PLACE

PLATFORM OF LABORATORIES FOR ADVANCES IN CARDIAC EXPERIENCE

ROMA
Centro Congressi
di Confindustria
Auditorium
della Tecnica

9ª Edizione

30 Settembre
1 Ottobre
2022

HOT TOPICS IN CATH LAB 2:
CORONARY PHYSIOLOGY & INTRAVASCULAR IMAGING

OCT: INDICAZIONI NEL 2022 E PROSPETTIVE FUTURE

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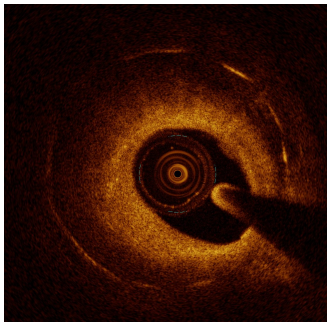
Istituto di Ricovero e Cura a Carattere Scientifico

WHICH INDICATIONS FOR OCT IN 2022?

What Guidelines recommend…

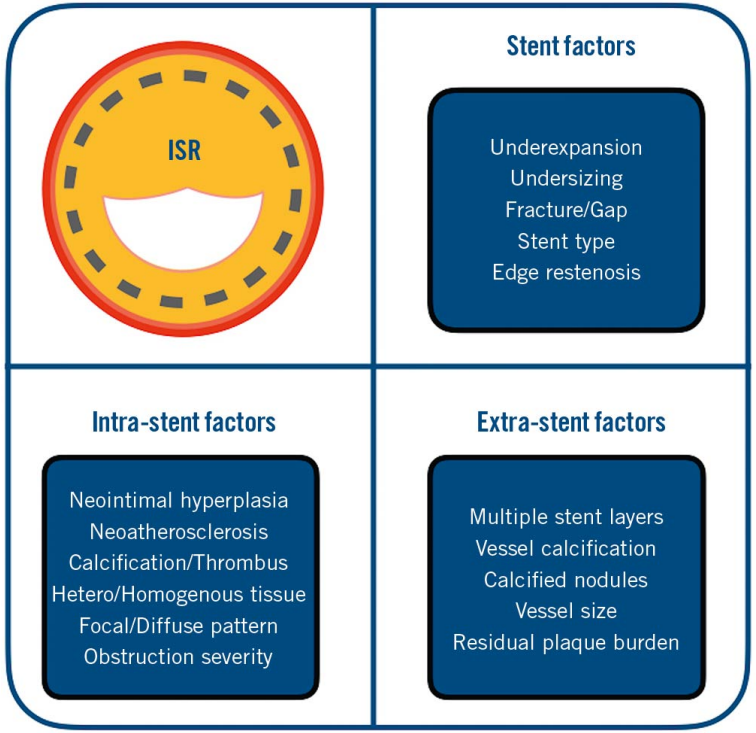
1. "OCT should be considered to detect stent-related mechanical problems leading to restenosis"

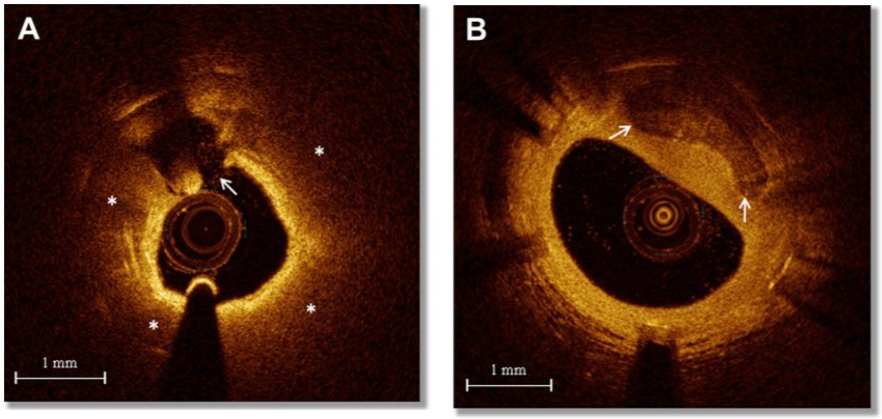
IIa	C



Neumann FJ, et al. Eur Heart J 2019;40:87-165

OCT for assessment of restenosis

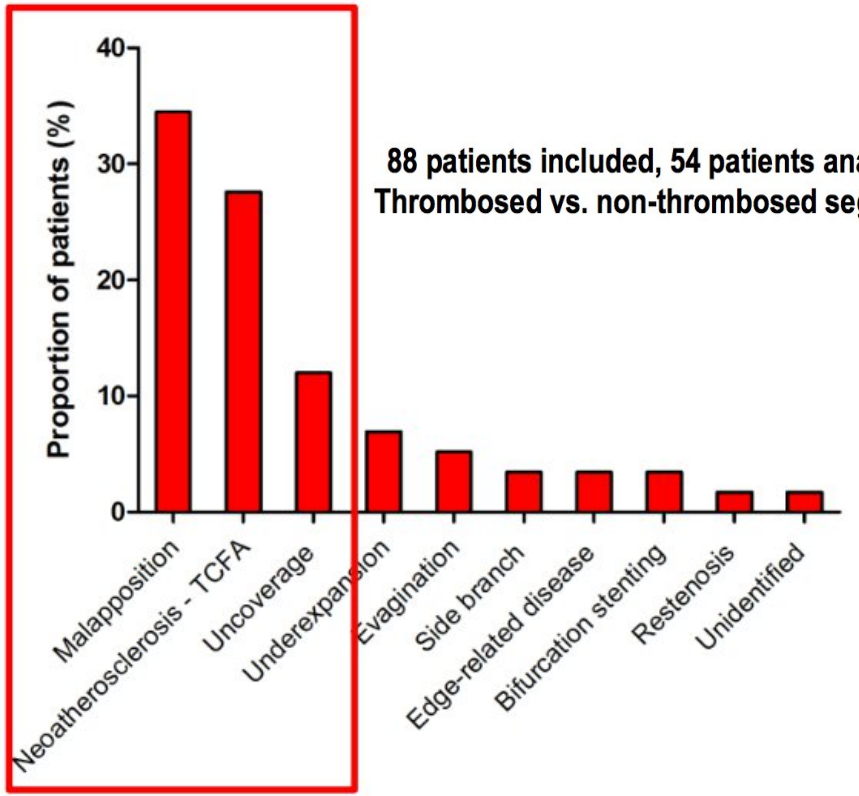




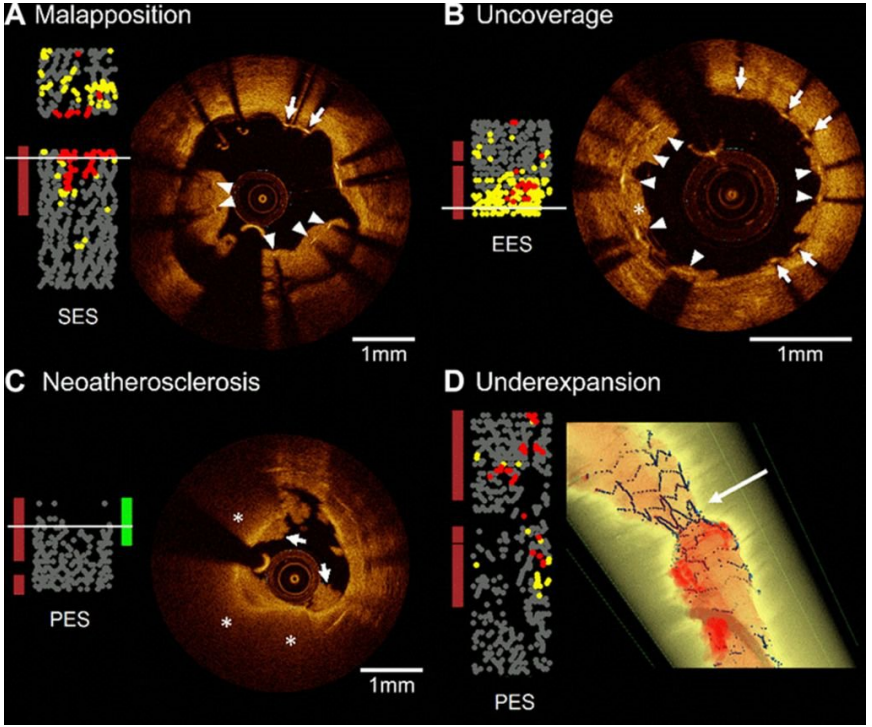
Alfonso F, et al. Eurointervention 2022;18e103-e123

Vergallo, et al. Am J Cardiol 2013;112:1315-21

Mechanisms of very late DES thrombosis



88 patients included, 54 patients analysed
Thrombosed vs. non-thrombosed segments



Taniwaki M, et al. Circulation 2016;133:650-60

WHICH INDICATIONS FOR OCT IN 2022?

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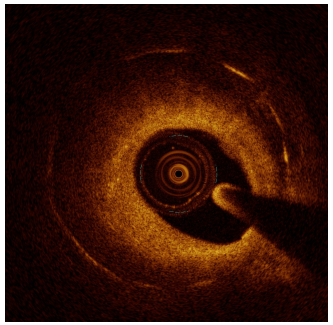
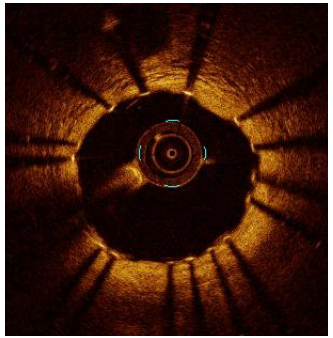


2. "OCT should be considered in selected patients to optimize stent implantation".

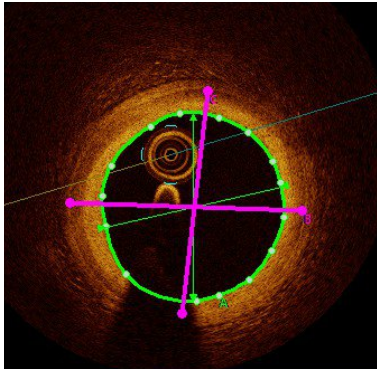
IIa | B



Neumann FJ, et al. Eur Heart J 2019;40:87-165

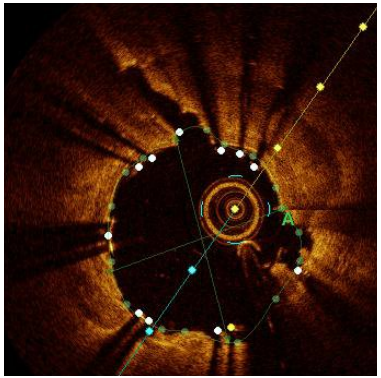
OCT to optimize stent implantation

Intra-procedural OCT applications



Treatment strategy optimization

- length (e.g. landing zone identification)
- lesion preparation strategy
- size (stent selection)

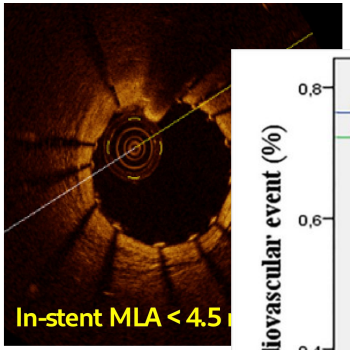


Procedural result confirmation and/or optimization

- stent apposition
- lesion coverage
- stent expansion

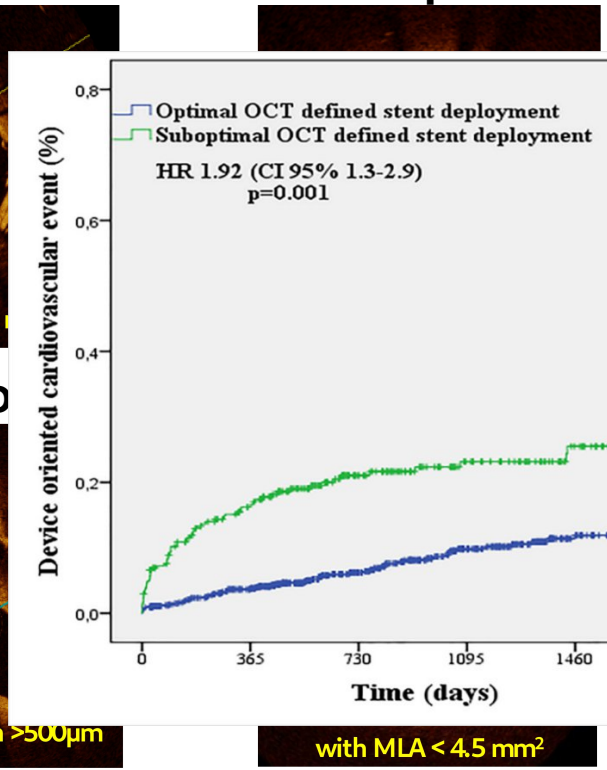
OCT to optimize stent implantation

MLA



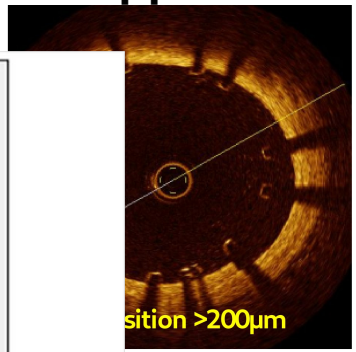
In-stent MLA < 4.5

Underexpansion



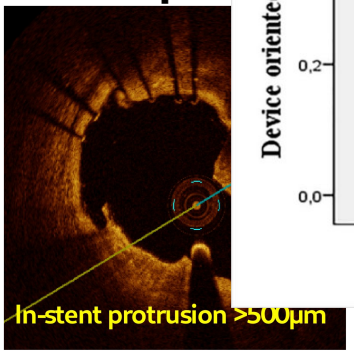
with MLA < 4.5 mm²

Malapposition



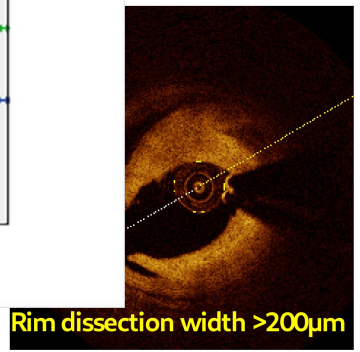
sition >200µm

Tissue pro



In-stent protrusion >500µm

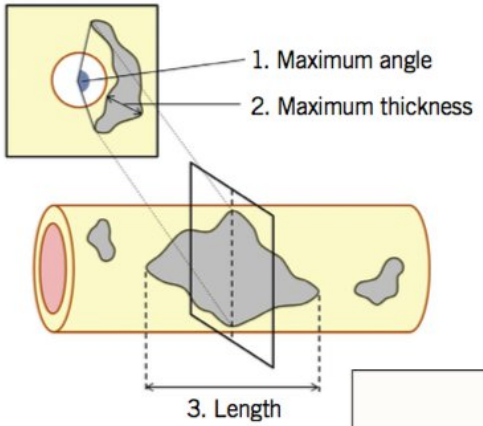
dissection



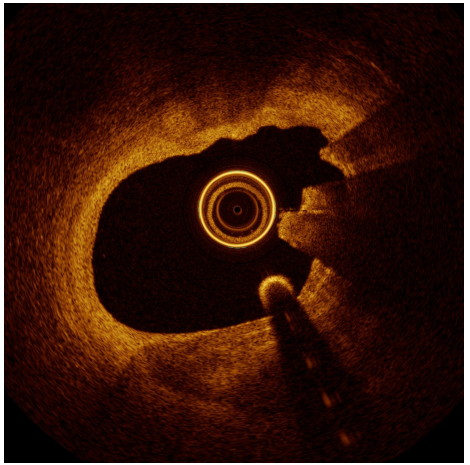
Rim dissection width >200µm

Prati F, et al. JACC Cardiovasc Imaging 2015

OCT to optimize stent implantation – calcified lesions



OCT-based calcium score	
1. Maximum calcium angle (°)	≤180° ➡ 0 point >180° ➡ 2 points
2. Maximum calcium thickness (mm)	≤0.5 mm ➡ 0 point >0.5 mm ➡ 1 point
3. Calcium length (mm)	≤5.0 mm ➡ 0 point >5.0 mm ➡ 1 point
Total score	**0 to 4 points**

