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How to Treat Bifurcations With IVUS Guidance ?

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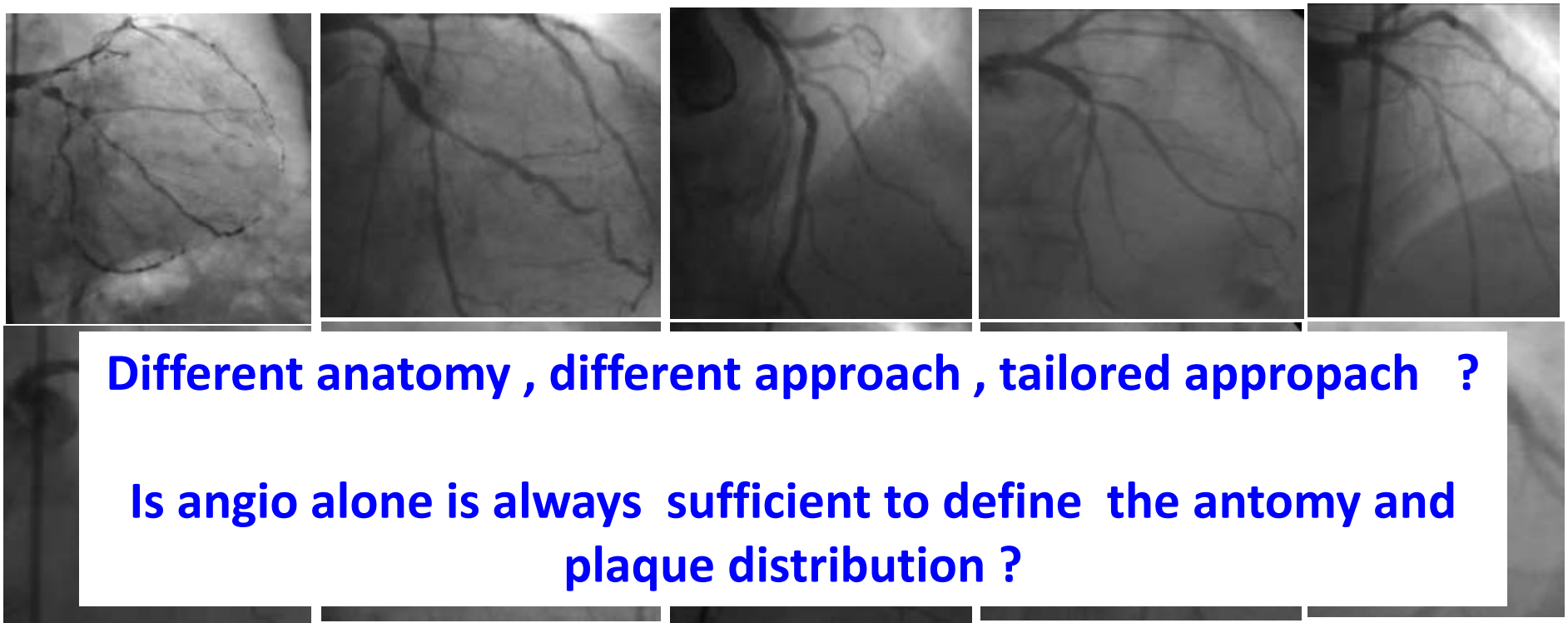
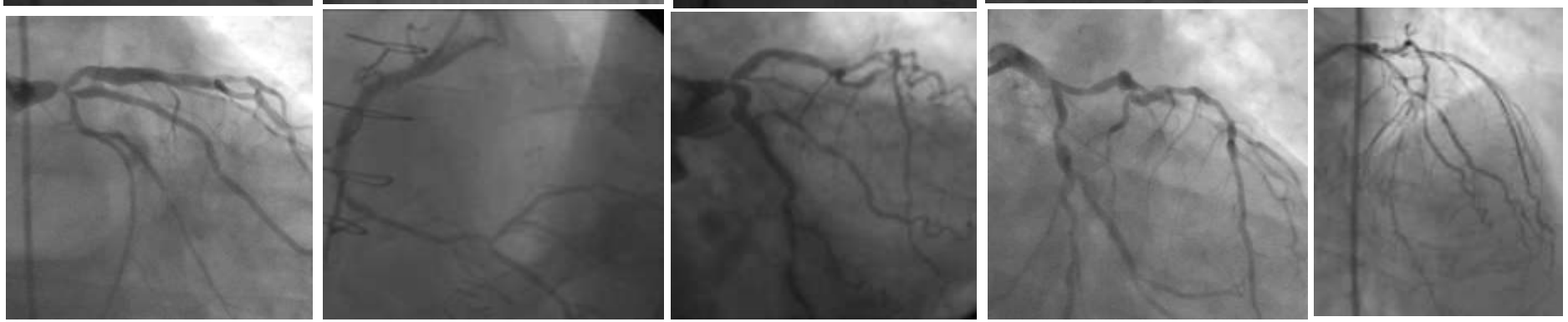
Bifurcations are not born equal …



Different anatomy , different approach , tailored appropach ?

Is angio alone is always sufficient to define the antomy and plaque distribution ?



