



ASIC
CONGRESS 2026

BỆNH ÁN CA NHỒI MÁU CƠ TIM

BS CKII PHẠM THÁI THIẾN

Bệnh viện Đa Khoa Tâm Anh TP Hồ Chí Minh

MLD MAX is the new standardized step-by-step OCT workflow to guide treatment decisions pre- and post-PCI

Pre-PCI OCT | Strategize



Morphology

Search for High Calcium¹



Length

Select Landing Zones Based on Healthy Tissue/
EEL Visualization²



Diameter

Measure Vessel, Stent, Balloon Diameters¹

Post-PCI OCT | Optimize



Medial Dissection

Address Significant Dissection²



Apposition

Address Gross Malapposition

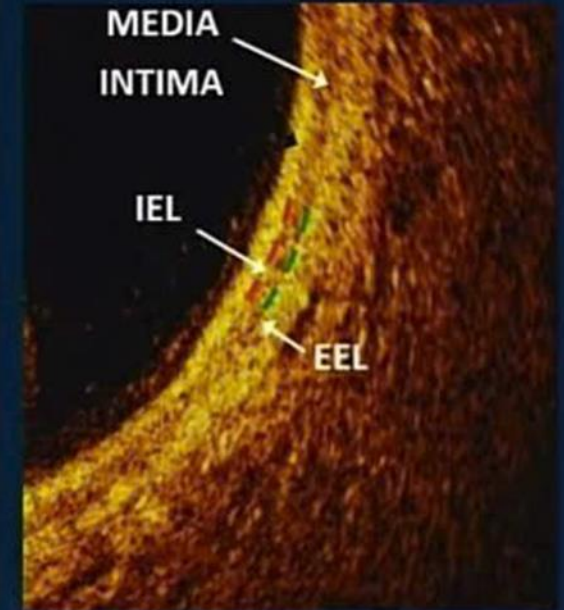
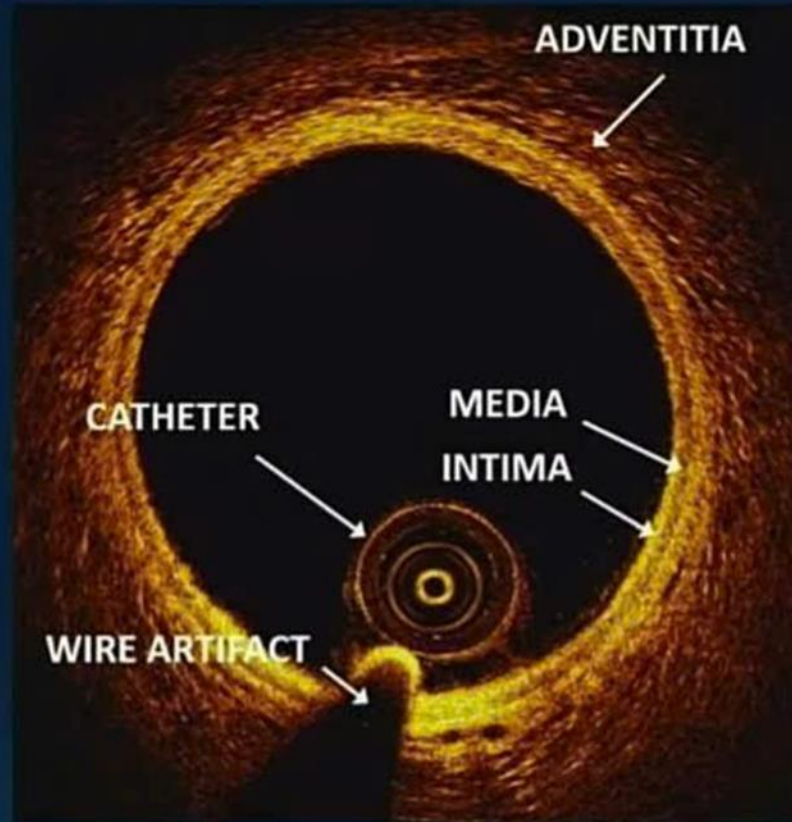


Xpansion

Confirm Expansion^{3,6}

Normal Artery Morphology on OCT

- **Intima** = hard sponge
- **IEL** = rubber band
- **Media** = soft rope
- **EEL** = rubber band
- **Adventitia** = mesh

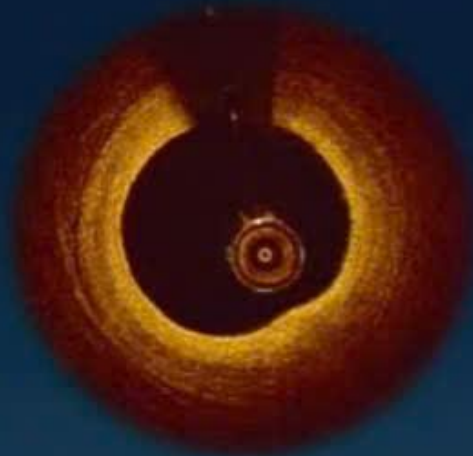


Plaque Characterization by OCT

Fibrous	Bright pixels	Finely textured	Deep penetration	Homogeneous
Lipid	Dark pixels	Diffuse edge	Low penetration	Homogeneous
Calcium	Dark pixels	Sharp edge	Deep penetration	Heterogeneous

Gonzalo N. 2010 "Optical Coherence Tomography for the Assessment of Coronary Atherosclerosis and Vessel Response after Stent Implantation". (Thesis)

Fibrous



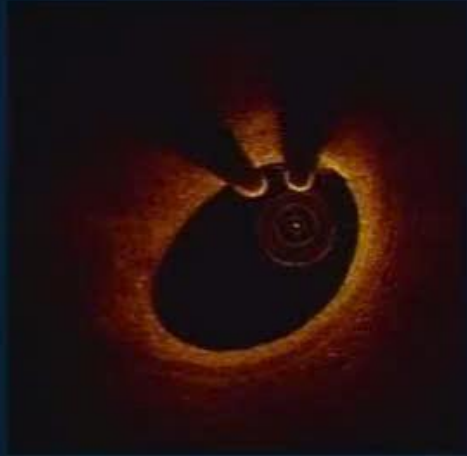
Lipid-rich



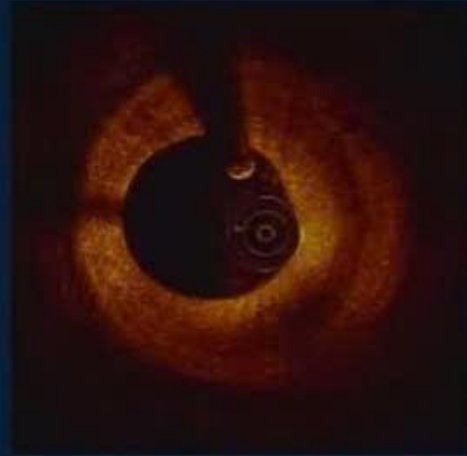
Calcified



Morphology Guided Lesion Preparation



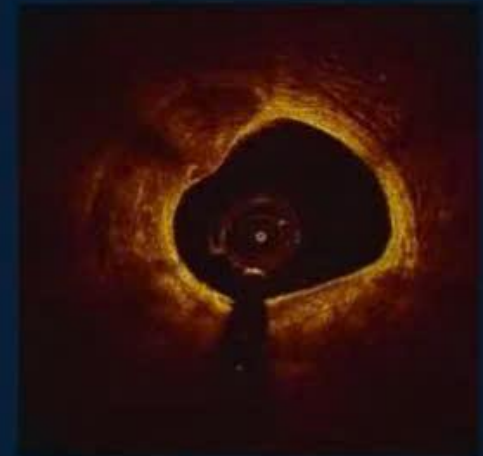
Lipidic



Fibrotic



Mild/Moderate Ca²⁺



Severe Ca²⁺

DIRECT STENTING¹

COMPLIANT BALLOON²

NON-COMPLIANT BALLOON³

ATHERECTOMY OR IVL⁴

1. Taylor, A., et al. Efficacy and Safety of Direct Stenting in Coronary Angioplasty, J. Invasive Cardiology, 2000; 12(11); 2. Romagnoli, E., et al. Drug Eluting Stenting, JACC Cardiovascular Interventions, 2008; 1(1): 21-31; 3. Seyithanoglu, B., Compliant vs Non-compliant balloons. A Prospective Randomised Study, 1998; 39(1): 45-54; 4. Tomey, M., Current Status of Rotational Atherectomy, JACC Cardiovascular Interventions, 2014; 7(4): 345-354.

OCT classification of calcium

SUPERFICIAL CALCIUM



DEEP CALCIUM



NODULAR CALCIUM



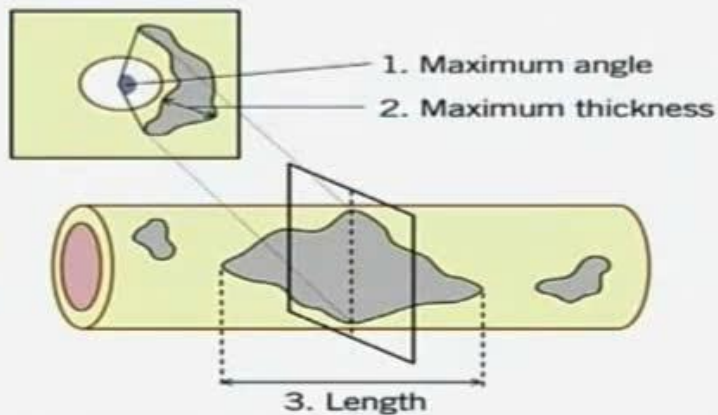
ECCENTRIC CALCIUM



CONCENTRIC CALCIUM



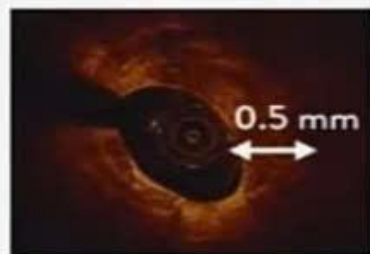
OCT calcium score: Rule of 5s



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

Rule of 5s

① 0.5 mm thickness



② 50% vessel arc



③ 5.0 mm long



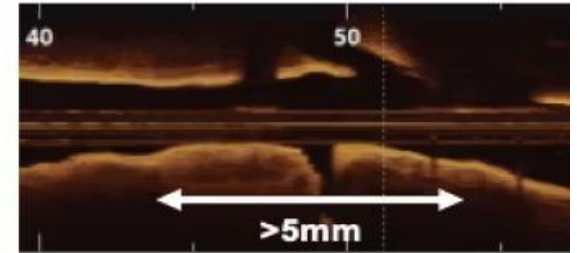
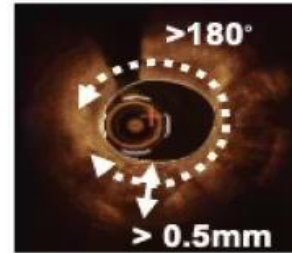
Lesions at risk of stent under-expansion have a calcium score of 4

Pre-PCI OCT | Strategize (“MLD”)

Morphology

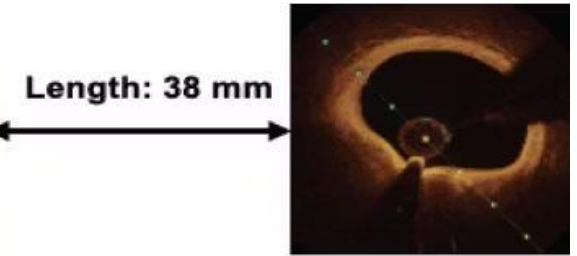
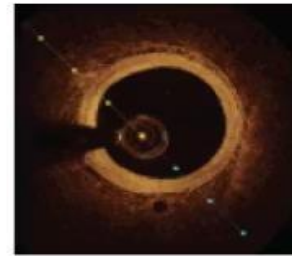
Consider calcium modification if significant calcification (rule of “5”)

- 1) >50% circumference
- 2) >0.5mm thickness
- 3) >5mm length



Length

- Find healthy proximal and distal landing zones (avoid lipid pools or thin cap fibroatheroma)
- Length between the landing zone
- Adjust to available stent length



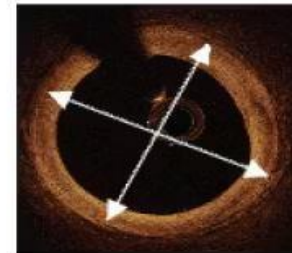
Length: 38 mm

Proximal reference

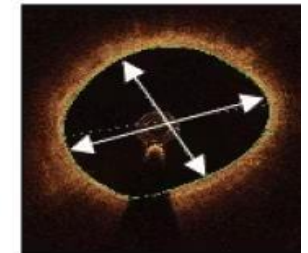
Distal reference

Diameter

- Round down EEL-EEL diameter
- Round up mean lumen diameter
- Stent size based on the distal reference
- Balloon size based on the based on the respective reference diameter



EEL-EEL diameter (Round down)



Lumen diameter (Round up)

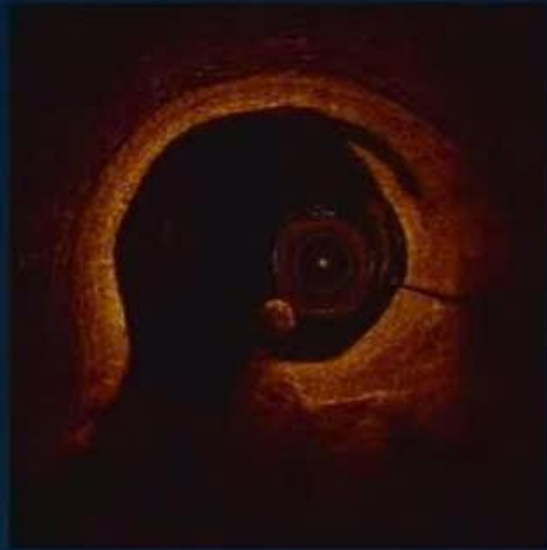
Dissections

Address Significant Dissection ¹

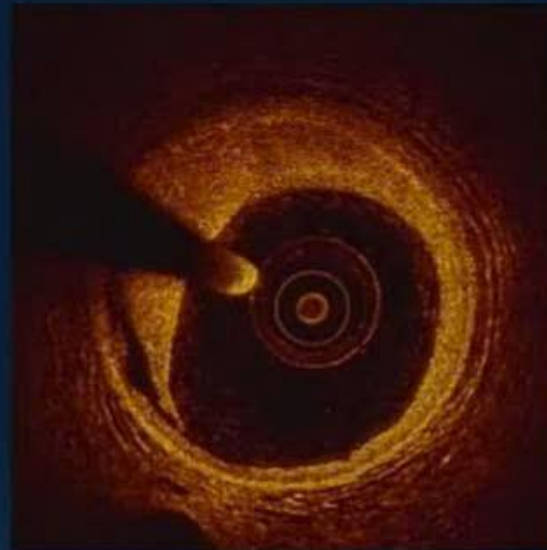
Dissection penetrates medial layer, and is greater than 1 quadrant arc

Common Practice ^{1,2}

Place additional stent (particularly for distal dissections)



Intimal



Medial



Intramural Hematoma

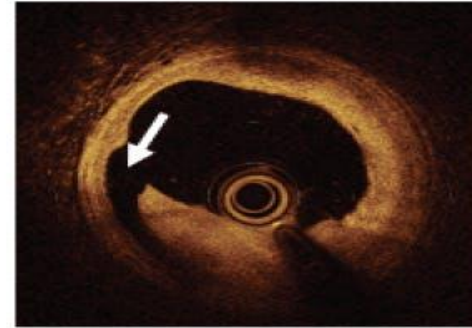
1. Kubo, T. et al. Application of Optical Coherence Tomography in Percutaneous Coronary Intervention. *Circulation Journal*, September 2012; Vol. 76, 2076-2083; 2. Ali, Z. et al. ILUMIEN III: Optimize PCI. *Lancet* 2016, 388:2618-2628.

