Bifurcation PCI optimization using intracoronary guidance: optimization criteria and supporting clinical data

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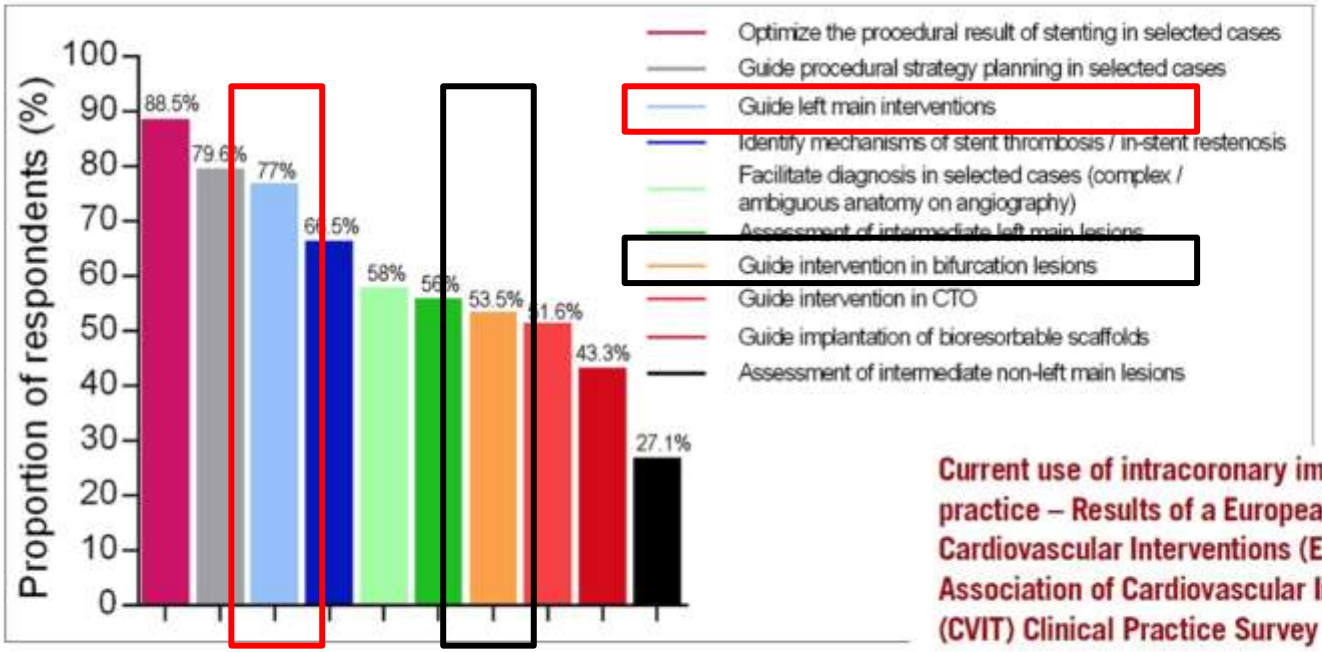
Conflict of Interest

- **I have nothing to disclose**

Current Use of Intracoronary Imaging

Web-based survey by the **EAPCI** and **CVIT**

In your opinion, what are the **clinical indications** for IVUS or OCT?



Current use of intracoronary imaging in interventional practice – Results of a European Association of Percutaneous Cardiovascular Interventions (EAPCI) and Japanese Association of Cardiovascular Interventions and Therapeutics (CVIT) Clinical Practice Survey

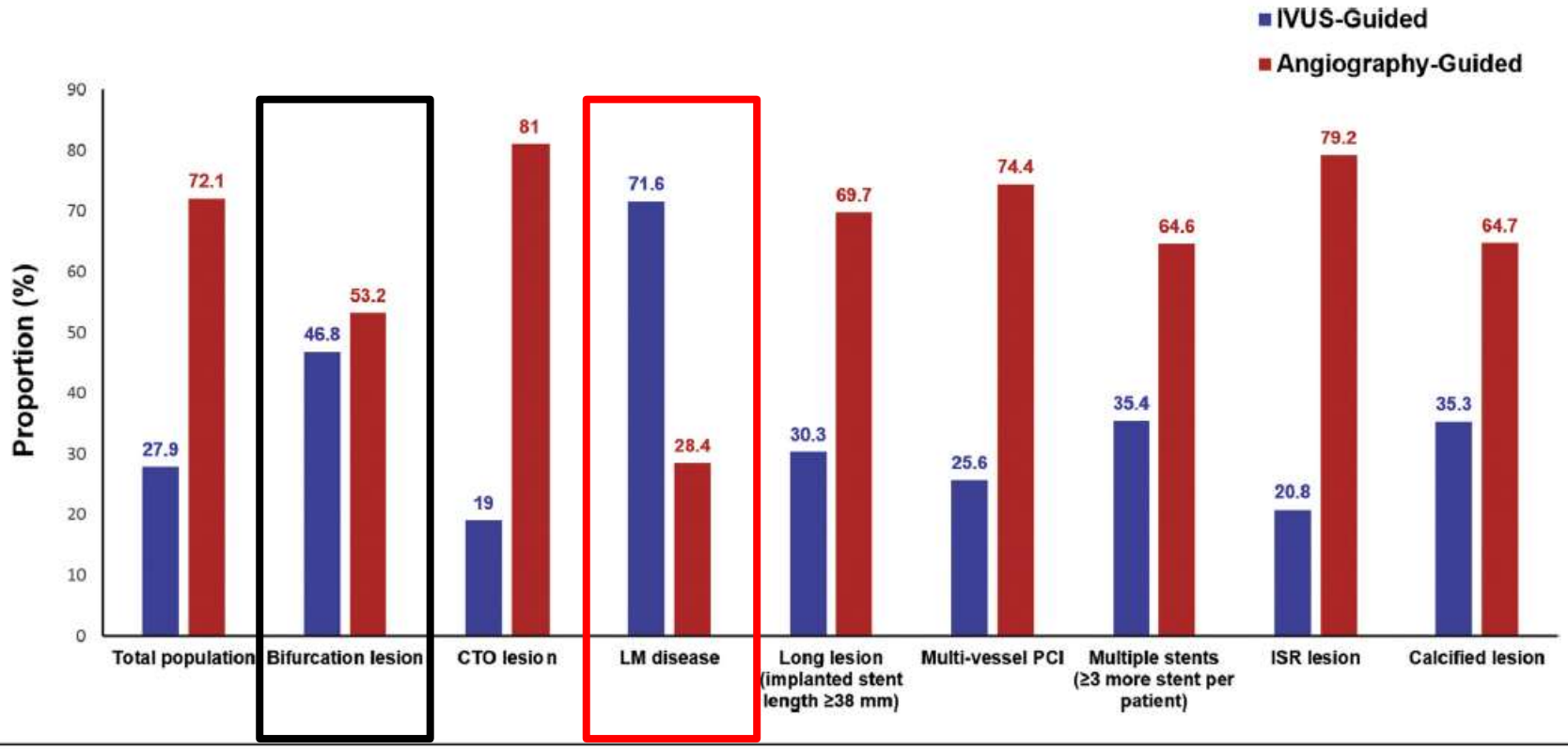
- Total of **1,105** responses received

Koskinas K et al. Eurointervention and Circ J. online 2018

Use of IVUS in complex lesions: median 64 months FU

IVUS guidance= 1,674 patients; angiography guidance=4,331 patients

FIGURE 2 Proportion of Use of IVUS According to Lesion Characteristics



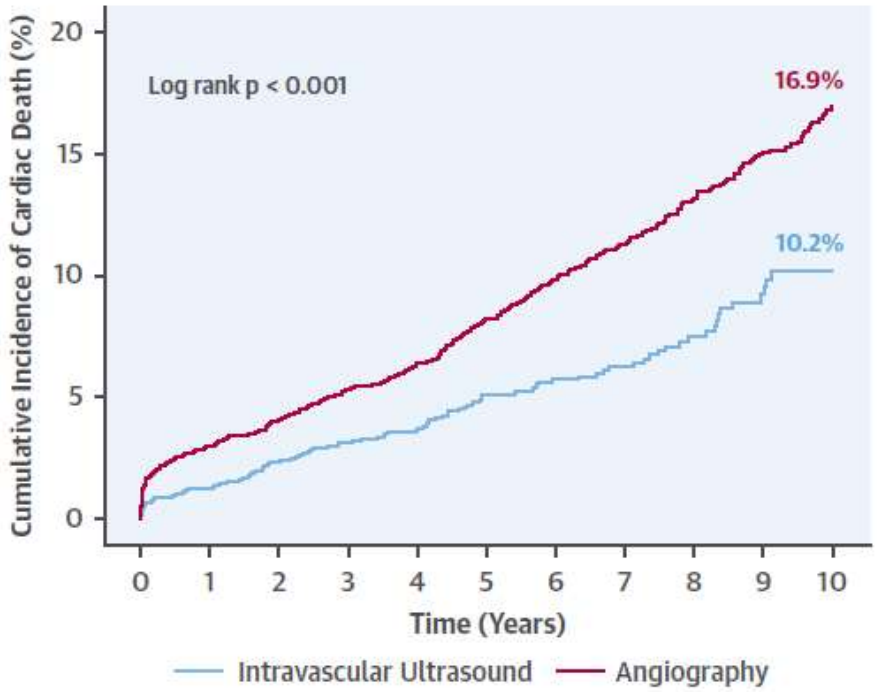
Bar graphs show the proportion of use of IVUS with various lesion characteristics. The **blue bars** denote the proportion of use of IVUS, and the **red bars** denote the proportion of use of angiography only. CTO = chronic total occlusion; ISR, in-stent restenosis; IVUS = intravascular ultrasound; LM = left main coronary artery; other abbreviation as in Figure 1.