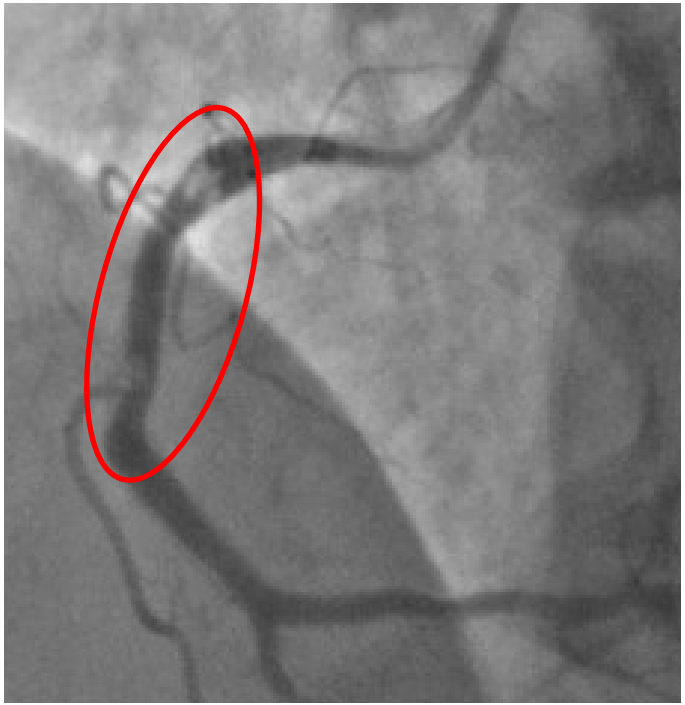


Lesions with calcium score 4

Stent underexpansion

Fujino A, et al. EuroIntervention 2018;13:e2182-e2189

ULTREON to aid identification of calcium



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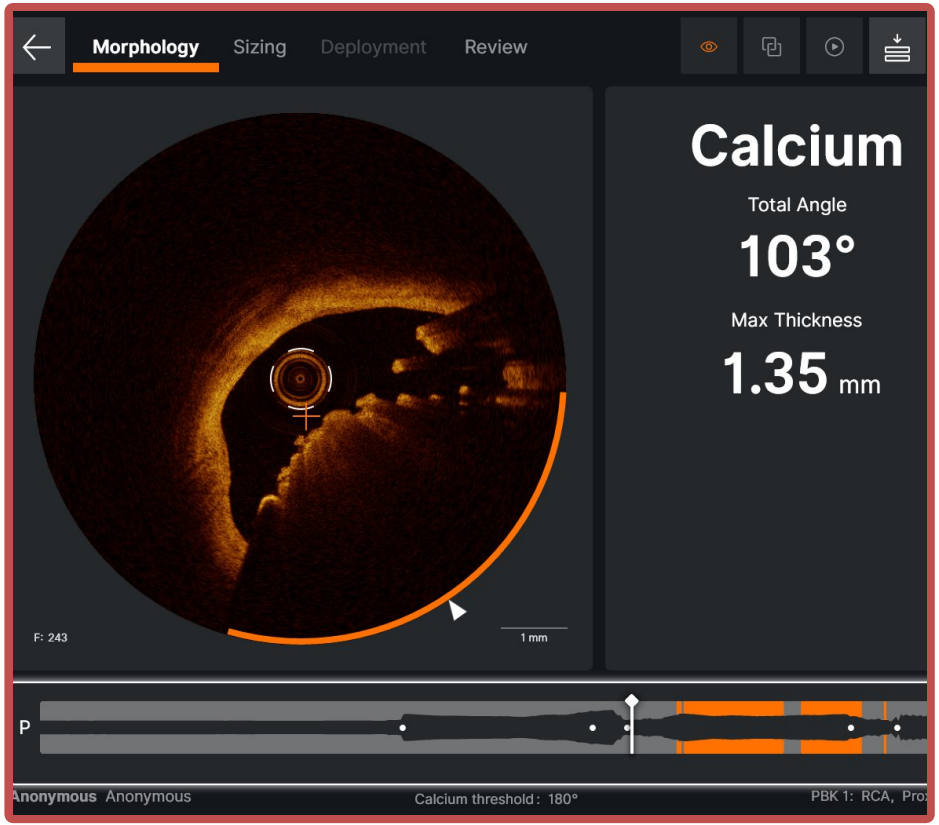
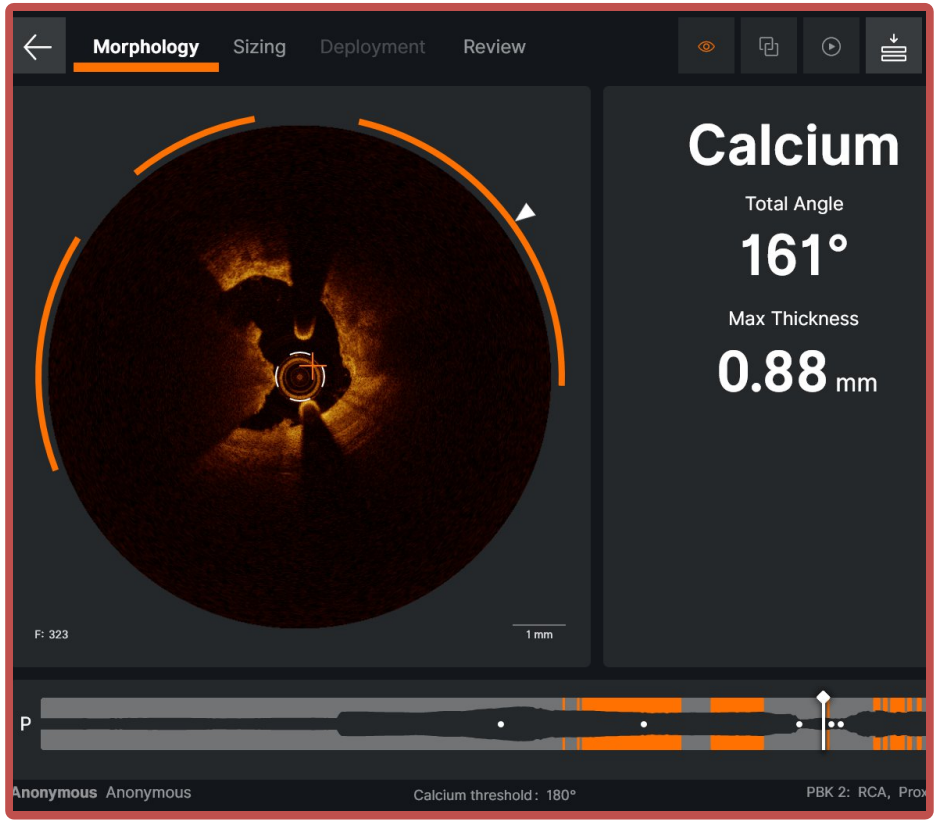
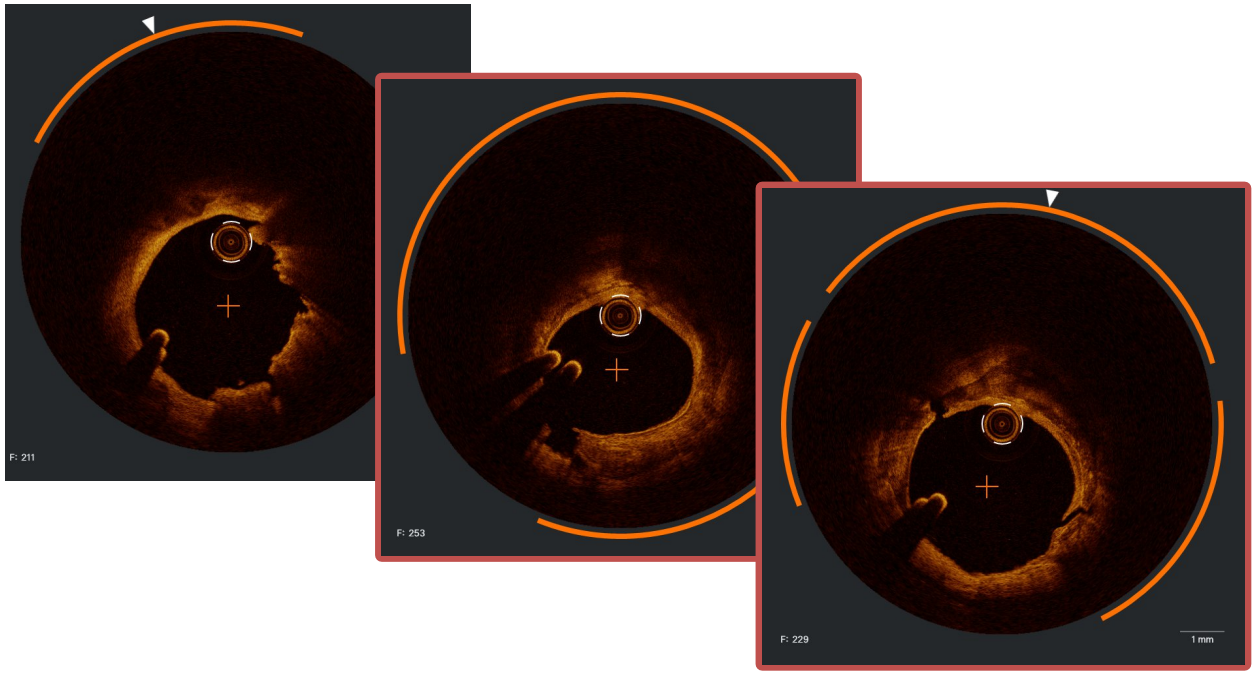
ULTREON to aid identification of calcium





ULTREON to aid identification of calcium

After intravascular lithotripsy

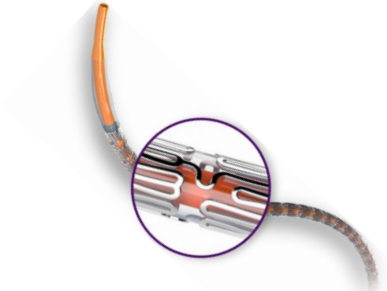


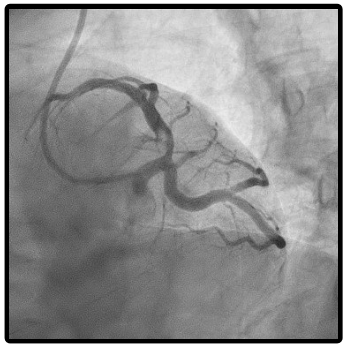
Final angio result

WHICH INDICATIONS FOR OCT IN 2022?

What Guidelines do not say… and future perspectives

1. **Identify** the culprit lesion in patients with unclear infarct-related coronary artery.





