Hybrid Coronary Revascularization

Best treatment option for multivessel CAD?

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Interventional Cardiologist

Hybrid coronary revascularization (HCR)

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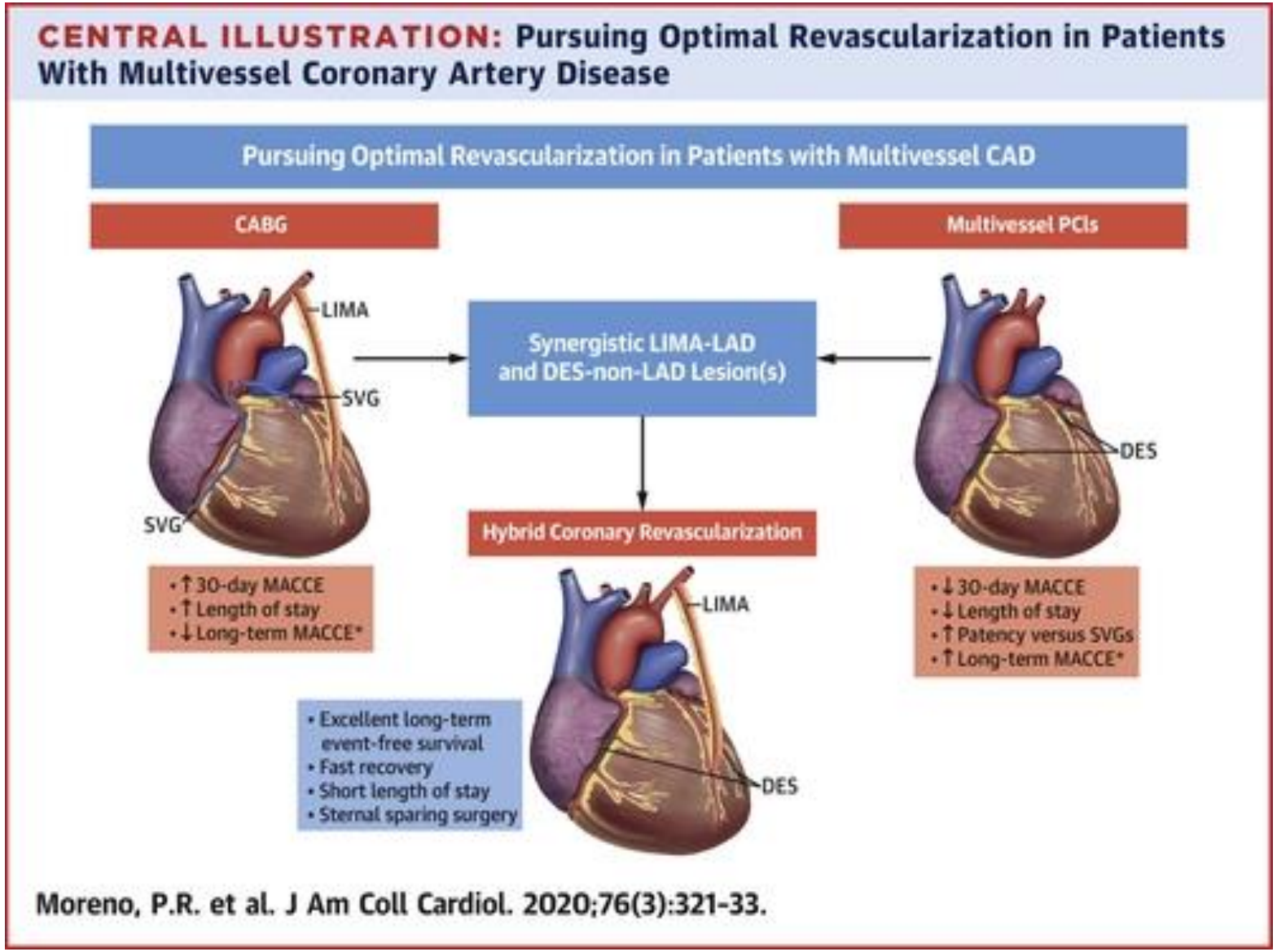

MIDCAB

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- Using off-pump, sternal-sparing incisions or robotic-assisted endoscopic techniques, the LIMA is anastomosed to the LAD.
- This approach has been shown to reduce neurological events, bleeding, infection, time of mechanical ventilation, and length of stay.
- The proven patency and survival benefits of LIMA-LAD revascularization will enhance long-term outcomes.

1. Trivedi A et al. J Am Coll Cardiol. 2006;47:417–424.

2. Nallamothu BK et al. Circ Cardiovasc Qual Outcomes. 2008;1:116–122.

PCI of non-LAD

- For non-LAD vessels, **DESs are used rather than SVGs**, which despite recommendations for pan-arterial surgical revascularization remain the most common conduits used for non-LAD bypass grafts worldwide [1]
- The longevity of SVGs are relatively poor, with graft failure in ~20% in the first year and reaching 70% at 15 years [2]
- The PREVENT IV (Prevention of Autogenous Vein Graft Failure in Coronary Artery Bypass Procedures) trial reported an SVG failure of 45% at 12 to 18 months
- Alternatively, contemporary DESs offer long-term patency rates of 96% to 98% [2]

1. *Parang P et al, Can J Cardiol*
2. *Stone G et al. for the SPIRIT IV Investigators, N Engl J Med*

Hybrid Coronary Revascularization

- Sokratis Sidiropoulos, MD
- Ioannis Pasatas, MD
- Vasileios Goulielmos, MD, PhD
- Konstantinos Bermpeis, MD

Case presentation

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Clinical Characteristics

53-year-old man, BMI 31.2 kg/m²

Presented with Typical angina CCS class 2

Medical history: Diabetes mellitus, hypertension, hyperlipidemia

Medication: ACE-I, Statin, Beta blocker, Calcium blocker, Metformin

Right Coronary Artery

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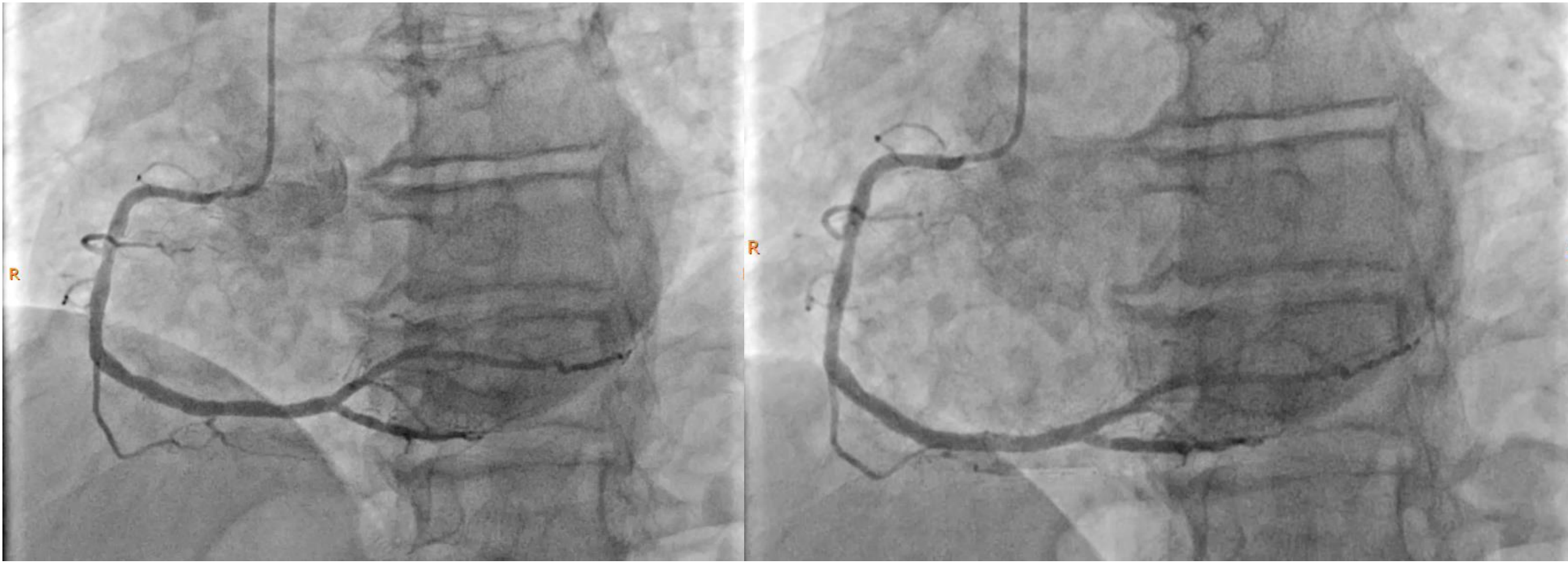
Severe ostial stenosis of the RCA



