

Role of MDCT for CTO-PCI

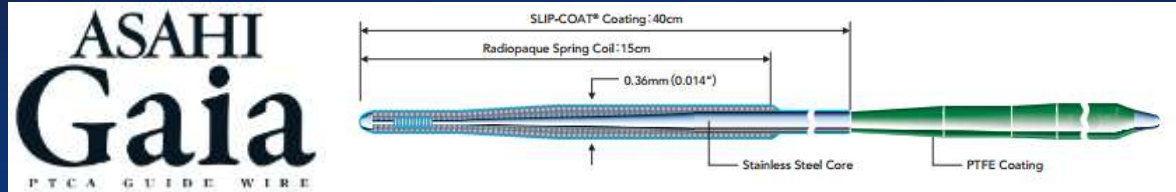
Keiichi Igarashi

JCHO (Japan Comity Healthcare Organization)

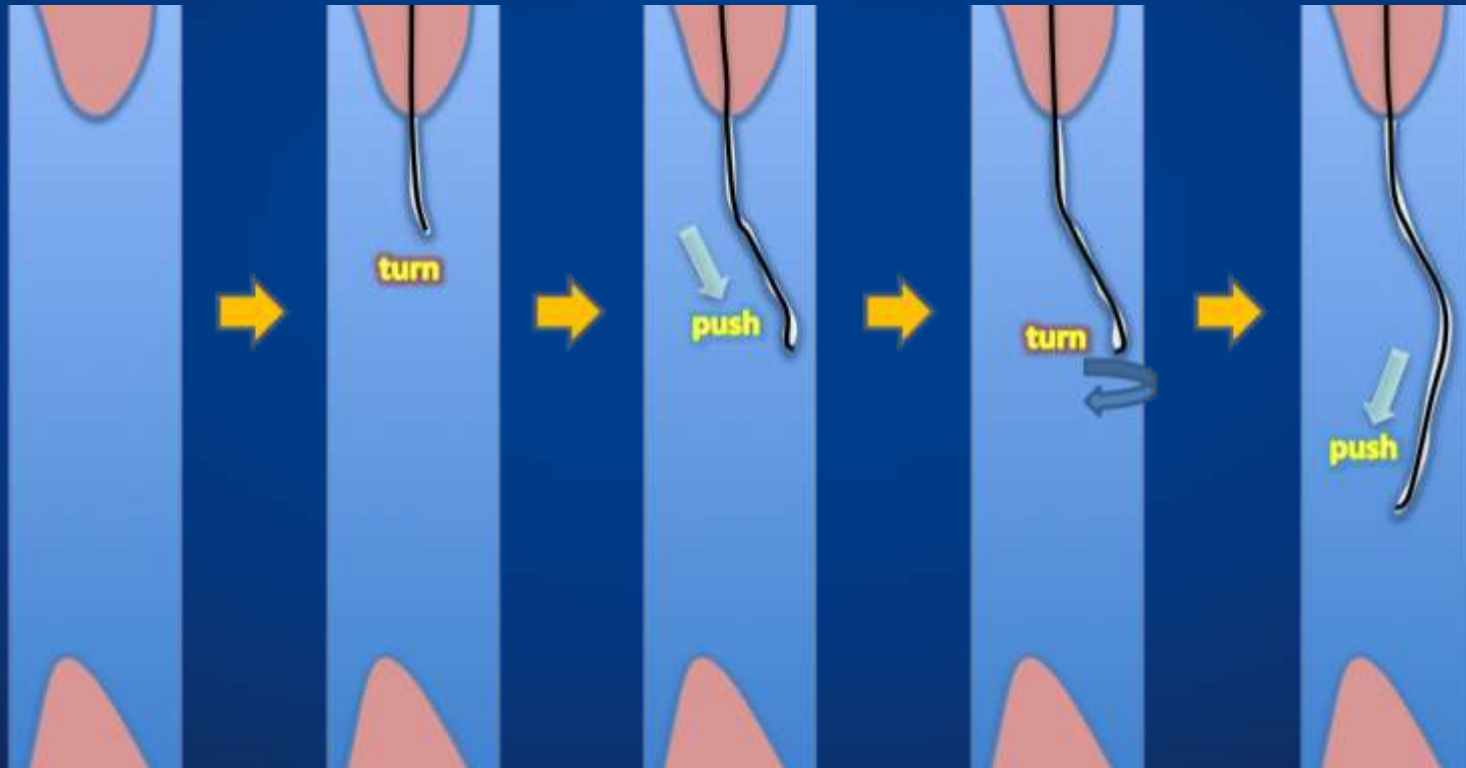
Hokkaido Hospital



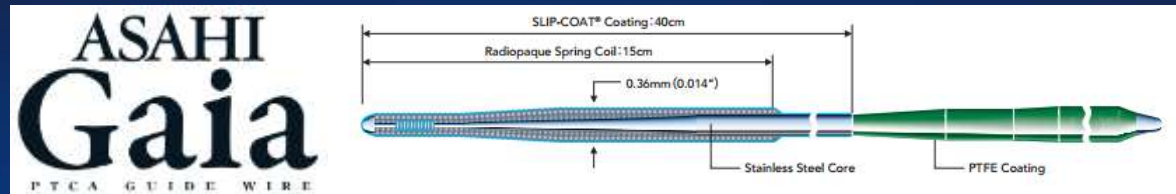
CTO PCI in Gaia era



Active Wire Control



CTO PCI in Gaia era

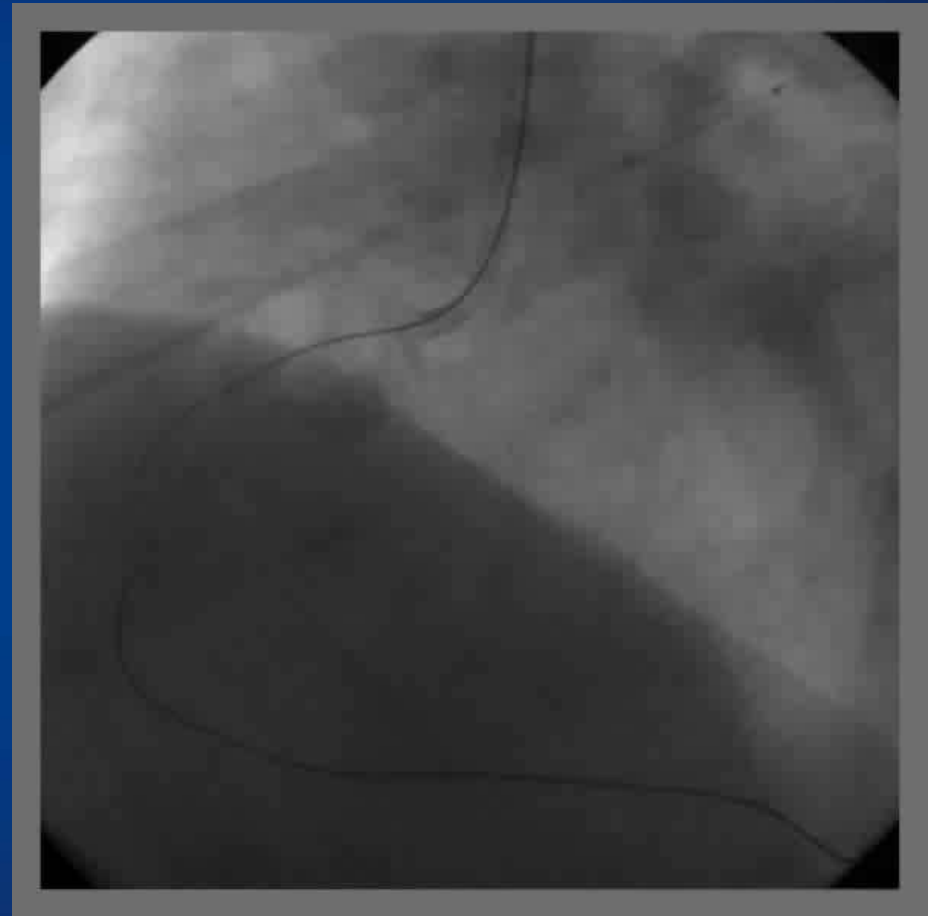