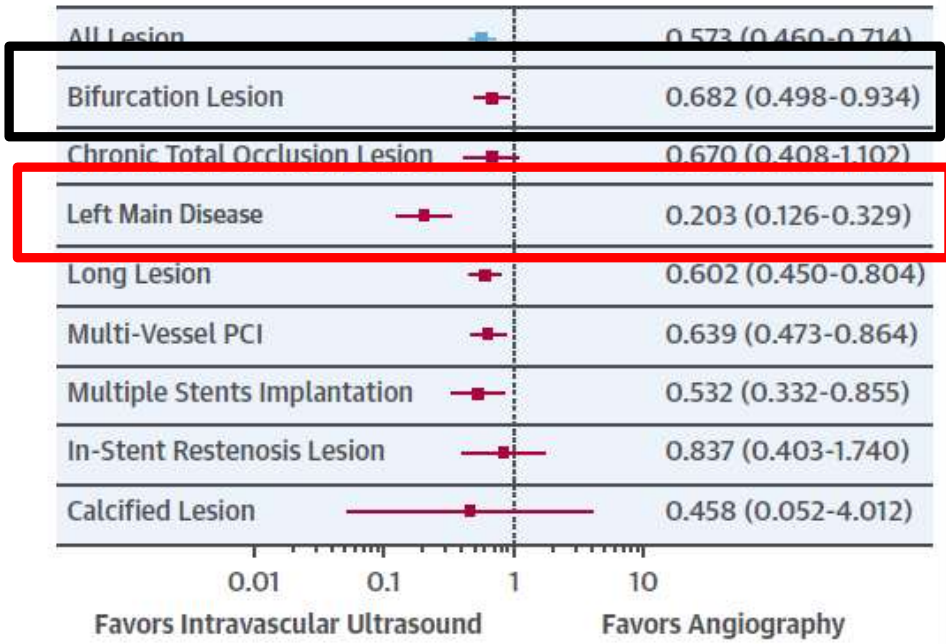
Choi KH, et al . *JACC Intv* 2019;12:607-20

Use of IVUS in complex lesions: median 64 months FU

IVUS guidance= 1,674 patients; angiography guidance=4,331 patients

Clinical Outcomes



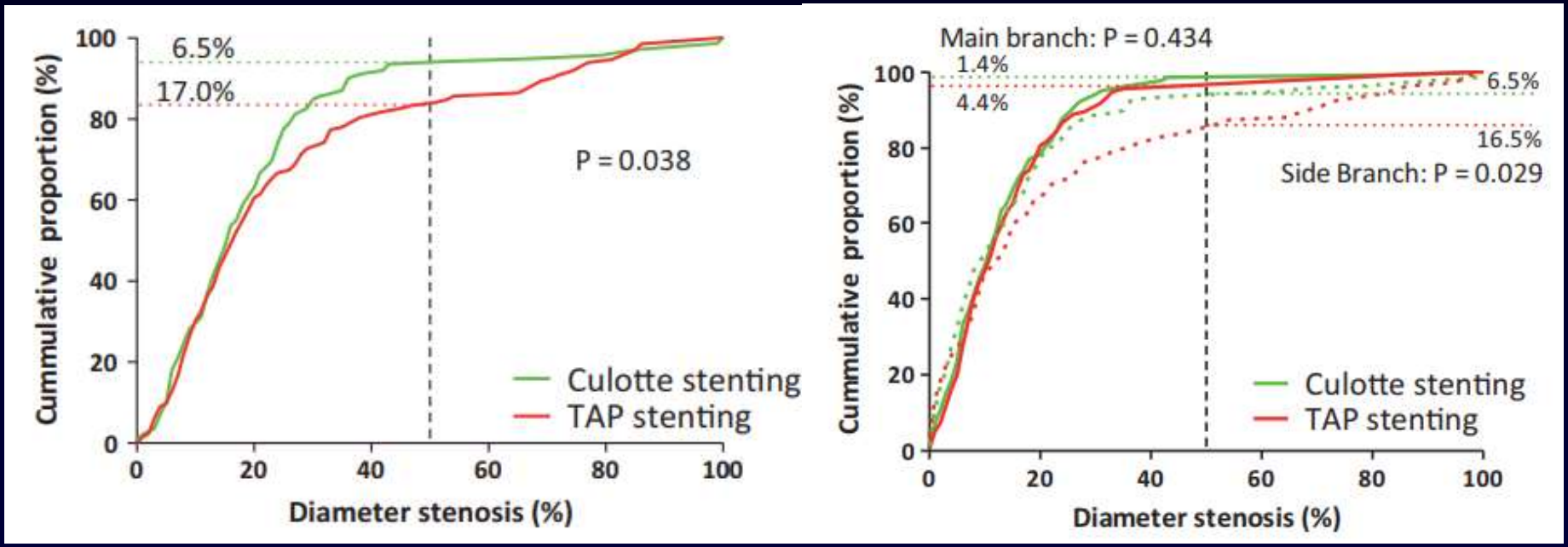


Choi, K.H. et al. J Am Coll Cardiol Intv. 2019;12(7):607-20.

Choi KH, et al . *JACC Intv* 2019;12:607-20

Culotte vs. TAP

The Bifurcations Bad Krozingen (BBK) II angiographic trial
Culotte (n=150) vs. TAP (n=150)



Clinical outcome: 1Y TLR: 9 (6%) in culotte vs. 18 (12%) in TAP, *p*=0.069

Culotte may be better.

Ferenc M et al. Eur Heart J. (2016) 37, 3399–3405

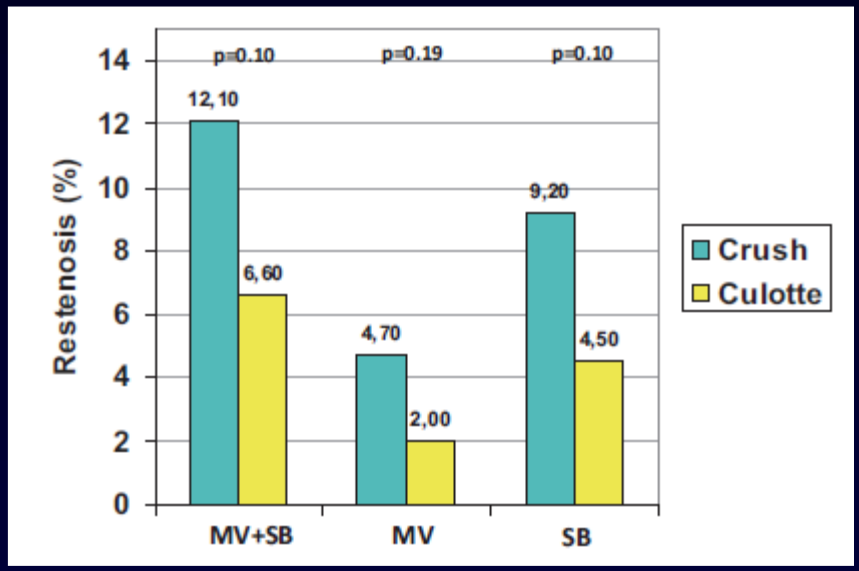
Culotte vs. Crush

The Nordic Stent Technique Study

Crush (n=209) vs. Culotte (n=215)

Clinical outcomes at 3Y

- **MACE: 20.6% vs. 16.7%, *p*=0.32**
- **Restenosis: 11.5% vs. 6.5%, p=0.09**
- **Definite ST: 1.4% vs. 4.7% p=0.09**



No difference in clinical outcomes (primary EP), but trend of lower incidence of restenosis in Culotte group.

