

APCTO Retrograde Algorithm 2021 Retrograde Knuckle Wire When and How ?

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Disclosure

- Lecture and Proctorship Honoraria – Bioexcel, Alvimedica, Boston Scientific, Abbott, Abiomed
- Advisory Boards – Abbott, Medtronic

Careful analysis of coronary angiogram / MSCT

Stent CTO lesion

Consider use of CrossBoss

Proximal cap ambiguity

Yes

IVUS-guided entry

No

Yes

No

Poor quality distal vessel

Yes

Interventional collaterals present

No

No

Yes

Antegrade approach

Retrograde approach

If suitable reentry zone

ADR

Parallel wiring
+/- IVUS-guided wiring

- Features favouring early use of KWT for dissection-re-entry:**
- Ambiguous course in CTO
 - Length > 20 mm
 - Tortuous CTO segment
 - Heavy calcification
 - Previous failed attempt

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

APCTO recommendations for knuckle wire technique (KWT)

Consider primary use of KWT/ dissection re-entry

- Ambiguous course of CTO
- Tortuous CTO segment
- Heavy calcification

Consider secondary use of KWT/ dissection re-entry

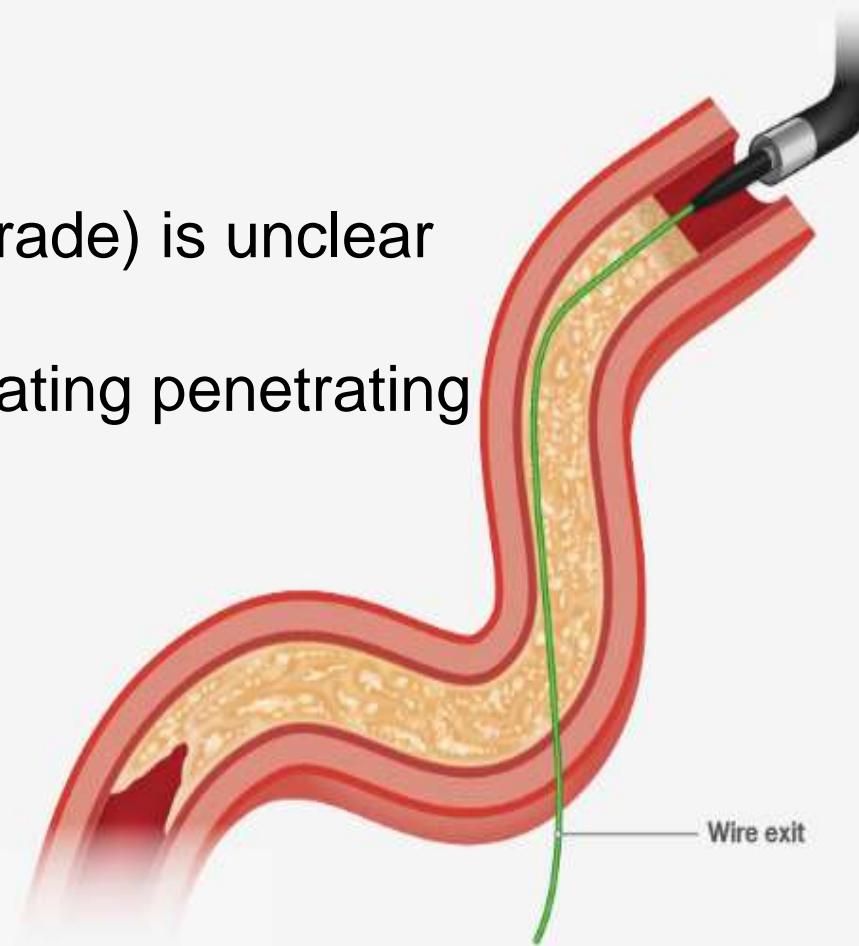
- Length >20mm
- Previous failed attempt

Use of penetration wires over long, tortuous segments is associated with an increased risk of wire exit

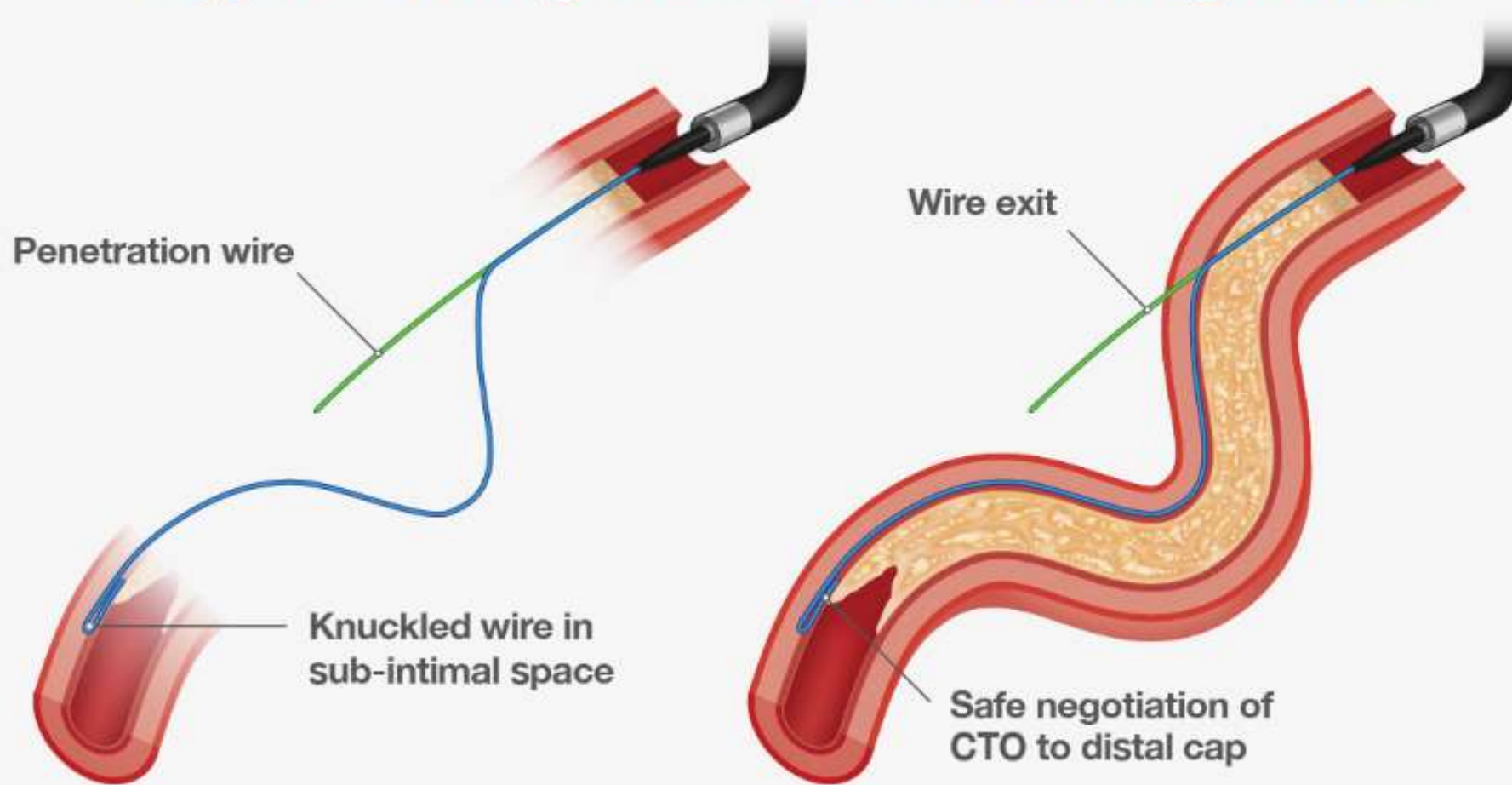
In Retrograde approach,

If vessel direction of CTO (antegrade) is unclear

Protracted wiring time with escalating penetrating wires would be hazardous....

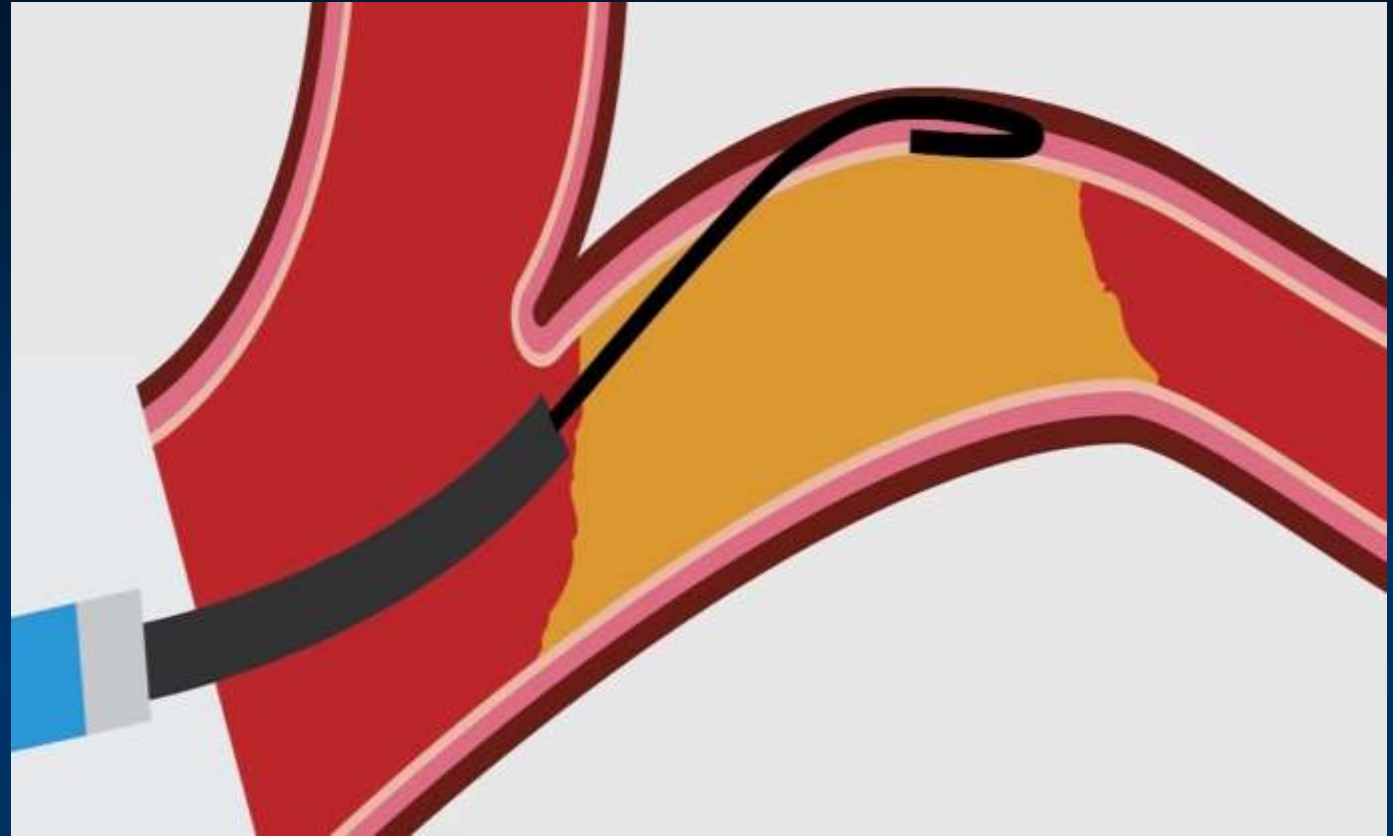


Blunt dissection utilises adventitial stretch to safely bypass ambiguous or tortuous segments



Knuckle wire ?

