

Complex Multi-bifurcation Procedure: Make it Easy with Stepwise Approach and Intravascular Imaging Guidance

I. Sheiban ,MD

Director Interventional Cardiology

Pederzoli Hospital

Pescheria del Grada (Verona) / Italy

Disclosure

- I have nothing to disclose

Background

- **Coronary bifurcation lesions PCI is challenging and complex particularly when consecutive multiple bifurcation lesions have to be treated**
- **PCI on bifurcations has greatly evolved in the last 10 years, refining both simple and complex stenting strategies :**
 - *Different platforms , with different designs and more appropriate strut thickness and cell opening for the use in BL*
 - *Improvements of the basic strategies based on more detailed data coming from bench testing and clinical practice*
 - *More use of intravascular Imaging for procedural Guidance*
 - *More effective devices for calcified lesion preparation*
 - *More Clinical Data with improved outcome*
- **Key issues in complex PCI : Plan the strategy and follow the fundamental steps to obtain an optimal result : inspection, lesion preparation, stenting and optimization**

GT, 78yrs/male

CRF : Hyperlipidemia ,Hypertnsion , Familiarity , PAD

On 22 July 2022 : First episode of chest pain on exertion lasting for 3 minutes

The day after : prolunged chest pain on rest . He was admitted for NSTEMI

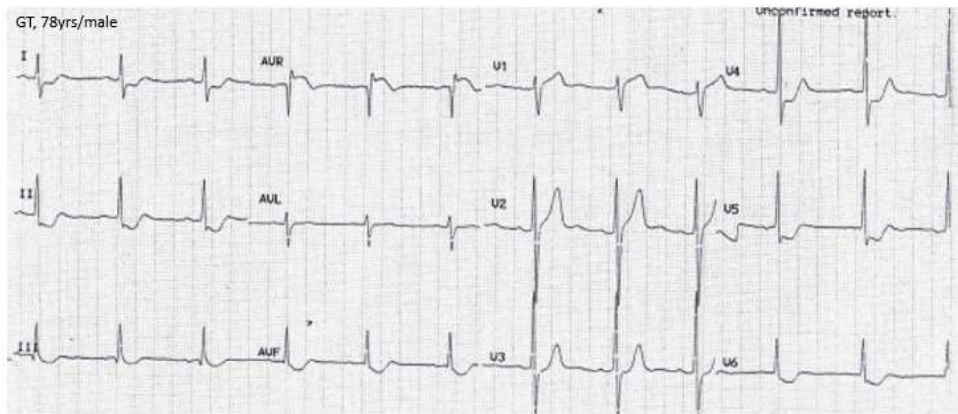
On arrival : Persisting chest pain, BP = 140/80mmHg

pulse : 72 bpm , O2 saturation 96 % , Creatinine= 0,9 mg/dl ,

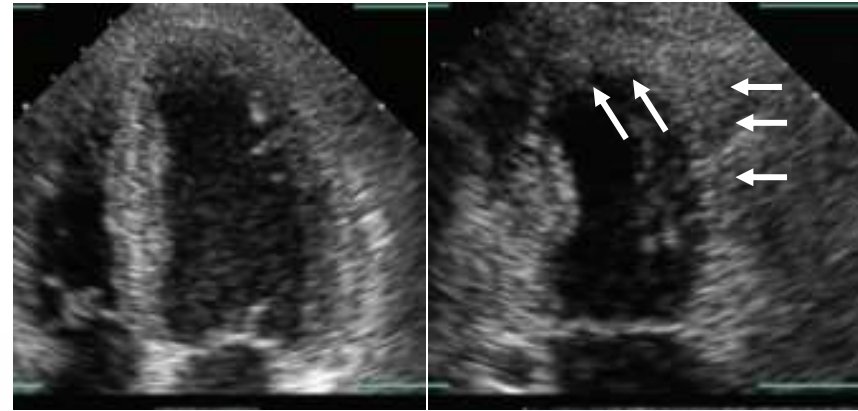
T-troponine = 357 ng /L

EKG : ST depression in I-II-III - aVL , V₄₋₅ ,

Echo : LV normal volume , moderate inferior and apical hypokinesia, EF = 0,52



EKG at arrival



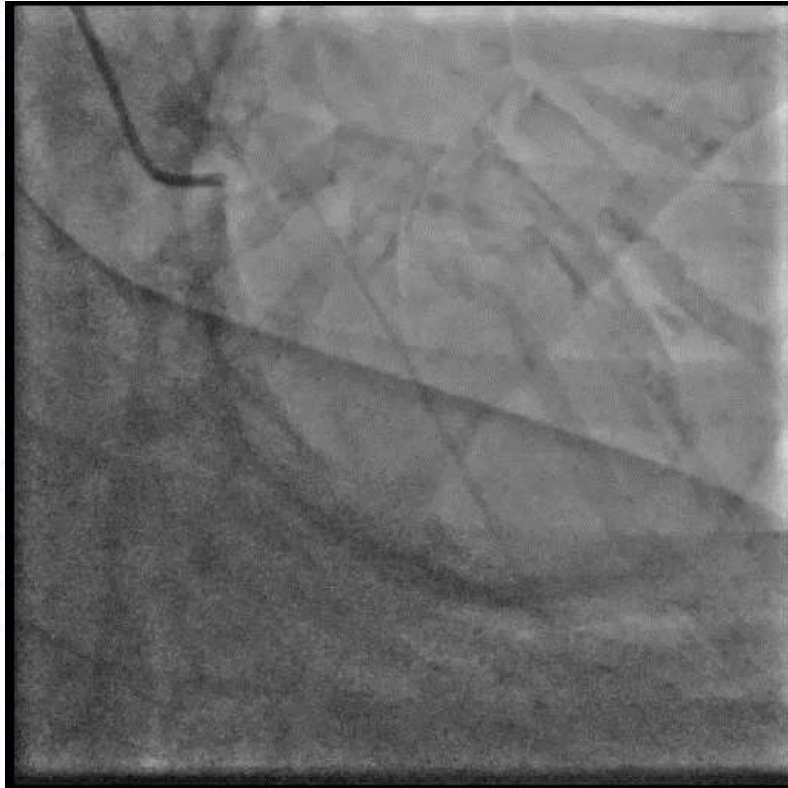
Echo at arrival



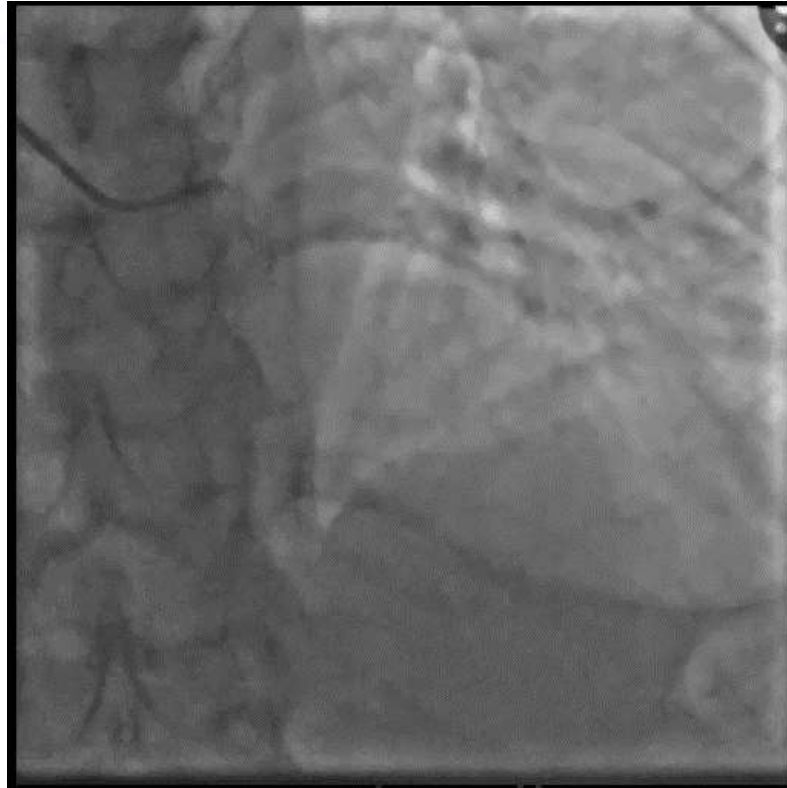
RCA



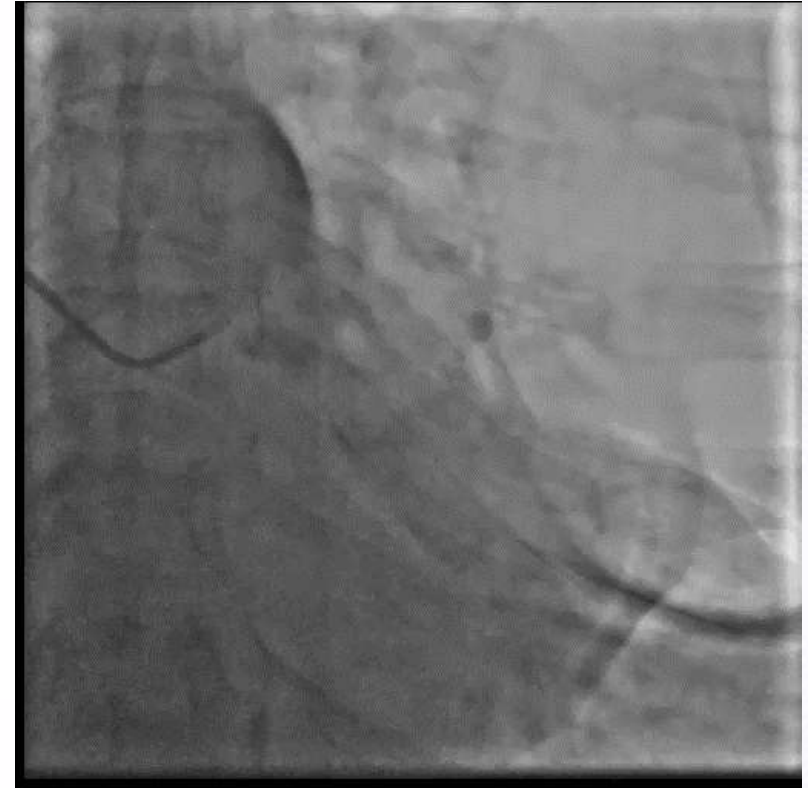
NSTEMI "Culprit Lesion"