Guidance in Bifurcation PCI: *Role of IVUS*

Pre-PCI assessment

Assess the severity of Bifurcation lesion
Select the appropriate strategy

Immediate Post-PCI assessment

Optimize technical results
Confirm adequacy of stenting results

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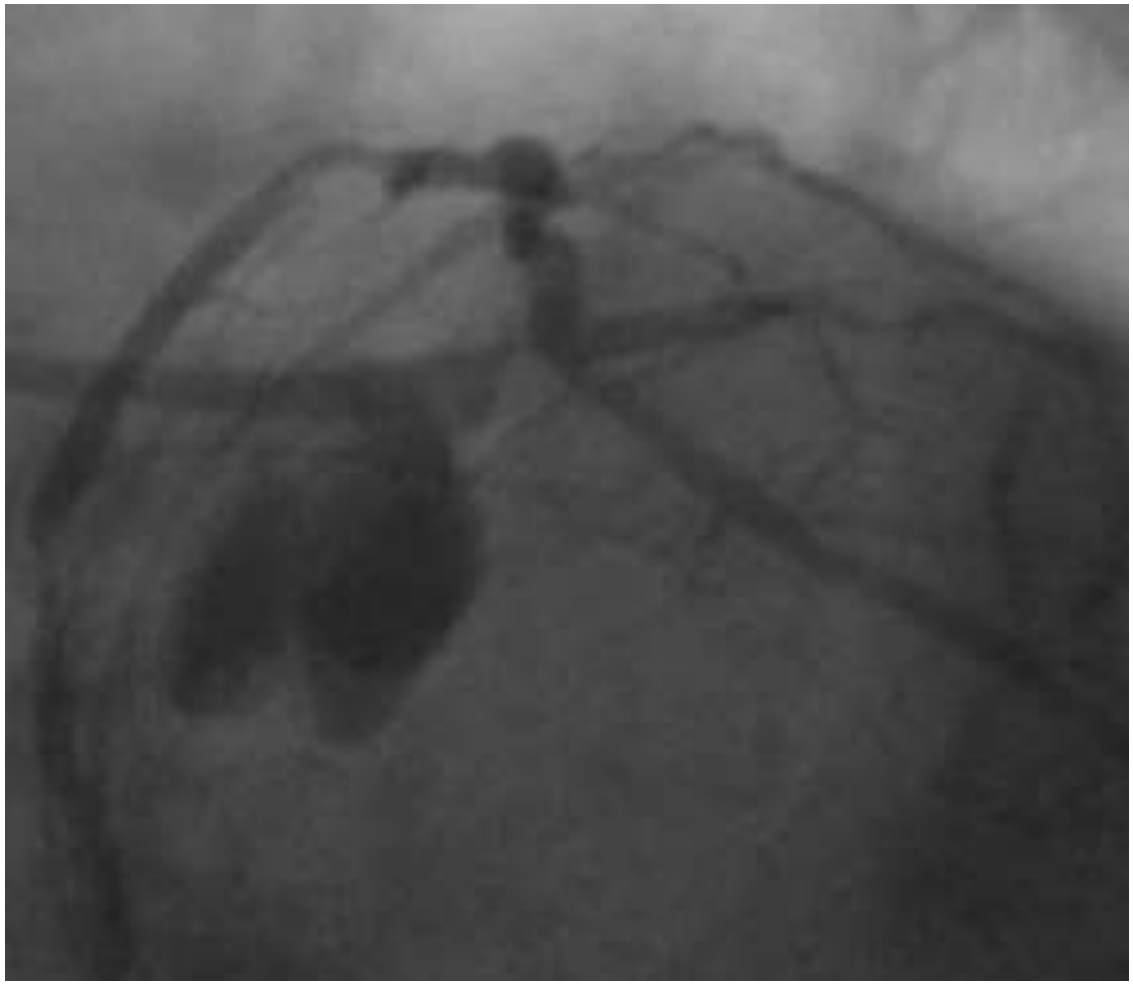
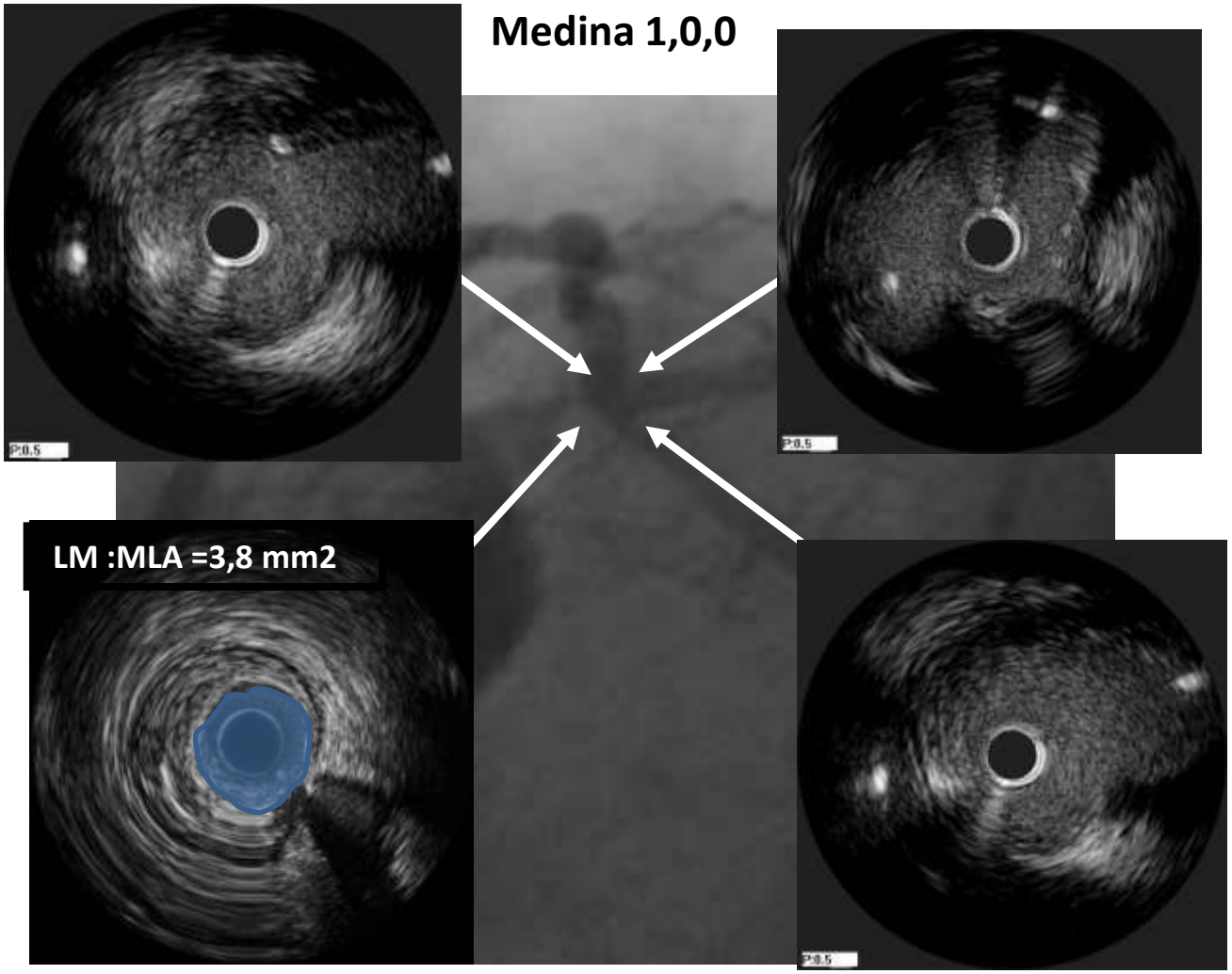
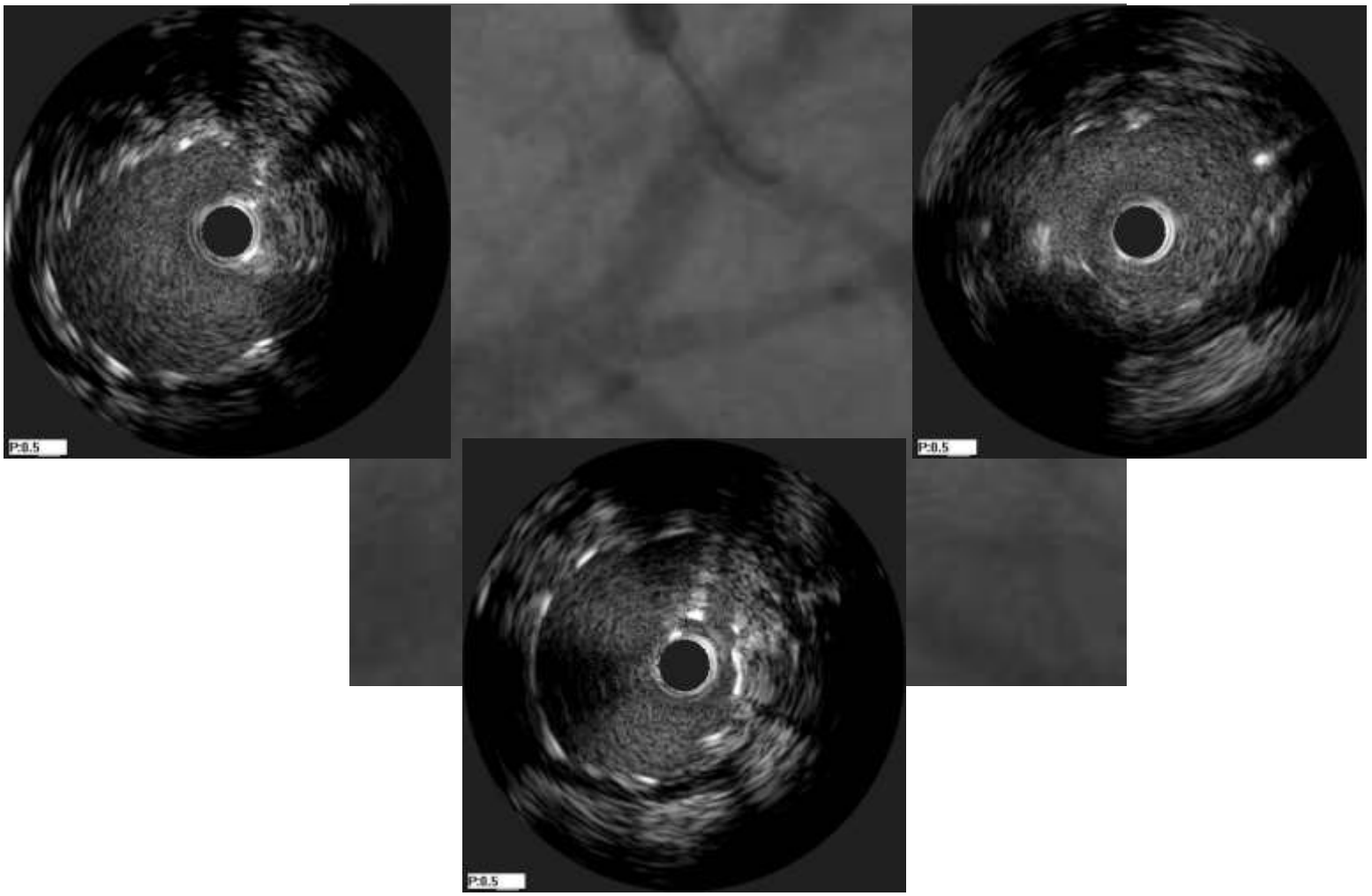
Distribution of the plaque at bifurcation is not always well defined by angio



