Real-time physiological changes with differing techniques for optimizing bifurcation stenting

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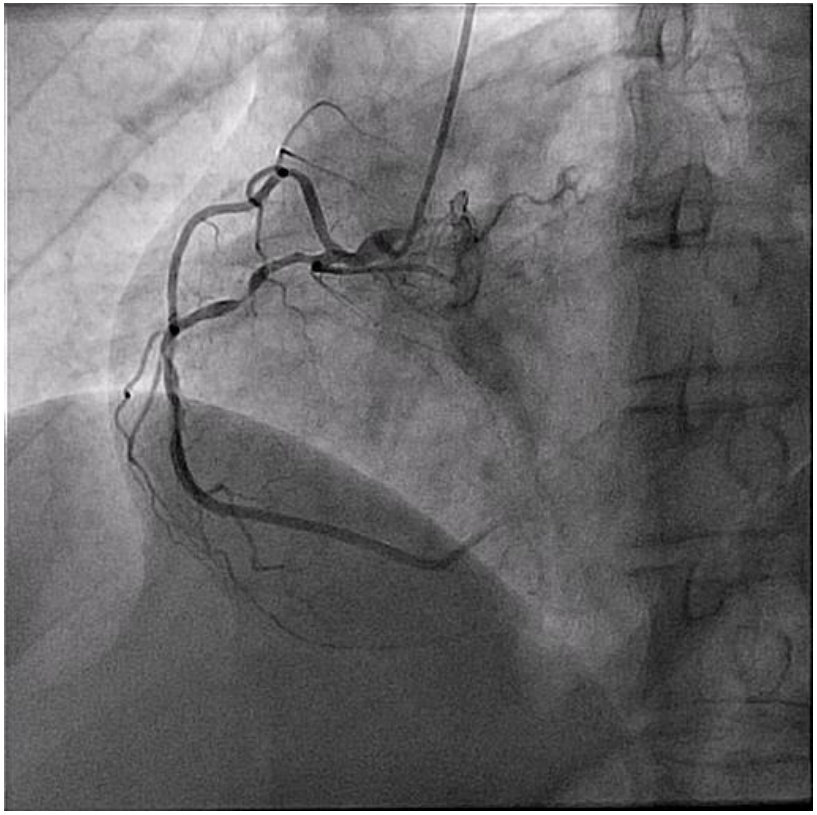
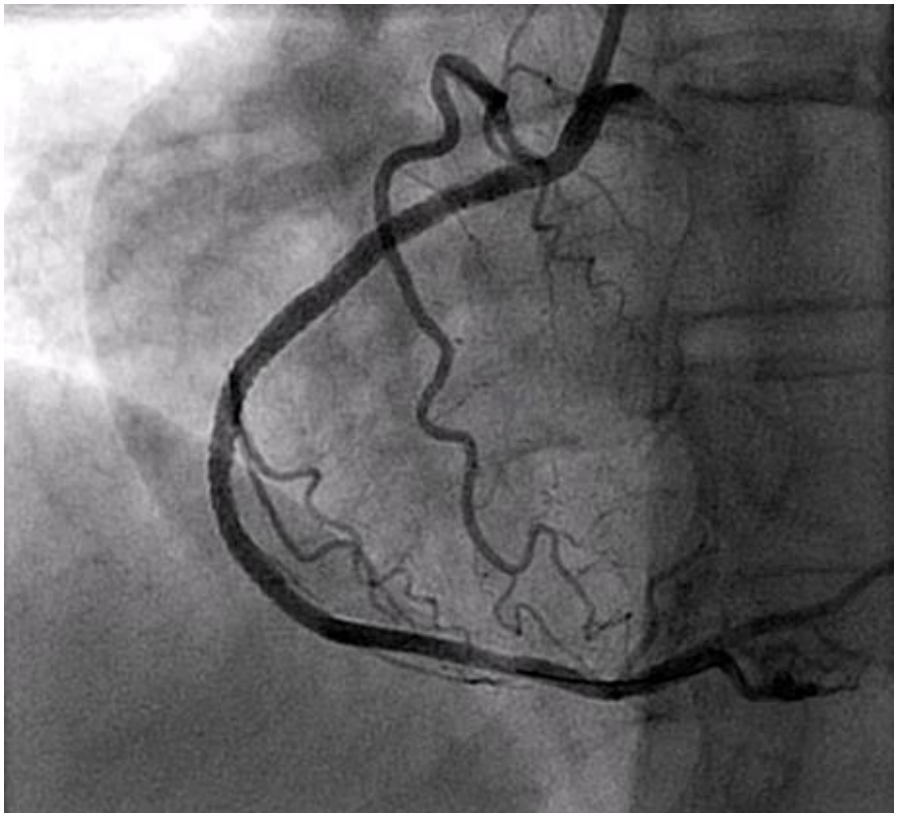
Case history

