Angiography, physiology and intravascular imaging mismatch in bifurcation stenting

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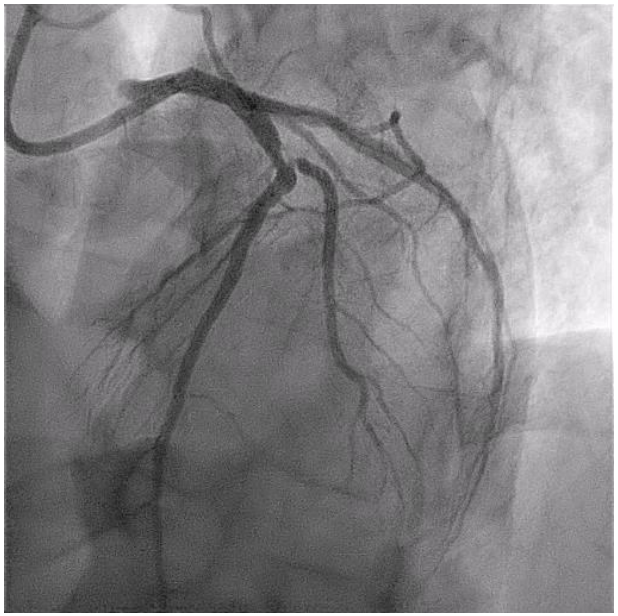
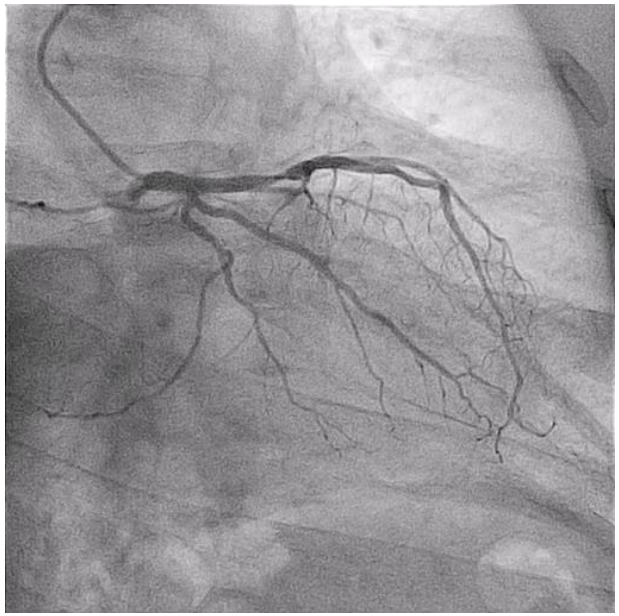
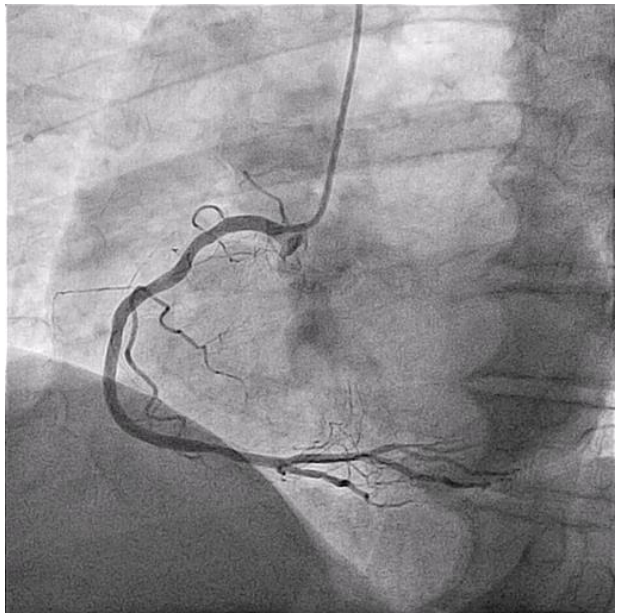
Case history

- 59 year old male
- Cardiovascular risk factors
  - Hypertension
  - Hyperlipidaemia
  - Current smoker
  - Obesity