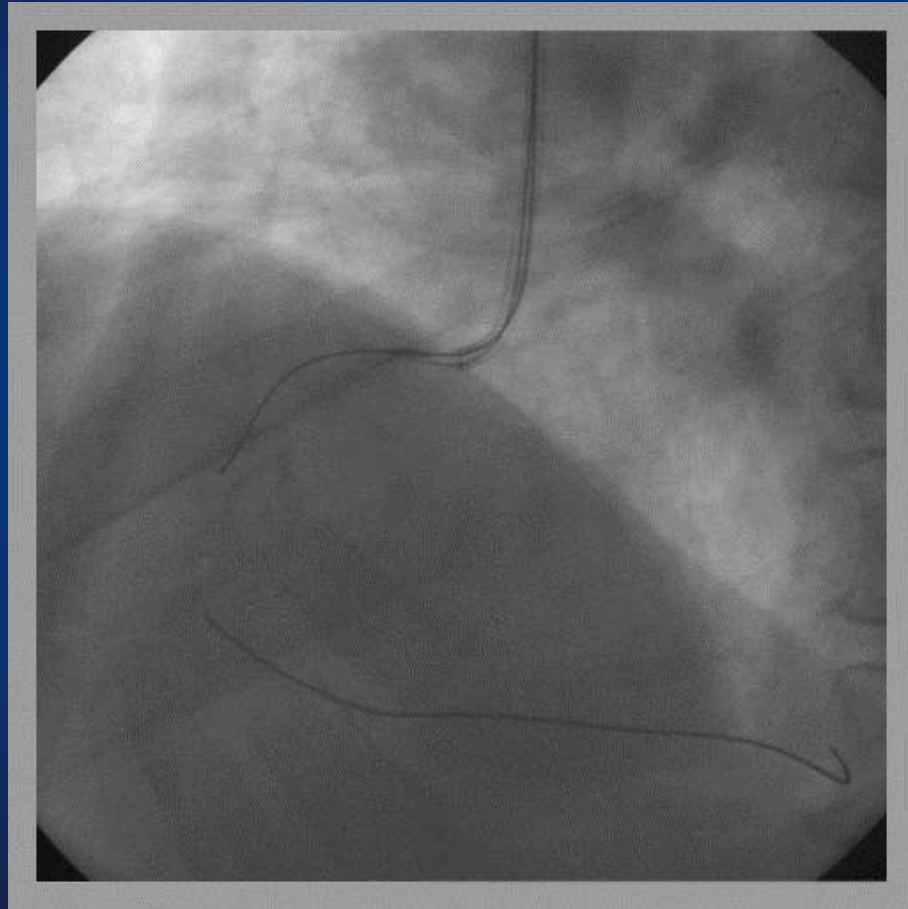


Active Wire Control

Points :

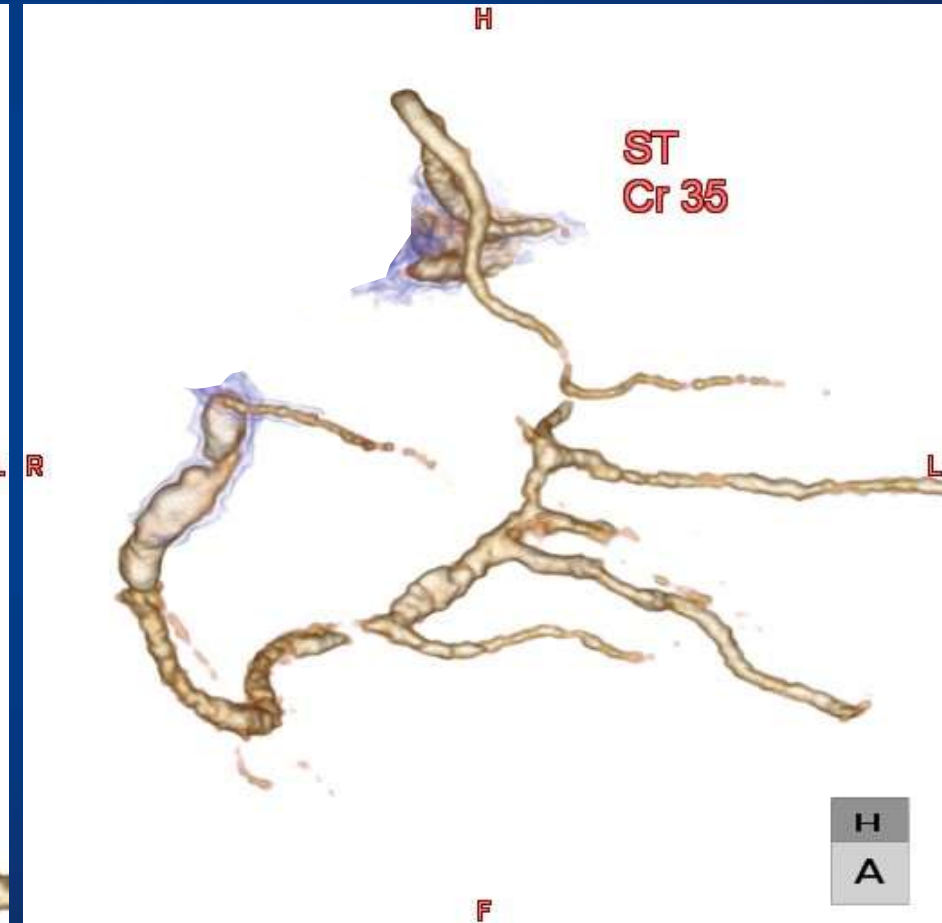
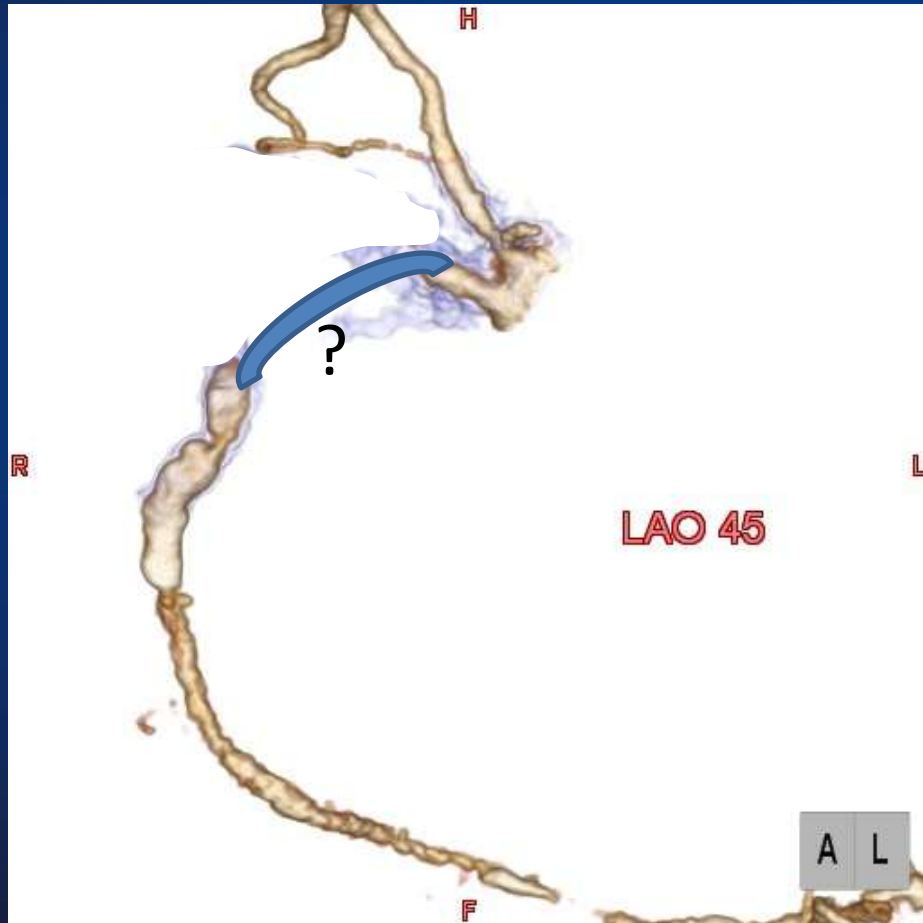
- Don't rotate the wire too much !
 - Understand exactly the vessel shape and the distribution of calcium in occluded site.
- ➔ Utilize information from coronary CT

