

Novel antegrade wiring for CTO PCI: Concept of PPV and OPV and its clinical application

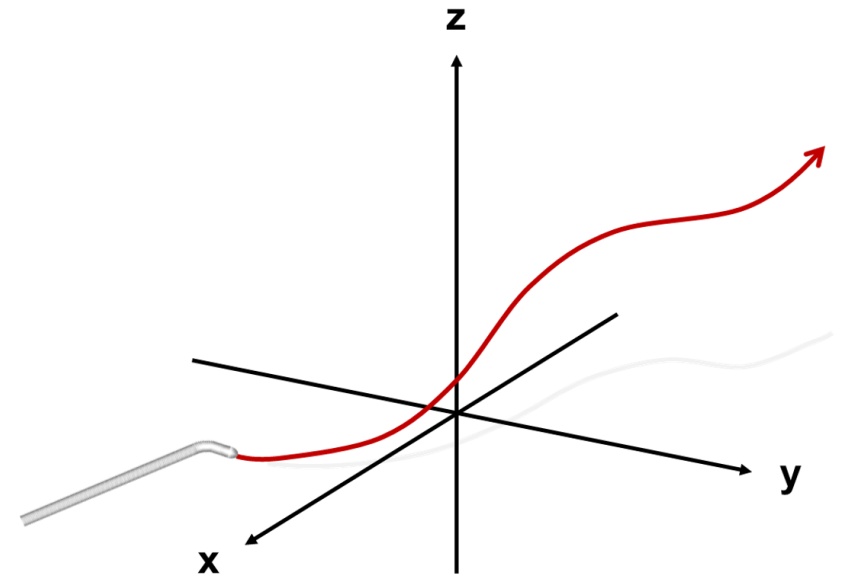
Mie Heart Center

Kenya Nasu, MD, FACC

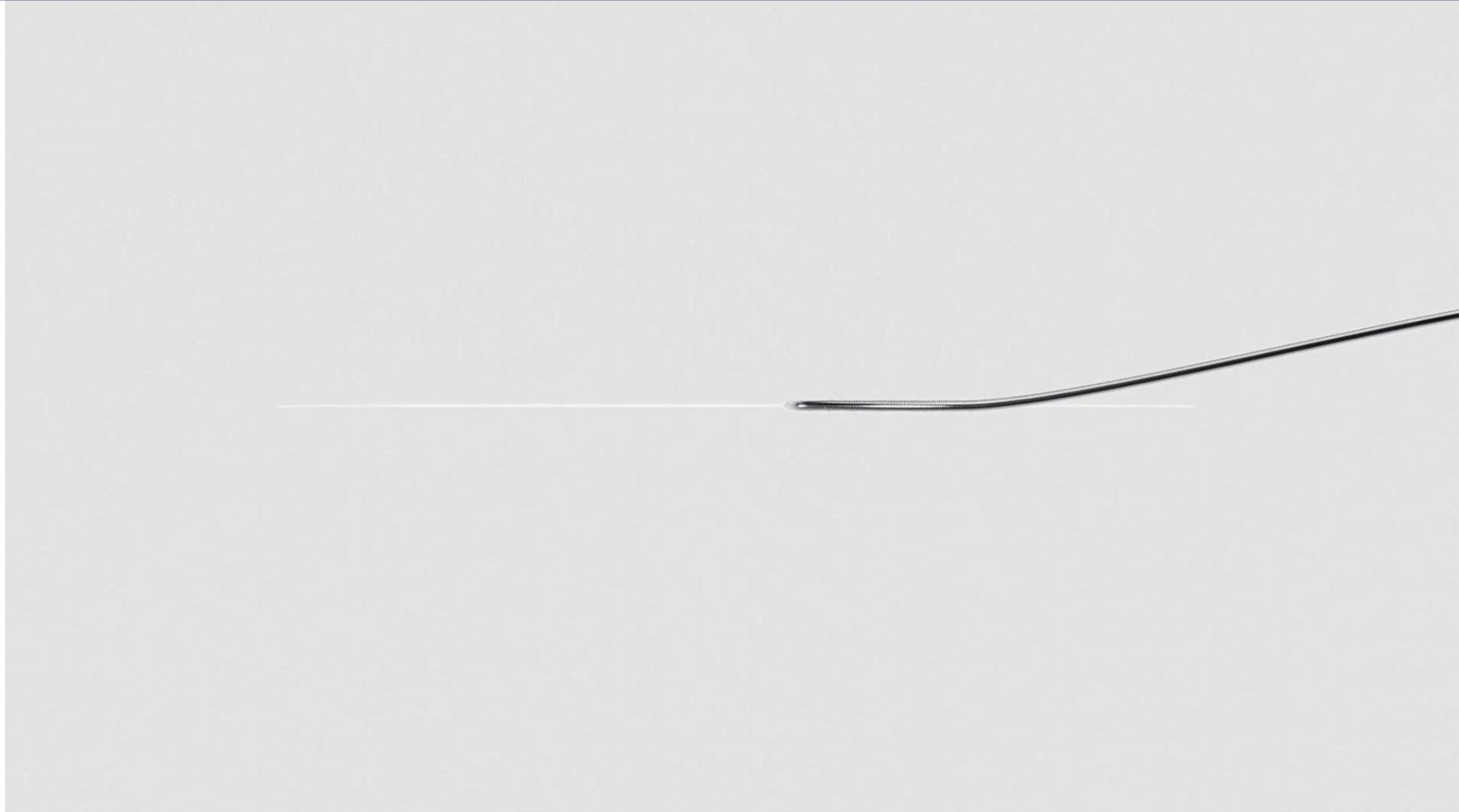
This presentation includes content on
unapproved pharmaceutical products

Why wire crossing is still challenging in CTO PCI?

- ❑ 3-dimensional wire manipulation is needed to achieve wire crossing in the CTO lesion
- ❑ When we advance a guidewire while changing the tip direction, the guidewire track curve becomes a complicated 3-dimensional curve with torsion, which makes guidewire behavior unpredictable and uncontrollable.
- ❑ There is a need for a novel wire-manipulating method to overcome this difficulty.



How does the wire advance by tip deflection?

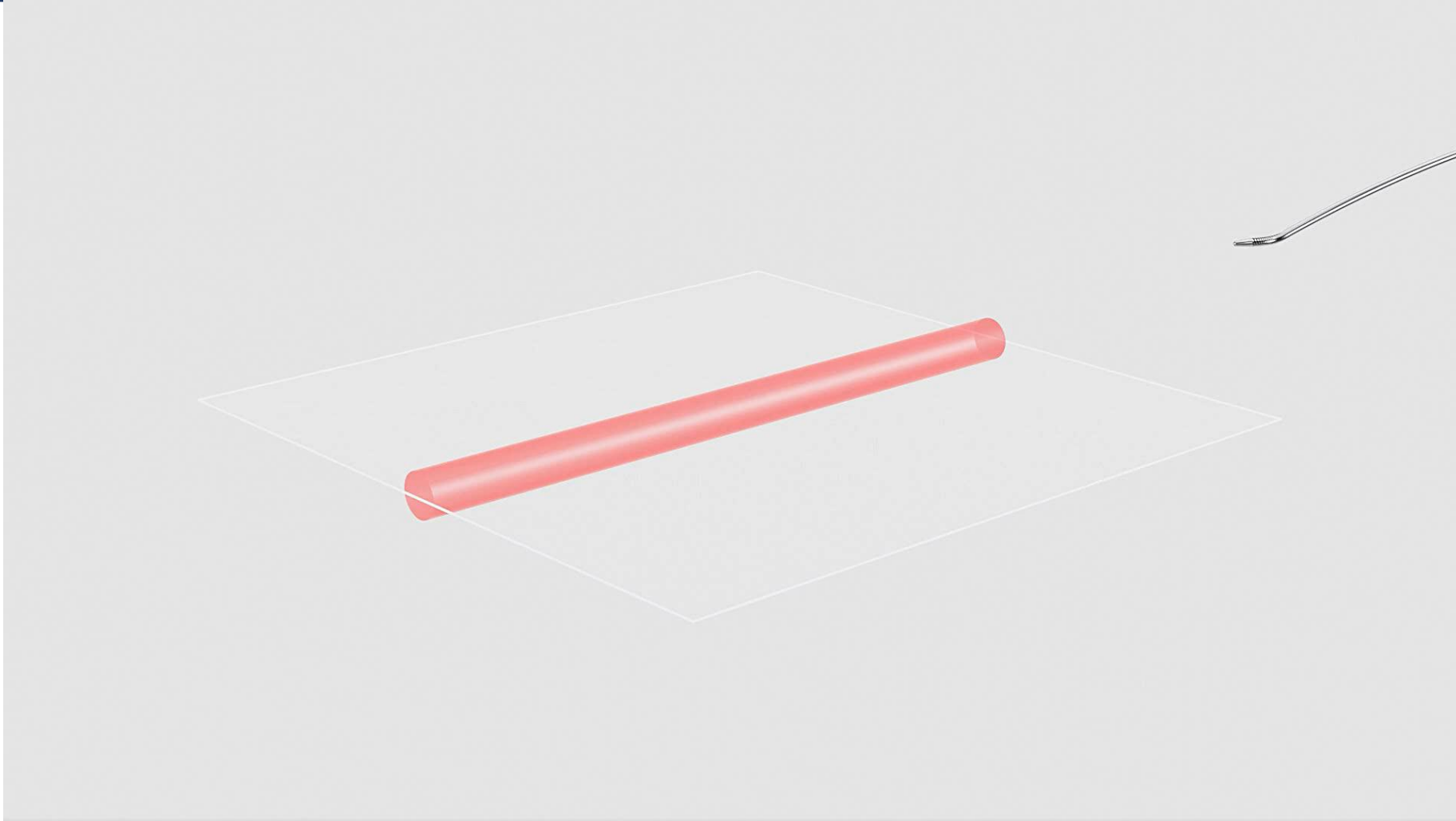


The principle of the PP method is shown in this video, where the guidewire is manipulated on a single plane.

Deflection occurs when the guidewire is advanced in the CTO without rotation.

Unless the direction of the tip curve is deviated by torque, the wire orbit is always on the same plane (the plane formed by the tip and shaft). The plane is a penetration plane

Rationale of Penetration Plane method wiring



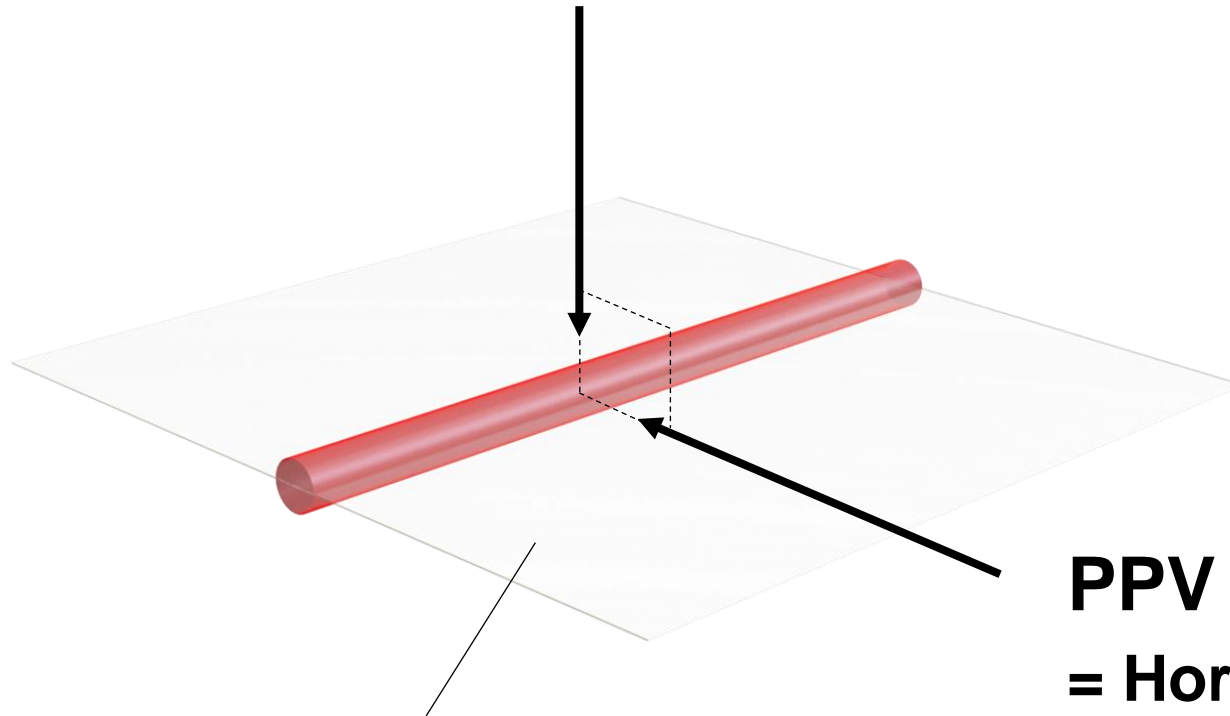
When approaching a vessel, the penetration plane is the plane in which the vessel appears straight; the penetration plane view is from a direction that makes the plane appear flat, so the guidewire will always appear straight.

