

IVUS Guidance of CTO Recanalization Procedures

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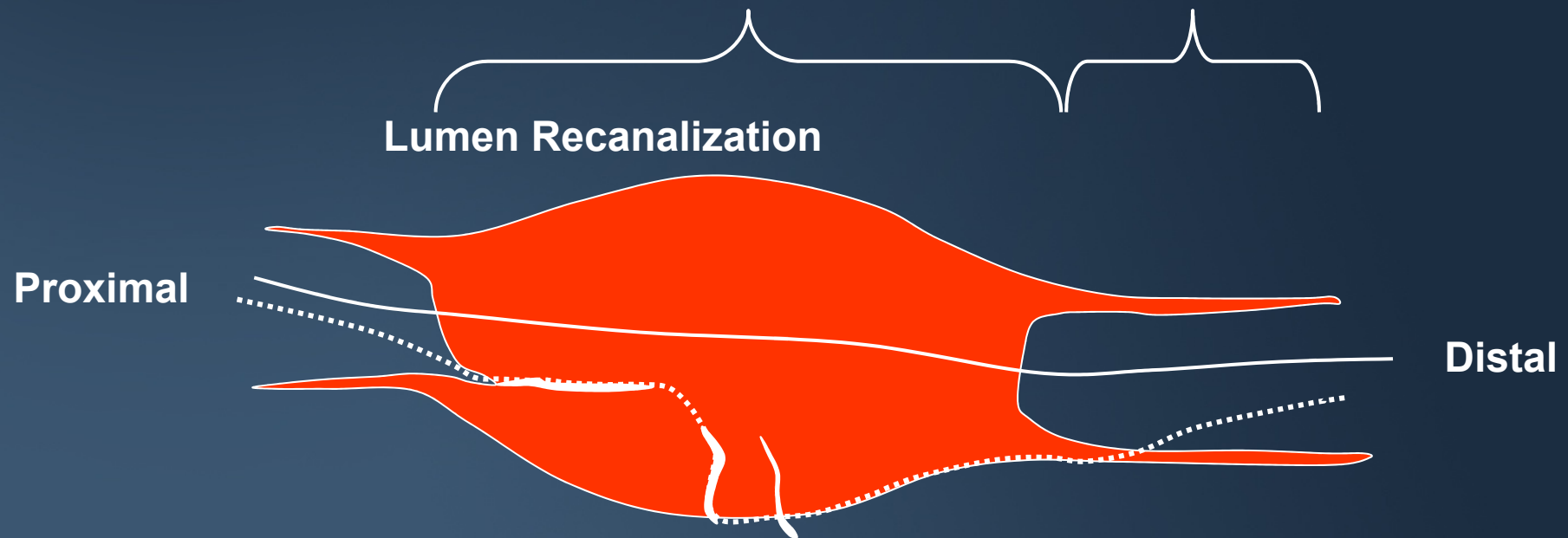
Key observations by IVUS during CTO procedure



Wire Crossing

CTO Segment: Subintima? Presumed true lumen? Outside of Adventitia?

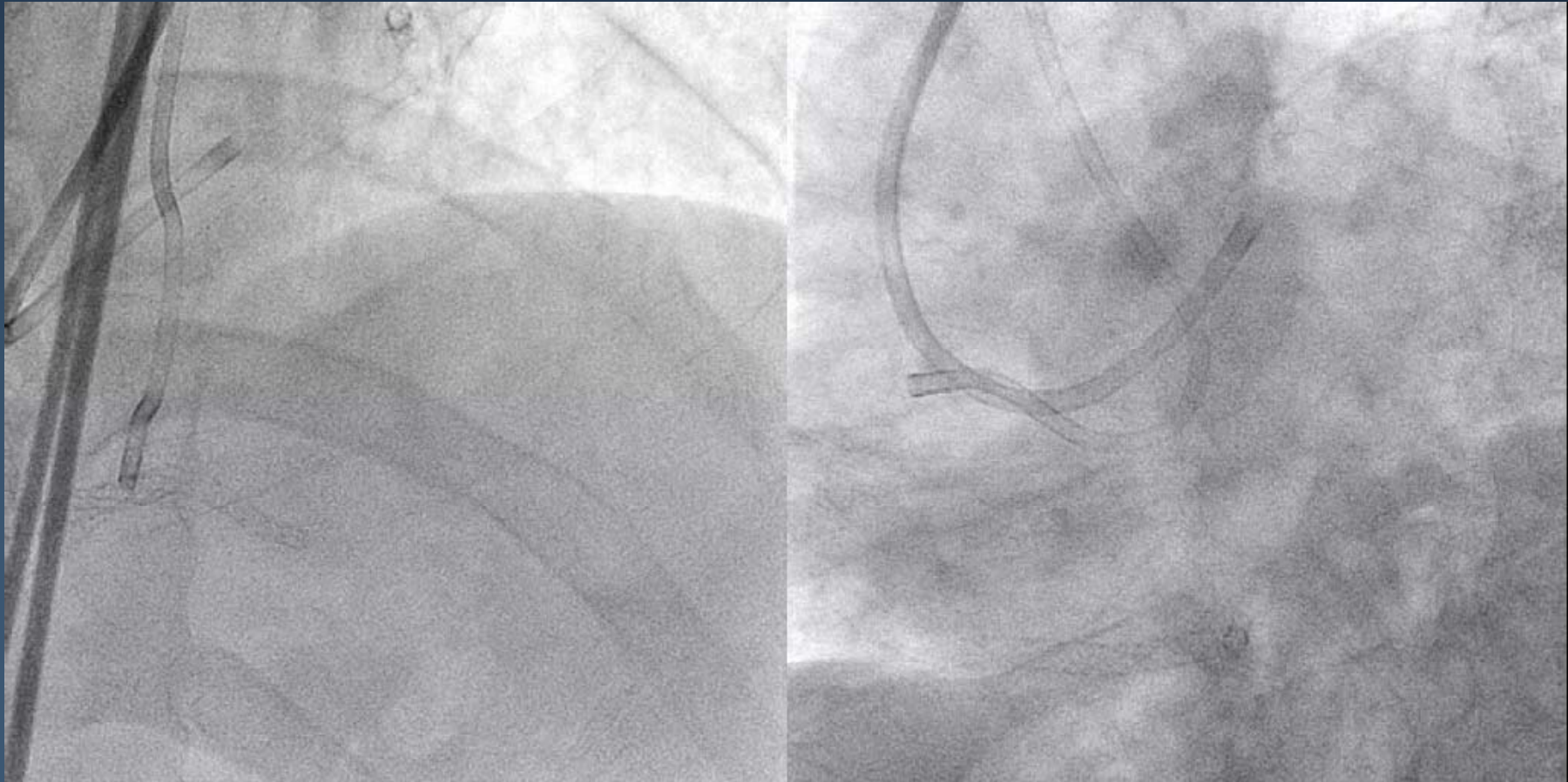
Distal to CTO: True or false?