Vessel shape in CTO site



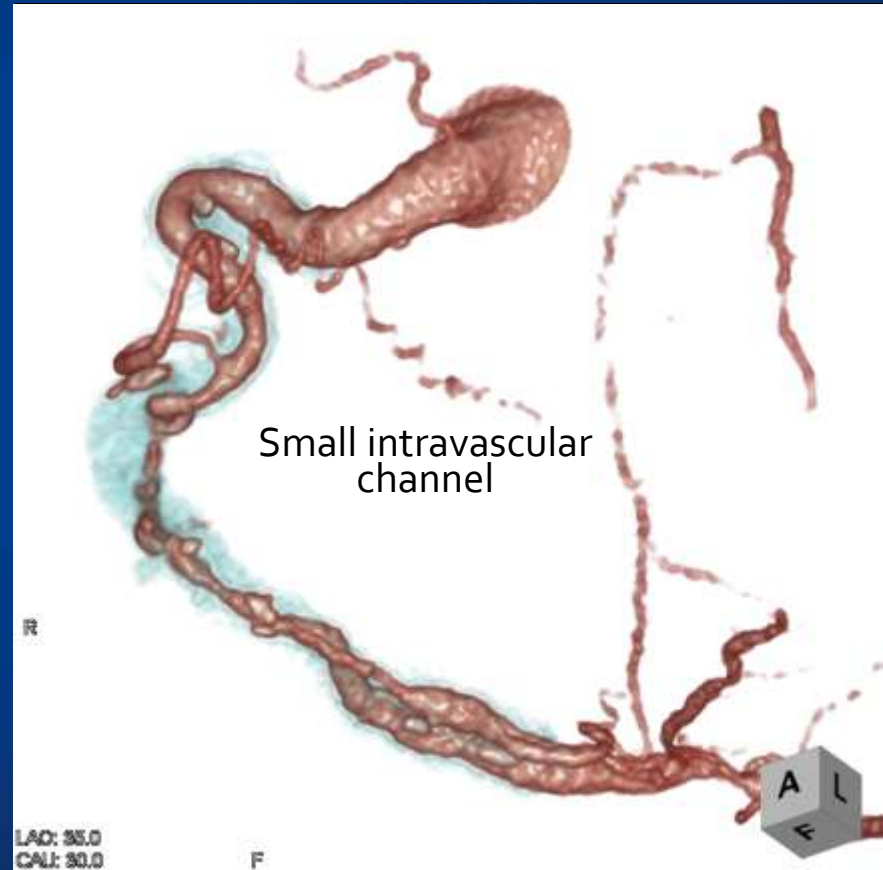
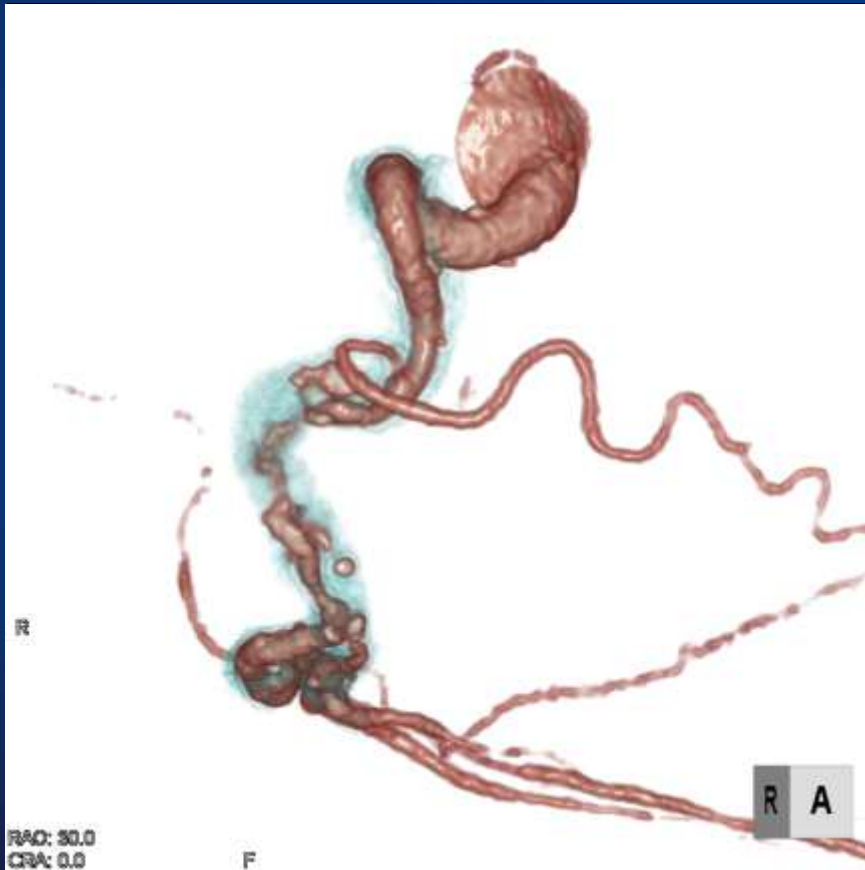
Vessel shape in CTO site