The view perpendicular to this plane is called the objective perpendicular view (OPV), and manipulating the wire in these two planes is the basis of the PP method.

Setting of PPV and OPV as working views

OPV (objective perpendicular view)

= Vertical view of the PP



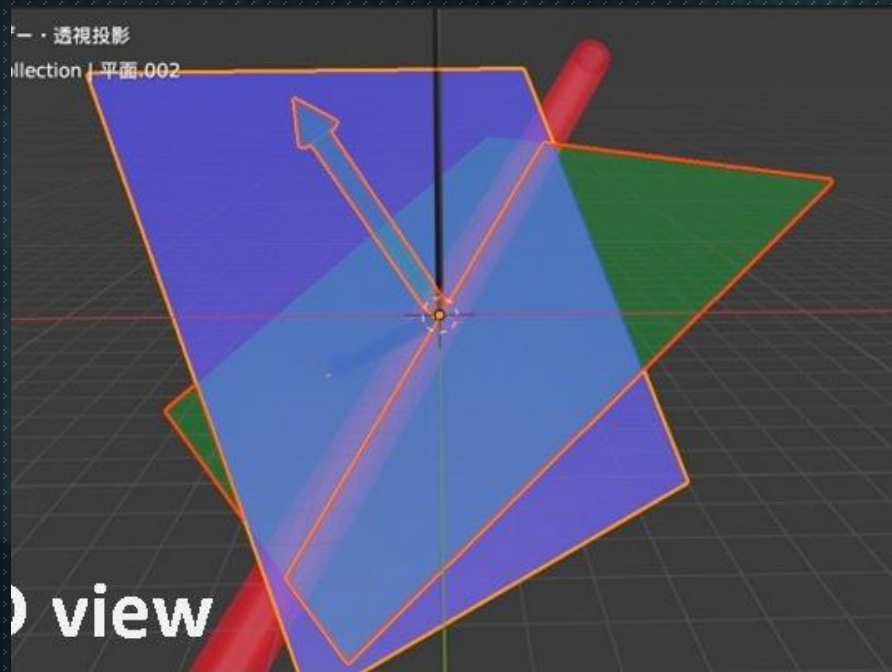
PPV (penetration plane view)

= Horizontal view of the PP

Penetration plane (PP)

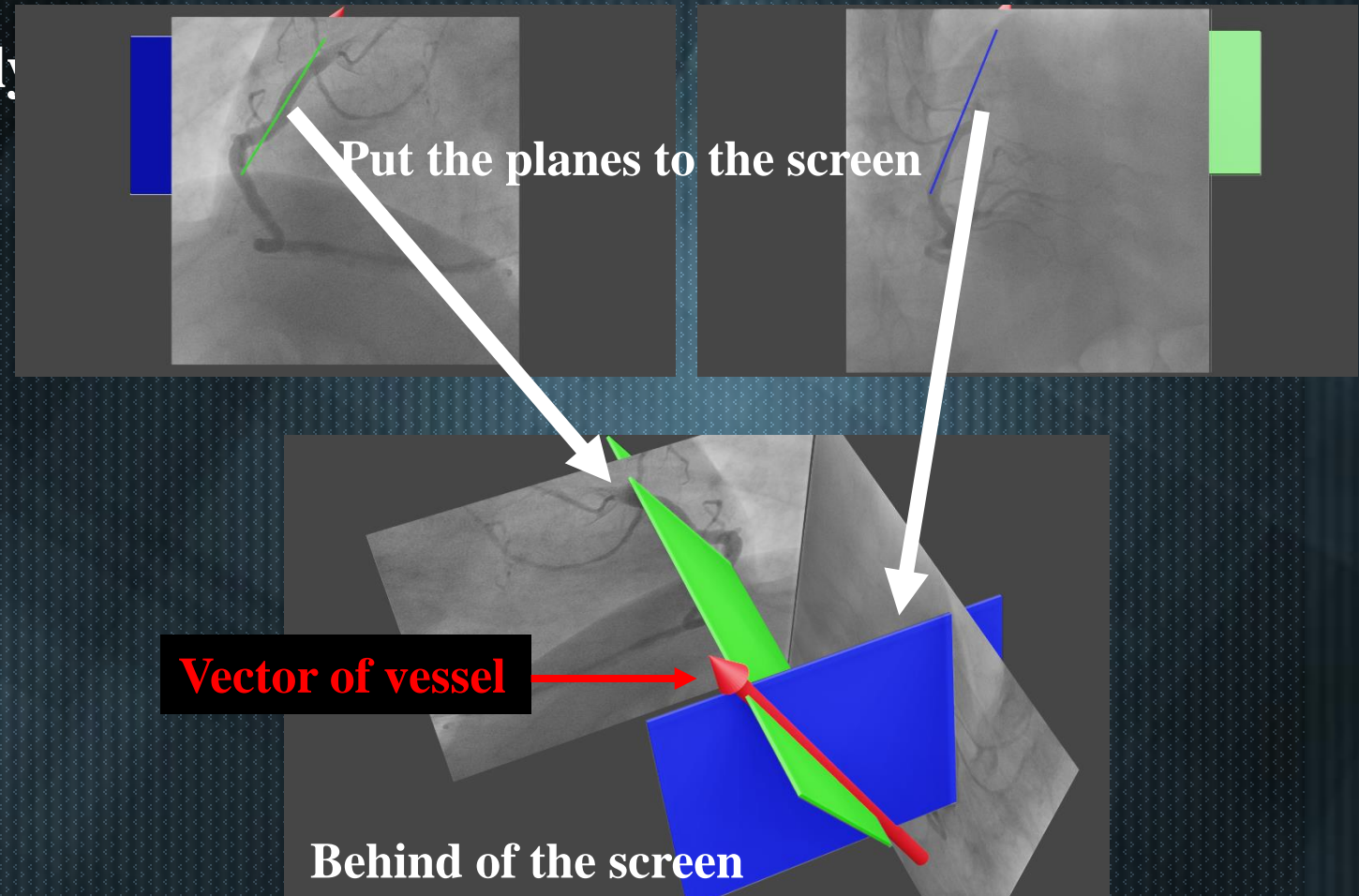
Vector of vessel detection by vector projection

- Coronary angiography is a projection image of real coronary artery (3D).
- Conversely, 3D vessel vector (only short straight part) can be detected from random two angiographic images.



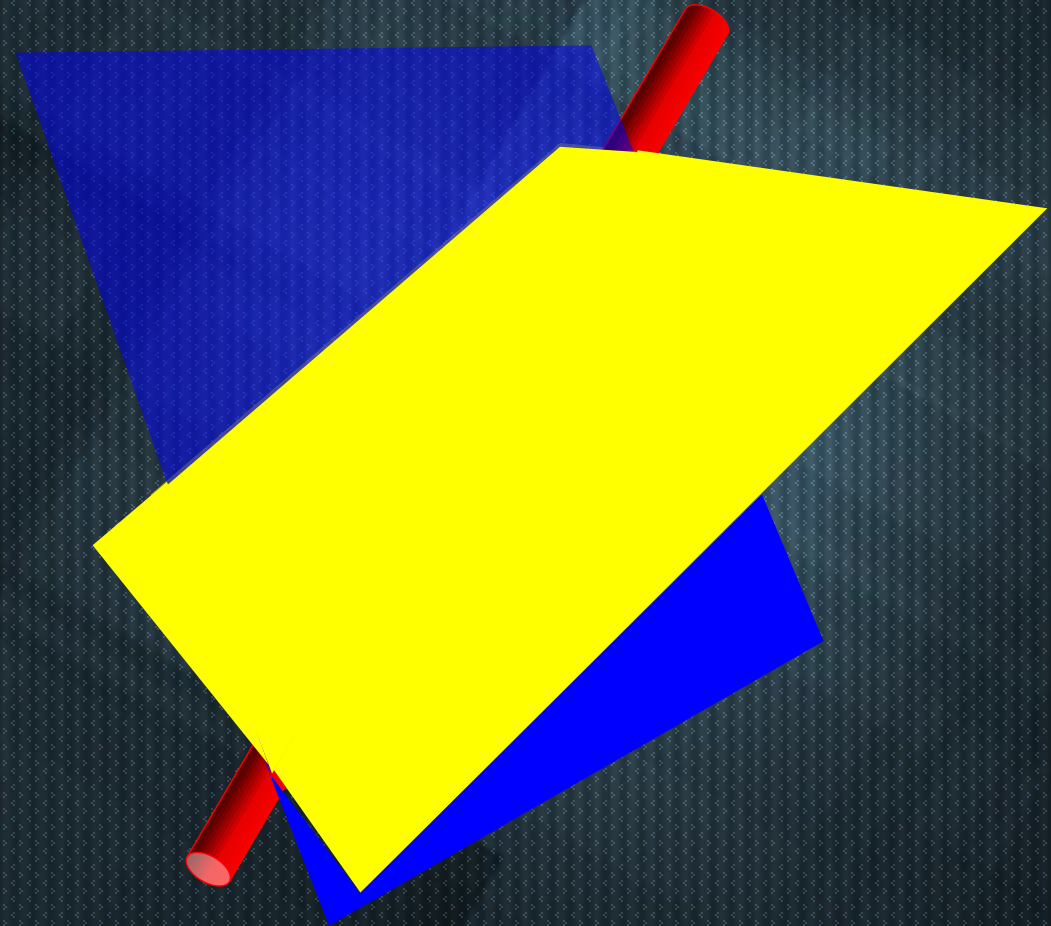
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View1

RAO

CRA

View2

RAO

CRA

Drag and drop file or click to select file

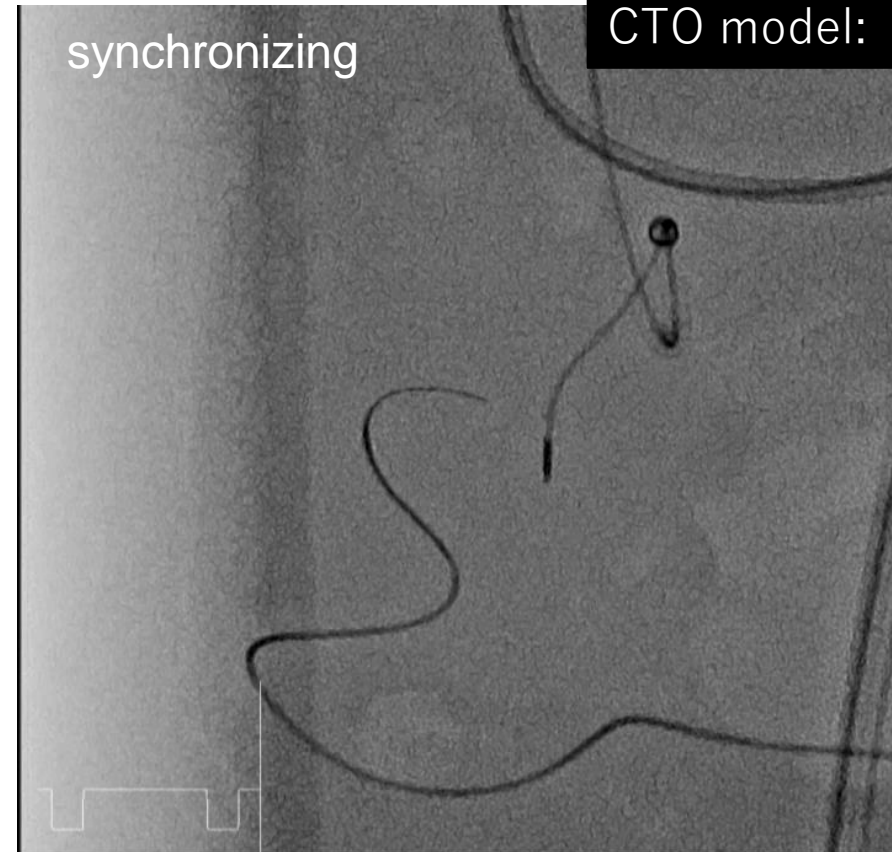
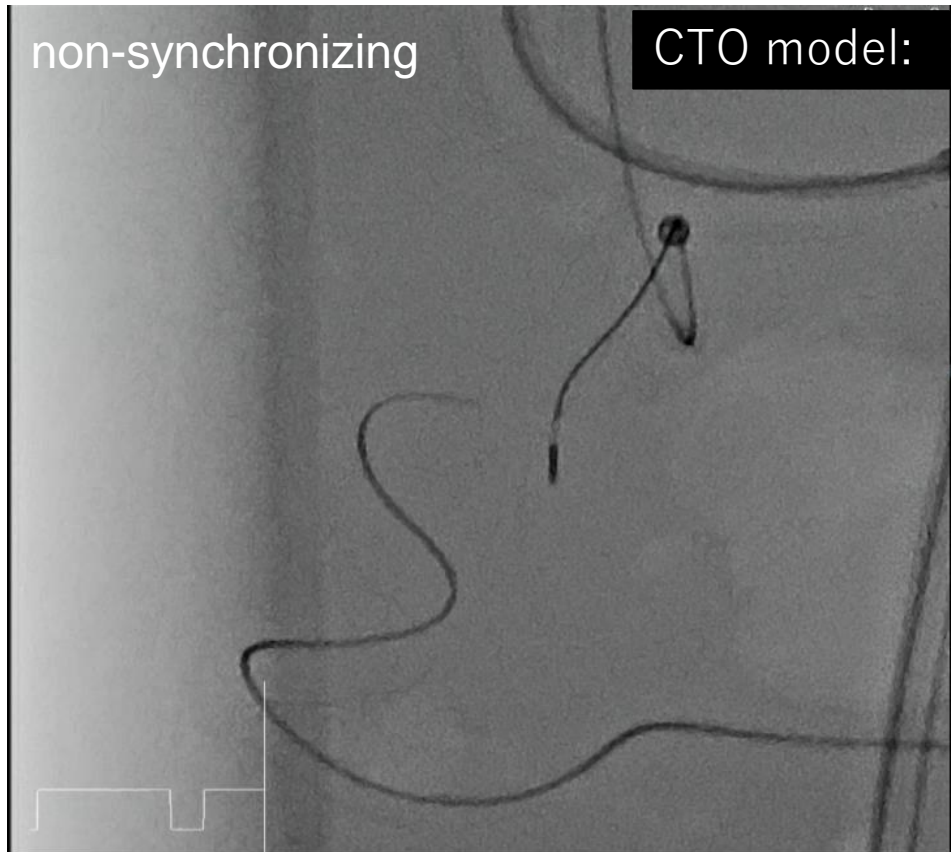
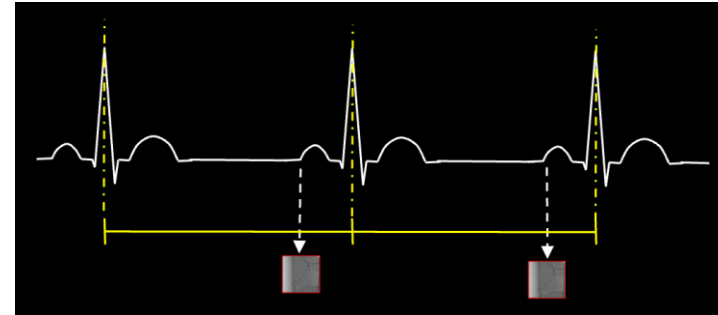
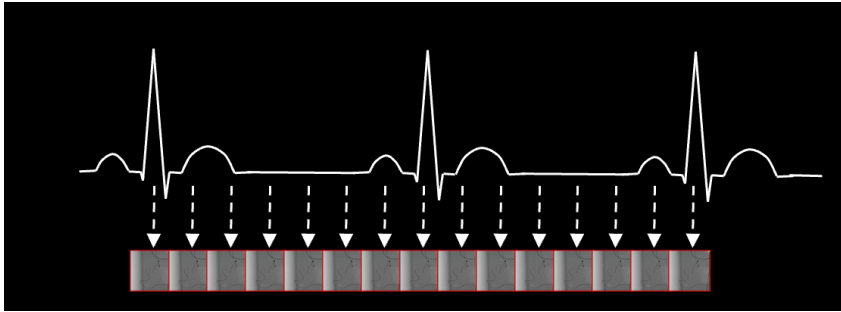
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- Image one file
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Drag and drop file or click to select file

