IVUS Interpretation and Measurement

"What is important?"

Akiko Maehara, MD

Director of Intravascular Imaging & Physiology Core Laboratories

Associate Director of MRI/MDCT Core Laboratory

Cardiovascular Research Foundation, NY

What is important?

1. During the case at cath lab
2. For the database
3. For the specific research purpose

What is important?

1. During the case at cath lab
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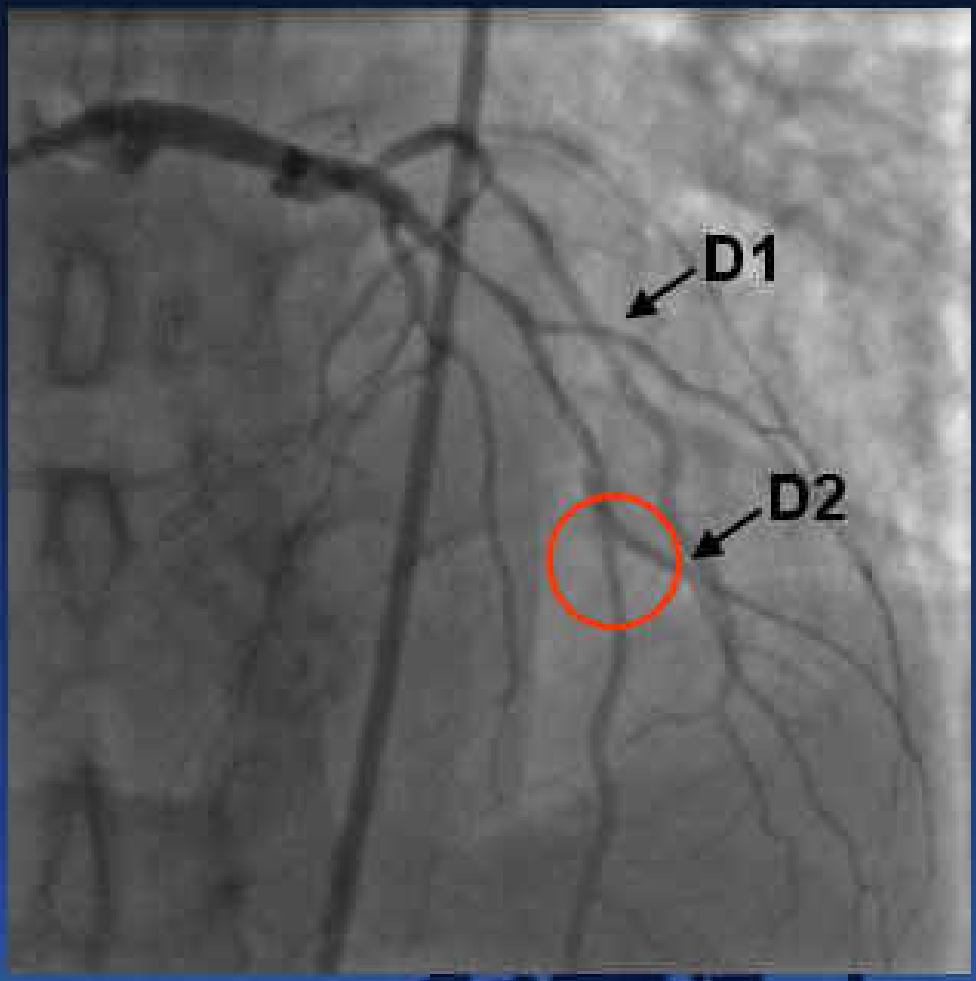
3. For the specific research purpose

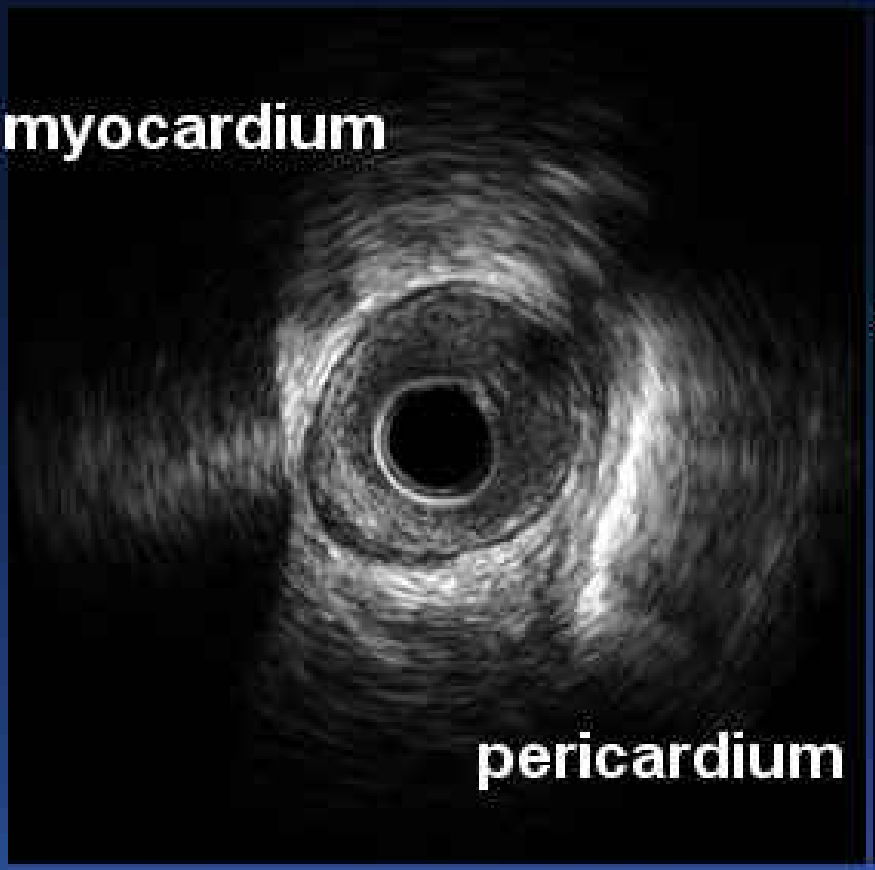
On-line analysis

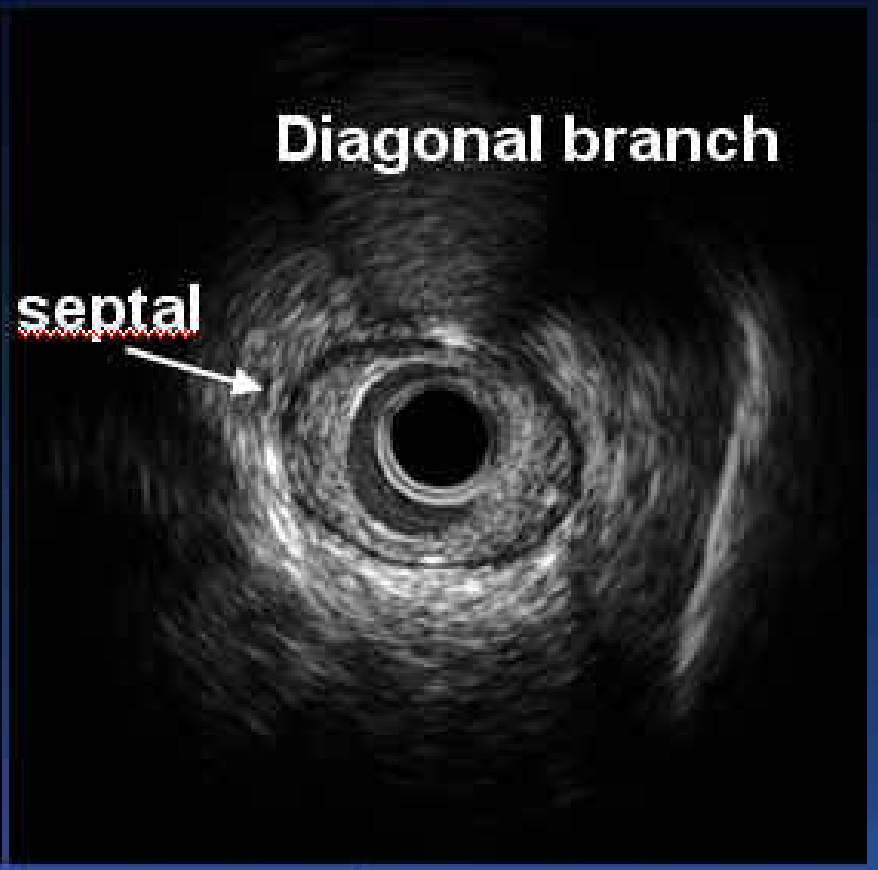
1. Quick & not too accurate.
2. Know what you cannot say.
3. Comparison with angio
4. Expect how often/what you can see.
5. Tip and tricks

Where is your interest?

