HOSPITAL ZUM HEILIGEN GEIST
Kempen

14th National Congress of Cardiology, Azerbaijan Society of Cardiology, Baku, Azerbaijan, 13.12.2025

COMPLEX AND HIGH-RISK PCI

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CHIP - Complex high-risk and indicated percutaneous coronary intervention

Any PCI case that has met at least 1 of the following patient's characteristics:

- age ≥80 years,
- left ventricular function impairment,
- previous CABG,
- chronic renal failure

or the following procedural's characteristics:

- left main
- chronic total occlusion,
- severe vascular calcifications,
- the need for LV support.

COMPATIBILITY OF MATERIALS AND TECHNIQUES

INNER LUMEN SIZE (inches; mm)	ACCOMMODATING CAPACITY FOR PCI DEVICE
5 Fr (0.056-0.059 inch; 1.42-1.50 mm)	• Balloon angioplasty • Scoreflex® focused-force dilatation balloon • Drug-coated balloon (e.g., SeQuent Please®; DIOR®) • Most coronary stents • Rotablator burr 1.25 mm • Some IVUS catheter (Volcano Eagle Eye® Gold / Platinum catheter; Terumo ViewIT®; Boston Scientific Opticross®) • Kissing balloons with smaller profile balloons and 0.010" guidewire [3] – slender system
6 Fr (0.068-0.072 inch; 1.73-1.83 mm)	• Standard angioplasty and stenting • Some bifurcation angioplasty, including kissing balloons with small profile balloons • 6 Fr Thrombuster® / Export® aspiration catheters • IVUS (Boston Scientific Atlantis Pro®; Volcano Revolution®), when used with 0.014" guidewire • Rotablator burr 1.5 mm
7 Fr (0.078-0.082 inch; 1.98-2.08 mm)	• Rotablator burr up to 1.75 mm & 2 mm • 2 rapid-exchange balloon catheters • 7 Fr Thrombuster® aspiration catheter • Simultaneous 2 stent deployment • Simultaneous 2 microcatheters
8 Fr (0.088-0.099 inch; 2.24-2.30 mm)	• Rotablator burr 2.25 mm • 2 OTW balloon catheters • Directional atherectomy (discontinued)

The PCR-EAPCI Textbook – Percutaneous interventional cardiovascular medicine- Guide catheters and wires

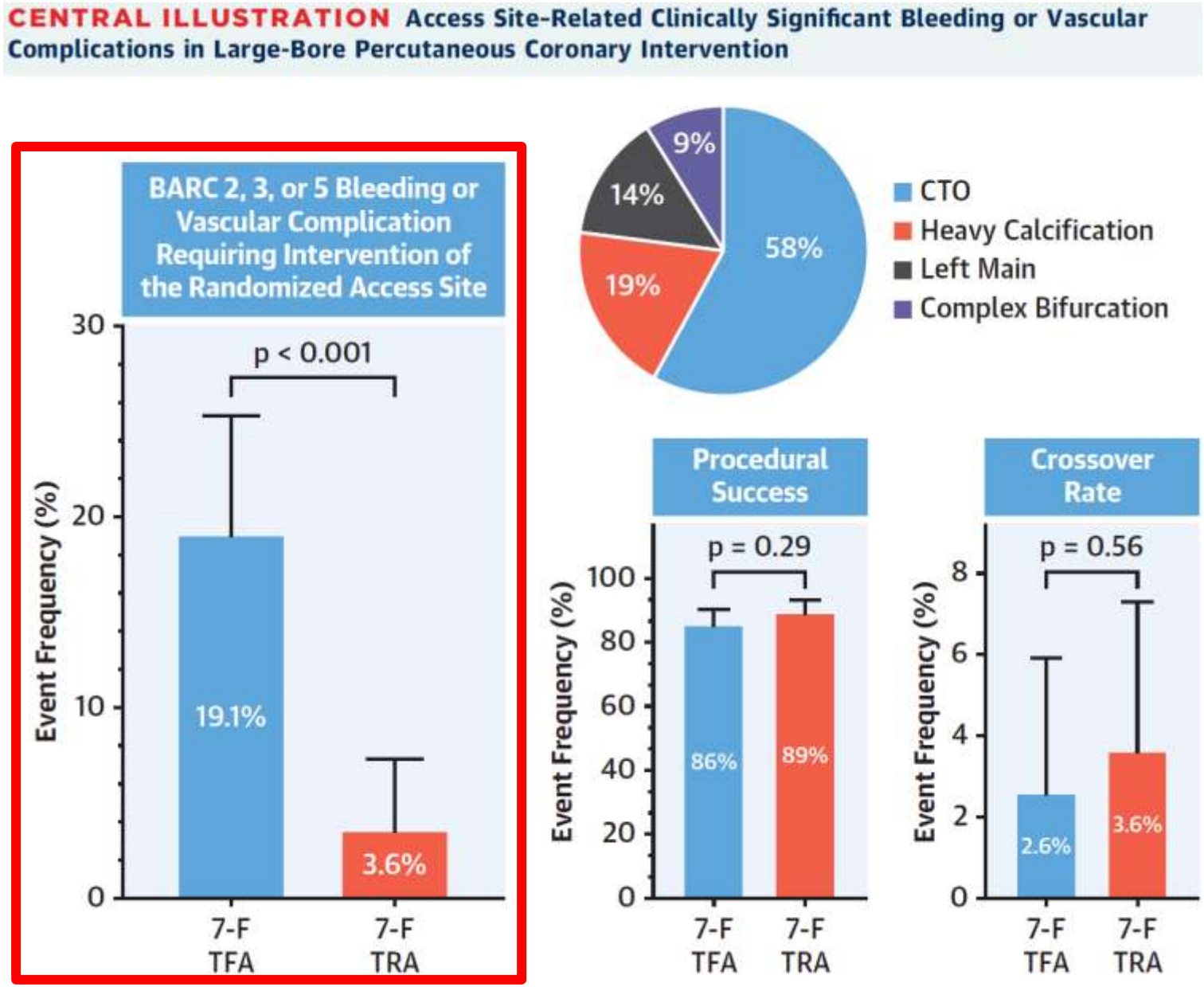
COMPATIBILITY OF CTO PCI TECHNIQUE AND GUIDE CATHETER

Guide catheter	5 Fr	6 Fr	6.5 Fr sheathless	7 Fr	7.5 Fr sheathless	8 Fr
Internal Diameter (in.)	0.56–0.58	0.7–0.71	0.7	0.78–0.81	0.81	0.88–0.90
External diameter at the arterial access site (mm)	2.3	2.52–2.6	2.16	2.85–3.1	2.49	3.2–3.5
Parallel wire technique (antegrade CTO PCI technique)						
Wire + 1 microcatheter	Yes	Yes	Yes	Yes	Yes	Yes
2 microcatheters	No	Yes	Yes	Yes	Yes	Yes
1 microcatheter + 1 OTW balloon	No	No	No	Yes	Yes	Yes
2 OTW balloons	No	No	No	No	No	Yes
Side-branch anchoring balloon and balloon trapping (useful for both antegrade and retrograde CTO PCI techniques)						
1 monorail balloon + 1 microcatheter	No	Yes[a]	Yes[a]	Yes	Yes	Yes
1 monorail balloon + 1 OTW balloon	No	Yes[b]	Yes[b]	Yes	Yes	Yes
CTO PCI: IVUS-guidance (useful for both antegrade and retrograde CTO PCI techniques)						
With simultaneous wire inside	Yes	Yes	Yes	Yes	Yes	Yes
With simultaneous microcatheter inside	No	No	No	Yes	Yes	Yes
Adjunctive devices (useful for both antegrade and retrograde CTO PCI techniques)						
Orbital Atherectomy CSI	No	Yes	Yes	Yes	Yes	Yes
Rotablator 1.25–1.75 mm Burr	No	Yes[c]	Yes	Yes	Yes	Yes
Rotablator 2.0–2.25 mm Burr	No	No	No	Yes	Yes	Yes
Laser 0.9–1.4	Yes	Yes	Yes	Yes	Yes	Yes
Laser 1.7–2.2	No	No	No	Yes	Yes	Yes
Tornus 2.1 Fr	No	Yes	Yes	Yes	Yes	Yes
Tornus 2.6 Fr	No	Yes	Yes	Yes	Yes	Yes
Corsair	No	Yes	Yes	Yes	Yes	Yes
CrossBoss	No	Yes	Yes	Yes	Yes	Yes
Stingray LP balloon	Yes	Yes	Yes	Yes	Yes	Yes

Percutaneous Coronary Intervention for Chronic Total Occlusion, 2022, https://doi.org/10.1007/978-3-031-05437-2

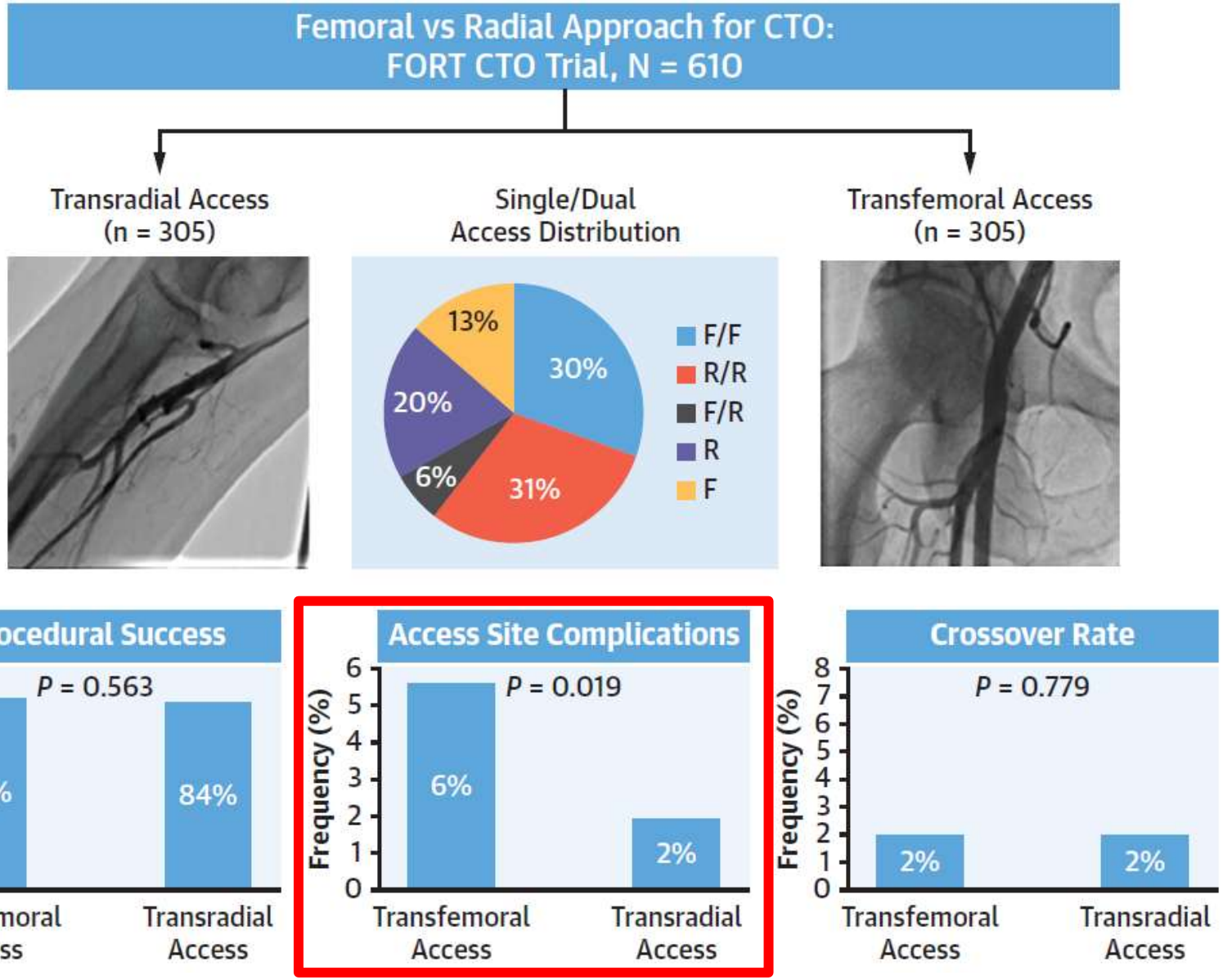
Cardiologists after their first successful femoral artery puncture

COLOR TRIAL (COMPLEX LARGE-BORE RADIAL PCI)



J Am Coll Cardiol Intv 2021;14:1293–303

FORT CTO (FEMORAL OR RADIAL APPROACH IN THE TREATMENT OF CORONARY CTO)



J Am Coll Cardiol Intv 2022;15:823–830

PATIENTS CHARACTERISTICS

67-year-old male (186 cm, 112 kg) was admitted via emergency room:

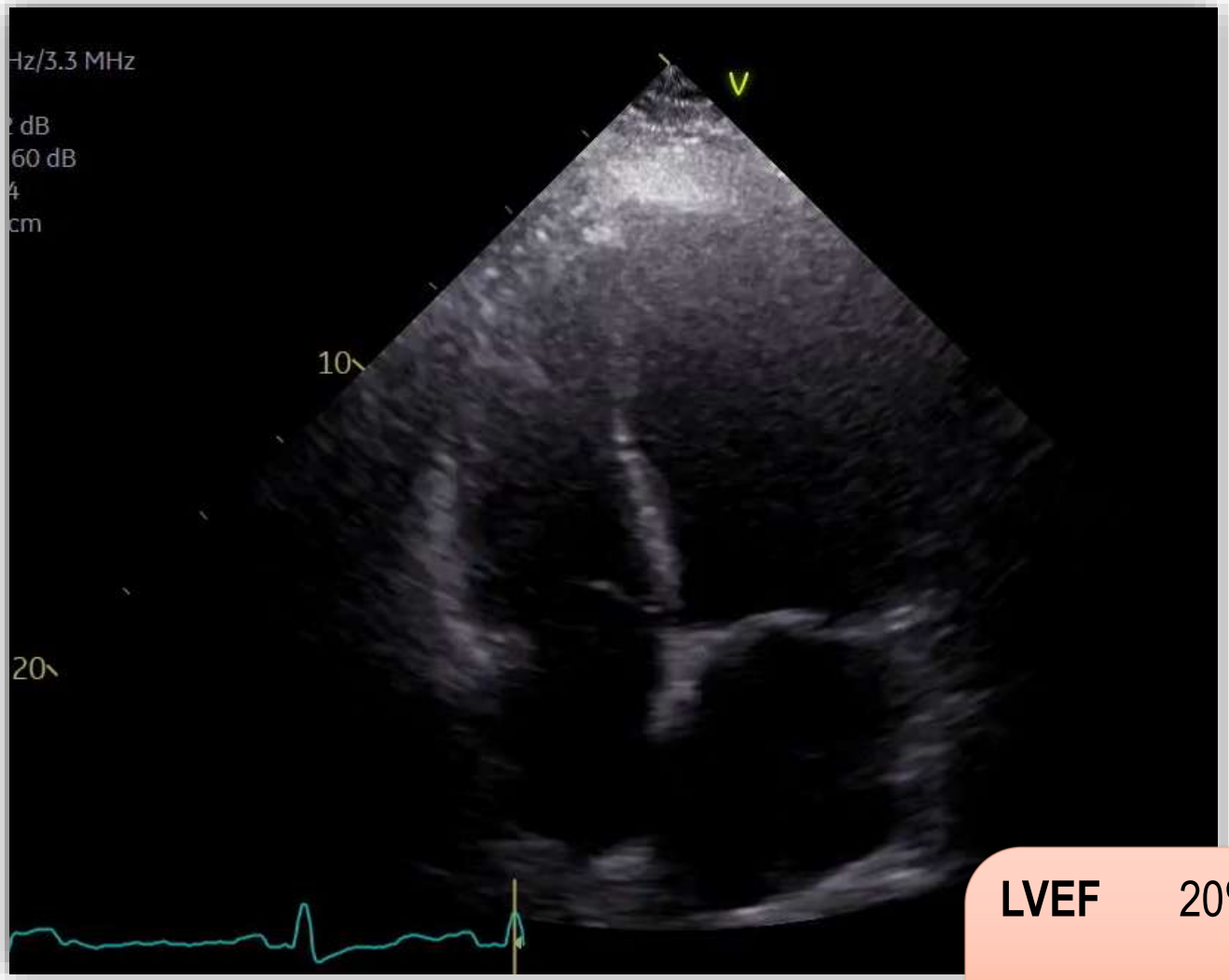
- Progressively worsening shortness of breath, leg oedema and palpitations (3 weeks). No angina.
- Primary care physician prescribed antibiotics last week.

