

What is the Next Weapon for CTO-PCI

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Disclosure

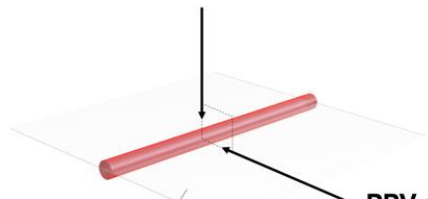
- Disclose potential conflicts of interest
 - ① Consultation fees: none
 - ② stock ownership/profit: none
 - ③ patent fees: none
 - ④ remuneration for lecture: Asahi intecc.
 - ⑤ manuscript fees: none
 - ⑥ trust research/joint research funds: none
 - ⑦ scholarship fund: none
 - ⑧ Affiliation with Endowed Department: none
 - ⑨ Other remuneration such as gifts: none

This presentation includes content on
unapproved pharmaceutical products

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

Penetration Plane method

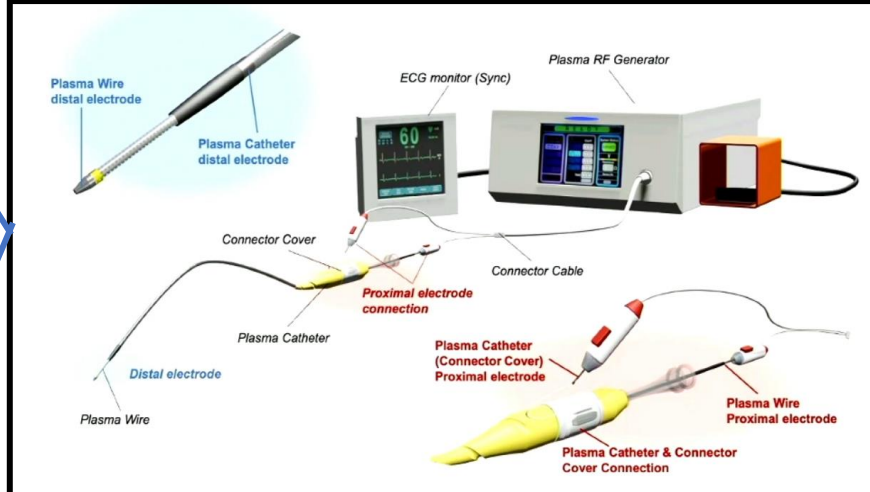
OPV (objective perpendicular view)
= Vertical view of the PP



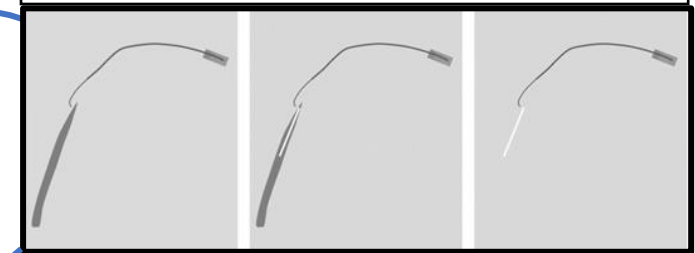
PPV (penetration plane view)
= Horizontal view of the PP

Penetration plane (PP)

Plasma mediated ablation (PMA) system

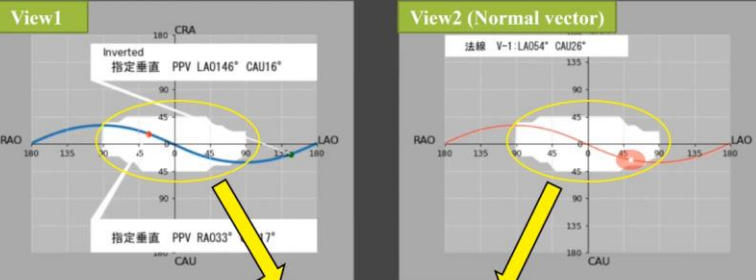


Distal true lumen mapping



Axis-vector analysis software

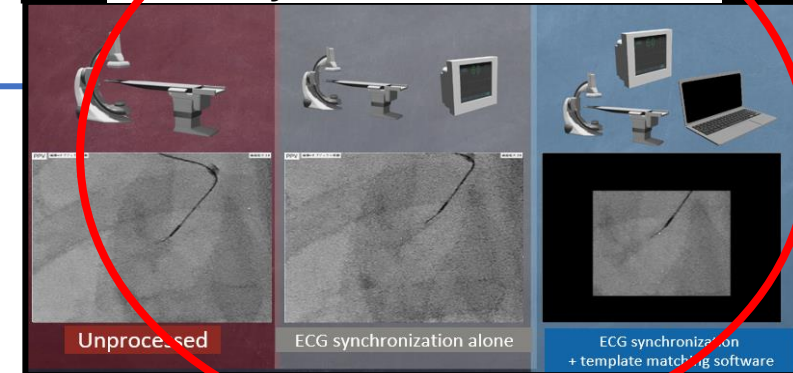
Ve: RAO 92 CAU 59



Movable range of C-arm

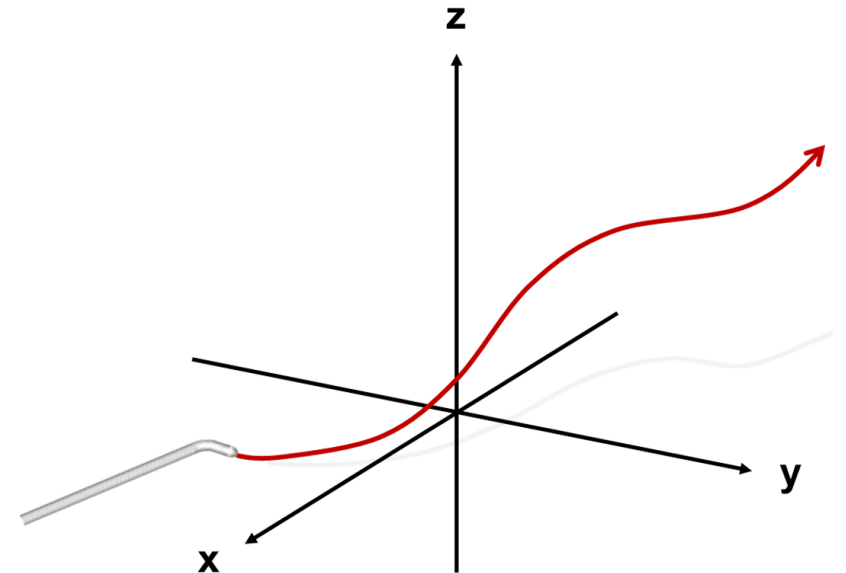
All systems are linked and needed

ECG-synchronized fluoroscopy

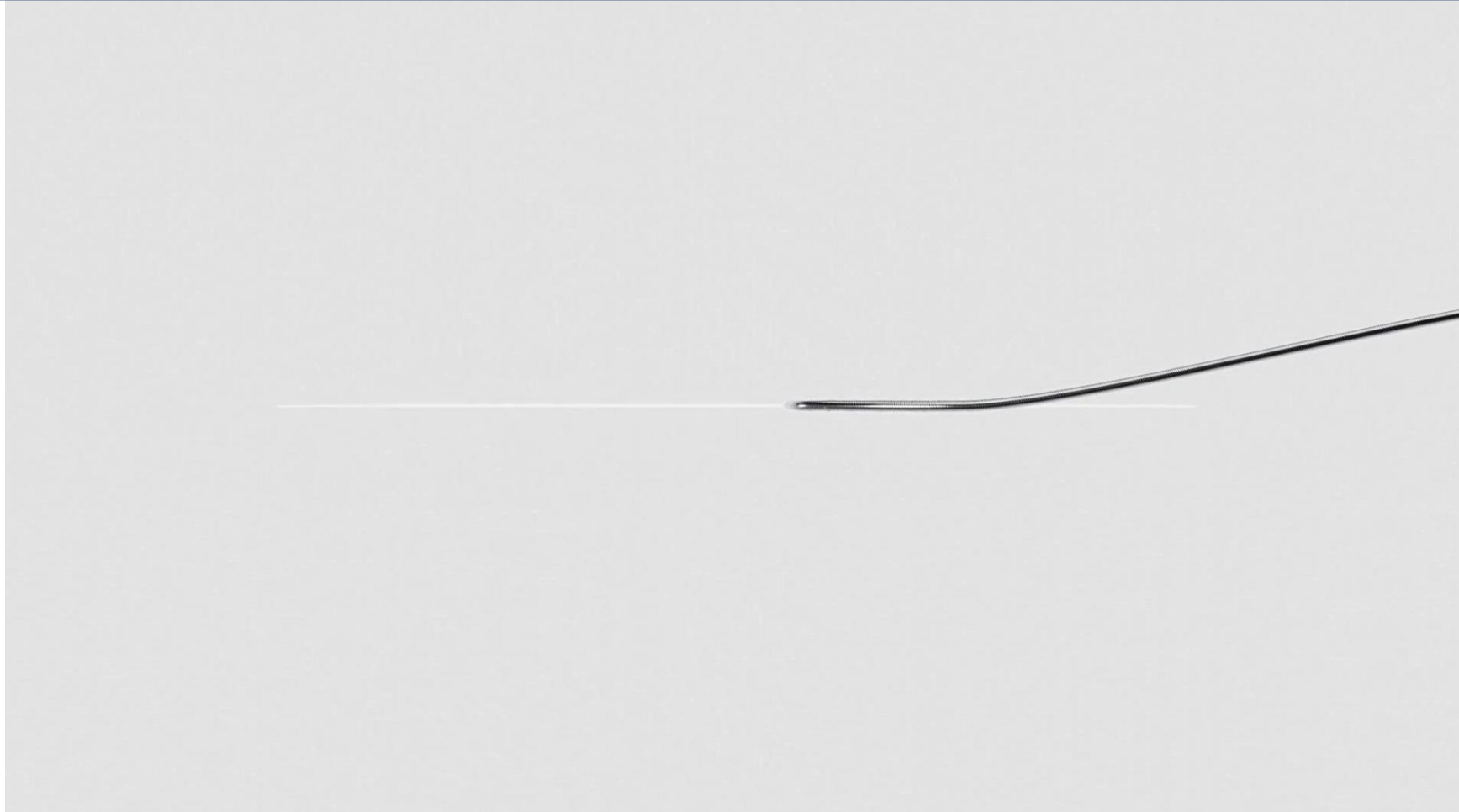


Why wire crossing is still challenging in CTO PCI?

- ❑ 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.