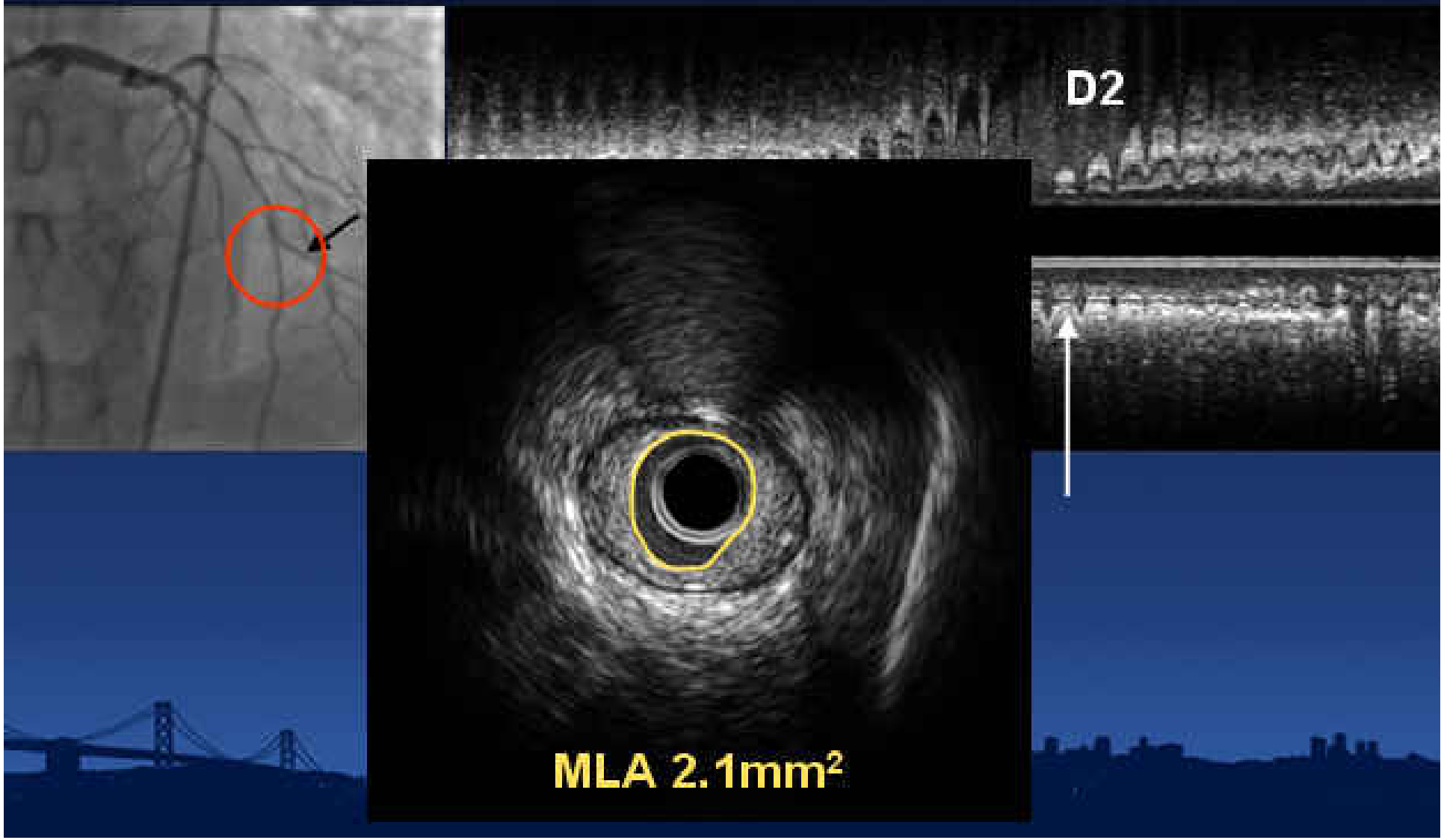


Recognize your landmark

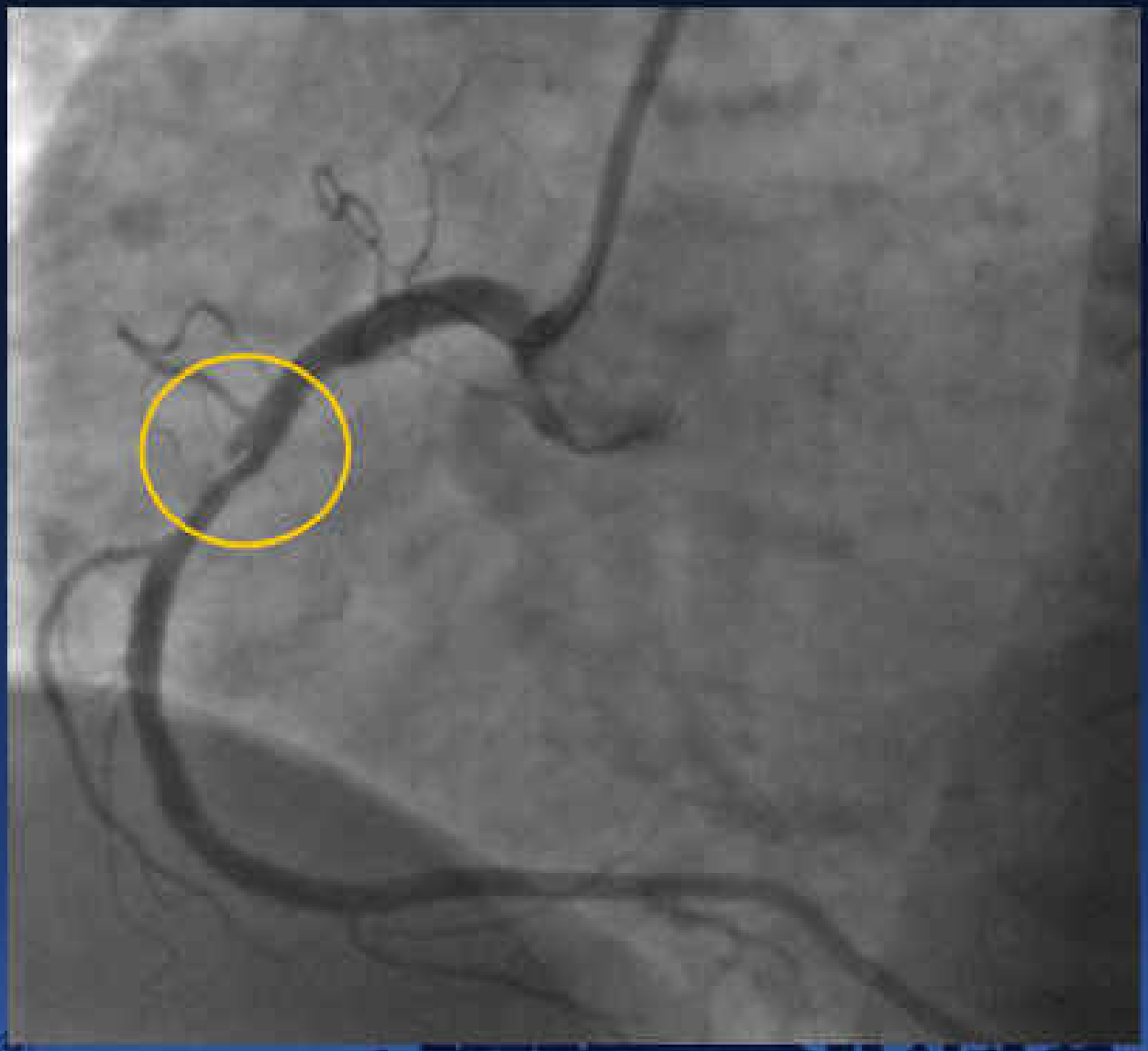




Find your interest on IVUS image



What is your guess?