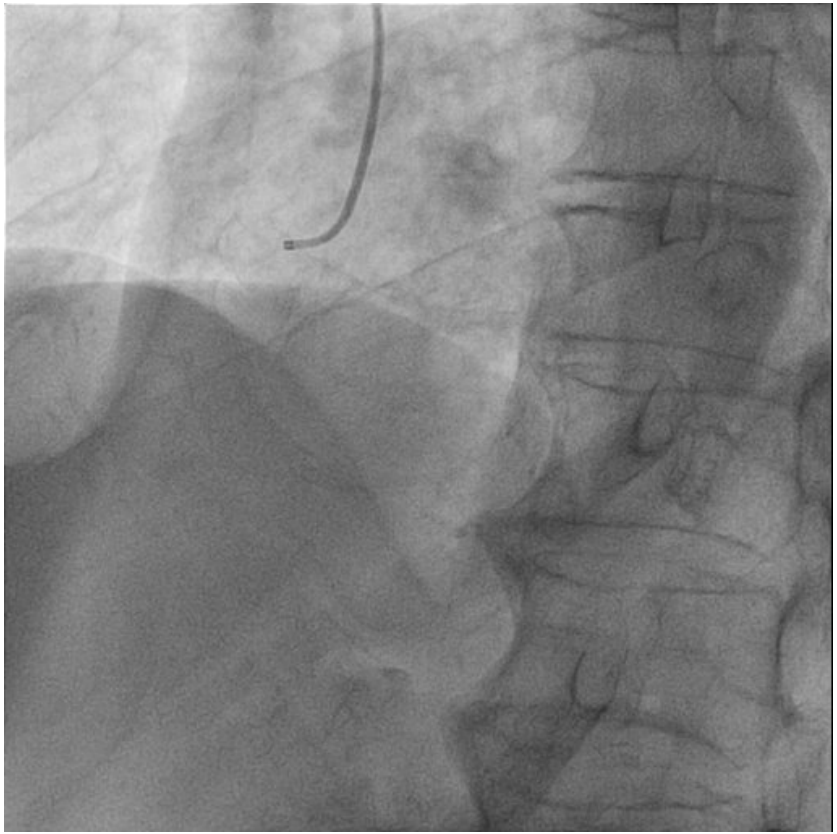
OCT to identify culprit lesion

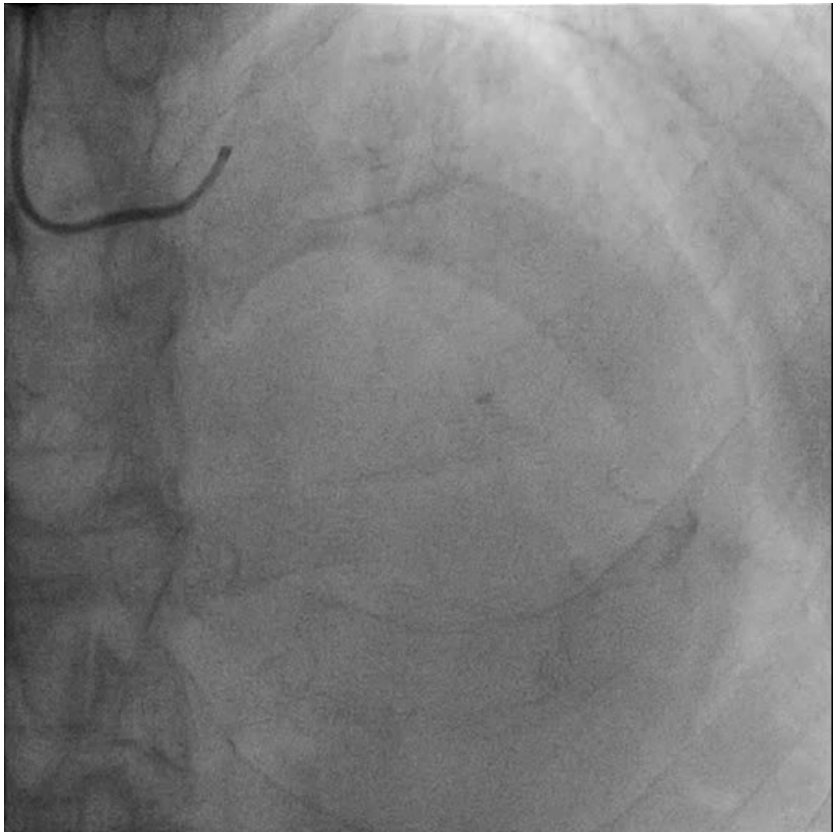
78 y.o. male

- CV risk factors: hypertension, dyslipidemia
- **NSTEMI**

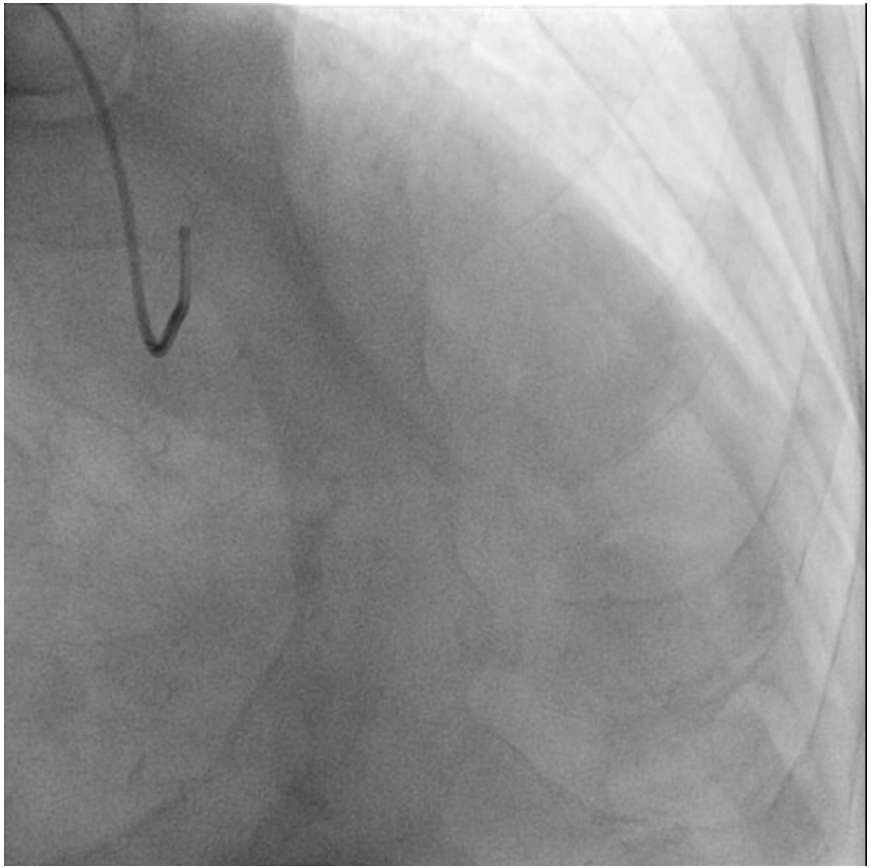
- EKG: non-specific ST-T wave changes
- Echo: LEVF 57%, inferior wall and infero-septum hypokinesia
- TnI: 0.068 ☾ 0.171 ☾ 0.571