3D-MAP

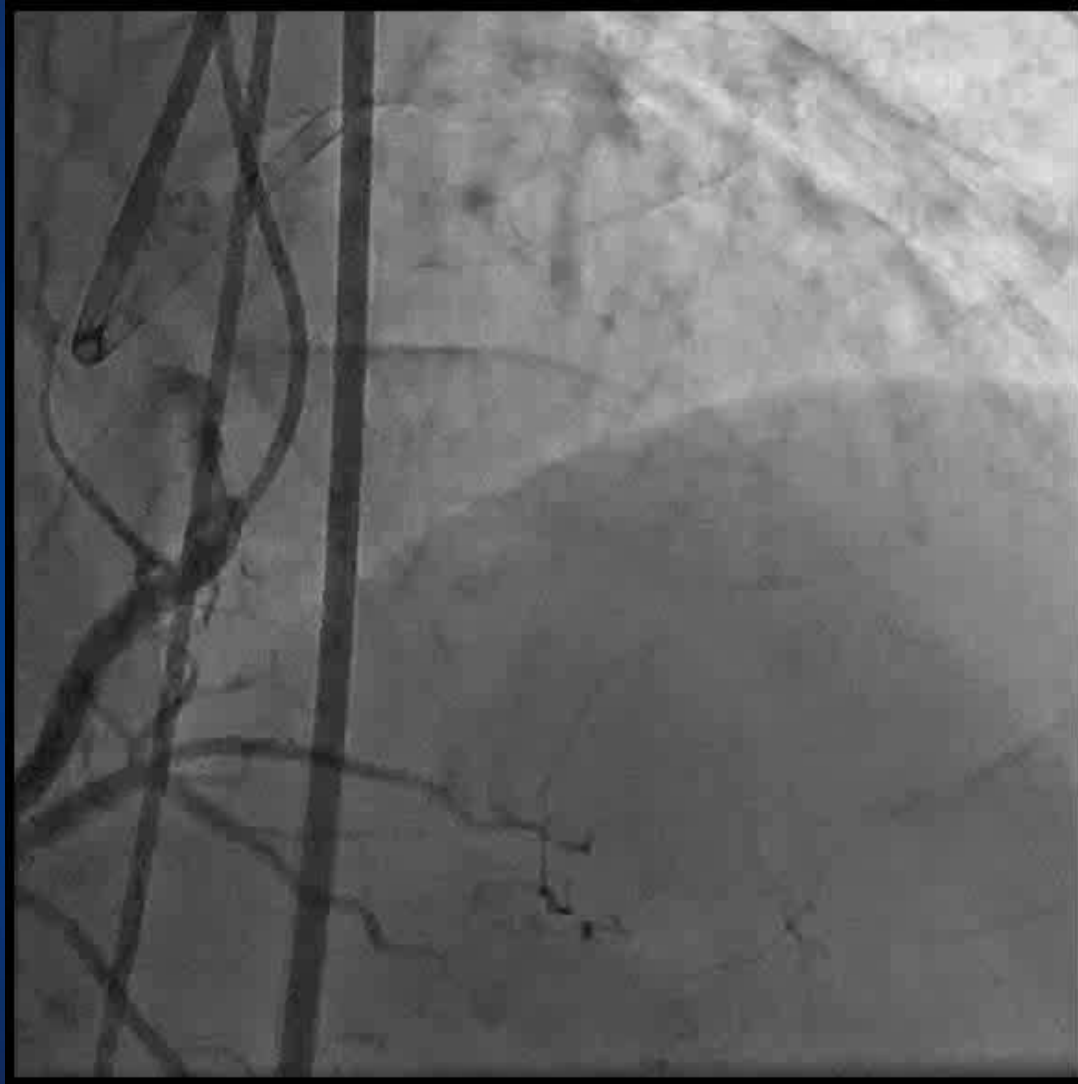


Small Channels

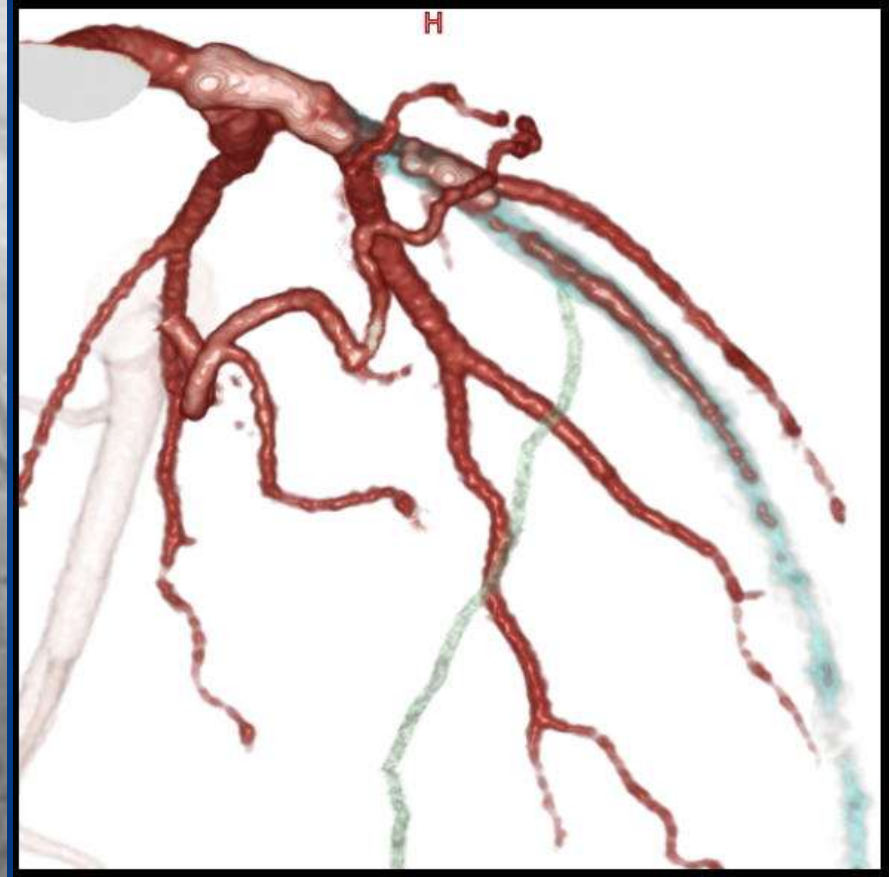
~~Bridging~~ lateral or Intravascular channel ?