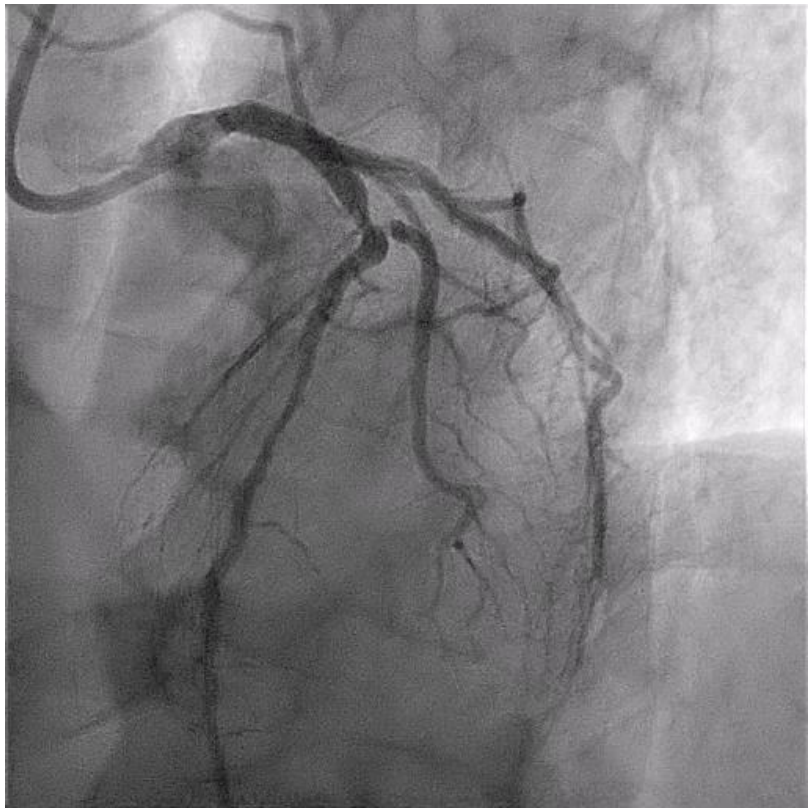
- Current presentation
  - Stable angina
  - CT coronary angiogram
    - Severe stenosis mid LAD-diagonal bifurcation
  - Diagnostic coronary angiogram
    - Severe mid LAD bifurcation stenosis with the first diagonal (Medina 1.0.1)

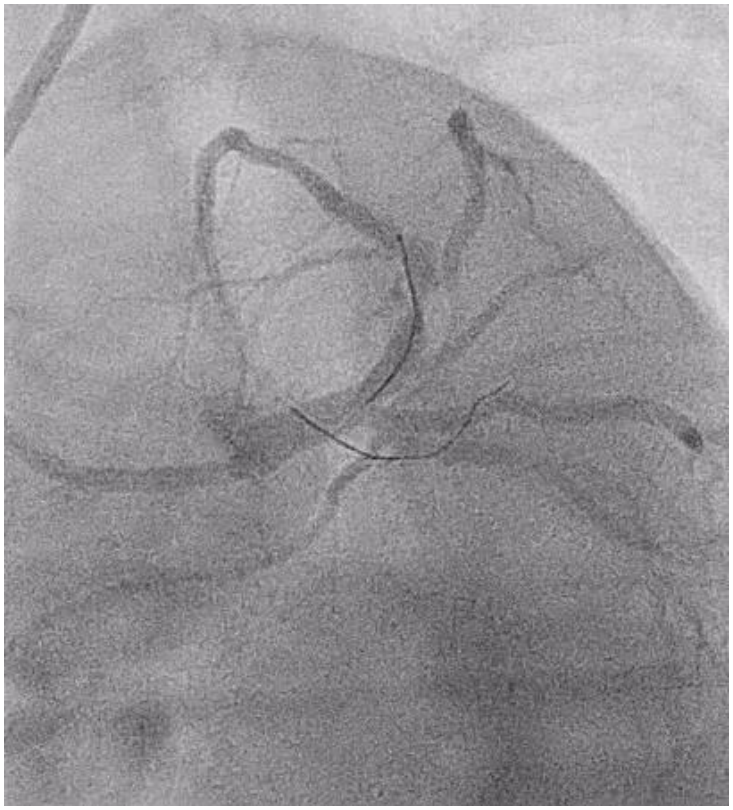
Diagnostic coronary angiogram

Diagnostic coronary angiogram
LMS: Good calibre, no stenosis
LAD: Good calibre vessel. Severe bifurcation disease LAD/D1 Medina 1.0.1. iFR in LAD 0.88 (positive)
LCx: Non dominant. No significant stenosis
RCA: Dominant. No significant stenosis

