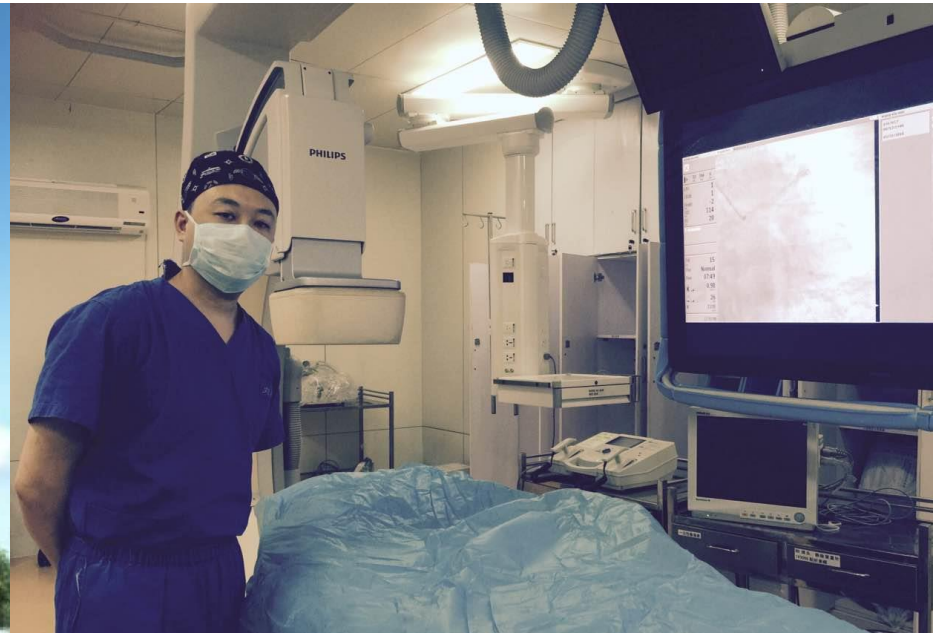


Recanalization of CTO secondary to in-stent restenosis(ISR)

Bing-Chen Liu

**Department of Cardiology
Fourth Hospital of Harbin Medical University**



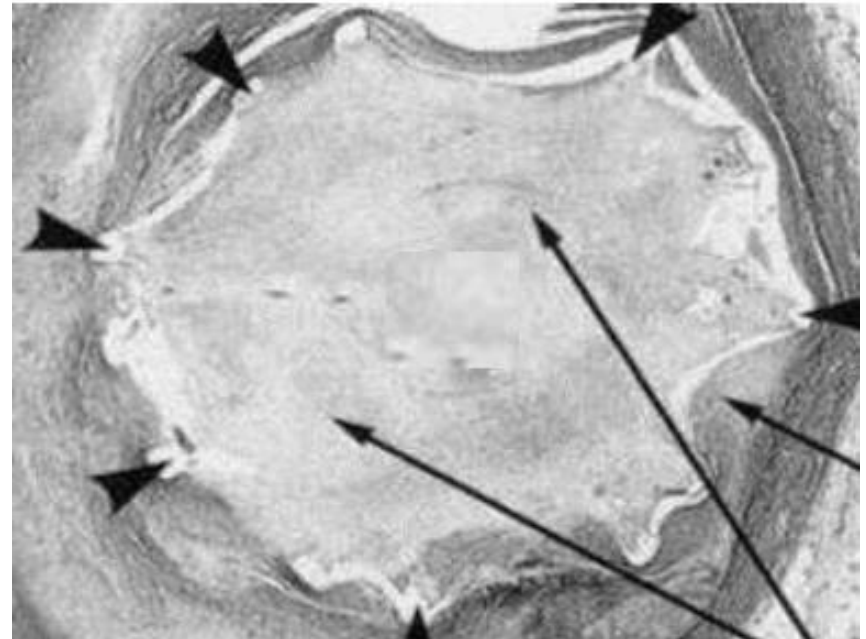
Background

- Occlusive ISR is an uncommon cause of CTOs (<5%)
- Most are symptomatic (stable angina)
- Presence of stent(s) within CTO
 - “Roadmap”
 - Protection against perforation

BUT Case reports

Suggest lower success rates

- Hyperplastic smooth muscle and hypocellular matrix of ISR is hard and resistant with lack of microchannels (need penetrative wires)



4th Hospital of Harbin Medical University

Background

- Mode of failure
 - Inability to cross with wire
 - Inability to stay within struts (esp stiff wires)
- Reported predictors of failure
 - Longer duration occlusion
 - Smaller initial stent diameter
 - Large side branch at proximal cap
- CTO ISR usually excluded from CTO trials
- Previous devices trialled
 - Optical reflectometry wire, Frontrunner™ device

Furuichi S, Airoidi F, Colombo A. Intravascular ultrasound- guided wiring for chronic total occlusion. *Catheter Cardiovasc Interv* 2007;70:856–859.

Yang Y-M, Mehran R, Dangas G, Reyes A, Qin J, Stone GW, Leon MB and Moses JW. Successful use of the Frontrunner Catheter in the treatment of in-stent coronary chronic total occlusions. *Catheter Cardiovasc Int* 2004;63:158–161.

Hoye A, Onderwater E, Cummins P, Sianos G, Serruys PW. Improved recanalization of chronic total coronary occlusions using an optical coherence reflectometry-guided guidewire. *Catheter Cardiovasc Interv* 2004;63:158–161.

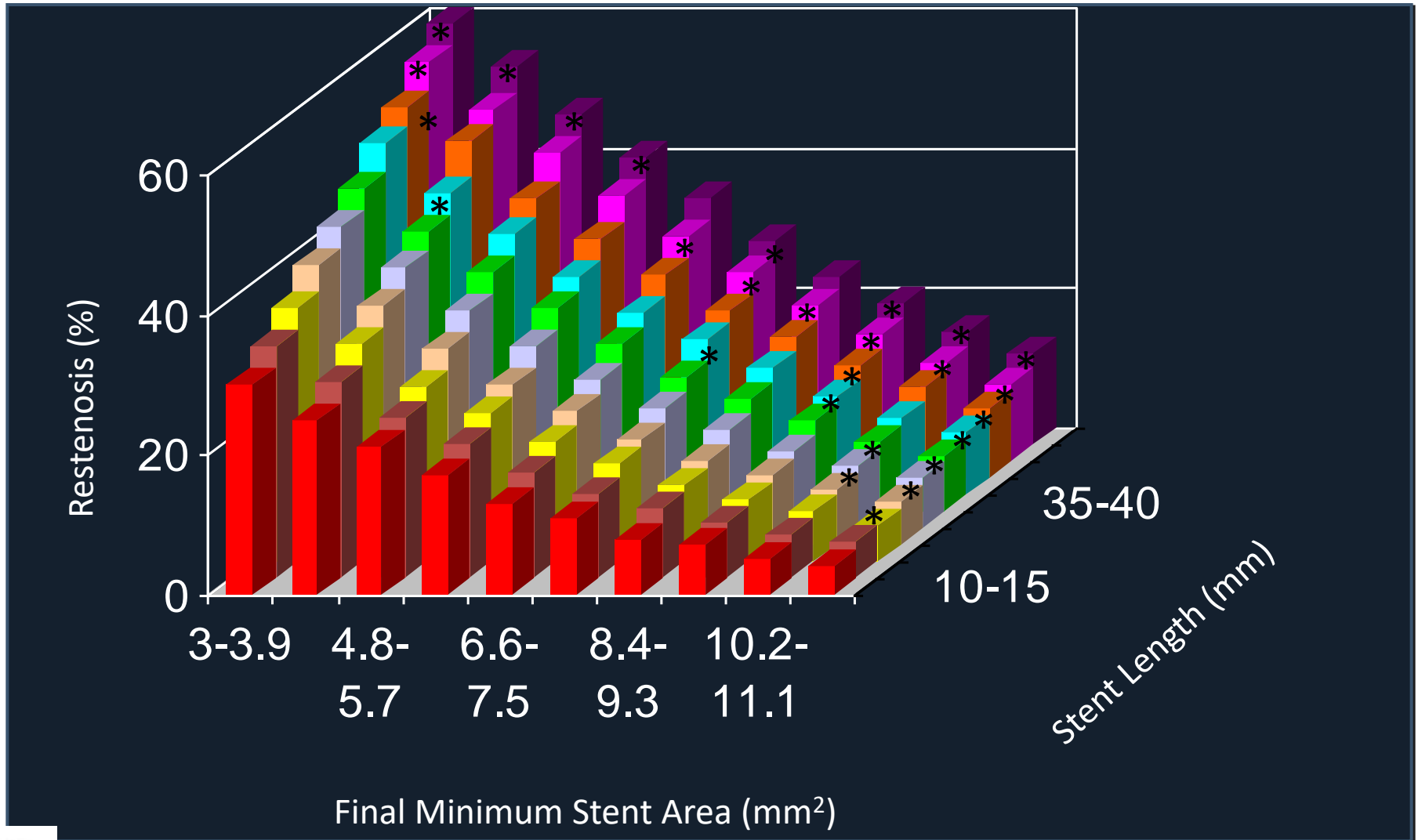


Preparation

- Quality imaging and reading
- Guiding selection(Strong support,7F, femoral)
- Characteristics of lesion
(J-CTO score, Progress CTO score)
- The type of the restenosis stent(BMS or DES)

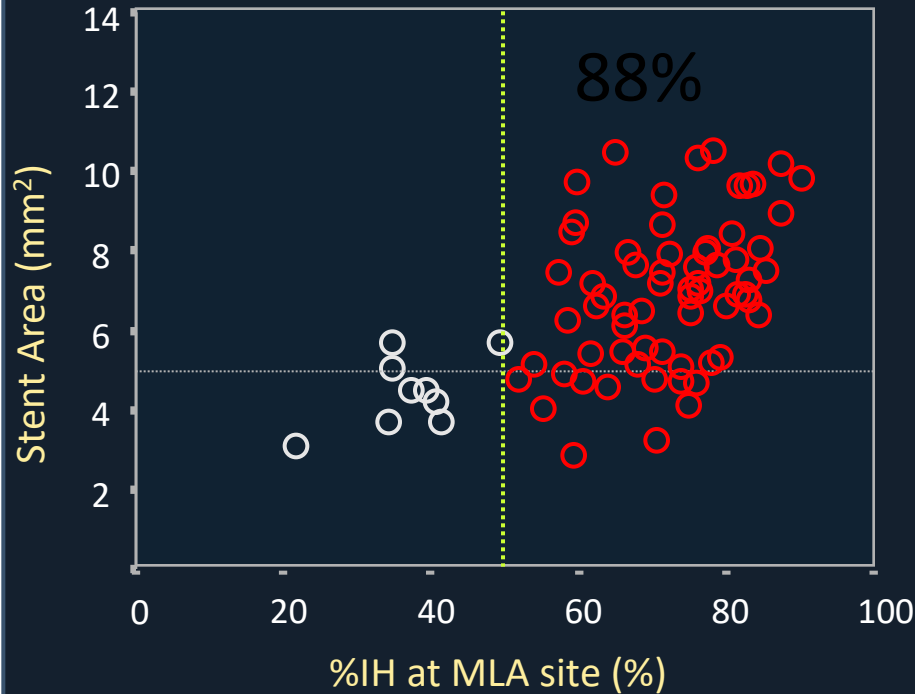


Impact of Stent Length and Final Minimum Stent Area on Bare Metal Stent Restenosis



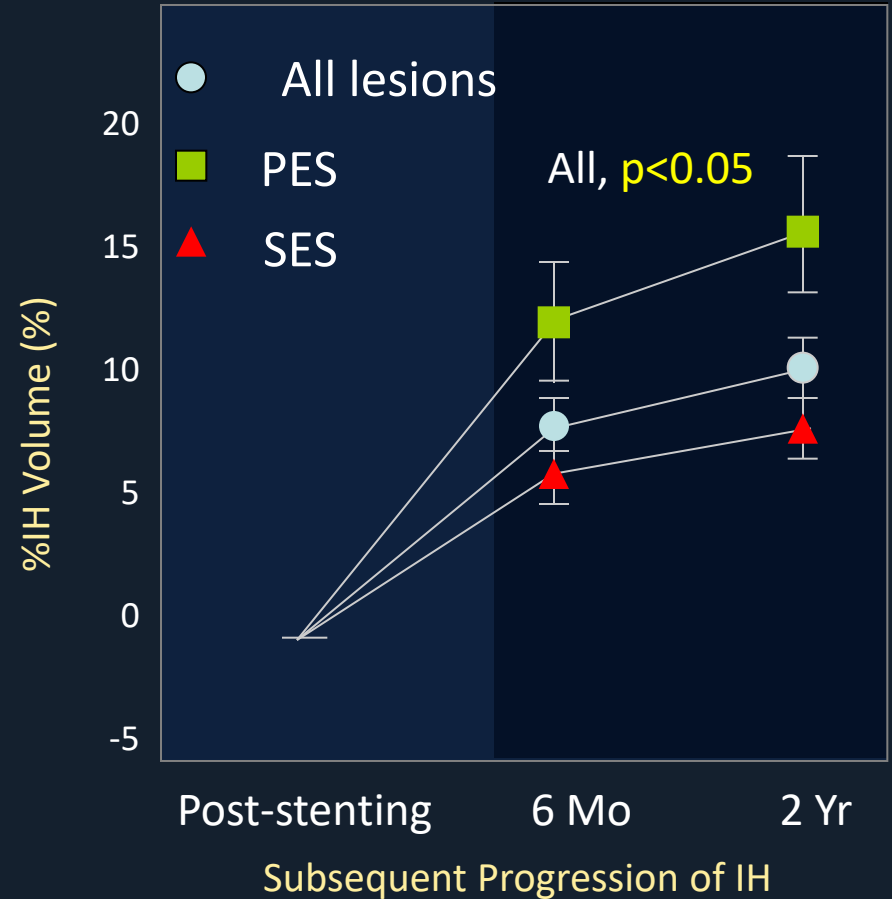
“Late Catch-up”

Mechanism of DES-ISR



Kang et al. Circ Cardiovasc Interv 2011;4:9-14

Serial F/U %IH



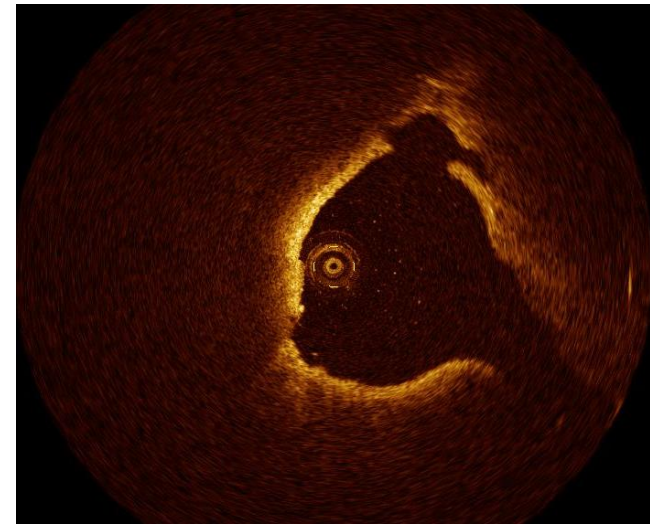
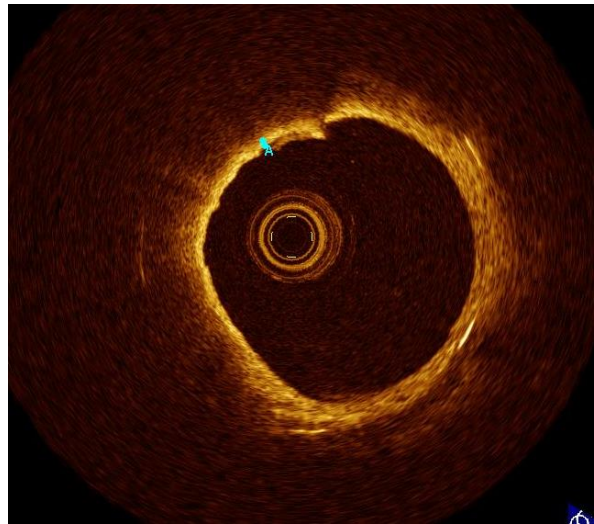
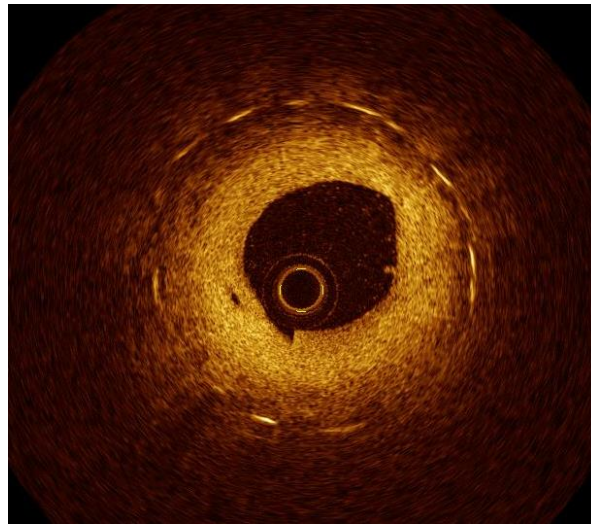
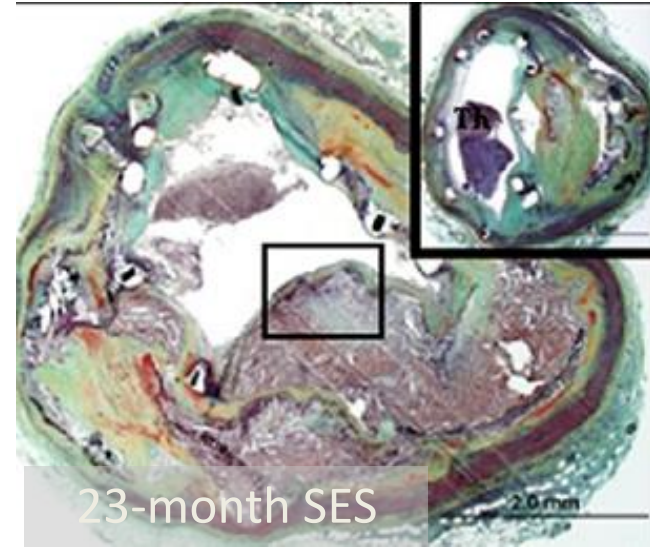
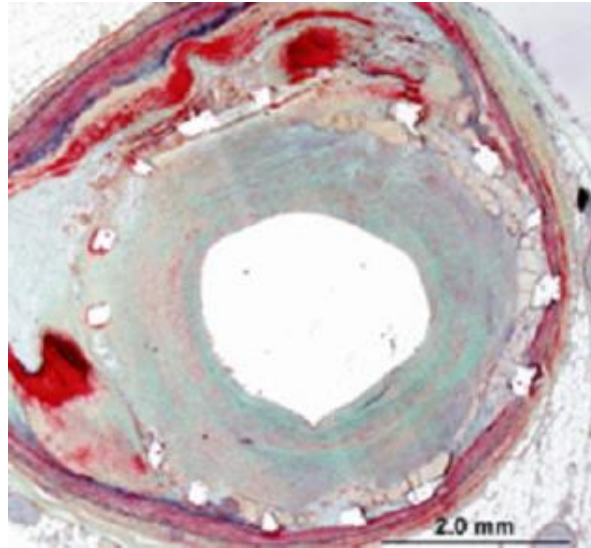
Kang et al. Am J Cardiol 2010;105:1402-8



Early Neointima

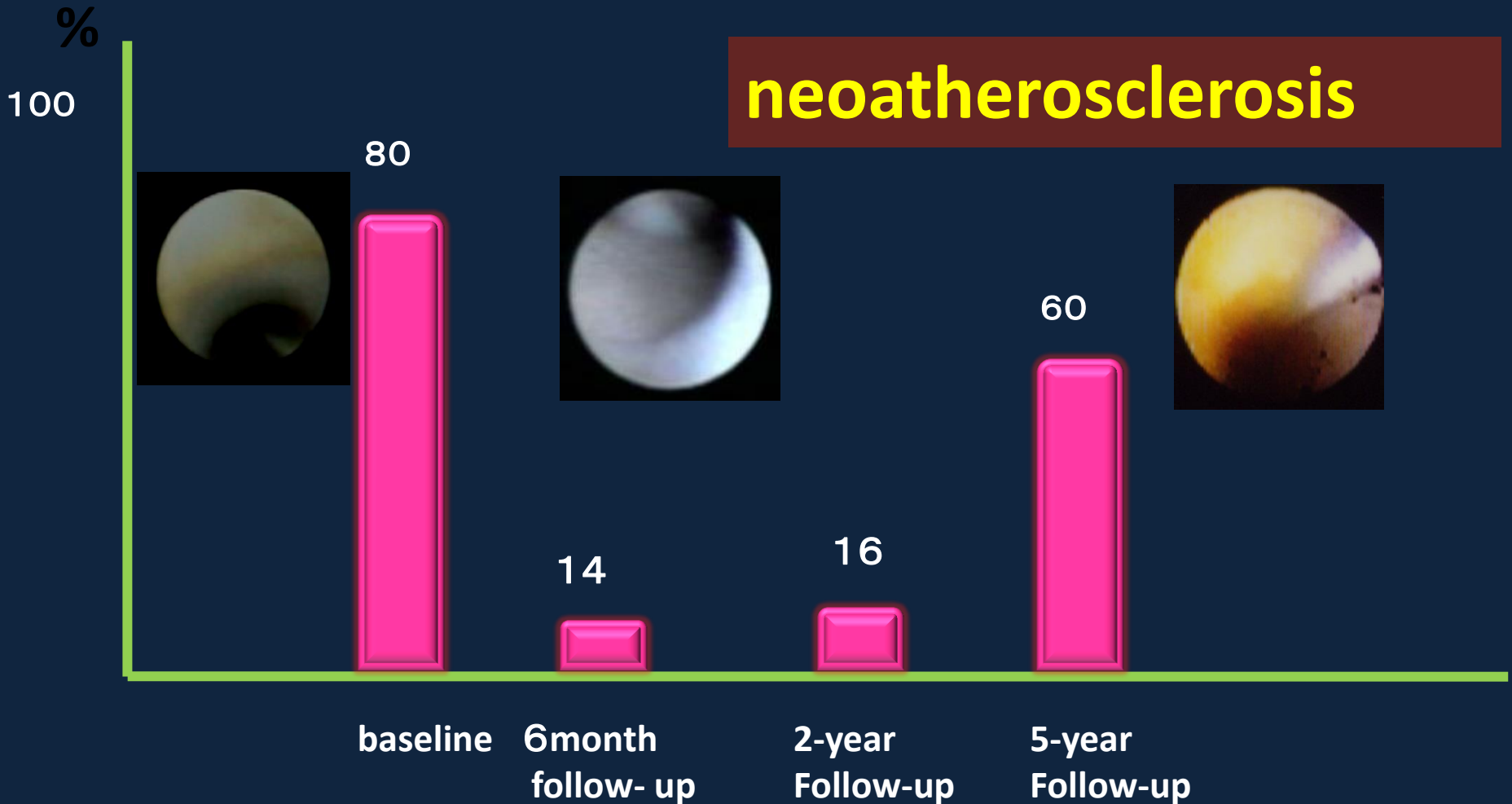


Neoatherosclerosis

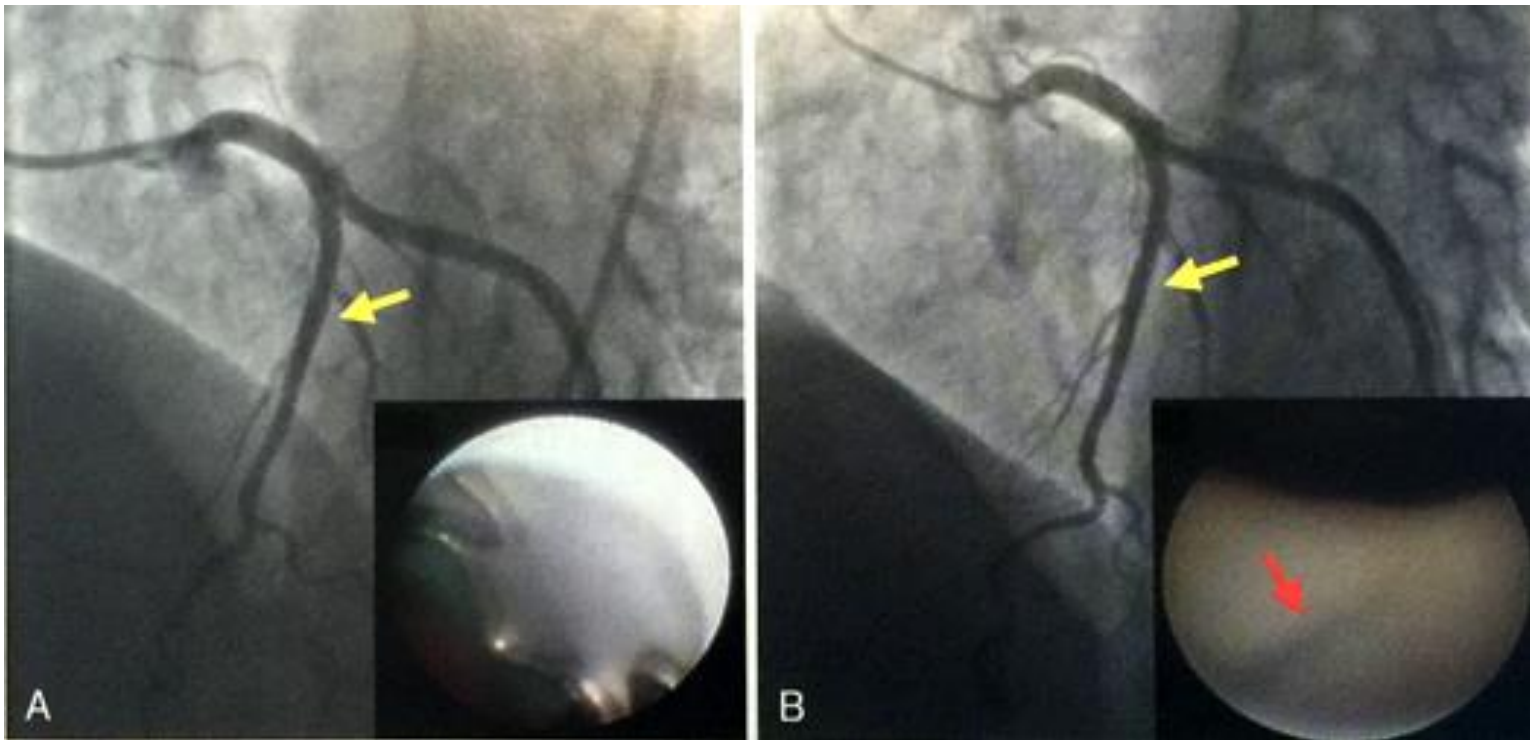


Serial changes of yellow plaque after BMS implantation

neoatherosclerosis

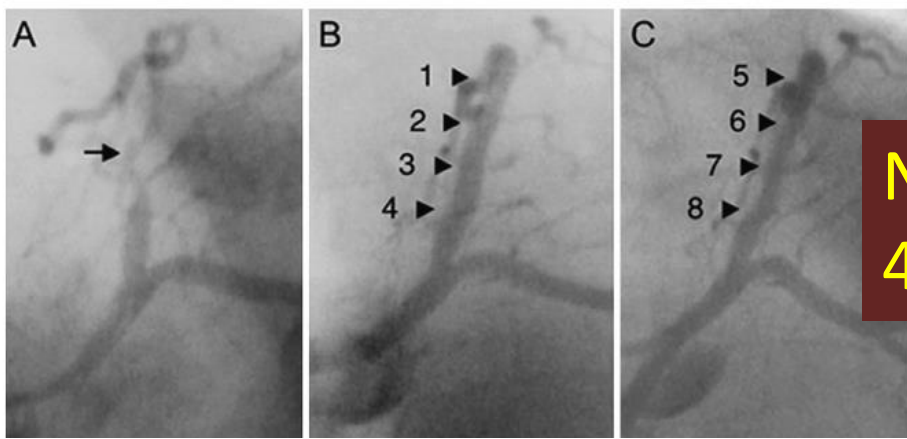


Changes of plaque after DES implantation

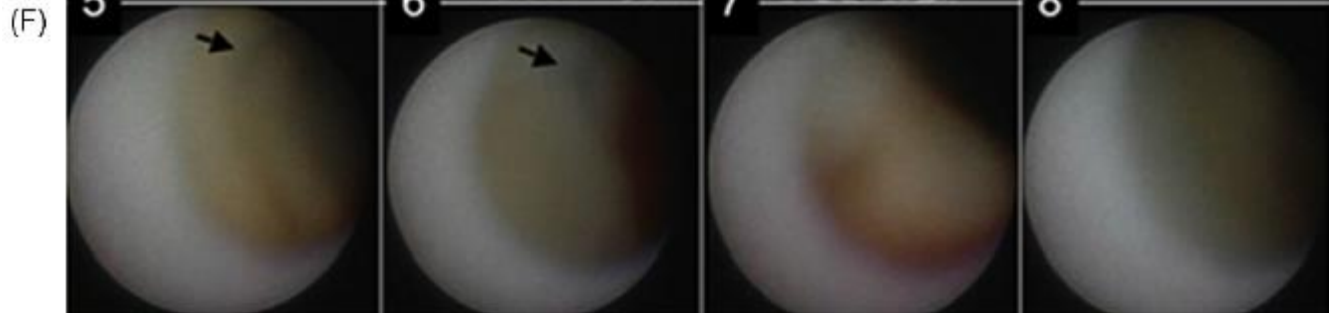
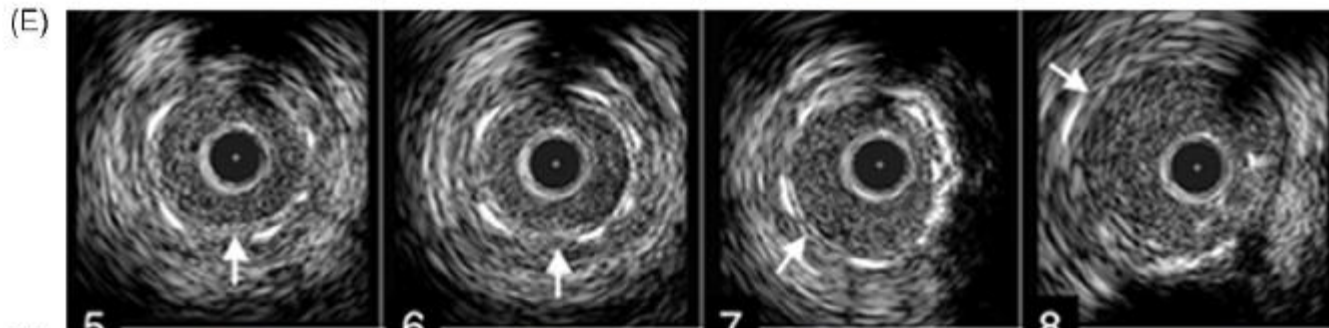
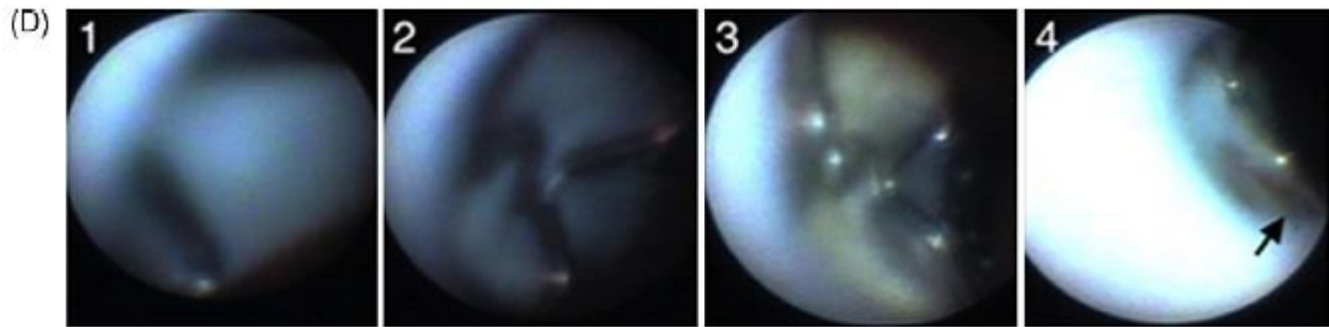


