IVUS in BVS Era: What Is Missing?

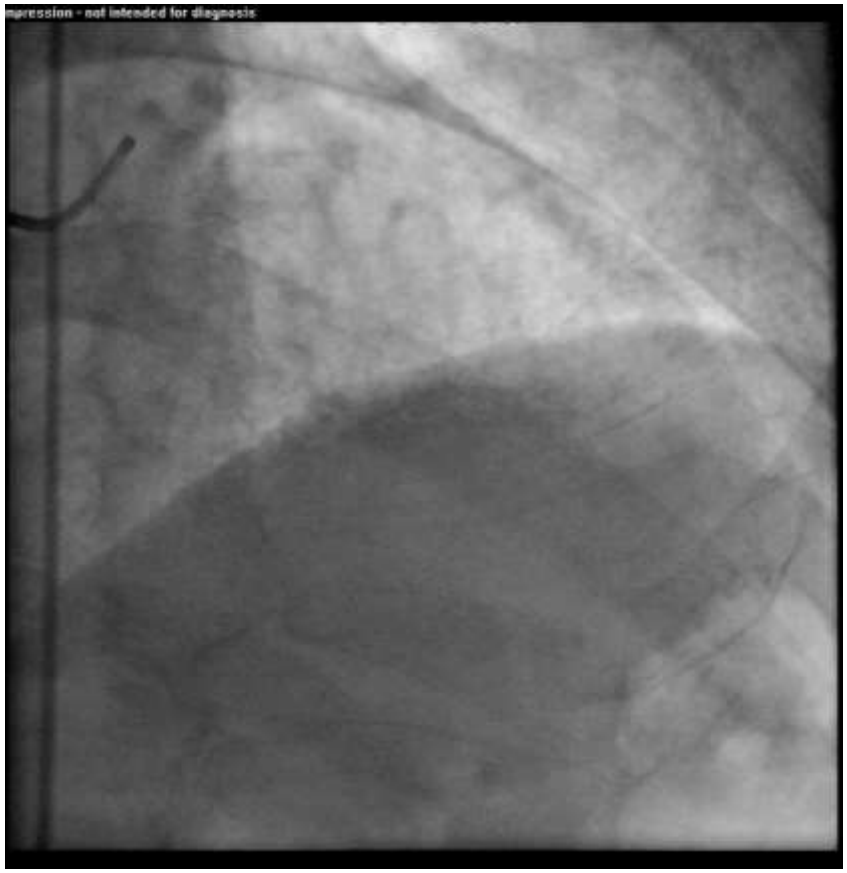
Dr. Chih-Fan Yeh, Dr. Paul Hsien-Li Kao
National Taiwan University Hospital
Taipei, Taiwan

Dec. 5th, 2014

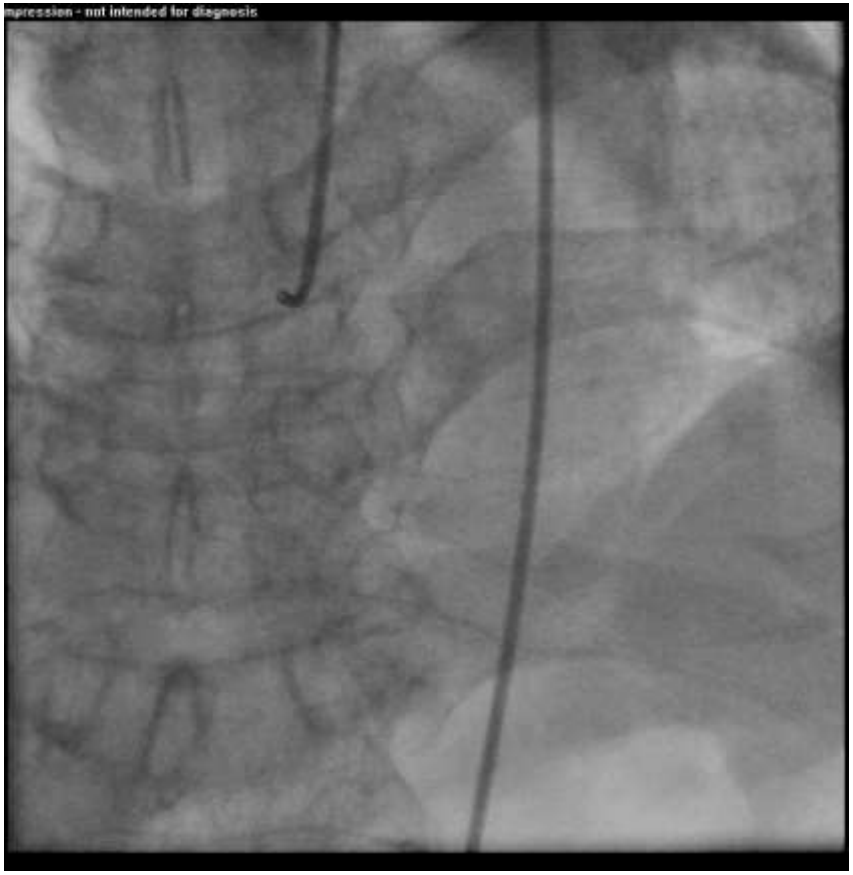
Basic information

- Mr. Wang, an 84 year-old man
- History of left ICAS s/p PTAS in Nov, 2013
- Risk factors for CAD: age, gender, hypertension, diabetes mellitus, hyperlipidemia
- Presentation: Intermittent chest tightness, CCS class II
- Th-201: reversible reperfusion defect over anteroseptal and anterolateral wall