- 69 year old male
- Cardiovascular risk factors
  - Hypertension
  - Hyperlipidaemia

- Current presentation
  - Acute coronary syndrome: NSTEMI
    - Typical ischaemic chest pain
    - ECG SR, no ischaemic changes
    - Troponin positive
    - ECHO: Preserved LVEF

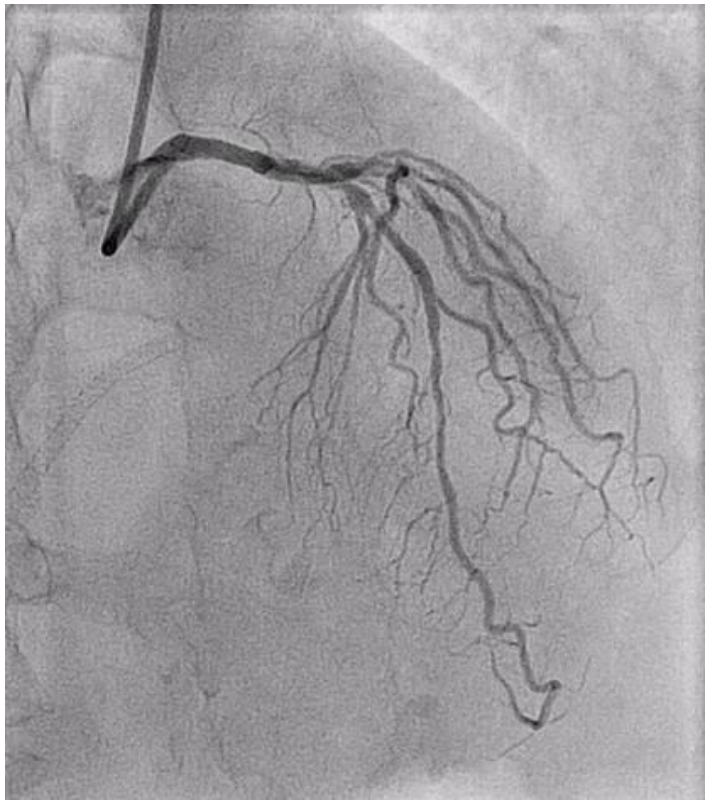
Diagnostic coronary angiogram

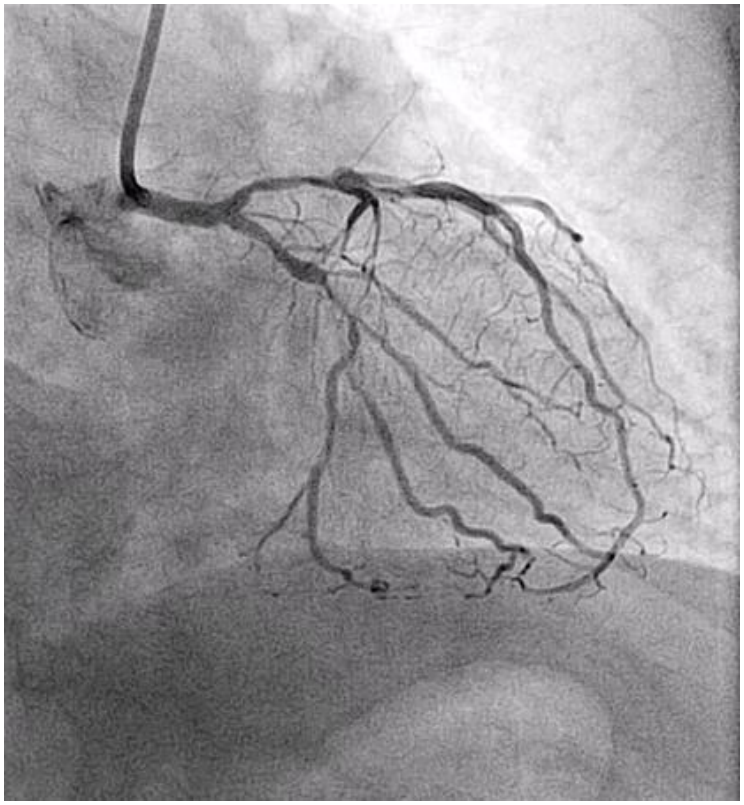




Diagnostic Coronary Angiogram
RCA: Severe stenosis in the proximal RCA with TIMI 2 flow treated with a 3.5 x 33 mm proximally & 3.0 x 33 mm DES distally