Pre-procedure IVUS : defining the lesion

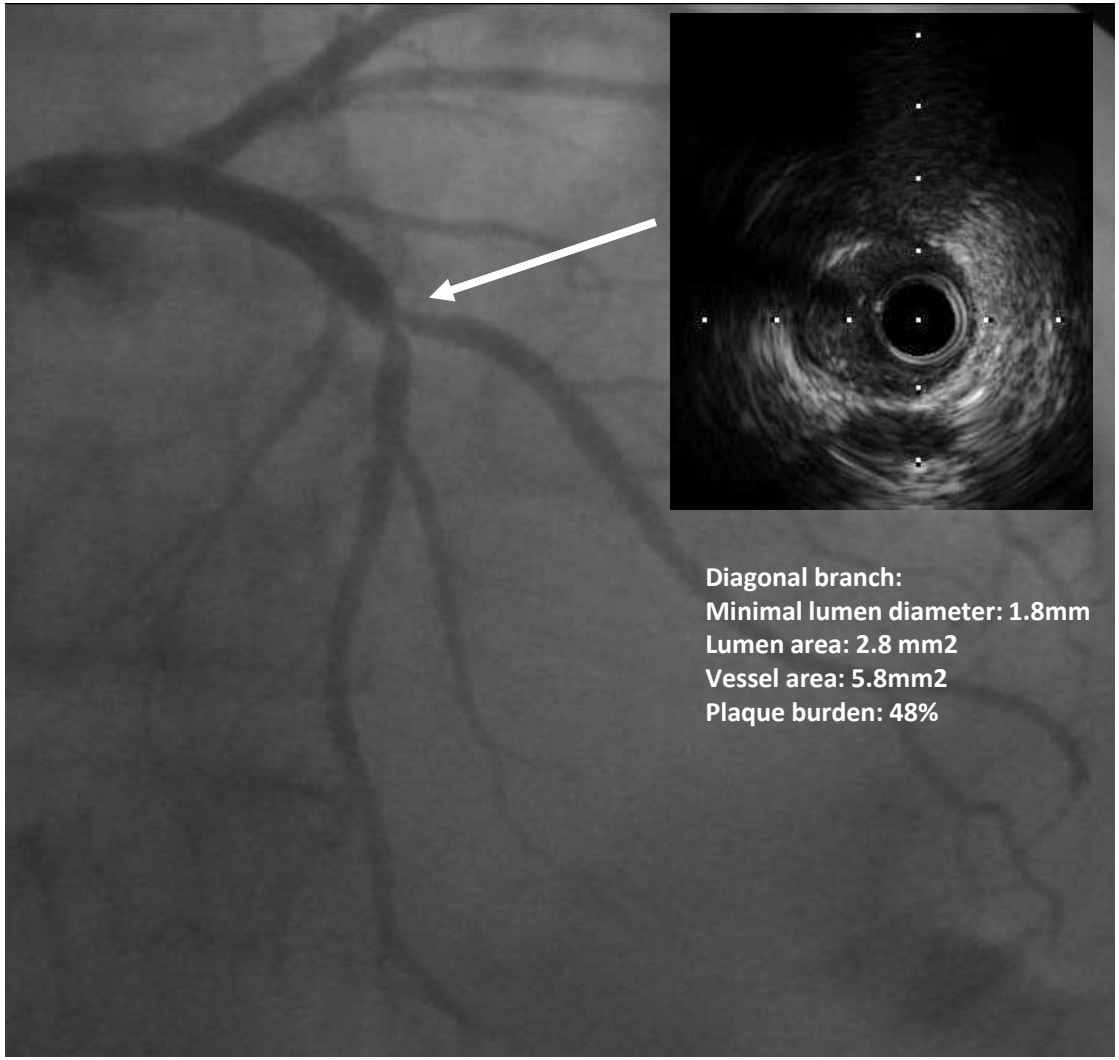


Strategy guided by IVUS : Single stenting

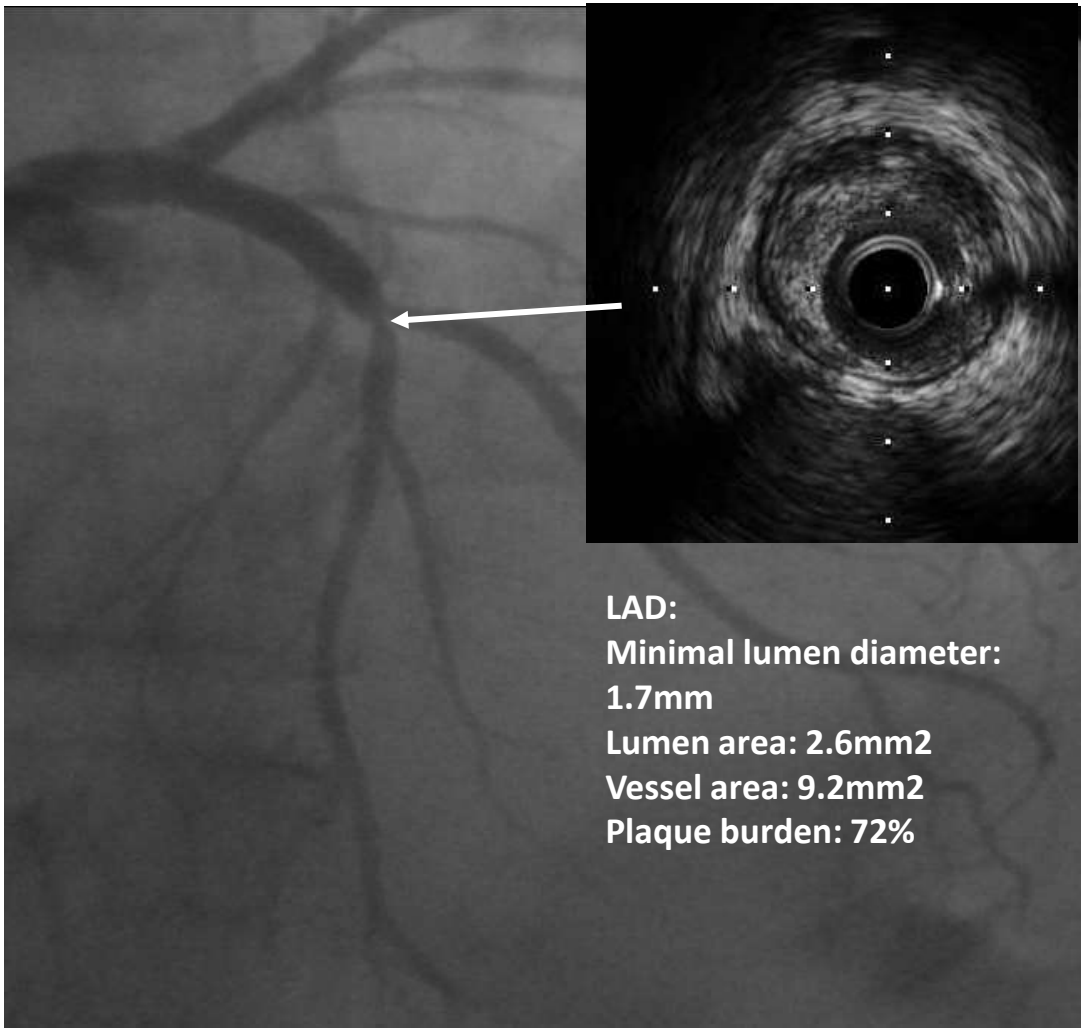


Is Preintervention IVUS is needed in this case ?

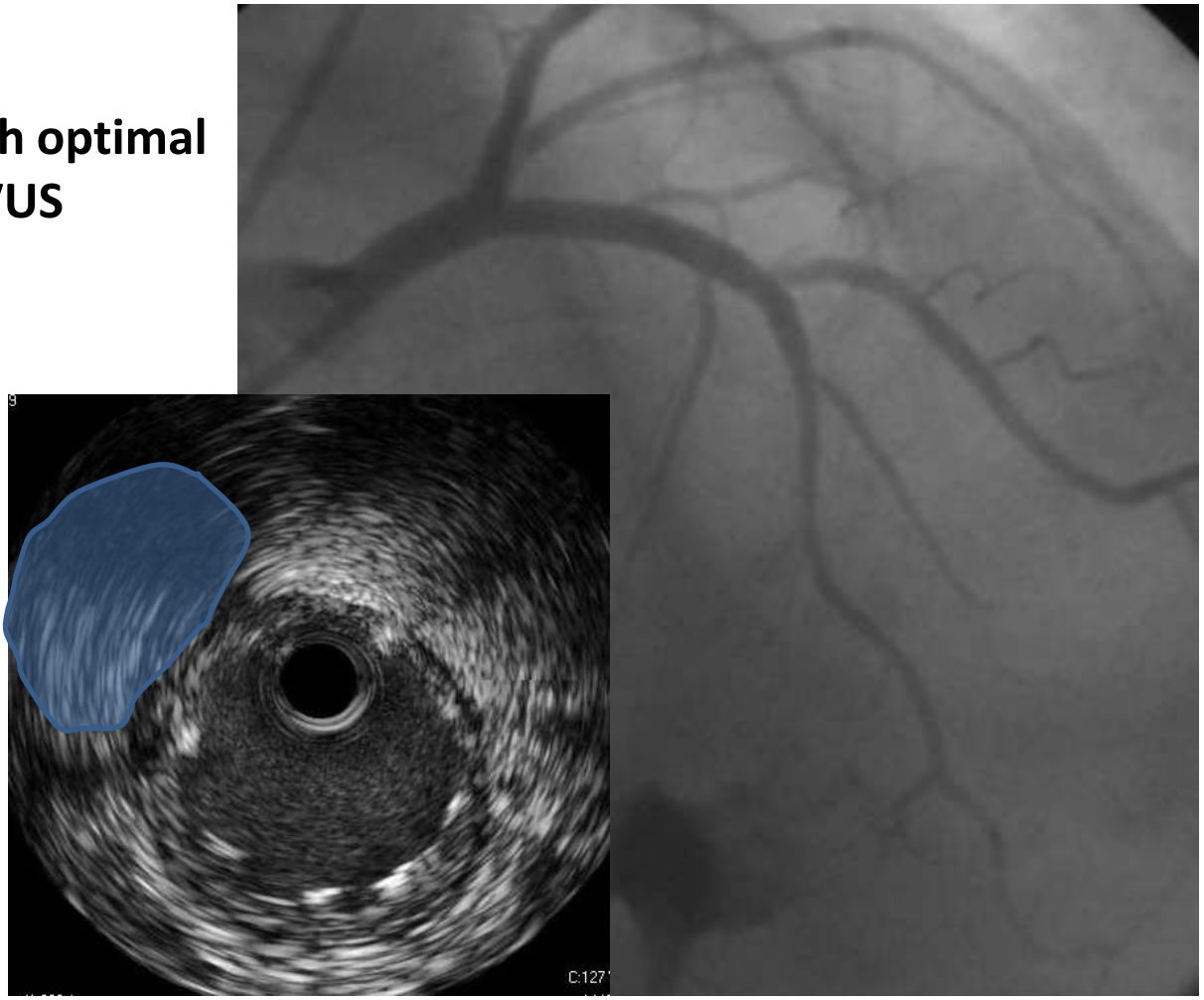
Precise anatomical assessment: Define by IVUS for a more appropriate Strategy



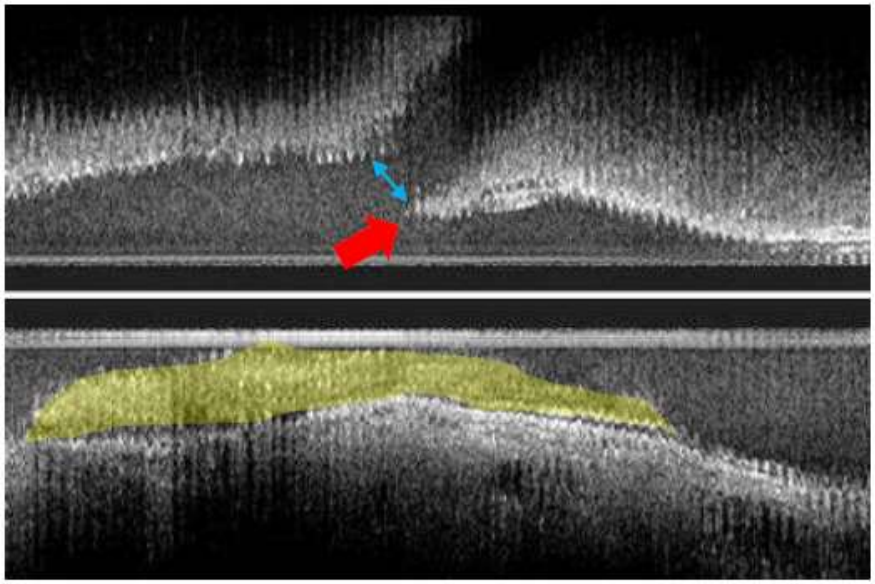
Precise anatomical assessment: Define by IVUS for a more appropriate Strategy

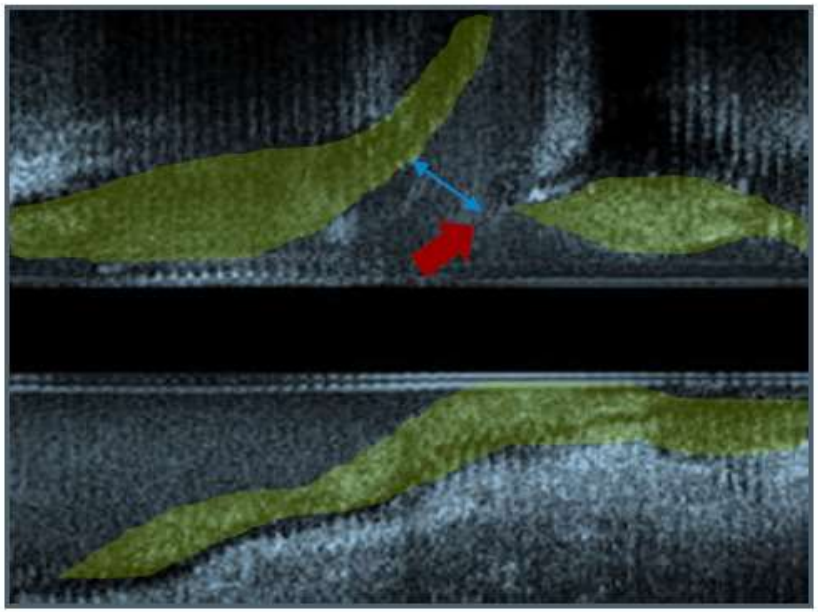


Single stenting with optimal result guided by IVUS



Other important informations :