- **Negotiate Calcification**
- **Tortuosity**
- **Anatomical ambiguity**
- **Distance**
- **Safety**



PRINCIPLE

Pressure = Force / Area

Adventitia distensible, but easily penetrable

CTO dissection/re-entry strategies

Antegrade

Dissection

Knuckle wire
CrossBoss

Re-entry

- STAR
- Contrast-guided STAR
- mini-STAR
- LAST
- Stingray

Retrograde

Dissection

Knuckle wire

Re-entry

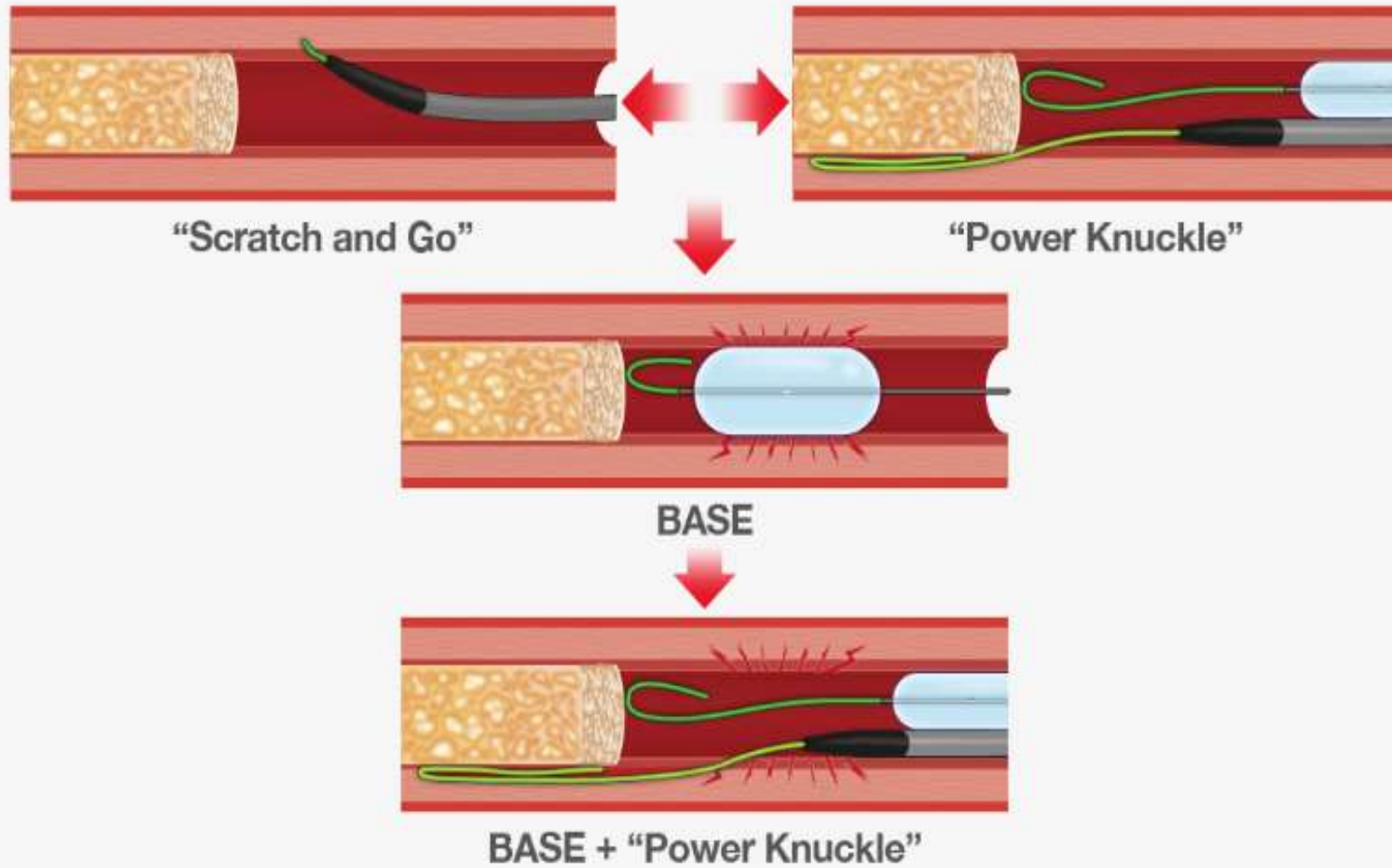
CART
Reverse CART

Equipment needed for knuckle wire

- Support : Guide
 Microcatheter – Corsair

- Wire : Pilot 200
 Sion Black
 Gladius Mongo
 Gladius
 (any wire can be knuckled)
 (wires ideally enough push force and makes small knuckle)
 (big knuckles create large subintimal space
 which is equally bad for parallel wiring and ADR)

Bypass proximal cap



CASE 1 “Long-plus” CTO

- Long = greater than 20 mm
- Plus = Tortuous, Ambiguous, Calcified
- Long alone – does not necessarily mean wire failure, but “long-plus” very likely does



