



Health
South Western Sydney
Local Health District



AP CTO algorithm and AP style ADR

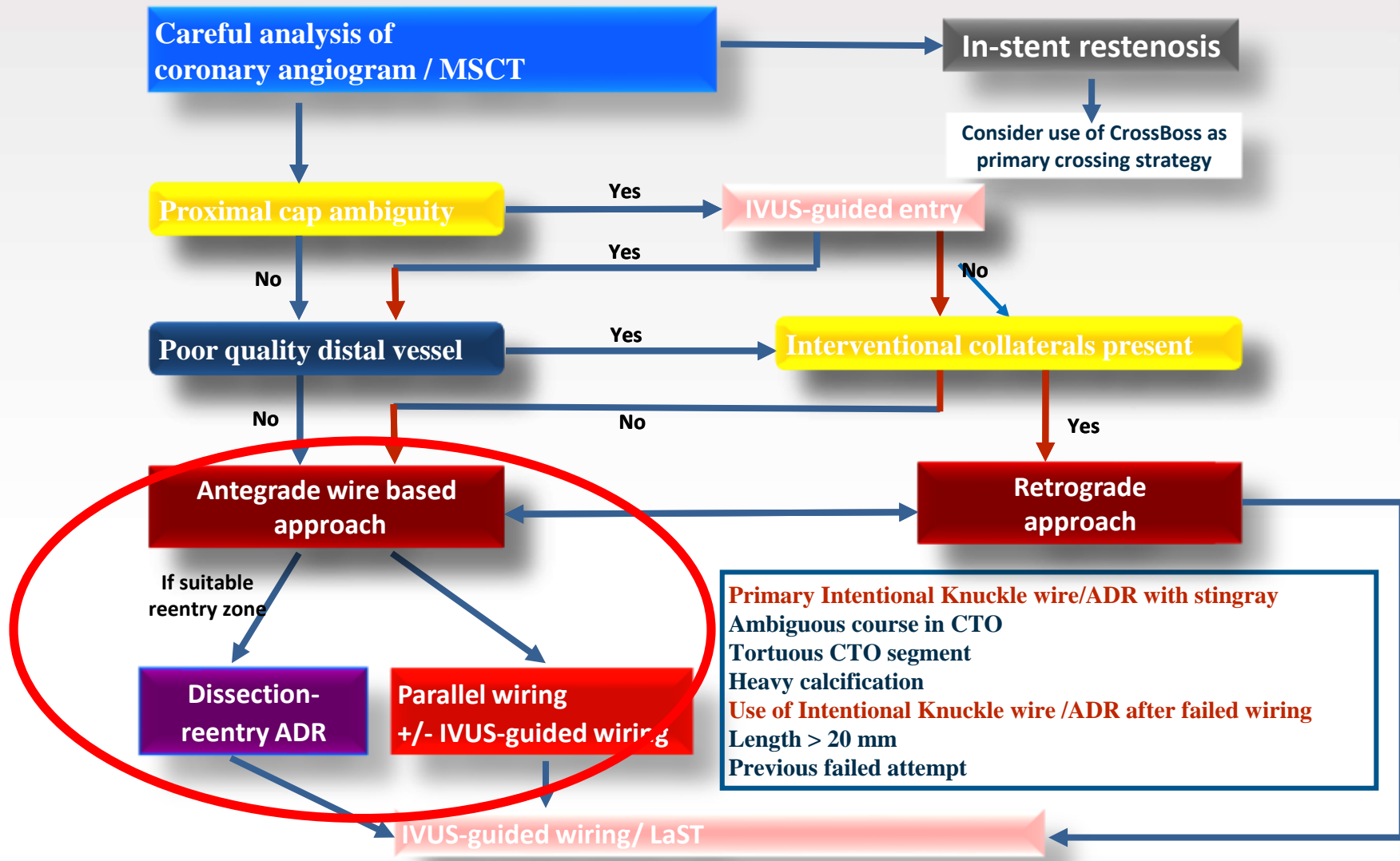
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Secretary/NSW representative, Interventional council , Cardiac Society of Australia and New Zealand



UNSW
AUSTRALIA

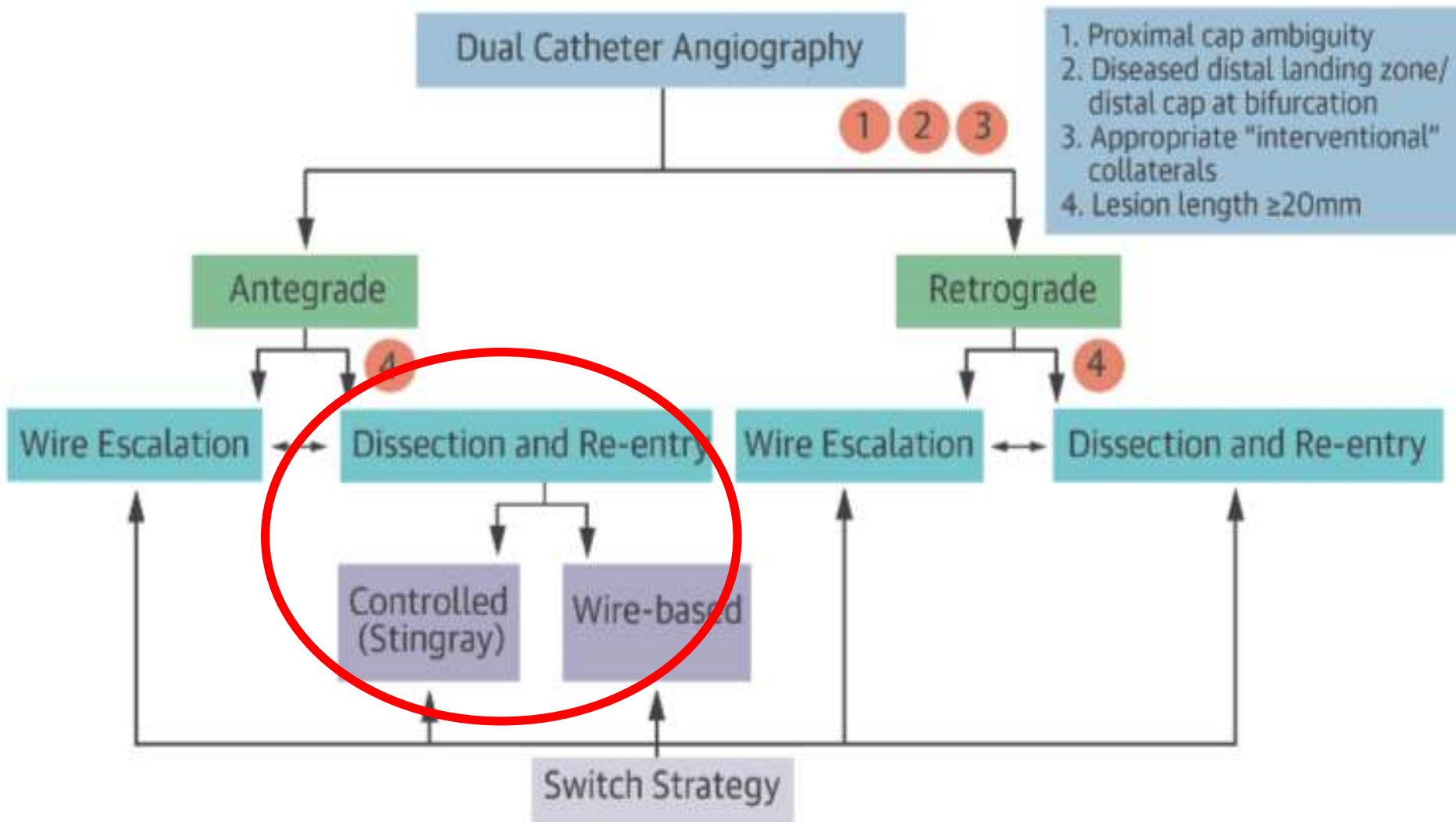




- Primary Intentional Knuckle wire/ADR with stingray
- Ambiguous course in CTO
- Tortuous CTO segment
- Heavy calcification
- Use of Intentional Knuckle wire /ADR after failed wiring
- Length > 20 mm
- Previous failed attempt

Consider stopping if > 3 hr; 3.7x eGFR ml contrast; Air Kerma > 5 Gy unless procedure well advanced.

B. The Hybrid Algorithm for CTO Crossing

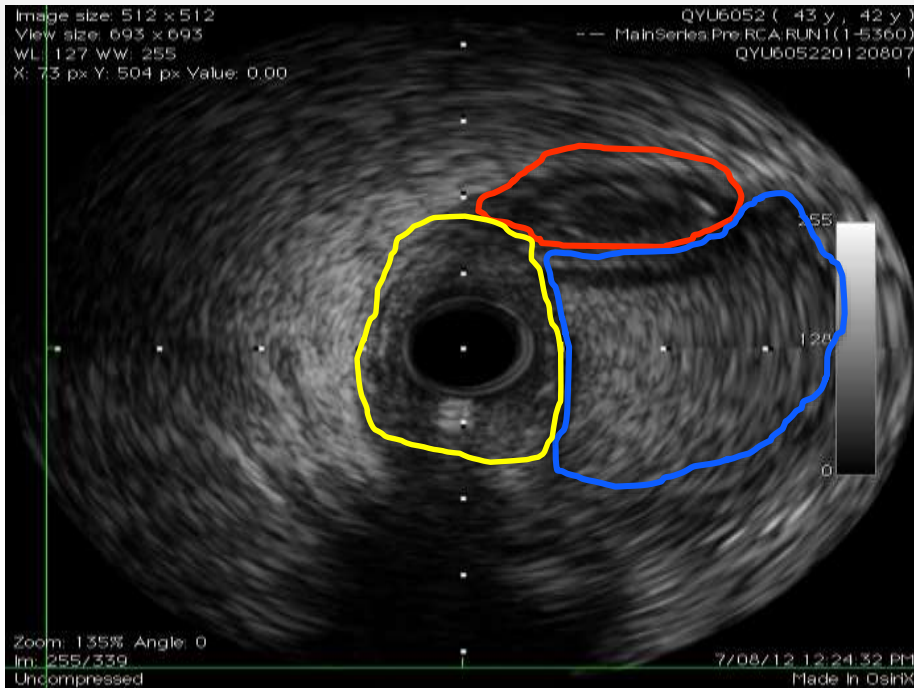


Maeremans, J. et al. J Am Coll Cardiol. 2016;68(18):1958-70.

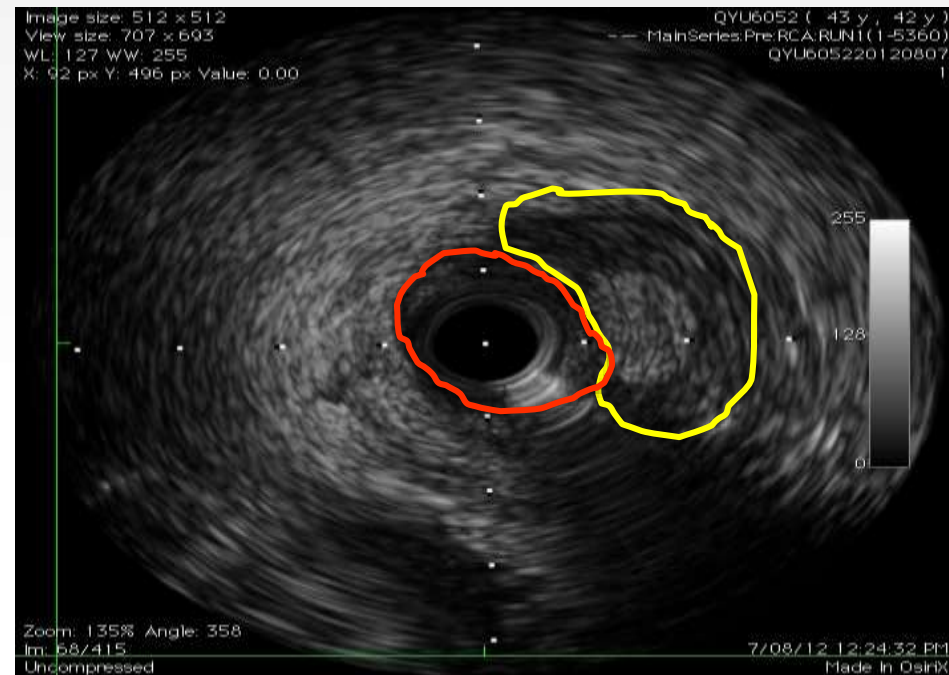
	Parallel Wire	ADR
Intrinsic operator comfort	Higher	Lower
Perforation risk	Operator dependent Relatively low	Operator dependent
Success	Operator dependent	Operator dependent
Smaller sub-intimal space	Higher success	Higher success
Large sub-intimal space	Low success	Low success
Side-branches	May be helpful	Higher risk for perforation and side-branch loss
Dissection	Unintentional	Intentional
Re-Entry	Proximally with wire	Intentional distally with Stingray and wires

Control of the sub-intimal space KEY IN ADR AND PARALLEL WIRING

IVUS following successful ADR



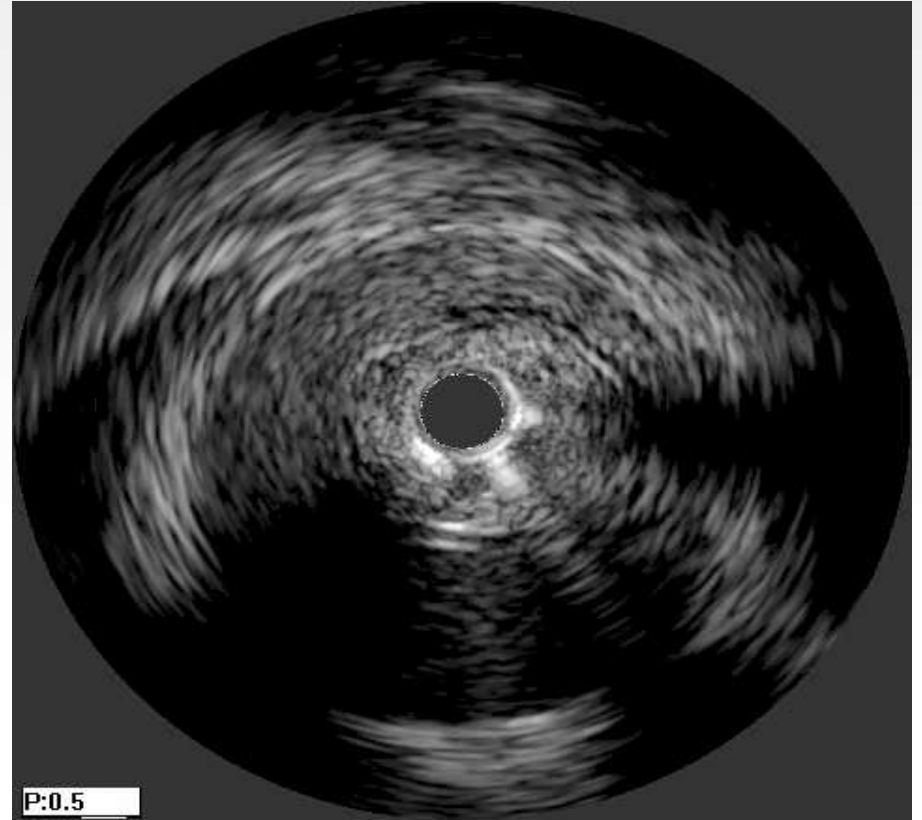
Proximal



Distal

Control of Tissue Planes

1. Avoid creating large subintimal spaces with aggressive wiring manoeuvres
2. Knuckle wires creates large subintimal spaces making both approaches difficult
3. CrossBoss creates a more controlled tissue plane