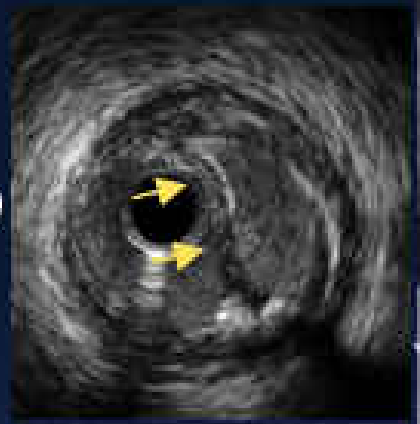


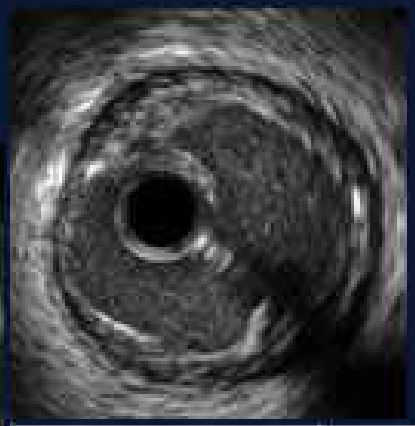
Plaque Rupture

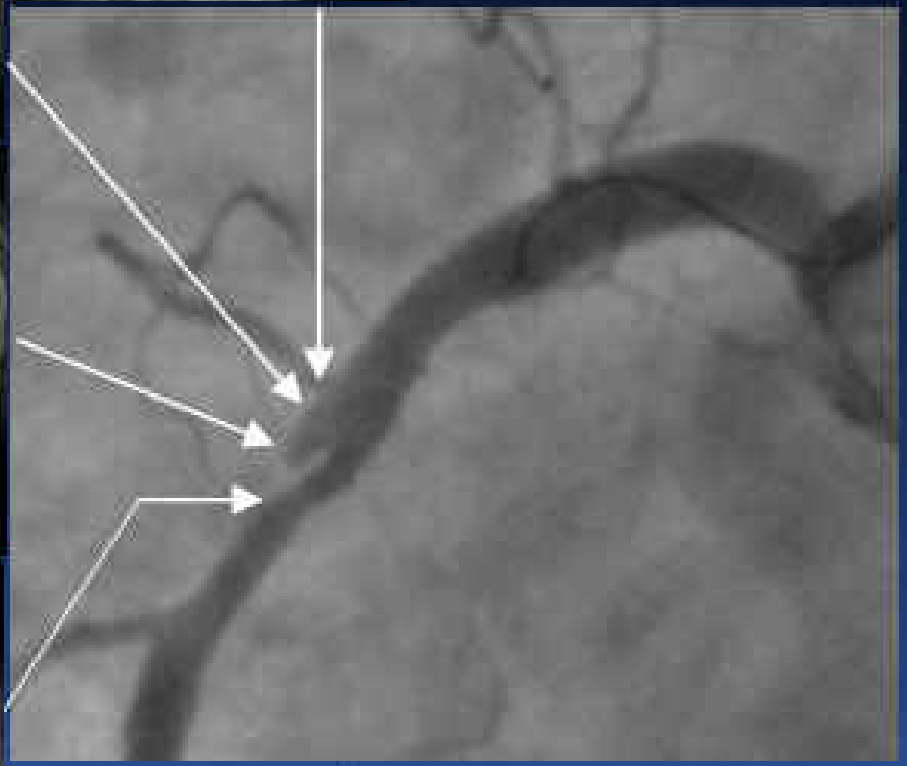
Fibrous cap

End of rupture

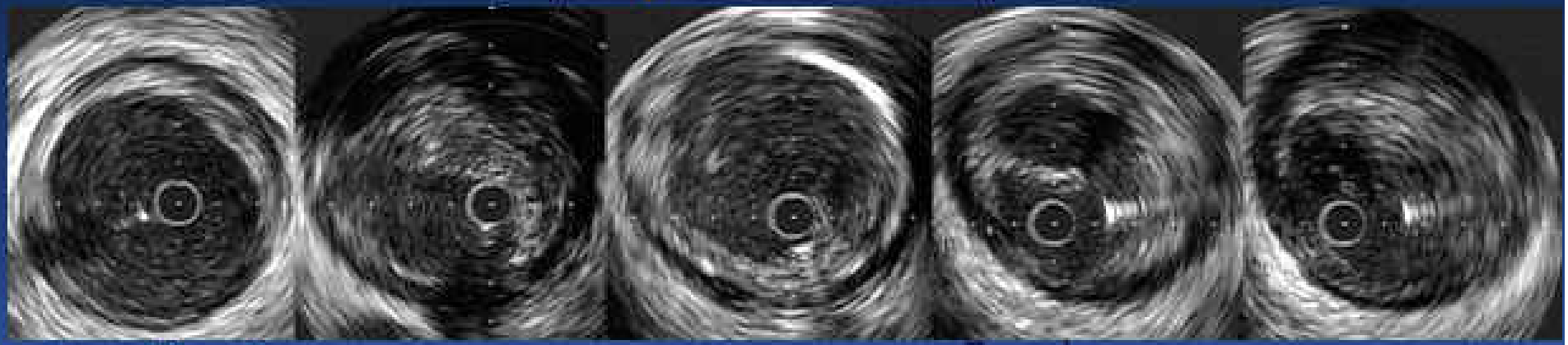
MLA





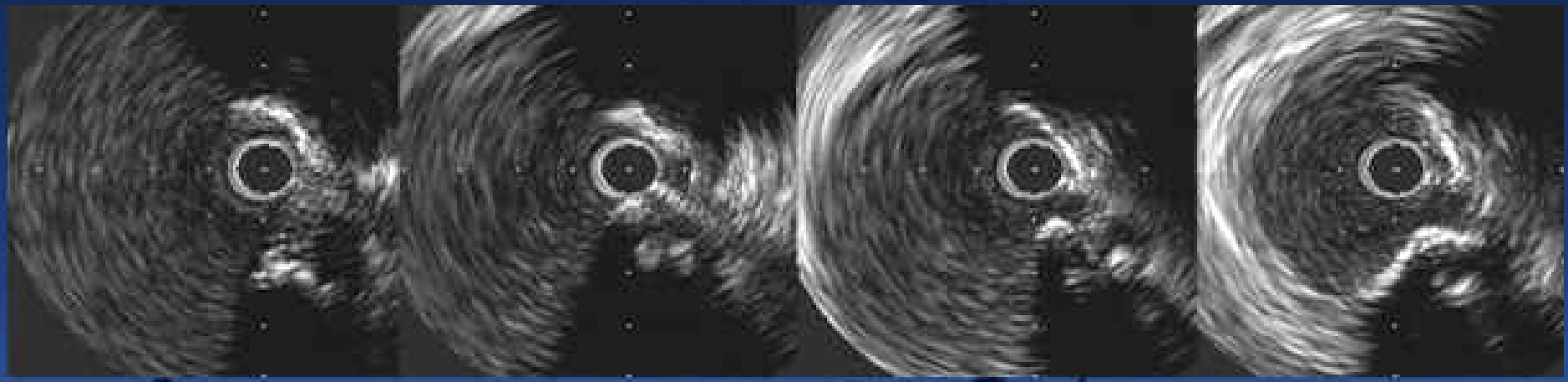


Rupture with Thrombus



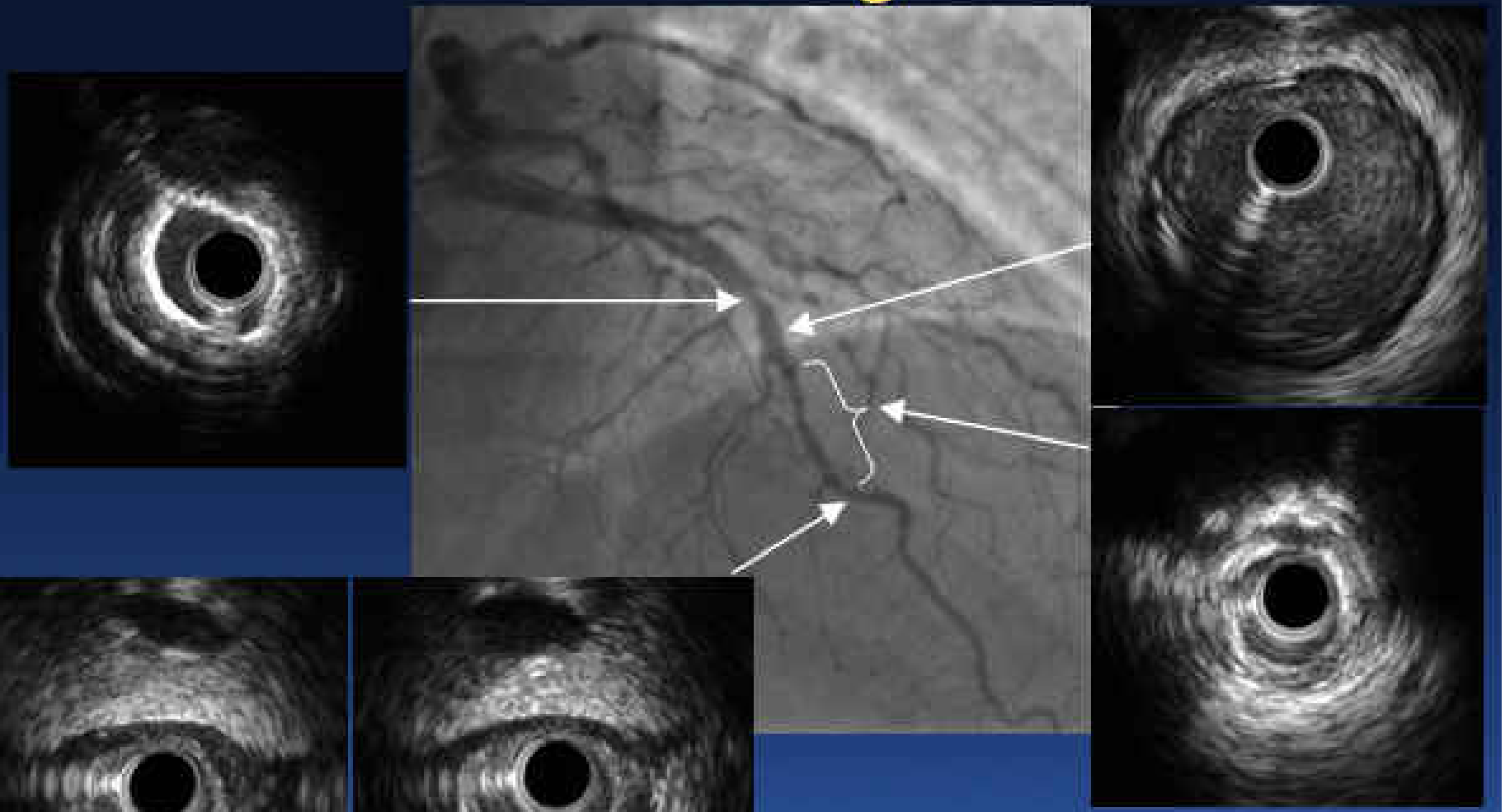
Proximal

Filling Defect - Calcium Nodule -

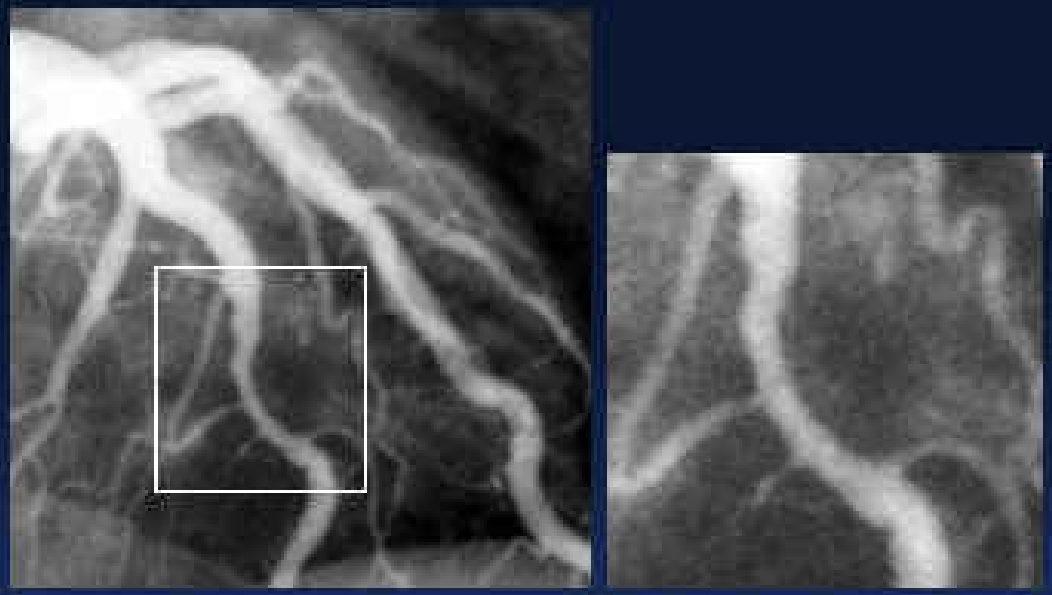


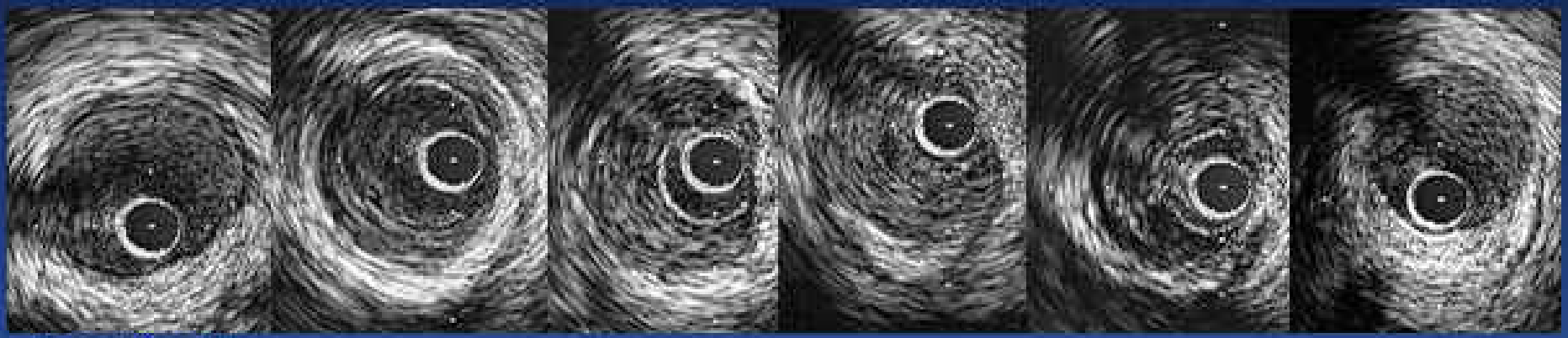
Haziness in the mid LAD

"Muscle Bridge"



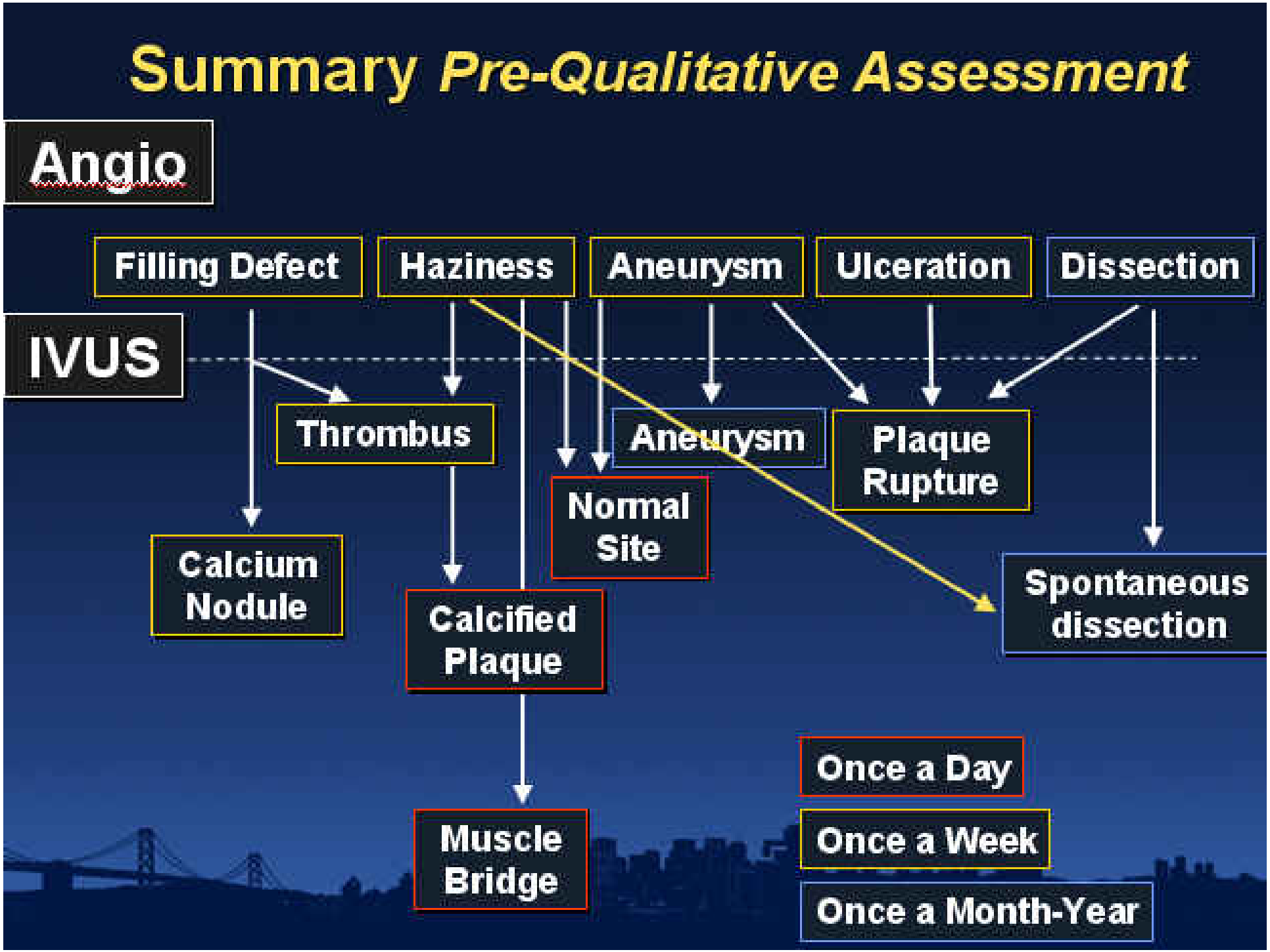
55y.o. Female, AMI





Proximal

"Spontaneous Dissection"


Summary Pre-Qualitative Assessment
Angio
Filling Defect
Haziness
Aneurysm
Ulceration
Dissection
IVUS
Thrombus
Aneurysm
Plaque Rupture
Normal Site
Calcium Nodule
Calcified Plaque
Spontaneous dissection
Muscle Bridge
Once a Day
Once a Week
Once a Month-Year

