Intravascular Ultrasound Guided Controlled Retrograde Tracking After Failed Antegrade Dissection Re-Entry

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Disclosure

- I don’t have any potential conflicts of interest.

Patient history:

Male 70 y.o.

Clinical symptoms: stable angina (CCS III, NYHA II)

Comorbidities: hypertension, dyslipidemia, family history

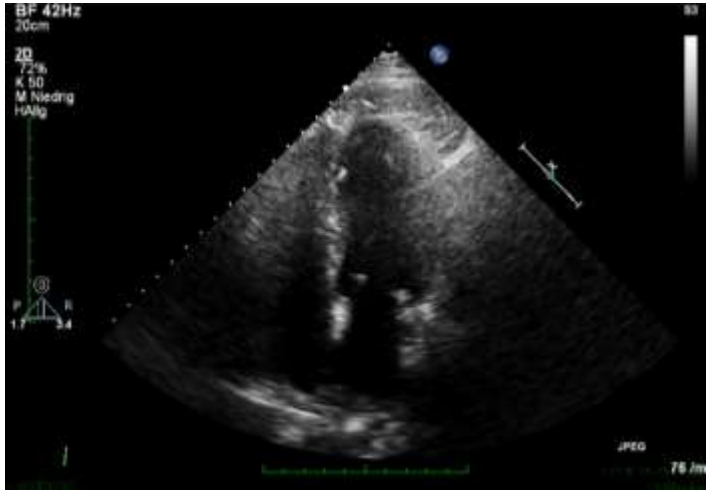
04/10/2021 patient underwent coronary angio – 2 vessel disease (RCA-CTO and significant LAD-stenosis)

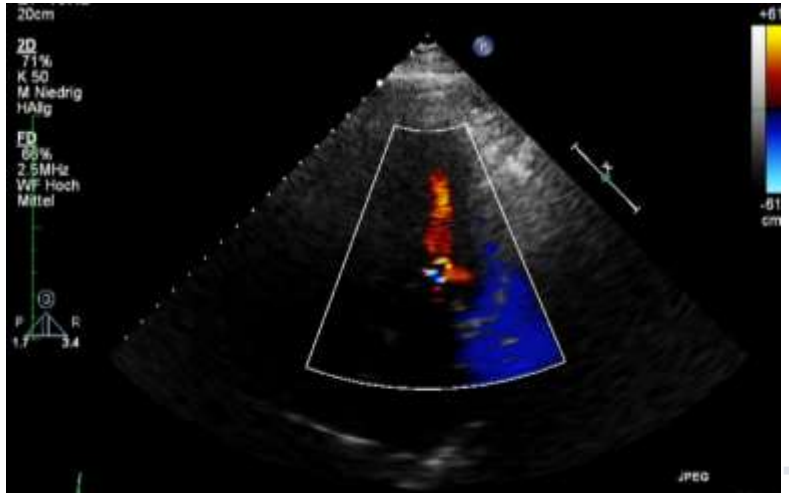
Recommendation for CABG, denied by the patient

03/11/2021 patient was referred to the university Heartcenter of Bad Krozingen for PCI.

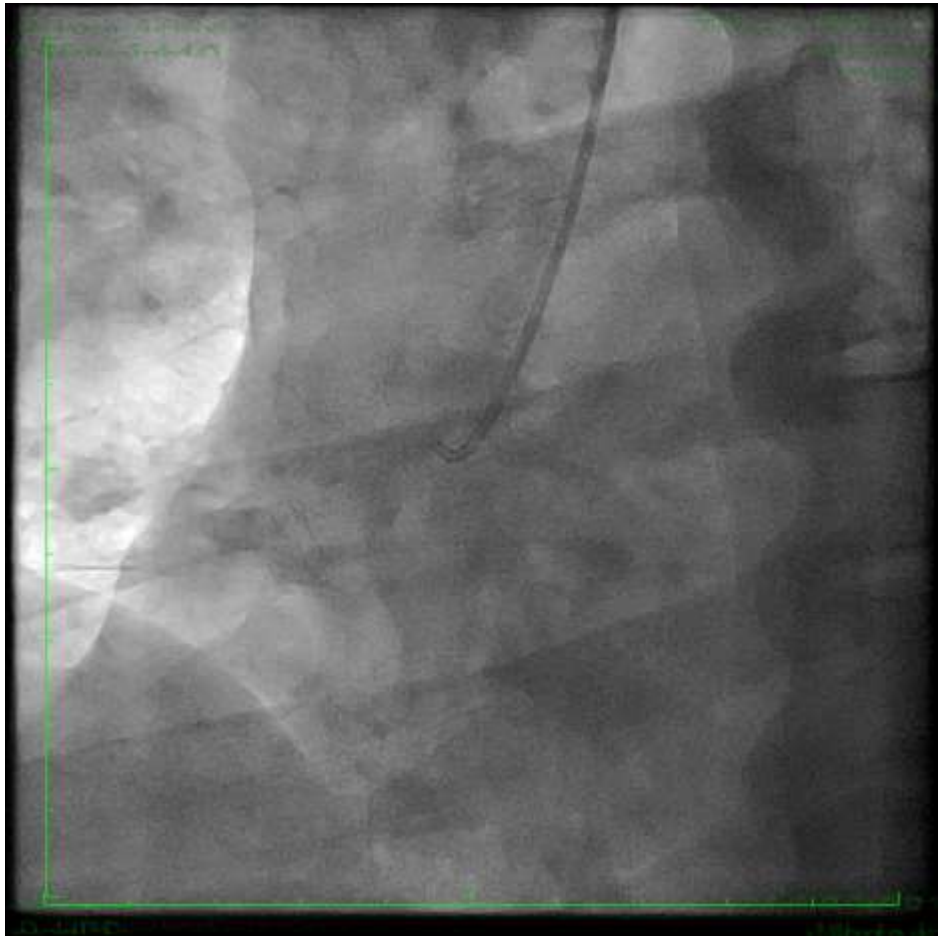
Examinations

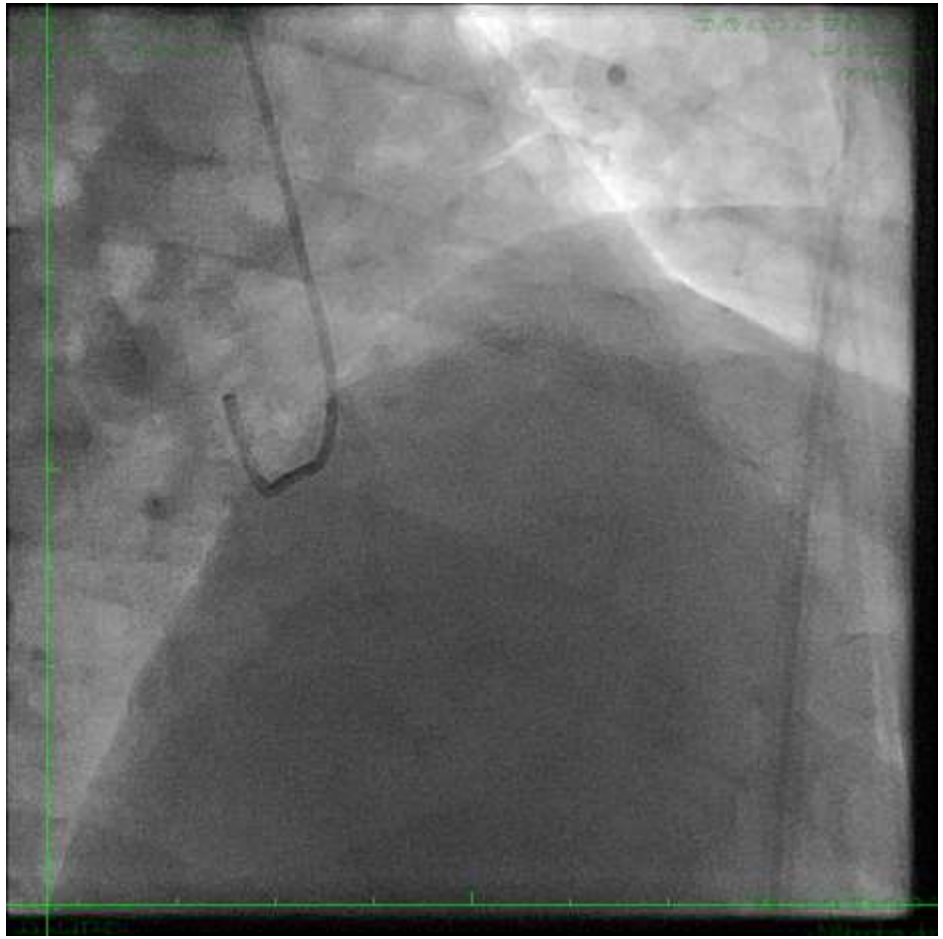
- Resting ECG: sinus rhythm, 88/min with normal conduction time, left-sided type with small Q in III, otherwise unremarkable spread of excitation and regression of excitation.
- Transthoracic echocardiography: left ventricle with normal size, normal function. Minor left ventricular hypertrophy (12/11 mm). Right ventricle normal size, normal function. The aortic valve is fibrotic, milde stenosis (maximum flow velocity 2.55 m/s, mean pressure gradient 13 mmHg, velocity coefficient 2.4), mild insufficiency, no pericardial effusion.