Left Coronary Artery

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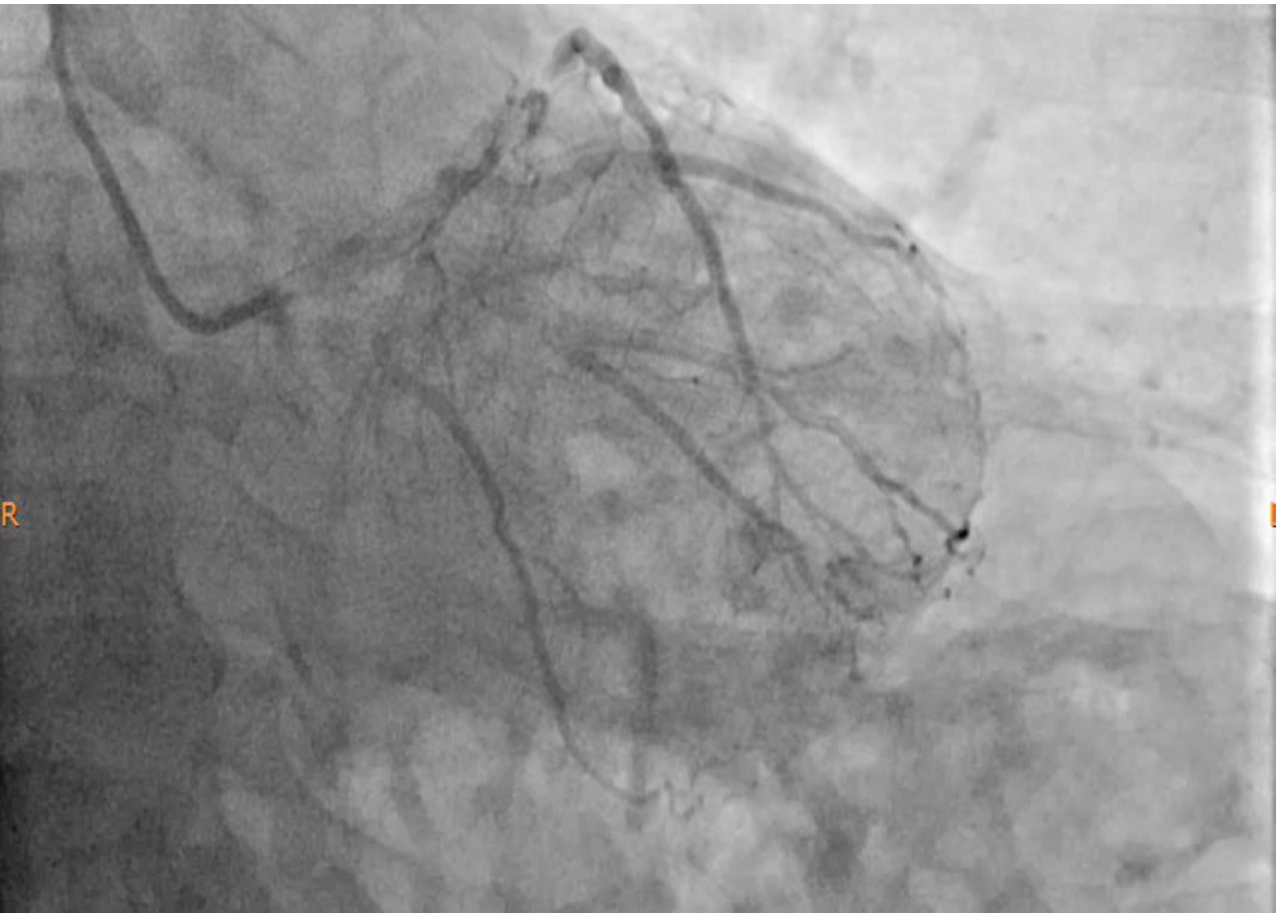
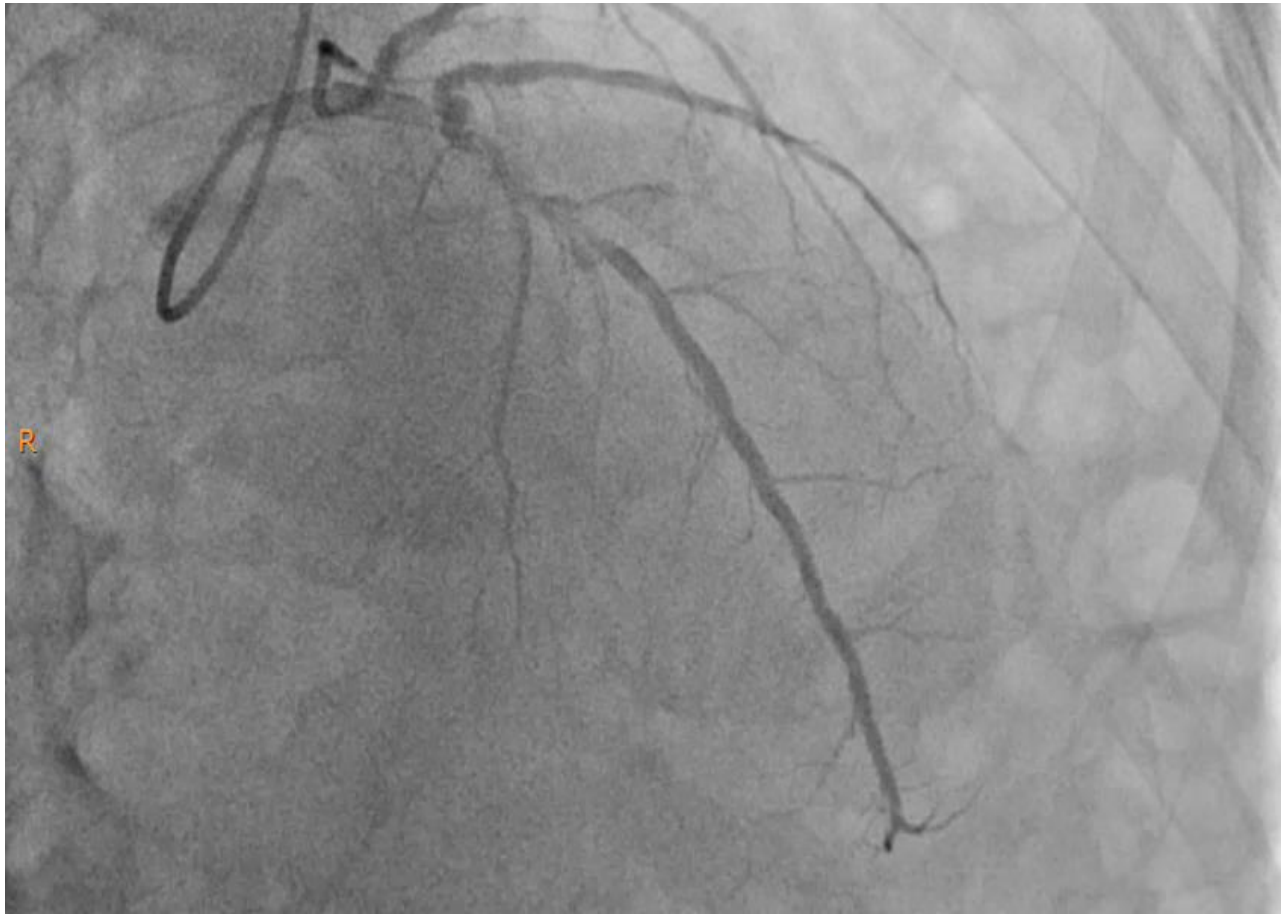
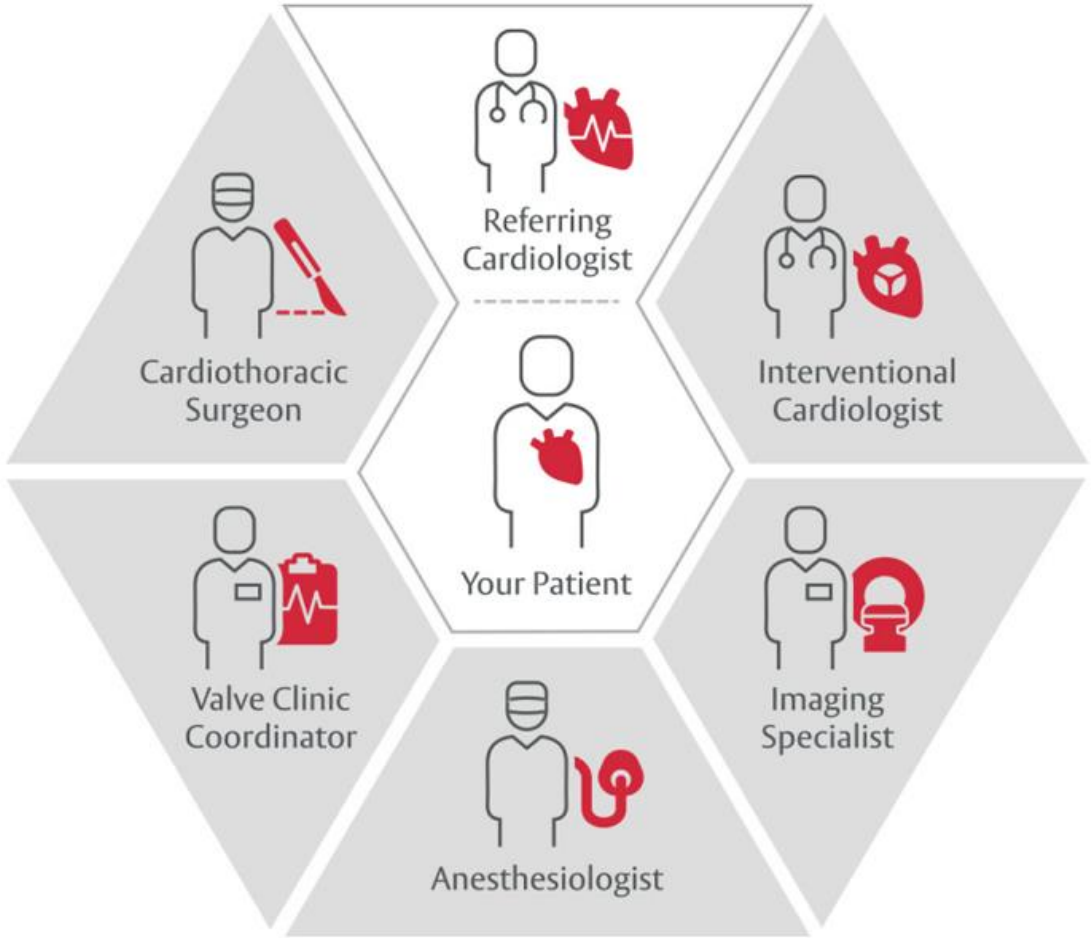