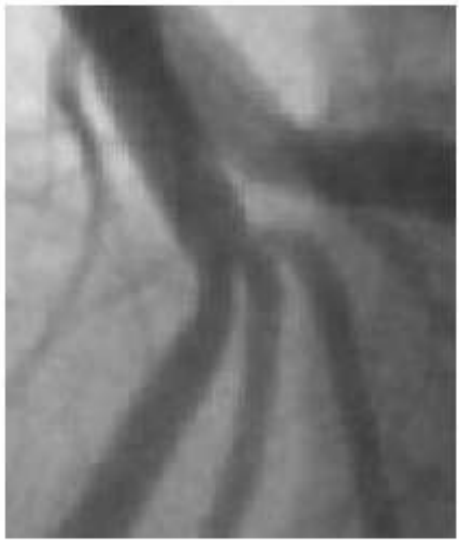


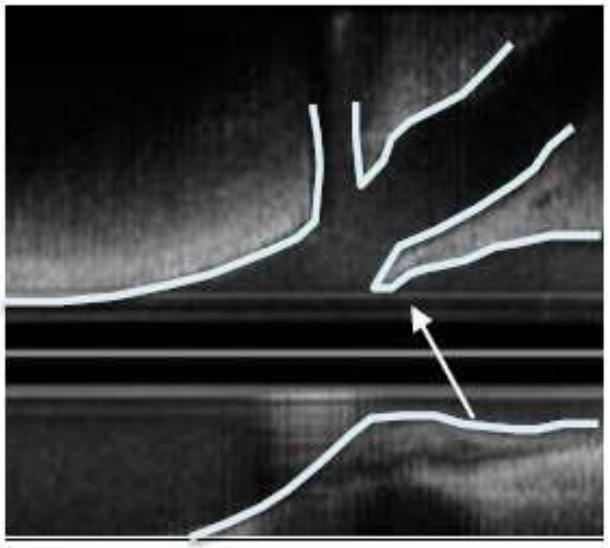


Plaque amount and distribution
Geometry of bifurcation lesion
Distance Between the carina and outer lumen of SB

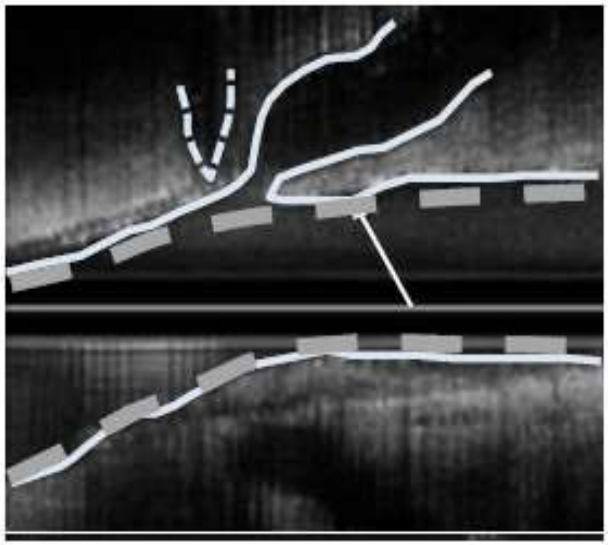
Courtesy of Bon-Kwon Koo

Mechanism of carinal Shift





Longitudinal vessel imaging with IVUS can predict carinal shifting and helps in predicting SB compromise after stenting of the main vessel



Courtesy of Bon-Kwon Koo

IVUS can tell you what happened with SB after stenting

Carina Shift or plaque shift ?

To decide what to do with SB use IVUS !

Different mechanism different strategy

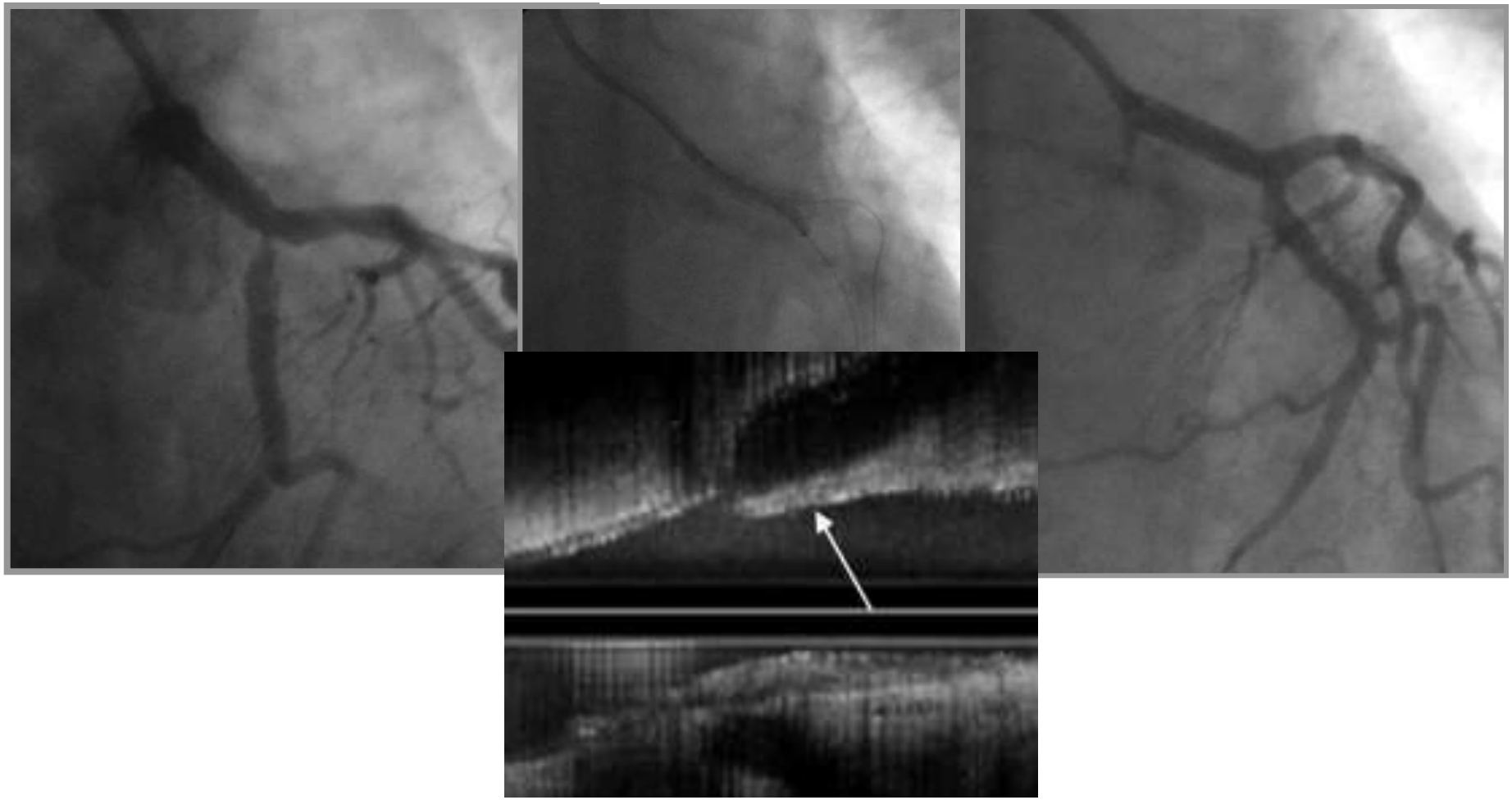
Plaque shifting

- **1:1 HP balloon , high pressure inflation ,**
- **Kissing Balloon**
- **More injury , more dissection**
- **More probability of SB stenting**

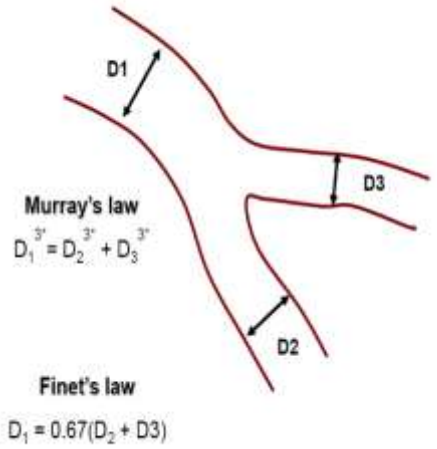
Carina Shifting

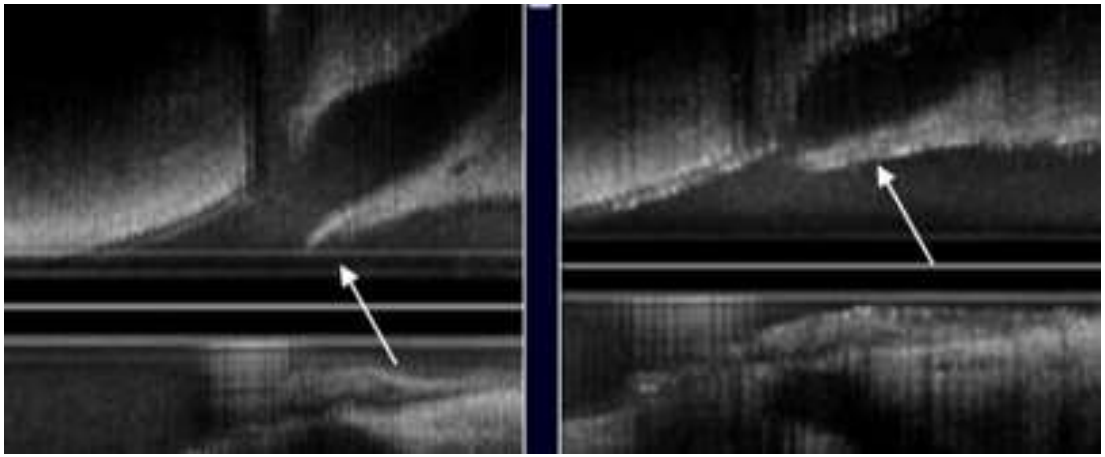
- **Small balloon , low pressure inflation**
- **Less injury ,**
- **Less probability of SB stenting**
- **Less MV stent deformation**
- **Less need for kissing balloon**