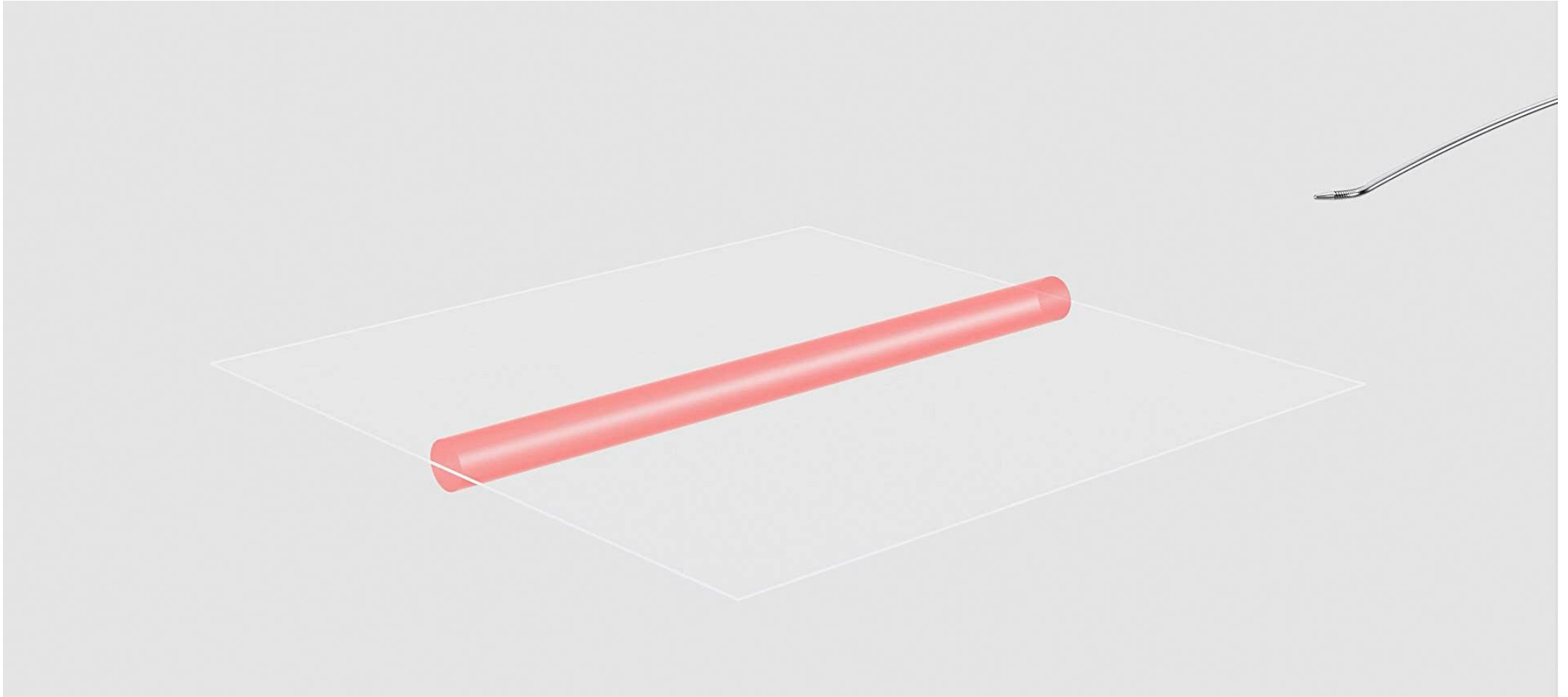


How does the wire advance by tip deflection?



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

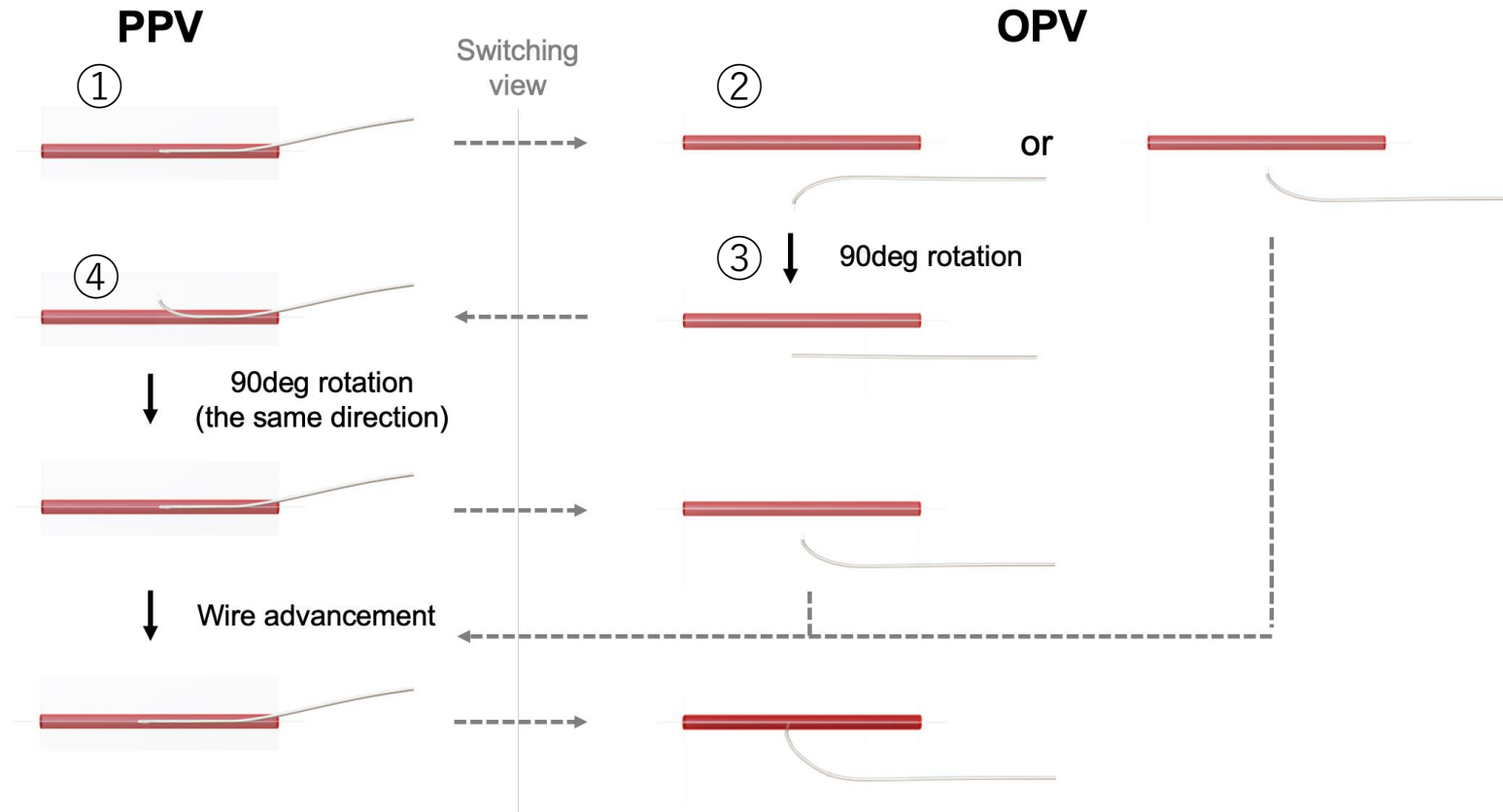
Rationale of Penetration Plane method wiring



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.

How to advance the wire on the penetration plane



① place GW on the line with PPV
(GW looks straight)

④ Rotate another 90° in the same
direction and place on the Line
(GW tip will not be straight,
and rotate to GW looks straight)

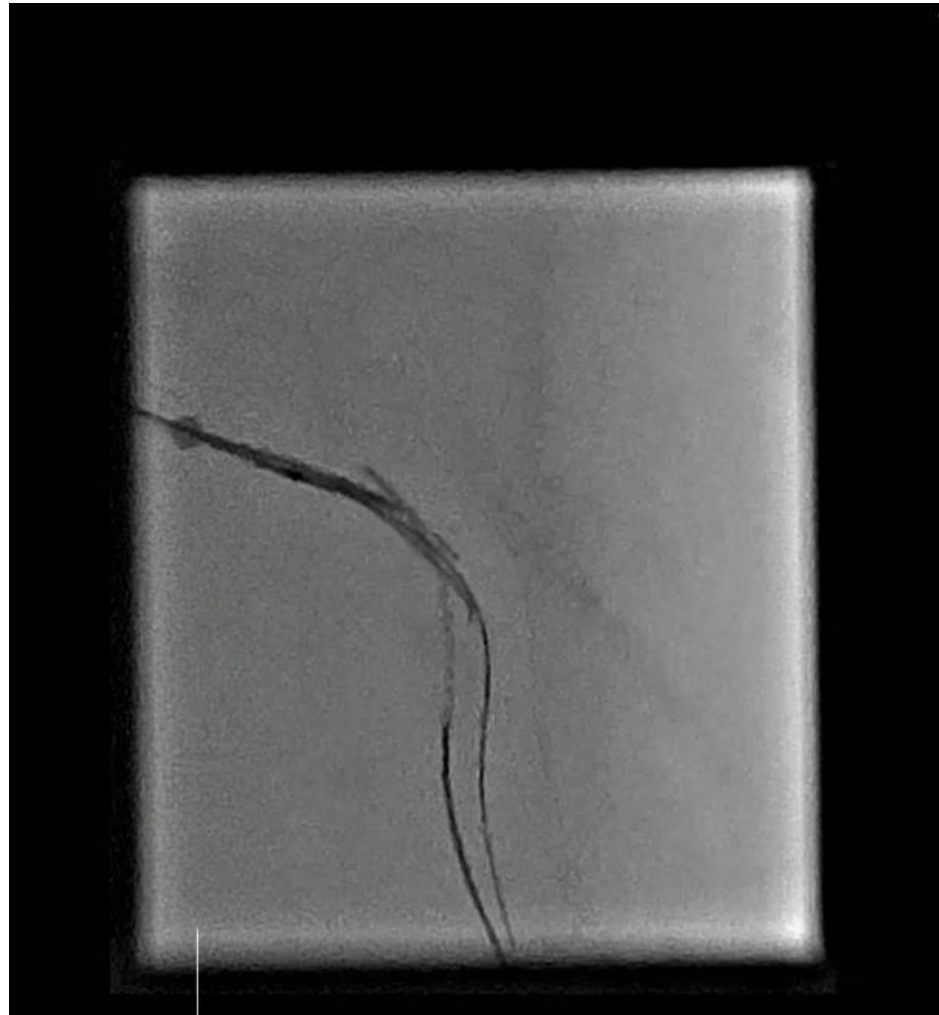
② Confirm the GW tip direction
(GW tip will either be toward or away from the vessel)