ReCHARGE REGISTRY – ADR success

First Successful Strategy

1253 CTO attempts

- AWE 623 (58%)
- ADR 192 (18%)
- RWE/RDR 260 (24%)

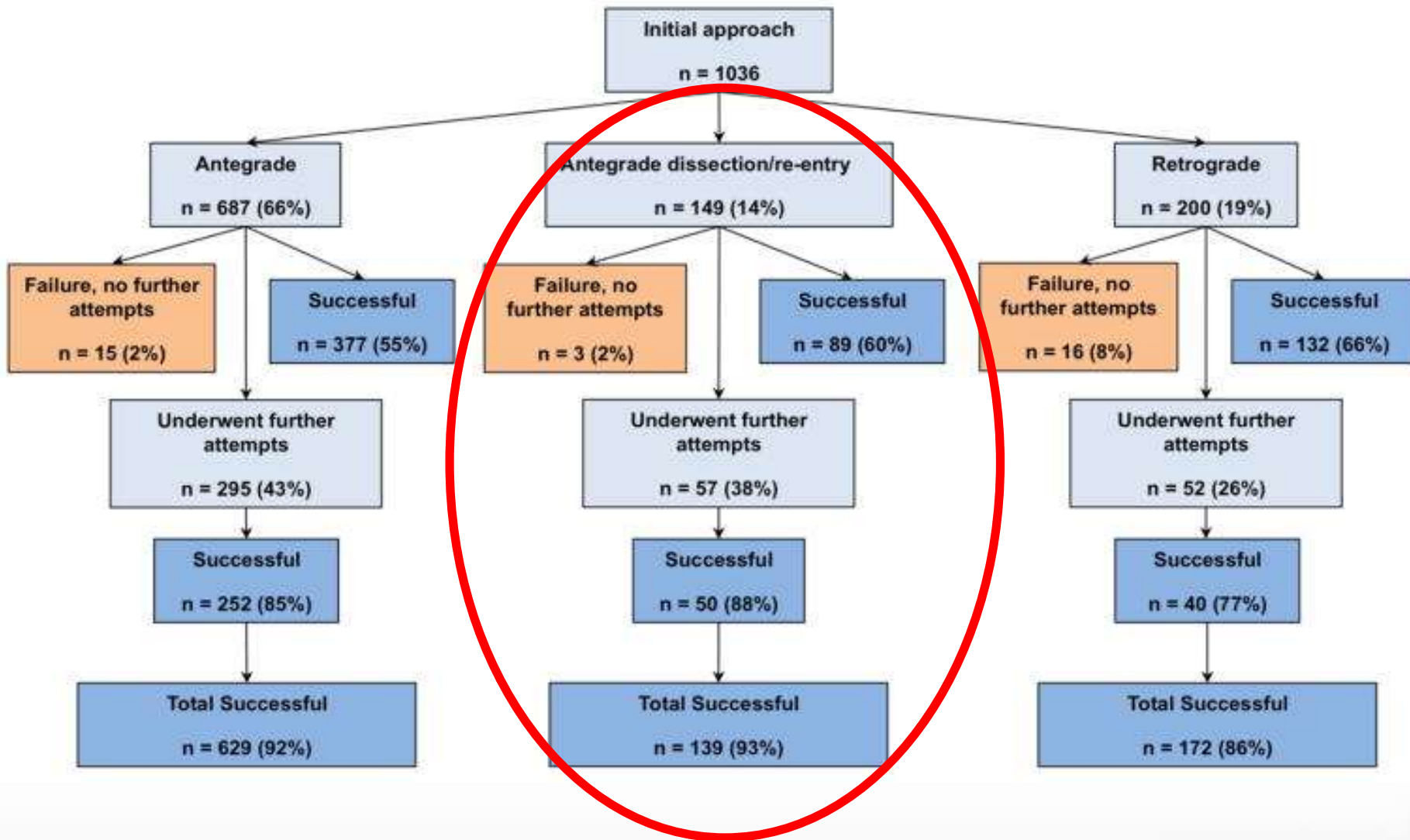
Joren Maeremans et al. JACC 2016

FIGURE 2 Application and Outcomes of the Hybrid Techniques According to the J-CTO Lesion Complexity

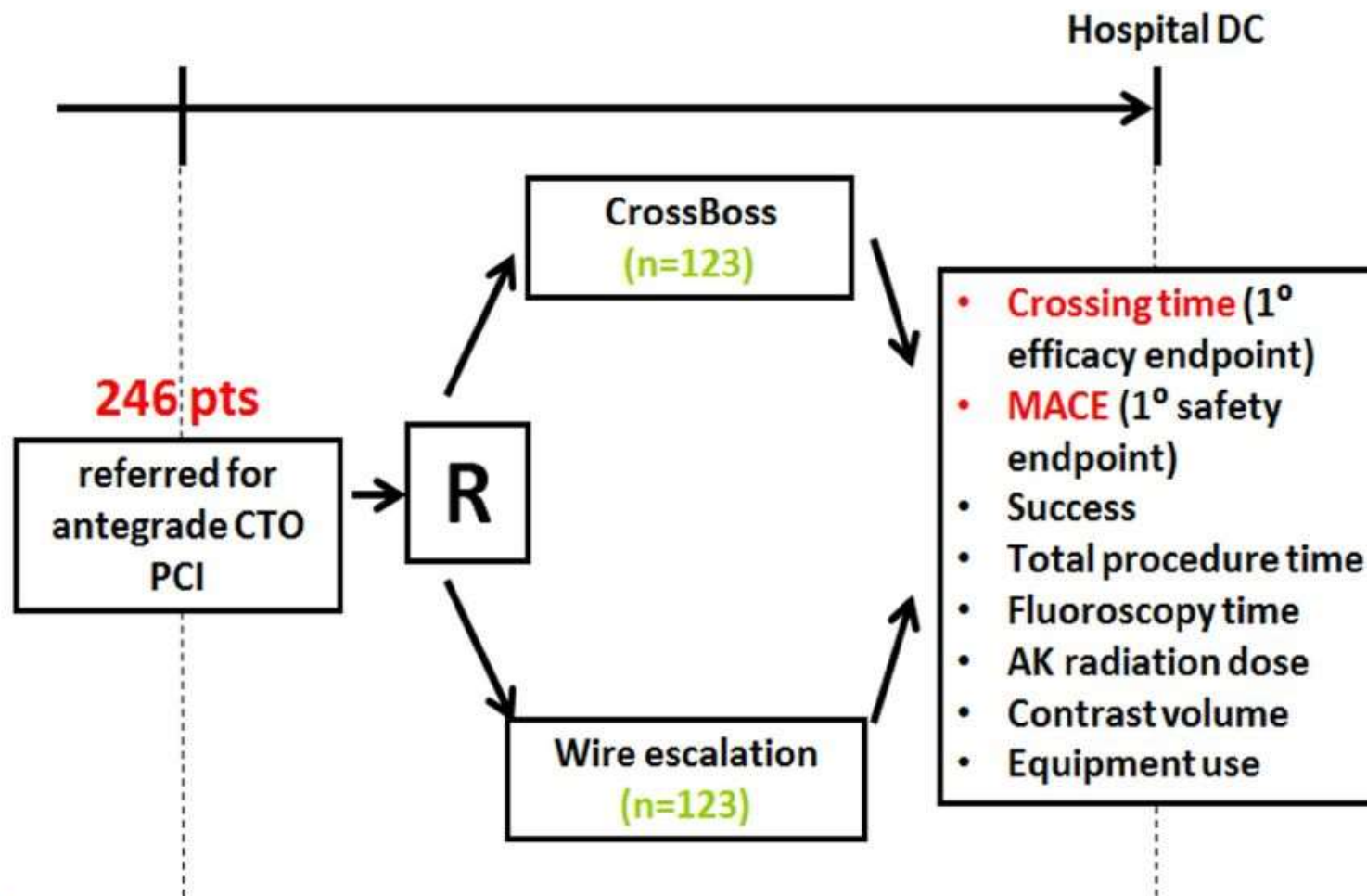


RECHARGE REGISTRY, MAEREMENS ET AL J Am Coll Cardiol 2016;68:1958–70

PROGRESS REGISTRY – ADR success



Study design



Crossing strategies

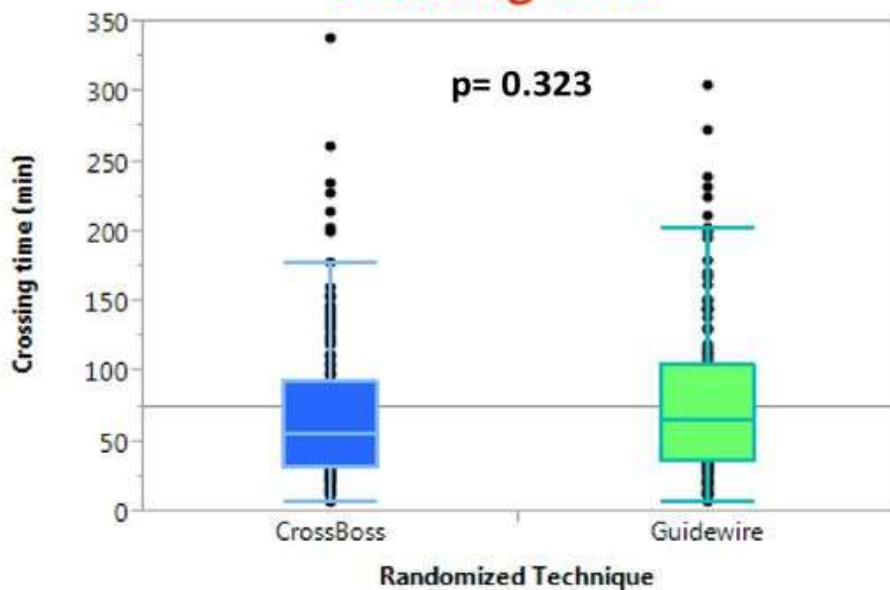


Variable	CrossBoss (n=122)	Guidewire (n=124)	P value
Technical Success, %	88.5	87.1	0.846
First Crossing Strategy, %			
▪ Antegrade wire escalation	22	98	<.0001
▪ Antegrade dissection and re-entry	77	1	
▪ Retrograde	1	1	
Successful Crossing Strategy, %			
▪ Antegrade wire escalation	24	51	<.0001
▪ Antegrade dissection and re-entry	50	22	
▪ Retrograde	18	17	
▪ None	8	10	

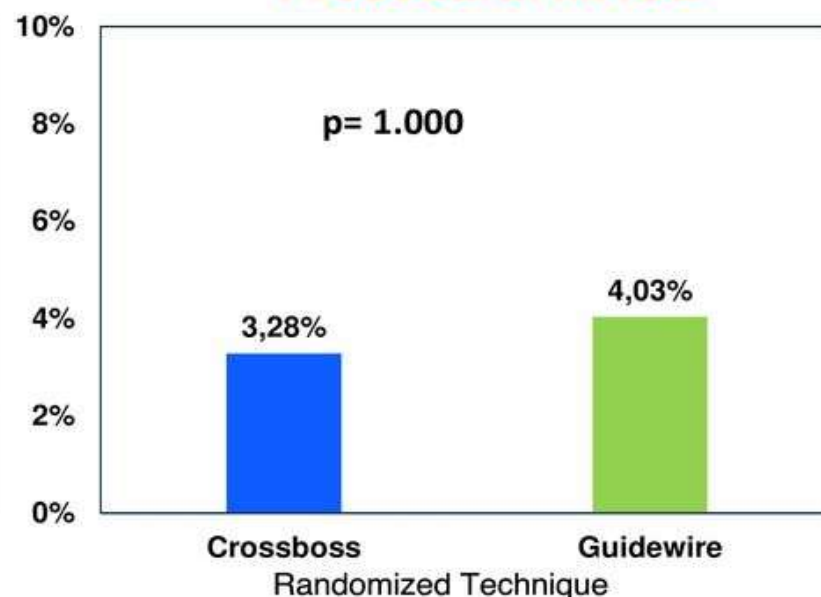
Primary endpoints



Crossing time



Procedural MACE

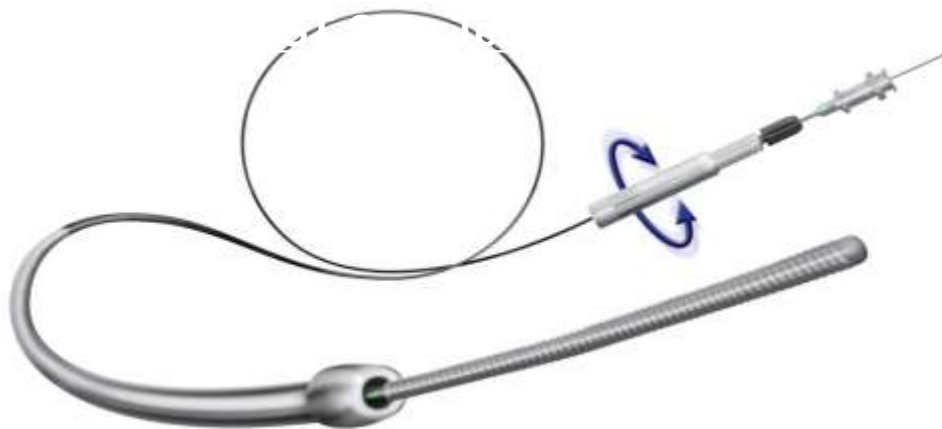


Variable	CrossBoss (n=122)	Guidewire (n=124)	P value
Crossing time (min) ^b	56 (33, 93)	66 (36, 105)	0.323

