LM CTO, Is it No Man’s Land?

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Disclosure

No conflict of interest with this paper

Remark

LM supplies >50% cardiac muscle in the setting of right dominant coronary system and as high as 90% in the setting of left dominant system.

Introduction

Large registry data shows LM CTO is rare. The proportion of LM CTO PCI in the studies (Japanese CTO expert, OPEN CTO and ERCTO) was only 0.4%, 0.3% and 0.8%, respectively.

Canadian Multicenter Chronic Total Occlusion registry shows the prevalence of non LM CTO lesion in elective angiography was 18.4% and 40% of the patients had previous myocardial infarction.

From 2006 to the present, we have performed 1212 cases of CTO PCI, of which only two cases were LM CTO.

Discussion Points

- Which patient in LM CTO would be indicated for PCI?
- If do, what should we think about?

Anatomy of LM

- Average length: 8.53 +/- 4.03mm (1.9mm ~ 22.7mm)

  Morphologie 2019 Mar; 103 (342) 17-23

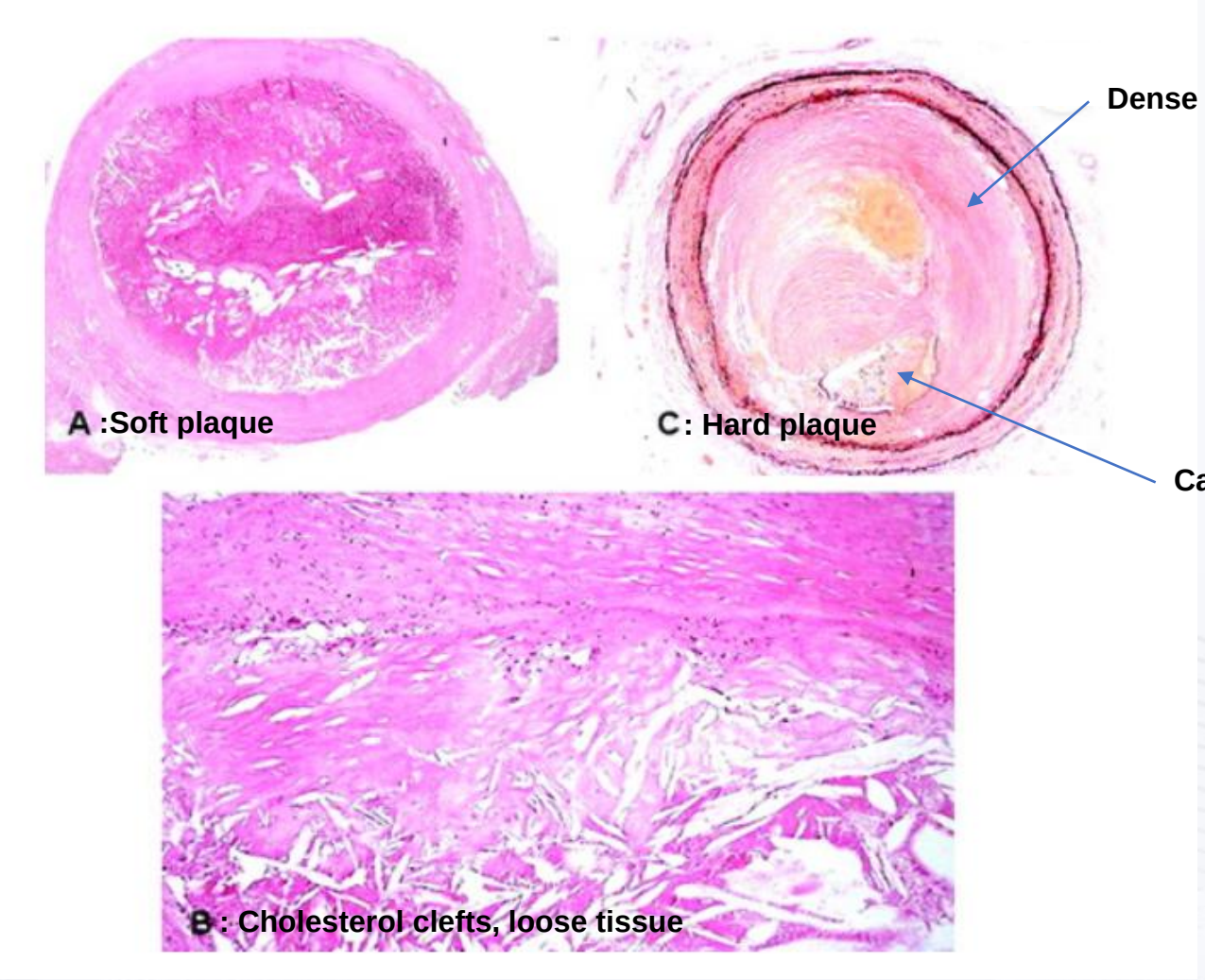
- Average diameter: 4.5 +/- 0.5mm

  Circulation 1992; 86: 232-246

- Distal branch variation: Bifurcation (78.2%), trifurcation (20.4%).

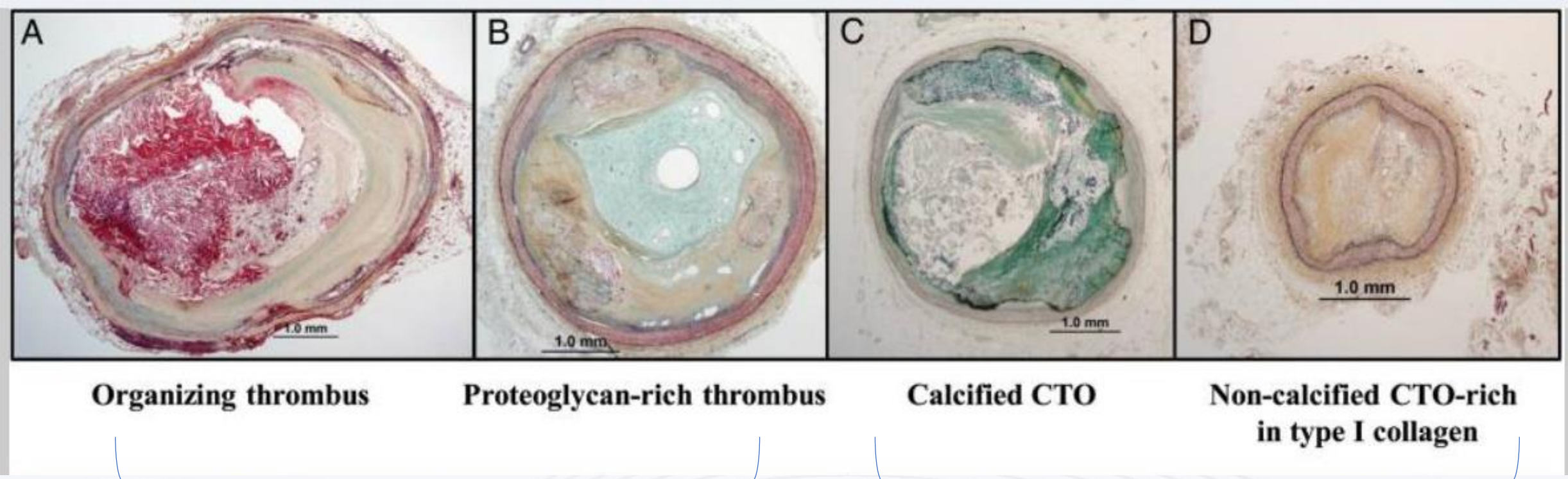
  Folia Morphol 2013; 72 128-131

Histopathology of CTO lesion



Circulation 2005, 112 2364-2372

Histopathology of CTO lesion



Short occlusion period

Long occlusion period

Eur Heart J 2014 Jul 1; 35(25): 1683-1693

J CTO score

J-CTO SCORE SHEET

Version 1.0

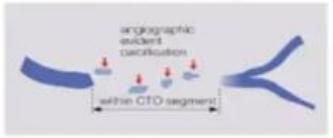
Variables and definitions

Tapered **Blunt**

Entry with any tapered tip or dimple indicating direction of true lumen is categorized as "tapered".