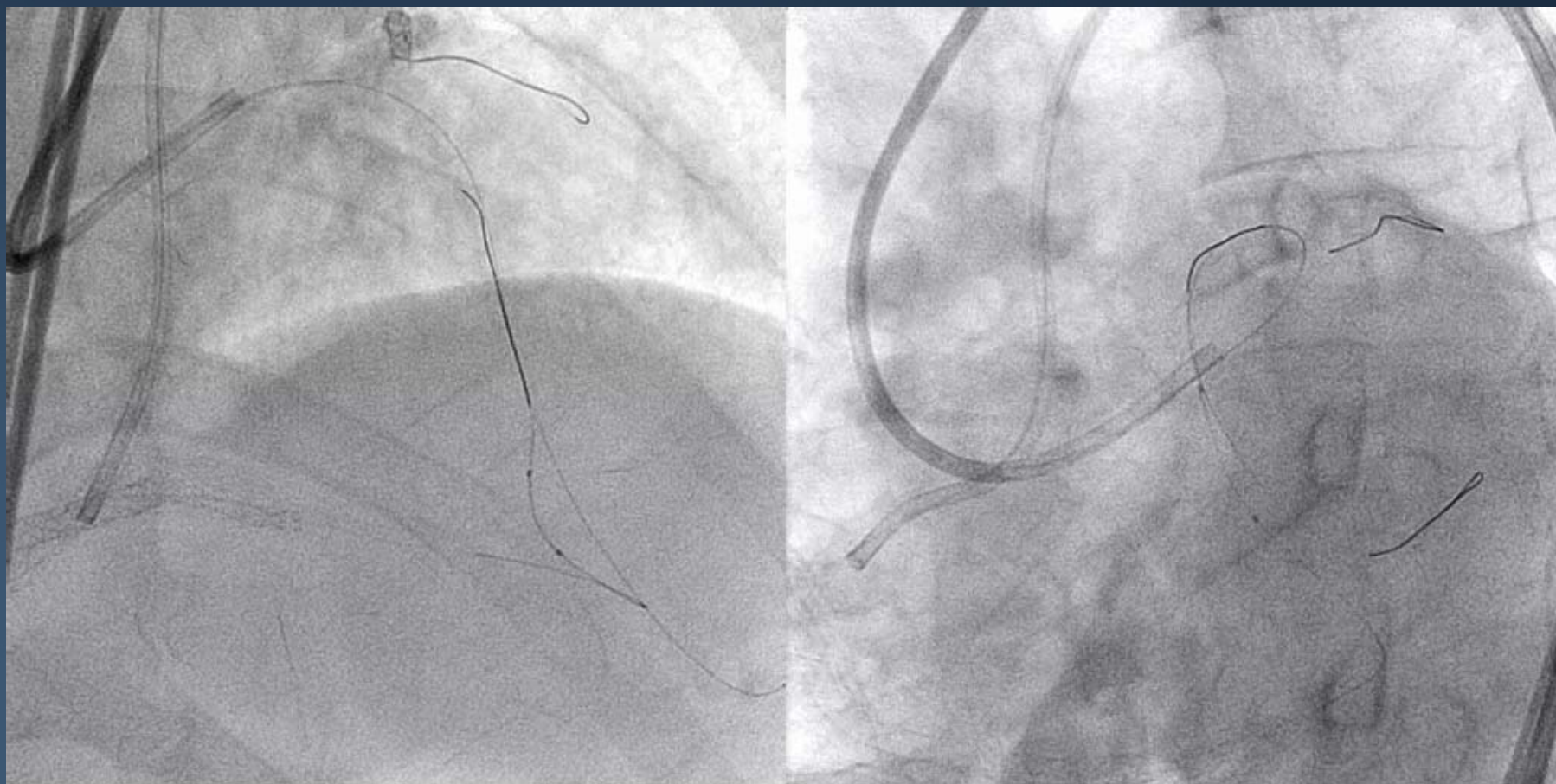
Intraplaque neovascular channels connect to vaso vasorum in adventitia