Standardized mean difference: 0.094

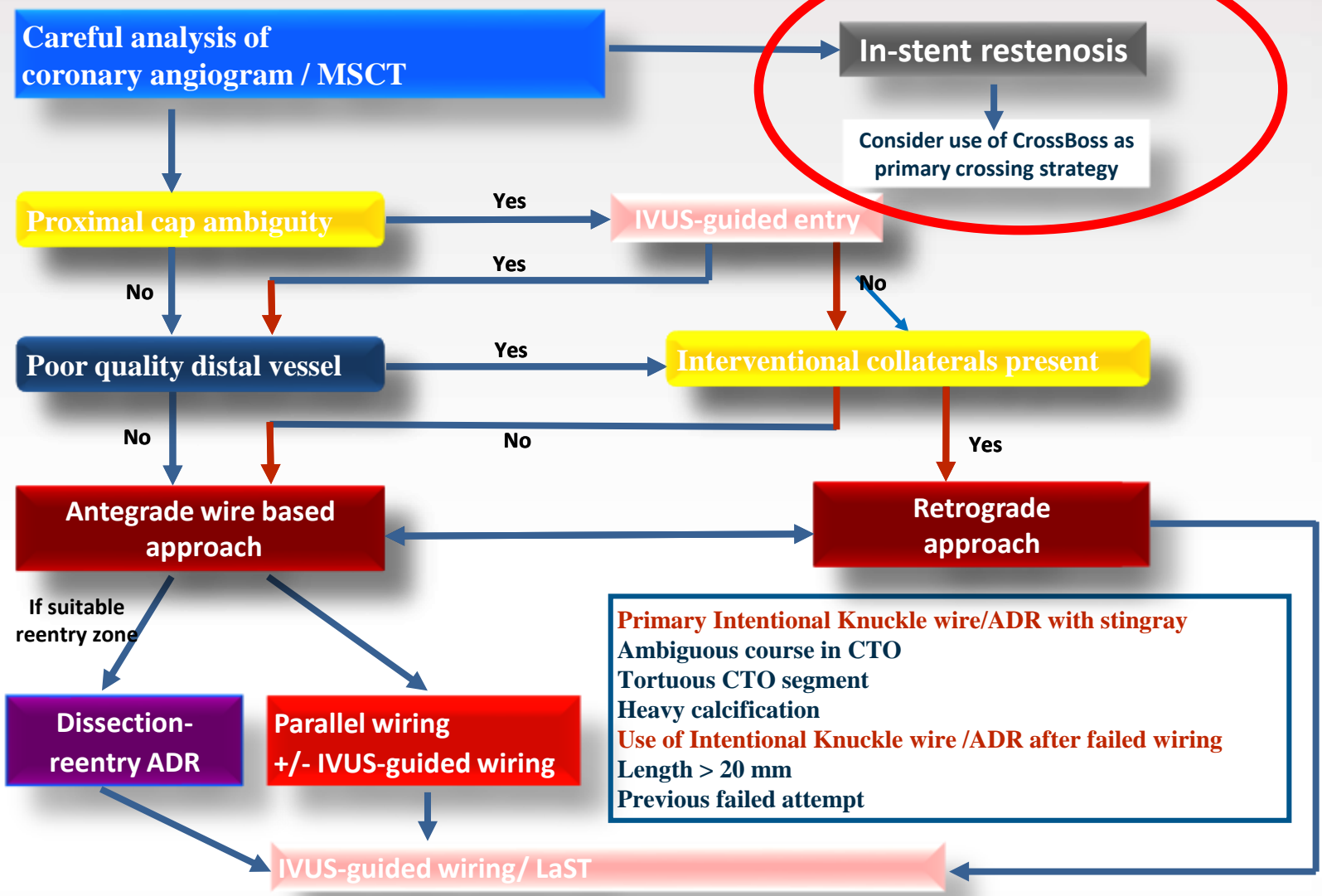
CrossBoss™ Catheter Design

CrossBoss designed to quickly create subintimal pathway around CTO segment or true lumen crossing



AP STYLE

- 1. Usually avoid**
- 2. Wiring to re-entry zone**
- 3. Limited use to extend from wiring zone**
- 4. Algorithm suggest for instent CTO**



Consider stopping if > 3 hr; 3.7x eGFR ml contrast; Air Kerma > 5 Gy unless procedure well advanced.

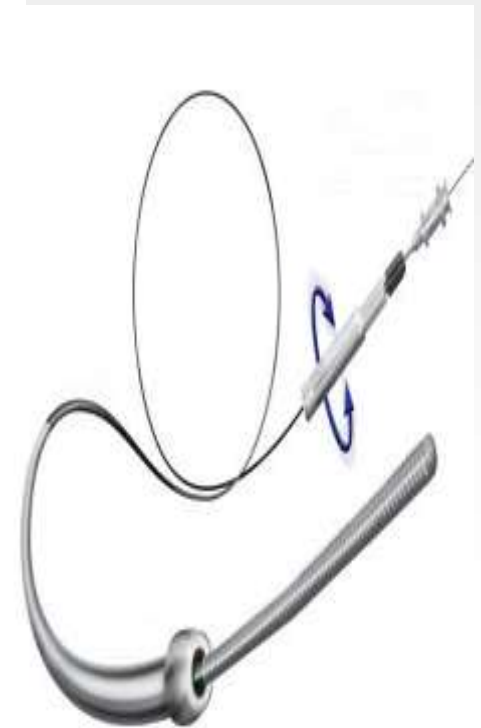
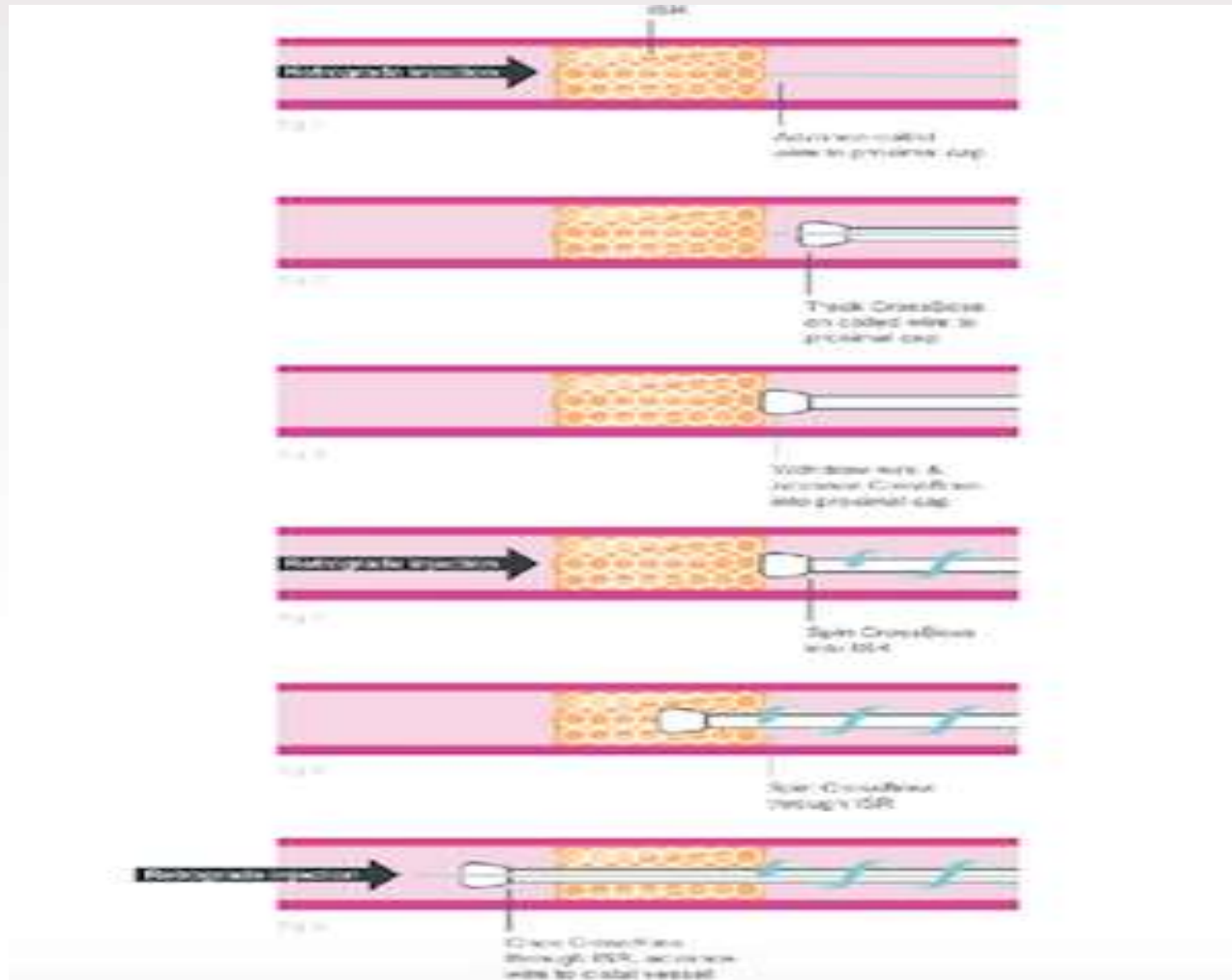
CrossBoss in In-stent restenosis

A novel approach to the management of occlusive in-stent restenosis (ISR)

William M. Wilson¹, MBBS, FRACP; Simon Walsh³, MD, FRCP; Colm Hanratty³, MD, FRCPI;
Julian Strange⁴, MBChB, FRCP, MD; Jonathan Hill⁵, MA, MBChB, MRCP;
James Sapontis⁵, MBBCh, BSc, FRACP; James C Spratt^{1,2*}, BSc, MD, FRCP, FESC, FACC

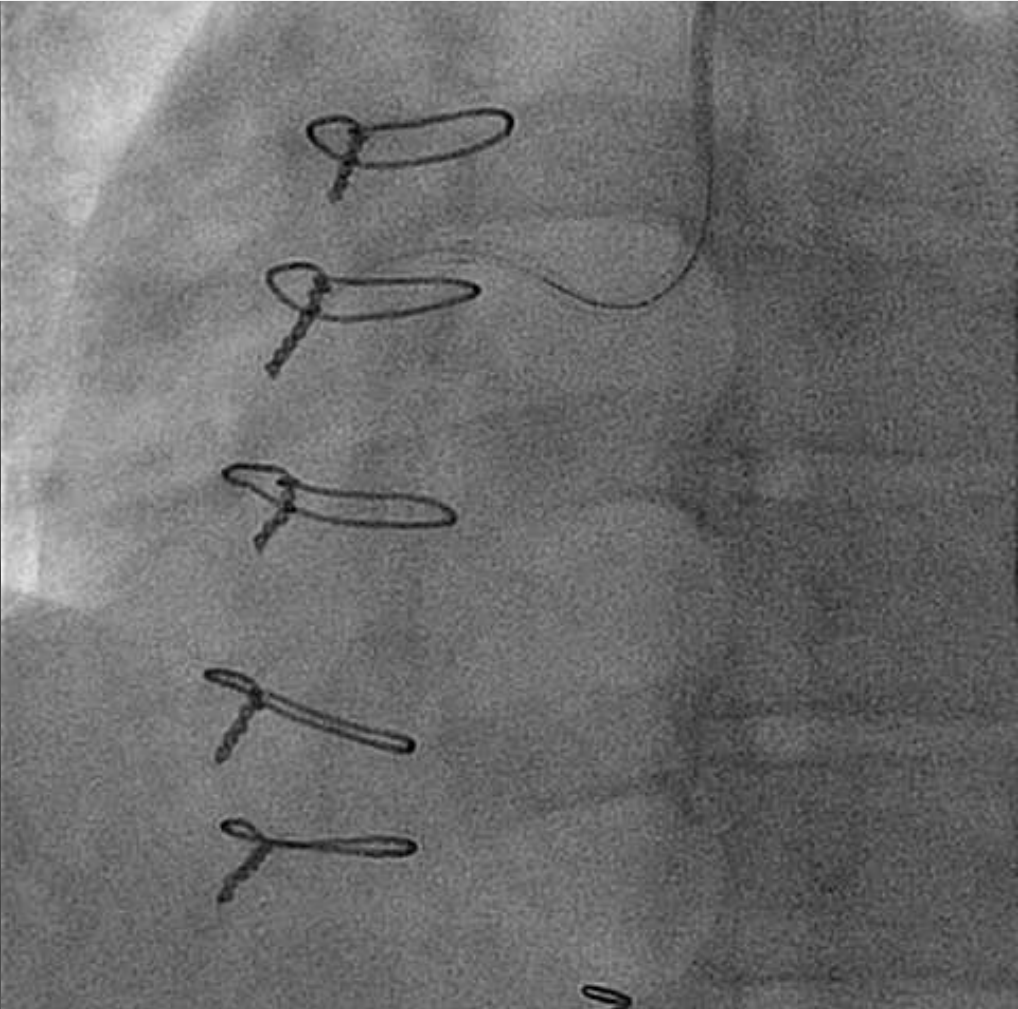
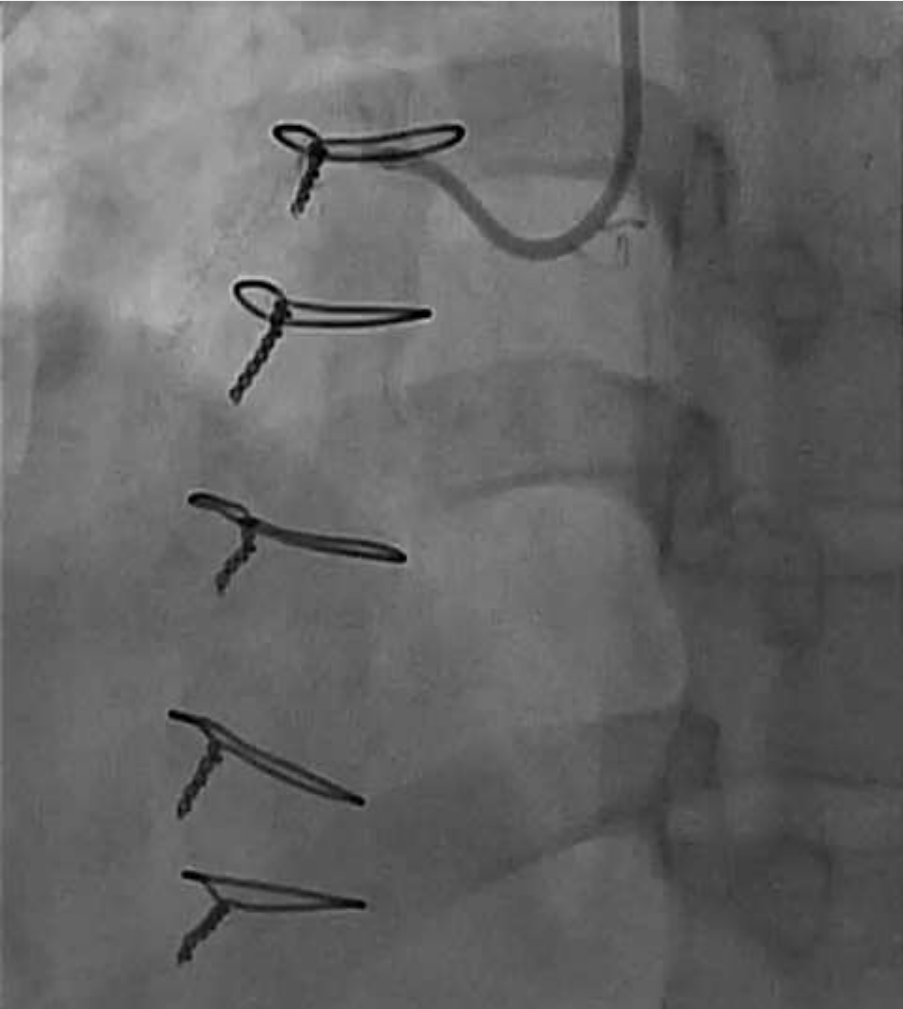
- CrossBoss catheter primary strategy in 30 patients
- Procedural success 90%
- CrossBoss True-True cross 81% cases
- Crossing time was short (median 8 minutes, range 1– 40 min)
- No procedural complications