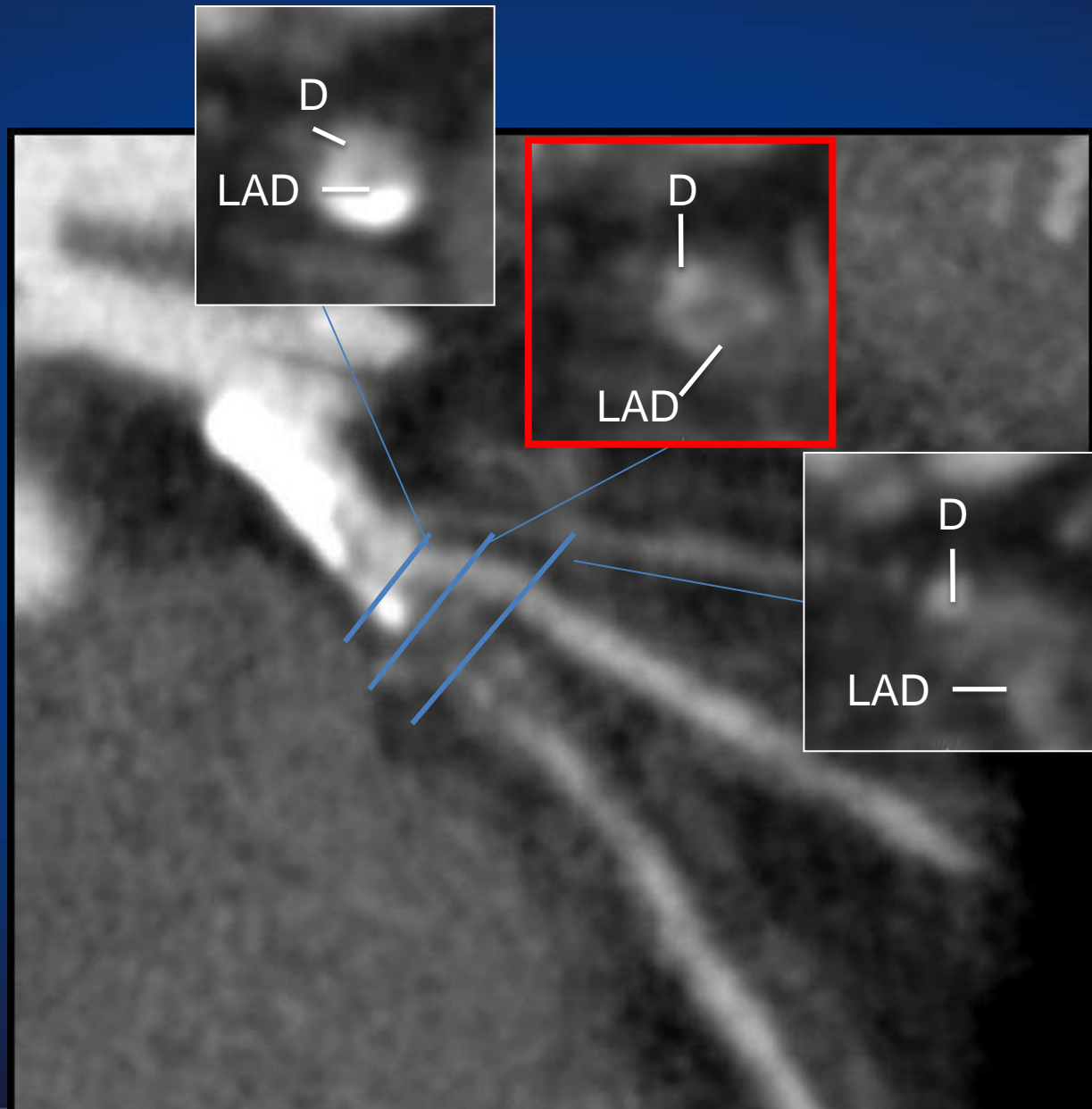
Entry point of CTO



Entry point of CTO

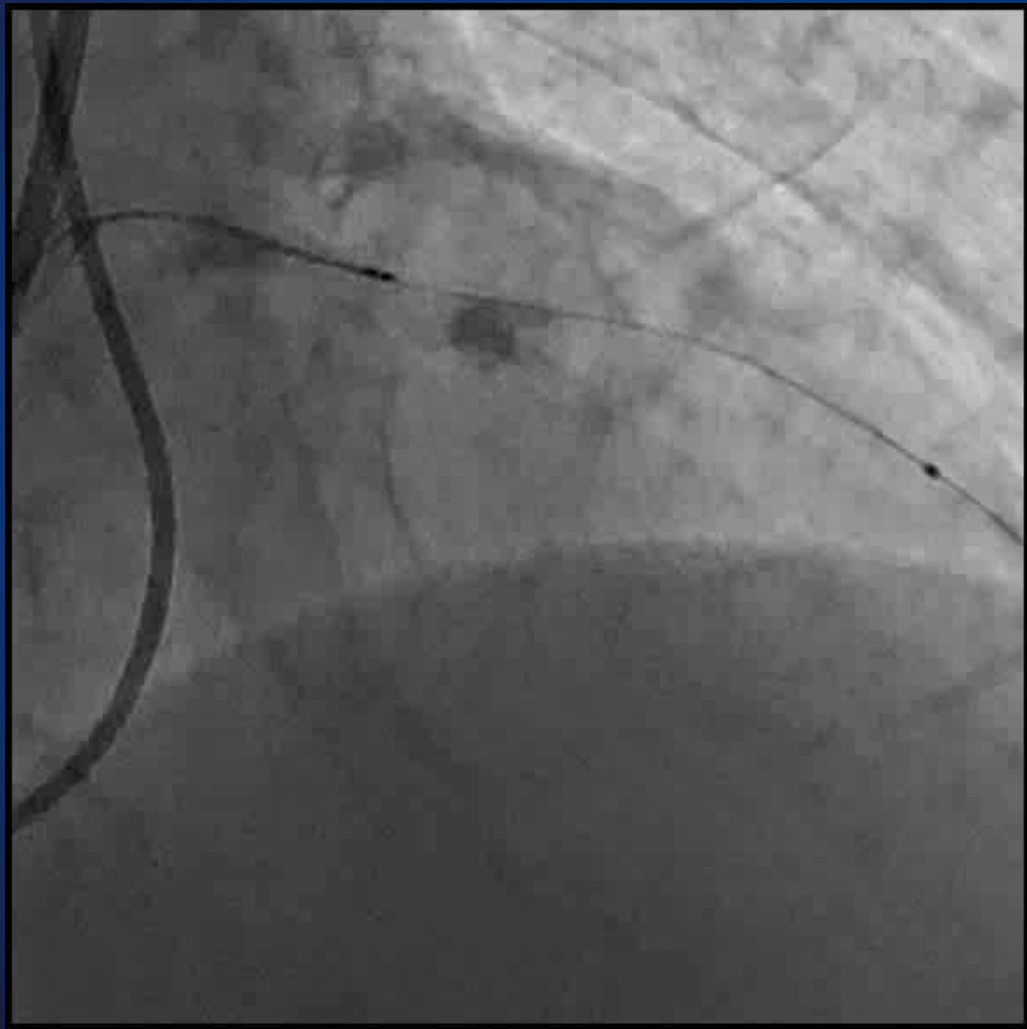


Entry point of CTO

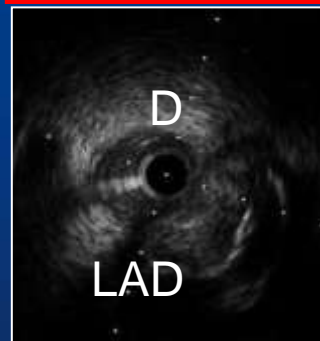
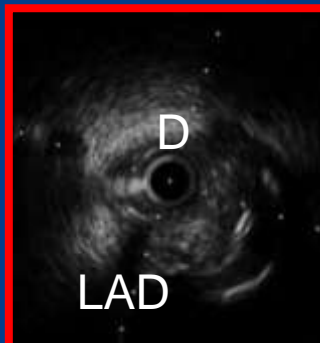
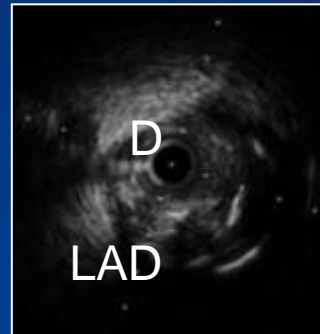