"Haziness" Following Stenting

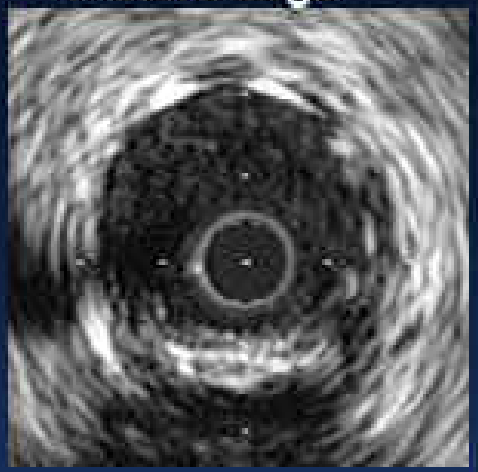
Pre-Intervention

Post-Stent

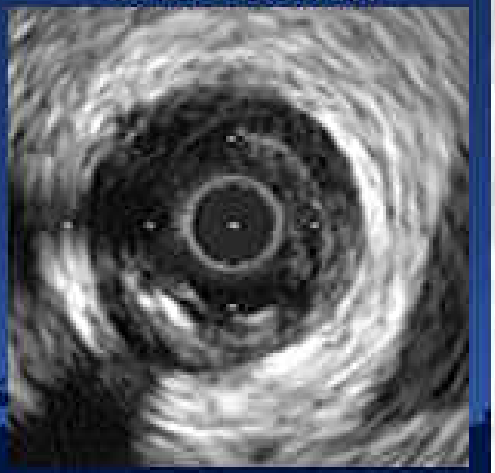
Post-Additional Stent

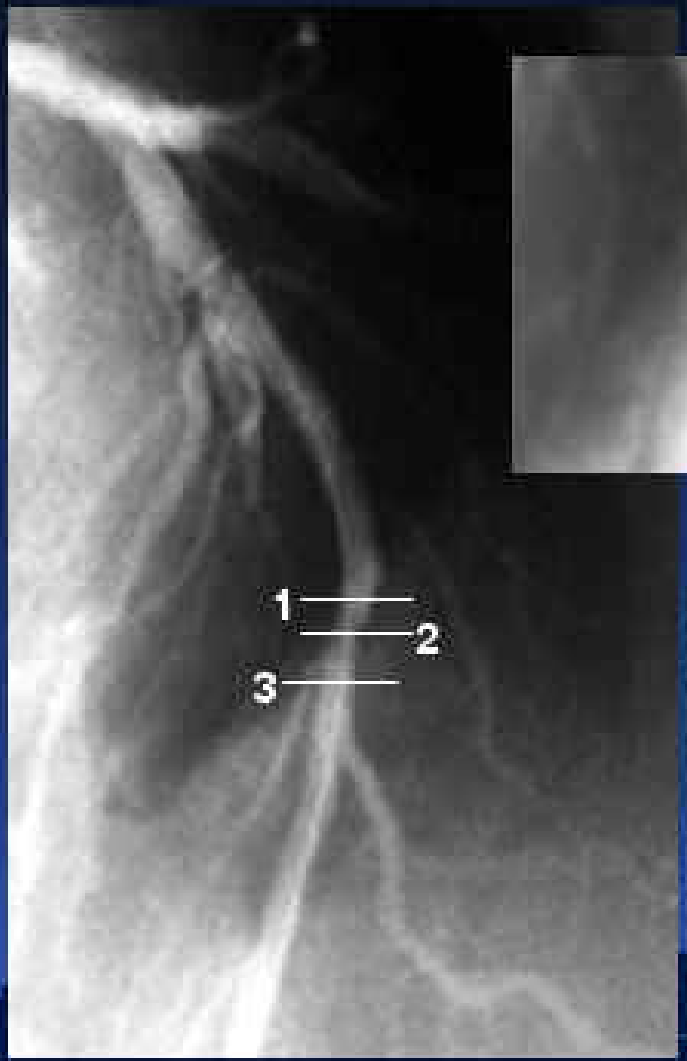
"Haziness" Following Stenting

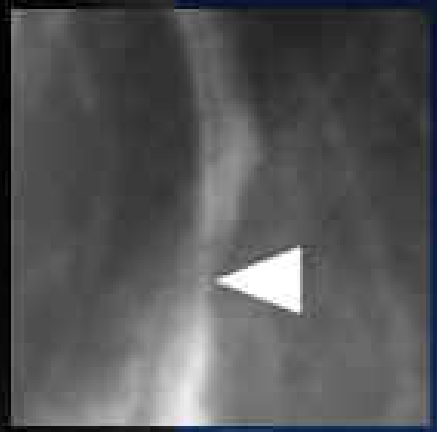
1. Stent Edge



2. Dissection



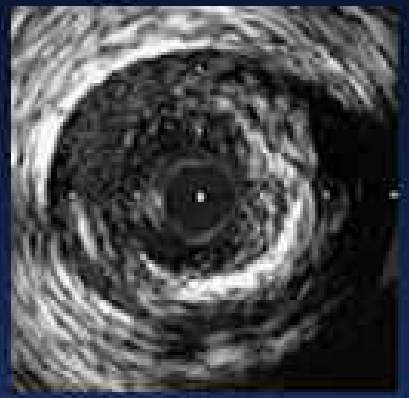




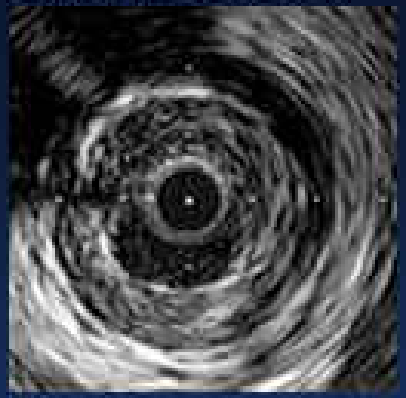
3. Dist. Reference

"Haziness" Following Stenting

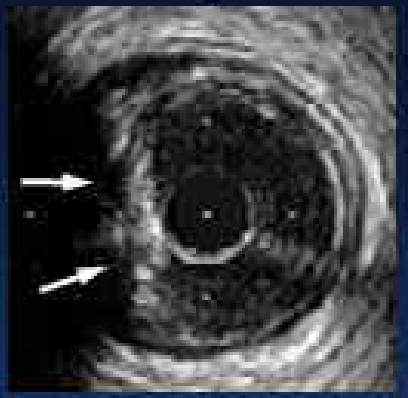
1. Edge Dissection



2. Residual Plaque Burden

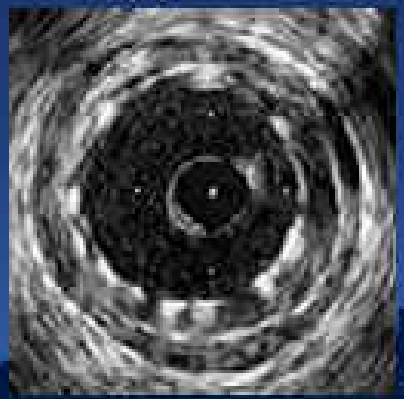


3. Calcified Plaque



4. Incomplete Expansion

5. Incomplete Apposition

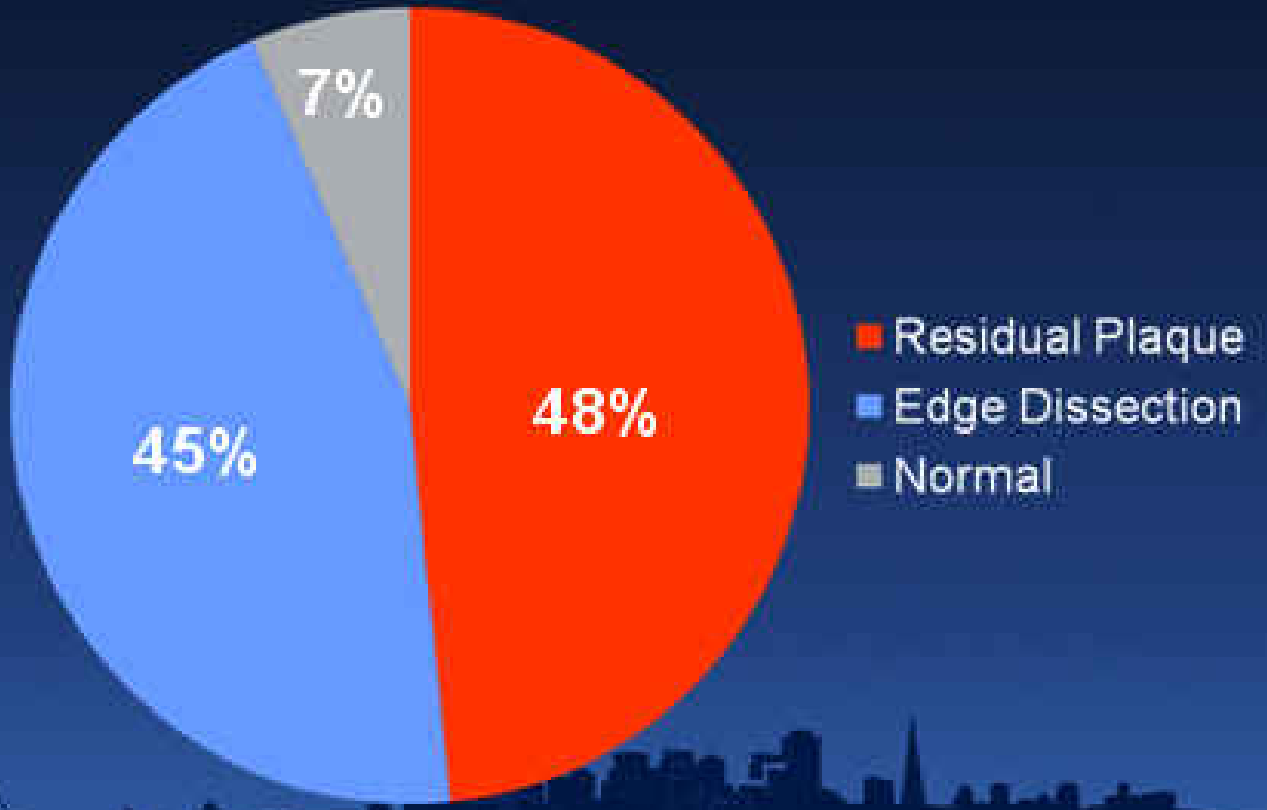


6. Thrombus

7. Plaque Protrusion

IVUS Assessment for Angiographic "Haziness"

Angiographical Haziness : 31/201 segments (15%)