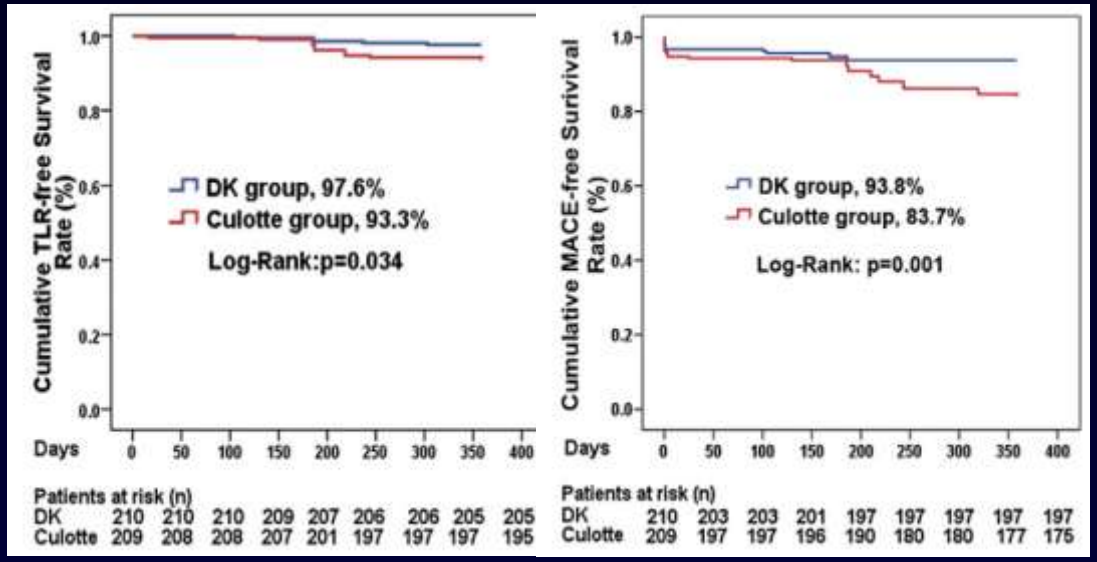
Culotte may be better.

Erglis A et al. Circ Cardiovasc Intervent. 2009;2:27-34.
Kervinen K et al., JACC Cardiovasc Interv. 2013;11:1160-5

DK Crush vs. Culotte

The DKCRUSH-III Study

DK Crush (n=210) vs. Culotte (n=209) in distal LM bifurcation



%DS at 8M F/U

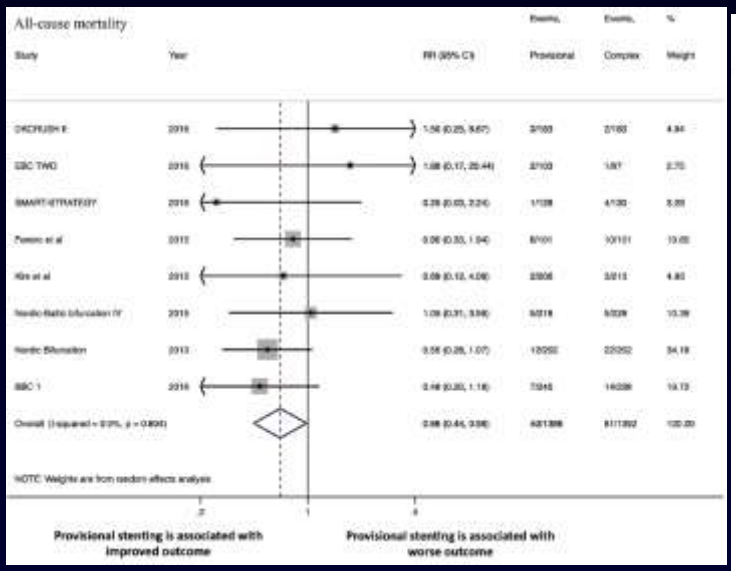
- **LM: 11% vs. 12%, p=0.401**
- **LAD: 16% vs. 15%, p=0.401**
- **LCX: 9% vs. 19%, p=0.034**

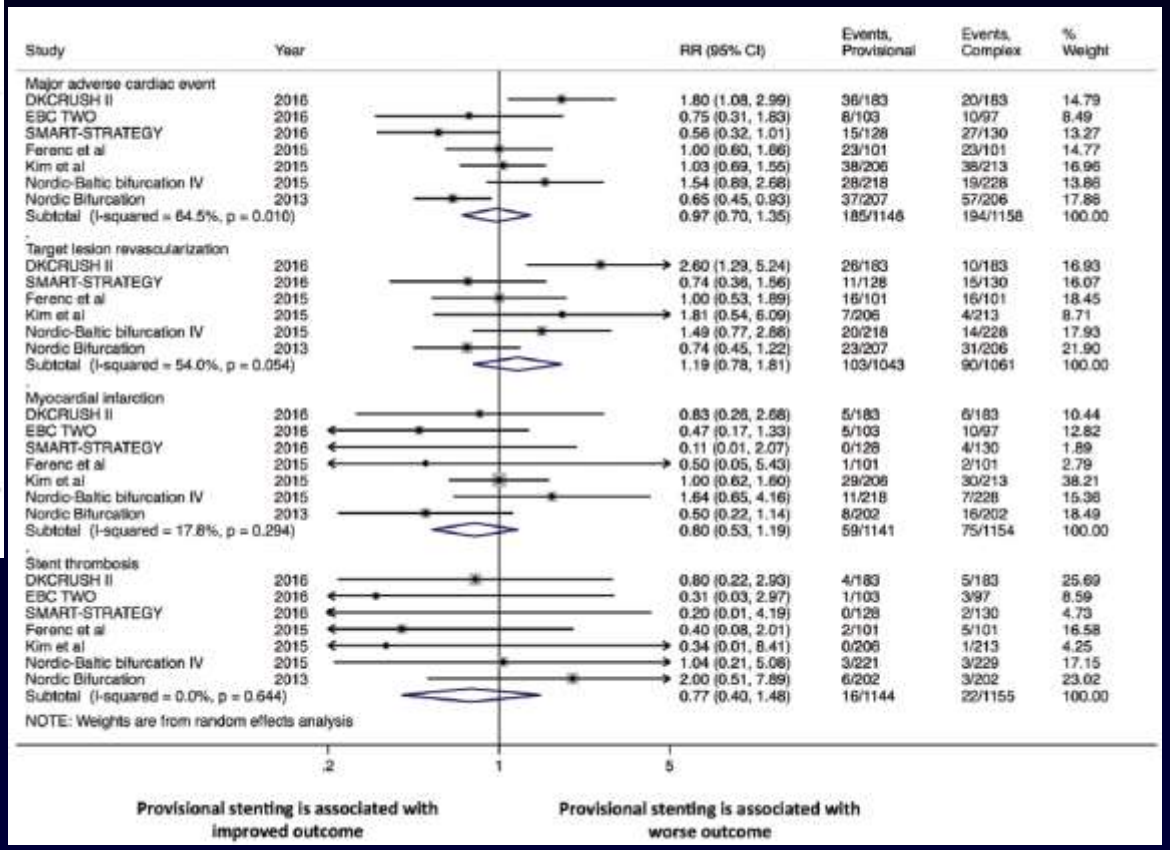
Better clinical outcomes in DK crush group, mainly driven by lower TLR.

DK crush may be better.

Chen SL et al., J Am Coll Cardiol 2013;61:1482–8

Two-stenting vs. provisional stenting





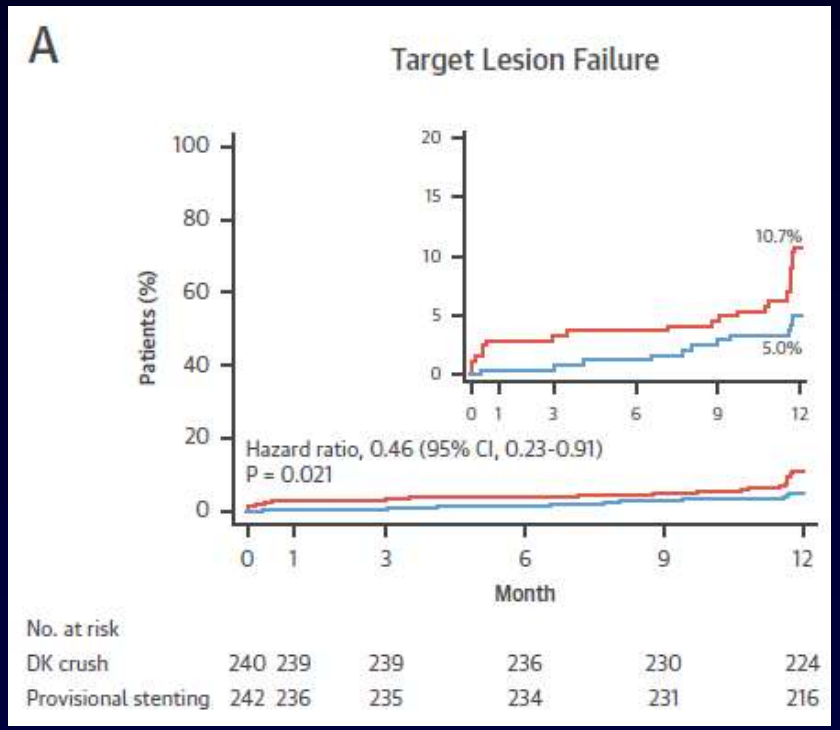
Lowering mortality in favor of provisional stenting, but not no differences in MACE, TLR, MI or ST