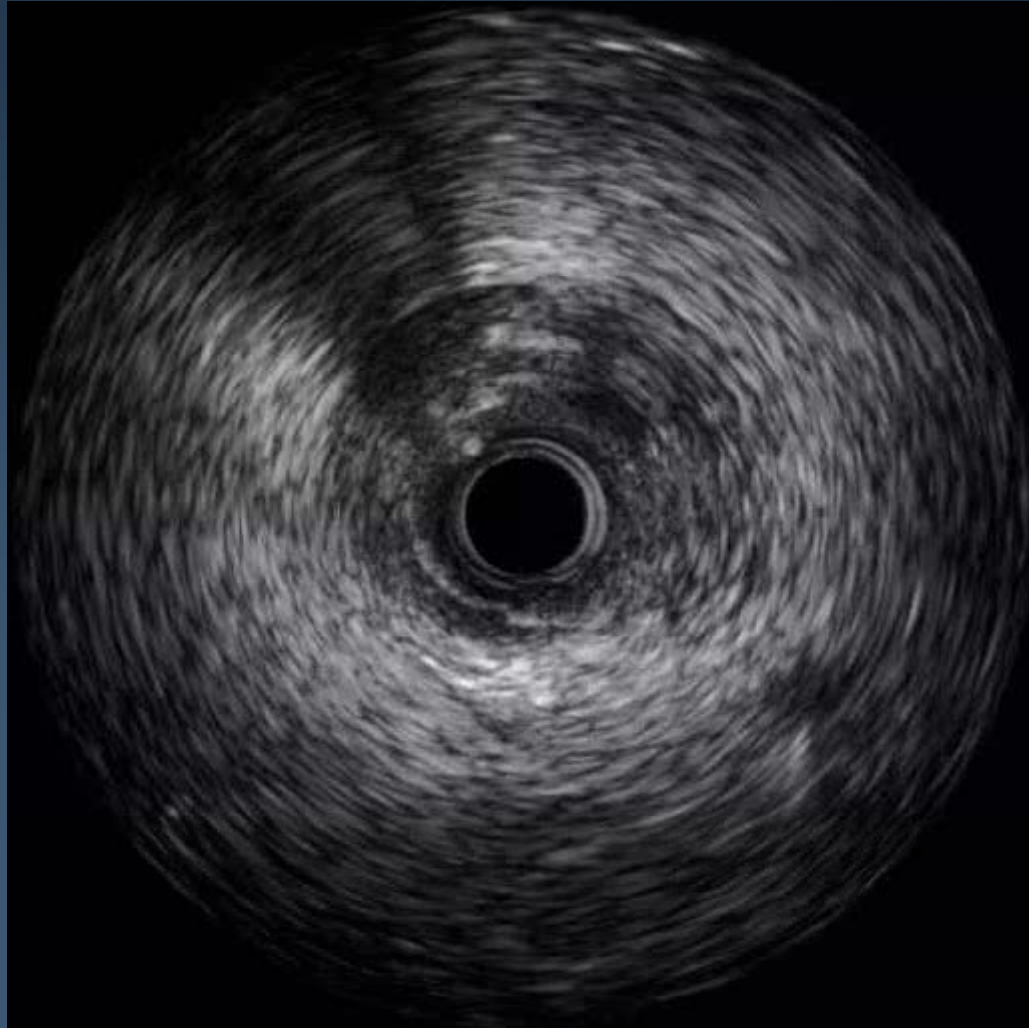
Pre



Post-Balloon



Post-Balloon IVUS

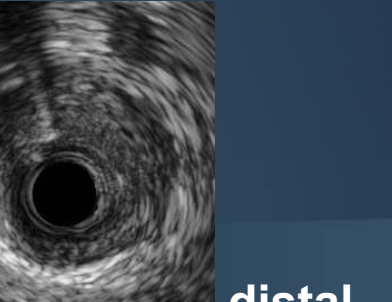
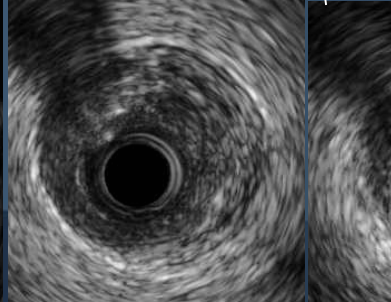
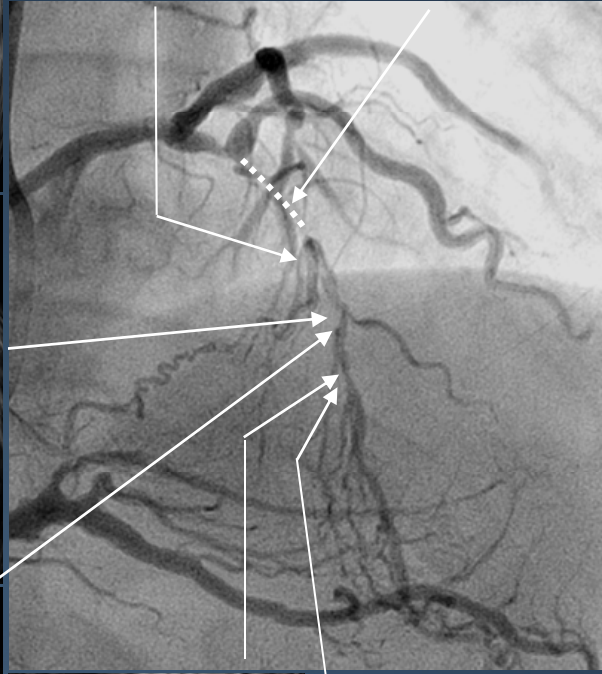
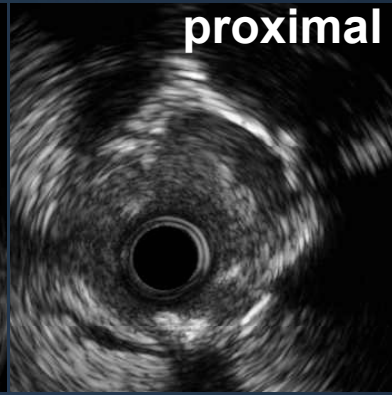
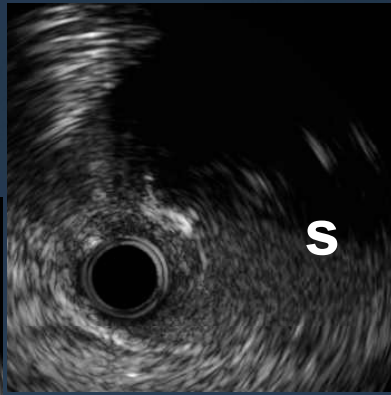
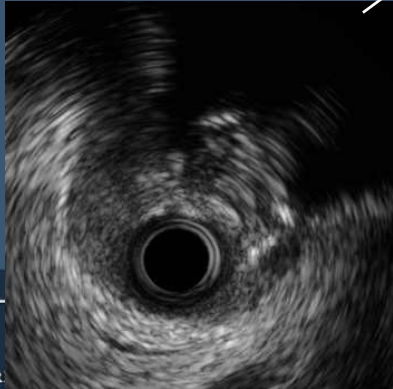
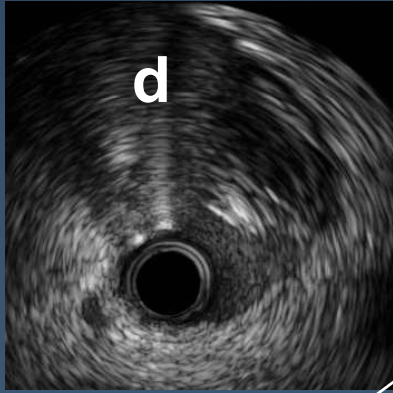
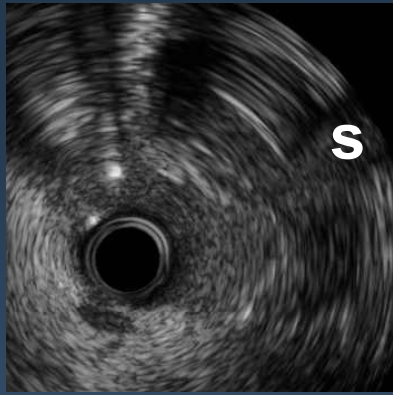


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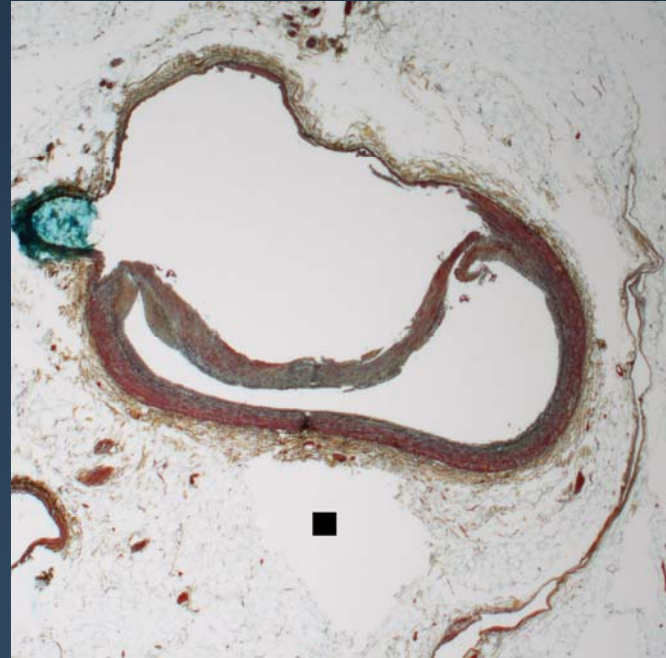


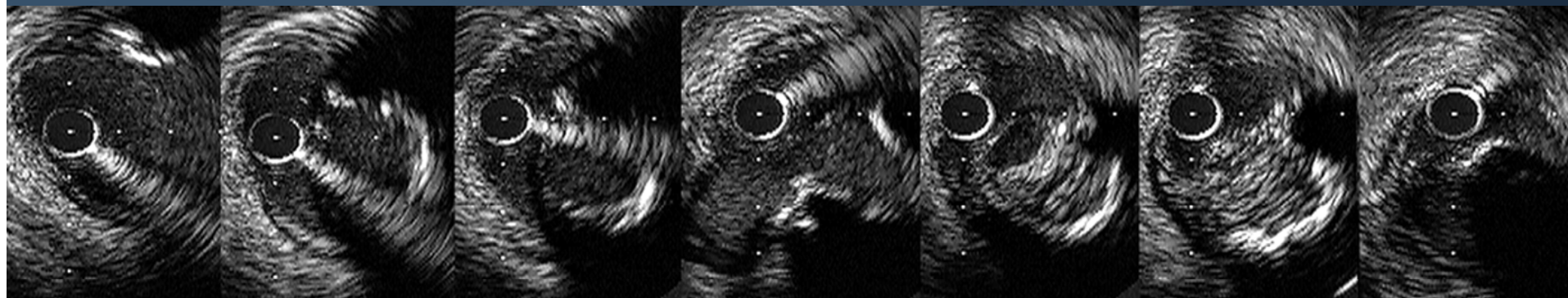
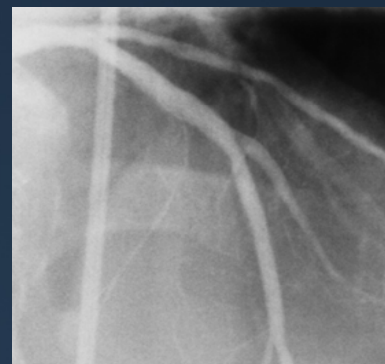
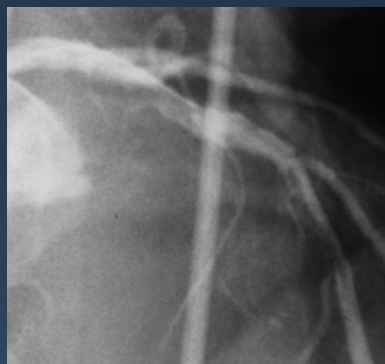
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Subintimal (False) Lumen



distal





0 → 4.0 → 24.0mm

**Why is being in the
“subintimal space or not”
important?**



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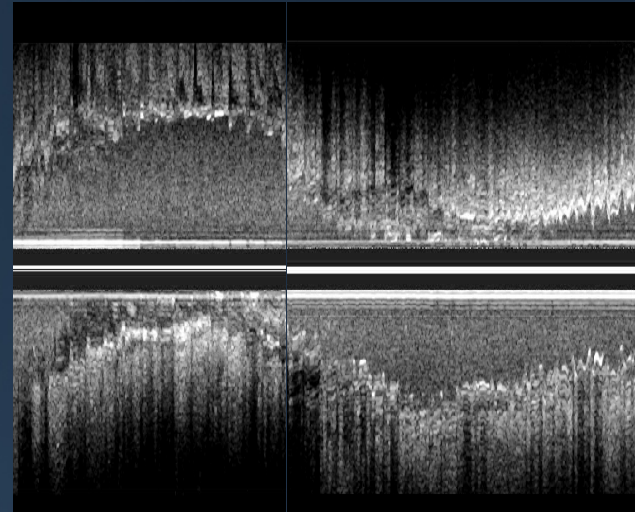
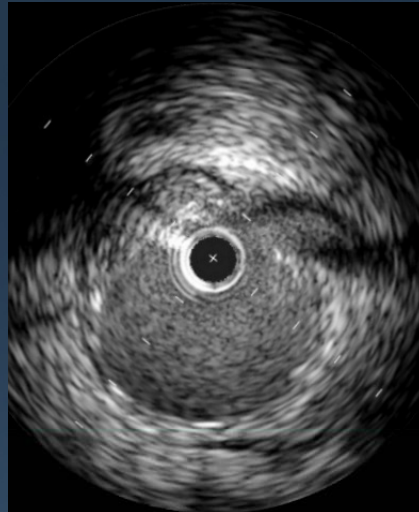