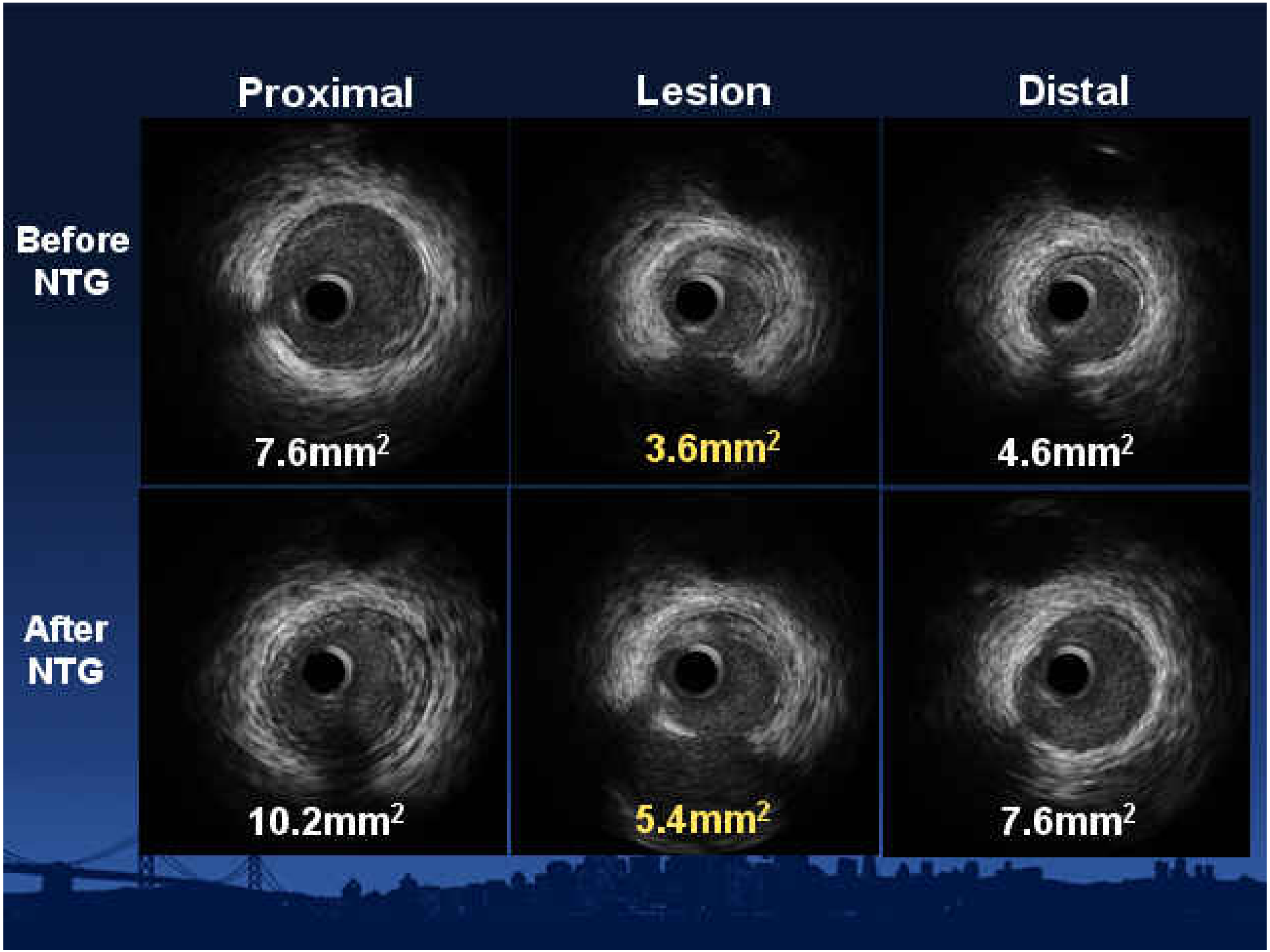


Ziada et al. Am J Cardiol 1997

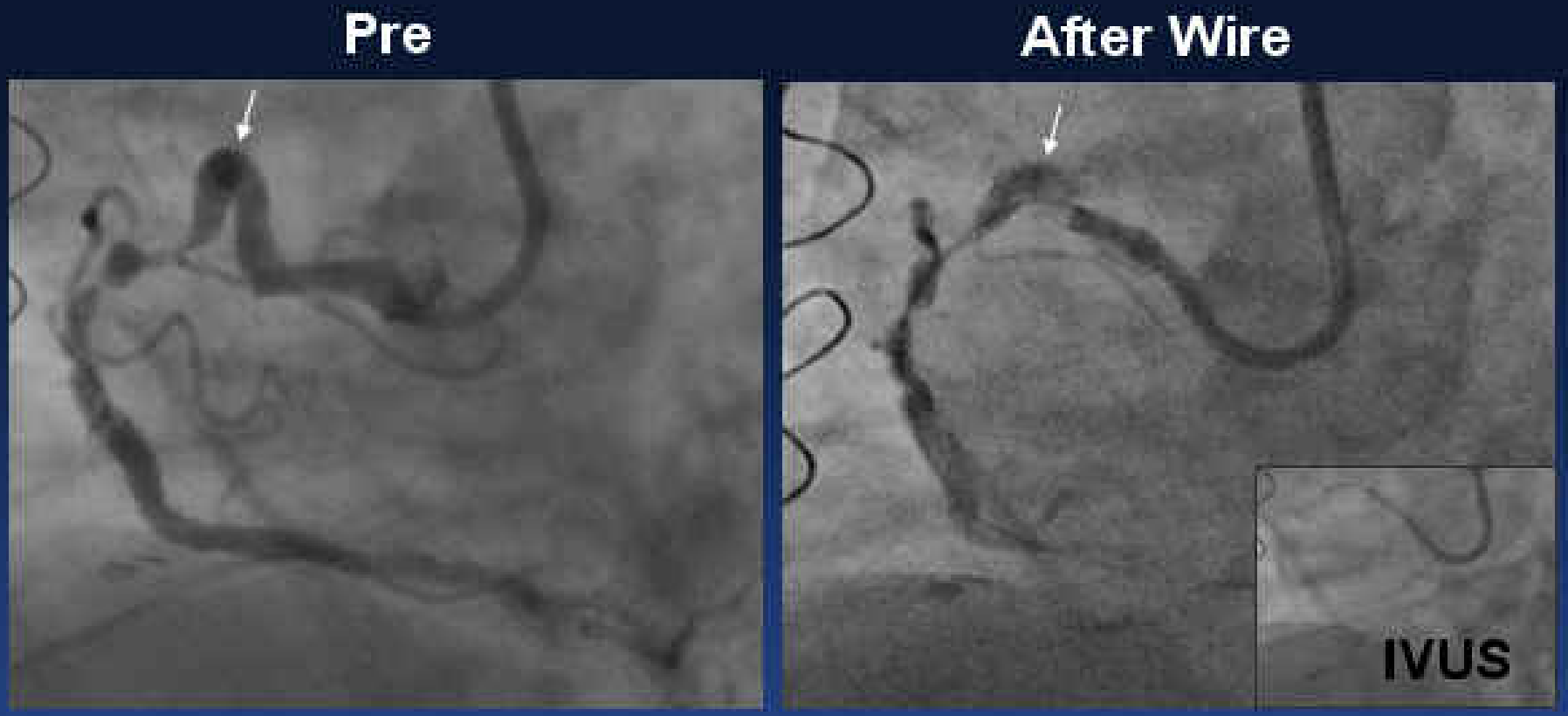
Importance of NTG

Before NTG

After NTG


Proximal
Lesion
Distal
Before NTG
After NTG
7.6mm2
3.6mm2
4.6mm2
10.2mm2
5.4mm2
7.6mm2

How IVUS looks like?