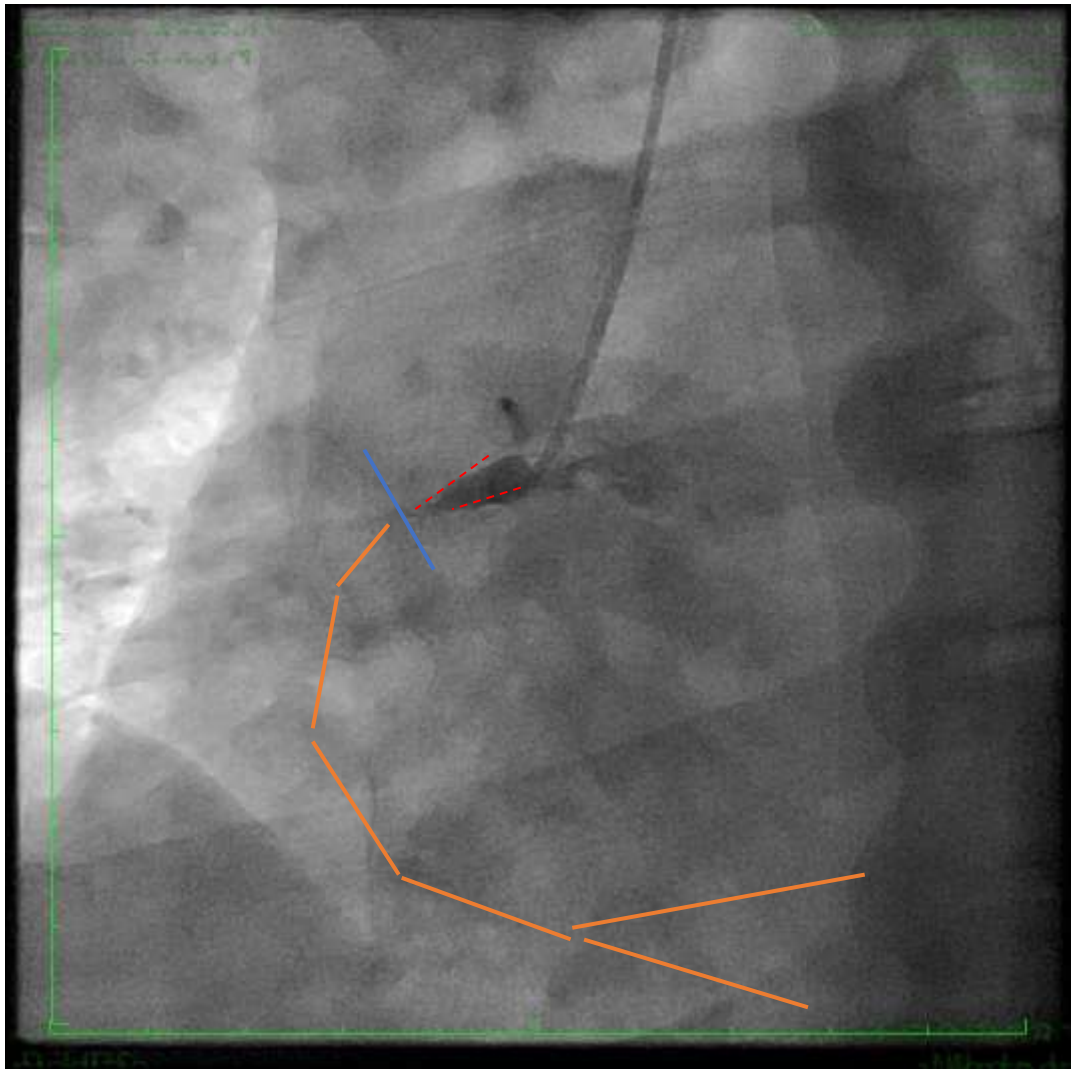


Coronary angio:

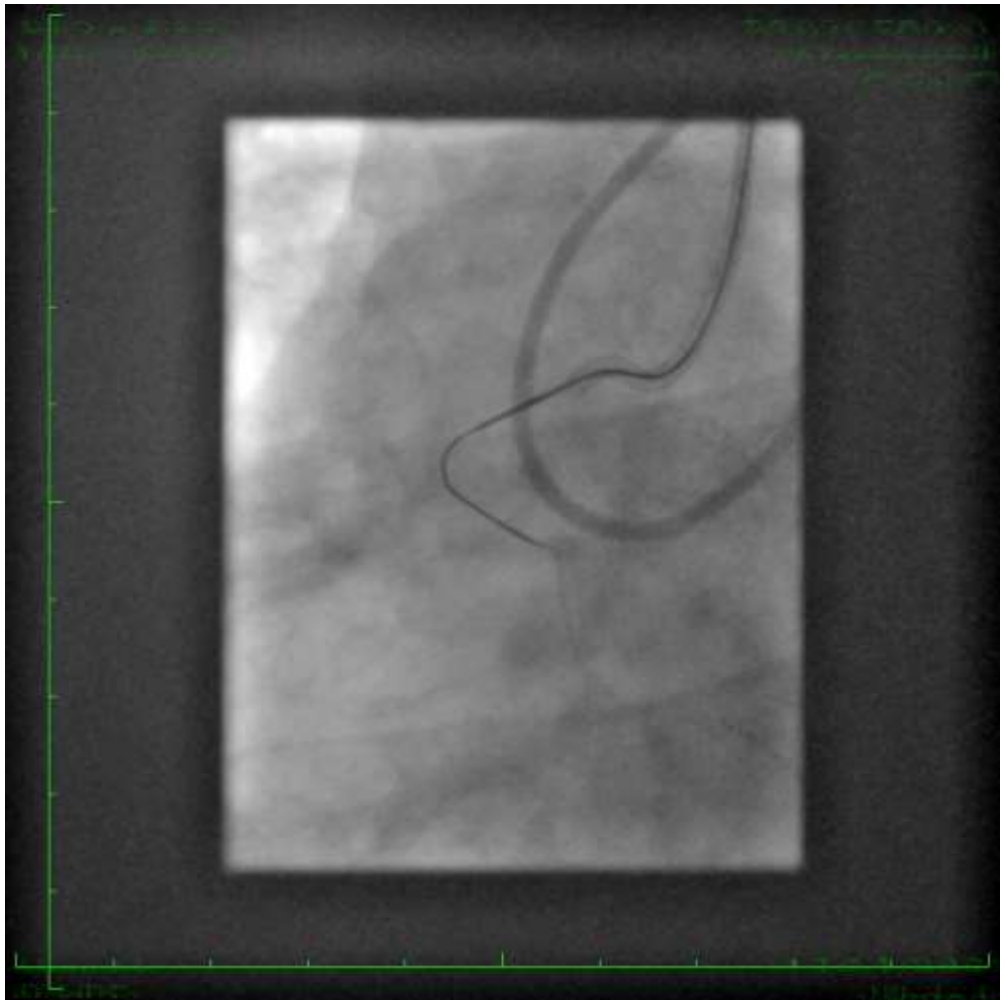




Supposed vessel anatomy of the RCA

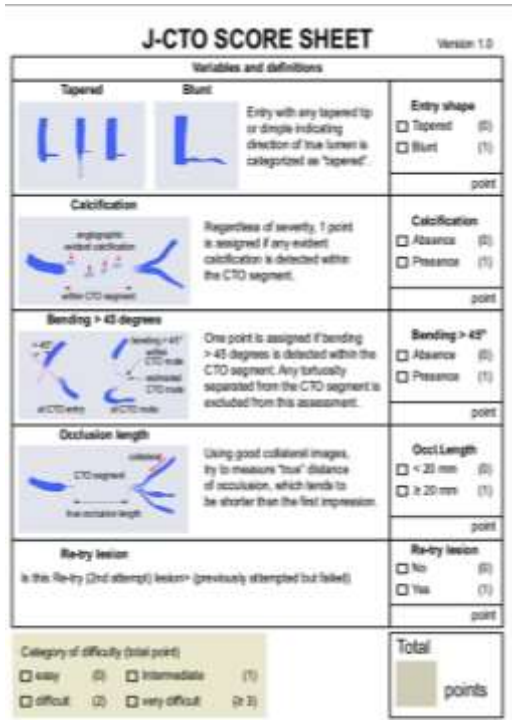


Bi-radial approach – 7F (RCA - AL1; XB 3.5 - LCA)
Antegrade attempt:
Wire escalation from XT-R to Gaia 3rd



J-CTO Score = 2 (difficult)

- Entry shape – Tapered (0)
- Calcification – Presence (1)
- Bending - > 45º (1)
- Occlusion length – < 20 mm (0)



J-CTO SCORE SHEET

Version 1.0

Variables and definitions

Tapered / Blunt

Entry with any tapered tip or dimple indicating direction of true lumen is categorized as "tapered".

Entry shape
☐ Tapered (0)
☐ Blunt (1)
point

Calcification

Regardless of severity, 1 point is assigned if any evident calcification is detected within the CTO segment.

Calcification
☐ Absence (0)
☐ Presence (1)
point

Bending > 45 degrees

One point is assigned if bending > 45 degrees is detected within the CTO segment. Any tortuosity separated from the CTO segment is excluded from this assessment.

Bending > 45°
☐ Absence (0)
☐ Presence (1)
point

Occlusion length

Using good collateral images, try to measure "true" distance of occlusion, which tends to be shorter than the first impression.