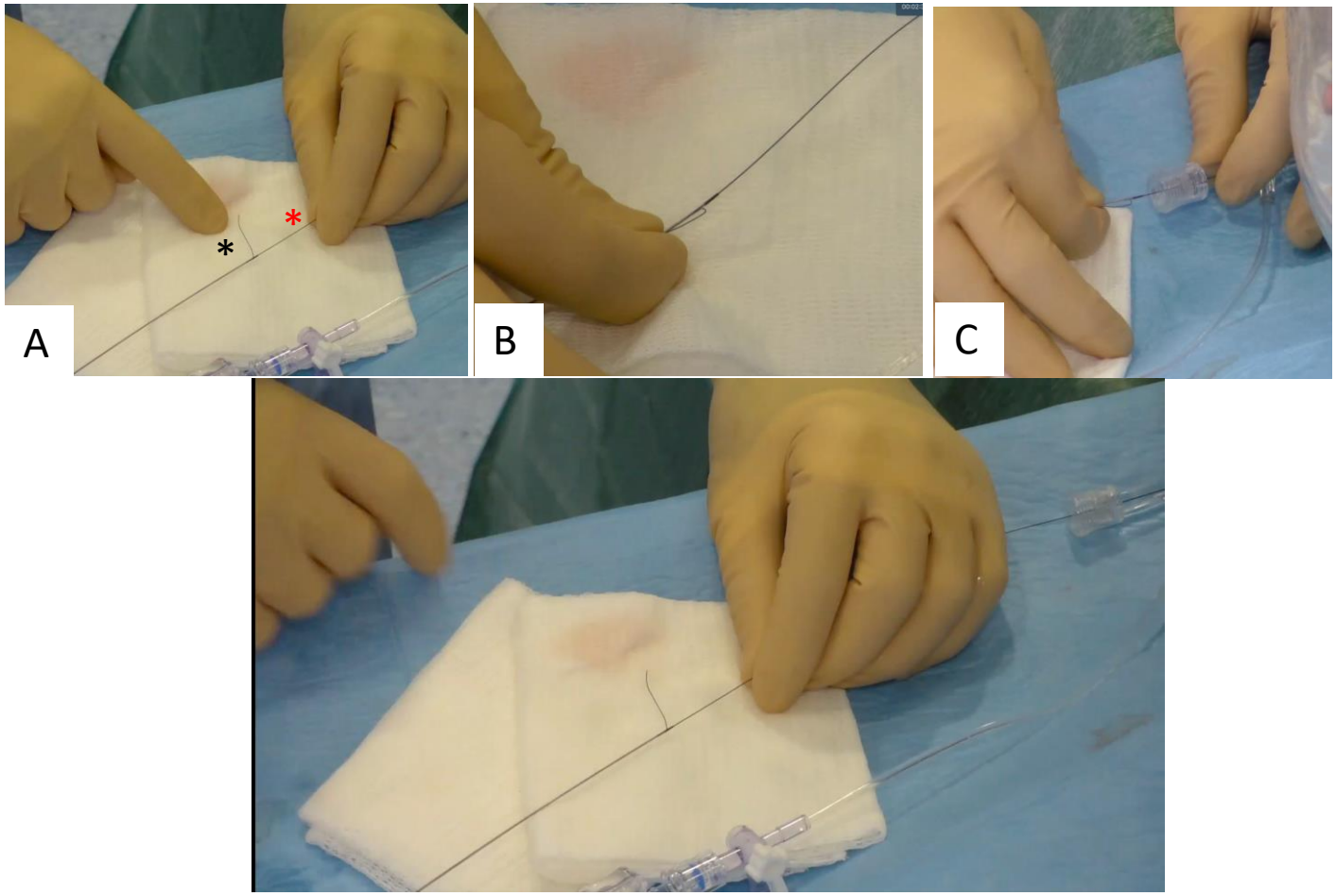
LAD intervention





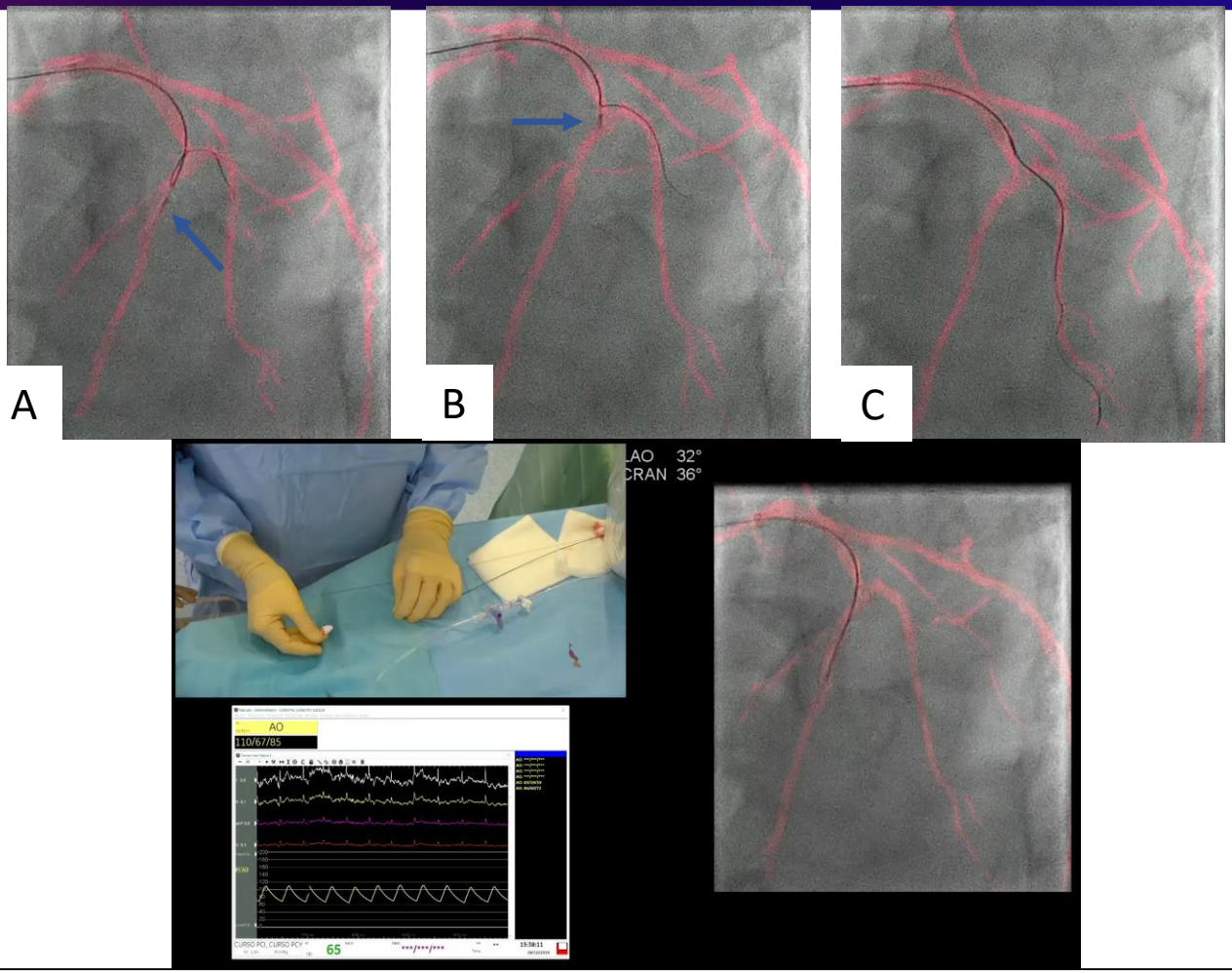
A: Difficulty wiring the diagonal branch with multiple wires of differing profiles attempted and attempted wiring using double lumen microcatheter

Reverse wiring technique



Reverse wiring technique
A: Double lumen microcatheter with LAD anchor wire at tip (monorail *) and wire exiting the side lumen (OTW lumen *) planned for manipulation into the diagonal branch