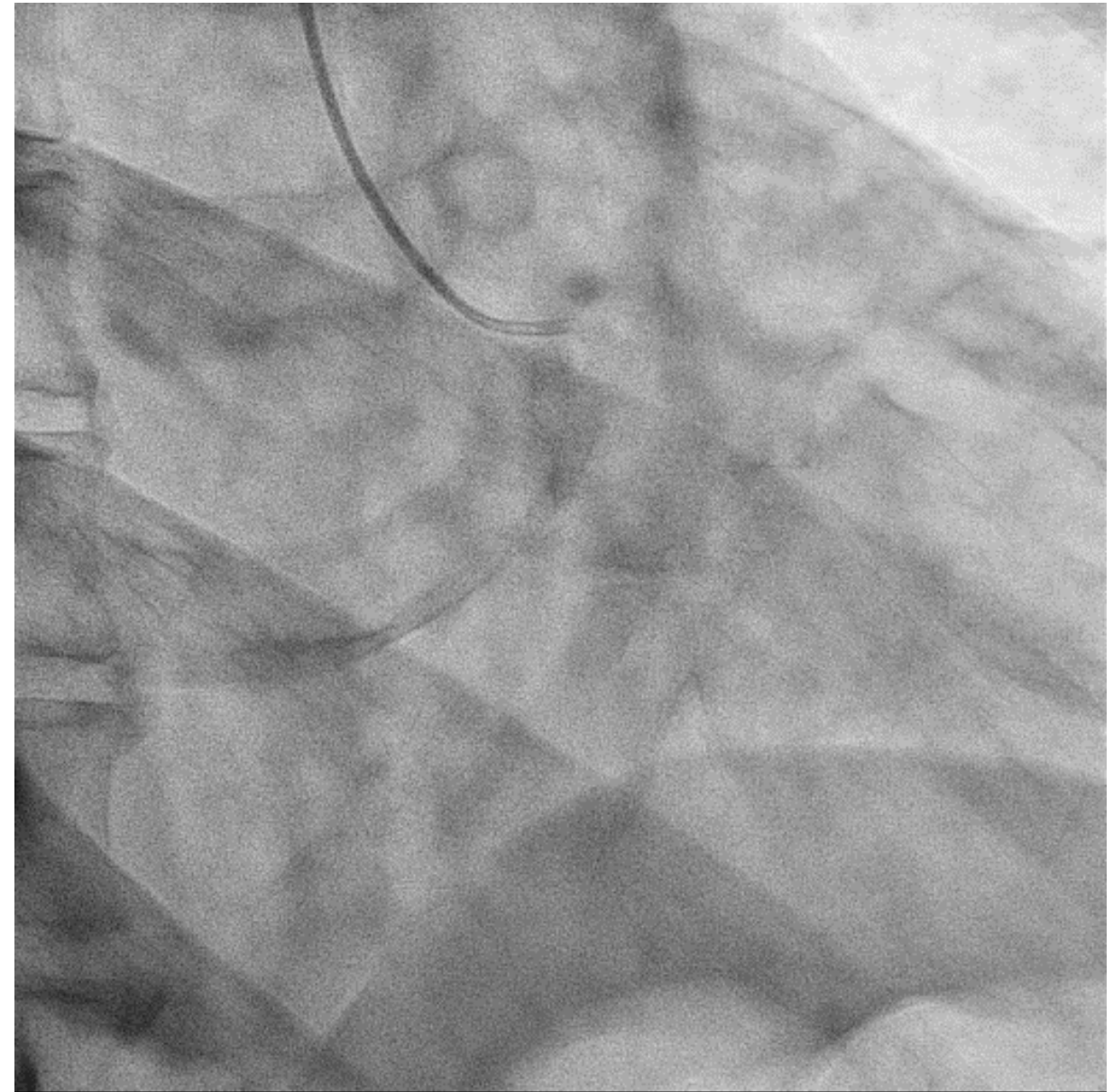
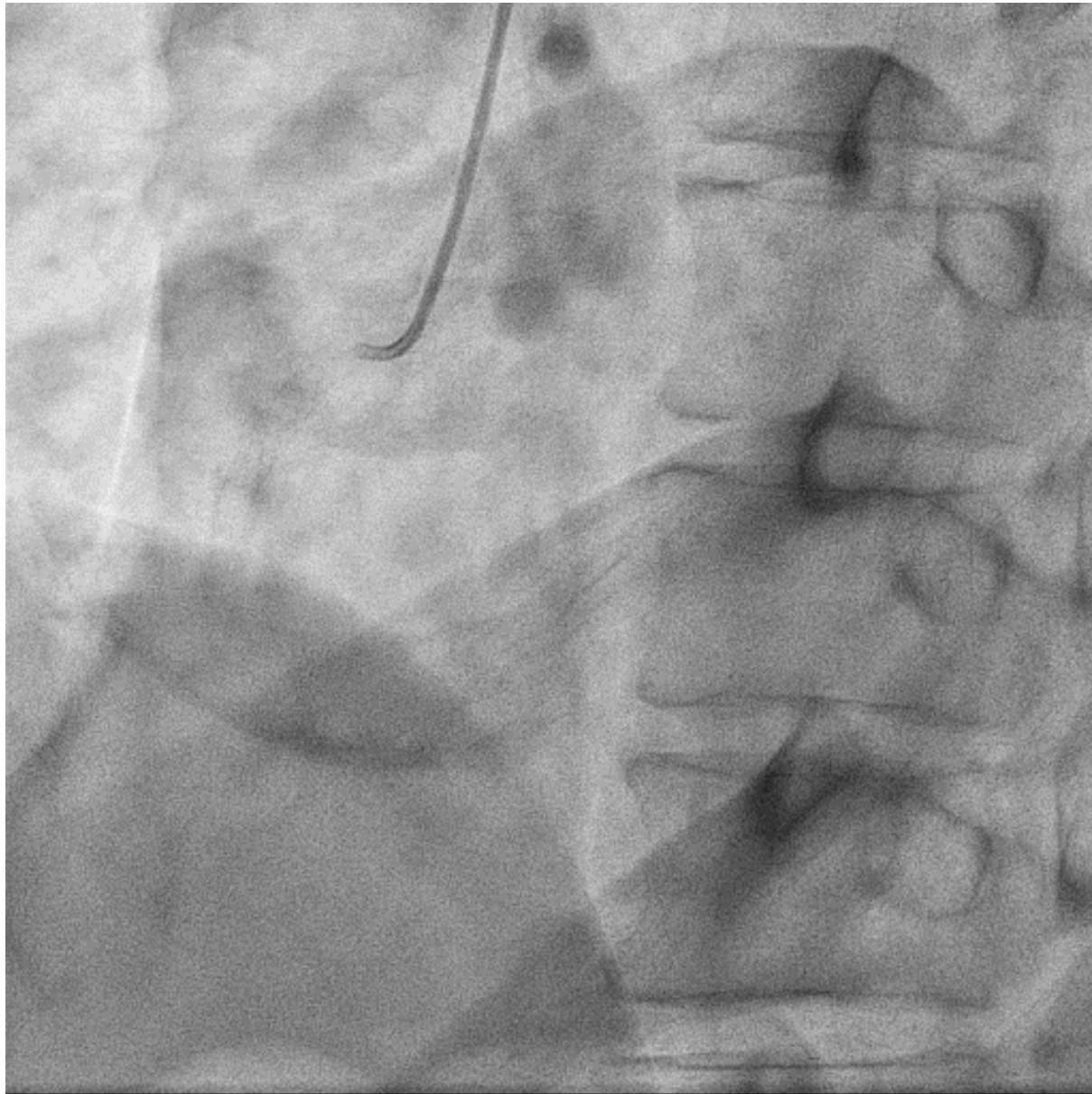
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Parameter	Result	
Ve1		
View1	Line	NA
	Angle	NA
View2	Line	NA
	Angle	NA
BNV		
View1	Line	NA
	Angle	NA
Ve2		
View1	Line	NA
	Angle	NA
View2	Line	NA
	Angle	NA