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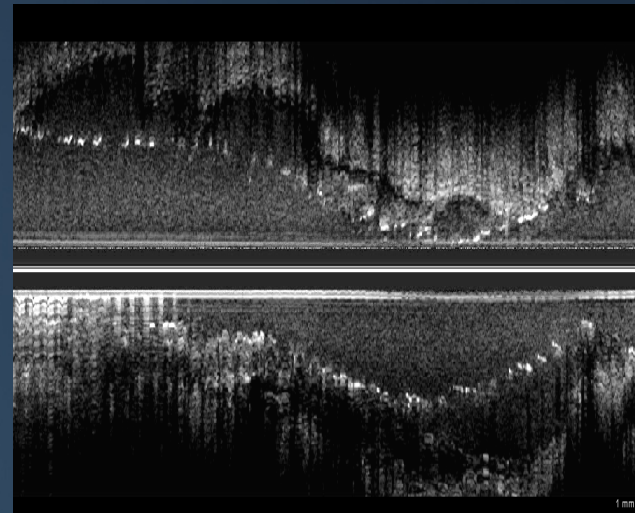
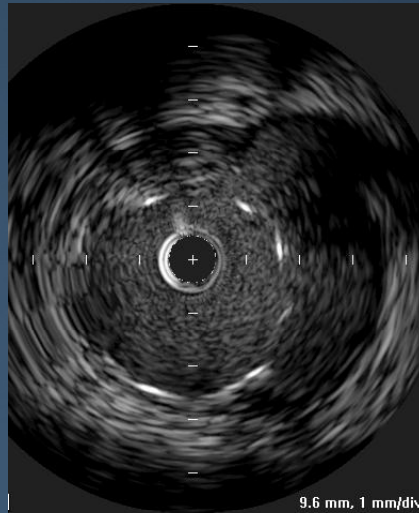
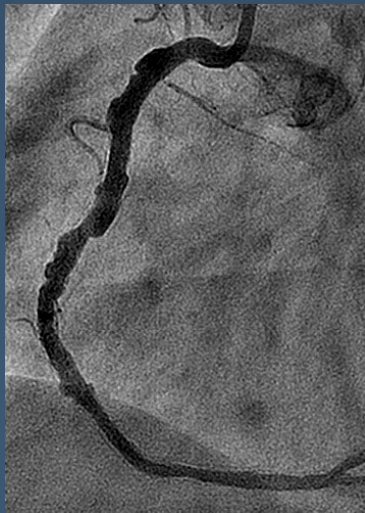
DES Stenting the Subintimal Space



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Follow-up



It is even more important to end the stent within the true lumen. Otherwise, flow to the distal vessel will be severely compromised.



Inside or Outside of Vessel (Adventitia)?