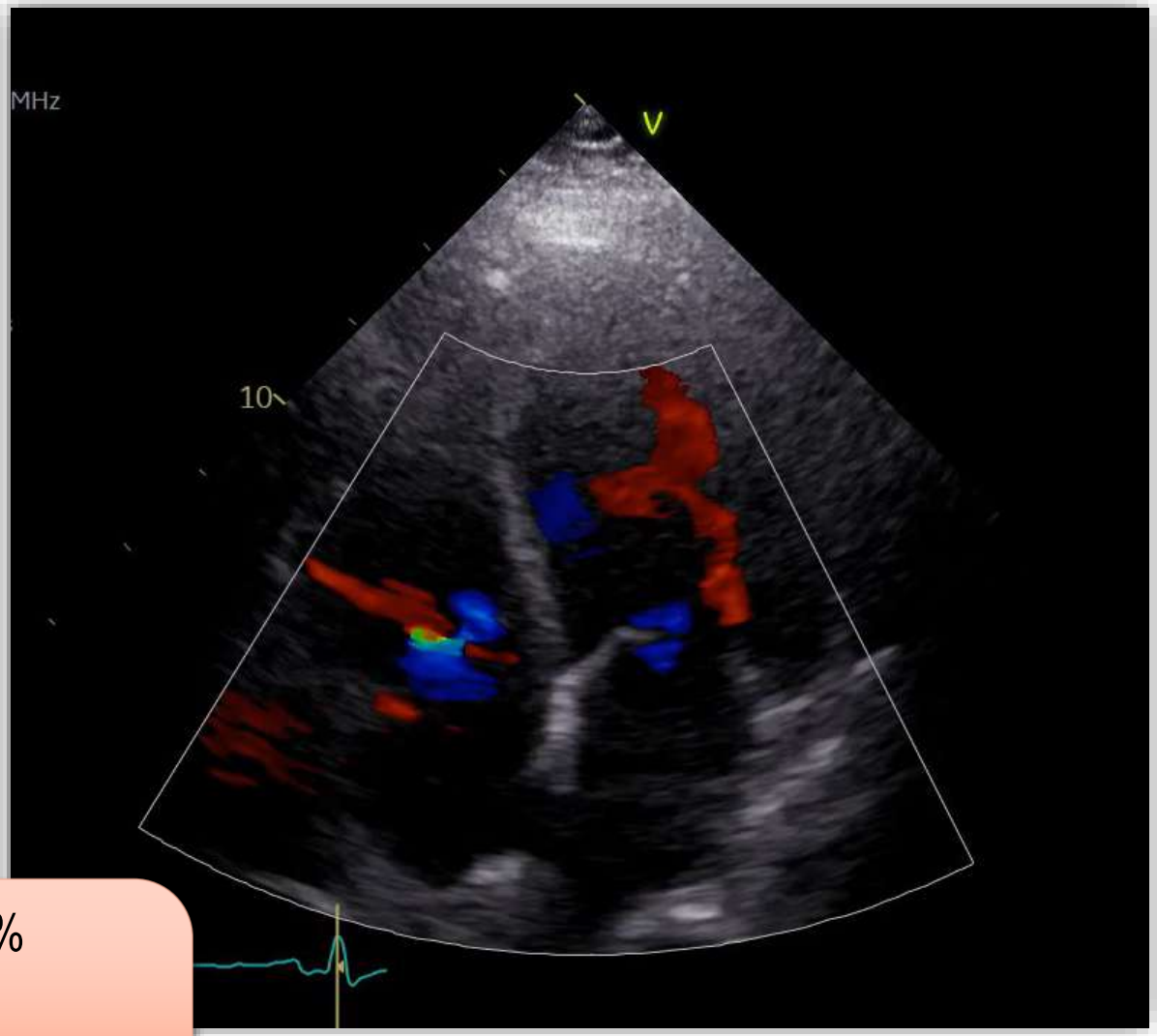
Lab results:

- Infect: Mild leucocytosis and elevated cRP
- Liver congestion: LDH 797 U/L (<250), moderately elevated transaminases, gamma-GT, and alkaline phosphatase.
- Acute kidney injury: eGFR of 44 mL/min; S-Creatinine of 1.6 mg/dl.
- NT-proBNP was significantly elevated at 16007 pg/mL (<376).

