

Management of In-Stent Chronic Total Occlusions

Kevin J. Croce MD, PhD

**Director CTO and Complex
Coronary Artery Intervention Program**

Director BWH Translational Discovery Laboratory

Harvard Medical School



@kevinjamescroce

kcroce@bwh.harvard.edu



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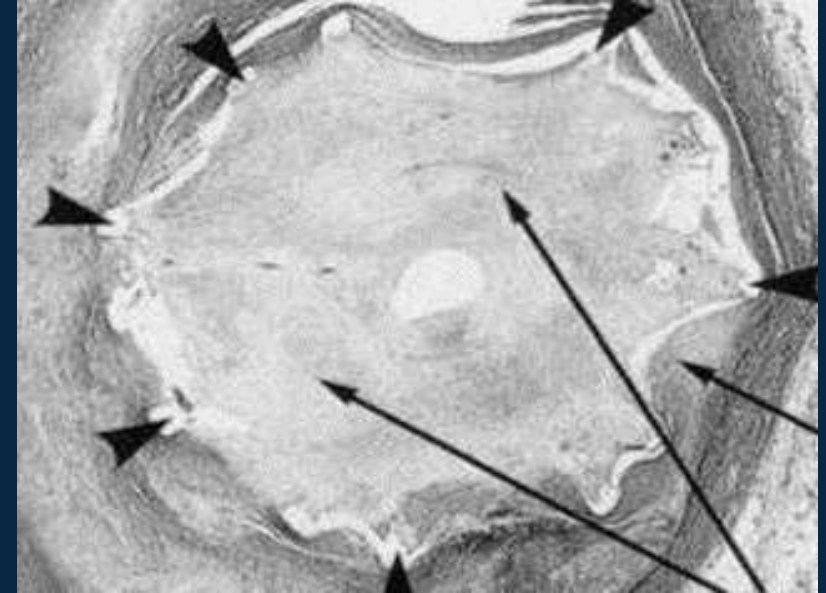
Background

Occlusive ISR is an uncommon cause of CTOs (<5%)

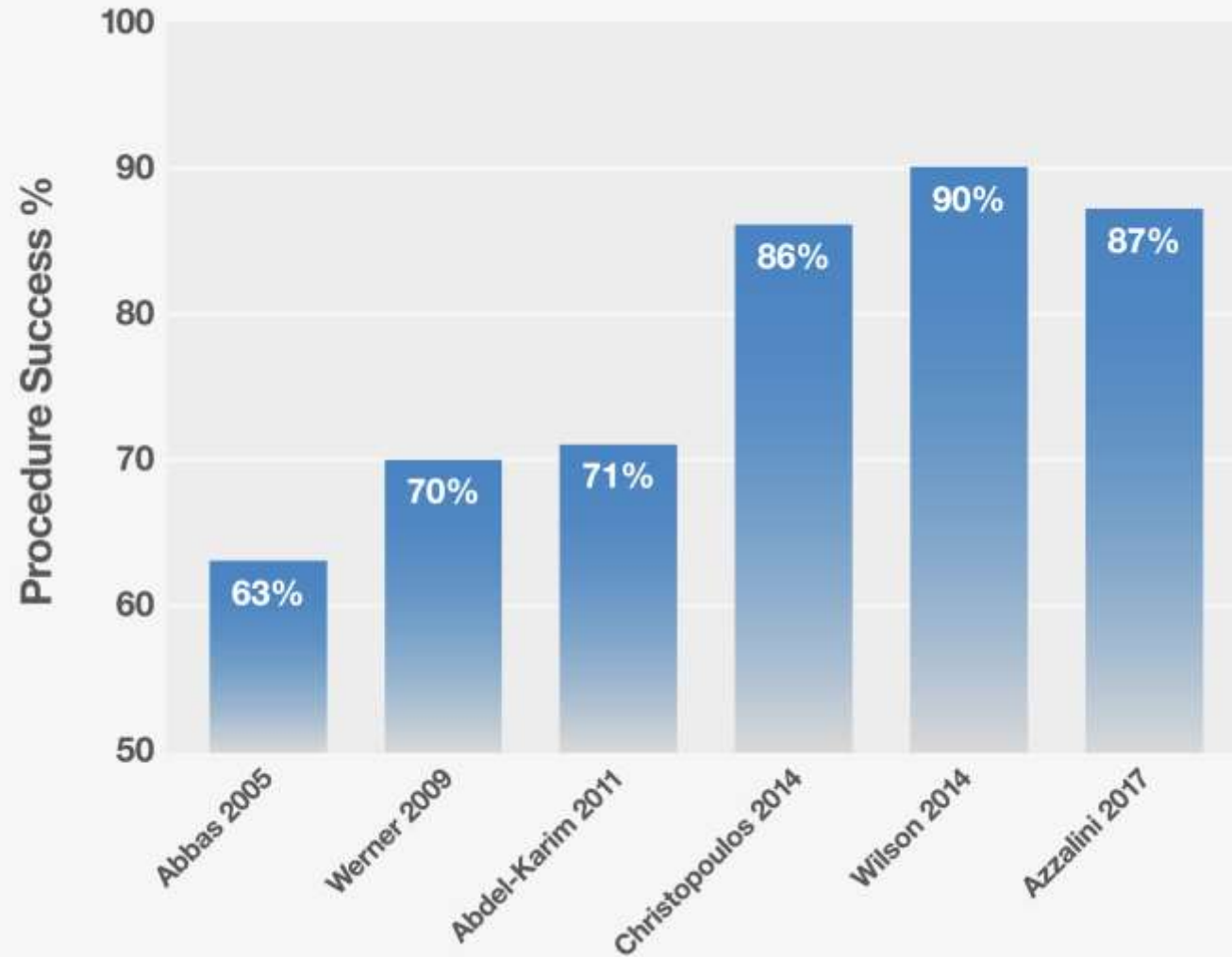
Most are symptomatic

Presence of stent(s) within CTO

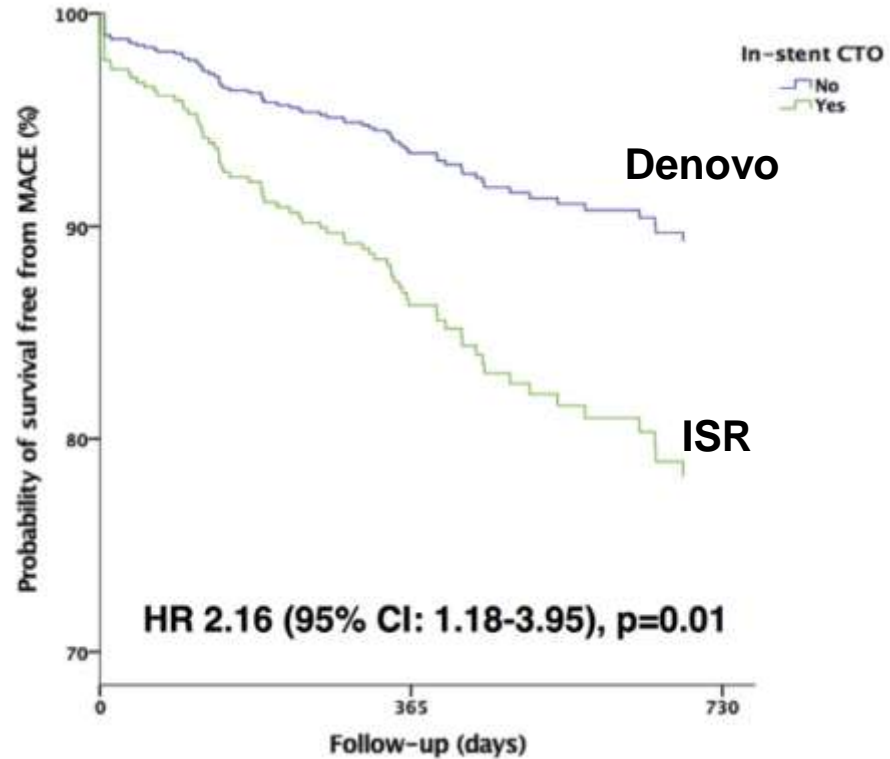
- 'Roadmap' (decreases anatomic ambiguity)
- Protection against perforation