③ When the direction of the tip is opposite, rotate 90°
(to GW looks straight)

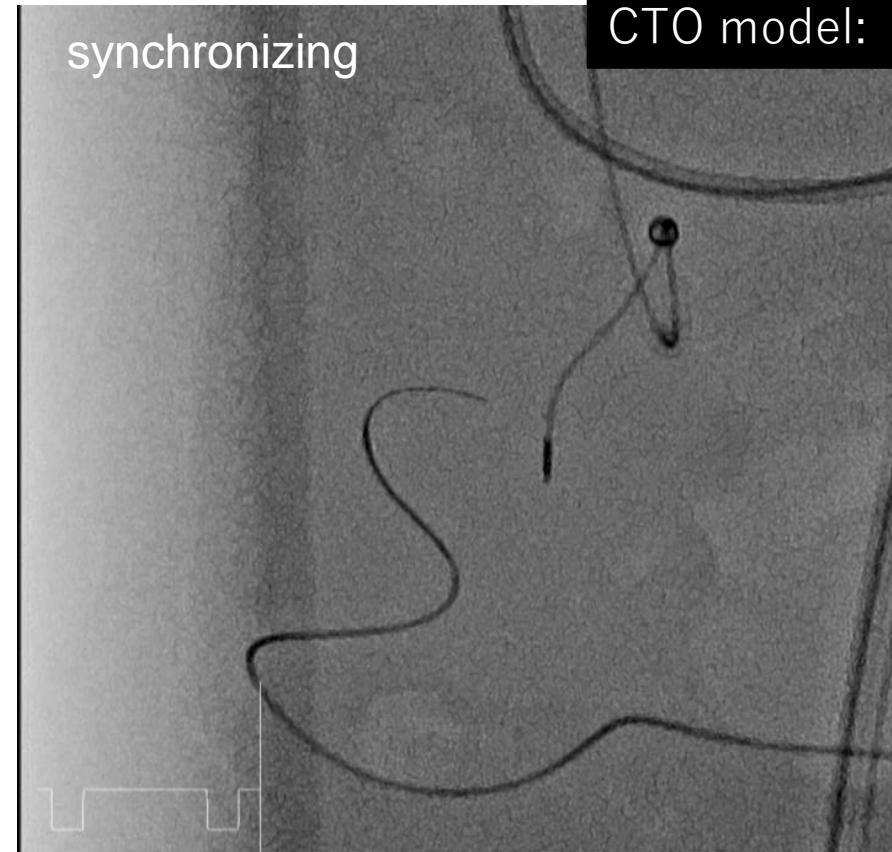
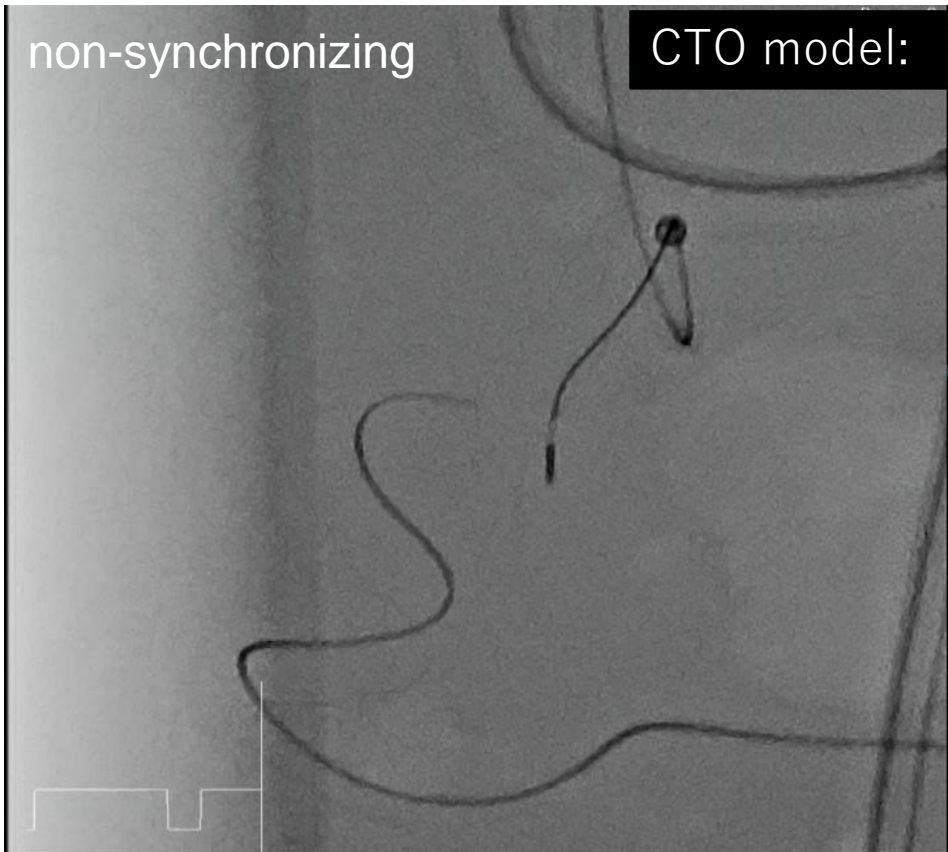
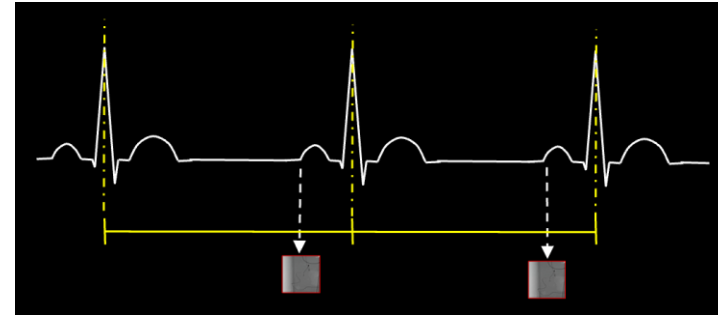
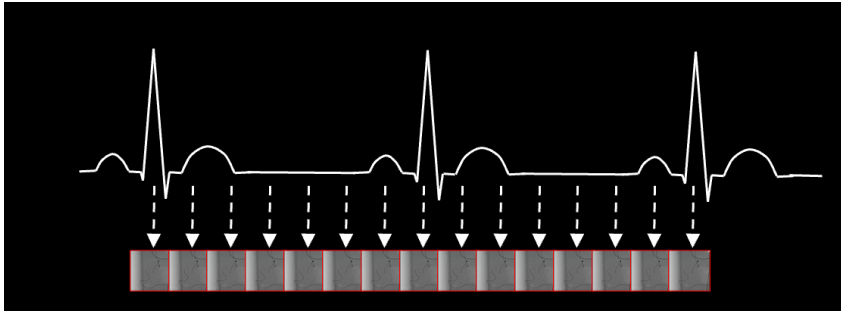
To ensure the success of Penetration Plane method

It is impossible to perform such a delicate manipulation in a beating heart.

Therefore, a new ECG-synchronized fluoroscopy that can stop heartbeats as much as possible was required