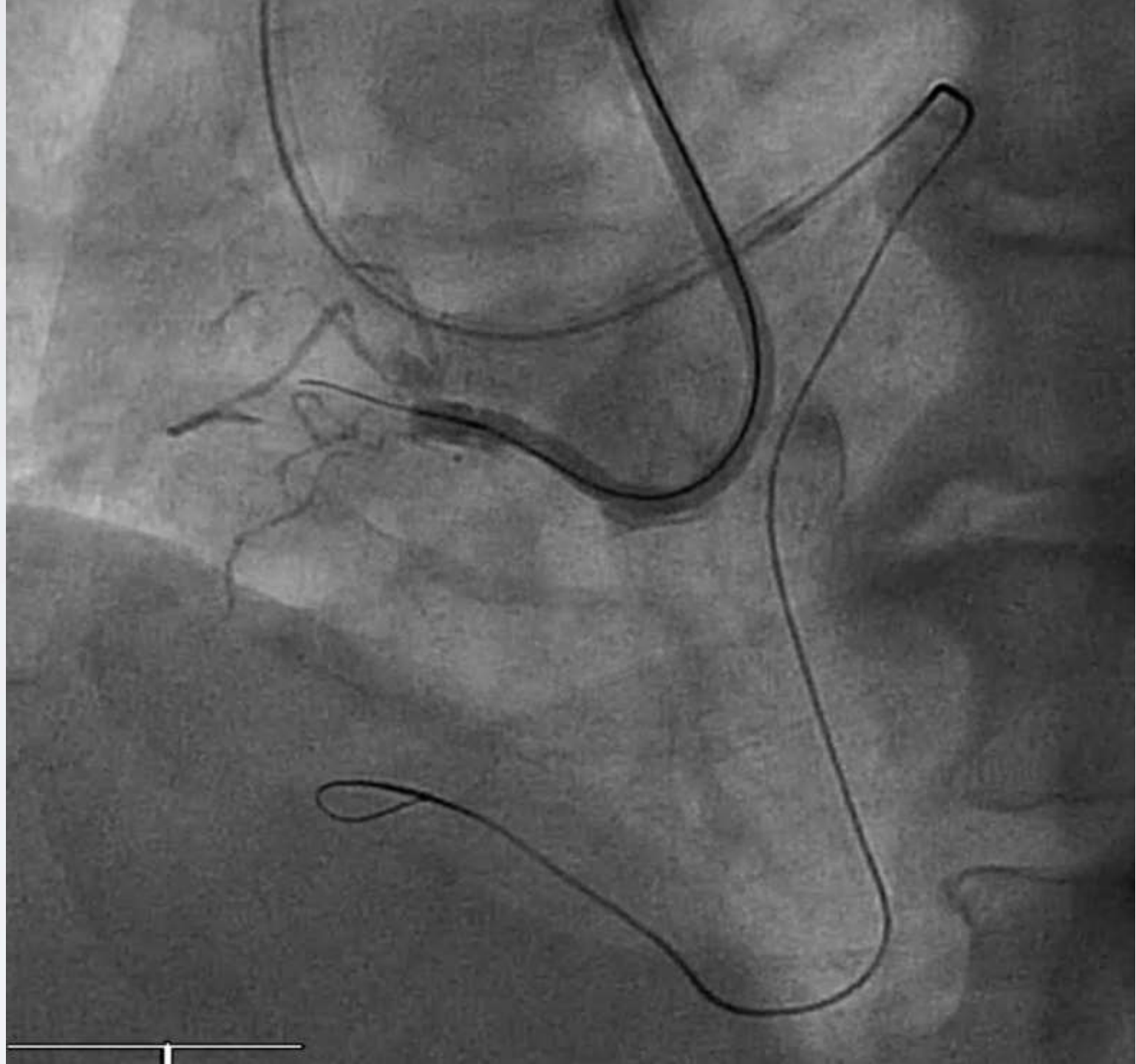
Procedural considerations

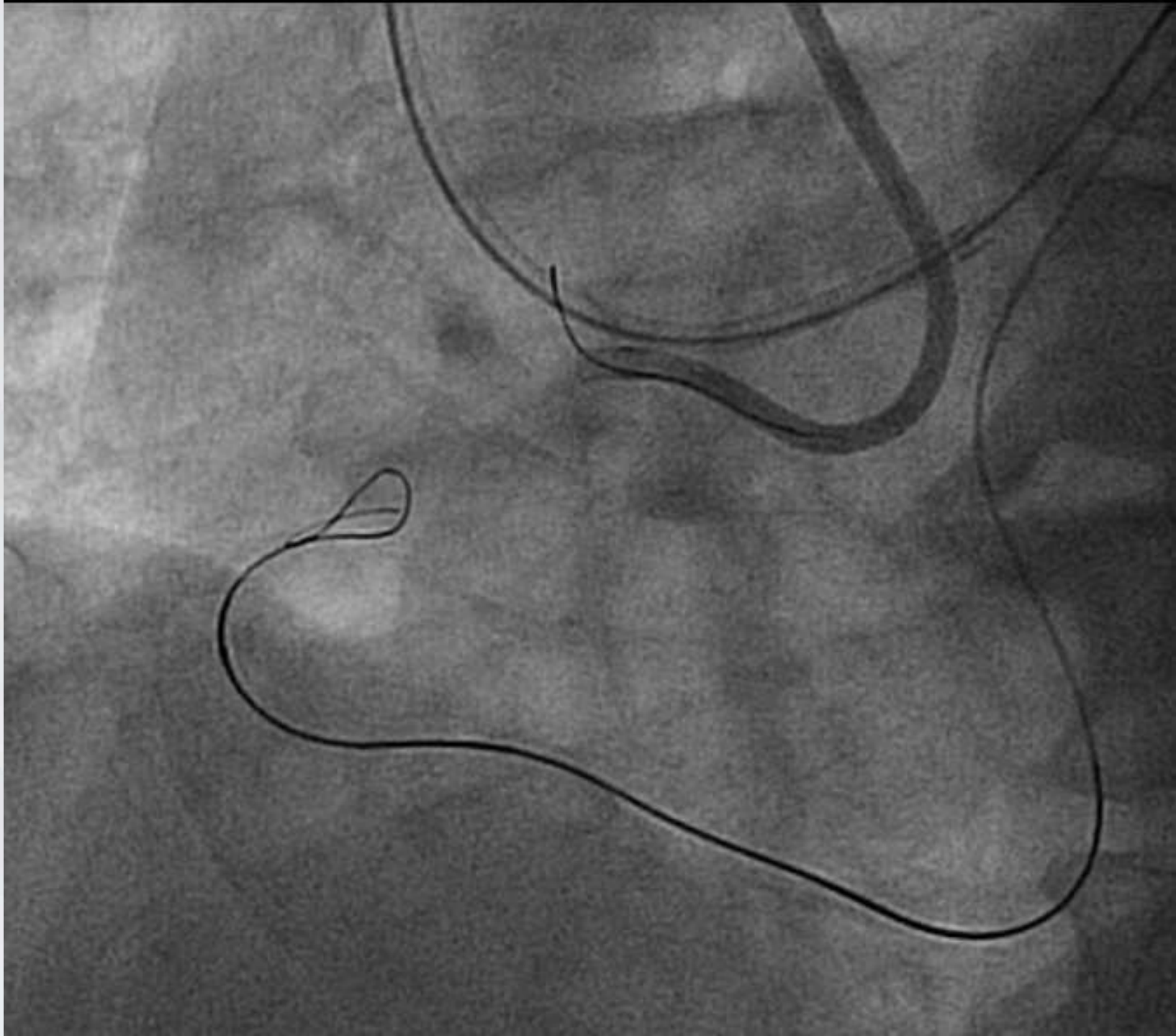
As wire is exiting retrograde MC:

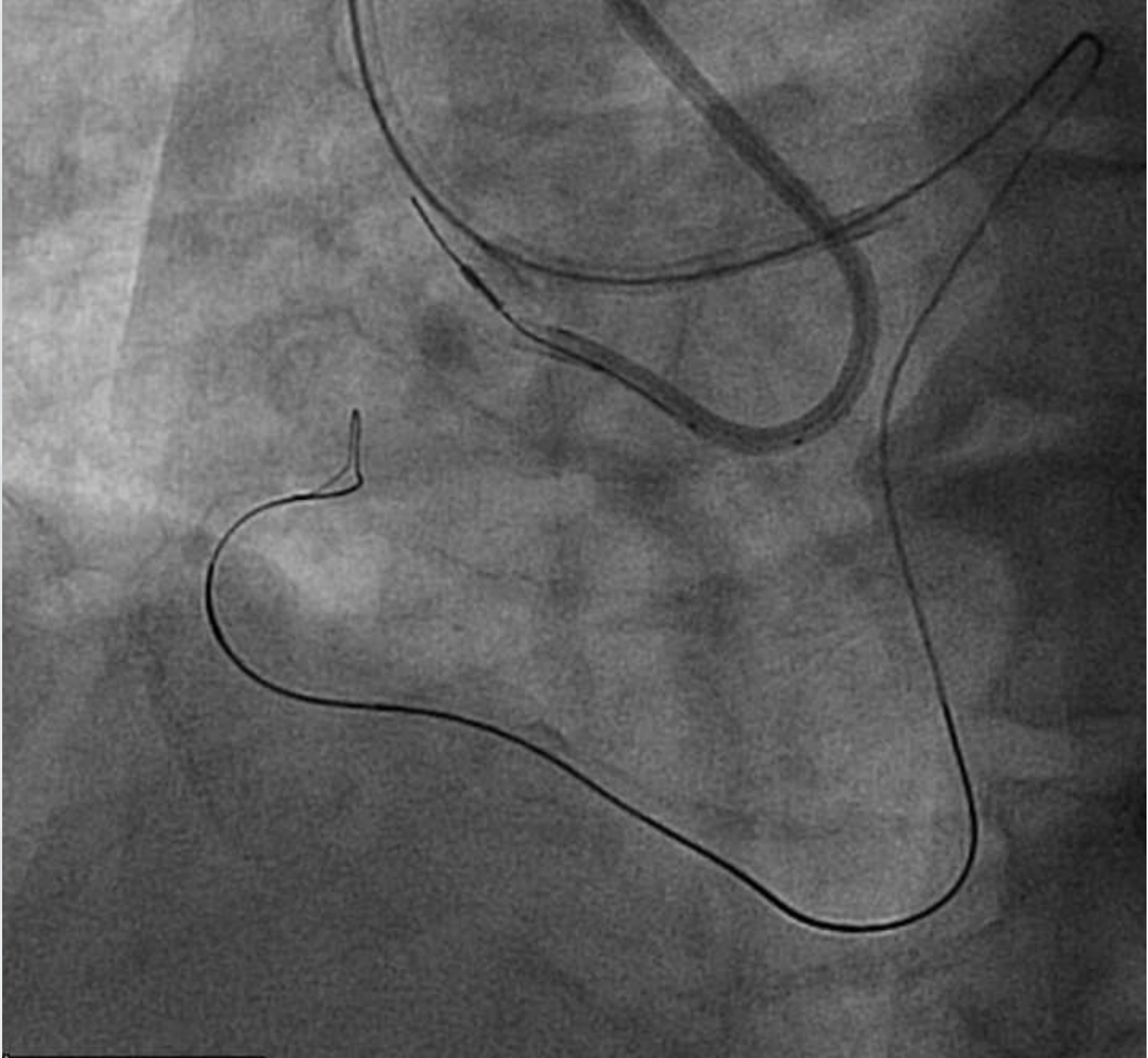
How much wiring ?

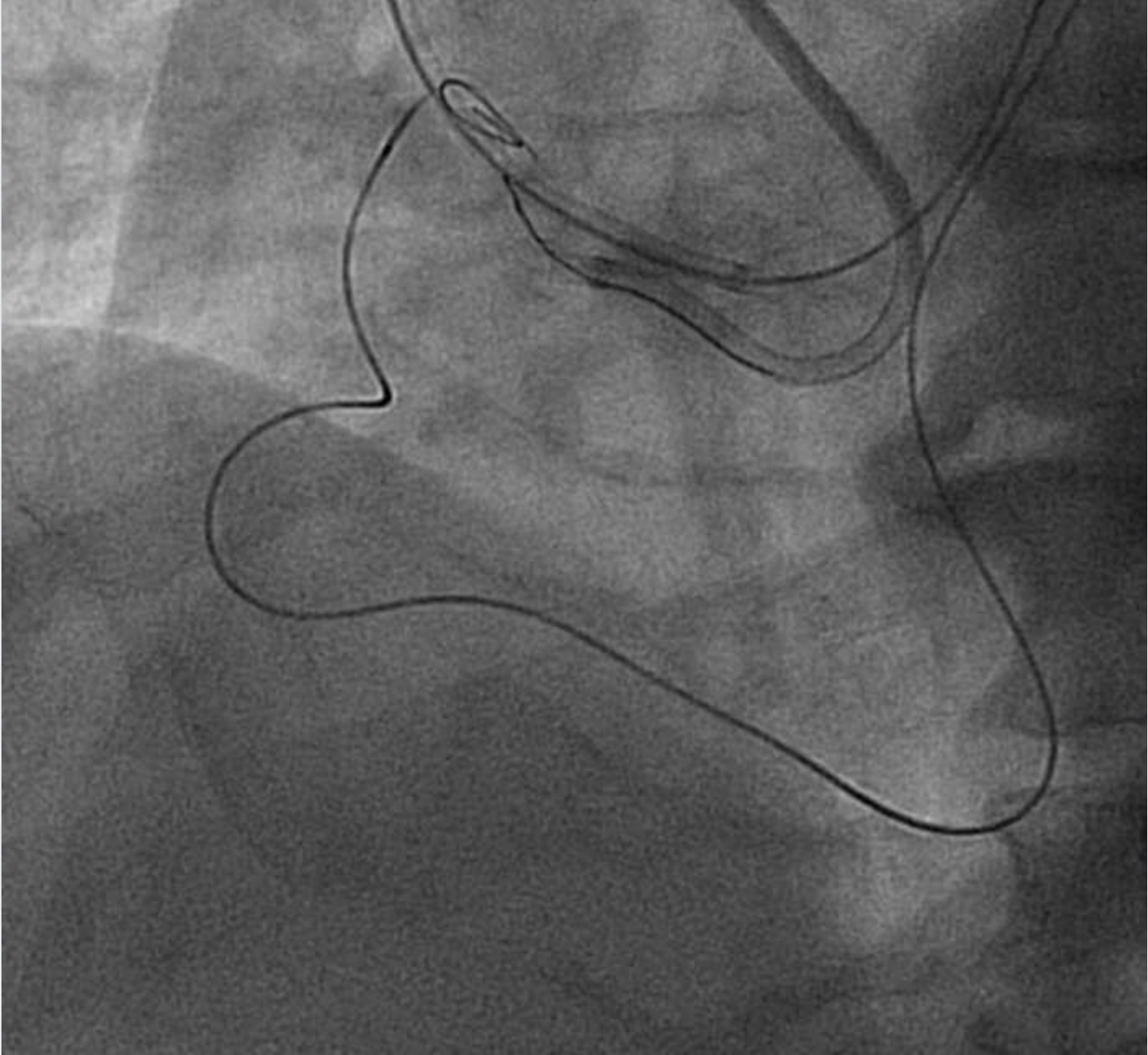
How much wire escalation ?