ECG: new tachycardic atrial fibrillation

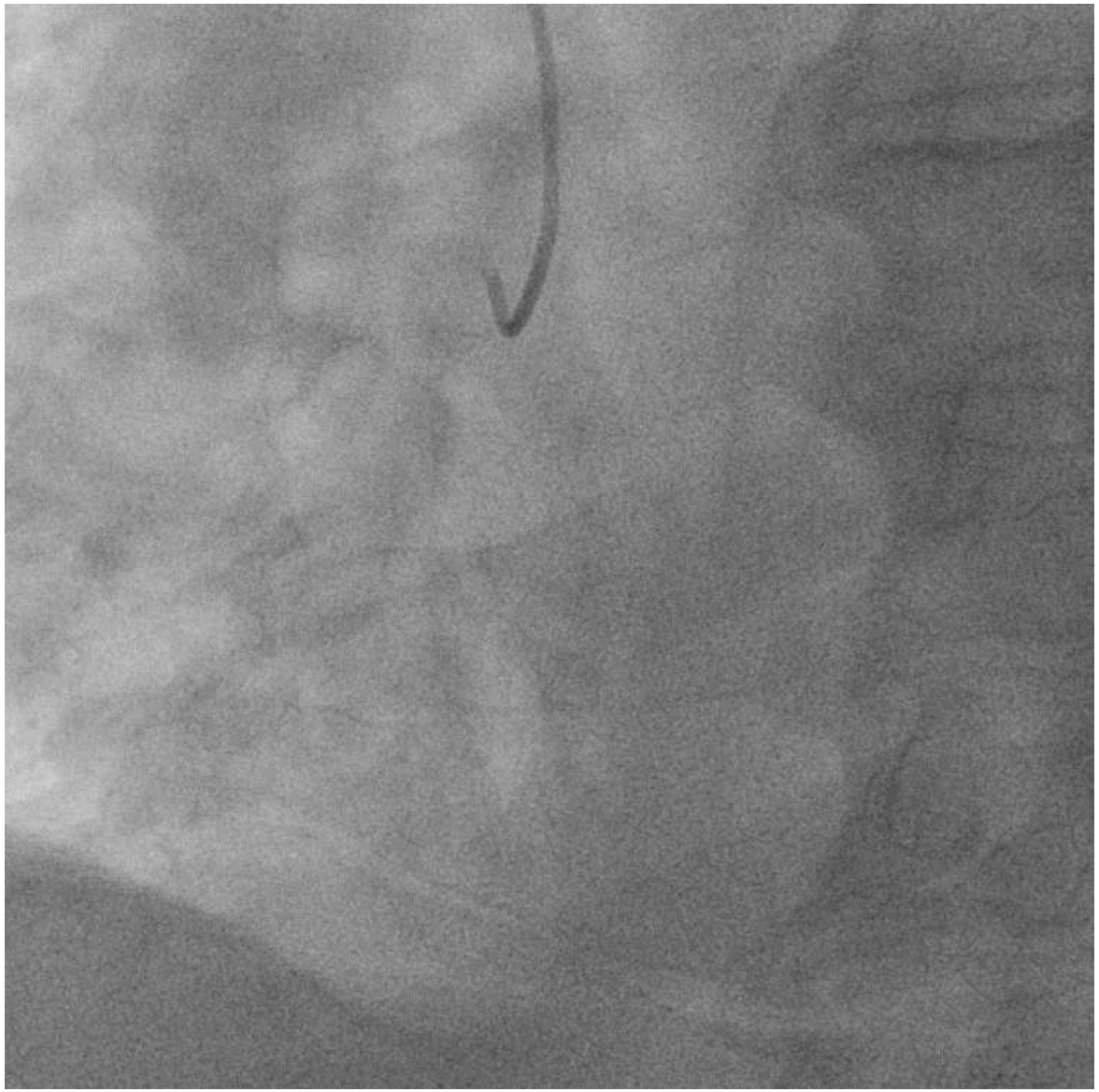
ECHOCARDIOGRAPHY





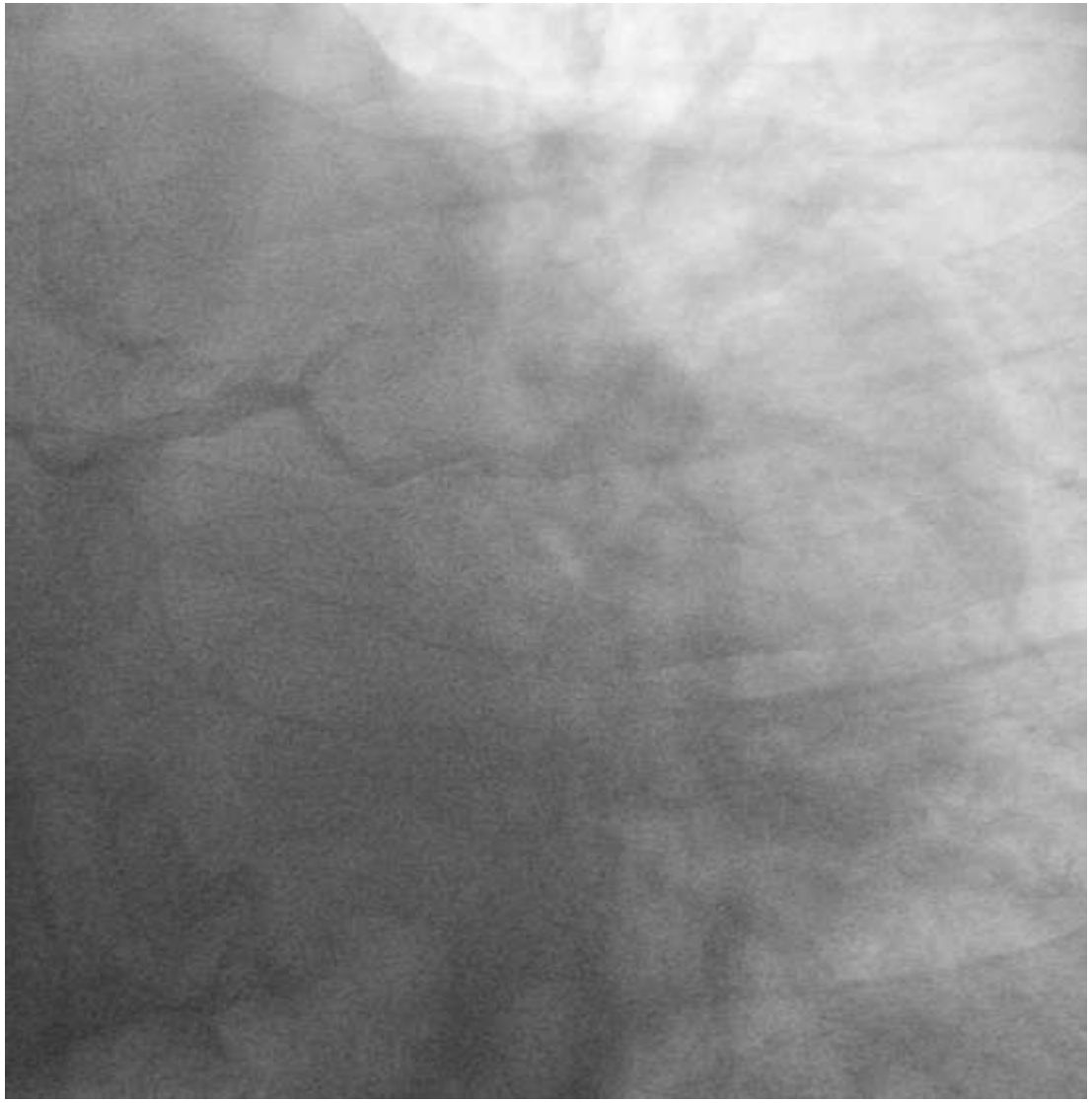
LVEF	20%
PISA	9 mm
ERO	0,3 cm²
RV	45 ml

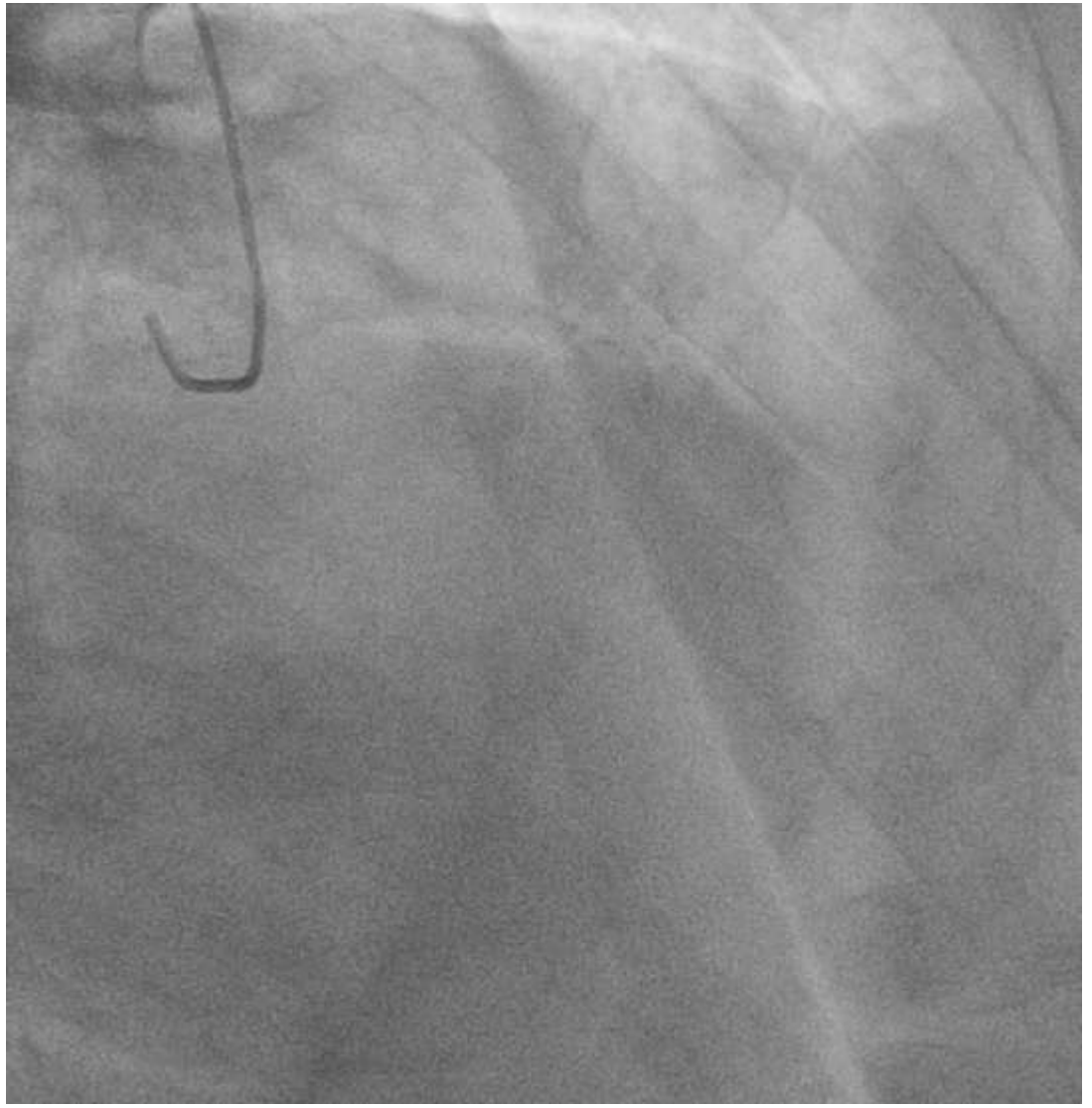
CASE PAT. 67 Y.O.



RCA: proximal CTO

CASE PAT. 67 Y.O.





LM: 70% stenosis. **LAD:** proximal CTO.
CX: last remain vessel, medial 80% stenosis, collaterals to LAD and distal RCA

WHAT DO WE HAVE?

67-year-old obesity male with

- Cardiac Decompensation (NYHA III)
- ICM with severely reduced LVEF (HFrEF)
- Severe 3-Vessel CAD
- Severe mitral valve insufficiency
- Paroxysmal Atrial Fibrillation
- Pneumonia

WHAT SHOULD WE TO DO?

Medical Therapy

Cardiac Surgery

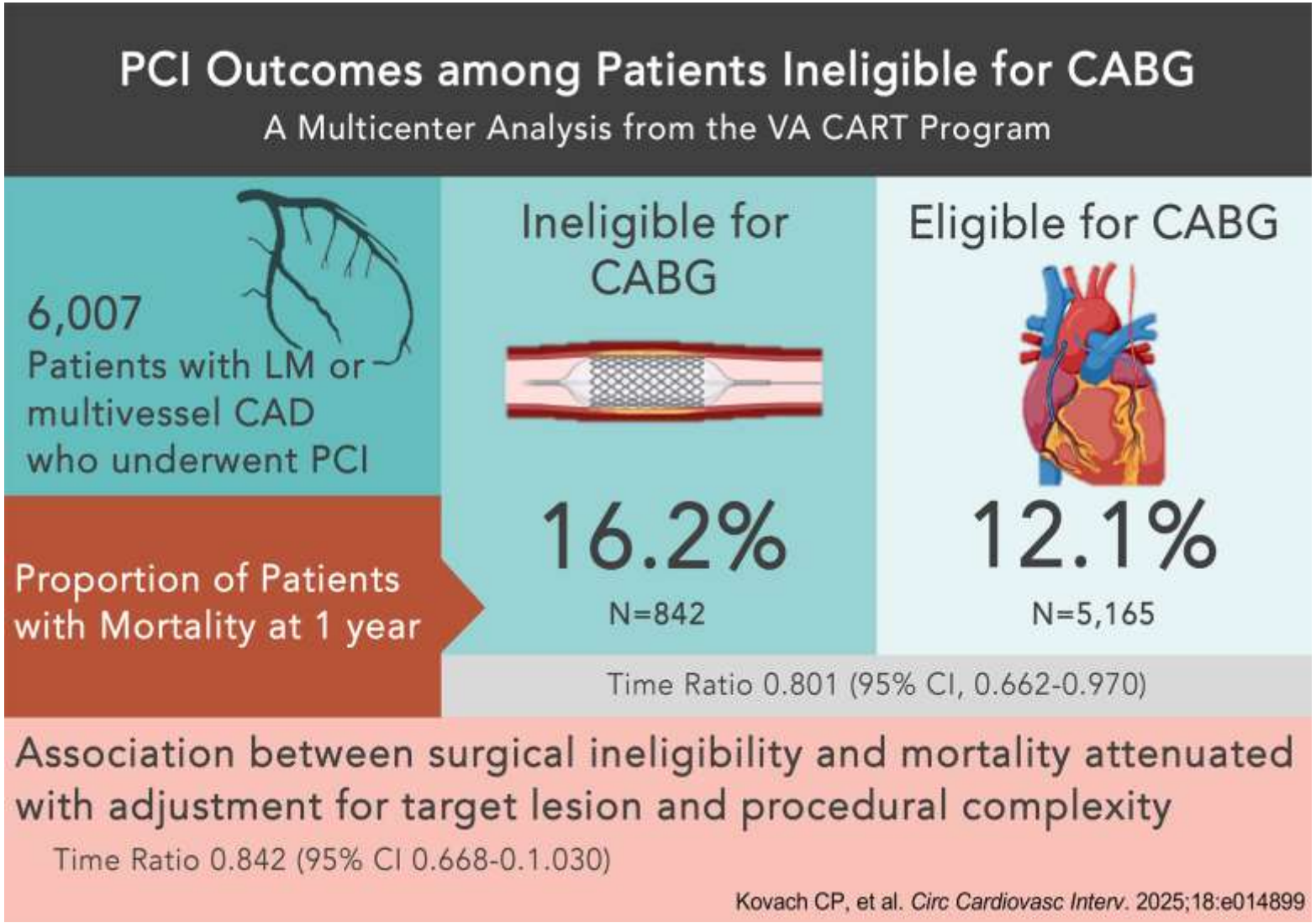
PCI

The case was discussed in our Heart Team: due to

- the complex severe three-vessel disease,
- severe mitral valve insufficiency(!),
- advanced ischemic cardiomyopathy,
- obesity……..

Surgery was declined by the cardiac surgeon. Consequently, PCI was selected as first-line treatment approach.

Characteristics and Outcomes of PCI Among Patients Ineligible for Surgical Revascularization



- Ineligibility for surgical revascularization was associated with increased risk of long-term mortality after PCI.

- The risk of adverse outcomes after PCI was similar among surgically eligible and ineligible patients.

Circ Cardiovasc Interv. 2025;18:e014899. DOI: 10.1161/CIRCINTERVENTIONS.124.014899

HOW WOULD YOU TREAT?

LCx | LM | LAD-CTO | RCA-CTO

WE DECIDED FOR THE FOLLOWING 2-STEP-APPROACH

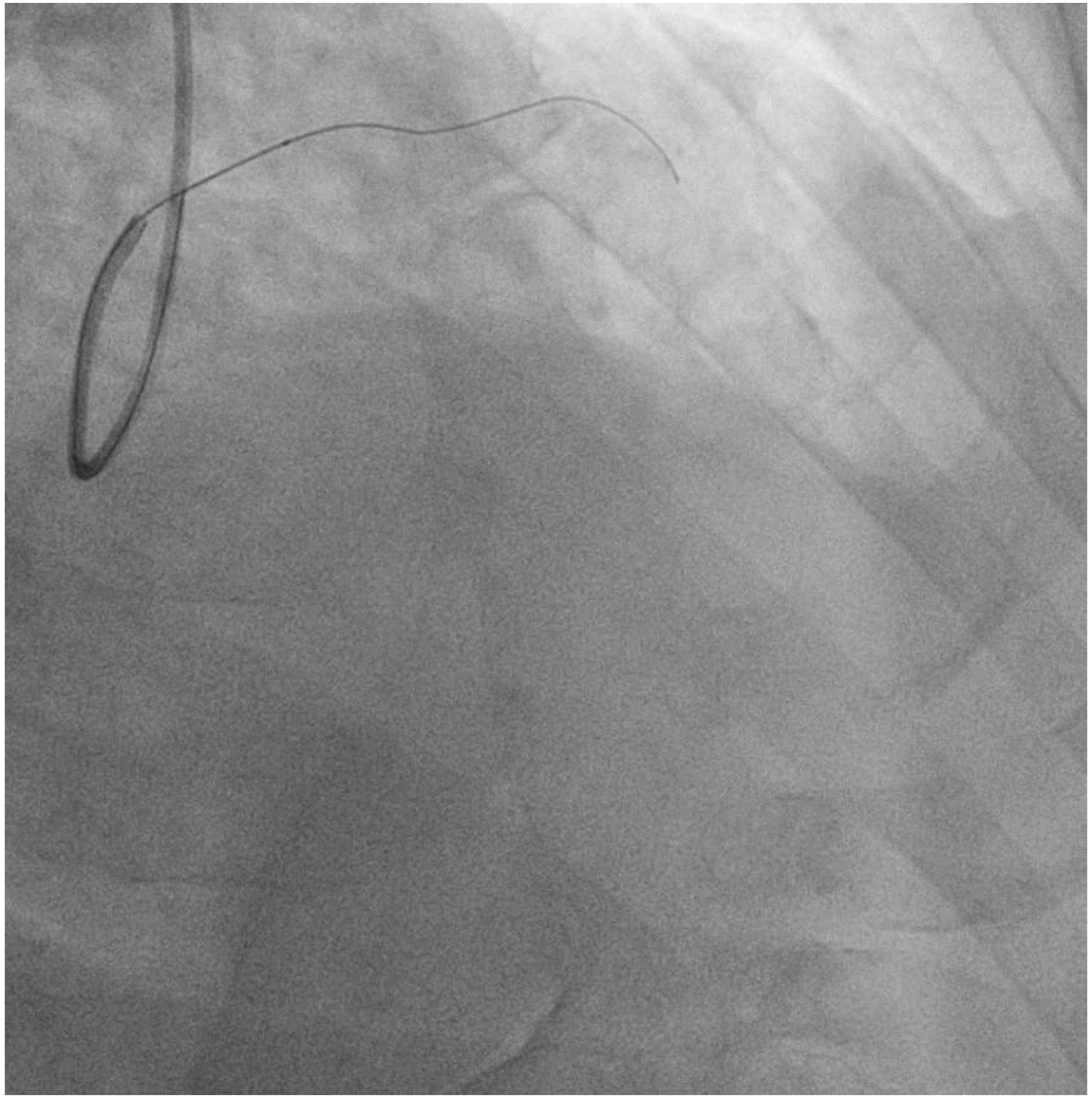
First session:

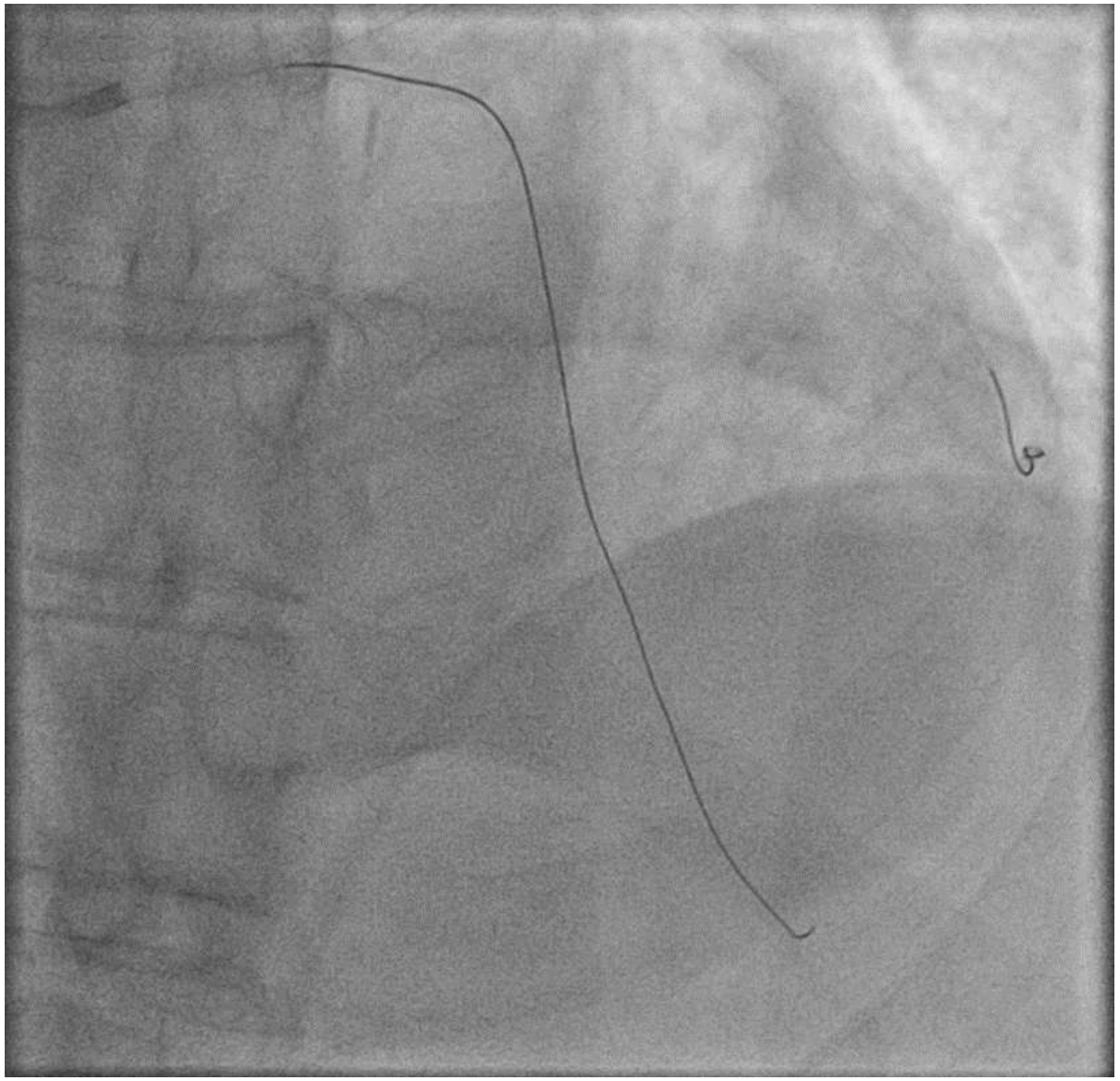
- Treatment of the LAD-CTO and LM stenosis,
- Followed by LCx-PCI.