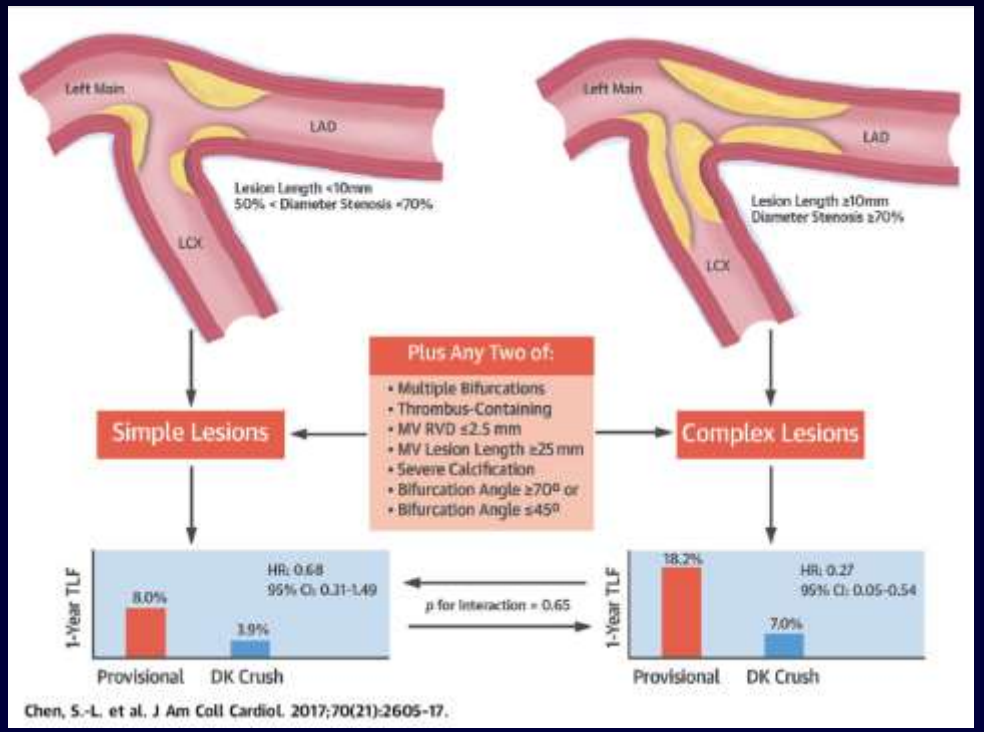
Nairooz R, et al. Heart 2017;103:1427–1434.

Two-stenting vs. Provisional stenting (2)

The DKCRUSH-V trial

DK crush (n=240) vs. provisional stenting (n=242)



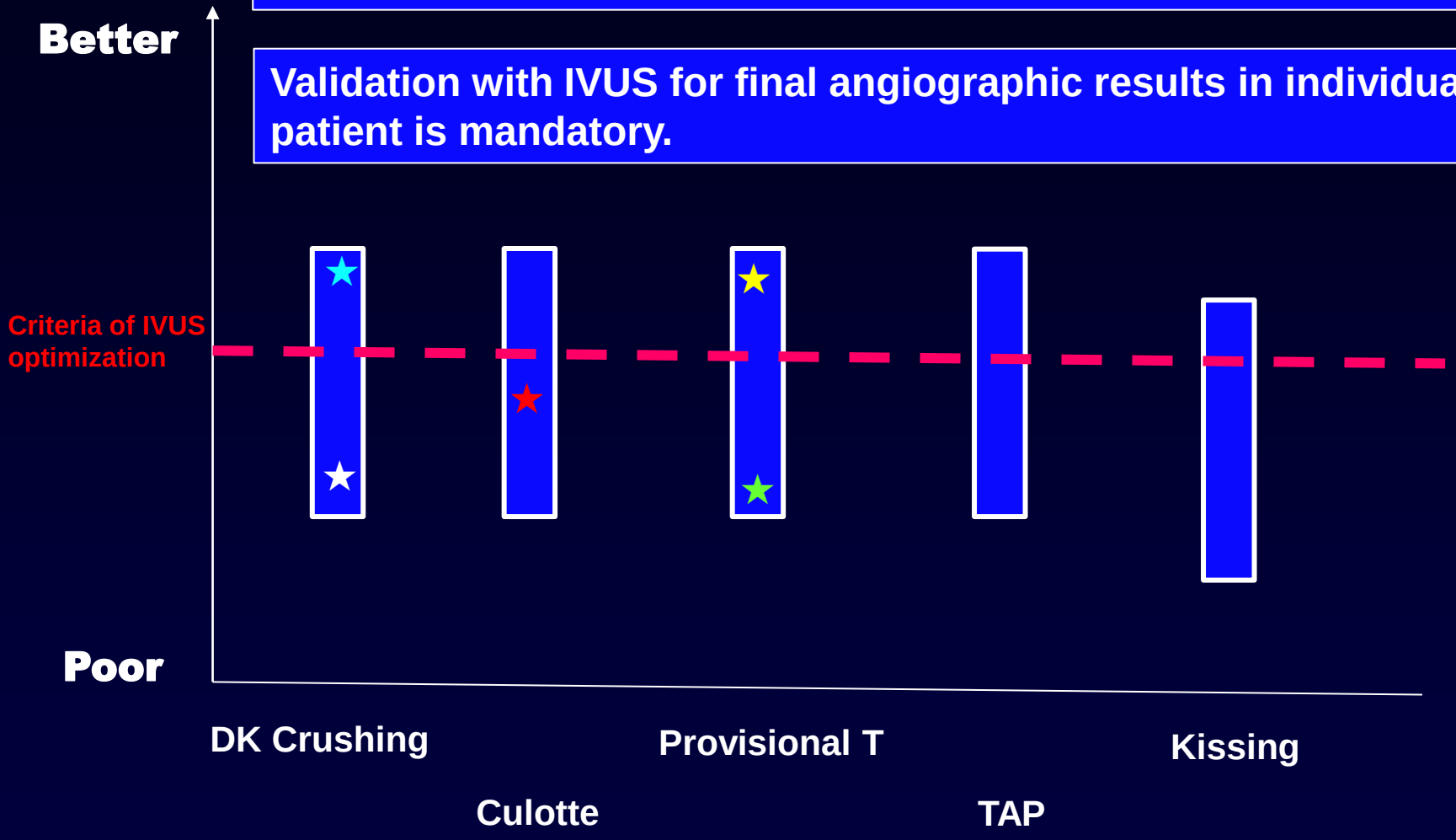


Chen SL et al., J Am Coll Cardiol 2017;70:2605–17

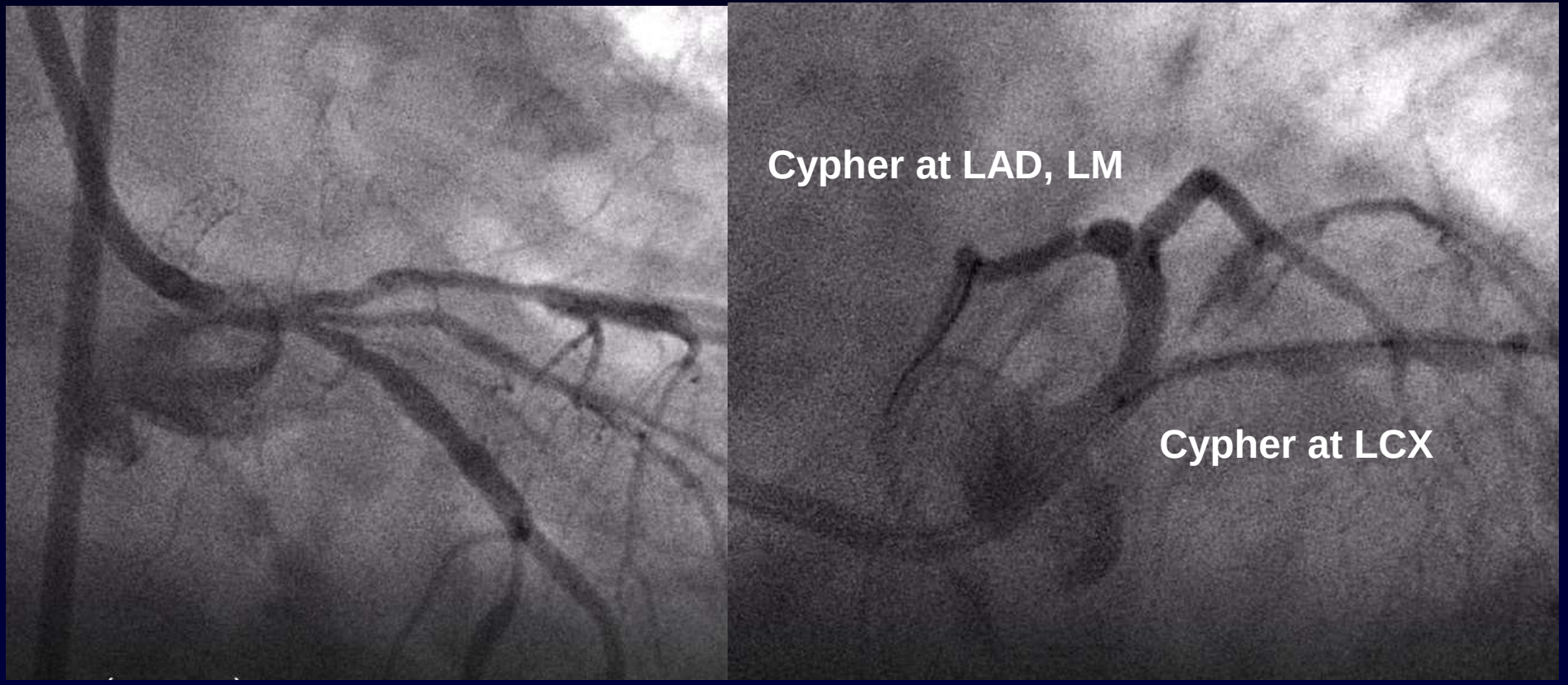
Better clinical outcomes

Can final angiographic findings discriminate stent optimization?