Entry point of CTO

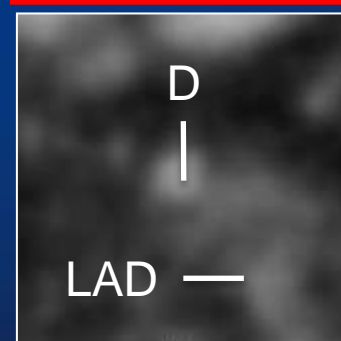
IVUS marking



IVUS



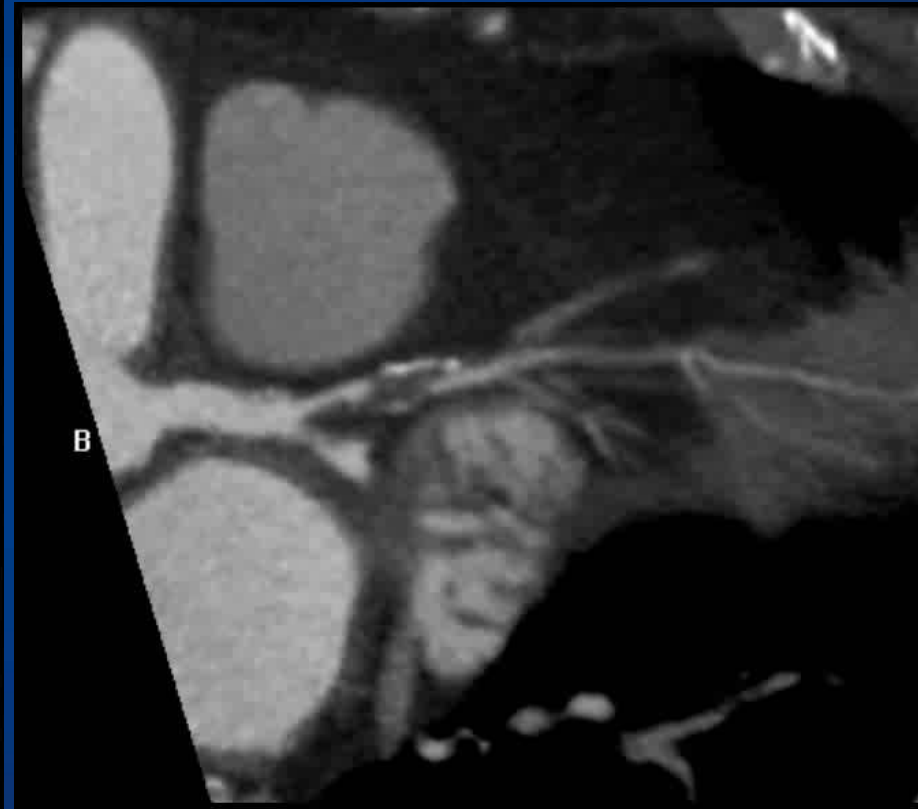
CT



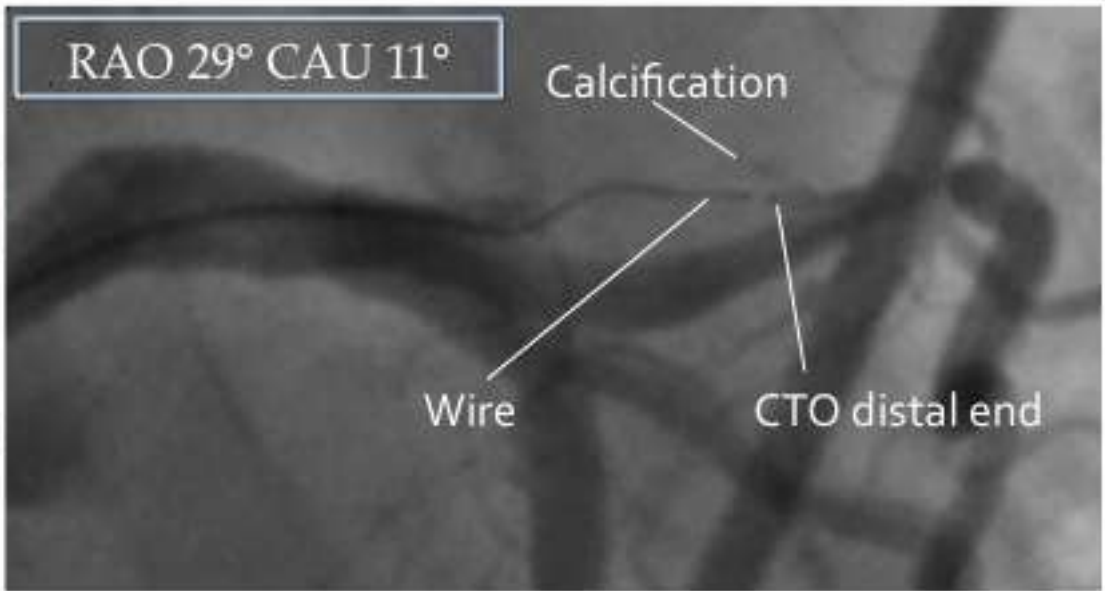
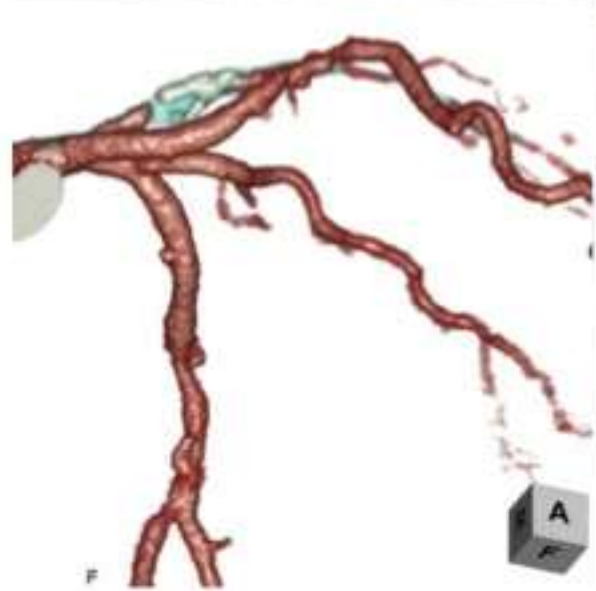
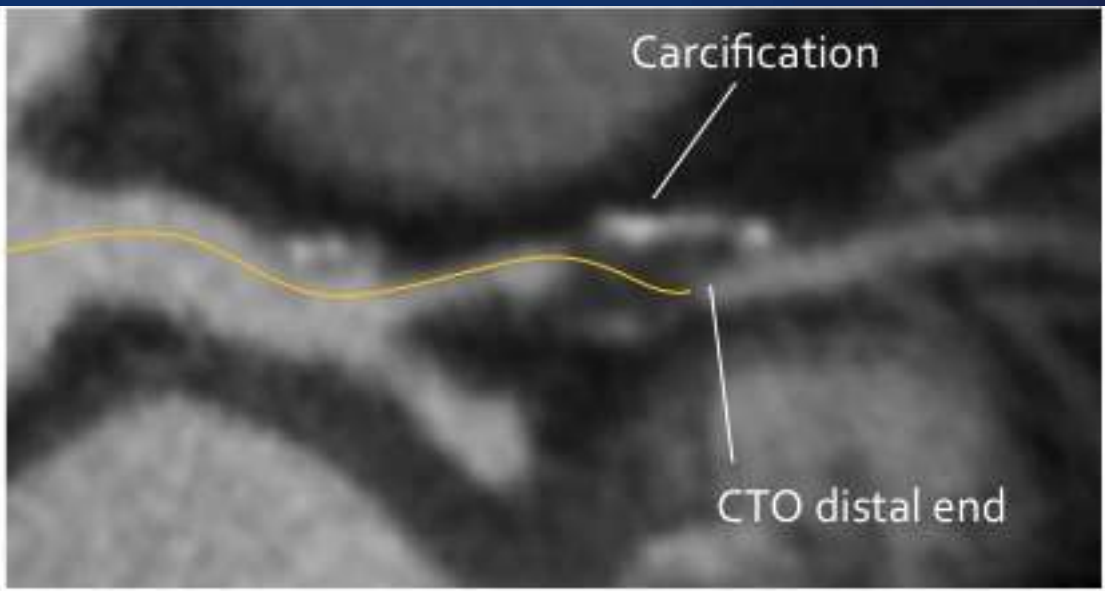
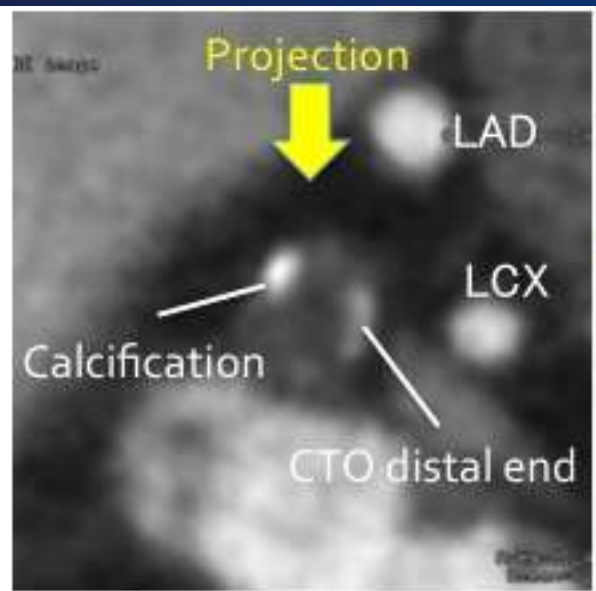
distal