Second session after appr. 2 months:

- Treatment of the RCA-CTO.

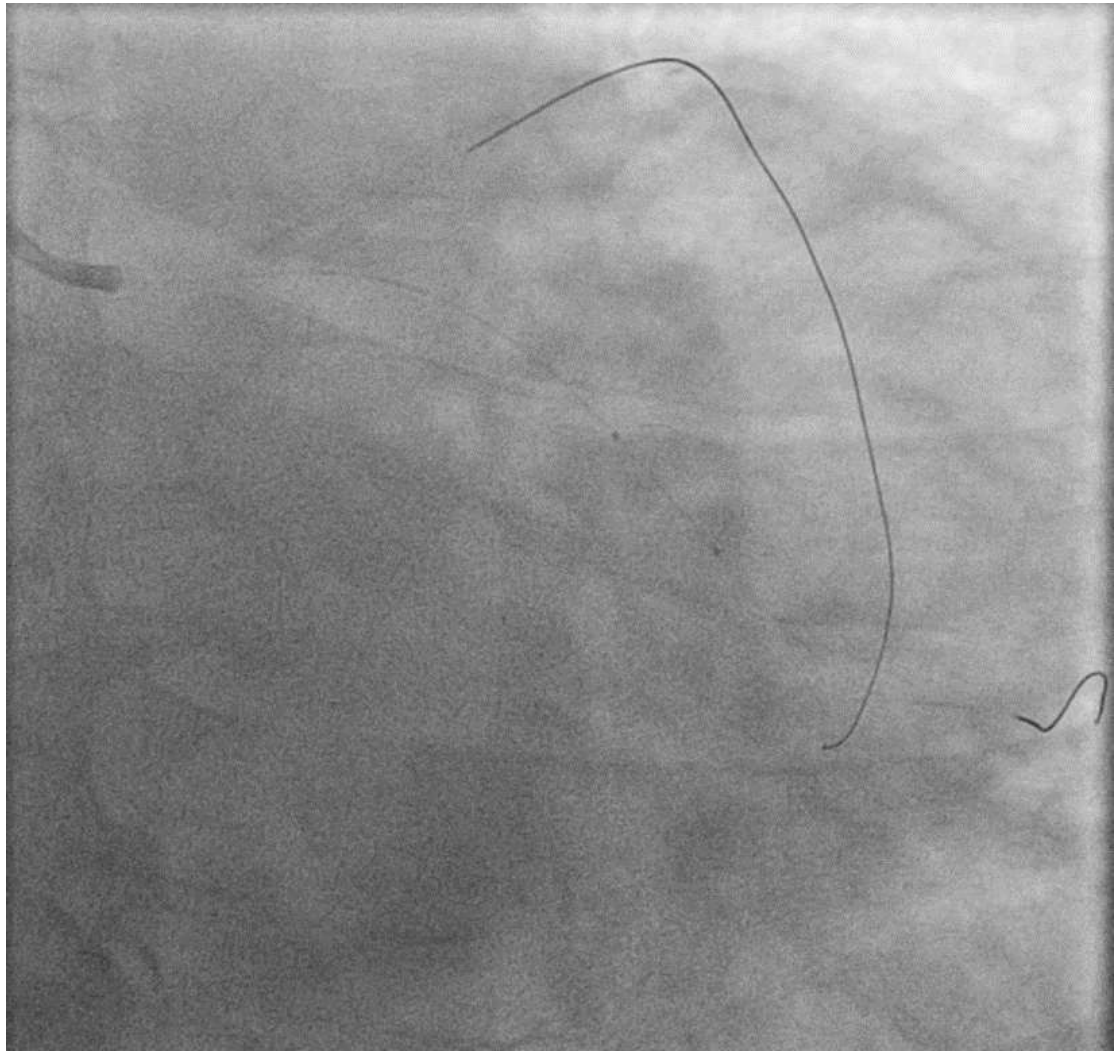
CASE PAT. 67 Y.O.

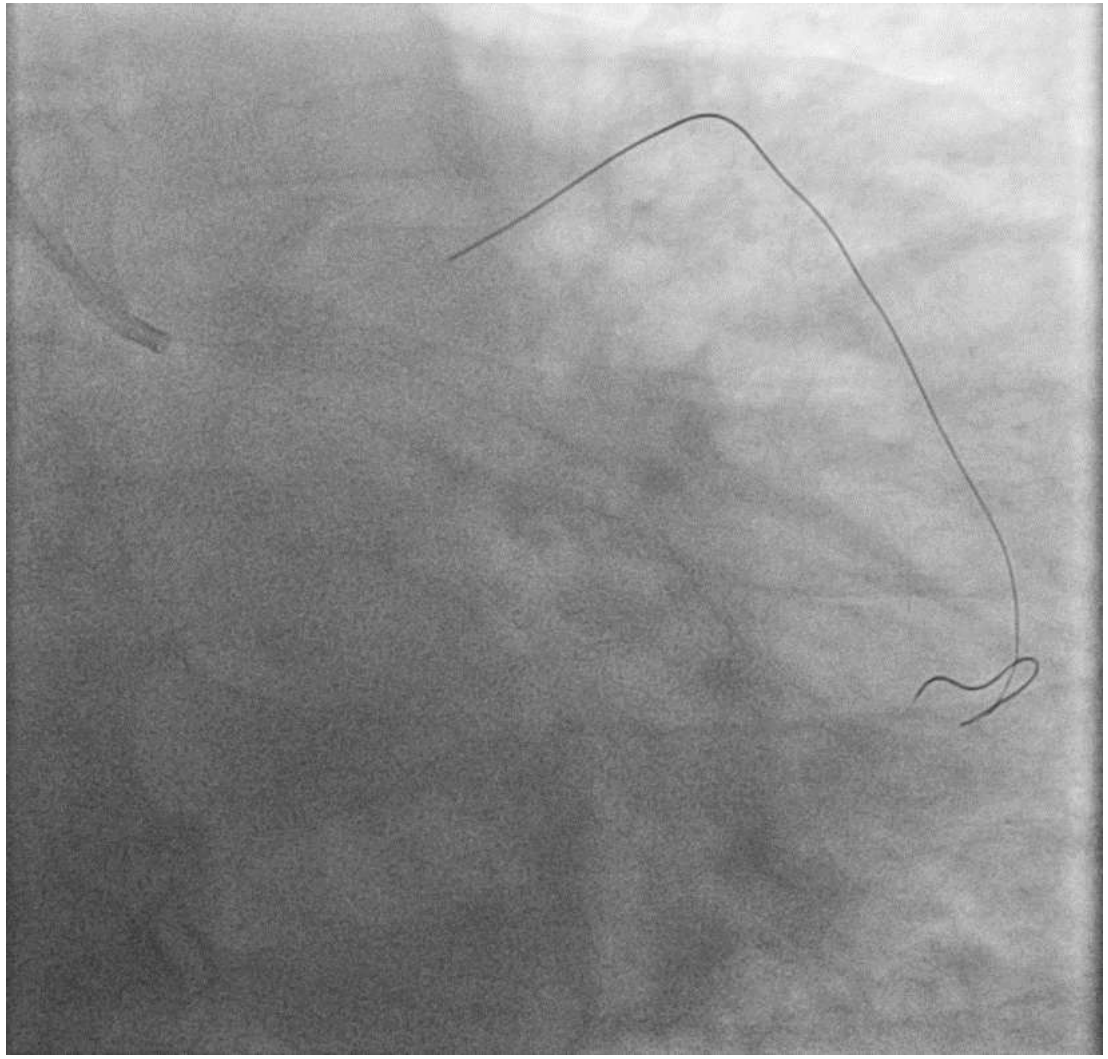




LAD-CTO-PCI, HS-PCI: FineCross, Fielder-XT-A, trapping, PTCAs, IVUS

CASE PAT. 67 Y.O.