A: White plaque and DES implantation

B: One year follow up and yellow plaque formation



Neoatherosclerosis
400d after DES



Procedure

- Wire selection
 - stiff wires: Miracle, Conquest, **Gaia III**
 - AWE : Fielder XT/**XTR**→Gaia→Confianza Pro
- Microcatheter(Corsair)
- Multi-position verification($>90^\circ$)
make sure wire stay within struts
- Good collateral should perform retrograde angio
ASAP
- Retrograde is still difficult and can not performed

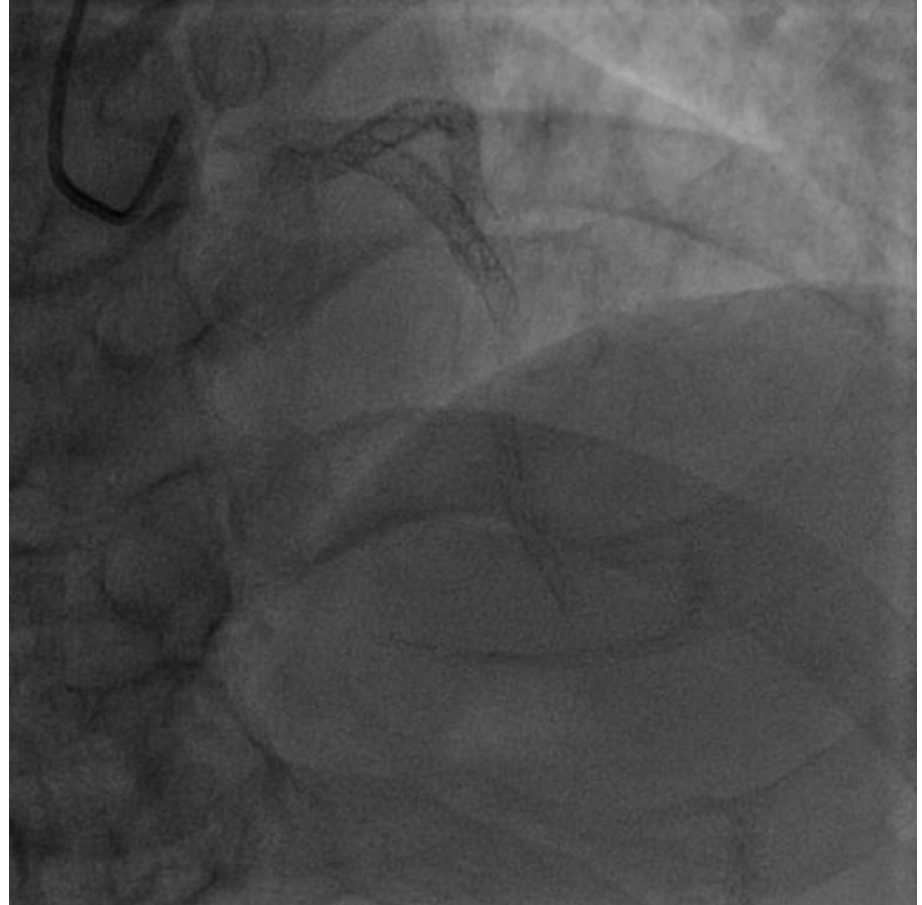


Procedure

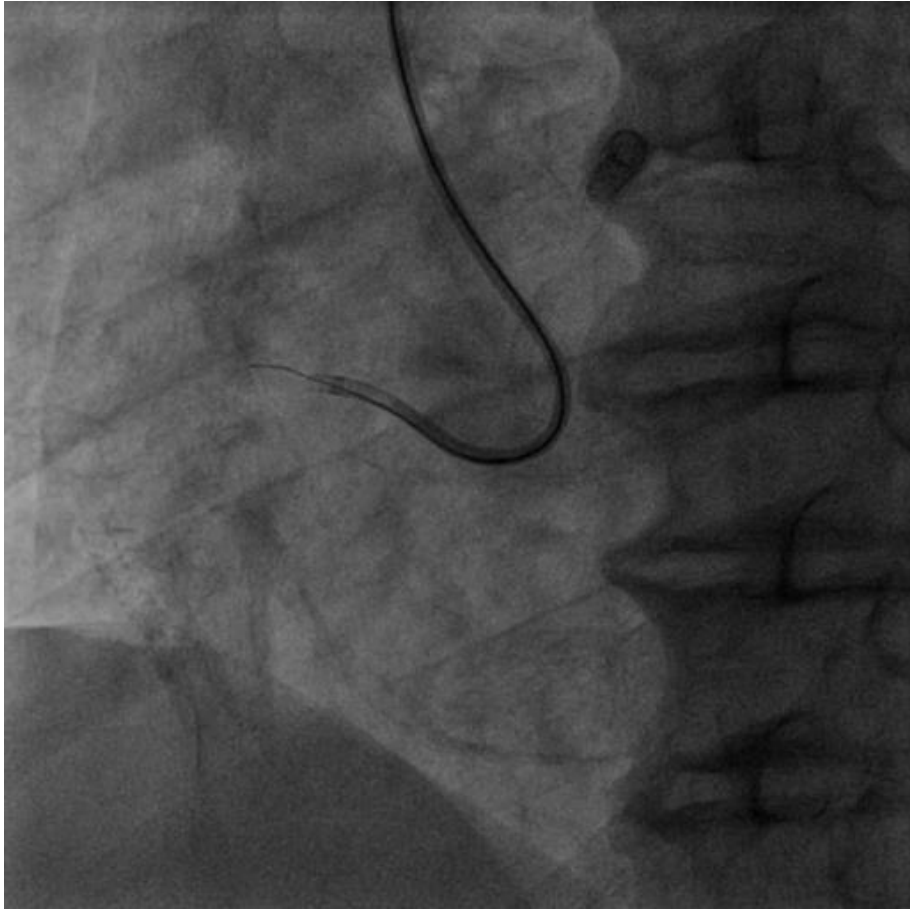
- Techniques after wire crossing
 - Tornus
 - Balloon anchored
 - Guidezilla
 - Seesaw balloon-wire cutting



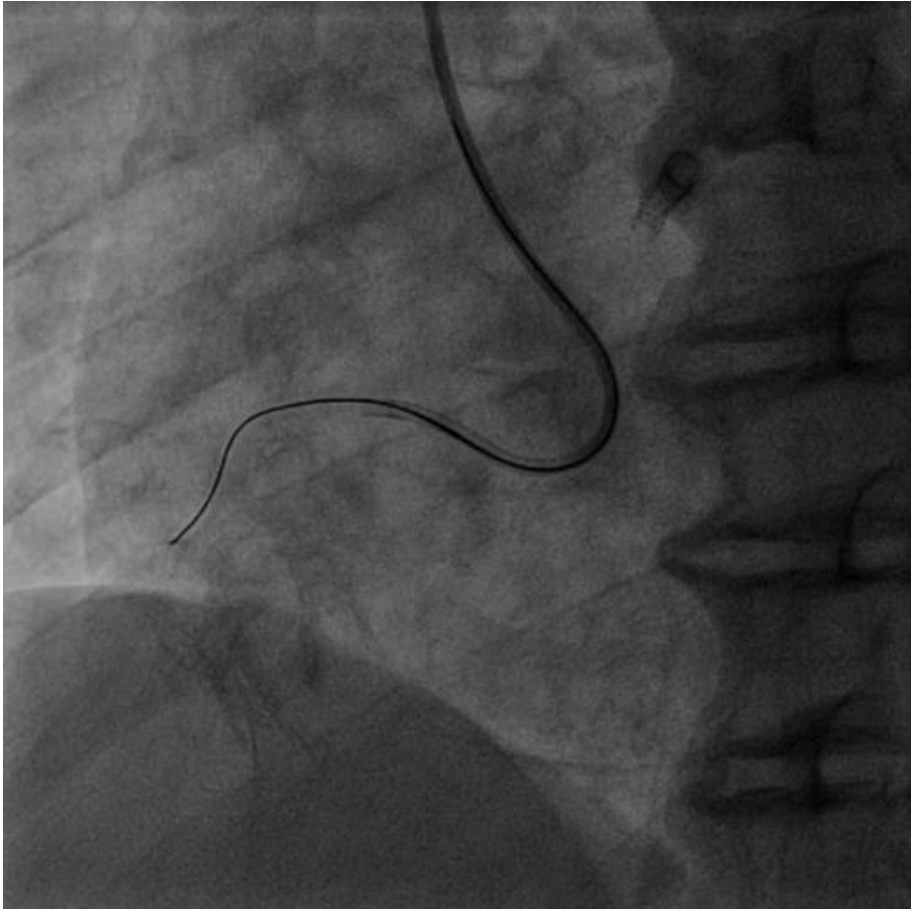
Case 1



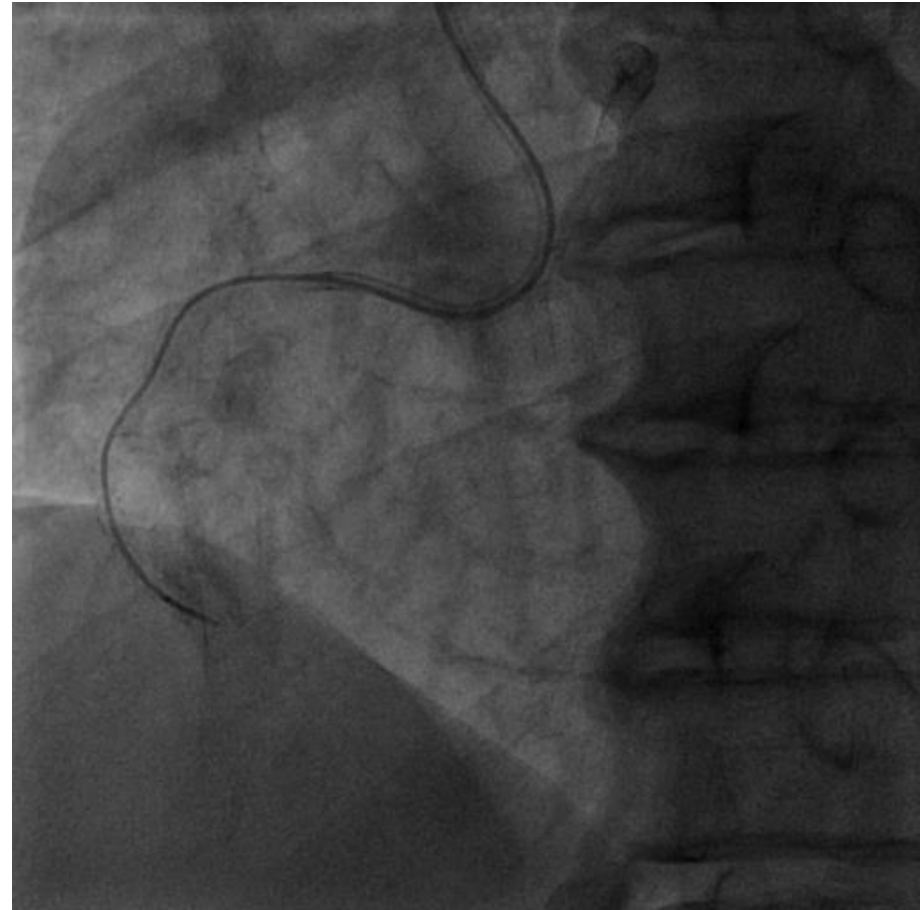
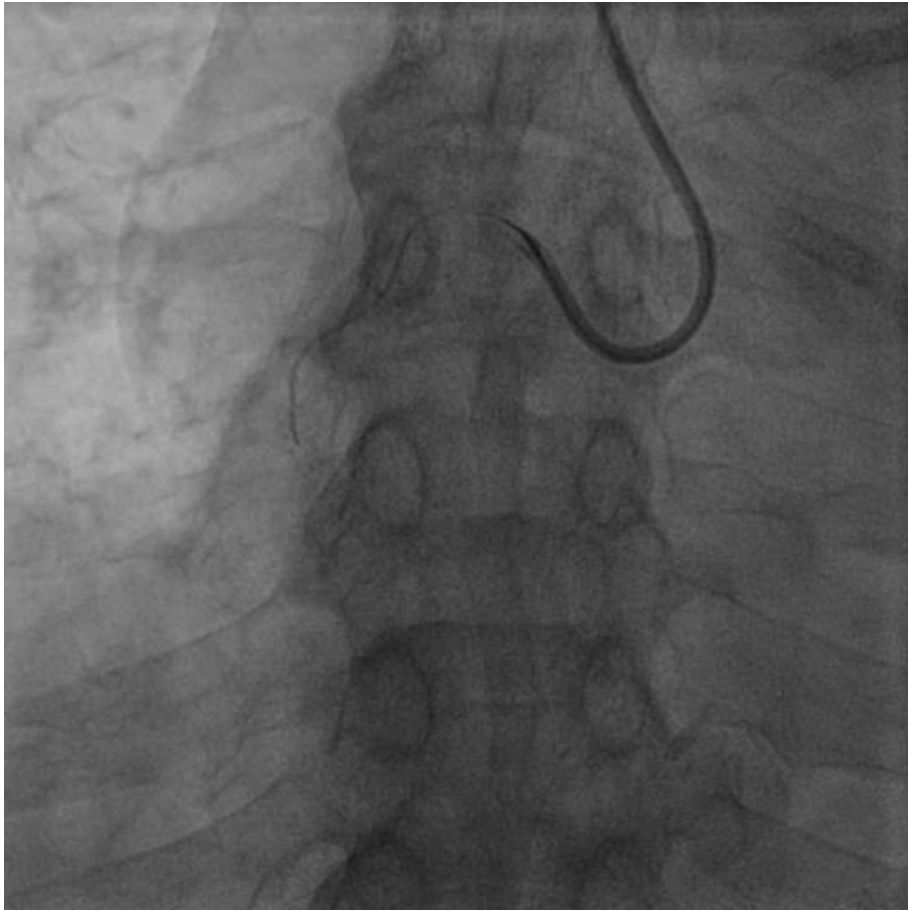