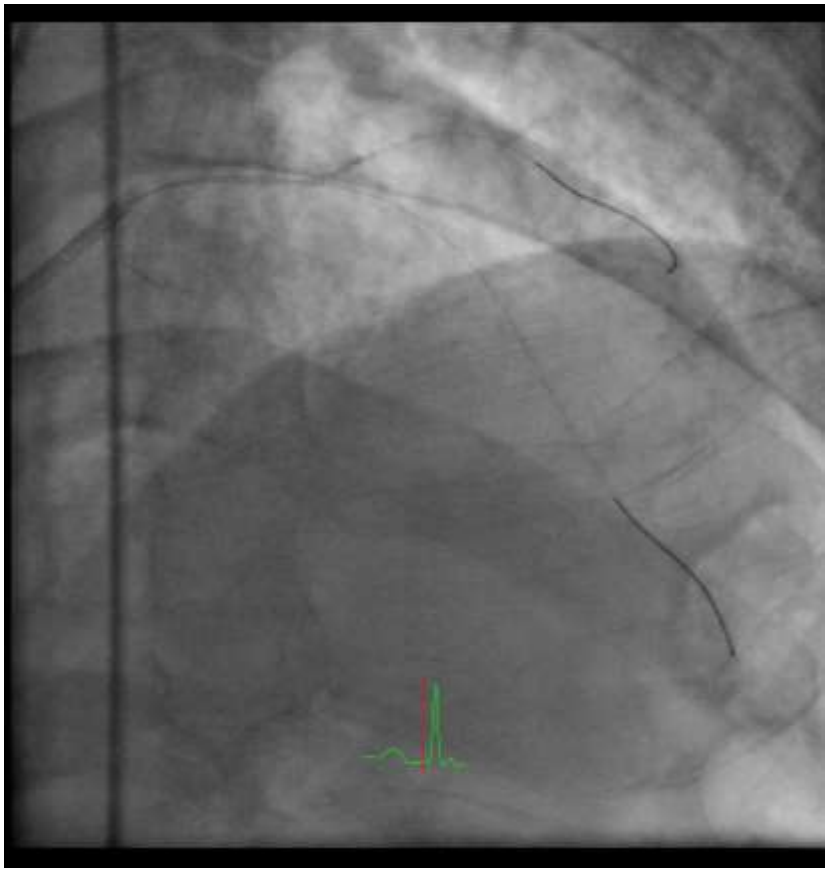
Diagnostic angiography



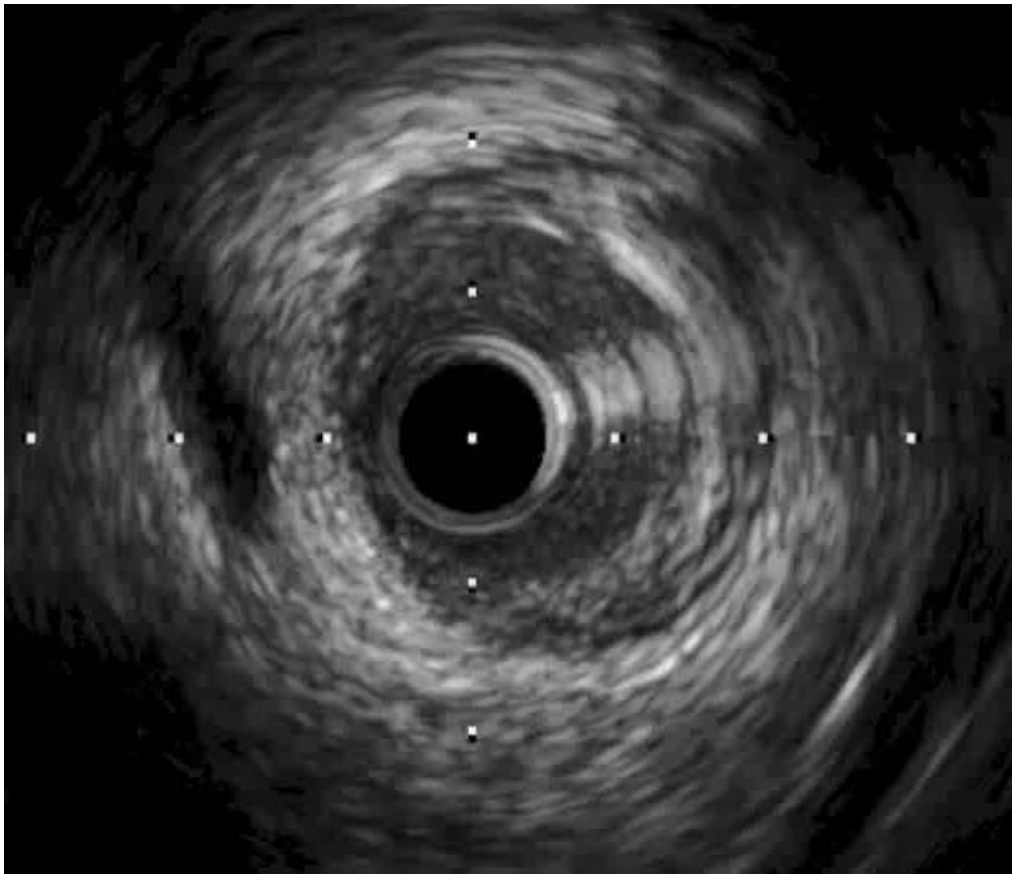
Diagnostic angiography



Procedure steps

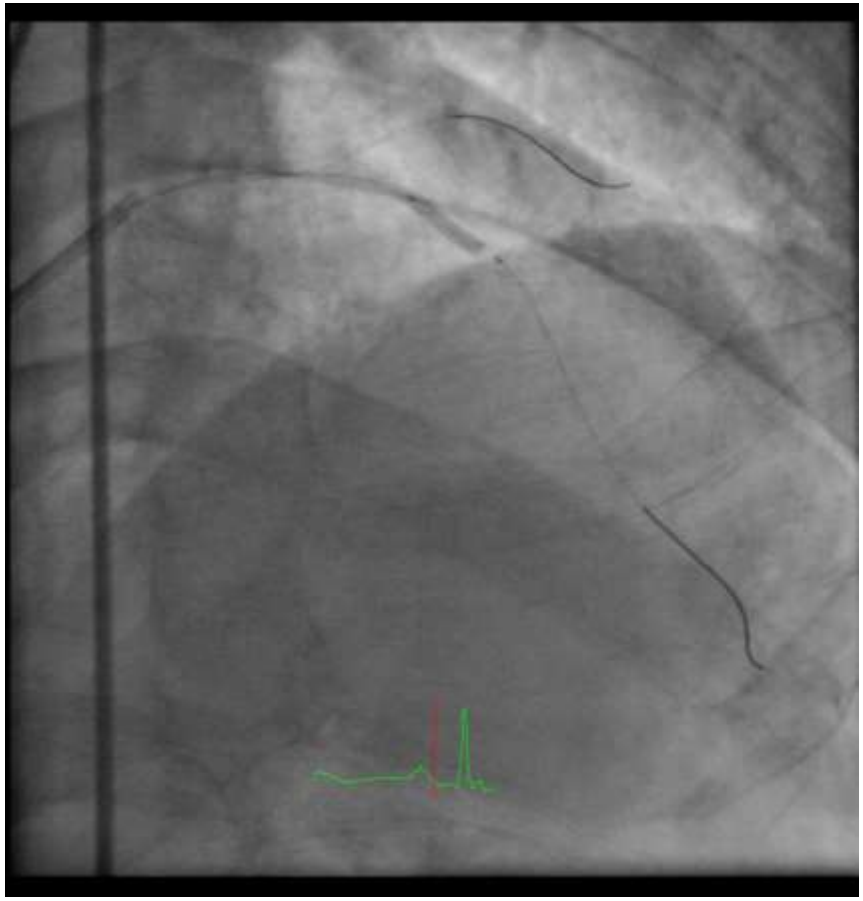


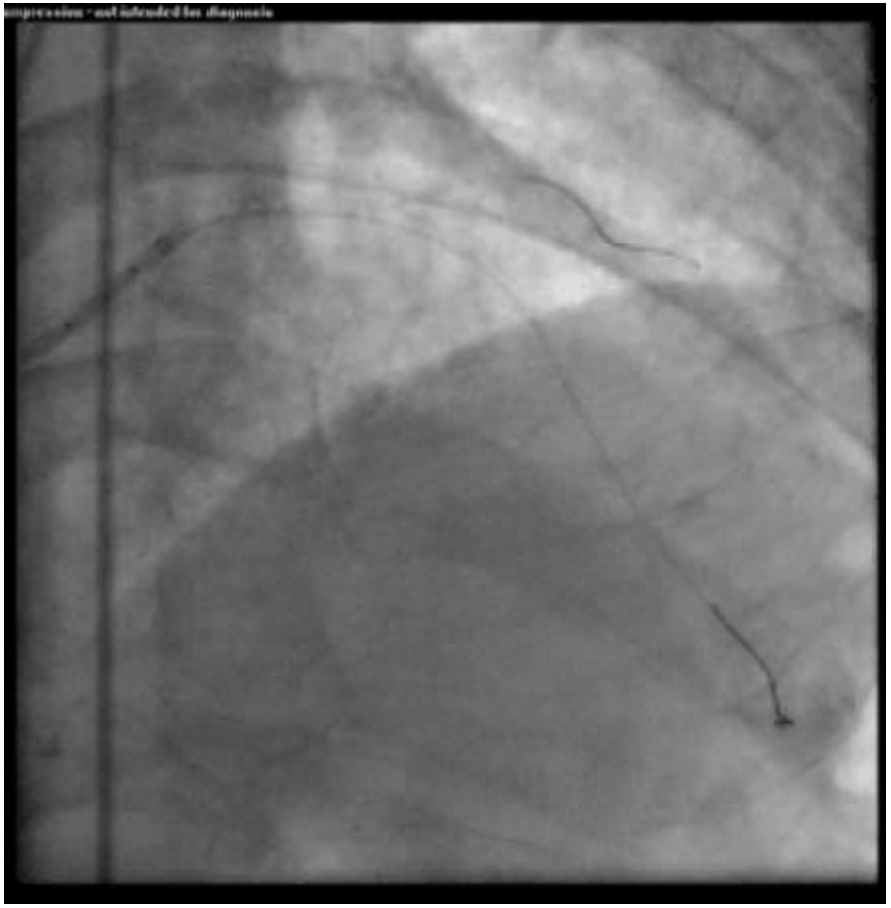