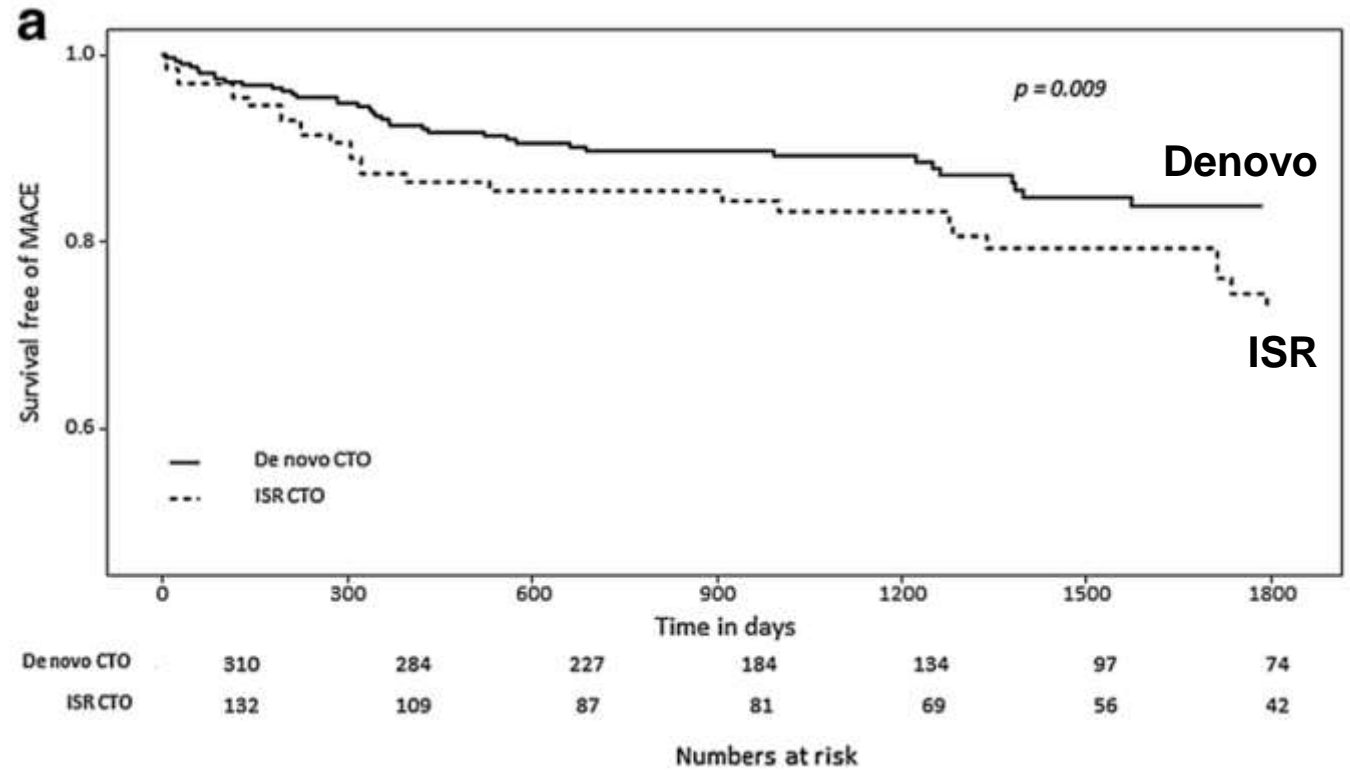
ISR CTO Success Rates



ISR CTO - Higher Long-Term MACE

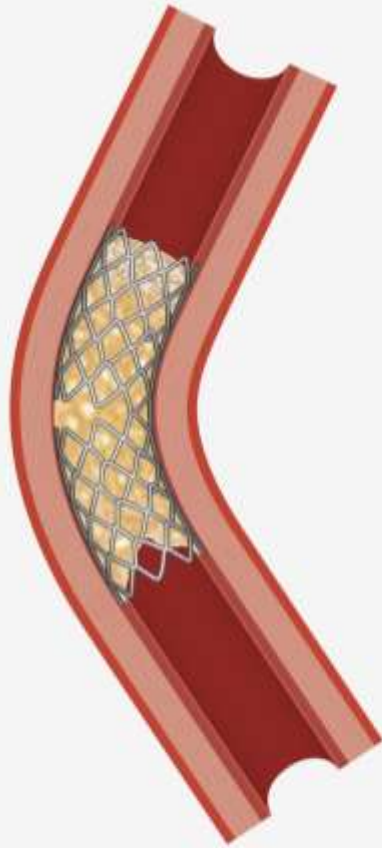


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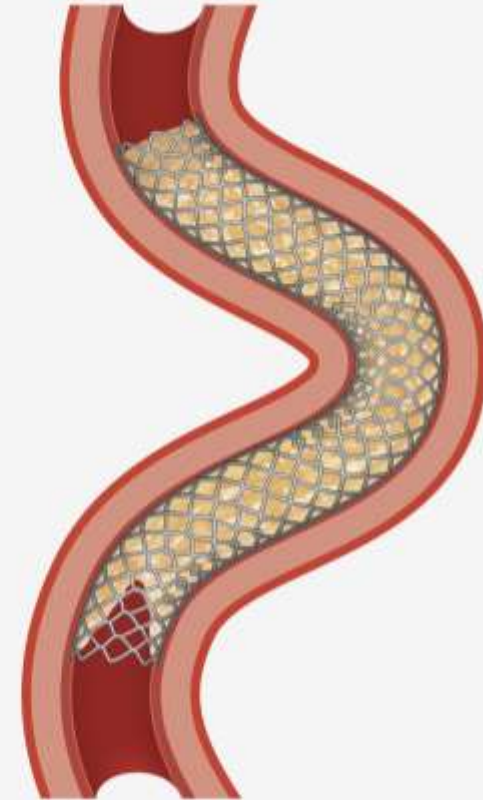
Predictors of in-stent CTO Procedural Failure



Stent fracture



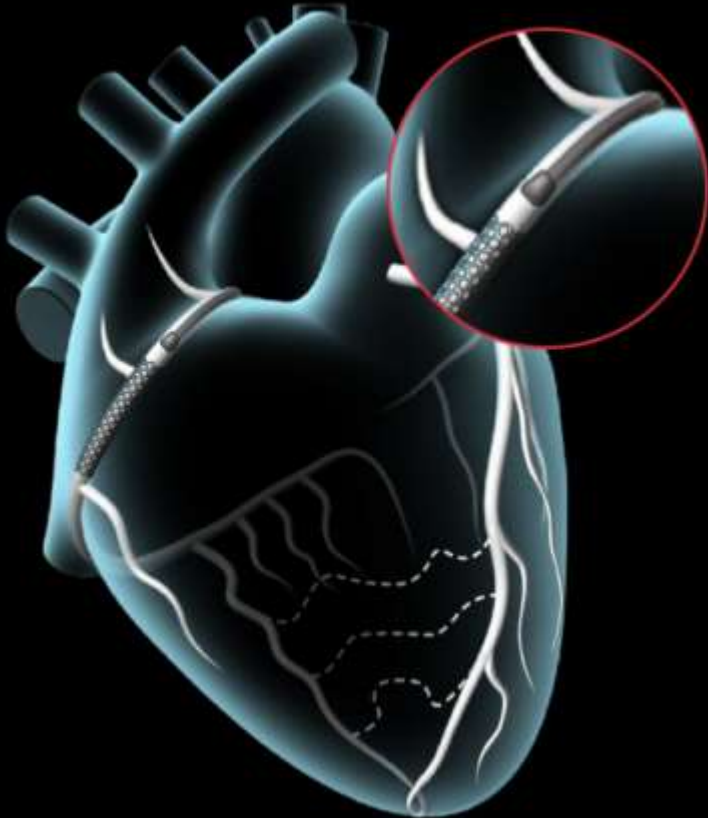
Stent under expansion



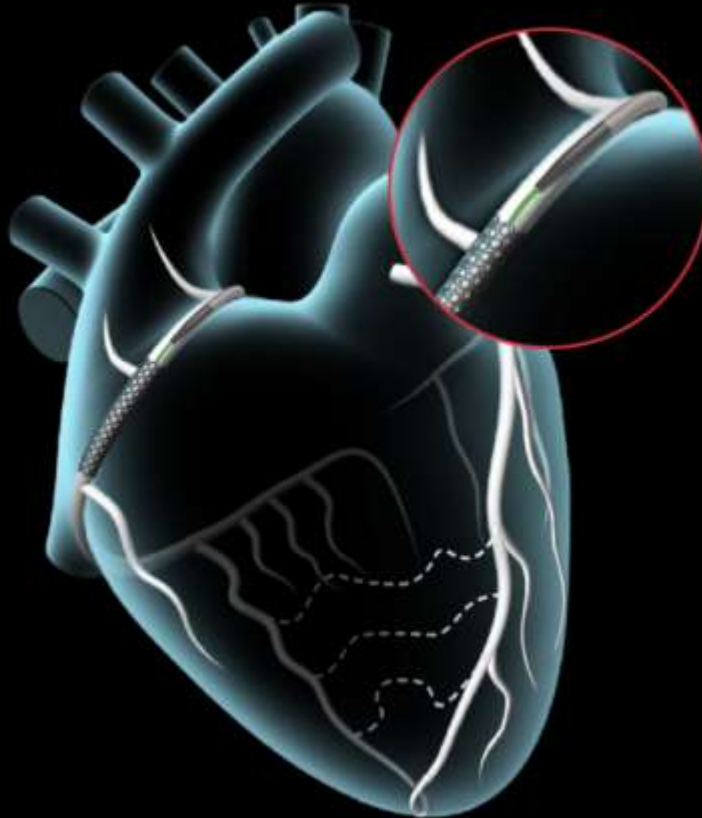
Marked tortuosity

Hybrid Approach to Within-Stent CTO

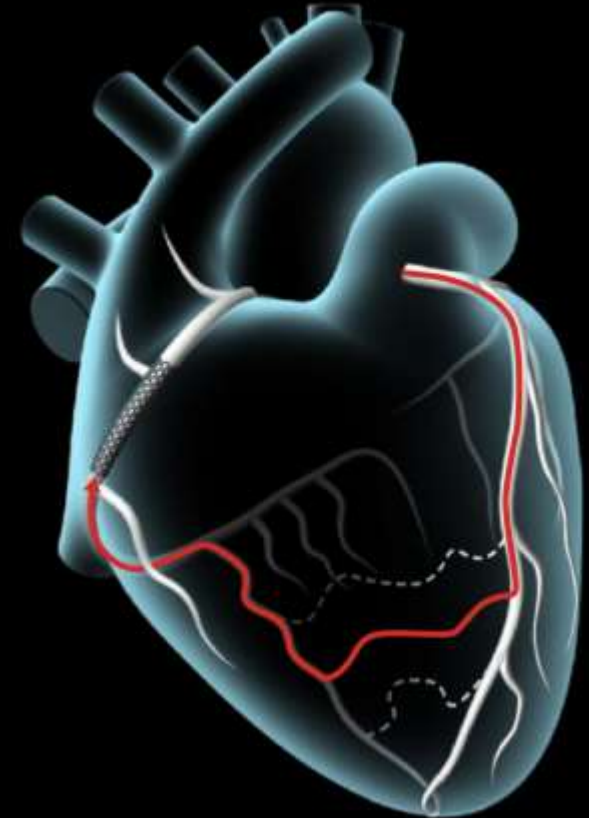
1st Strategy - CrossBoss



2nd Strategy - wire escalation*



3rd Strategy - retrograde



* Consider as first line strategy if proximal cap tapered, highly angulated entry into the CTO, very severe proximal cap disease or proximal cap begins before stent margin

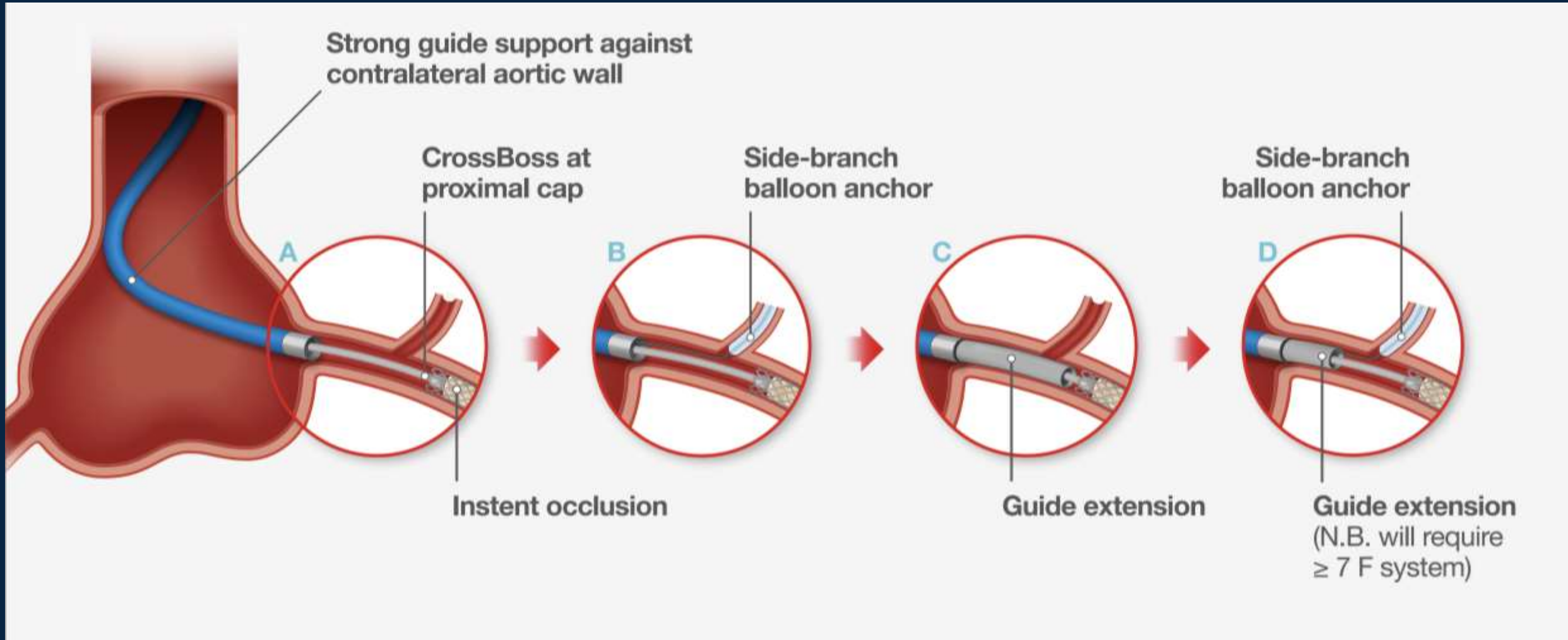
Factors that favour initial use of the CrossBoss