ECG-synchronized fluoroscopy



ECG-synchronized fluoroscopy

non-synchronizing

Irradiate at the specified pulse rate



1 Heartbeat 7.5times irradiations

✂HR 60, 7.5 fps

synchronizing

Irradiation at the same time phase linked to a heartbeat



1 Heartbeat 1 times irradiations

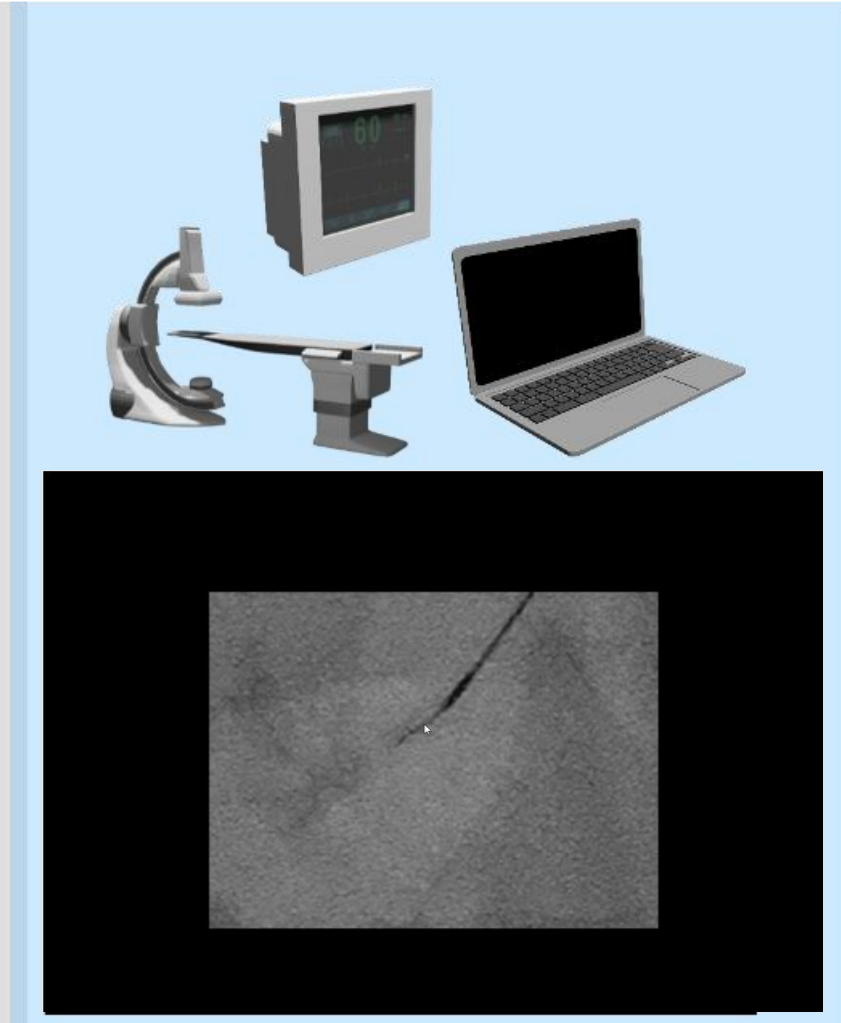
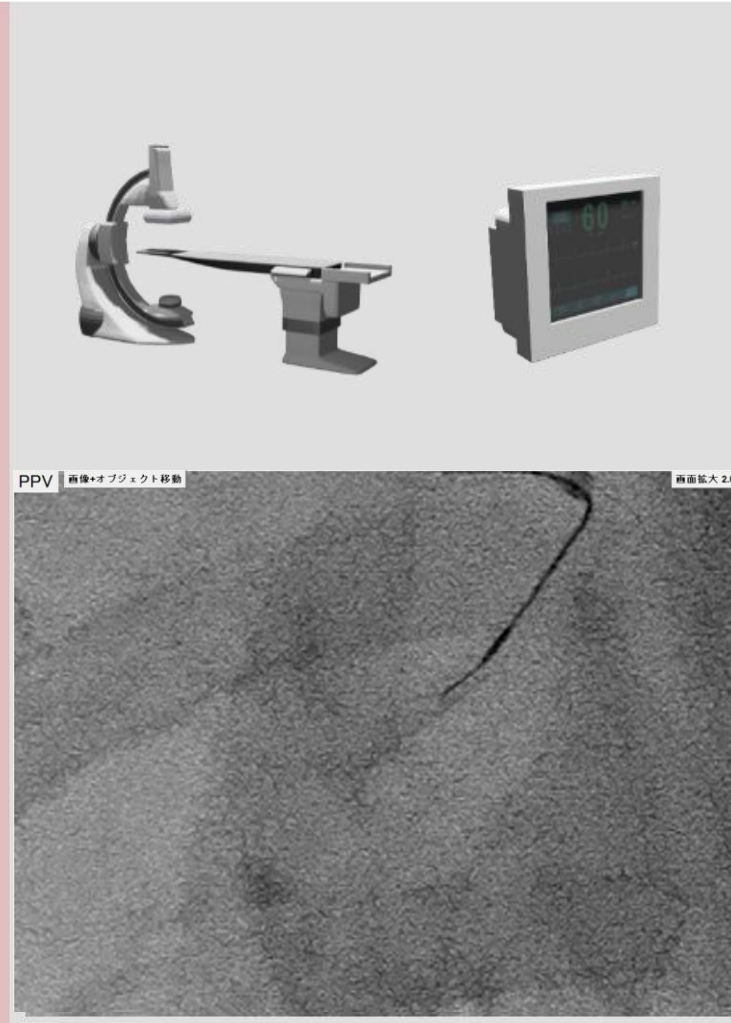
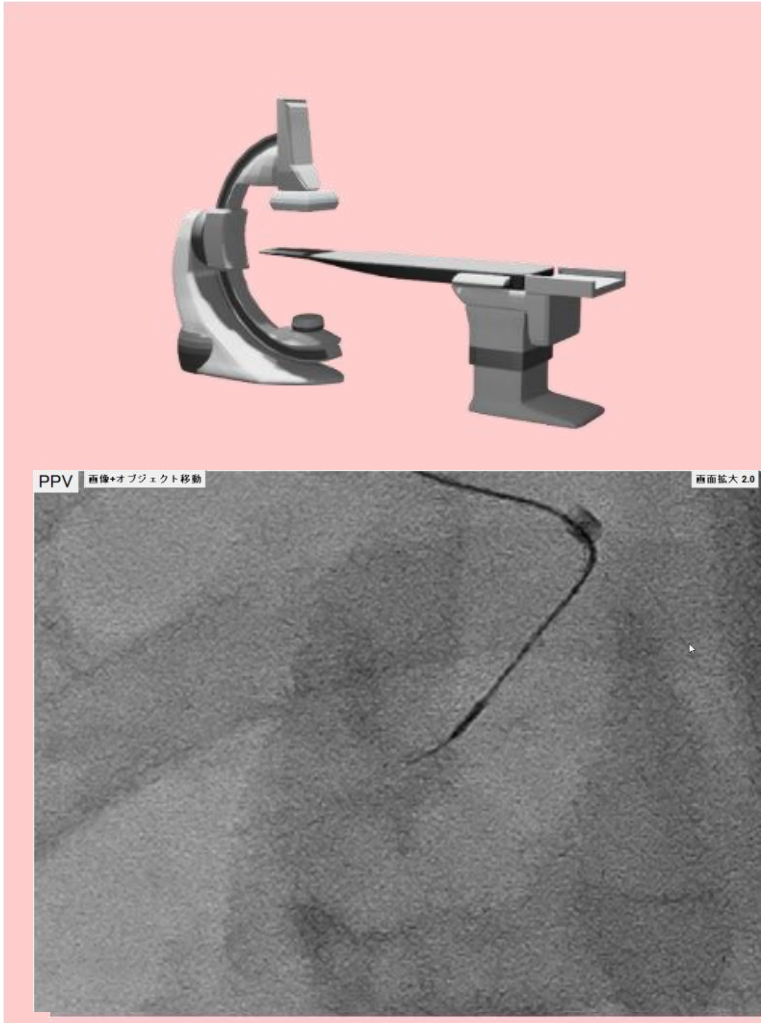
For a normal fluoroscopy system, 7.5 emissions are given per heartbeat. With an ECG-synchronized system, on the other hand, a single radiation pulse is emitted at the end-diastole of the ECG to present an image that appears as if the cardiac movement was stopped.