Trek 1.5x15mm
Cutting balloon 2.0x10mm



IVUS LAD

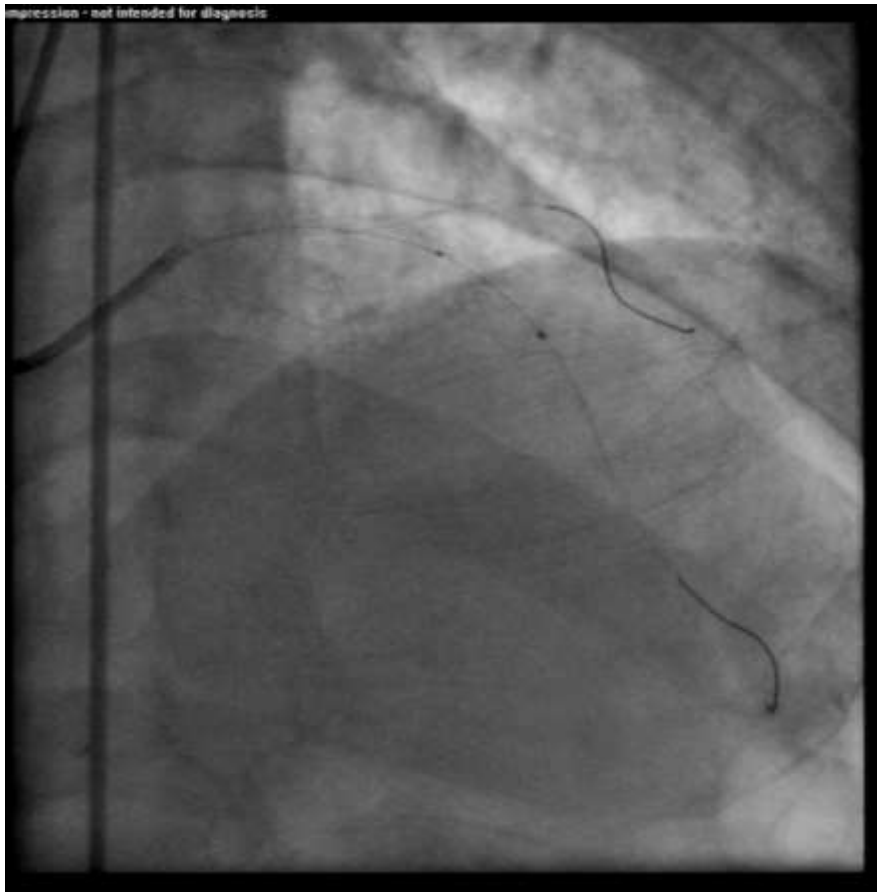
Balloon dilatation to LAD



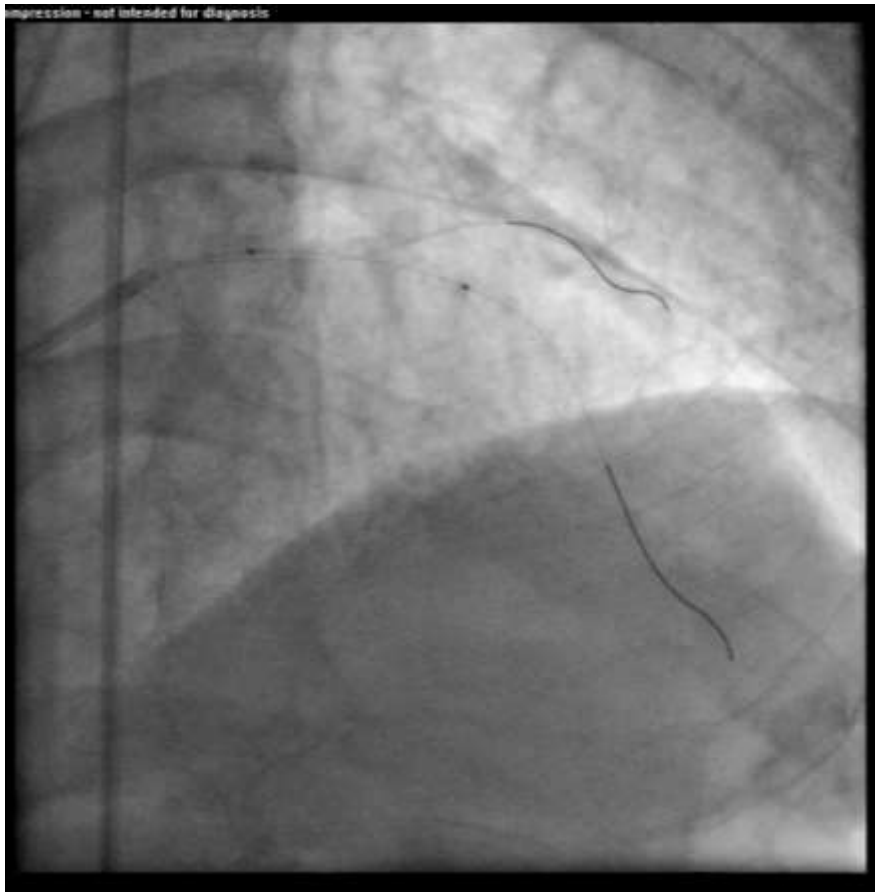


Trek 2.5x15 mm and Trek 3.0x15mm

BVS stenting to m-LAD and p-LAD