- Proximal cap located within the stent
- Blunt proximal cap
- Distal cap located within the stent

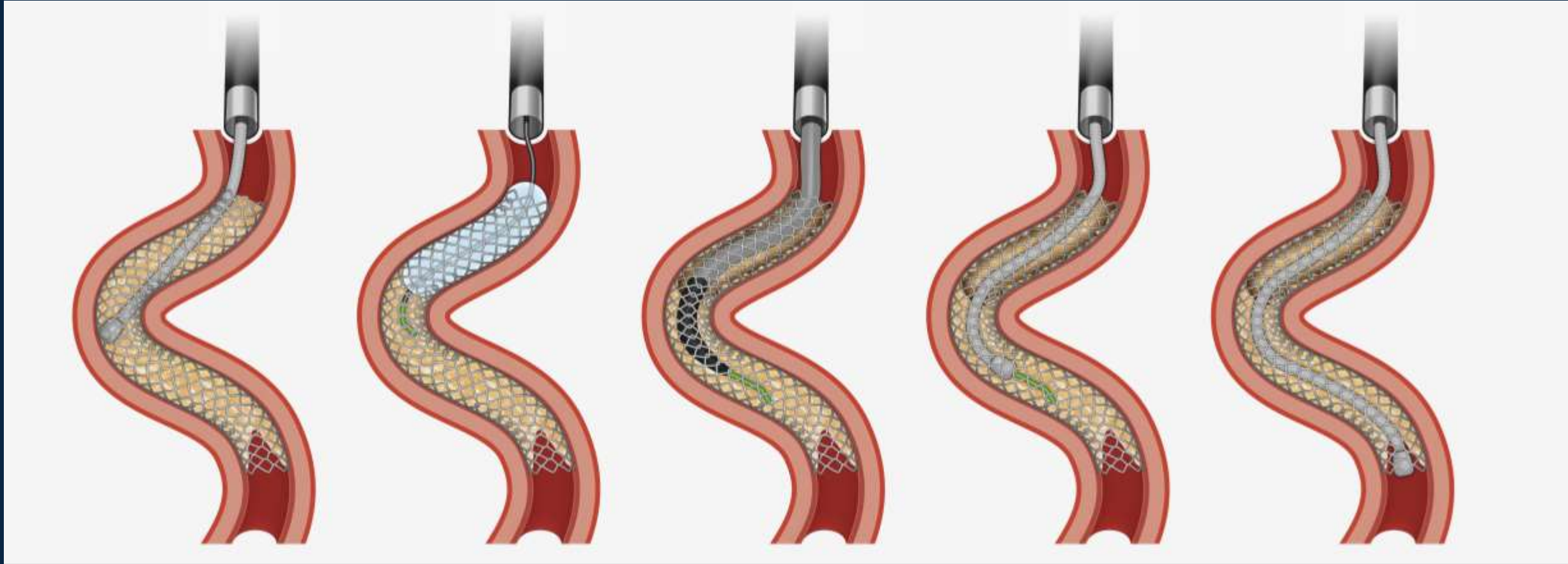
Factors that favour initial use of AWE

- Tapered proximal cap
- Proximal cap that begins before the stent or there is significant disease at the inlet.
- Highly angulated entry into the CTO
- Stent fracture or underexpansion at the inlet
- Very resistant proximal cap

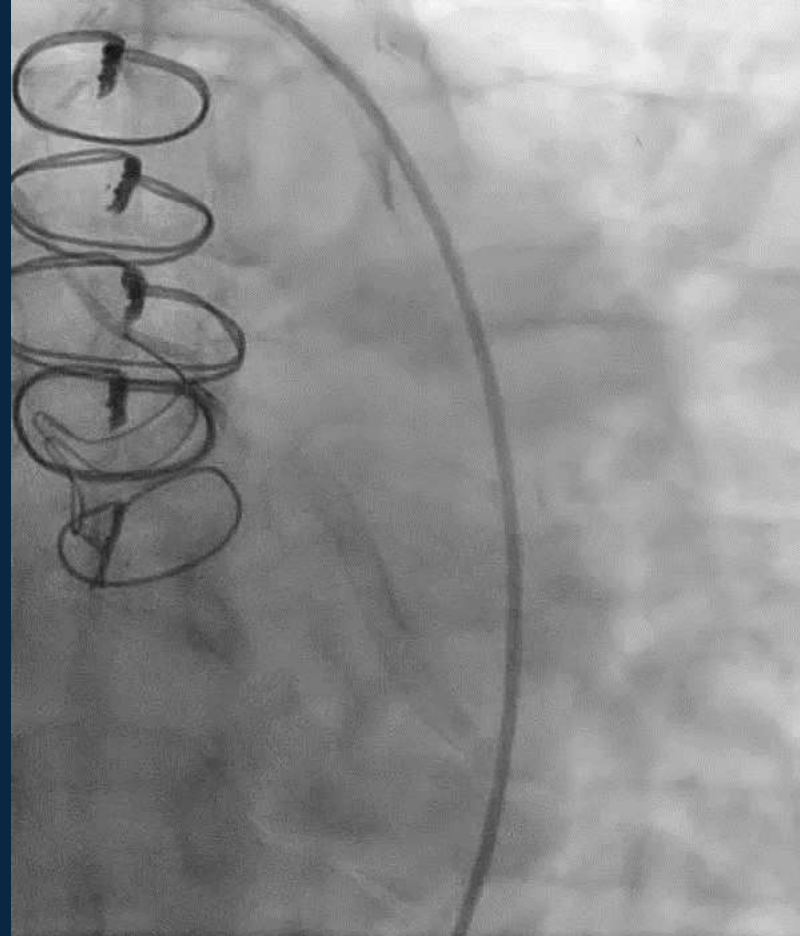
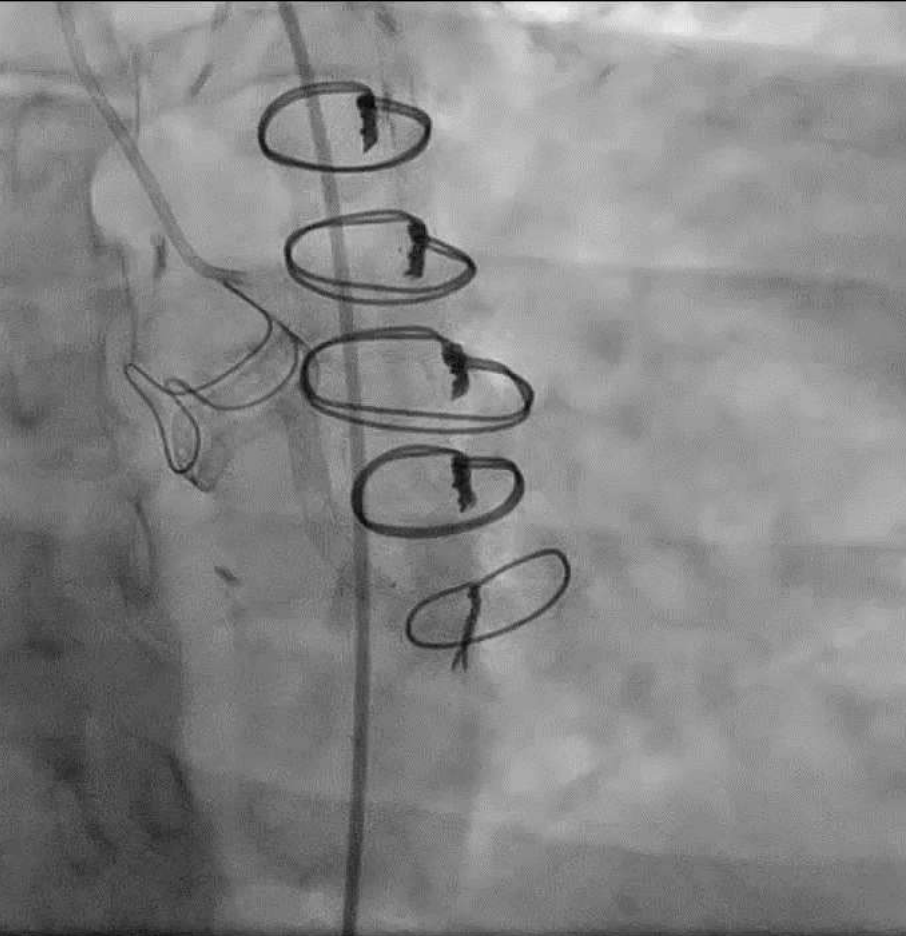
Algorithm for Escalating CrossBoss Back-Up



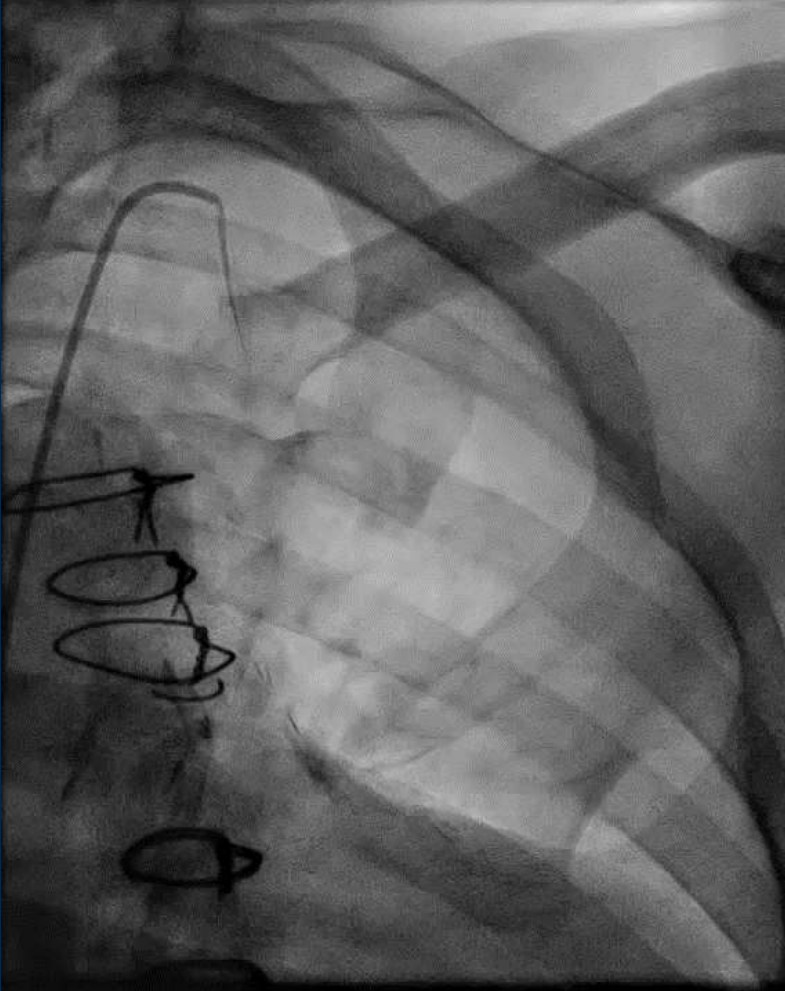
Overcoming CrossBoss Failure Within Tortuous In-Stent CTO Segments