B: Backwards folding of wire exiting the side lumen before advancing in guide catheter
C: Double lumen microcatheter entering the guide catheter with folded wire exiting side lumen

Reverse wiring technique



Reverse wiring technique

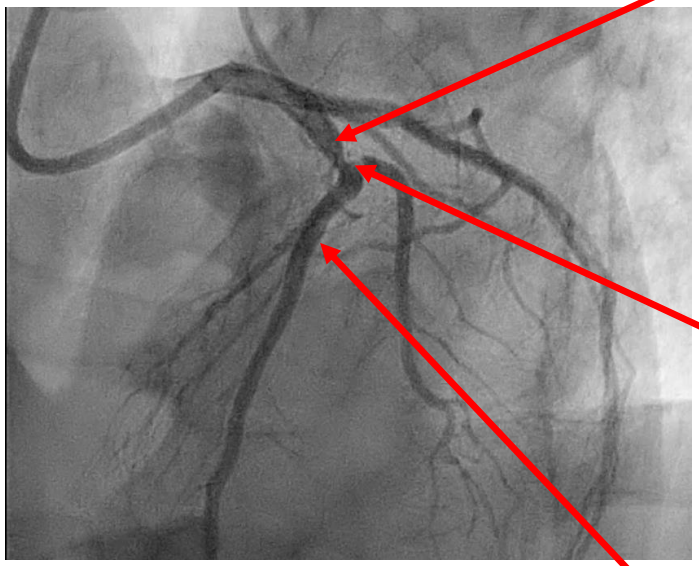
A: Tip of microcatheter advanced distally over the LAD wire (blue arrow) with manipulation of the folded wire to cannulate the diagonal ostium