LCA : RAO Caudal



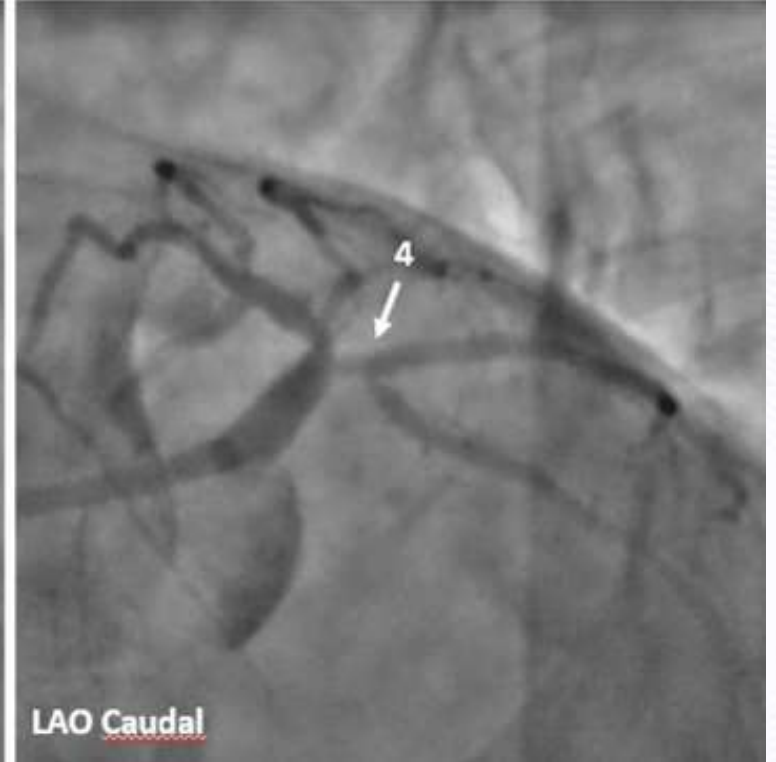
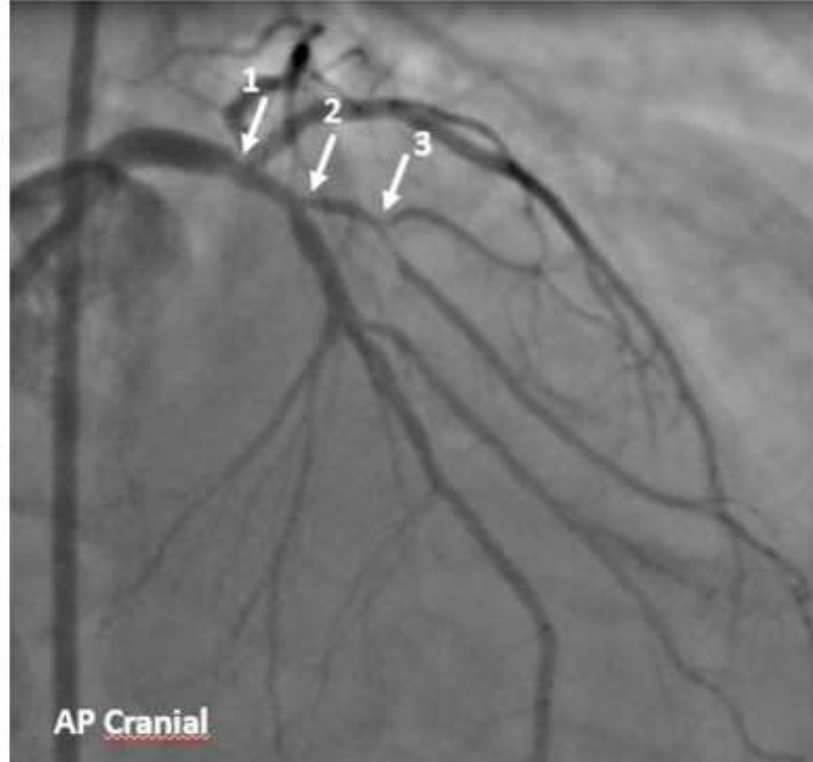
LCA : AP Cranial



LCA : APCaudal

Angio : 3-Vessel disease

RCA Culprit lesion + distale left main involvment with LAD-I diagonal bifurcation disease & LCX-OM Bifurcation



1. Distal LM Bifurcation
2. LAD- 1° Diag Bifurcation
3. Diagonal Bifurcation
4. LCX- OM Bifurcation

- **Cuplrit Lesion treated: RCA ricanalization and Stenting (long lesion med to distal RCA)**

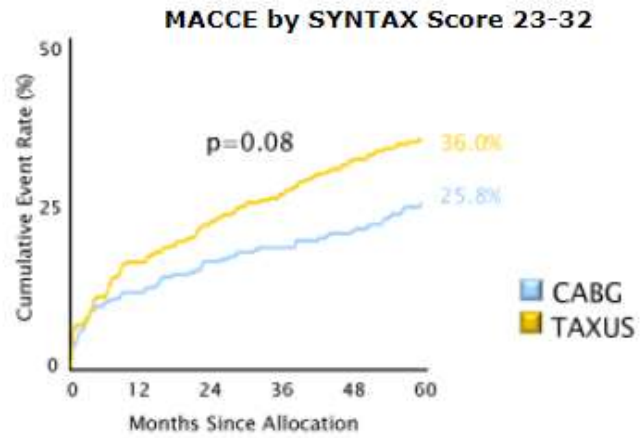


- **Planning to complete revascularization before discharge (Heart Team Discussion and Patient's consent)**

Heart Team Discussion :

Syntax I - II Score

Syntax Score I = 30



The cumulative MACCE rate is displayed for the SYNTAX Trial group this score corresponds to.

SYNTAX Score II



Decision making -between CABG and PCI- guided by the SYNTAX Score II to be endorsed by the Heart Team.

PCI

SYNTAX Score II:
PCI 4 Year Mortality:

44.8
21.7 %

CABG

SYNTAX Score II:
CABG 4 Year Mortality:

52.4
37.0 %

Treatment recommendation :