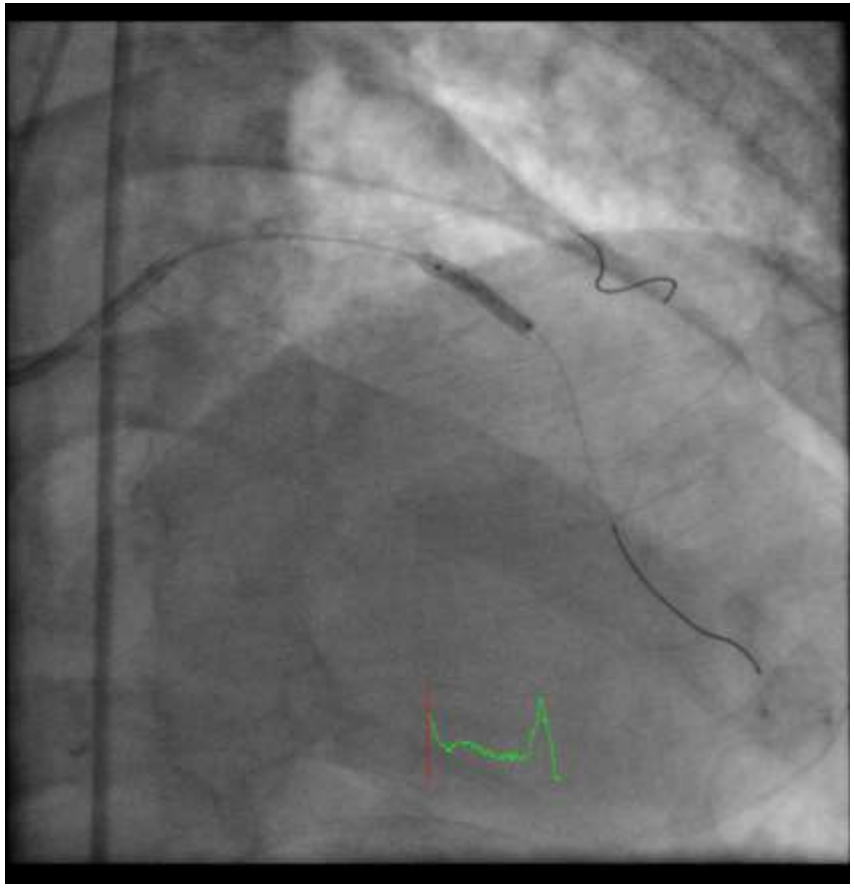


Abbott BVS 2.5x18 mm

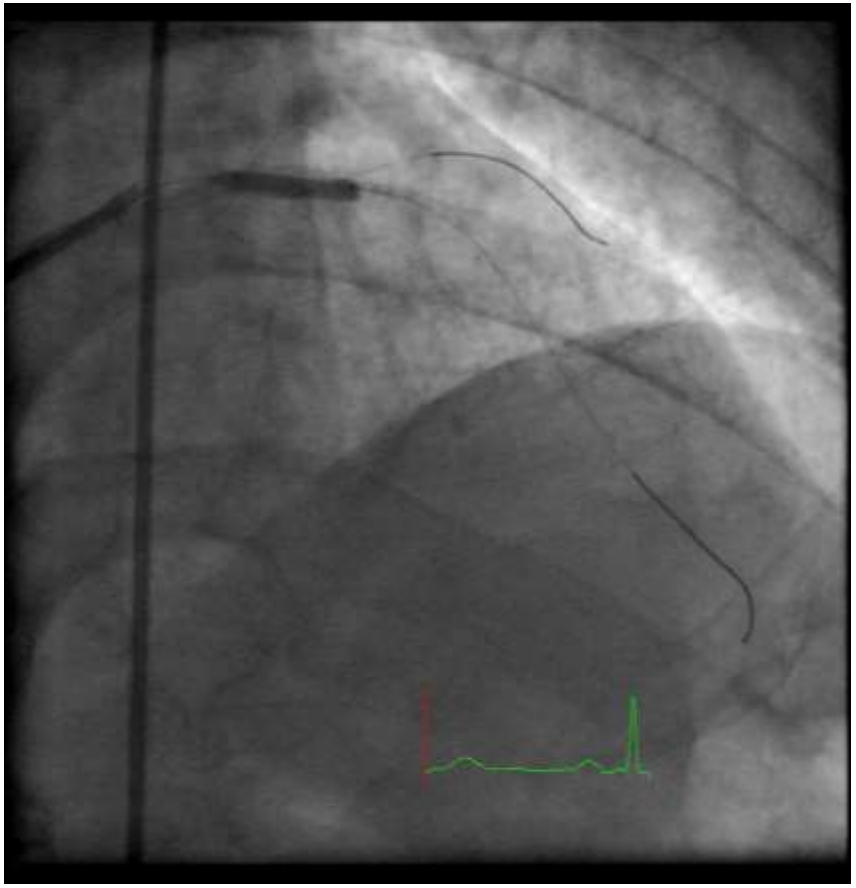


Abbott BVS 3.0x28 mm

Post-stenting dilatation

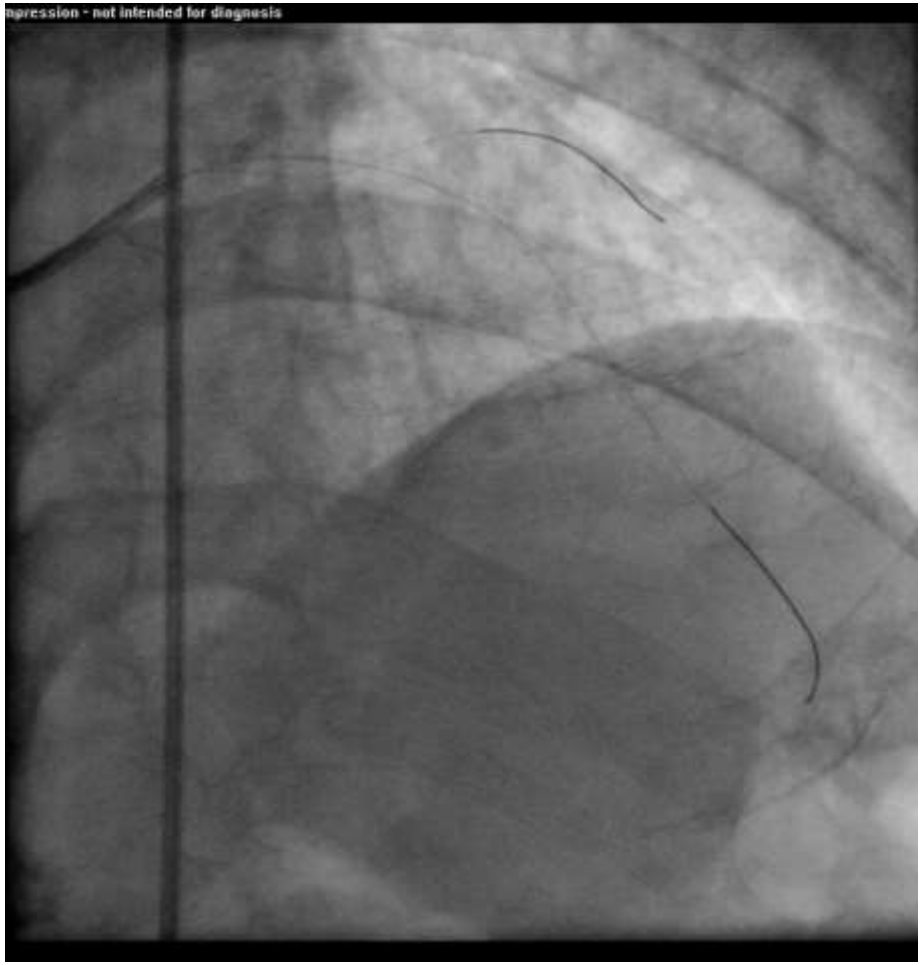


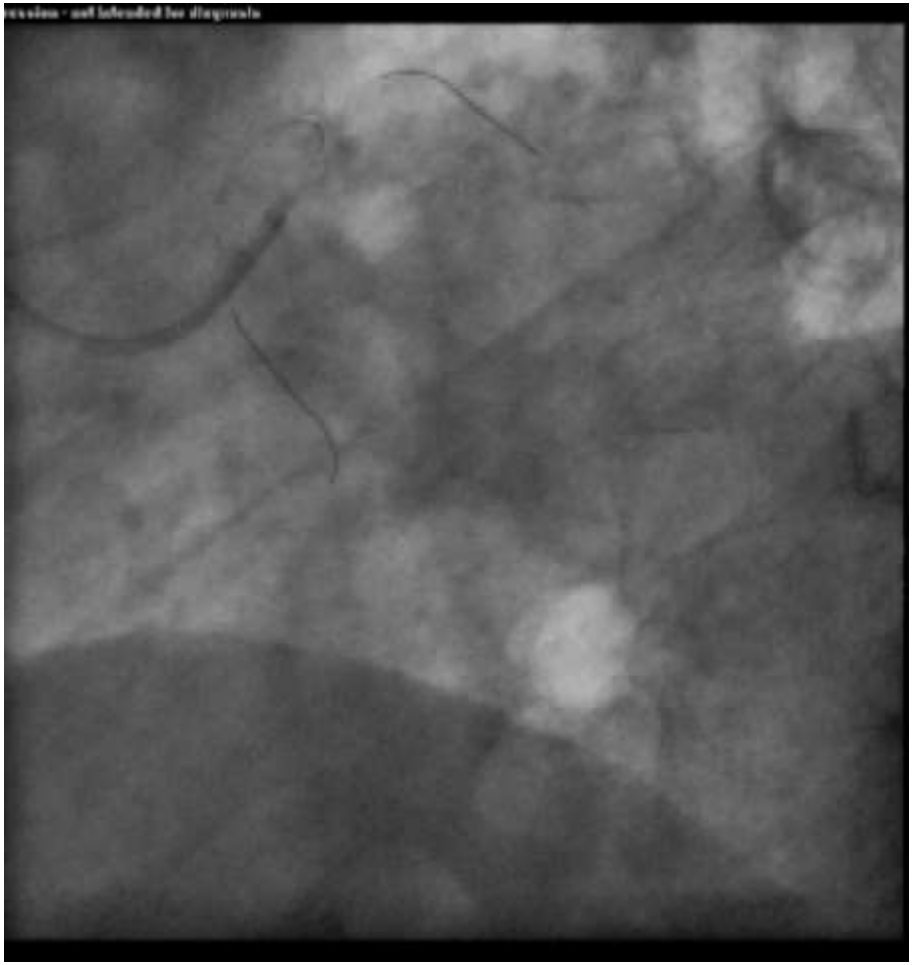