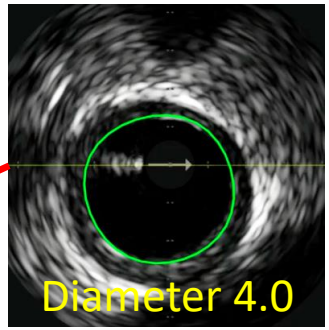
B&C: Gentle back-traction of the microcatheter resulting in unfolding and advancement of the diagonal wire distally.

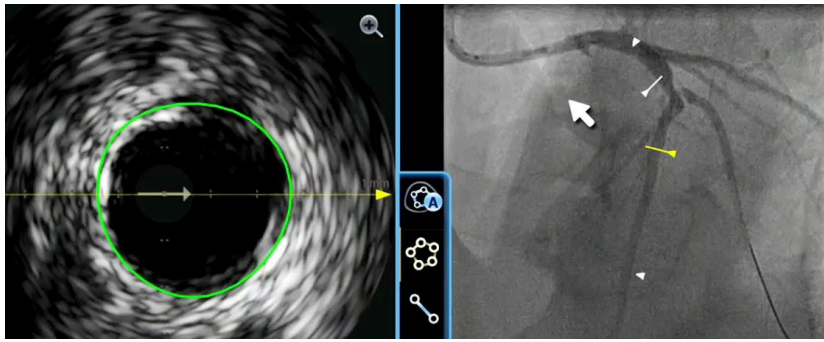
A-C demonstrating the use of dynamic road-mapping technology which resulted in wiring of the diagonal branch with zero radiographic contrast used.

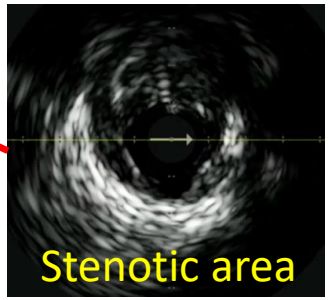
Double lumen microcatheter removed using trapping technique. FIELDER XTA in the diagonal exchanged for SION using a microcatheter and trapping

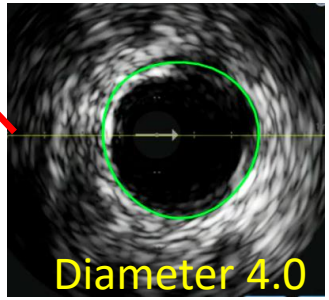
Intravascular imaging and co-registration of the LAD