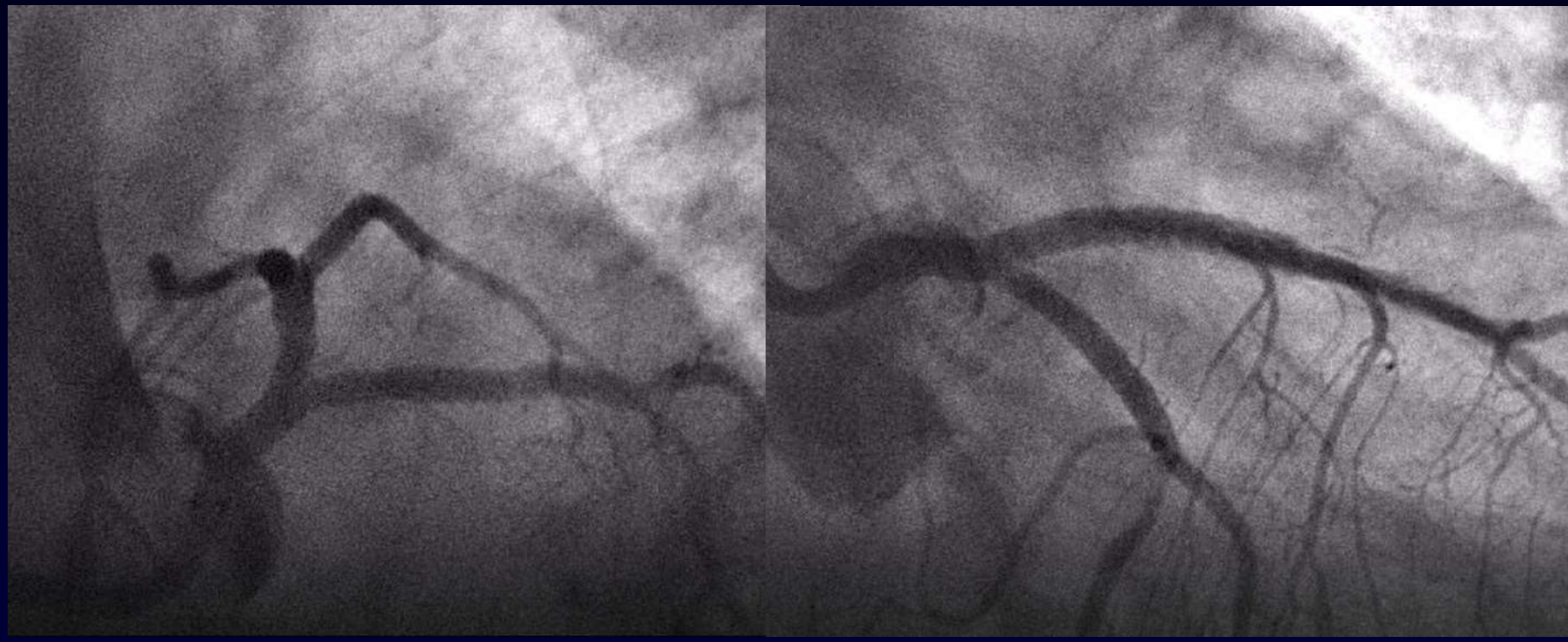
Validation with IVUS for final angiographic results in individual patient is mandatory.