Trek 2.75x15 mm



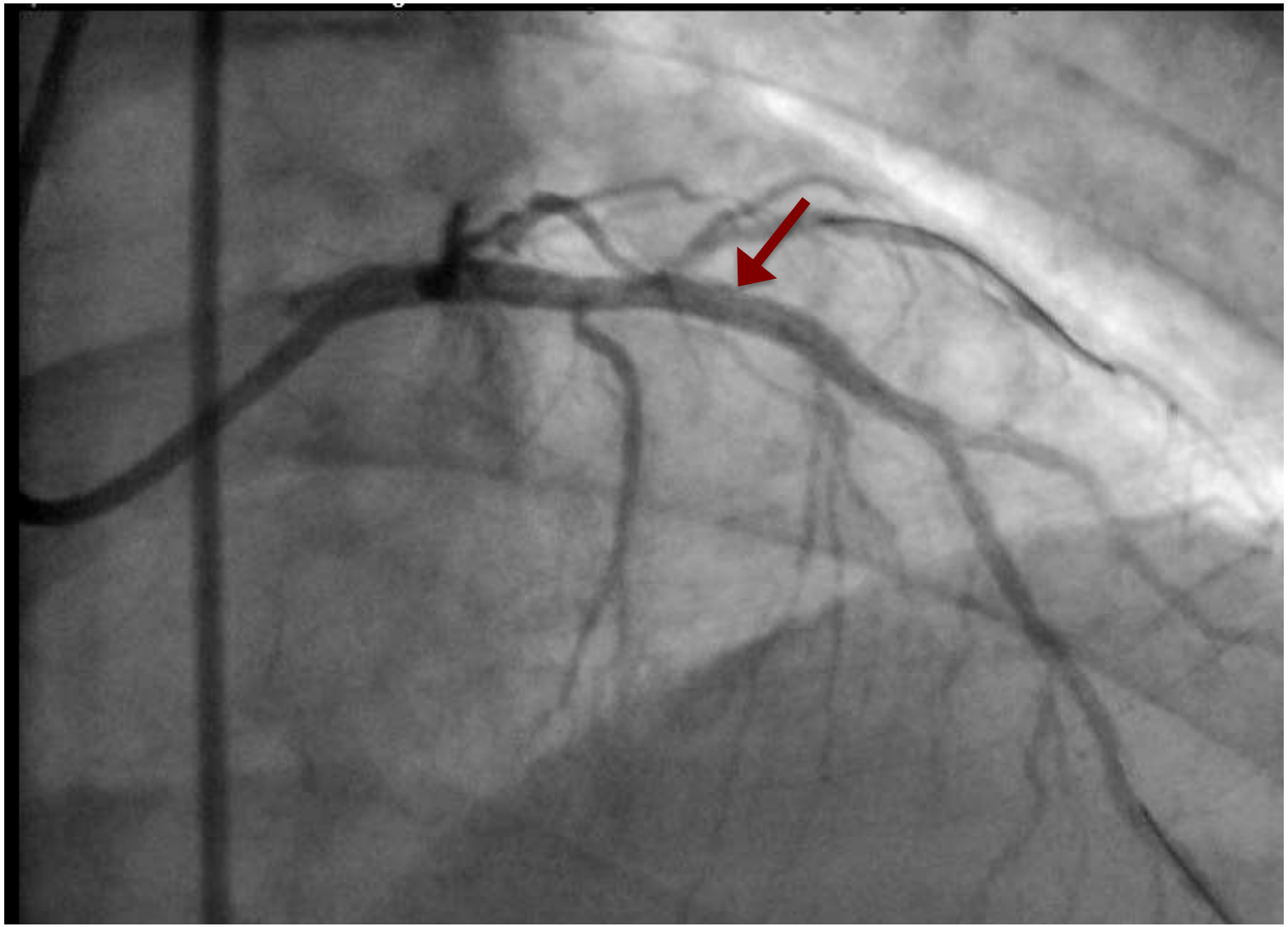
NC Trek 3.5x15mm

Post-dilatation angiography

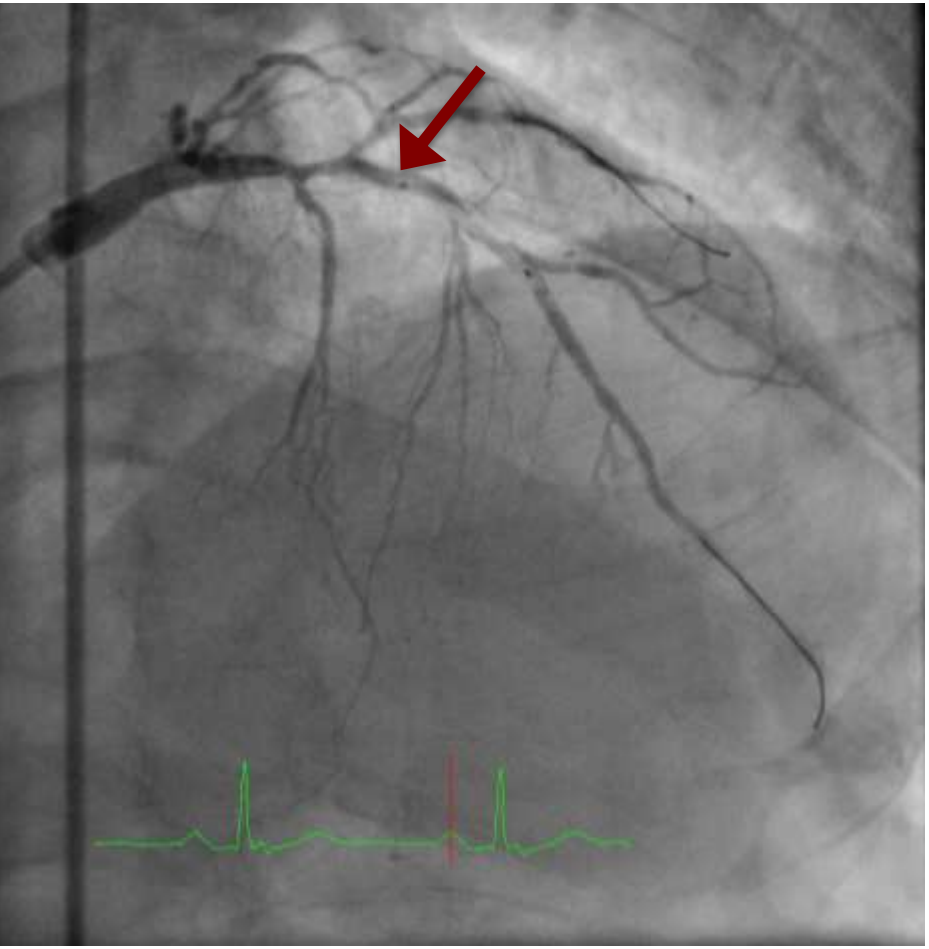


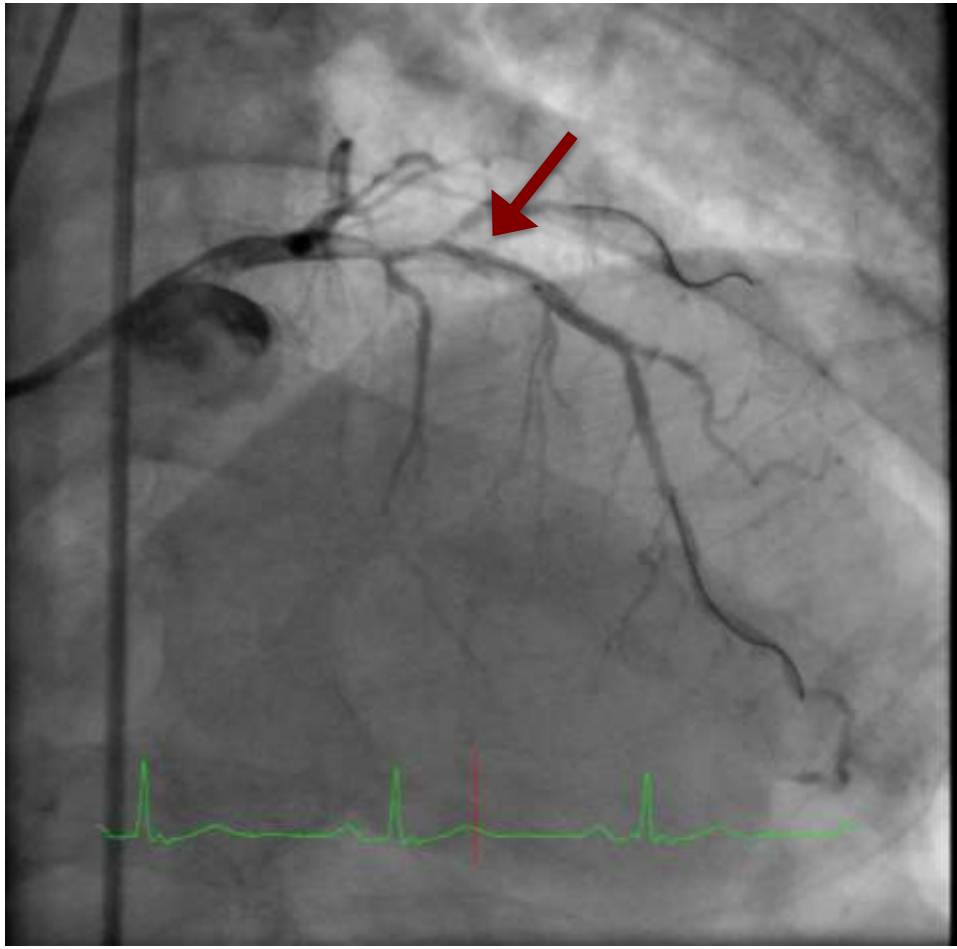


What's the problem?