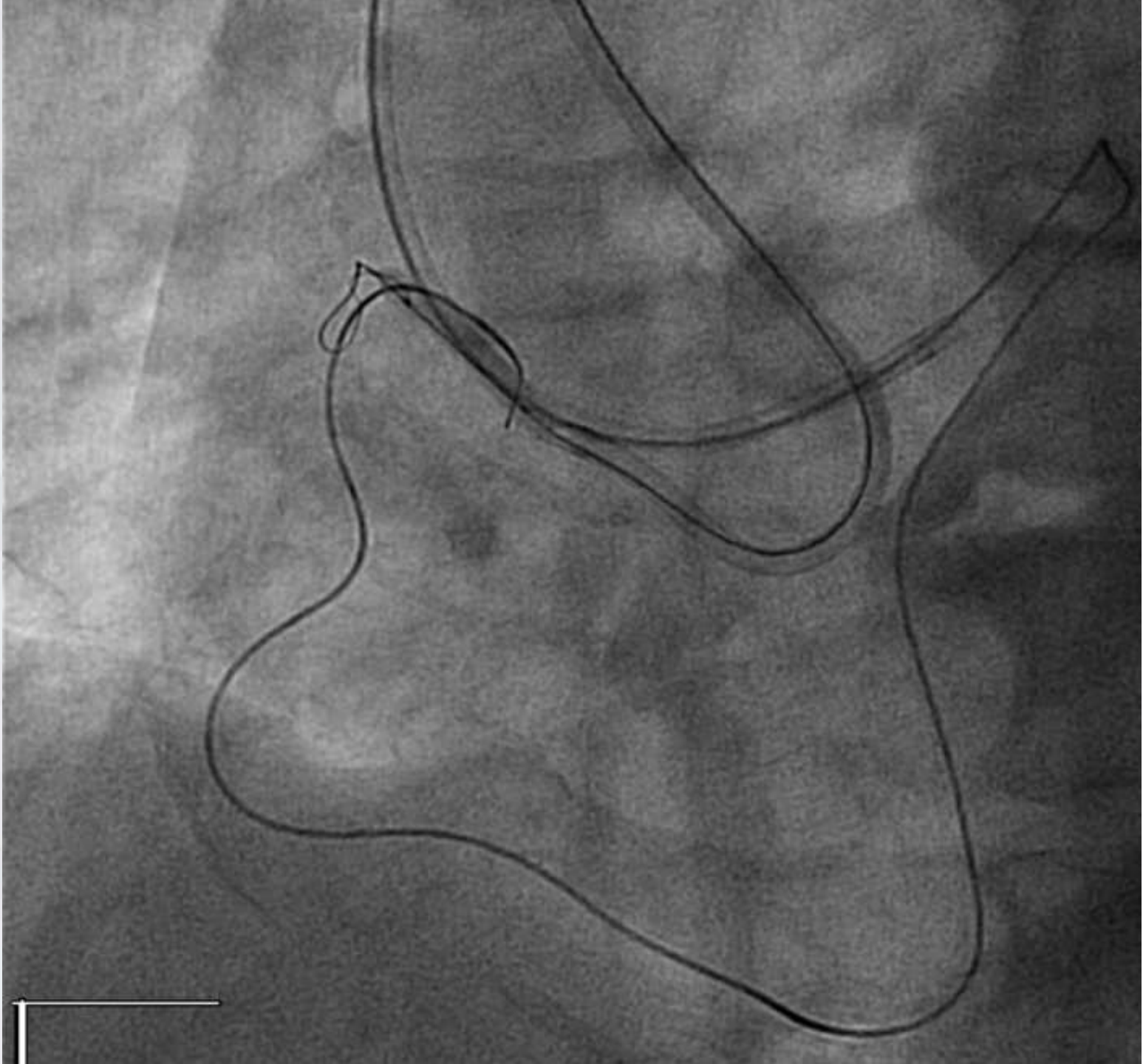
When to knuckle ?

