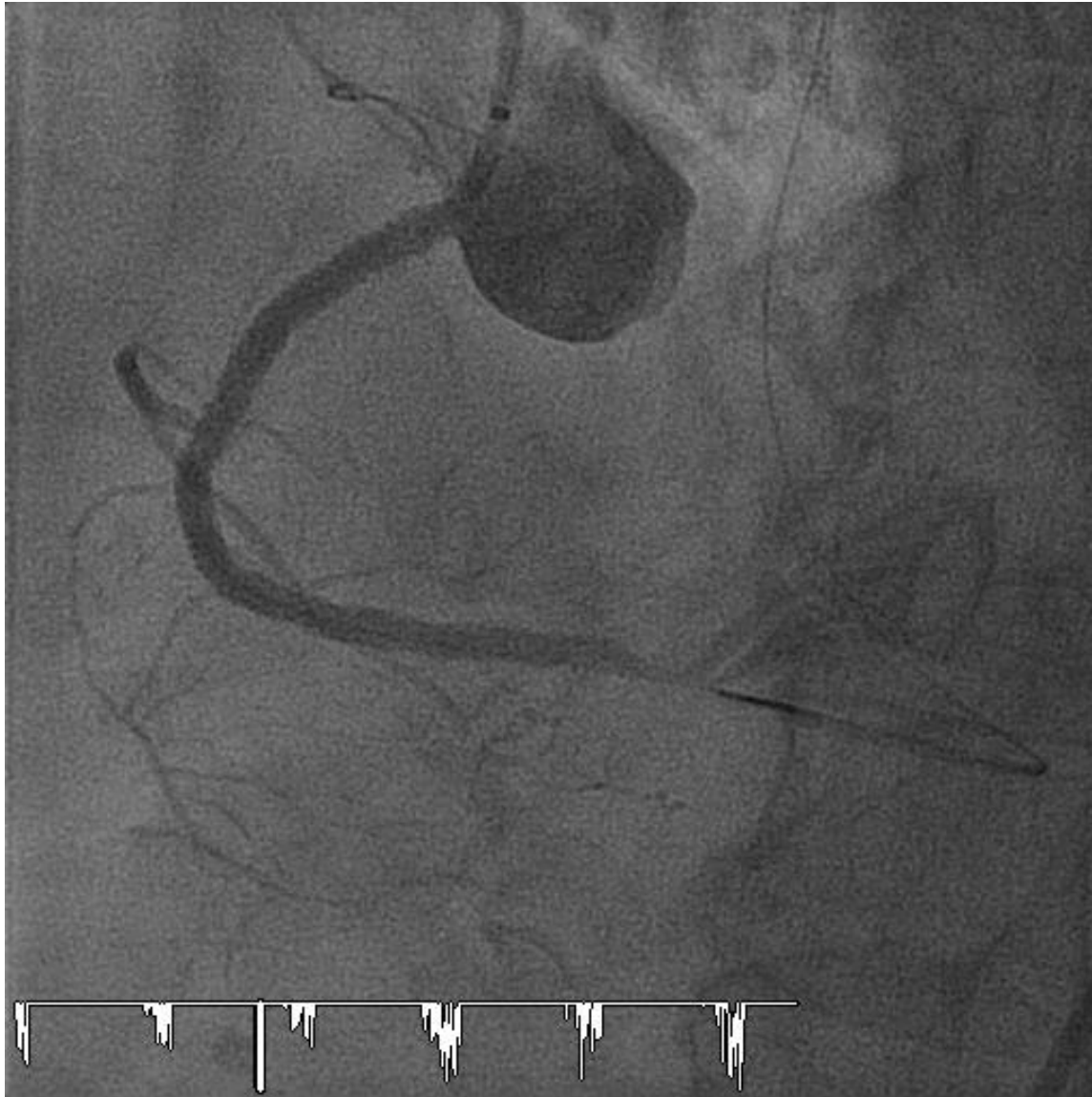
DES 2.5 x 38mm



DES 2.5 x 32mm



Post-stenting DES 3.0x24mm