Modified T stenting

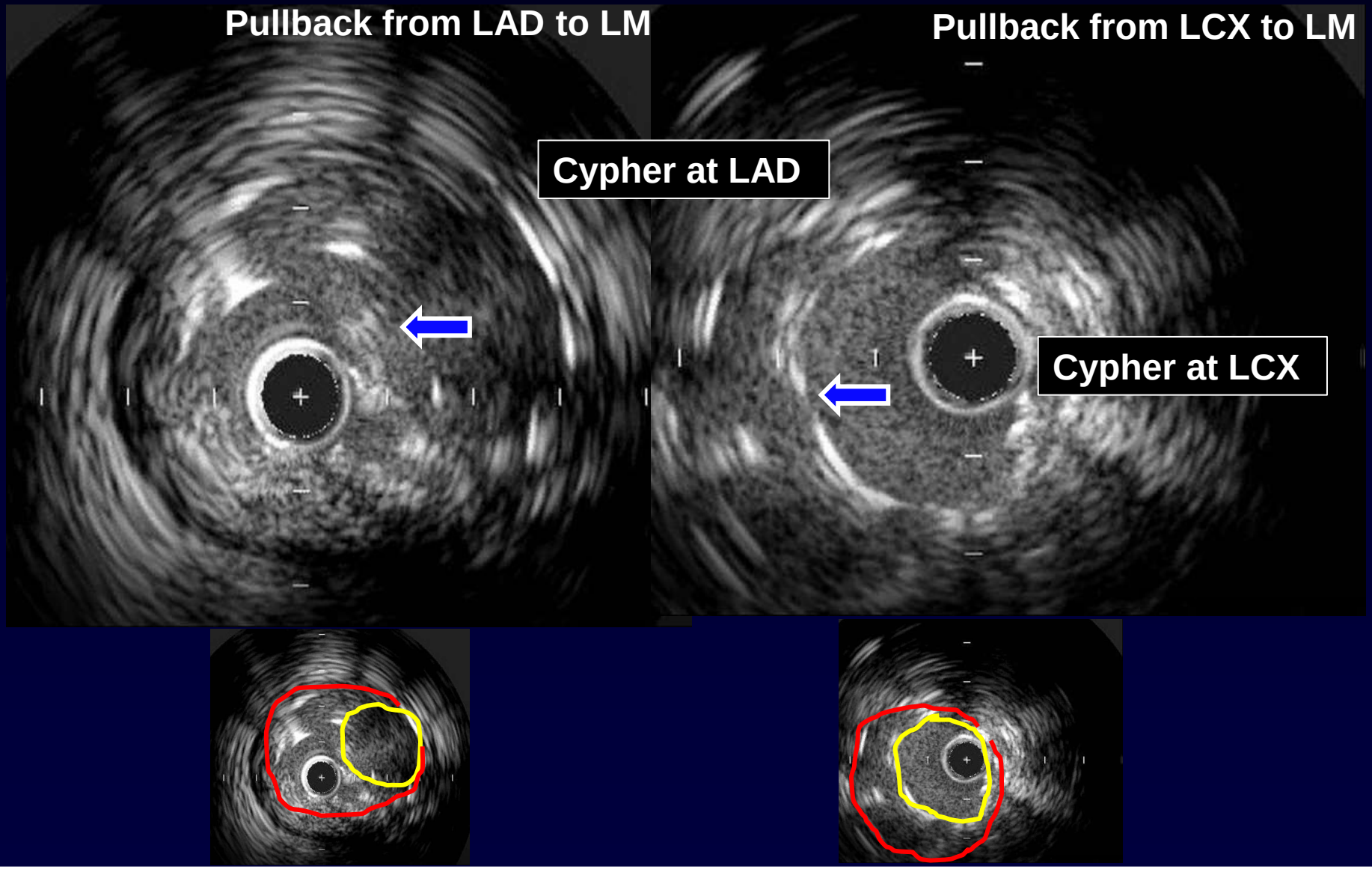


Final angiogram after kissing balloon

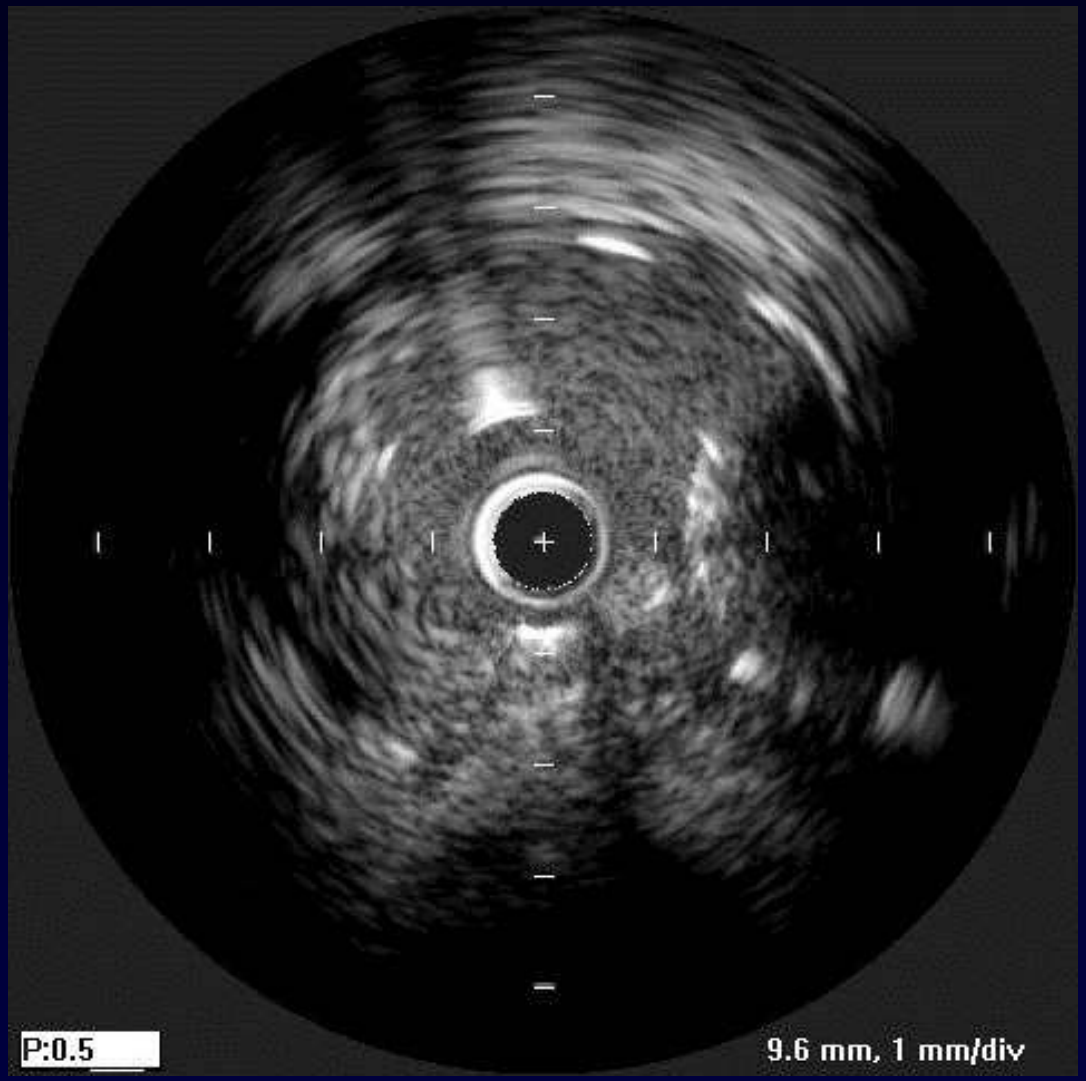


Successful angiographic appearance

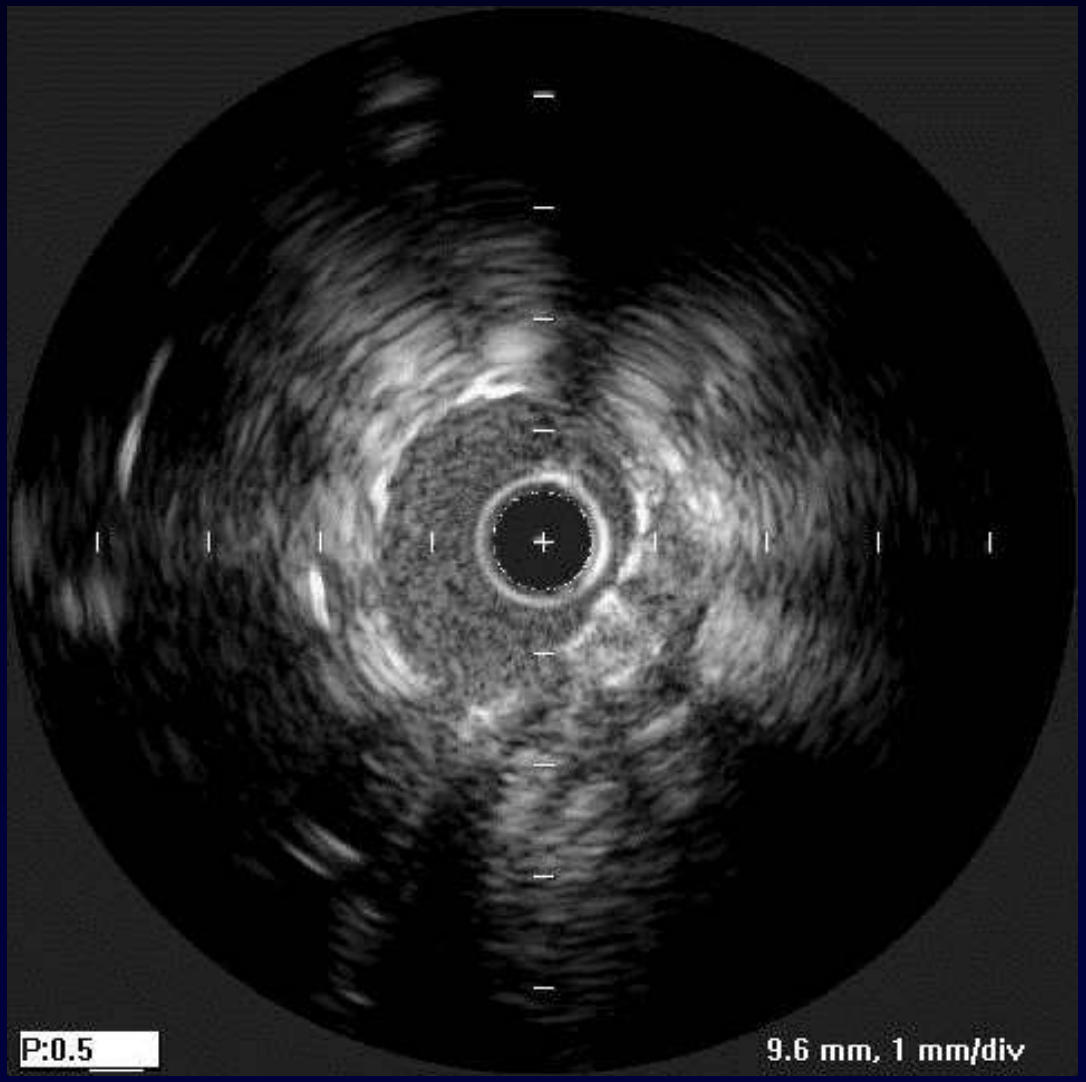
IVUS at LM: What are hidden and uncomfortable findings?



IVUS from LAD to LM



IVUS from LCX to LM



Crushing technique after kissing balloon

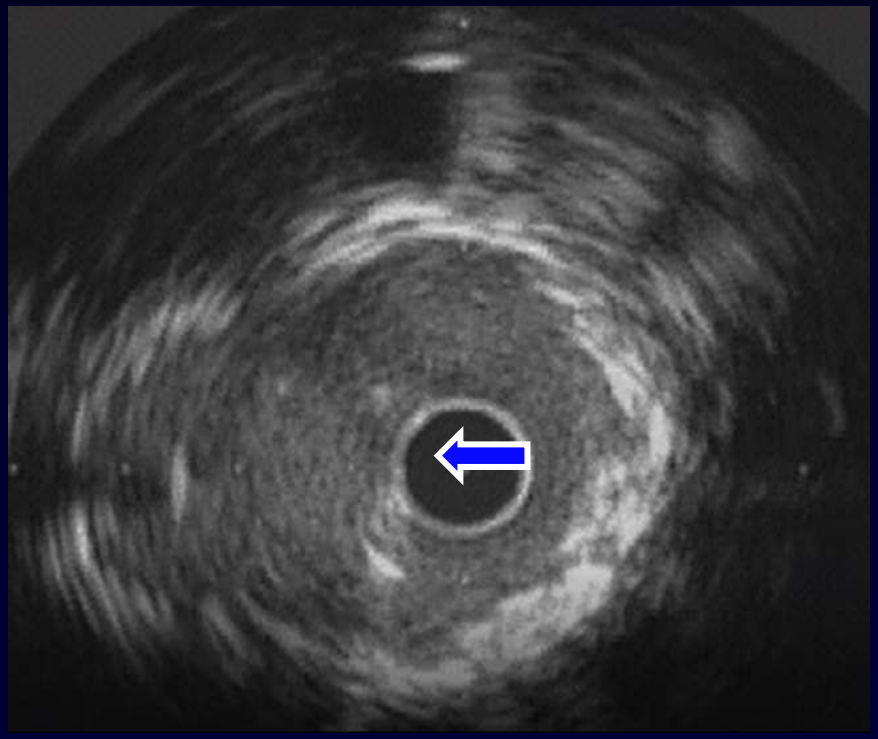
Pre-intervention

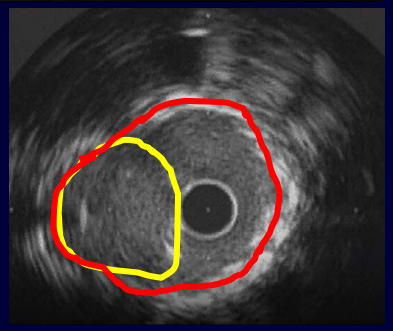
Post-intervention, Cypher

Successful angiographic appearance

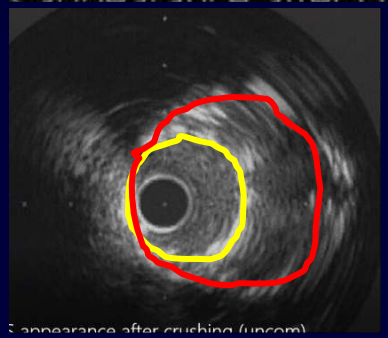
IVUS at LM: What are hidden and uncomfortable findings?