Post-PCI OCT | Optimize (“MAX”)

Medial Dissection

Consider adding stent if major dissection

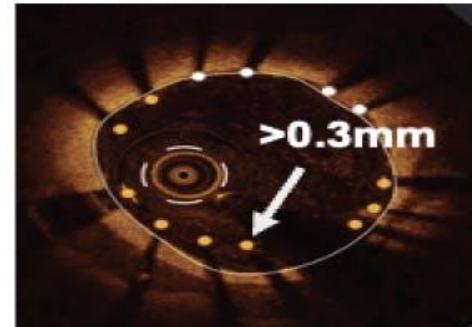
- Involving $\geq 60^\circ$ of arc + ≥ 3 mm in length
- Involving media + >1 quadrant of arc



Apposition

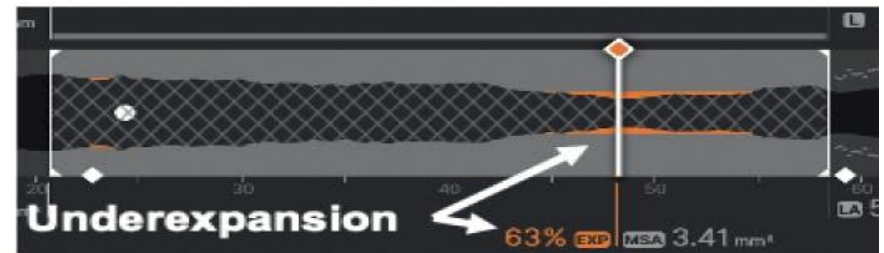
Consider additional post-dilation if major malapposition

- ≥ 0.3 mm from wall + > 3 mm length



eXpansion

Consider additional post-dilation if MSA $<90\%$ to the closest reference segments ($\geq 80\%$ acceptable; $\geq 90\%$ optimal)



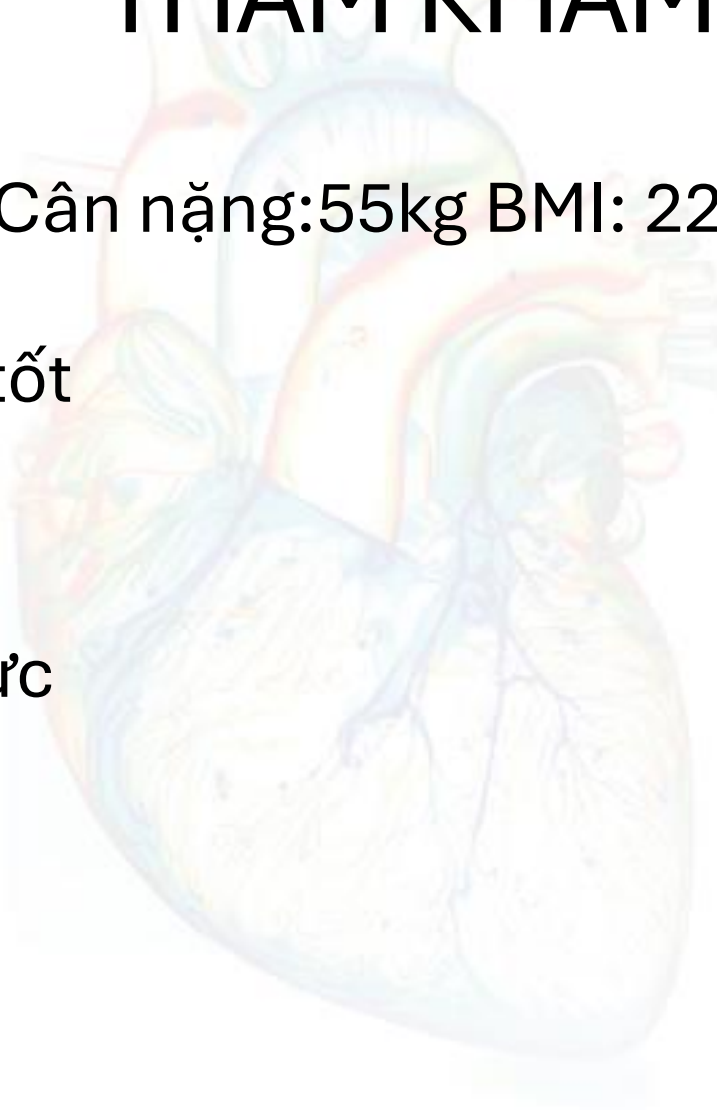
*In the ILUMIEN IV, additional stenting was required if there was residual inflow/outflow disease defined as minimal lumen area < 4.5 mm² within 5mm from the edges of the stent

THÔNG TIN BN

- Họ tên: **DƯƠNG TUẤN K.**, nam. Sinh năm: 1979, **46 tuổi**
- Đc: Khu Phố Suối Lớn, Đặc khu Phú Quốc, Tỉnh An Giang
- NV: 01/10/2025
- Lí do nv: đau ngực
- BS: Bệnh nhân khai cách nhập viện # 2 ngày nay bệnh nhân mệt cảm thấy đau nặng ngực (T) từng cơn không lan nhập bệnh viện huyện Phú Quốc điều trị, chẩn đoán nhồi máu cơ tim cấp → **cNhồi máu cơ tim cấp thành dưới ngày 2 Killip I**
- huyễn viện đa khoa Kiên Giang.
- TS: rối loạn lipid máu
- CĐ:

THĂM KHÁM

- Chiều cao: 155 cm Cân nặng: 55kg BMI: 22 M: 66l/p HA: 120/80 mmHg SpO2: 99%
- Bệnh tỉnh, tiếp xúc tốt
- Da niêm hồng
- Nằm đầu ngang
- Hiện tại hết đau ngực
- Tim đều
- Phổi trong
- Bụng mềm



CẬN LÂM SÀNG

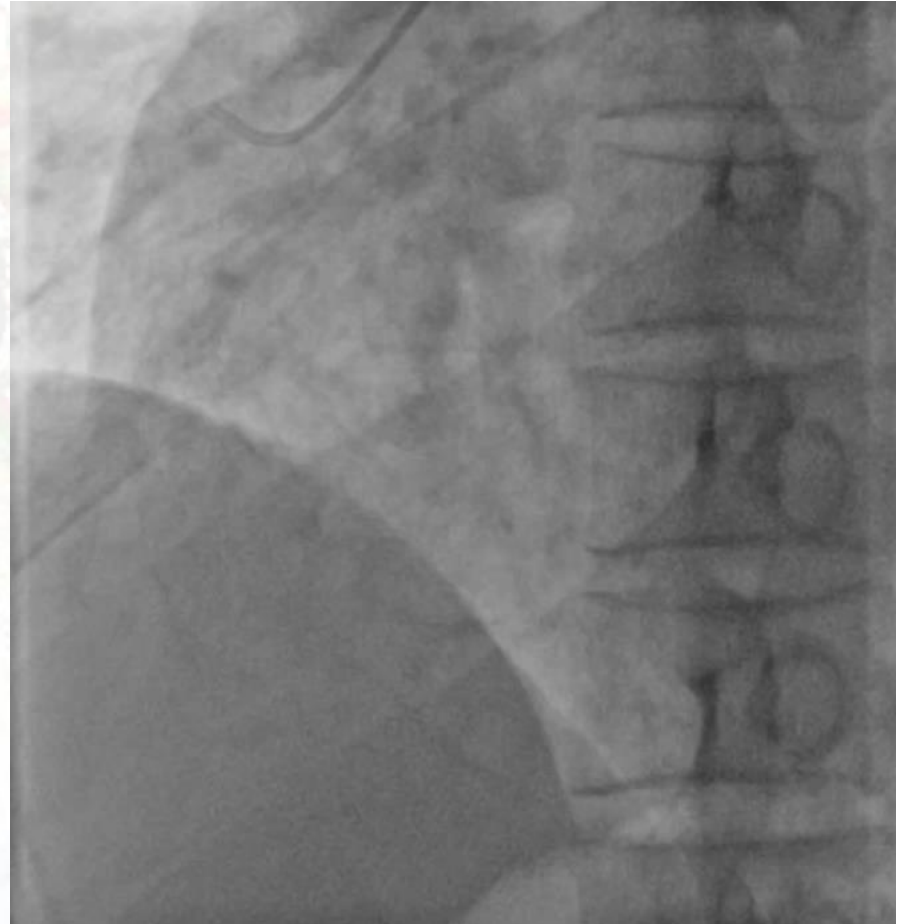
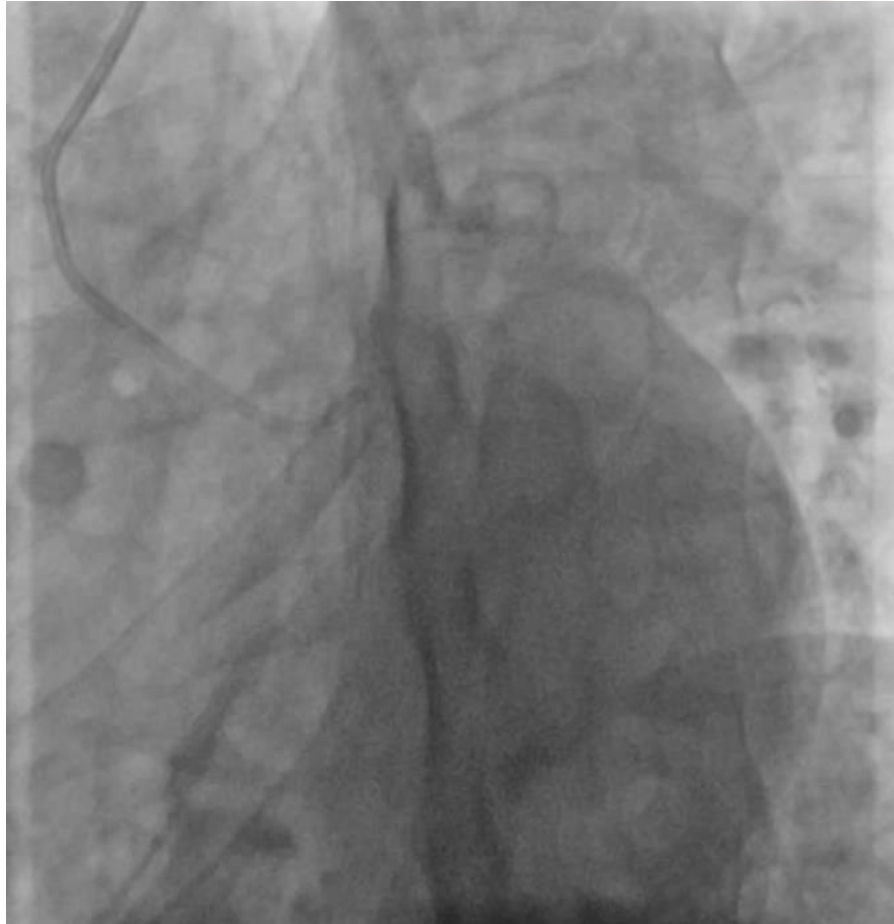
- XN: **Tpn T hs 7186 pg/mL**, Glucose 5.1 mmol/L, Creatinin 75 umol/L, Cholesterol TP 11.66, TG 1.31, HDL-c 1.77, LDL-c 8.3 mmol/L
- ECG: Ghi nhận: Nhịp xoang đều, tần số 66 lần/phút. ST không chênh, T âm DII, DIII, avF
- Siêu âm tim: LA 33, LV 50/30, MR ¼, không rối loạn động vùng, EF Simpson 56%

THUỐC



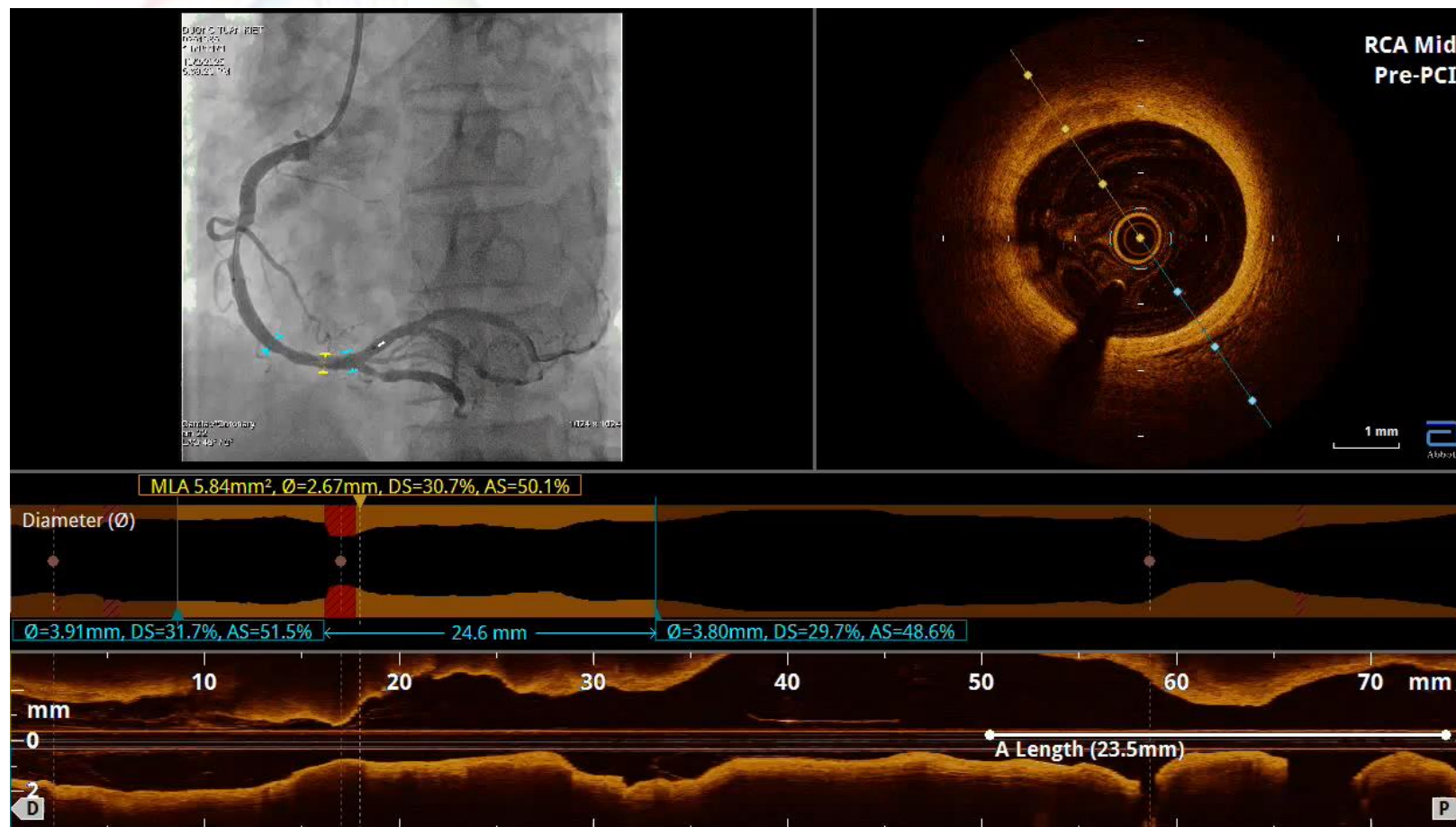
- Natri clorid 0,9% 500ml, 1 Chai TTM XX g/p 9h
- Lovenox 60mg/0,6ml Sáng: 1 Chiều: 1 (0.5ML X2(TDD) 9H 21H)
- Aspirin Stella 1 viên uống 9h
- Nexium Mups 40mg 1 viên uống 9h
- Brillinta 90mg 1v x2(u) 9h 21h
- Crestor 20 mg 1 viên (u) 21h
- Ezitimible 10 mg 1 viên (u) 21h