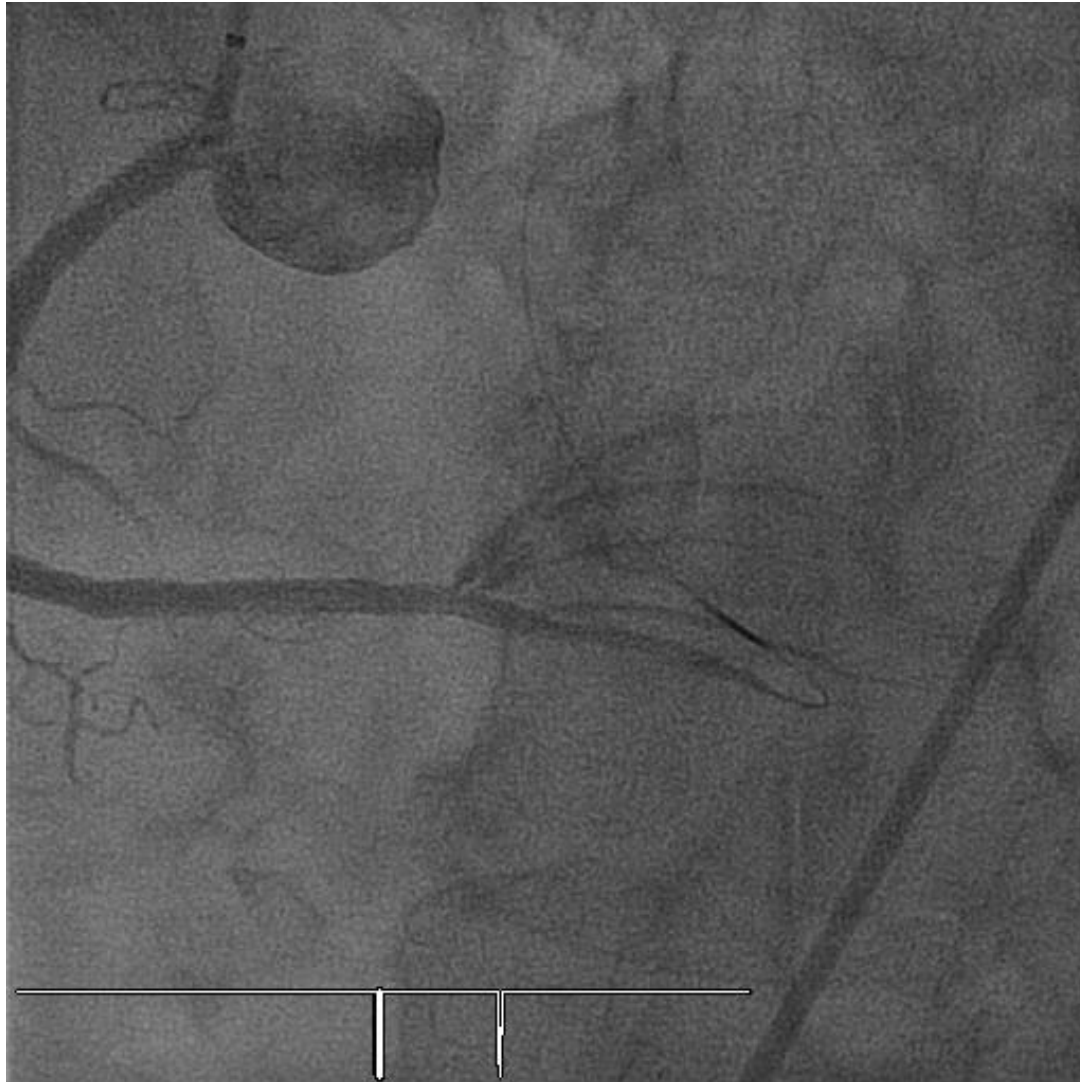
Pull back retrograde crossair