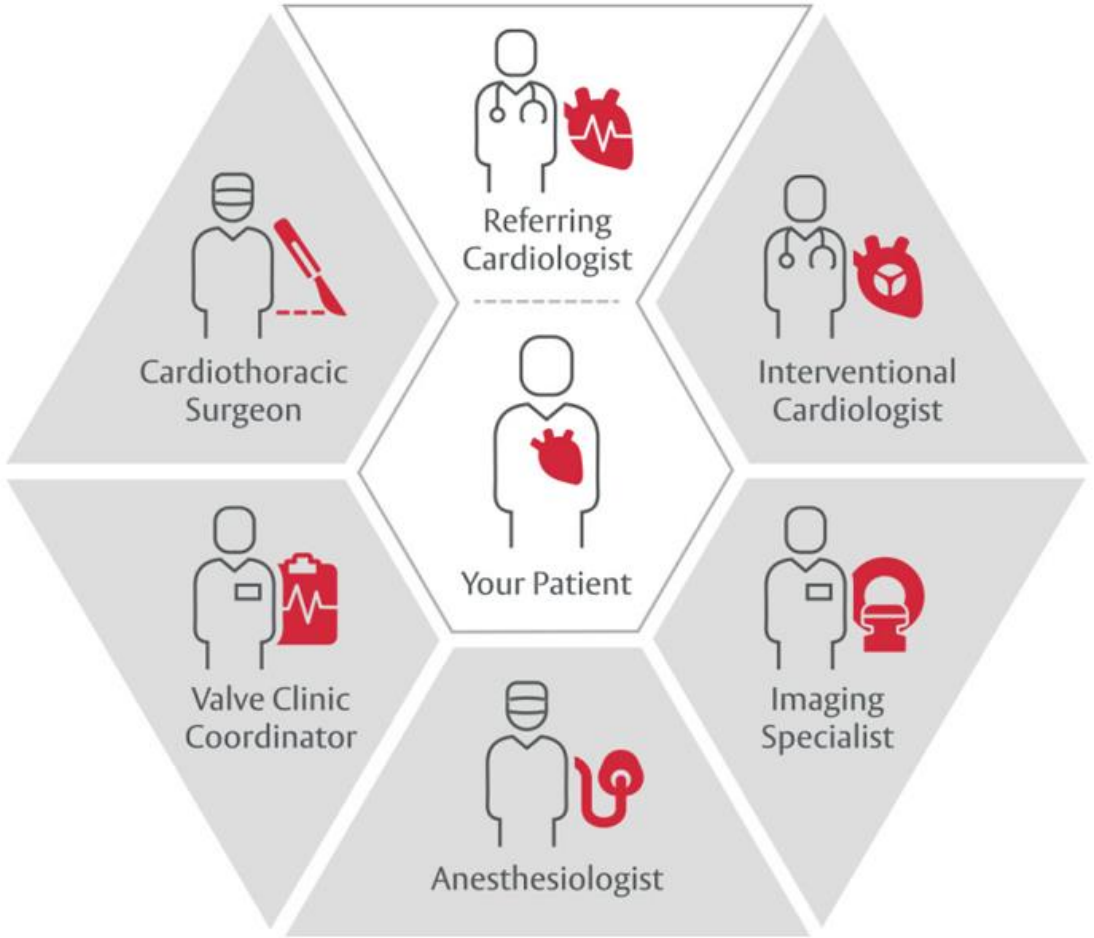
SYNTAX II Score 35→ Heart Team Discussion