CHỤP MẠCH VÀNH (01/10/2025)



HÌNH ẢNH OCT TRƯỚC CAN THIỆP

- M: huyết khối đỏ, rupture, erosion plaque, TCFA, hồ lipid, xơ sợi
- L: 24 mm
- D: RCA III: EEL đoạn xa 4.5, gần mm. MLA 4,95 mm²
RCAII: 4,7; 5,1 mm. MLA 2,75 mm²



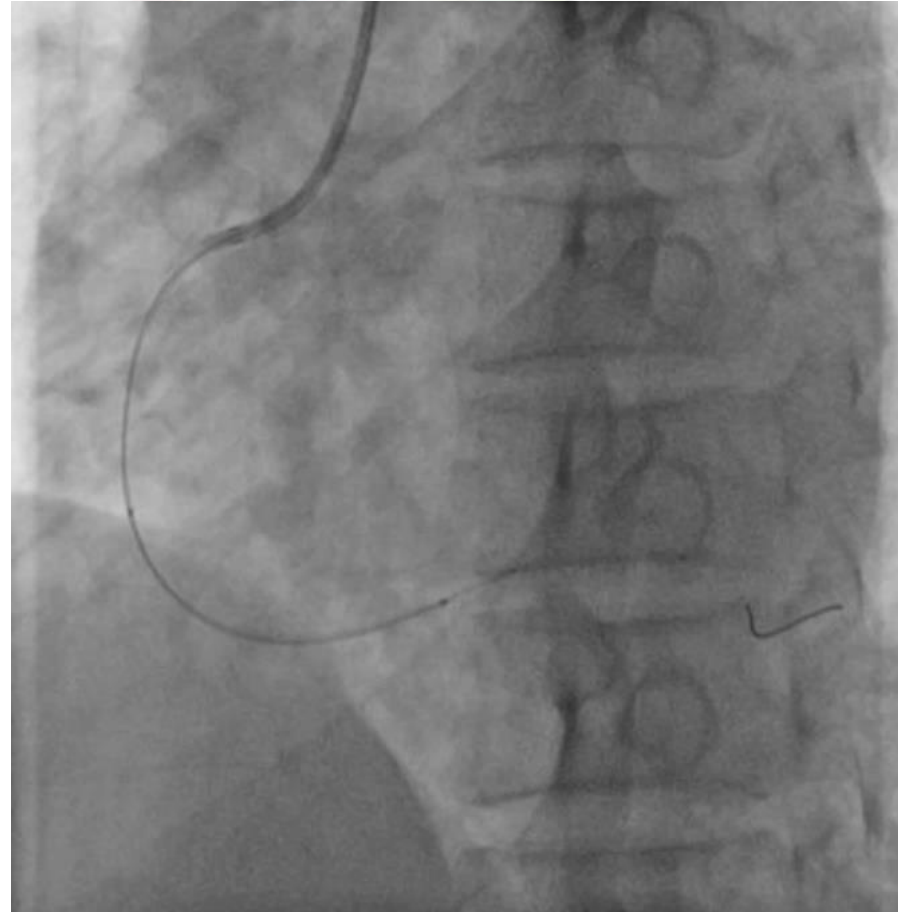
TIẾN HÀNH CAN THIỆP

- SYNERGY

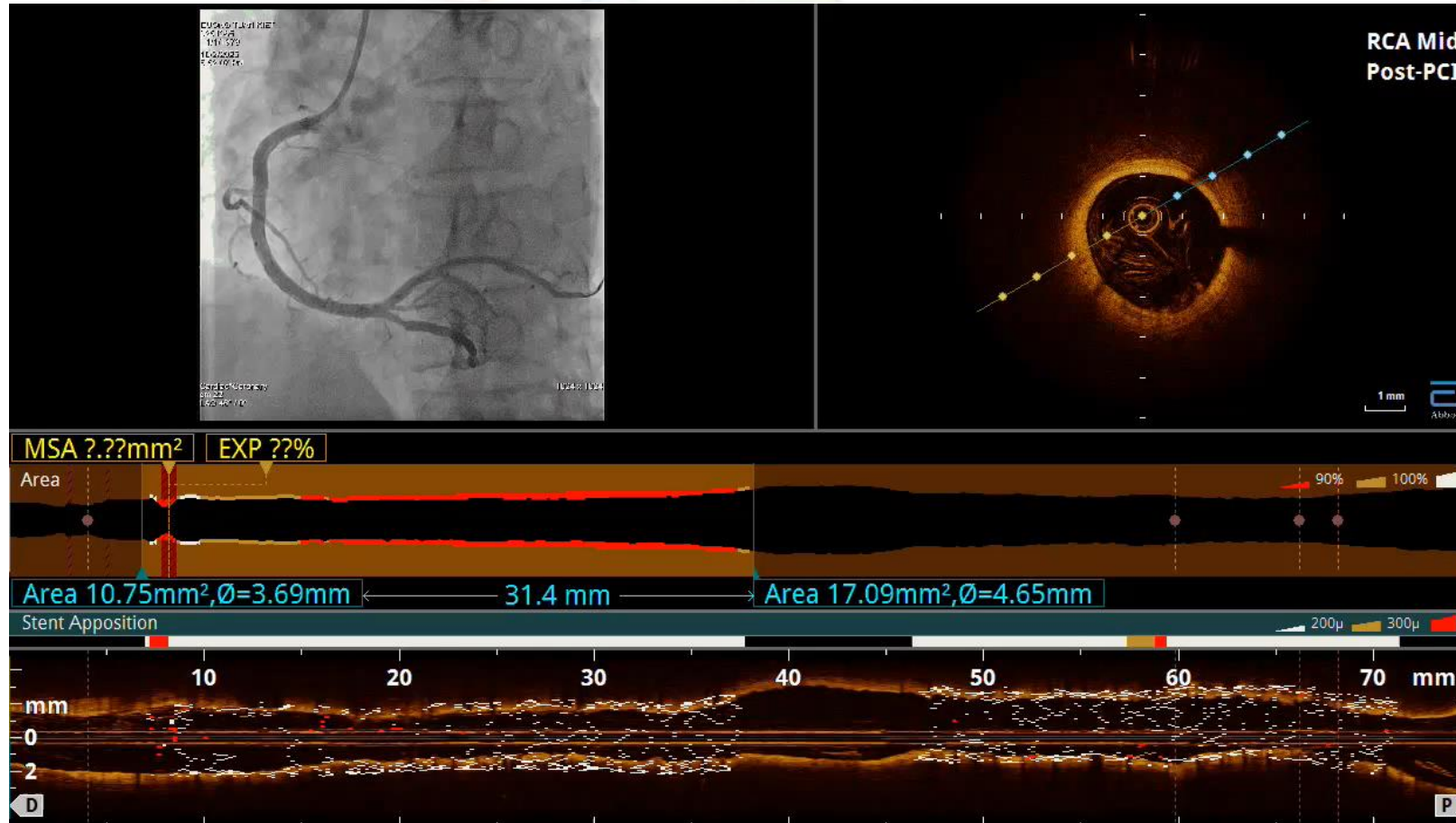
4.0x24mm/RCA III,
16bar, 4.30mm

- EluNIR 4.0x24 mm/RCA
II, 20bar, 4.33mm,
NC Euphora

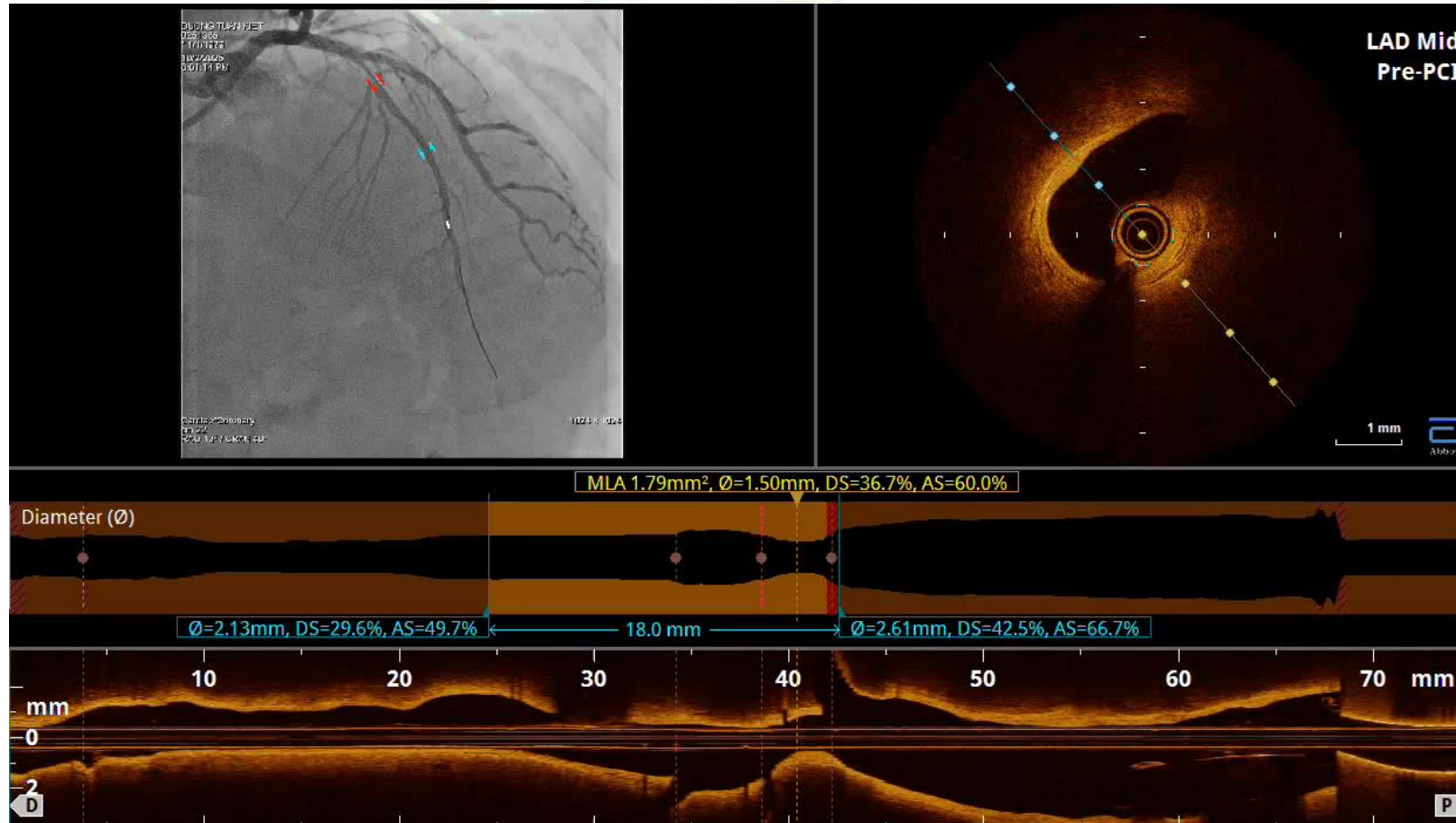
4.5x15mm/Stent RCA II,
18bar



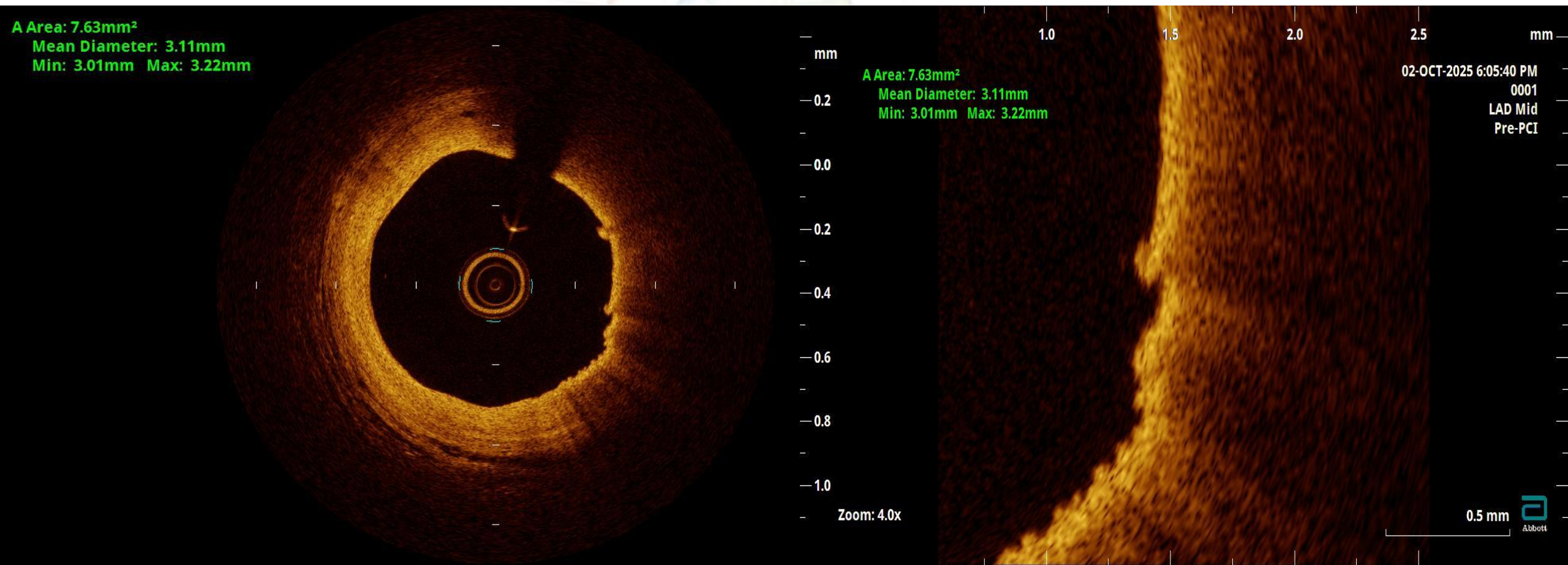
HÌNH ẢNH OCT SAU CAN THIỆP



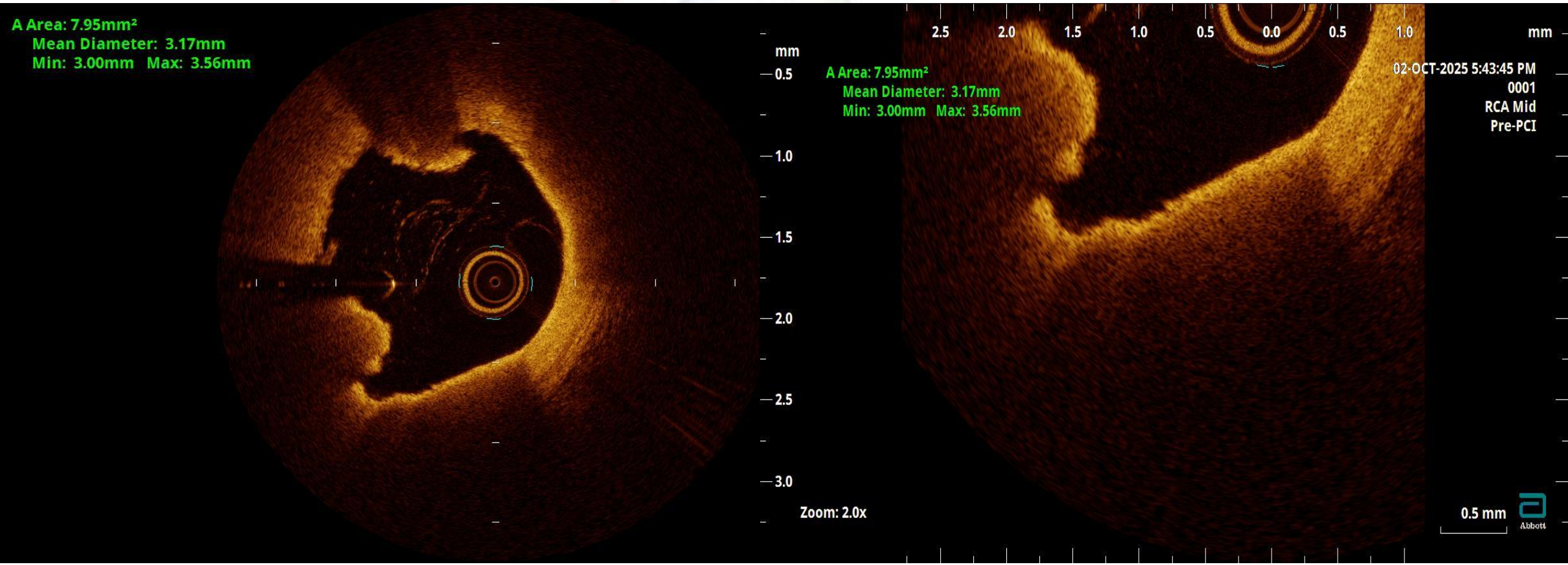
HÌNH ẢNH OCT LAD



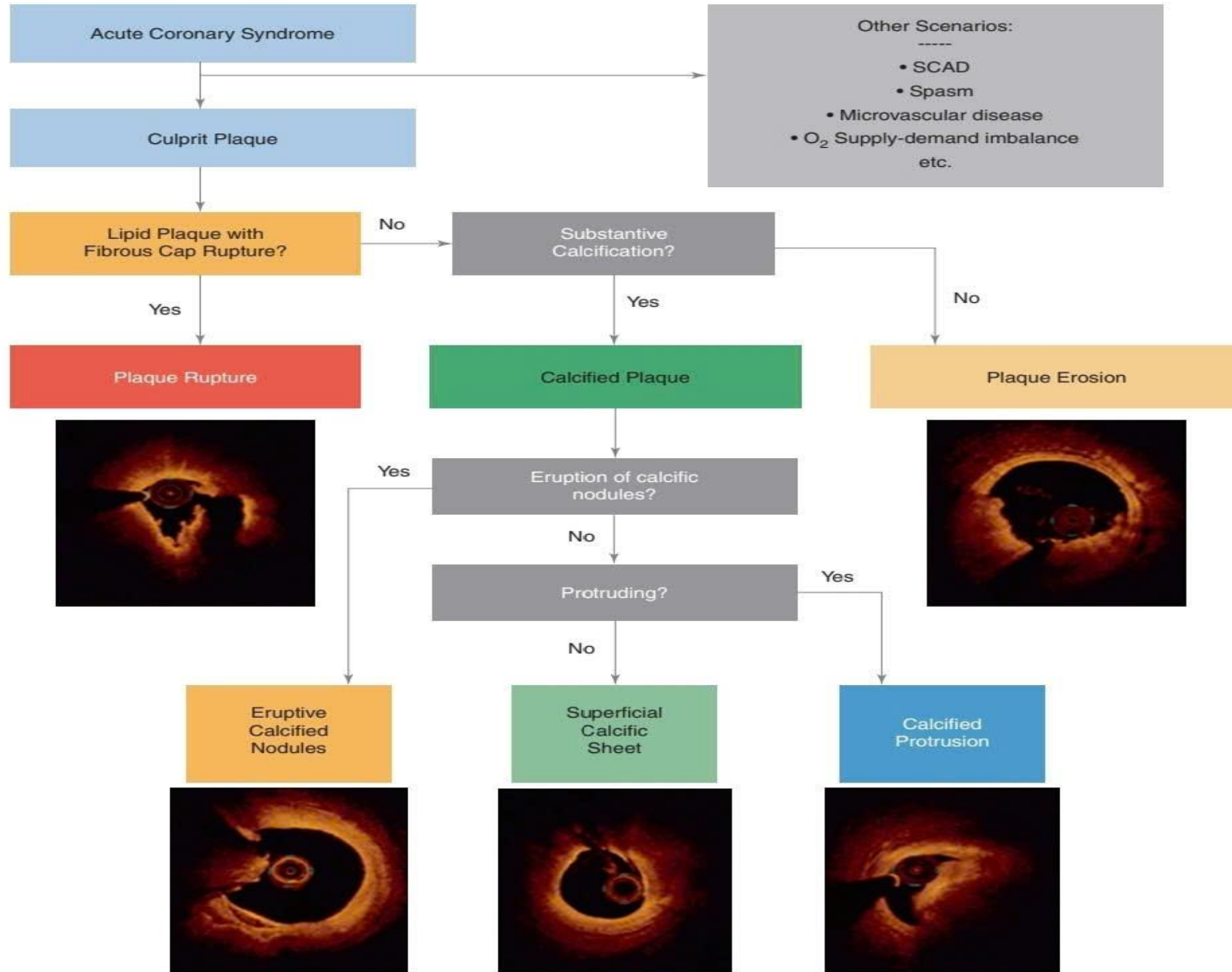
HÌNH ẢNH EROISON/LAD



HÌNH ẢNH HUYẾT KHỐI, EROISON/RCA



CENTRAL ILLUSTRATION Optical Coherence Tomography Diagnostic Algorithm for Acute Coronary Syndromes





HÌNH ẢNH HEMATOMA

THÔNG TIN BN

- Họ tên: **PHẠM THỊ T.**, nữ. Sinh năm: 1949, **76 tuổi**
- Đc: Tổ 08, Ấp Tràm Dương, Xã Mỹ Phước, Huyện Hòn Đất, Tỉnh Kiên Giang
- NV: 11/12/2024
- Lí do nv:
- BS: : Bệnh nhân và người nhà khai bệnh, cùng ngày nhập viện, bệnh nhân ho đàm nhiều kèm sốt, khó thở -> nhập viện
- TS: Cường giáp, tăng huyết áp, bệnh tim thiếu máu cục bộ