ECG synchronization with dedicated software

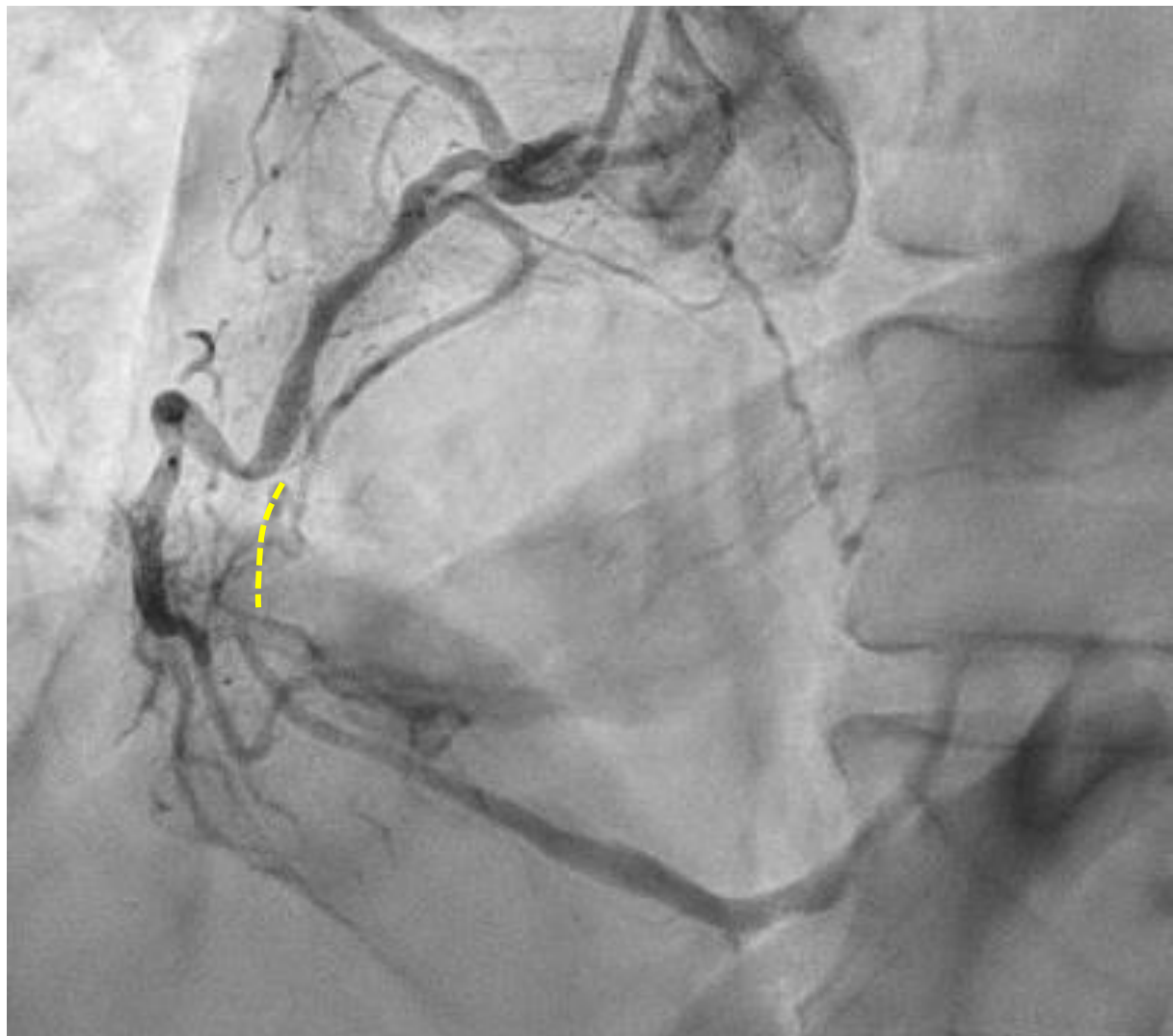
Unprocessed

ECG synchronization alone

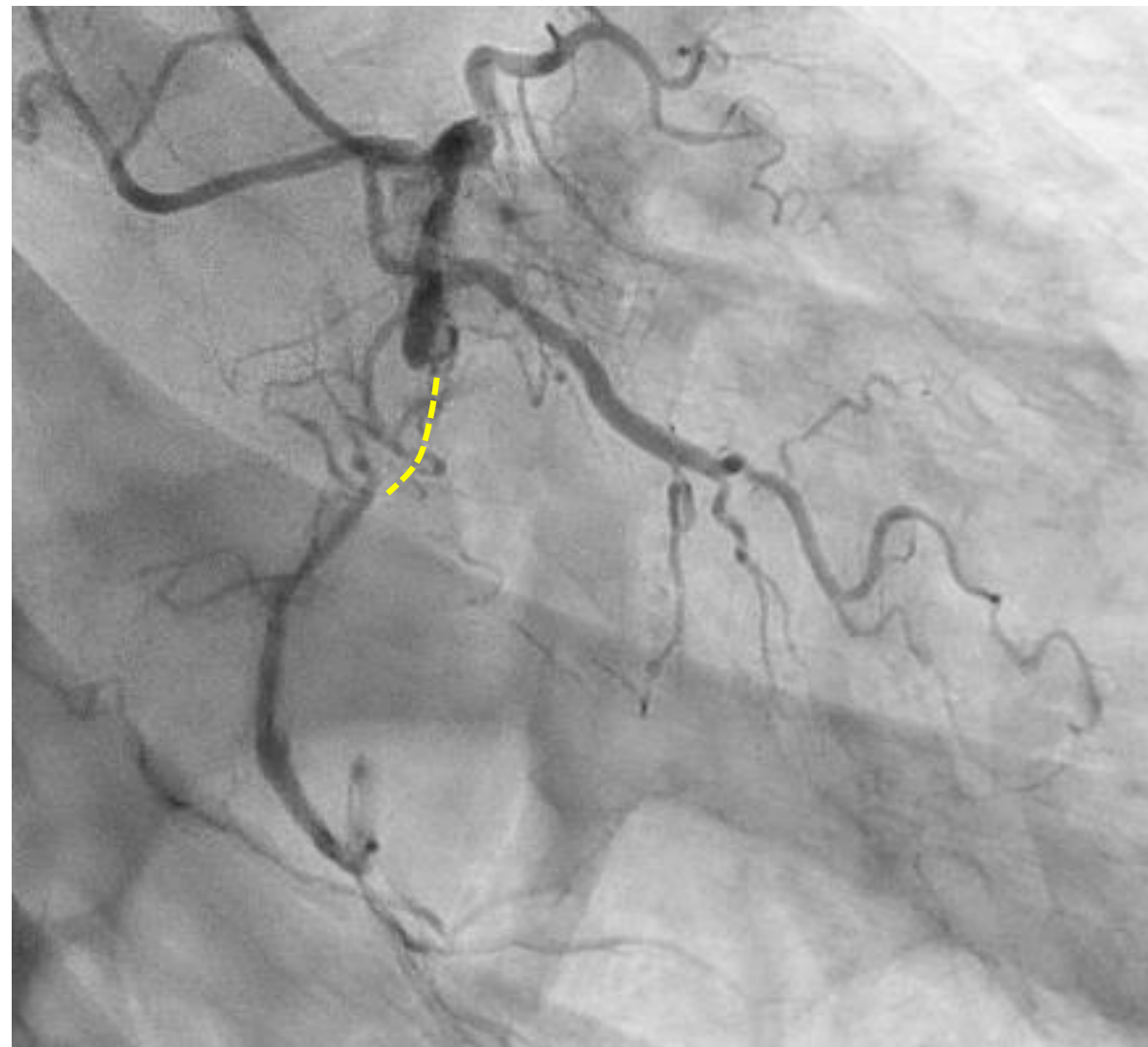
ECG synchronization
+ Template matching software