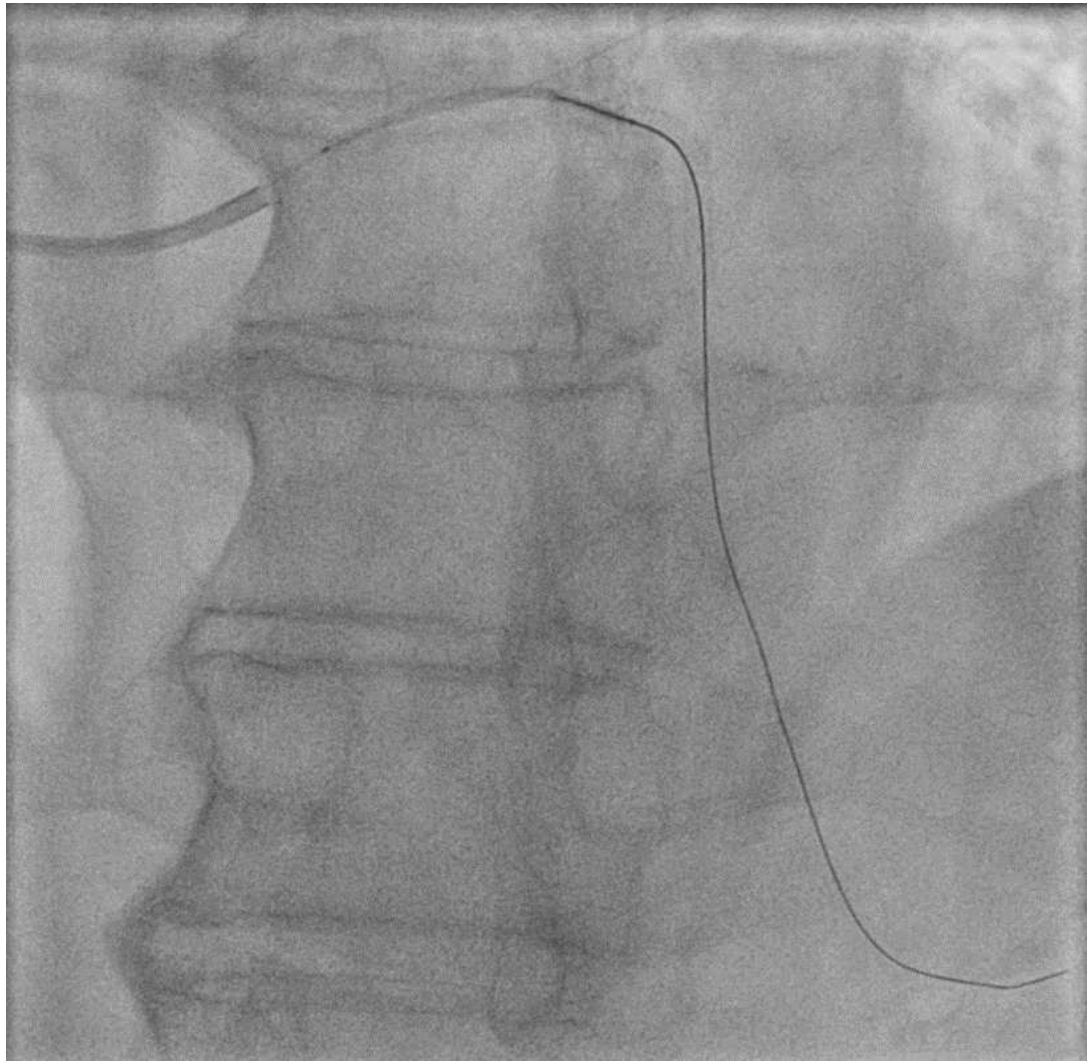


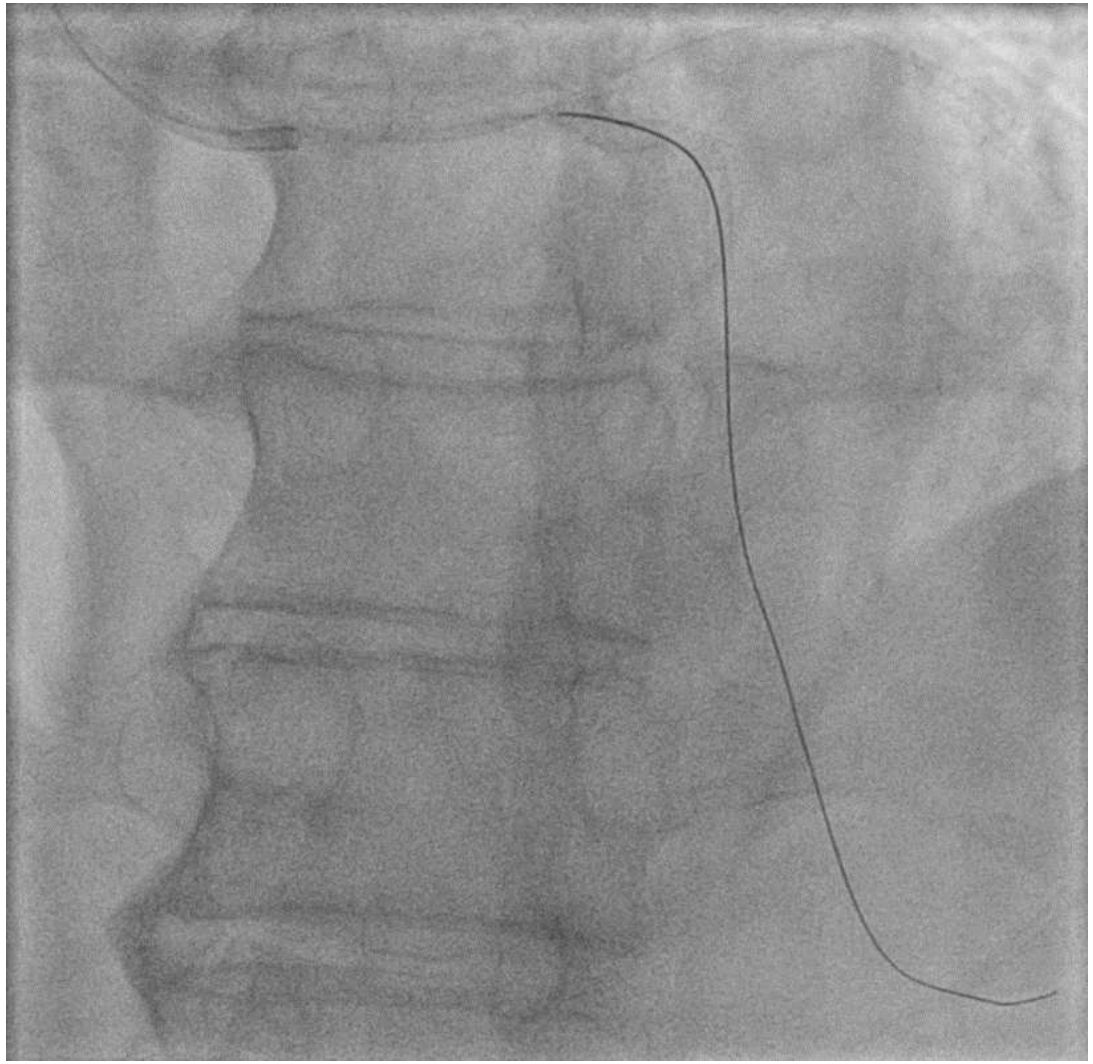


CX-PCI: PTCA and DES (Promus Premier Select 3,5x16mm).

IVUS: LM 5,5-5,7mm, long 70% stenosis. LAD: distal 2,25-2,5mm, medial 3mm, proximal 4mm, severe calcification in the CTO area, long diffuse plaque to distal.

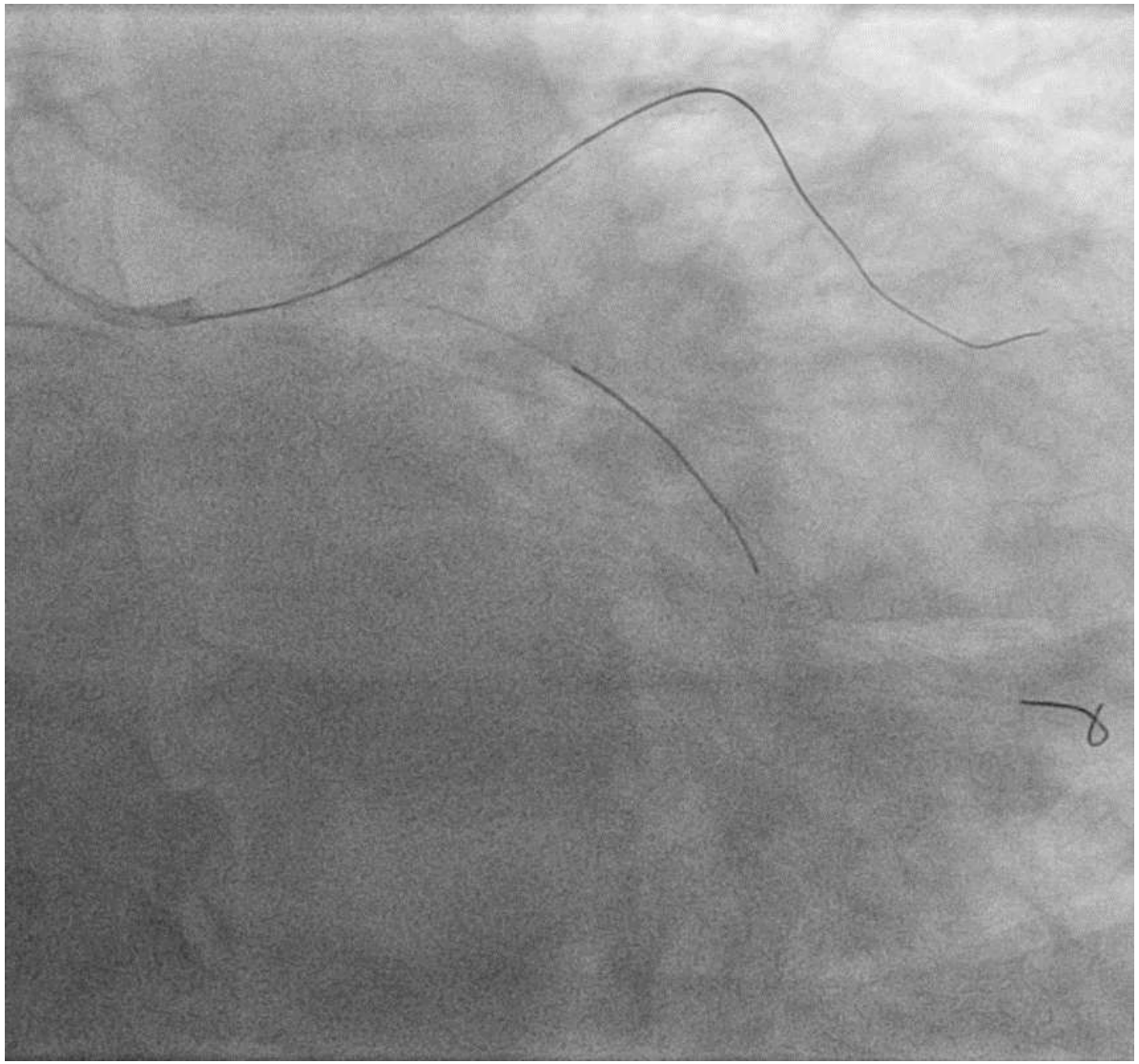
CASE PAT. 67 Y.O.

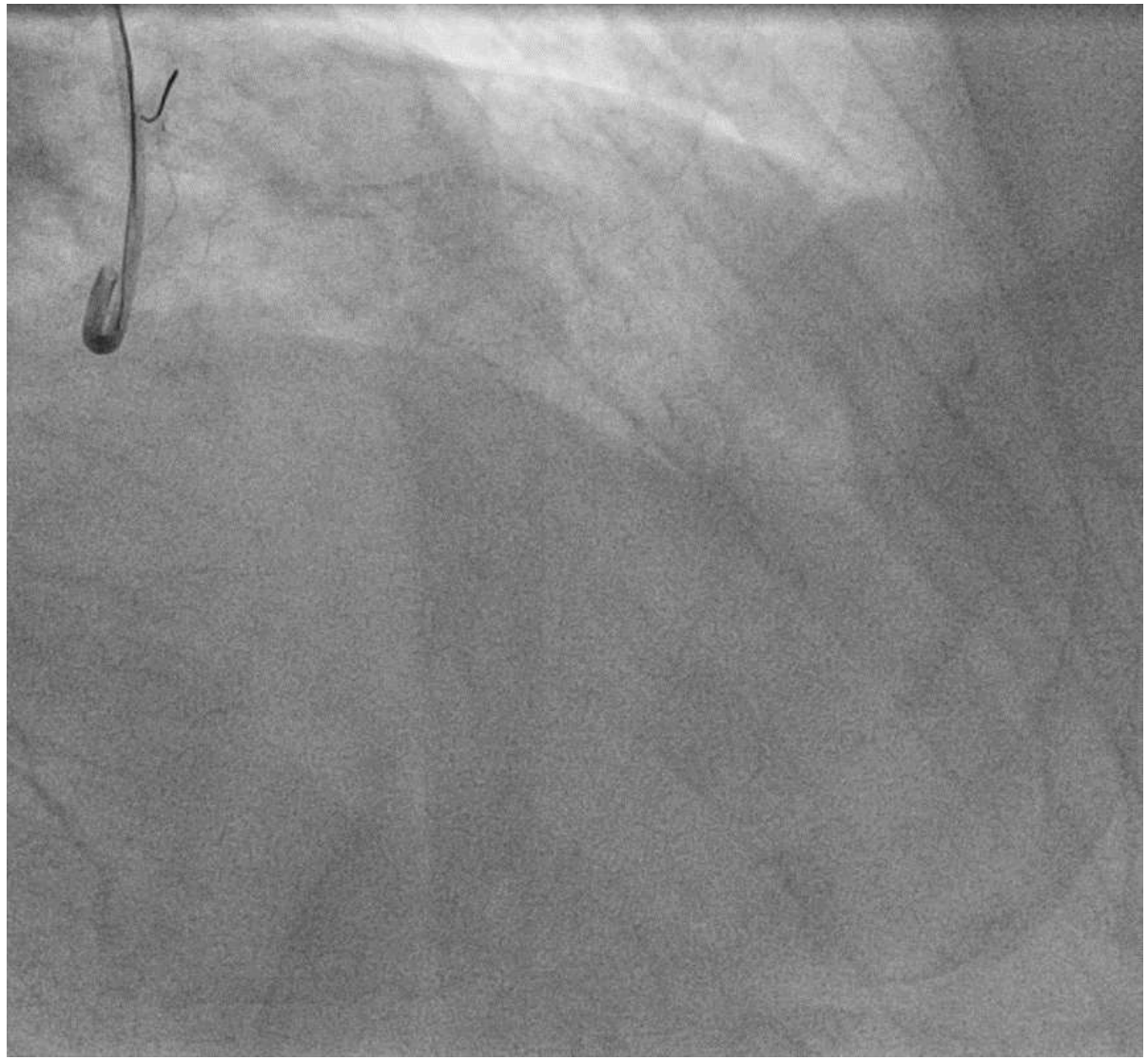




LAD-CTO-PCI and HS-PCI: blade angioplasty (NSA Alpha 3,0/13mm), 3xDCB (Sequent Please Neo 2,0x30mm, 2,25x40mm und 2,5x35mm) from distal to medial, 2xDES-Implantation (Supraflex Cruz 3,0x40mm und 4,0x48mm) in LAD/HS.

CASE PAT. 67 Y.O.





LAD-CTO-PCI and HS-PCI: POT in LM with 5,5mm NC balloon.

Contrast 250 ml, FT 36,08 min, DAP 22500 cGy*cm²

DISCHARGE

Patient was discharged:

- LifeVest® and guideline-directed heart failure therapy,
- DOAC and antiplatelet therapy,
- Optimal management of cardiovascular risk factors.

Follow-up was scheduled after appr. 2 months for elective treatment of the RCA-CTO as well as clinical, laboratory and echocardiographic reassessment.

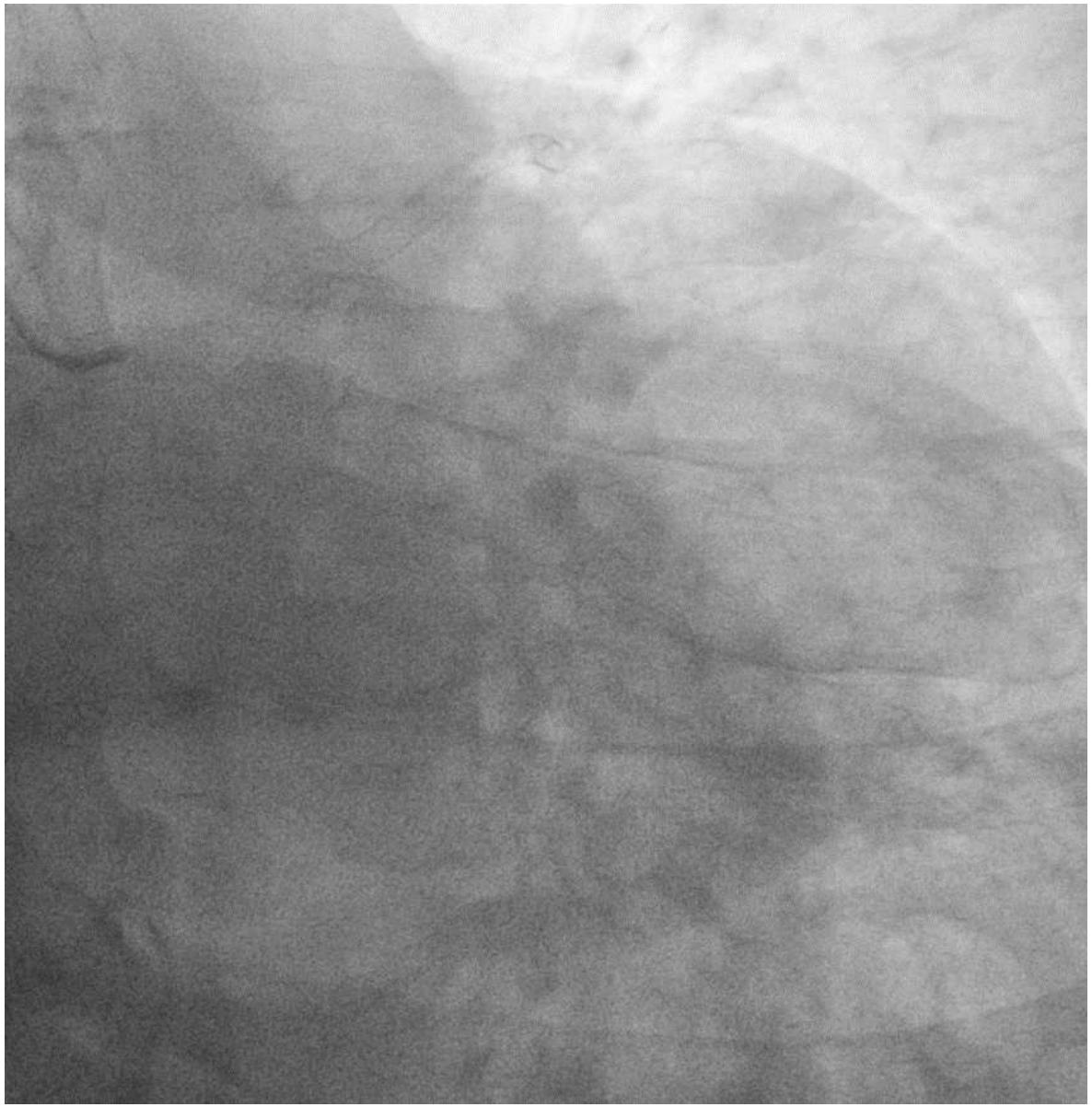
ELECTIVE ADMISSION AFTER 2 MON.