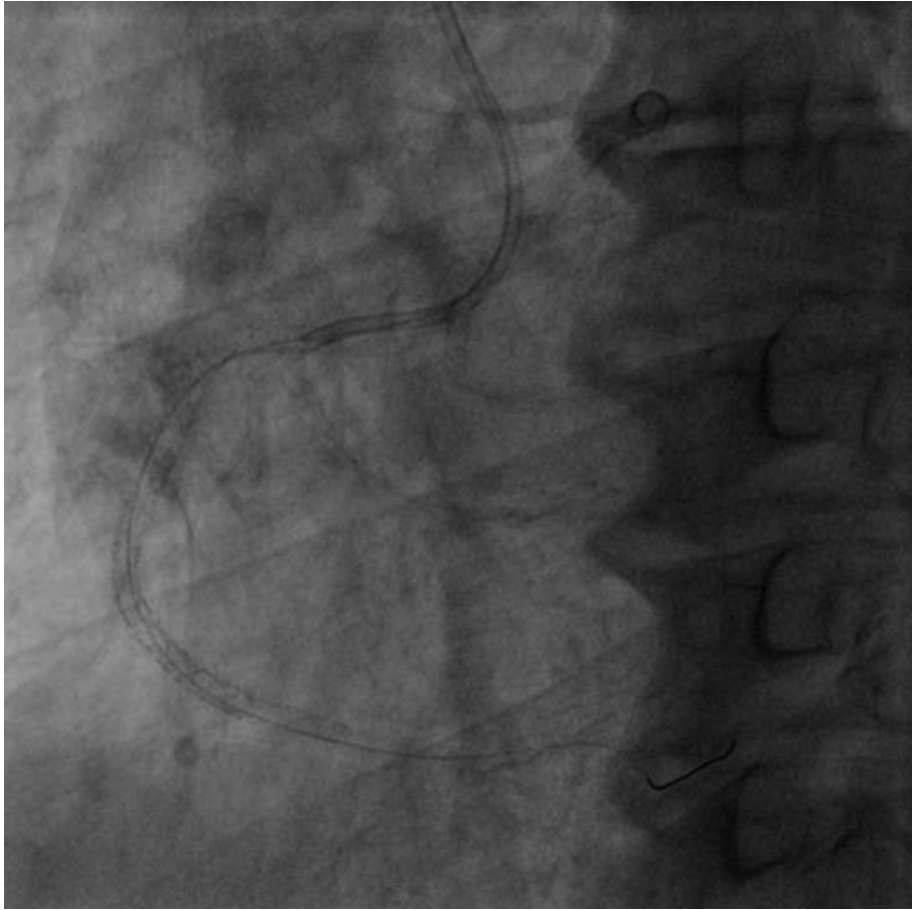
Fielder XT

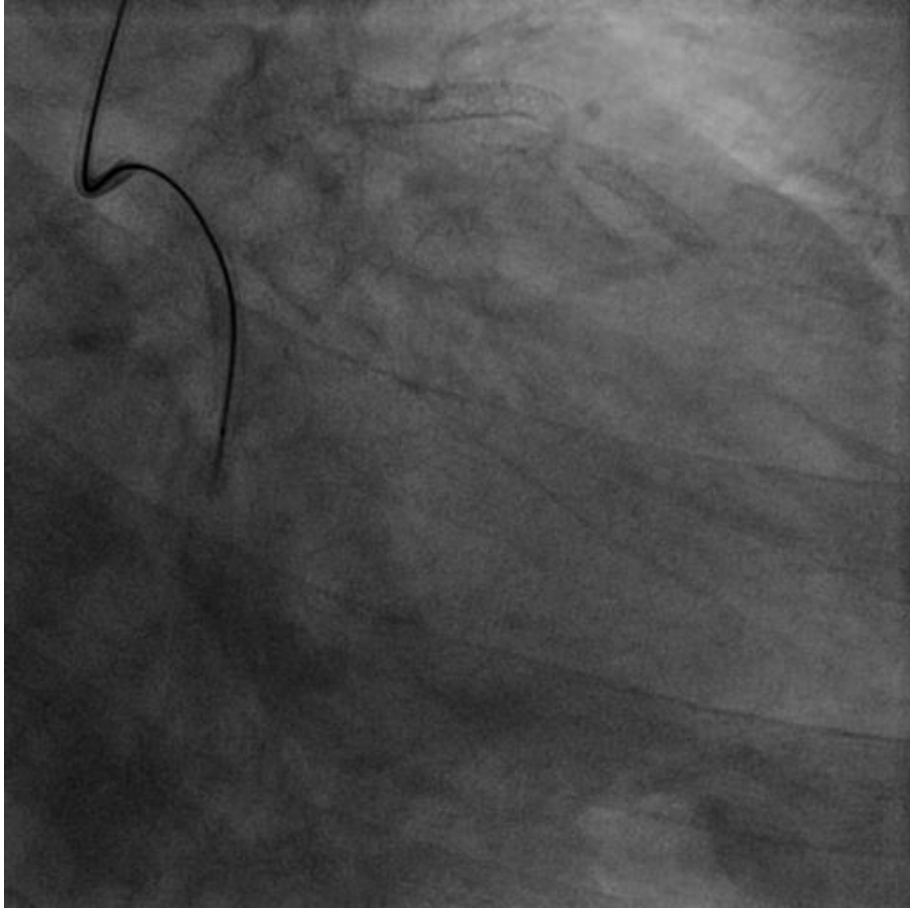


Miracle 6

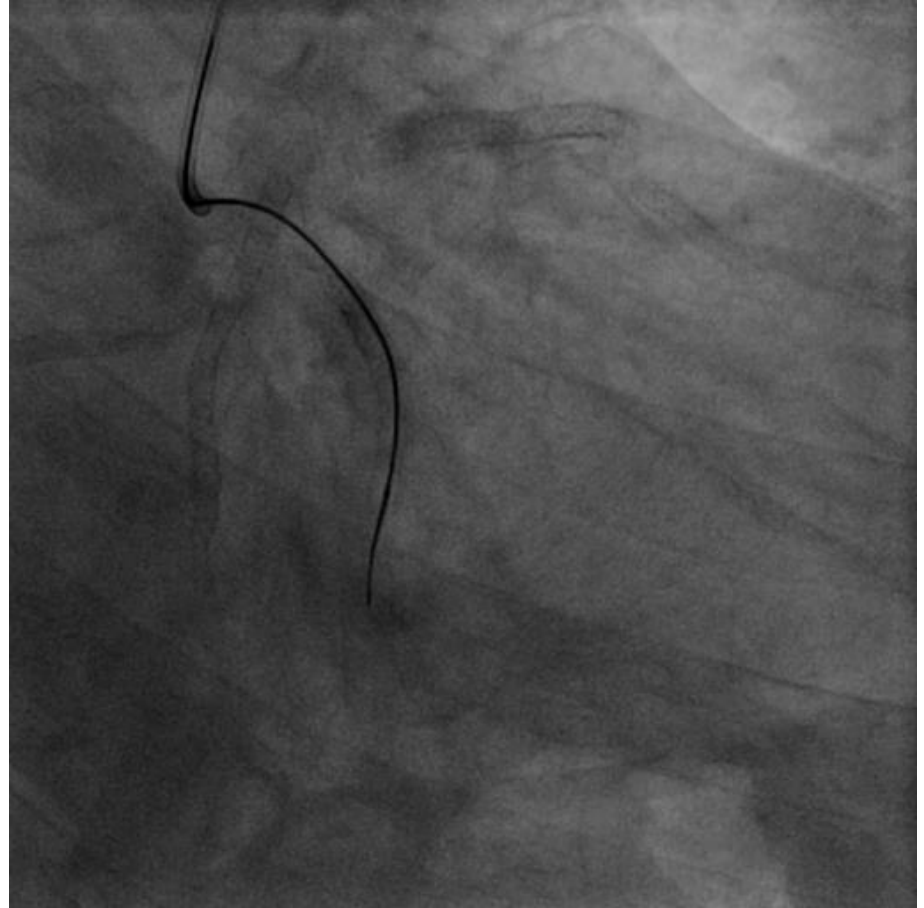


Pilot 200

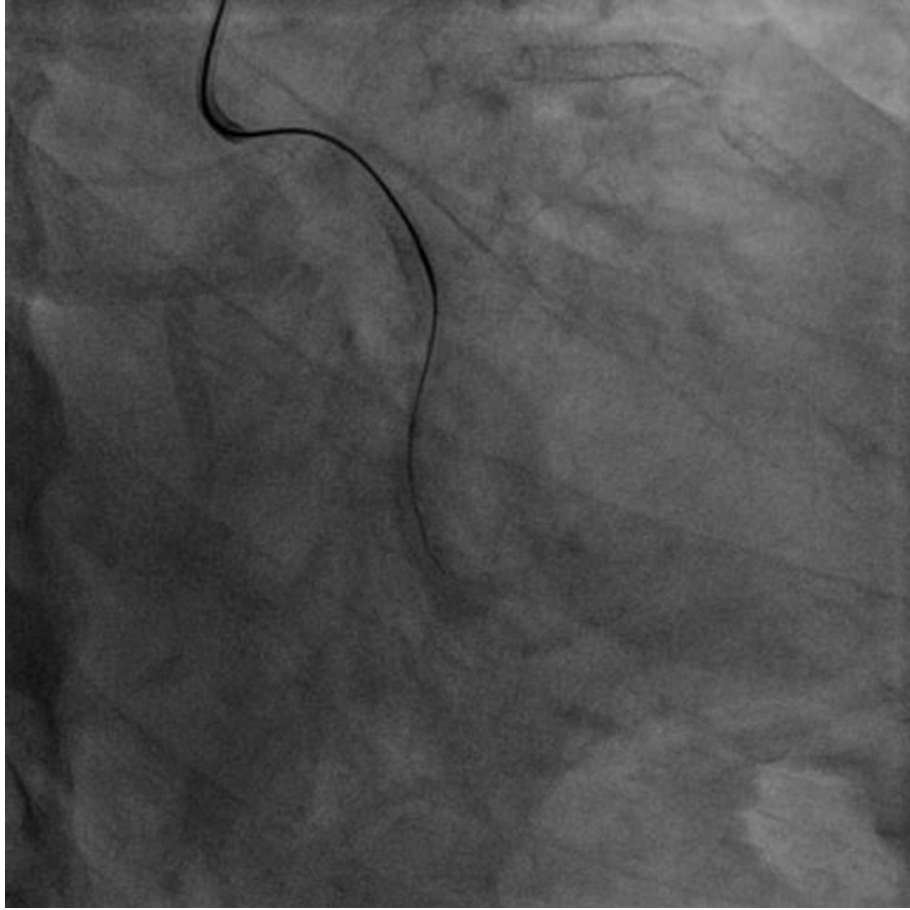




Corsair



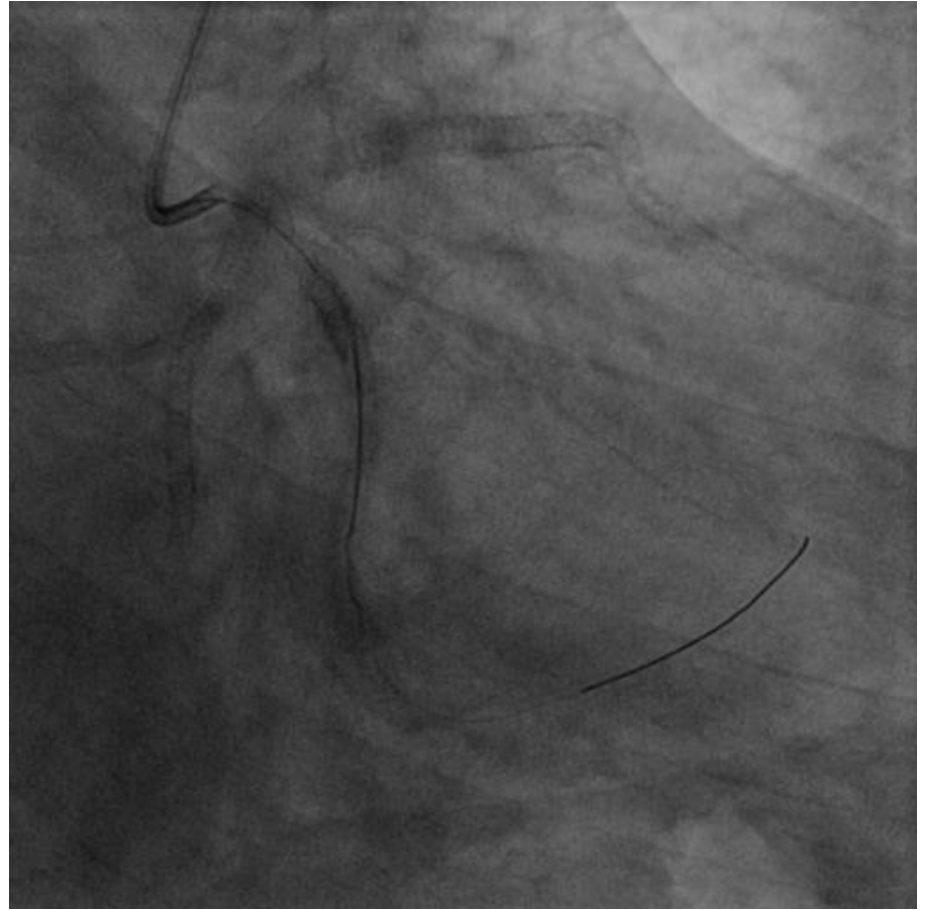
Miracle 6



Conquest pro



Pilot 200

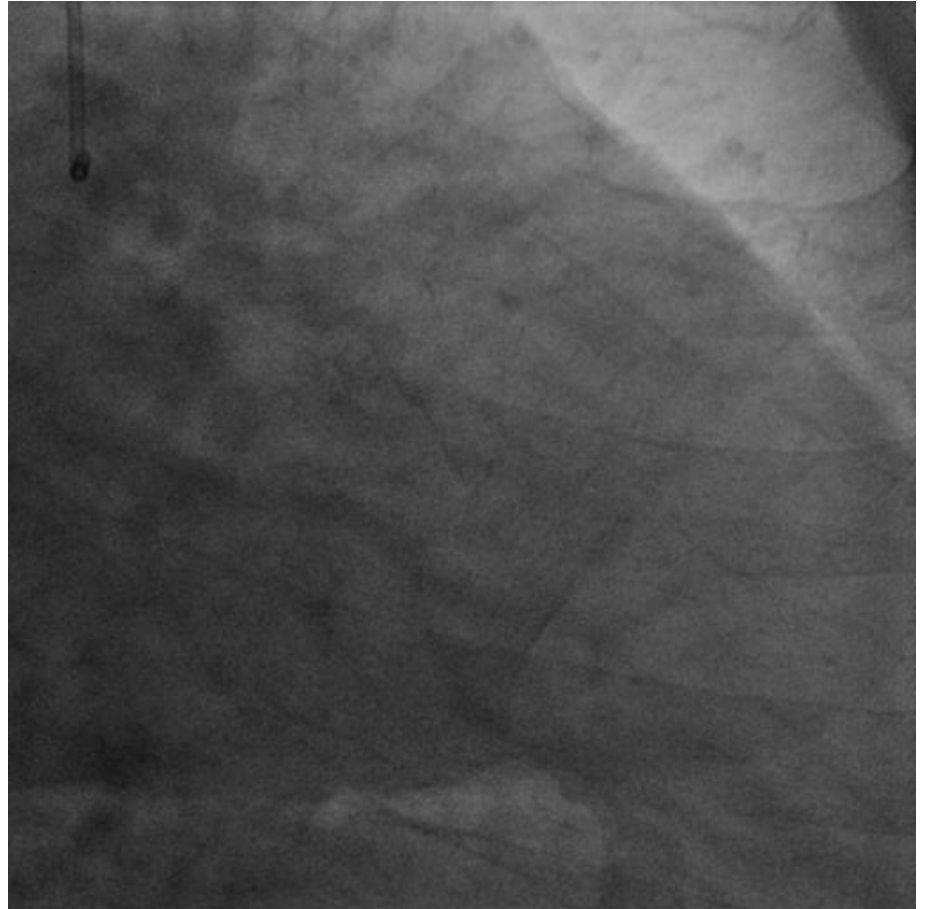


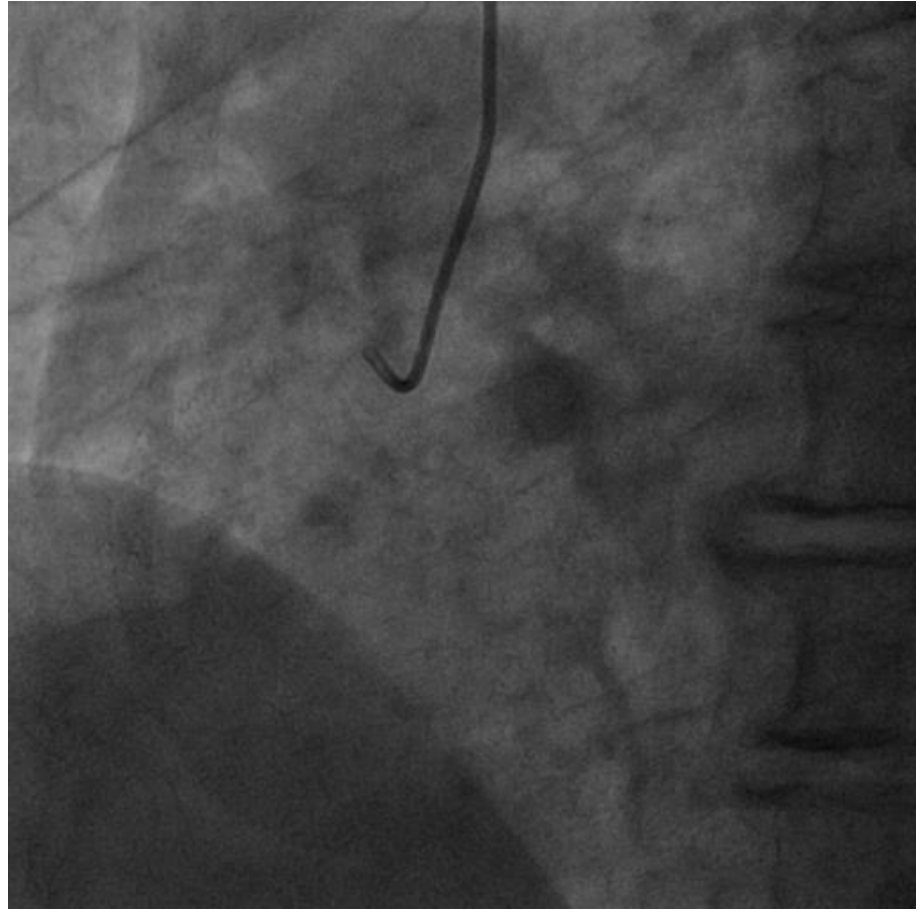
BMW

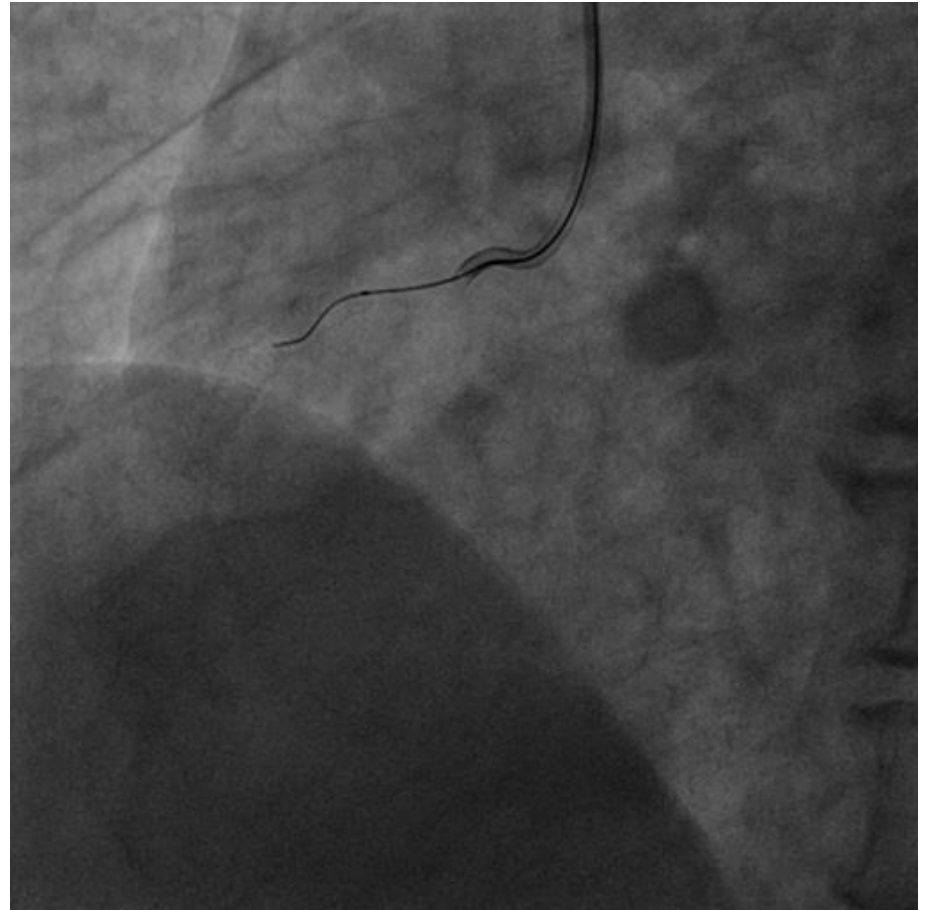
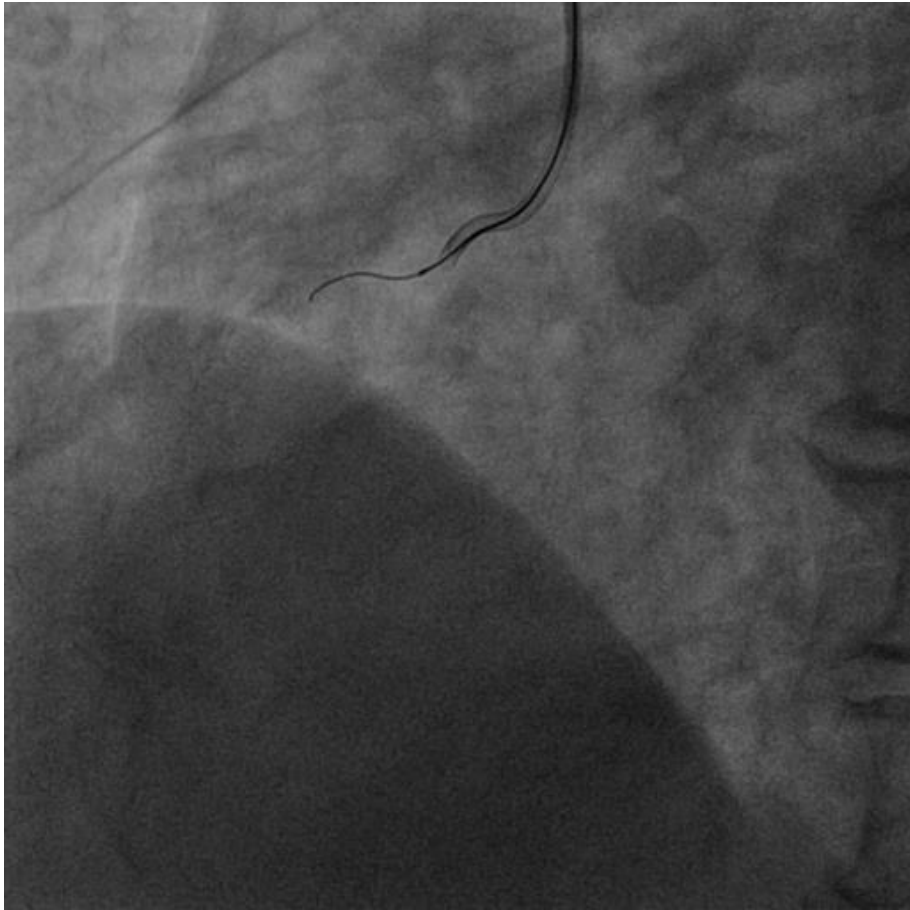


Rosuvastatin+Ezetimibe

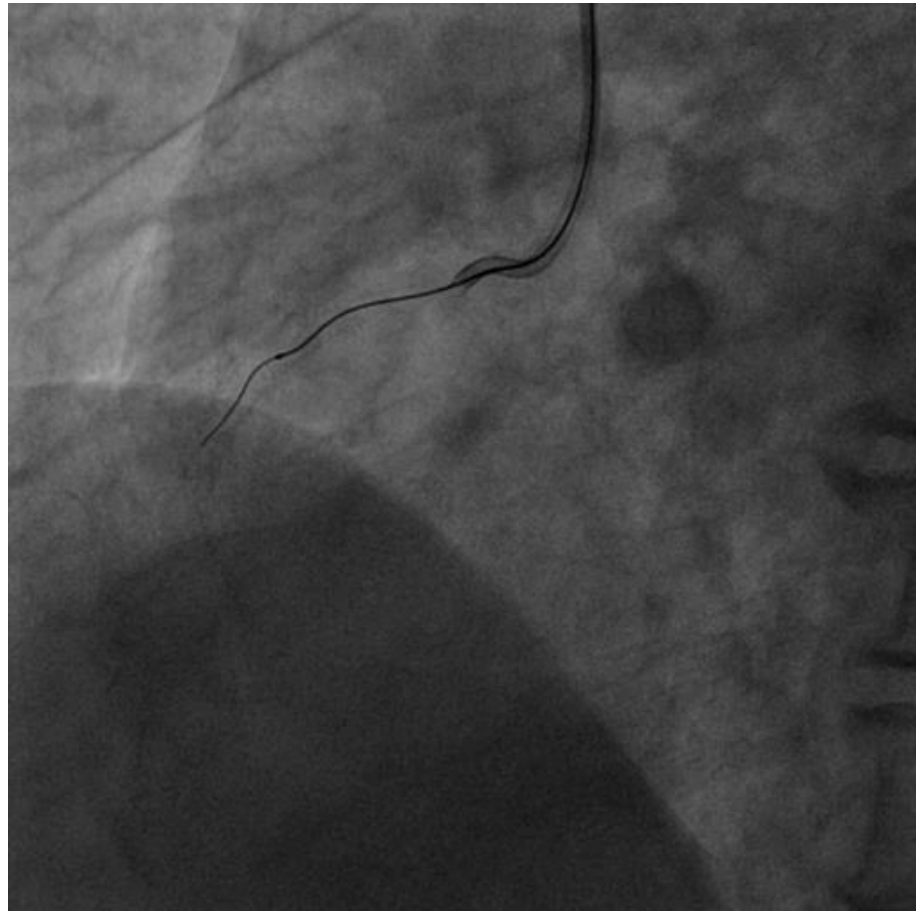
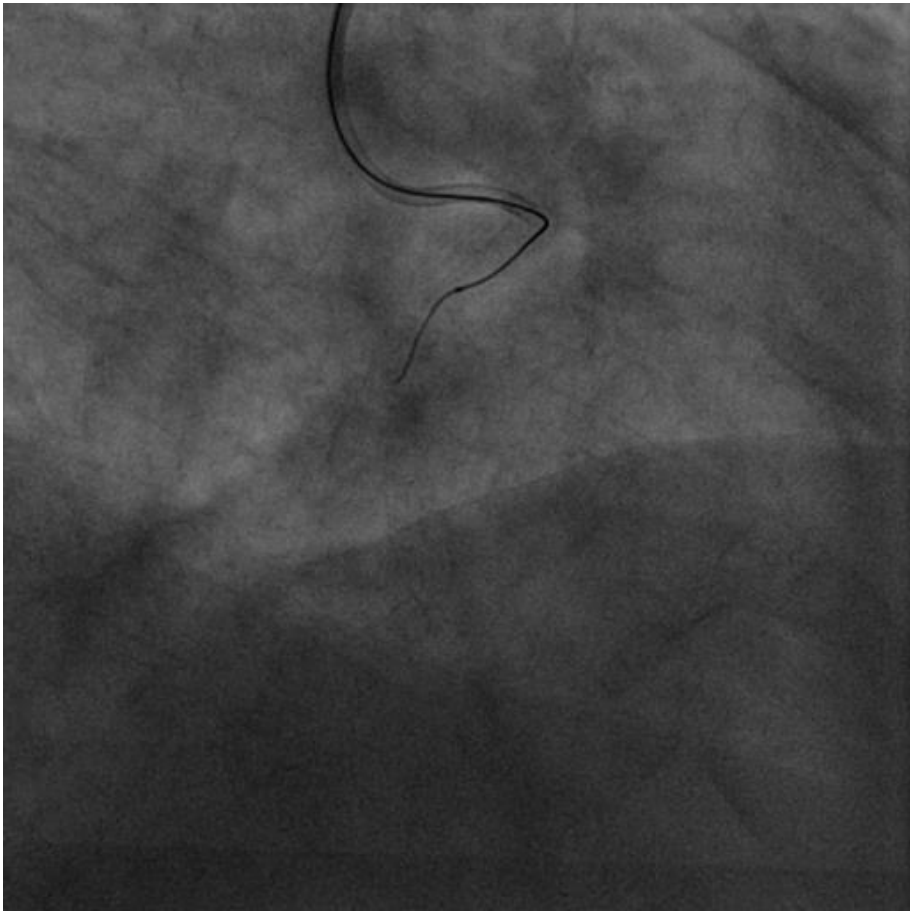
Case 2

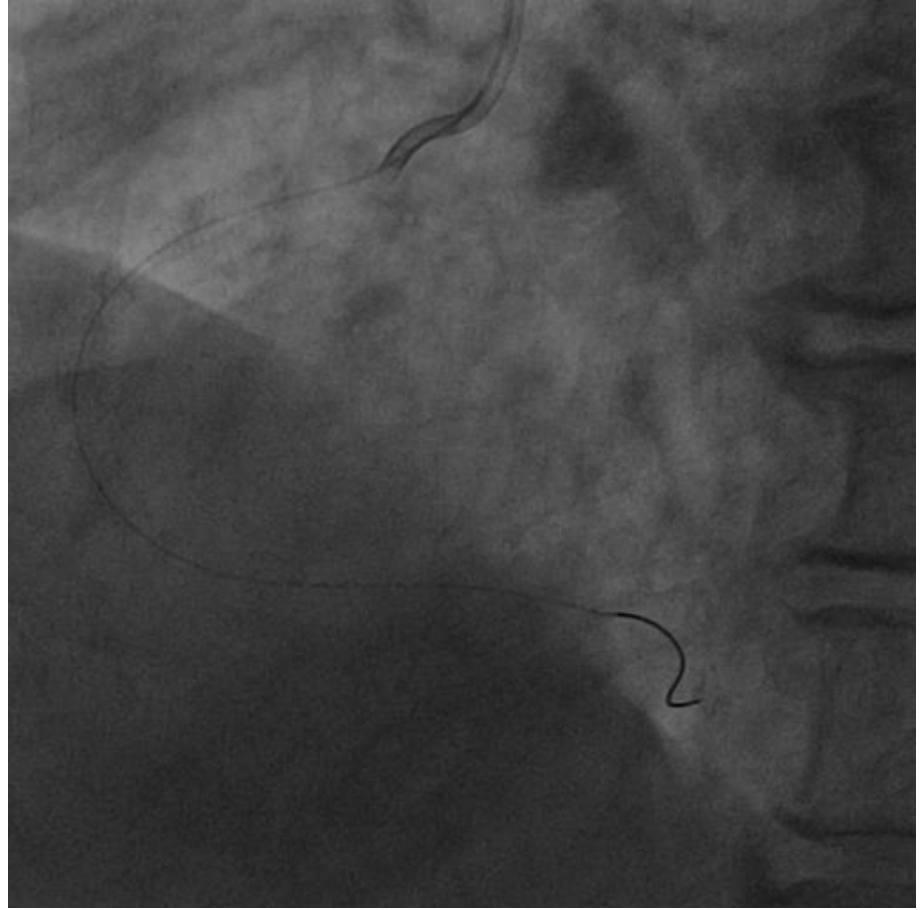
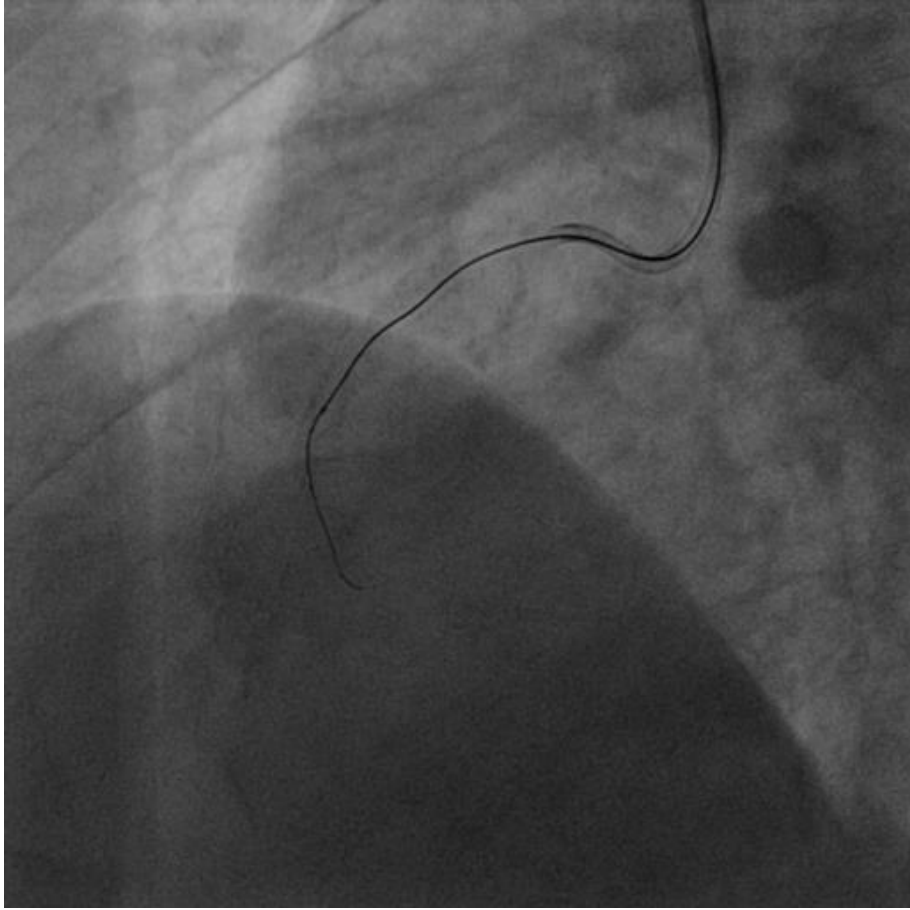




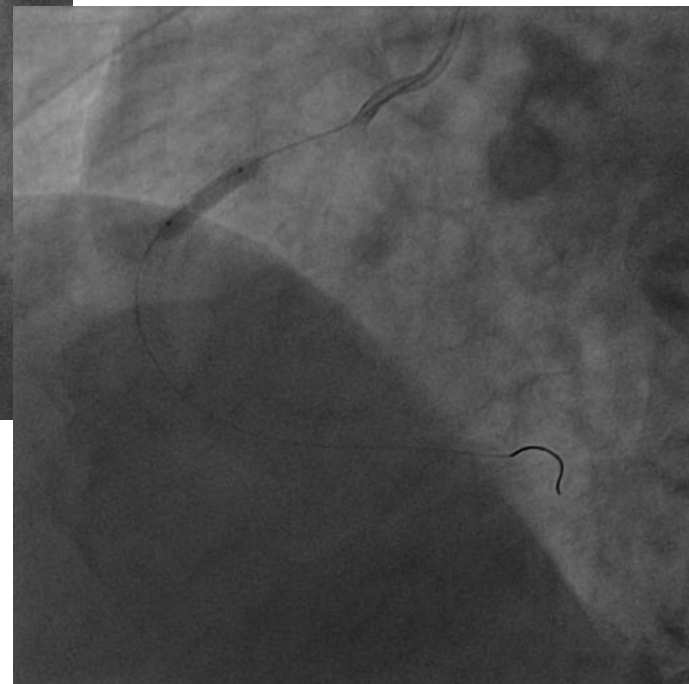
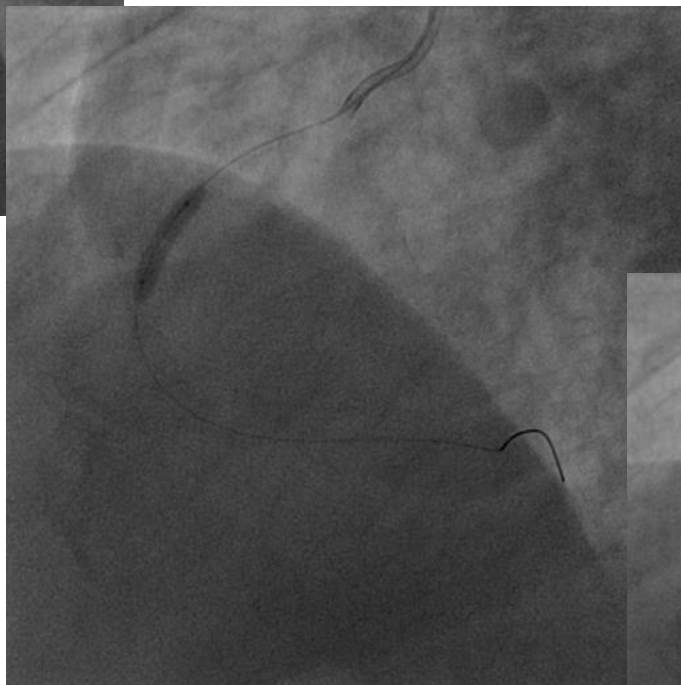
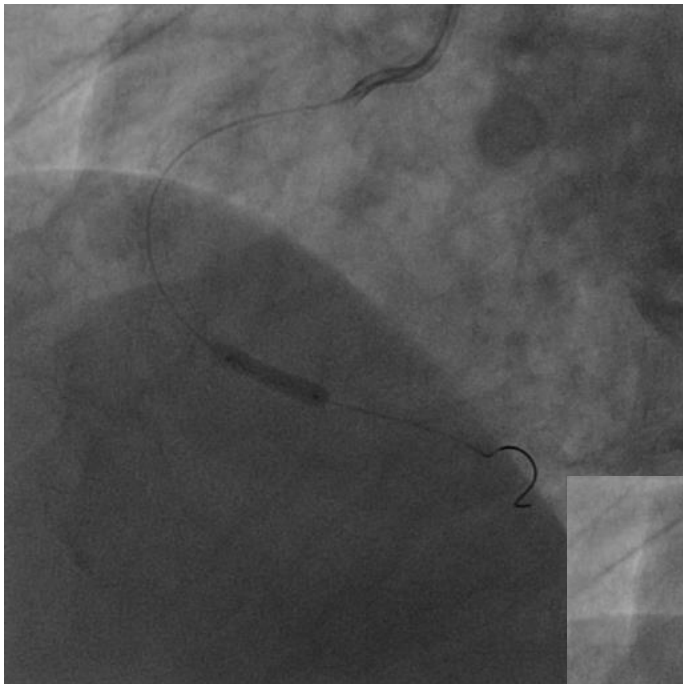