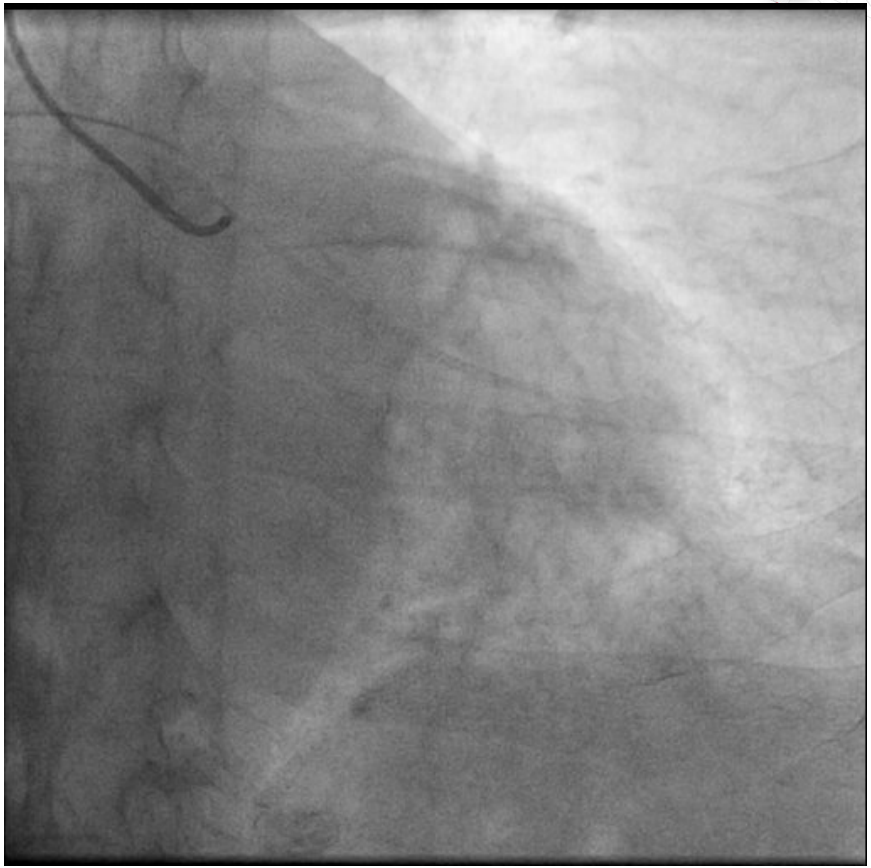
OCT to identify culprit lesion



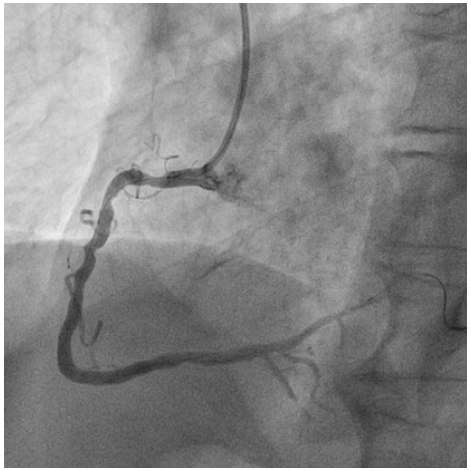


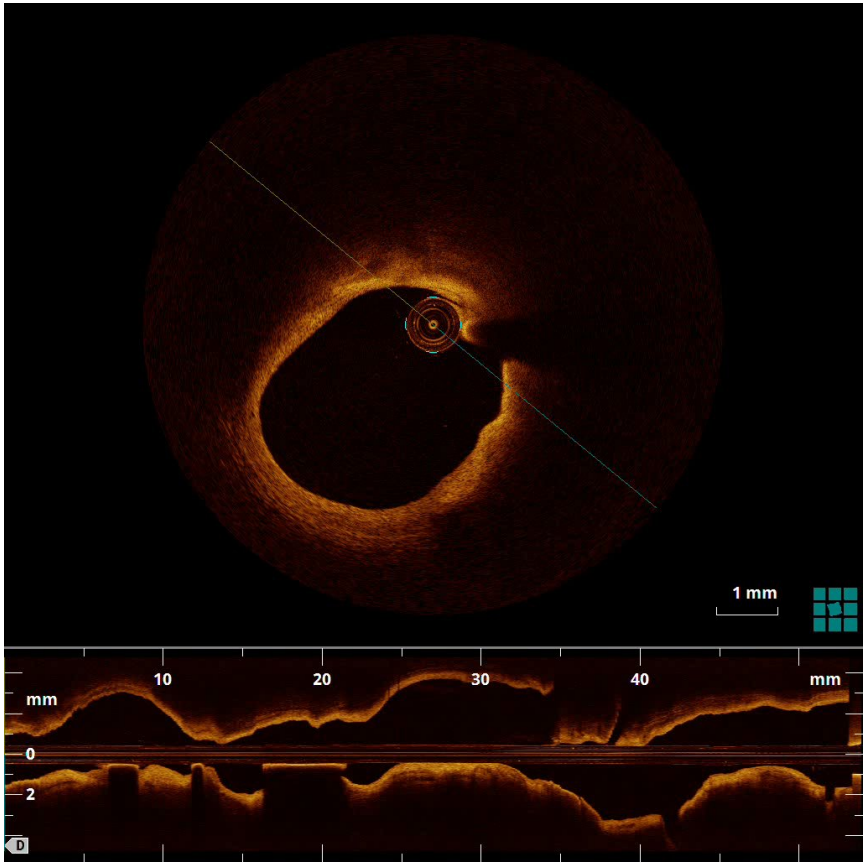
OCT to identify culprit lesion





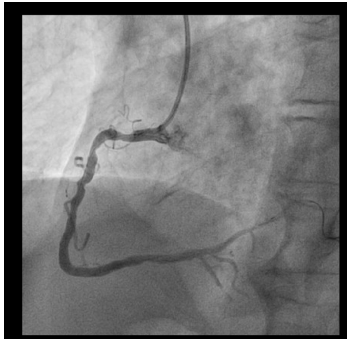
OCT to identify culprit lesion





OCT pullback to RCA

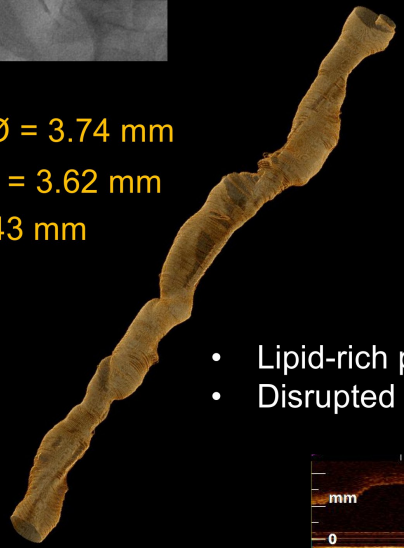
OCT to identify culprit lesion



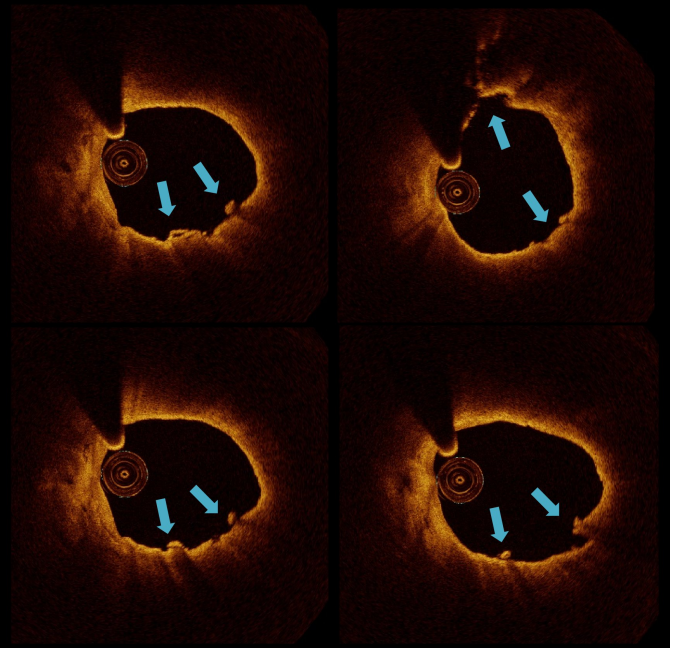
Prox ref Ø = 3.74 mm

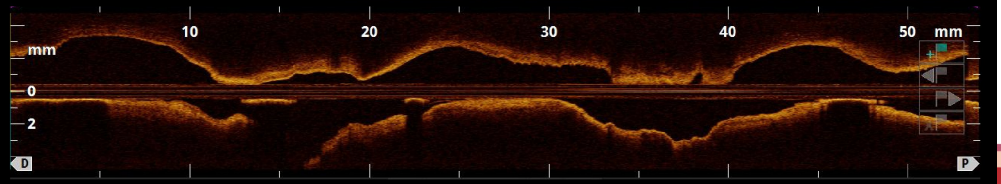
Dist ref Ø = 3.62 mm

Length= 43 mm



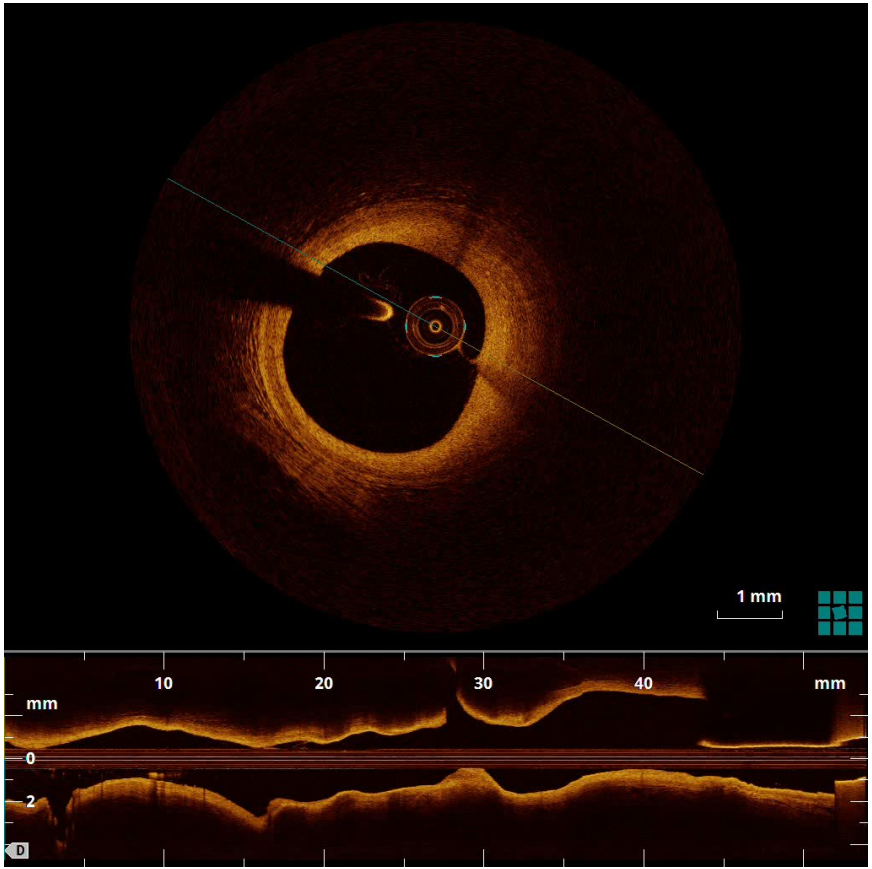
- Lipid-rich plaque/TCFA
- Disrupted fibrous cap

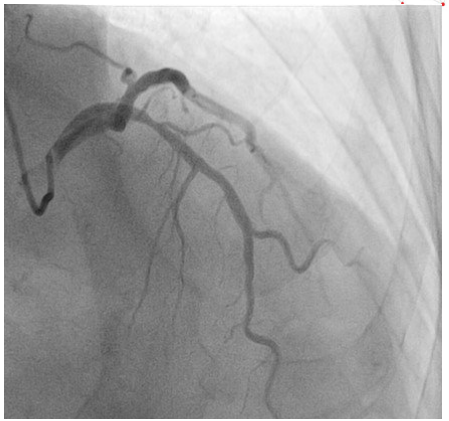




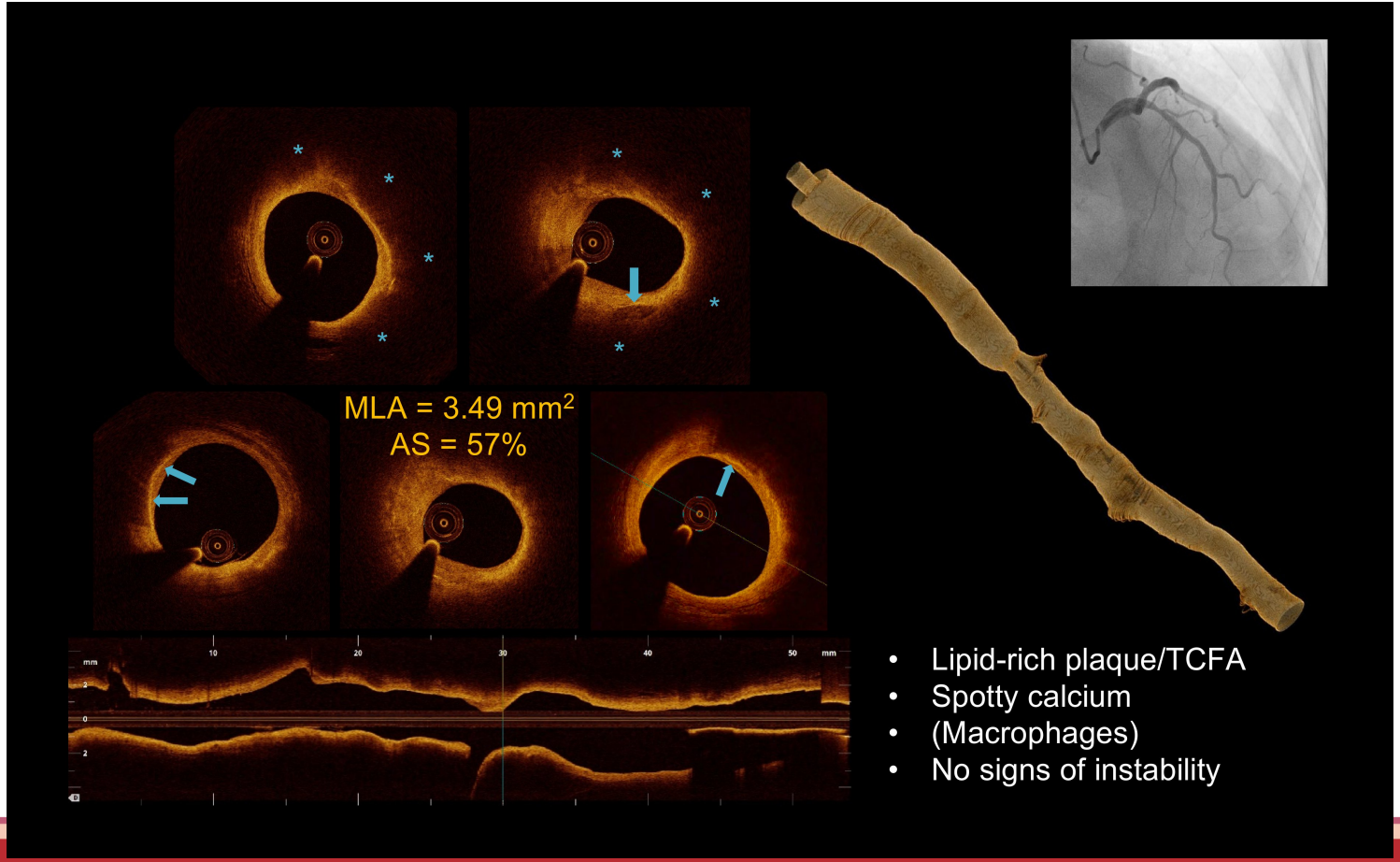
OCT to identify culprit lesion

OCT pullback to LAD



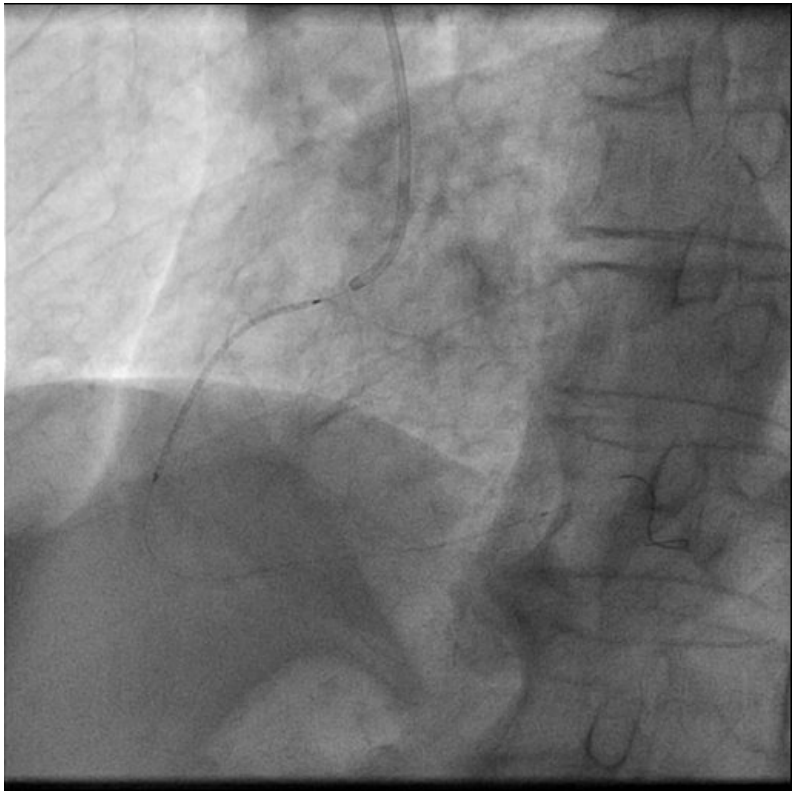


OCT to identify culprit lesion

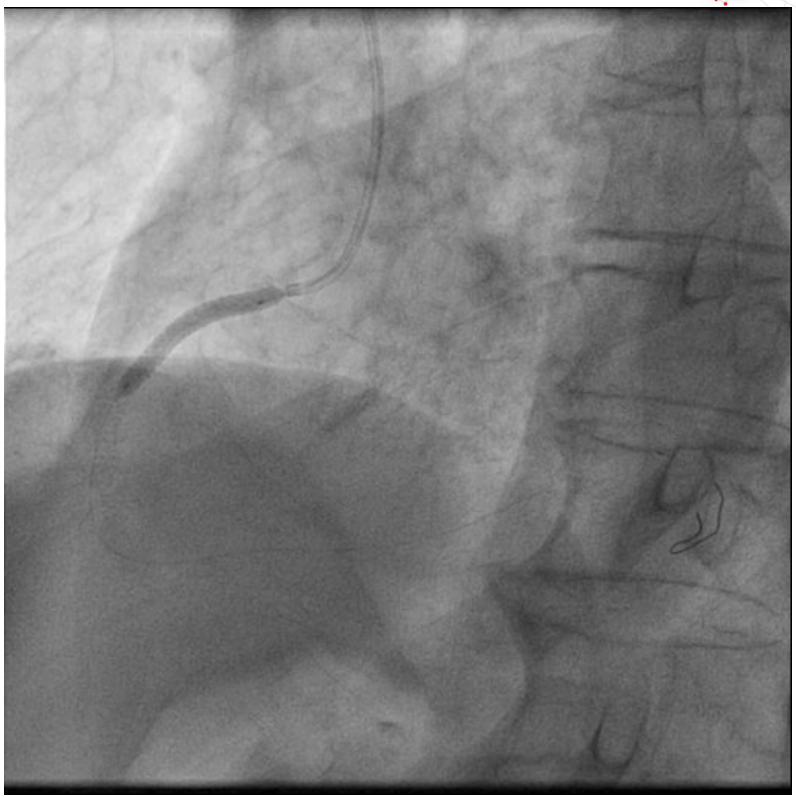


- Lipid-rich plaque/TCFA
- Spotty calcium
- (Macrophages)
- No signs of instability

OCT to identify culprit lesion

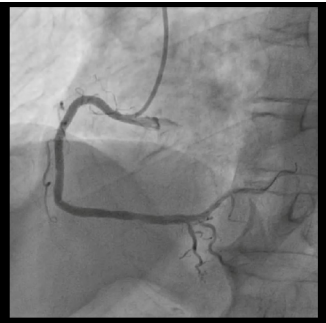


Xience Pro 3.5x48mm (14 atm)

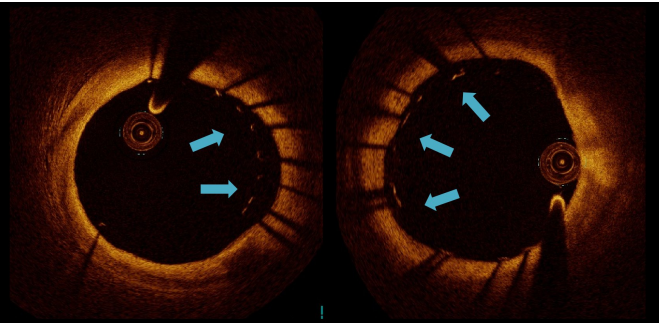


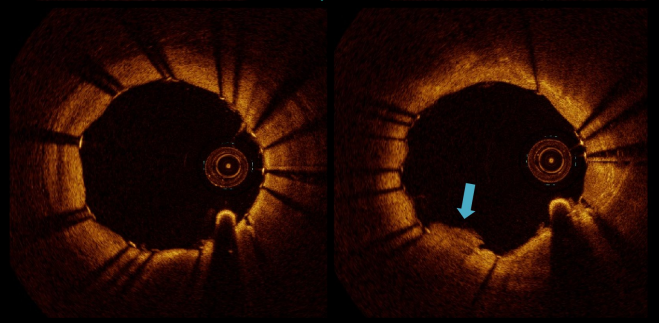
Trek NC 3.75x30 (18 atm)