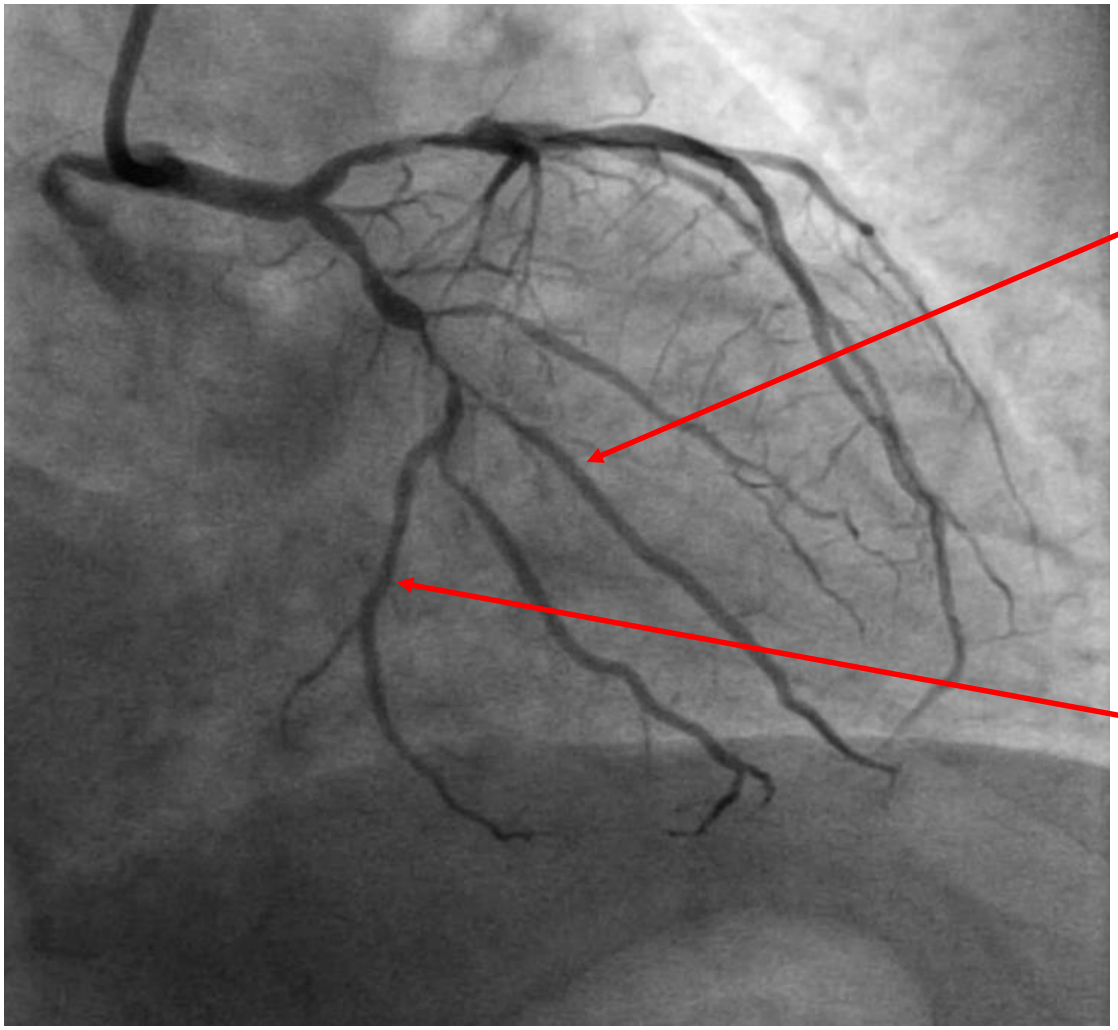
Diagnostic coronary angiogram



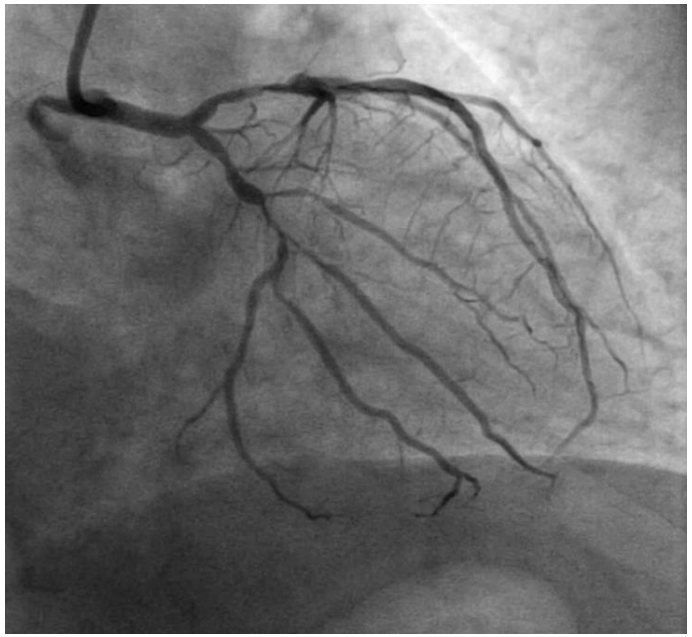


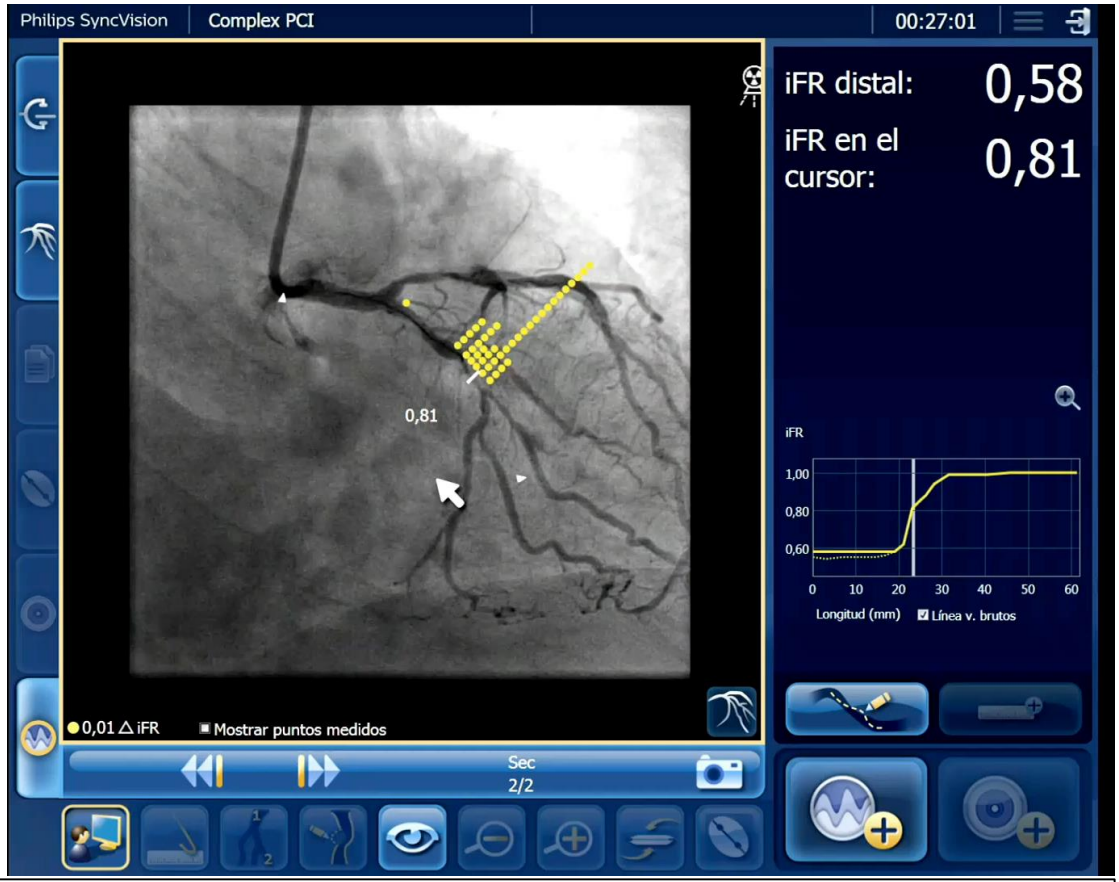
Diagnostic Coronary Angiogram
LMS: No significant stenosis
LAD: Diffuse moderate disease in the proximal segment
LCx: Long segment severe stenosis after the take off of the OM1 branch extending beyond the take off of the OM2 branch. Long segment moderate stenosis of the proximal OM2 branch