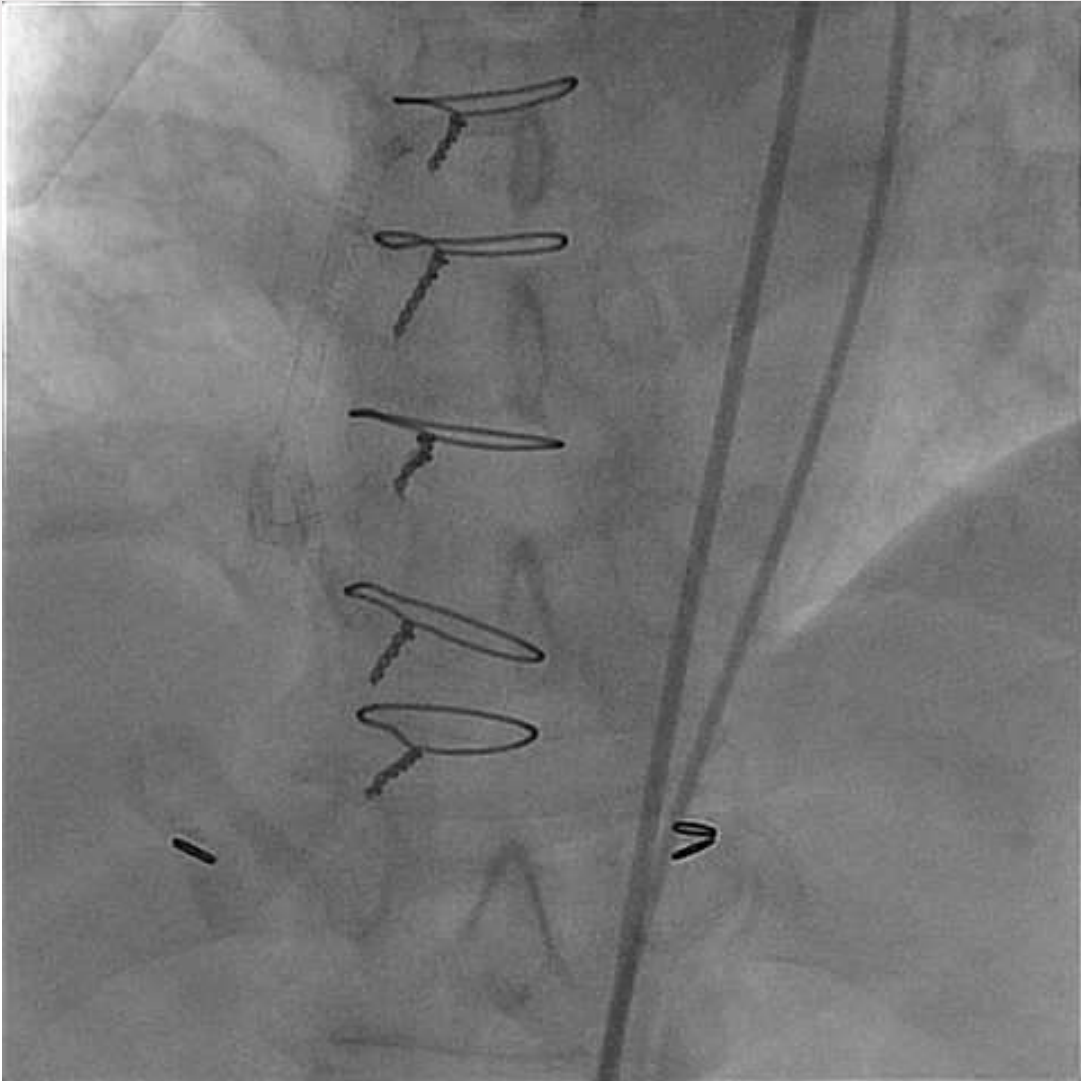
Crossboss for Instent occlusion



Wilson et al. Eurointervention 2014 Mar 20;9(11):1285–93. doi: 10.4244/EIJV9I11A218.

CrossBoss for ISR

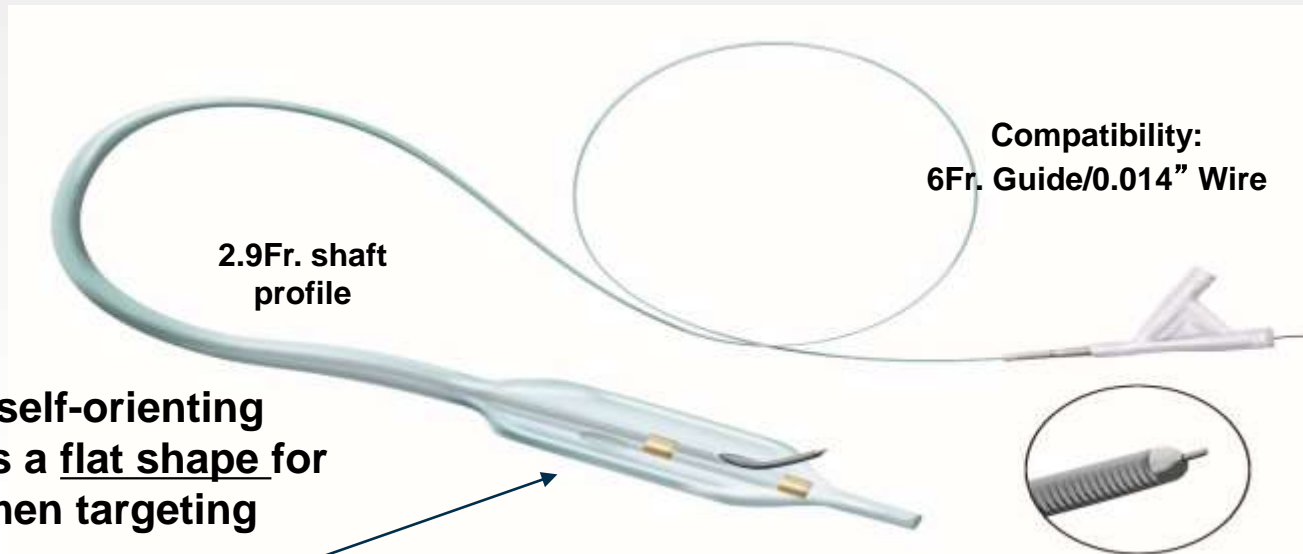




ADR	AP STYLE	HYBRID STYLE
INSTENT OCCLUSION	CROSSBOSS/WIRE	CROSSBOSS
NATIVE CTO	ANTEGRADE WIRE FIRST	CROSSBOSS FIRST
BEFORE STINGRAY	CORSAIR/CROSSBOSS OFTEN AVOIDED	CROSSBOSS
RE-ENTRY WIRE – STICK	CP12/HORNET 14/GAIA	STINGRAY WIRE
RE-ENTRY WIRE – SWAP	GAIA/XTR/PILOT 200	PILOT 200
RE-ENTRY STICKnDRIVE	ALMOST NEVER	STINGRAY WIRE
STRAW USING STINGRAY BALLOON	ROUTINE	IF NEEDED
MINIMIZE DISSECTION/RE-ENTRY LENGTH	BY WIRING (more control)	CROSSBOSS Extends usually (less control)

The Stingray™ System Design

Stingray System (catheter and guidewire) is designed to accurately target and re-enter the true lumen from a subintimal position



Unique self-orienting balloon has a flat shape for true lumen targeting

180° opposed and offset exit ports for selective guidewire re-entry

Re-entry probe at Stingray Guidewire tip

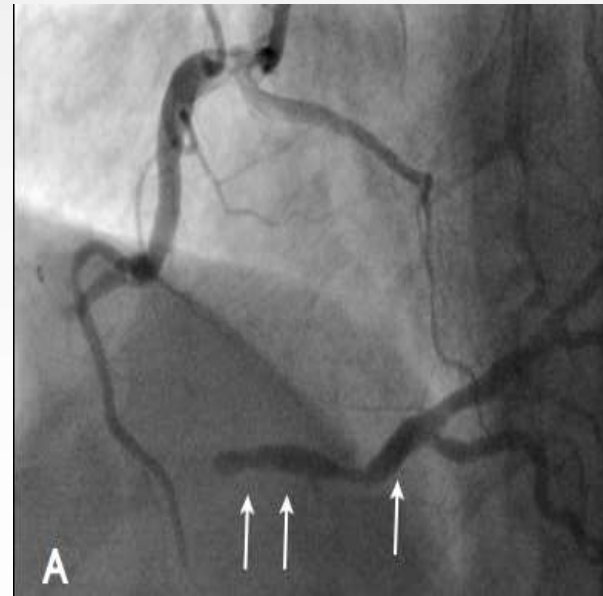
AP style

- 1. Adopted as re-entry device**
- 2. Other wires used (some cost considerations)**

Issues with ADR

- Anatomy – esp side-branches (Crossboss perforation risk)
- Calcification – difficult to re-enter with even Stingray wire
- Not so predictable
- Variable success
- Steeper learning curve in terms of failure/complications

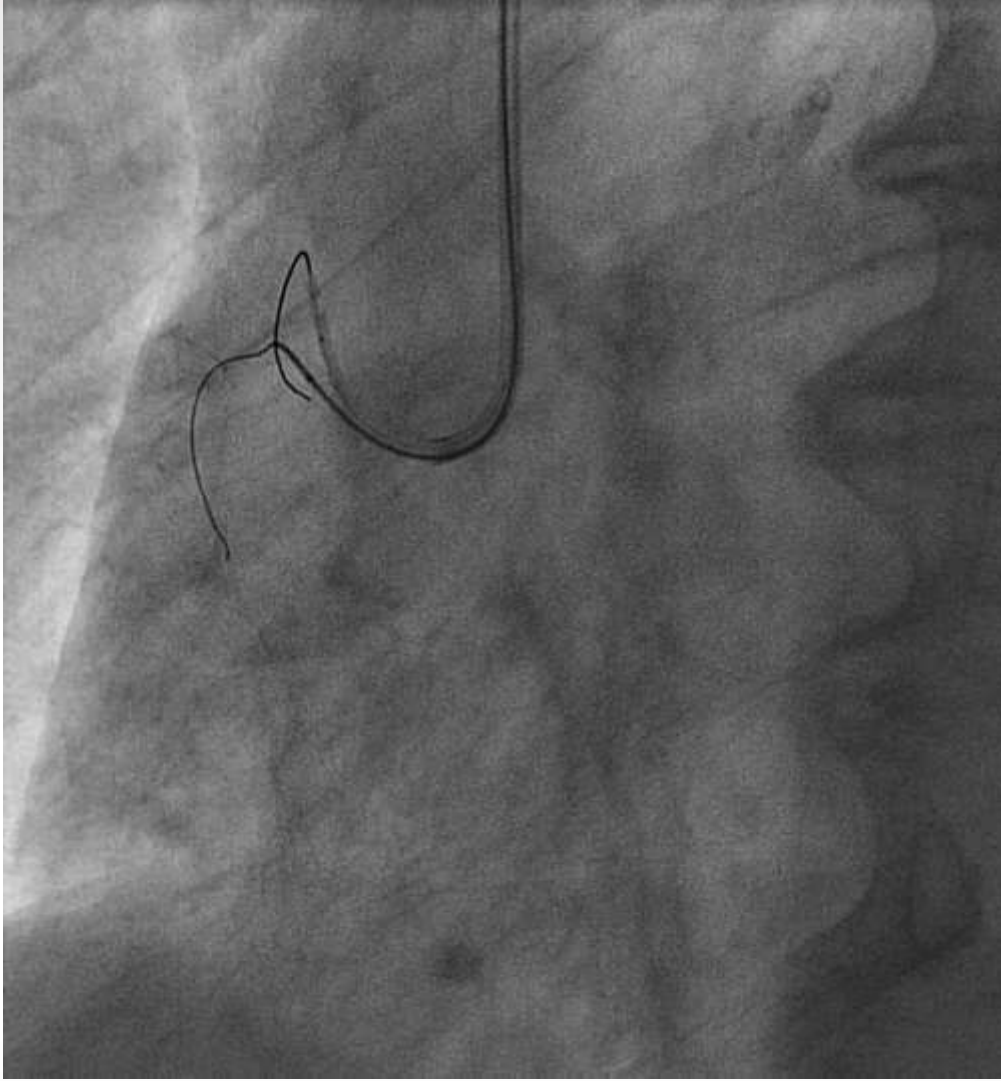
Does ADR add any advantage ?



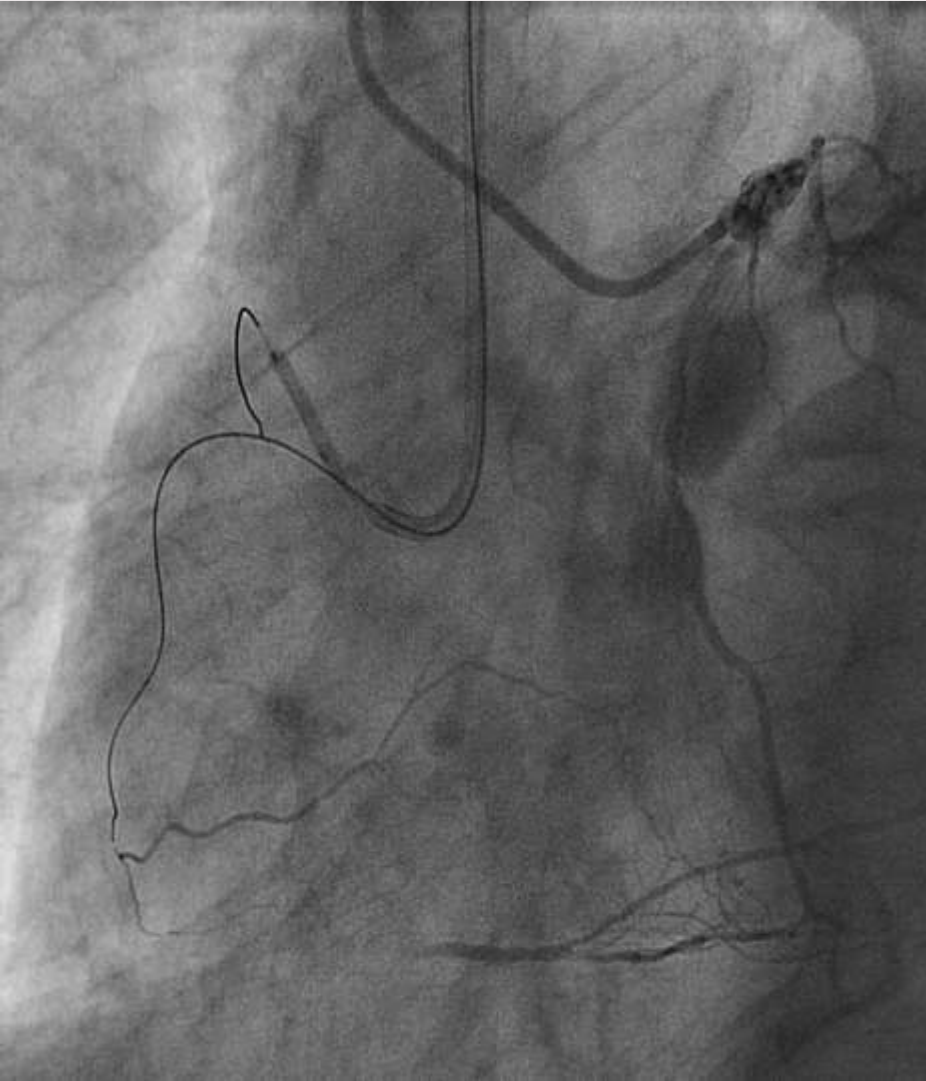
1. Expedited antegrade approach
(good distal re-entry zone)
2. No interventional collaterals
(limiting to antegrade alone)
3. Failed retrograde approach
(oft already failed antegrade)
4. “Investment” procedure if final antegrade failure