Position

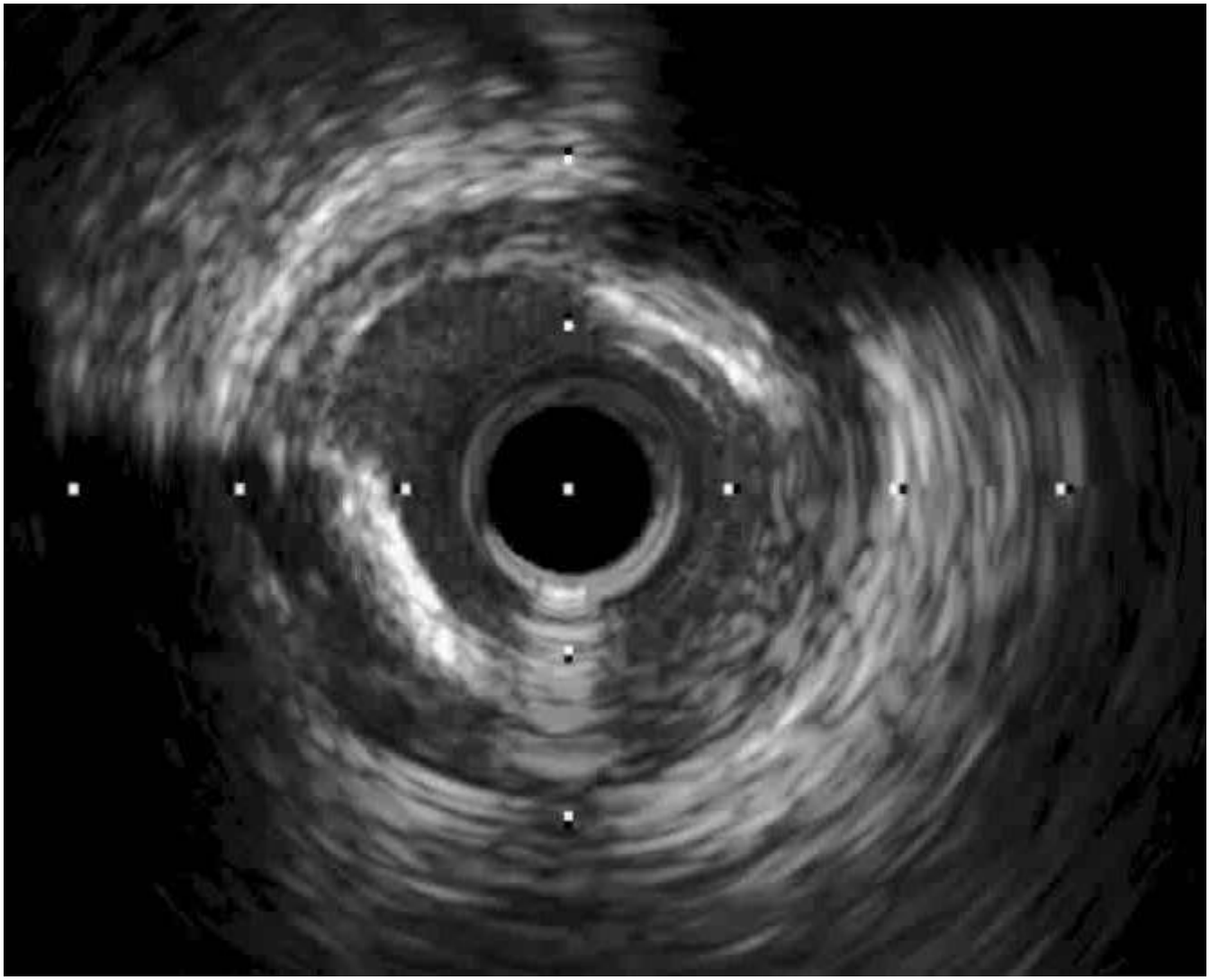




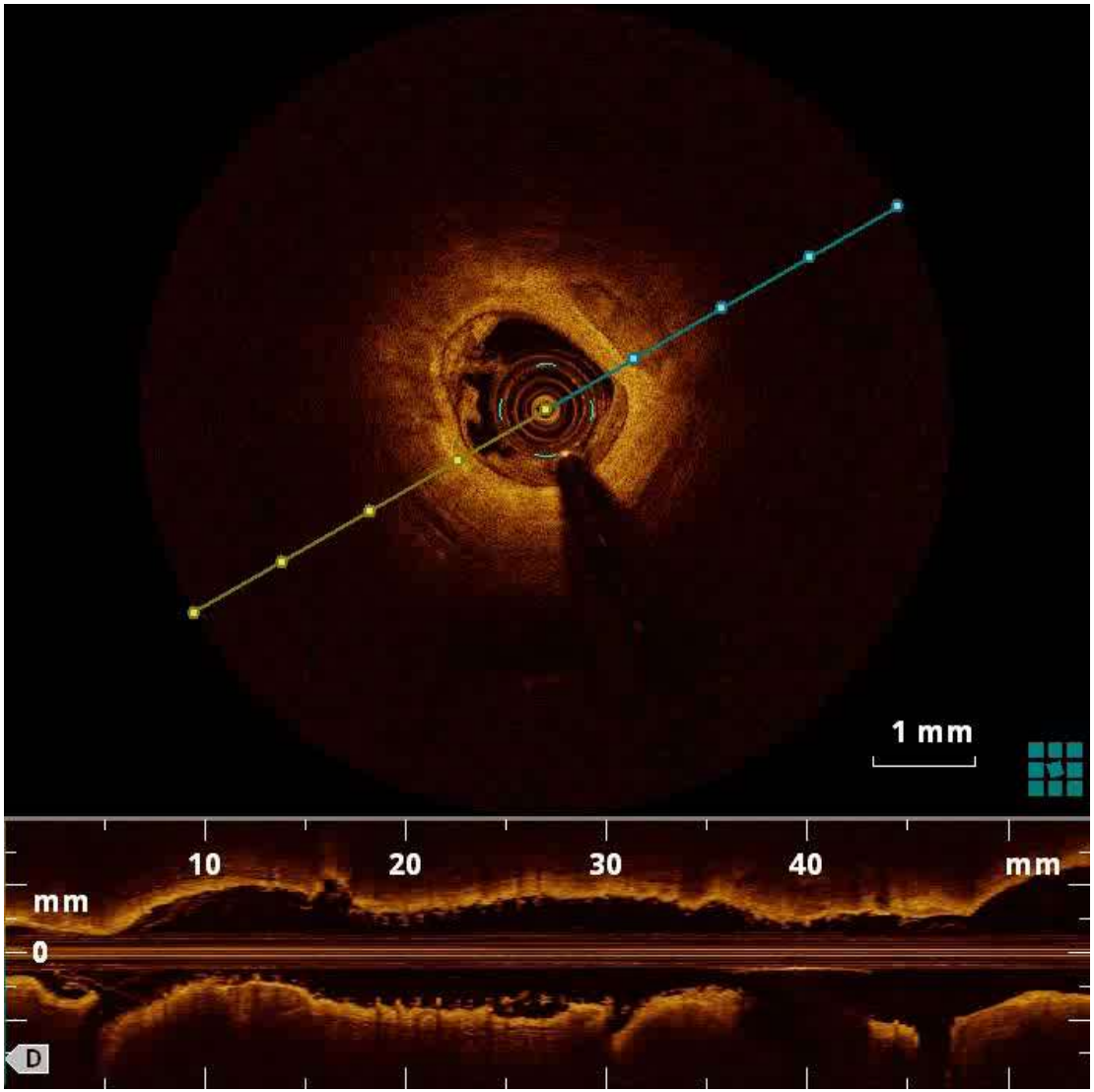
What's next?

IVUS or OCT?