Initial physiological assessment of LCx



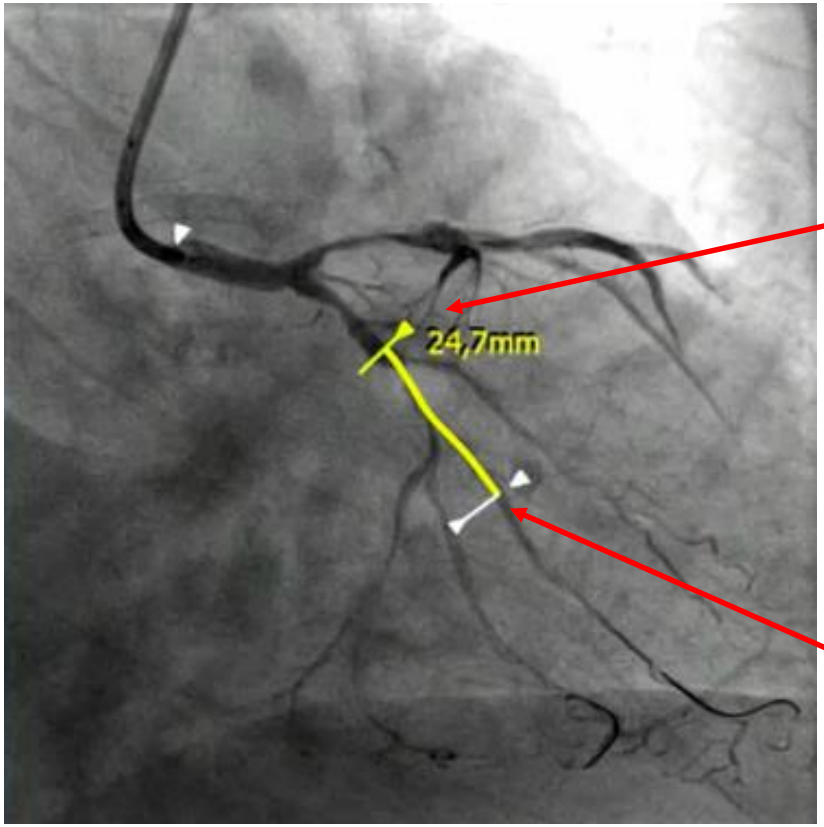
Initial physiological assessment of LCx

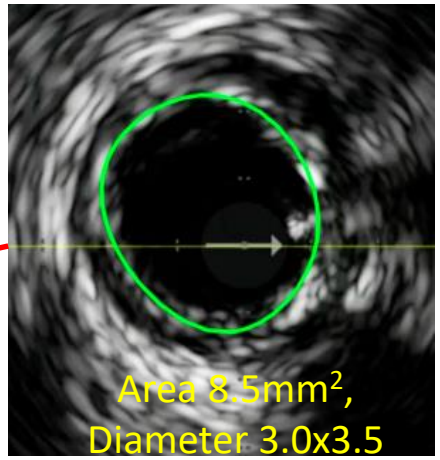


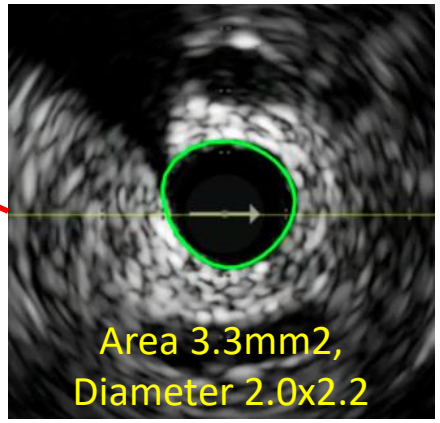


- Physiological mapping of the vessel demonstrating significant pressure loss in the mid LCx before the OM2 bifurcation
- Physiological vessel mapping using iFR pullback demonstrating the predicted result from PCI
- Strategy based on physiological result: PCI to LCX/OM2. Proximal Optimization. Reassessment of bifurcation post PCI

Intracoronary imaging with IVUS of the LCx

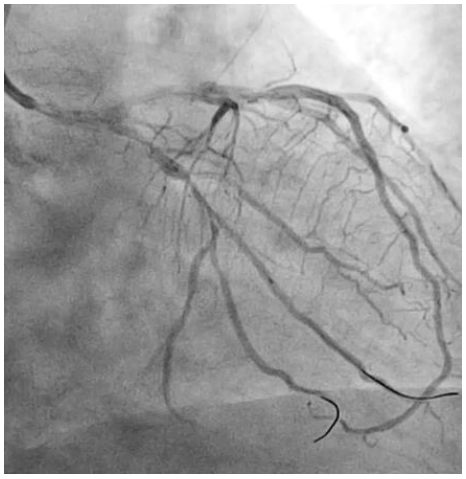
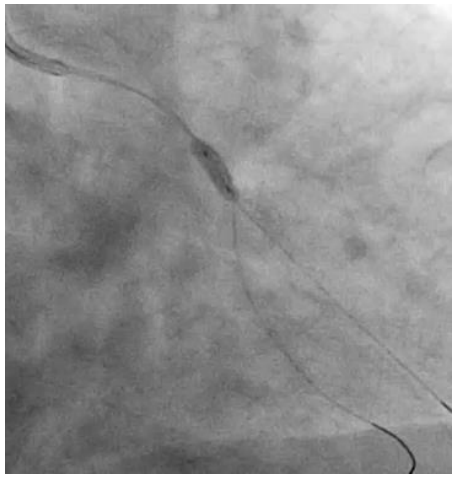
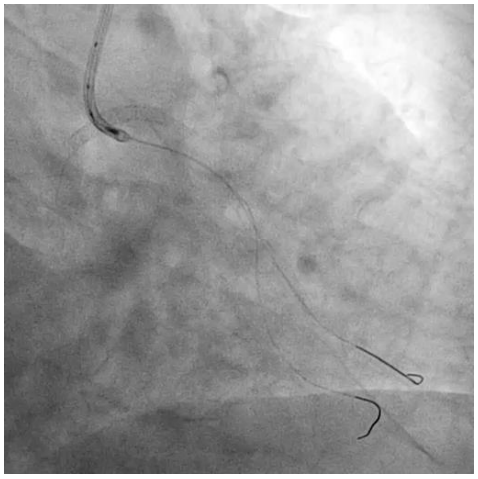
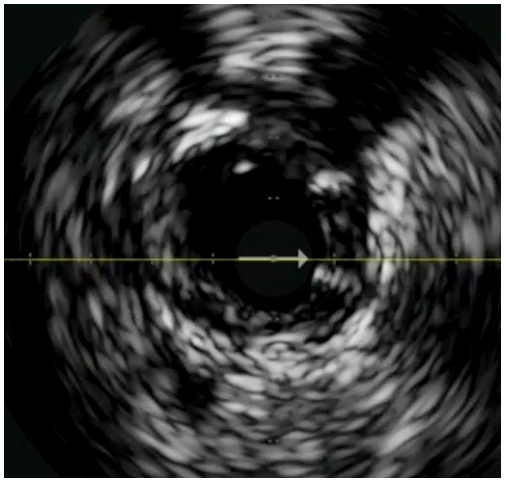