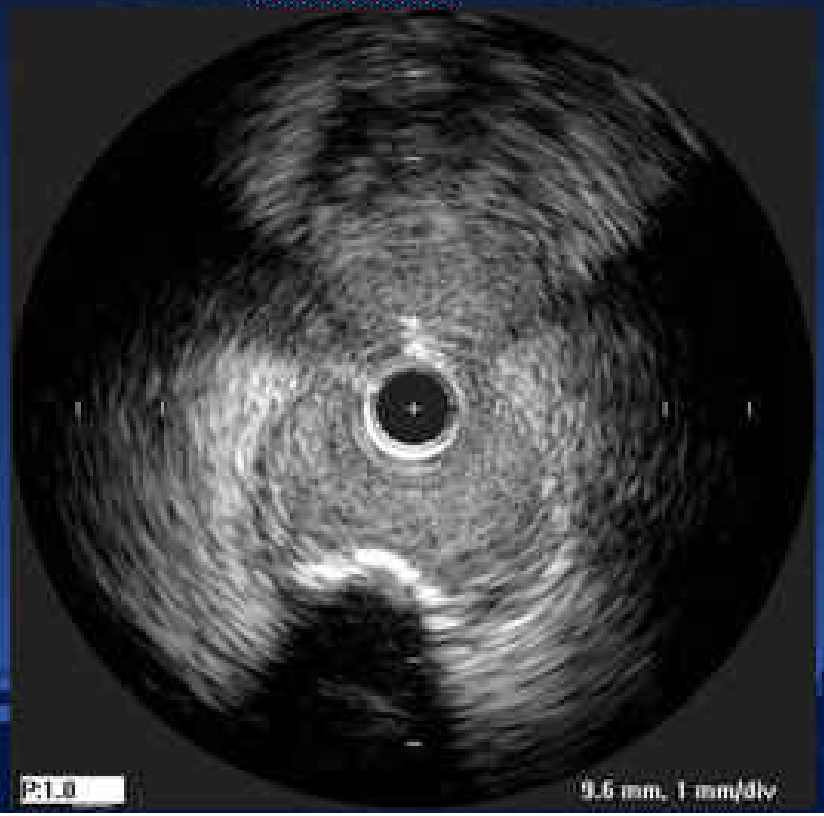


Wrinkling

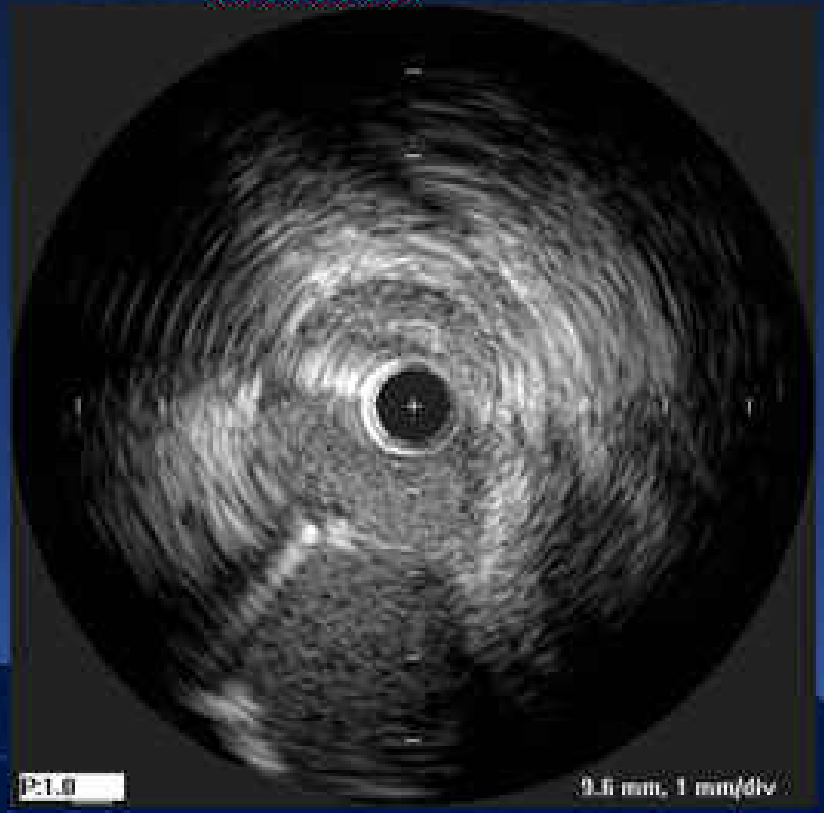
Side Branch Evaluation

False positive

LCX ostium from LAD

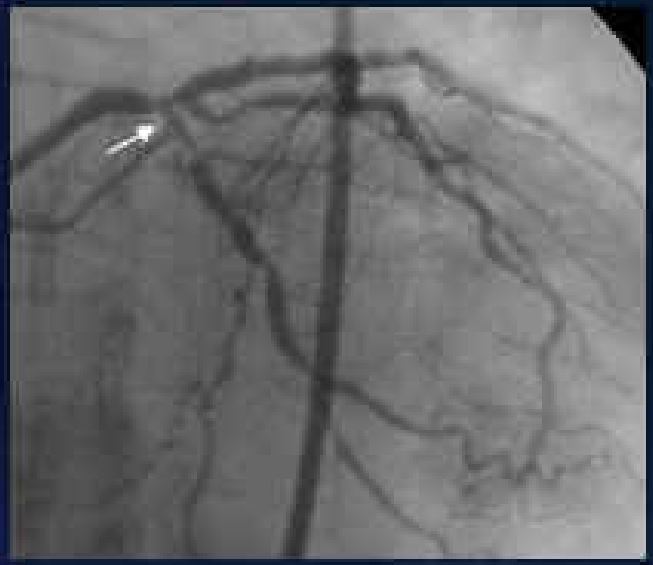


LCX ostium from LCX

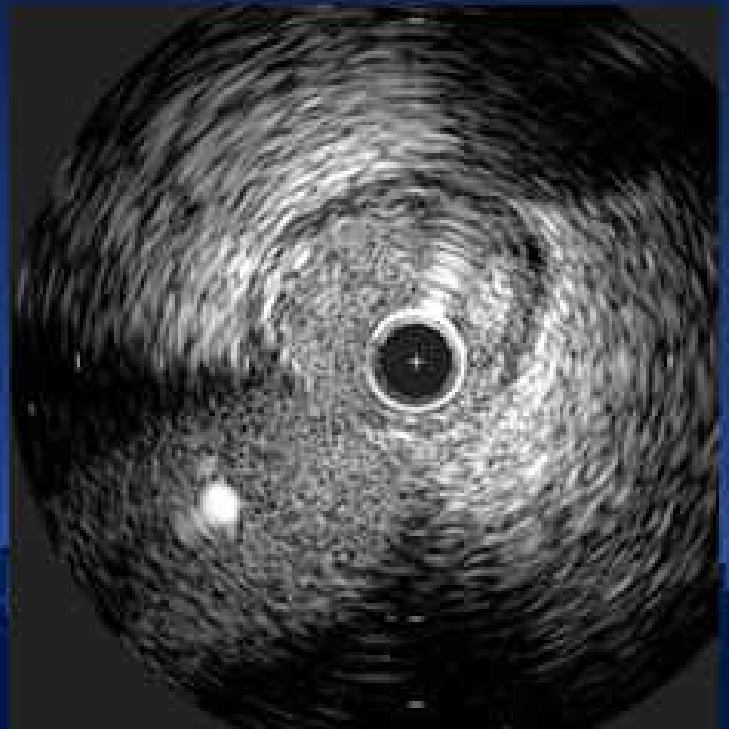


Side Branch Evaluation

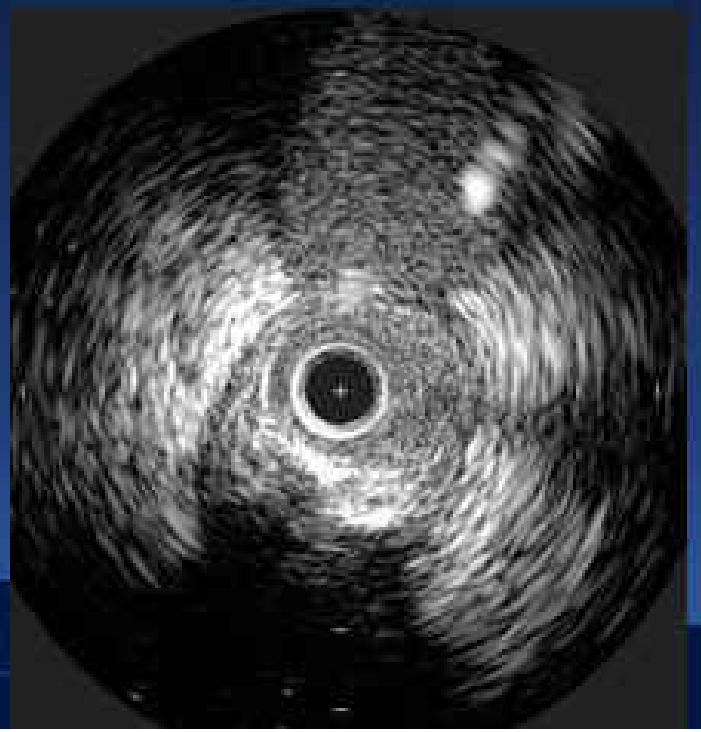
False negative



LCX ostium from LAD



LCX ostium from LCX



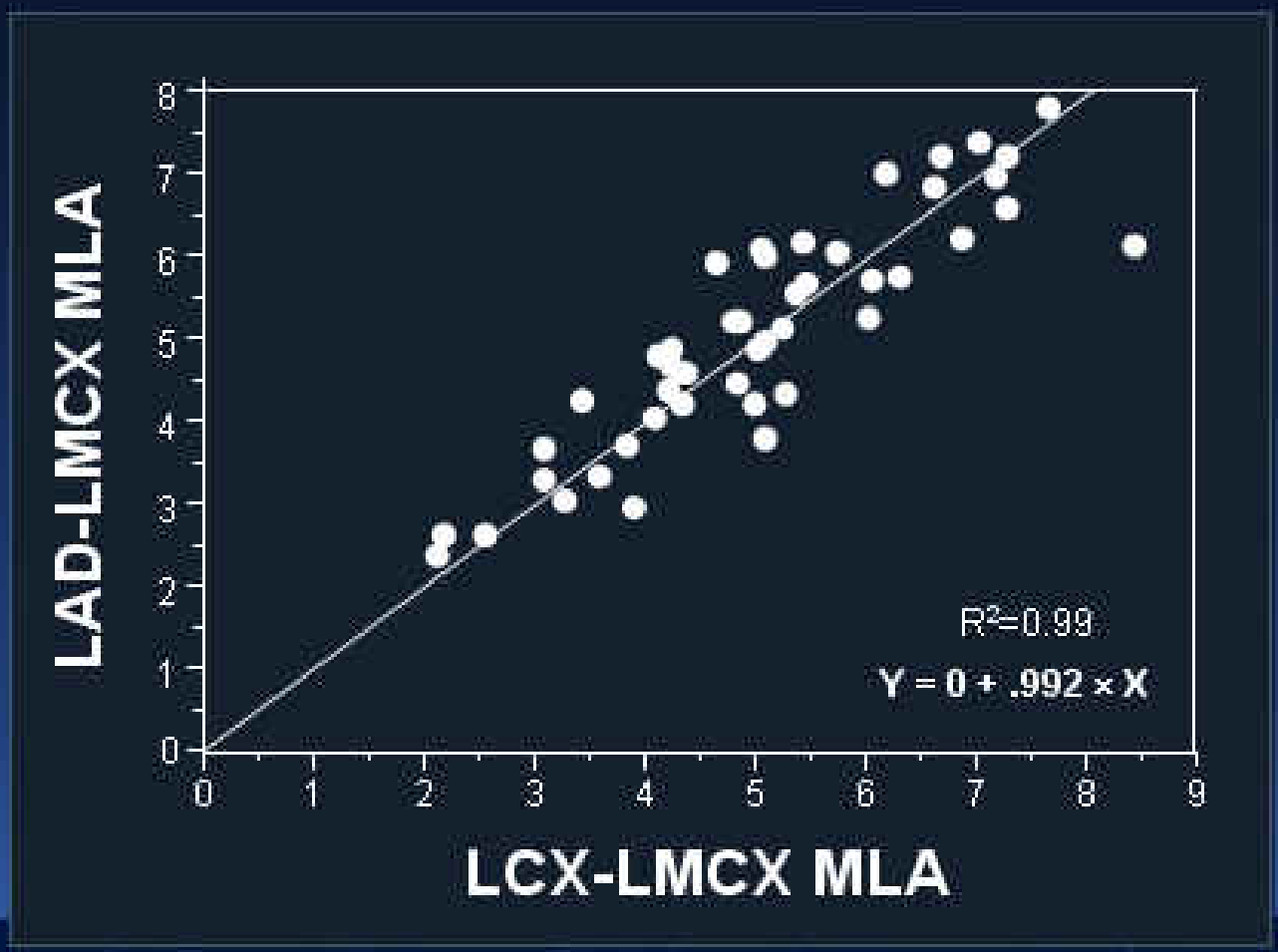
Left Main Evaluation by IVUS

From LAD

From LCX

IVUS is not accurate!

- n=73, MLA=6.7±3.1mm²
- Half: LAD pullback<LCX pullback
- 1mm² difference=20 (26%)