Entry shape
☐ Tapered (0)
☐ Blunt (1)
point

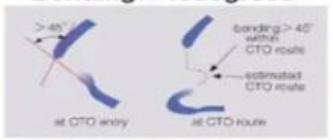
Calcification



Regardless of severity, 1 point is assigned if any evident calcification is detected within the CTO segment.

Calcification
☐ Absence (0)
☐ Presence (1)
point

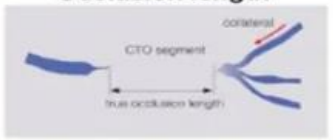
Bending > 45degrees



One point is assigned if bending > 45 degrees is detected within the CTO segment. Any tortuosity separated from the CTO segment is excluded from this assessment.

Bending > 45°
☐ Absence (0)
☐ Presence (1)
point

Occlusion length



Using good collateral images, try to measure "true" distance of occulusion, which tends to be shorter than the first impression.

Occl.Length
☐ <20mm (0)
☐ ≥20mm (1)
point

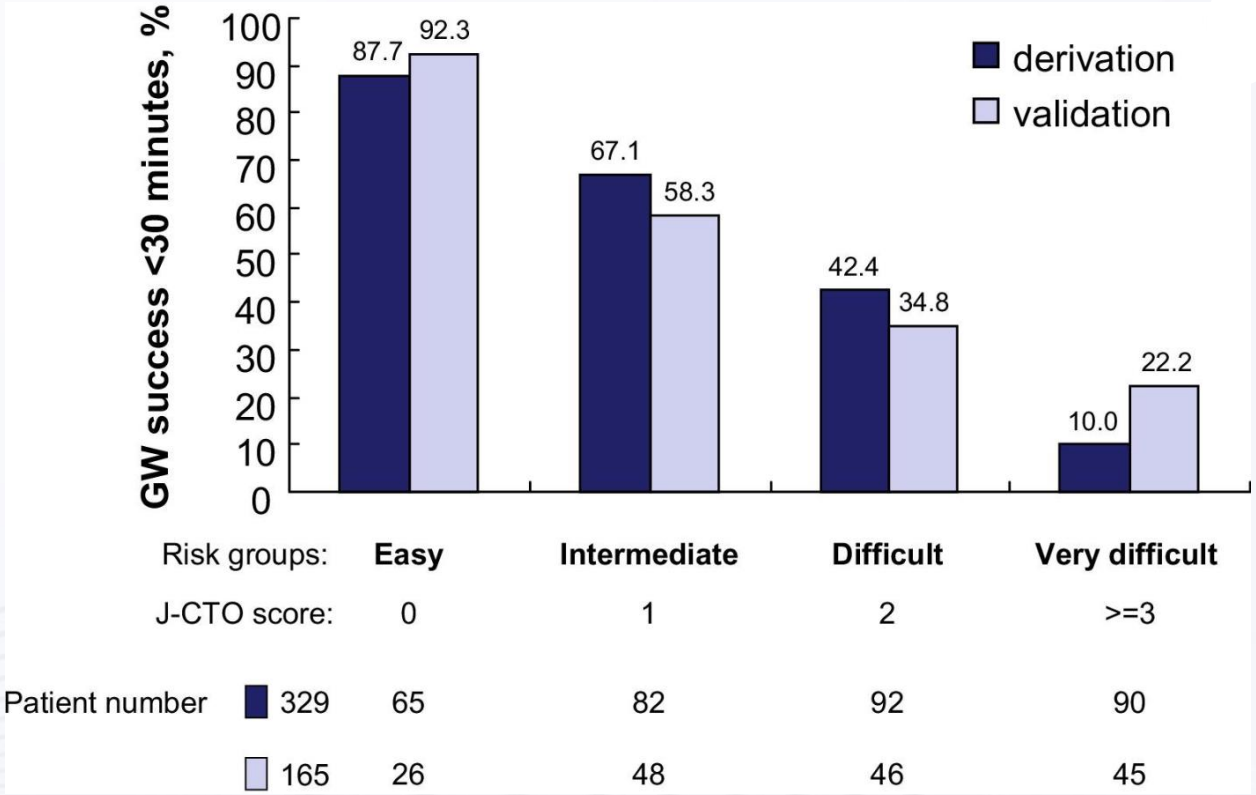
Re-try lesion

Is this Re-try (2nd attempt) lesion ? (previously attempted but failed)

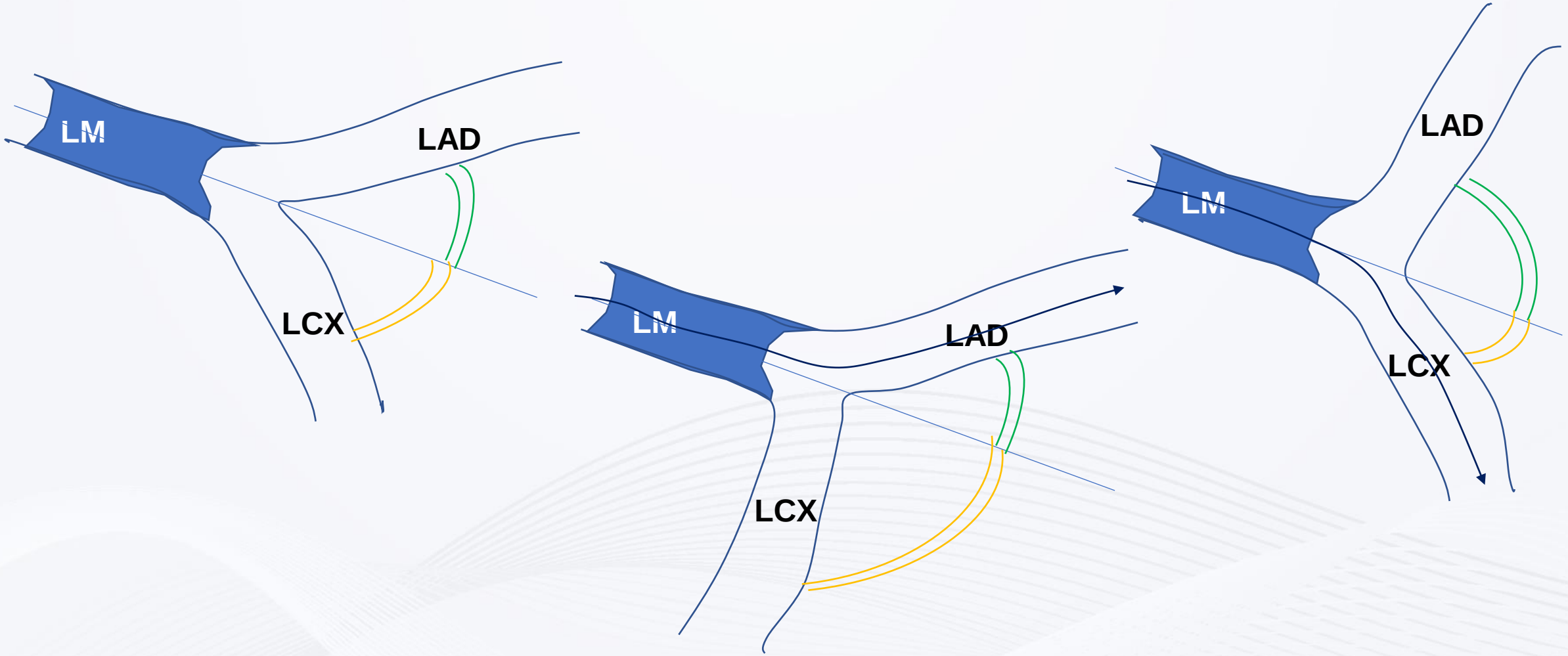
Re-try lesion
☐ No (0)
☐ Yes (1)
point

Category of difficulty (total point)
☐ easy (0) ☐ Intermediate (1)
☐ difficult (2) ☐ very difficult (≥3)