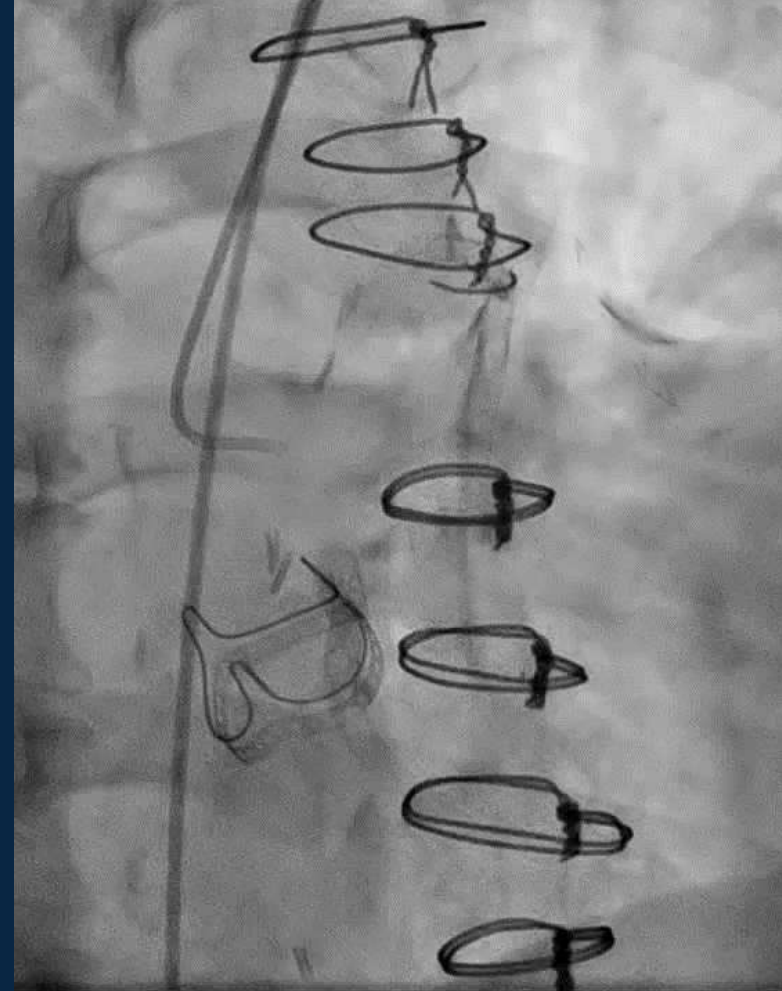
- 68 year old male
- CABG 2007
- Redo sternotomy 2019 for AVR
- ACS



Diagnostic Angiogram



- Patent LIMA

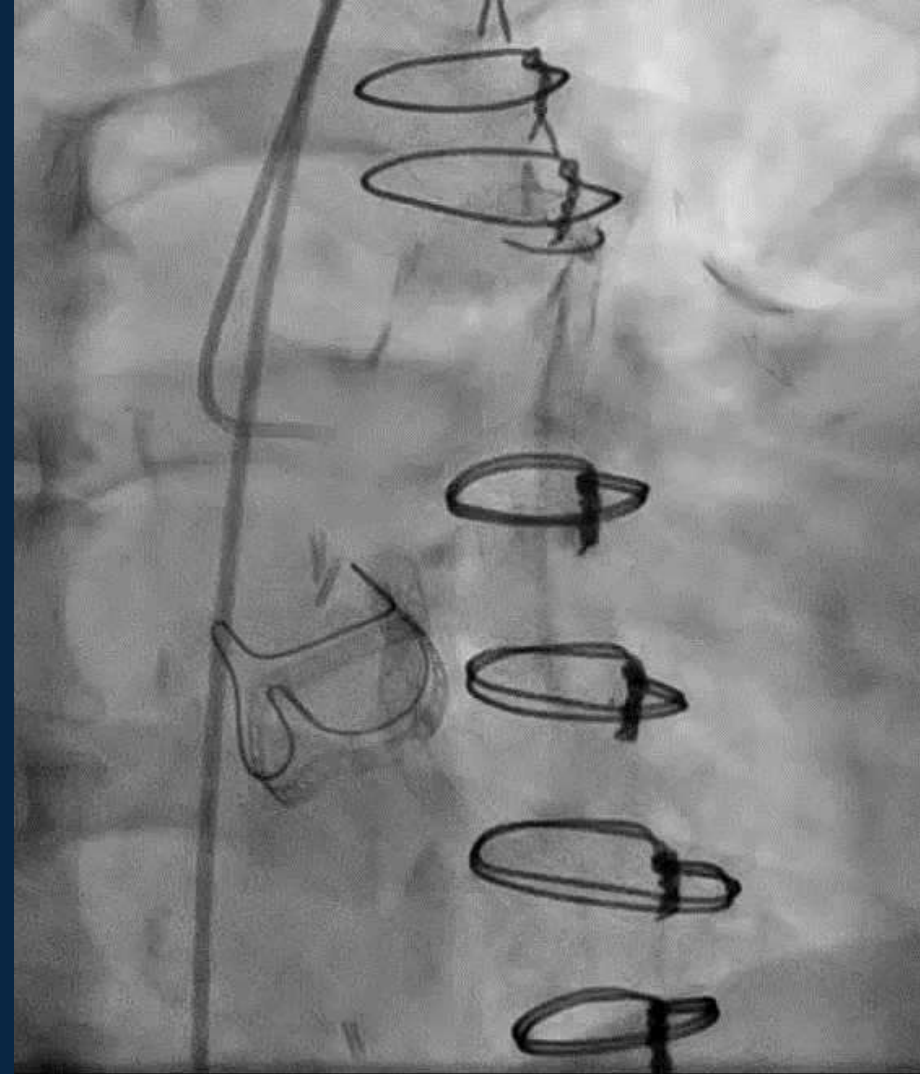
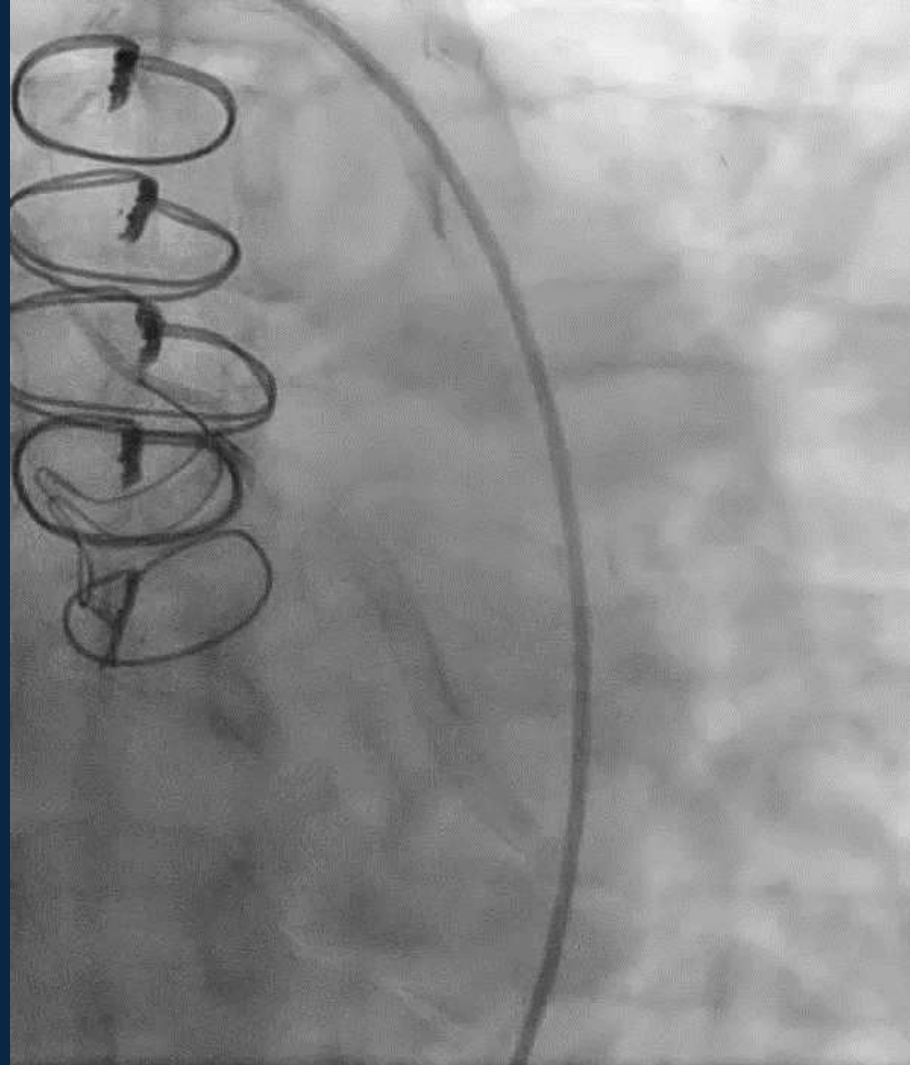


- Culprit VG-OM
- Multilayer DES - thrombus

LCX CTO PCI

Plan

- Dual injection
- Cross boss
- AWE
- Retrograde option

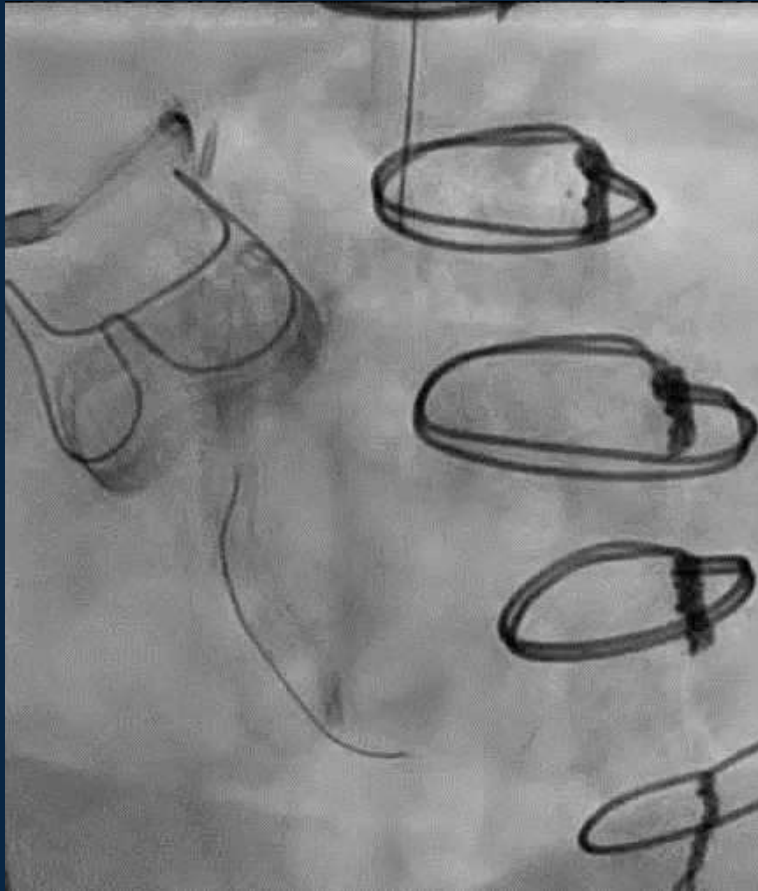


Cross Boss Stalled \Rightarrow Antegrade wire escalation:

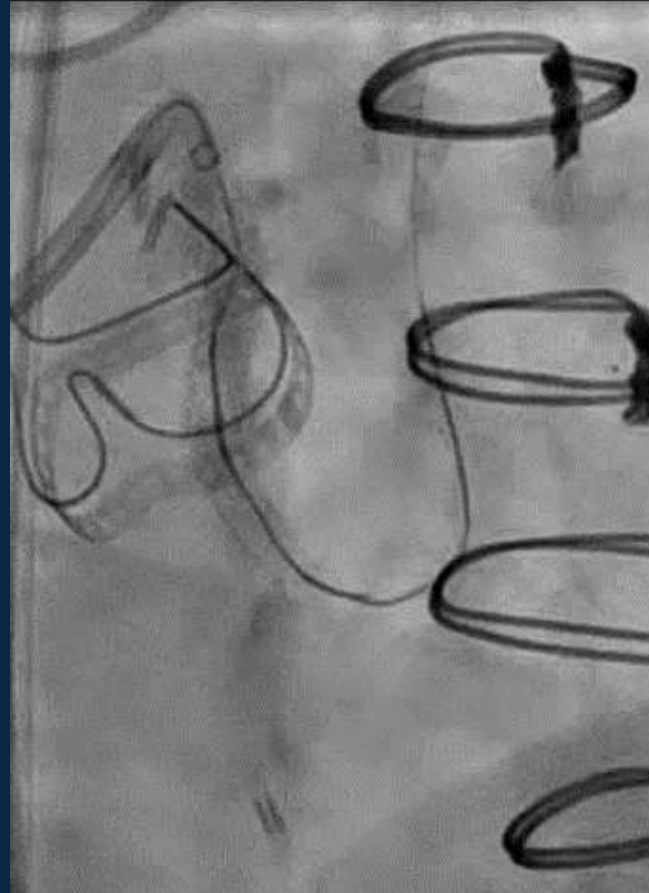
Resistant proximal Cap - Pilot 200, Mongo, Gaia 3