Occl Length
☐ < 20 mm (0)
☐ ≥ 20 mm (1)
point

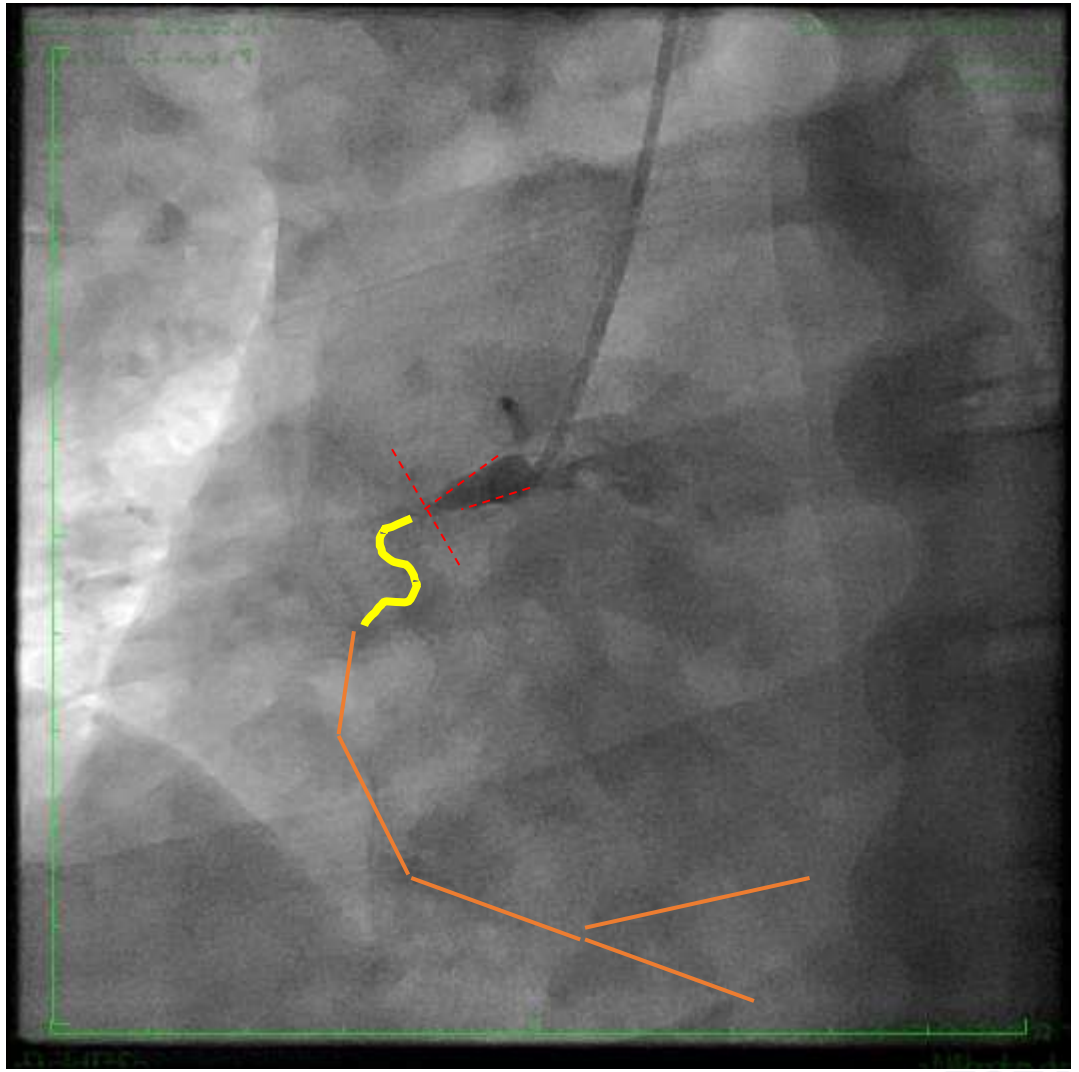
Re-try lesion

Is this Re-try (2nd attempt) lesion= (previously attempted but failed)

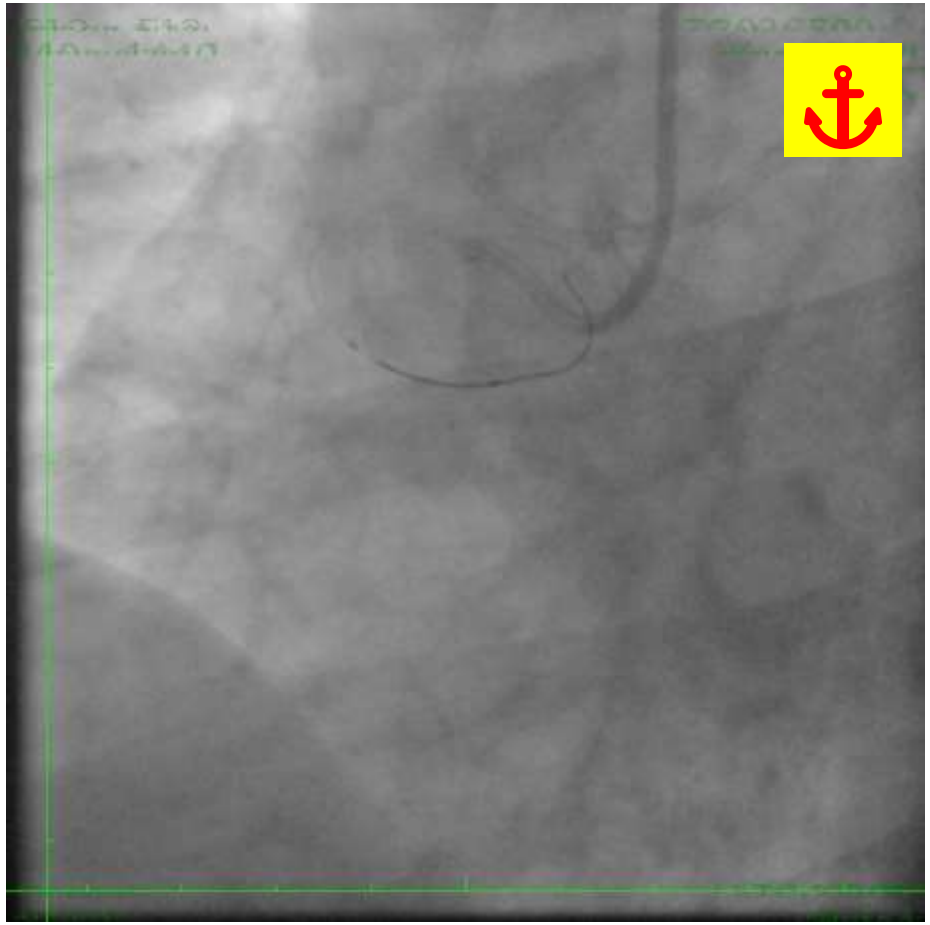
Re-try lesion
☐ No (0)
☐ Yes (1)
point

Category of difficulty (total point)
☐ easy (0) ☐ intermediate (1)
☐ difficult (2) ☐ very difficult (≥ 3)

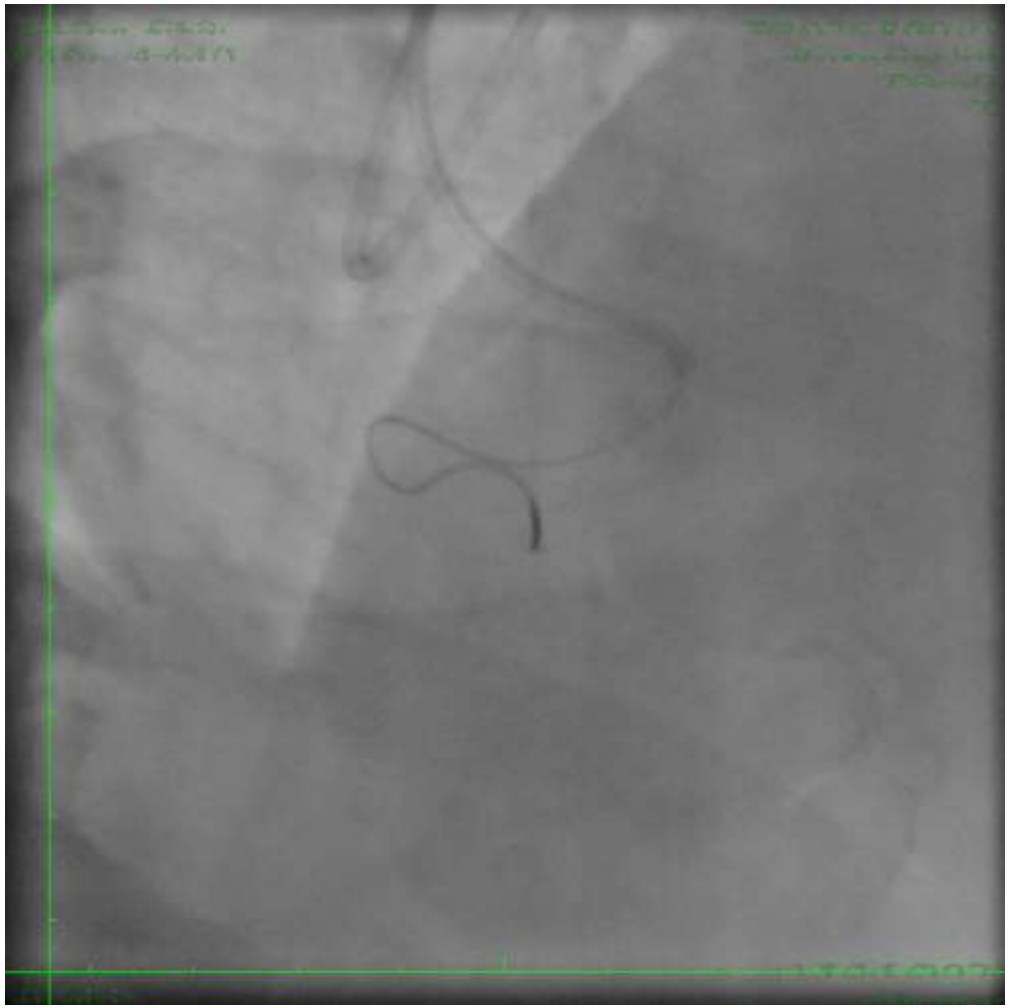
Total
points



Multiple failures of puncturing the distal cap with wire escalation strategy (Dual lumen MC-Sasuke: Suoh3, Fielder XT/R, Gaia 3rd, Confianza 12g)



Superselective analysis of the epicardial ipsilateral: finally decision to change strategy based on to high risk for collateral damage