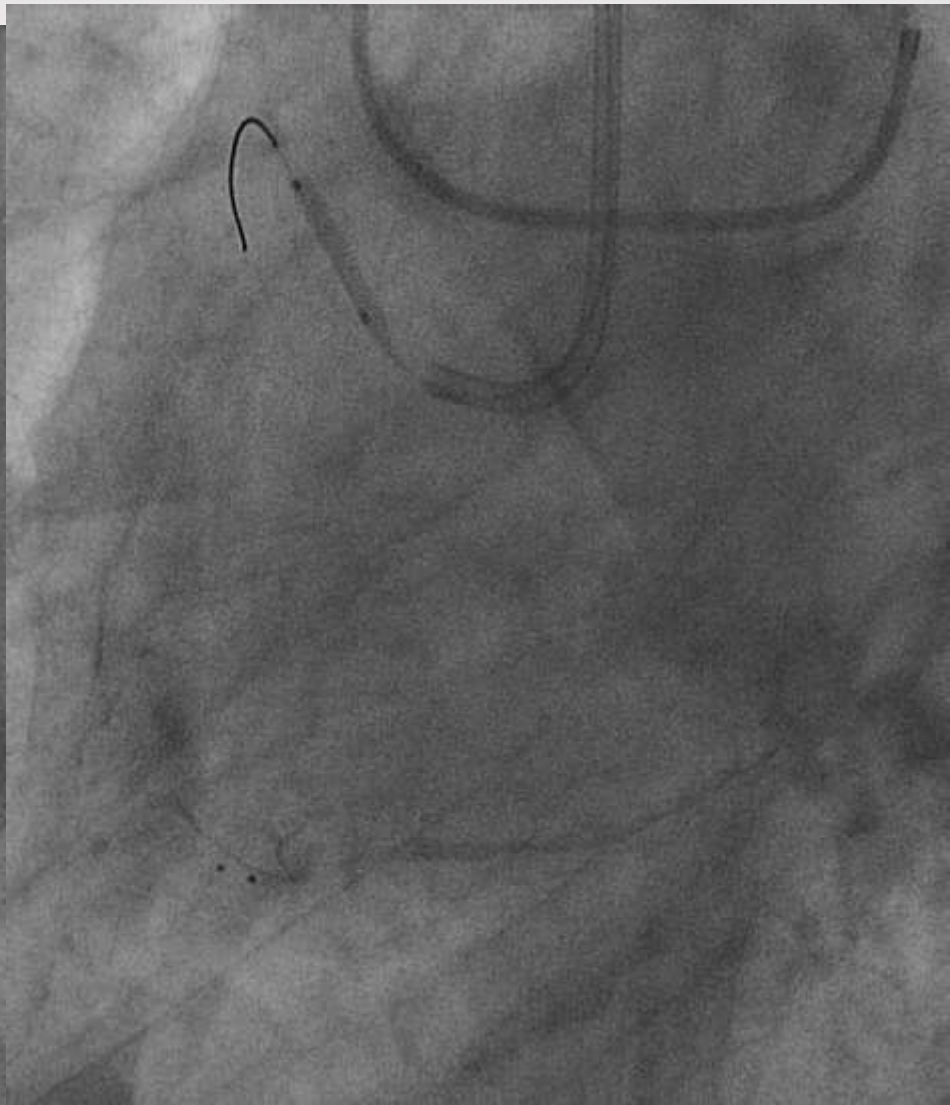
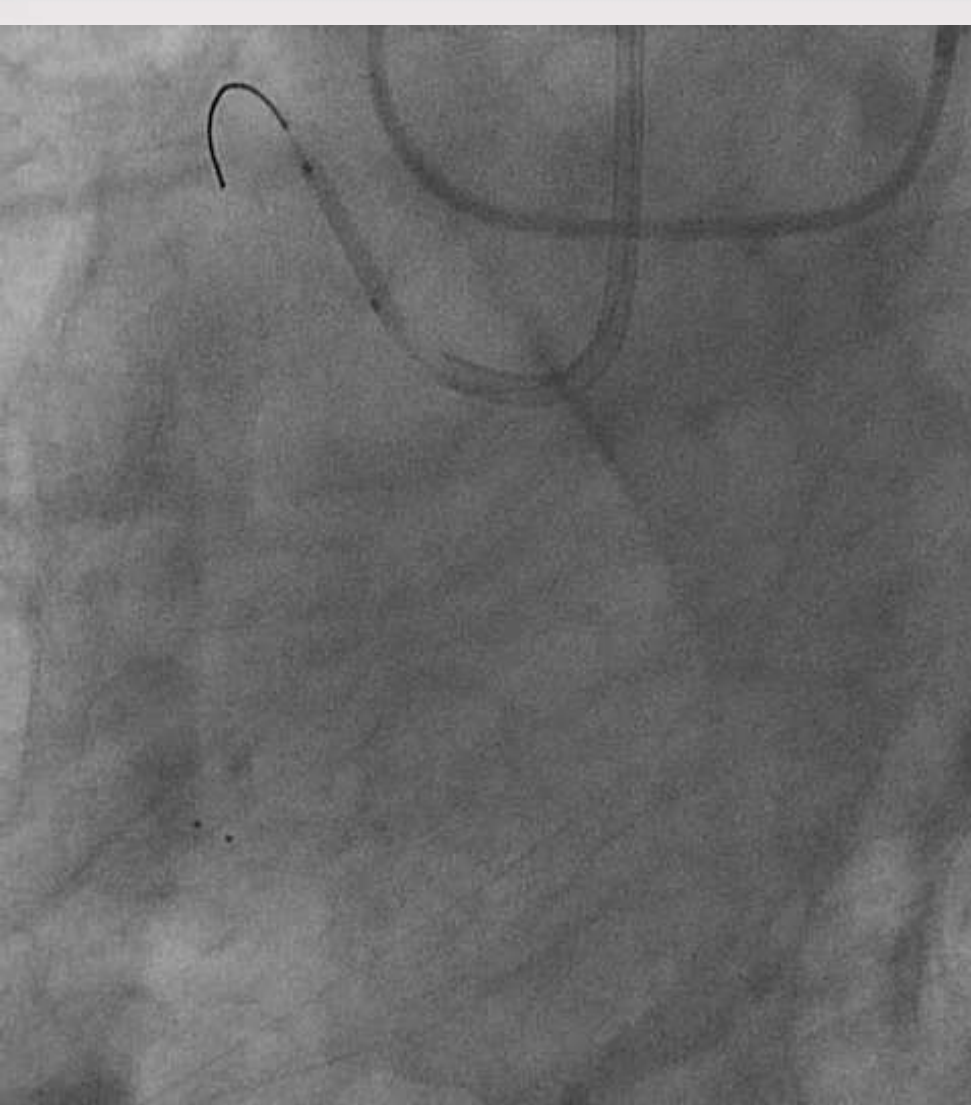
CASE 1 NEAR OSTIAL RCA CTO

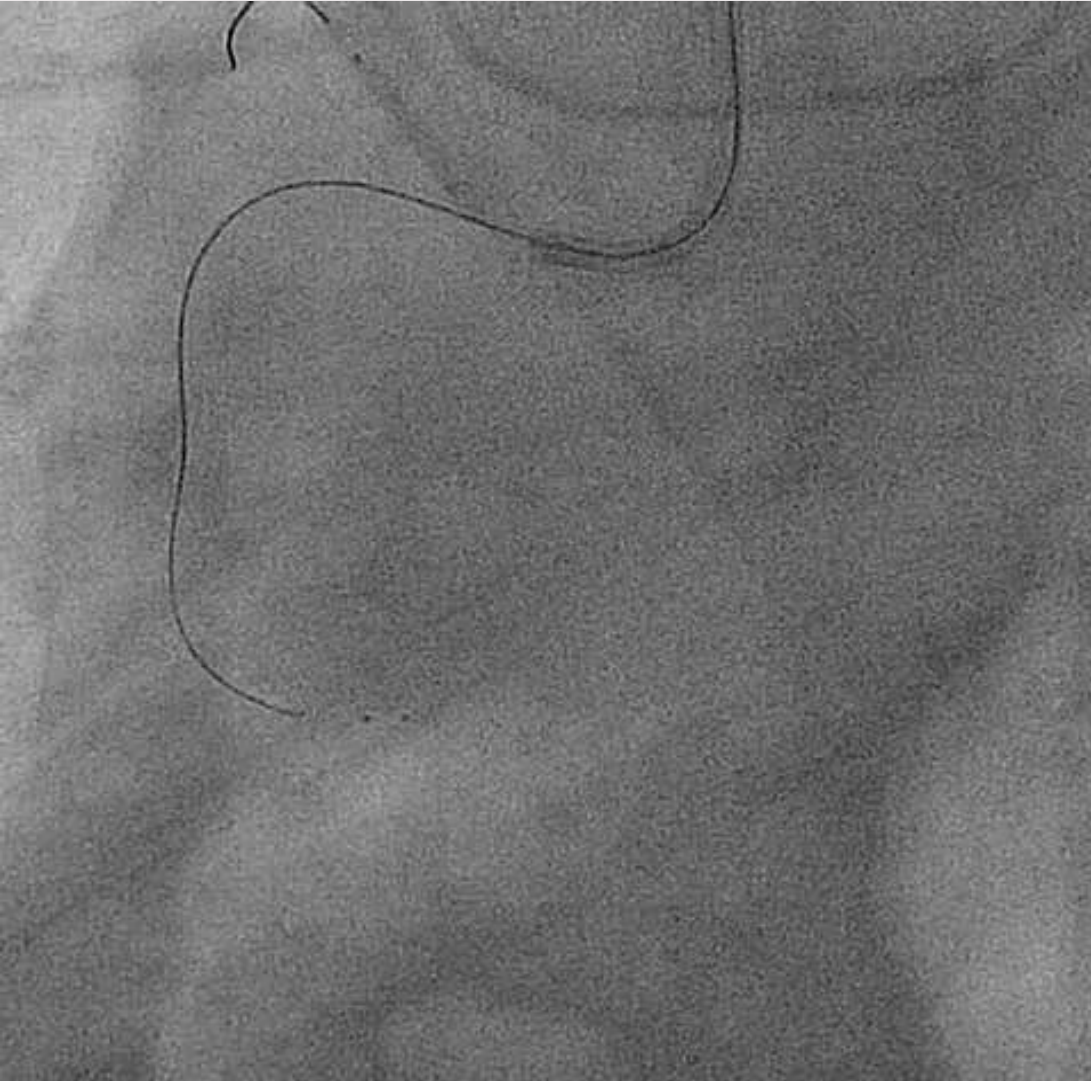
ANCHOR BALLOON, CORSAIR /XTA



KNUCKLE WIRE

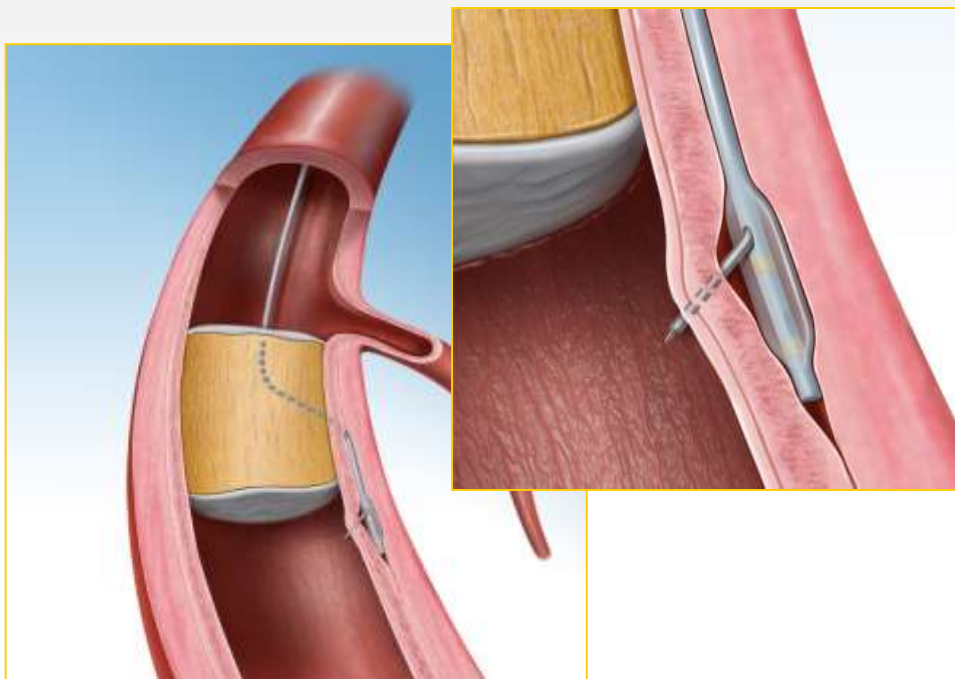






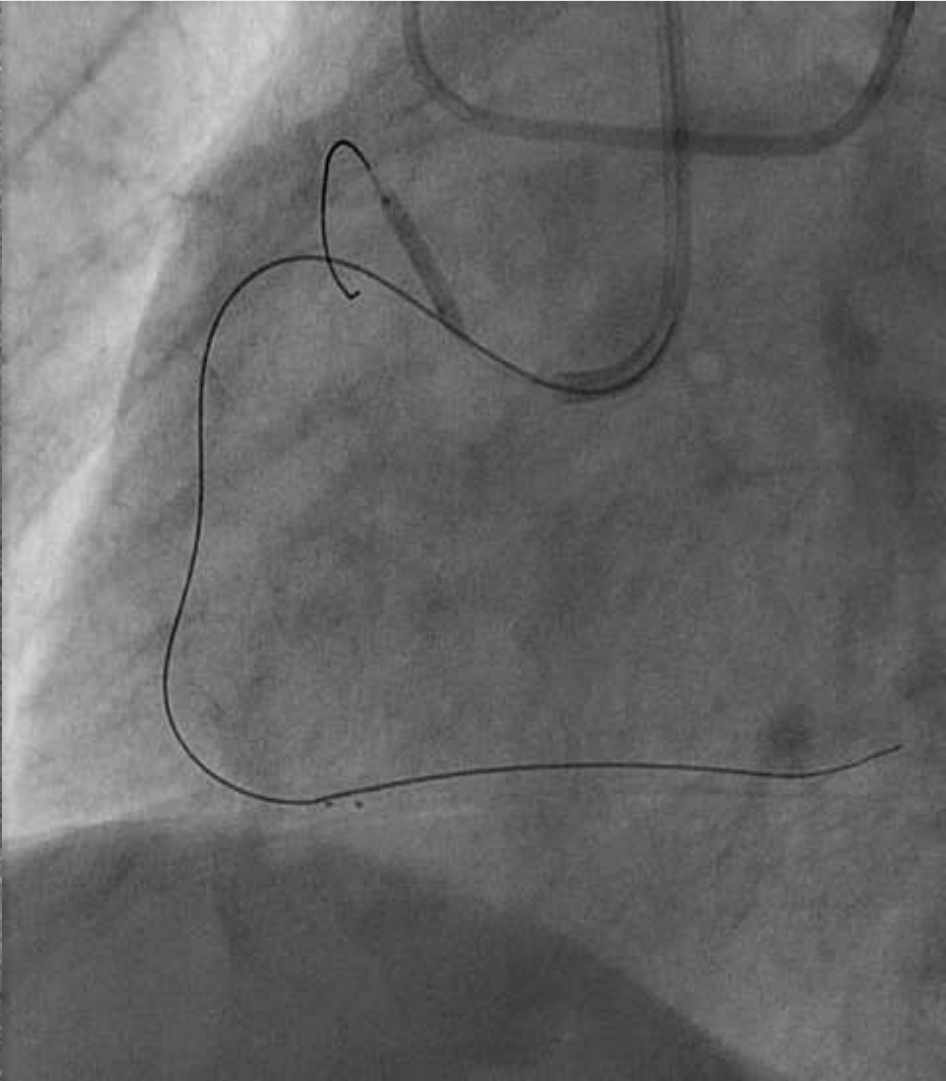
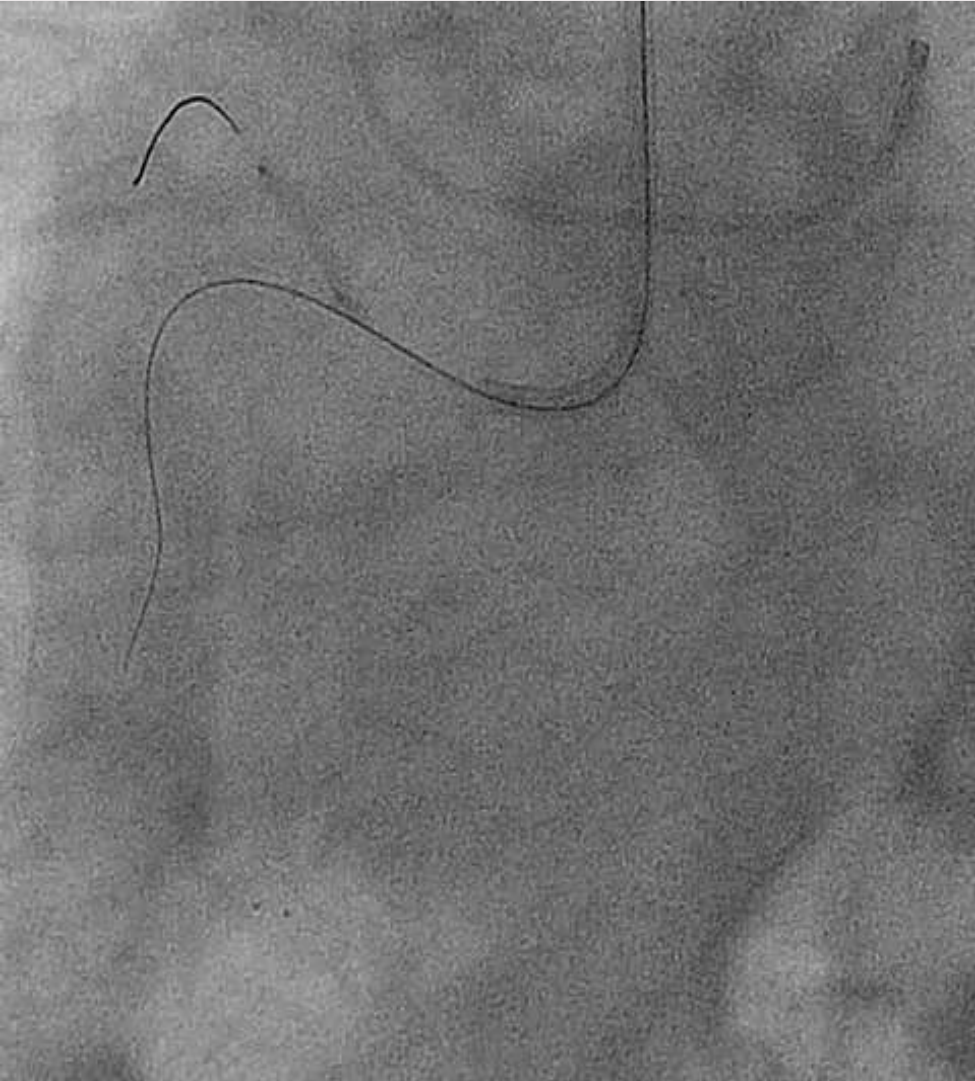
Stingray wire “Stick”