CABG or PCI

Patient preference = PCI

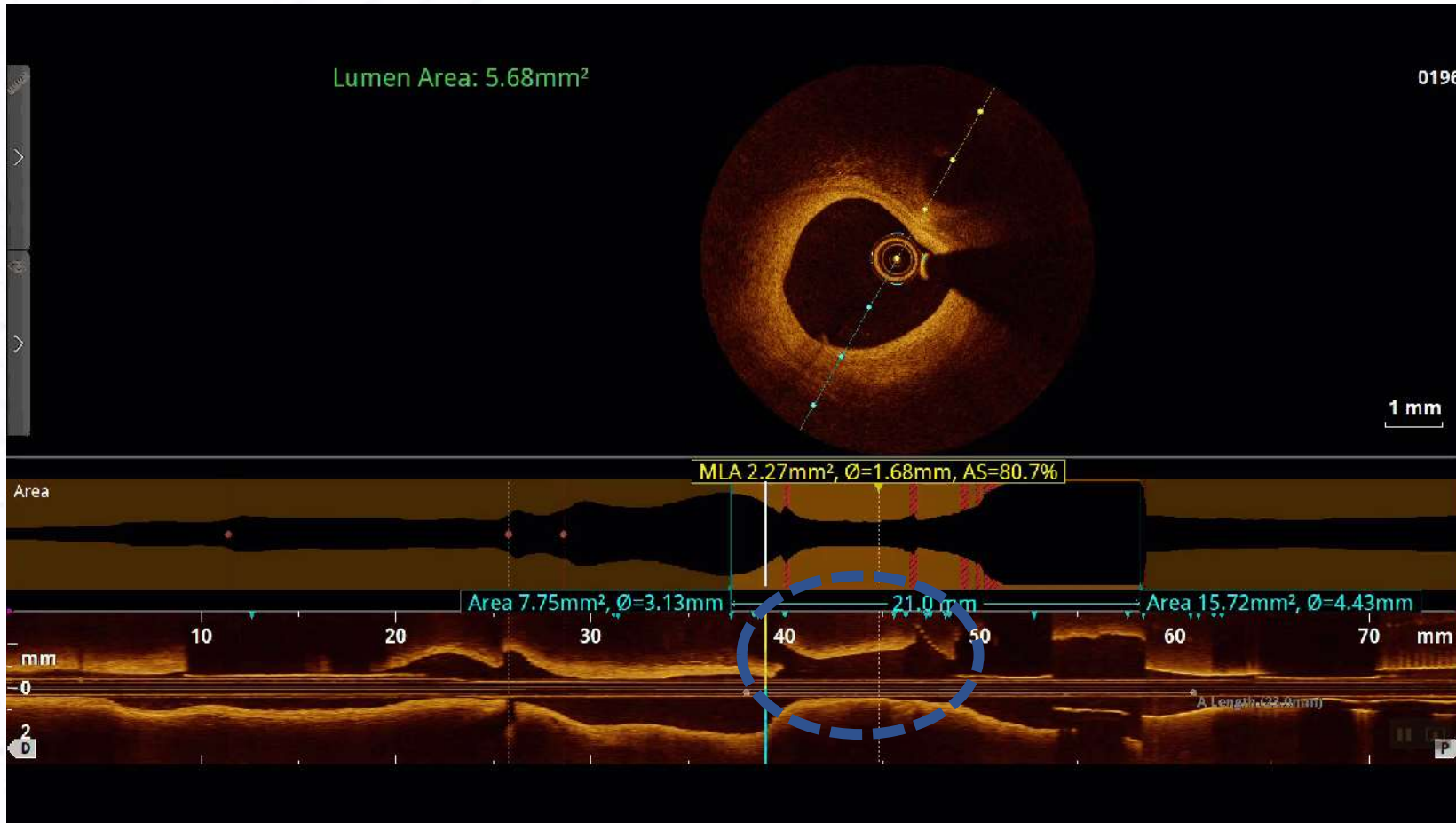
Baseline Run LAD to LM

Ostio- proximal LAD : 2.64mm²

POC :2.80mm²

Distal LM: 3.73mm²

Lesion Length : 21 mm



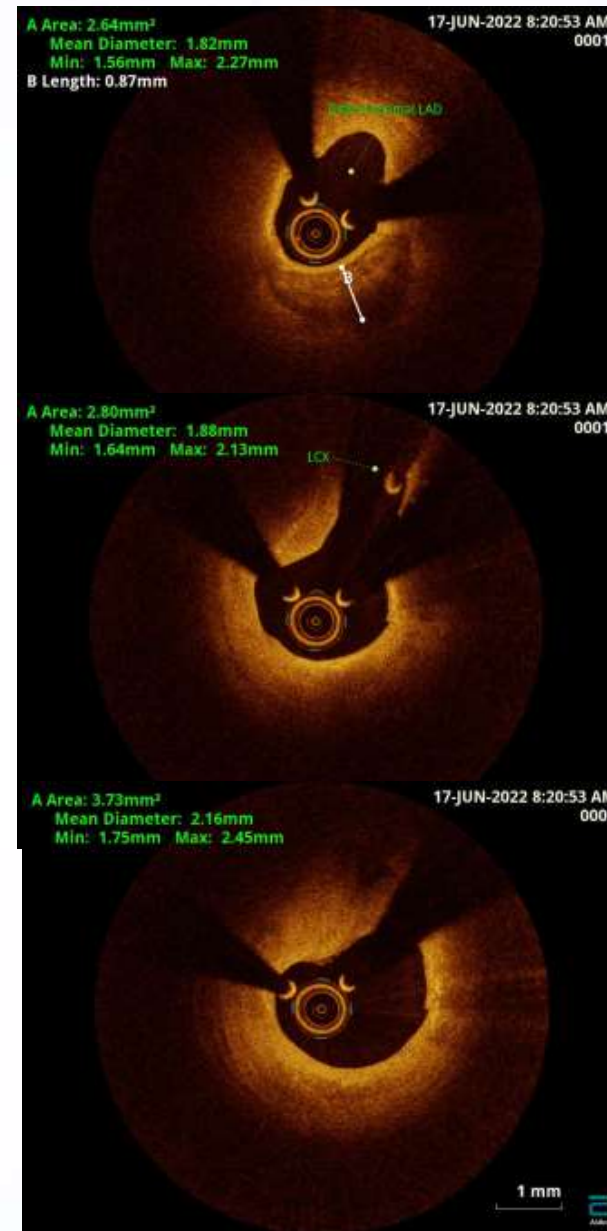
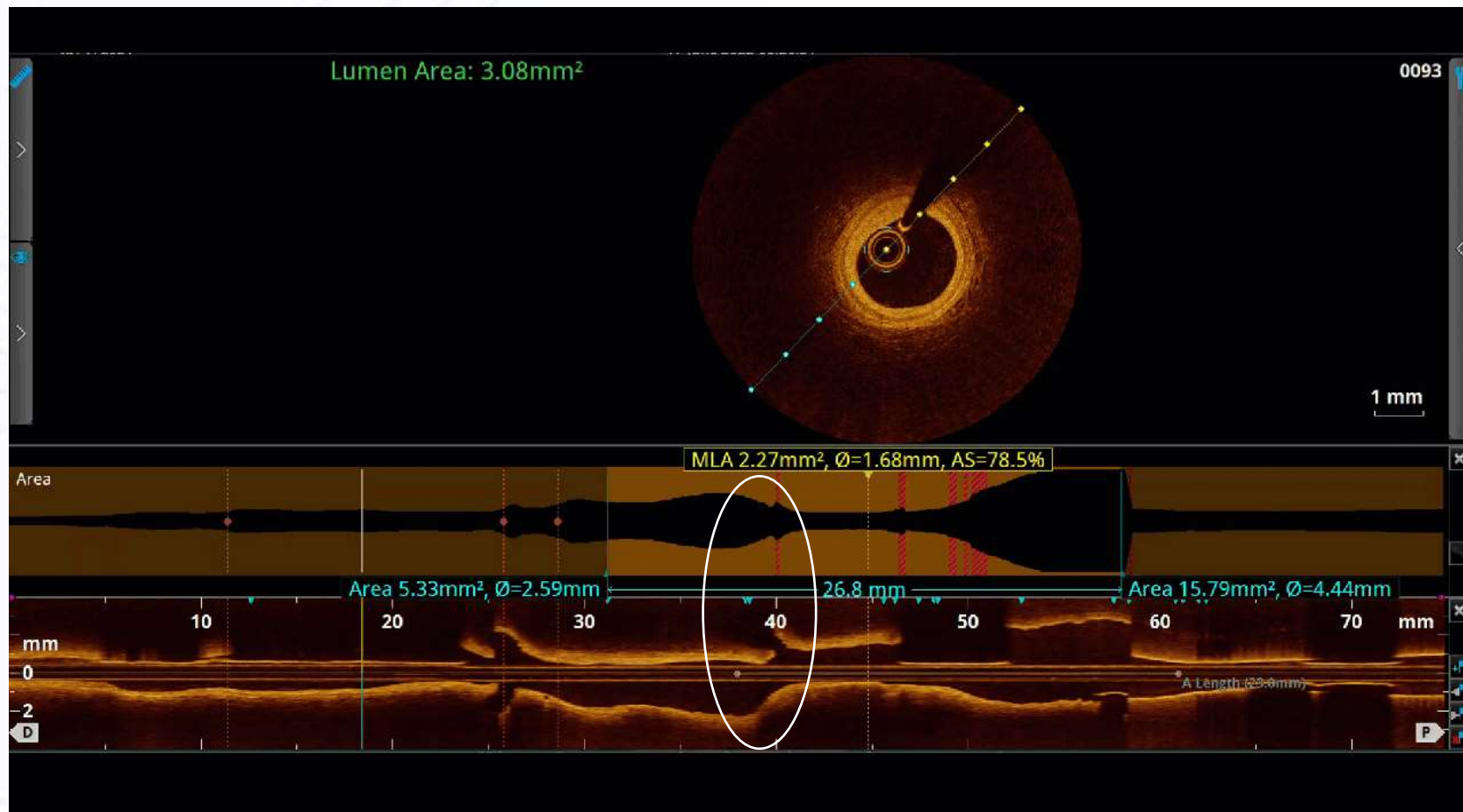
Baseline Run OM to LM

Ostio- proximal LCX : 2.21mm²

POC :2.86 mm²

Distal LM: 3.91 mm²

Lesion Length : 17 mm



PCI:

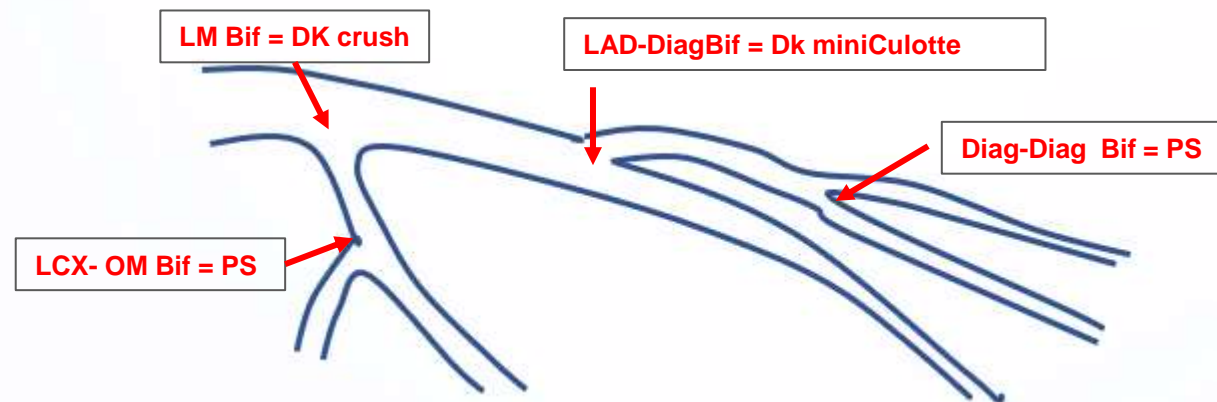
7F guiding catheter

Intarvascular imaging guidance (OCT) : inspection – Procedural guidance and Optimization

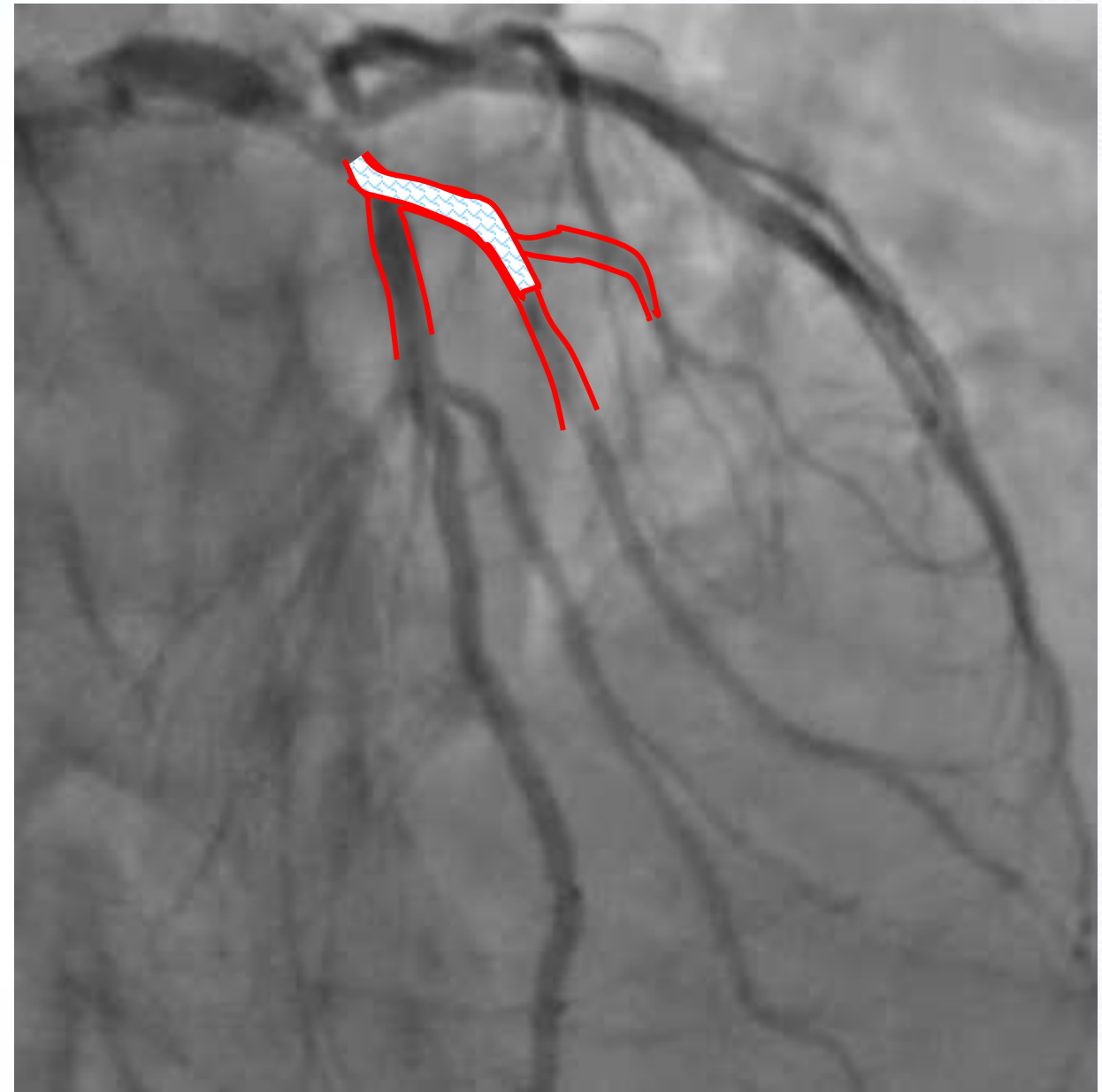
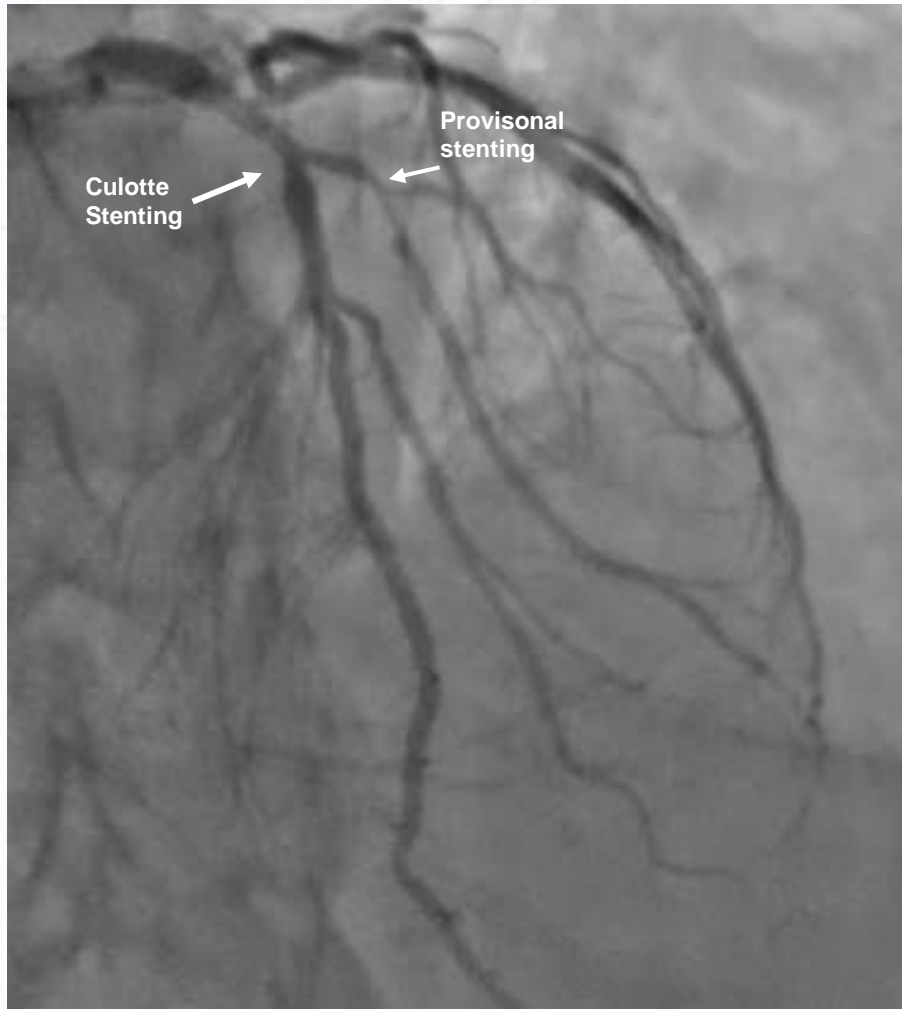
LAD - Diagonal Bifurcation: complex BL - 2 stent strategy (DK an POT miniCulotte + PS for Diagonal bifurcation

LCX-OM Provisional stenting

Distal LM : DK Minicrush - 1 stent Crossover LM to LAD to complete both DK minicrush On distal Lm and MiniCulotte on LAD