Carina Shift treated with small size balloon inflation

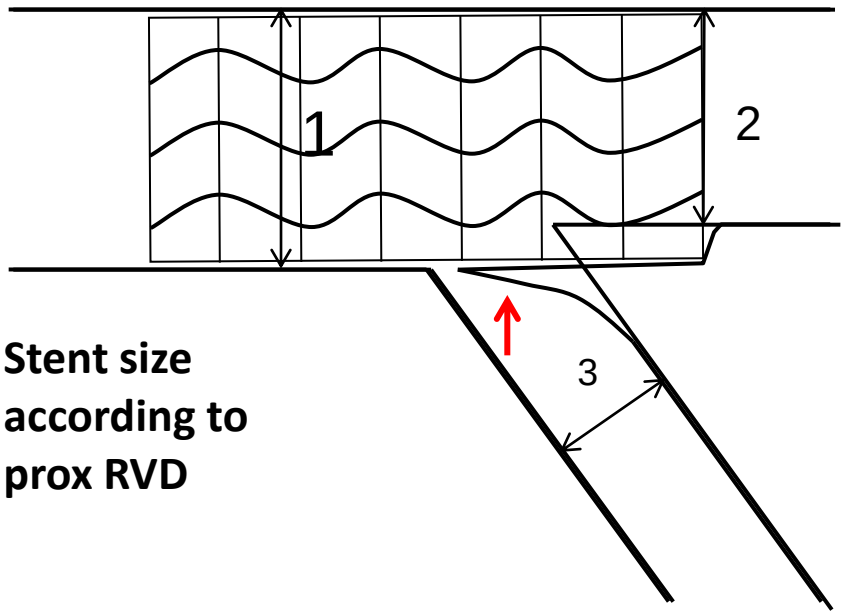


IVUS and stent sizing in bifurcation lesions

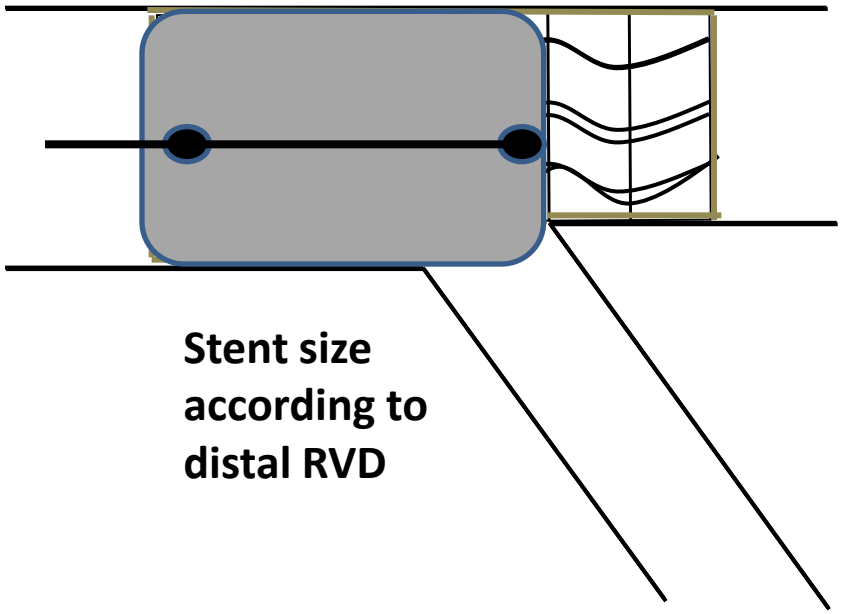




POT



Stent size according to prox RVD



Stent size according to distal RVD

Guidance in Bifurcation PCI: *Role of IVUS*

Pre-PCI assessment

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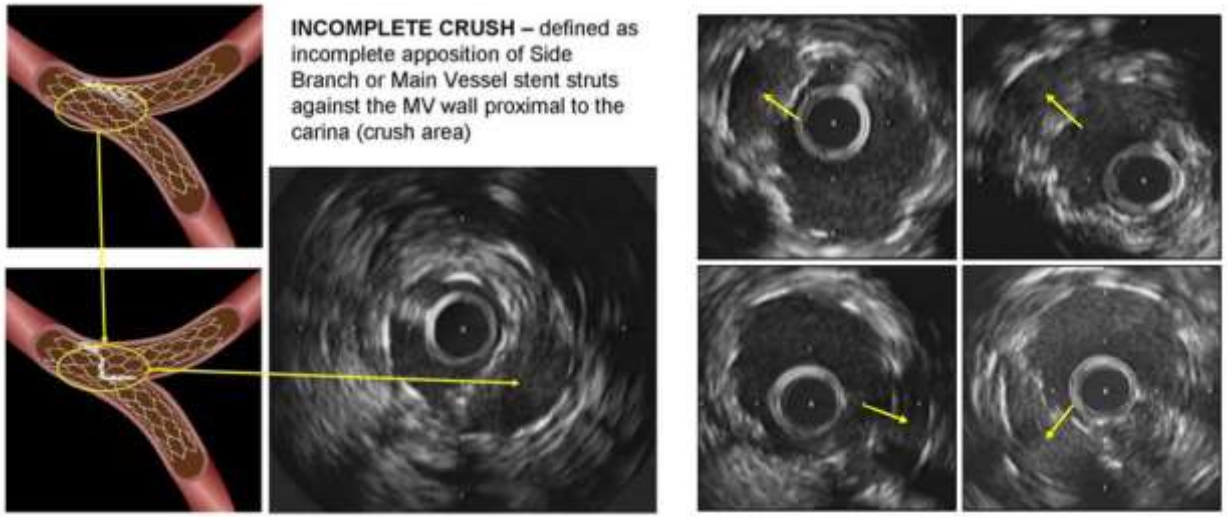
Select the appropriate strategy

Immediate Post-PCI assessment

Optimize technical results

Confirm adequacy of stenting results

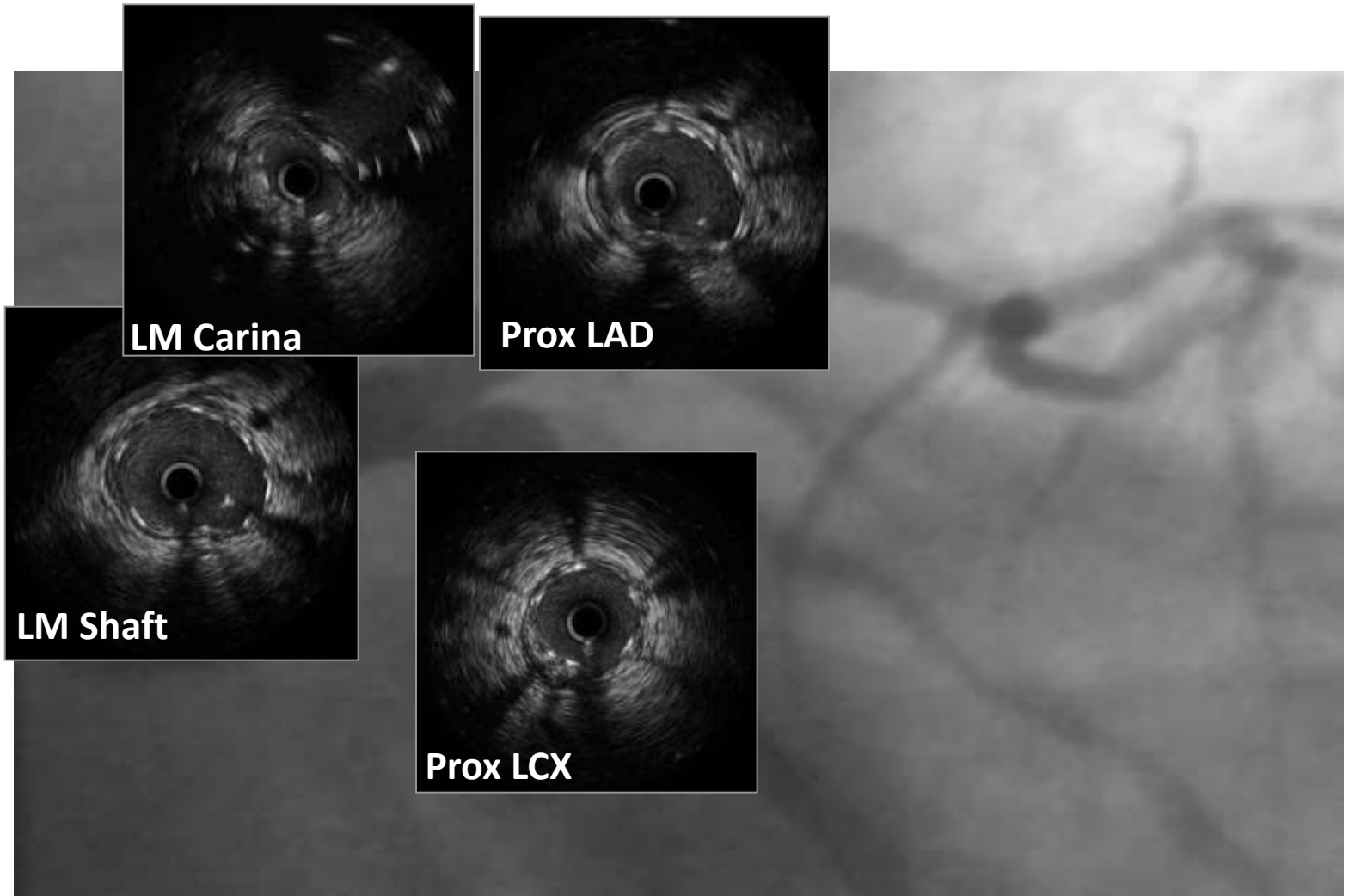
Commplex Stenting should be always optimised .
Keep it simple when ever is possible



Costa et al , JACC 2005;4:599-605 : Cruch Stenting in Bifurcation Leions

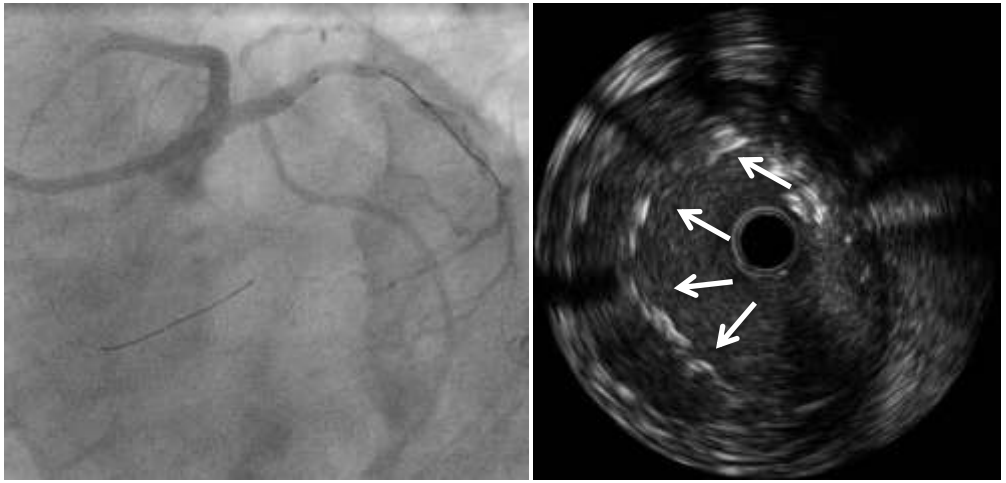
Courtesy of Dr. Murasato

IVUS Guidance is recommended (by guidlines) in complex stenting optimization in complex bifurcation (particularly in Distal LM)