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Pre

Post-Stent

Final

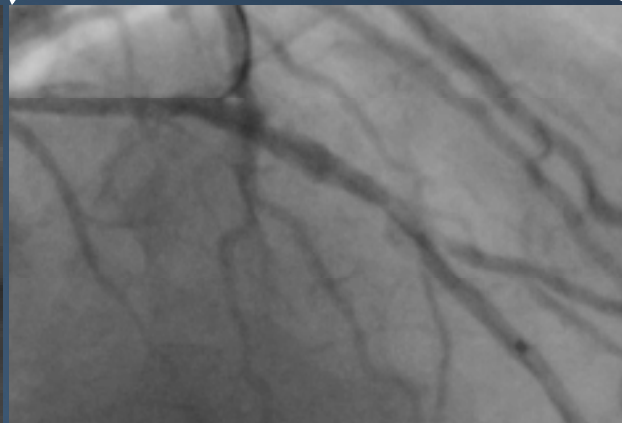
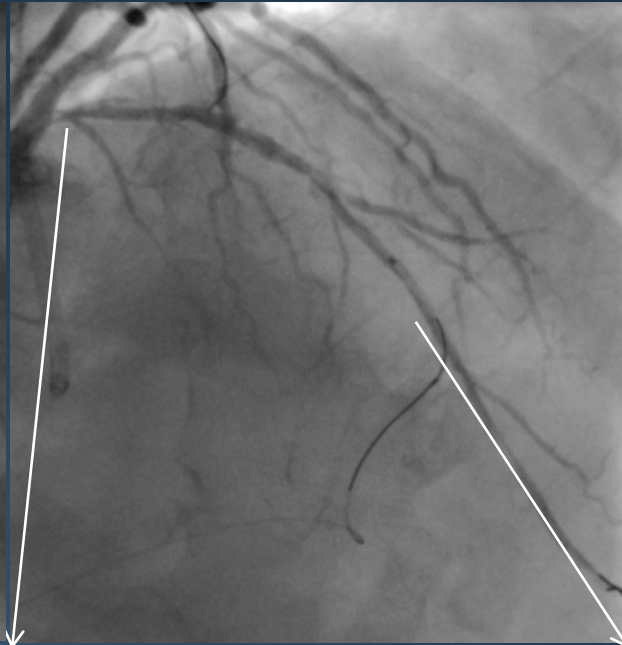
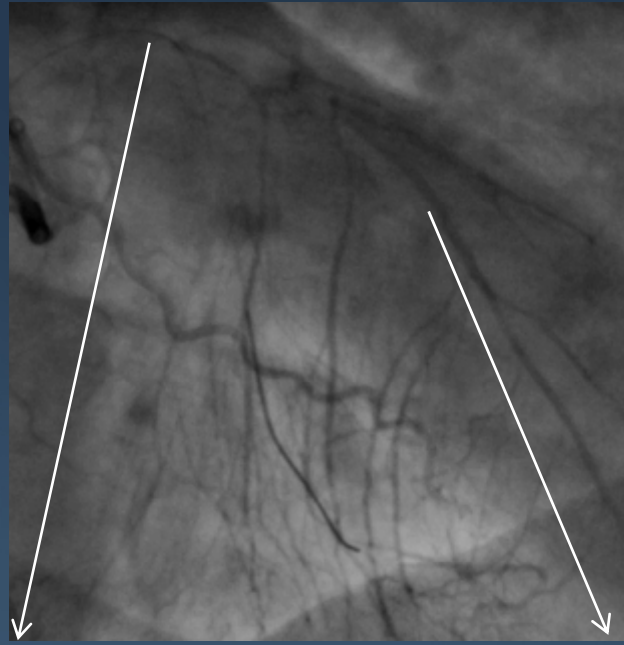
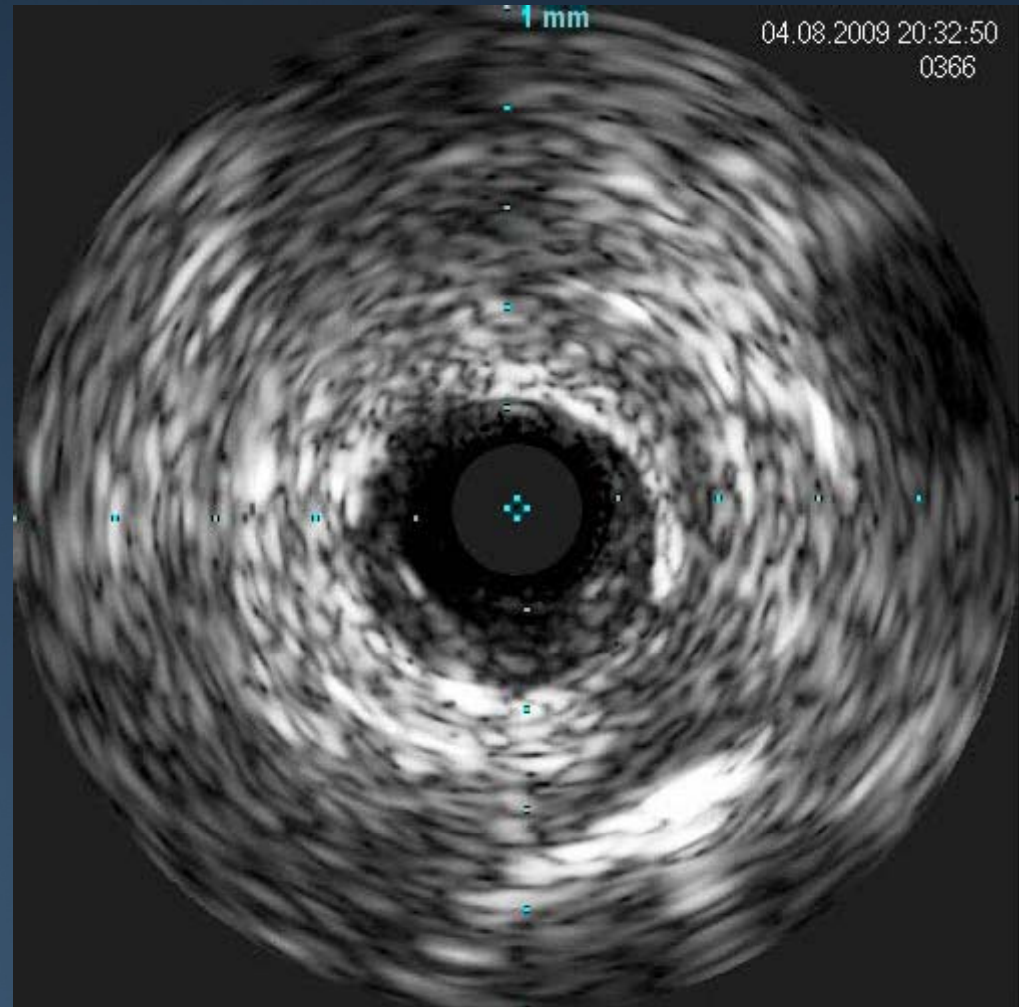
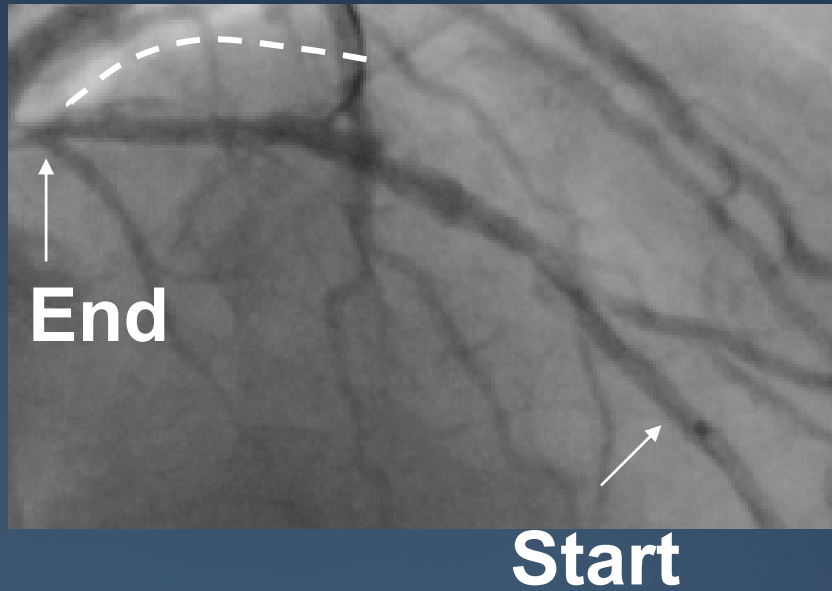
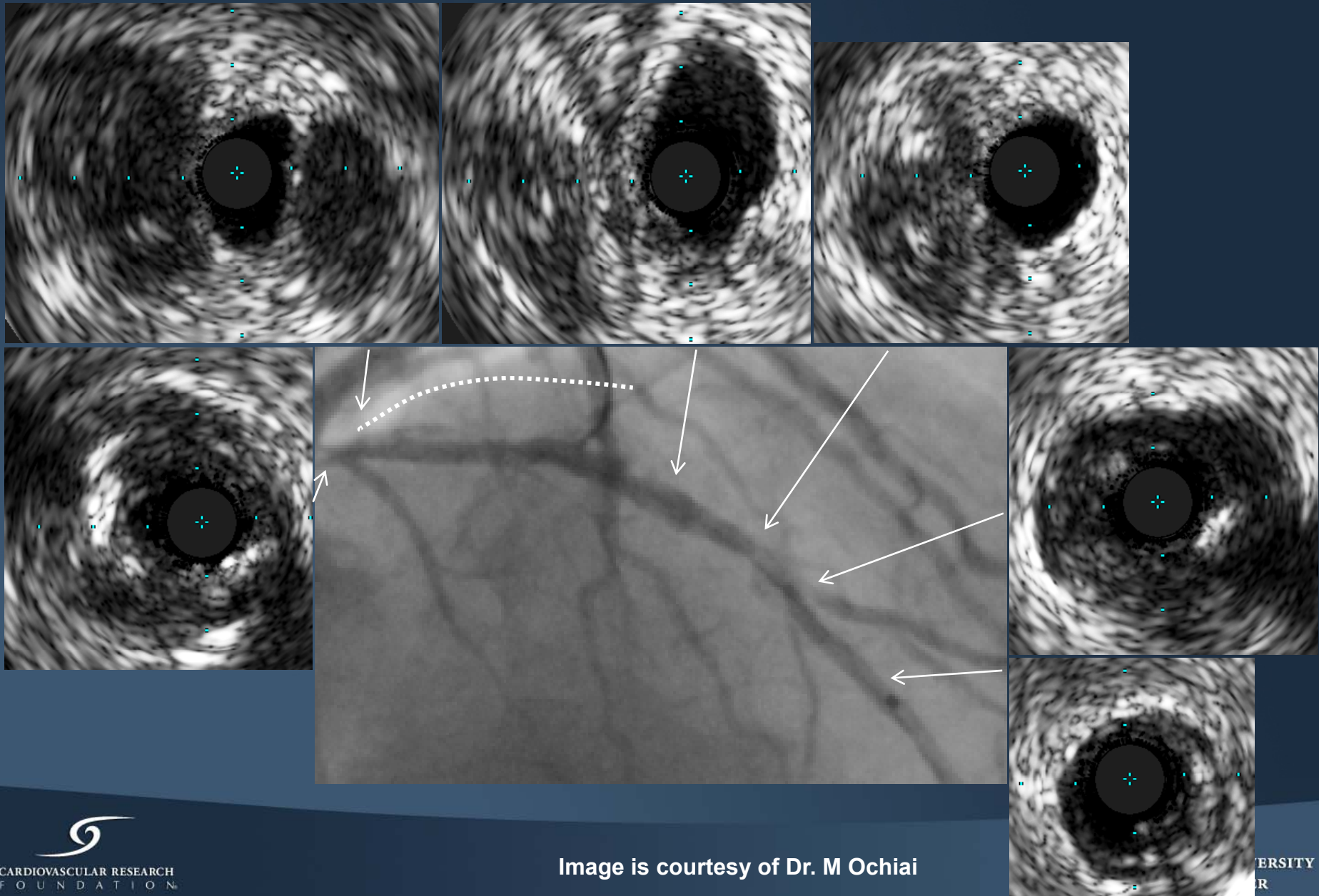


Image is courtesy of Dr. M Ochiai

Where are we?



Outside of Vessel (Adventitia)



Perivascular damage (Perforation)



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Extramural (Peri-adventitial) Hematoma?