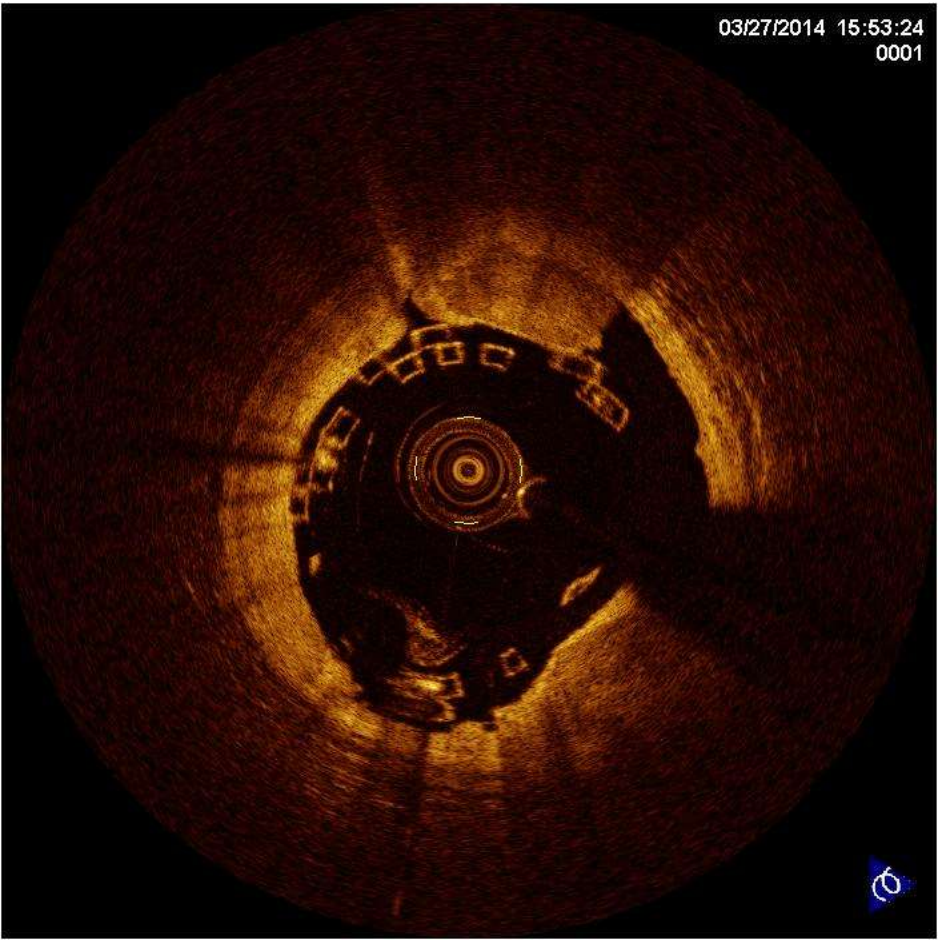
Post-stenting IVUS

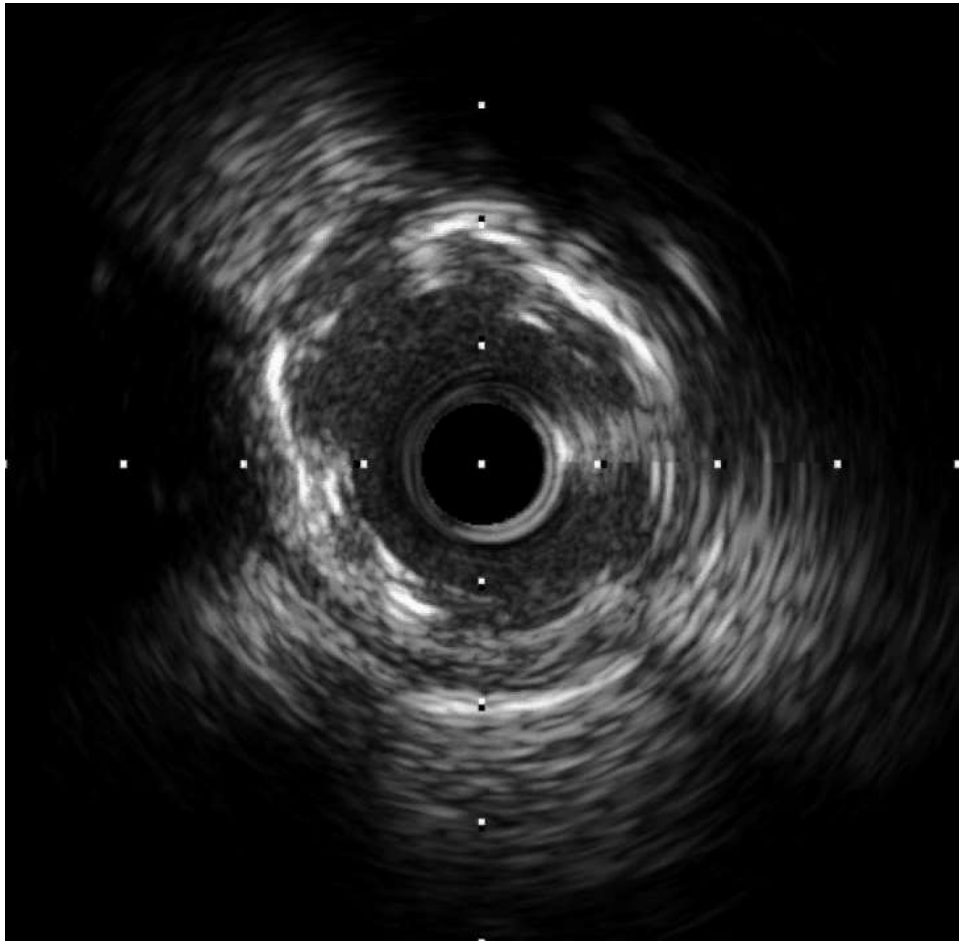


OCT



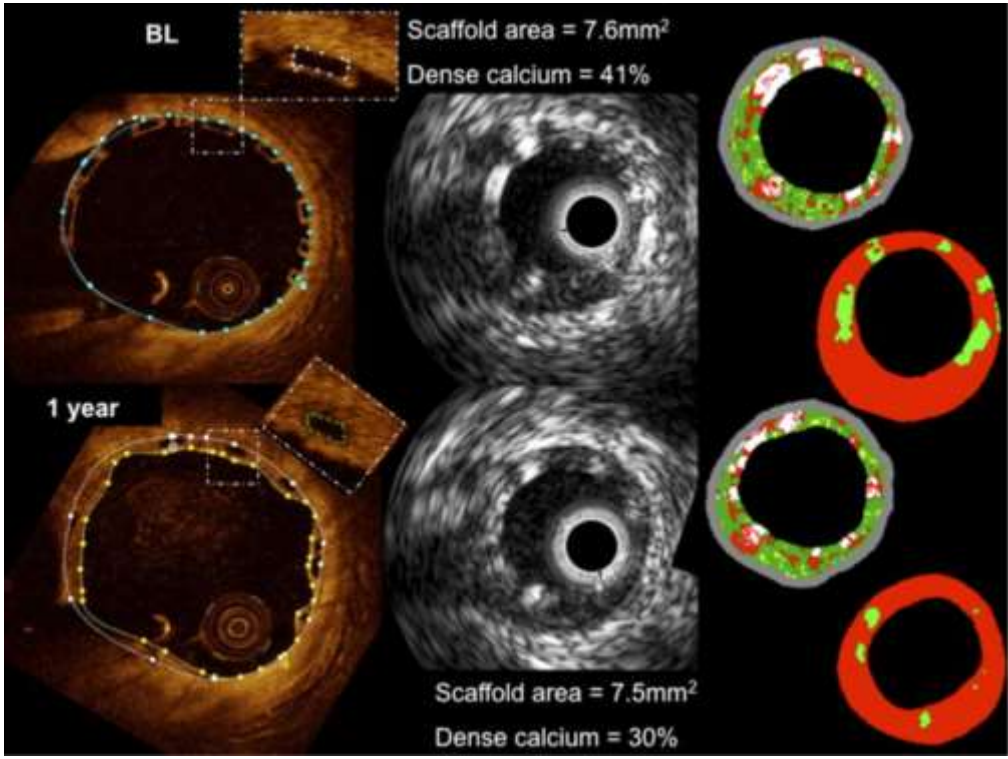
What's the difference?





OCT versus IVUS for BVS

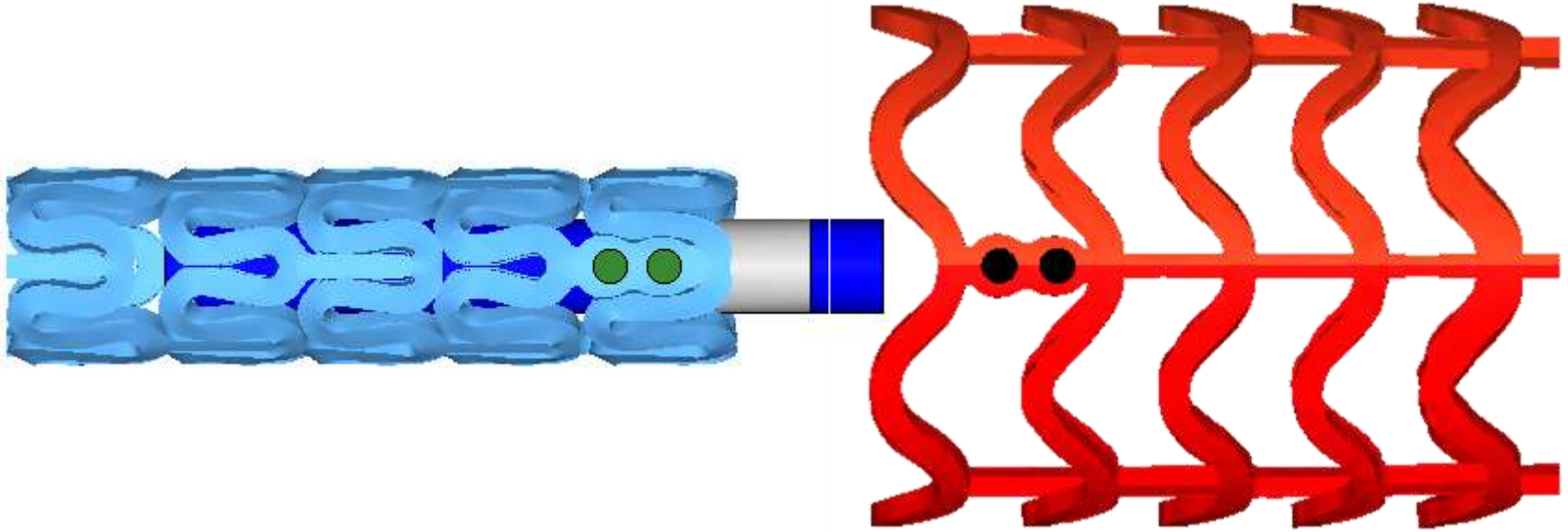
- Better resolution of OCT
  - Scaffold visualibility, including apposition
  - Dissection detection
  - Thrombus detection
- Benefits of IVUS
  - Calcium detection before BVS treatment
  - Higher penetration field



J Am Coll Cardiol. 2011;58(15):1578-1588

Scaffold Overlap Considerations

‘Marker to Marker’