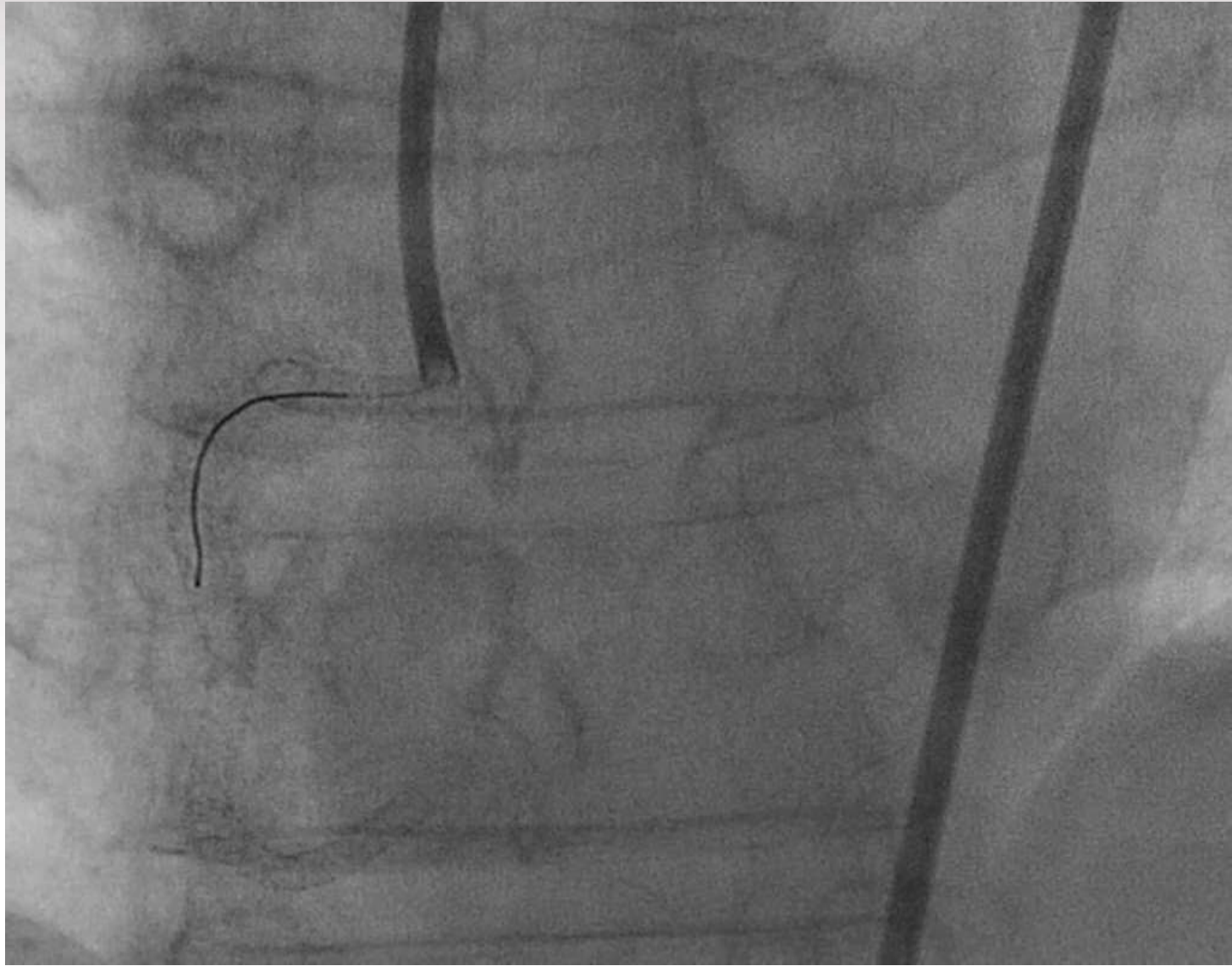
Stick with Stingray Wire



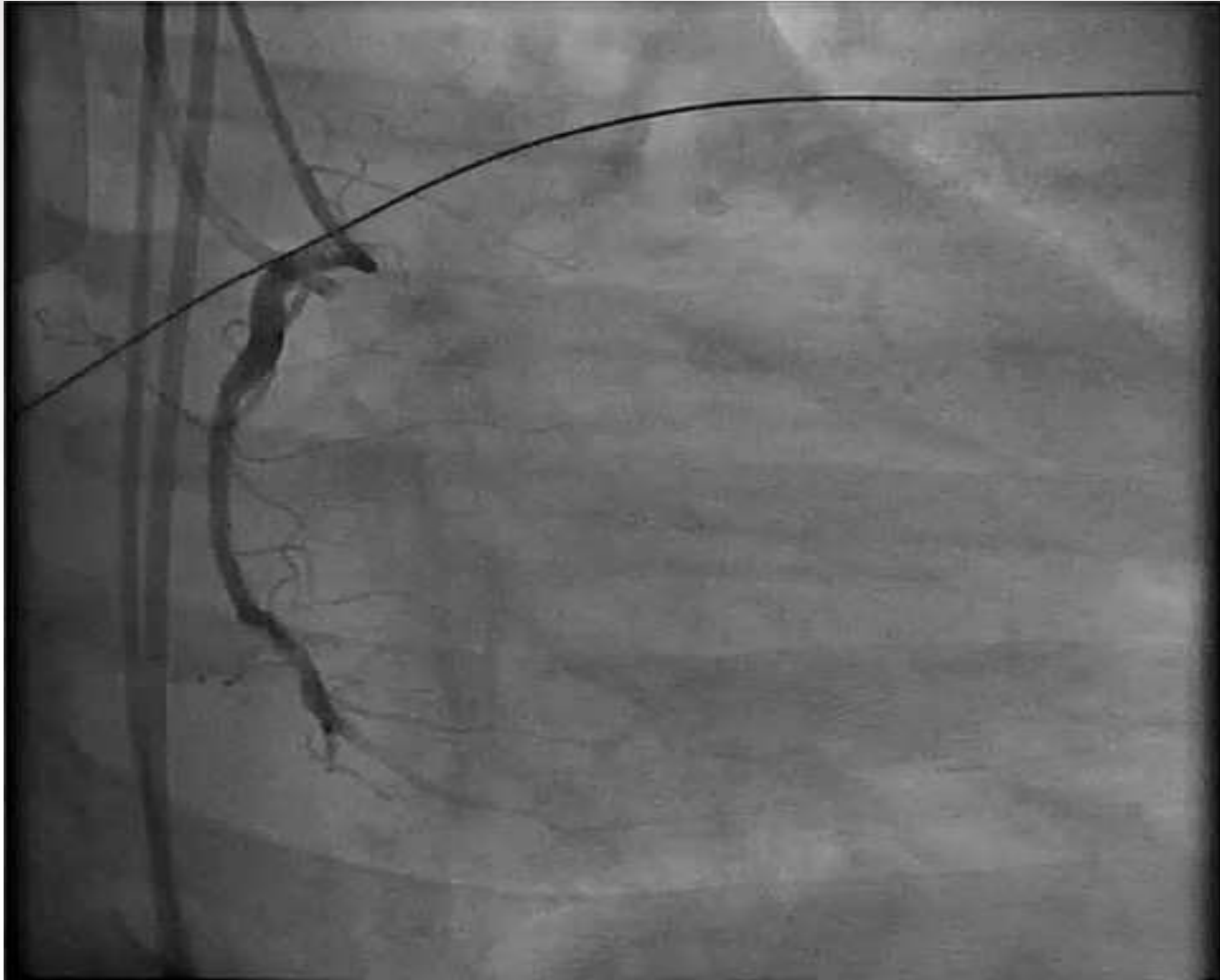
Access the distal vessel with the Stingray wire (strike across) withdraw and remove

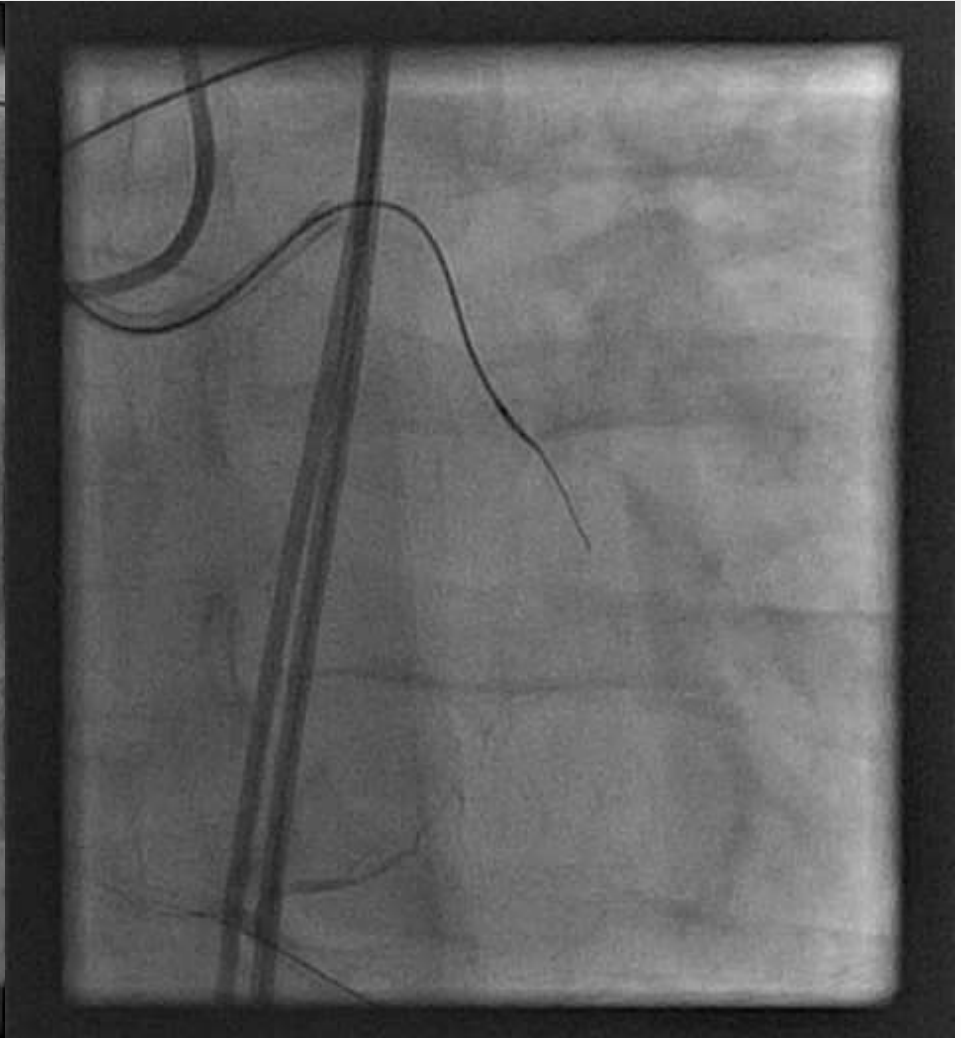
The Stingray balloon remains aligned with the channel created from false to true lumen