Pullback from LAD

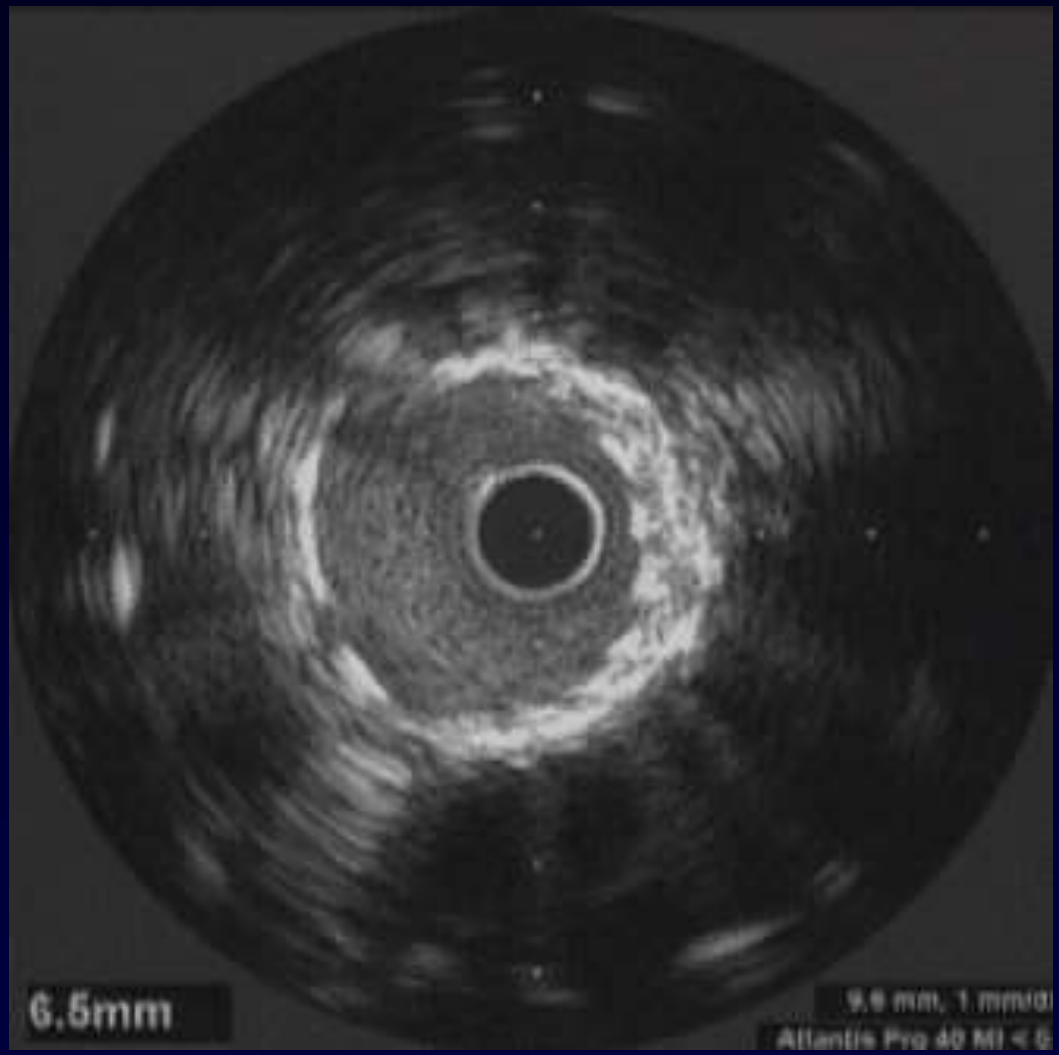




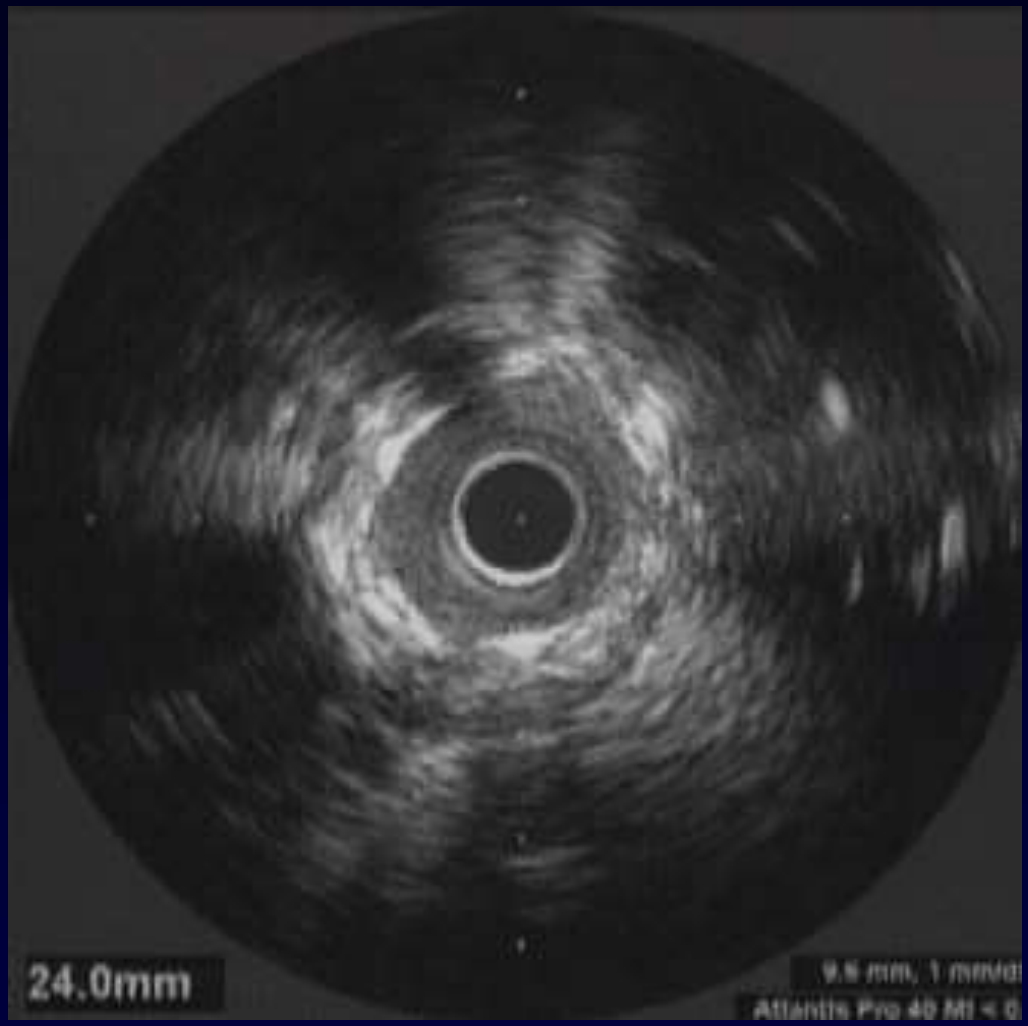
Pullback from Diag



IVUS from LAD



IVUS from Diag



Two stent techniques in true bifurcation lesions

Which technique is best?
Which technique do you prefer or believe?

What is the angiographic criteria or definition of optimal bifurcation stent implantation in Crushing, Culotte, T stent or TAP technique? POT?

Stenting techniques do not matter.