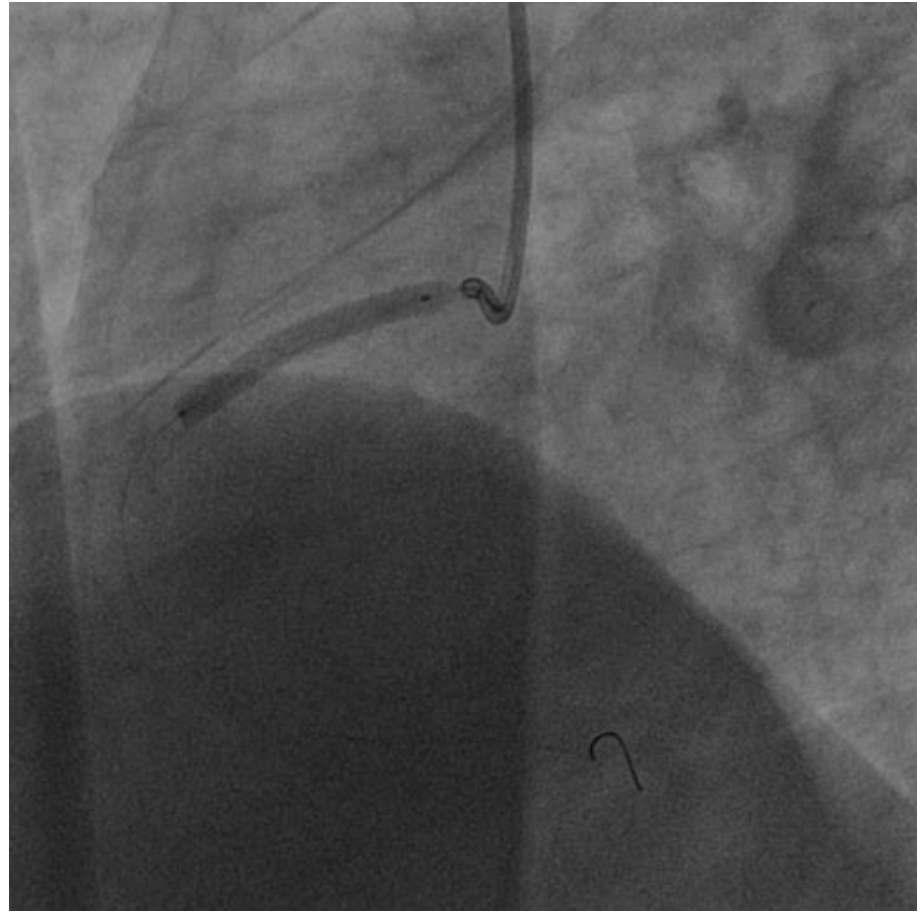
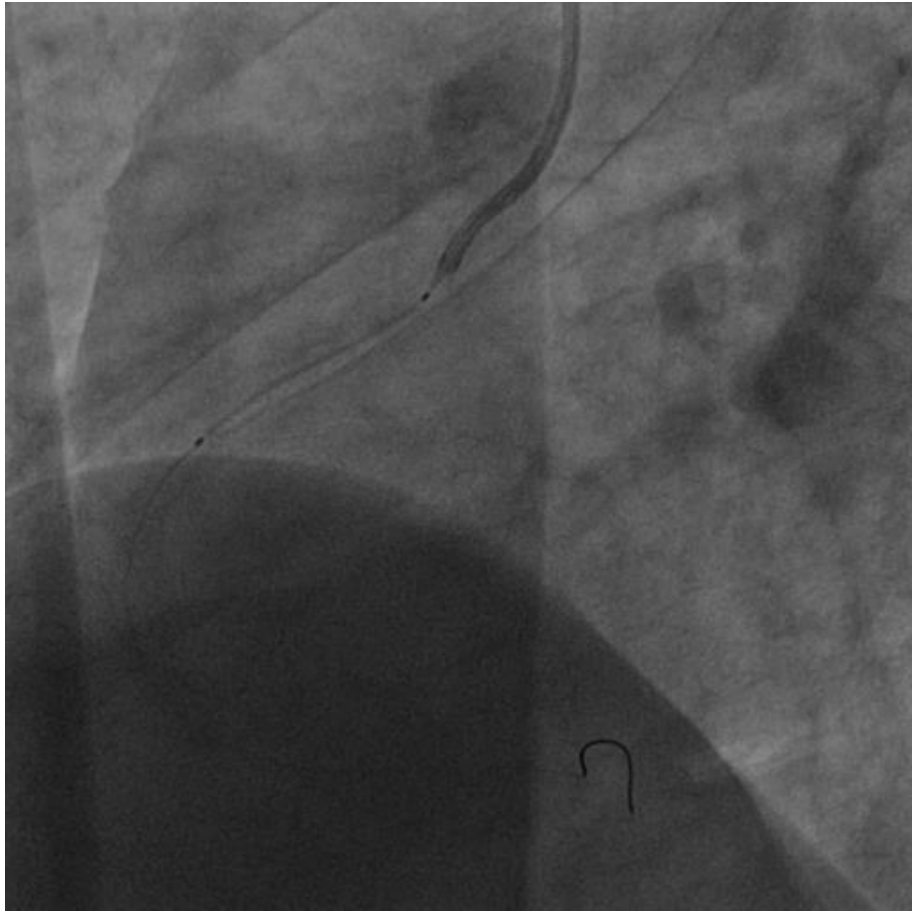
Fielder XTR + Finecross



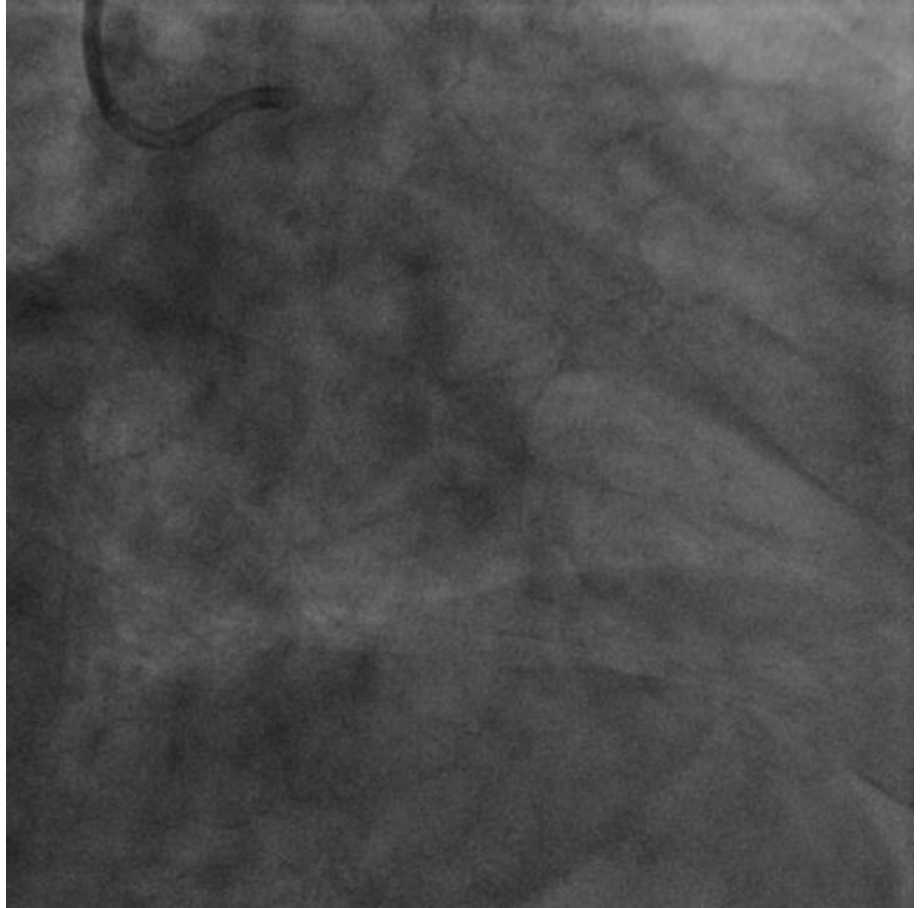
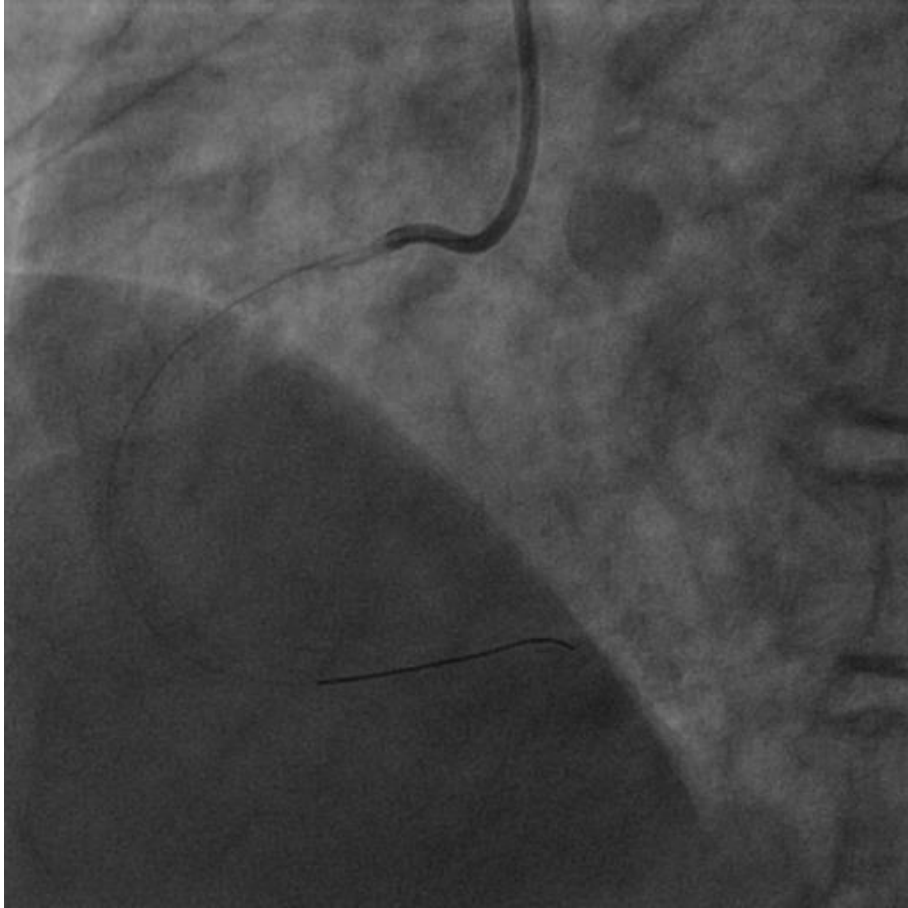


3.0mm × 15mm Cutting Balloon

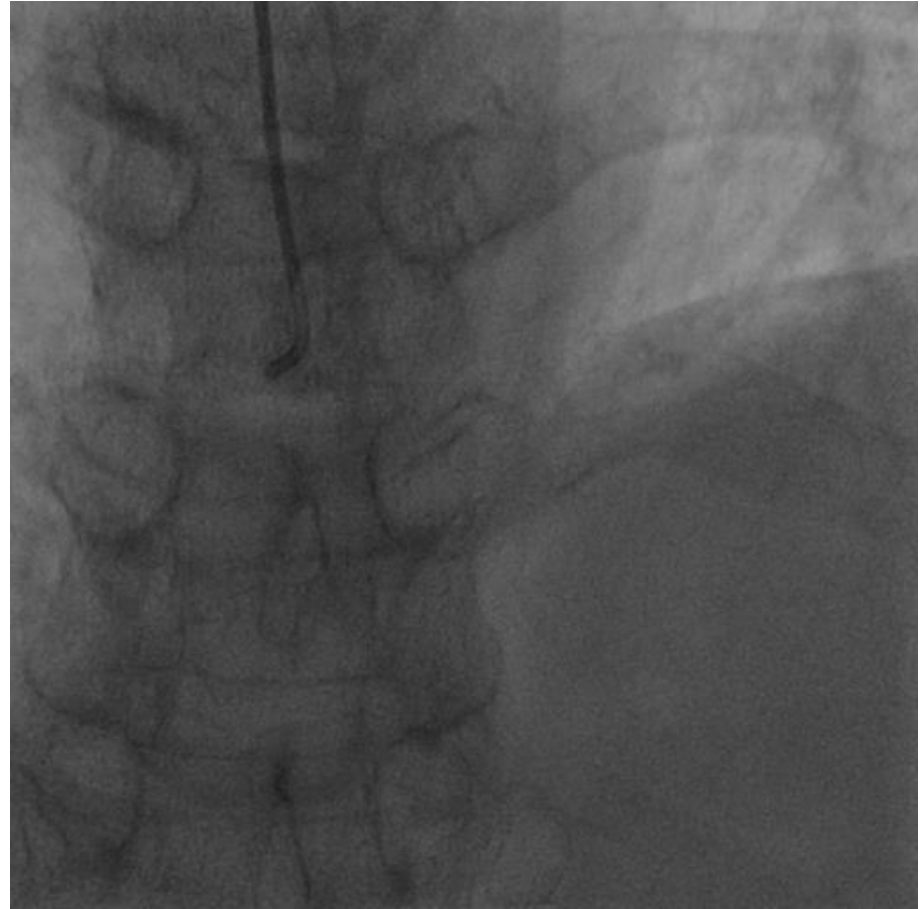
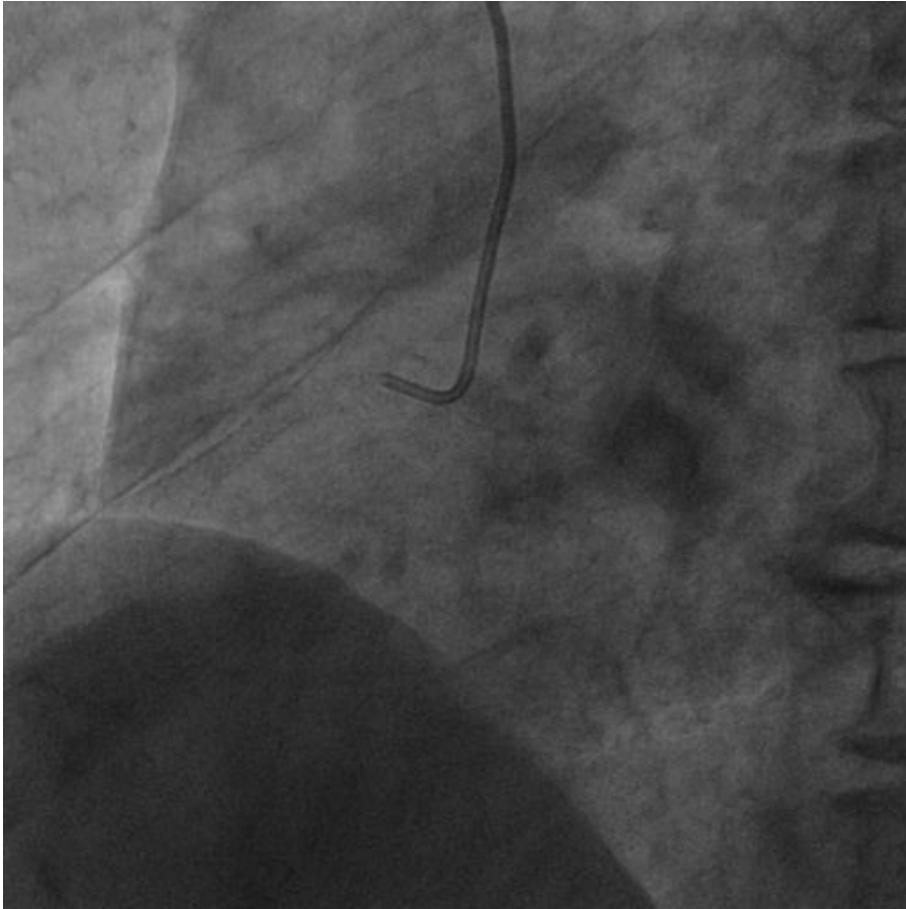




Final result

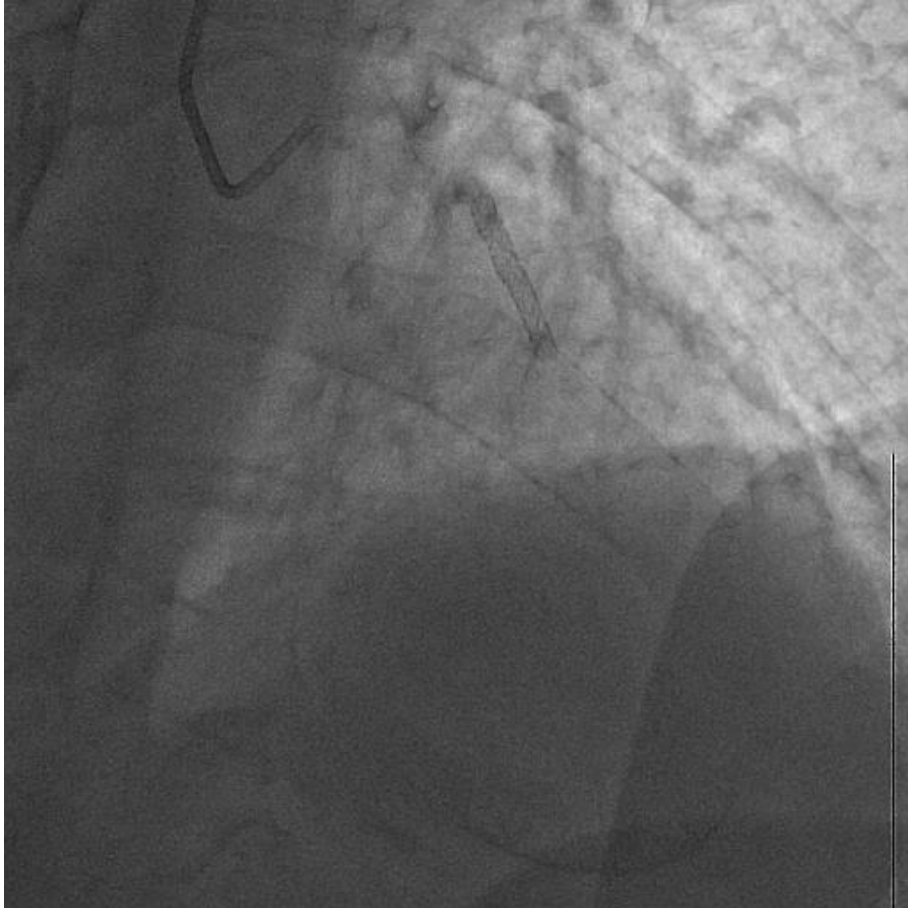


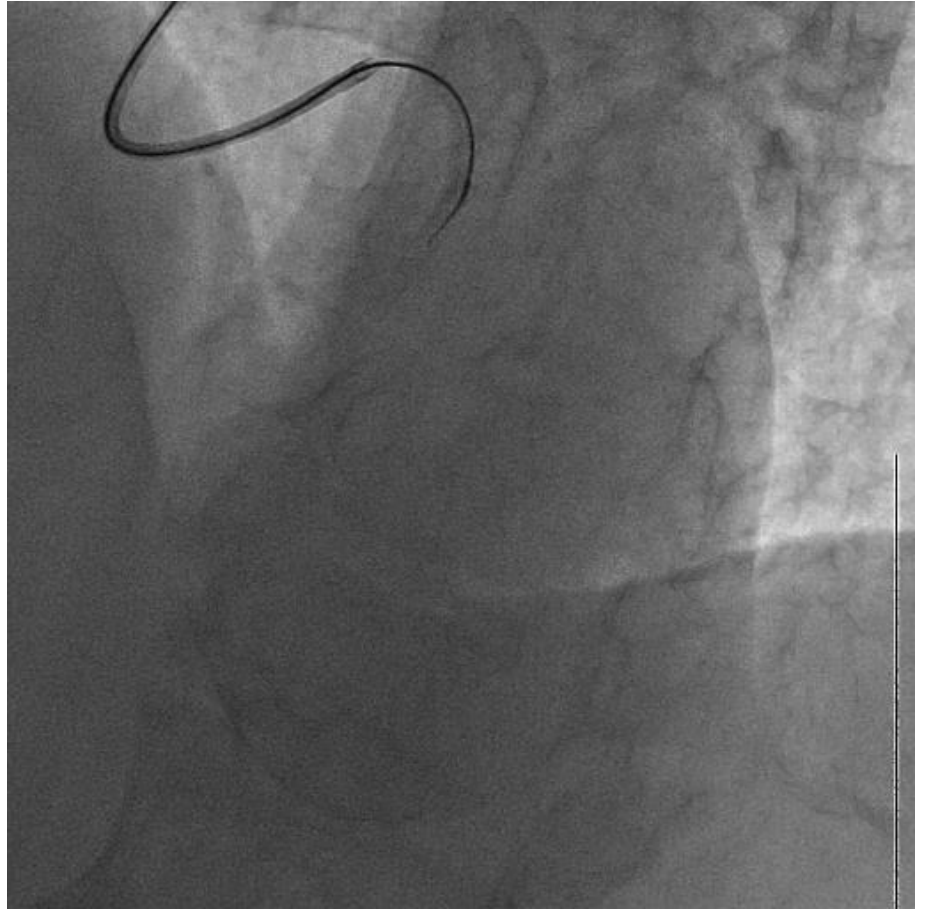
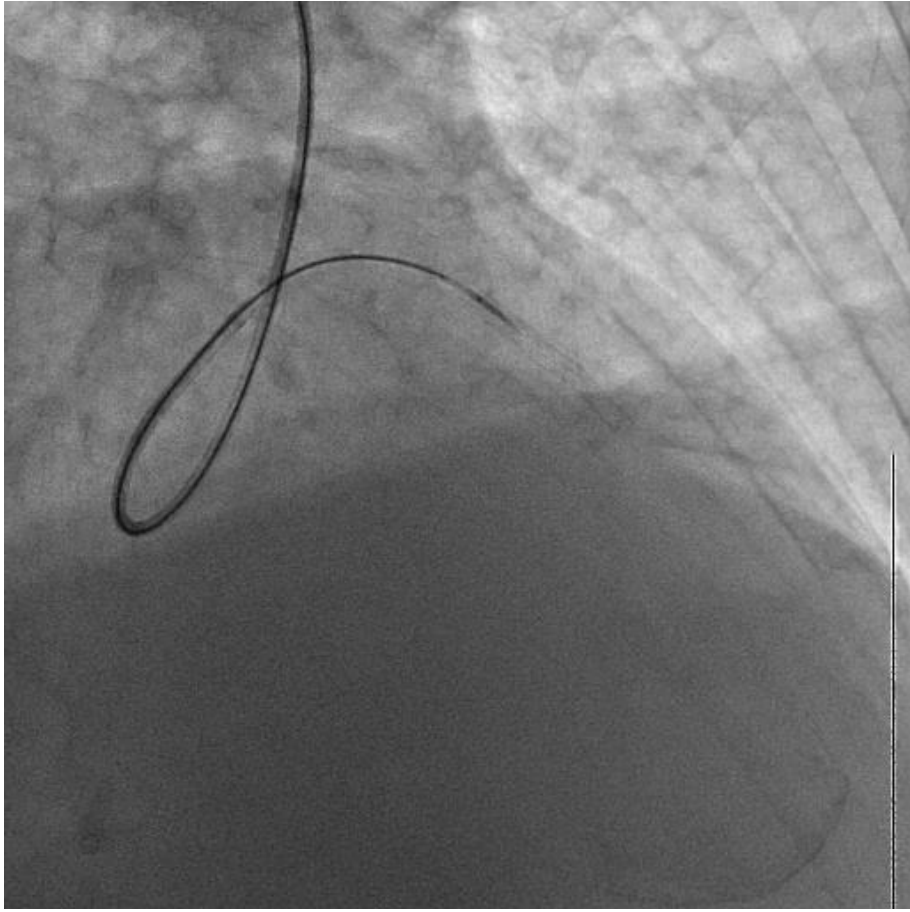
Follow up after 6 months



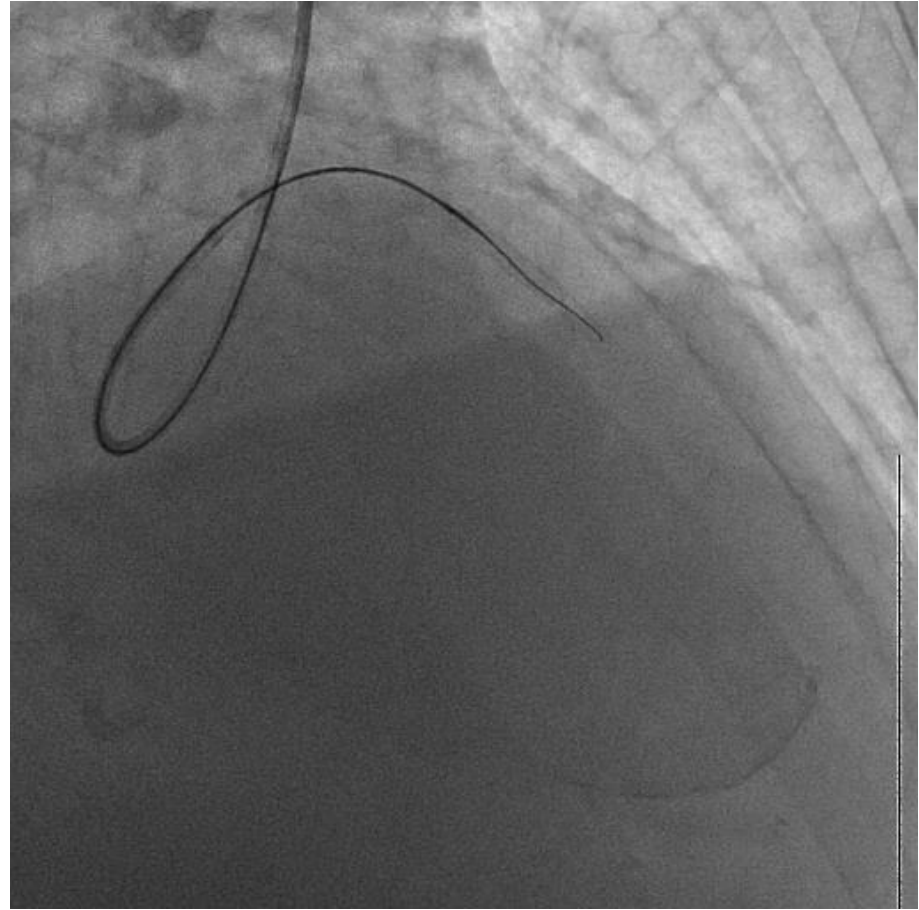
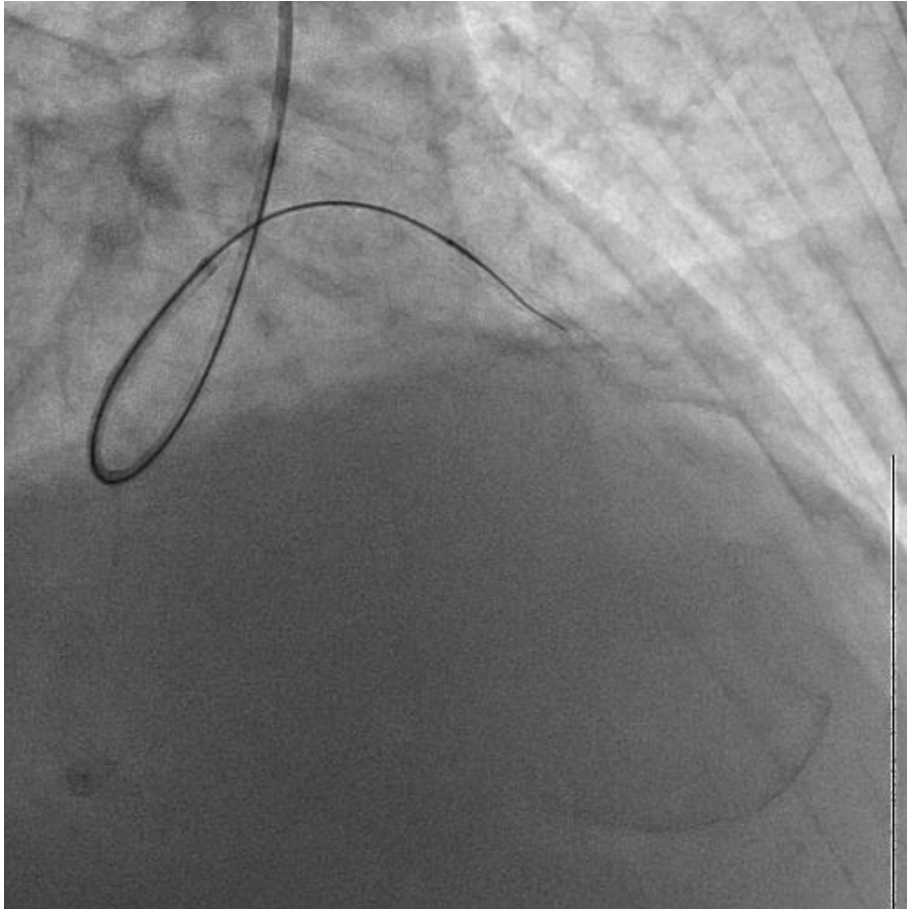
Case 3