Turnpike / Spiral = no cross - swap to caravel

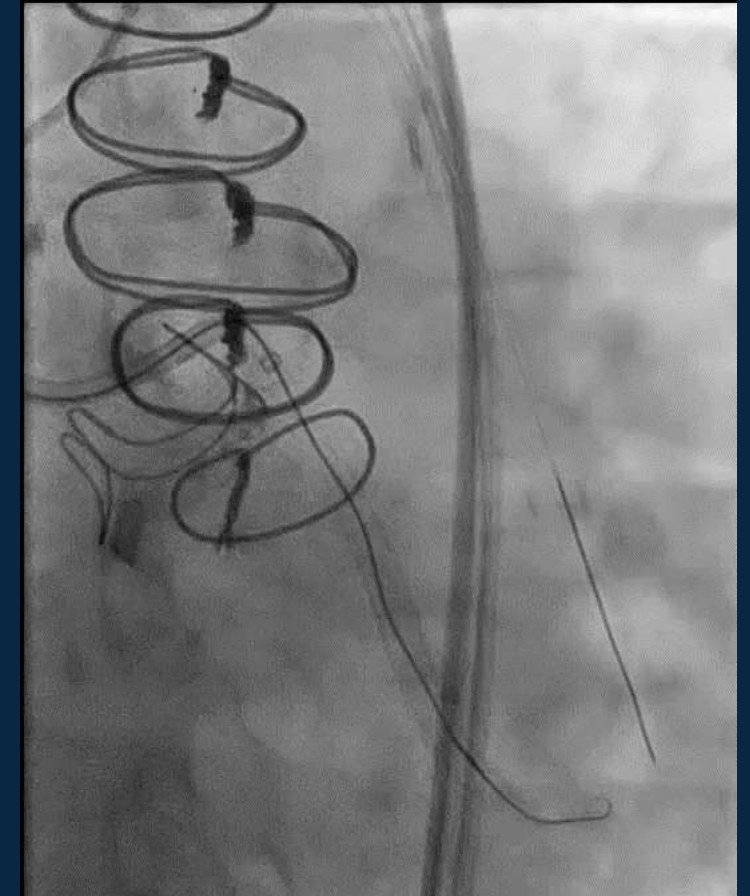
Off target



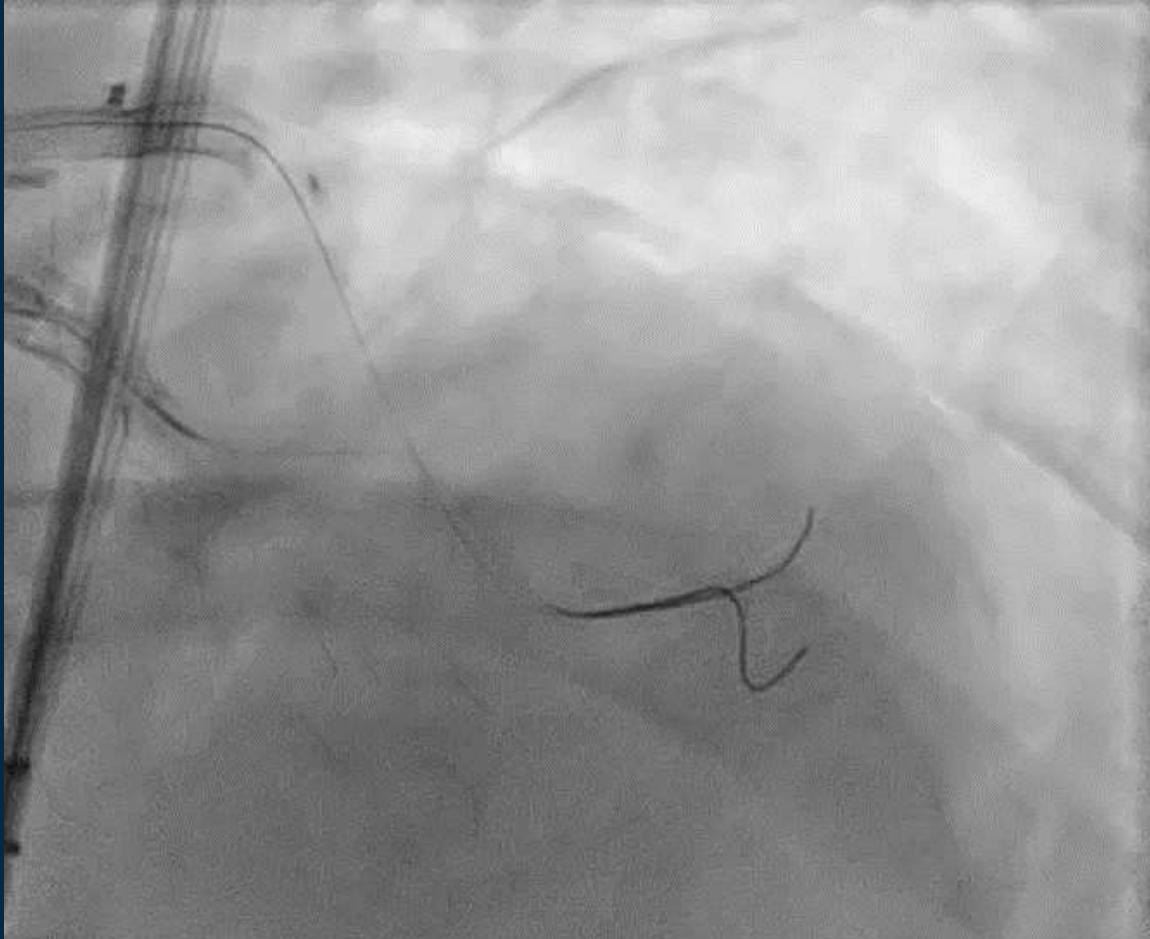
Marker wire



Resistant distal cap



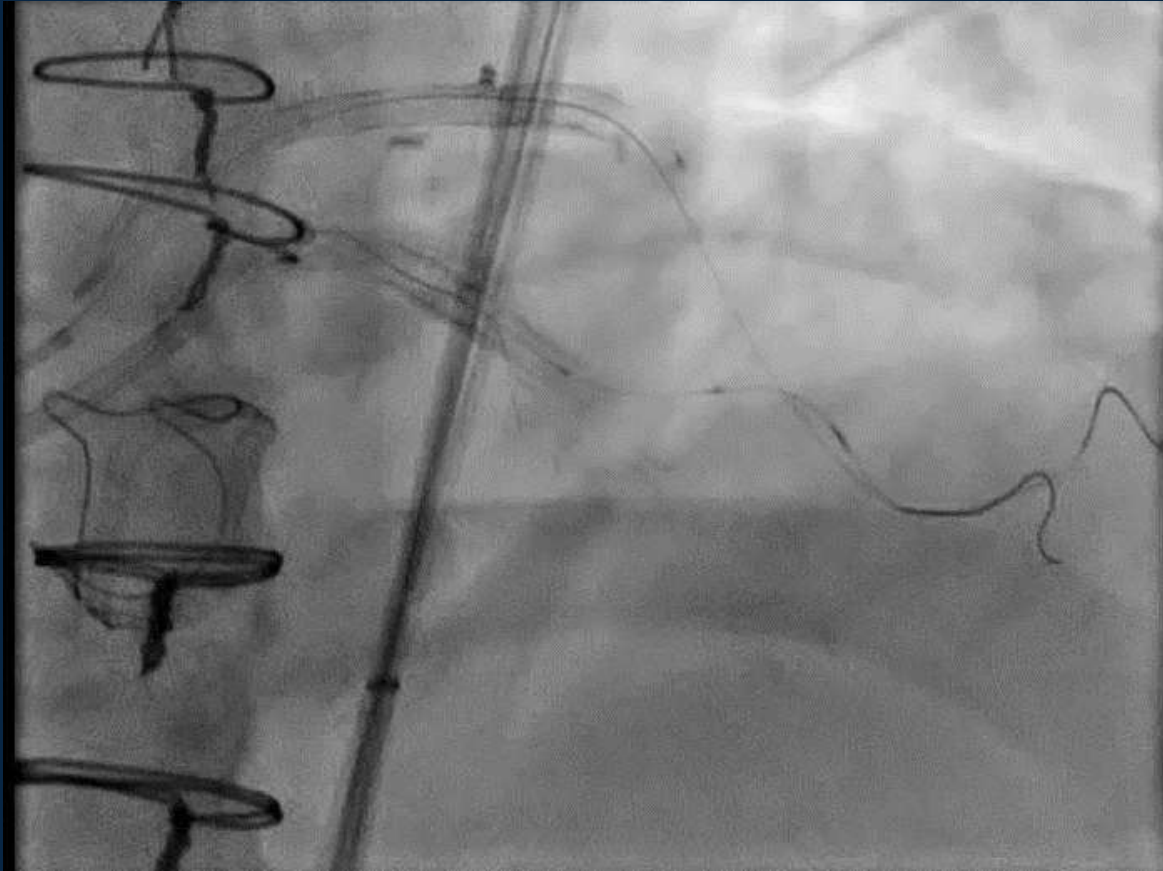
True Lumen



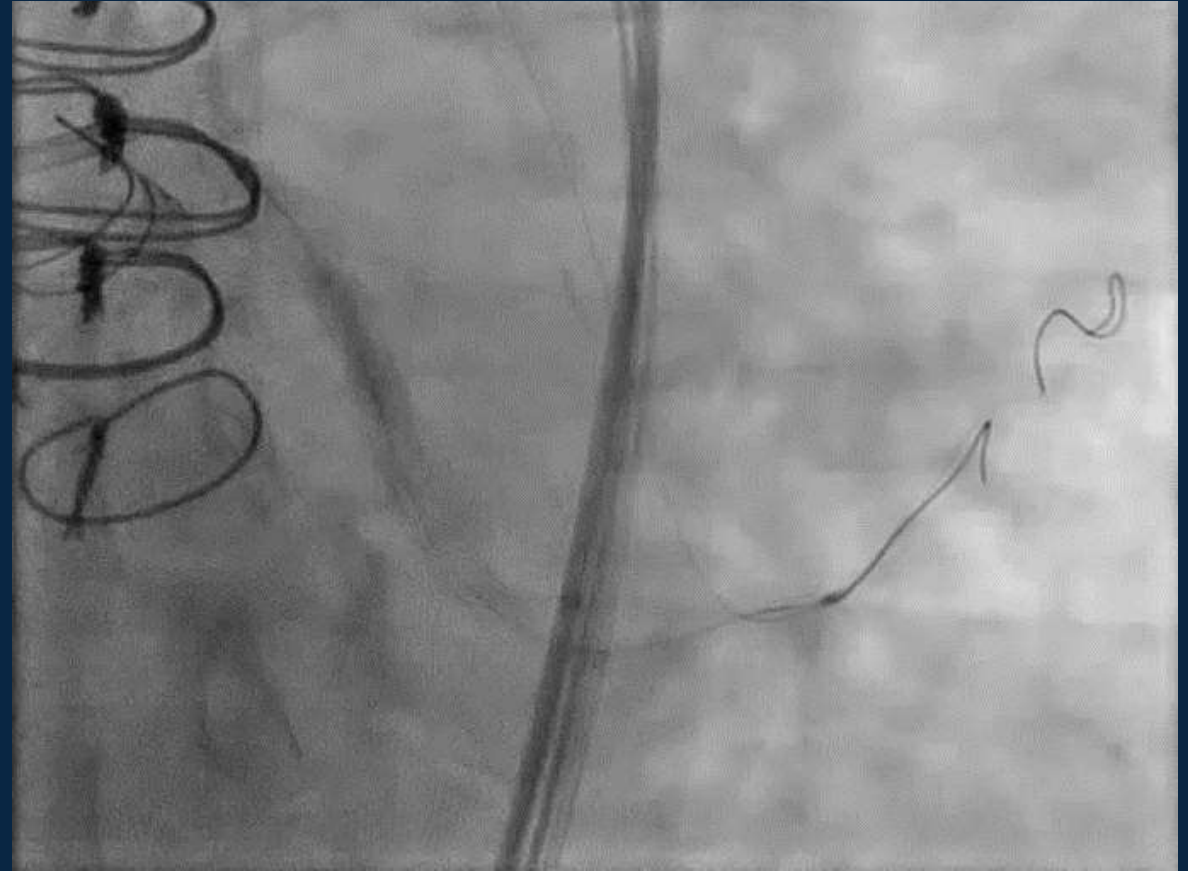
**Sion Blue exchange - caravel
tip broke off**