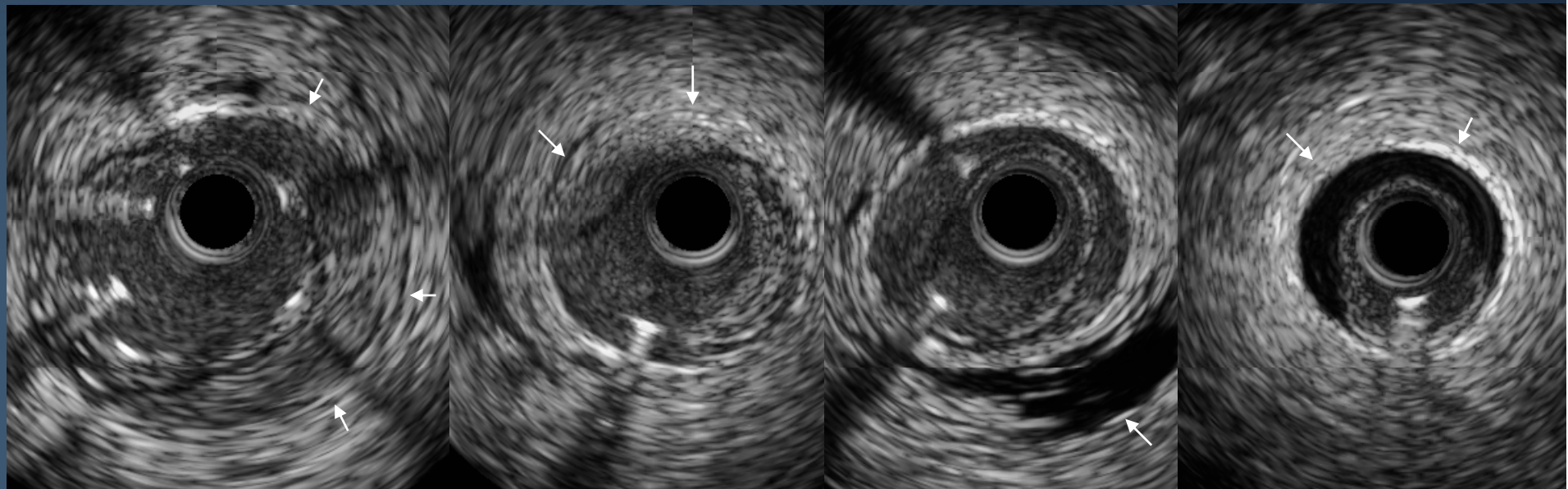
Proximal

Distal

**Extramural
hematoma**

**Edge
dissection**

Intramural hematoma



Penetrating the proximal fibrous cap



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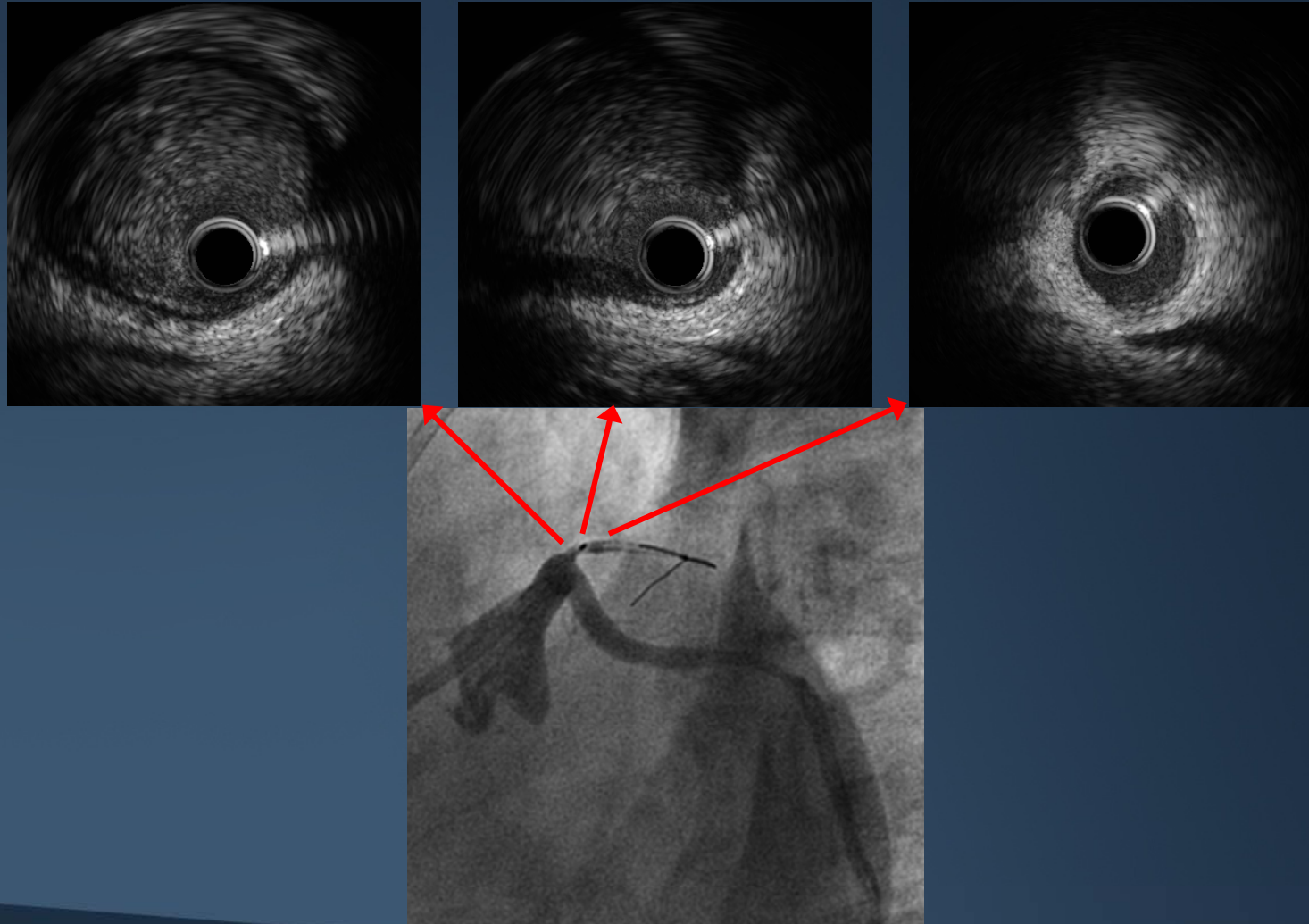


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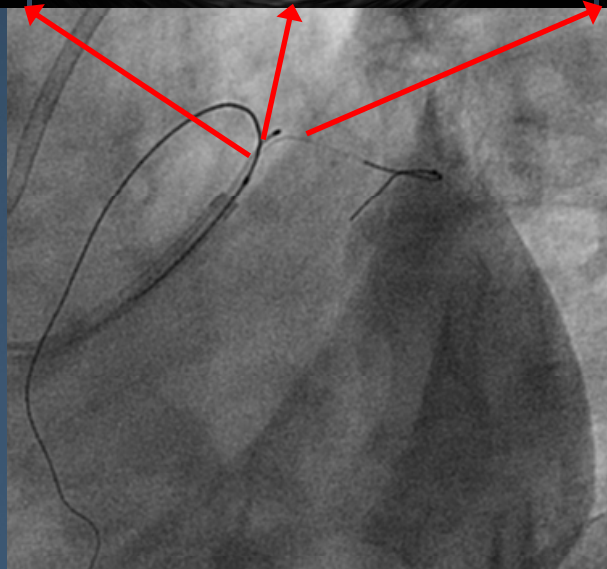
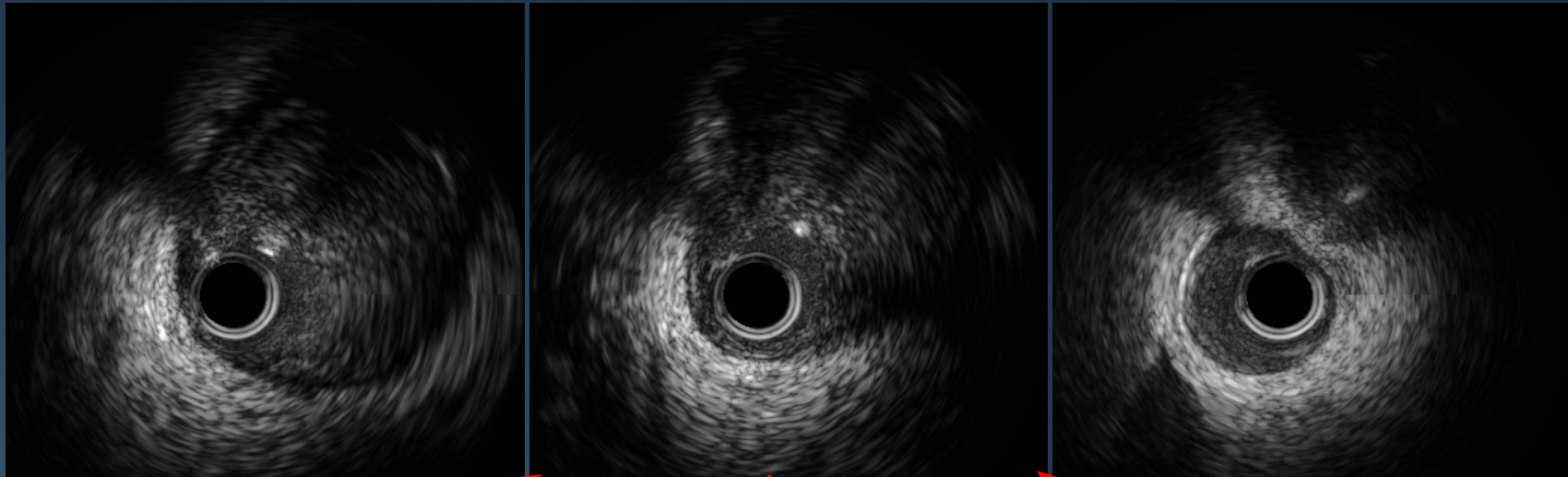
IVUS-Guided CTO Recanalization