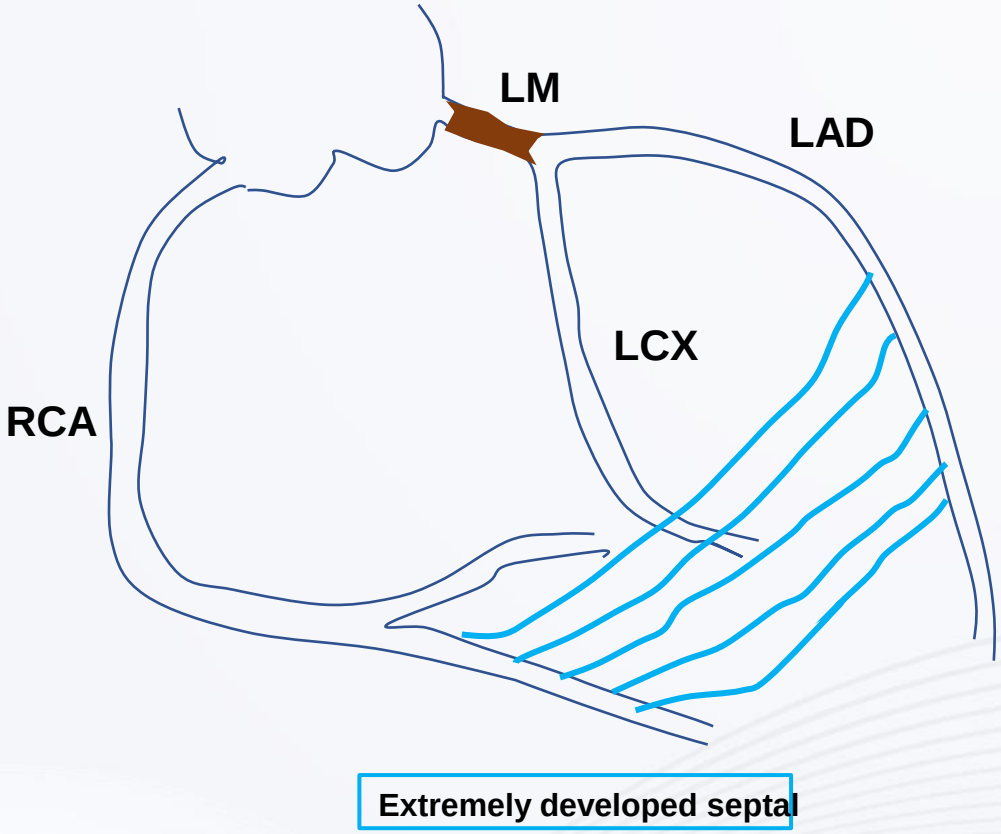
Total ____ points

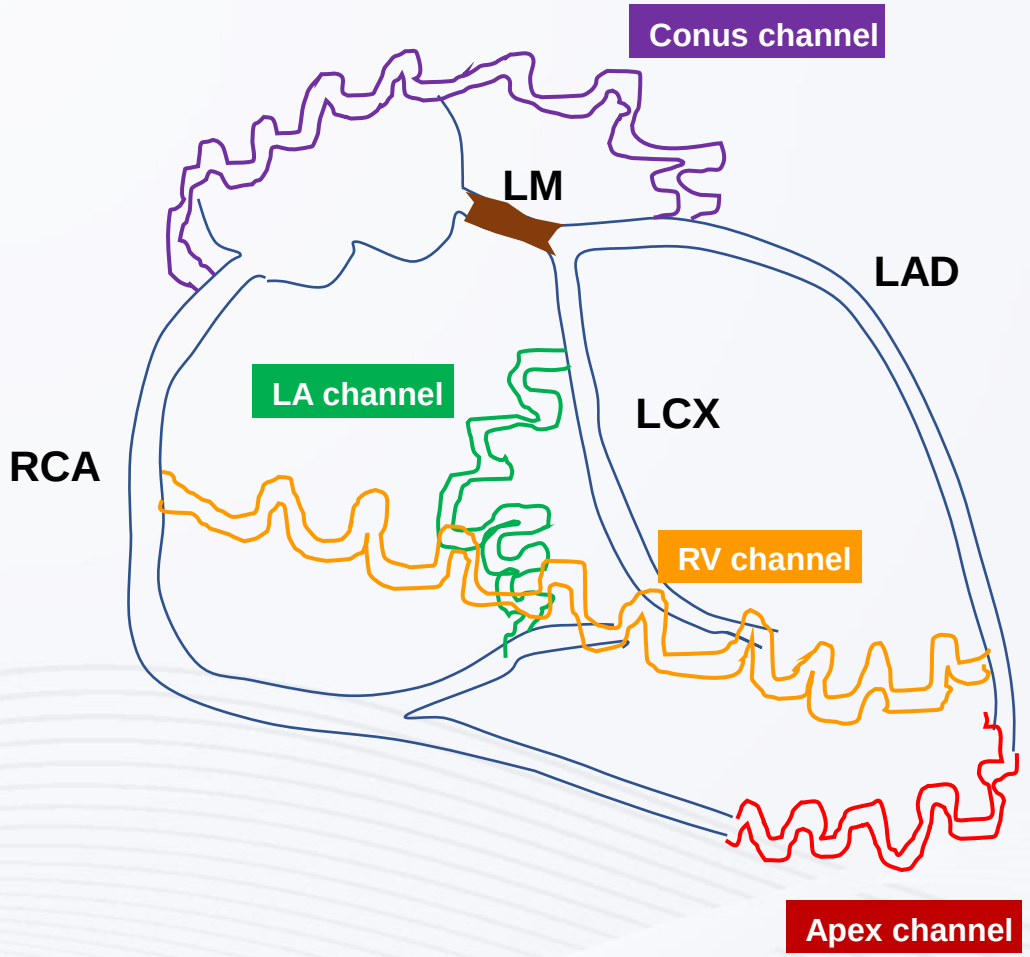


Distal bifurcation angle



Collaterals





In case with non stump LM CTO, retrograde approach is the only way.
In case with extremely developed septal channels, retrograde approach may be possible but may expose patient to critical condition, if the problems occur in RCA.
Tortuous epicardial collaterals should not be used because decreasing flow though the collateral can cause total myocardial ischemia.