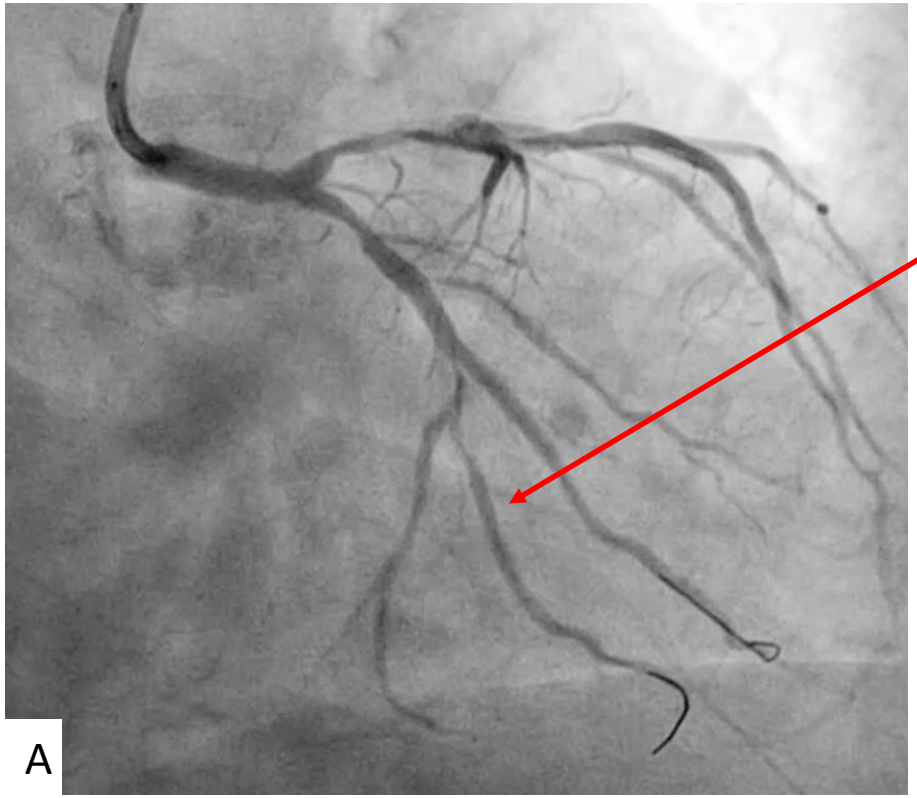
- PCI to LCX-OM2
  - Provisional stenting
  - 2.25 x 26mm DES
  - Proximal optimization with 3.0 NC balloon
  - Reassessment of bifurcation after PCI

PCI to LCx/OM2, POT, IVUS

A: Predilation with 2.5 x 15mm,PCI to LCx/OM2 with 2.25 x 26 mm DES
B: POT with 3.0 x 8mm NC balloon.
C: Angiography post stenting and POT
D: IVUS evaluation post stenting