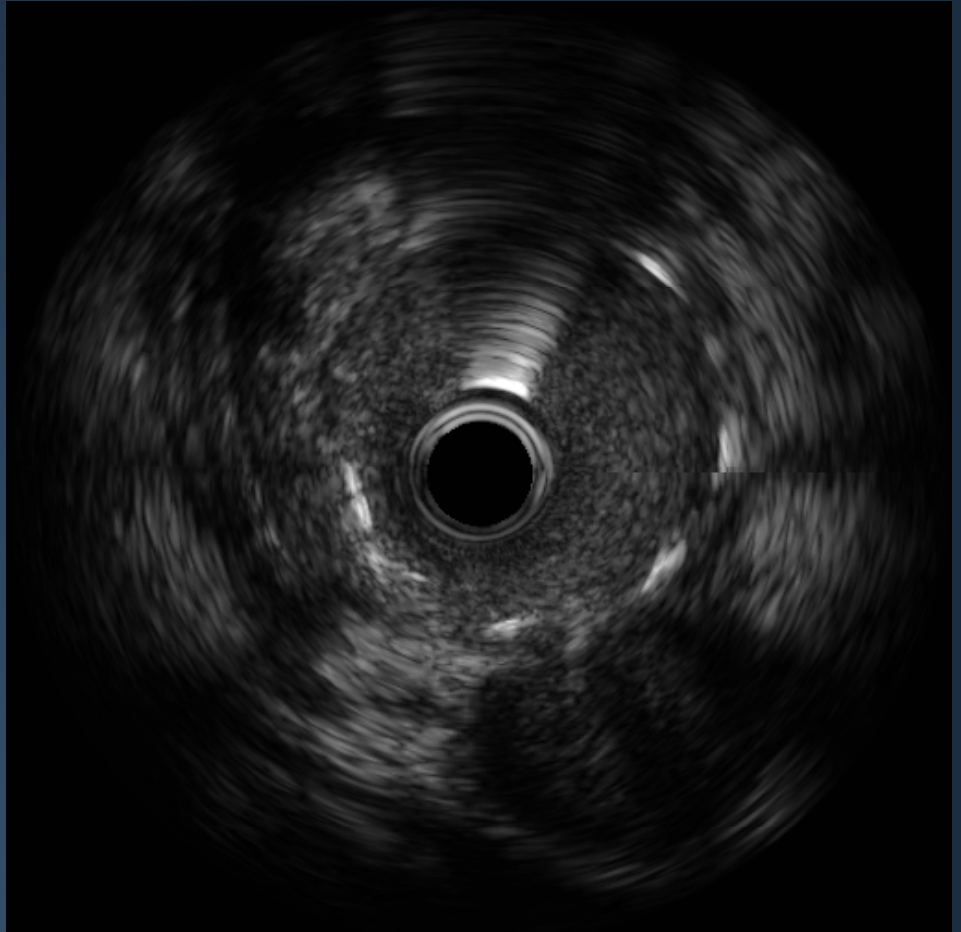
Proper Entry Point Marking by Transducer During Pullback from Small Proximal D-1 into Stump of LAD



Confirmation of Optimal Penetration



Final Result

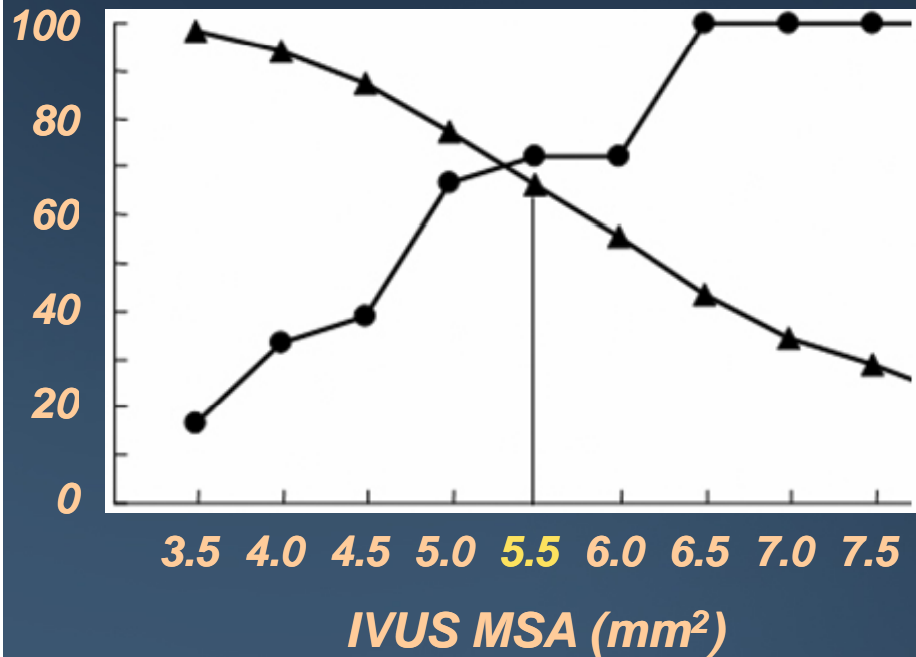


**Optimal Stent Expansion
(although this has not been
addressed specifically in CTO
lesions. . .)**

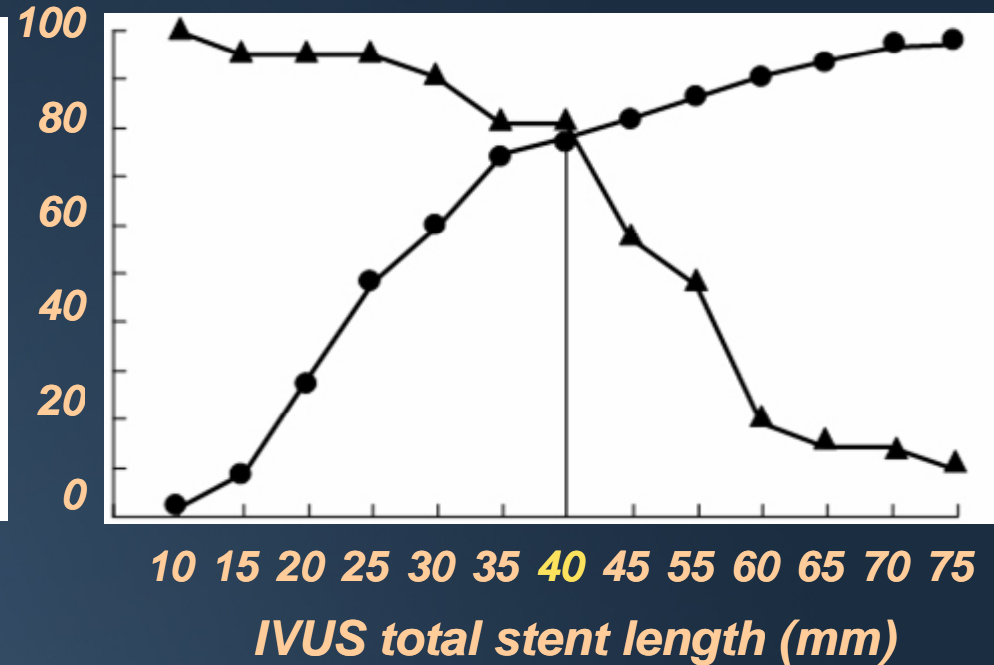


Predictors of angiographic restenosis in 550 pts with 670 native lesions treated with Cypher stents

Angiographic restenosis (%)