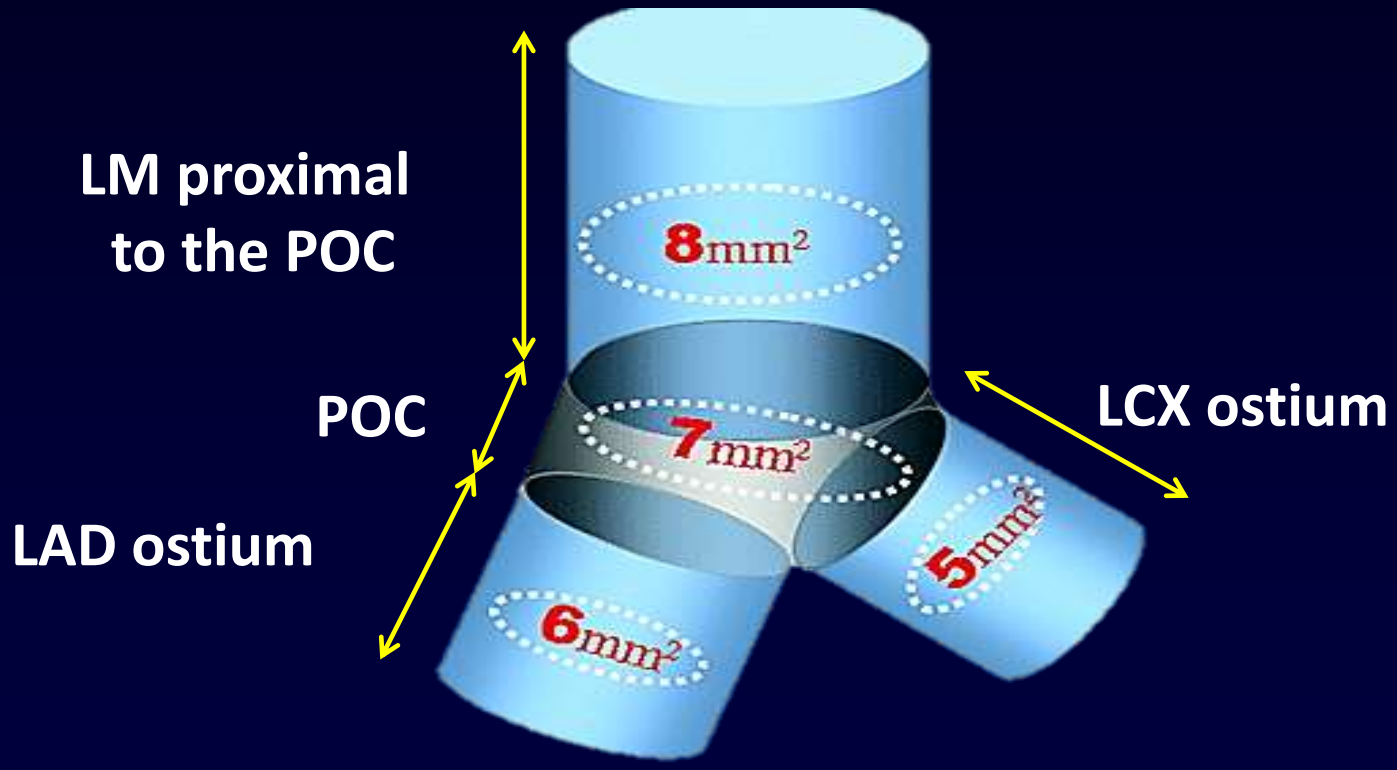
Regardless of stenting techniques,
imaging-based optimal vs. suboptimal results are essential.

Angiographic appearance can not discriminate between optimal vs. suboptimal results.

LM disease is a typical case of bifurcation lesions

IVUS optimization: Quantitative criteria

Post-stenting MLA cutoff values that best predicted ISR



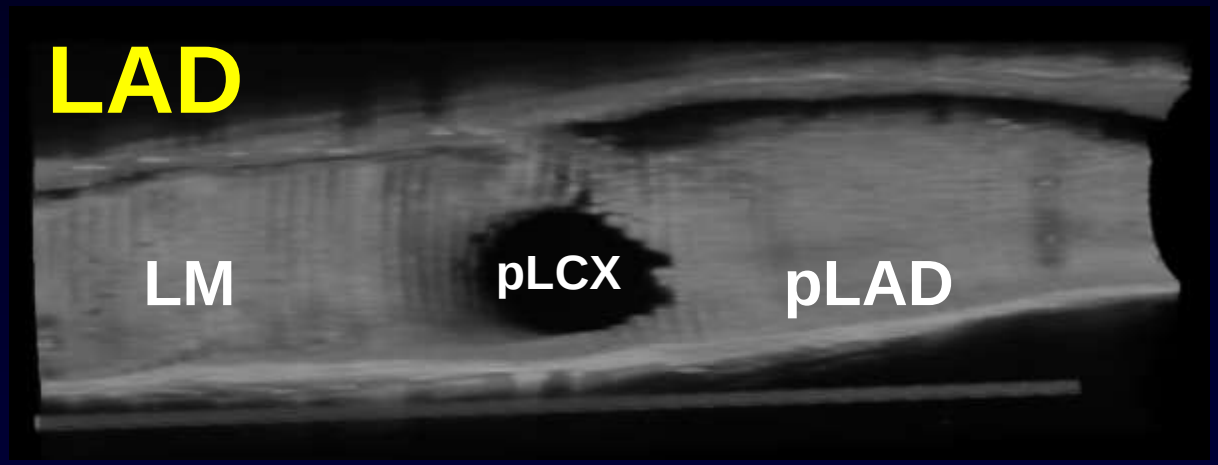
Kang SJ et al. *Circ Cardiovasc Interv*. 2011;4:562–569

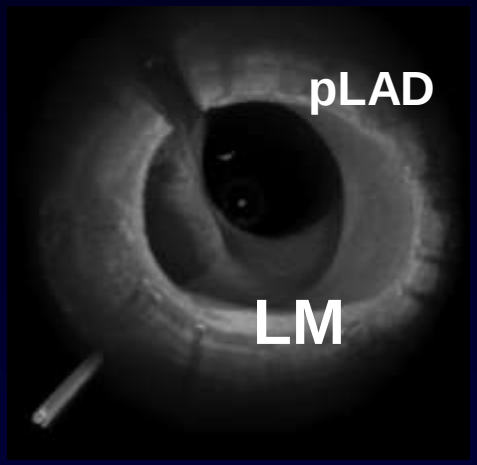
Imaging criteria for optimal bifurcation stenting in two stents technique: Qualitative criteria

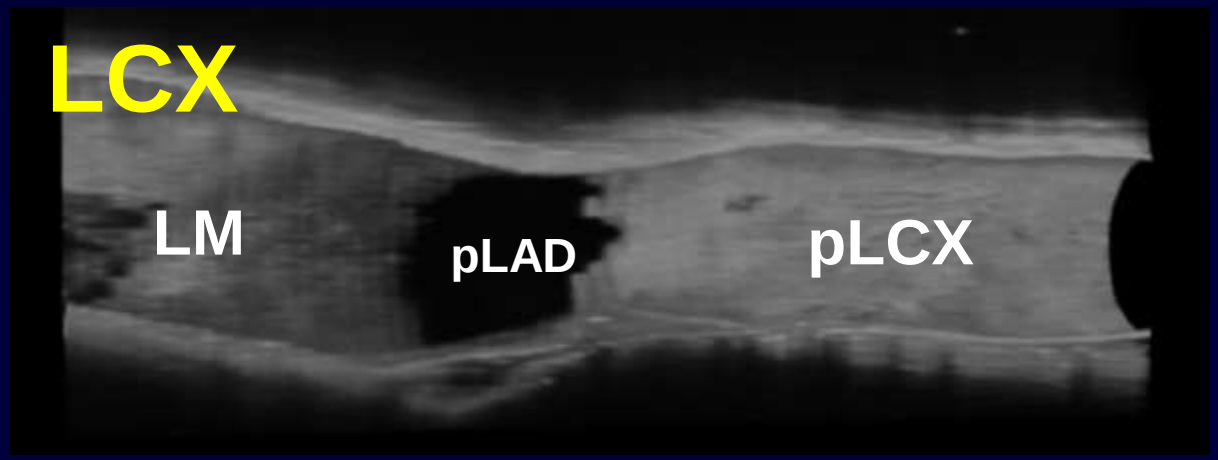
- Complete scaffolding and coverage of the side branch ostium with a DES strut
- Absence of significant influence on the coronary blood flow by extended stent struts in the main vessel (good stent strut apposition to main vessel wall)
- Little to no stent struts just above or near the side branch ostium

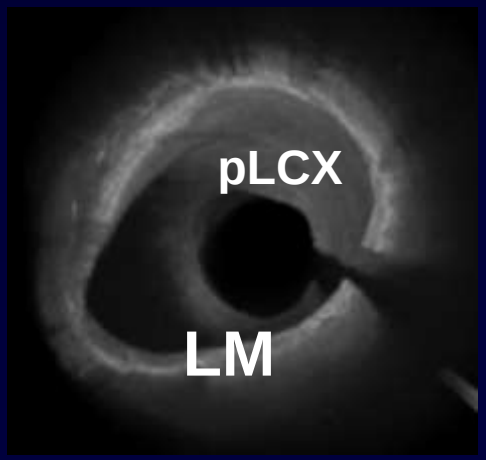
Hong MK, et al. *J Interven Cardiol* 2010;23:54-59

One-year FU after crushing stent technique: 3D-reconstruction (no strut protrusion in LM bifurcation)









How to make LM bifurcation PCI perfect?

1. Just do Imaging
2. To achieve optimal (both quantitative and qualitative) imaging criteria


Dreams will
come true