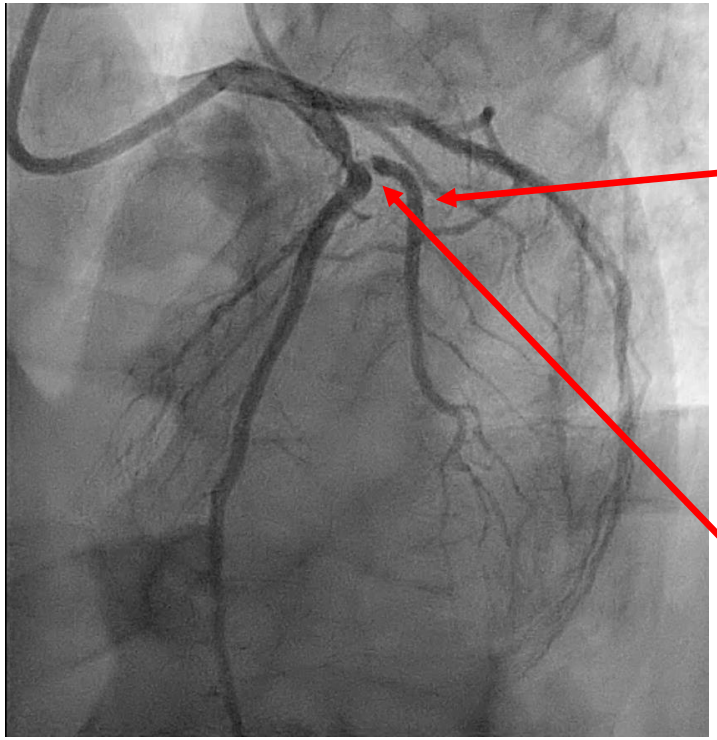


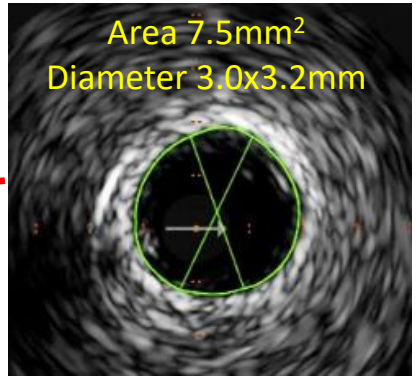
IVUS images demonstrating proximal and distal landing zones with distal luminal diameter of >4mm

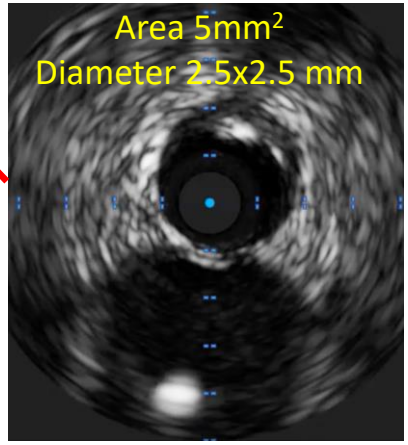
The stenotic area demonstrates soft plaque on IVUS without significant calcification