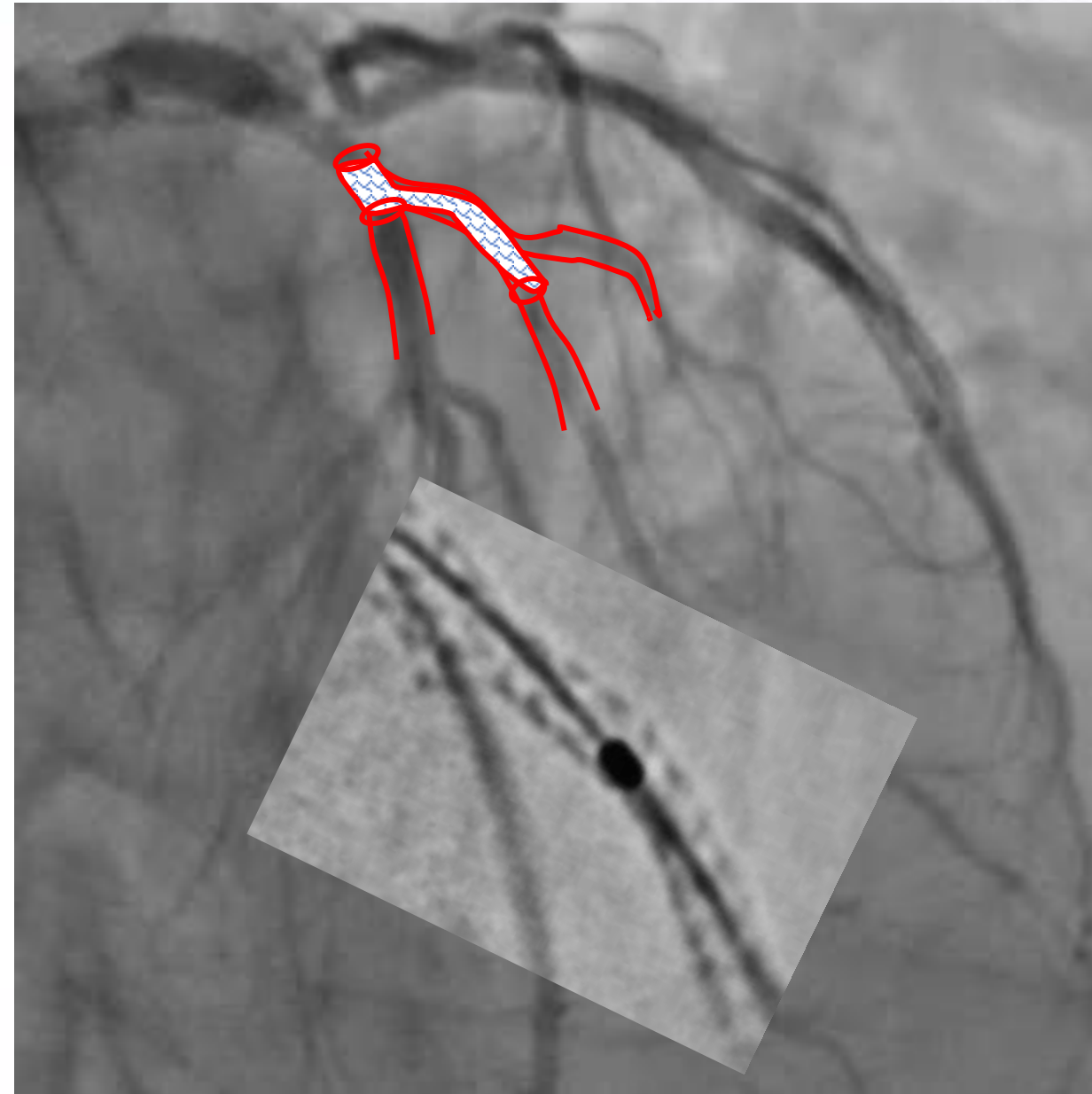
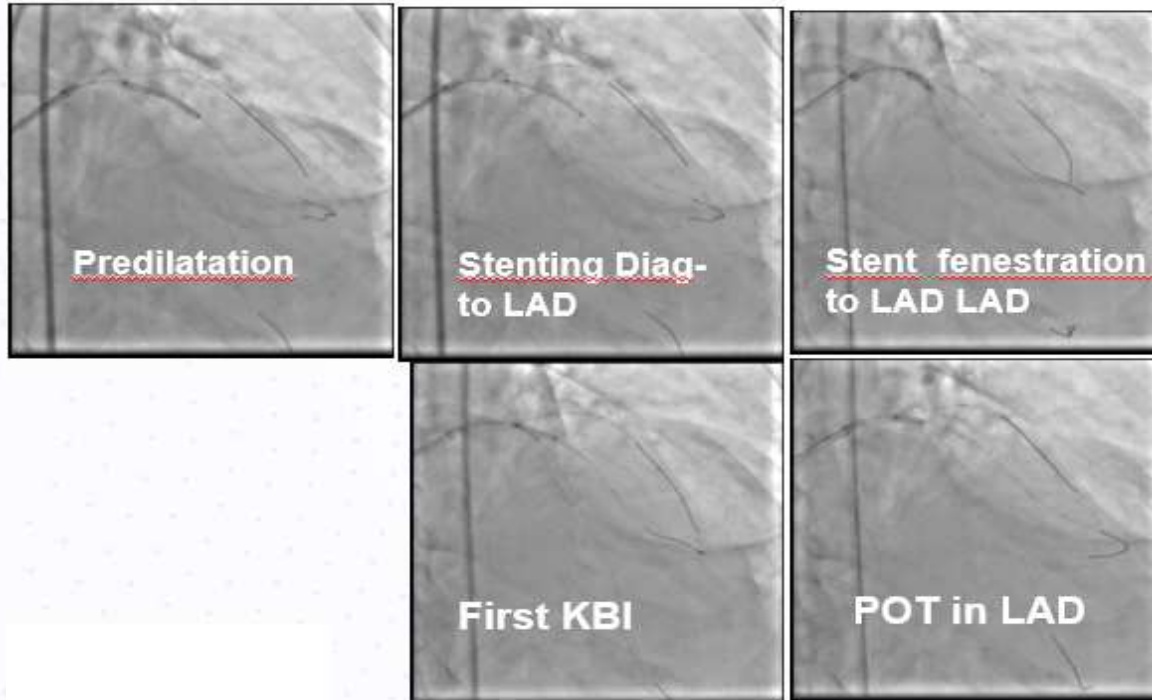


Procedural Plan :
Starting from LAD –Diagonal Bifurcation
Wiring MV and SB, Lesion preparation , stent deployment in
Diagonal LAD (Culotte stenting) Optimizing stent expansion
and apposition inDiagonale and LAD



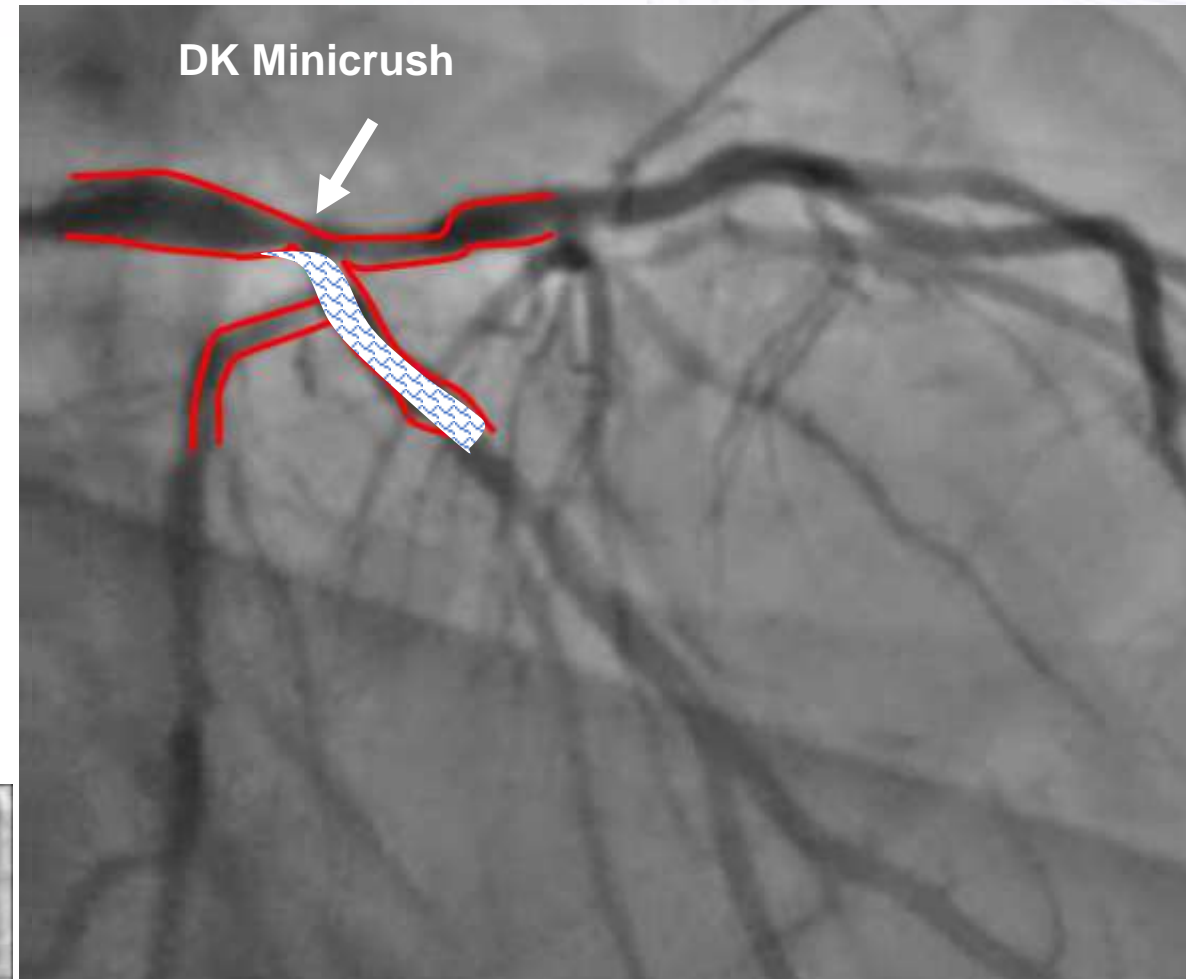
Dk miniculotte LAD-I Diagonal:

- Lesion preparation : predilatation NC2.5x12 mm at 14 atm
- Stent deployment in Diagonal with minimal protrusion in LAD (2 struts) deployed at 14 atm
- Recrossing the stent with guide wire to distal LAD
- Dilating the stent strut toward LAD with 3.0 x12 balloon.
- I KBI : NC 2.5x 12 mm LAD –Diagonal
NC 3.0x 12 mm LAD-LAD
- POT in LAD : NC 3.5 x 8 mm

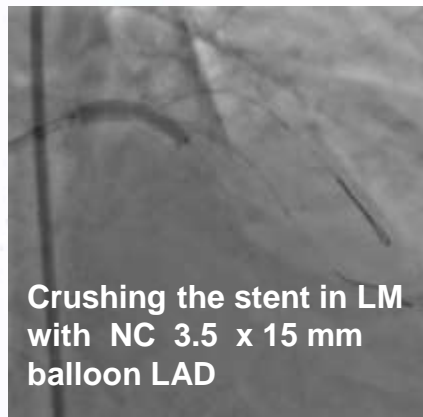


DK Minicrush: Distal Lm Provisional Stentin LCX-OM

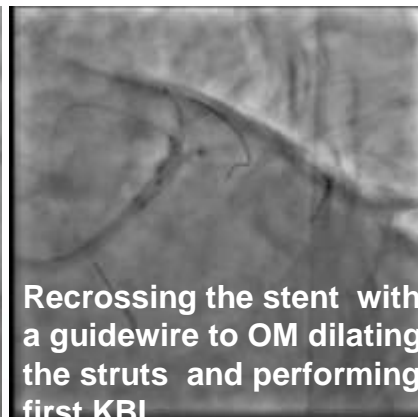
- Lesion Preparation NC 3.0 x 15mm at 14atm
- Stent from OM to LM with minimal protrusion in LM and simultaneous positioning a balloon 3.5 x 12 in LM to LAD
- Stent deployed at 16 atm performing provisional stenting with LCX
- Then the protruding segment in LM crushed with the balloon 3.5 x 15mm
- Recrossing the crushed segment with a guide wire proximally to OM
- Fenestrating the stent with NC 3.25 x 12 mm balloon
- Performing First KBI :
 - LM to LAD NC 3.5 x 12 mm
 - LM to OM NC 3.25 x 12 mm



Stent OM to LM with a deflated balloon in LM to LAD



Crushing the stent in LM with NC 3.5 x 15 mm balloon LAD

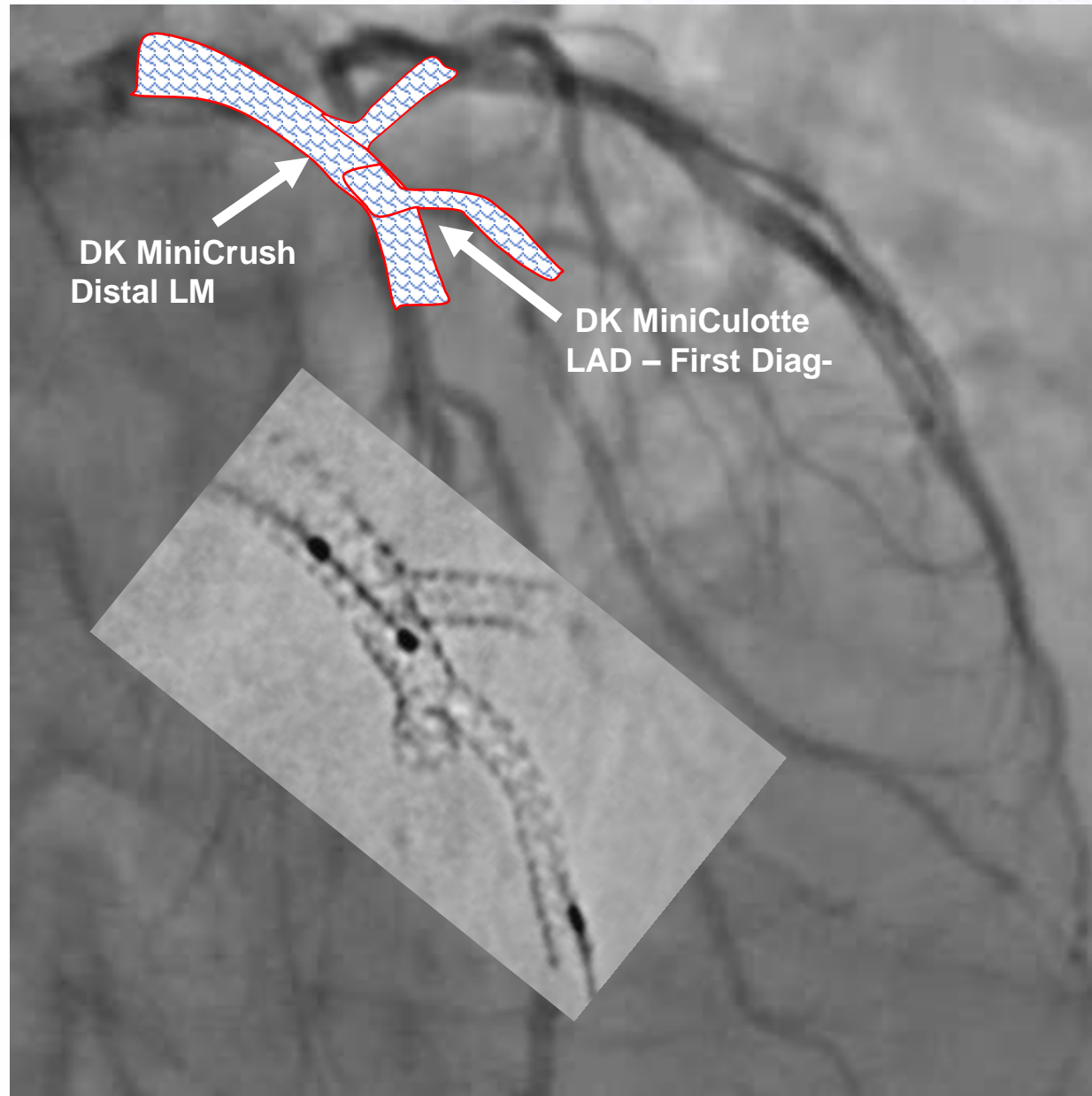
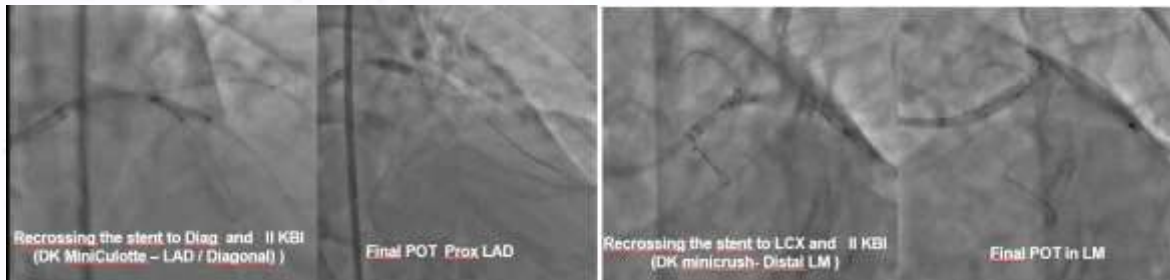


Recrossing the stent with a guidewire to OM dilating the struts and performing first KBI

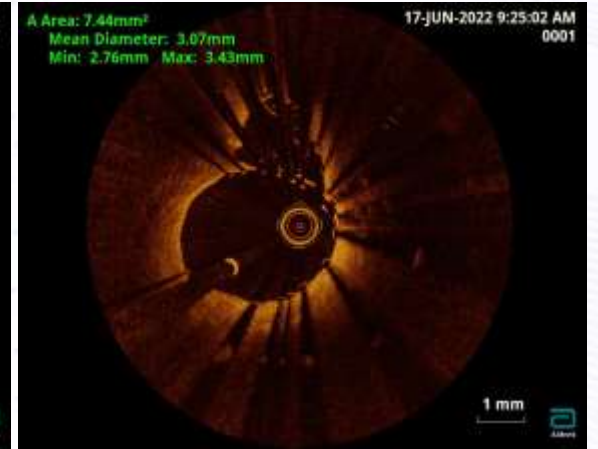
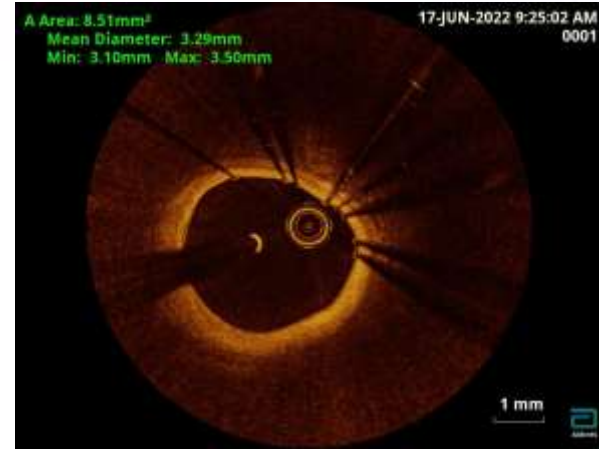
Stenting from LM to LAD :