Summary

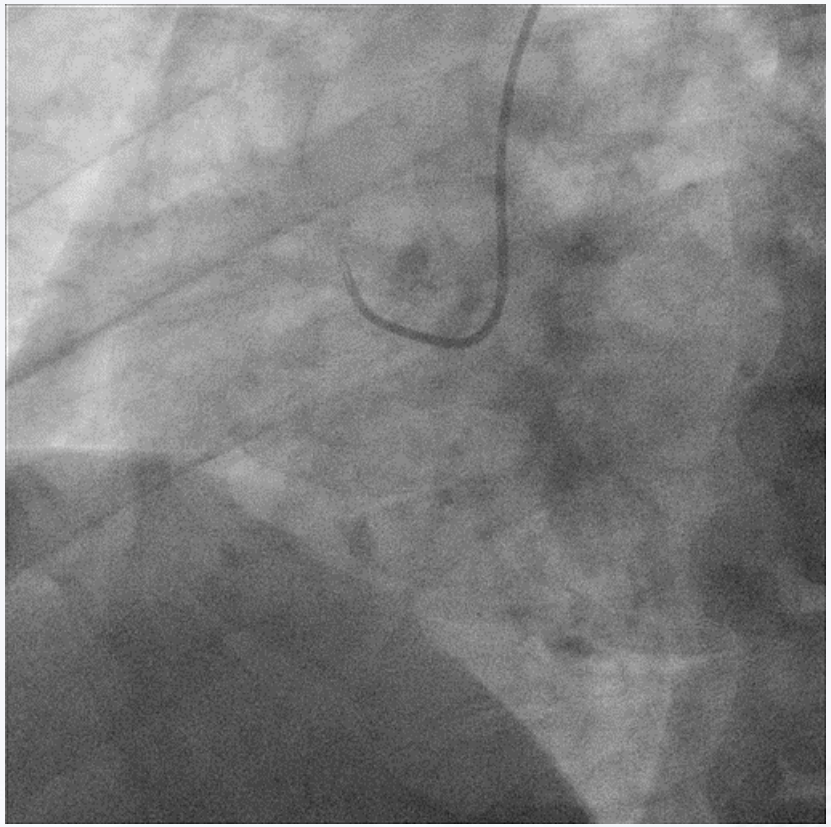
Lesions in LM CTO are usually short, but most of them have bifurcation with varying bifurcation angle at the distal end.

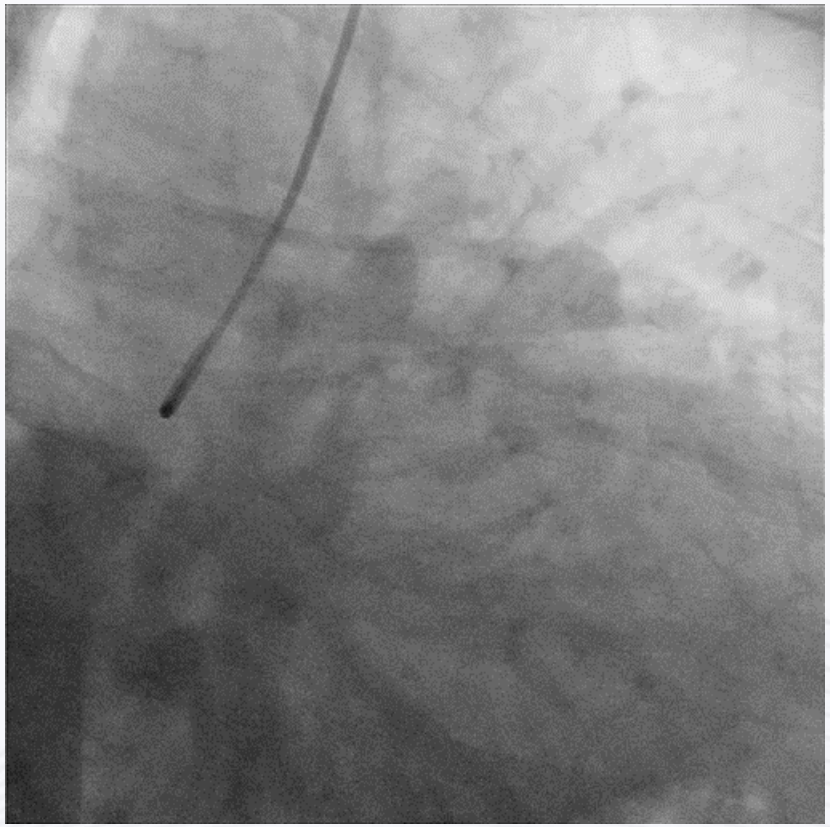
Short duration LM CTO might be a candidate for antegrade approach.

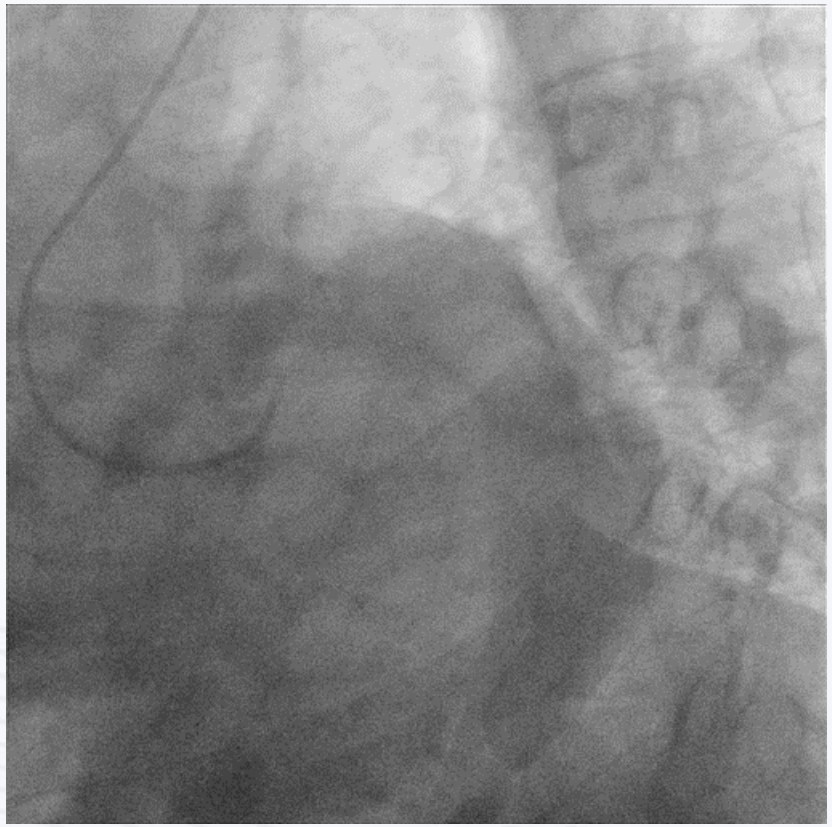
The well grown epicardial channels are essential for patient survival and retrograde approach using these channels are contraindicated.

Even in case where a very large number of septal channels have been developed, retrograde approach may damage only remaining RCA and may expose patient to a very critical state.

Case







65 years old male.
CABG was chosen due to the critical stenosis and non favorable angle for wiring toward LAD. CABG was performed in the following manner; LITA-LAD, SVG-D-14PL and GEA-RCA.