HL CTO

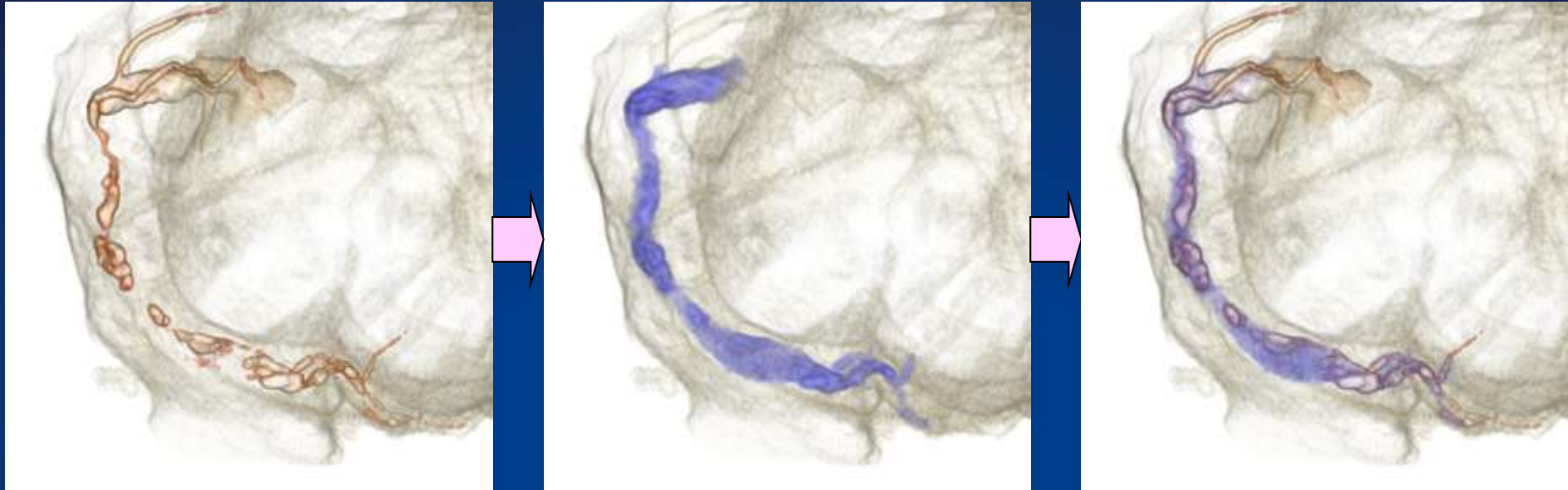
Which projection angle should we use for CTO wiring?



Projection for wiring derived by CT



3D MAP technique for occlusion vessel



The occluded site cannot be filled with contrast media during CCTA.



Calcification and vessel shape can be visualized without contrast media.