- CĐ: **Nhồi máu cơ tim cấp không ST chênh lên ngày 2 Killip I- Tăng huyết áp- Viêm phổi- Bướu giáp nhân**

THĂM KHÁM

- M: 76 lần/phút HA: 120/80 mmHg NĐ: 37,5 độ C Nhịp Thở: 20 lần/p SpO2= 99% Cân nặng: 49kg
- Bệnh than mệt, nặng ngực ít, ho đàm trắng đục
- Bệnh tỉnh, tiếp xúc được
- Thể trạng gầy Da niêm hồng, tuyến giáp to độ III, nhân lớn, không âm thổi Không lồi mắt, không phù niêm, không run tay
- Tim : T1, T2 đều rõ
- **Phổi ran nổ**
- Bụng mềm, ấn không đau

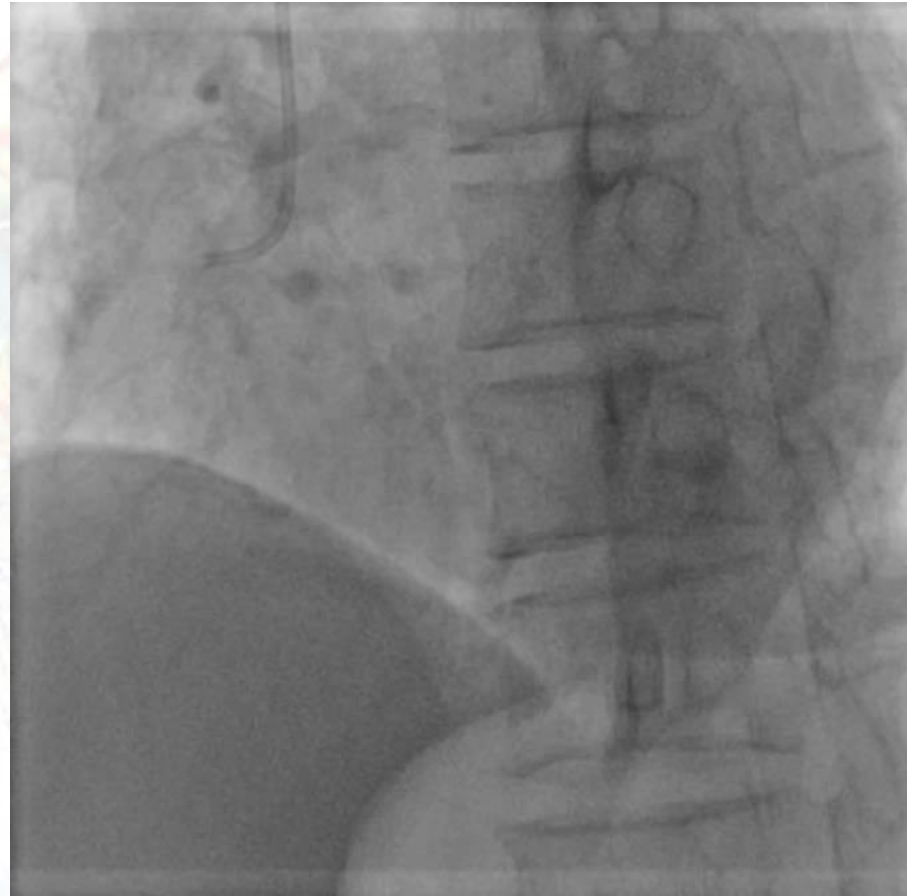
CẬN LÂM SÀNG

- XN: Tpn T hs 4145 → 17116 pg/mL, Glucose 6.7 mmol/L, Creatinin 92 umol/L, Na 130, K 2.6 mmol/L, BC 6.5 k/uL, N 75%, FT4 0.85, TSH 0.91
- **Cấy đờm: Pseudomonas aeruginosa nhạy Levofloxacin, nấm men**
- ECG: Nhịp nhanh xoang, tần số 103 lần/phút. **Không hình ảnh ST chênh**
- Siêu âm tim: : Kích thước các buồng tim trong giới hạn bình thường. EF Simpson 64%. MR 2/4. AR 1/4 . TR 1/4, PAPs = 25mmHg.

THUỐC

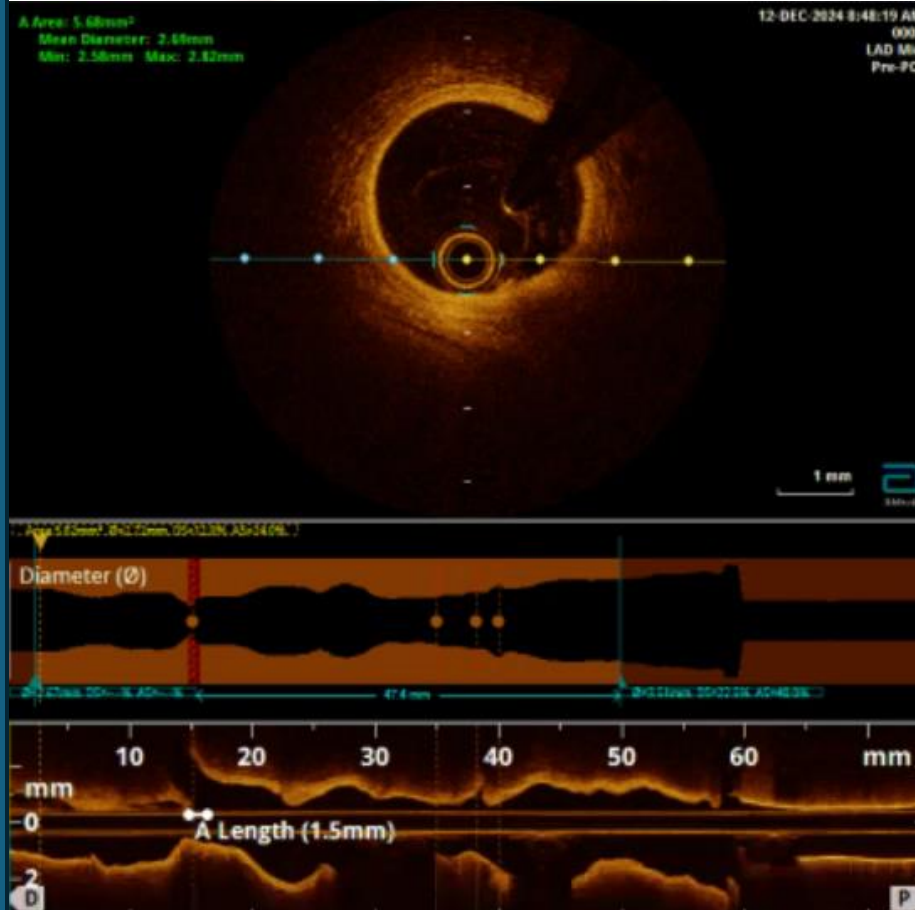
- Natri clorid 0,9% 500ml, 1 Chai TTM XX g/p 9h
- Levofloxacin 0.75 g/150 ml 1 chai TTM XXX g/p
- Lovenox 60mg/0,6ml Sáng: 1 Chiều: 1 (0.5ML X2(TDD) 9H 21H)
- Aspirin Stella 1 viên uống 9h
- Nexium Mups 40mg 1 viên uống 9h
- Brillinta 90mg 1v x2(u) 9h 21h
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CHỤP MẠCH VÀNH