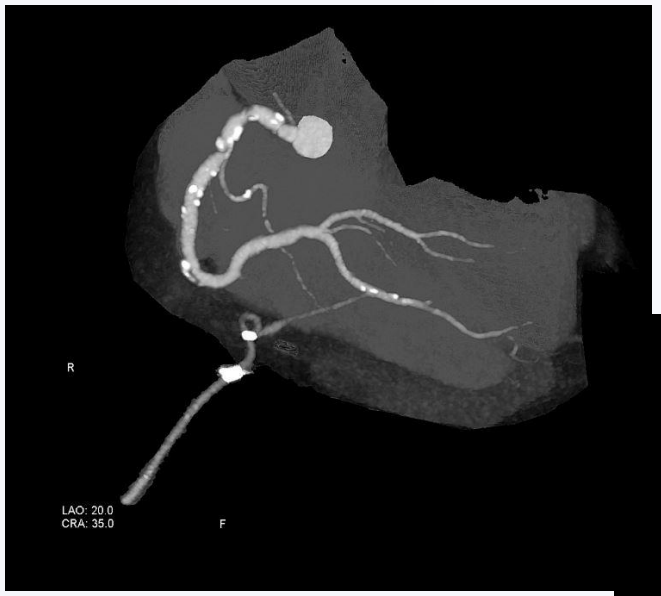
Clinical course

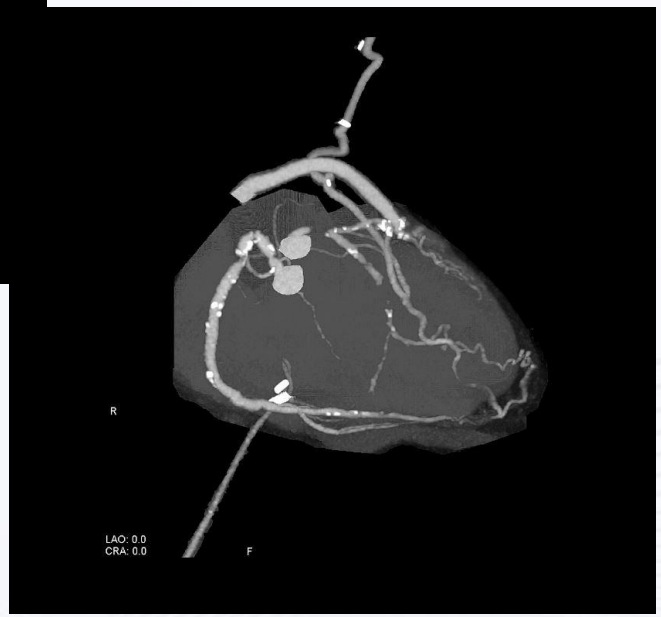
The patient’s course has been good for about 10 years.

Recently, the patient has become aware of chest pain during exertion.

ECG shows no myocardial infarction and UCG also shows no regional wall motion abnormality.

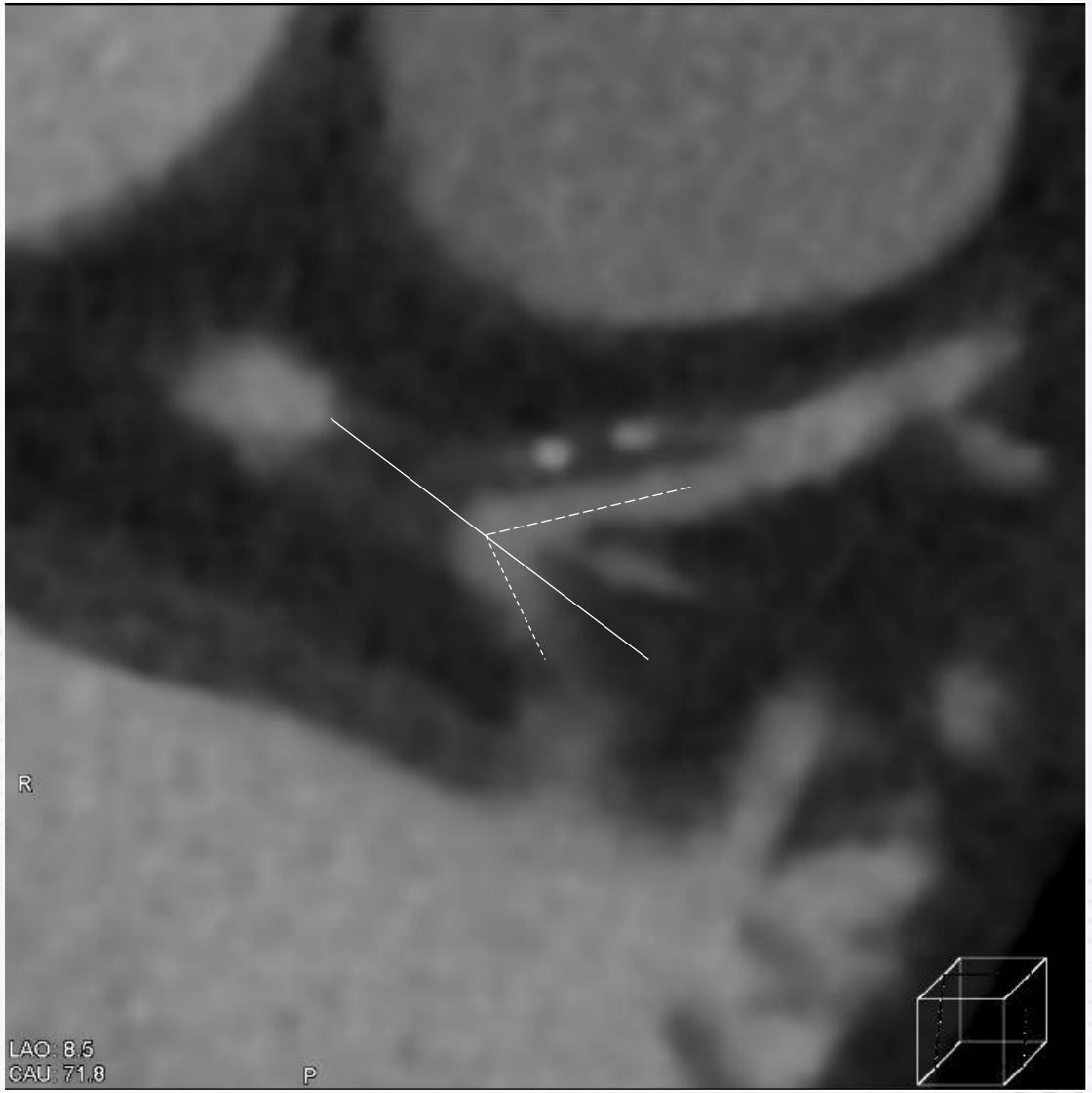
Coronary CT





All grafts, except sequential part between diagonal and #14 PL, are patent. But, GEA seems not to be sufficient to cover large RCA territory. LM and LCX are occluded.

Coronary CT



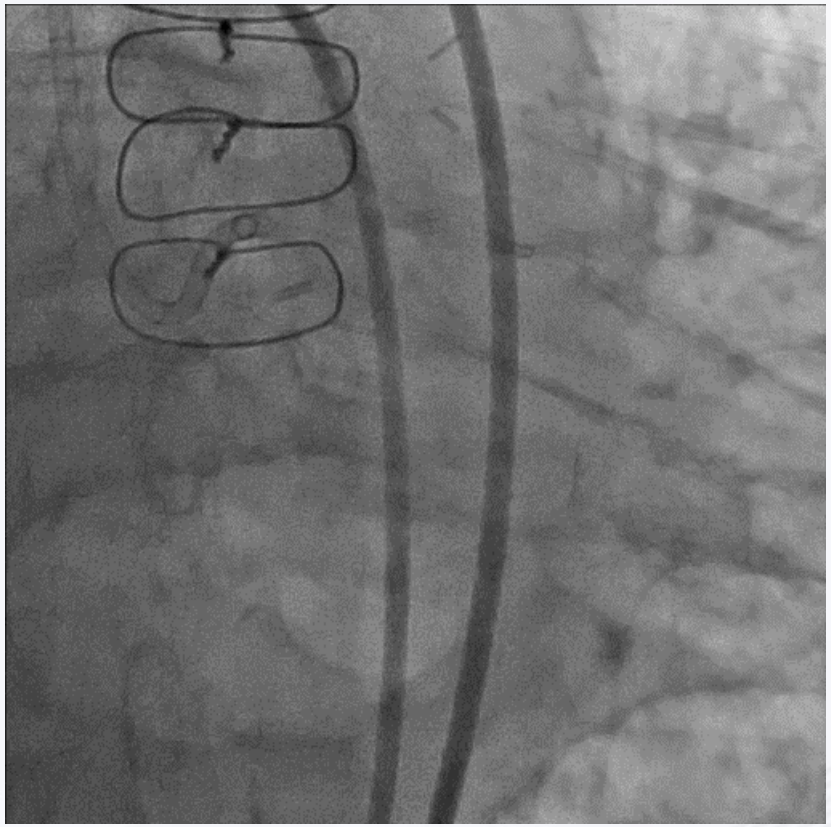
LM lesion is short, only small spot calcium. Smoother angle toward LCX.