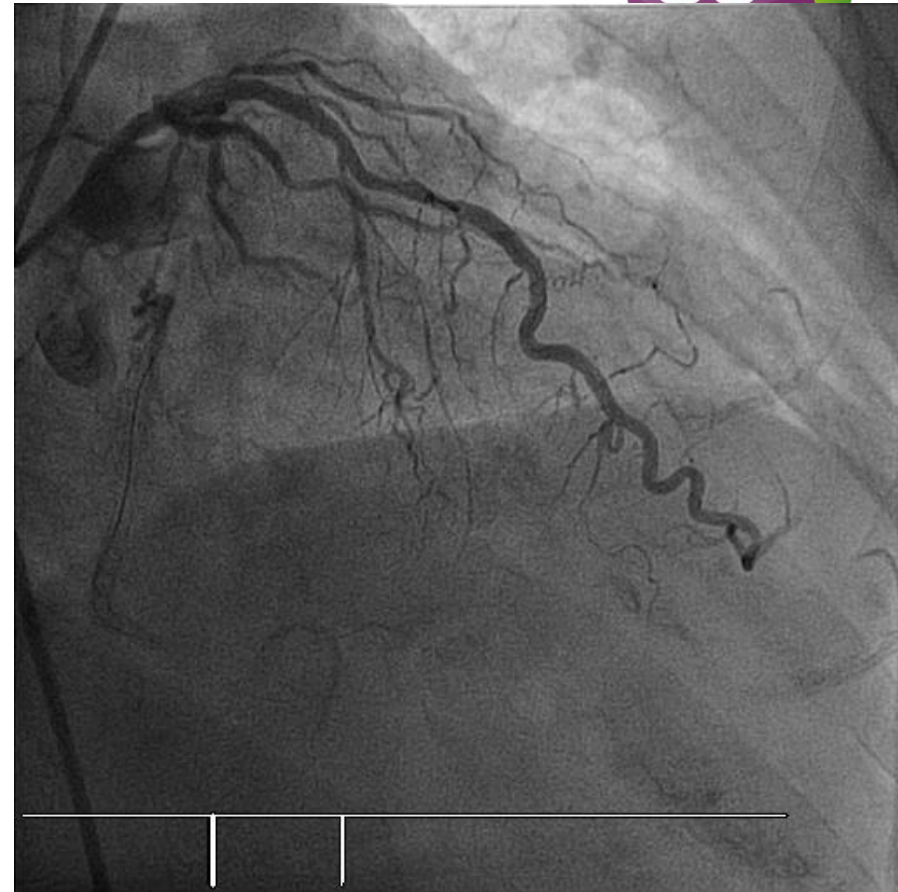
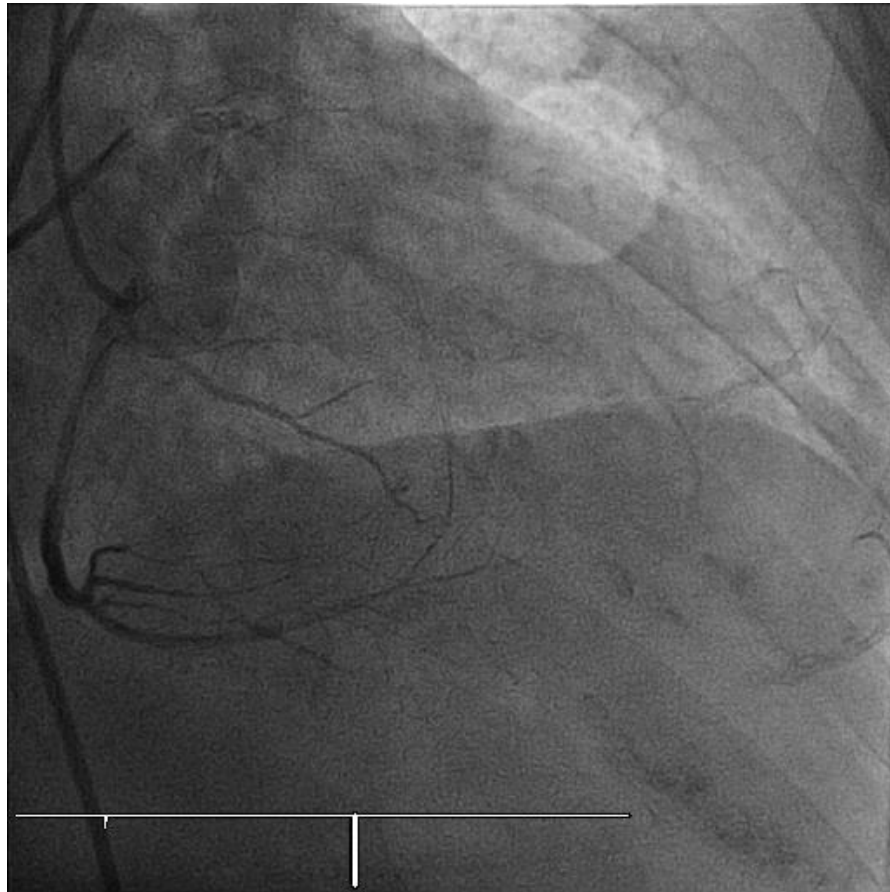
DES 2.5 x 20mm