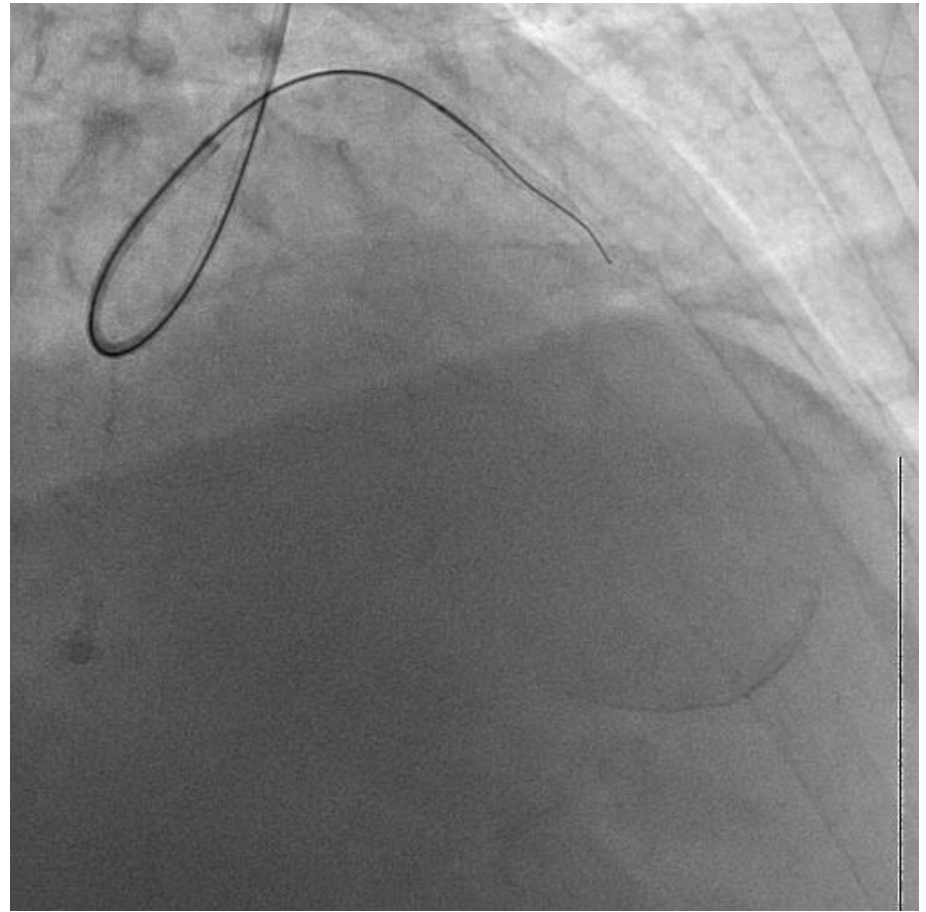
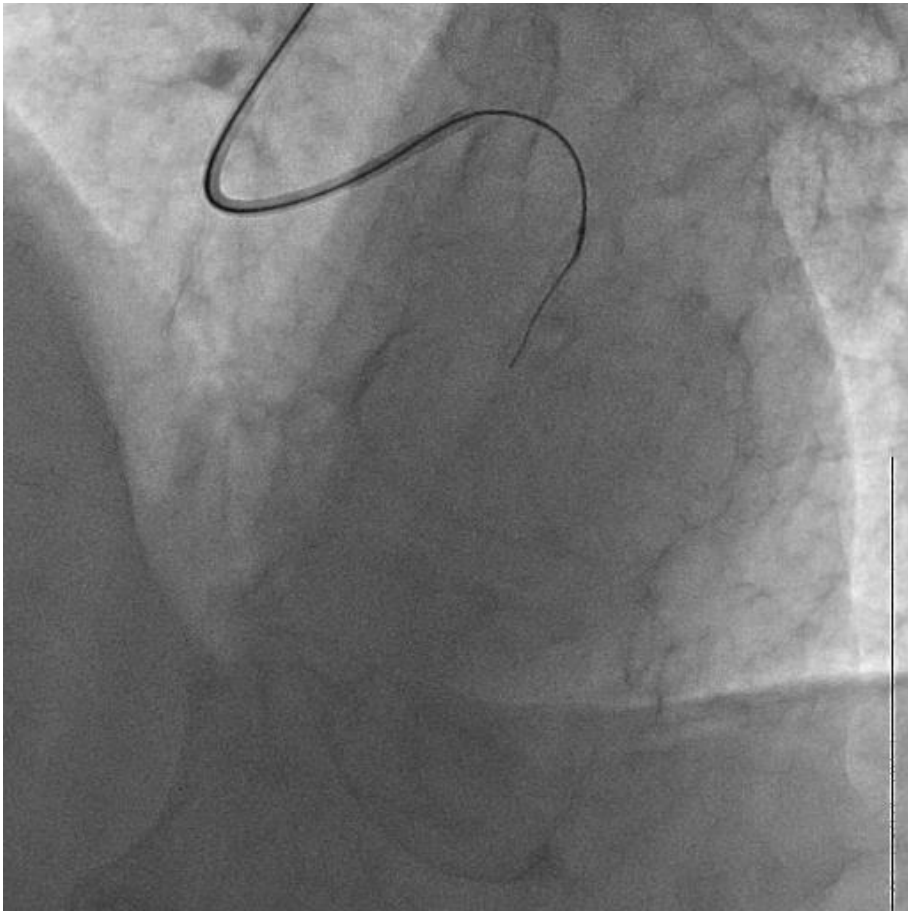


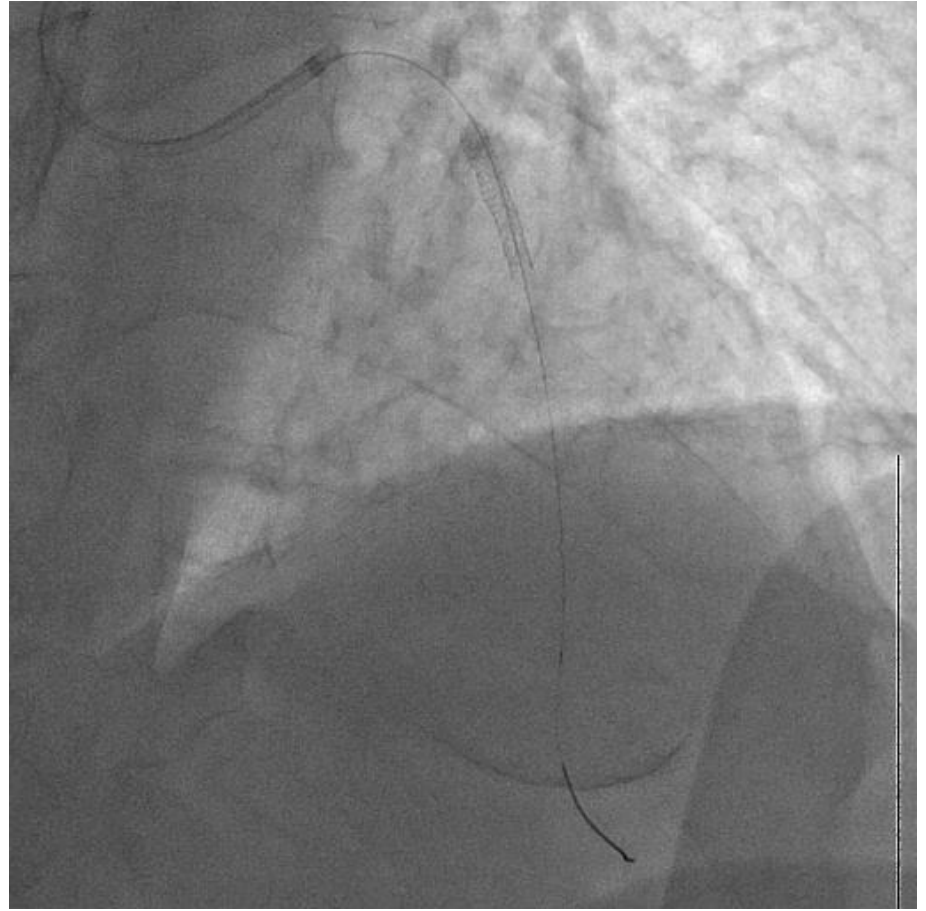
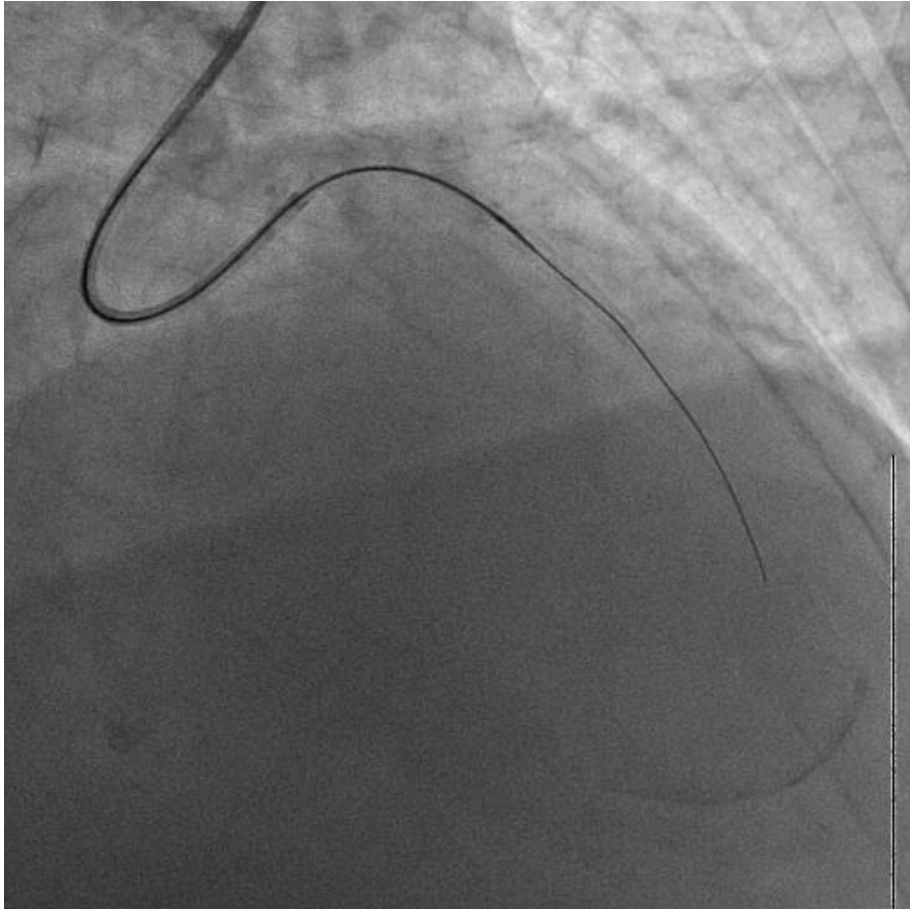




Gai III + Corsair







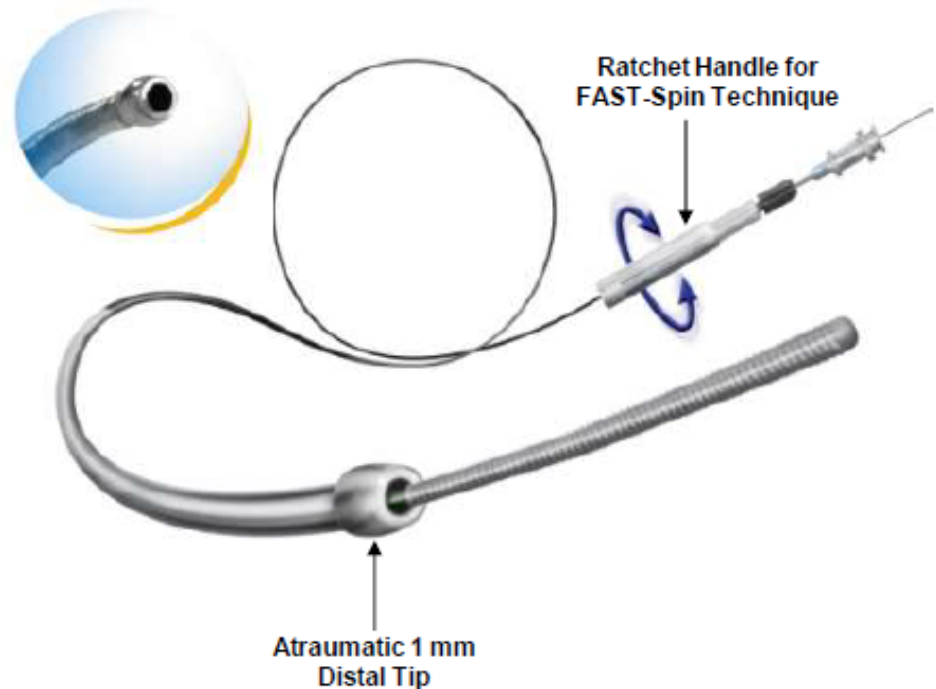
Final result

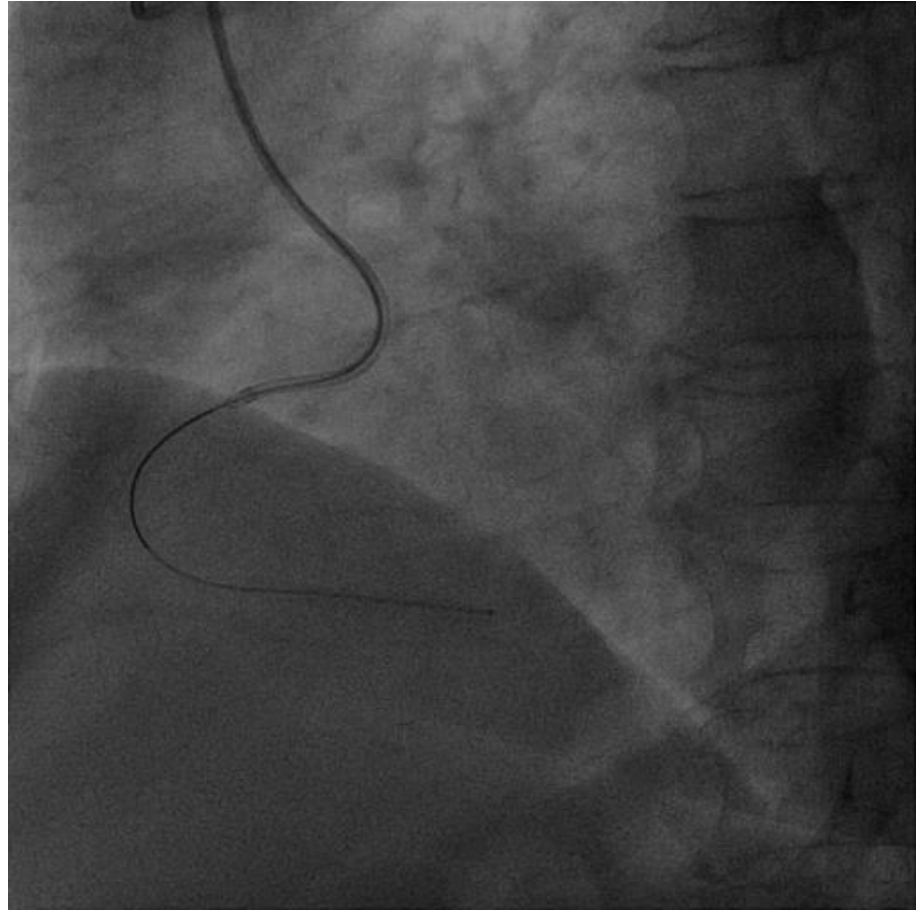
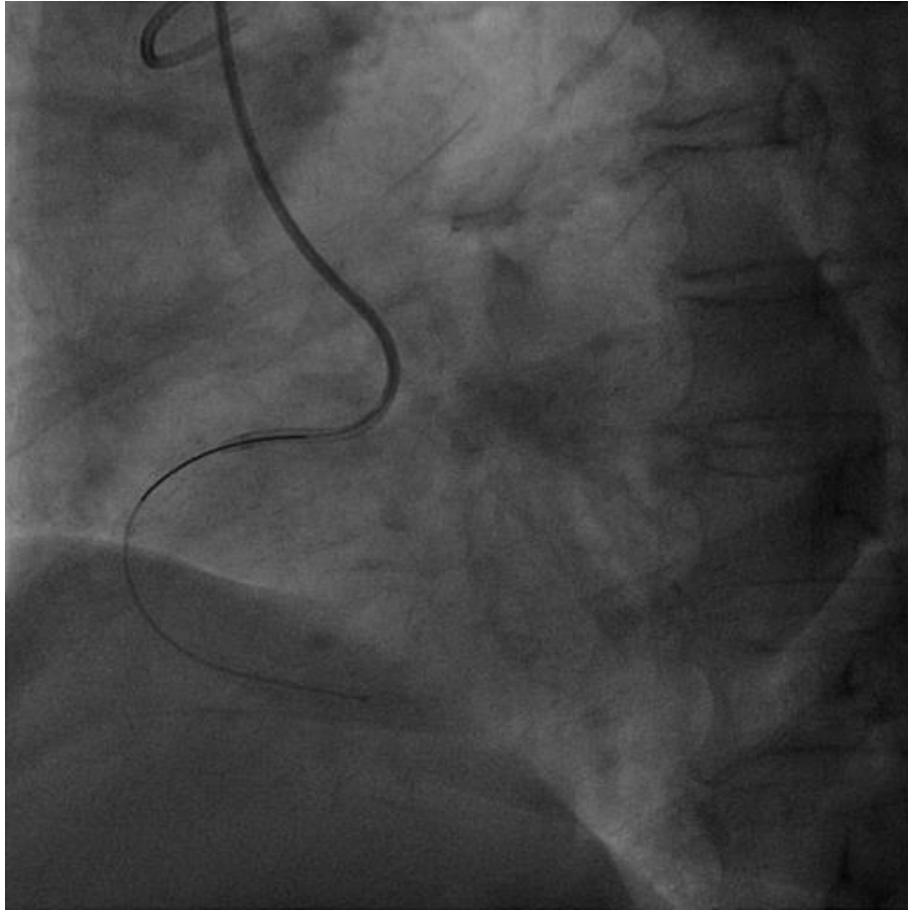


The CrossBoss™ CTO Crossing Catheter

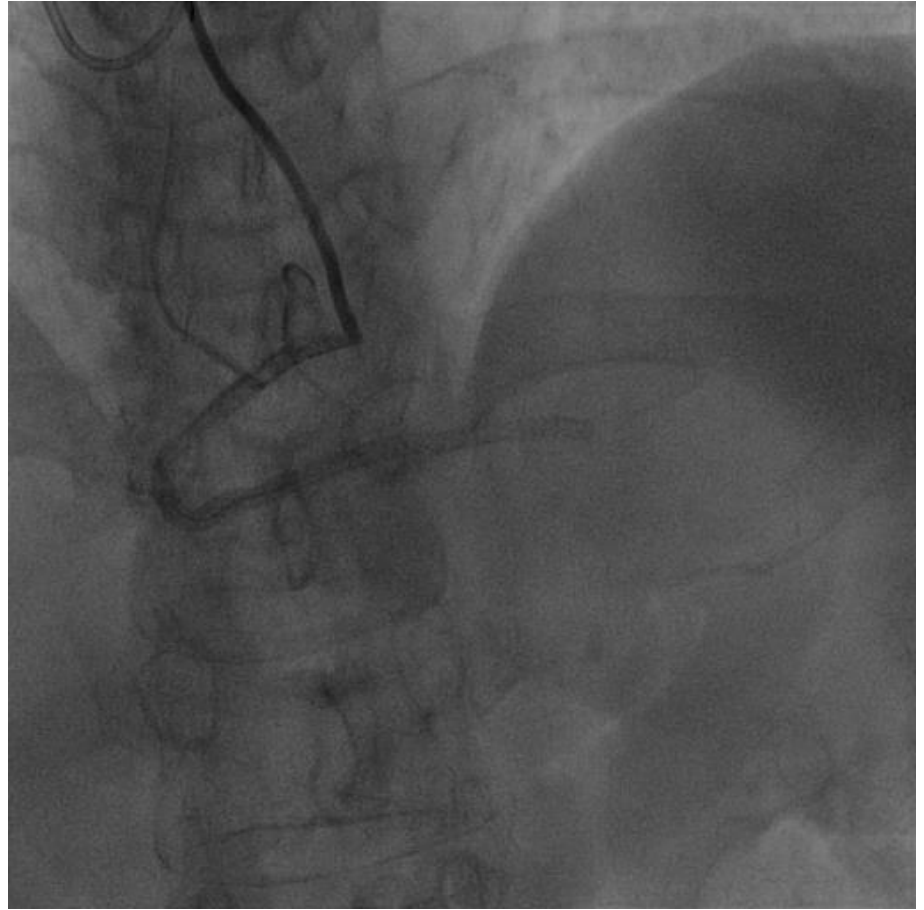
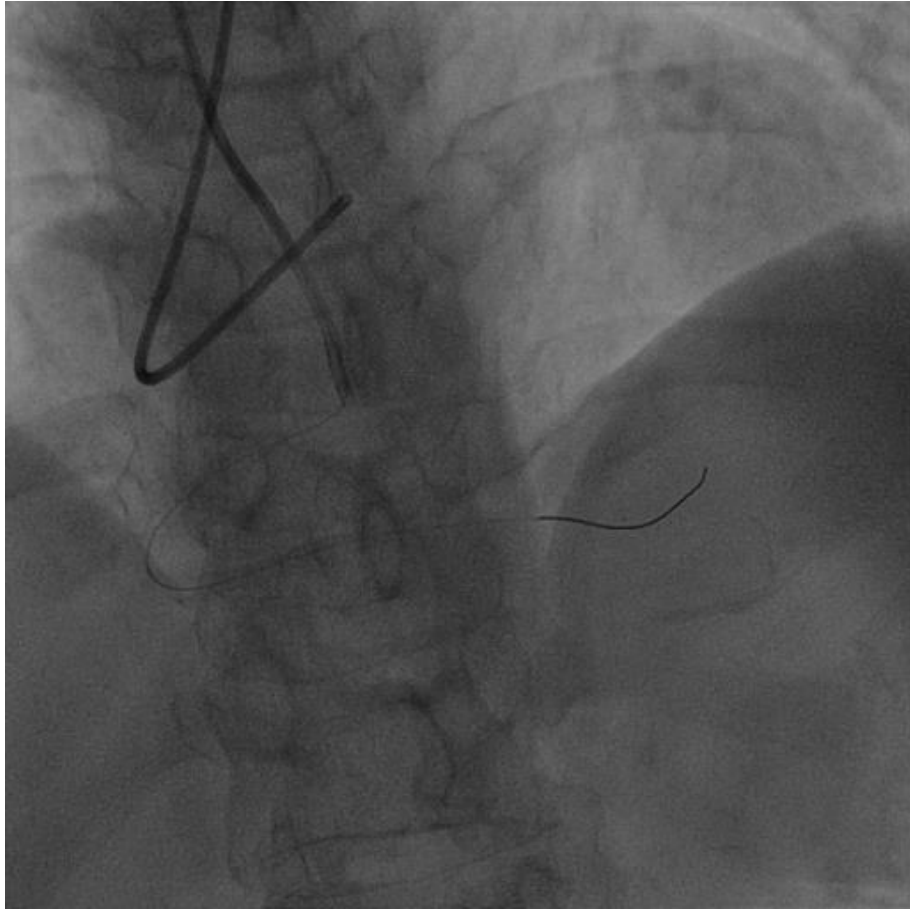
The CrossBoss™ catheter is an OTW stainless steel catheter designed to quickly and safely pass through the CTO to gain access to the distal true lumen or enter subintimal pathways. The catheter is advanced by using rapid bi-directional rotation.