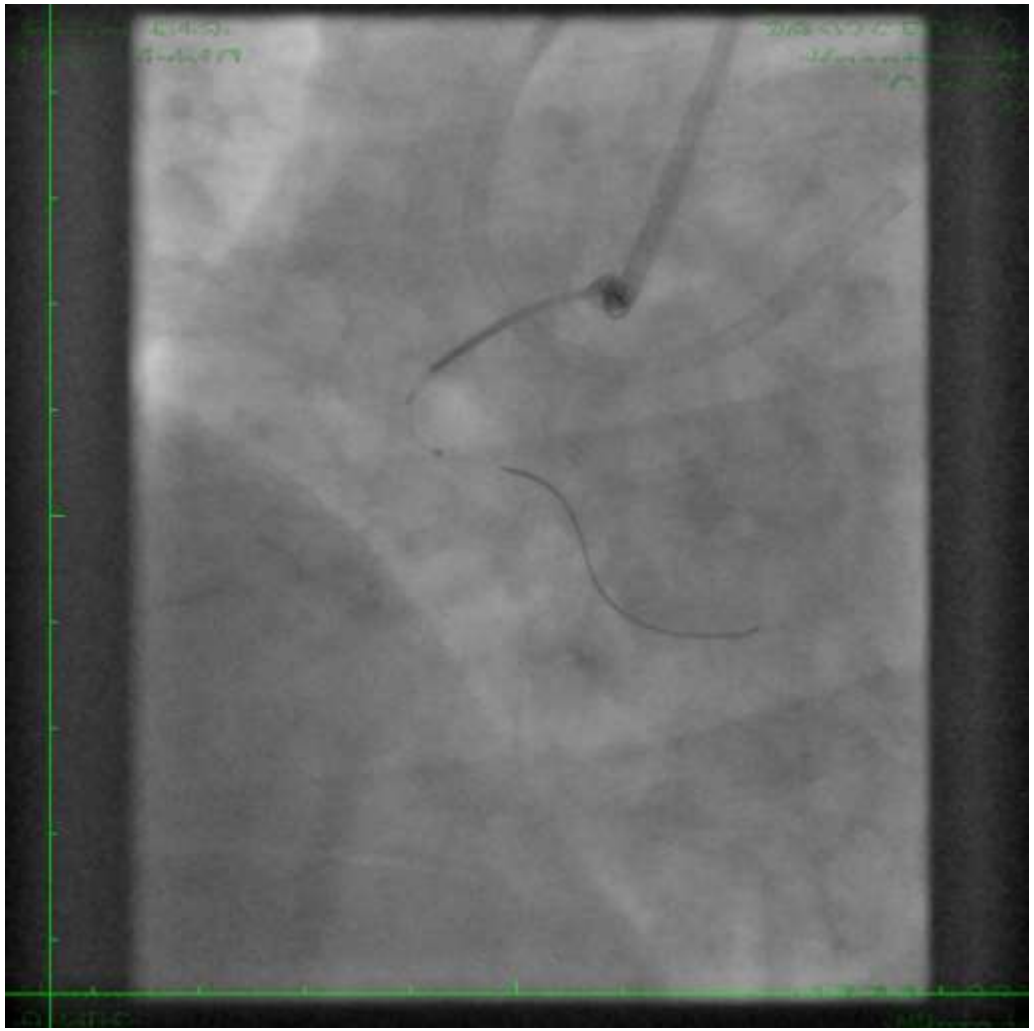
Next option?

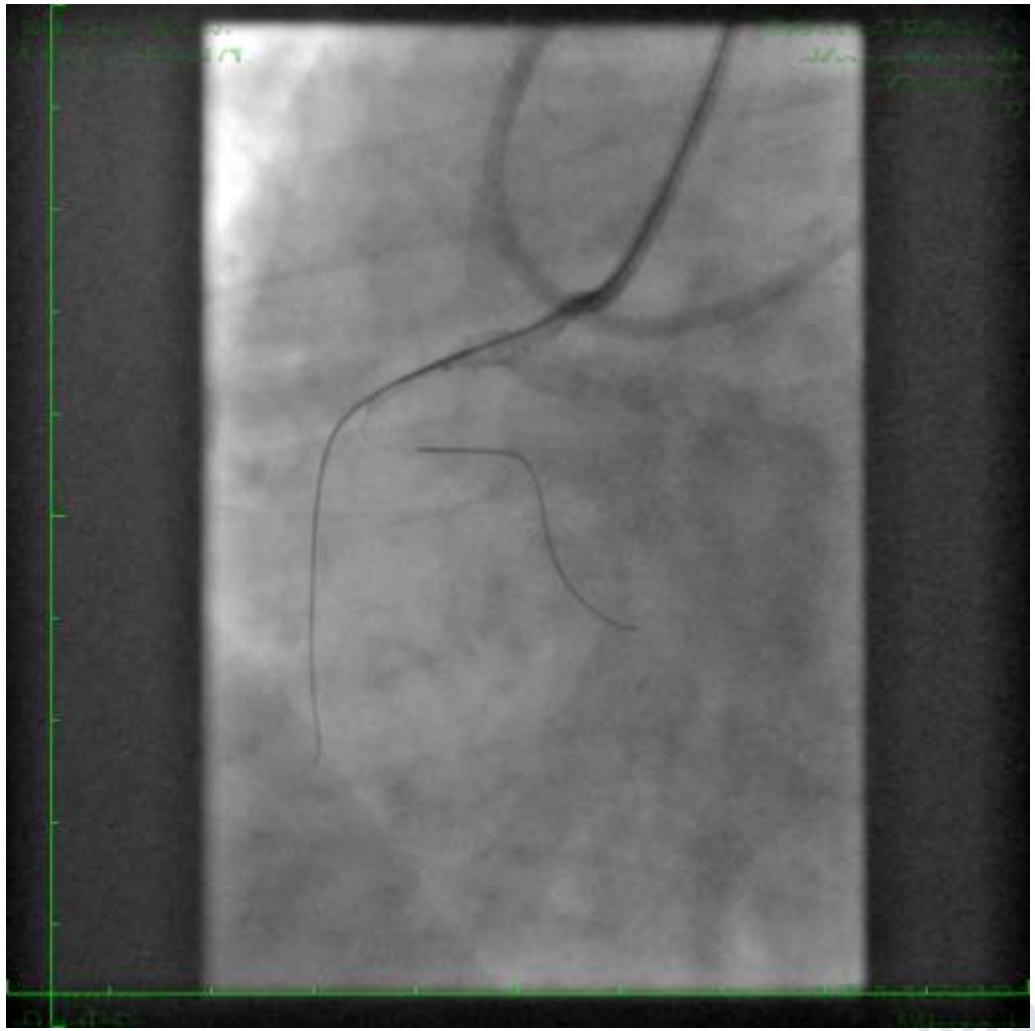
1) IVUS guided puncture of the distal cap - in case of failure ….

2) Intentional knuckle wire through the distal cap with distal wire re-entry (Stingray balloon) - in case of failure

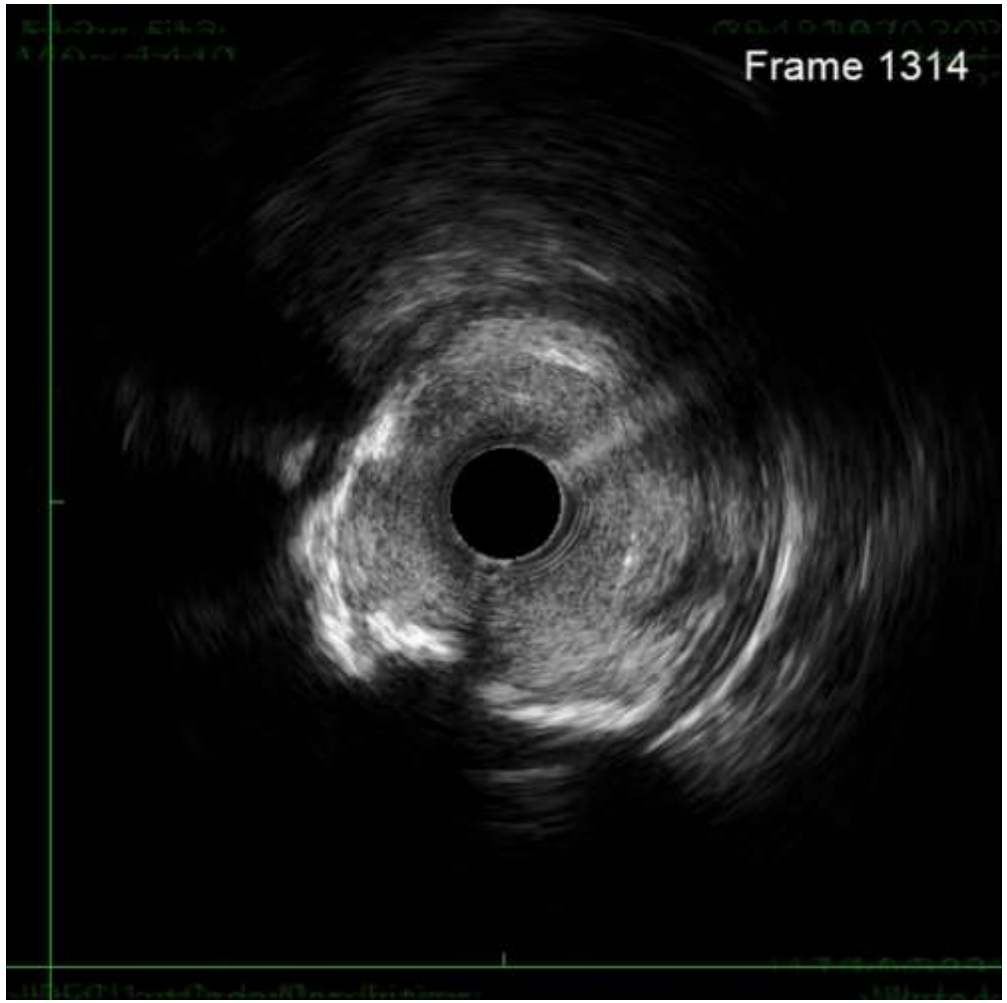
3) IVUS controlled antegrade re-entry versus retrograde septal surfing