Heart Team Discussion



Revascularization to improve outcomes		
In chronic coronary syndrome patients with left ventricular ejection fraction >35%		
In CCS patients with LVEF >35%, myocardial revascularization is recommended, in addition to guideline-directed medical therapy, for patients with functionally significant left main stem stenosis to improve survival.[718,719,859,860]	I	A
In CCS patients with LVEF >35%, myocardial revascularization is recommended, in addition to guideline-directed medical therapy, for patients with functionally significant three-vessel disease to improve long-term survival and to reduce long-term cardiovascular mortality and the risk of spontaneous myocardial infarction.[55,56,317,732–734]	I	A
In CCS patients with LVEF >35%, myocardial revascularization is recommended, in addition to guideline-directed medical therapy, for patients with functionally significant single- or two-vessel disease involving the proximal LAD, to reduce long-term cardiovascular mortality and the risk of spontaneous myocardial infarction.[55,56,317,719,732–734]	I	B
Assessment of procedural risks and post-procedural outcomes		
In patients with complex CAD in whom revascularization is being considered, it is recommended to assess procedural risks and post-procedural outcomes to guide shared clinical decision-making.	I	C
Calculation of the STS score is recommended to estimate in-hospital morbidity and 30-day mortality after CABG.[777,862–864]	I	B
In patients with multivessel obstructive CAD, calculation of the SYNTAX score is recommended to assess the anatomical complexity of disease.[786,865]	I	B
Intracoronary imaging guidance by IVUS or OCT is recommended when performing PCI on anatomically complex lesions, in particular left main stem, true bifurcations, and long lesions.[866,337,810,840,841]	I	A
Intracoronary pressure measurement (FFR or iFR) or computation (QFR) :		
• is recommended to guide lesion selection for intervention in patients with multivessel disease; [308,826,866,867]	I	A
• should be considered at the end of the procedure to identify patients at high risk of persistent angina and subsequent clinical events;[828,830,831,868]	IIa	B
• may be considered at the end of the procedure to identify lesions potentially amenable to treatment with additional PCI.[350,829,831]	IIb	B
Choice of revascularization modality		
It is recommended that physicians select the most appropriate revascularization modality based on patient profile,[c] coronary anatomy,[d] procedural factors,[e] LVEF, preferences, and outcome expectations.[719,725,728,792–795,801,816,820,822,859,869]	I	C

Heart Team Discussion



Hybrid Revascularization

1. MIDCAB LIMA-->LAD

2. IVUS guided PCI RCA

MIDCAB (LIMA-LAD)

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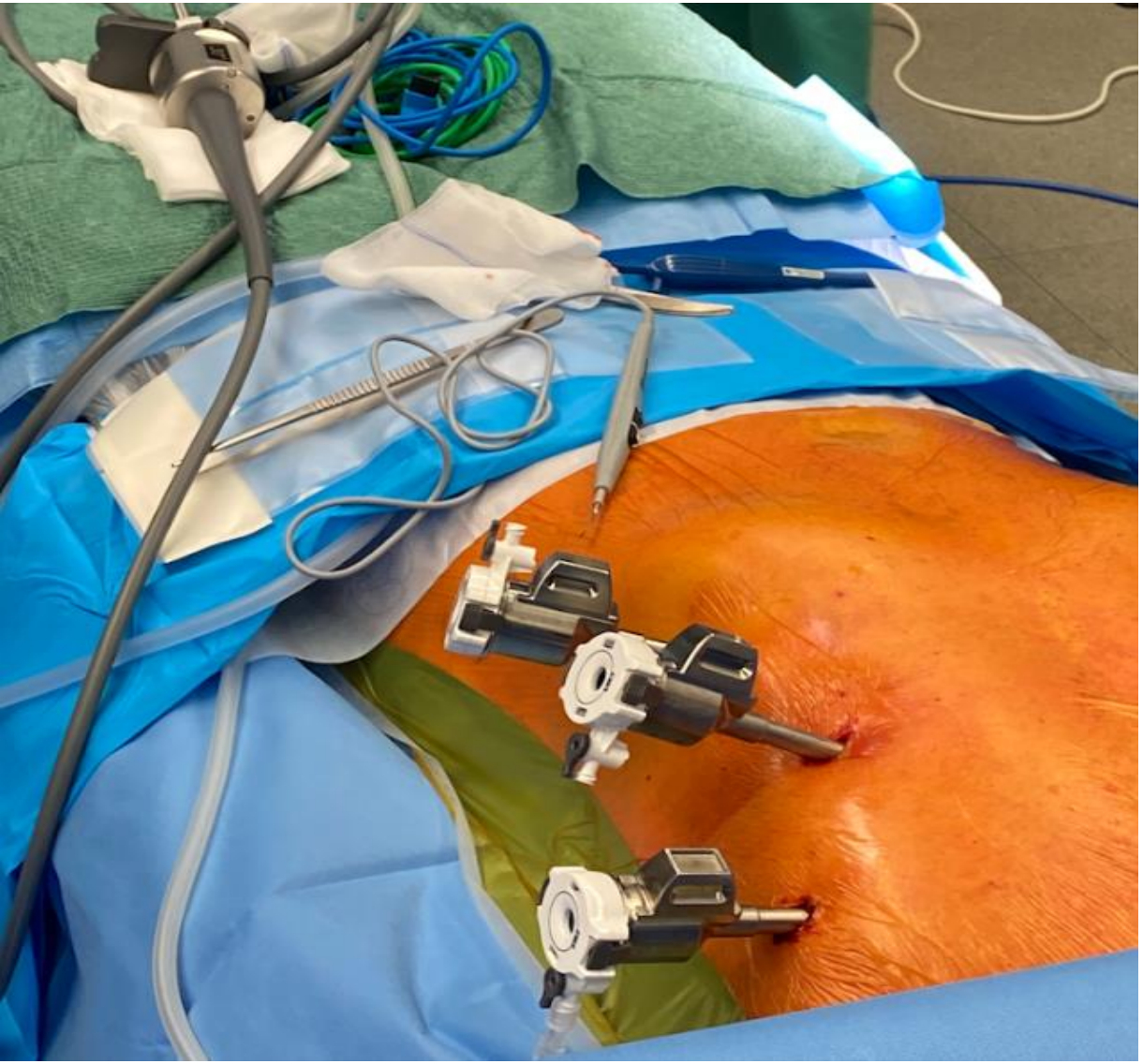