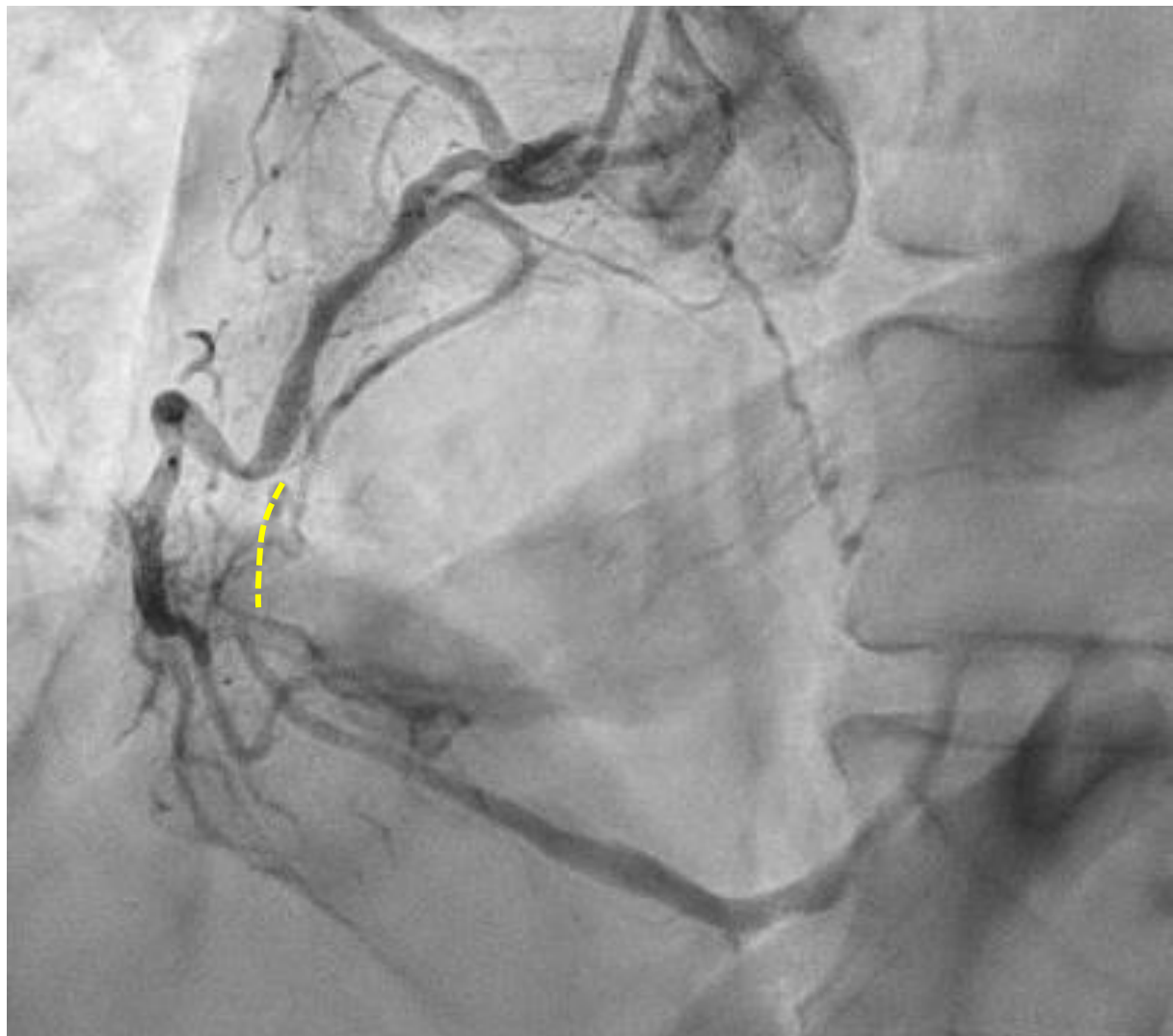
ECG-synchronized fluoroscopy



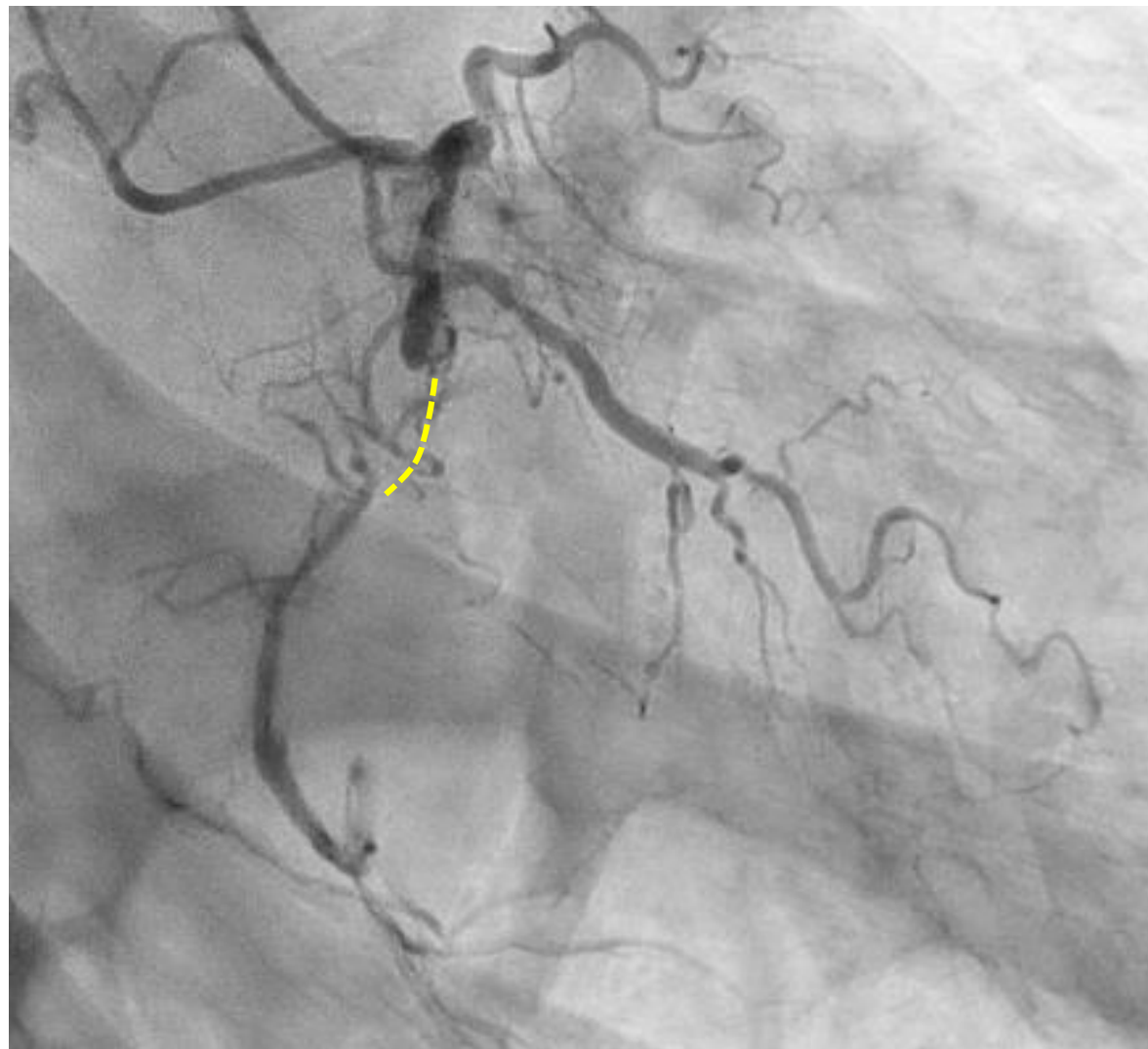
RCA CTO case



RCA CTO case

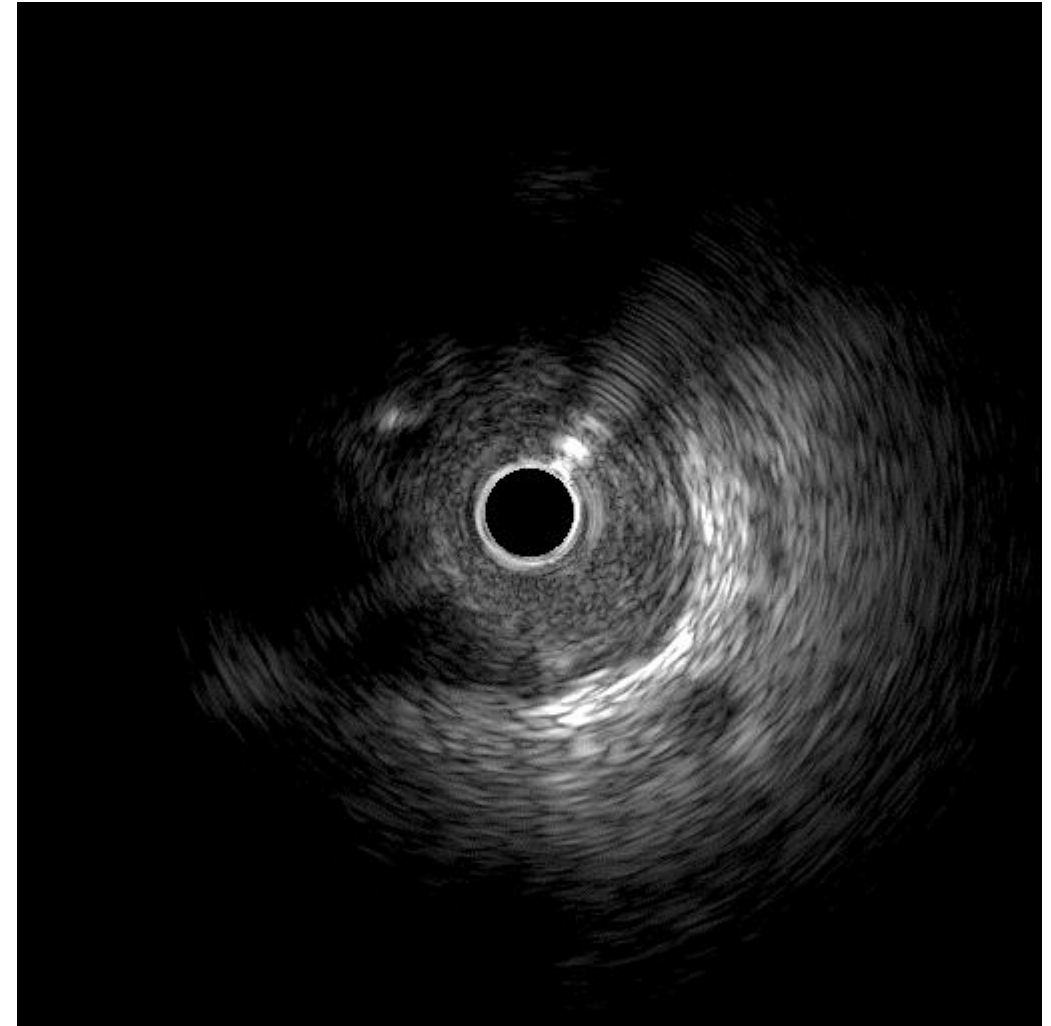


LAO50



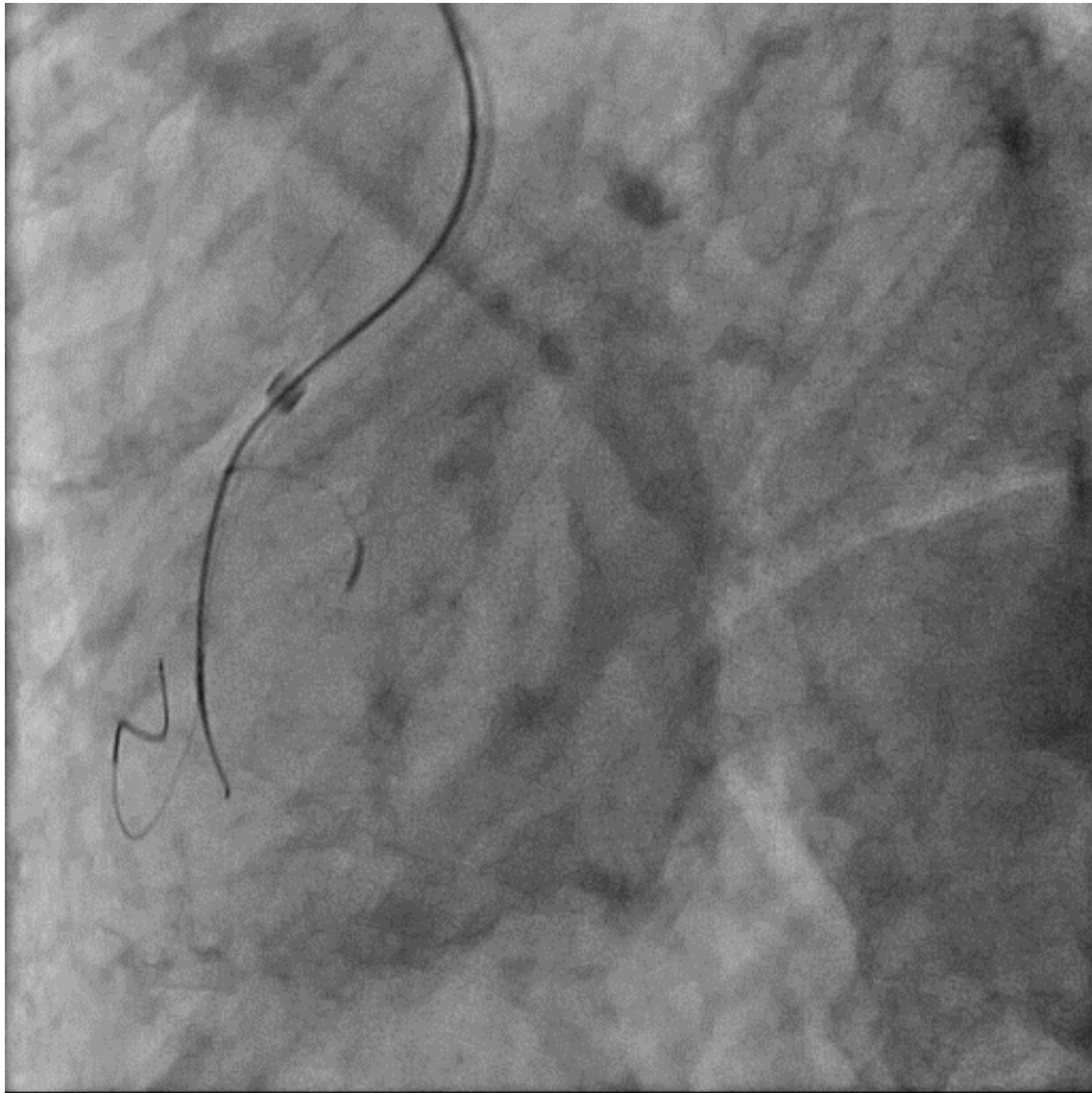
RAO28 CAU29

Proximal IVUS guided puncture