Physiological assessment of OM3

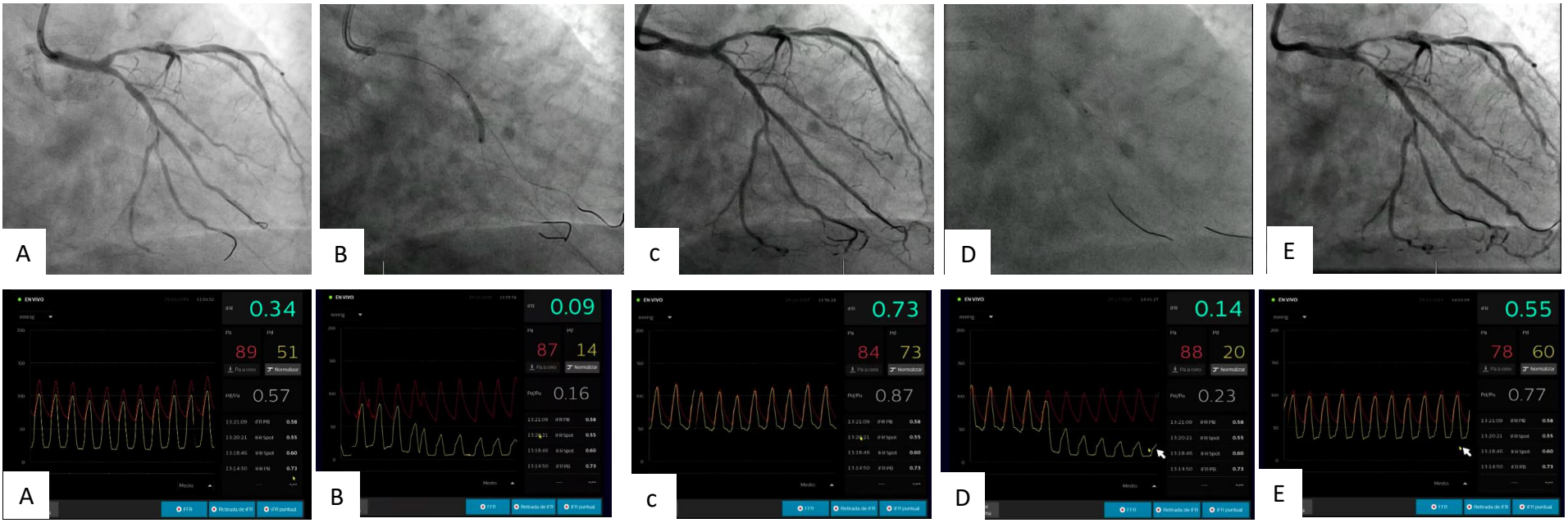


A

B

Physiological assessment of OM3 demonstrating significant ischaemia post PCI to the LCX/OM2

Physiological effects of POT-Side-POT



Physiological consequences of POT-Side-POT

A: Physiological assessment of OM3 immediately post PCI to the LCx-OM2

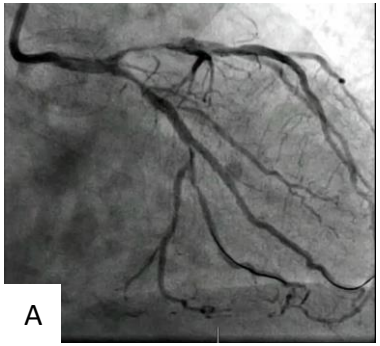
B: Effects of balloon inflation on distal vessel pressure (strut opening with 2.0 balloon to 18atm)

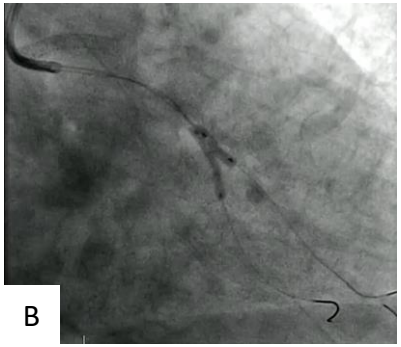
C: Post strut opening angiographic and physiological result with significant improvement in physiology in the OM3 branch

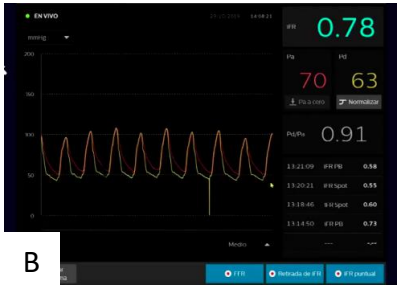
D: Effects of balloon inflation on distal vessel pressure (POT with 3.0 balloon at 18 atm)