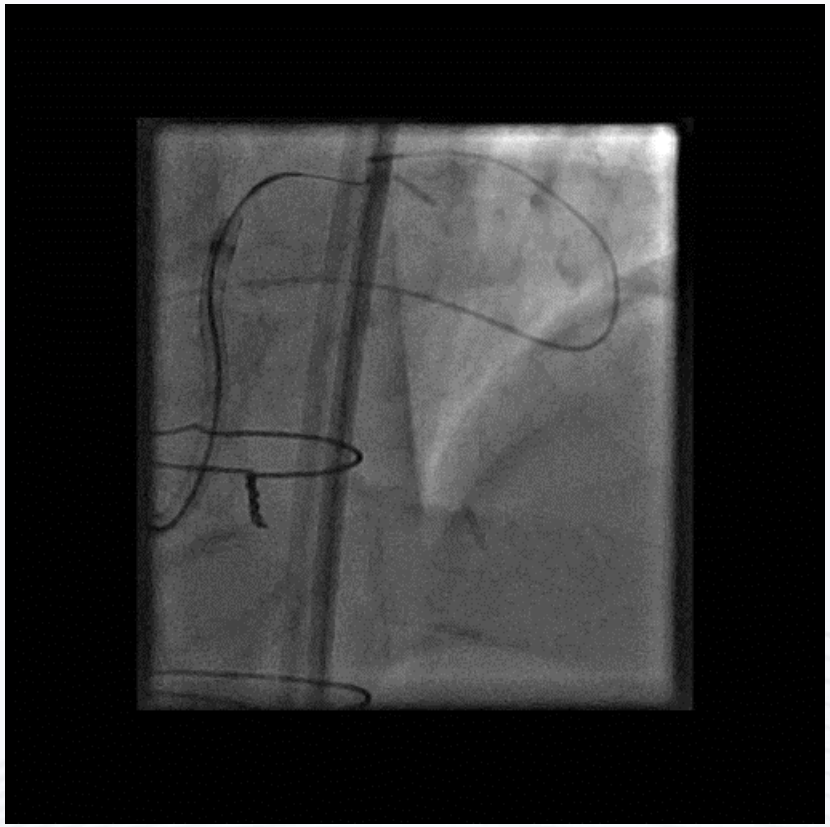
PCI for RCA

Stenosis progression in proximal RCA.

Stenting.