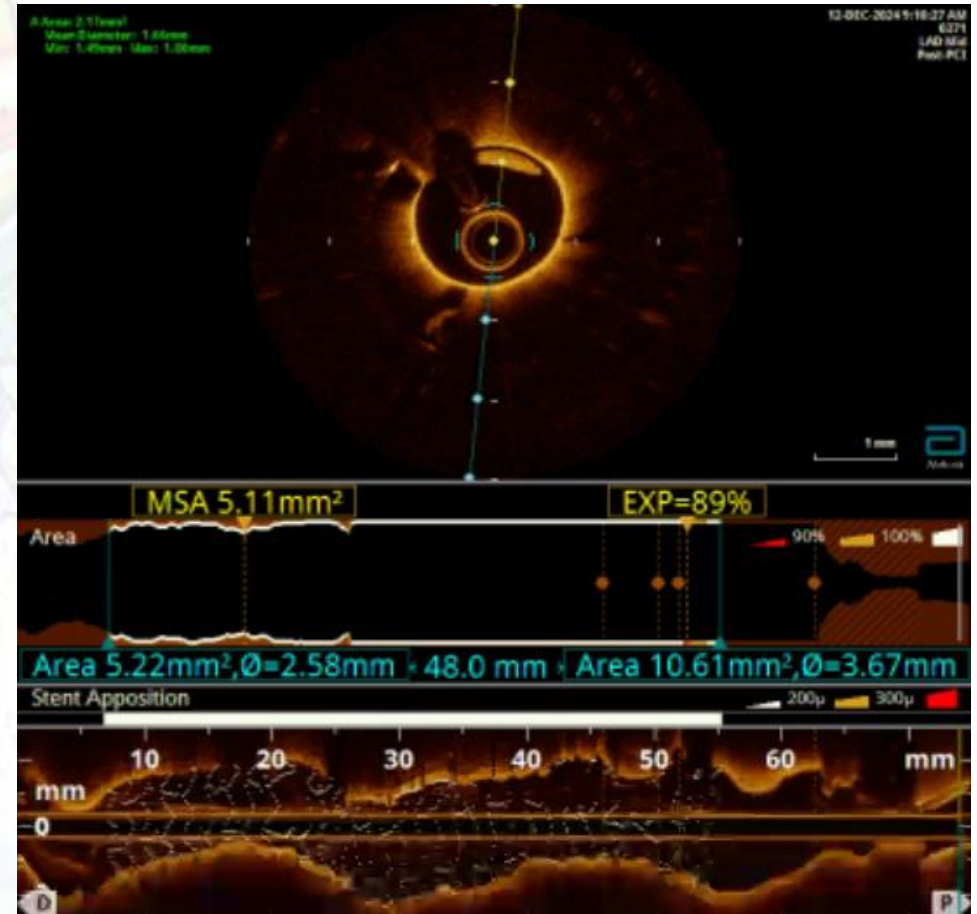


HÌNH ẢNH OCT LAD

- M: hồ lipid, canxi lan tỏa LAD II, TCFA kèm bóc tách và hematoma vị trí hướng 3h đoạn cuối LAD II đầu LAD III, đoạn sau chỗ chia nhánh D2-
- L: 47,4 mm
- D: lumen đoạn xa 2,47, gần 3,54 mm, EEL gần 4,1 mm. MLA 1,07 mm²



TIẾN HÀNH CAN THIỆP



BÓC TÁCH MẢNG XƠ VỮA, HEMATOMA

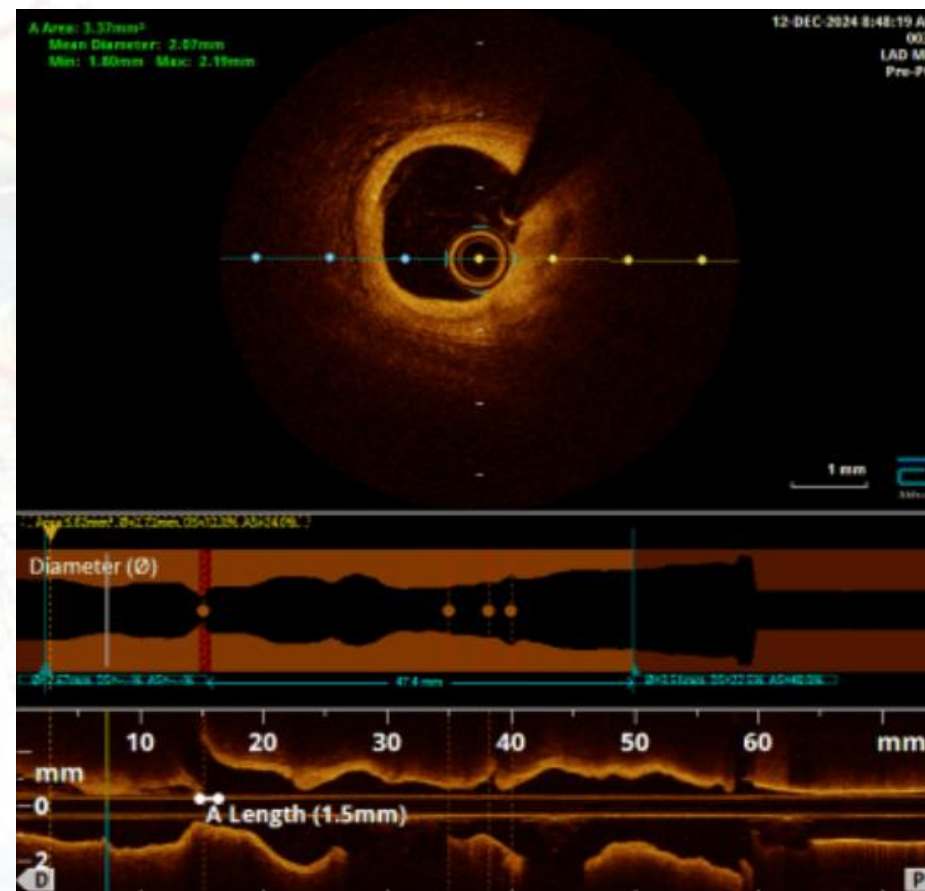
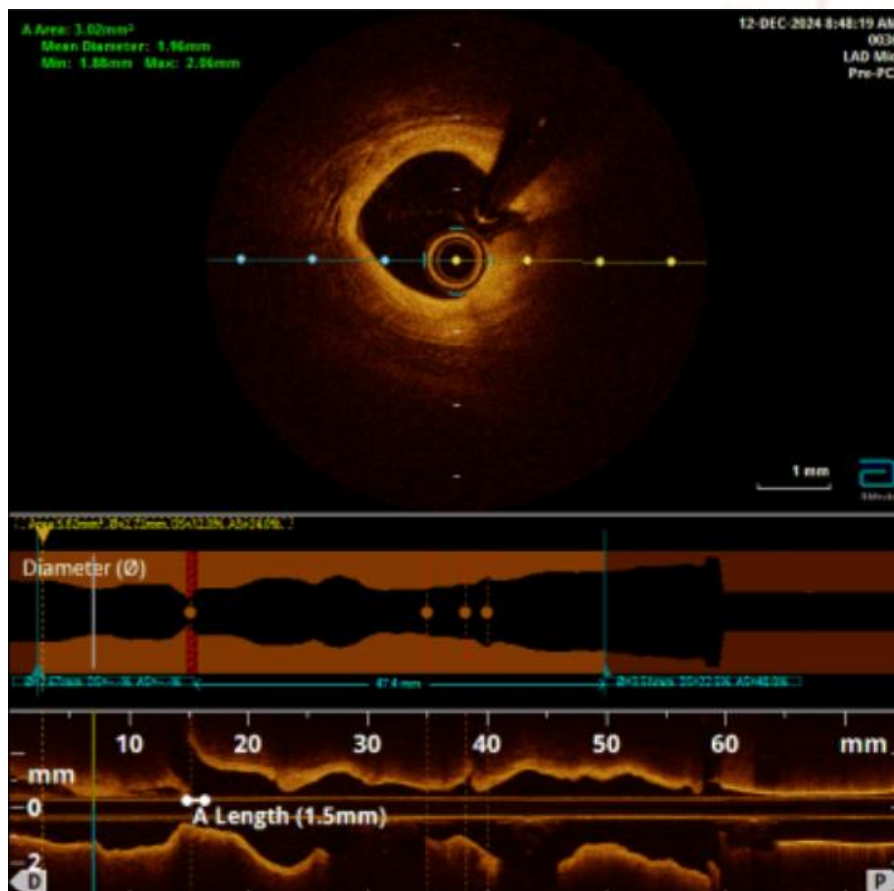
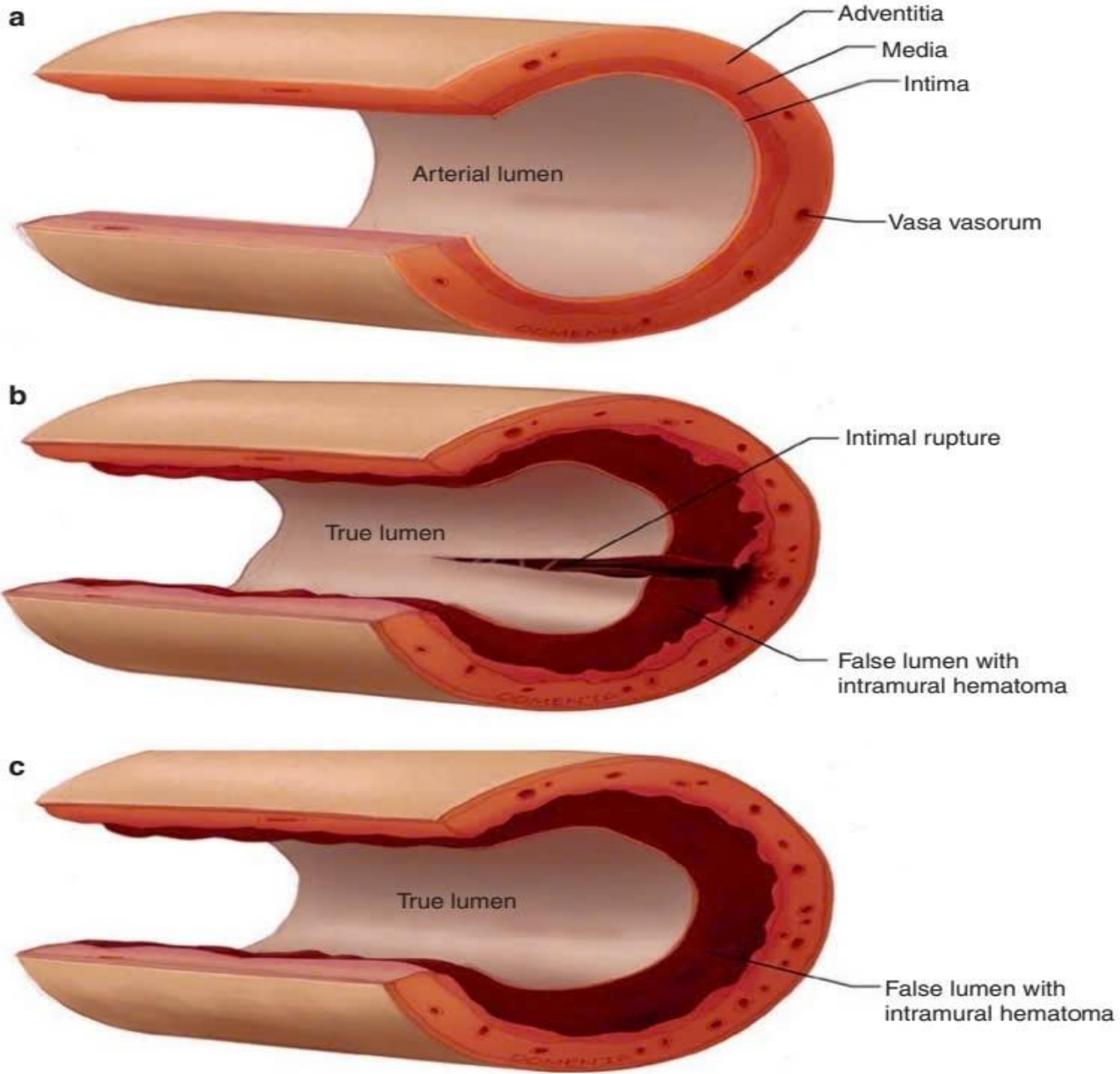
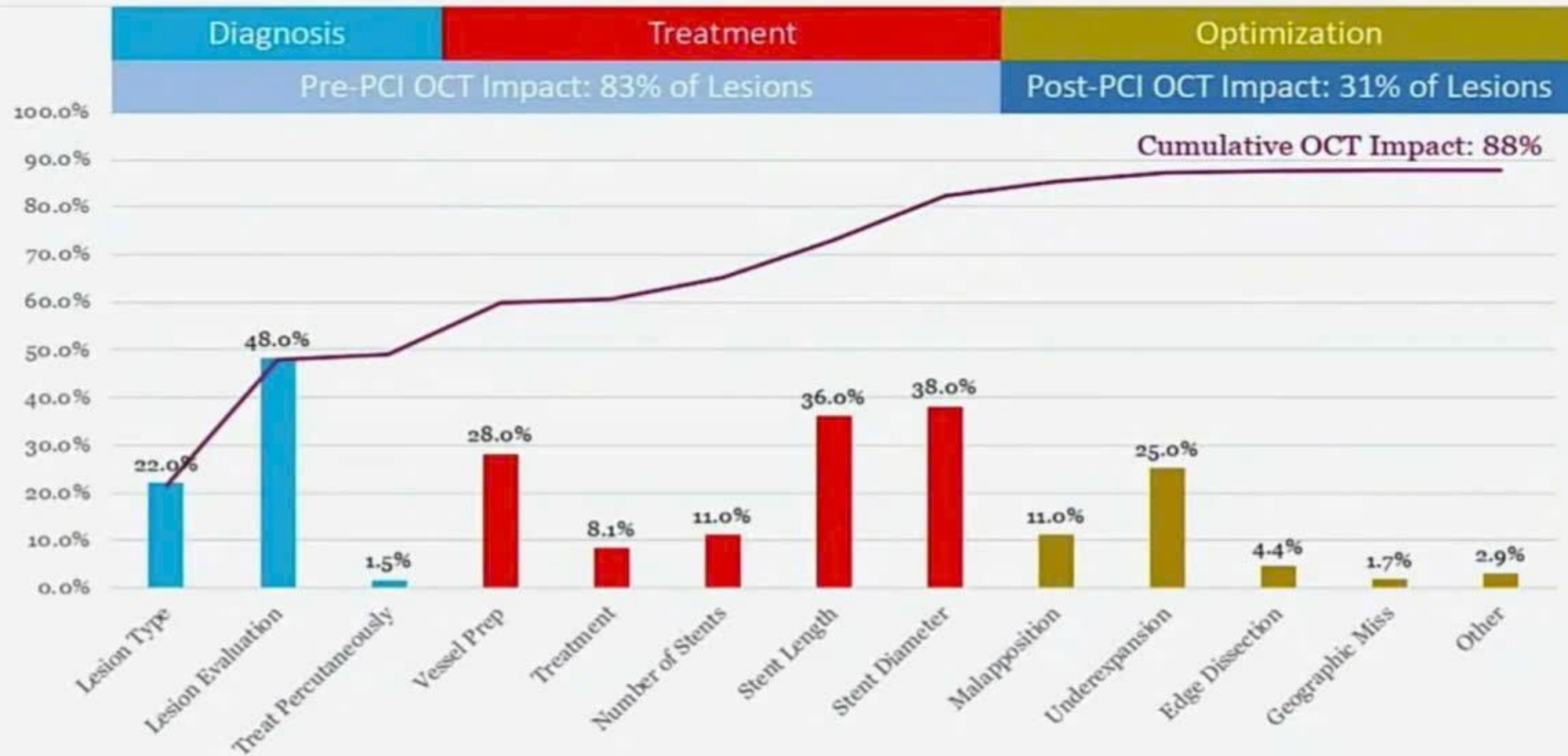


Fig. 7.1 Coronary artery walls showing different layers (a), intimal rupture (b) and false lumen with intramural hematoma (c). With permission from Ref. [22]