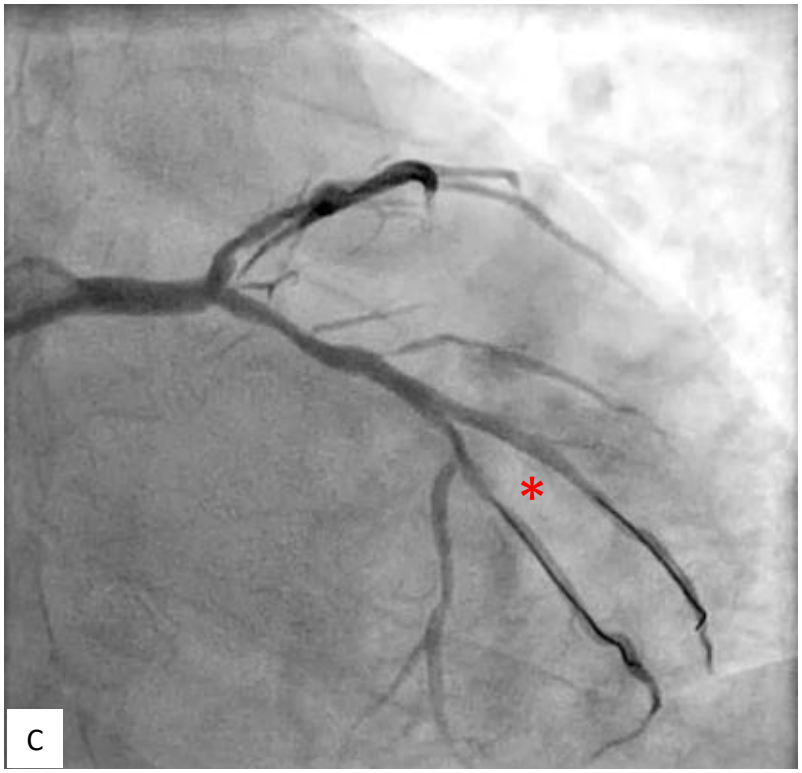
E: Physiological result in the OM3 after POT with evidence of worsening of the physiological result possibly due to altered carina post POT

Physiological effects of kissing balloon



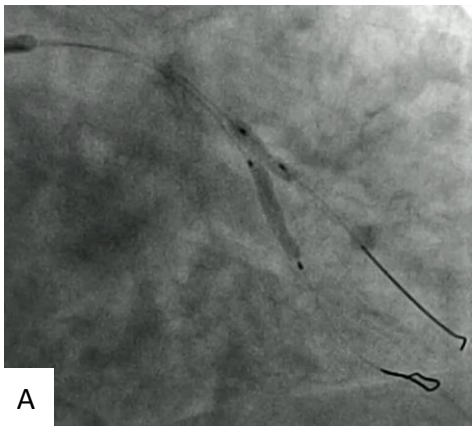


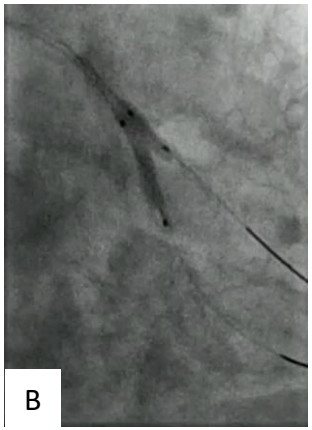


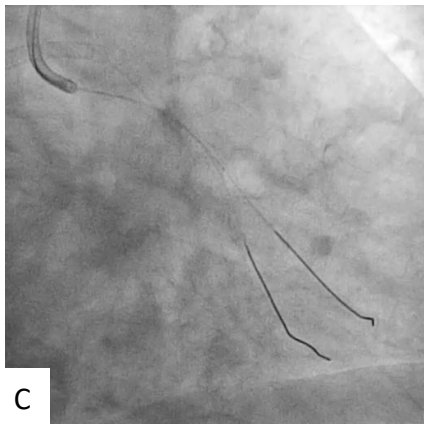


Physiological effects of kissing balloon
A: Physiological result of POT-Side-POT
B: Physiological result of kissing balloons (3.0mm in LCx/OM2 & 2.0mm in OM3) with significant improvement in physiology
C: Post kissing balloon angiogram demonstrating dissection in proximal OM3 (*)

TAP stenting


A


B


C

D

A: TAP stenting with 2.25 x 15mm DES to the OM3 to treat iatrogenic dissection
B: Kissing balloon inflation
C: Final angiographic result
D: Final physiological result (negative for ischaemia in OM3)

Learning points

- Bifurcation stenting presents a challenge to the interventional Cardiologist
- POT-side-POT technique can result in proximal stent distortion and may explain the worsening of physiological parameters after this technique
- Kissing balloon inflation results in realignment of the carina and likely explains the improved physiology seen after this technique in this case
- Physiology therefore, can identify residual ischaemia despite optimum angiographic results, and assist in optimisation of the result as in our case
- Bail out stenting techniques need to be considered when embarking on bifurcation stenting