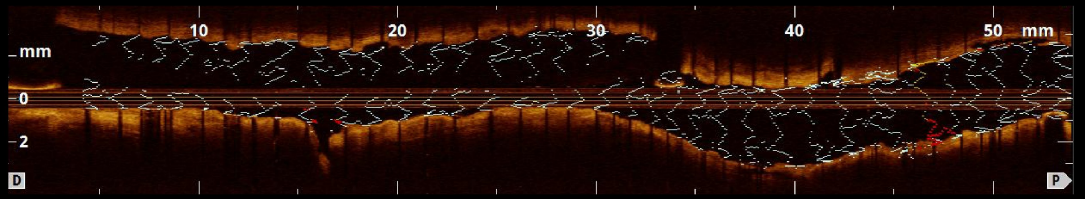
OCT to identify culprit lesion



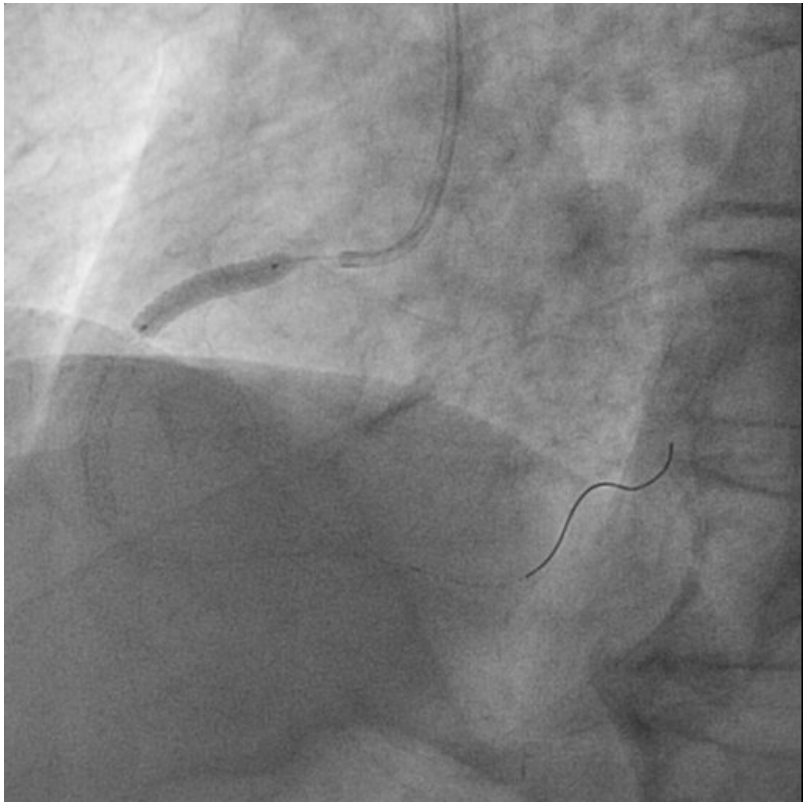
- Strut malapposition (proximal segment)
- In-stent thrombus/plaque protrusion



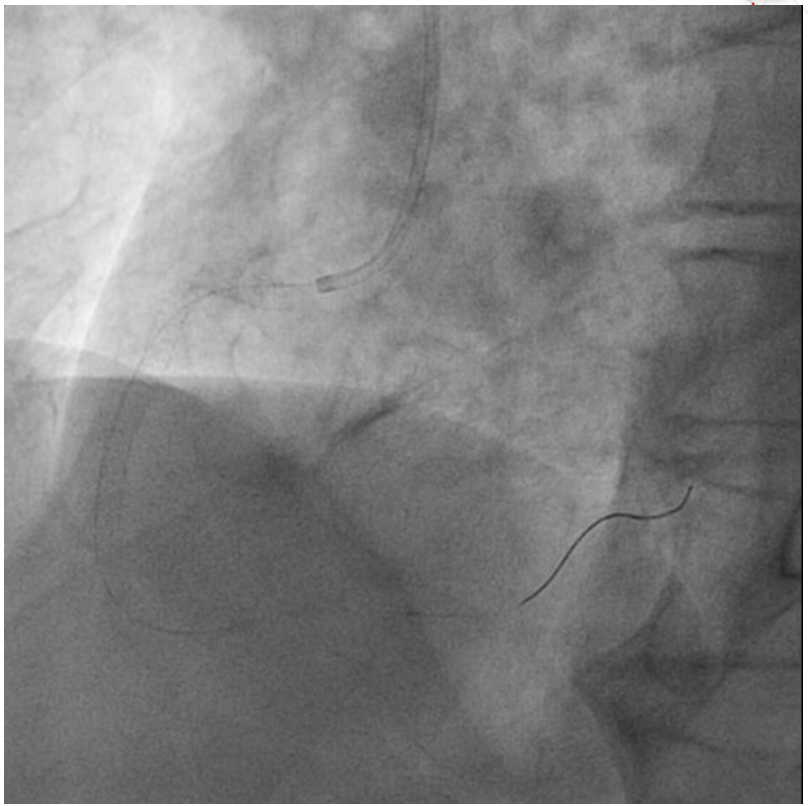




OCT to identify culprit lesion



TREK NC 4.0x20 mm (18 atm)



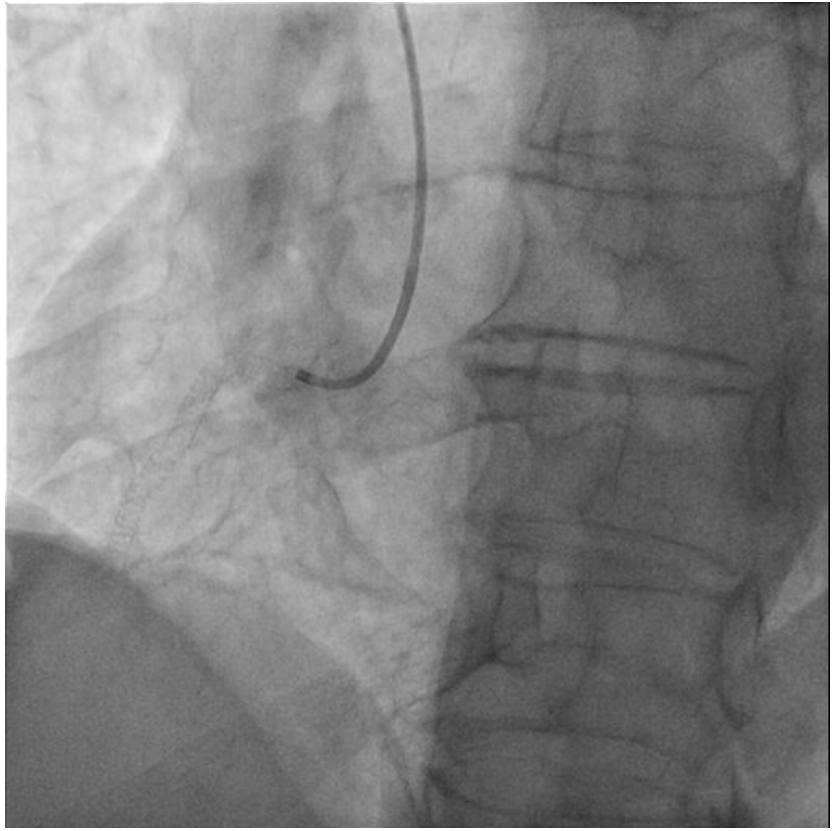
Final angiographic result

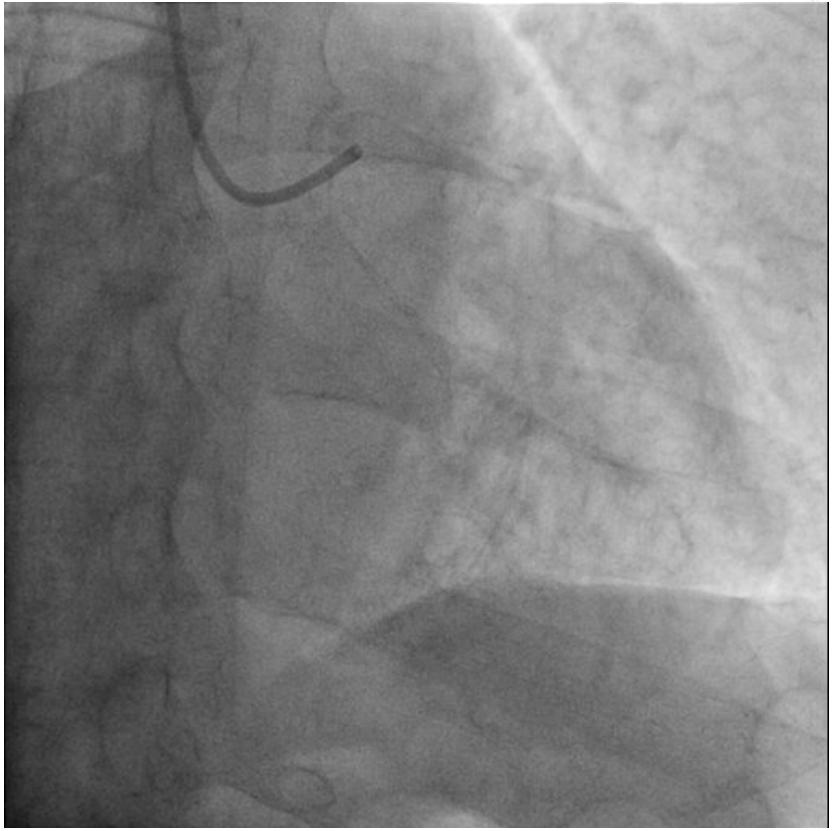
OCT to identify culprit lesion

- Discharge medications: **ASA, ticagrelor**, ramipril, bisoprolol, simvastatin/ezetimibe

- 1-year follow-up:
  - Clinically stable at 1-year follow-up
  - No ischemic/bleeding events
  - DAPT was stopped

2 years later… STEMI





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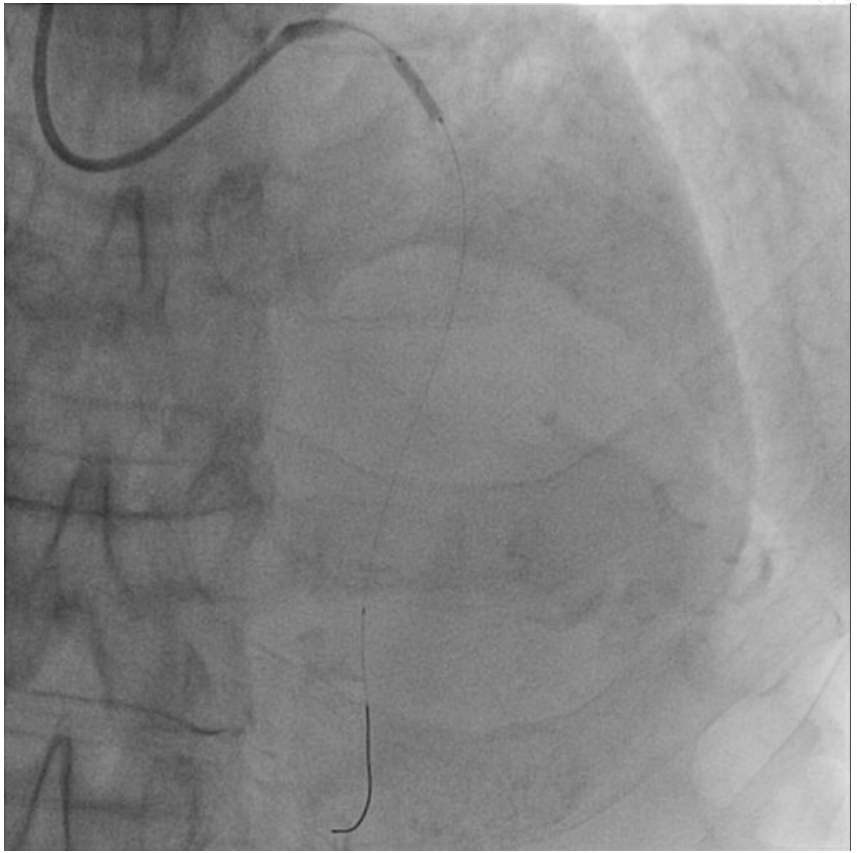

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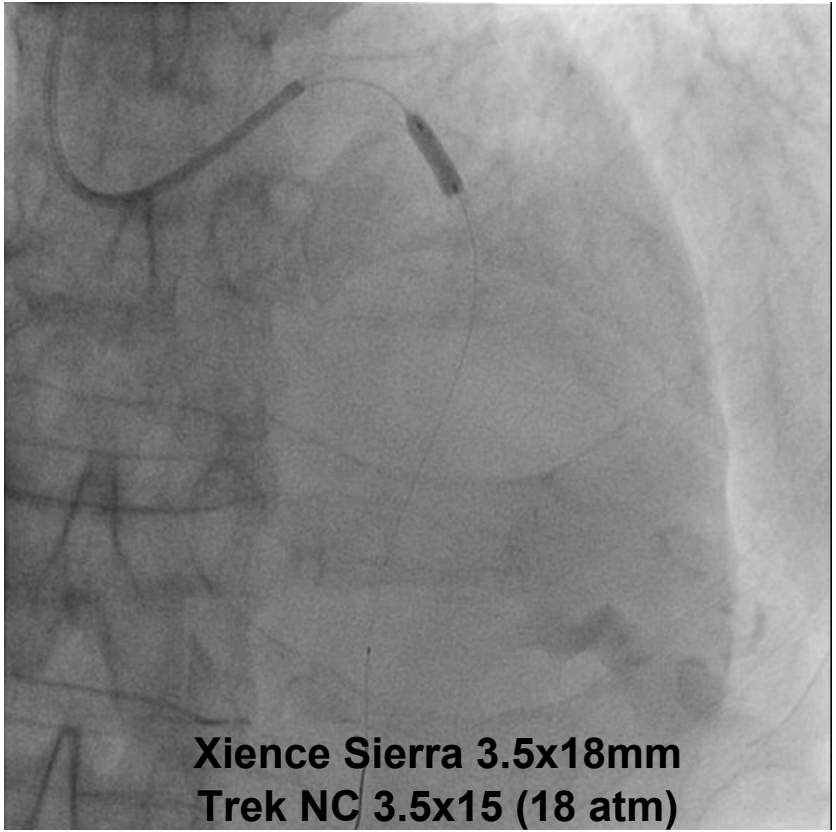