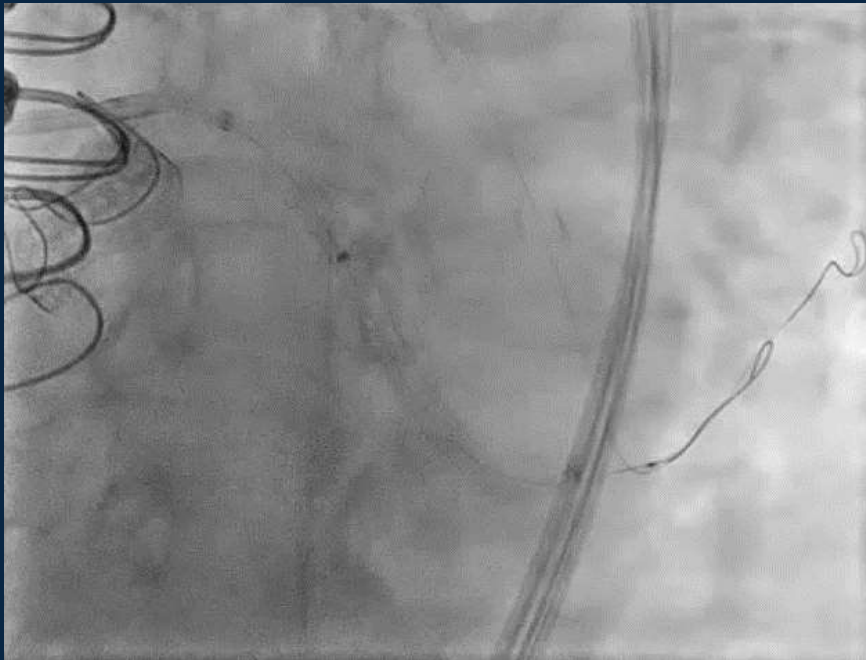
Left caravel tip on wire



**NC balloon unexpandable
IVUS = calcium, only 45% stent expansion**



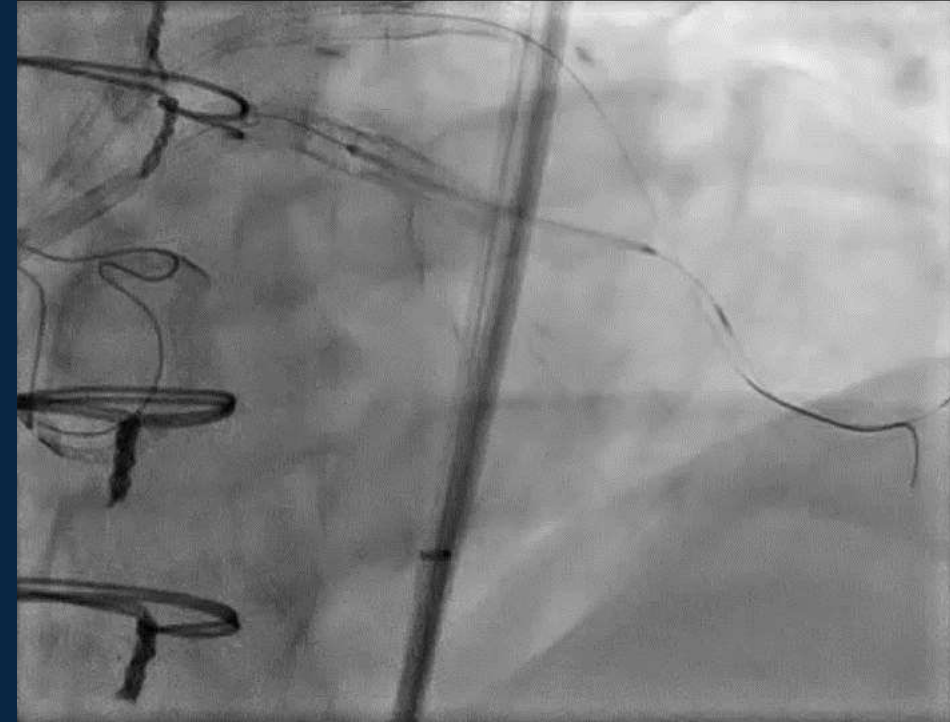
1.4mm laser



**NC balloon
expandable**

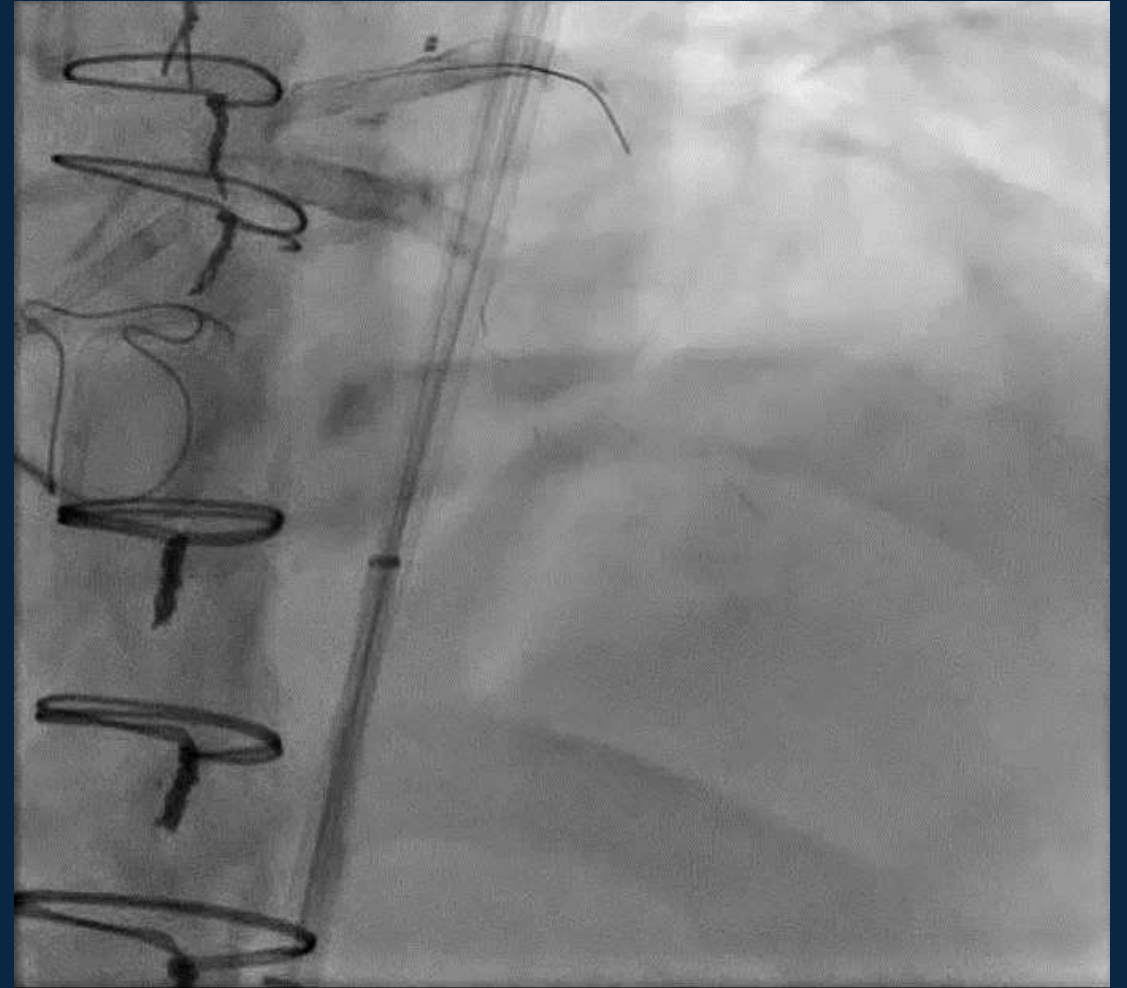
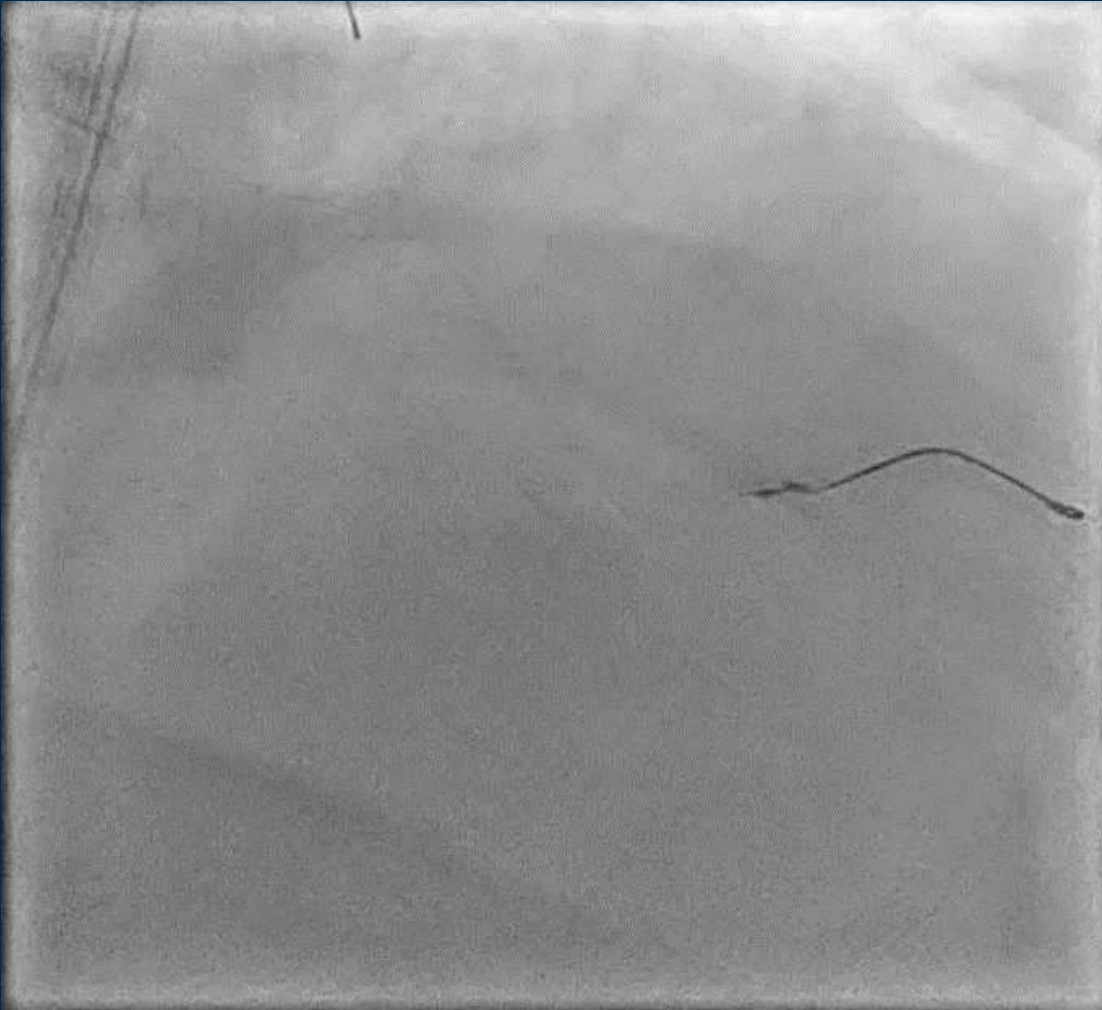