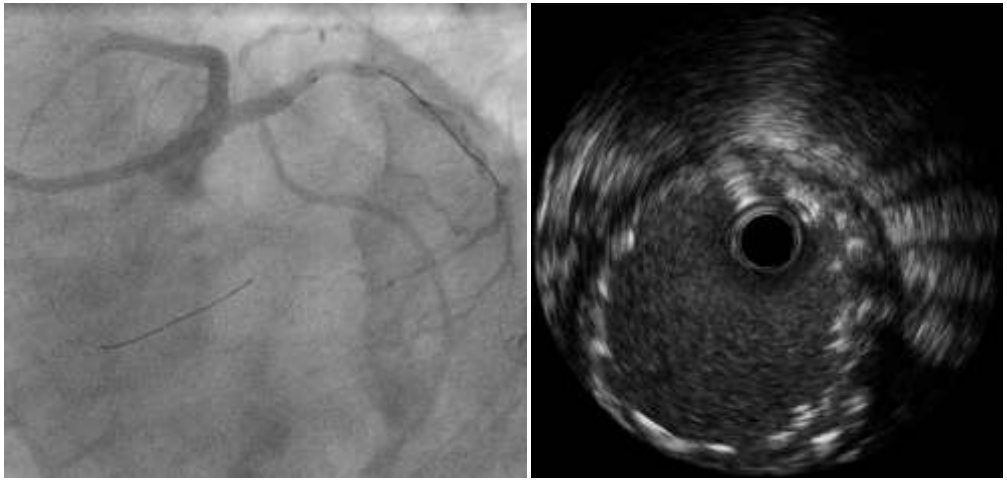


Stent underexpansion and malaposition : angio is not enough

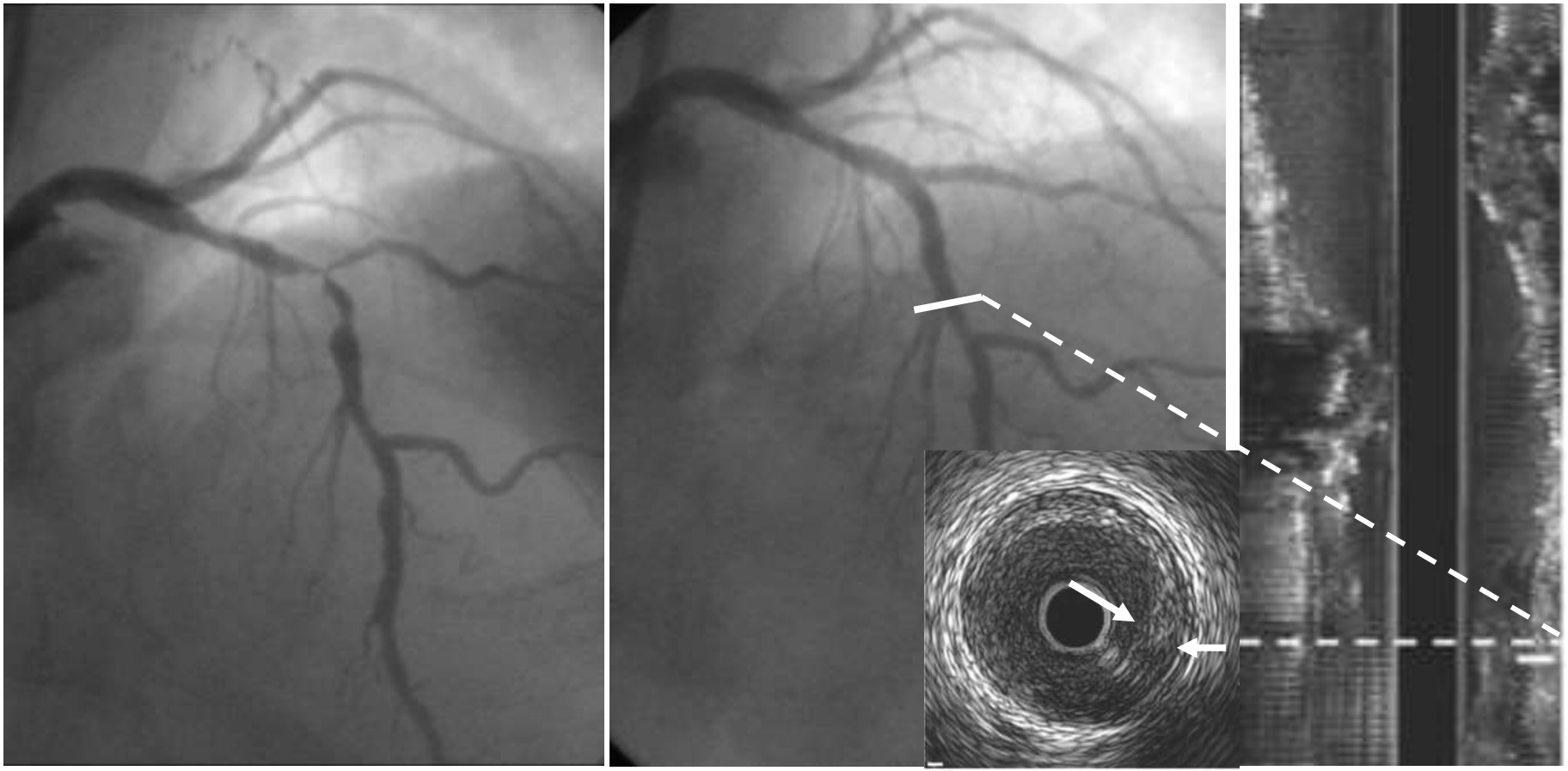
Angio following LM to LAD stenting at HP and FKB



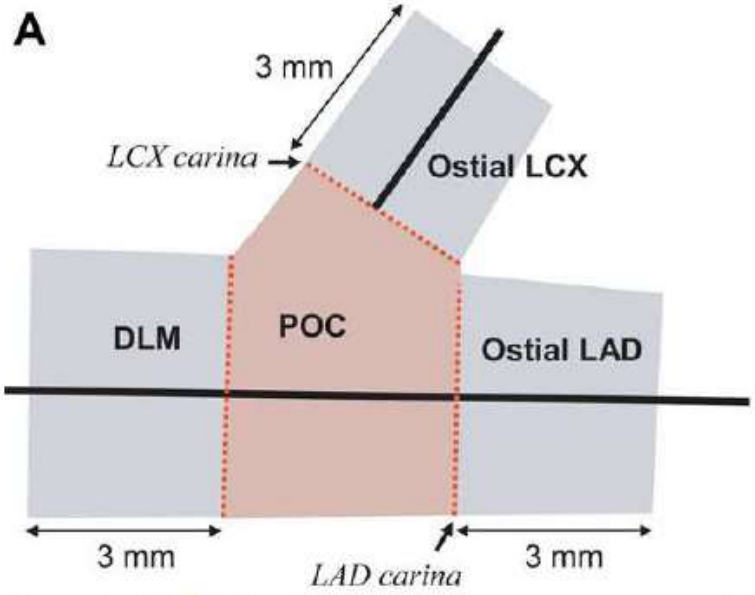
Angio following post-dilatation in LM with larger balloon (POT)