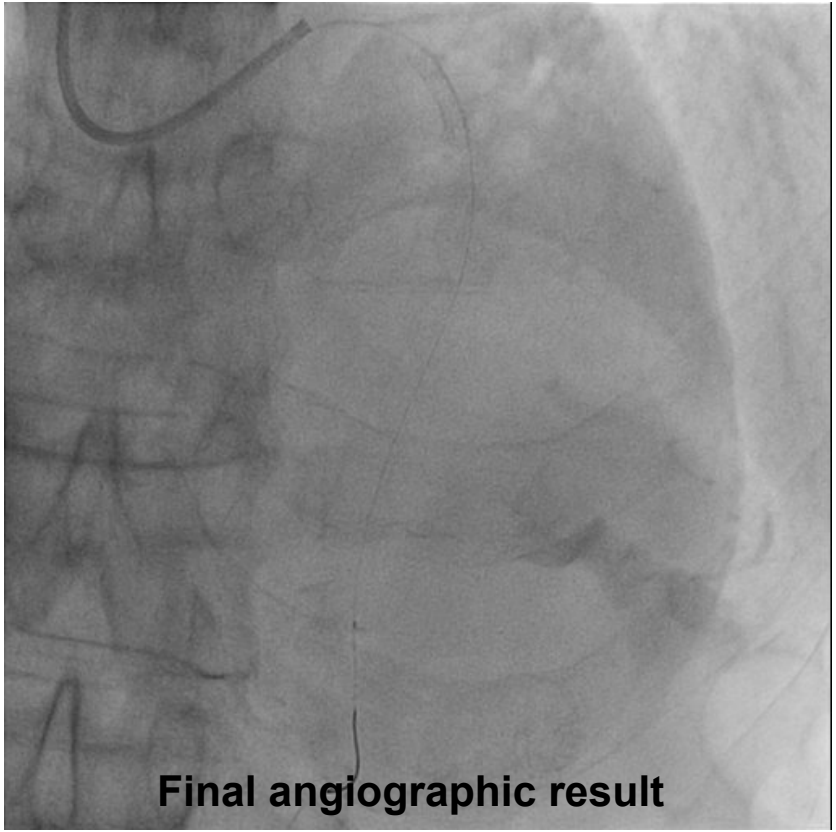

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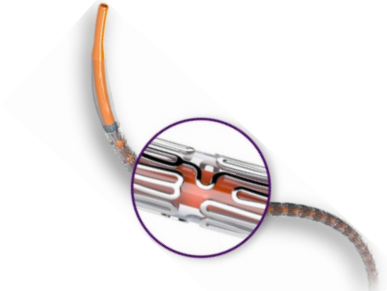
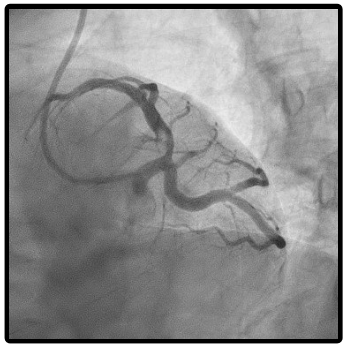
What Guidelines do not say… and future perspectives

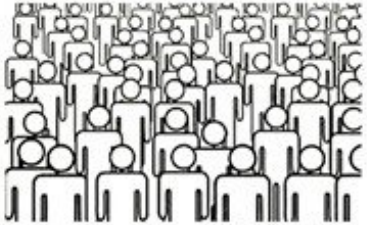
1. **Identify** the culprit lesion in patients with unclear infarct-related coronary artery.

2. **Predict** ACS (i.e., identifies vulnerable non-culprit lesions at high-risk for future events).



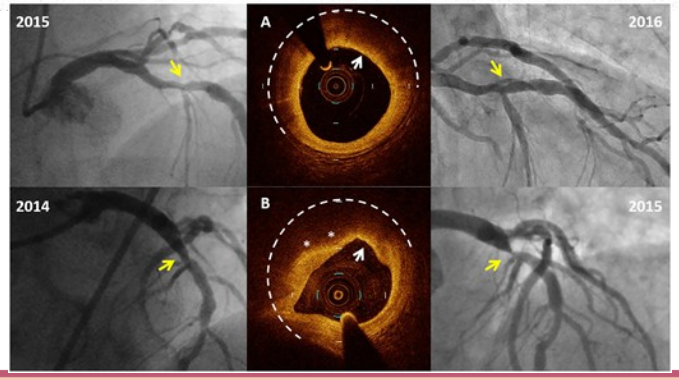


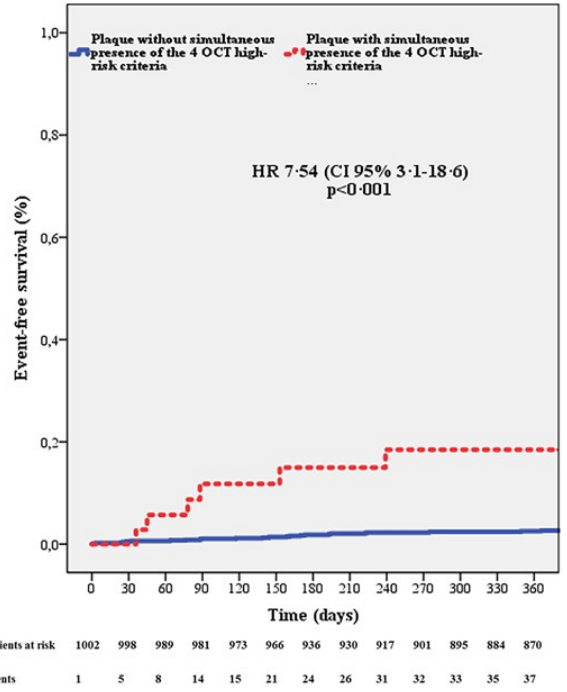
The CLIMA Study



OCT LAD in 1003 patients with clinically indicated coronary angiogram from 11 independent centres enrolled from January 2013 to December 2016 (clinicaltrial.gov identifier NCT02883088).

MLA <3.5mm² + FCT <75µm + Lipid arc circumferential extension >180° + OCT defined macrophages





Prati F, et al. Eur Heart J. 2020;41:383-391

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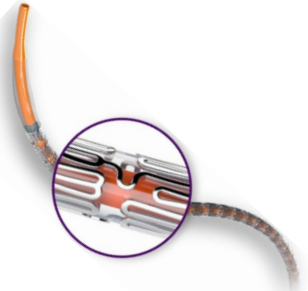
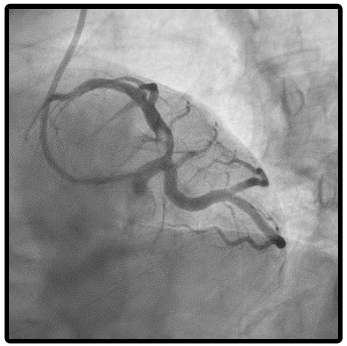
1. **Identify** the culprit lesion in patients with unclear infarct-related coronary artery.

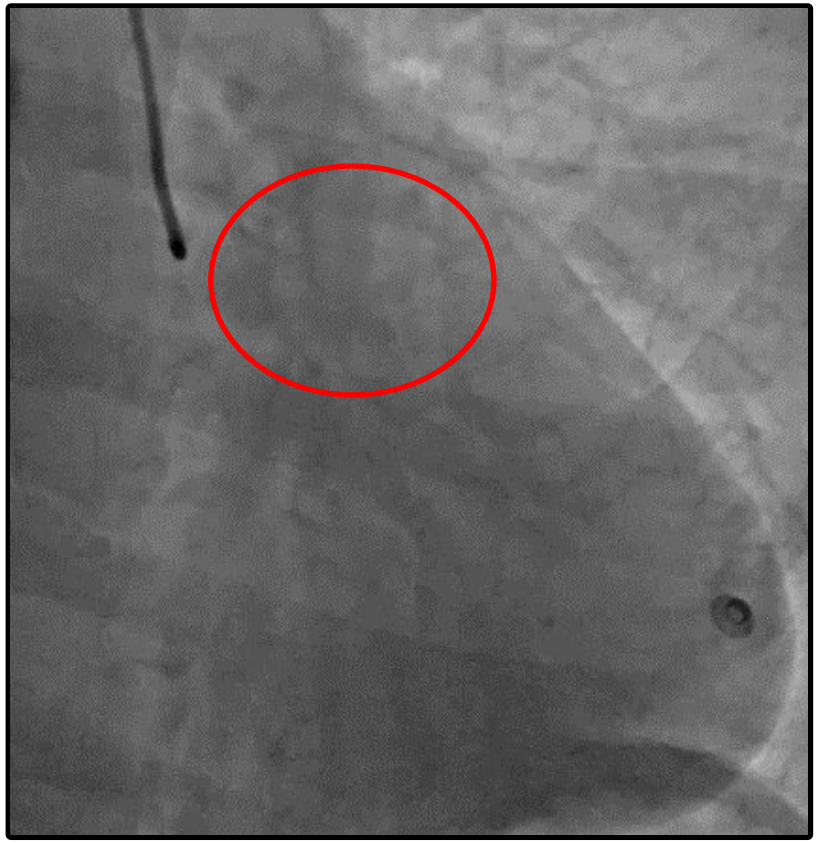
2. **Predict** ACS (i.e., identifies vulnerable non-culprit lesions at high-risk for future events).

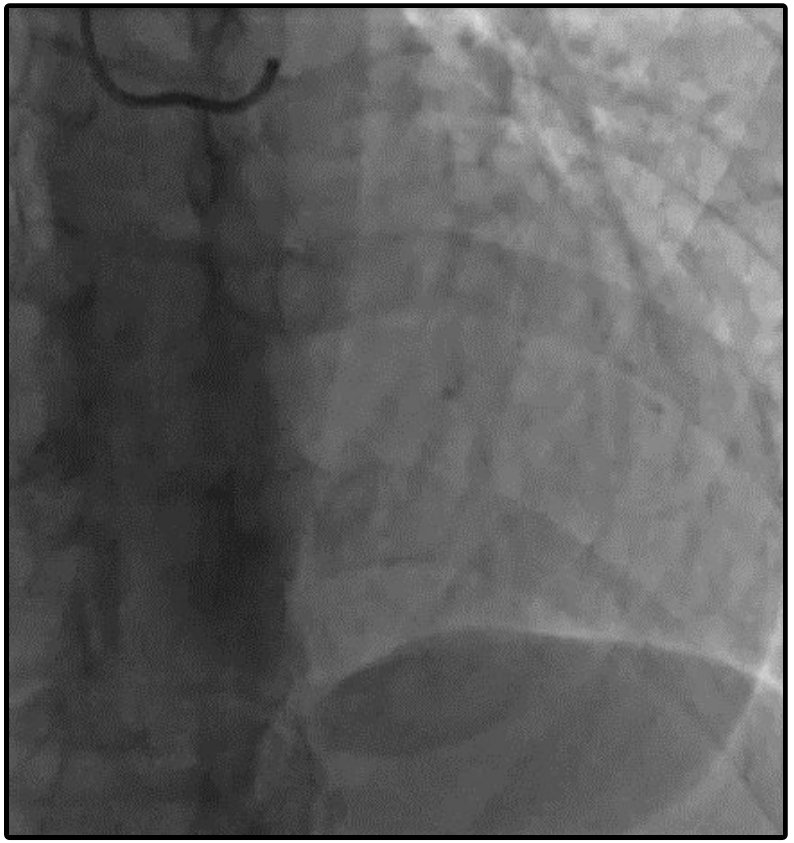
3. **Characterize** angiographically ambiguous/indeterminate lesions.