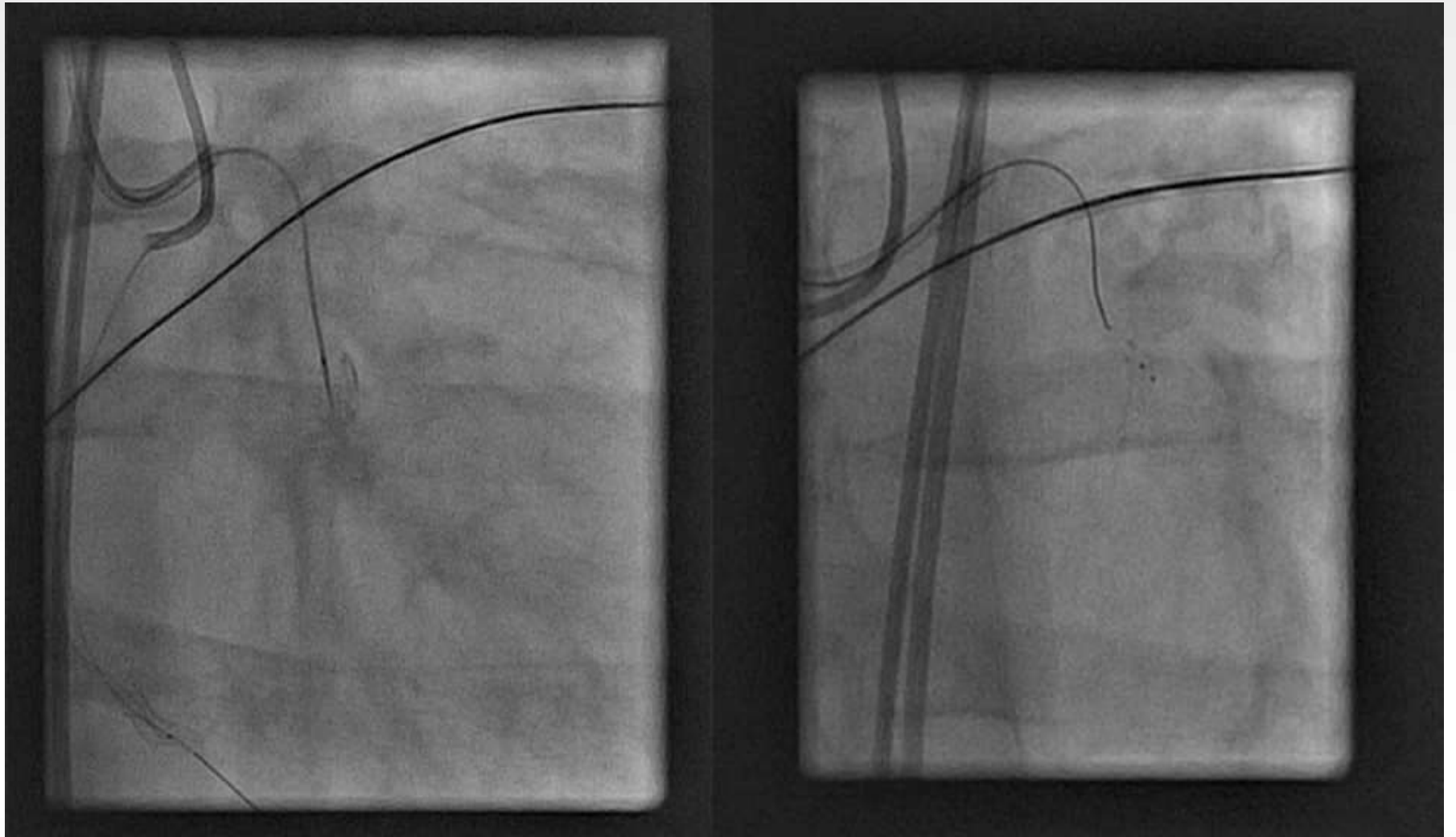


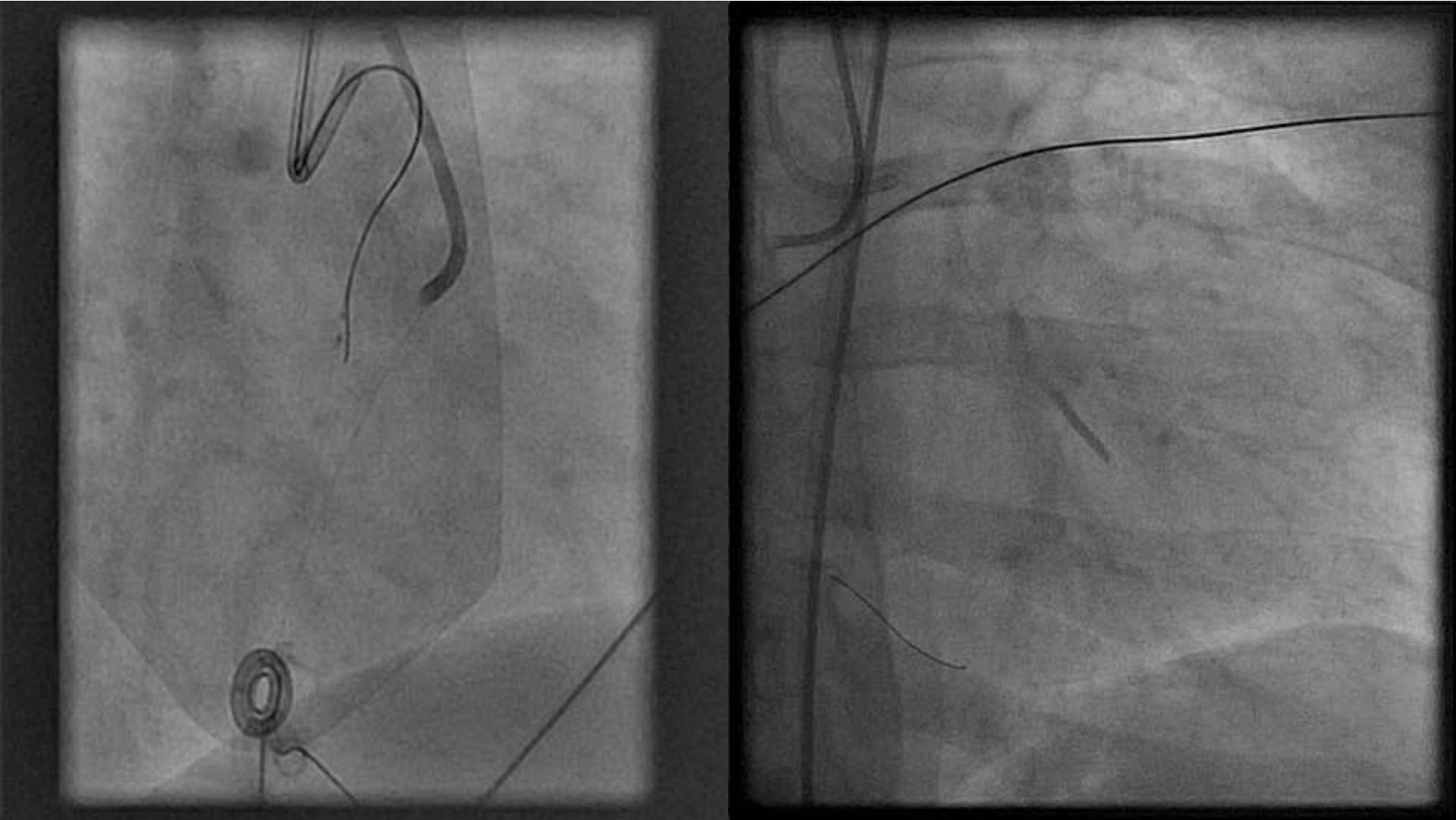


Case 2 : LCx CTO



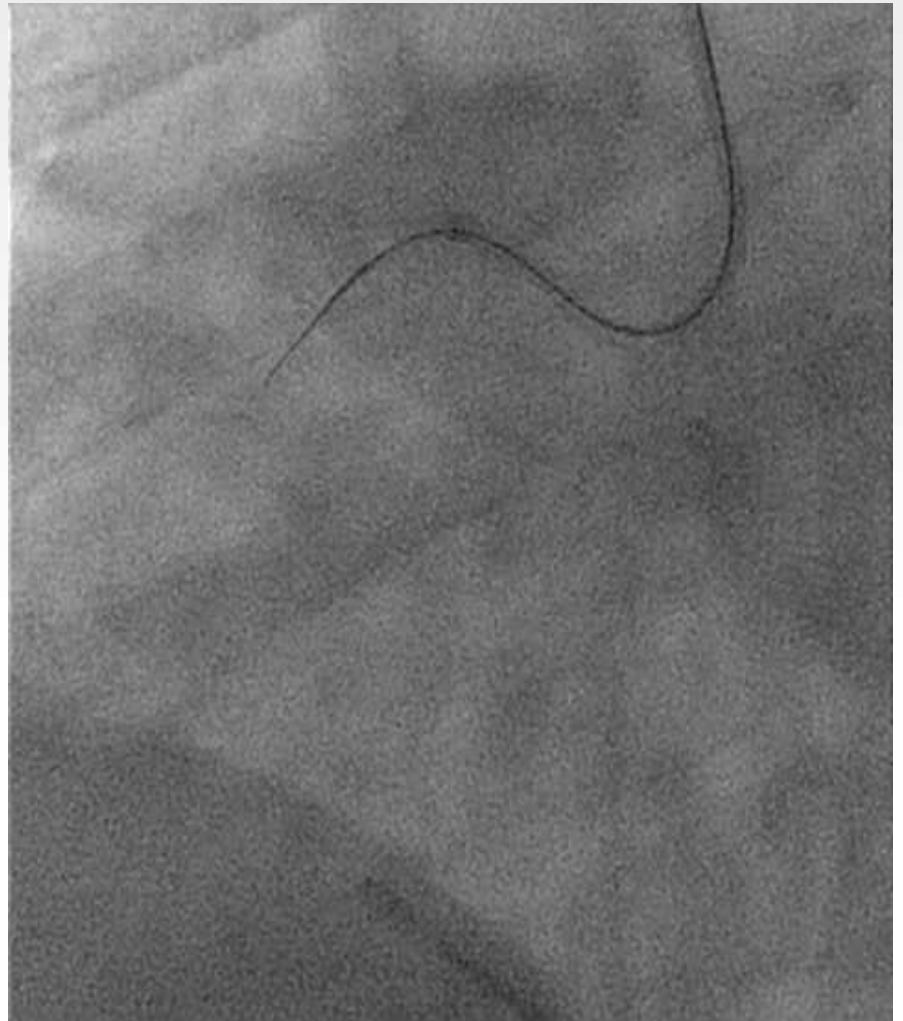
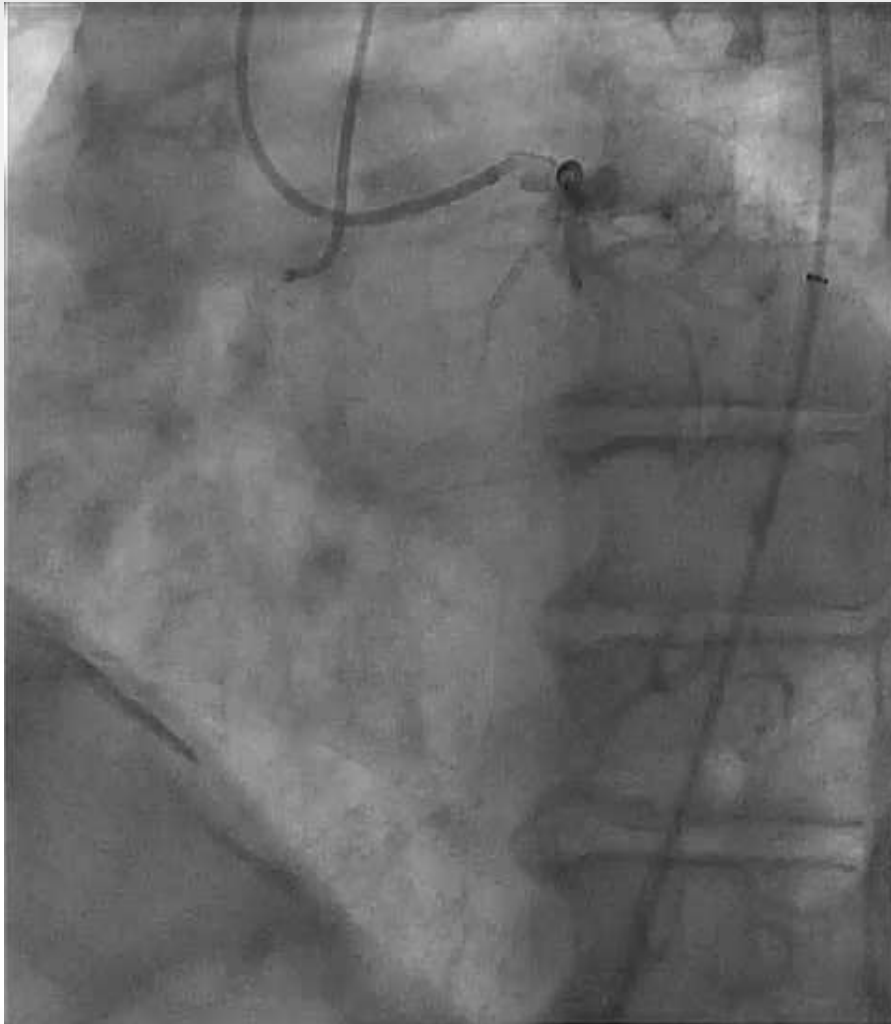


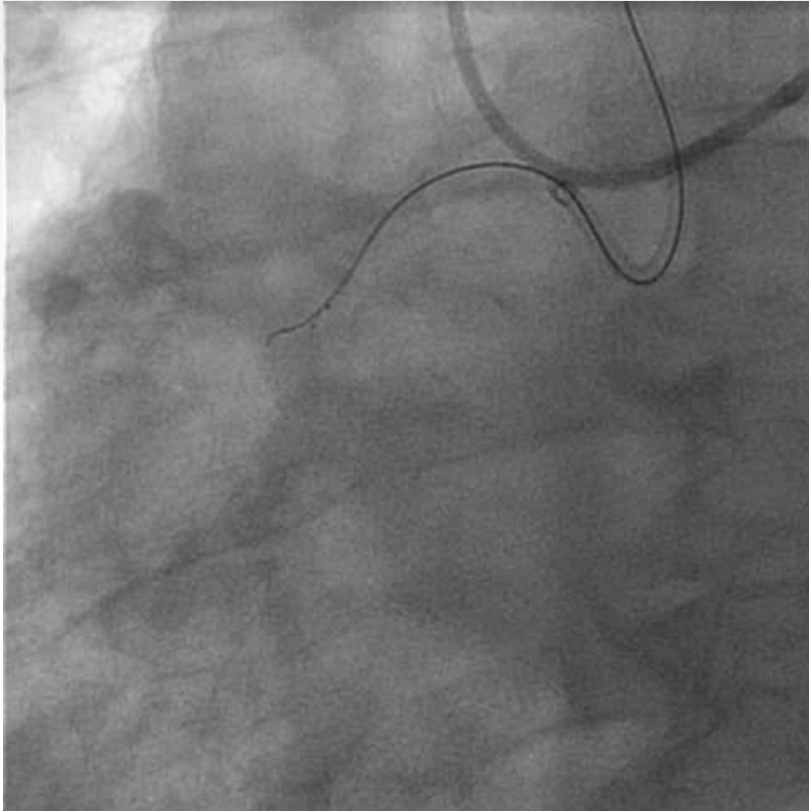




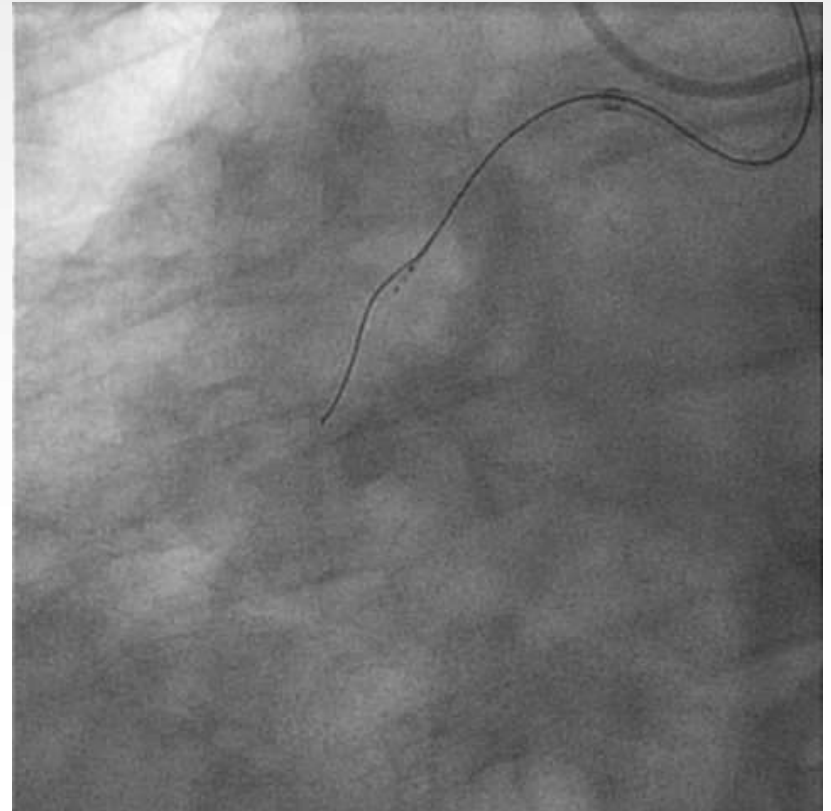
Haematoma extension to side-branch post-stenting