RCA CTO case

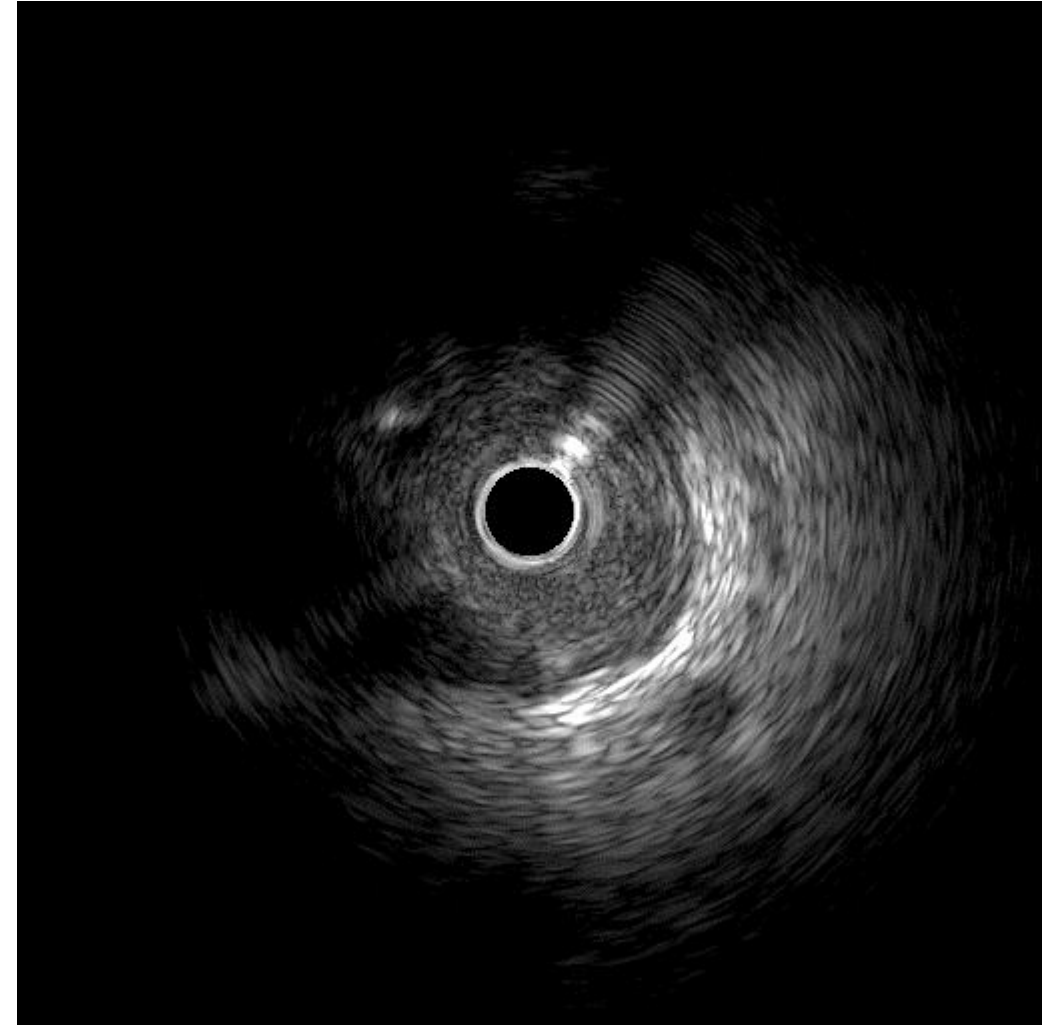


LAO50



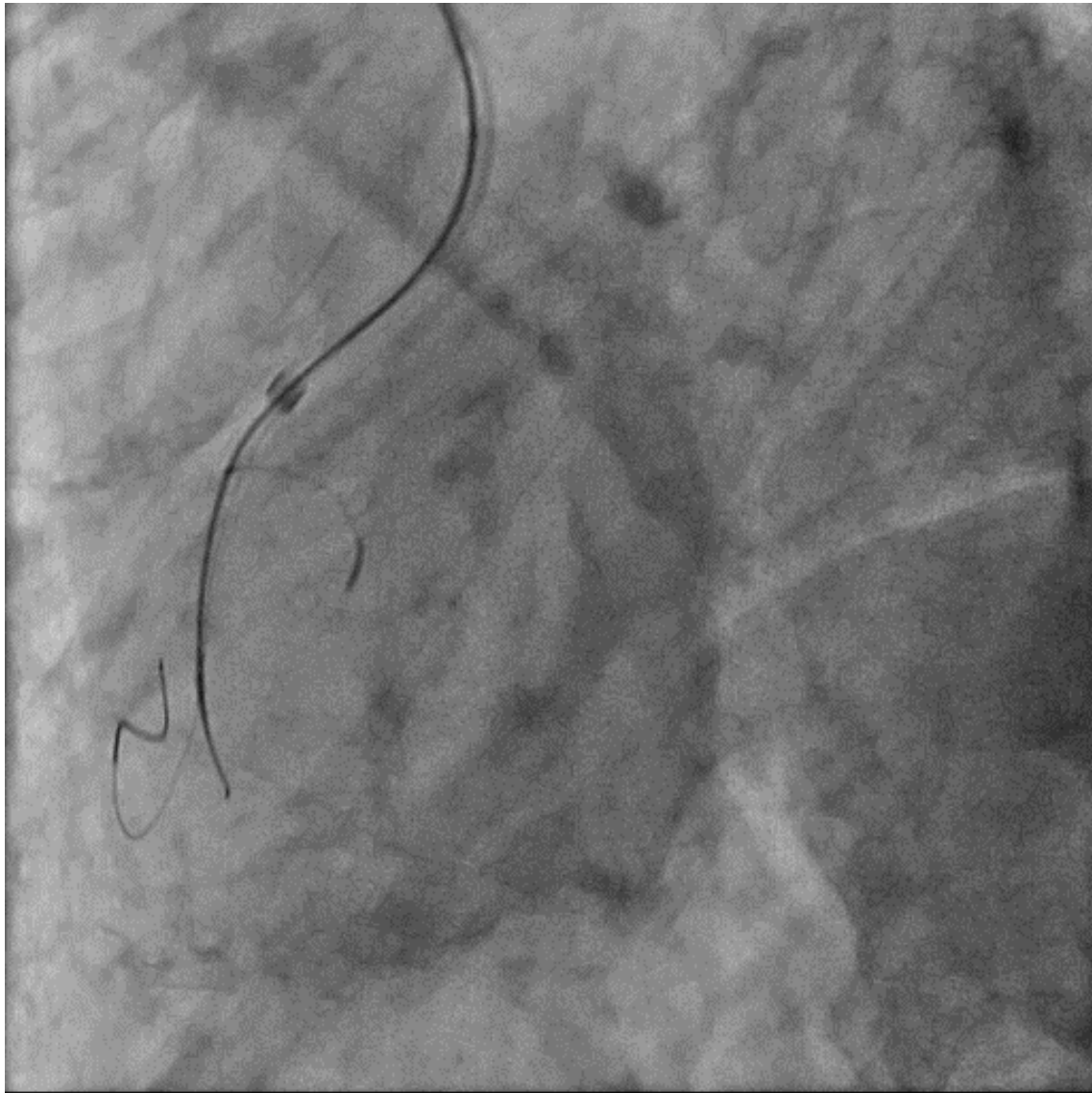
RAO28 CAU29

Proximal IVUS guided puncture

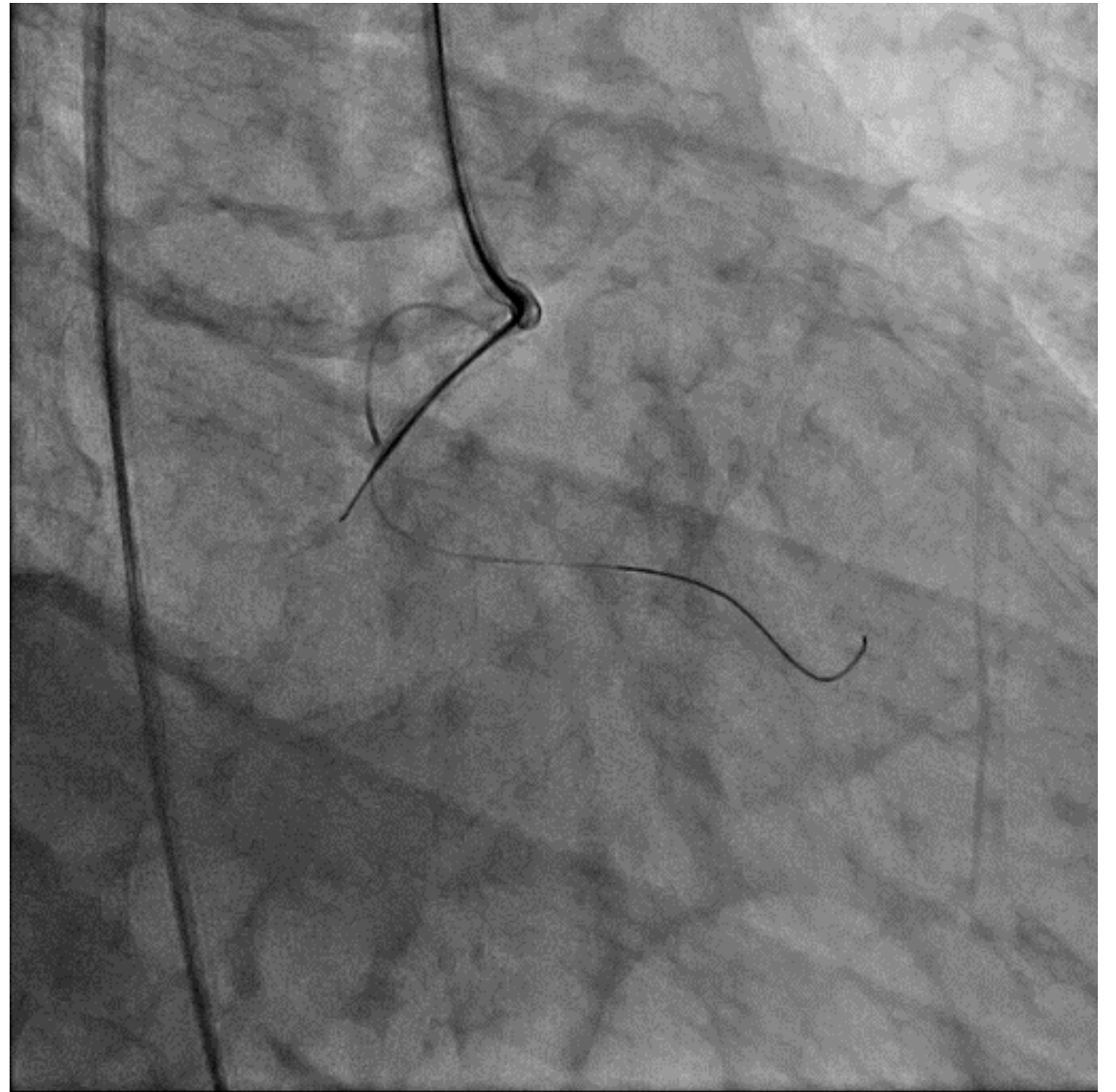


LAO37 CAU18

RAO40 CRA29



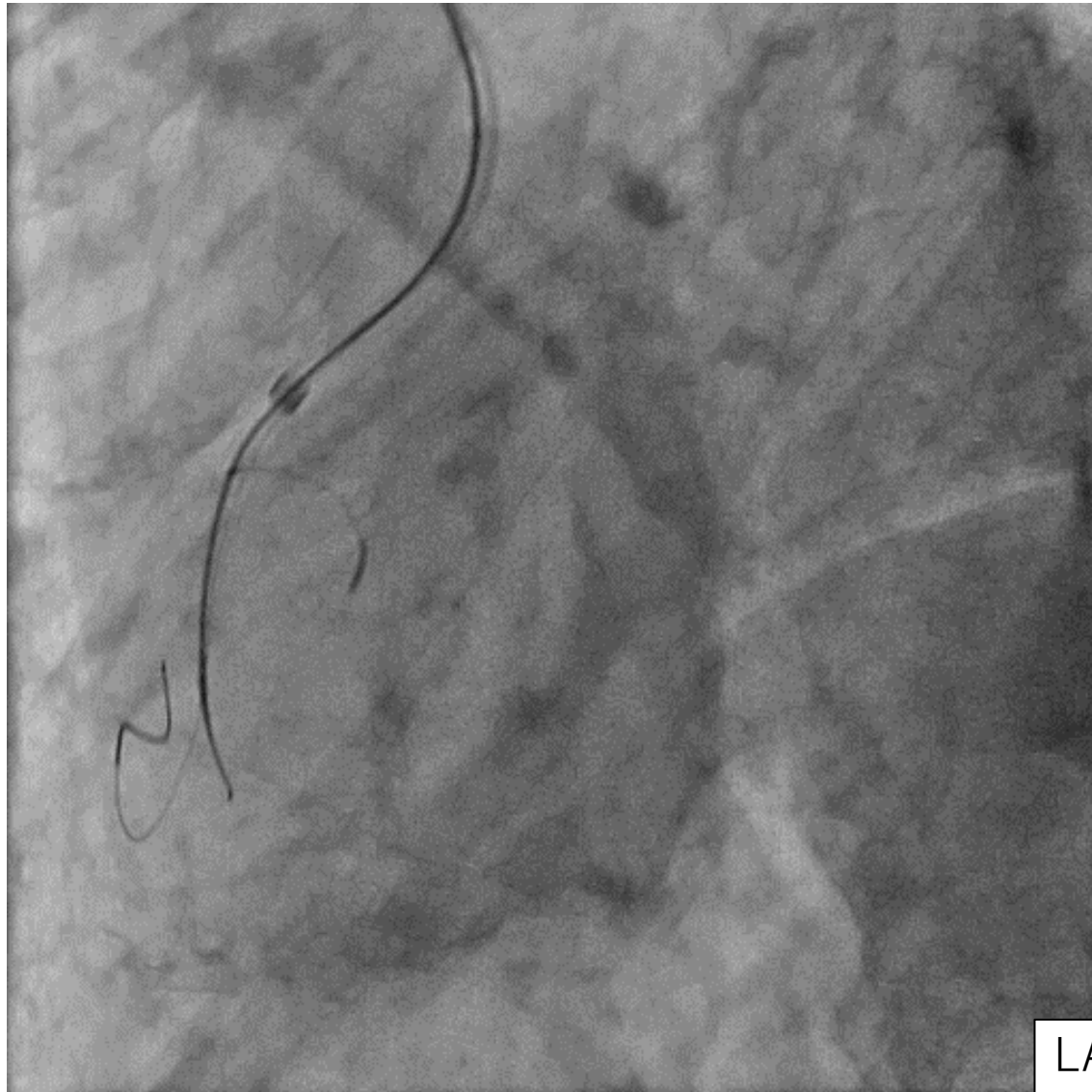
LAO61 CAU28



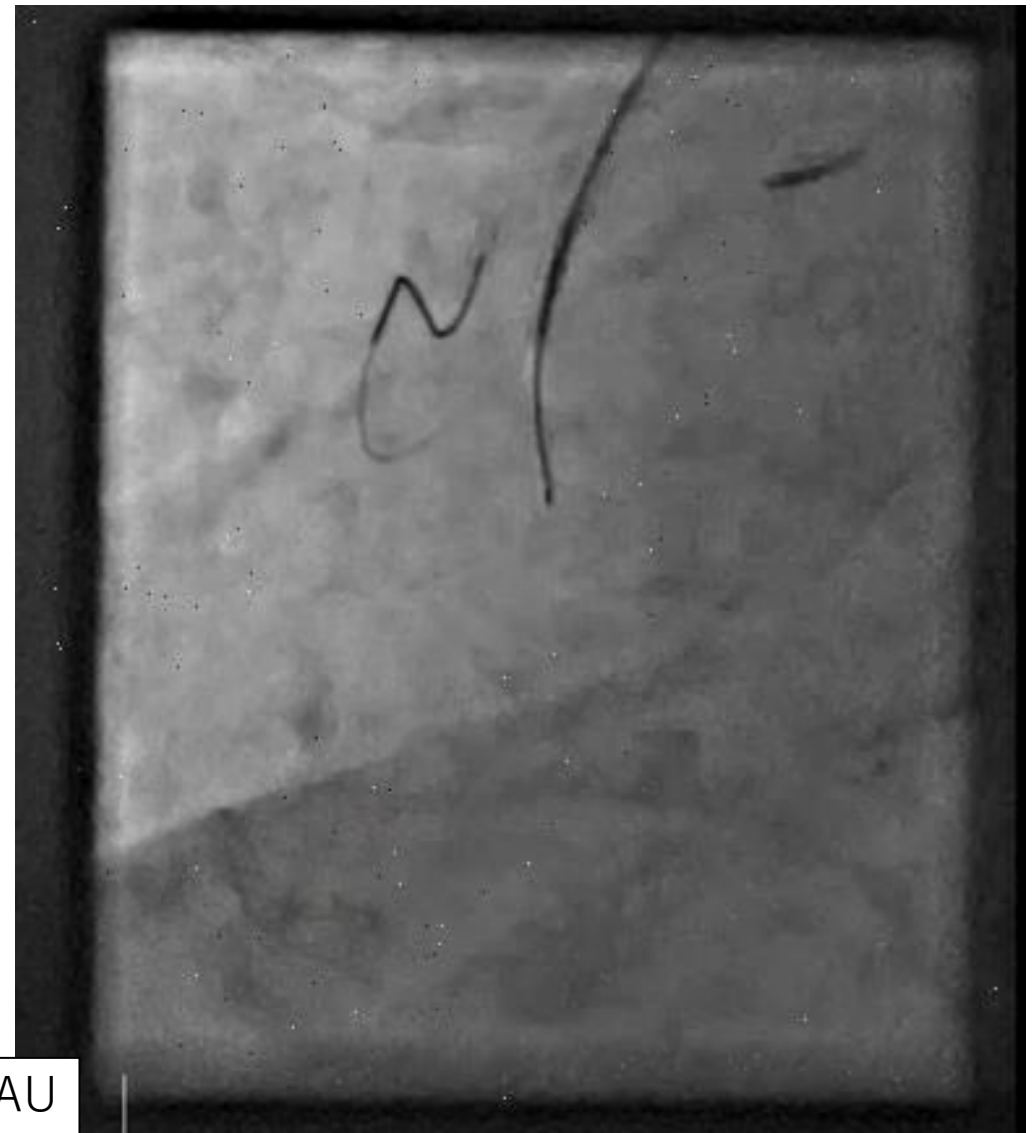