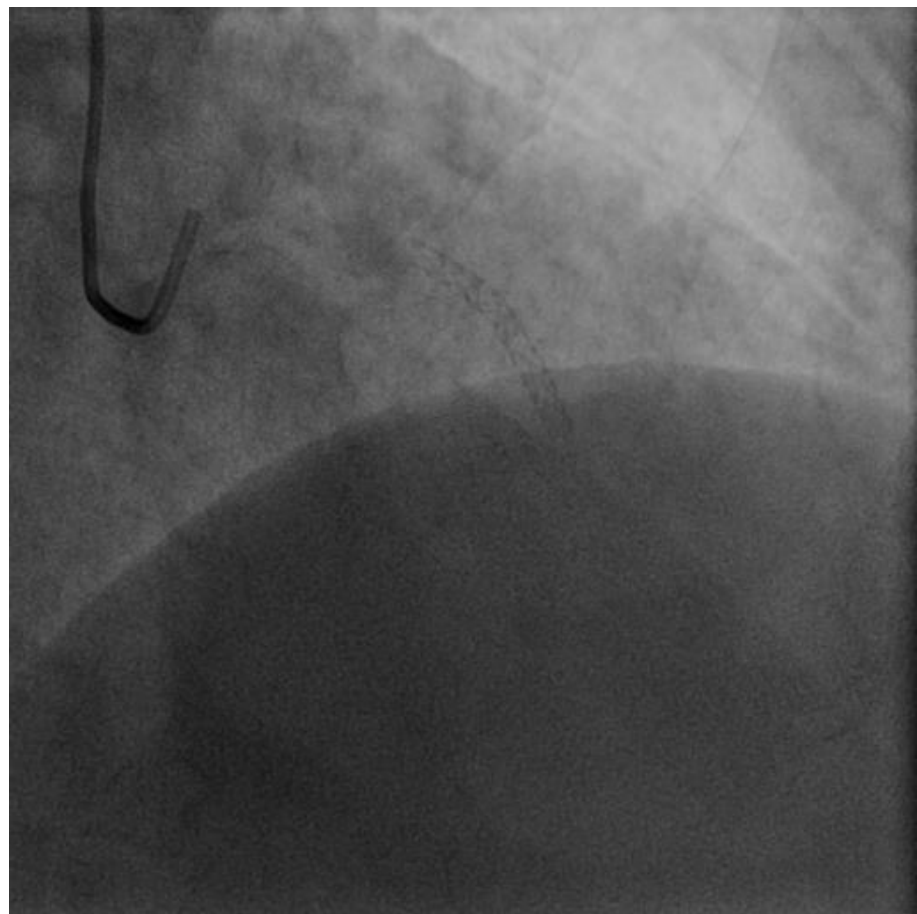
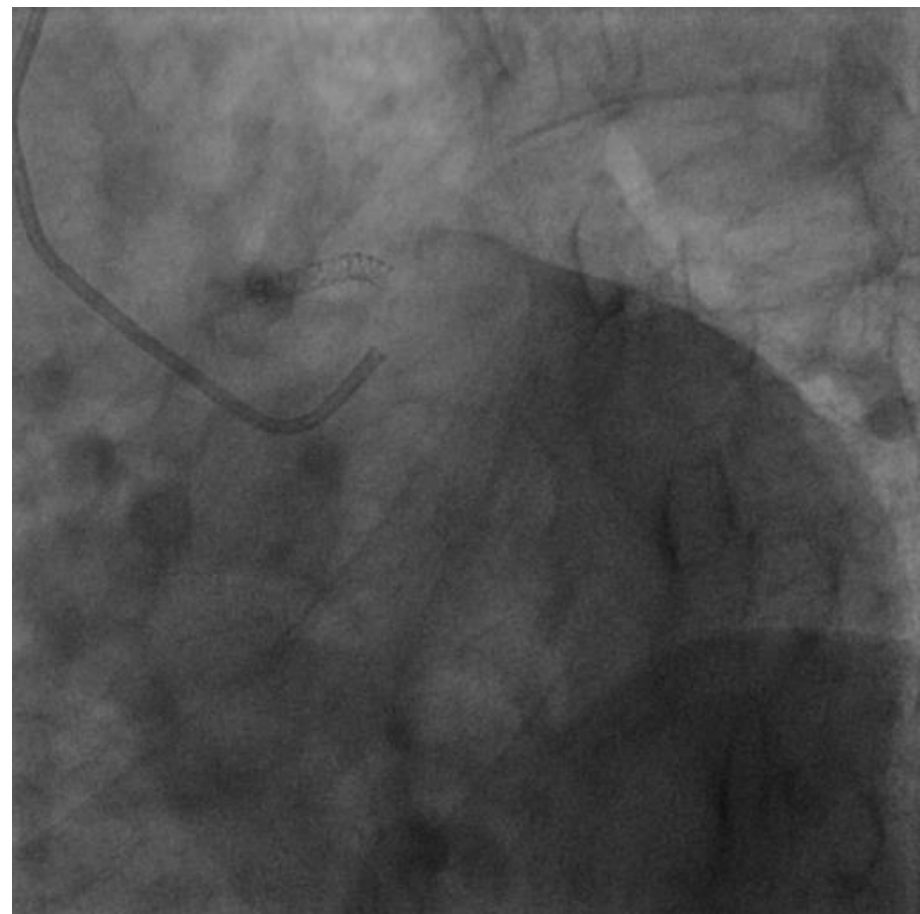
- Multi-wire coiled shaft
- Tracks via **FAST Spin Technique**
 - Highly torqueable coiled-wire shaft
 - FAST Spin reduces push required to cross CTO
- Atraumatic distal tip advanced across a CTO ahead of the guidewire
- OTW 0.014" guidewire compatible

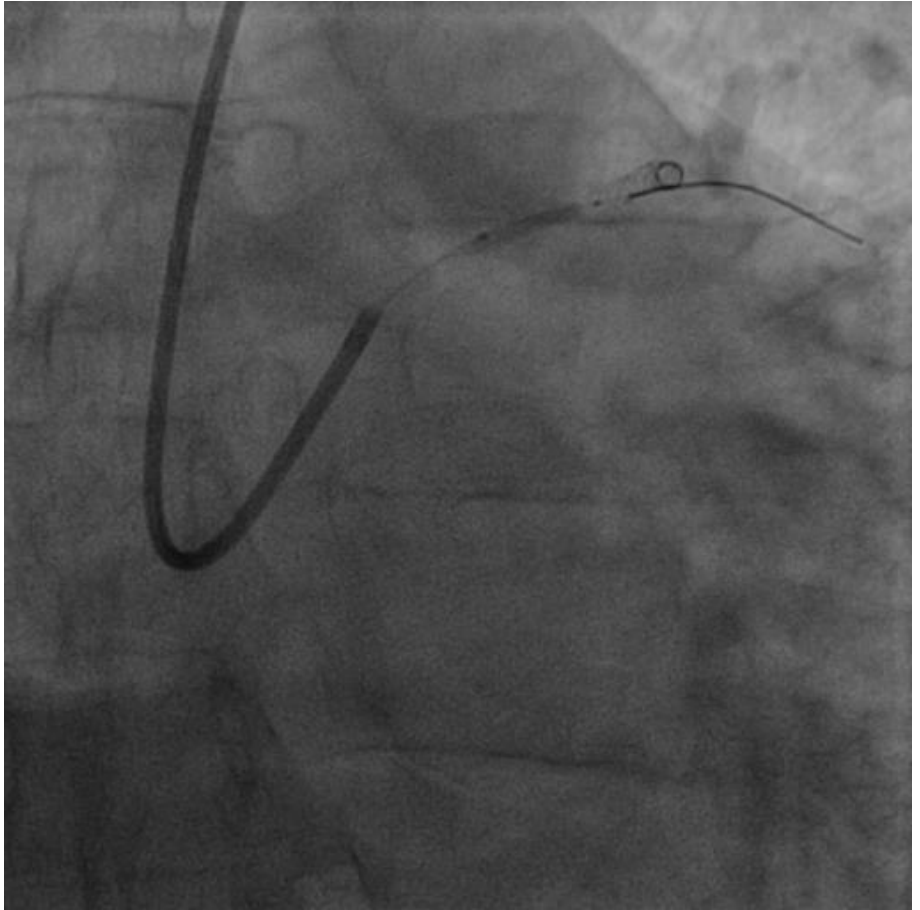
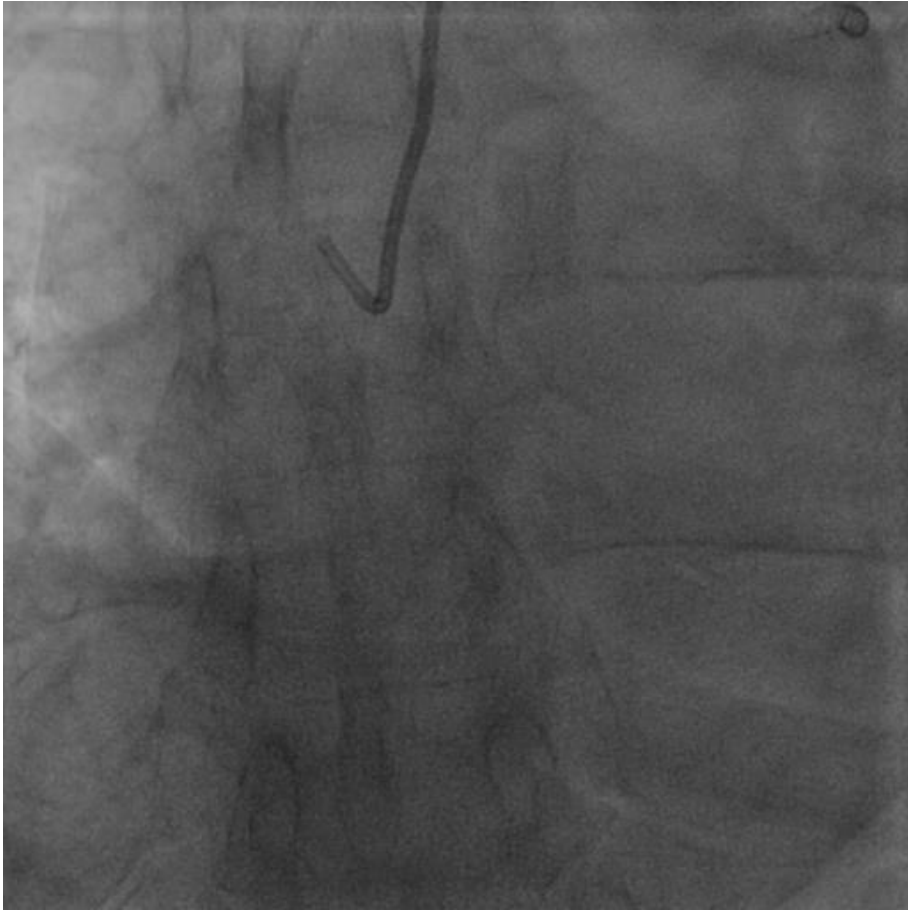


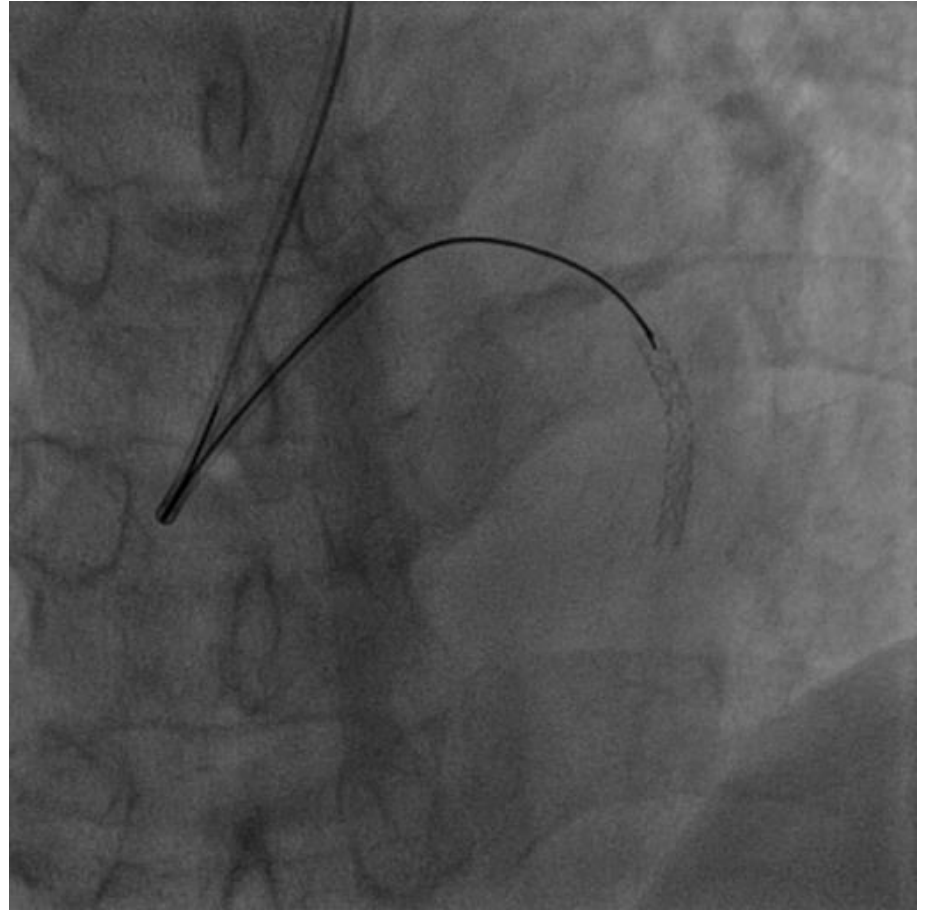
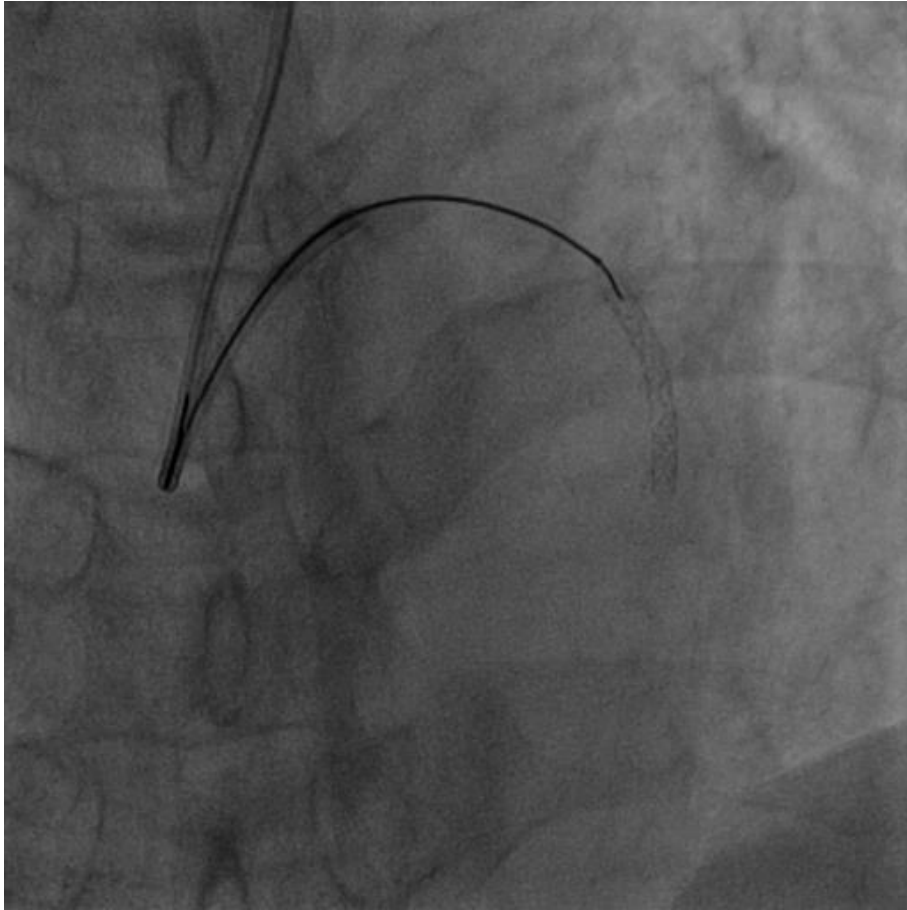


Miracle 6 + CrossBoss

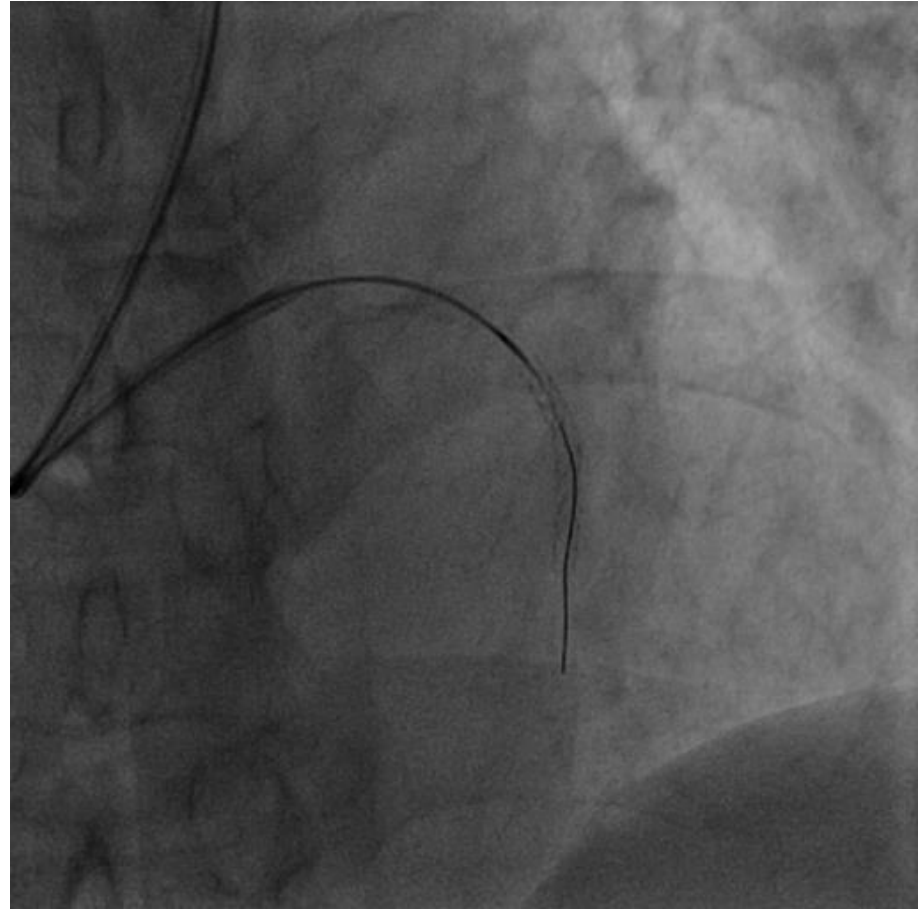
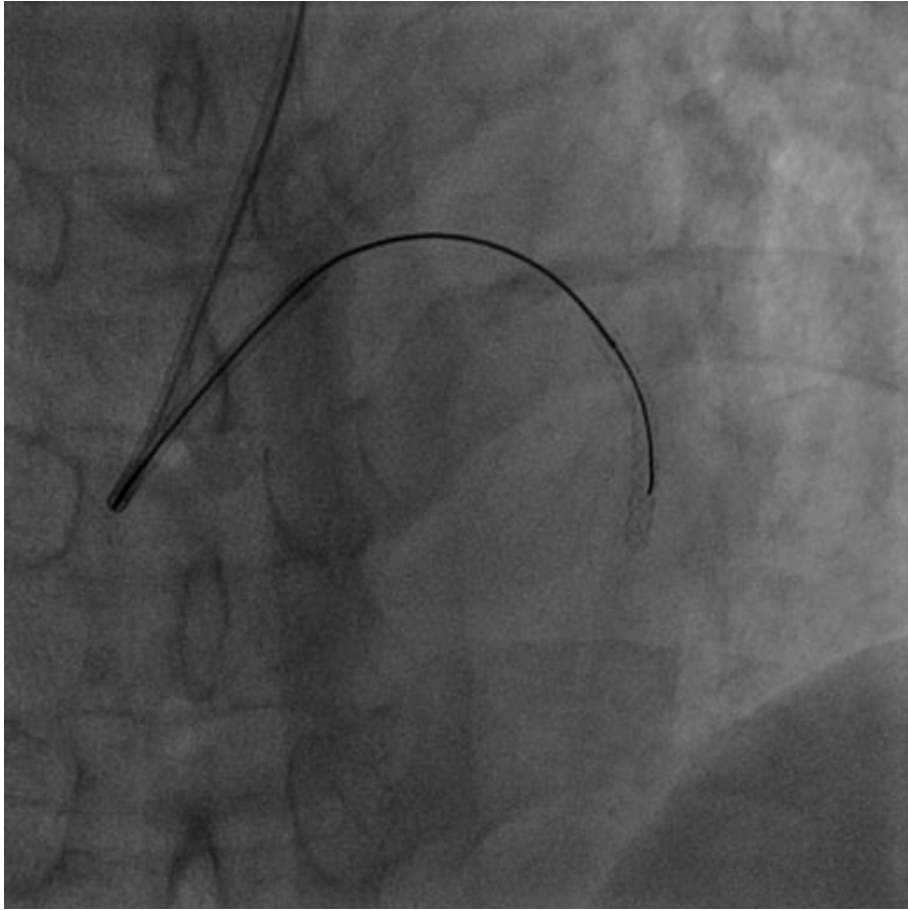




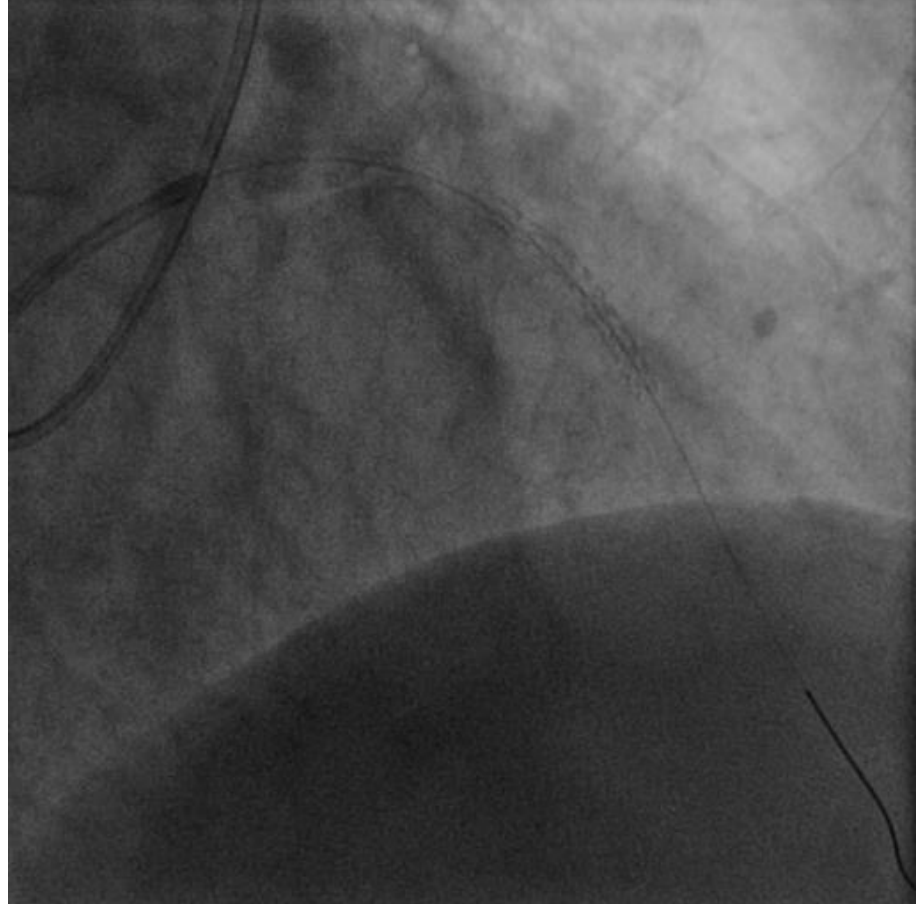
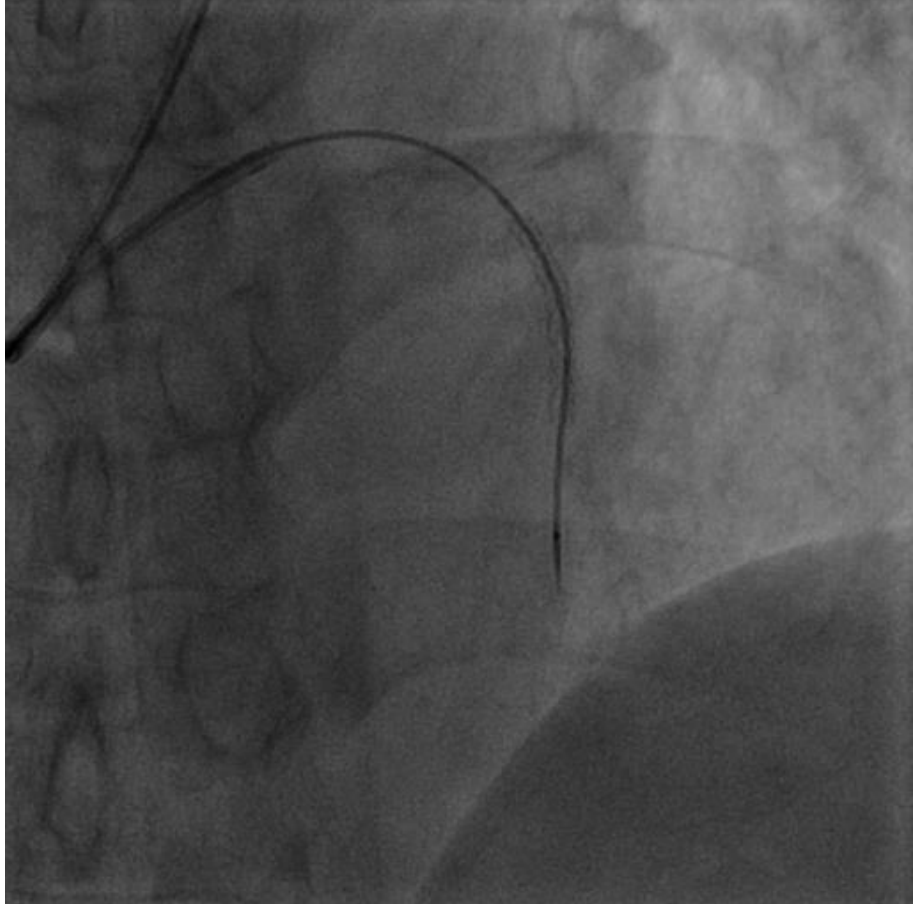


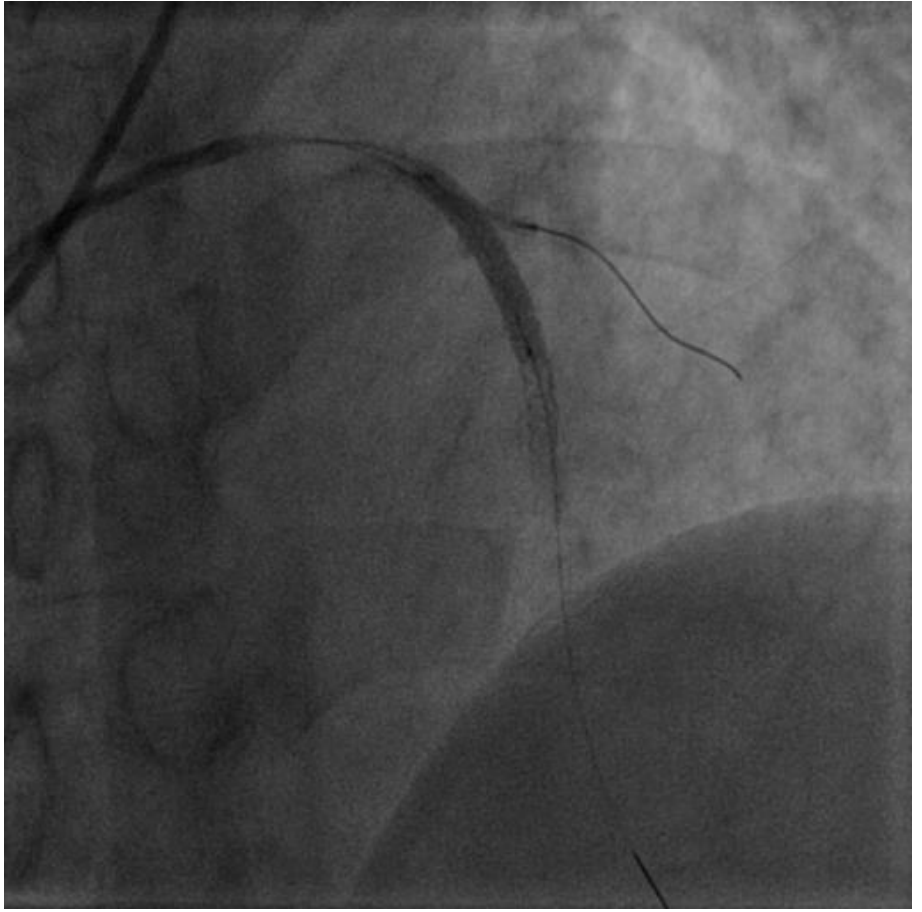


Miracle 6 + CrossBoss

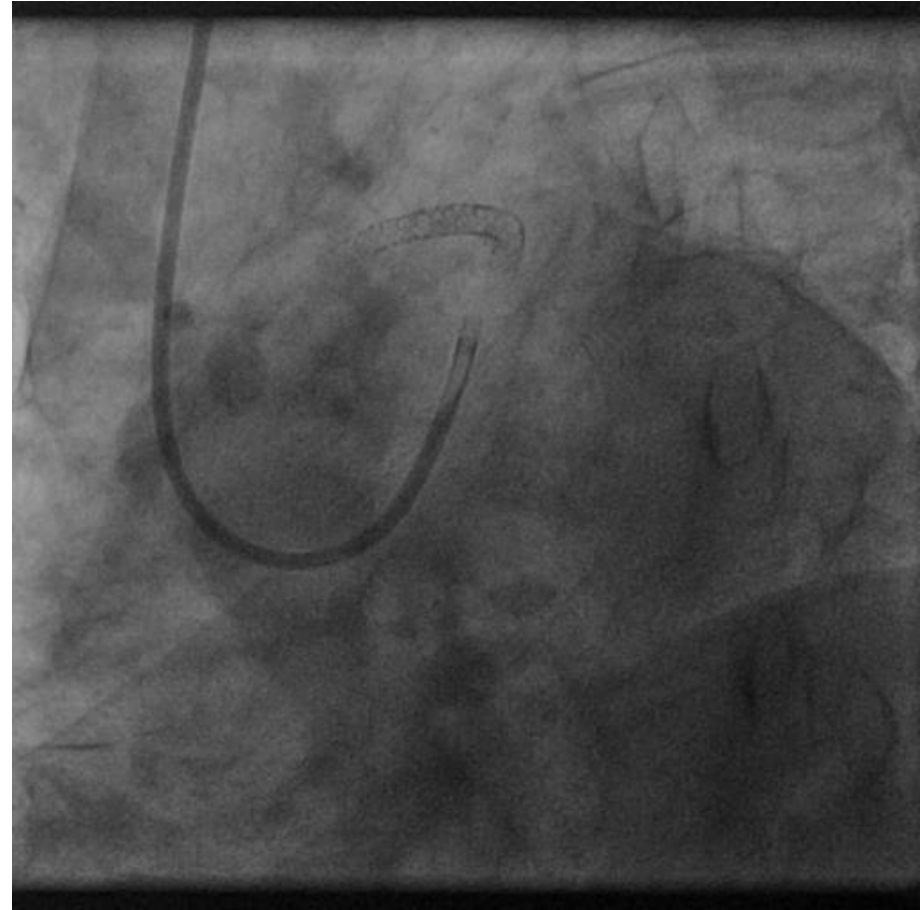
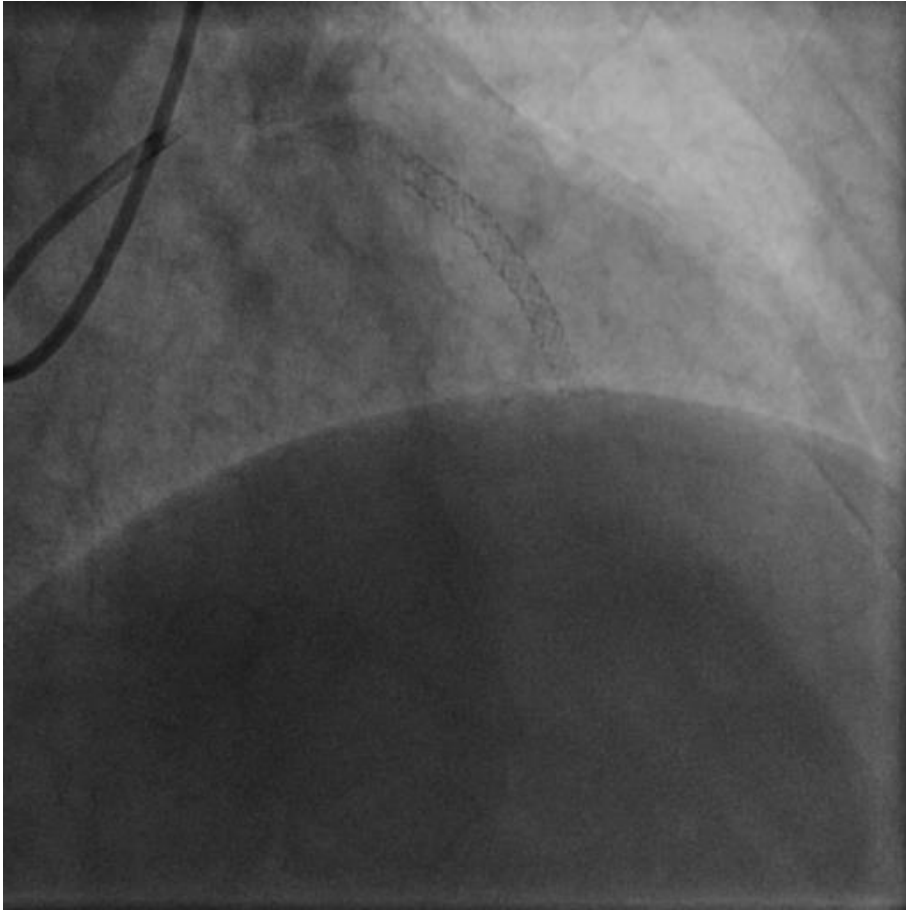