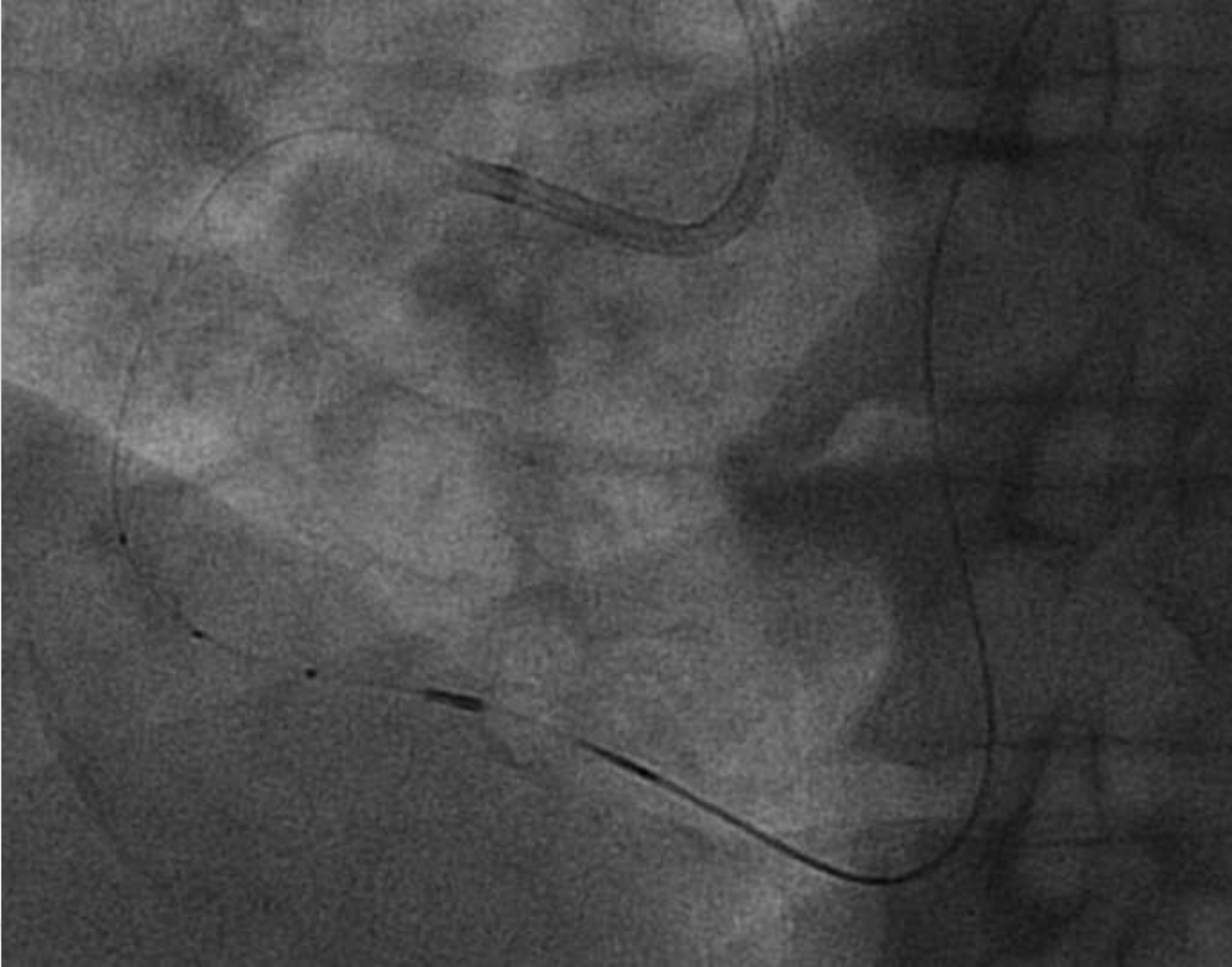












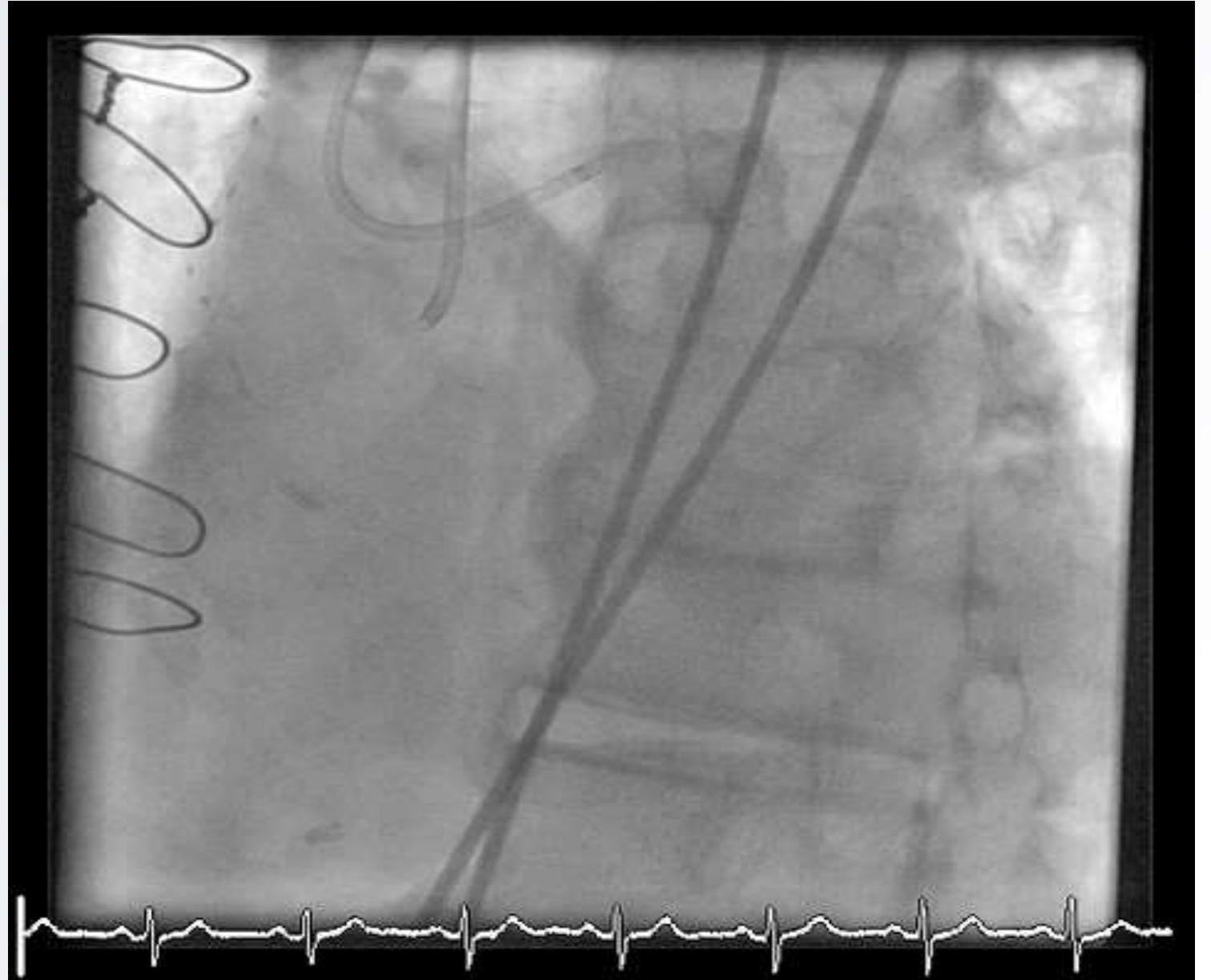


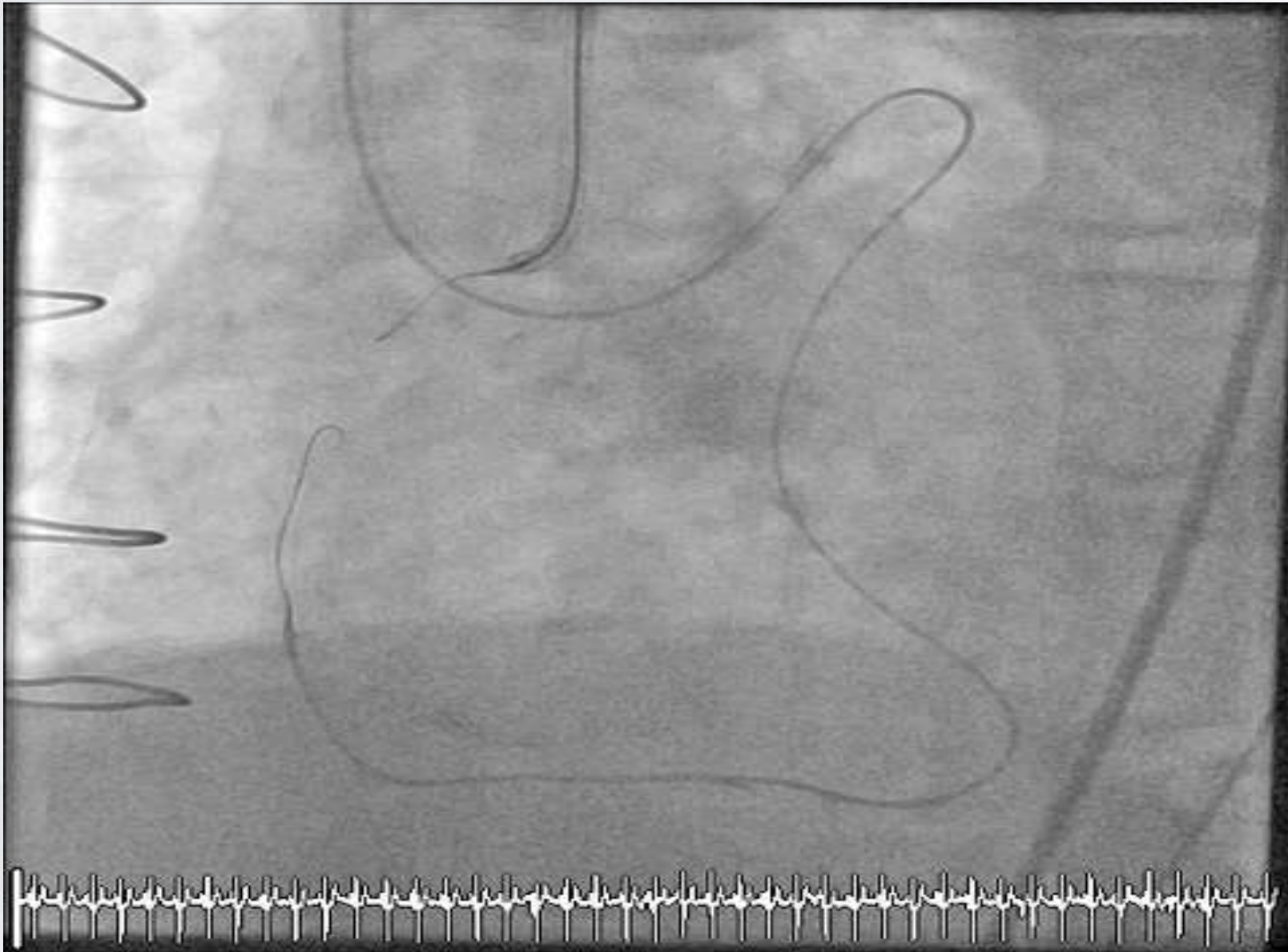
CASE 2

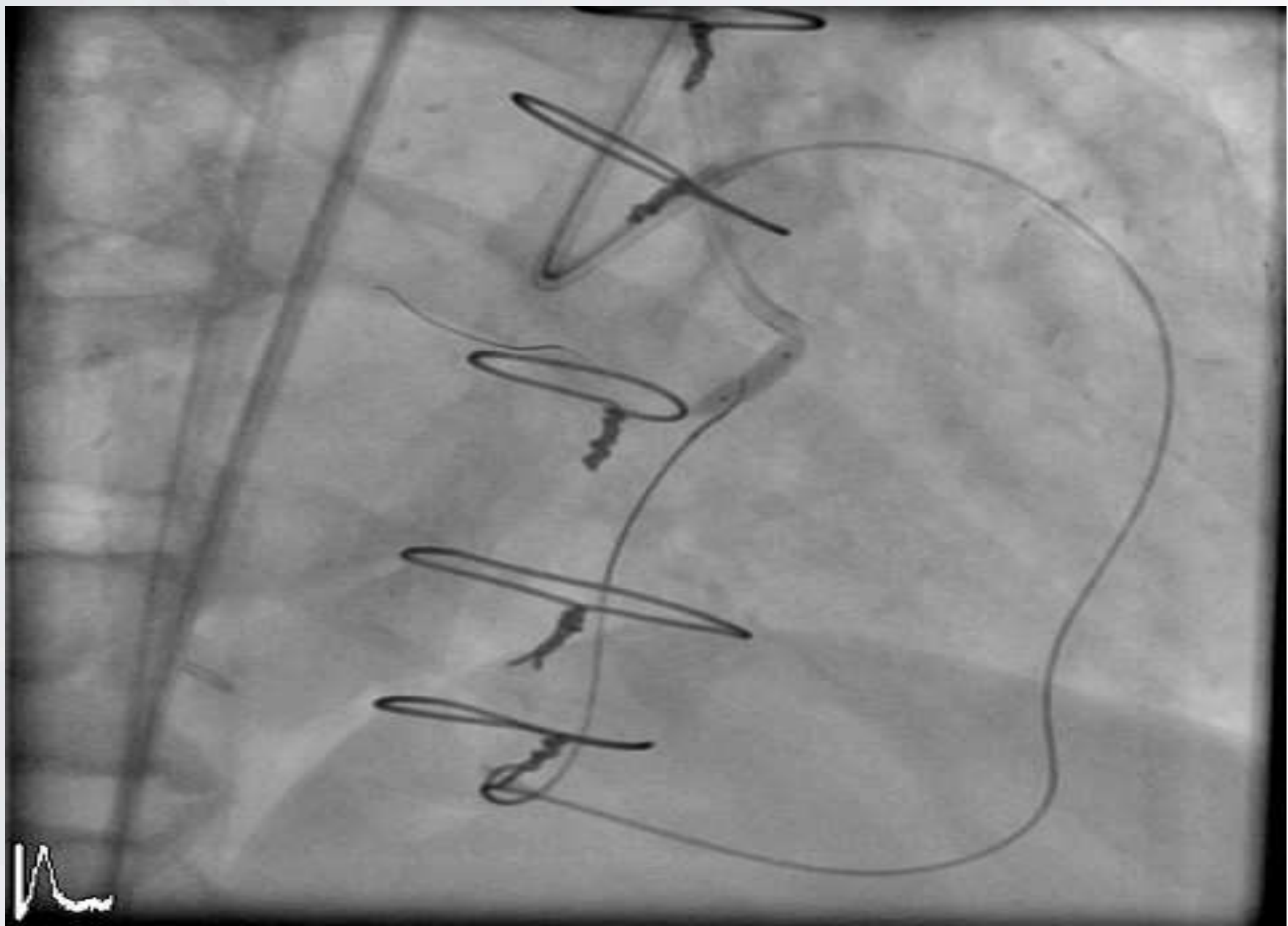
60 yr old man
15 yrs post CABG
Patent LIMA-LAD
Occluded RCA