RAO41 CAU20

Non-Synchronizing vs ECG-Synchronizing

Non-Synchronizing

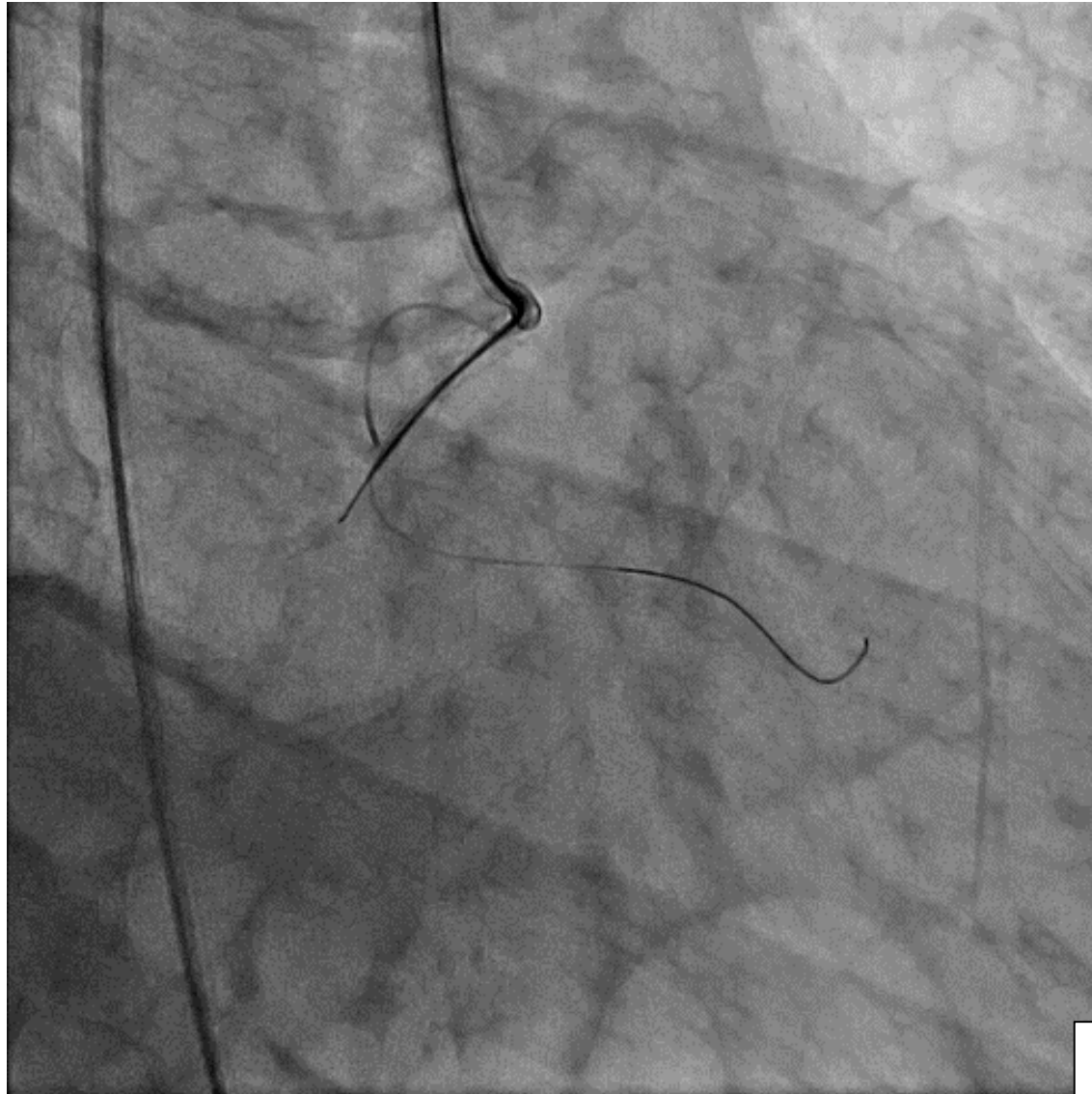


ECG-Synchronizing

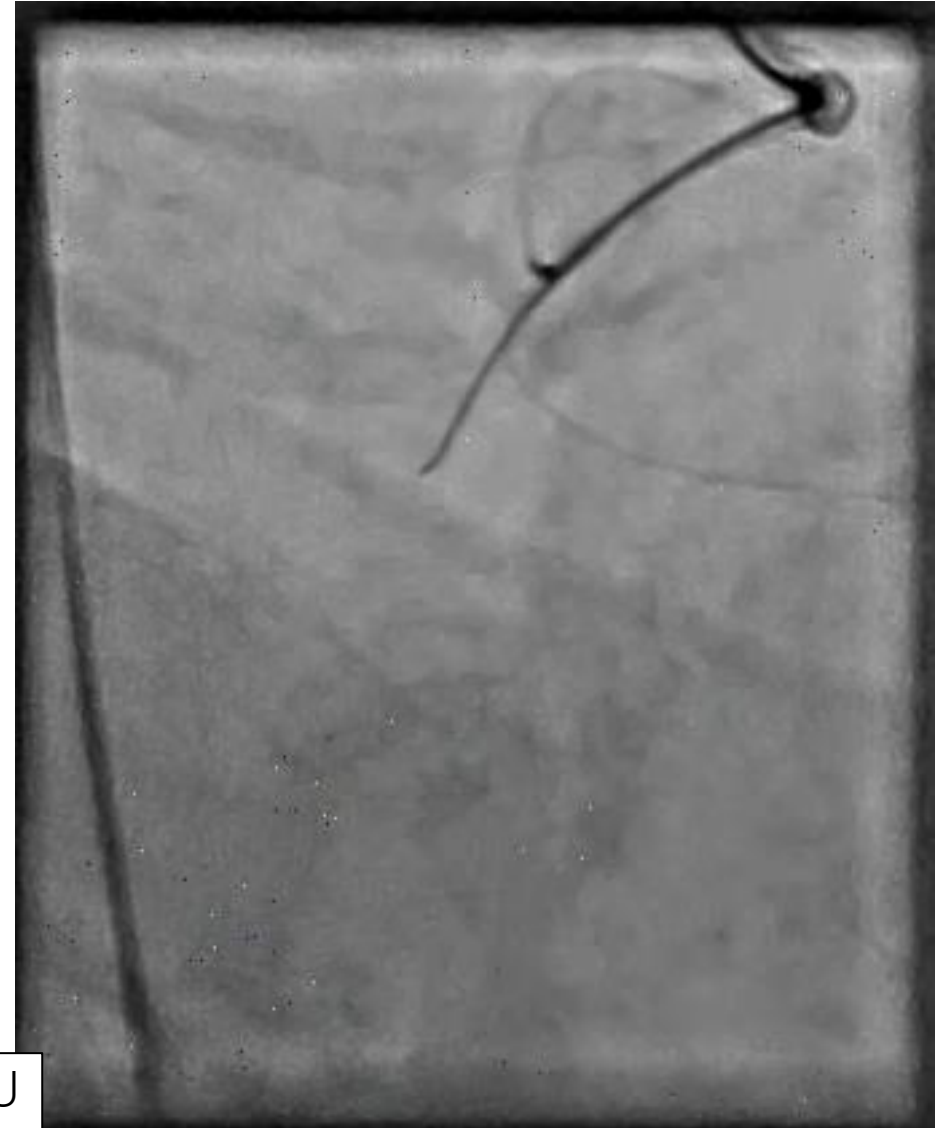


Non-Synchronizing vs ECG-Synchronizing

Non-Synchronized

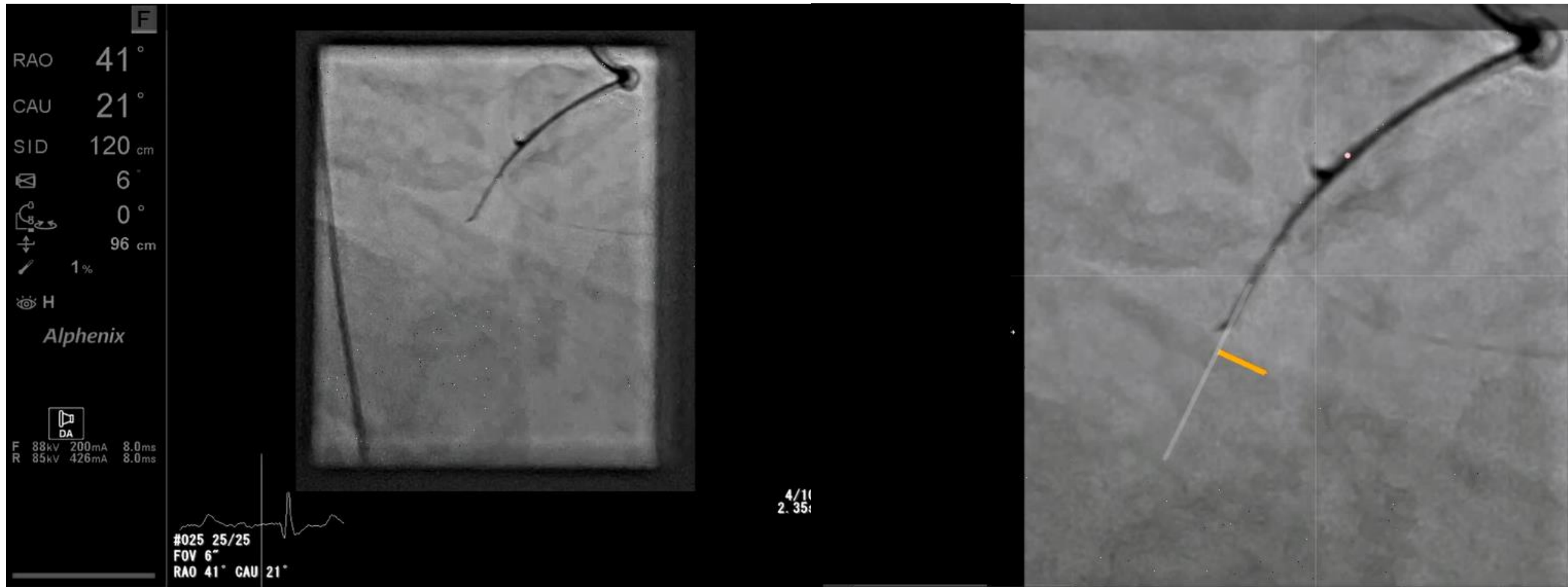


ECG-Synchronized