F-UP:

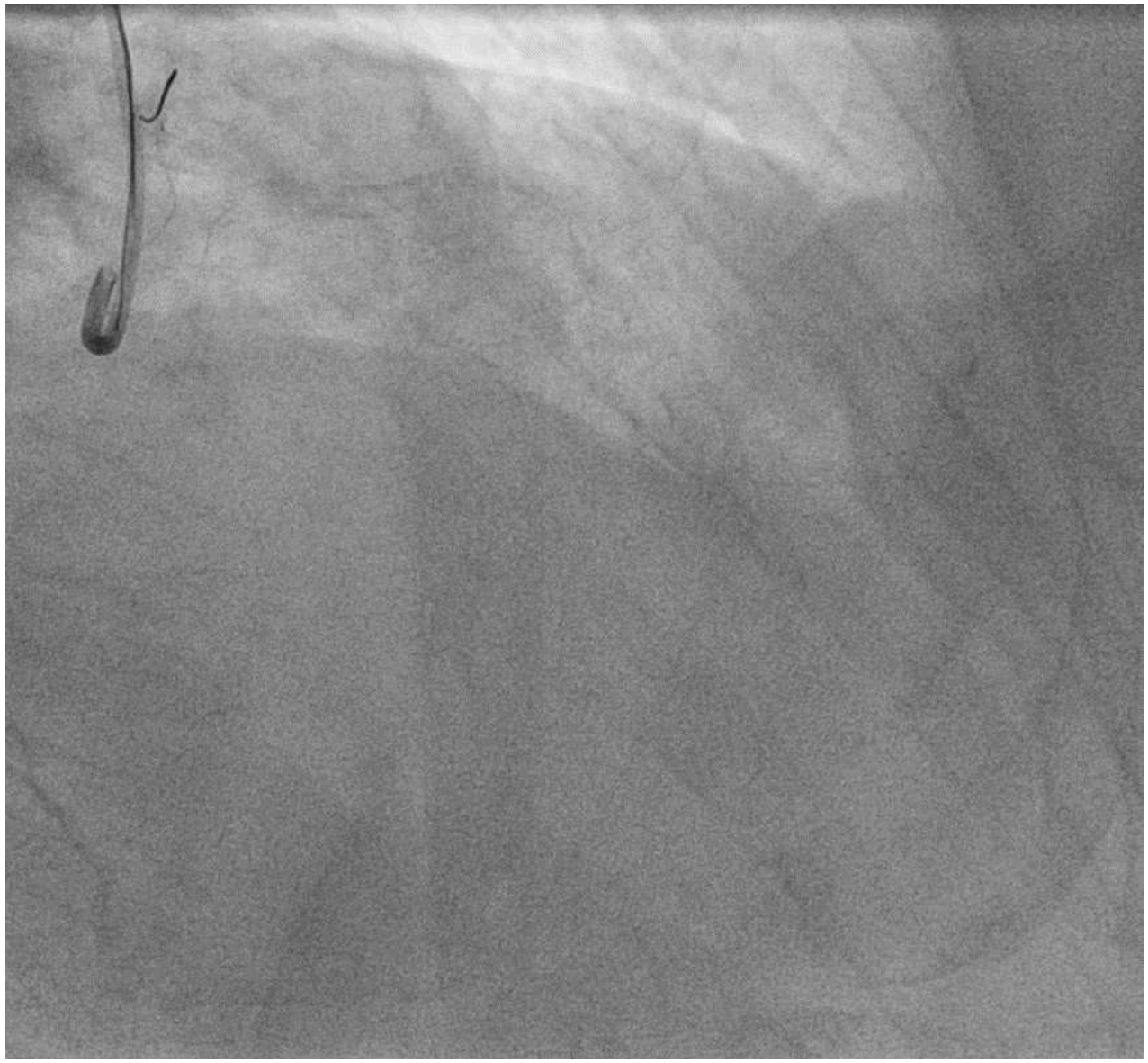
- Symptoms had regressed nearly completely, with the patient now in NYHA class I to II, without pulmonary congestion or peripheral oedema.

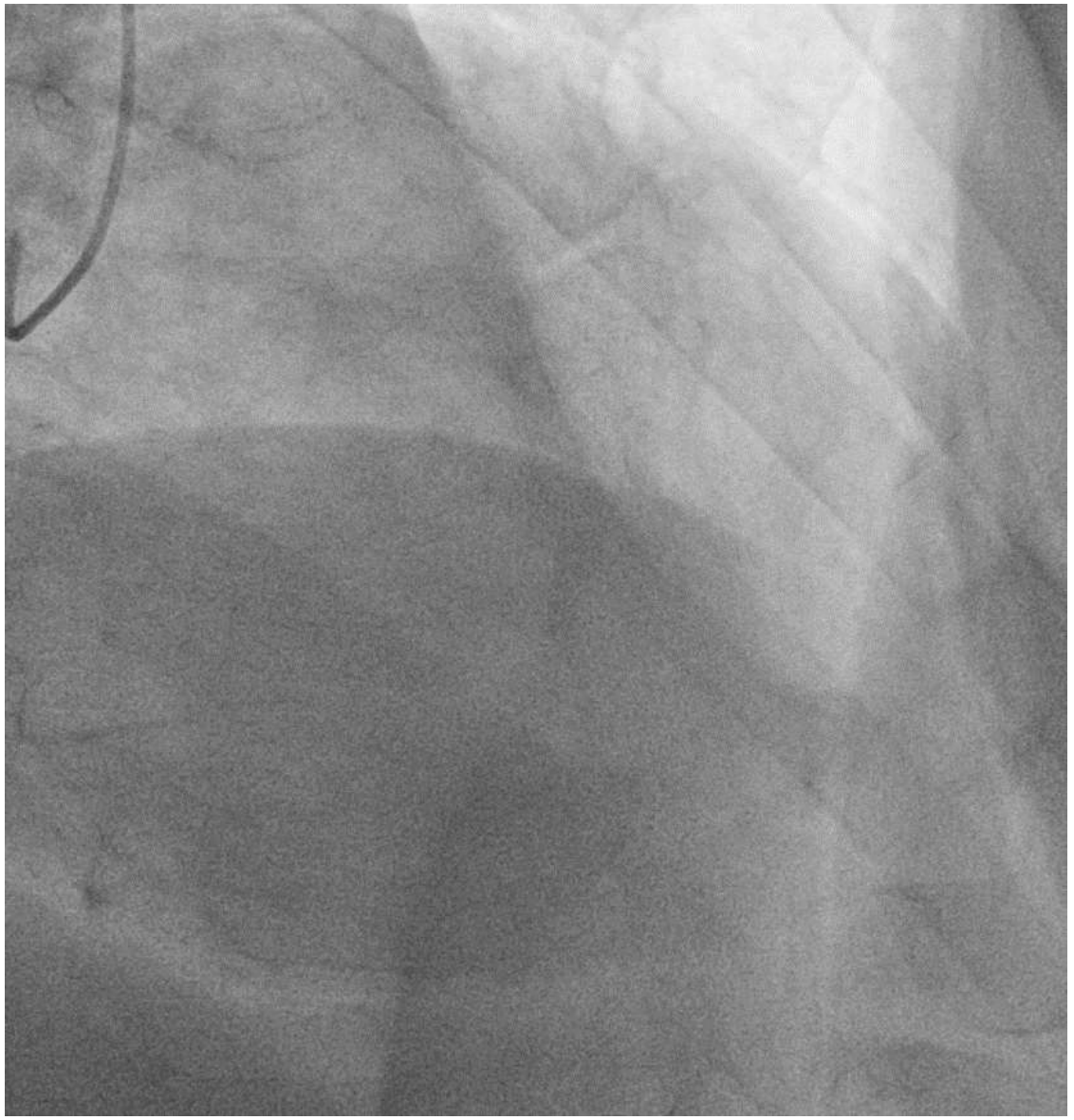
- Significant weight loss: initial 112 kg to 98 kg

CASE PAT. 67 Y.O. – IN 2 MON.

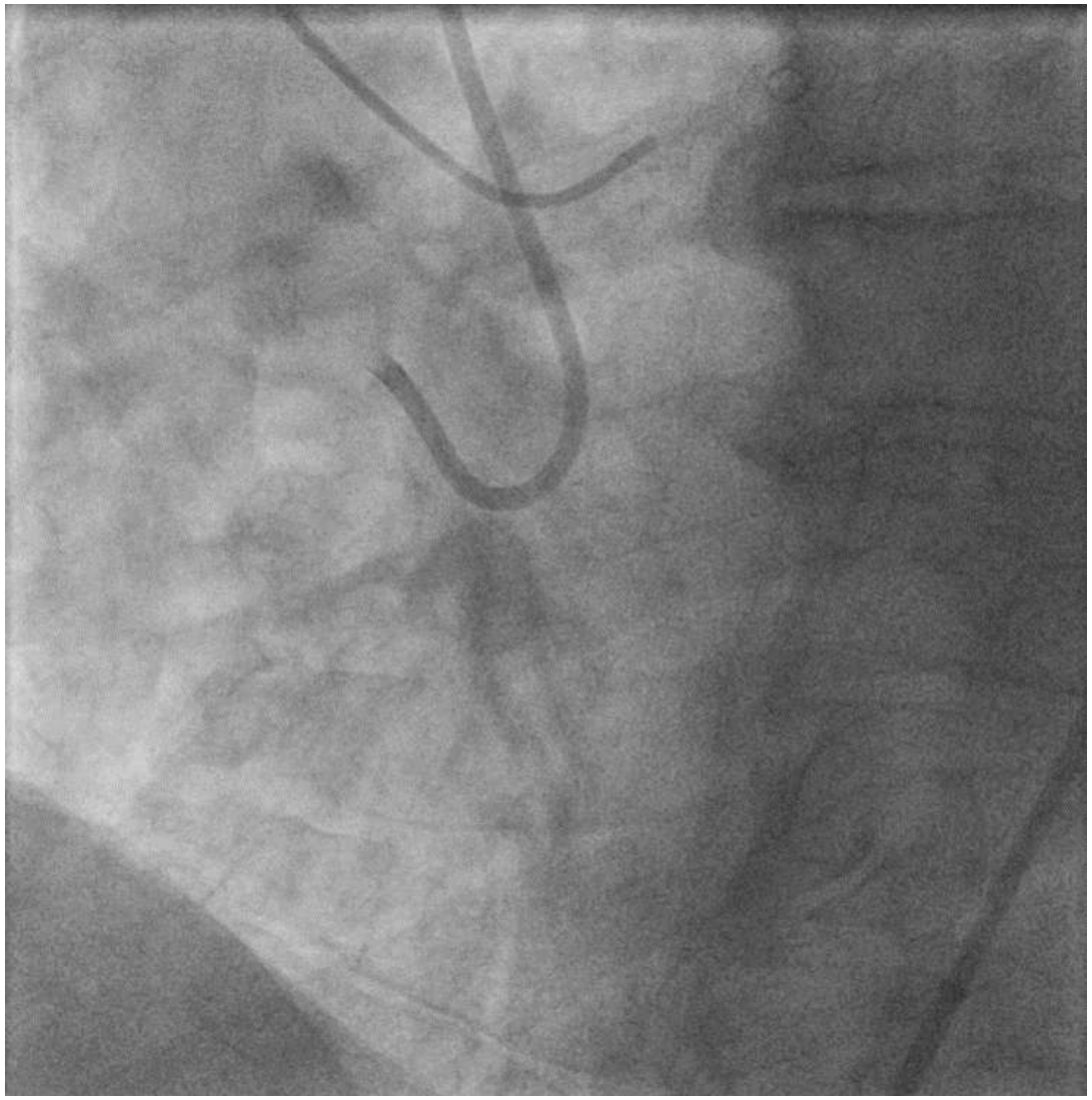


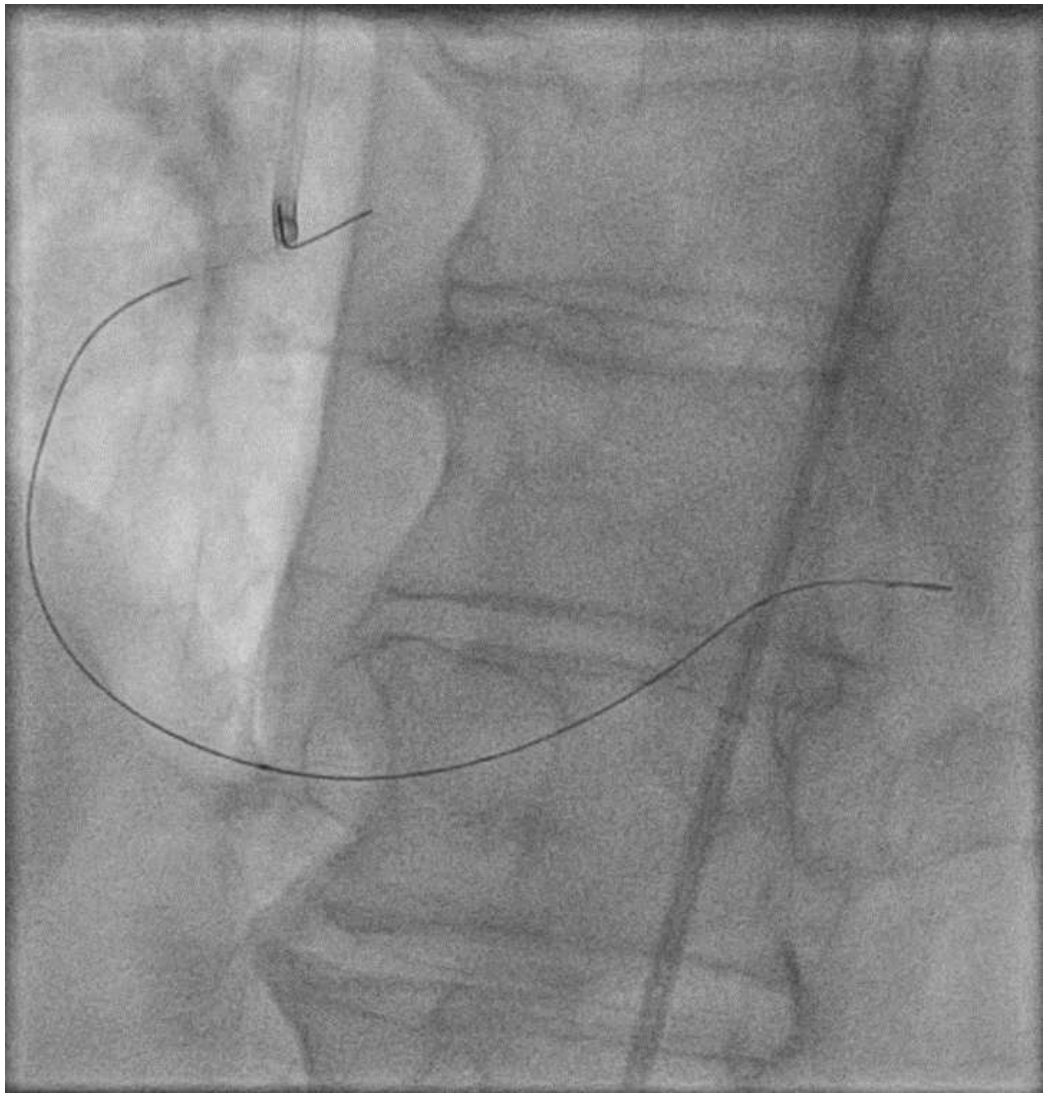
CASE PAT. 67 Y.O. – IN 2 MON.