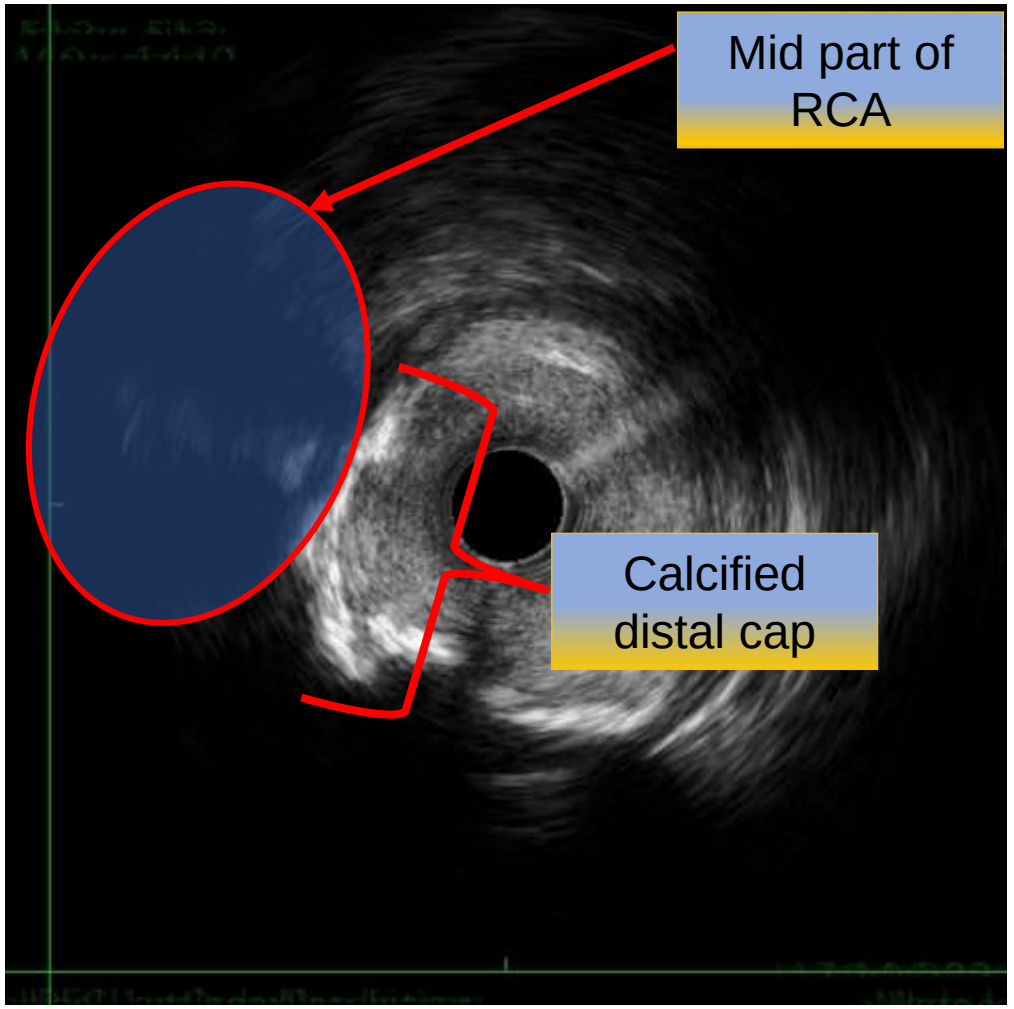
Failed IVUS guided antegrade puncture with Confianza Pro 12g, due to missing visualization of the distal vessel based on the calcified plaque





IVUS of the proximal cap





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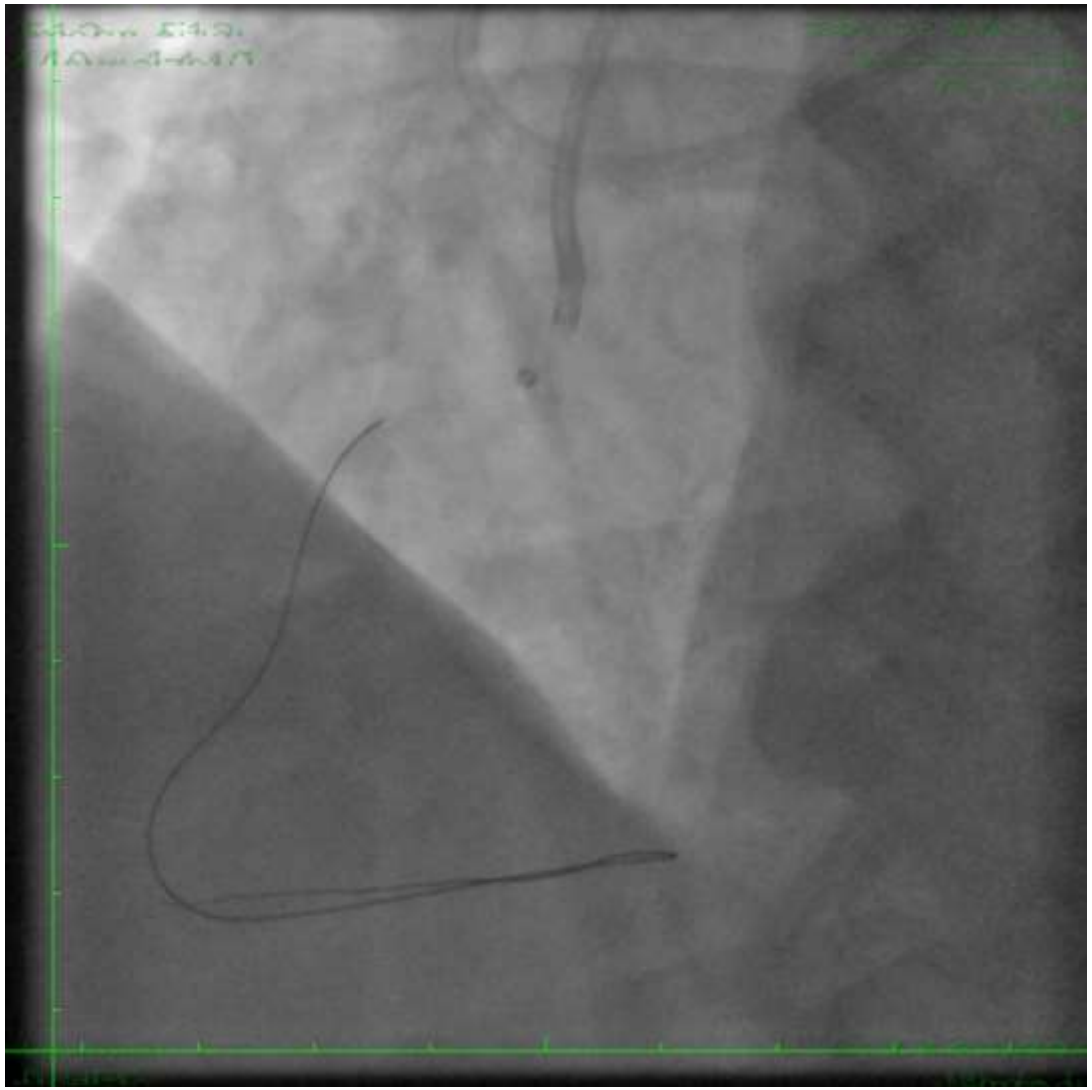
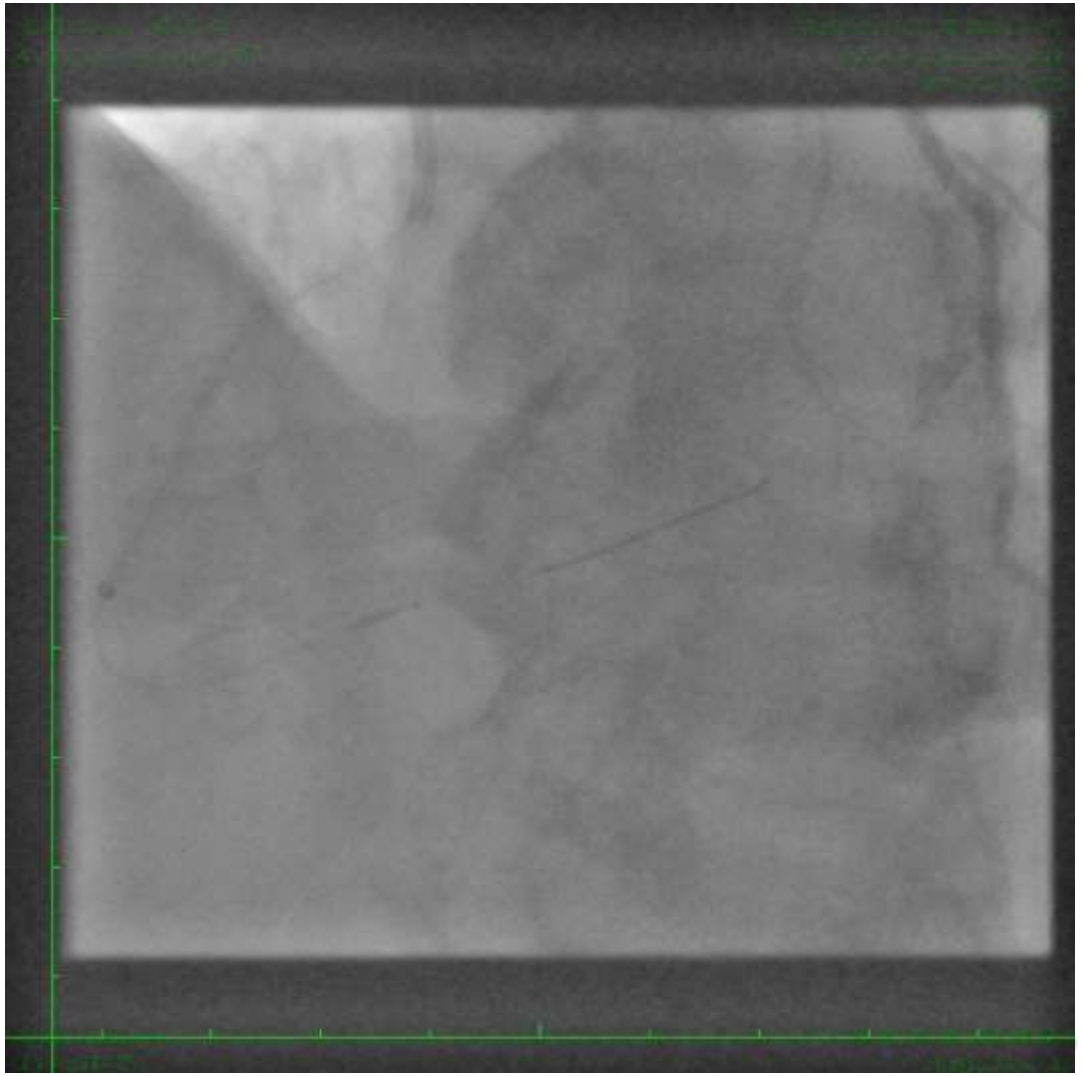
Antegrade dissection re-entry - Gladius MG