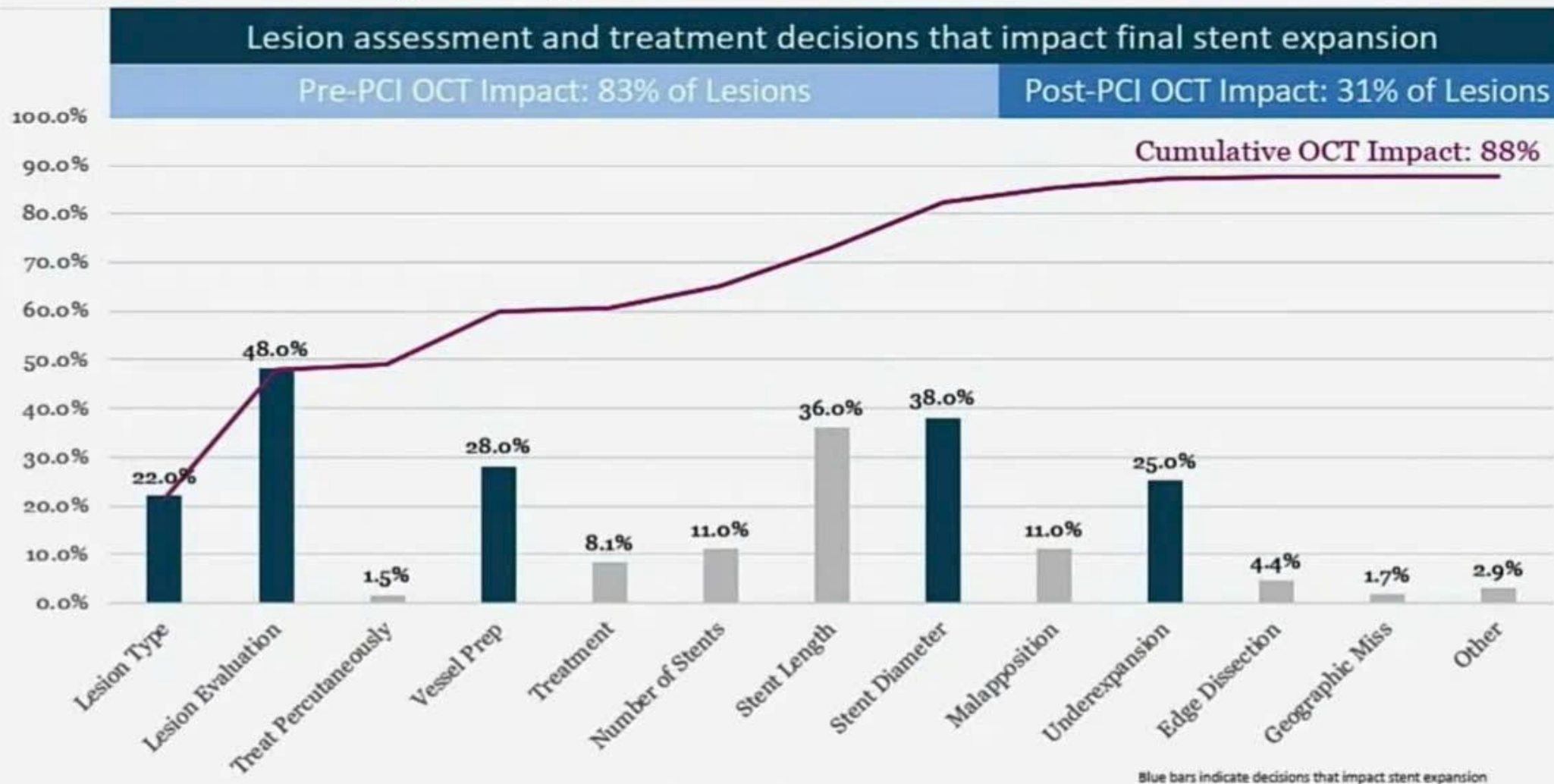


OCT changed angio-based decisions in 88% of lesions



Information contained herein for **DISTRIBUTION outside of the U.S. ONLY**. Check the regulatory status of the device in areas where CE marking is not the regulation in force.

OCT changed angio-based decisions in 88% of lesions

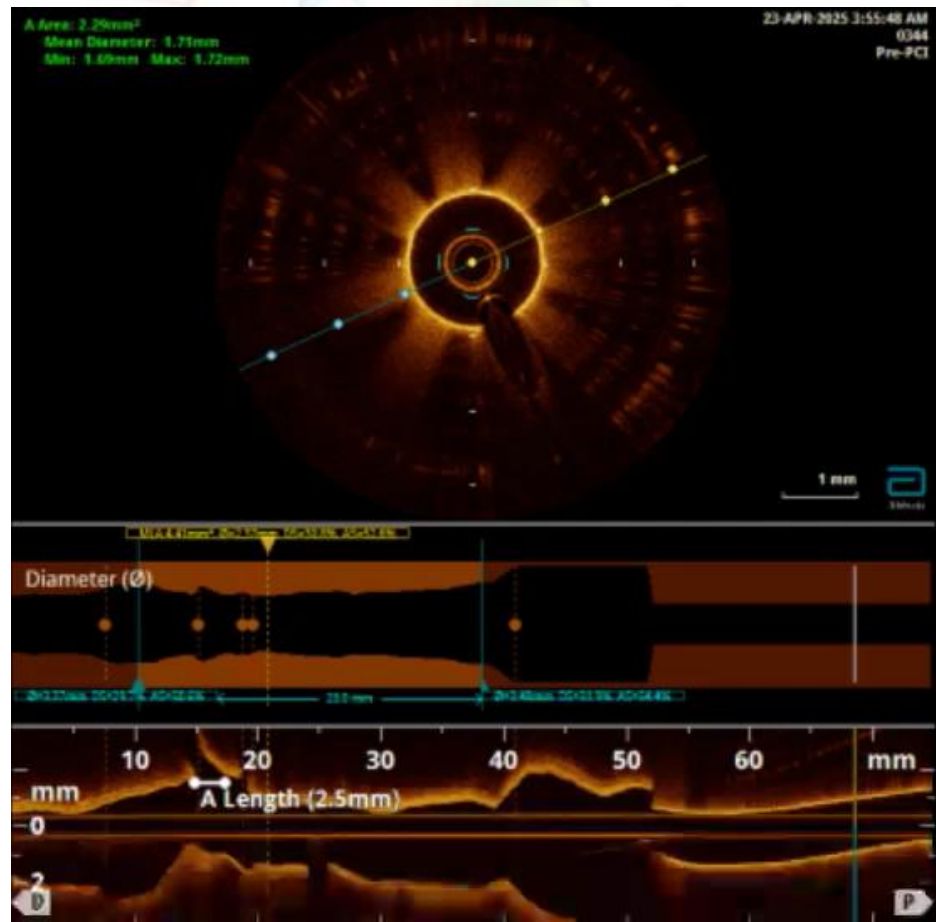


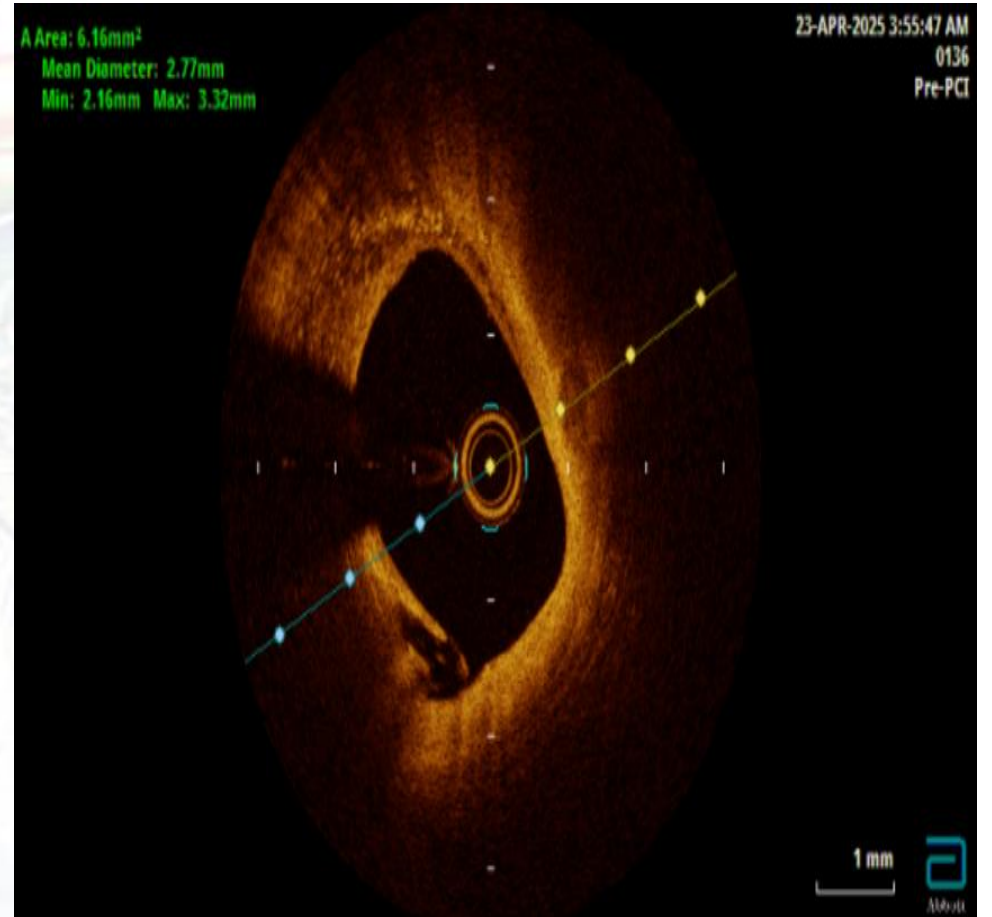
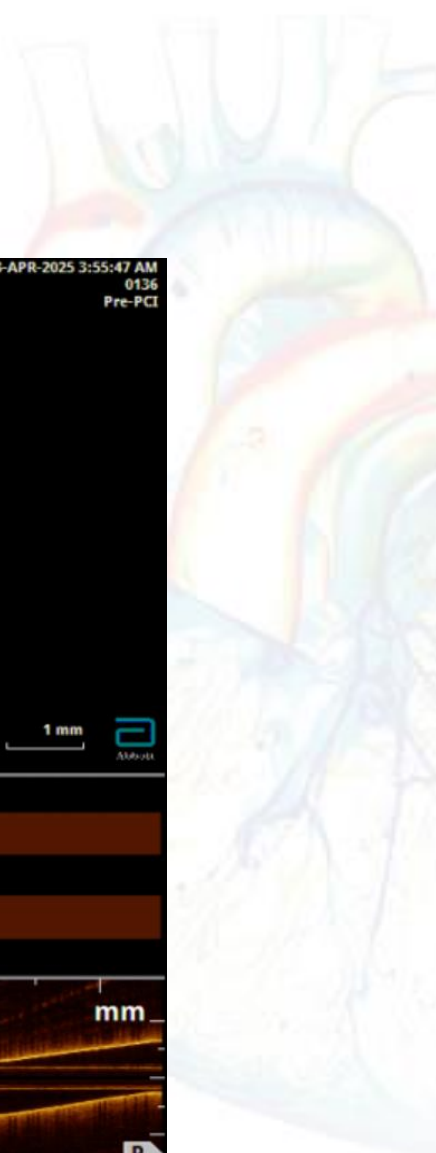
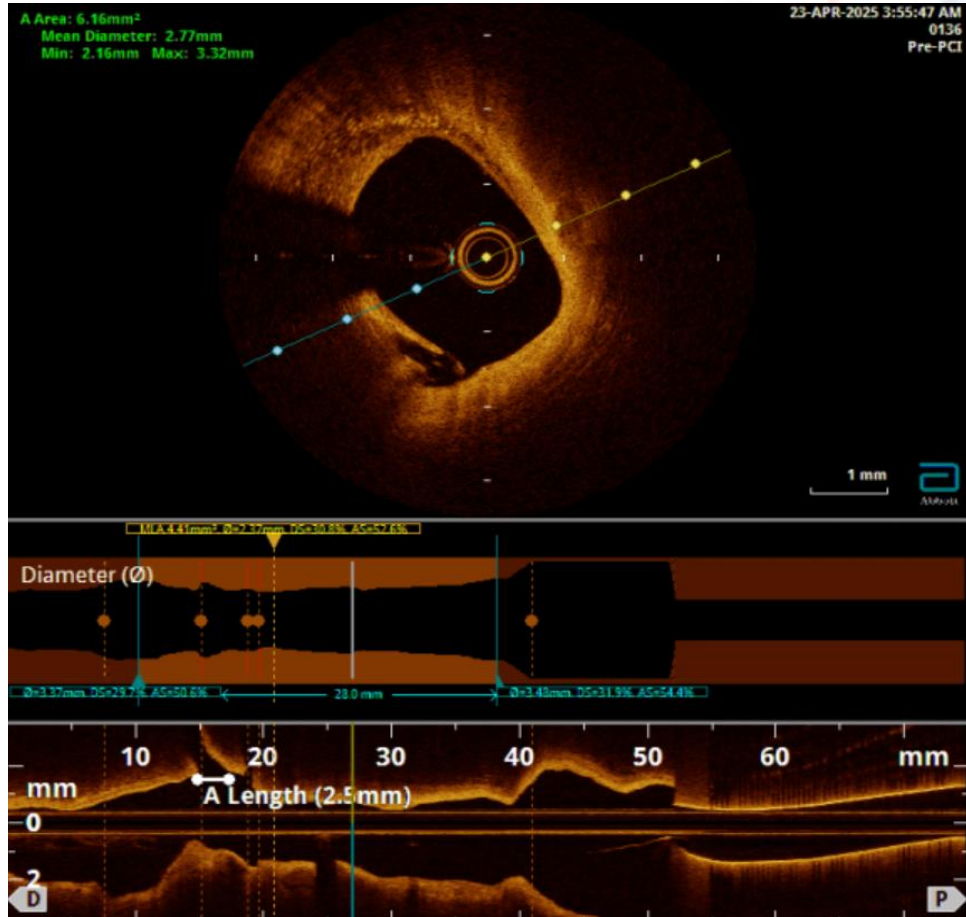
Information contained herein for **DISTRIBUTION outside of the U.S. ONLY**. Check the regulatory status of the device in areas where CE marking is not the regulation in force.