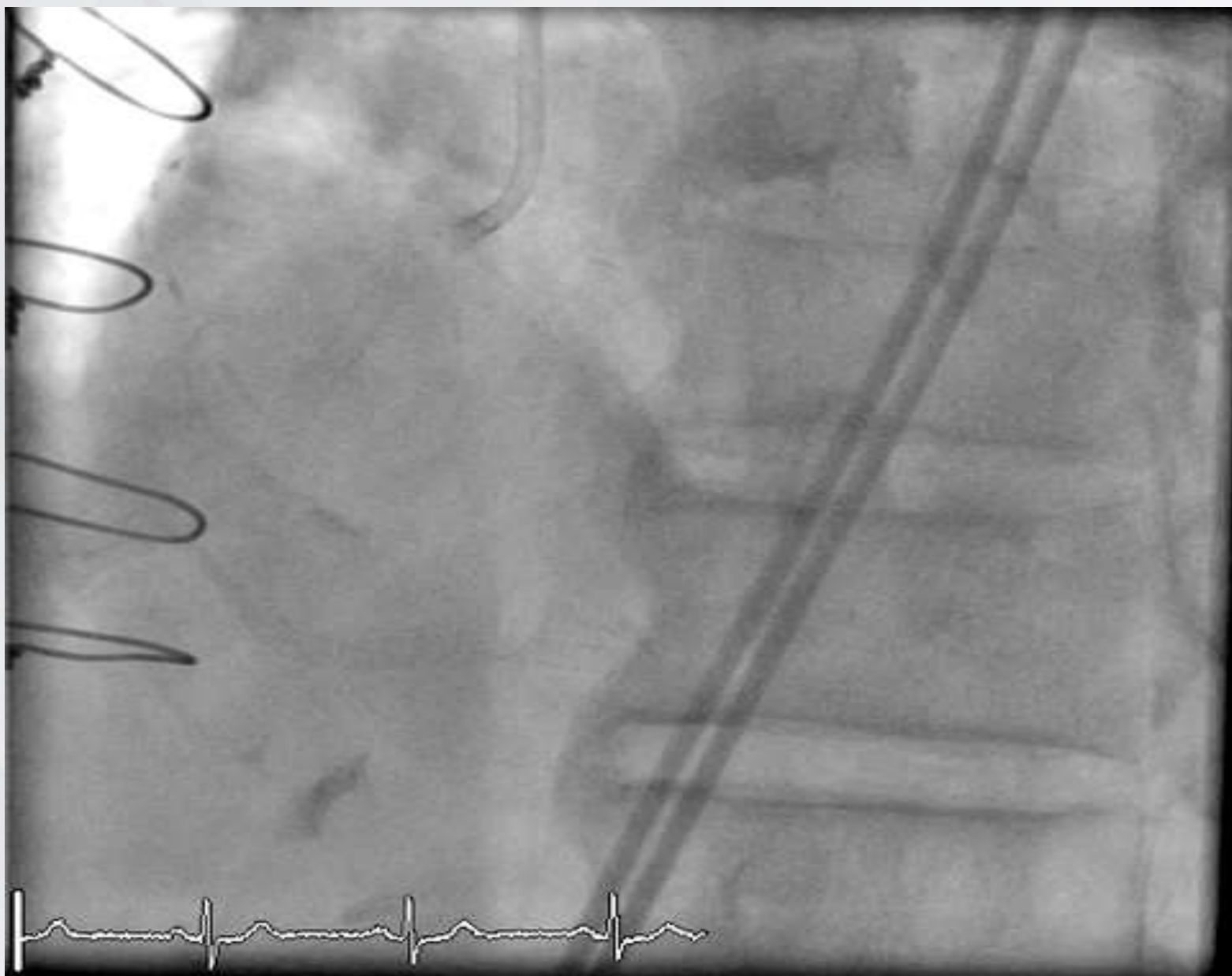
Long RCA CTO
'Island' in mid

J-CTO 3









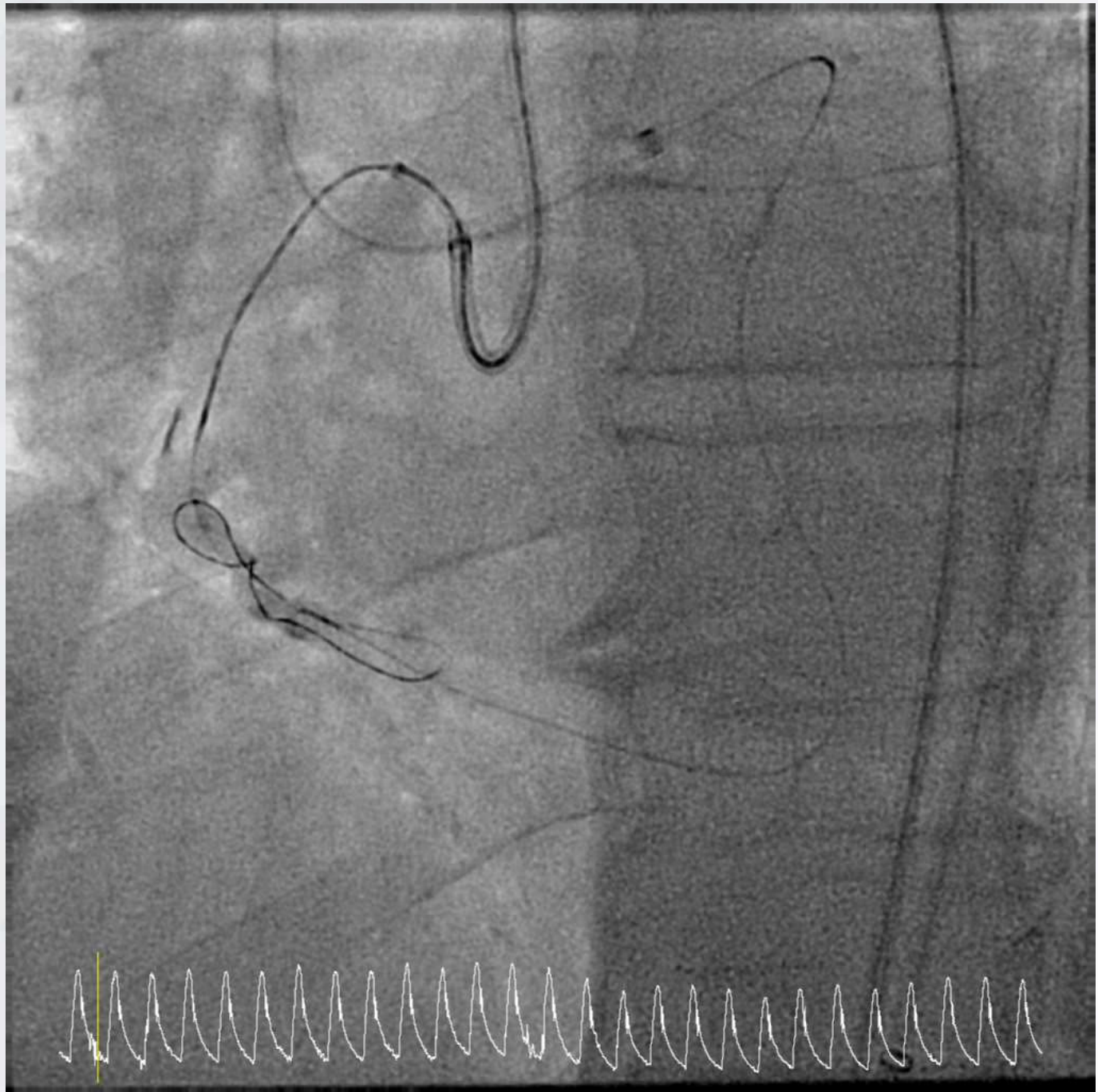
CASE 3

55 year old

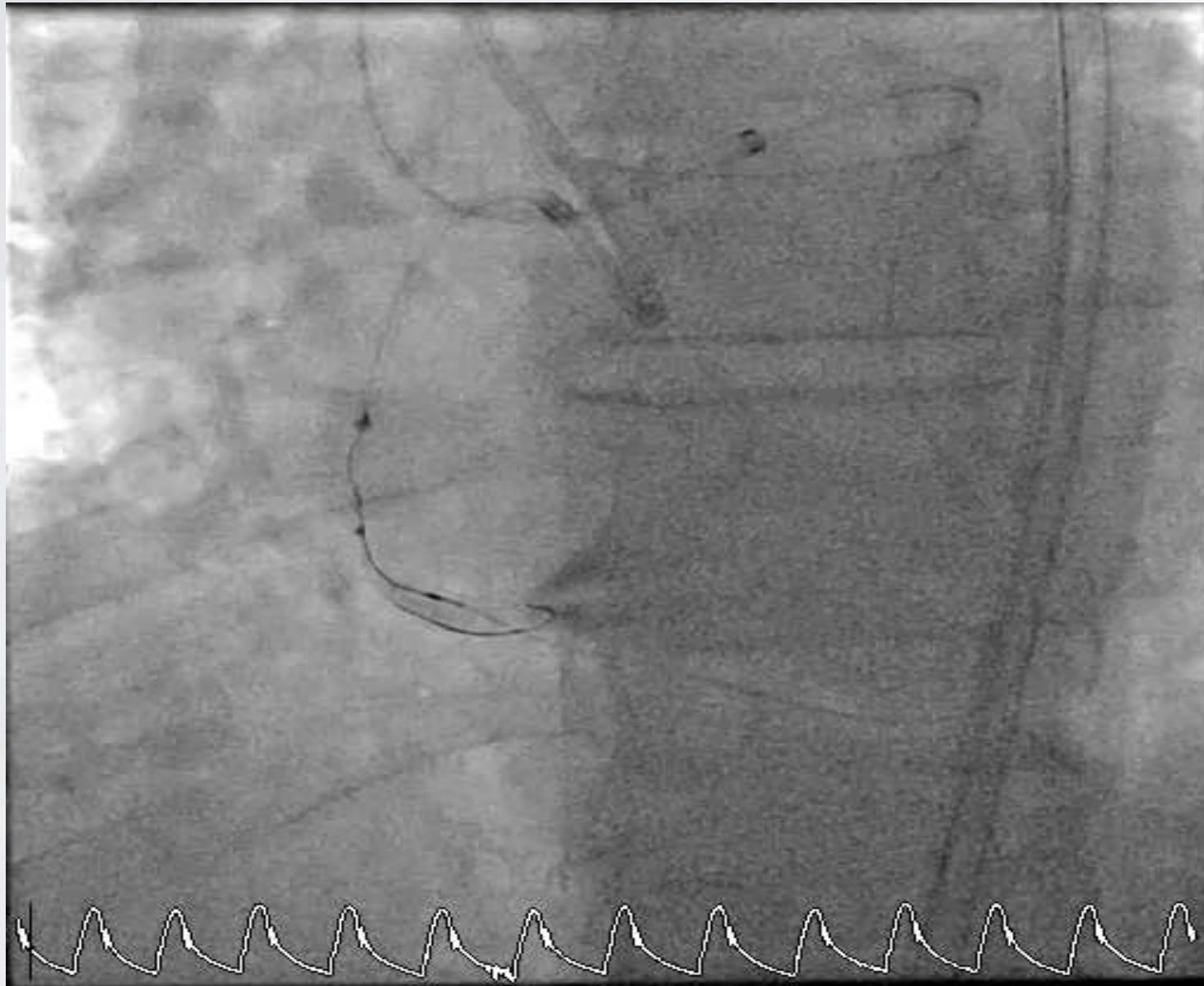
RCA CTO

JCTO - 4





Retrograde wire into guideliner



Coronary stenting



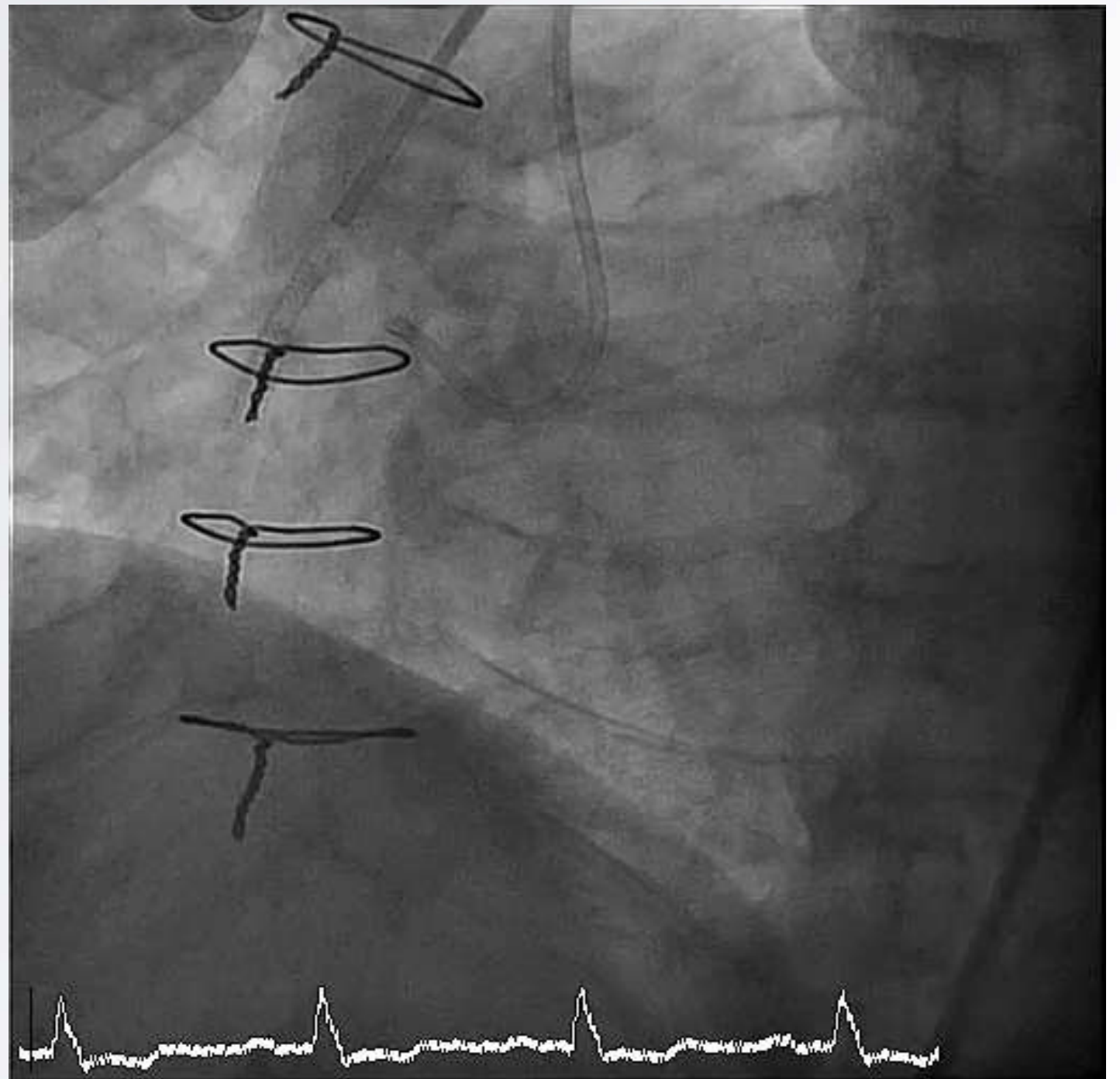


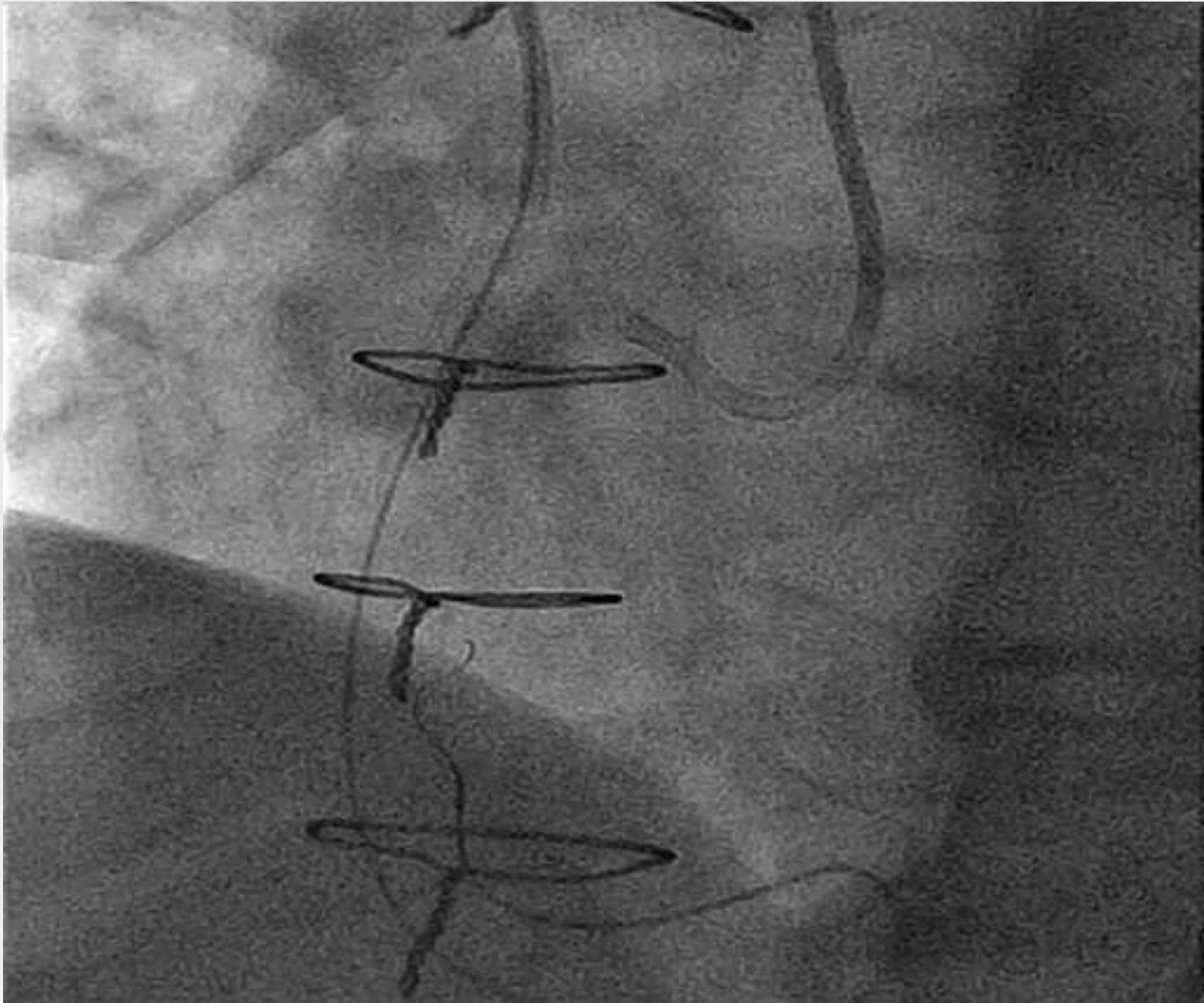
CASE 4

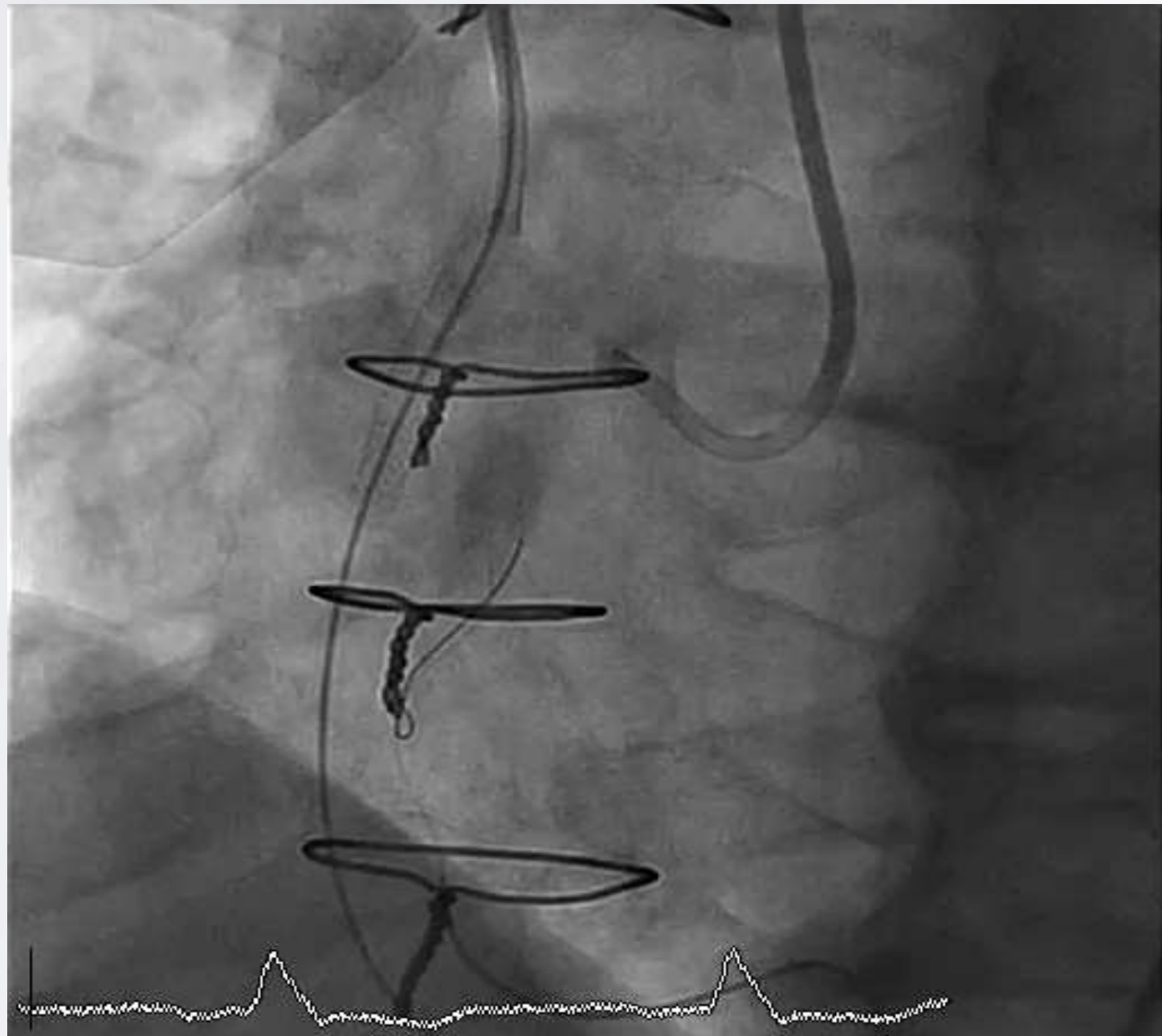