Guideliner assisted antegrade re-entry attempted with Stingray LP and Warrior 14g with failure to re-enter



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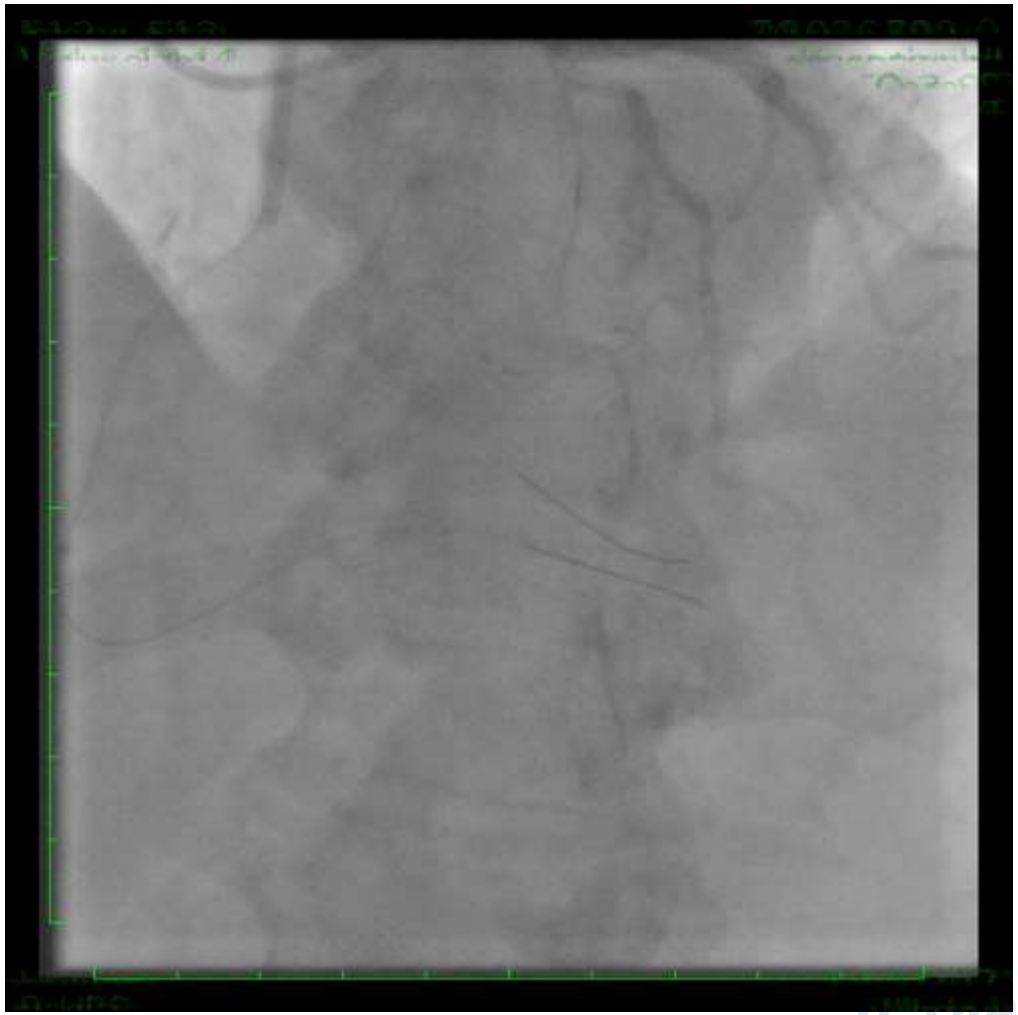
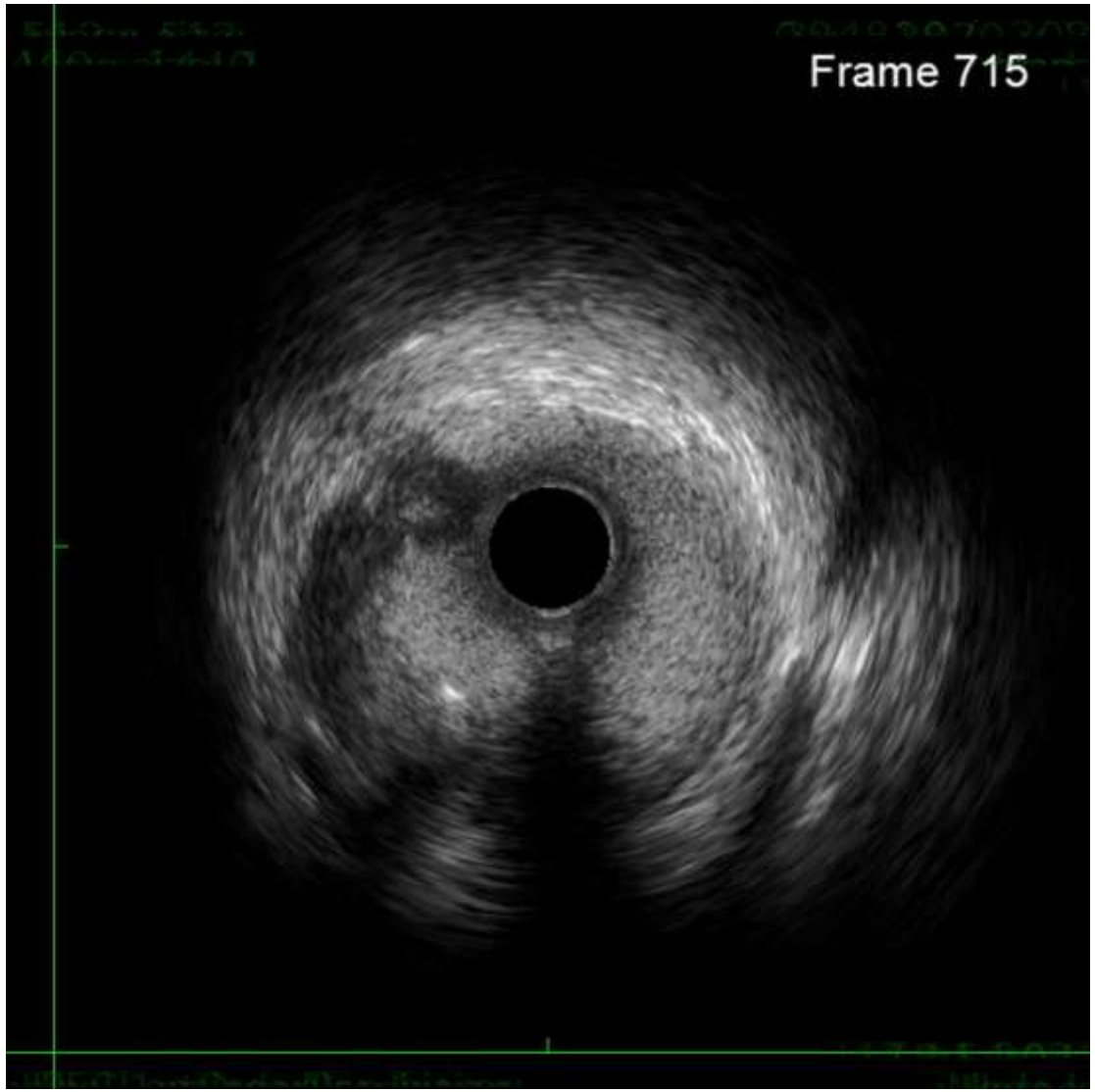
3) IVUS controlled antegrade re-entry versus retrograde septal surfing

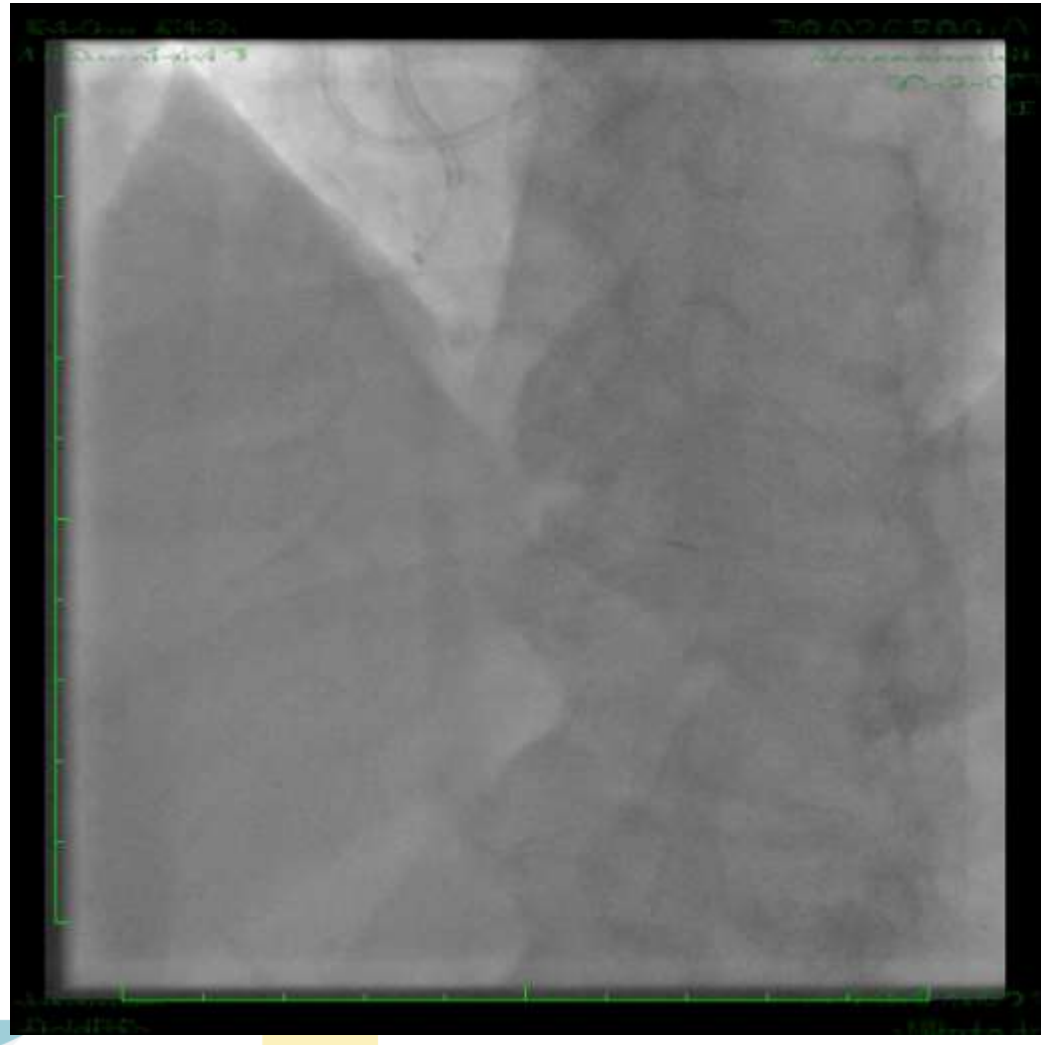
Switched to retrograde septal surfing with Sion Black and Caravel with IVUS controlled retrograde wire tracking