Timing of the HCR procedures

Three possible timing strategies can be used

1. CABG and PCI performed simultaneously;
2. **CABG first followed by PCI**; or
3. CABG following PCI

2nd Post Operative Day

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POST MIDCAB

Ostial RCA Lesion

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IVUS guided PCI

Baseline IVUS assessment

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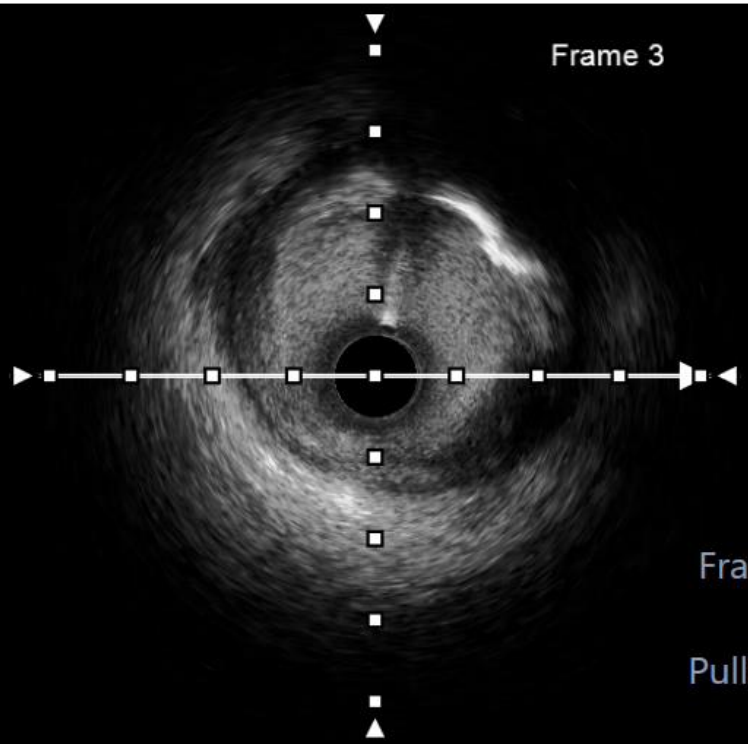
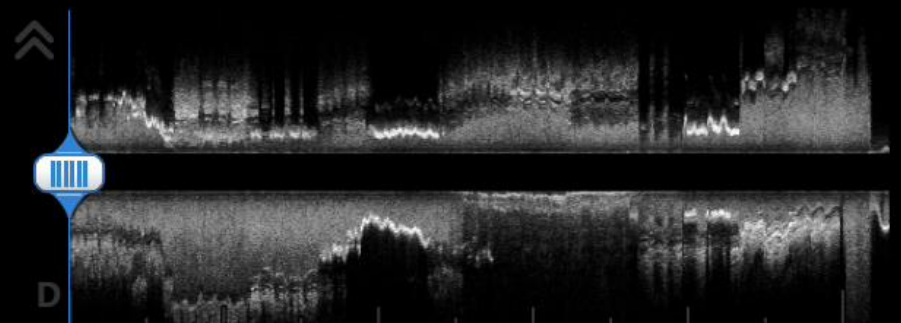
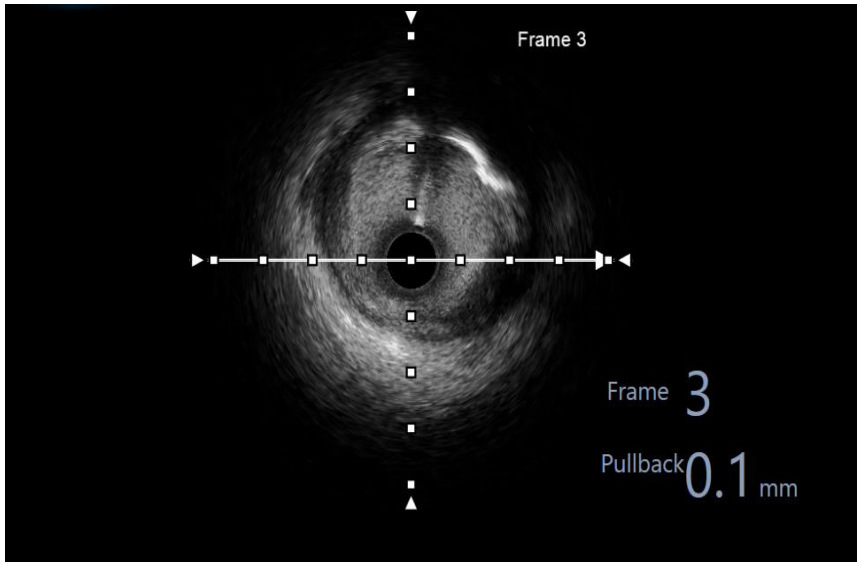
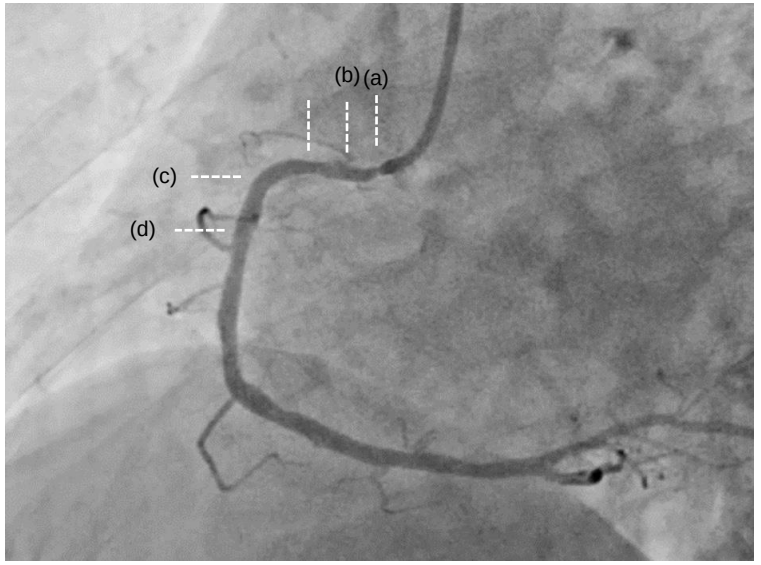


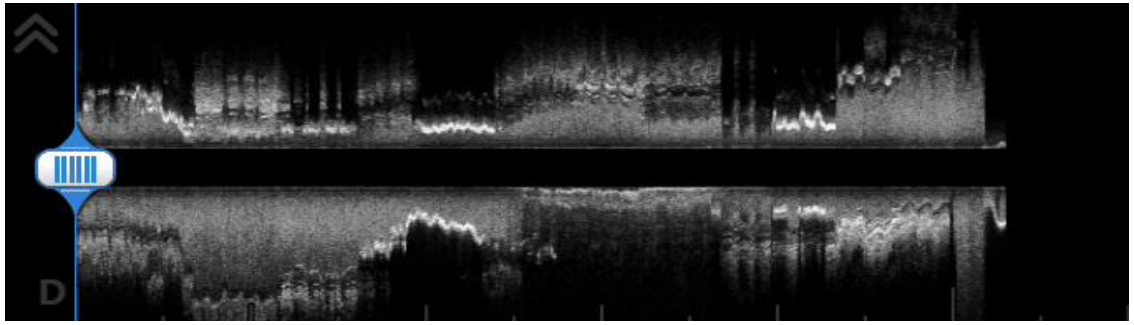
Frame 3

Pullback 0.1 mm

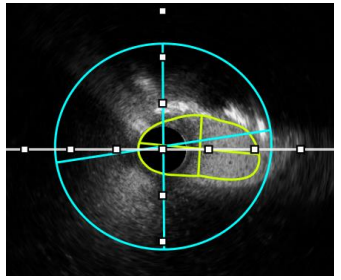






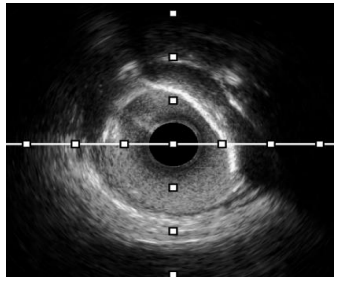


(a)