Hình ảnh vỡ mảng xơ vữa, TCFA Macrophage

,





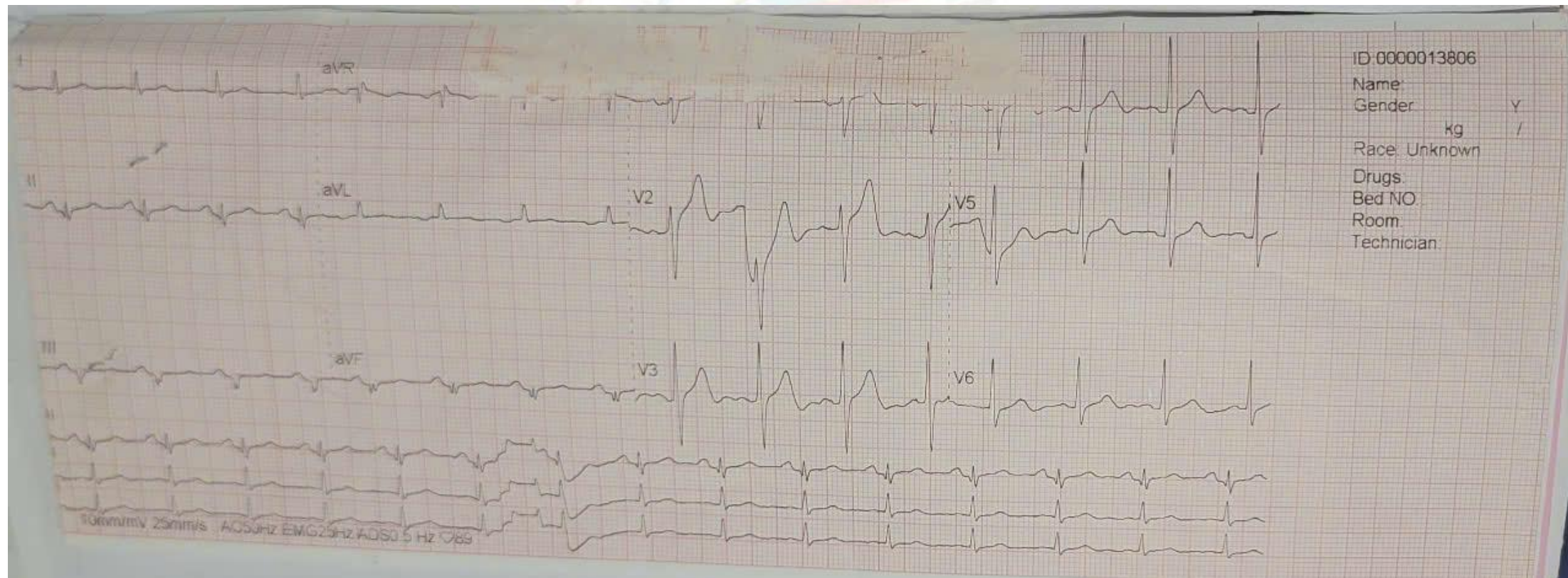


Case mạch máu vô hóa- OCT

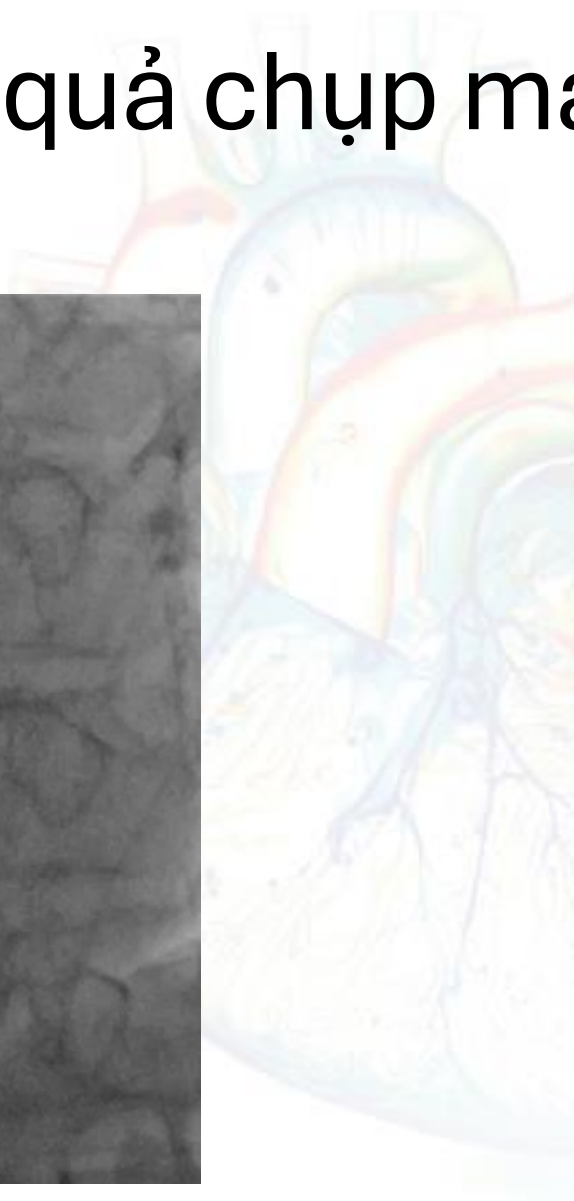
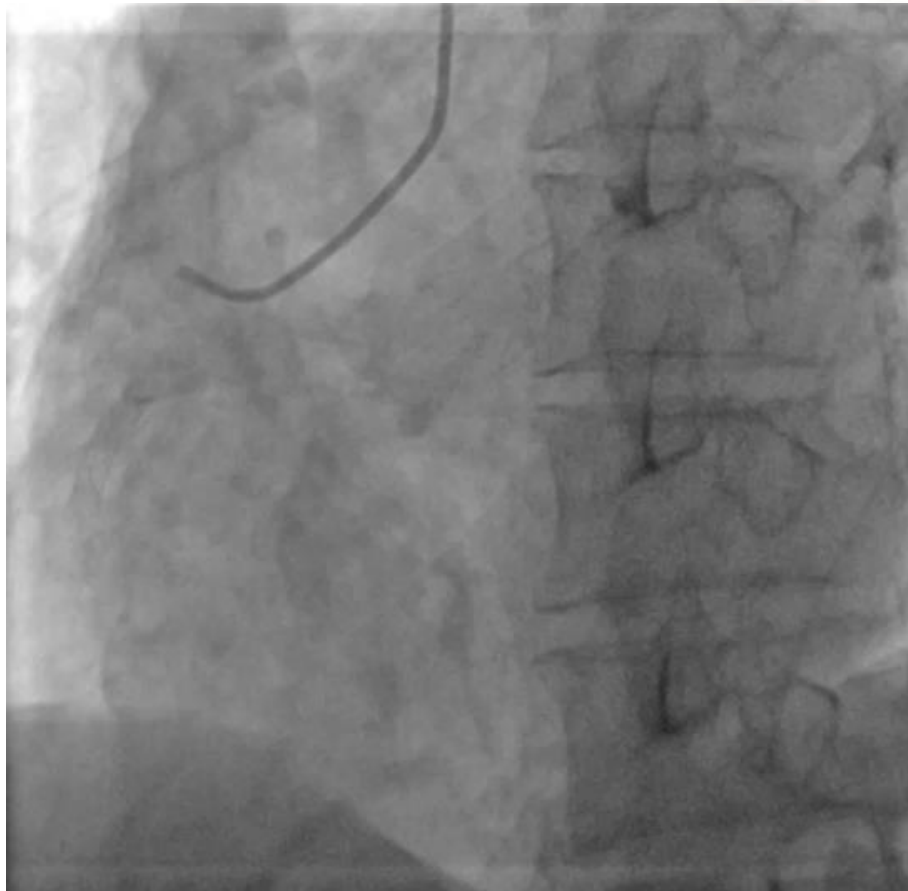
THÔNG TIN BN

- Họ tên: **NGUYỄN VIỆT T**, nam, **79T**
- Đc: : ấp Thạnh Đông, xã Thạnh Đông B, huyện Tân Hiệp, tỉnh Kiên Giang
- NV: 04/04/2025
- Lí do nv: đau ngực
- BS: Bệnh khoảng 01 tuần nay, bn đau ngực trái từng cơn khi gắng sức nhẹ, đến vừa, kiểu đè nặng, lan lên cằm, 5 – 10 phút, kèm khó thở, giảm khi nghỉ, uống thuốc không giảm → nv
- TS: NMCT cũ thành dưới đã đặt 01 DES/RCA (15/02/2024), còn hẹp 80%/LAD I-II, mạch máu vôi hóa nặng, hẹp Rotablator
- XN: Glucose 5.5 mmol/L, Creatinin 94 umol/L, Cholesterol TP 5.13, TG 0.99, HDL-c 1.43, LDL-c 3.67 mmol/L
- Siêu âm tim: LA 33, LV 50/30, MR ¼, dày đồng tâm thất trái, loạn động vách liên thất, EF 63%
- CĐ: **Đau thắt ngực ổn định kém đáp ứng điều trị nội- NMCT cũ- Bệnh 2 nhánh mạch vành đã đặt 01DES/RCA (15/02/2024), còn hẹp 80%/LAD- THA**

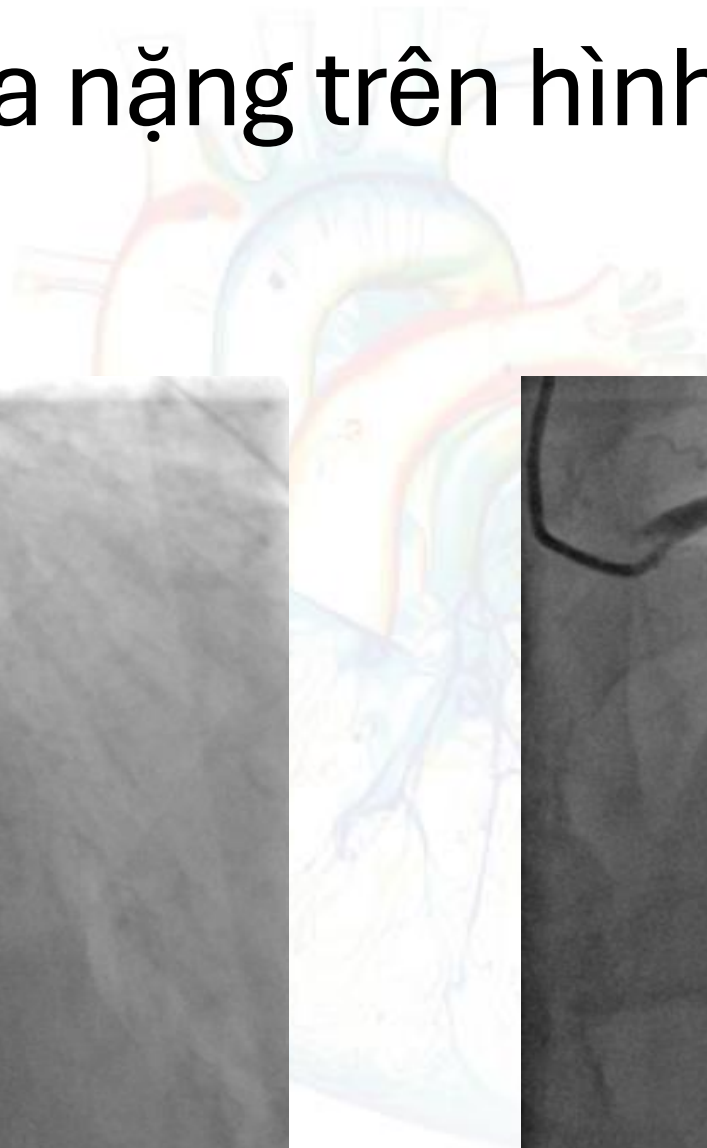
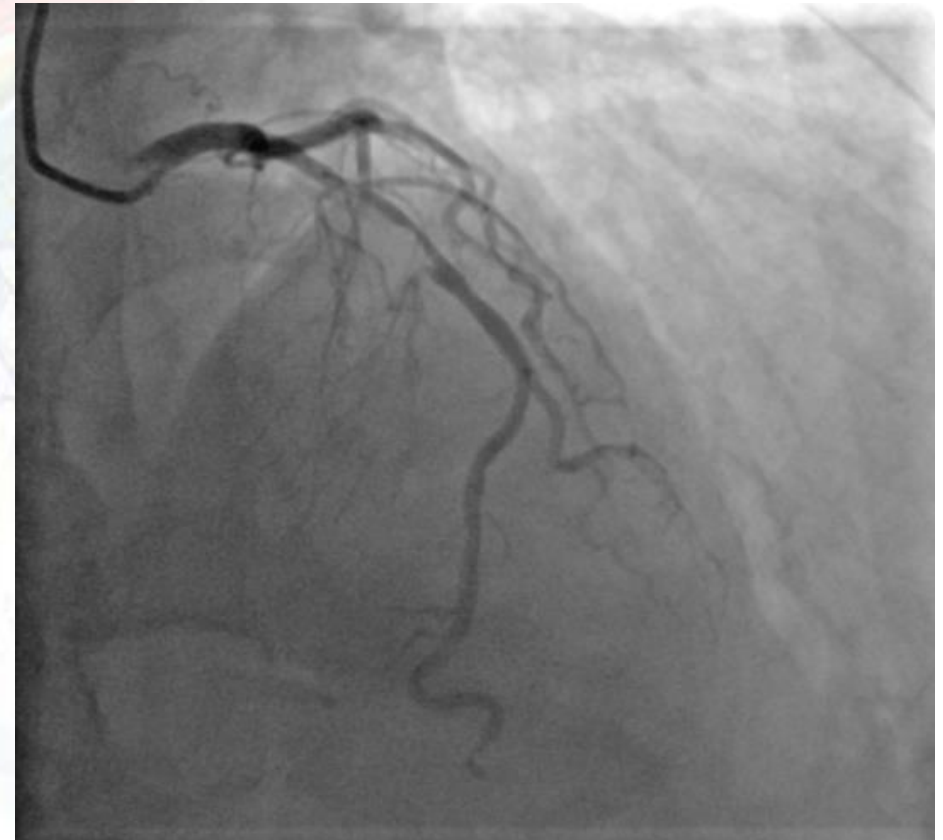
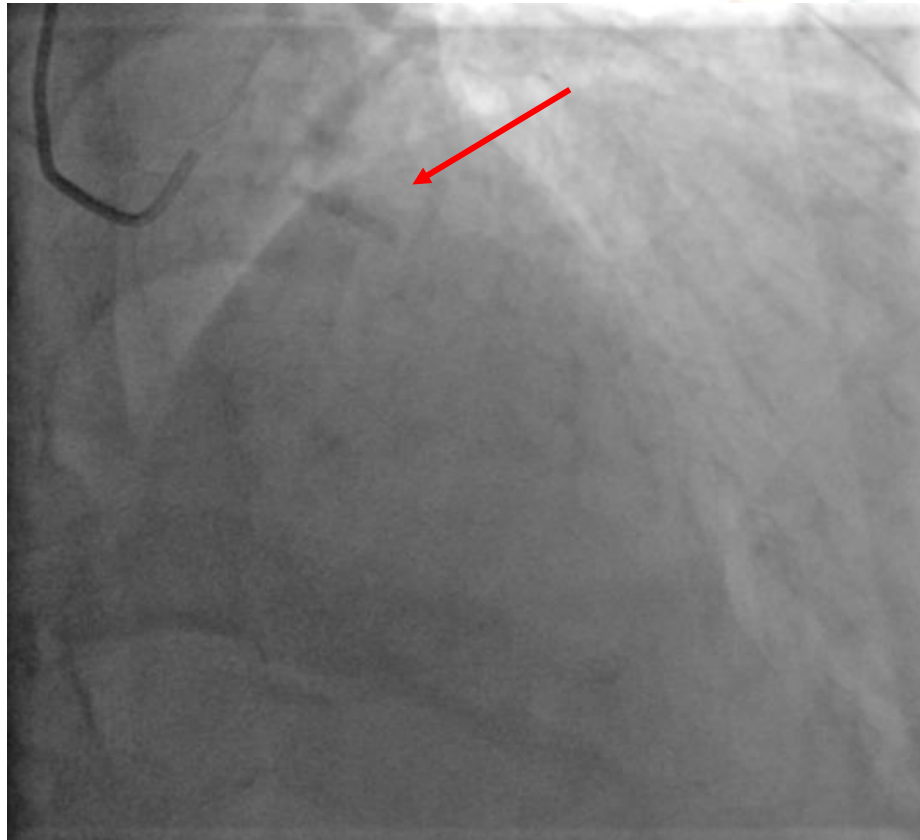
ECG