**78 year old man
18 yrs post CABG**

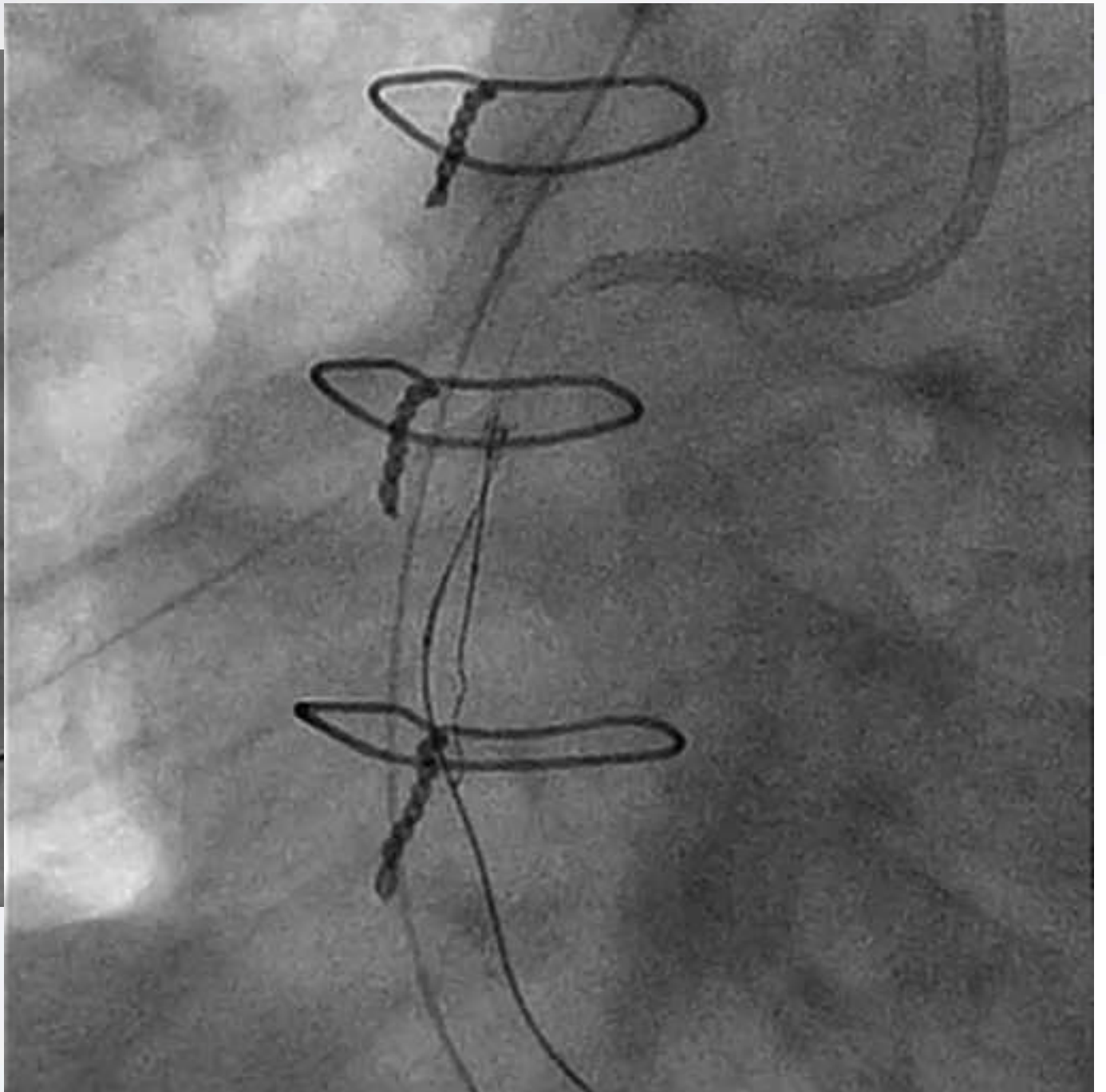
**10 PCIs over 3
years to SVG-RCA**

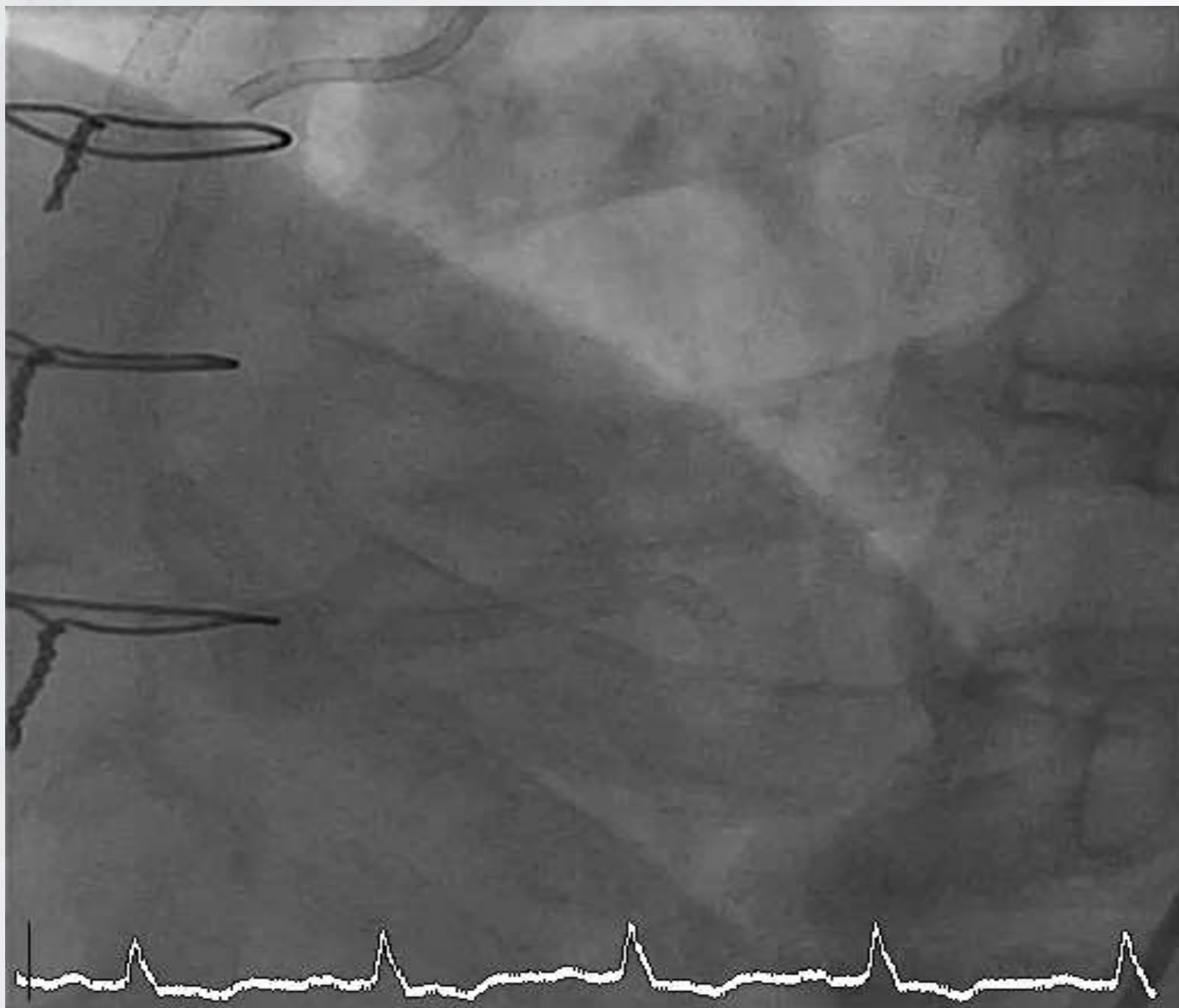
Native RCA CTO











CONSISTENT CTO TRIAL

Successful CTO PCI 210 of 231 patients (91% success)

J-CTO 2.4 +/- 1.3, lesion length (core lab) 29.1mm+/-20.4mm

- **At 1 year, TVF (cardiac death, MI, ischemia-driven TLR) = 5.7%**
- **MACE (all-cause mortality, MI, TVR) = 10% at 1 year and 17% 2 years**
- not influenced by DART
- Quality-of-life significantly better to 12 months.
- OCT similar at 12 months DART/ SI stenting compared with intimal strategies.

Conclusion / Take-home Message

- KWT useful adjunct in retrograde CTO-PCI
- Safe, efficient negotiation of ambiguous vessel course, long CTO lesion and calcification to aid CTO-PCI
- CTO-PCI operators should be comfortable with KWT