PCI for LM and LCX

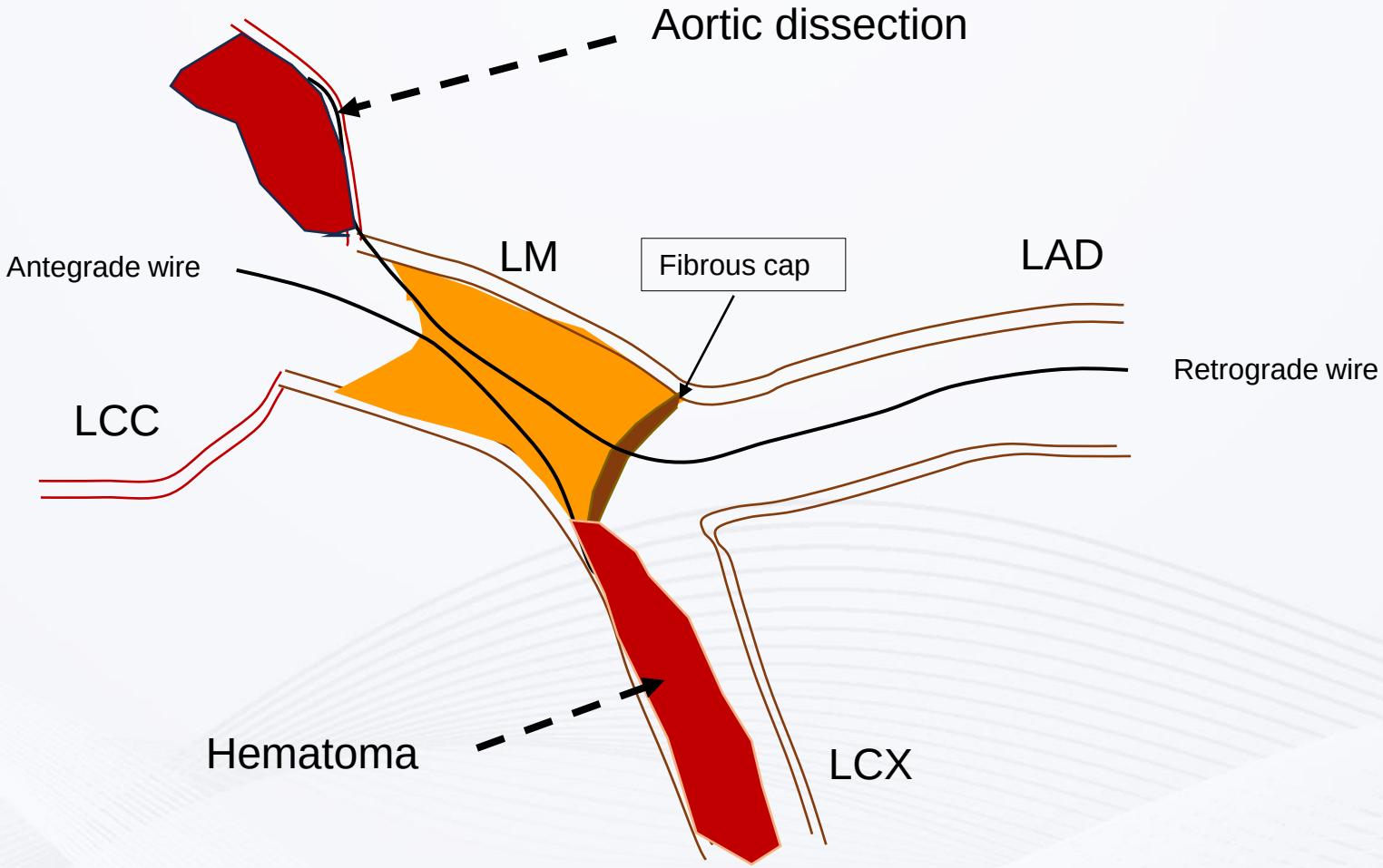




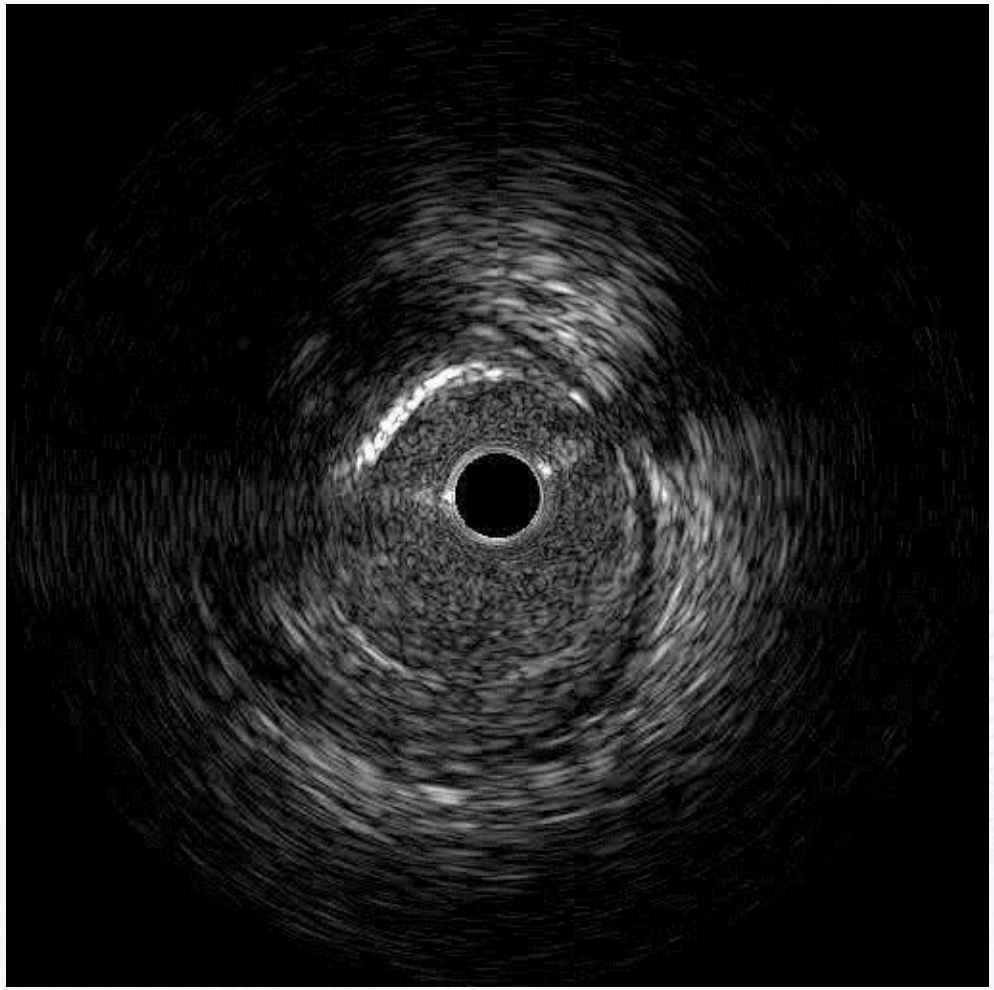
Failed antegrade wiring with GAIA 3

Retrograde wiring with Conquest pro 12

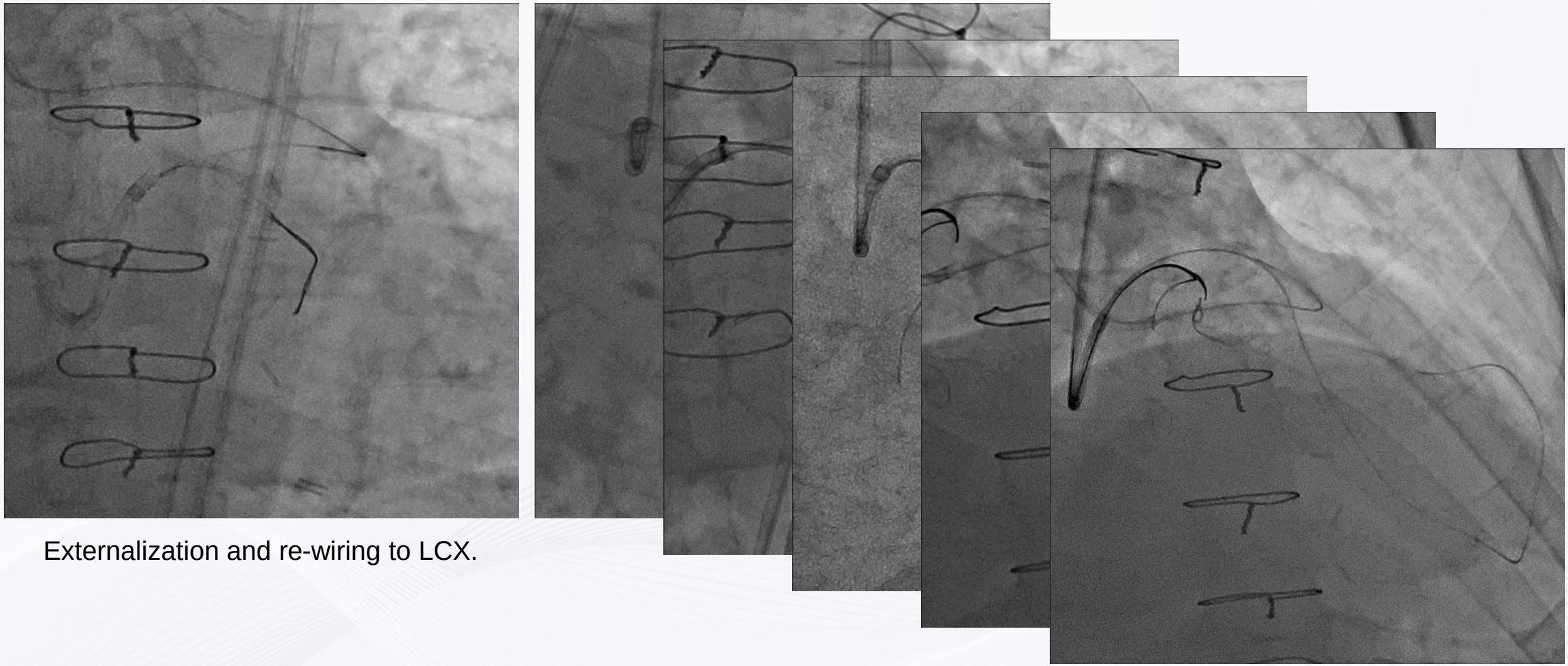
Two major problems to avoid



Retrograde direct cross

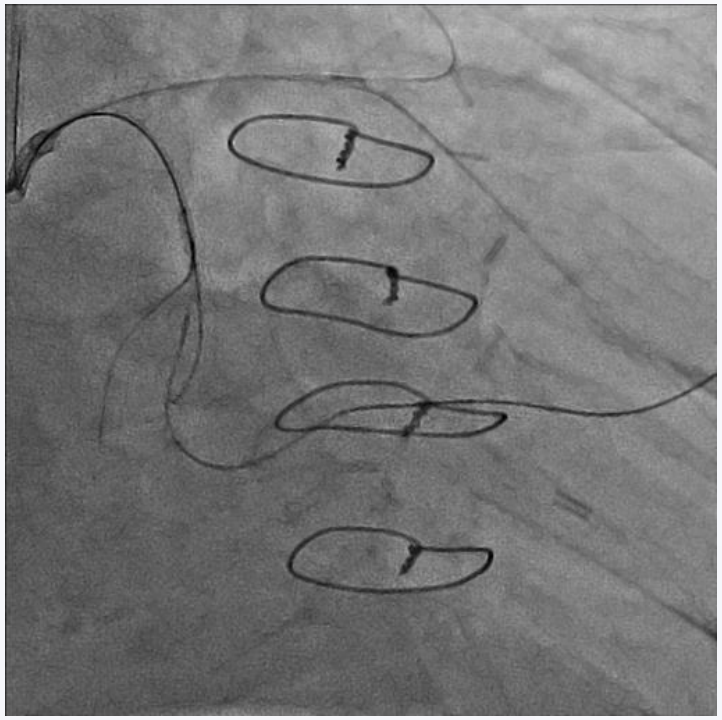


PCI for LCX

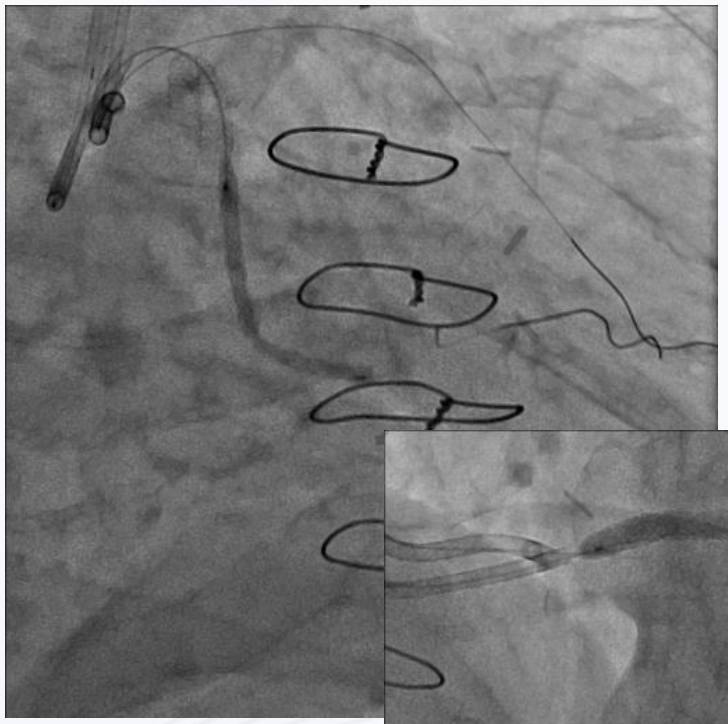


Externalization and re-wiring to LCX.