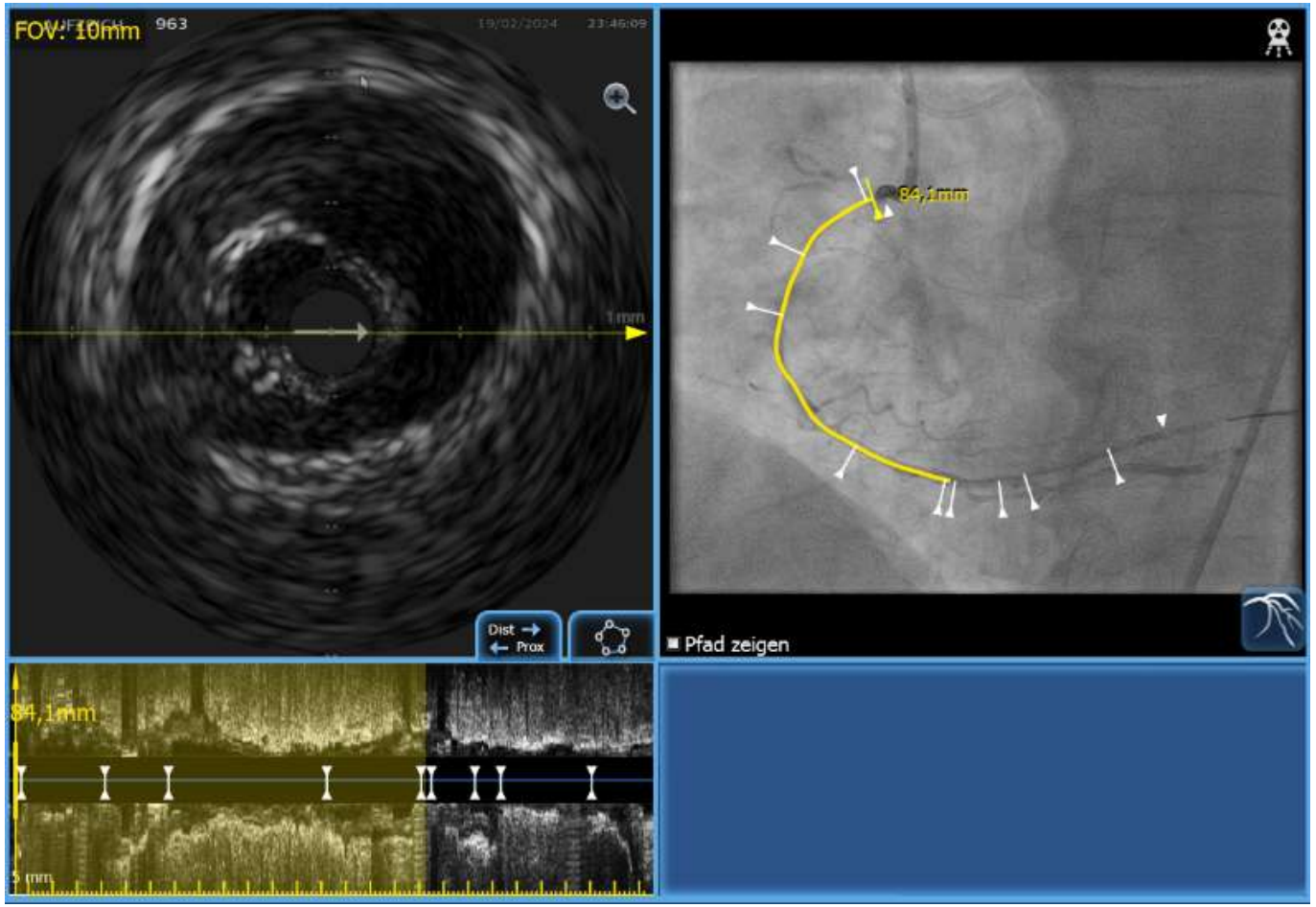
CASE PAT. 67 Y.O. – IN 2 MON.

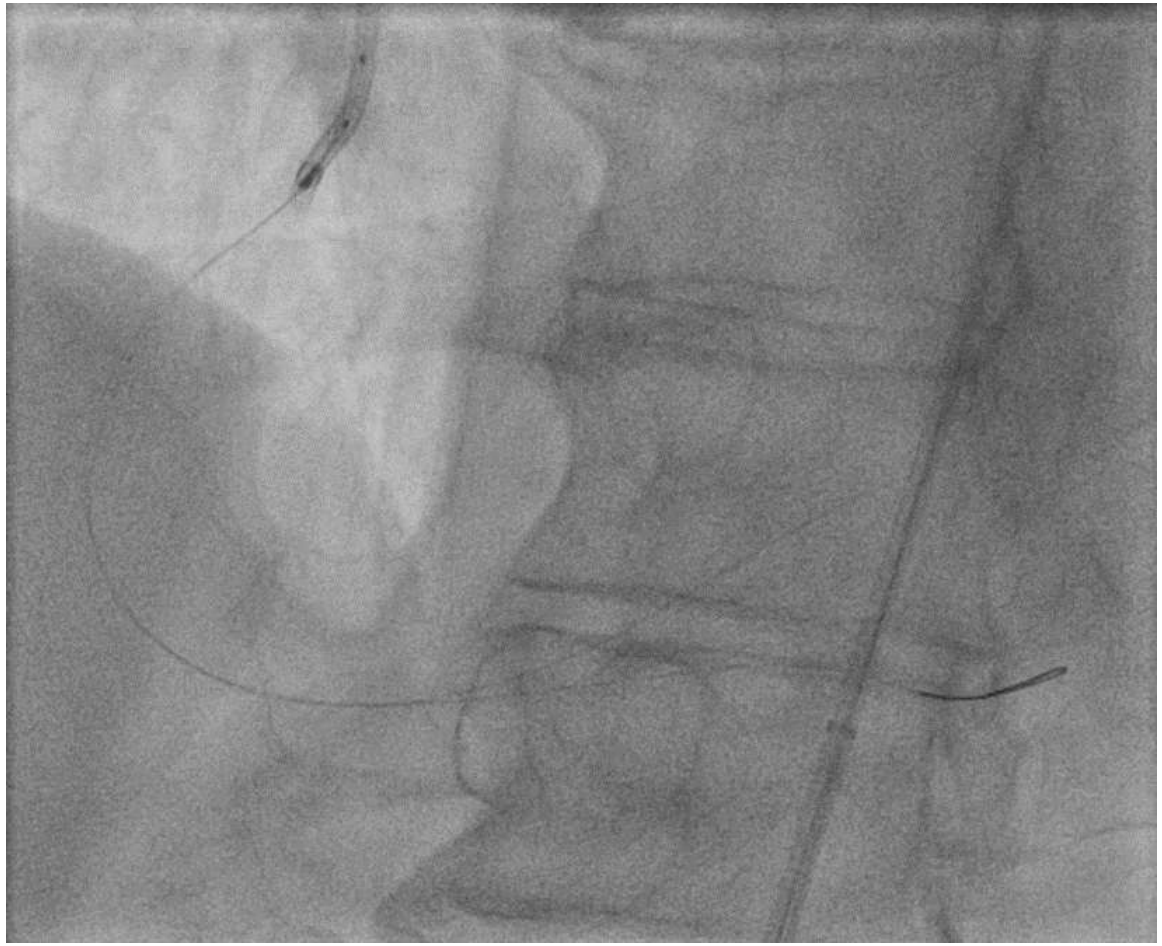




RCA-CTO-PCI: SuperCross, Fielder-XT-A with a unsuccessful attempt, Gaia Sec. successful, SuperCross, Runthrough, Trapping, PTCAs

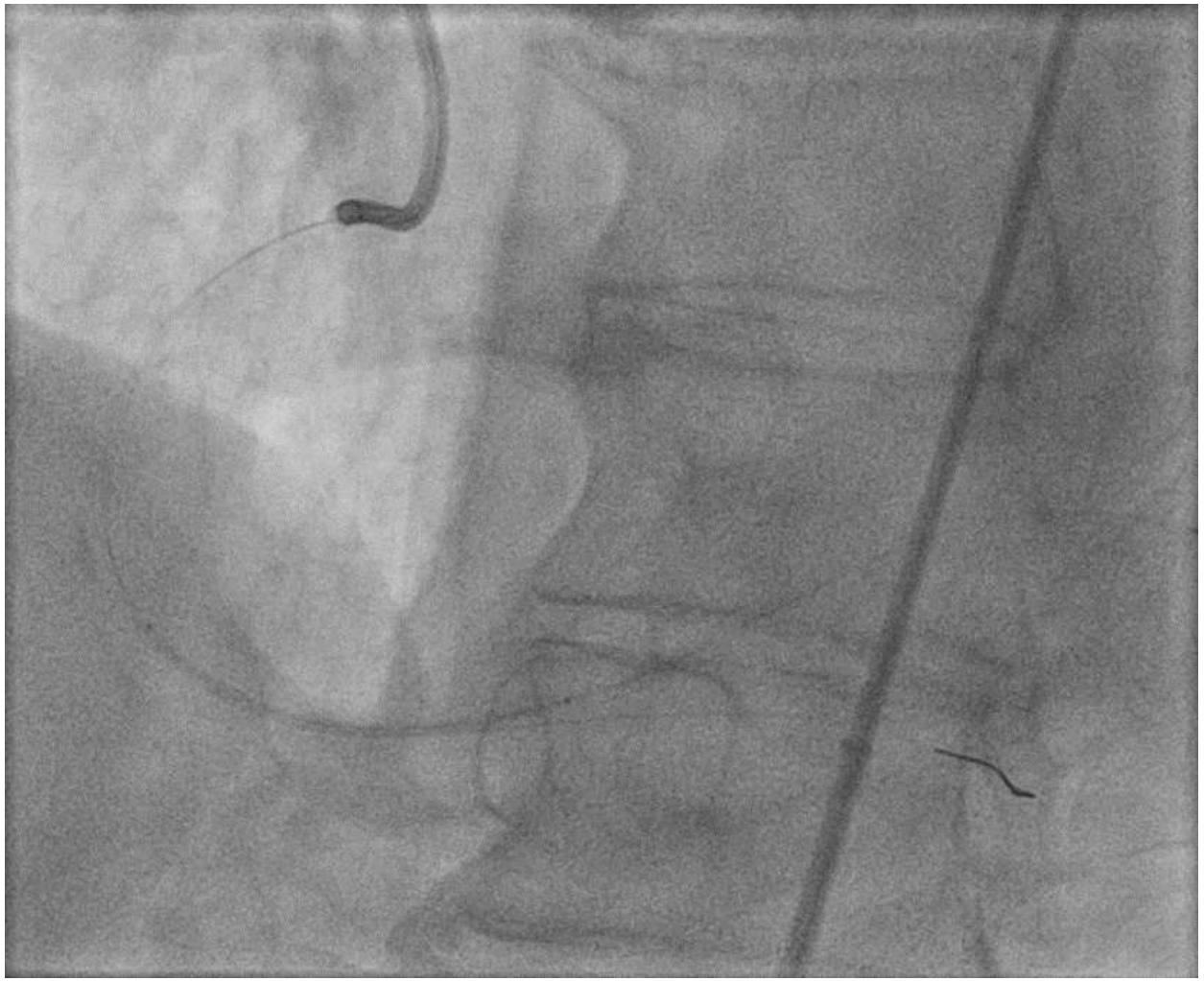
CASE PAT. 67 Y.O. – IN 2 MON.