Case 3: RCA CTO

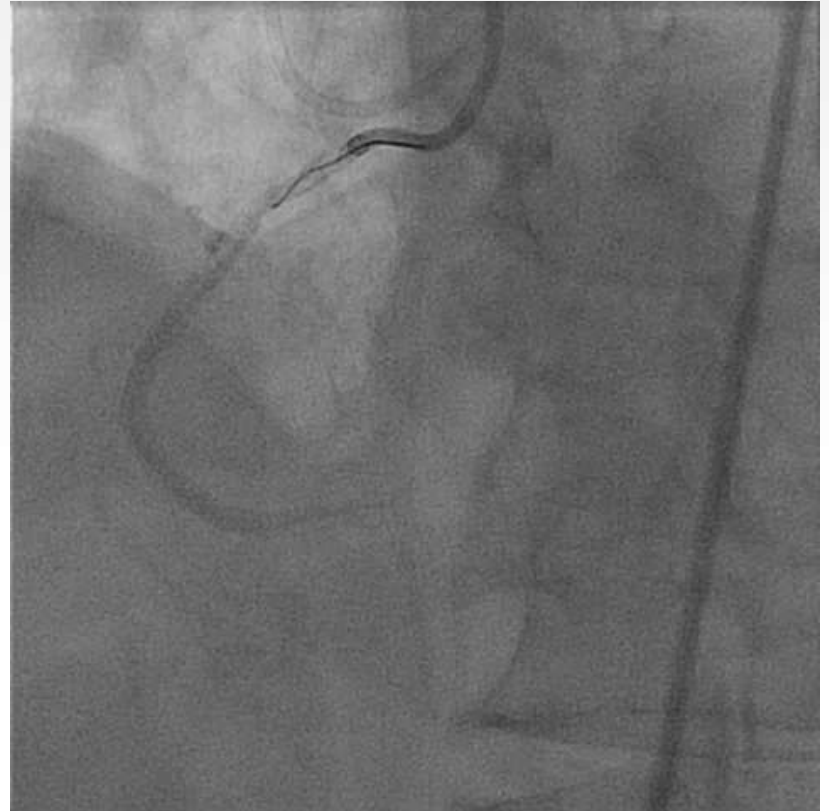




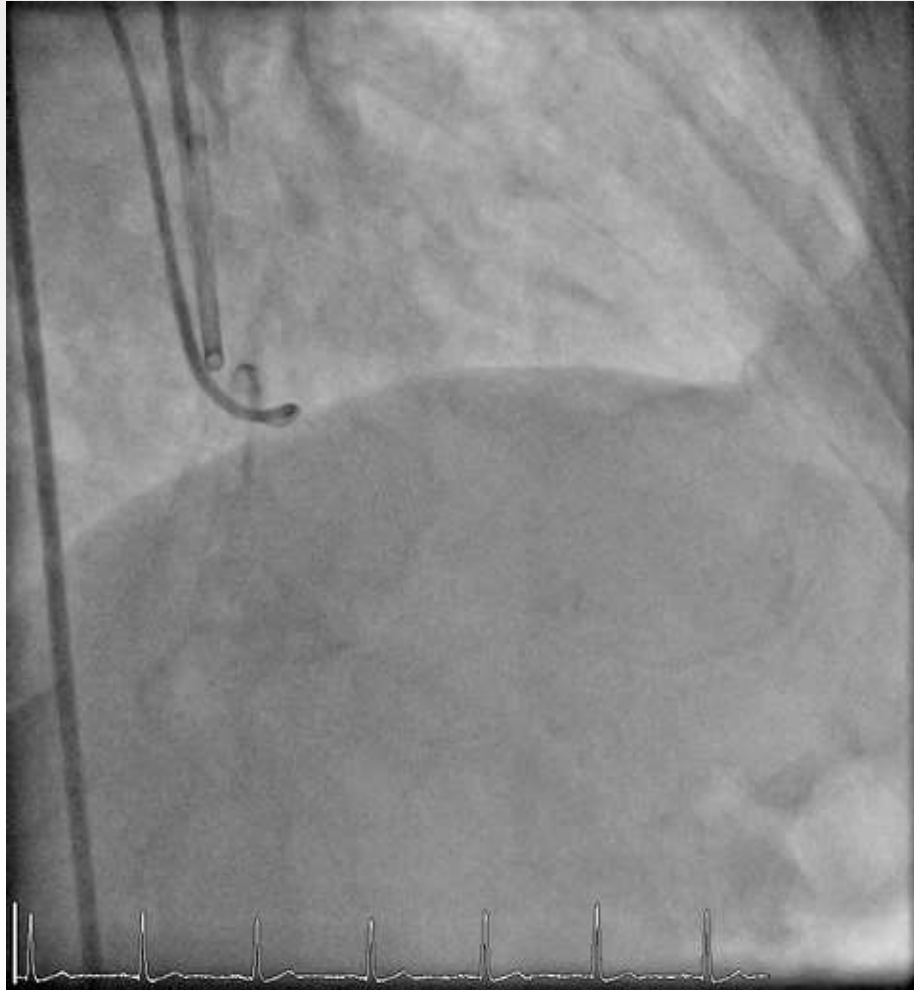
ADR CP 12, gaia 3rd

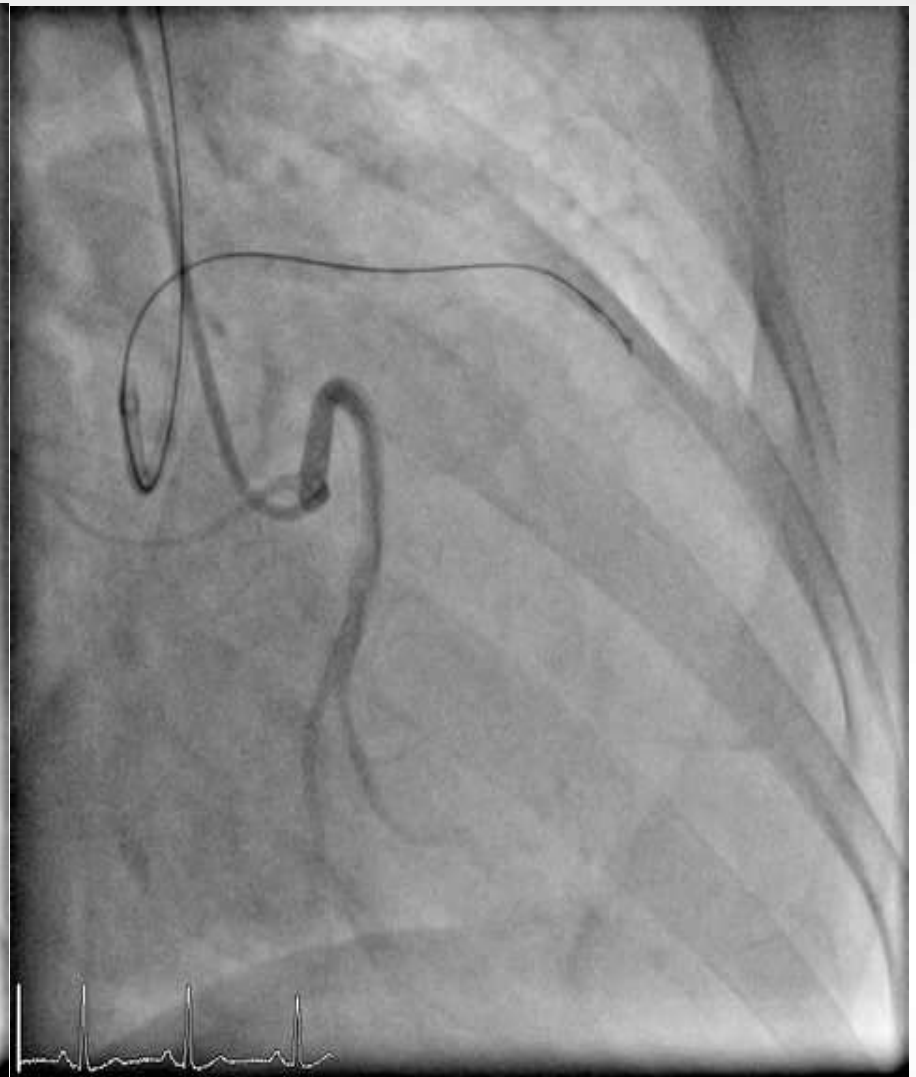


Wire in Side-branch



Case 4 : LAD CTO





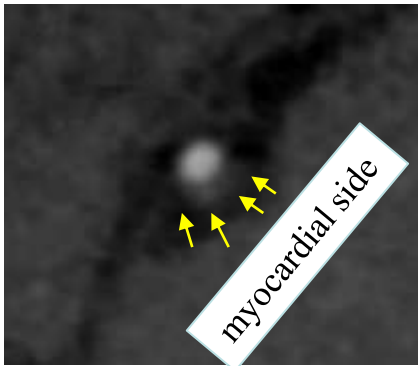


Pre-CTO-PCI CTCA assessment for ADR

More targeted re-entry zone

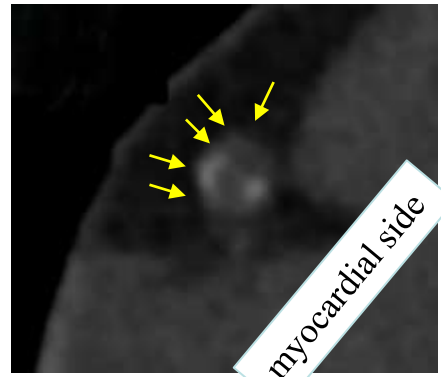
Courtesy Drs Habara, Dr Tsuchikane

Score: +1



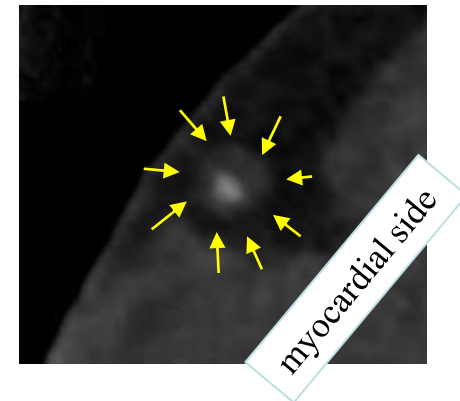
Plaque at myocardial site +1

Score: +3



Plaque at epicardial site +2
Calcification +1

Score: +2



Plaque all around +2

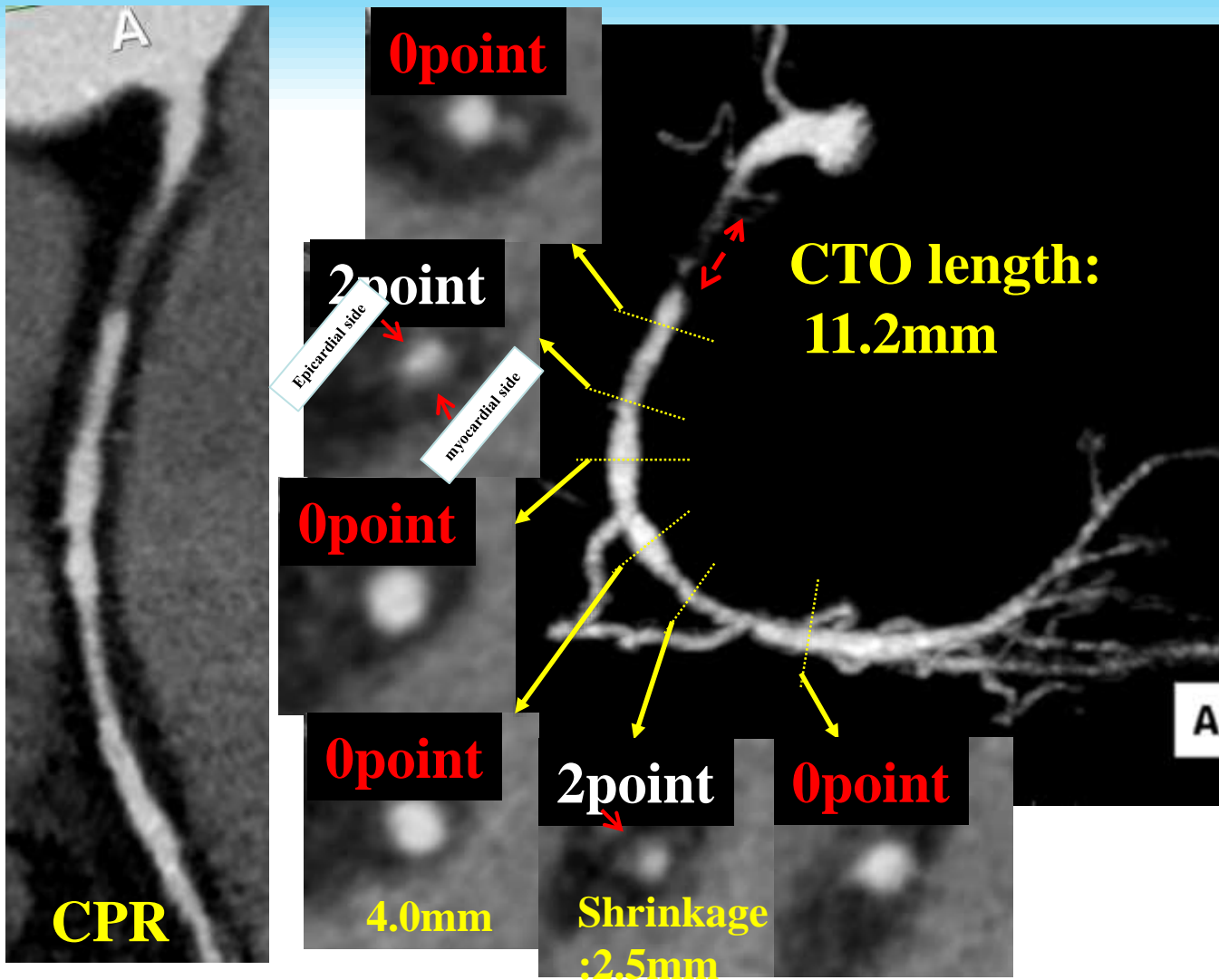
Stingray CT point / e.g.

- | | |
|--|----|
| 1. Plaques on the isolated myocardial side at distal puncture site | +1 |
| 2. Any plaques excluded above definition at distal puncture site | +2 |
| 3. Calcification on both 1 and 2 at distal puncture site | +1 |



Lesion with
1 point or below
indicated for Stingray?





Conclusions

B

- When antegrade wiring fails in Asia pacific region—there's high likelihood of retrograde approach
- ADR tends to be relegated to extremely difficult pts (due to high skill level in retrograde approach)
- May not use crossboss before stingray
- ADR can work but operator / lesion dependent
- Control of subintimal space vital for success
- More common use of other wires (ie other than stingray) for ADR—stick
- CrossBoss may be used as first line in occluded stents