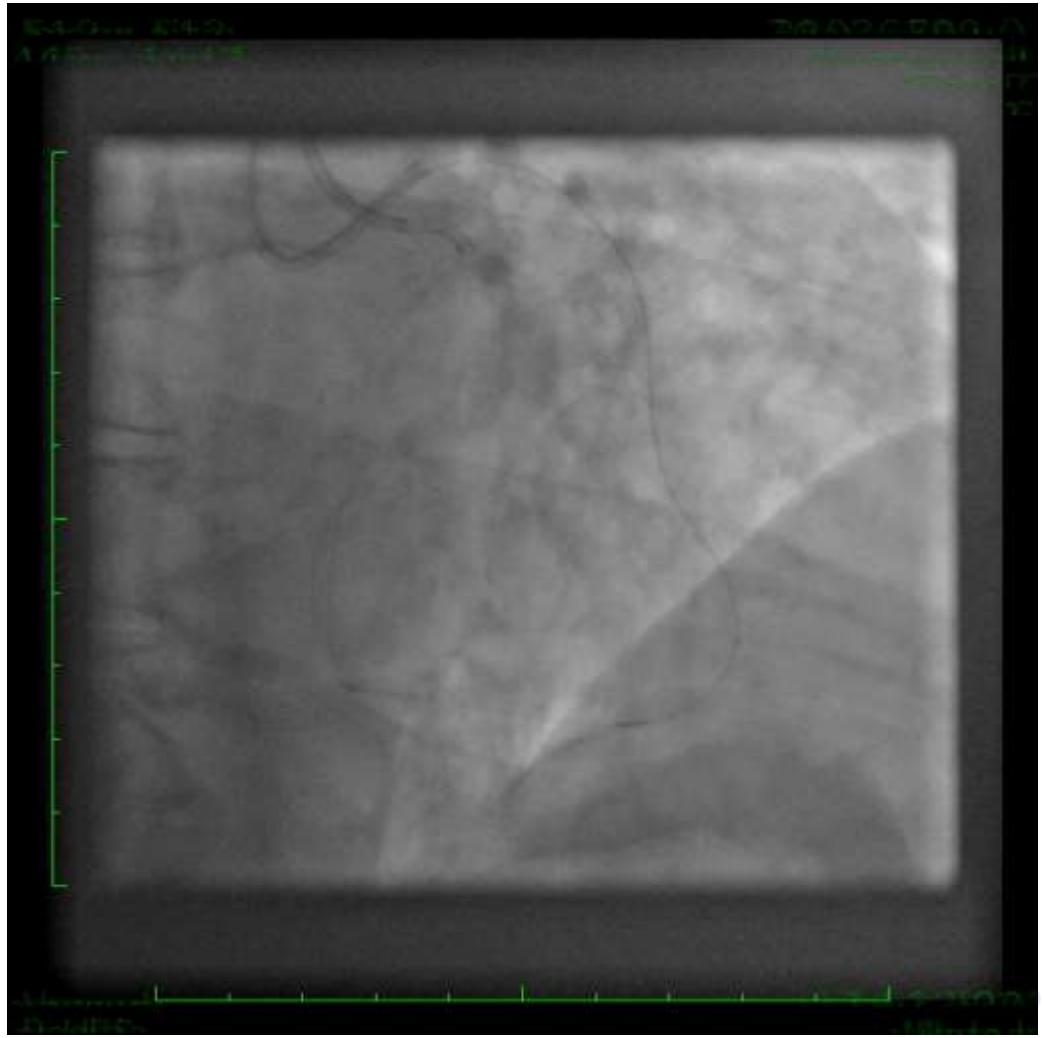


IVUS with visualization of the retrograde wire in the true lumen and IVUS in the false lumen

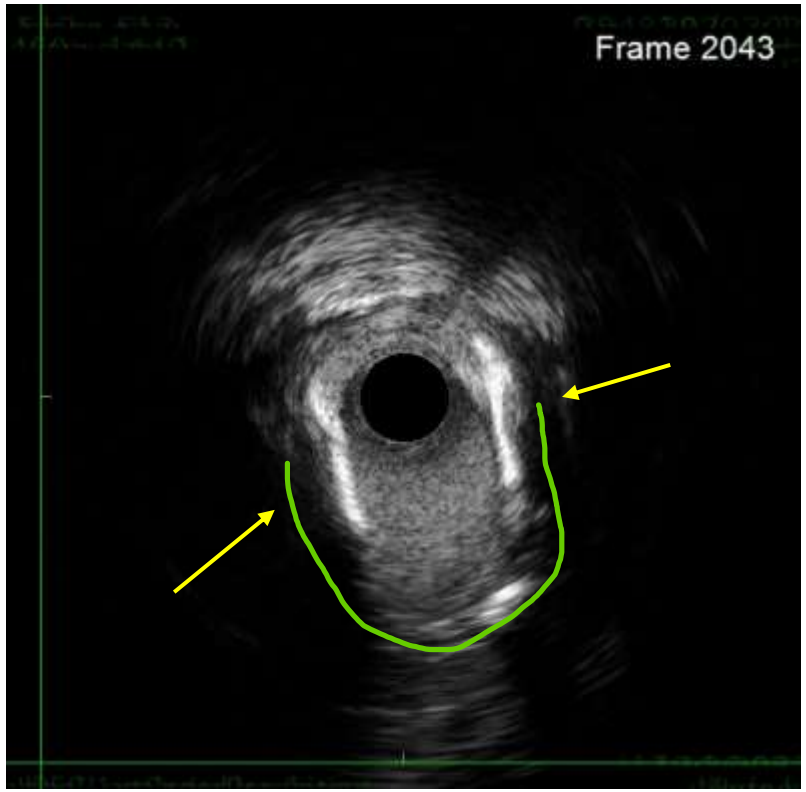


Retrograde wire was placed the whole way up towards the distal cap of the CTO into the true lumen controlled by IVUS, therefor only limited stenting was necessary (1st stent – DES 3.5x28mm)