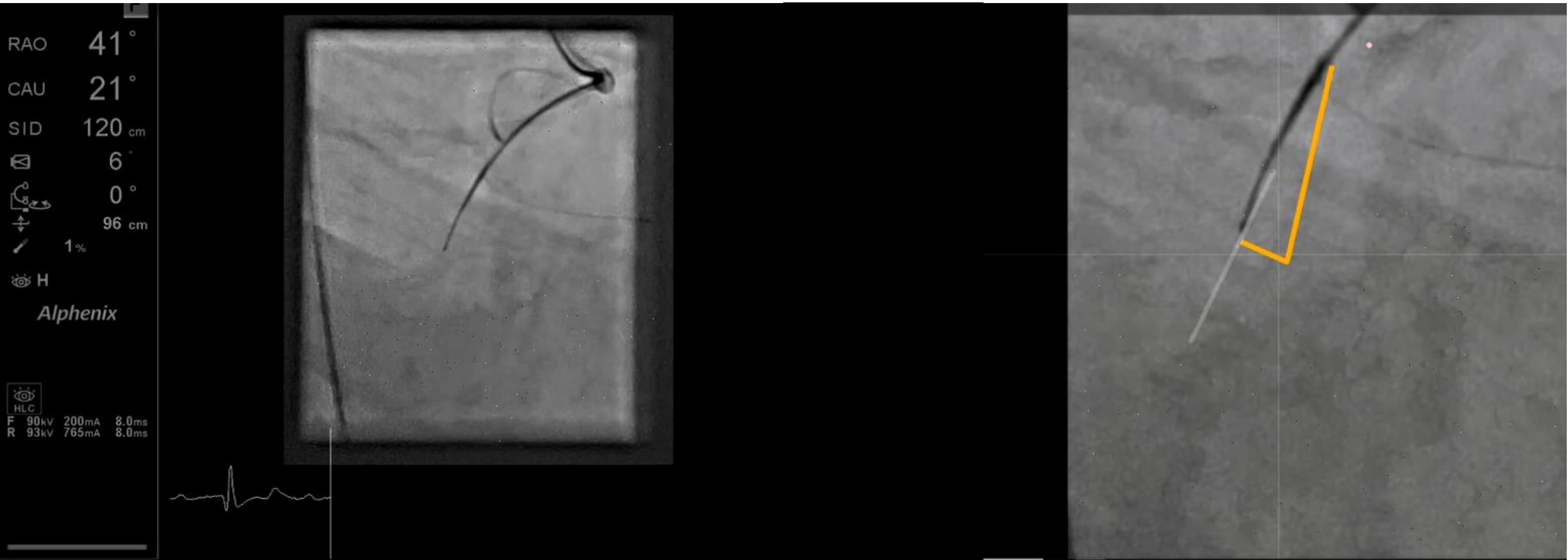


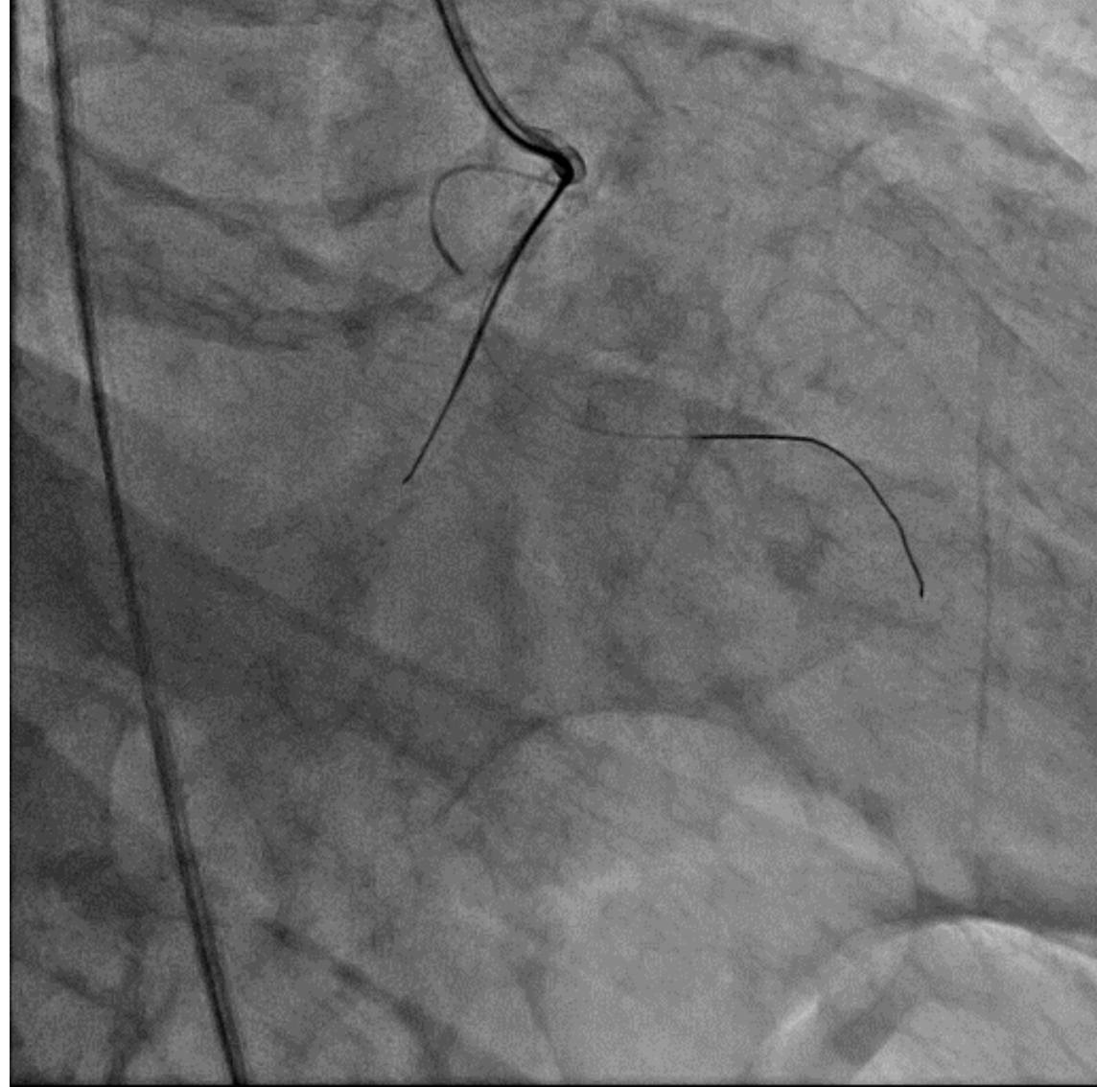
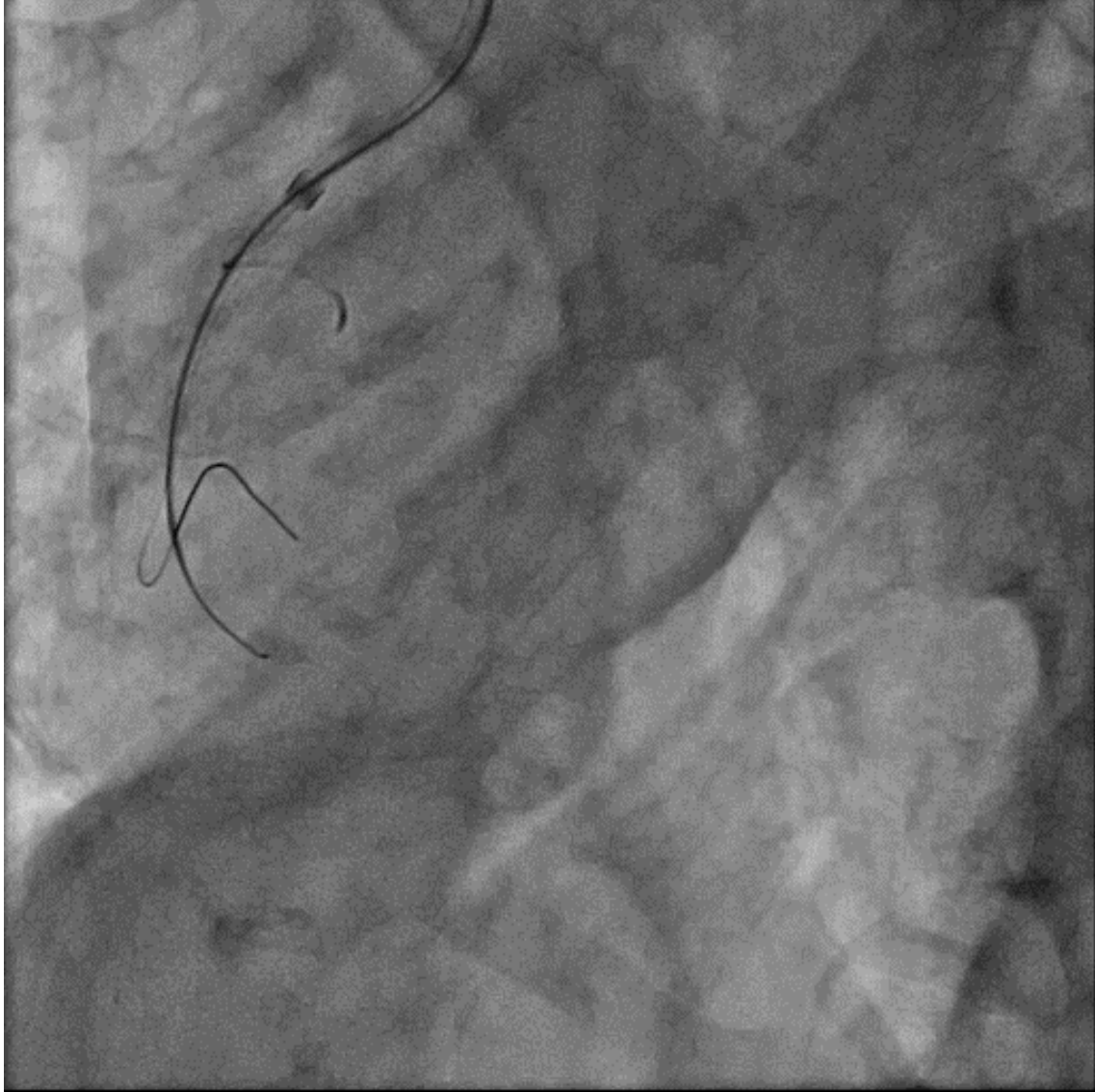
RAO CAU

Penetration Plane method in ECG synchronized system



Penetration Plane method in ECG synchronized system





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.