Completing DK Miniculotte stenting (LAD- First Diagonal) and DK Minicrush (LM LAD- LCM-OM) with the same stent

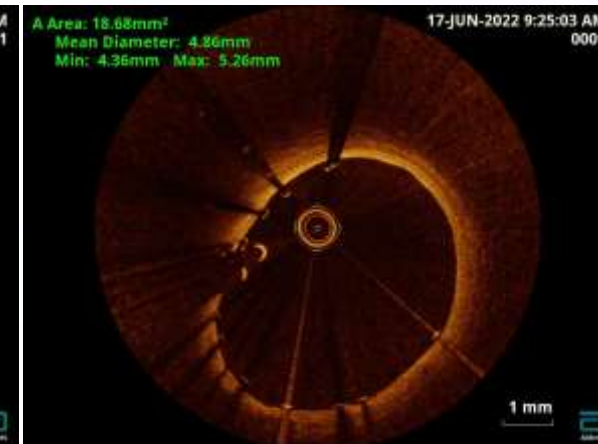
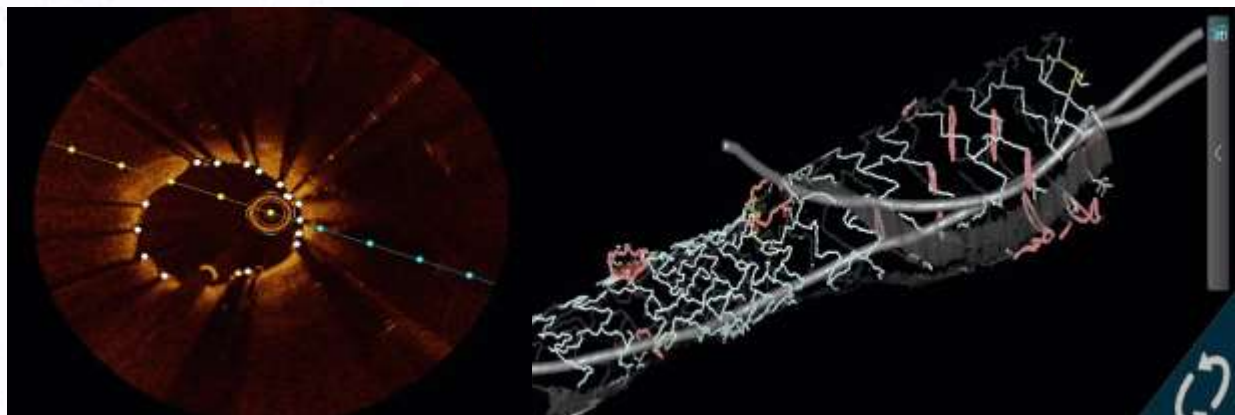
- Stent LM to LAD 3.5 x 23 mm deployed at 16 atm
- POT in Lm with NC 4.0 x12 mm at 22atm
- **Recrossing the stent with a guide wire to I Diagonal**
- Performing second KBI LAD to I Diag (NC2.75 x12mm)
LAD to LAD (NC 3.0 x12 mm)
- POT in Proximal LAD : NC 3.5 x 12 mm at 20 atm
- **Recrossing the stent with a guidewire to OM**
- Performing second KBI LM to OM (NC 3.25x 12 mm)
LM to LAD (NC 3.5 x 12 mm)
- Final POT in LM : NC 4.5 x 12 mm at 18 atm



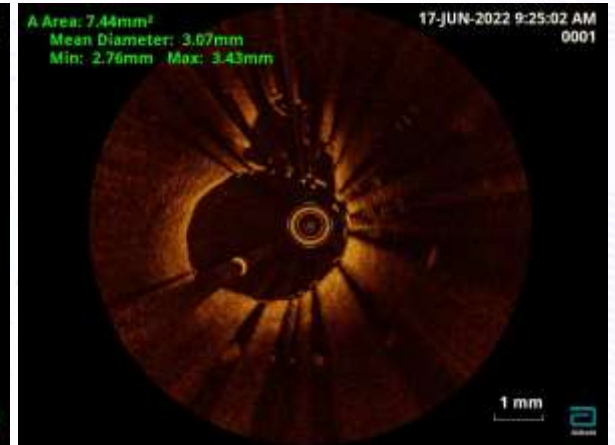
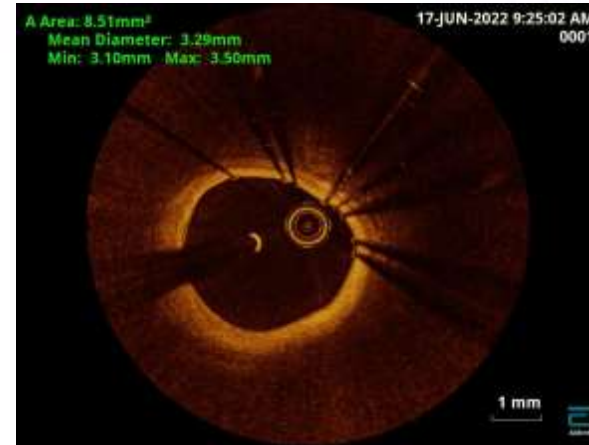
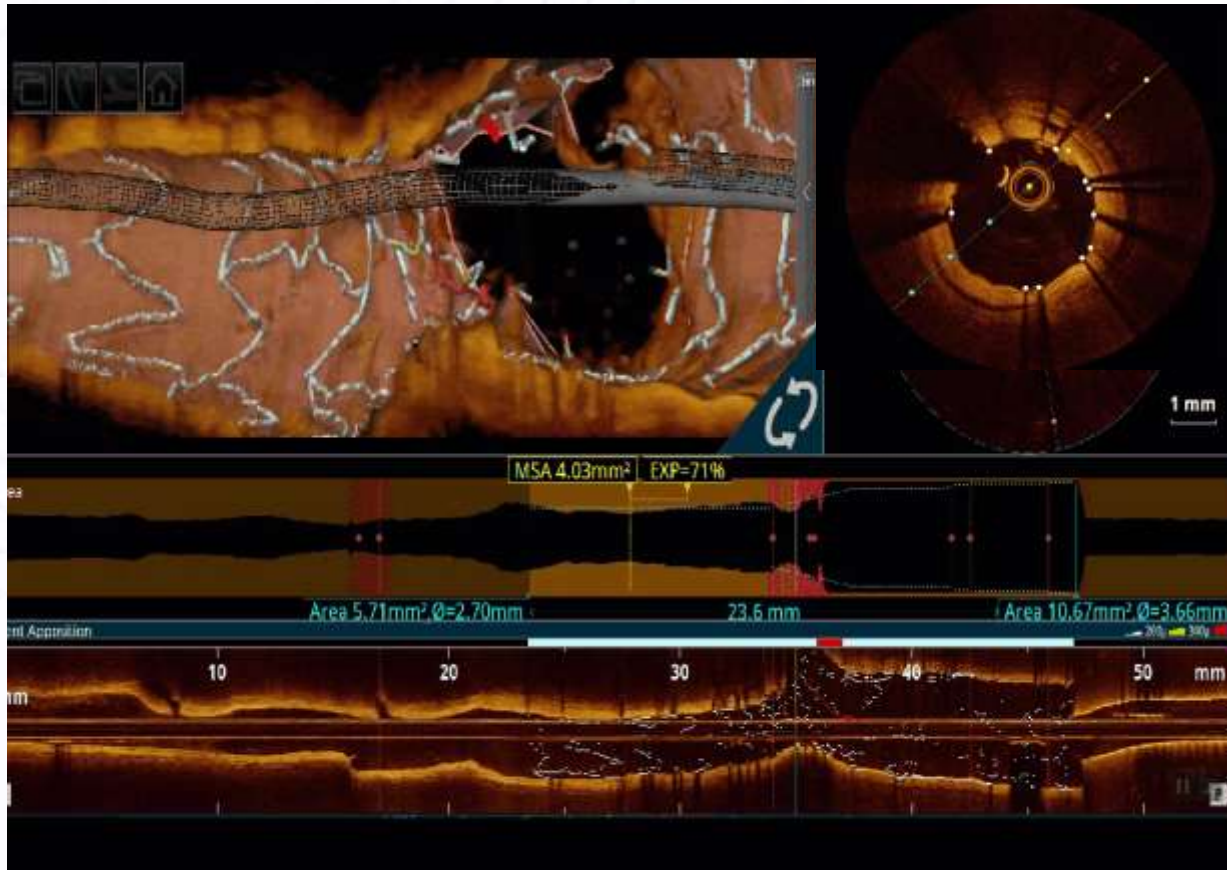
OCT : Bifurcation View – LAD to LM Run- Final