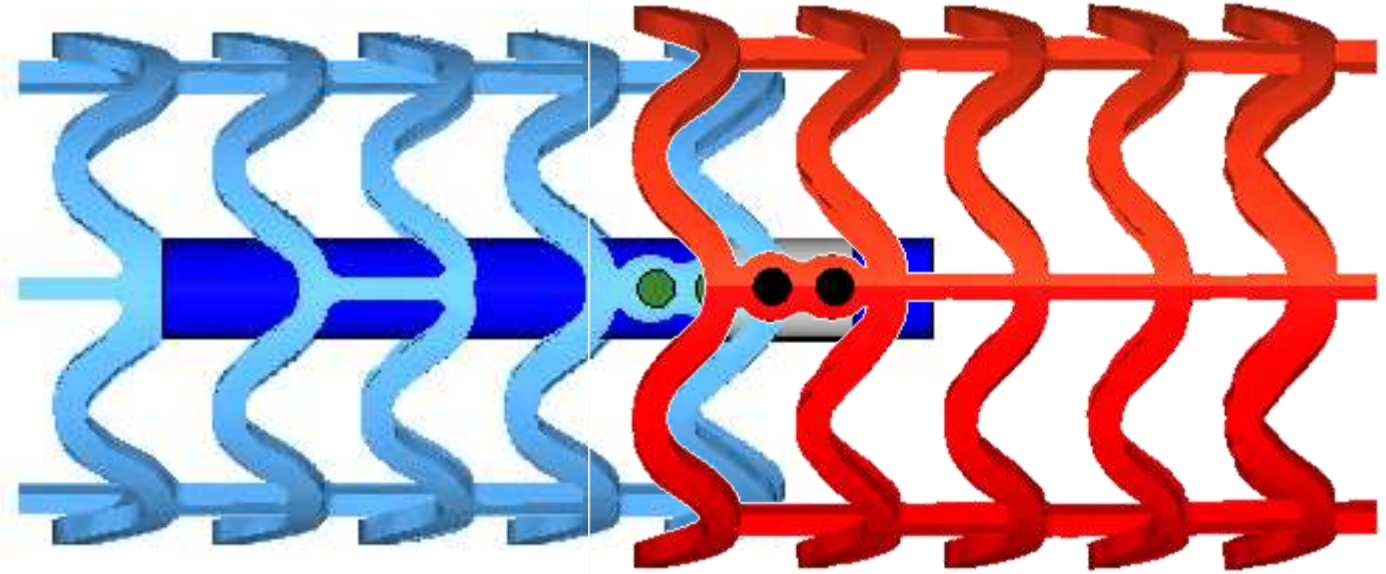


Advance the second scaffold system until the distal balloon marker lines up with the proximal marker beads of the implanted scaffold

The markers of the second scaffold will be adjacent to the markers of the deployed scaffold (scaffold marker to scaffold marker)

Scaffold Overlap Considerations

‘Marker to Marker’



Advance the second scaffold system until the distal balloon marker lines up with the proximal marker beads of the implanted scaffold

The markers of the second scaffold will be adjacent to the markers of the deployed scaffold (scaffold marker to scaffold marker)

Issue about BVS overlapping

- “Interdigitating position” or complete overlap with reduced number of stacked struts
  - Reduced endothelialization of the stacked struts may occur in animal models
  - “Theoretically” reduce scaffold restenosis or thrombosis
- Scaffold length: only 18mm and 28mm available

EuroIntervention 2011;7:386-399

Issue about BVS overlapping

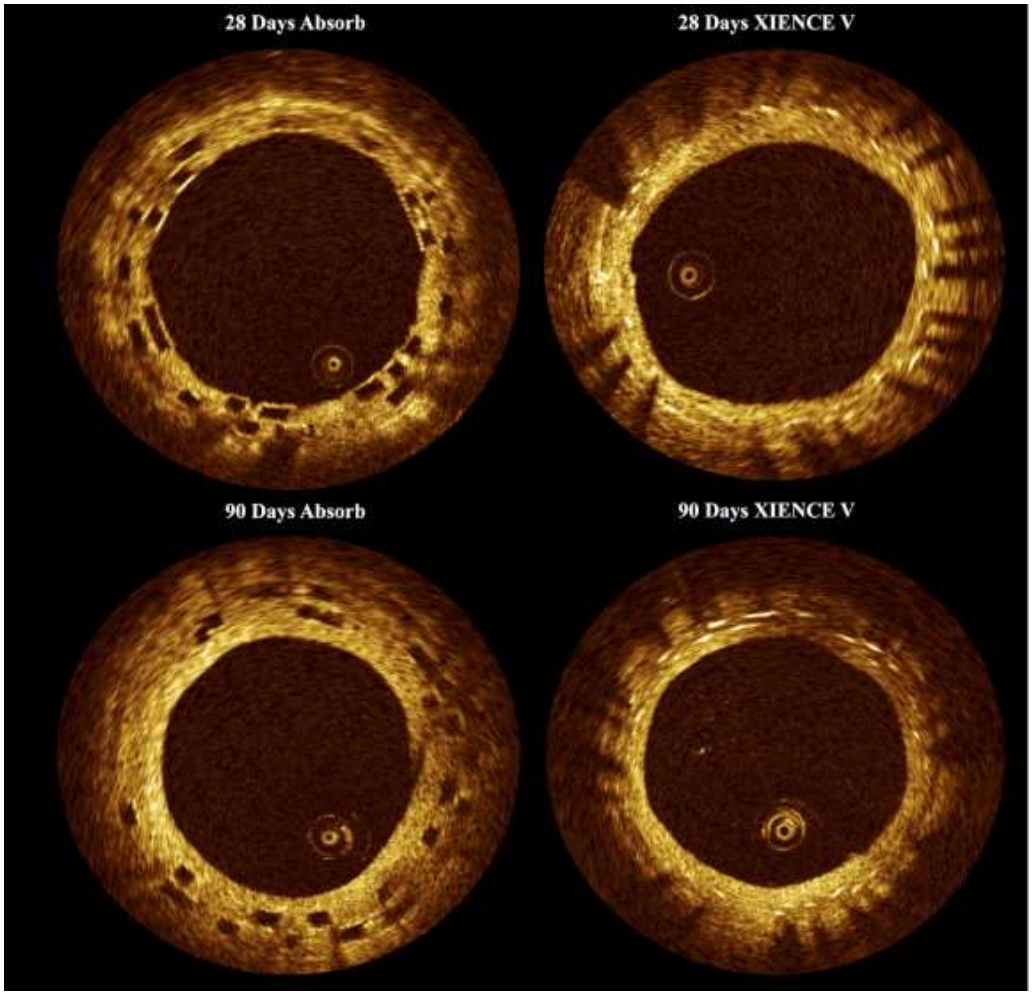
- Is that an issue for long overlapping?
  - No documented human study
  - The evidence for a lack of endothelialization at the overlap with metallic DES is more controversial.
  - No significant loss of lumen area in overlapping struts

EuroIntervention 2011;7:386-399
J Am Coll Cardiol Intv 2013;6:523–32

The healing process

Absorb

Xience V



J Am Coll Cardiol Intv 2013;6:523–32

Lumen area in overlapping struts

In porcine model

	Absorb*			XV†			
	Overlap	Nonoverlap	p Value	Overlap	Nonoverlap	p Value	Overlap p Value‡
28 days							
Coverage, categorical	1,215 (80.1%)	908 (98.2%)	<0.0001	833 (99.4%)	984 (99.8%)	0.33	<0.0001
Neointimal area, mm^2	2.80 ± 0.51	2.29 ± 0.49	0.028	2.14 ± 0.39	1.74 ± 0.23	0.037	<0.01
Mean lumen area, mm^2	5.44 ± 0.76	5.11 ± 0.68	0.31	4.87 ± 1.01	4.80 ± 1.08	0.90	0.19
Mean scaffold area, mm^2	8.80 ± 0.75	7.68 ± 0.75	0.002	7.01 ± 0.96	6.54 ± 1.08	0.27	0.001
% Volume obstruction	31.30 ± 5.47	29.85 ± 5.66	0.55	31.01 ± 7.47	27.62 ± 4.92	0.34	0.93
90 days							
Coverage, categorical	1,304 (99.5%)	838 (99.8%)	0.26	932 (100.0%)	923 (100.0%)	N/A	N/A
Neointimal area, mm^2	3.84 ± 0.74	2.43 ± 1.02	<0.001	2.73 ± 0.81	2.14 ± 0.66	0.13	0.005
Mean lumen area, mm^2	4.28 ± 1.36	4.62 ± 1.22	0.54	4.52 ± 1.79	4.66 ± 1.52	0.87	0.73
Mean scaffold area, mm^2	9.01 ± 0.56	7.32 ± 1.96	0.056	7.26 ± 1.19	6.80 ± 1.08	0.44	0.006
% Volume obstruction	42.12 ± 8.02	28.91 ± 13.09	0.013	39.40 ± 15.57	33.27 ± 13.58	0.42	0.64

Values are n (%) or mean ± SD. Comparisons between overlap and nonoverlap territories for the Absorb and XV individually are shown, with further comparisons between devices. *Absorb threshold for coverage is 30 μm. †XV threshold for coverage is 0 μm. ‡p Value comparing overlapping Absorb versus overlapping XV.

N/A = not applicable; XV = Xience V.

J Am Coll Cardiol Intv 2013;6:523–32

Final angiogram

Key messages

- Image-guided intervention is important in modern era of coronary intervention.
- Optical coherence tomography has better resolution for bioresorbable scaffold, esp. malapposition and dissection.
- Struts overlapping might not interfere long-term healing process and decrease lumen area. Further study should be investigated.