Kết quả chụp mạch vành

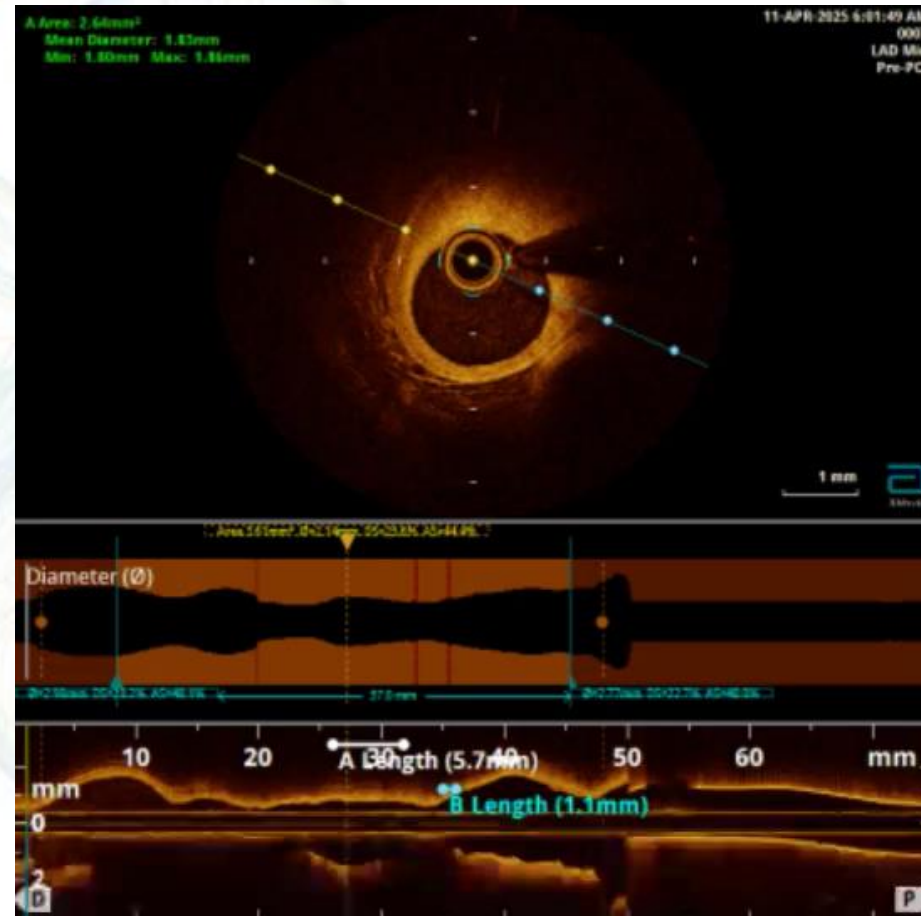


LADI-II vô hóa nặng trên hình ảnh Angiogram



Hình ảnh LAD I-II qua OCT, mức độ Canxi hóa 2 điểm

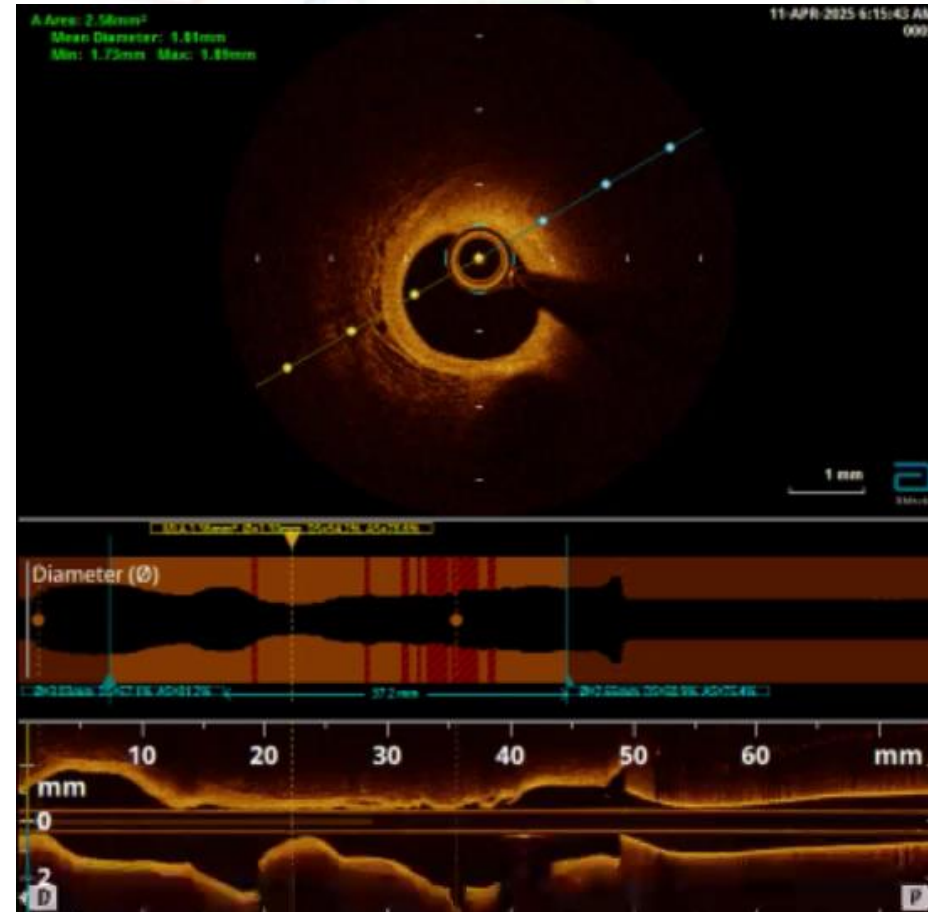
- Mổn thương hỗn hợp dạng xơ sợi, canxi hóa (2 điểm), hồ lipid, DG1 có $d=1.5$ mm, góc 60 độ, branching point-carina tip $d= 1.1$ mm
- L: 37 mm
- D: EEL đoạn xa 3.5, lumen gần 3,15 mm. MLA 1,56 mm²



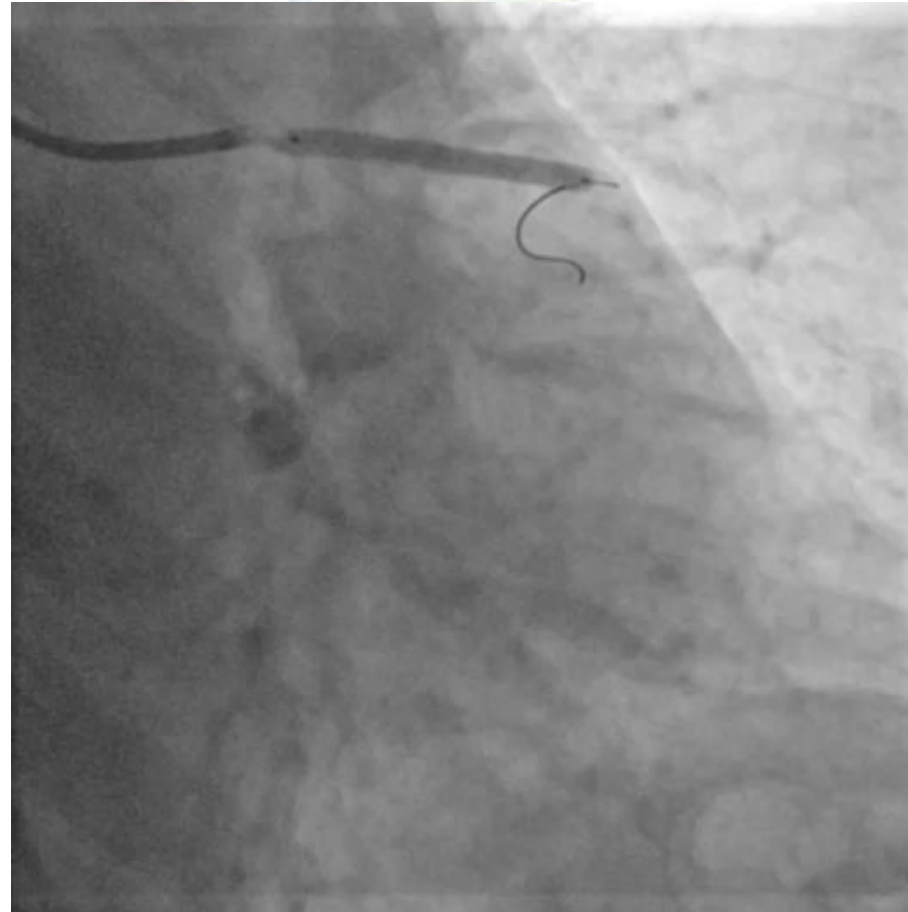
Nong bóng ScoreFlex 2.5x15mm, 16 bar



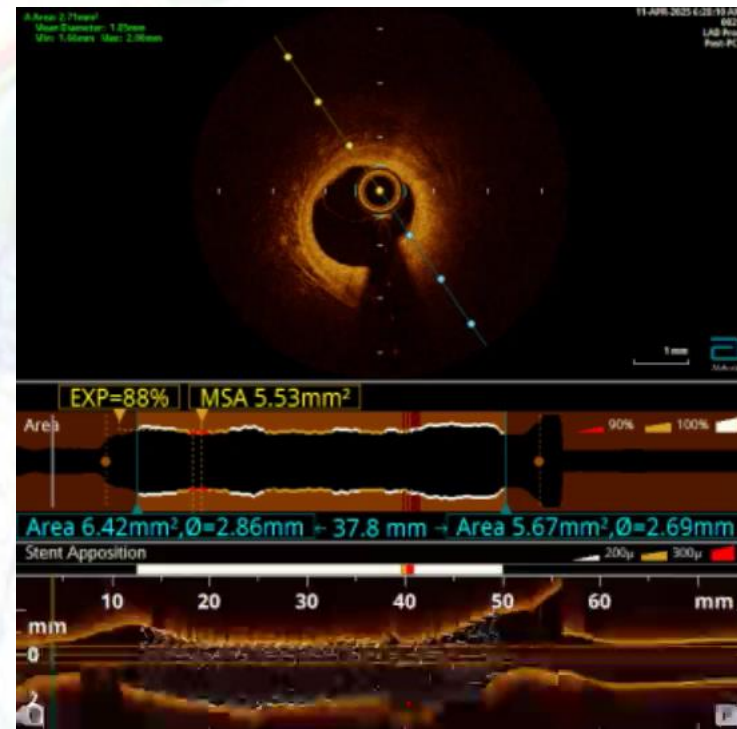
Hình ảnh LAD I-II qua OCT sau nong bóng, mảng Canxi bị nứt vỡ



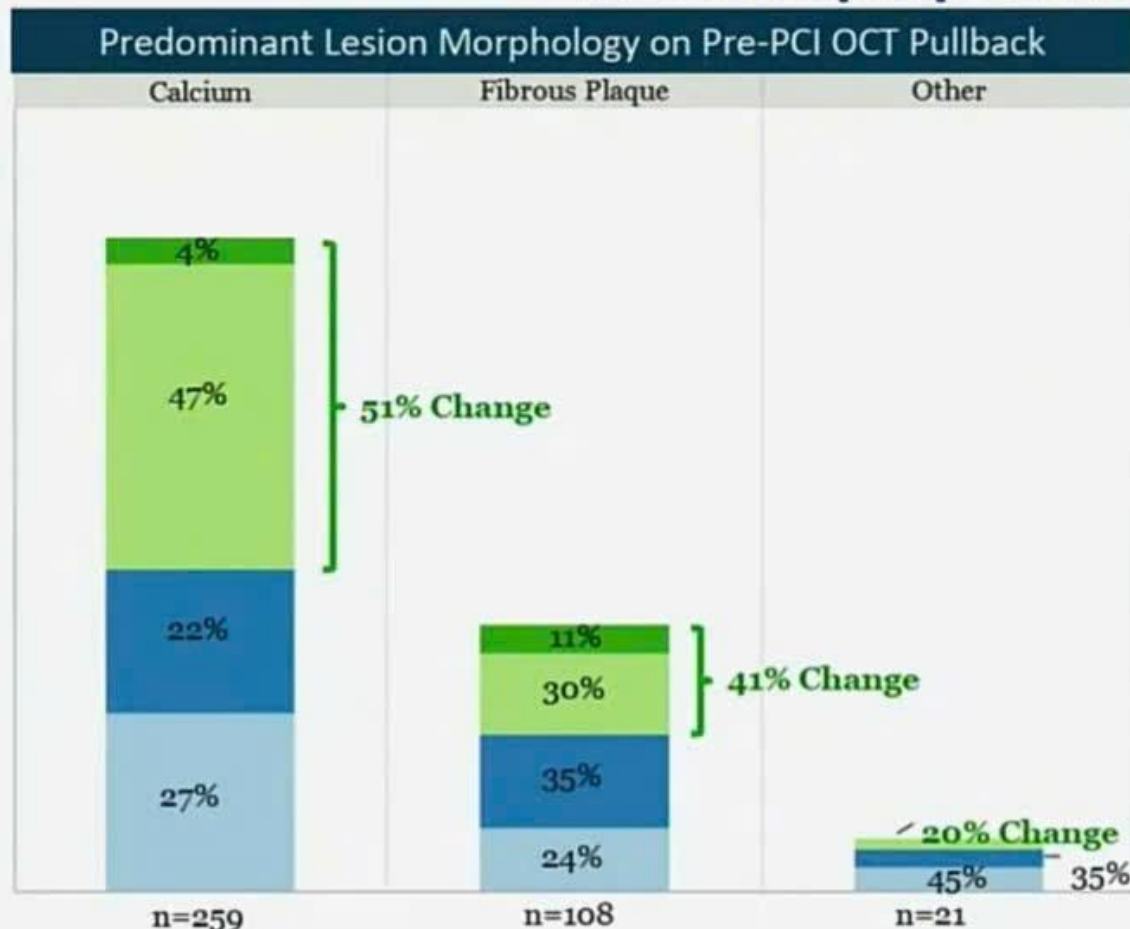
Đặt 01 Des 3.0 x 38 mm
Post dilated: bóng NC 3.0x15mm, 18bar



Sau can thiệp, stent nở tốt, áp tốt



Inaccurate diagnosis of Calcium severity drives changes in vessel preparation strategy



- Vessel Prep Change Type**
- No Change in Device
 - No vessel prep and no change
 - Change in Device
 - Change to no vessel prep

Calcified Lesions

Vessel preparation methods performed in 47% with device change:

- 49% Pre-dilatation with compliant or non-compliant balloons
- 26% Pre-dilatation with cutting or scoring balloons
- 25% Atherectomy or laser

Vessel preparation methods performed in 27% without device change:

- 88% Pre-dilatation with compliant or non-compliant balloons
- 2% Pre-dilatation with cutting or scoring balloons
- 10% Atherectomy or laser

Note: Excludes n=257 lesions where vessel prep was performed before pre-PCI OCT

Information contained herein for **DISTRIBUTION outside of the U.S. ONLY**. Check the regulatory status of the device in areas where CE marking is not the regulation in force.

**XIN CẢM ƠN ĐÃ CHÚ Ý
LẮNG NGHE**