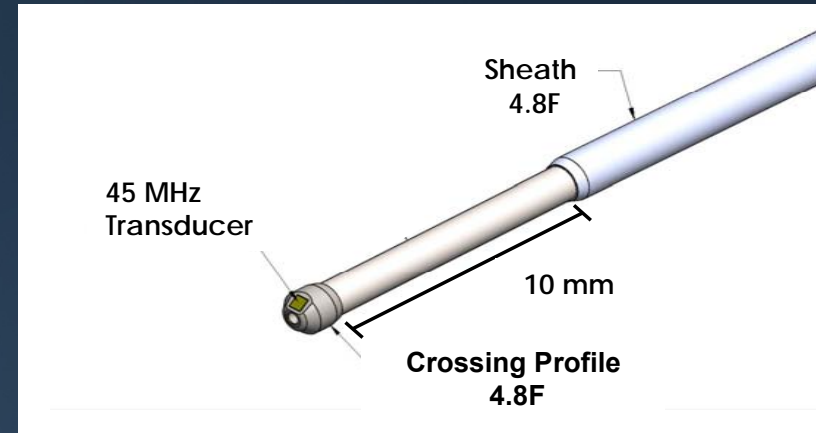
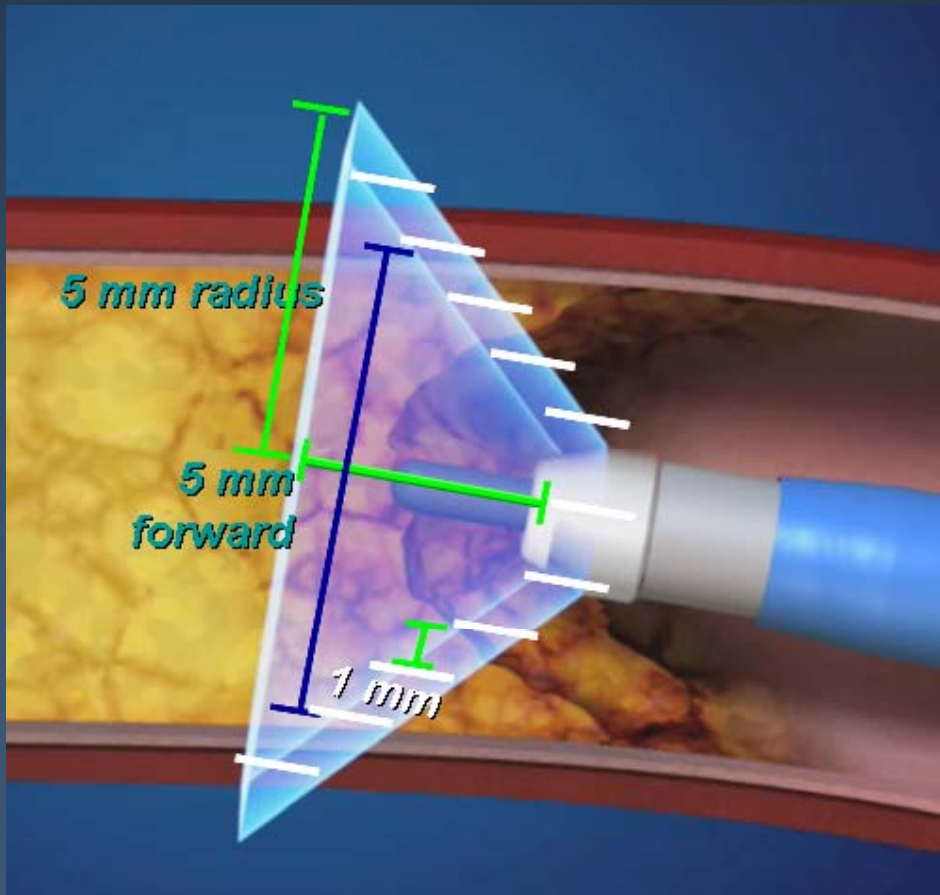


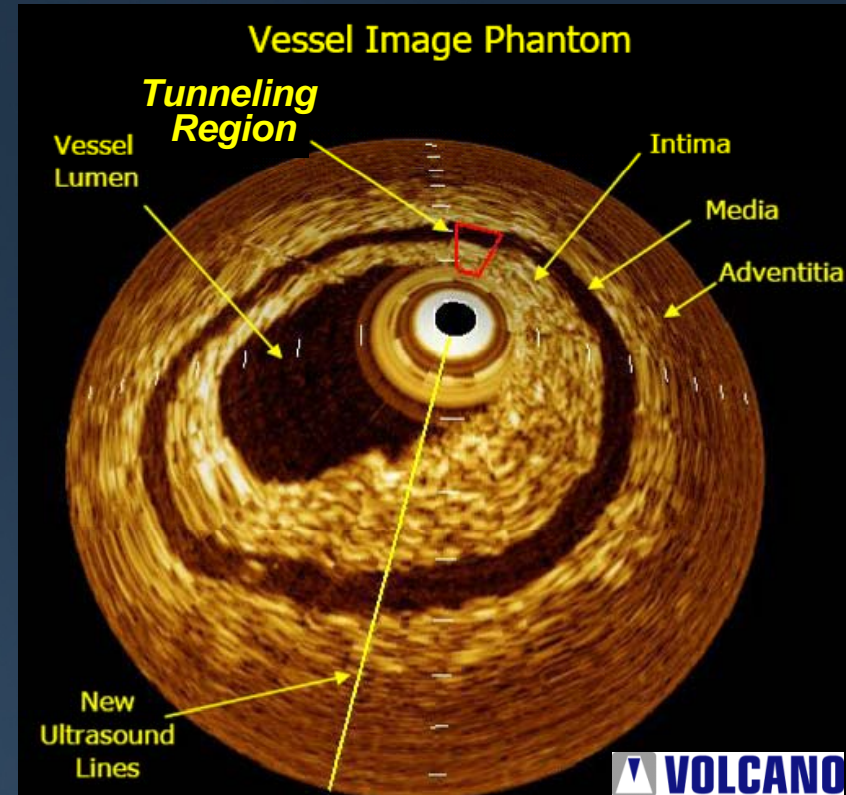
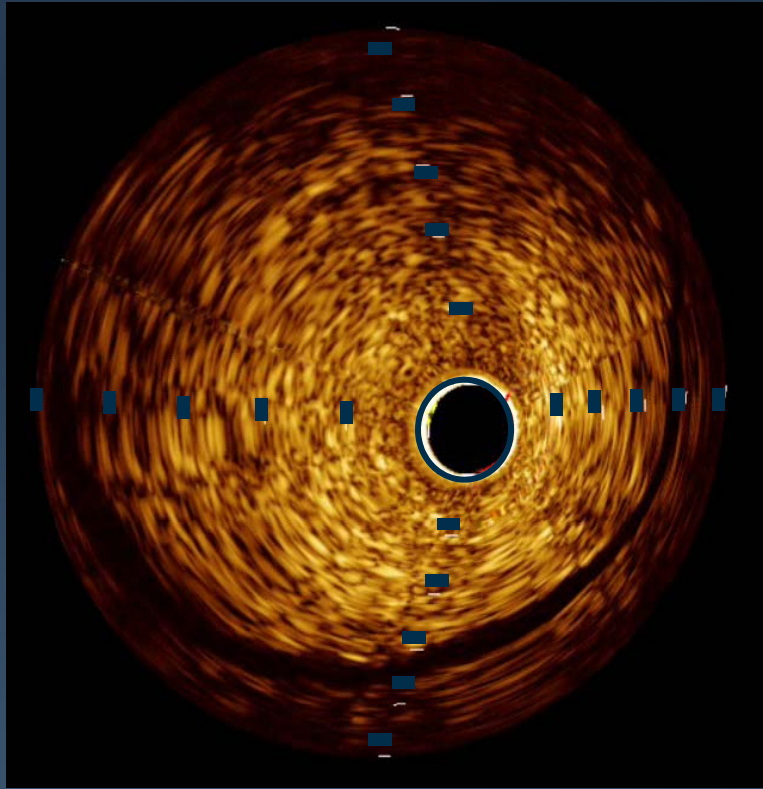
Angiographic restenosis (%)



	<5.5mm ²	≥5.5mm ²
≤40mm	2.4%	0.4%
>40mm	17.7%	8.6%

Forward Looking IVUS for CTO





Forward-looking IVUS with RF Tunneling :

- **CTO Visualization:** IVUS imaging will show proximal CTO cap and vessel borders
- **Steering:** Rotating the tip of the catheter will steer the RF electrode to desired target while the angled RF beam will allow the operator to steer away from vessel walls
- **Tissue Tunneling:** RF waves will tunnel through CTO tissue