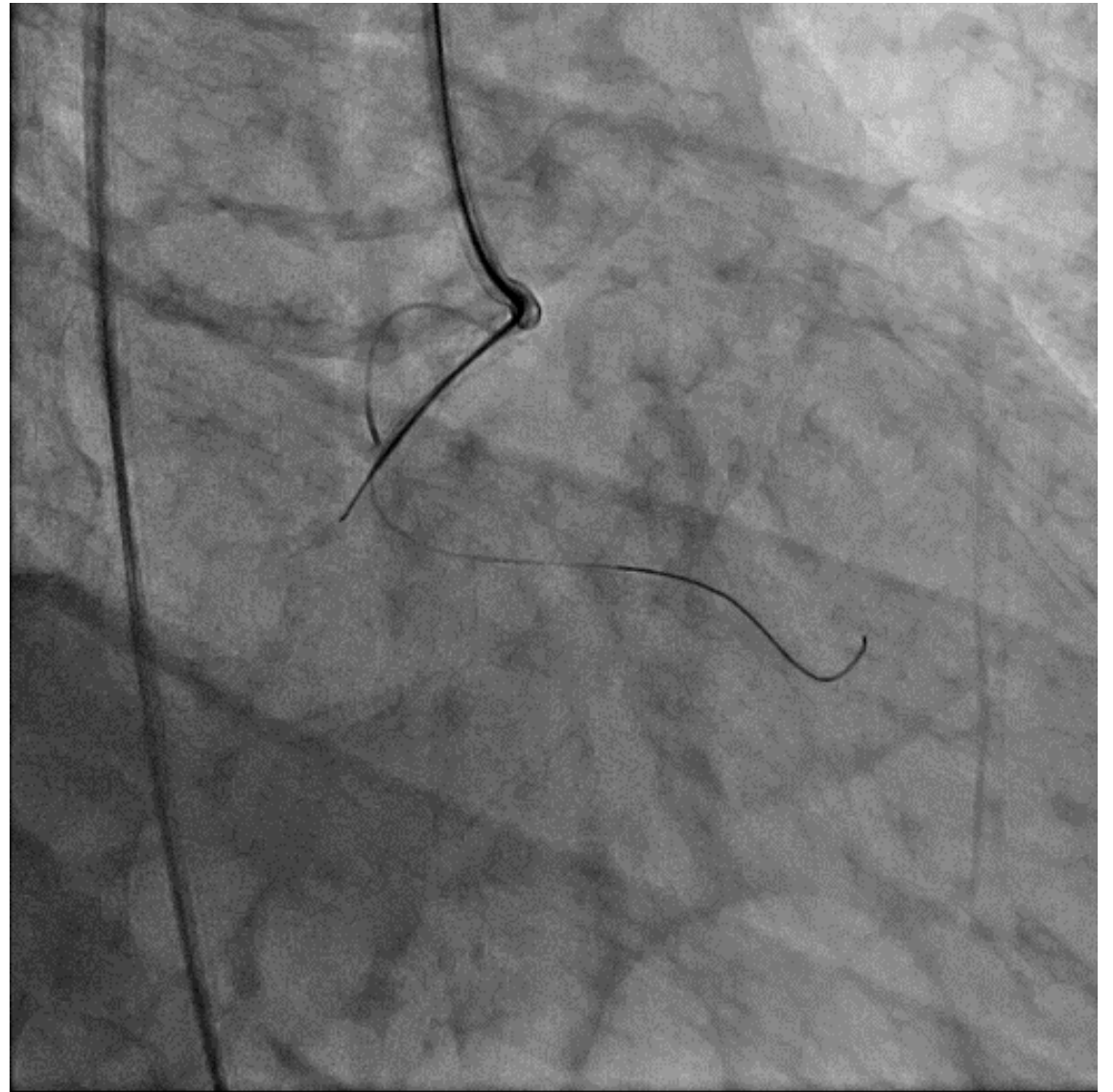


LAO37 CAU18

RAO40 CRA29



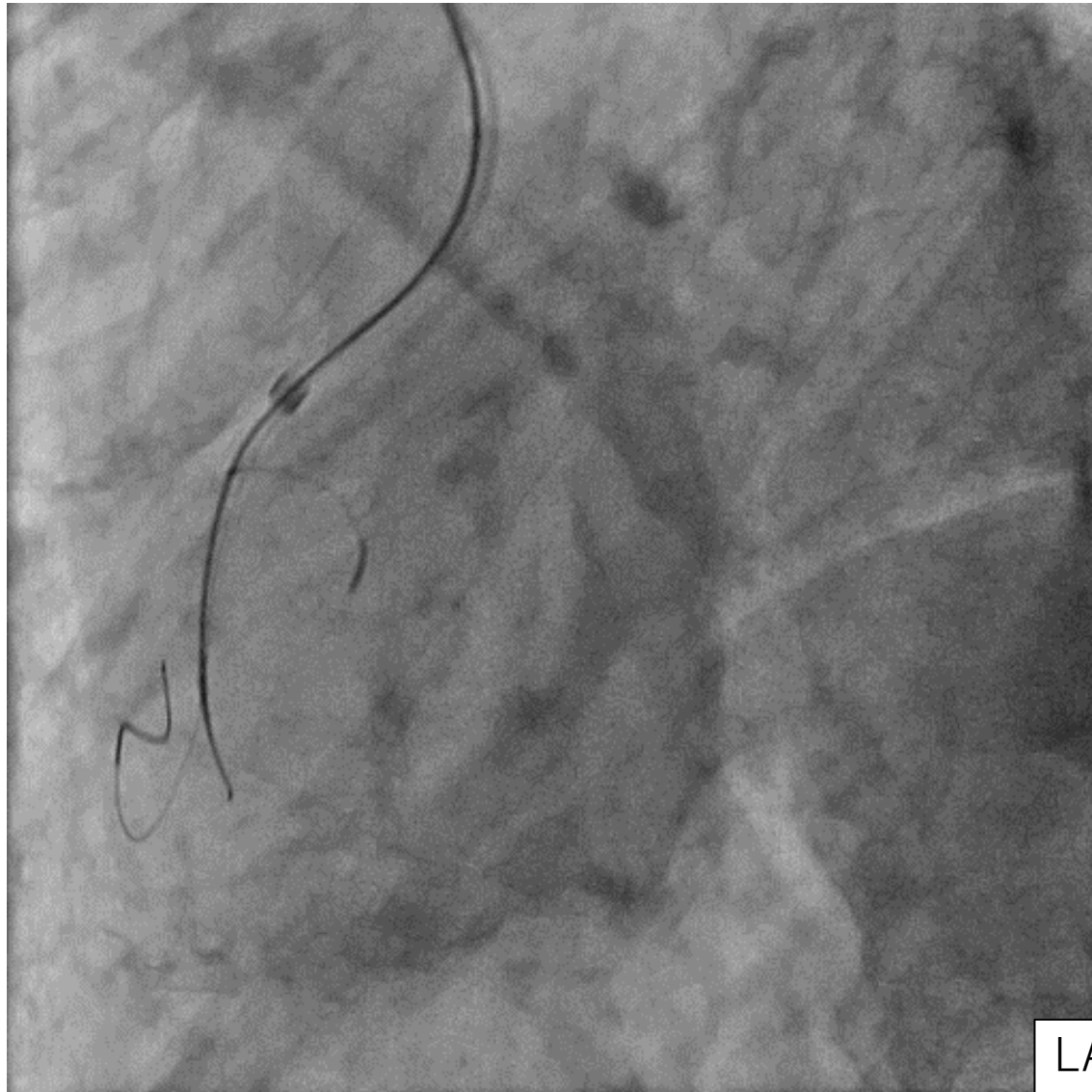
LAO61 CAU28



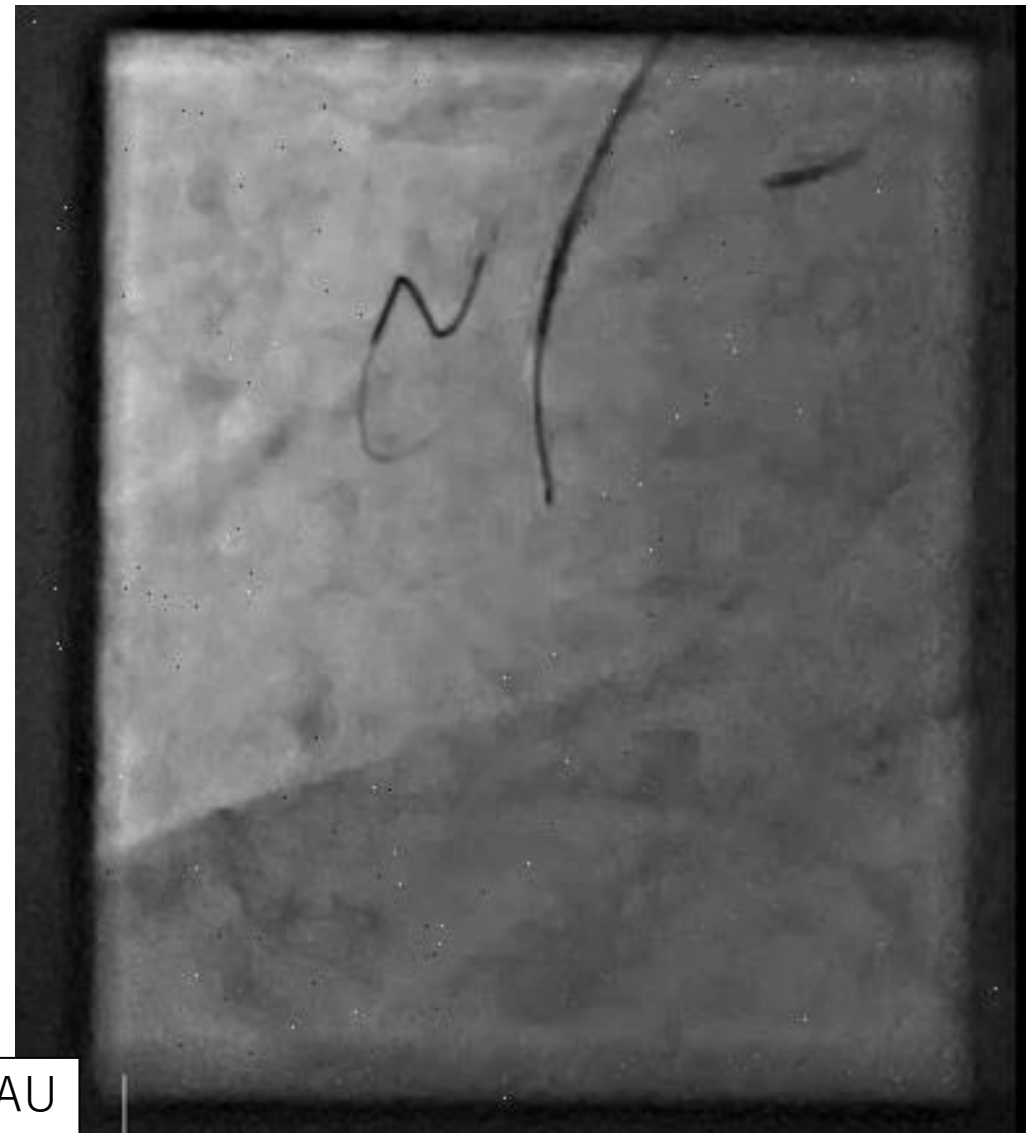
RAO41 CAU20

Non-Synchronizing vs ECG-Synchronizing

Non-Synchronizing

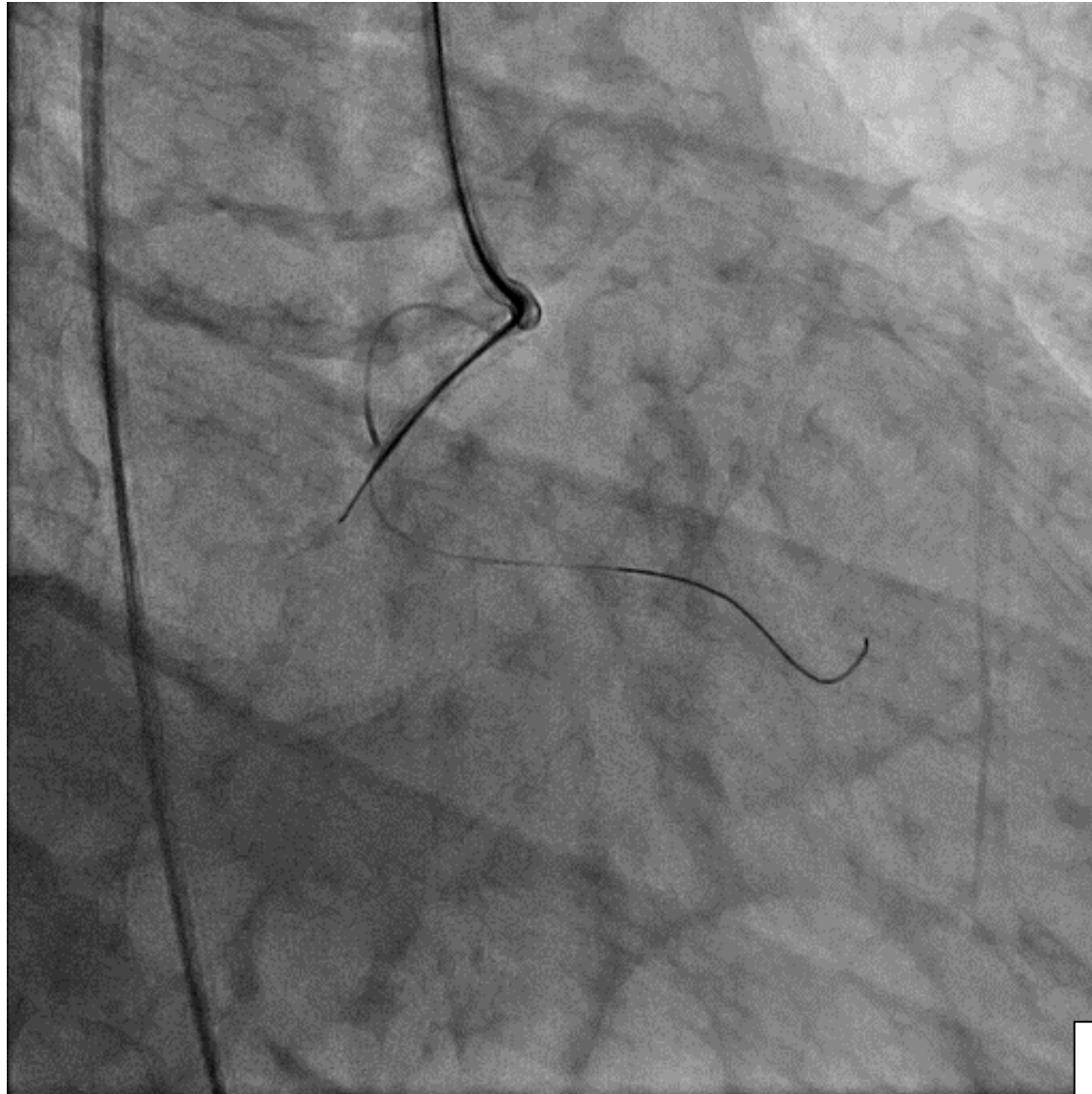