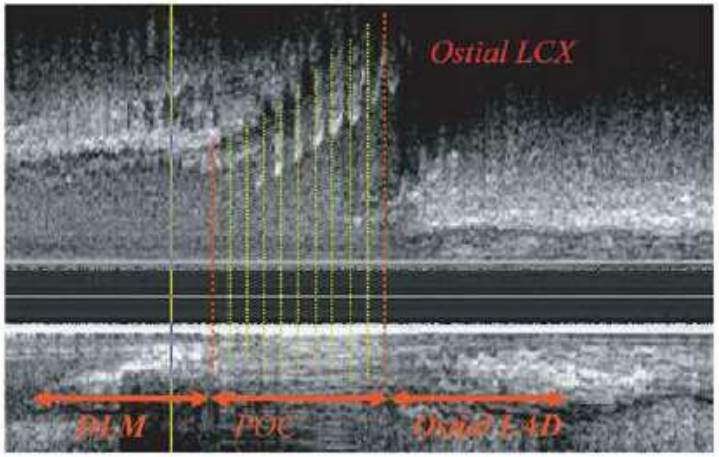


IVUS Assessment post-stenting dissections



IVUS Assessment of Distal LM Bifurcation





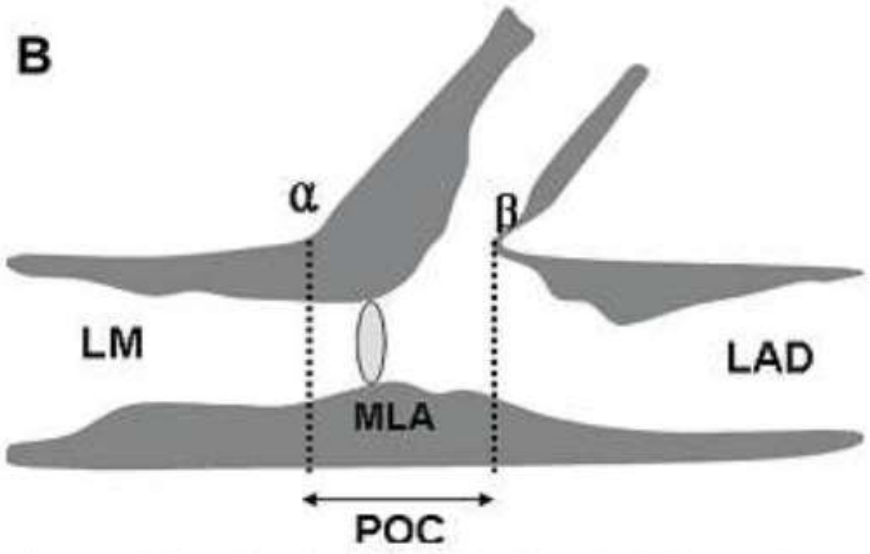
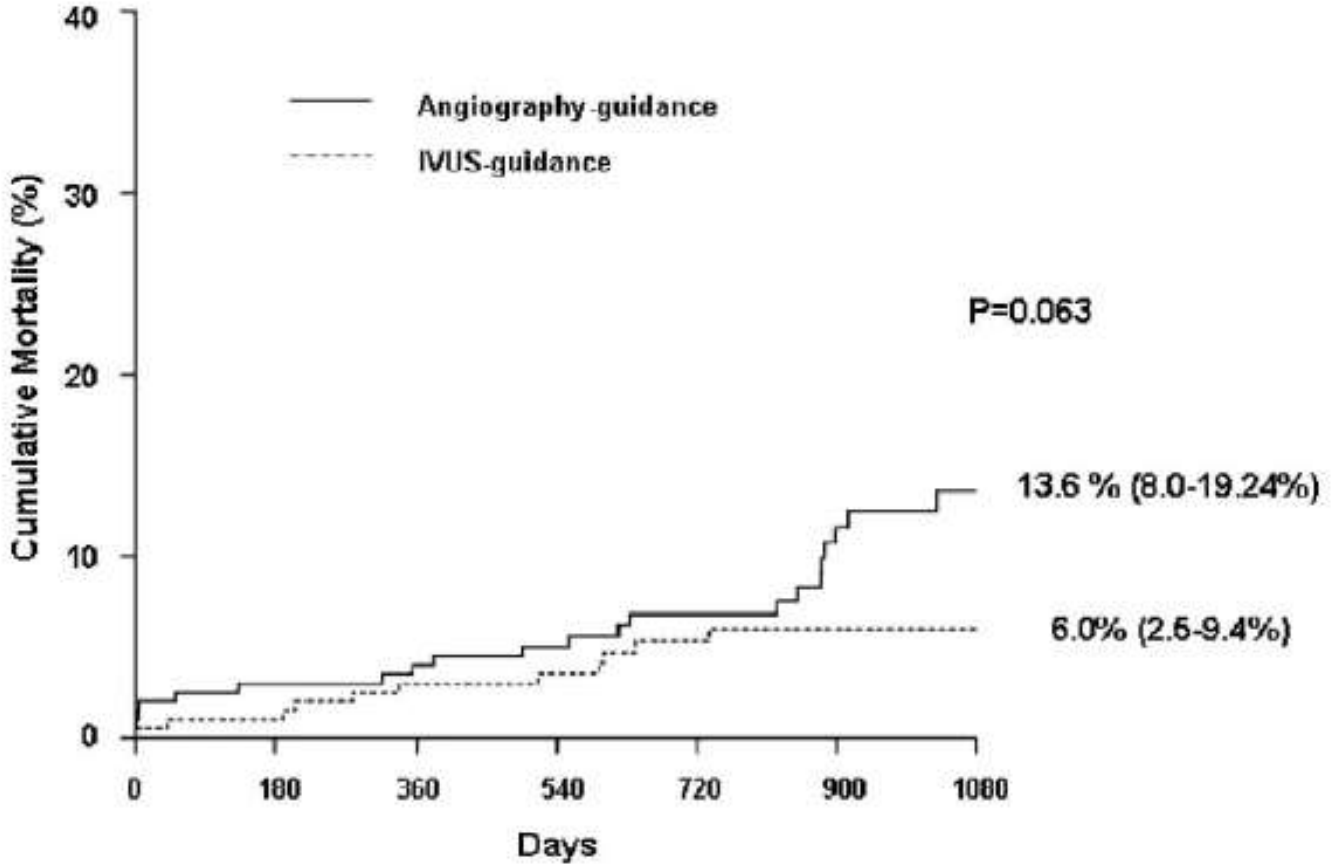


Fig. 1. (a) Four segments of LM bifurcation: ostial LAD (the 3-mm segment distal to the carina); POC (confluence zone of LAD and LCX on longitudinal IVUS image); proximal part of distal LM (DLM) (3-mm segment just proximal to the POC)—all assessed by LAD pullback; and ostial LCX (the 3-mm segment distal to the carina)—assessed by LCX pullback. (b) The POC begins at the LAD carina (β) and ends at the contacting point of two EEM borders of LCX and LM (α). MLA was defined as the narrowest lumen area within the POC segment.

Kang et al, *Catheter Cardiovas Interv* 2013;82:737–745

CAN IVUS REDUCE DEATH AND STENT THROMBOSIS



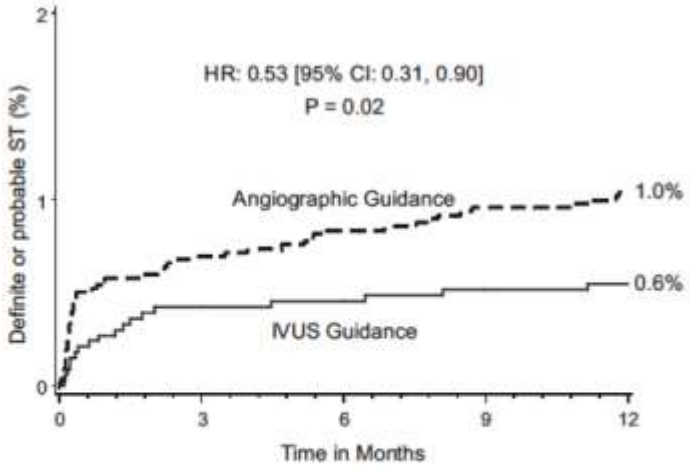
Patients at risk				
IVUS-guidance	201	194	143	88
Angiography-guidance	201	191	138	64

Other Data Supporting IVUS Guidance

The ADAPT-DES study

- **Prospective, multicenter, nonrandomized "all-comers" study of 8583 consecutive patients at 11 international centers**
- **Designed to determine the frequency, timing, and correlates of stent thrombosis and adverse clinical events after DES**
- **Largest study of IVUS use to date**

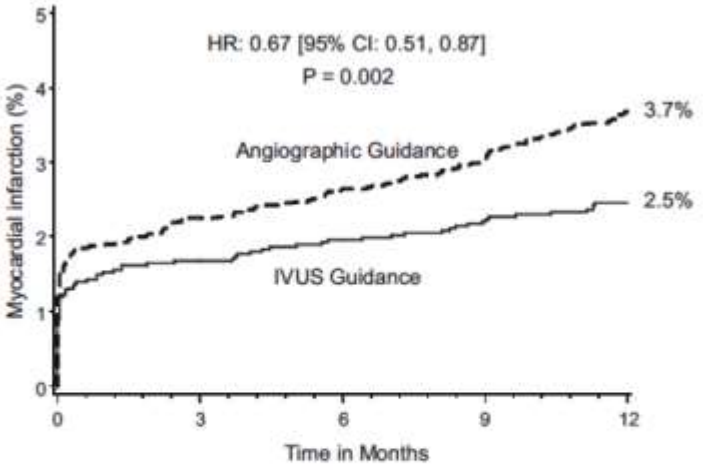
Stent thrombosis



Number at risk:

IVUS Guidance	3349	3250	3220	3196	3022
Angiographic Guidance	5234	5015	4978	4938	4585

Myocardial Infarction



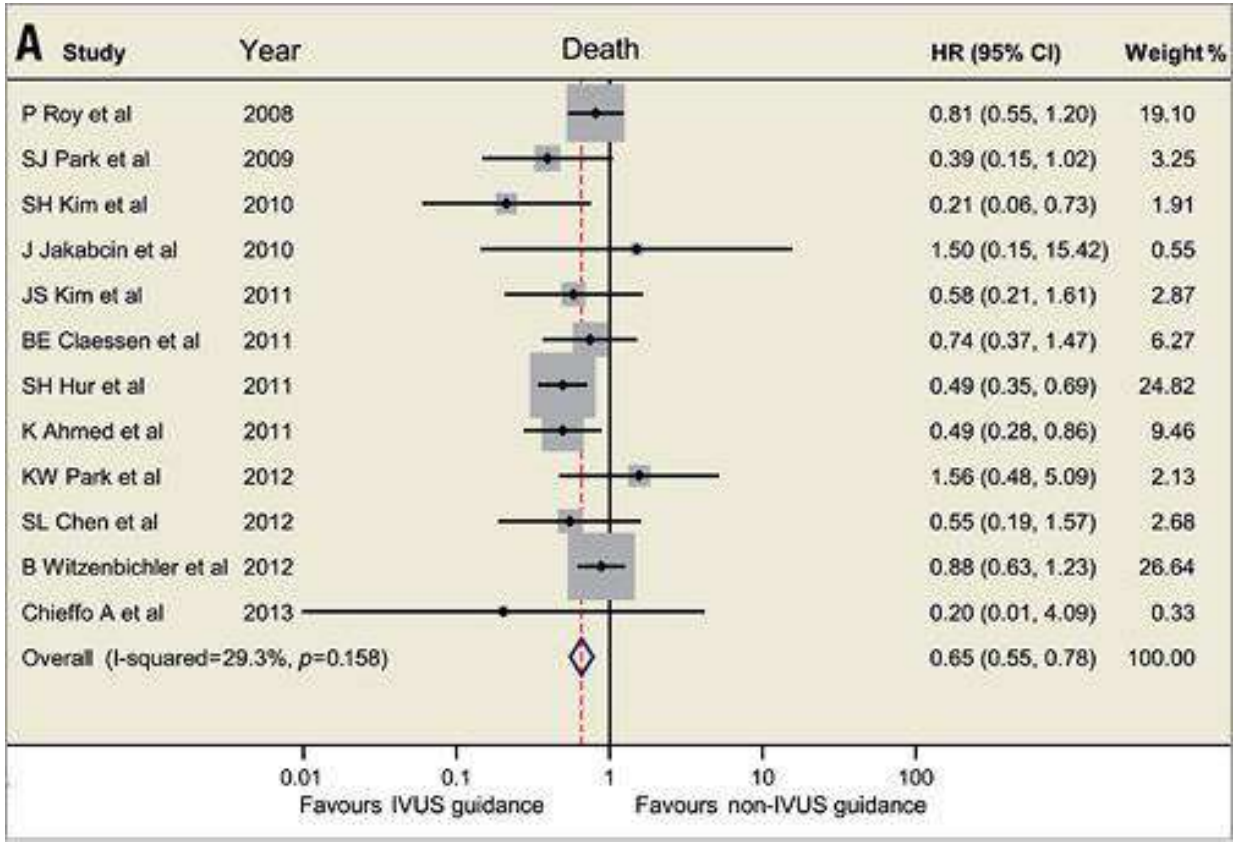
Number at risk:

IVUS Guidance	3349	3209	3171	3141	2969
Angiographic Guidance	5234	4932	4882	4830	4460

Witzenbichler B et al. Circulation. 2014;129:463-470.)