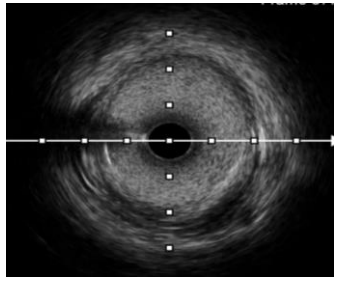
Ostial reference
(MLA)
2.2 mm^2

(b)



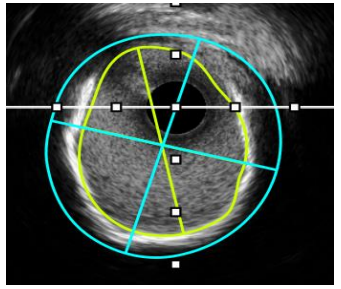
Calcified nodule
3.8 mm^2

(c)



Distal reference
8.8 mm^2

(d)



270° Calcified plaque
(MLA)
7.7 mm^2

Plaque modification

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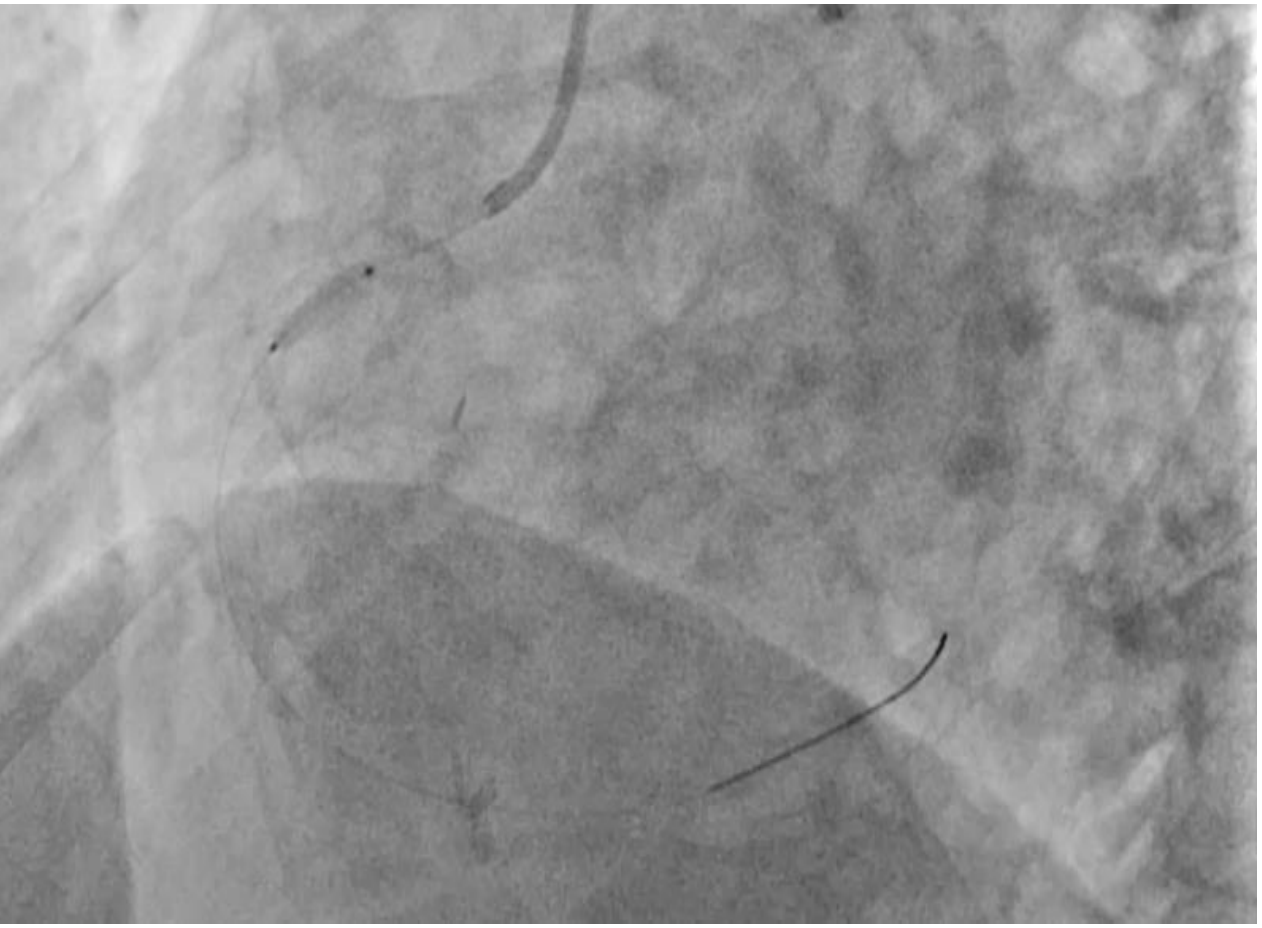

NC Balloon 2.5mm

NC Balloon 3.0mm

Stent Implantation

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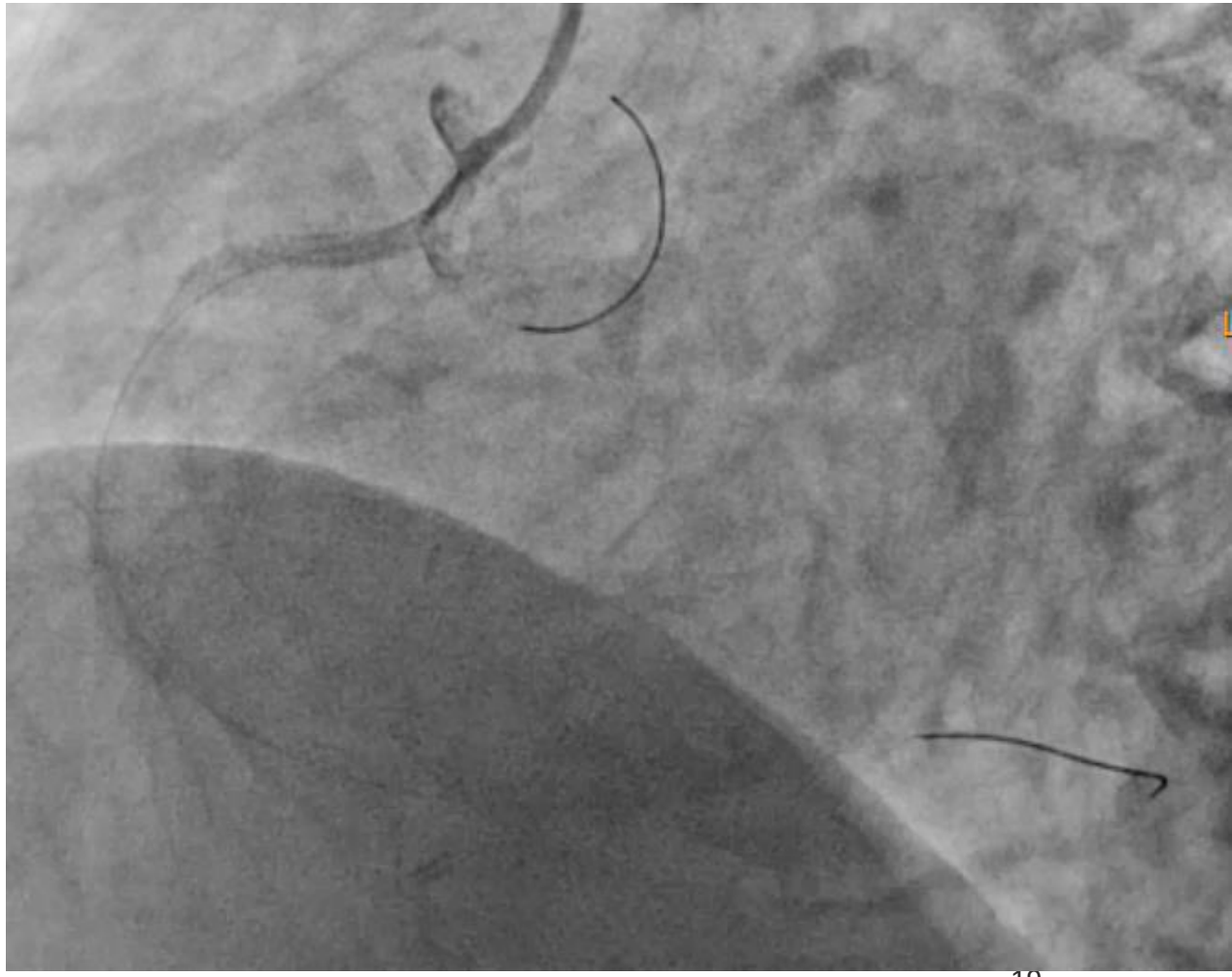
DES 3.0 x 28 mm