ECG-Synchronizing

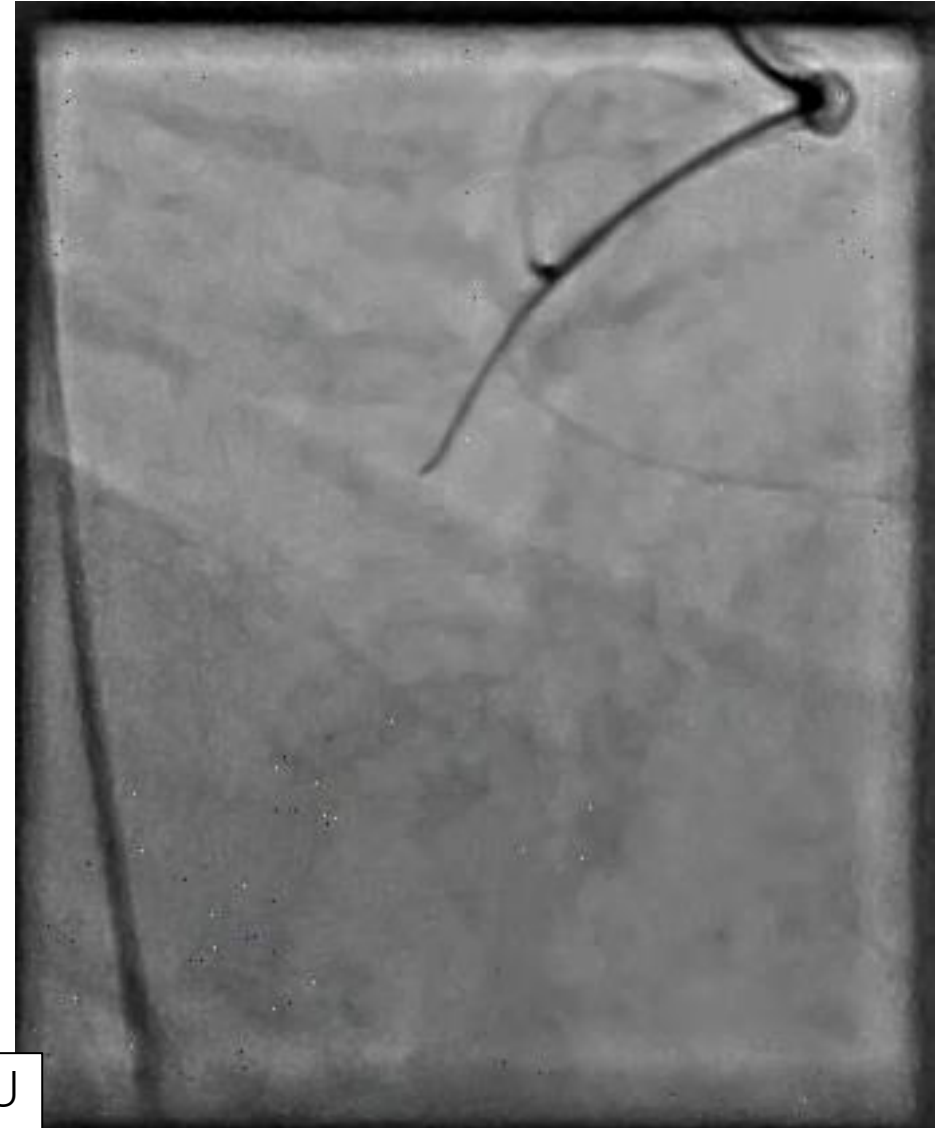


Non-Synchronizing vs ECG-Synchronizing

Non-Synchronized



ECG-Synchronized

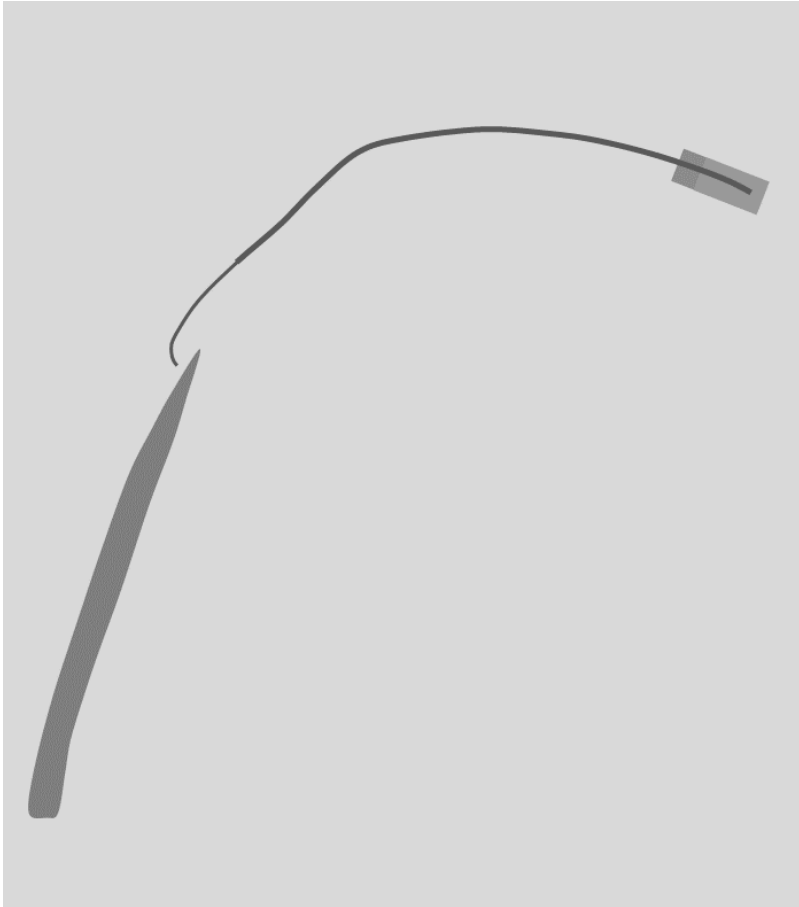


RAO CAU

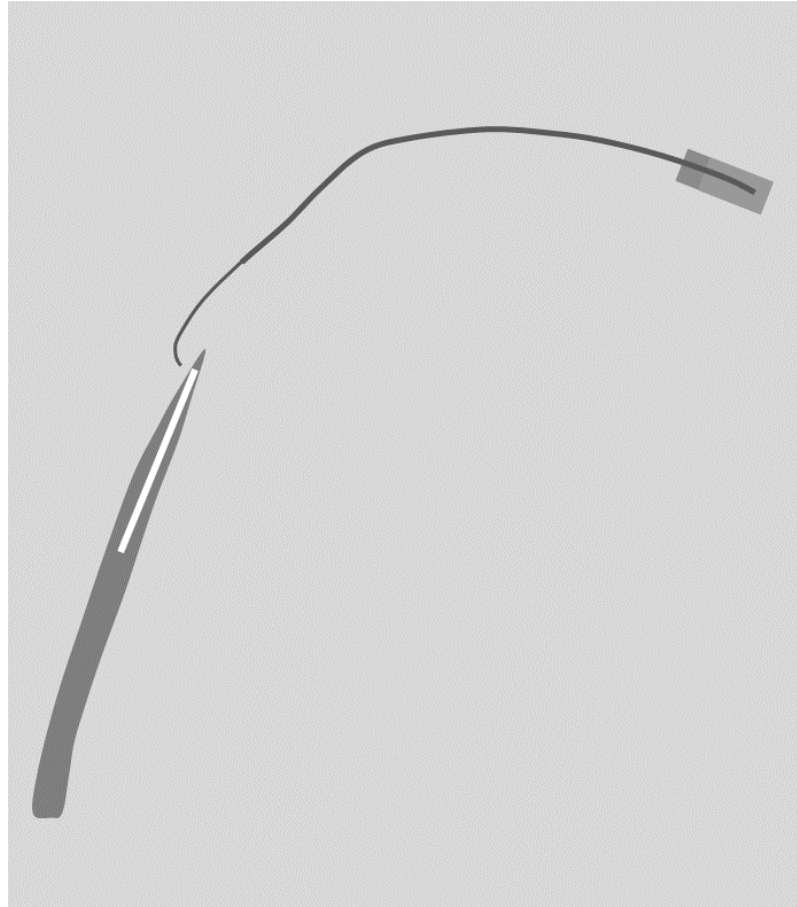
Mapping of the distal true lumen by the vector calculation