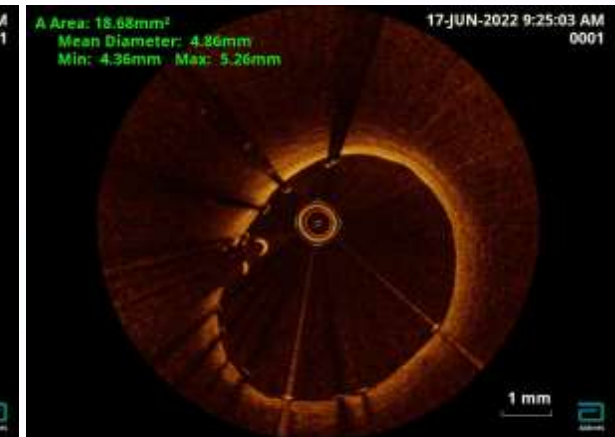
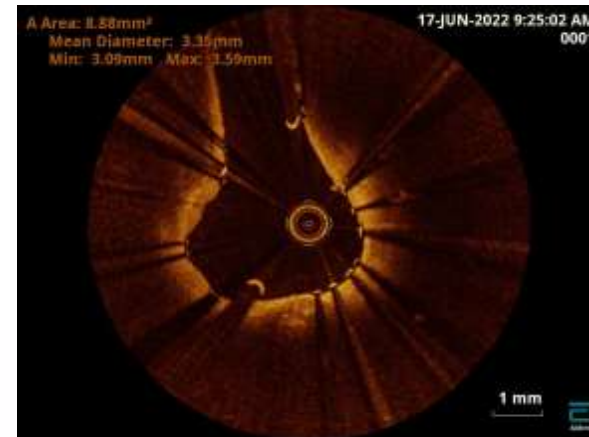
LAD Mid Seg Area 7.44mm²
LAD Proximal Area 8.88mm²
Distal LM Area = 14.7mm²
LM Area 18.68 mm²

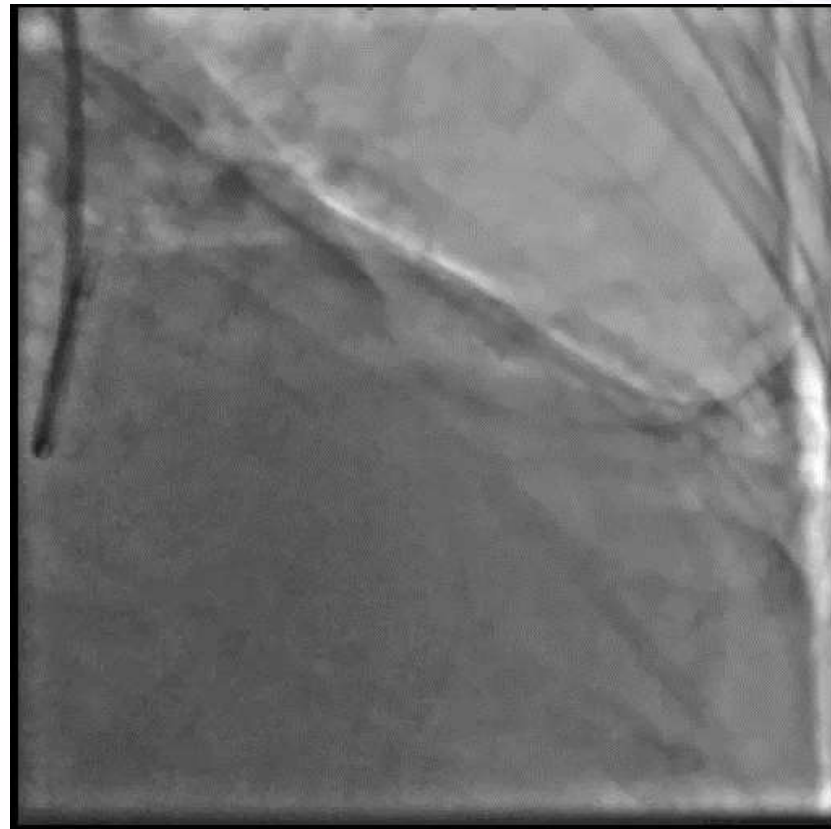
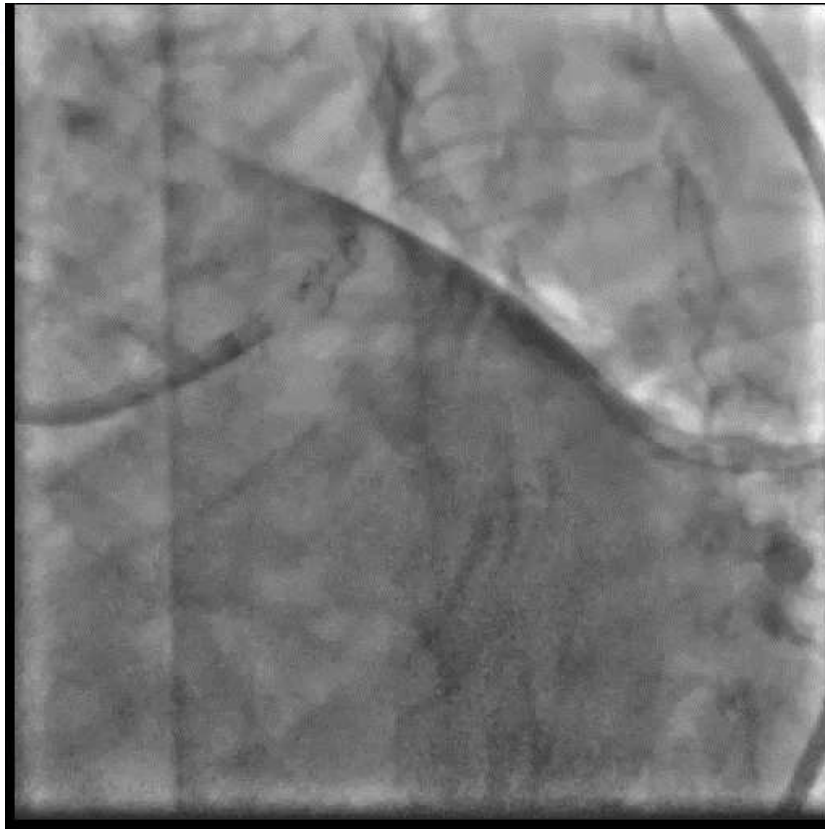
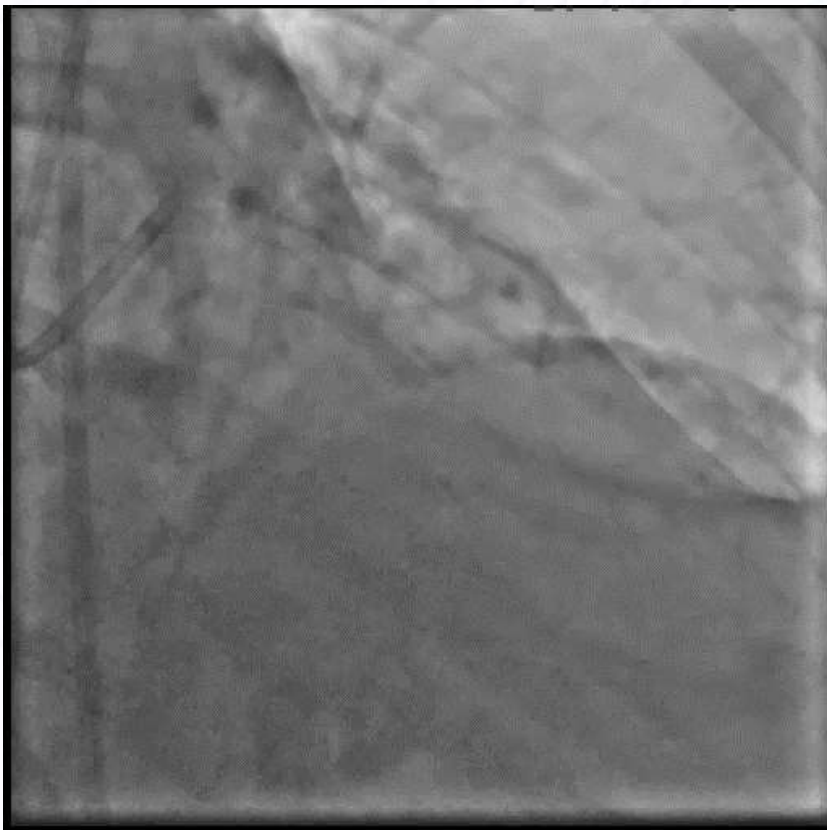


OCT : Bifurcation View – LCX to LM Run- Final



LCX Distal Area. 5.71 mm²
 LCX Proximal 4.96m2mm²
 LM Distal Area : 13.4mm²
 LM Proximal: 18.68mm²





Final Angio

Conclusion

- **Multiple Bifurcation PCI is a complex procedure and need to be planned appropriately**
- **Intravascular Imaging is crucial not only to evaluate the severity of the disease but also to define the plaque characteristics ,disease extension and bifurcation complexity and to select accordingly the appropriate lesion preparation approach and the appropriate strategy.**
- **Whatever the selected strategy stepwise approach and intravascular guidance can make the procedure more easy and safe**
- **Final optimaztion in complex strategies is mandatory to be guided by intravascular imaging which impact favourably the long-term clinical outcome**