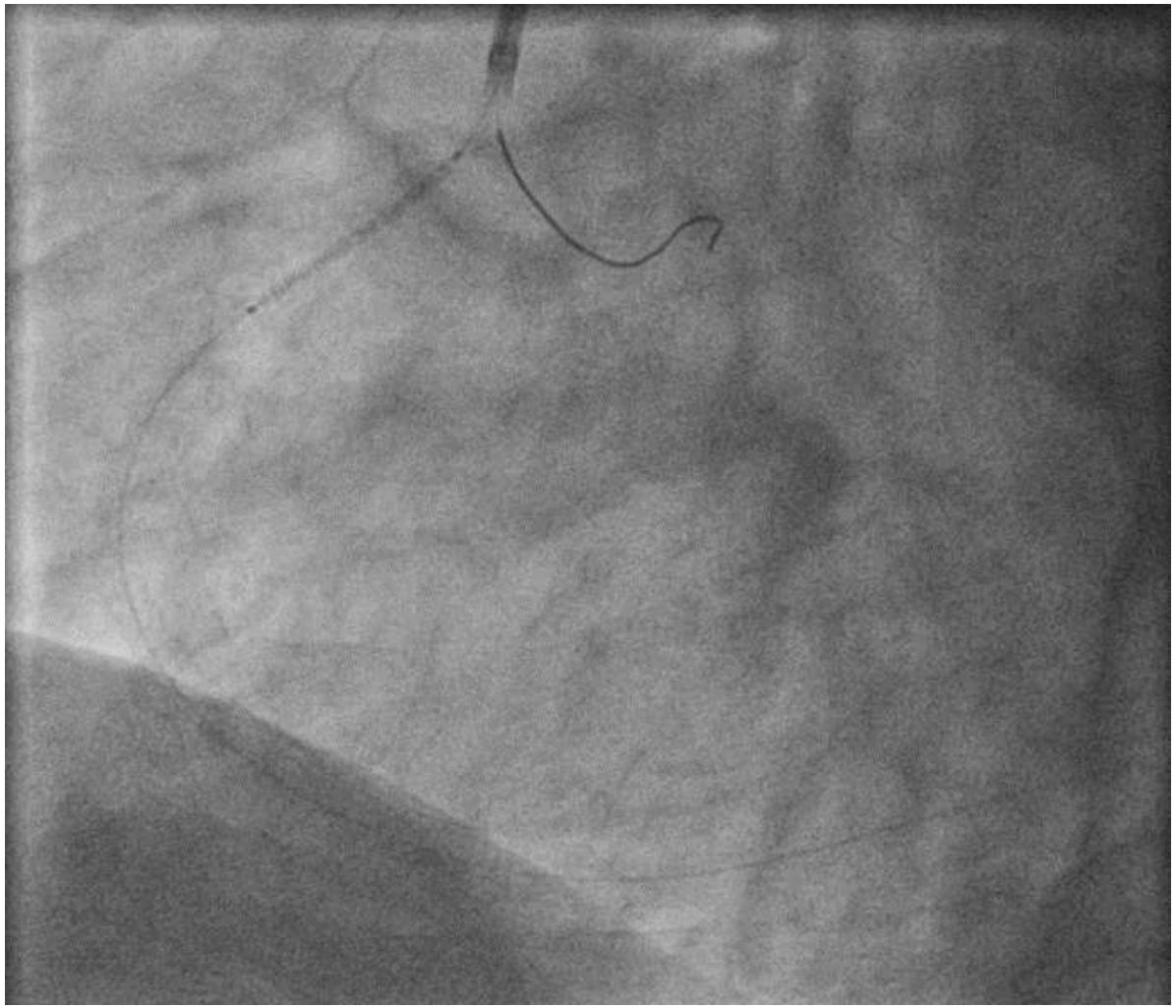




IVUS-RCA: proximal 5-5,5mm, medial 4-4,5mm, distal 3,5mm; after crux 2,75mm

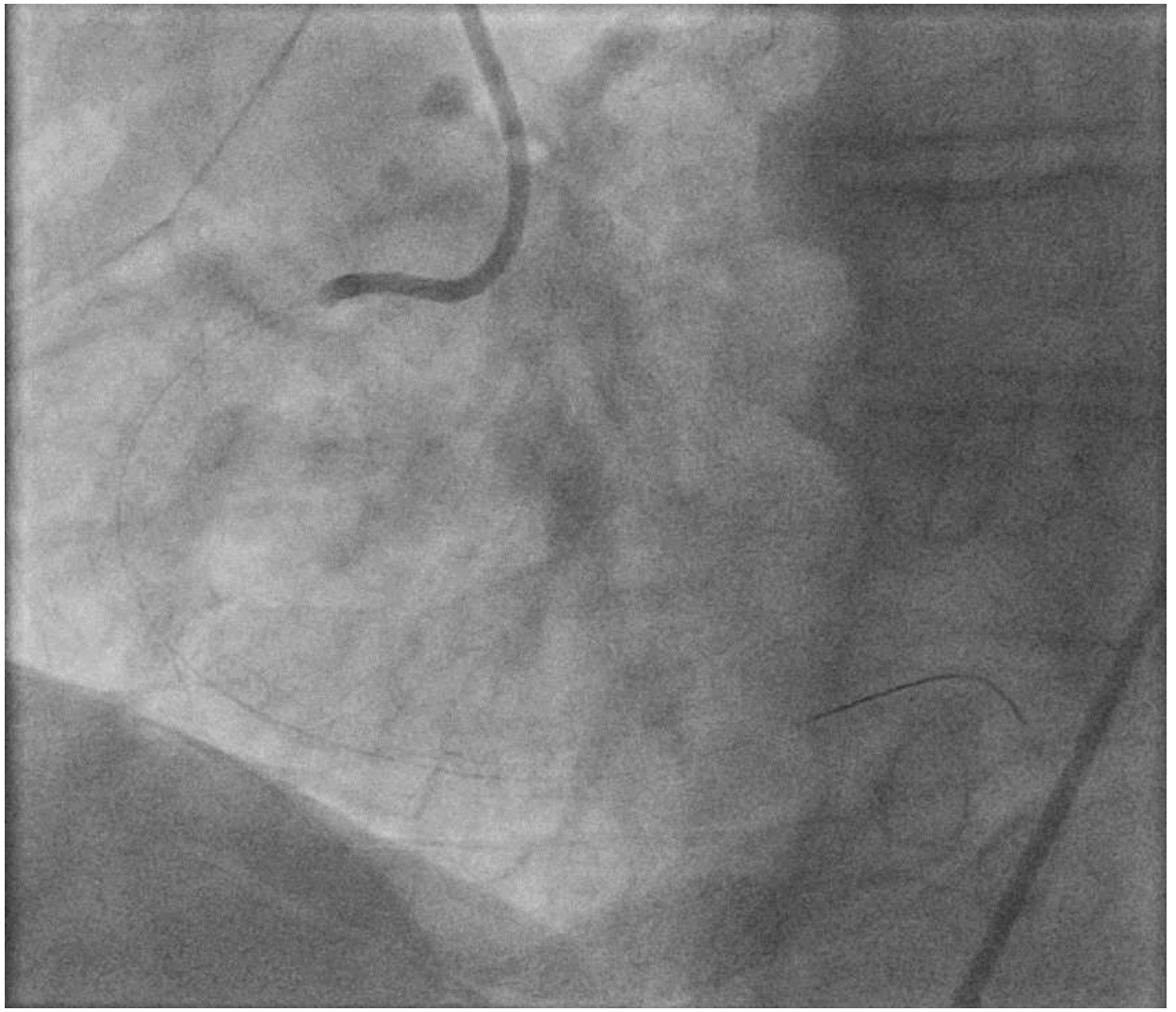
CASE PAT. 67 Y.O. – IN 2 MON.





RCA-CTO-PCI: DCB-PCI in RPLD (Sequent Please Neo 2,75x30mm) and RIVP (Sequent Please Neo 2,75x40mm), 3xDES (Supraflex Cruz 3,5x48mm, 4,0x44mm und 4,5x20mm)

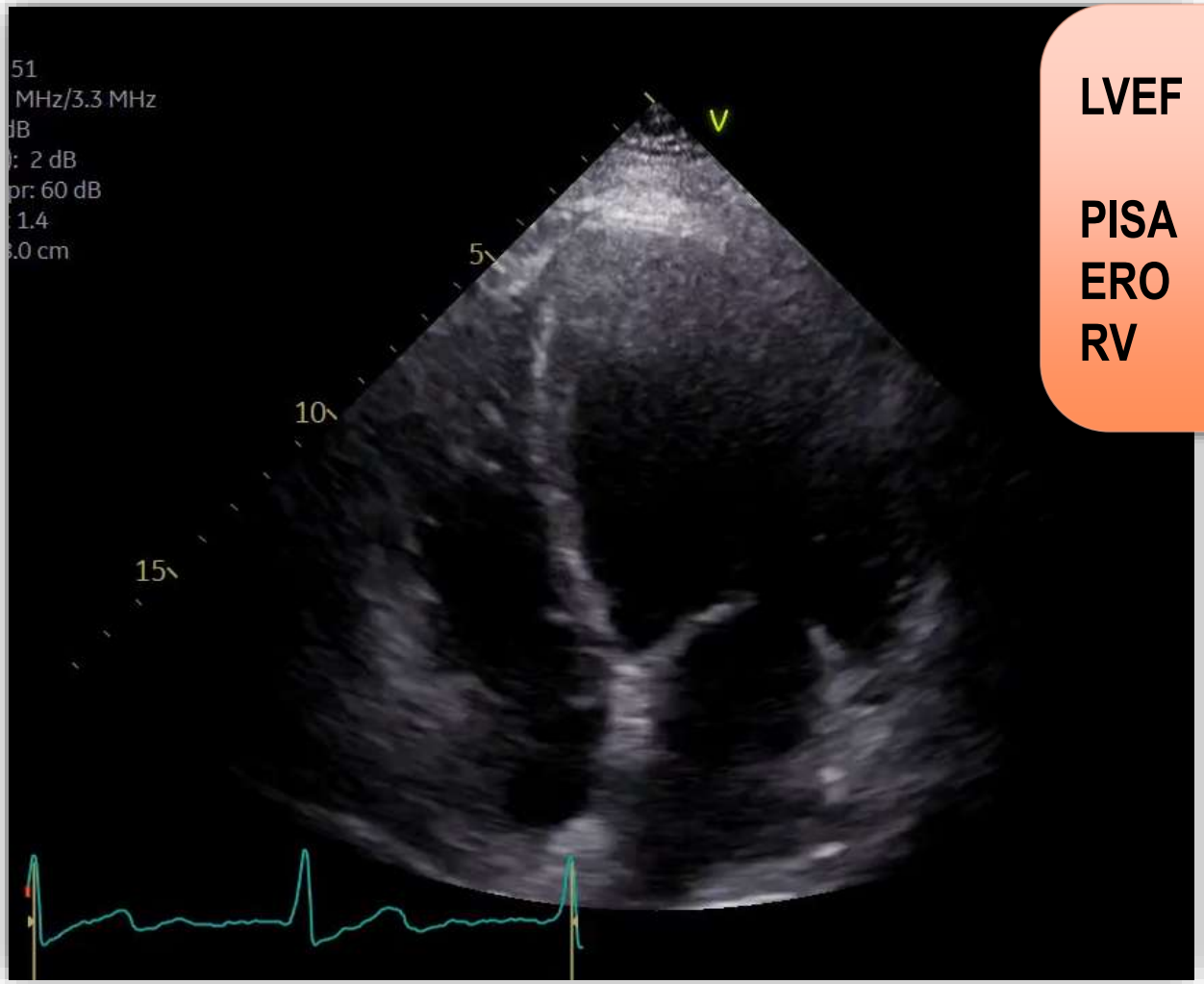
CASE PAT. 67 Y.O. – IN 2 MON.



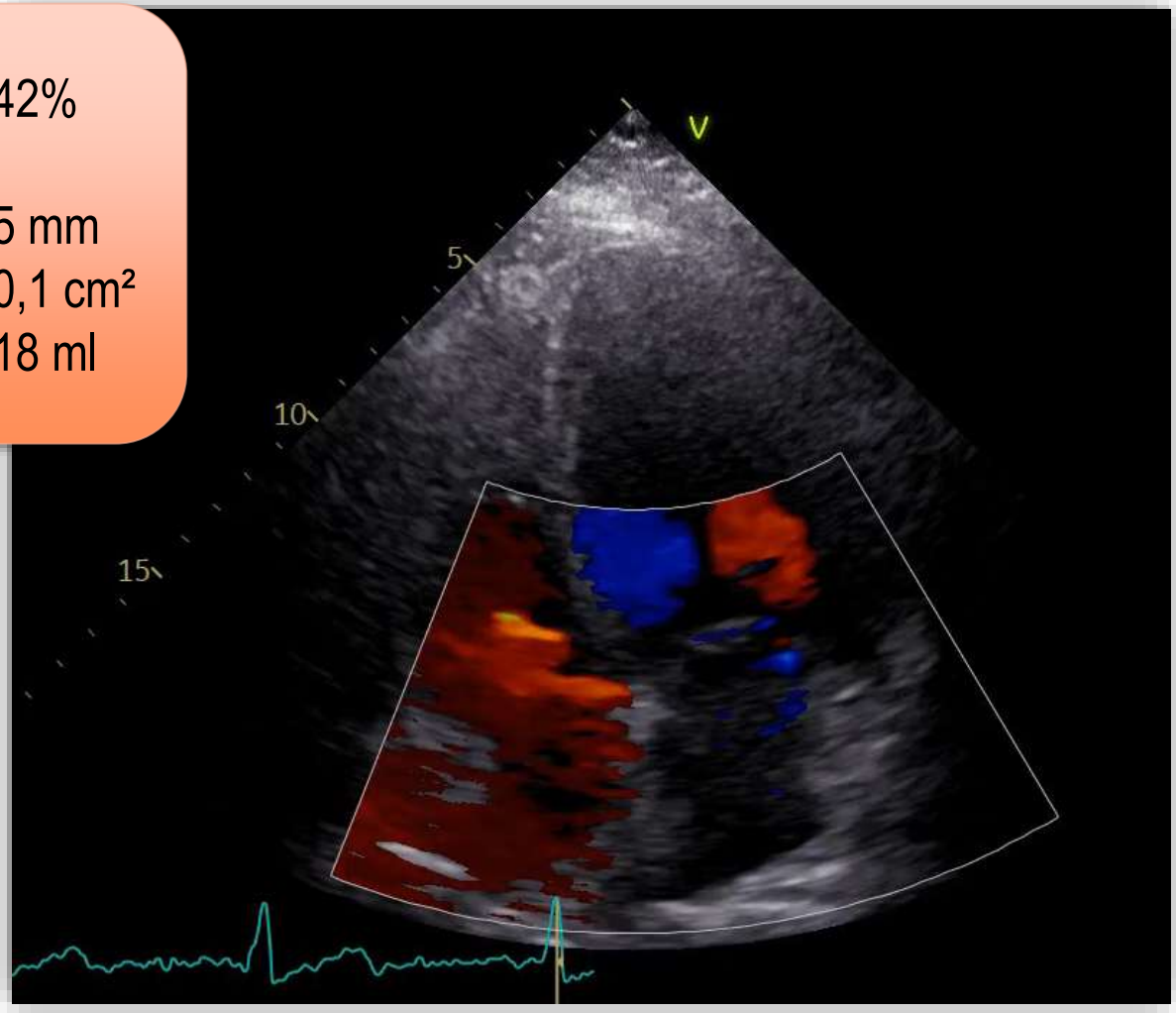
RCA-CTO-PCI: proximal stent optimisation with 4,5mm, 5mm and 5,5 mm NC balloons.

Contrast 250 ml, FT 54,1 min, DAP 15100 cGy*cm²

ECHOCARDIOGRAFY: 2. ADMISSION



LVEF	42%
PISA	5 mm
ERO	0,1 cm²
RV	18 ml



- significant improvement in LV function: moderately reduced.
- severe mitral insufficiency had improved to only mild insufficiency.

CONCLUSION

- The ageing population is growing, creating an increasing demand for the treatment of CAD in patients with multiple comorbidities and complex anatomical characteristics.

- CHIP procedures carry a risk of complications such as death, cardiac arrest and severe heart failure.

- Patients with complex severely calcified CAD and ICM require a structured approach in Heart-Team for the optimal therapeutic strategy.

- Due to successful PCIs, optimal pharmacological therapy of the heart failure and adequate patient education significant improvement in symptoms, laboratory parameters, and echocardiographic findings was achieved in a short period of time.

THANK YOU FOR YOUR ATTENTION!