Wire manipulation w/
repeated contralateral injection

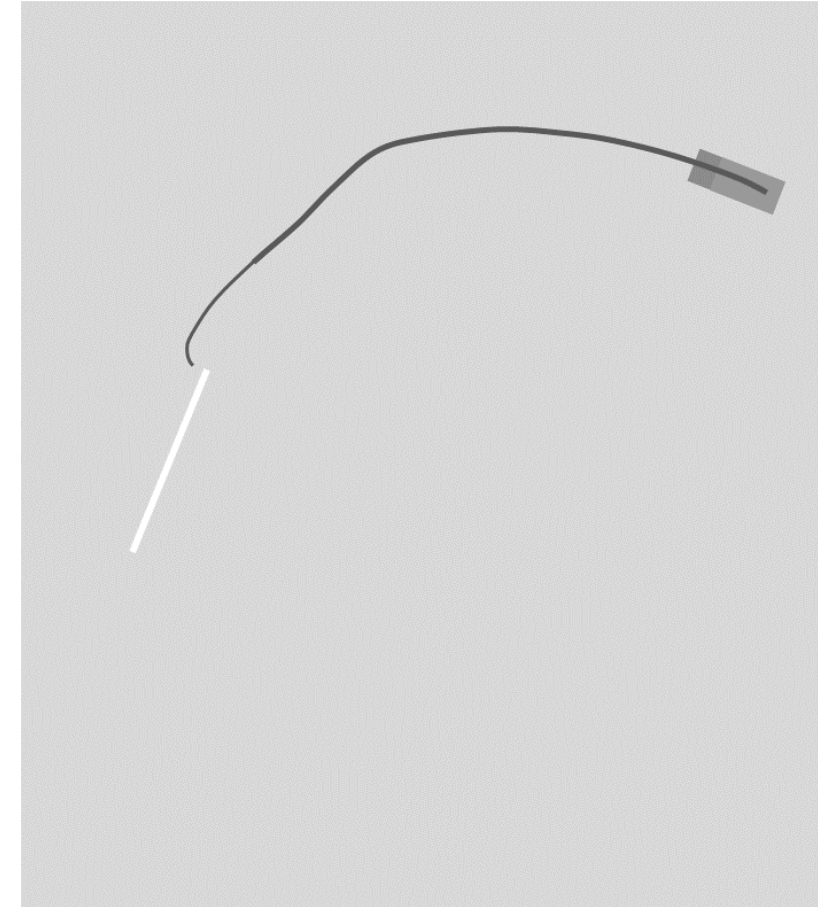
Dual injection angiography



Mapping of the distal true lumen

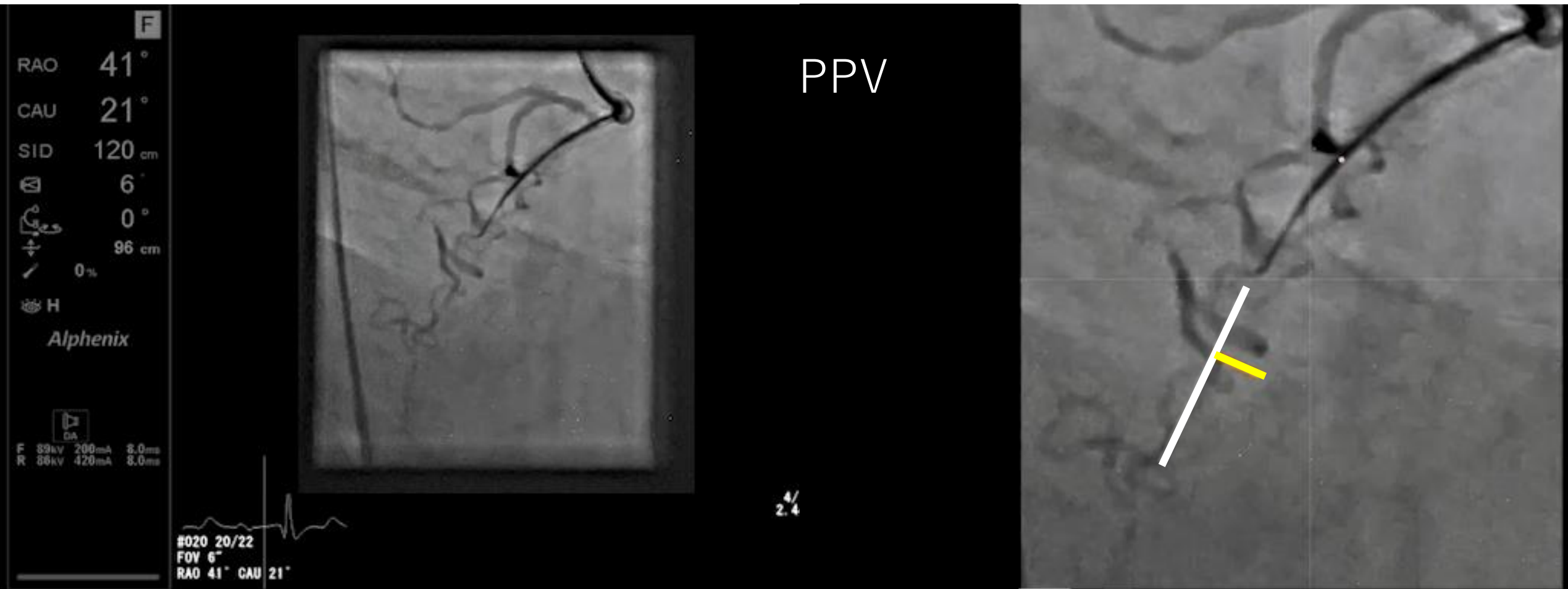


Wire manipulation w/ drawn line
indicating the distal true lumen

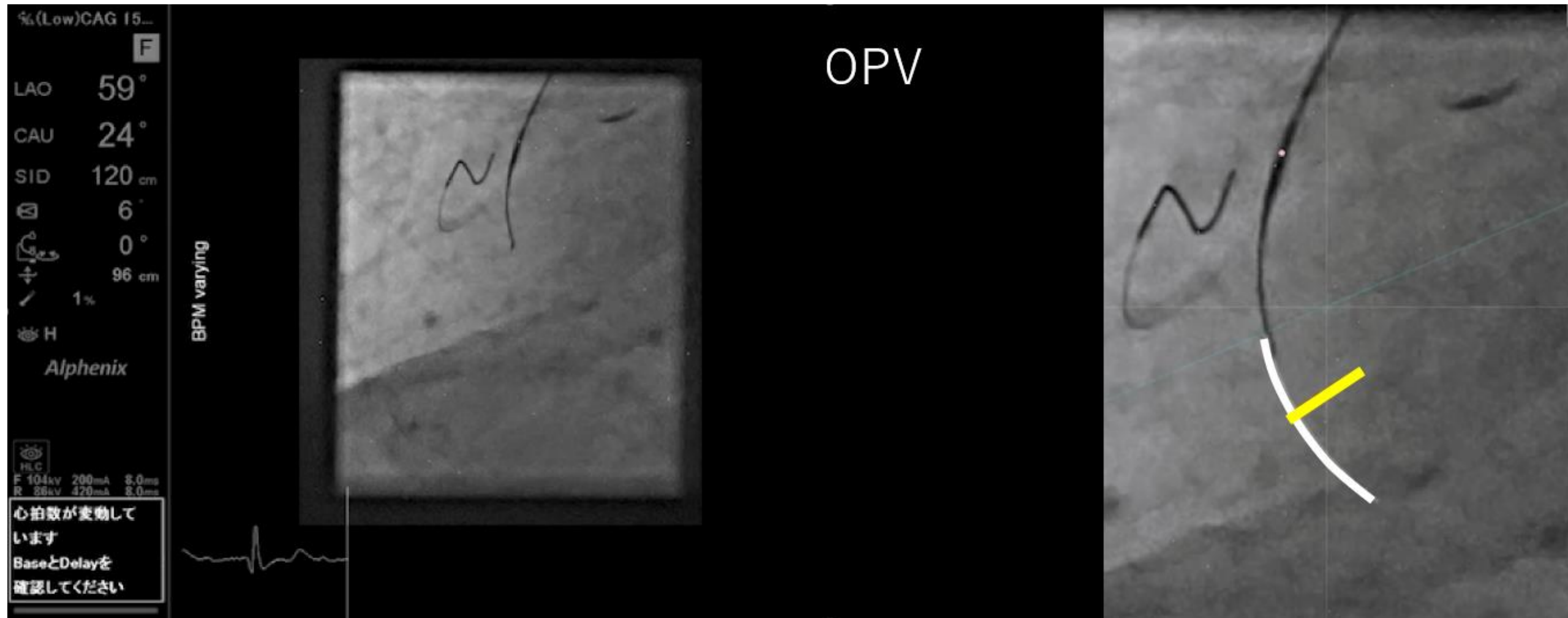


Target always visible on the screen leads to accurate wiring and less contrast.

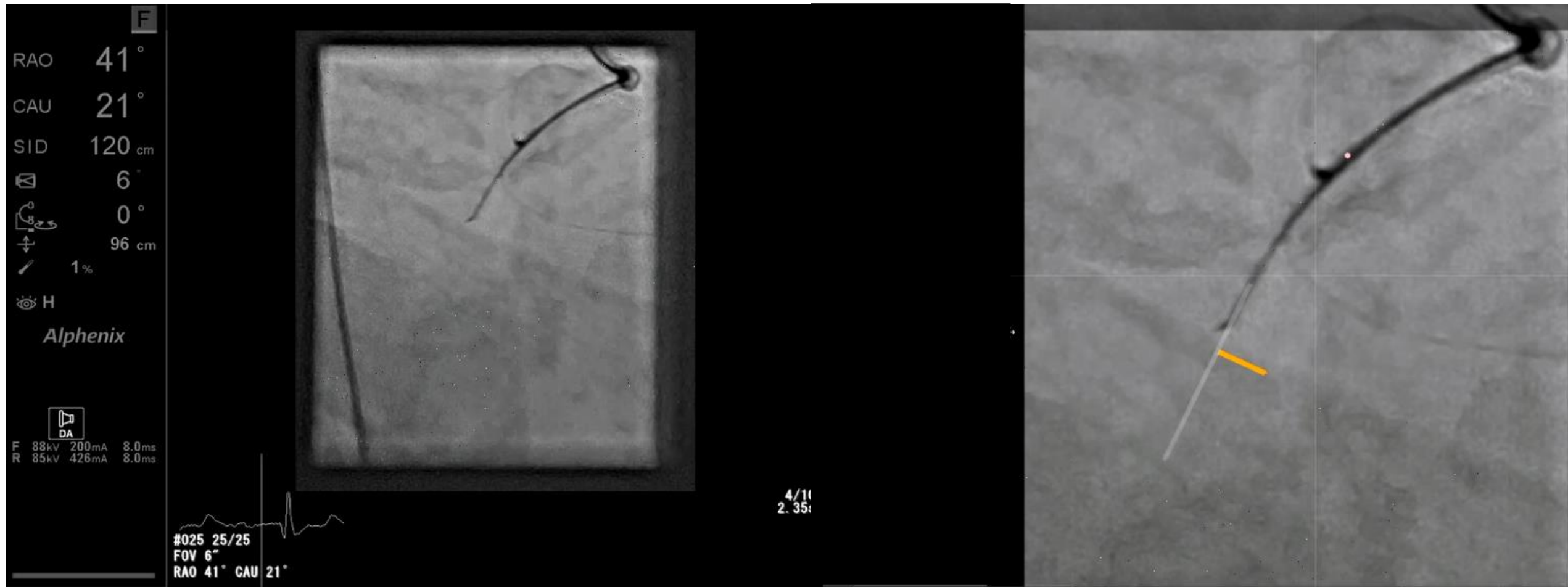
Penetration Plane method in ECG synchronized system



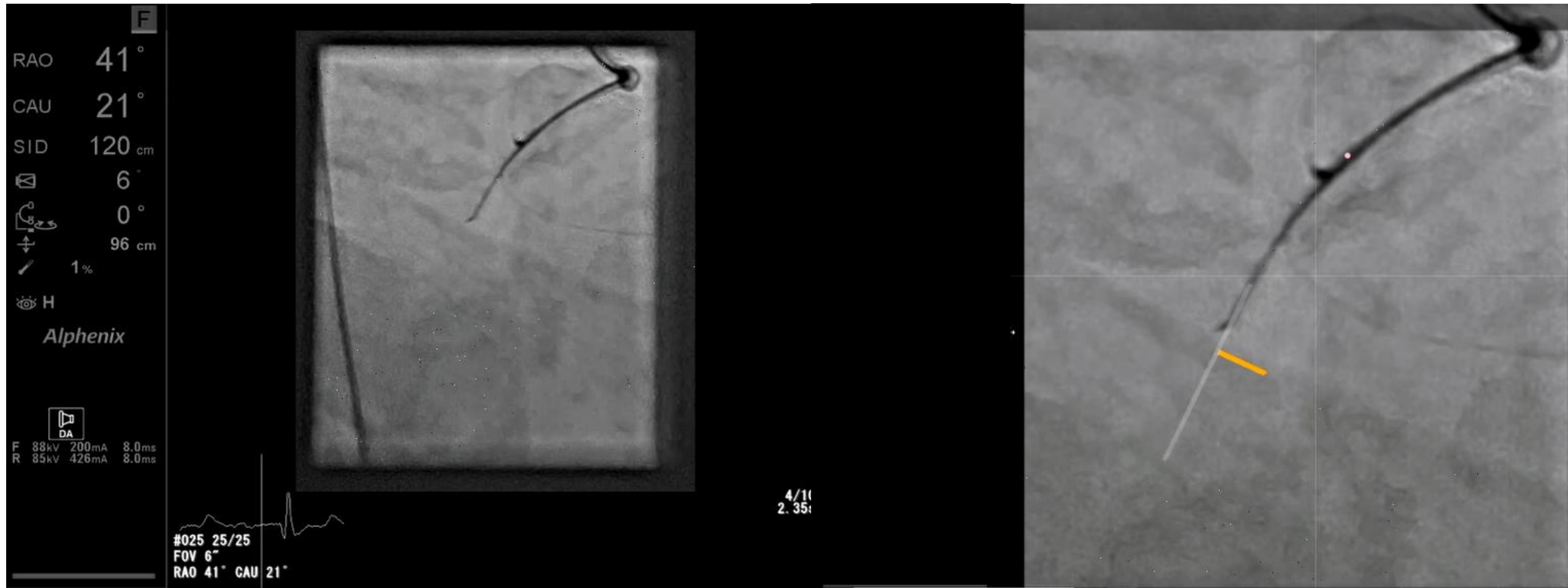
Penetration Plane method in ECG synchronized system