Post-dilation

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Balloon NC 3.0mm

Balloon NC 3.5mm

Post PCI IVUS assessment

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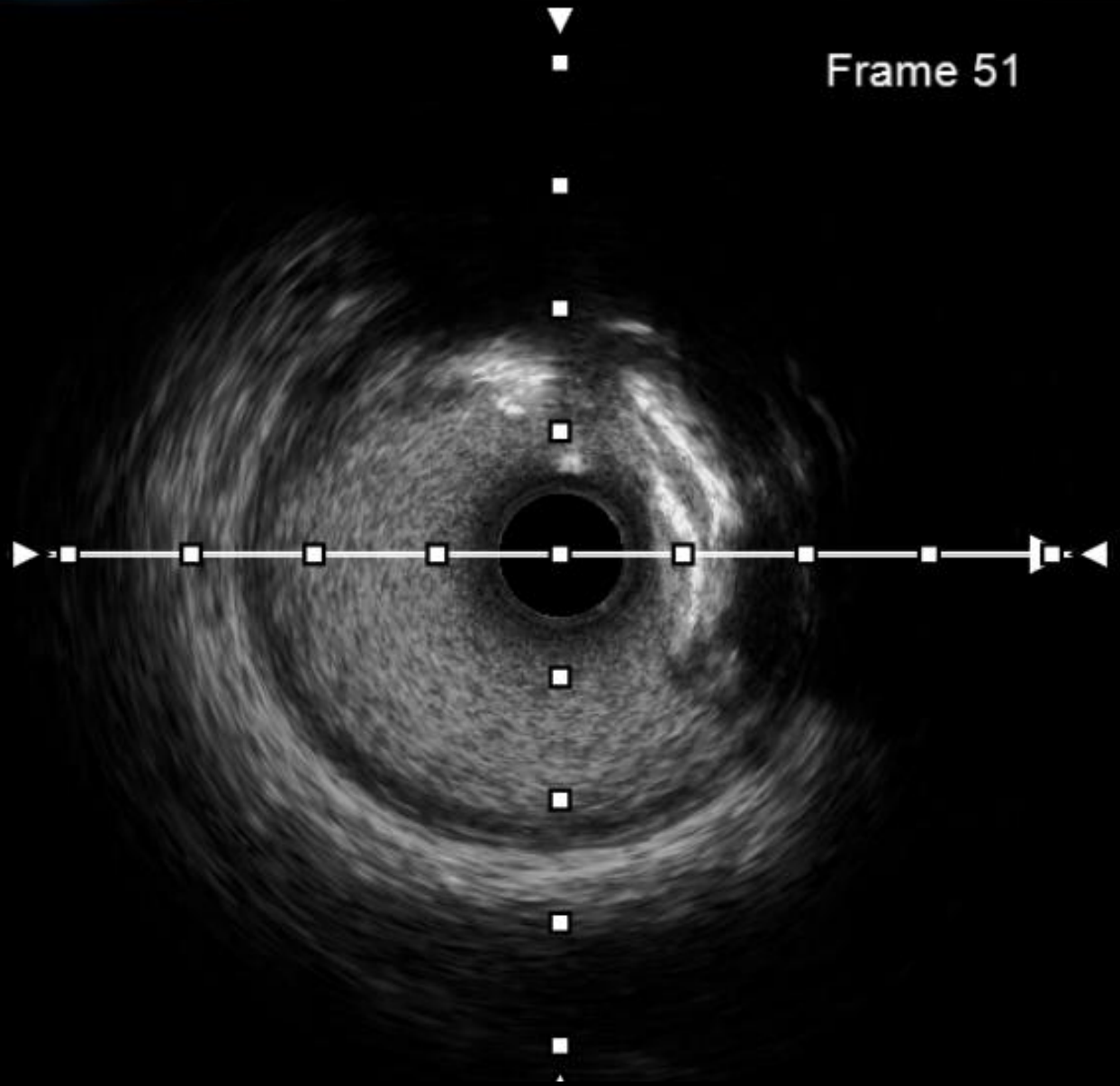
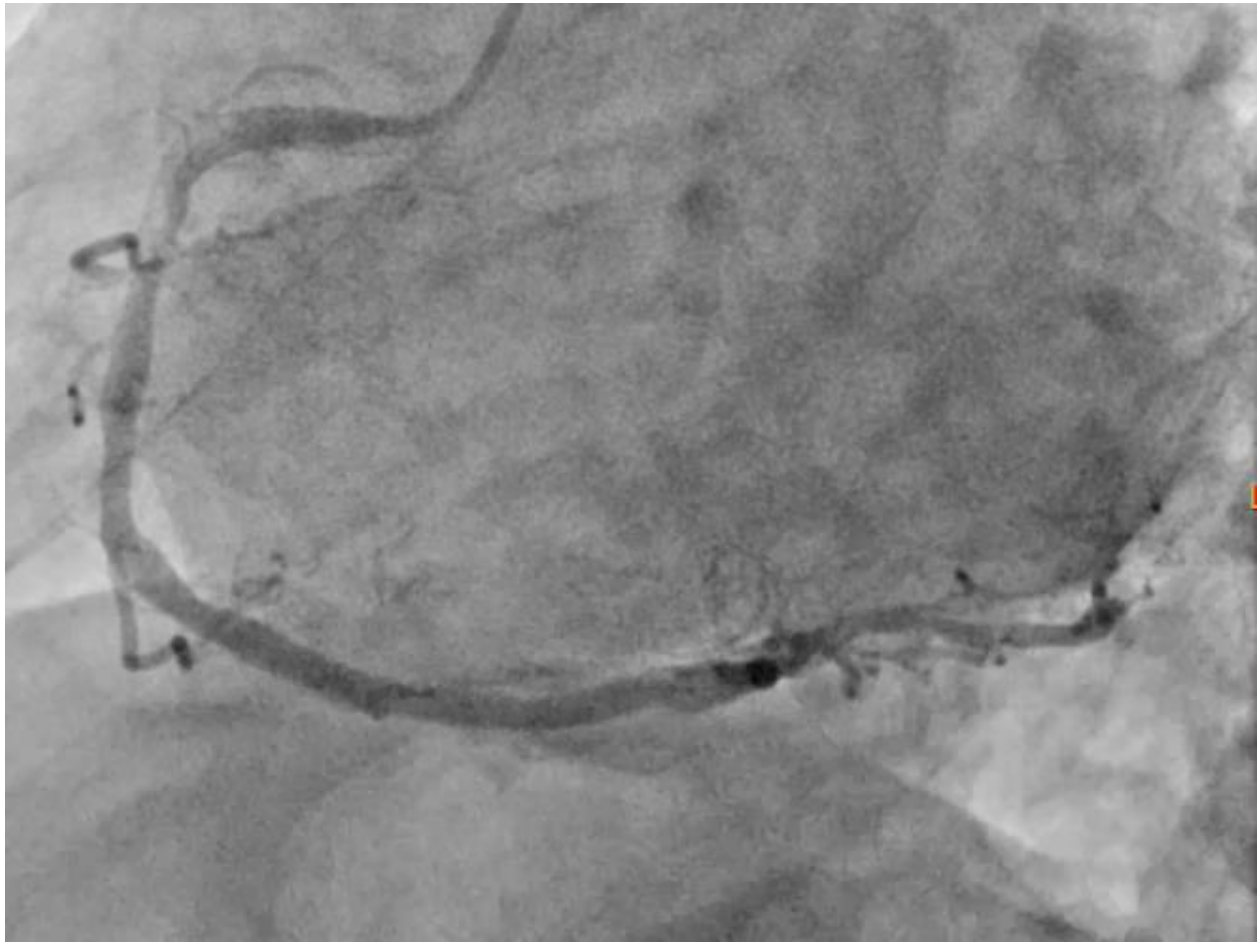