IVUS co-registration demonstrating proposed stent length of 24.9mm

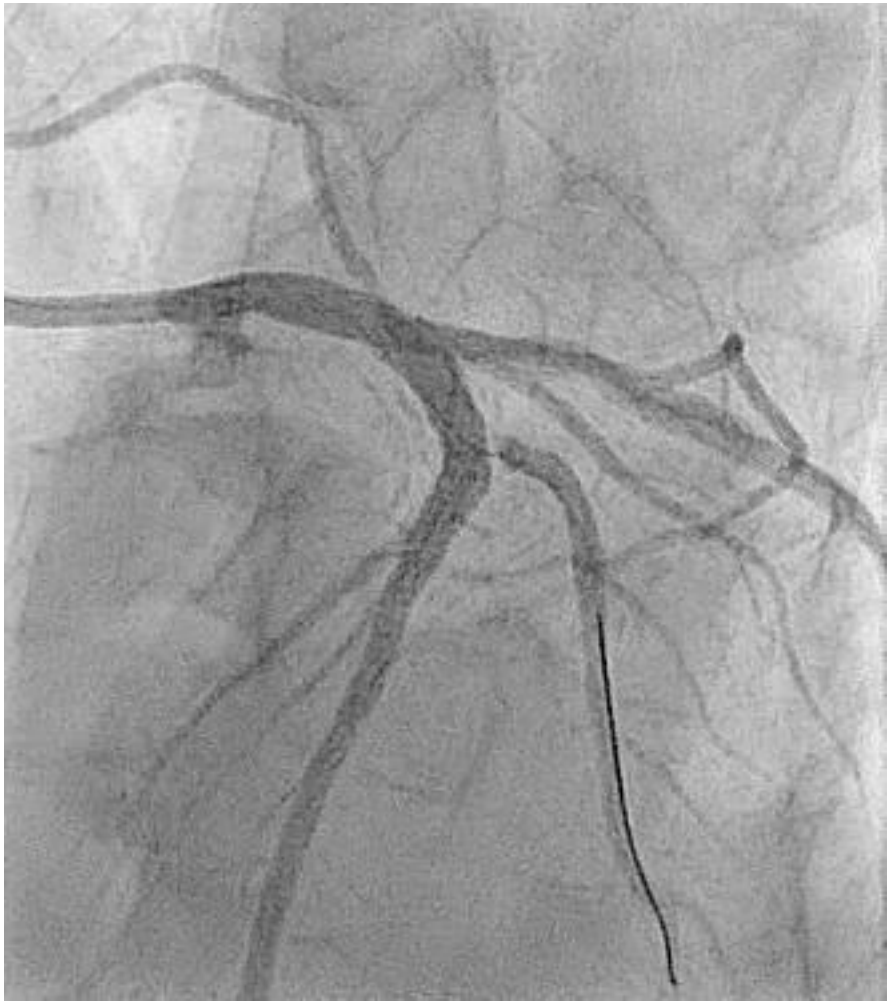
Intravascular imaging of the diagonal





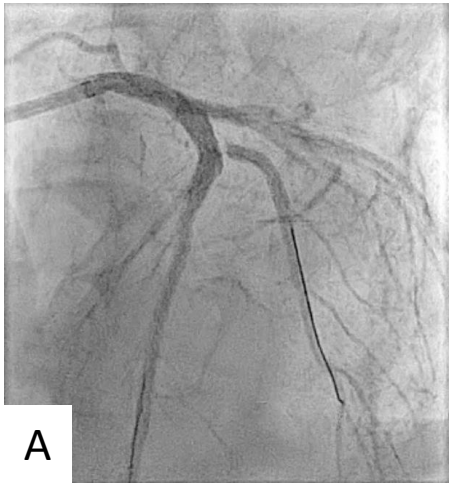


IVUS of the diagonal branch showing
A: health diagonal vessel distally with no evidence of significant stenosis and an area of 7.5 mm^2
B: Area of plaque corresponding to the stenosis seen on angiography however without obstructive disease as may be suggested by the angiogram and with an area of 5mm^2
Anatomical assessment using IVUS resulted in a change in the planned stenting strategy from was was initially planned to be a 2-stent strategy to now a provisional stenting approach

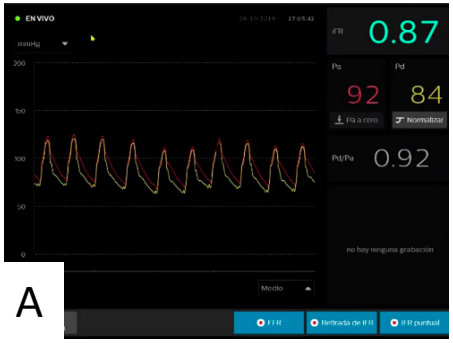


PCI to the LAD with a 4.0 x 26 mm DES based on previous IVUS measurements
Angiographic images suggest stenosis in the ostium of the diagonal branch post stent deployment but with TIMI 3 flow