Stenting and final angiogram

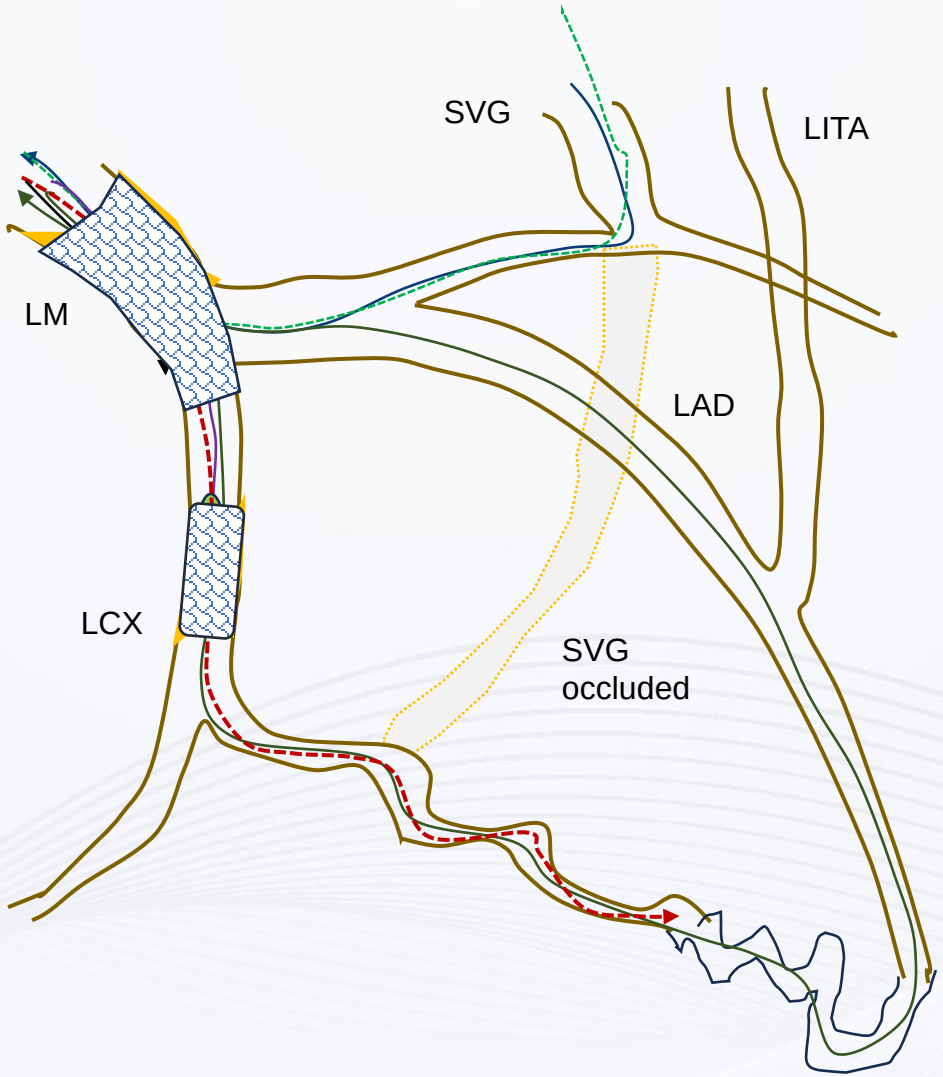


Reverse CART.

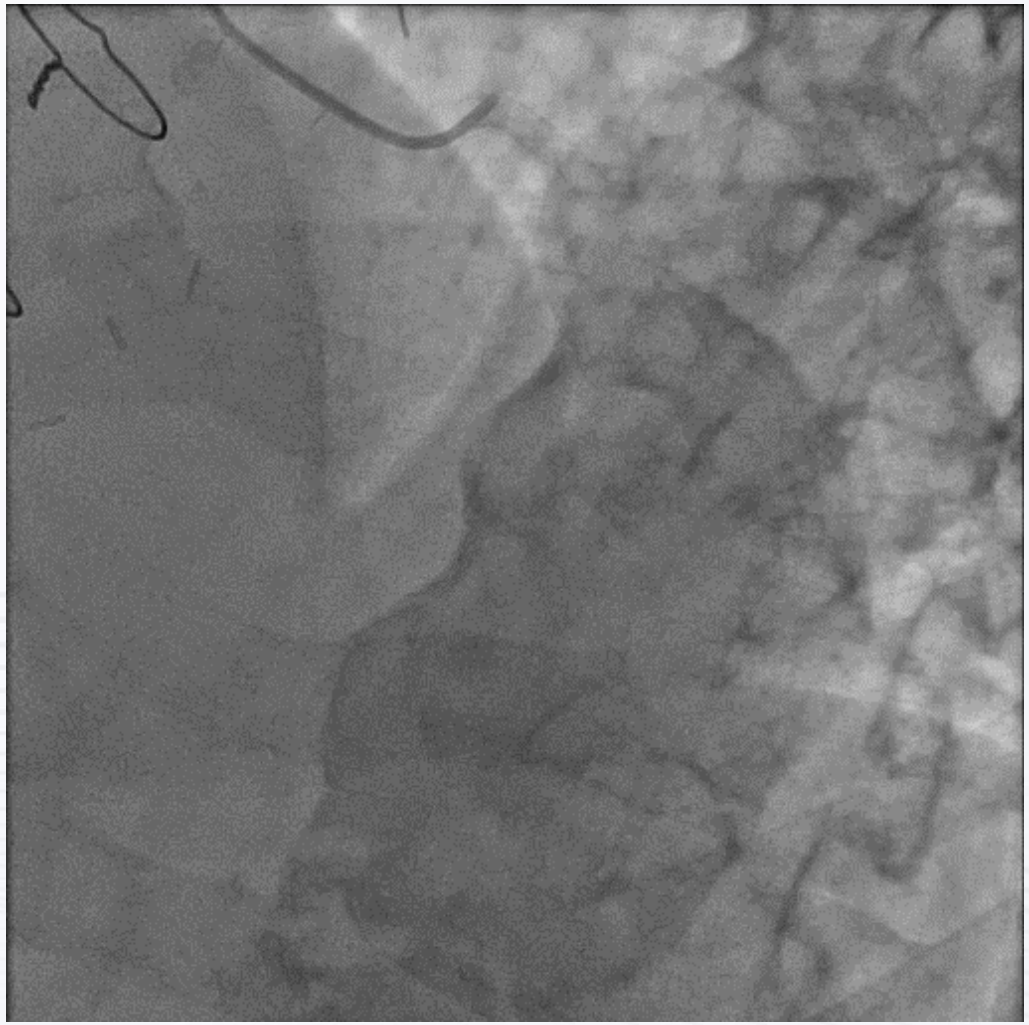


Stenting.

procedure



Follow up



Conclusions

LM CTO is rare.

Short duration LM CTO might be a candidate for antegrade PCI.

LM CTO in post CABG patients may be an indication for PCI. SVG will be a choice for retrograde route. ITA should not be used because of high chance of complications such as spasm.

Due to short lesion length of LM, reverse CART may have a chance of hematoma creation.