Final result

Balloon NC 4.0 mm



Final Angio

Final result

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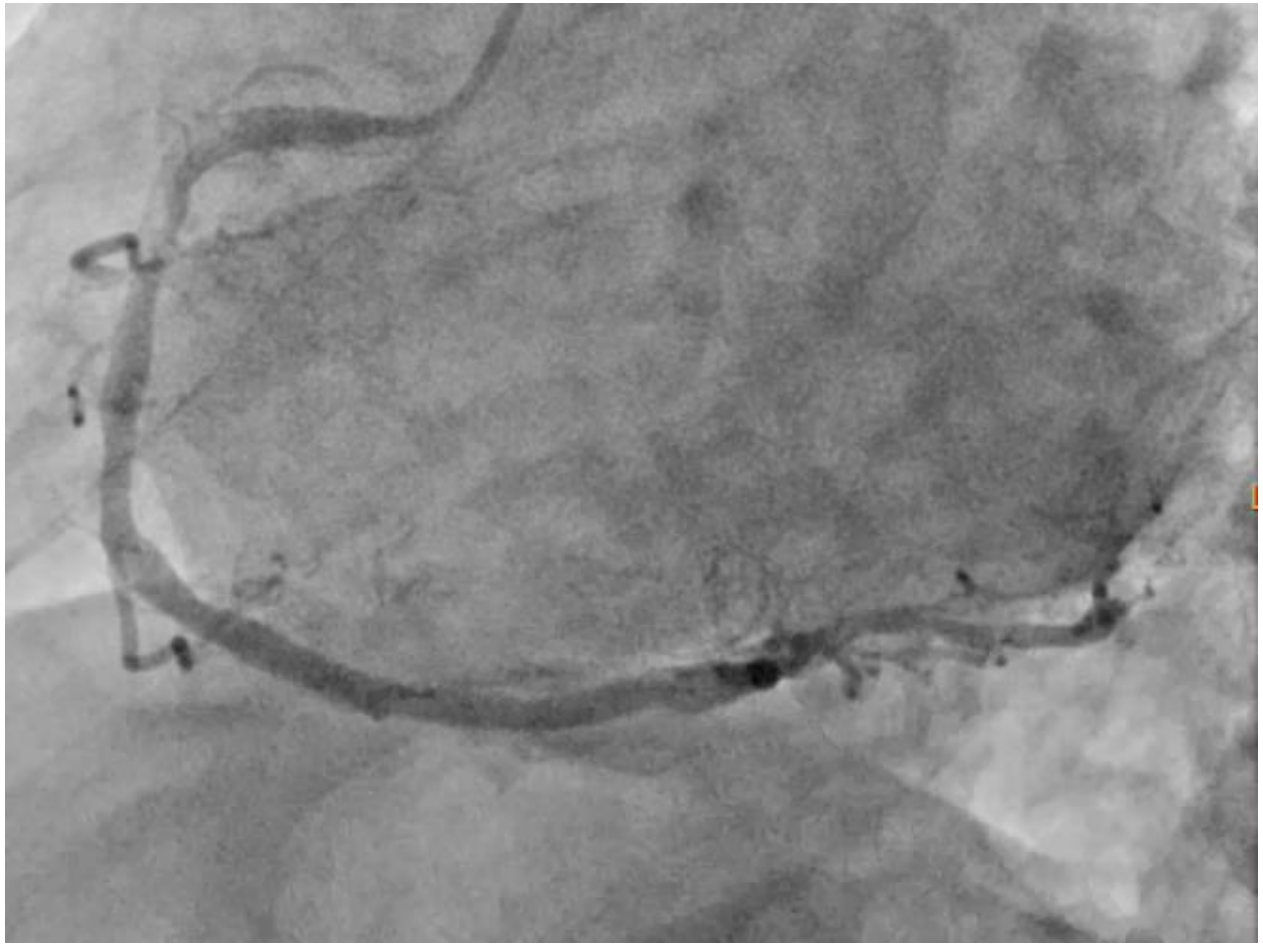

- Despite the intuitive advantages of the HCR approach in combining the best that both CABG and PCI have to offer

Best of two words?

- The evidence that HCR may reduce in-hospital complications and length of stay and improve patient satisfaction compared with conventional CABG while preserving the benefits of the LIMA and replacing SVGs with DES suggests the potential utility of HCR.
- Small RCTs and observational studies with propensity-matching of hybrid revascularization versus conventional CABG have found similar rates of death, MI, stroke, and repeat revascularization. [1]
- Previous reports and meta-analyses have demonstrated favorable outcomes, showing lower need for blood transfusion, shorter length of stay, and faster recovery.
- The hybrid approach to coronary has gained increasing popularity in recent years, although it is still performed by few centers.

1. Trivedi A et al. J Am Coll Cardiol. 2006;47:417–424.

2. Nallamothu BK et al. Circ Cardiovasc Qual Outcomes. 2008;1:116–122.

Lack of evidence

- Limited number of studies have directly compared HCR with multivessel PCI. [1]
- The Hybrid Coronary Revascularization trial, a phase 3, large-scale, randomized trial designed to compare multivessel PCI with hybrid coronary surgery in patients with disease of the LAD and ≥1 additional stenoses, was terminated early because of low enrollment[2]

1. Trivedi A et al. J Am Coll Cardiol. 2006;47:417–424.

2. Nallamothu BK et al. Circ Cardiovasc Qual Outcomes. 2008;1:116–122.

Conclusions

- Minimally invasive surgical techniques also have a distinct learning curve
- Optimisation of PCI results with all tools (Intravascular Imaging, Physiology)
- Center experience, well-coordinated heart team discussions, and good patient selection likely remain essential to ensure optimal outcomes.
- Future comparative studies are required to define the optimal target population.

- Ευχαριστώ!