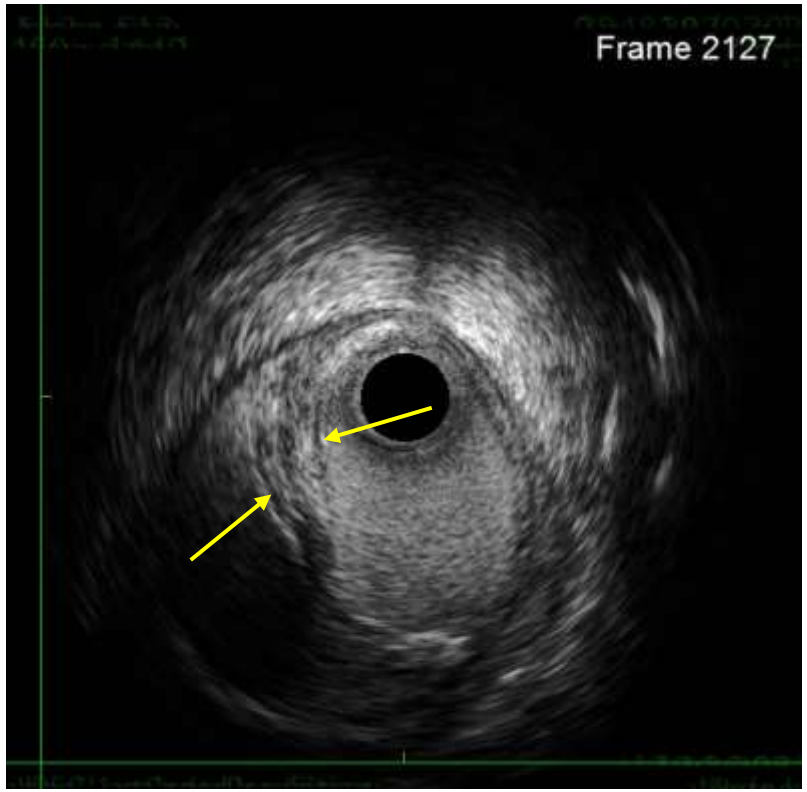




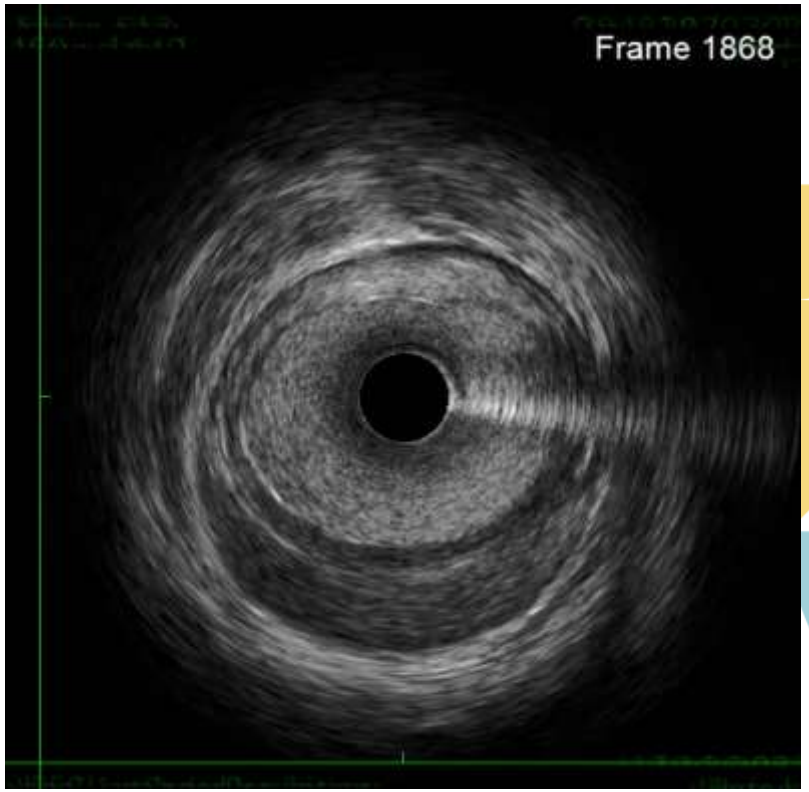
IVUS to analyze the middle part of RCA after 1st stent



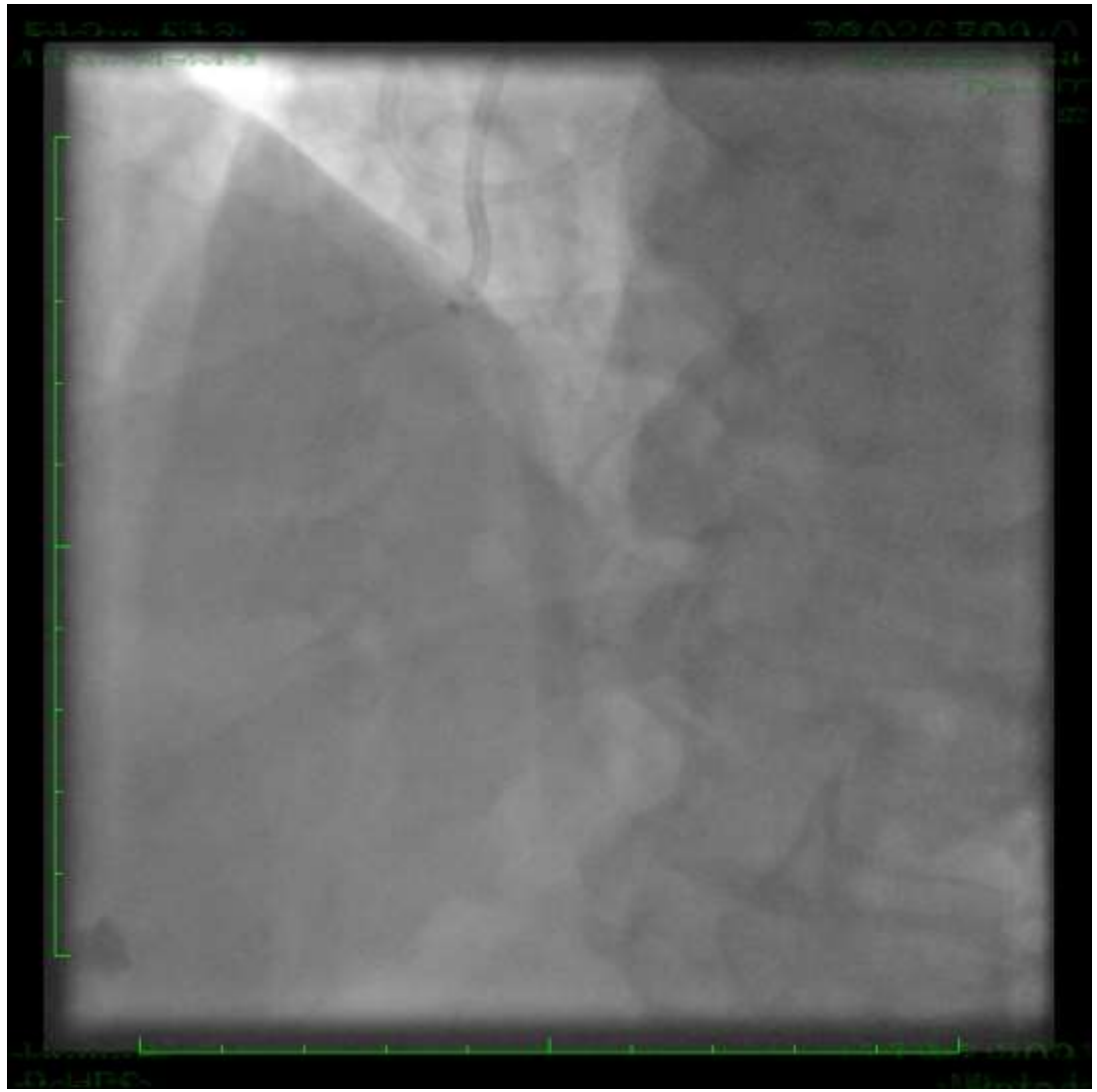
Circular compression of true lumen in the middle part of RCA with the hematoma



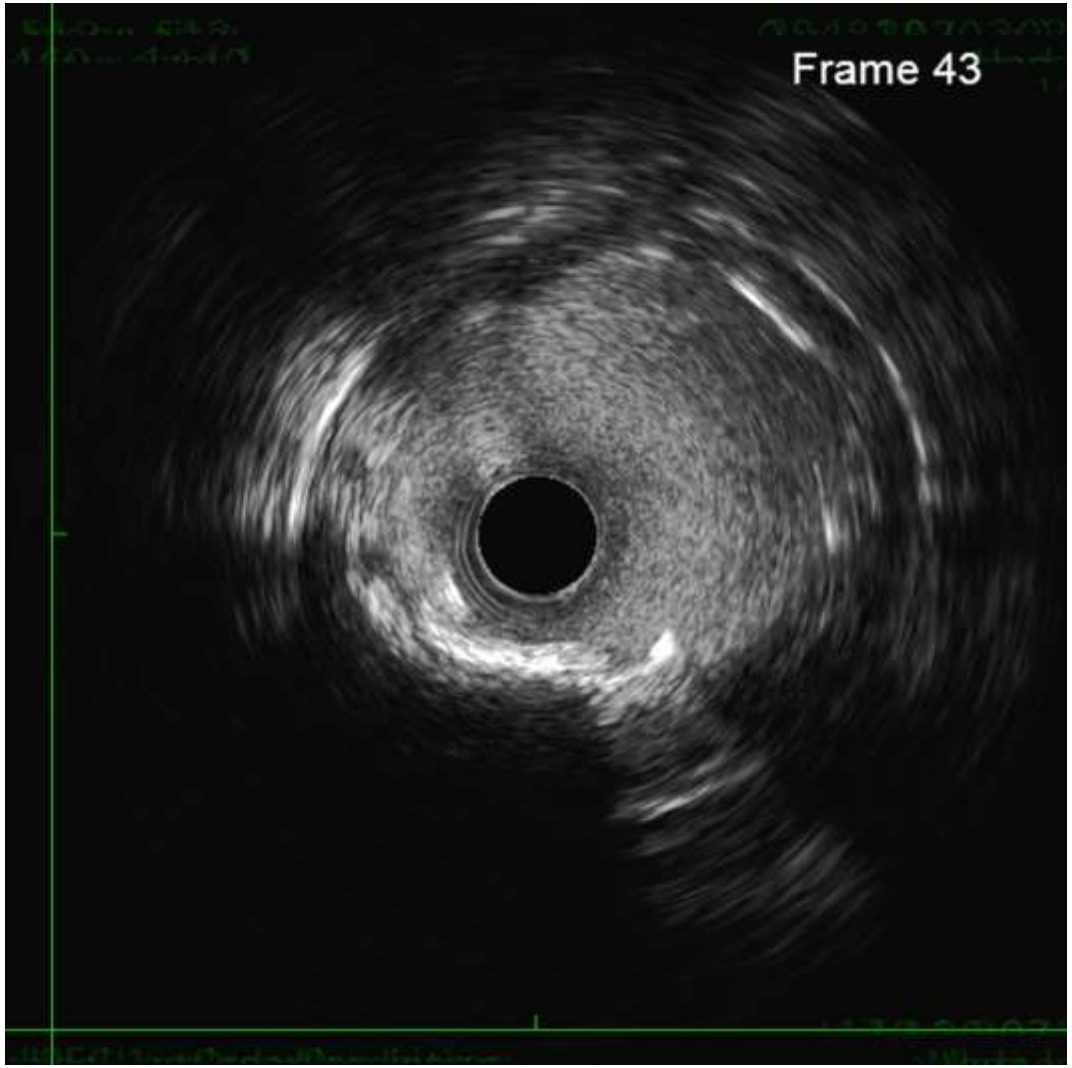
Dissection of the true lumen in middle part of RCA



Final Angio after 2nd stent – DES implantation



Final IVUS after 2nd stent – DES implantation



Conclusion / Take-home Message:

- 1) Never underestimate ”simple” CTO lesions
- 2) CT prior to CTO PCI could have given important information about the plaque composition of the distal cap
- 3) Failure of distal cap puncture often leads to hematoma and loose of visualization
- 4) ADR is an option to overcome distal cap calcification
- 5) In case of large antegrade dissection, retrograde bailout rescue is possible
- 6) IVUS controlled retrograde tracking is very useful to minimize stent-lenght, and optimized stent placement
- 7) Large antegrade dissections, “rescued” by retrograde true wire position will heal, after covering the true to true crossing by minimal stent length
- 8) Be always flexible to change the strategy for optimizing patients long term outcome