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IVUS Analysis

Case Repot Form at Core Lab

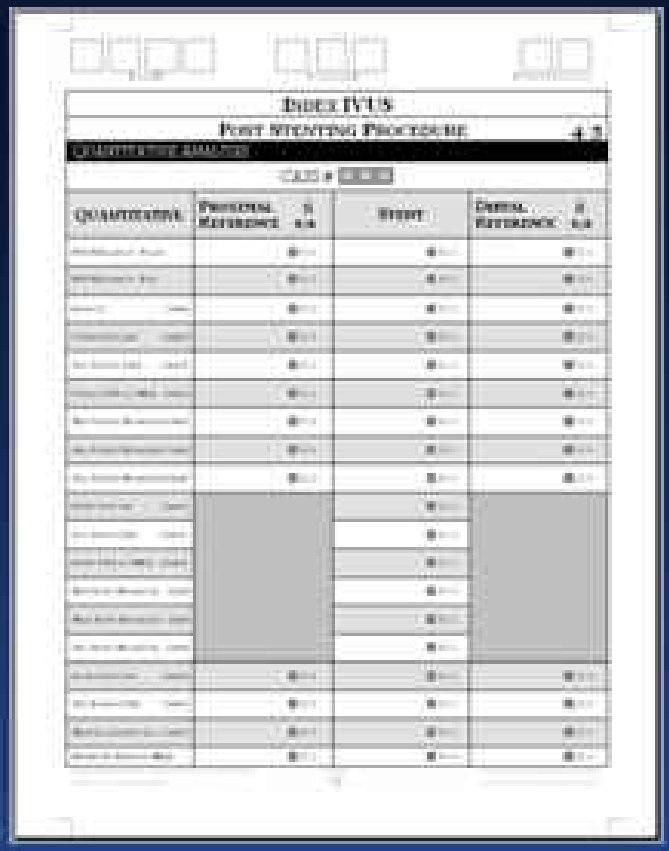
CARDIOVASCULAR RESEARCH FOUNDATION

TRIAL

INTRA-VASCULAR ULTRA-SOUND CASE REPORT FORM

IVUS CRF

INDEX – POST STENTING PROCEDURE



INDEX IVUS

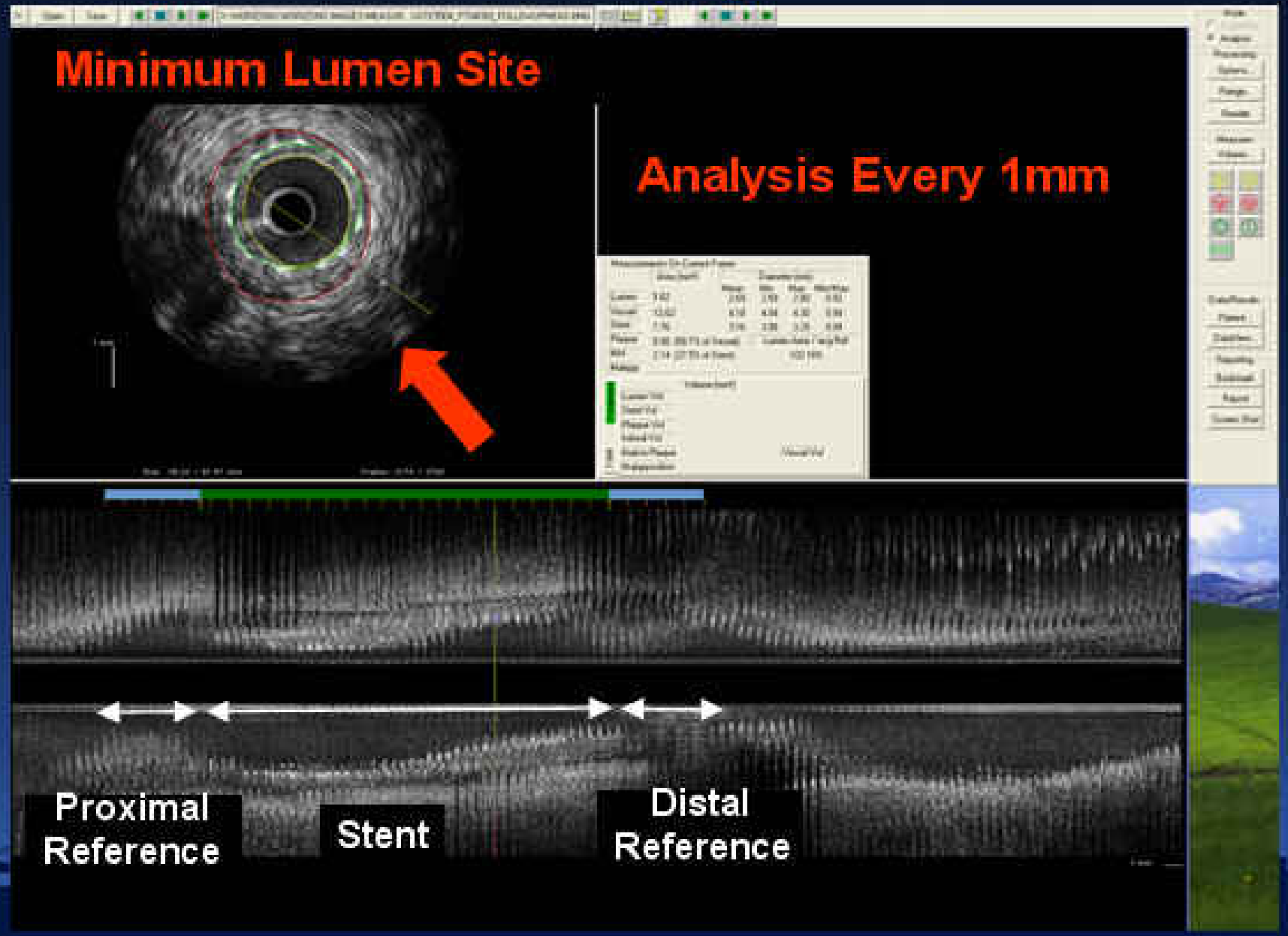
POST STENTING PROCEDURE

QUANTITATIVE	PROXIMAL REFERENCE		DISTAL REFERENCE

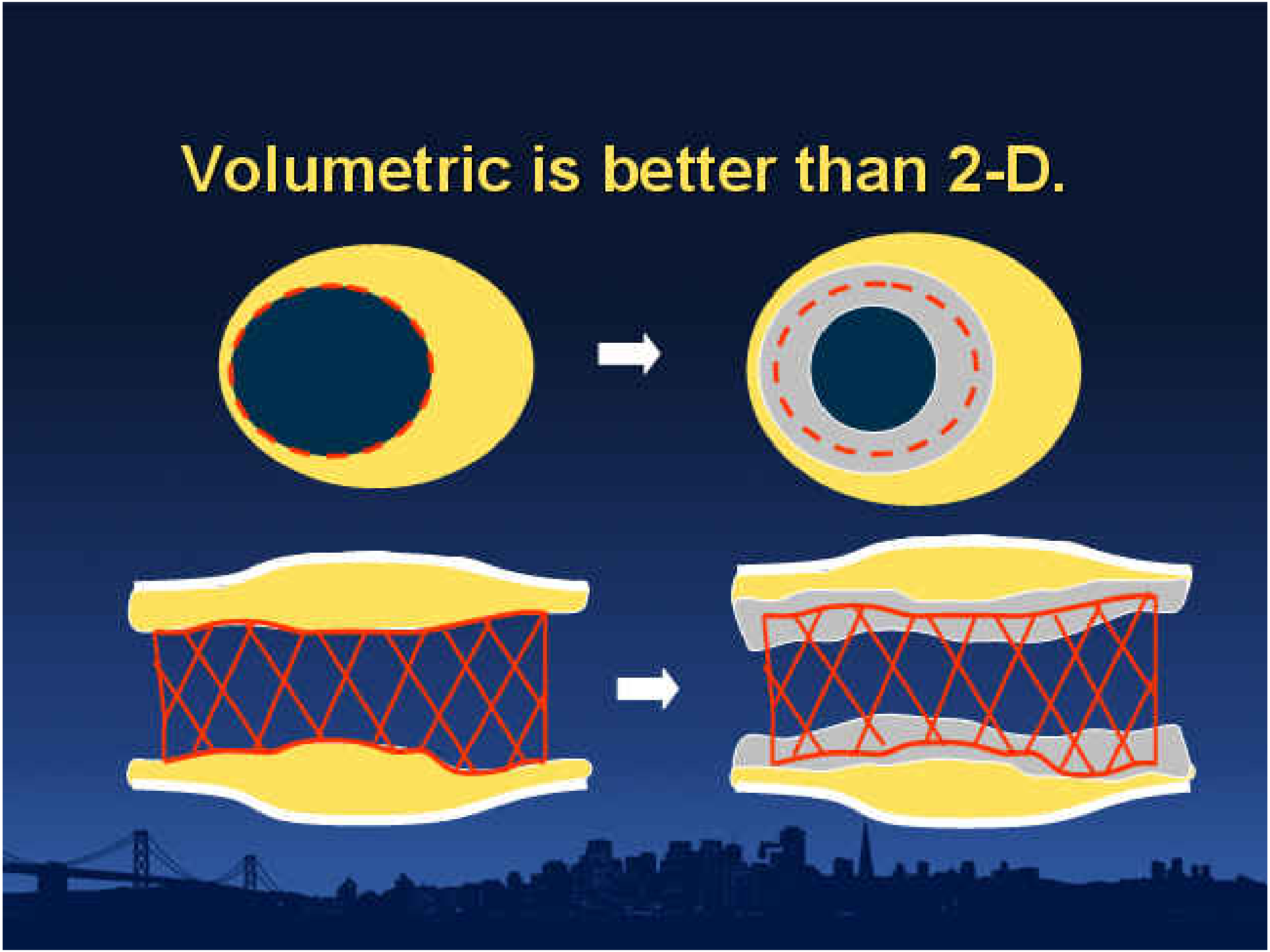
Index: 20 pages

Follow: 20 pages

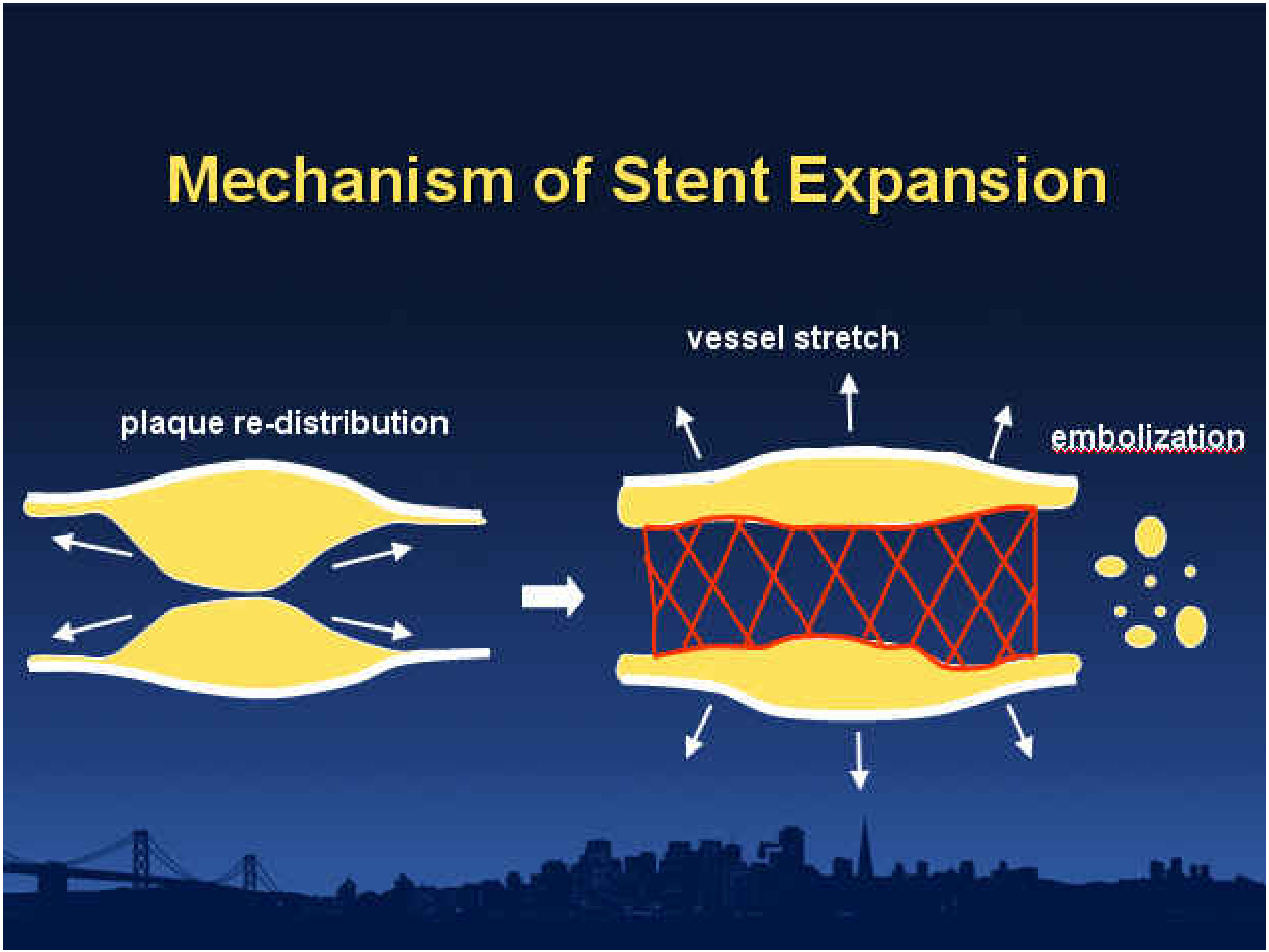
IVUS Analysis



Volumetric is better than 2-D.



Mechanism of Stent Expansion



Quantitative Analysis

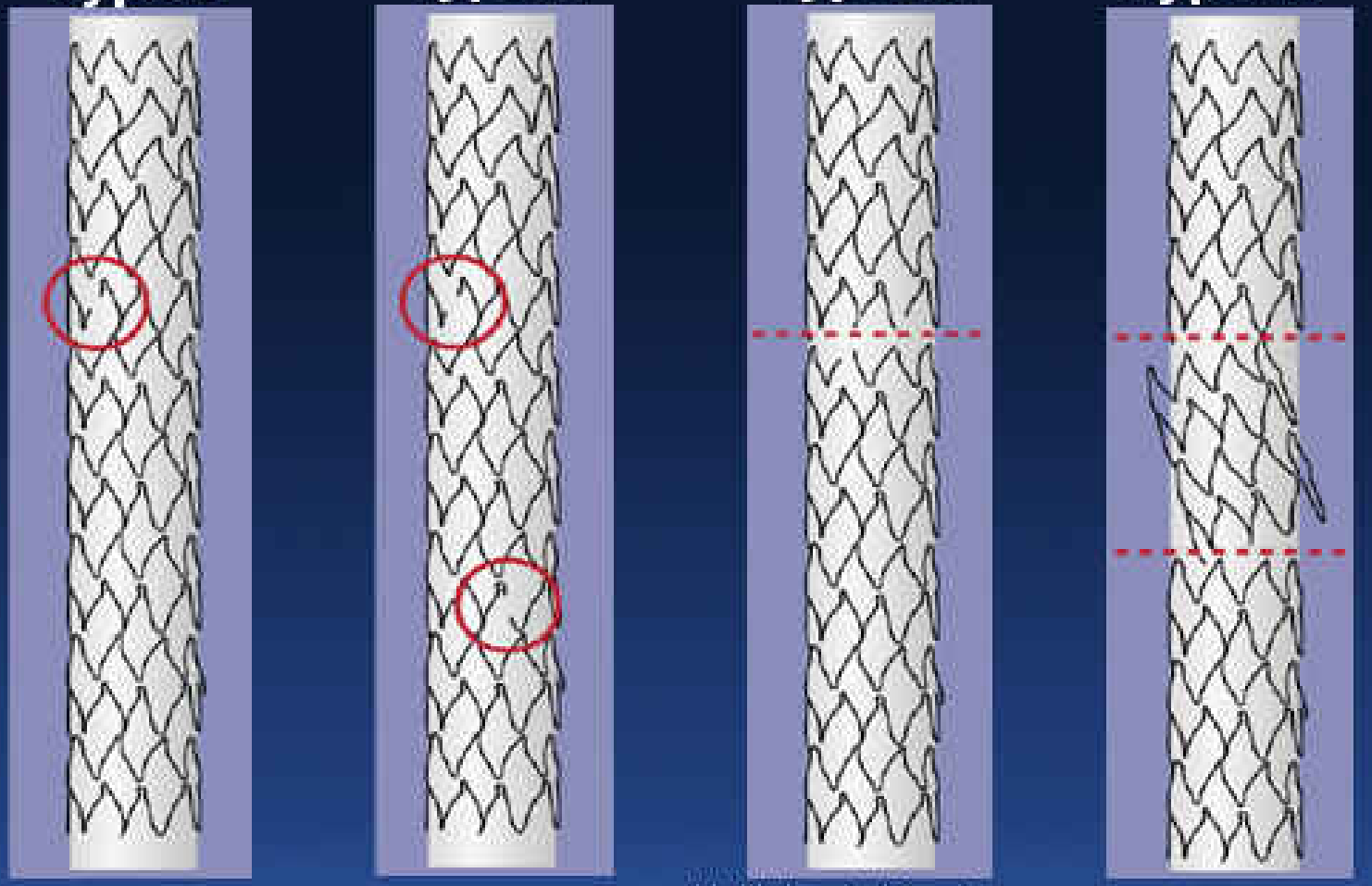
	Proximal reference	Stent	Distal reference
Minimum Lumen Site			
Vessel CSA (mm^2)			
Stent CSA (mm^2)			
Plaque CSA (mm^2)			
Entire Stent			
Vessel Volume (mm^3)			
Lumen Volume (mm^3)			
Stent Volume (mm^3)			
Plaque Volume (mm^3)			
Neointimal Volume (mm^3)			

Qualitative Analysis

1. Stent: Malapposition, Newly Aneurysm, Plaque/thrombus Protrusion, Thrombus, Stent Fracture
2. Stent Edge: Dissection (Intima/Media/Hematoma/Perforation)
3. Entire Vessel: Plaque Rupture, Plaque Ulceration, Aneurysm, Muscle Bridge, Thrombus, Calcification

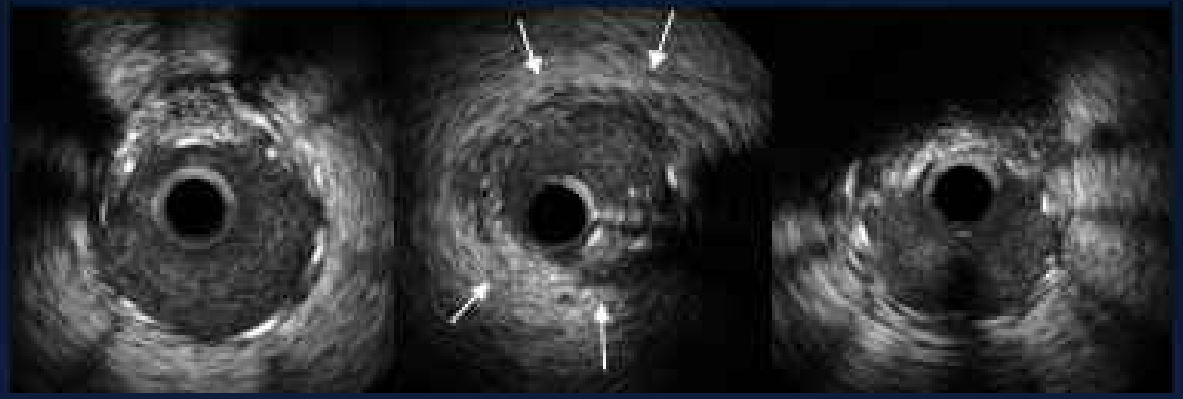
All Analysis will be compared between Baseline and Follow-up side by side.