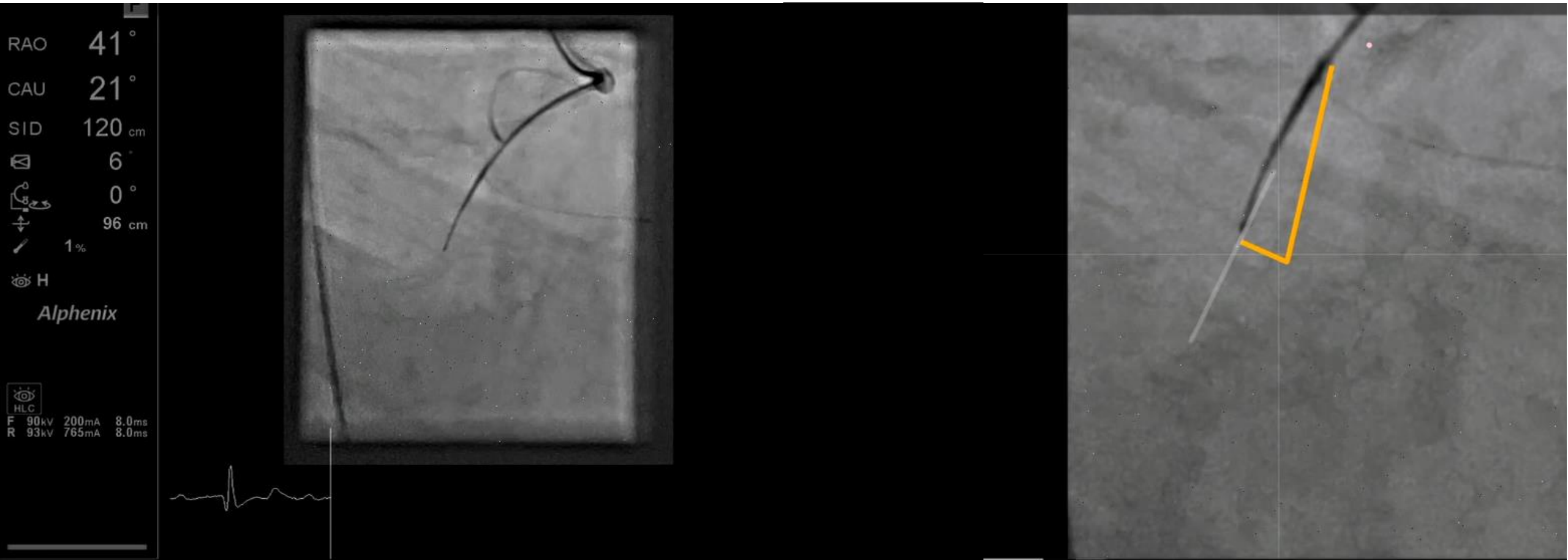
Penetration Plane method in ECG synchronized system

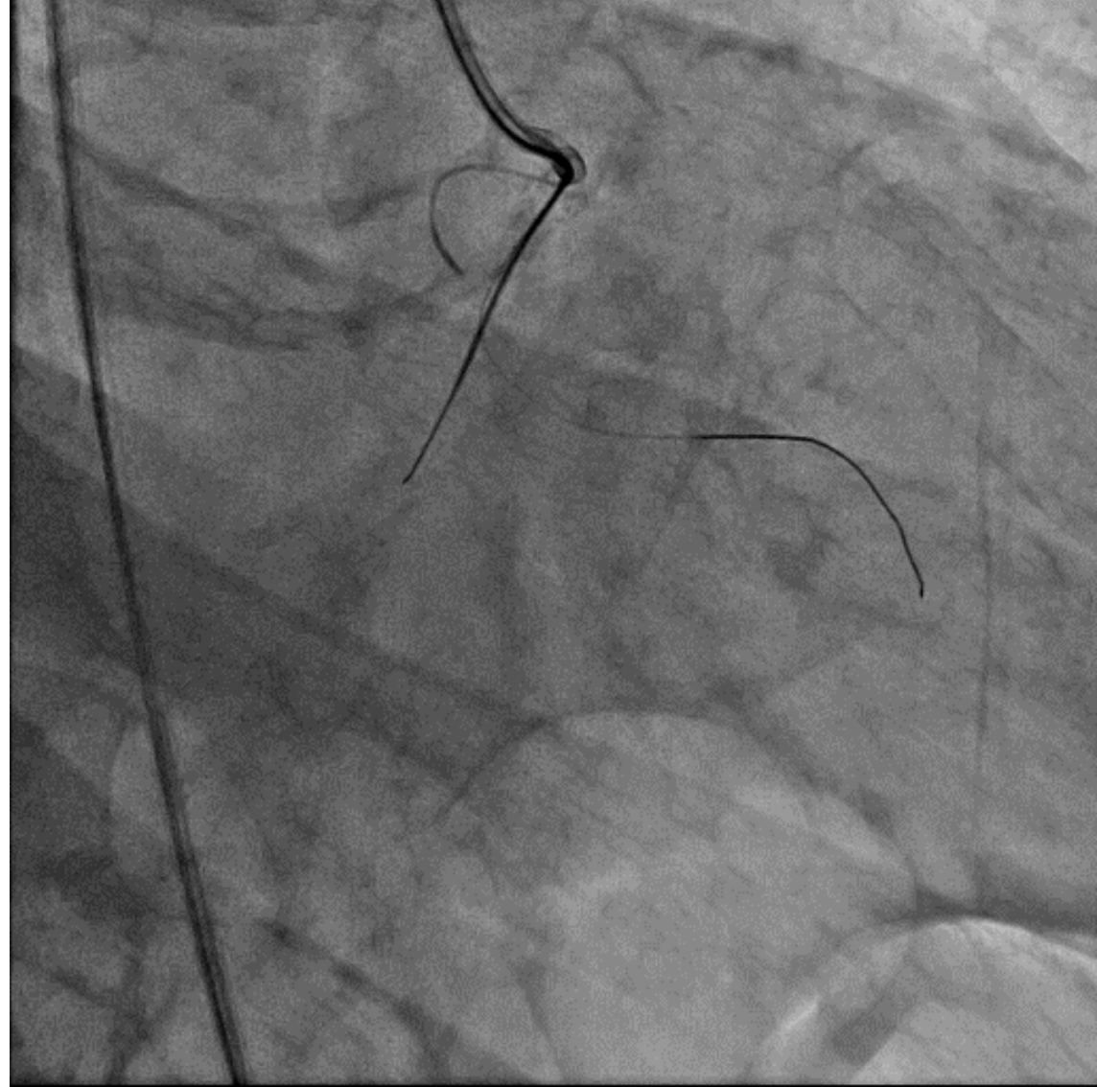
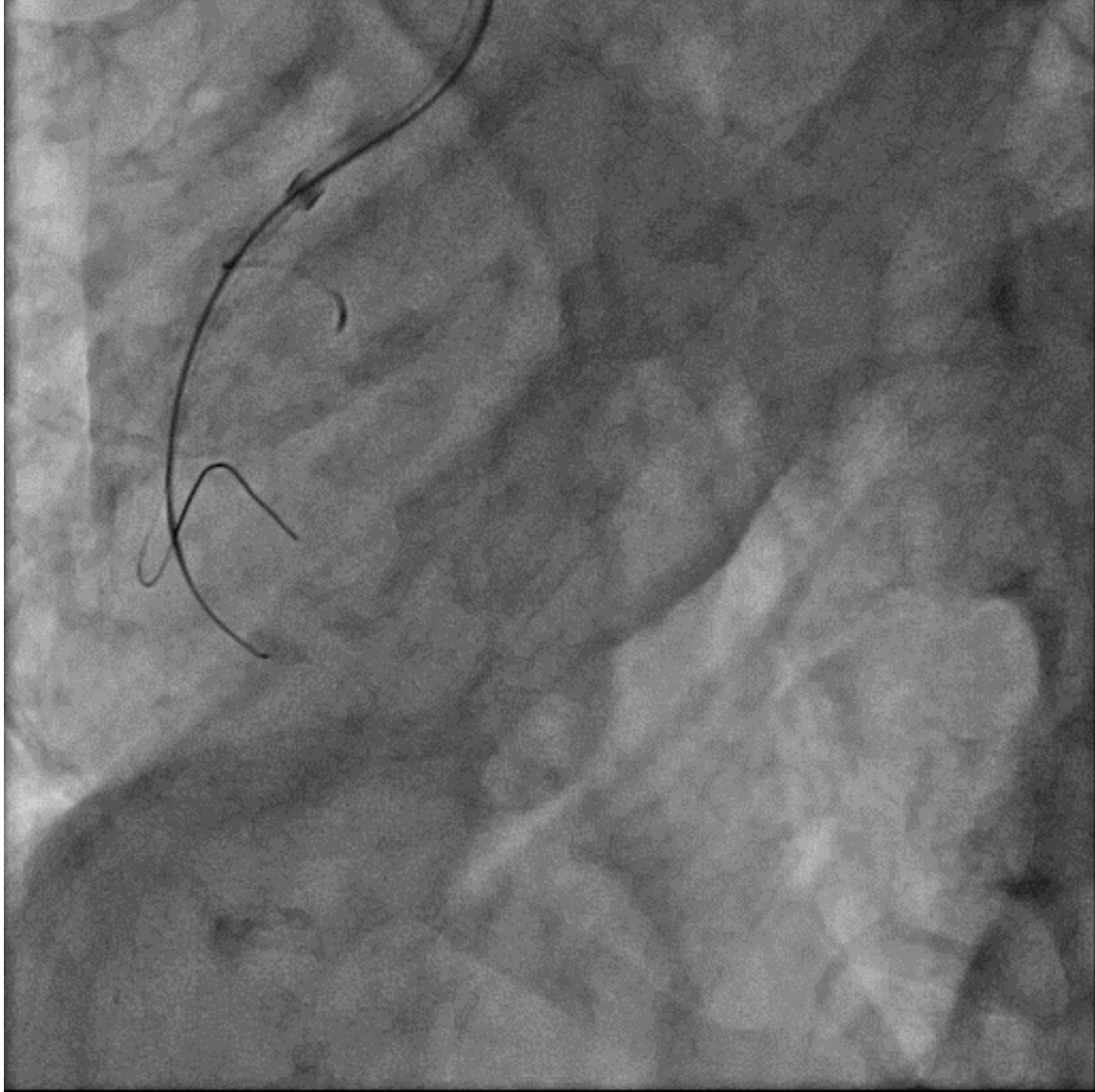


Penetration Plane method in ECG synchronized system



Penetration Plane method in ECG synchronized system





These will appear in the CTO PCI area in the near future

Penetration Plane method

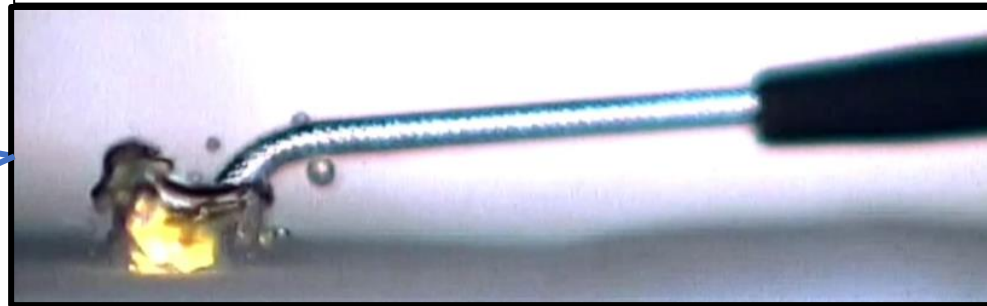
OPV (objective perpendicular view)
= Vertical view of the PP



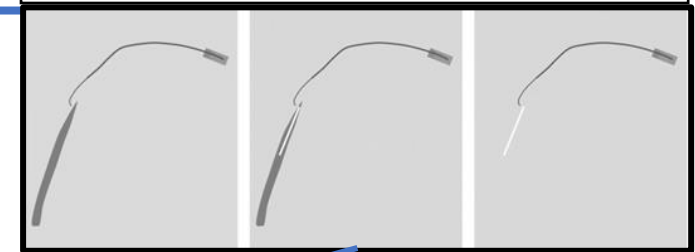
PPV (penetration plane view)
= Horizontal view of the PP

Penetration plane (PP)

Plasma mediated ablation (PMA) system

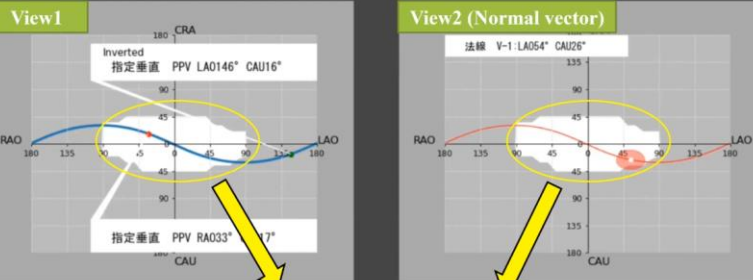


Distal true lumen mapping



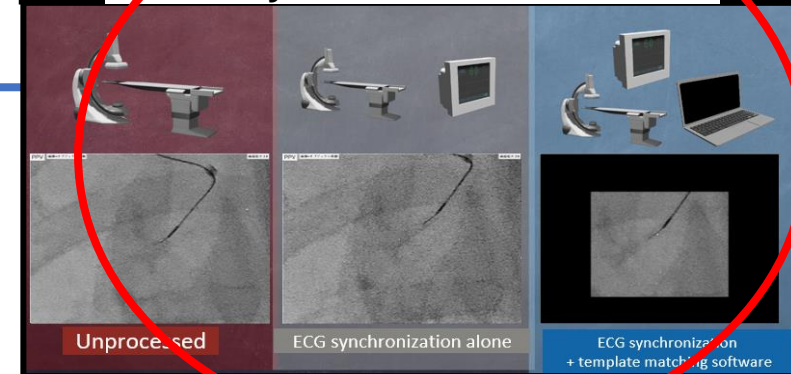
Axis-vector analysis software

Ve: RAO 92 CAU 59



Movable range of C-arm

ECG-synchronized fluoroscopy



All systems are linked and needed

Summary

- With the advent of new devices such as the plasma-mediated ablation system in the near future, new guidewire manipulation methodologies (Penetration plane method), and ECG synchronized systems have emerged.