**Overlapping DES w /
post dilation**



Gooseneck snare caravel tip w wire

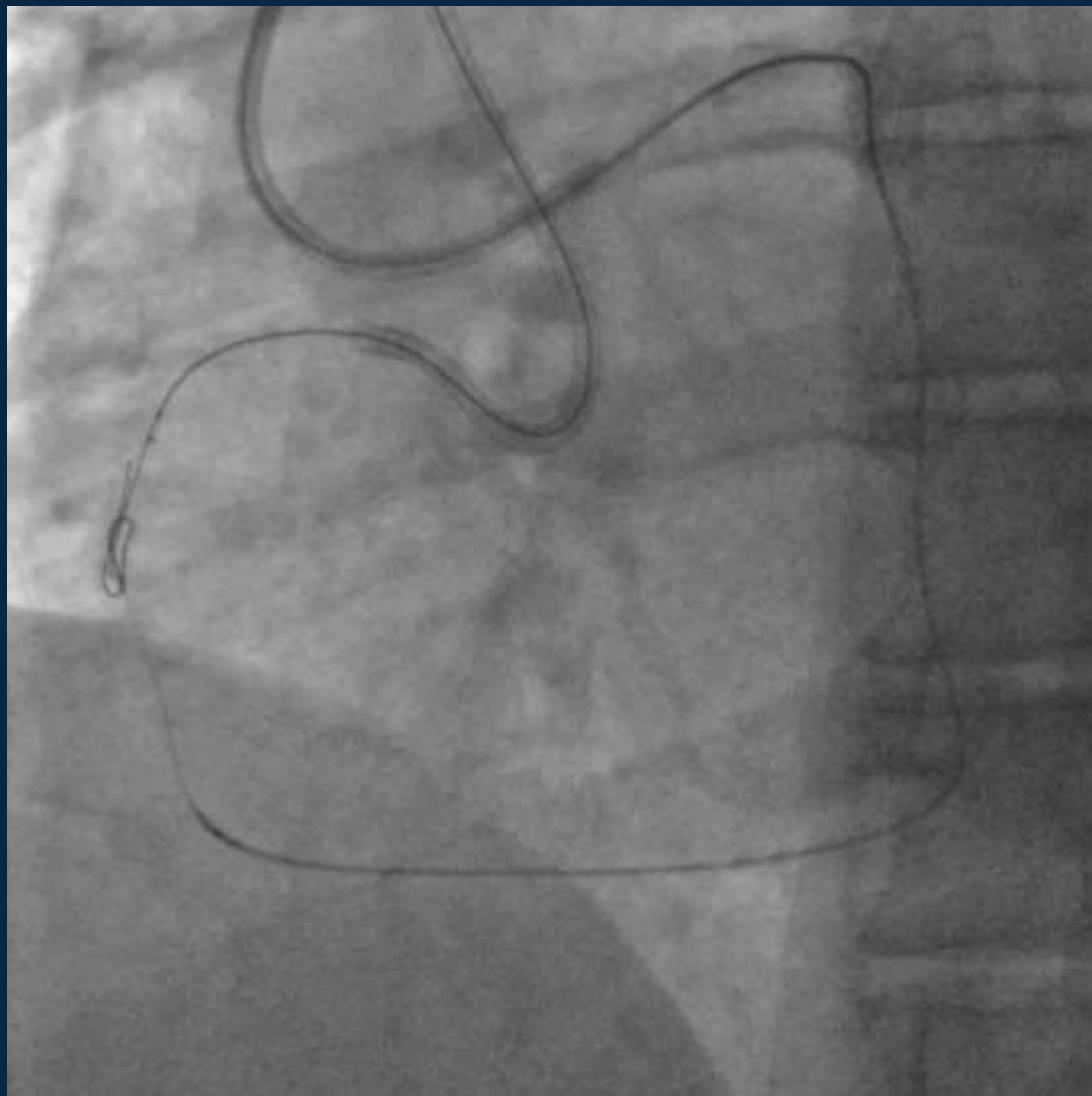
Final – did not coil graft



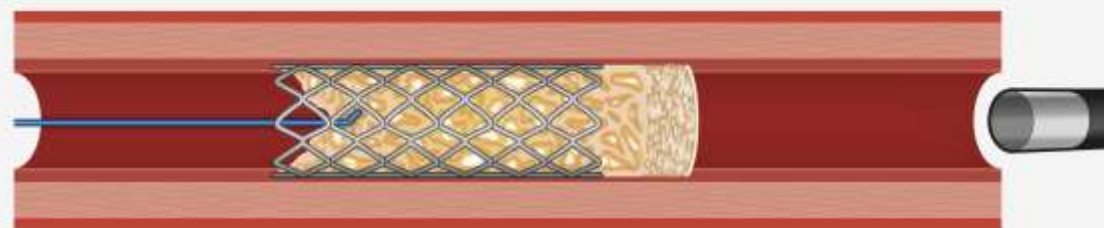
IVUS improved expansion

120cc contrast

Discharge hospital day 3 @ baseline renal function

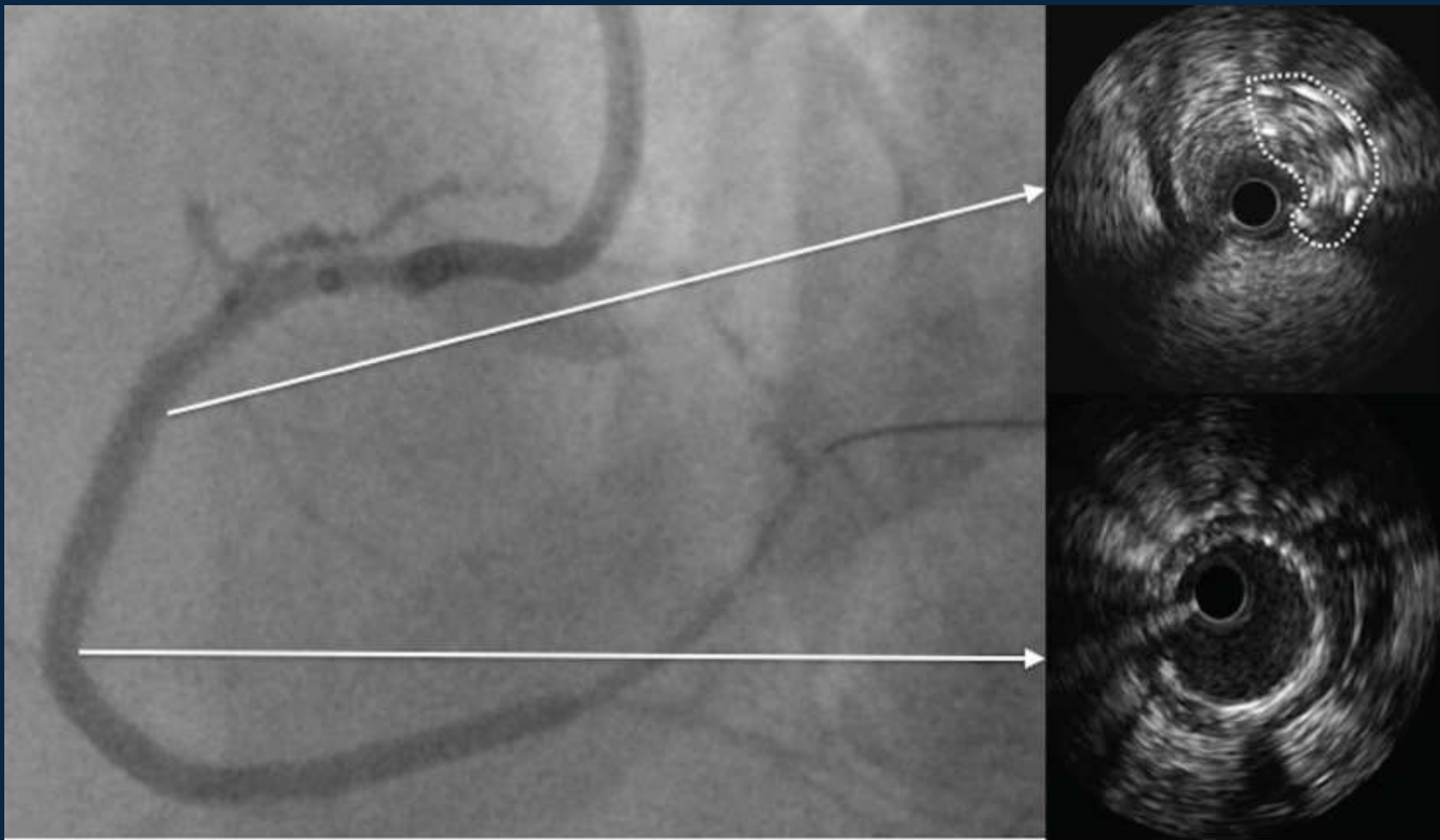


If it is not possible to secure entry within the stent, a retrograde approach may be required



A retrograde approach if available will resolve this issue

Sub-intimal Crush?



IVUS - Laser - Roto - Brachy Case

RCA CTO PCI:

-Three Layer ISR failure

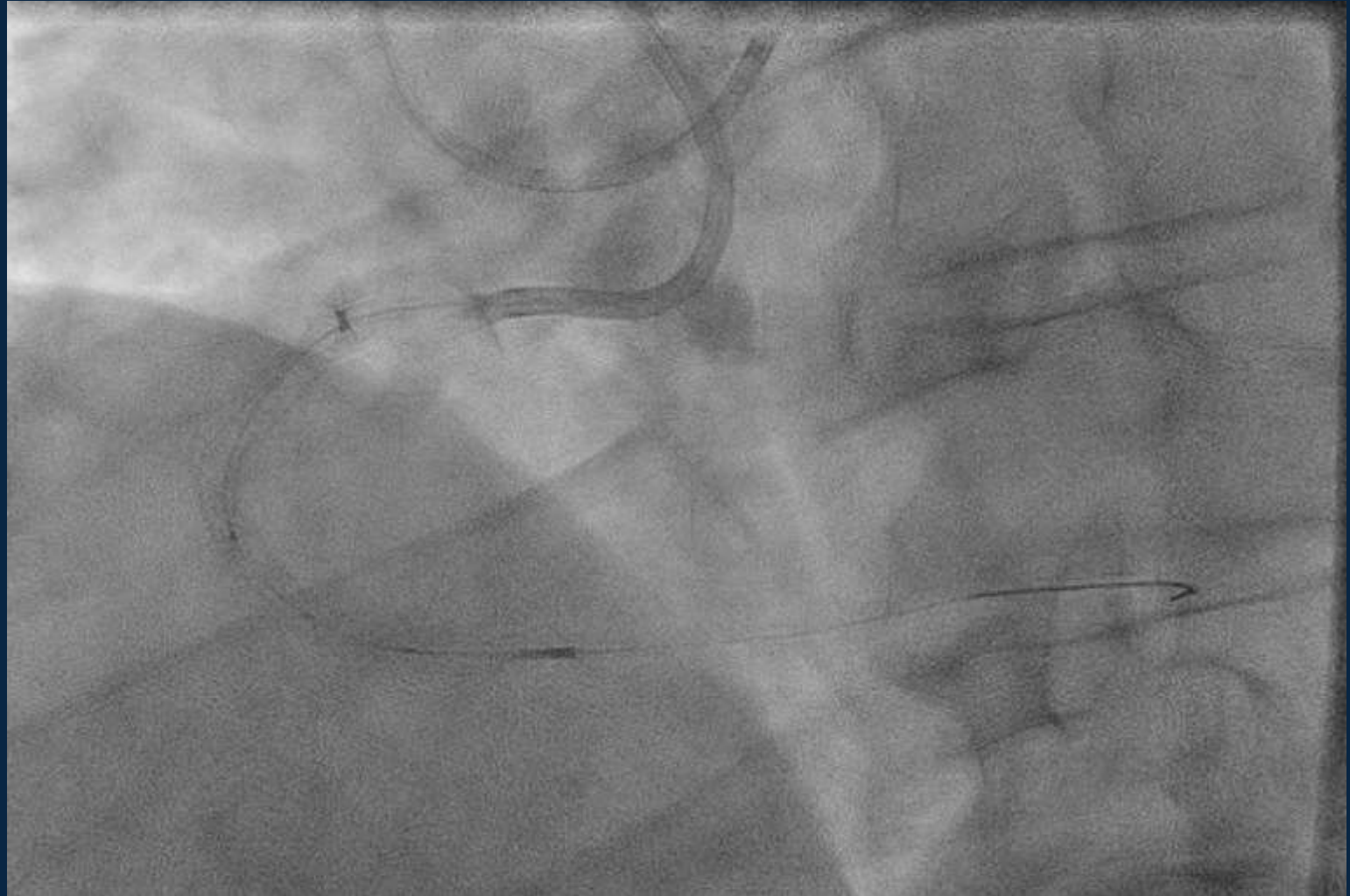
-Resistant proximal cap



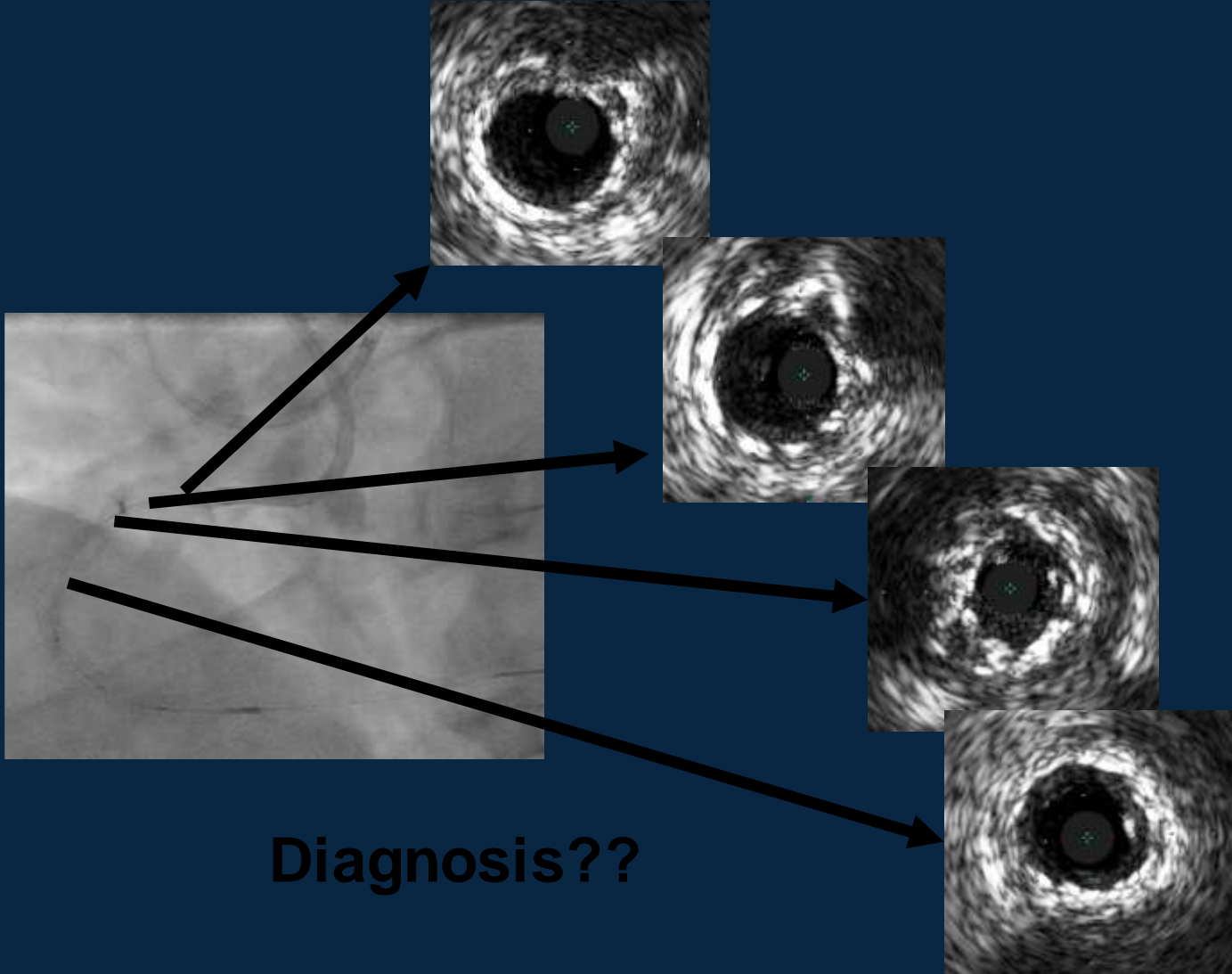
IVUS - Laser - Roto - Brachy Case

RCA CTO PCI:

- Balloon un-crossable
- Substrut
- Parallel wire Pilot 50
- Balloon 2.0 and 3.0mm (waist)
- IVUS



IVUS - Laser - Roto - Brachy Case



IVUS - Laser - Roto - Brachy Case

RCA CTO PCI:

- 1.4mm ELCA – no cross



IVUS - Laser - Roto - Brachy Case

RCA CTO PCI:

- **Stent Roto: 1.25 and 1.75mm burr**
- **190RPM, 10 passes total**



IVUS - Laser - Roto - Brachy Case

RCA CTO PCI:

- 3.5mm angiosculpt
- 4.0 mm NC balloon
- Brachytherapy
- Final result



Conclusions

- Angiographic features of ISR CTO PCI failure include
 - Tortuosity (stent fracture)
 - Ostial lesions
 - Calcification
- The hybrid strategy applies to ISR with a few additional considerations
- If the original stent is significantly undersized / stent fracture within stent passage may be challenging
- Intravascular imaging alters ISR treatment decision making