Fracture Angiographic Classification



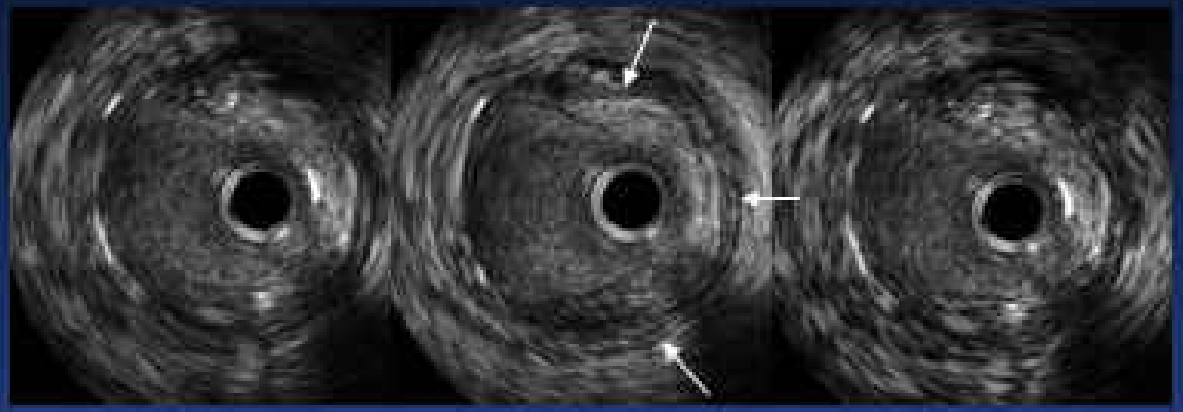
Fracture IVUS Classification

Complete fracture

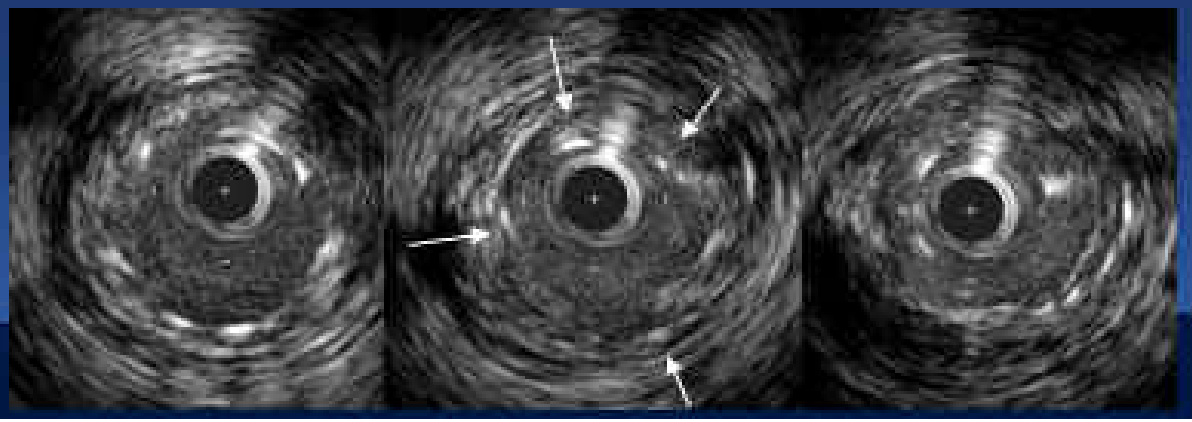


Partial fracture

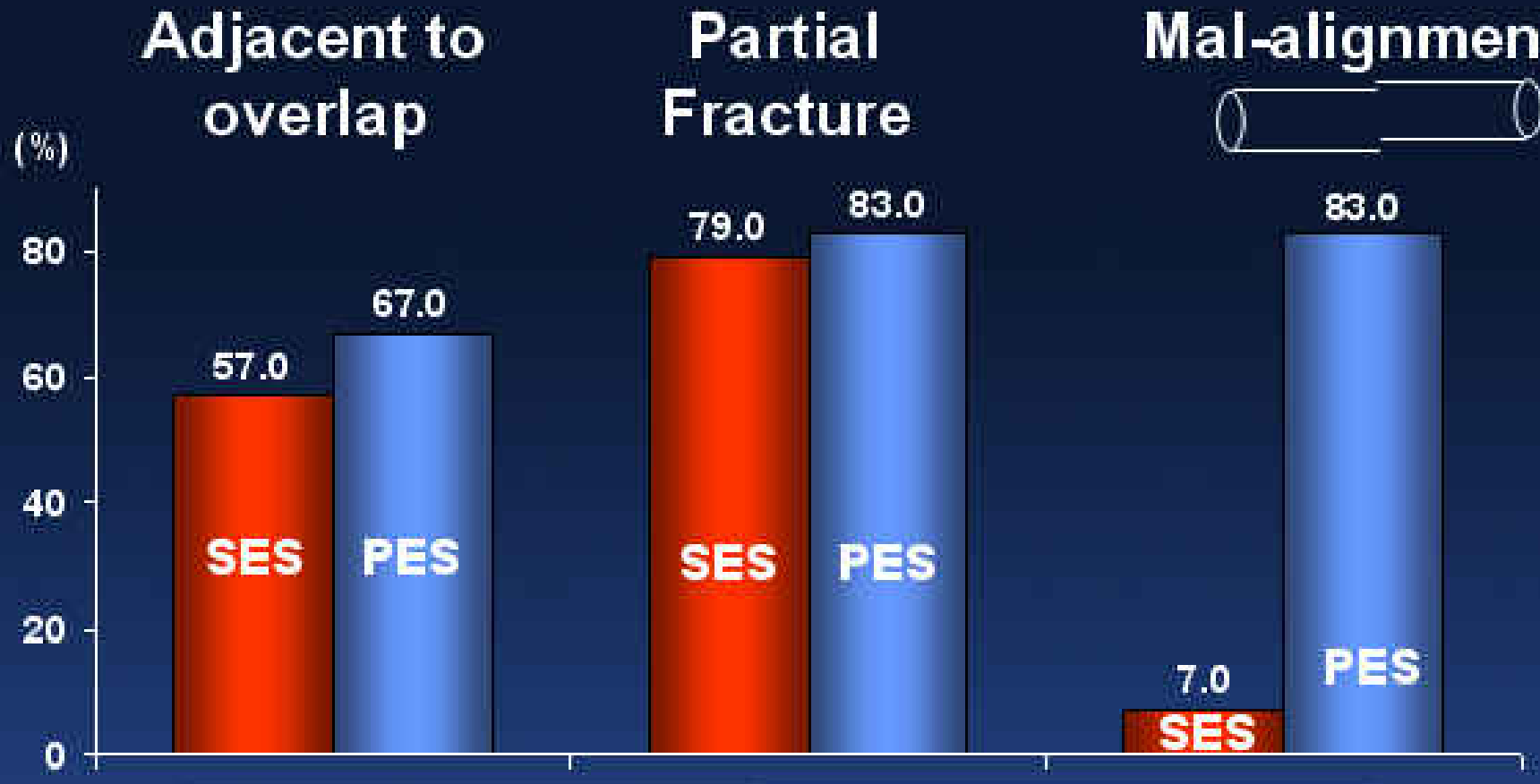
Absence of strut > 120°
(Max angle in control 65±12°)



Mal-alignment



Difference of PES vs SES fracture



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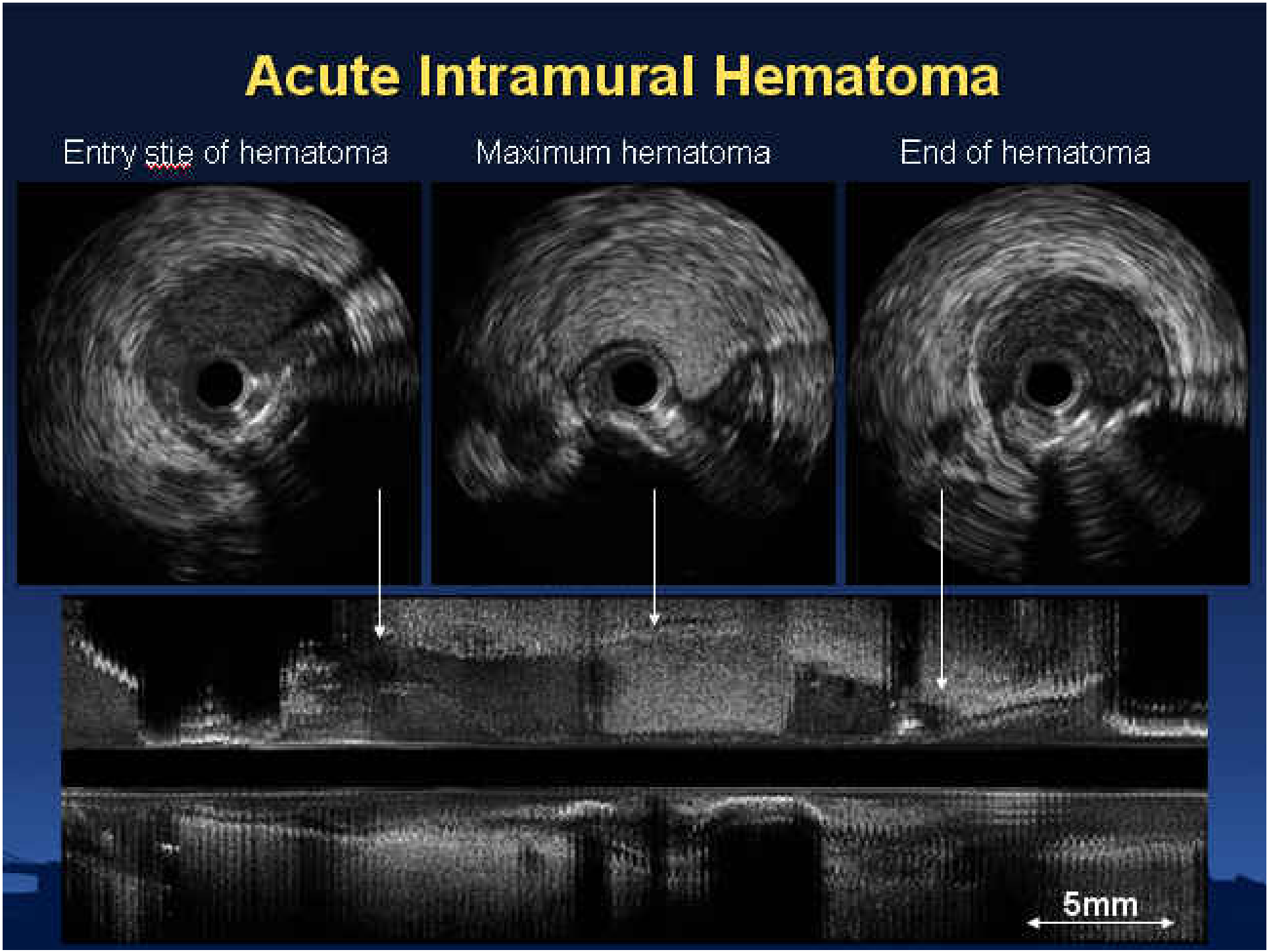
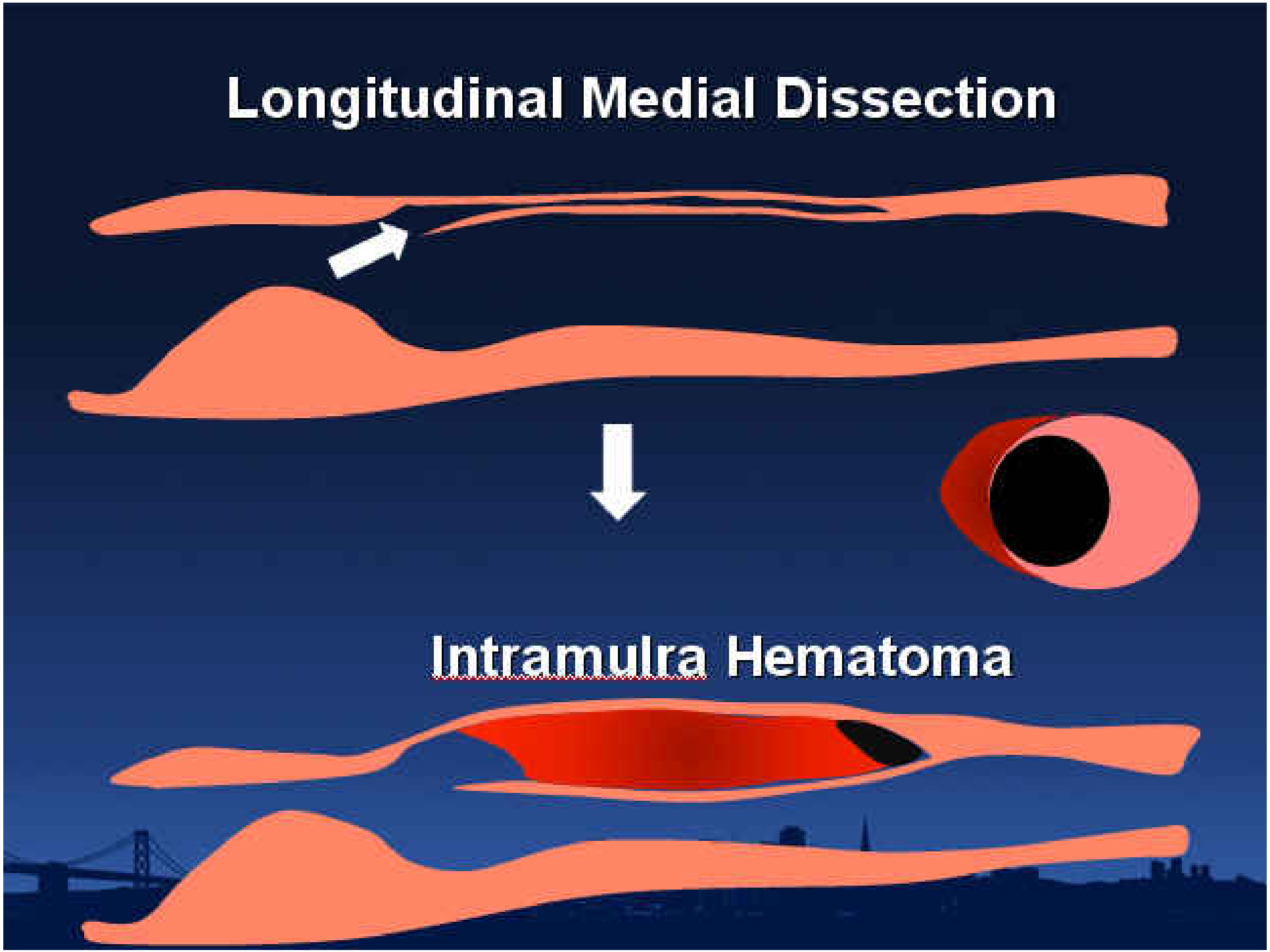
Acute Intramural Hematoma




Longitudinal Medial Dissection
Intramulra Hematoma

Imagine your whole story.

1. Description- Incidence, Mechanism (longitudinal medial dissection, entry without re-entry, accumulation of blood in the closed space, stop at the site of branch/calcification)
2. Diagnosis- comparison with angio
3. Treatment- Stent (how long, from where?), making the re-entry
4. Prognosis

Recommendation

1. Find 10-20 cases with same phenomenon
2. Review all 5 times at least
3. Imagine your whole story
4. Decide your parameter to be measured to prove your hypothesis
5. Start analysis
6. Find more importance
7. Re-analysis again

When you cannot find anymore, it is time to write your paper.

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Imagine what you can see before IVUS image!