Pilot 150 + Corsair





Final result



Coronary angiogram



Total occlusion of proximal LAD stent

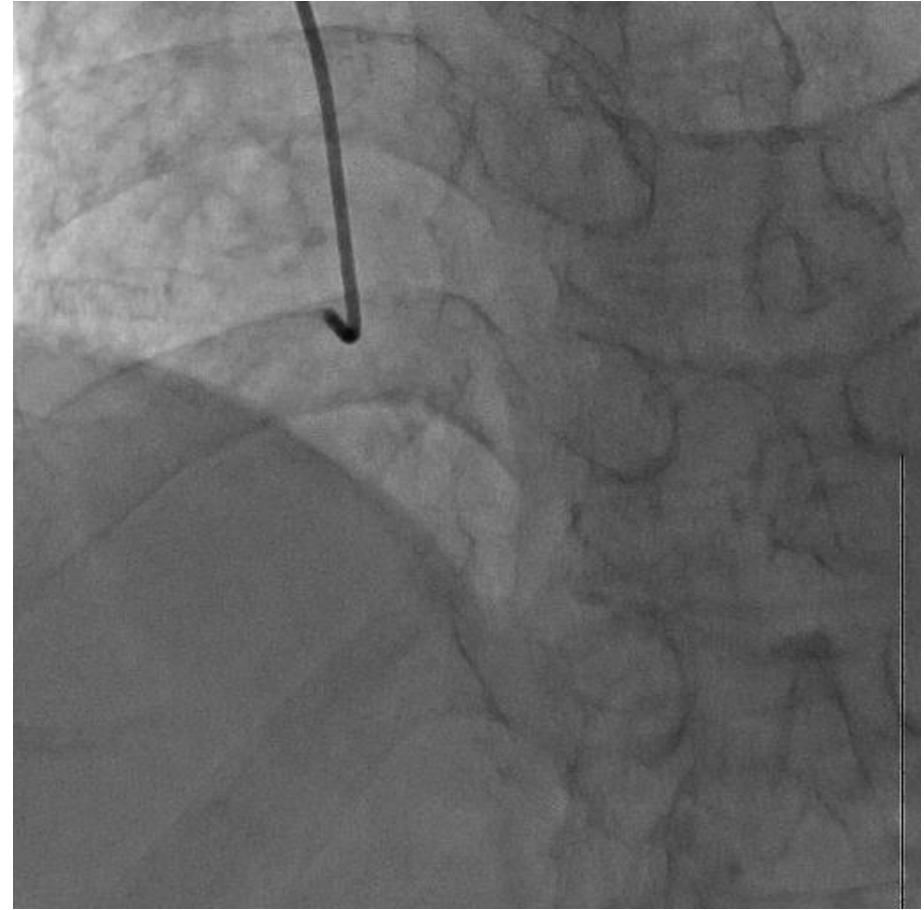
Crinial view



Coronary angiogram



Caudal view



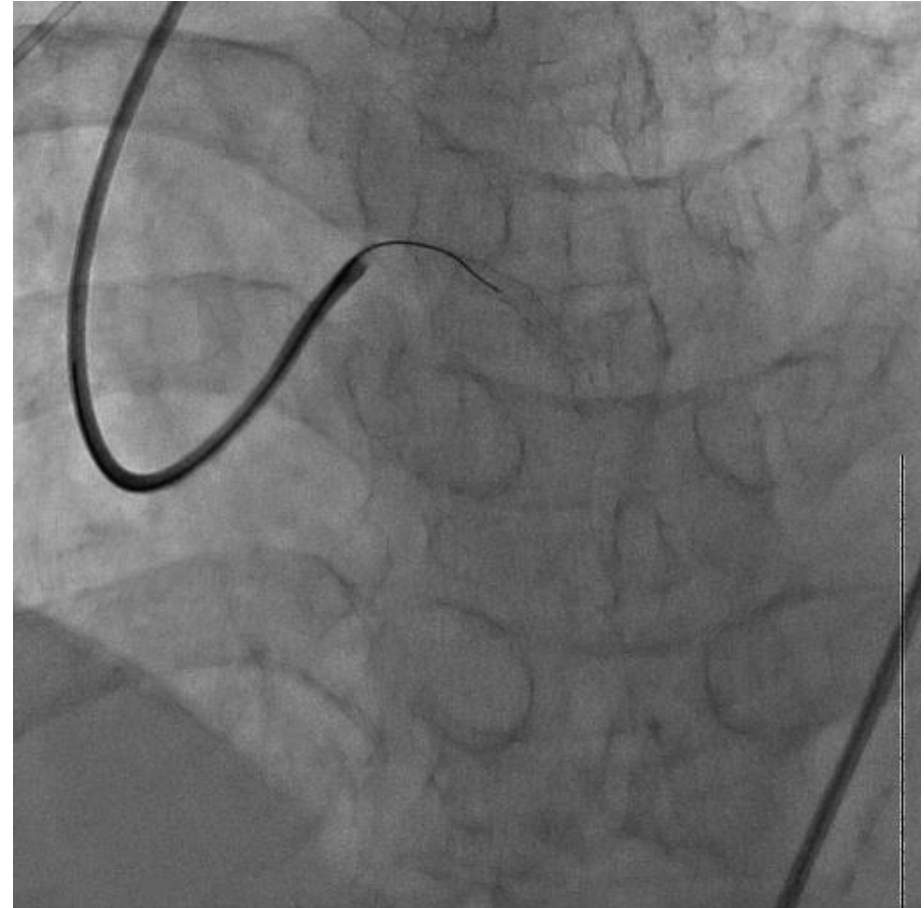
RCA angiogram



PCI



Poor collateral channels from RCA

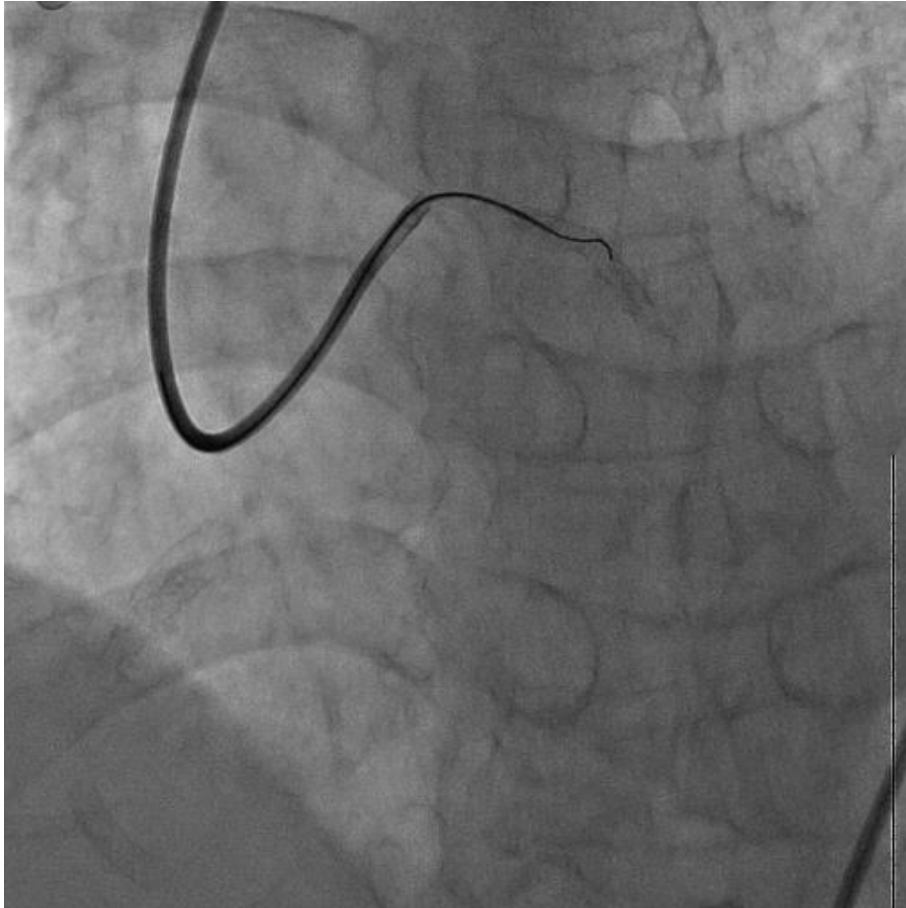


7 Fr EBU3.75 guiding catheter

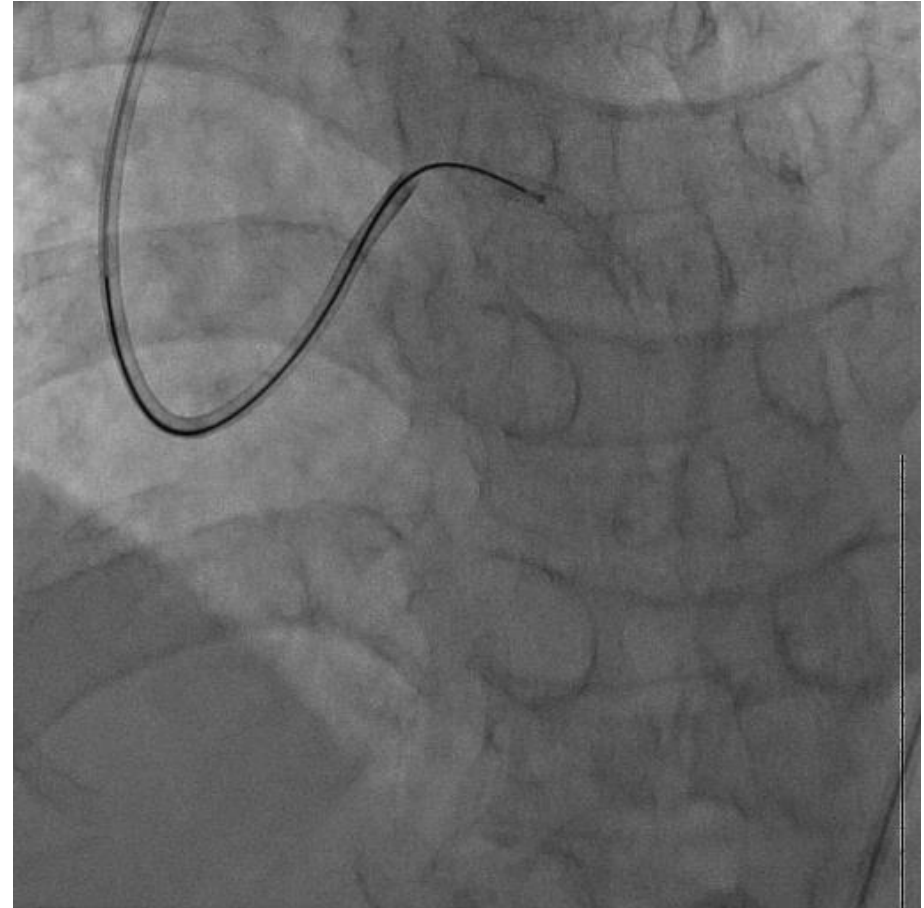
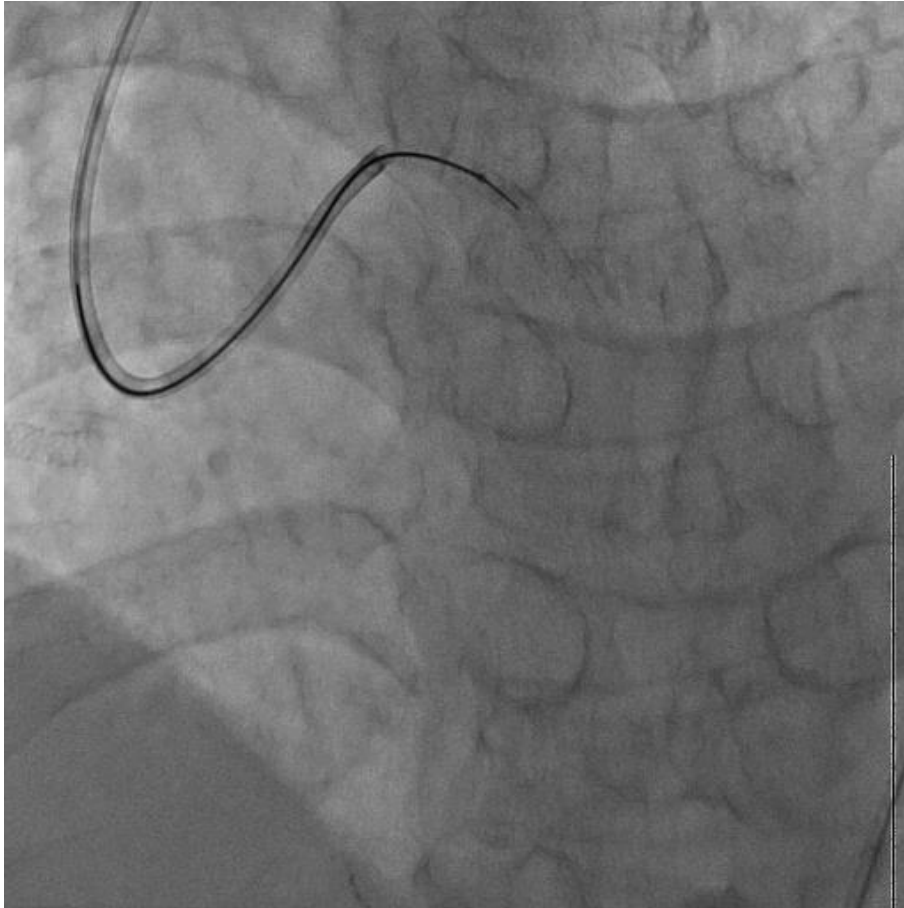
Miracle 6



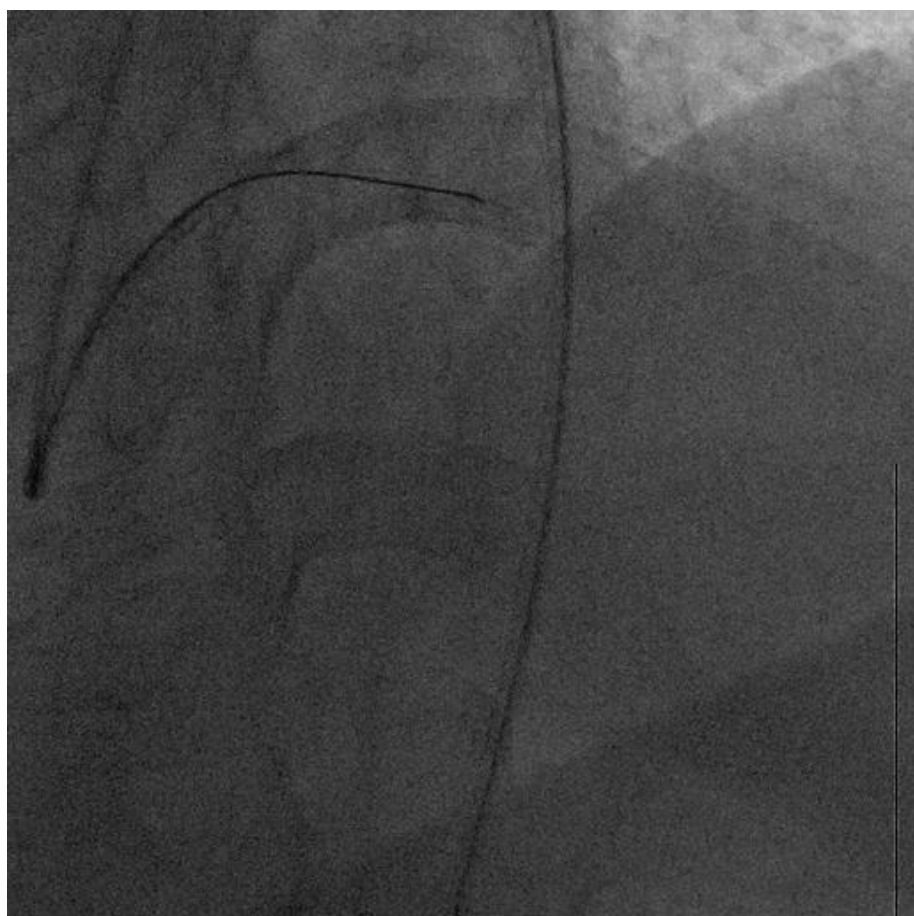
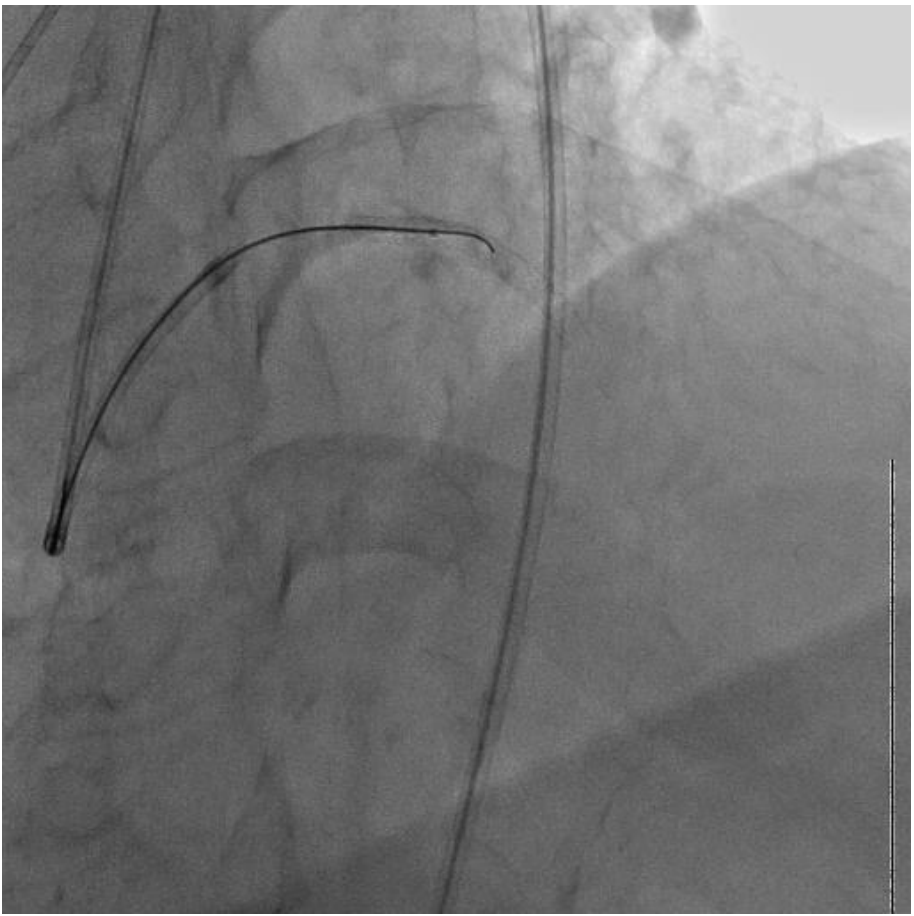
Miracle 6 was in the CTO lesion



**Crossboss catheter was rotated rapidly
using a proximal torque device by digital manipulation**



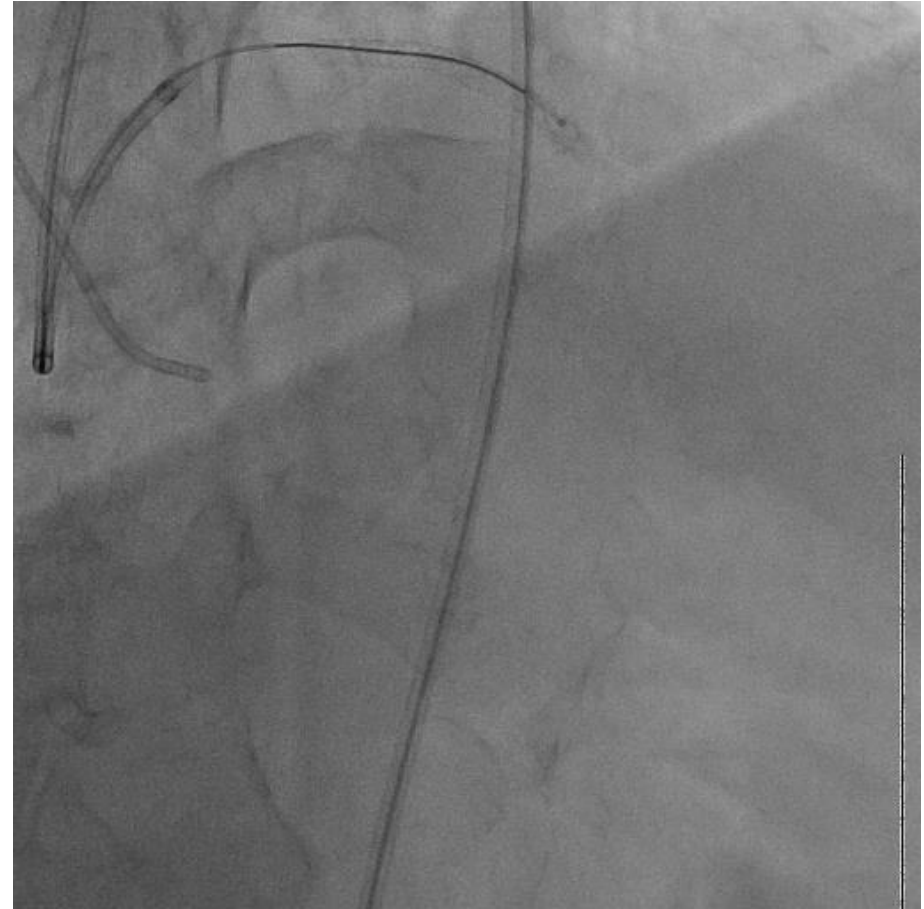
Switched to wire when crossboss suffered with resistance and bending



CrossBoss and wire moved forward alternately



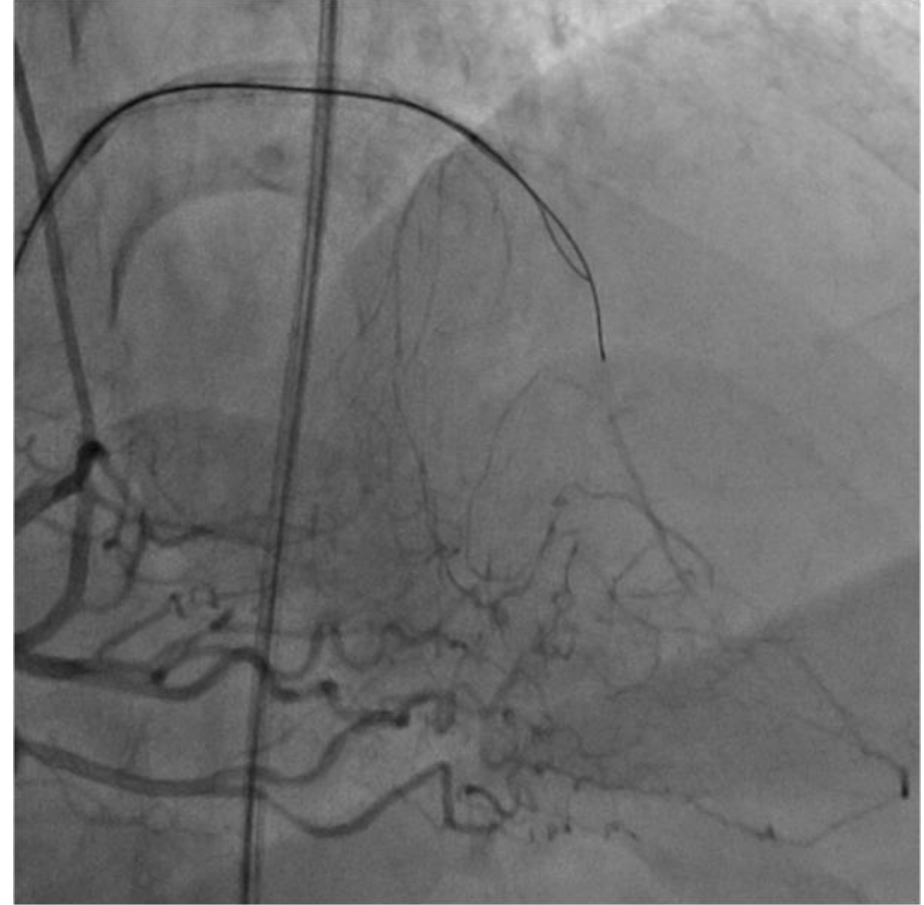
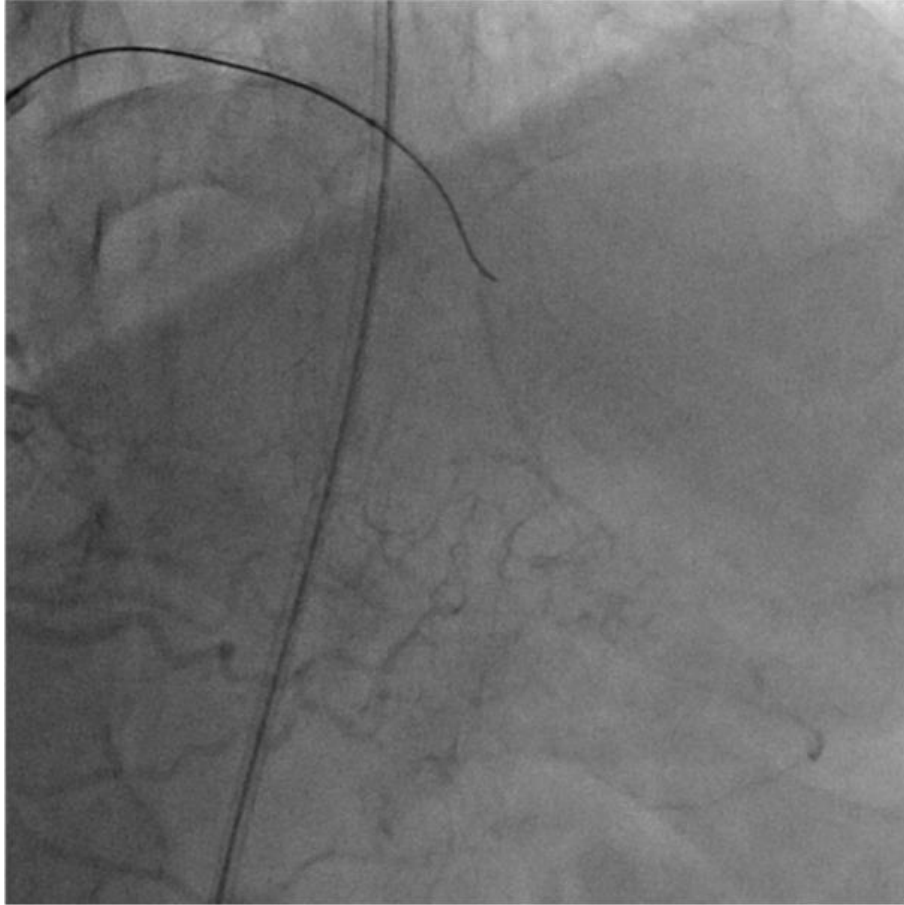
The Crossboss advanced through the occlusion segment in stent slowly and difficulty