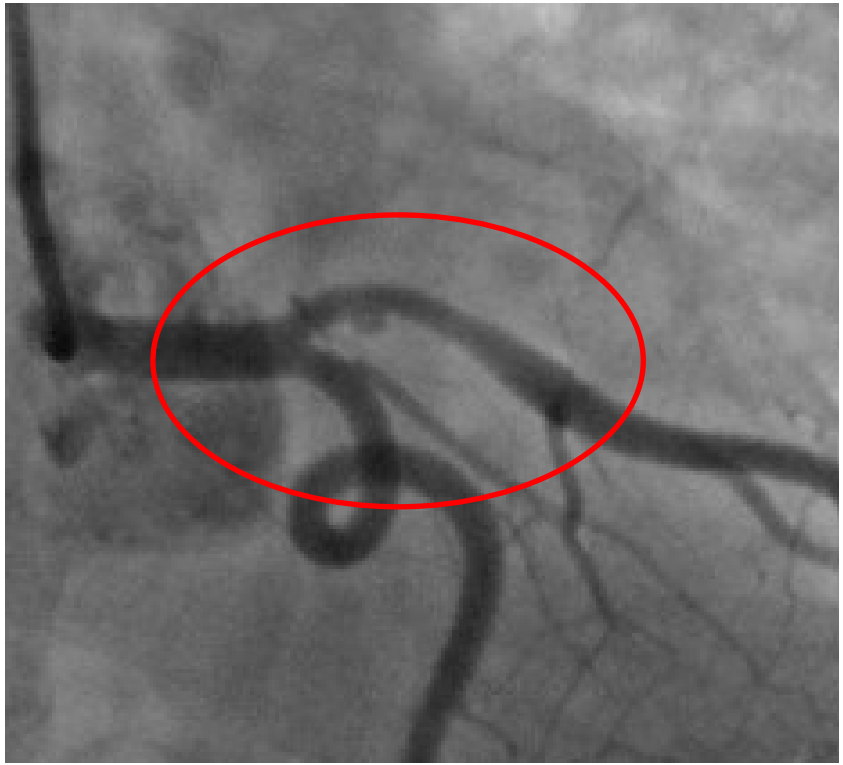


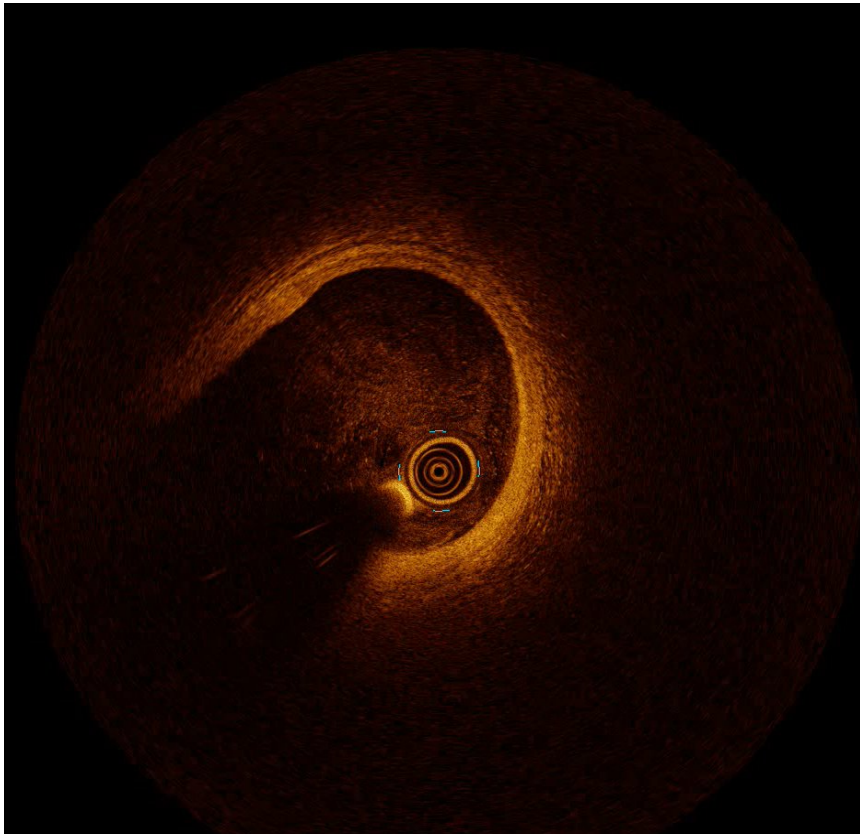
43 y.o. female, NSTEMI



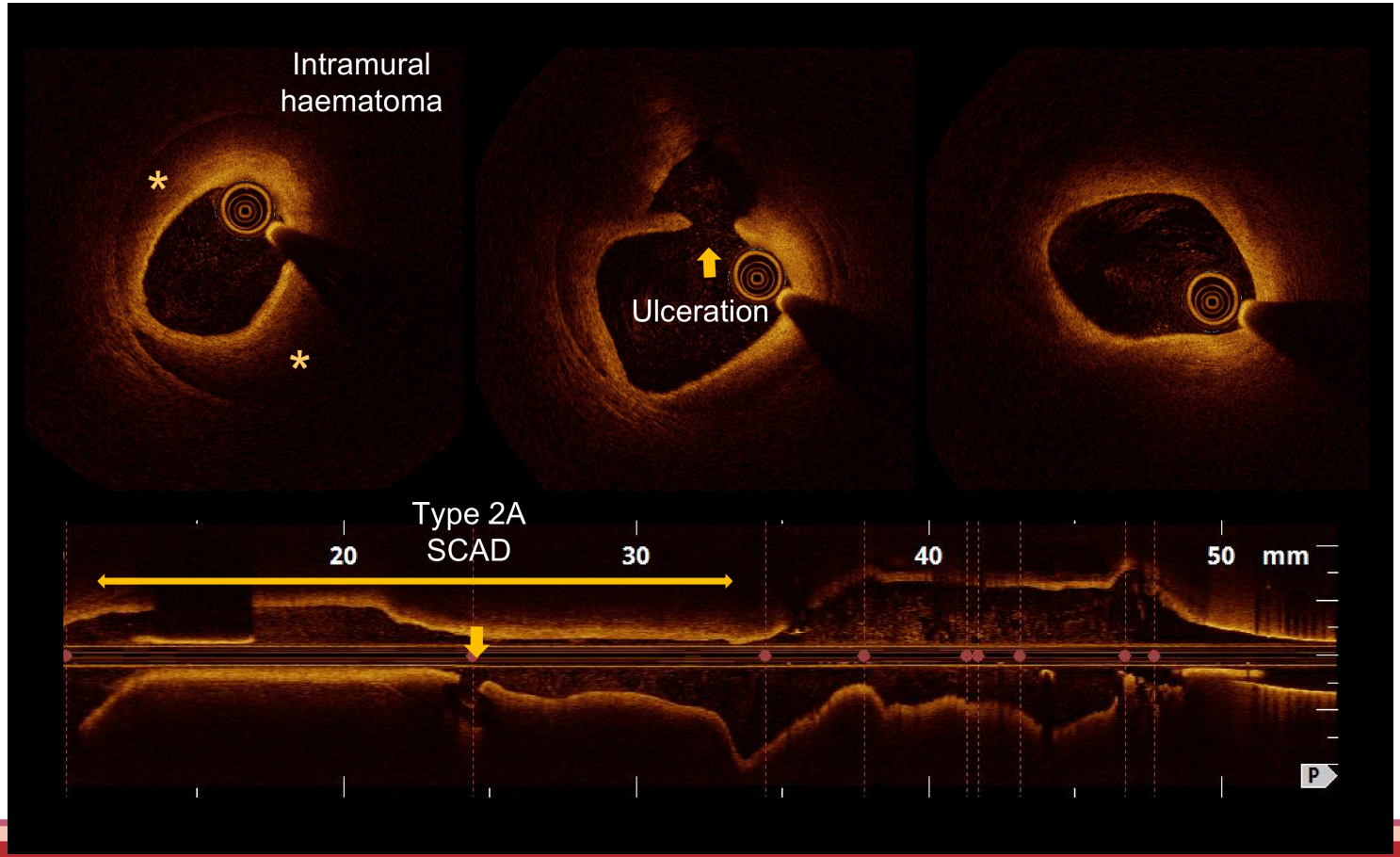


Coronary plaque rupture?



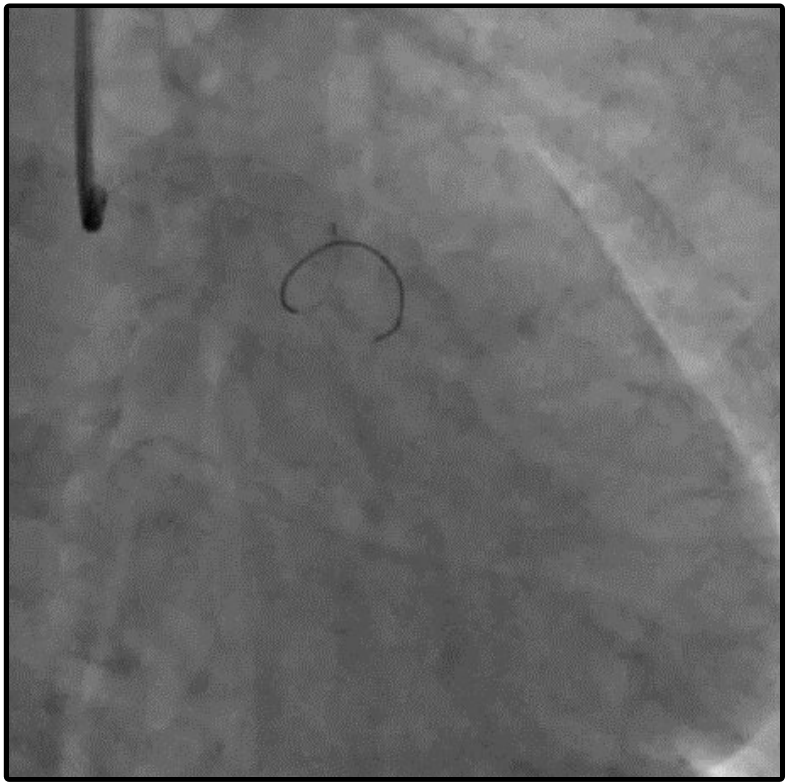


Spontaneous coronary artery dissection

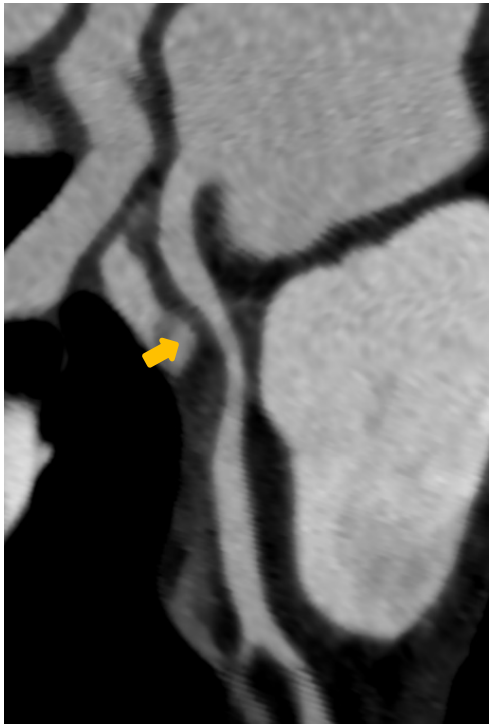


Follow-up of conservative therapy

3 days



2 weeks



6 months

WHICH INDICATIONS FOR OCT IN 2022?

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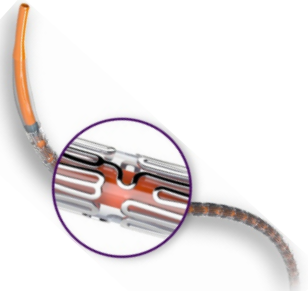
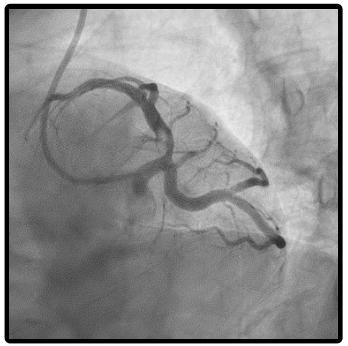
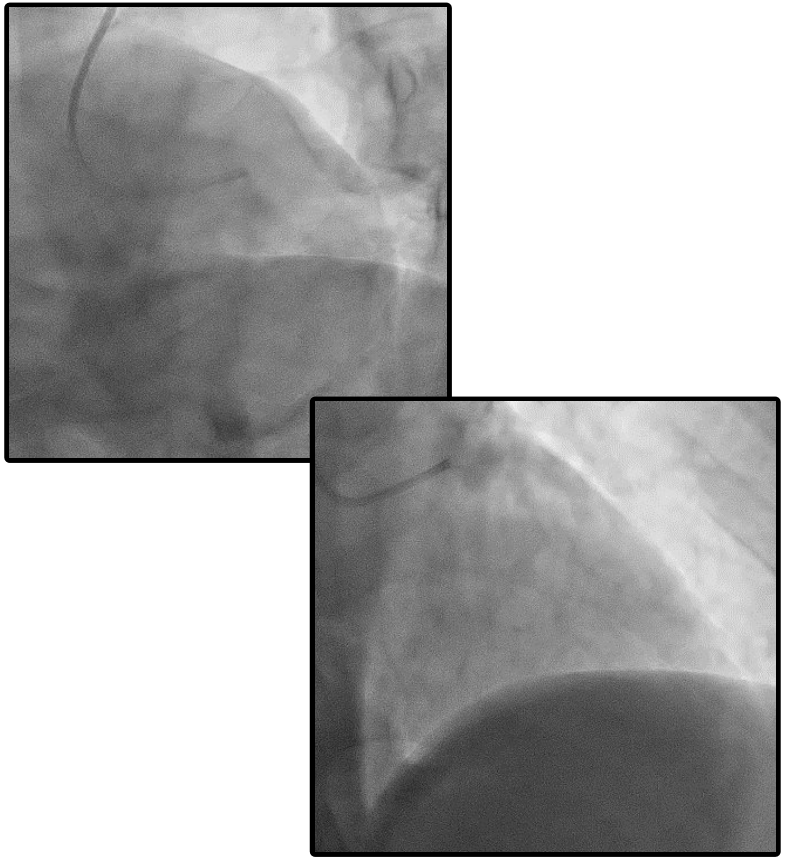
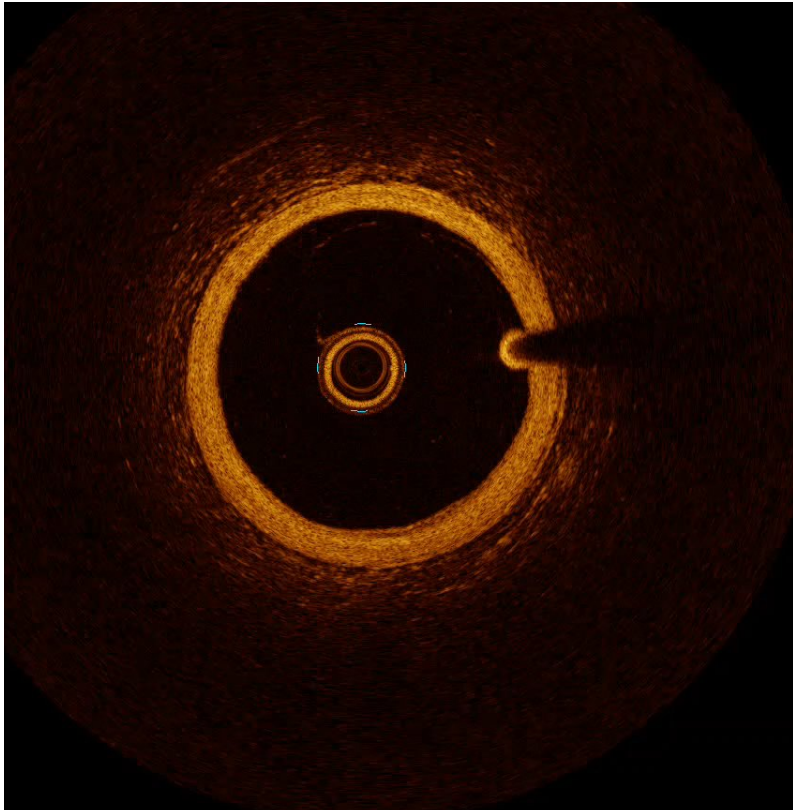
2. **Predict** ACS (i.e., identifies vulnerable non-culprit lesions at high-risk for future events).
3. **Characterize** angiographically ambiguous/indeterminate lesions.
4. **Guide/monitor** conservative treatment strategies in ACS (PCI deferral, adjunctive device use, follow-up of antithrombotic therapies, etc.).