Post-stenting Angio

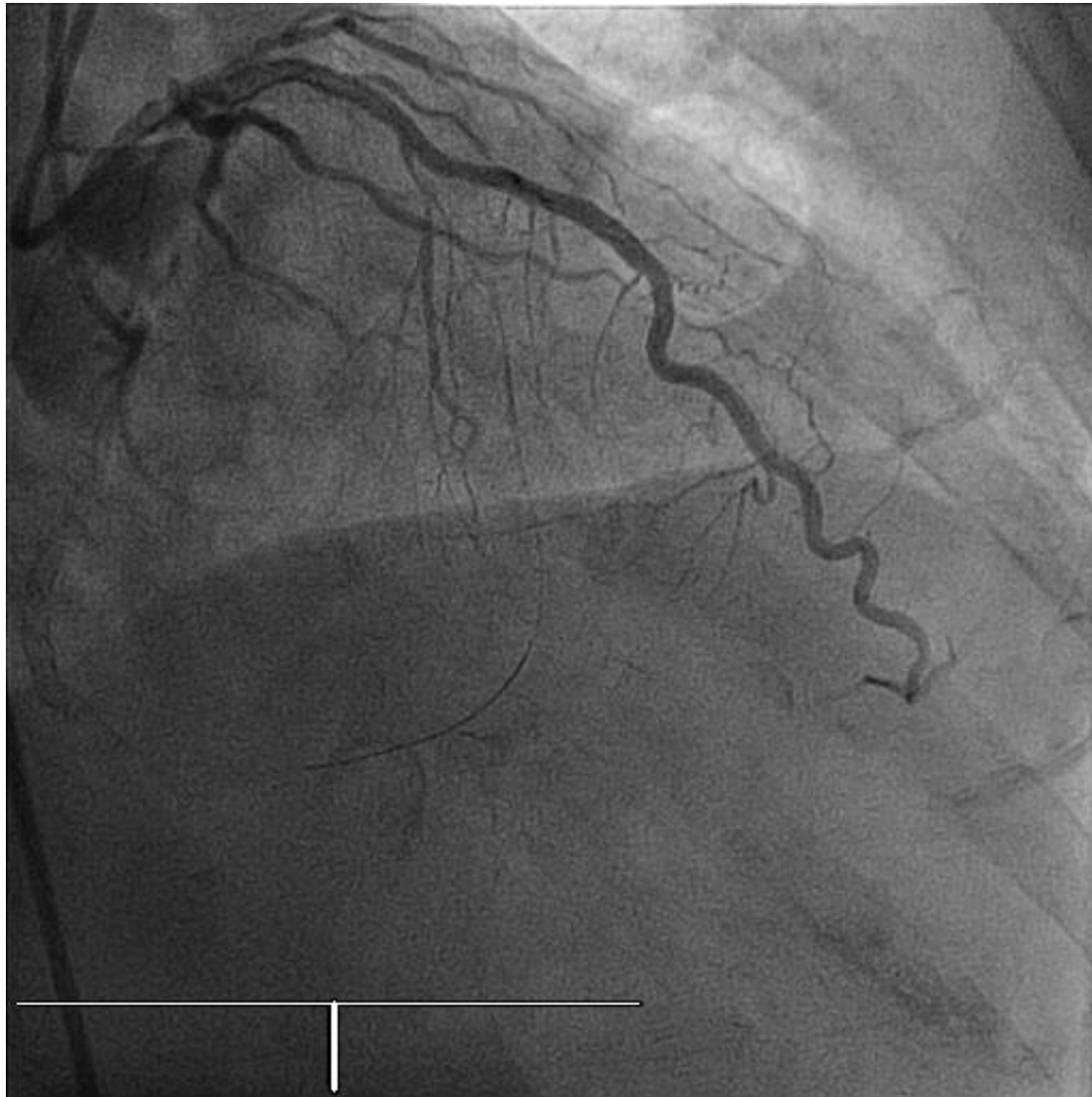


Check for Channel injury



1. Advance Crosair to antegrade guide
2. Pull back the RG3 wire into antegrade guiding tip
3. Pull back Crosair to LAD

Pull back the RG3 into PDA



Final Angio



Clinical FU



- Patient remains asymptomatic and walk unaided NOW

So....



- 1. CHIP is an expansion of case.
- 2. It is for indicated but conventionally untreated or undertreated cases.
- 3. Leaving lesions behind is associated with worse outcomes.
- 4. Leaving a CTO behind means that 1/3 patients will have a discordant ischemic territory treated.
- 5. We need to improve CTO PCI safety, efficacy, and efficiency to maximize the benefits of CHIP CTO PCI -> need for algorithms and detailed CTO teaching.