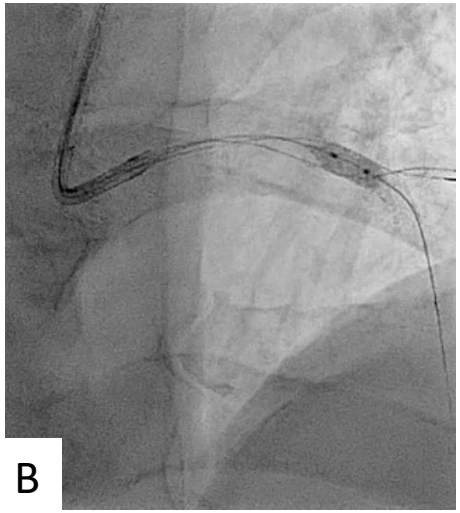
Anatomical-Physiological result



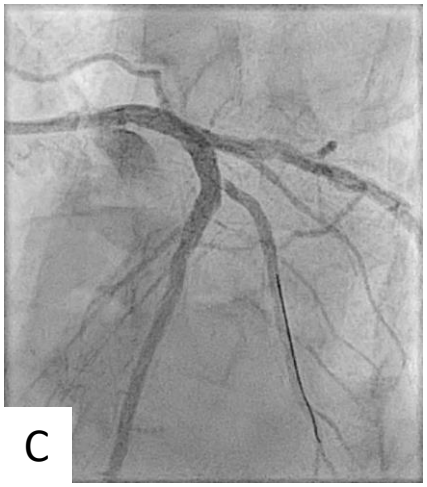
A



A



B

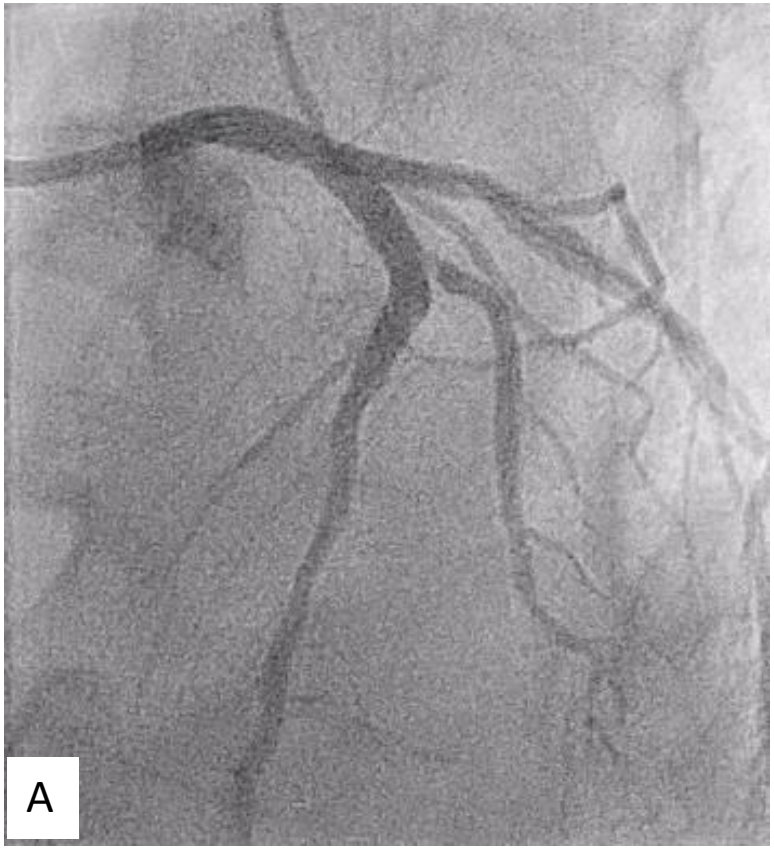


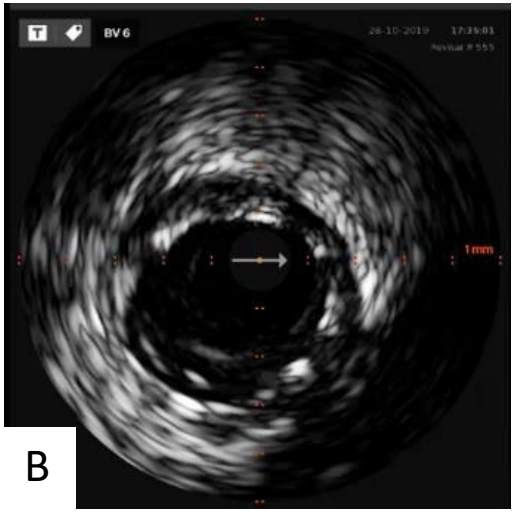
C

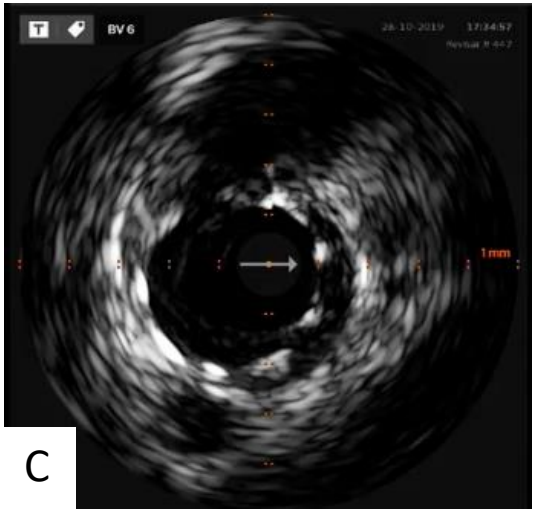
C

A: Angiographic & physiological result post stenting of the LAD
B: POT with 4.0 x 8mm NC balloon
C: Angiographic & physiological result post POT of the LAD
Physiological assessment confirming effectiveness of stenting strategy using provisional approach

Final result with IVUS







A: Final angiographic result
B: IVUS images showing well apposed and expanded stent throughout the LAD
C: IVUS image at the ostium of the diagonal branch showing open struts towards the diagonal with no evidence of stenosis

Final result with IVUS

- Angiographic lesions can be misleading regarding the severity of stenosis particularly in vessels that may have an angulated ostium
- Intravascular imaging and physiological assessment can be useful to understand the true nature of a stenosis seen on angiogram
- Simplification of a procedure may result when an integrated approach to lesion assessment is taken rather than angiography alone
- In our case a presumed Medina 1.0.1 lesion was found to be a 1.0.0 after intravascular imaging and physiological assessment and the strategy was changed from a 2-stent to provisional approach.