Meta-analysis : IVUS vs angiography guidance

(DES , n=19,619)



Zhang et al EuroIntervention 2013

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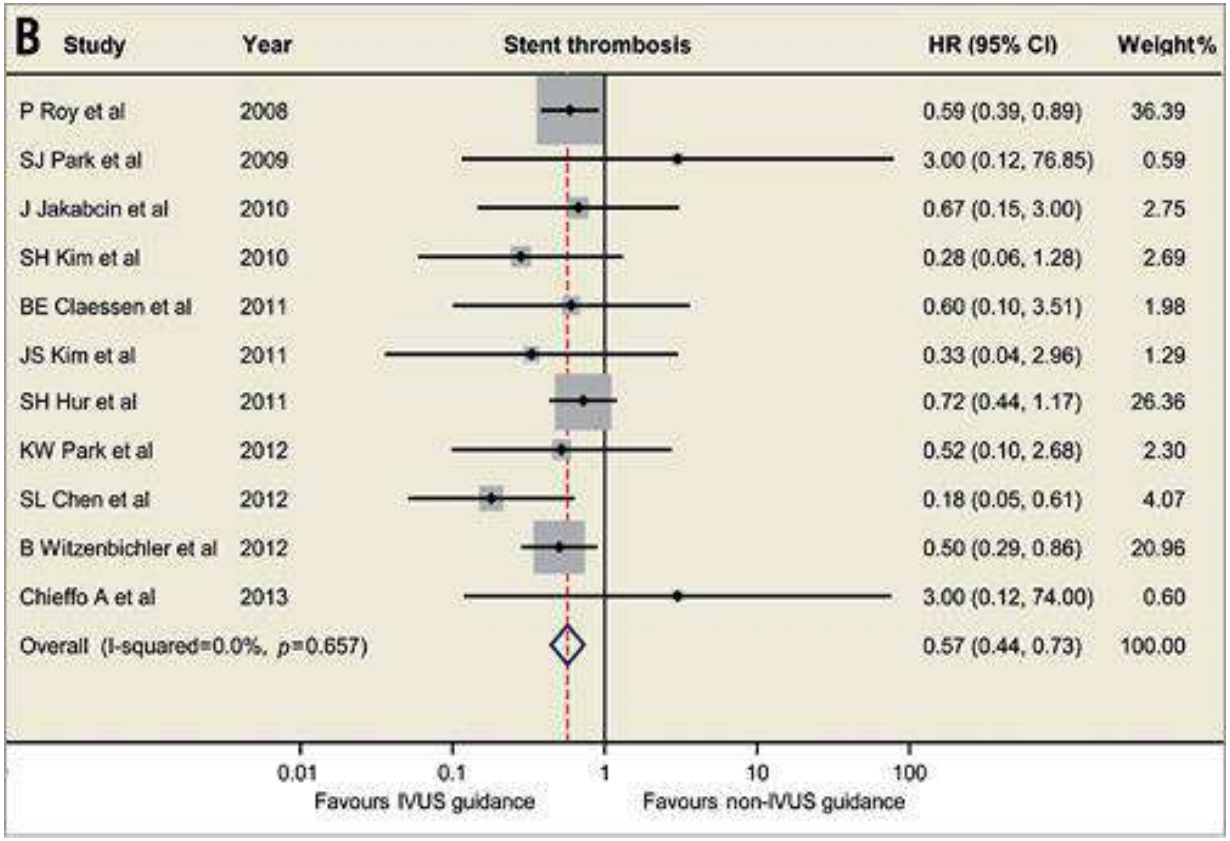

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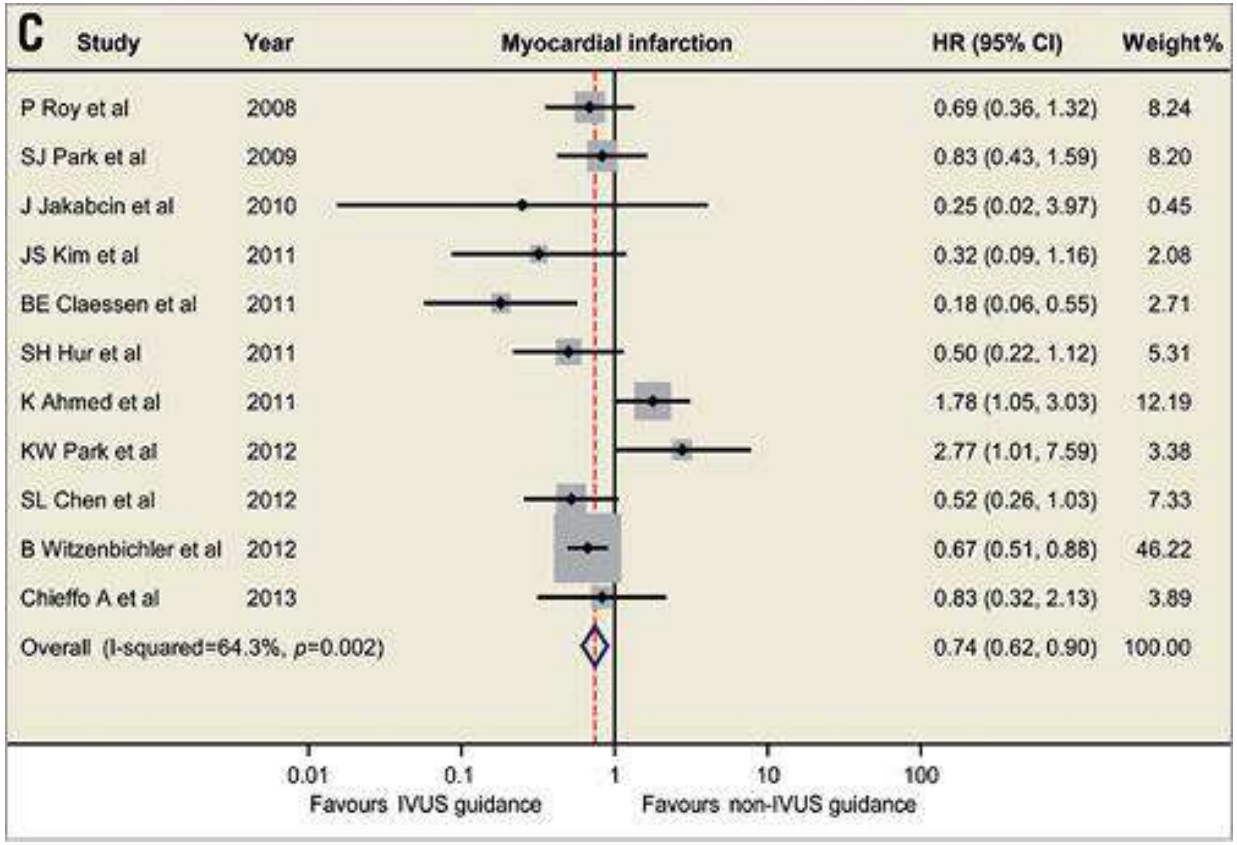
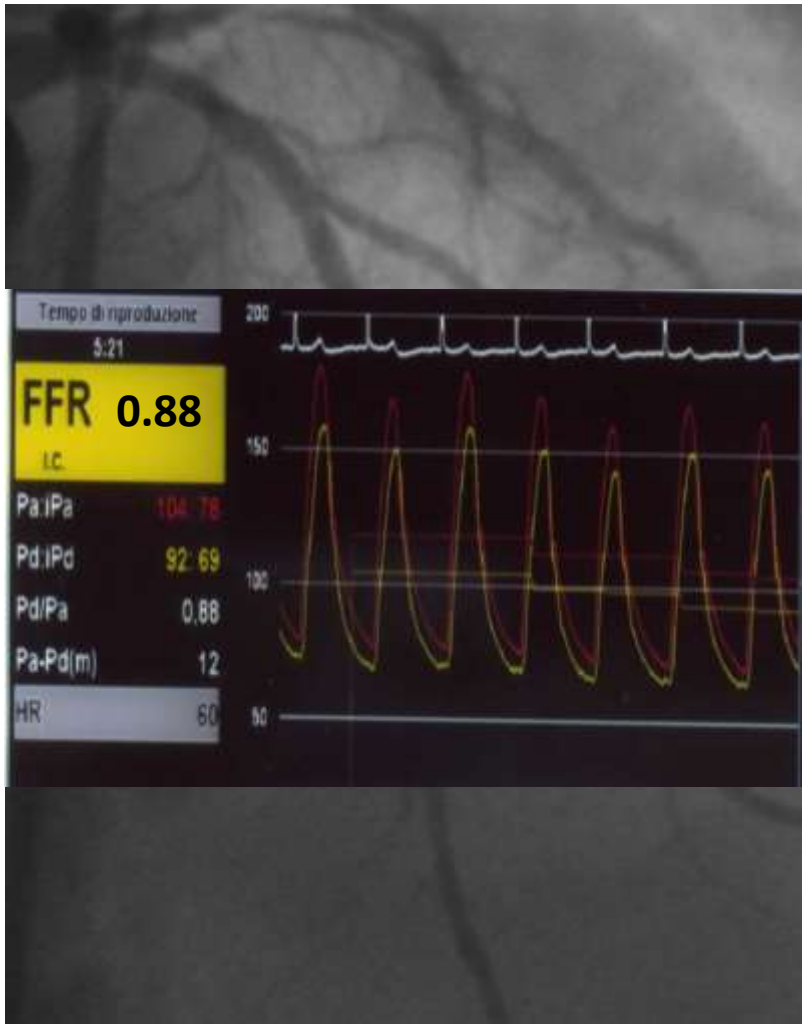


Zhang et al EuroIntervention 2013

Recommendations for the clinical value of intracoronary diagnostic techniques

Recommendations	Class[a]	Level[b]	Ref.[c]
FFR to identify haemodynamically relevant coronary lesion(s) in stable patients when evidence of ischaemia is not available.	I	A	50,51,713
FFR-guided PCI in patients with multivessel disease.	IIa	B	54
IVUS in selected patients to optimize stent implantation.	IIa	B	702,703,706
IVUS to assess severity and optimize treatment of unprotected left main lesions.	IIa	B	705
IVUS or OCT to assess mechanisms of stent failure.	IIa	C	
OCT in selected patients to optimize stent implantation.	IIb	C	

Still having some doubt on IVUS , use FFR for a functional evaluation



Take Home Message

- **IVUS in Bifurcation lesions provides more accurate and detailed information about anatomy ,lesion characteristics and extension**
- **IVUS guidance in bifurcation PCI (particularly in complex bifurcation and distal LM) is important both pre-procedure and post-procedure providing more detailed informations on :**
  - Hazy lesions
  - Intermediate lesions
  - bifurcation lesion ambiguity
  - Optimal stent expansion and apposition
  - Stent Thrombosis / in-stent restenosis in DES (stent underexpasion or Fracture)
- **Despite the lack of a clear evidence , in daily practice IVUS is important and highly recommended in complex bifurcation and distal LM PCI for a more objective procedural optimization which favorably impacts the clinical outcome.**

Thank You for Your Kind Attention !!