Failed to break through the distal fibrous cap



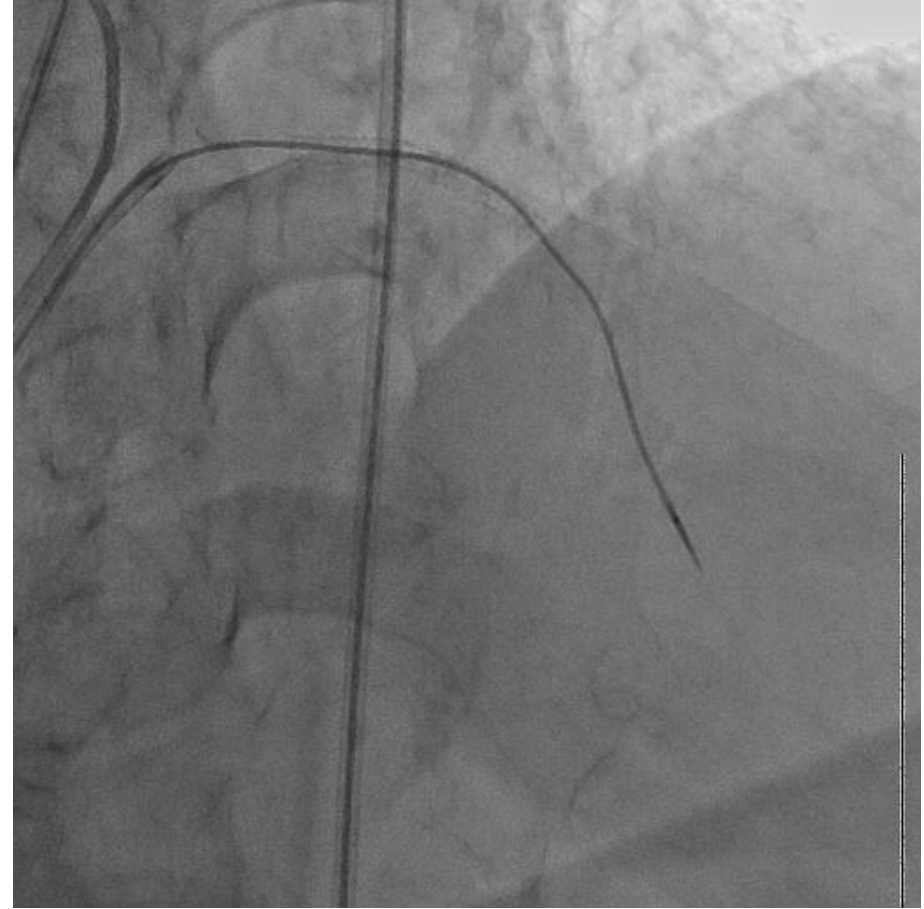
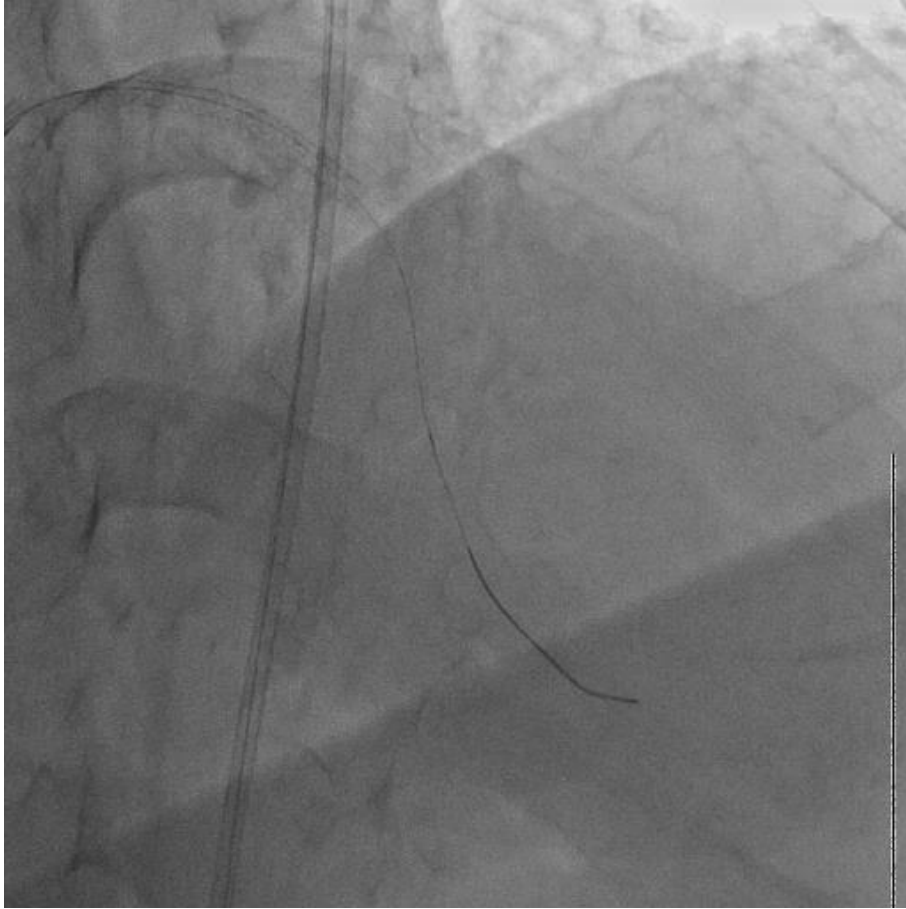
**Miracle 6 entered into sub-intima in
distal occlusion segment outside stent**



**Pilot 150 passed the CTO lesion in
lumen by paralalled wire technique**



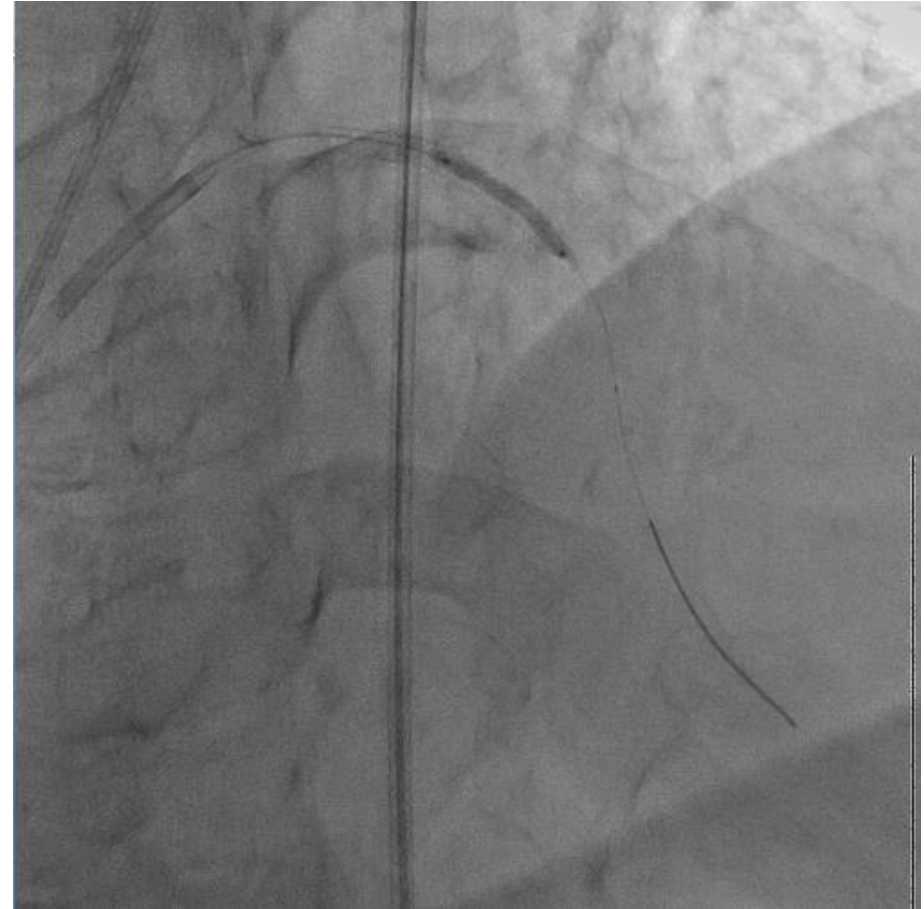
Retrograde angiogram verification



Tip injection to make sure



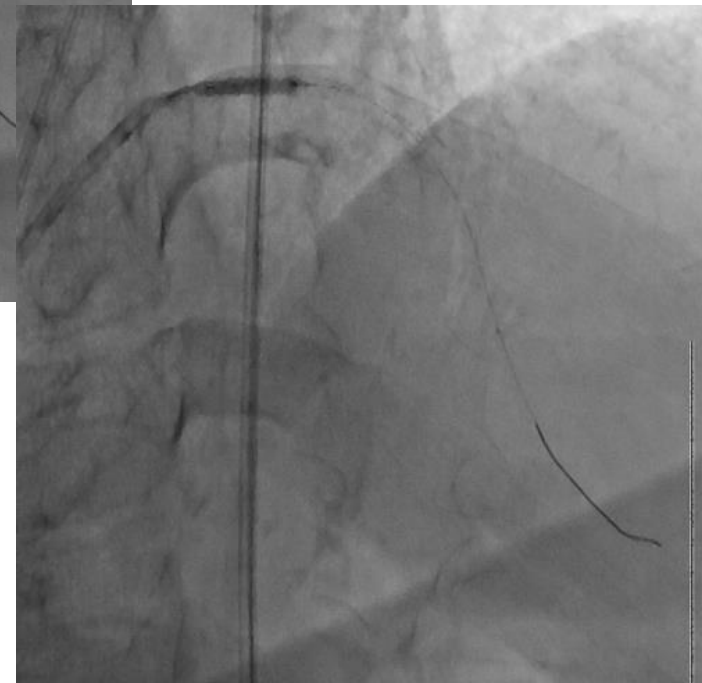
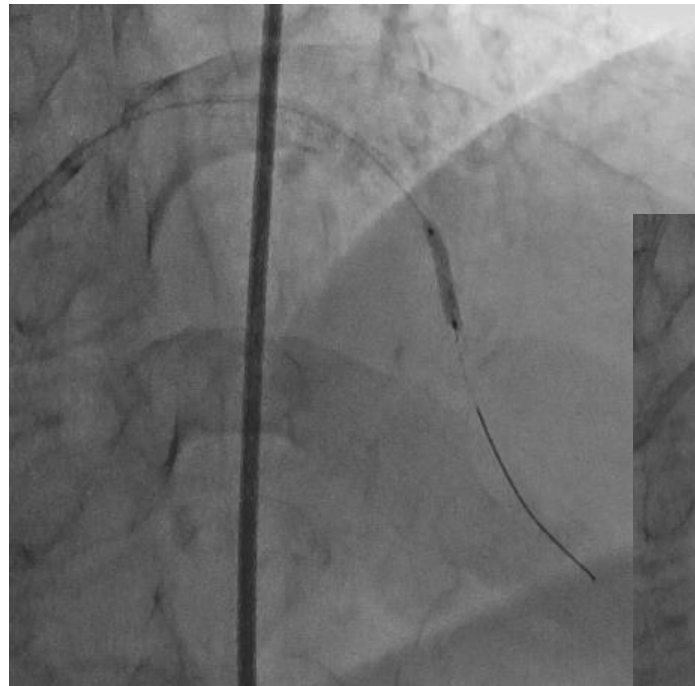
Balloon :Sprinter(2.0mm*20mm)



Predilation and tough plaque was found in distal part of the stent where Miracle 6 lost the right way initially



Balloon :Sprinter(2.5mm*15mm)



Step-up gradual predilatation

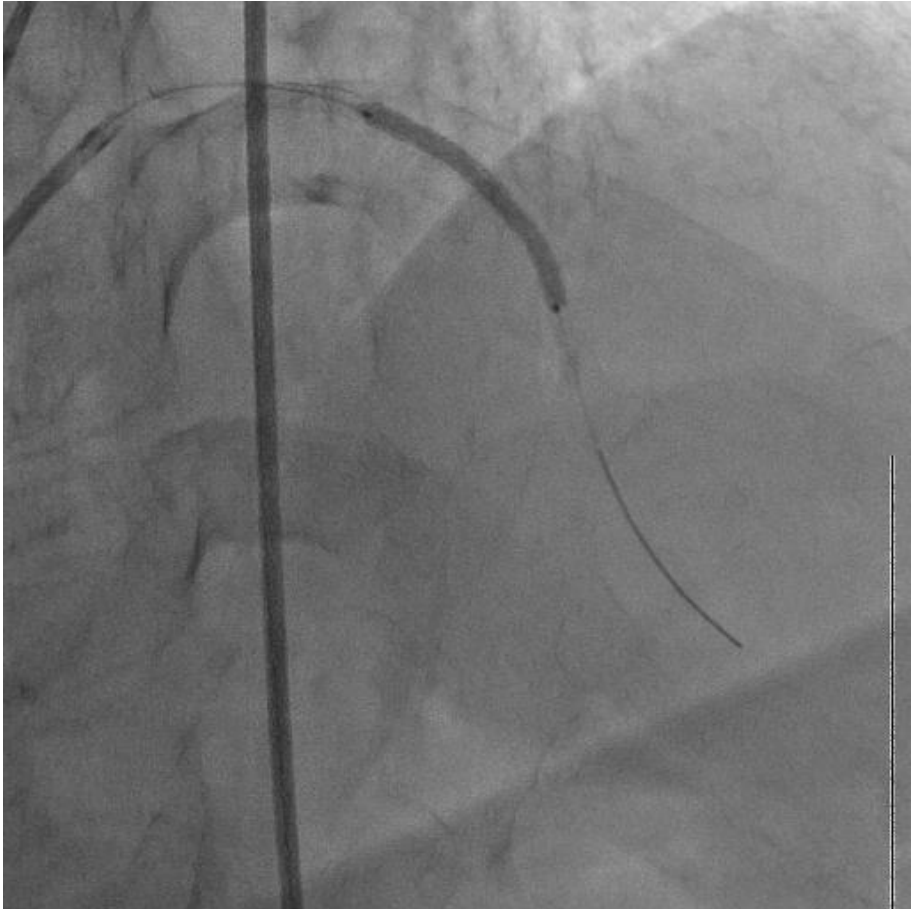
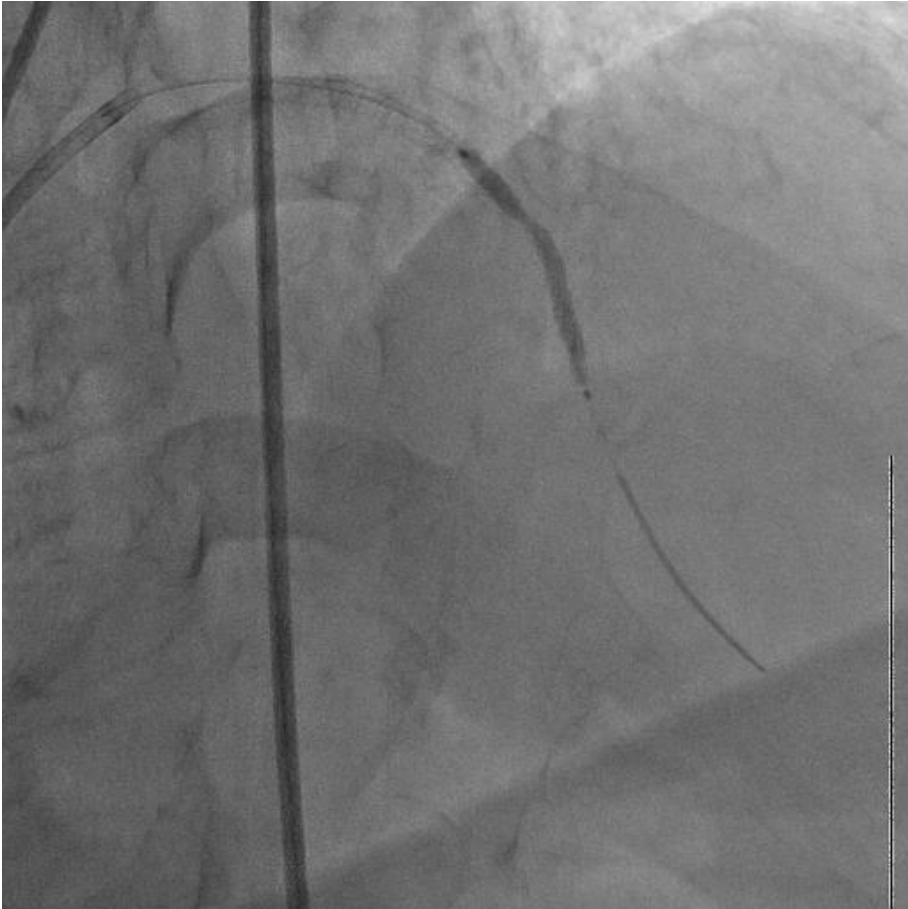


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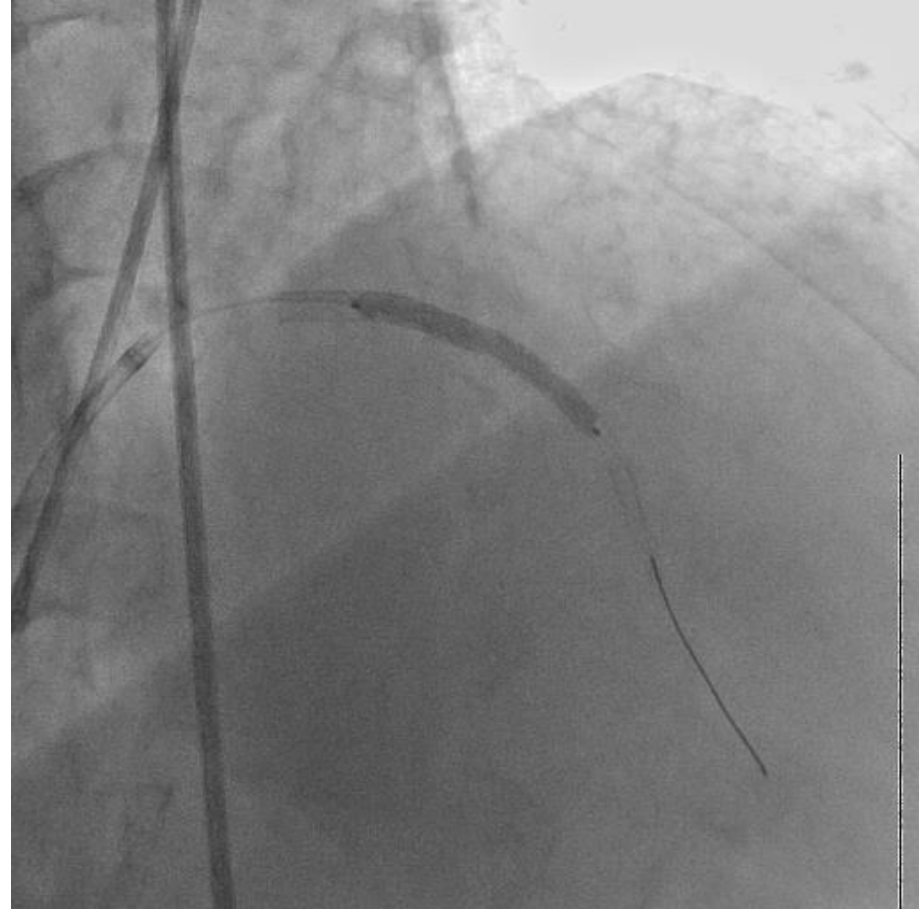
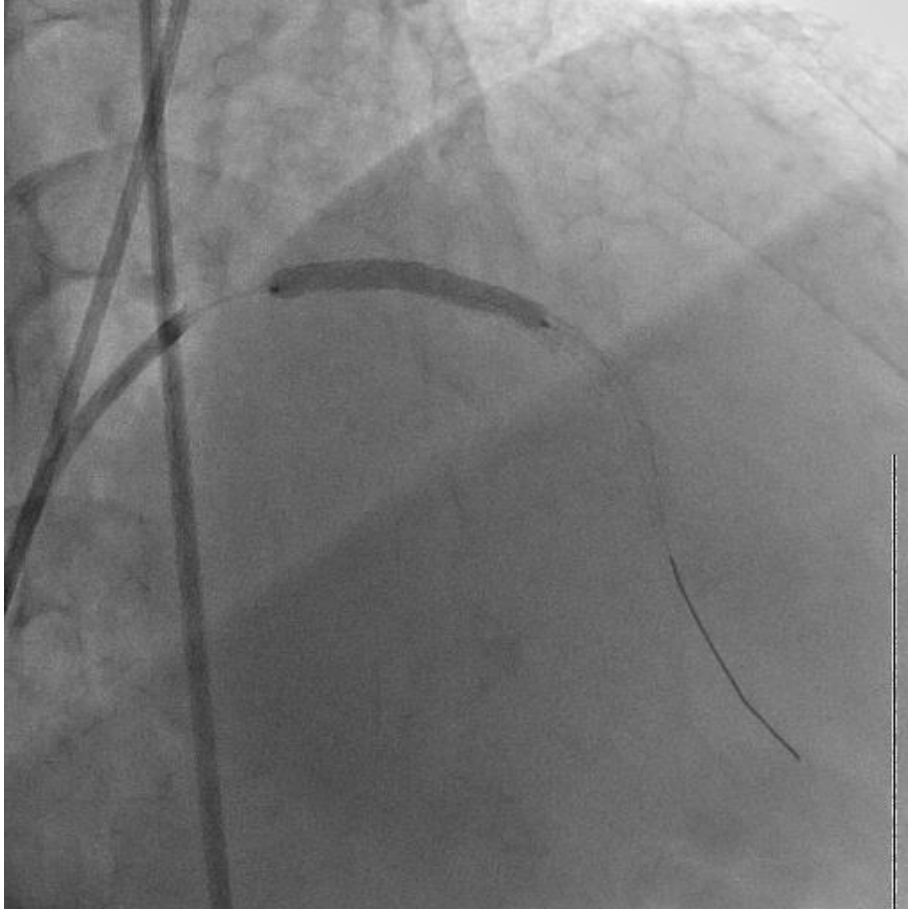
Distal part of LAD was diffuse atherosclerotic narrowing



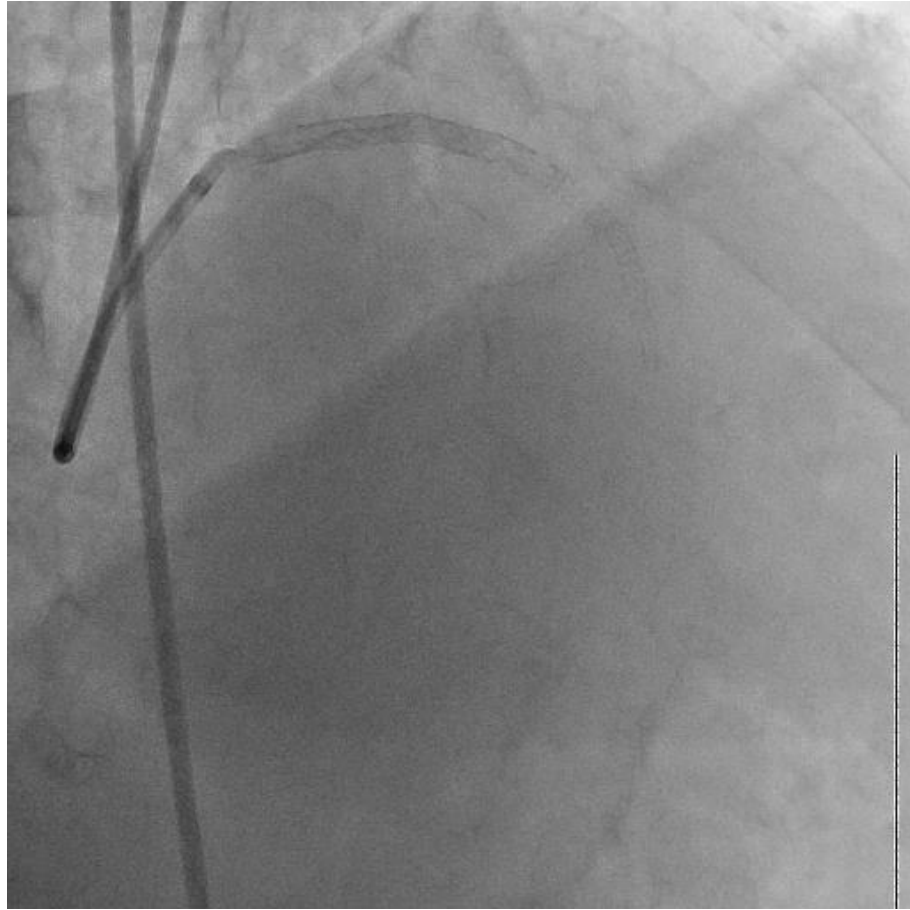
2.5mm × 29mm stent at mid-LAD



3.5mm × 29mm stent at proximal-LAD



Final result



CLINICAL RESEARCH

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

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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

KEYWORDS

stenosis

Clinical Case Report

Medicine®

OPEN

Initial clinical experience of CrossBoss catheter for in-stent chronic total occlusion lesions

A case report

Lei Zhao, MD, Long-Bo Li, MSc, Zhi-Hui Wang, MD, Yong-Feng Shi, MD, Jun-Duo Wu, MD, Ji-Chang Zhang, MD, Bin Liu, MD*

Particularly suited to tapered proximal cap without tortuosity

● CrossBoss in CTO due to ISR

procedural success rates was similar compared with wire-escalation (CrossBoss first study)

Short crossing times

Low complication rates



Therapeutic Strategy

- Intravascular Imaging can prove useful in identifying mechanical concerns
- A “switch” strategy—treatment of in-stent restenosis with a different type of DES, as explored in the RIBS III study—also yields better results than repeat use of the same DES
- DCB maybe promising compared with DES (Especially for patients with stent intolerance)
- Do not hurry to put “Full Metal Jacket” stents, some distal part of CTO is negative remodeling and can be reinstated or reassessed





*Thanks for
your
attention !*



4th Hospital of Harbin Medical University