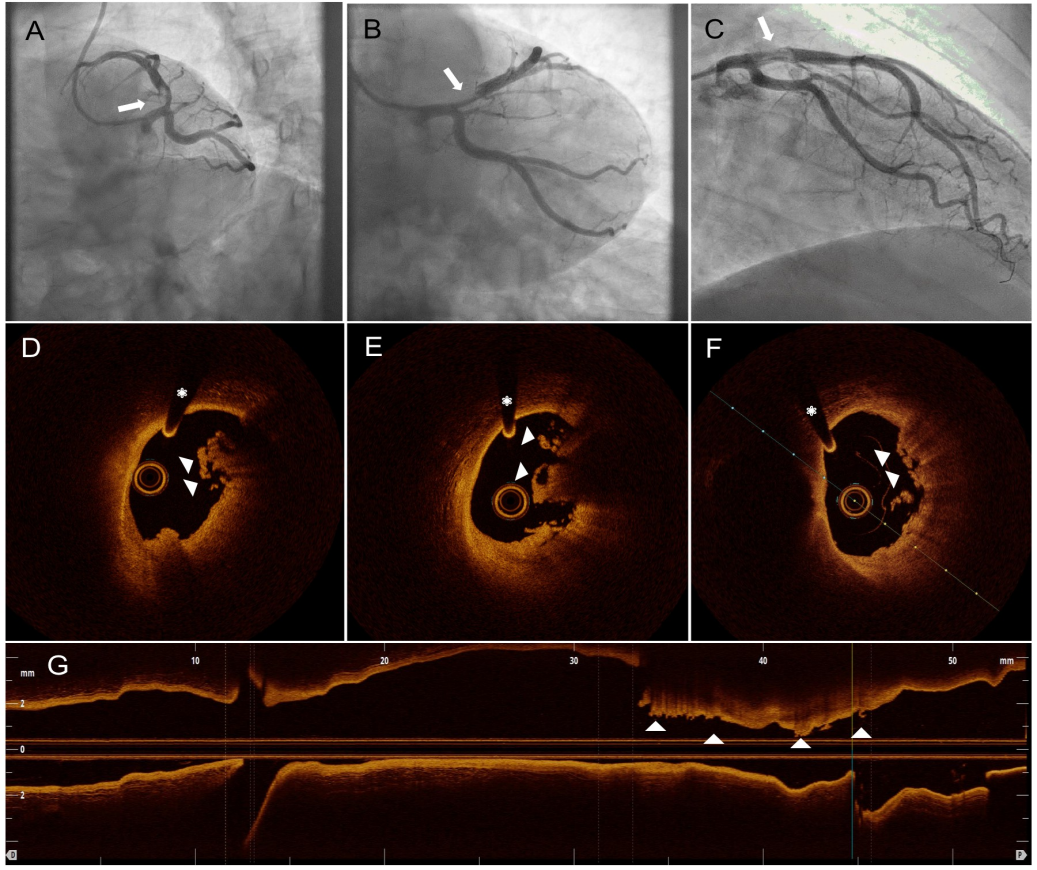


45 y.o. male, antero-lateral STEMI



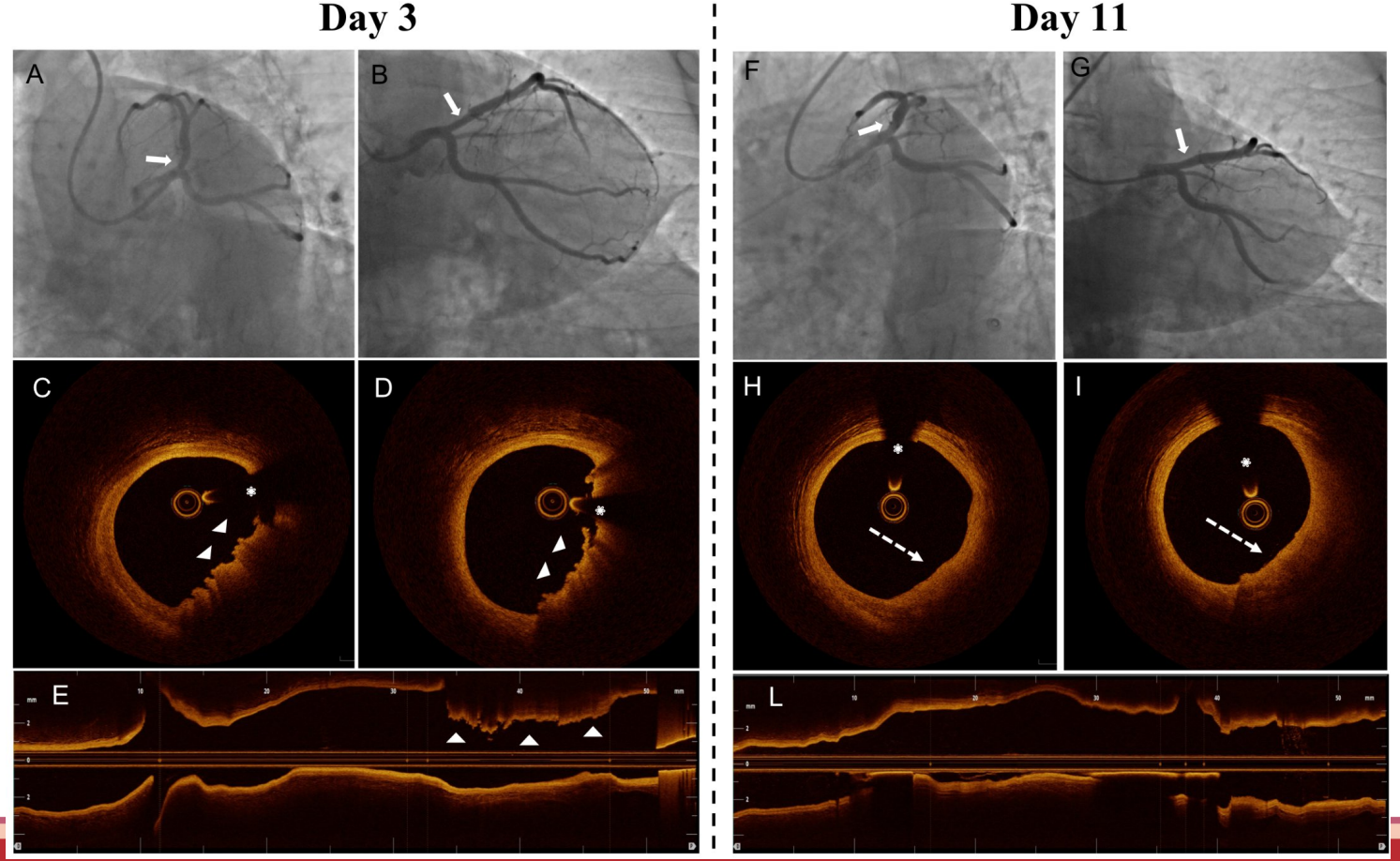


Conservative management of erosion

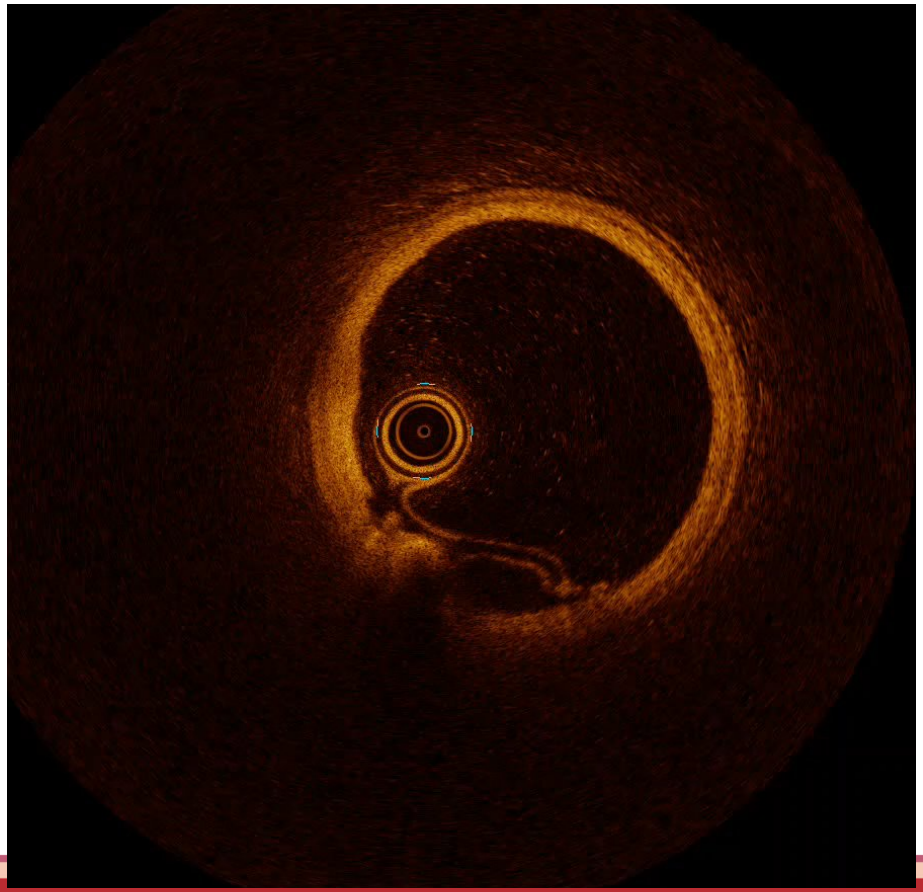


- Thrombus aspiration
- Left main to LAD stenting avoided
- **ASA, ticagrelor, UFH i.v. infusion**
- Transferred in the CCU
- Planned control CAG after 3 days

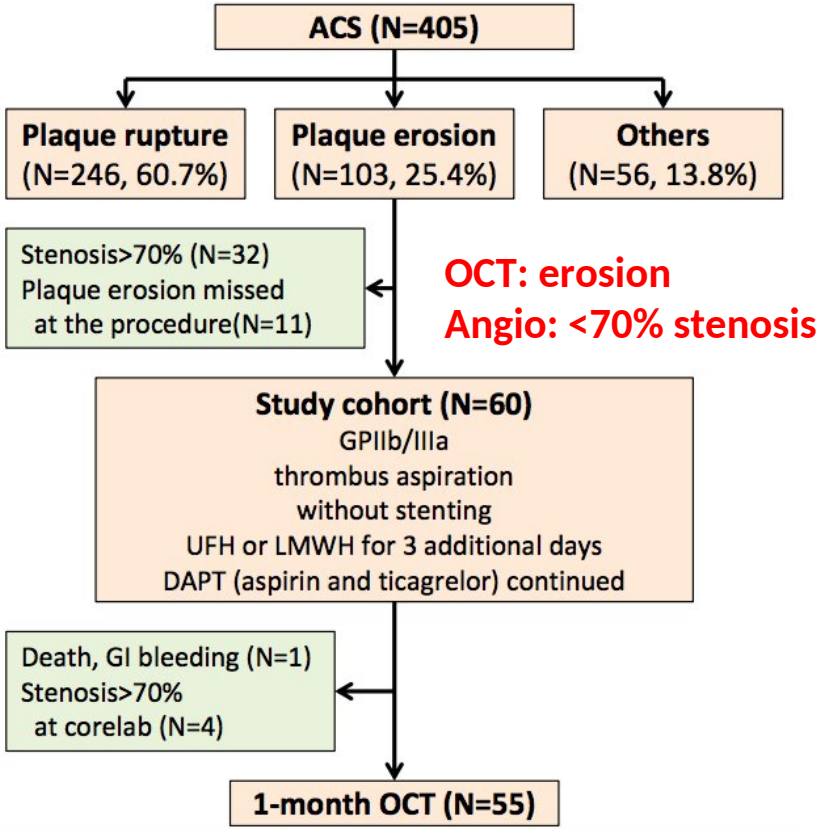
Conservative management of erosion

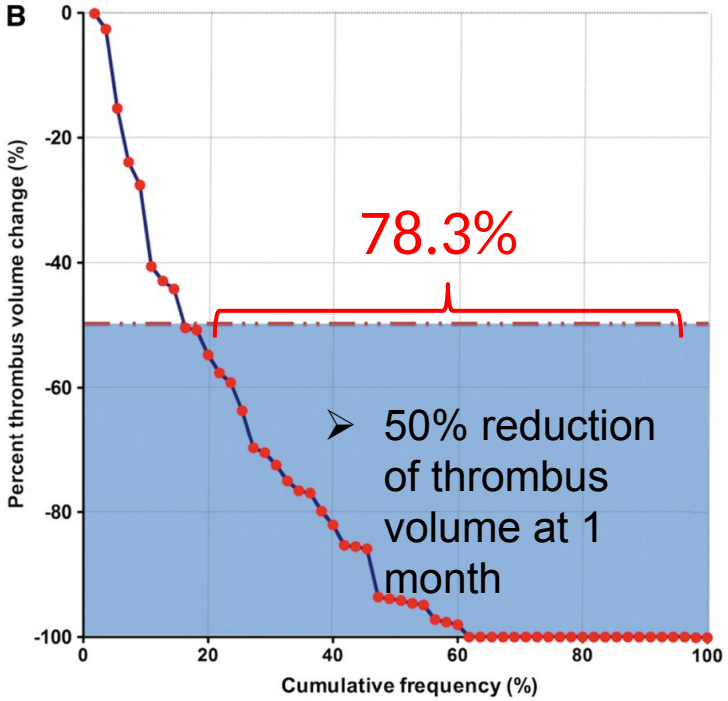


Conservative management of erosion



The EROSION study





Jia, et al. Eur Heart J 2017;38:792-800

Conclusions

1. Current guidelines recommendations for OCT use are to aid diagnosis of underlying **mechanisms of stent failure** (restenosis/thrombosis) and to **optimize stent implantation** in selected patients.

2. Ongoing studies (ILUMIEN IV, OCTOBER, etc.) will tell us whether OCT use for PCI guidance improves clinical outcome.

3. **Strengths of OCT imaging** (in my opinion) are mostly **in the setting of ACS** (unclear culprit, angiographic indeterminate lesions, guidance/monitoring of conservative strategies, prediction of ACS recurrence).

4. Artificial intelligence, improvement in flow dynamics computation techniques, hybrid intracoronary imaging may increase utility of OCT imaging in the diagnosis and treatment of our patients.