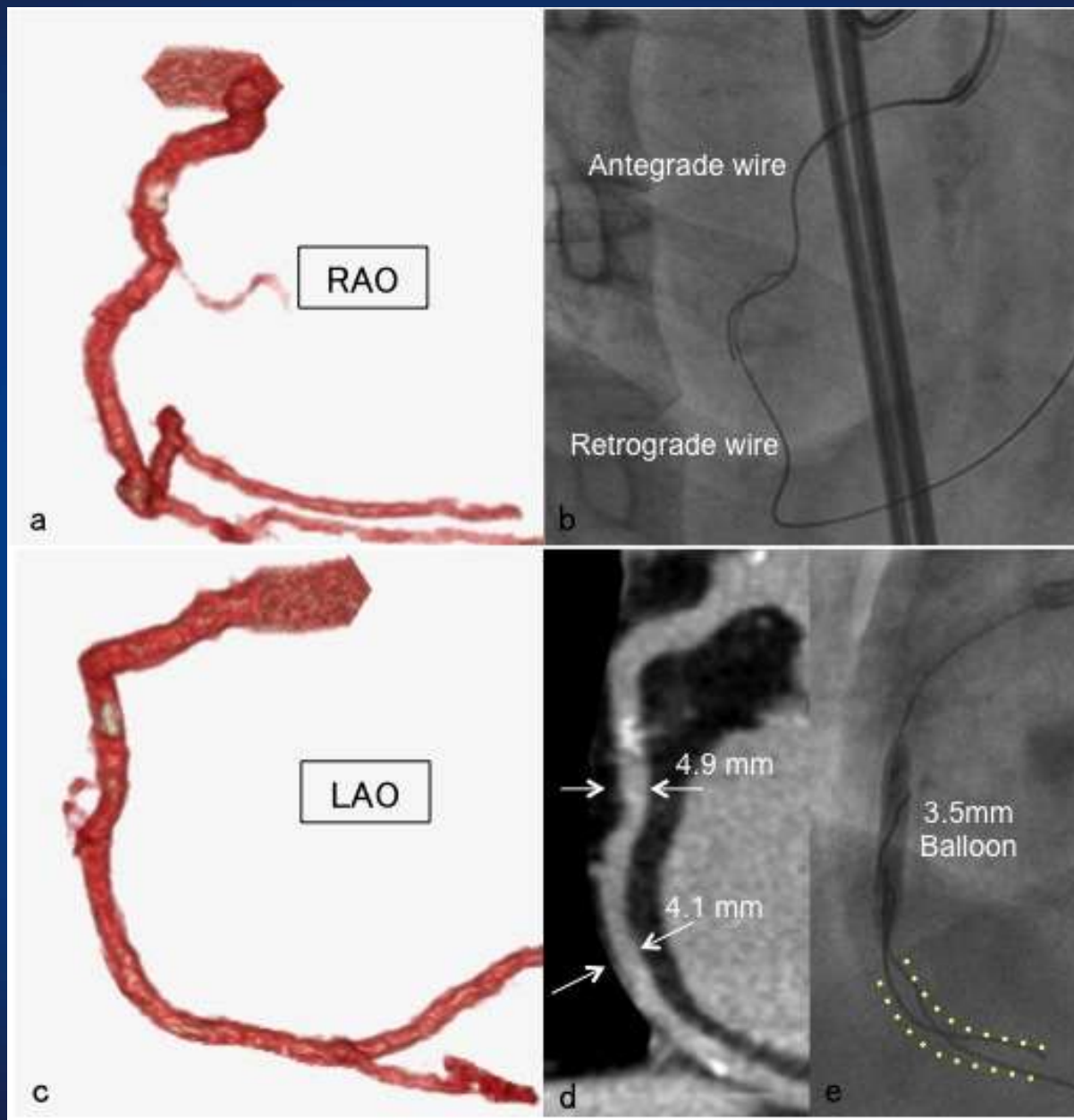
Is non-contrast cardiac CT enough for CTO PCI of the patient with renal dysfunction ?

RCA CTO case with renal failure

- Female in her 60's
- Renal failure
Cre 1.81_{mg/dl}
eGFR 22.9 ml/min/1.73cm²
- Antegrade failure case
in another hospital

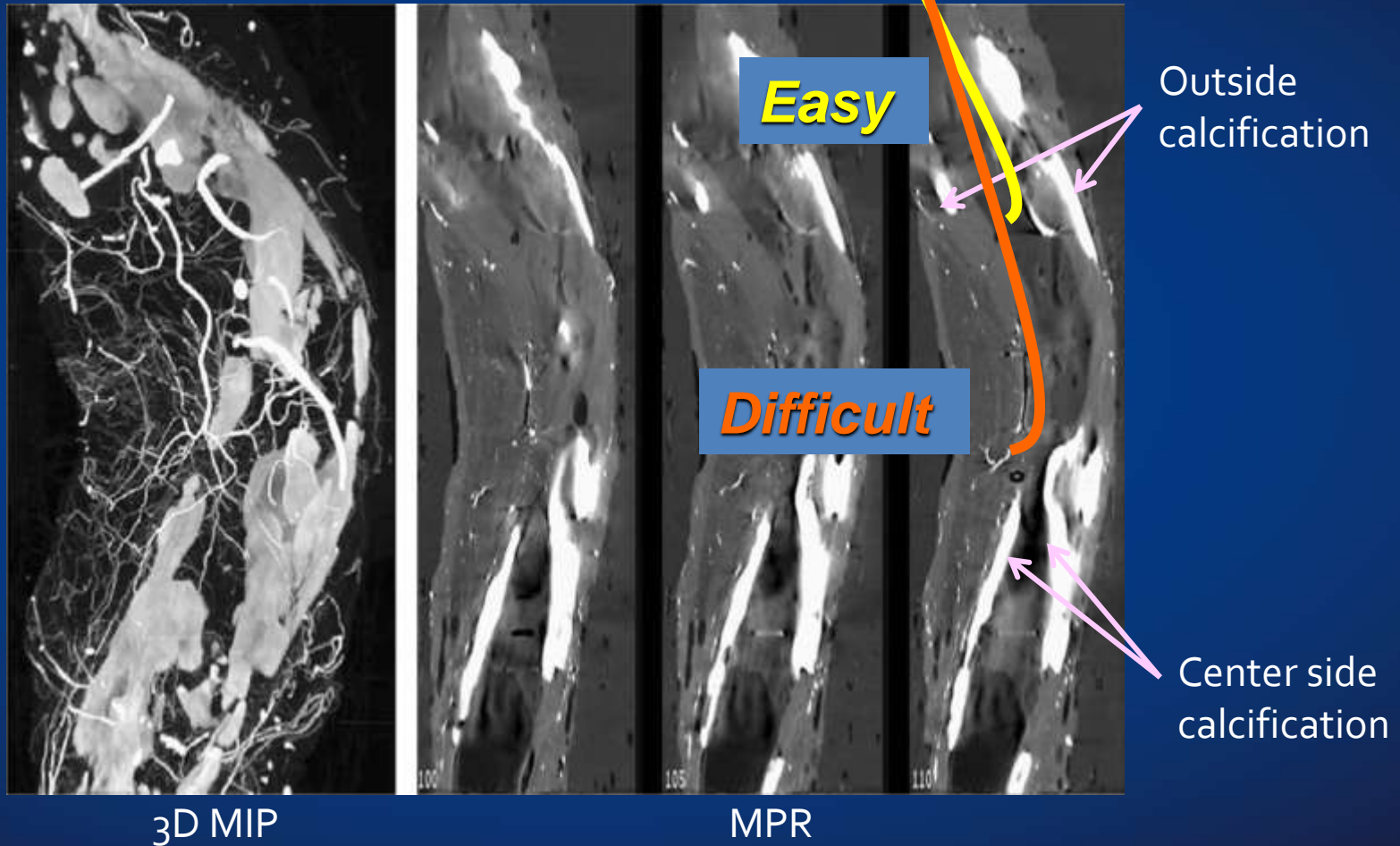


non contrast CT with 3D-MAP



Distribution of calcium

Microscopic CT images of CTO



Gregg W. Stone, David E. Kandzari, Roxana M, et al : Percutaneous recanalization of chronically occluded coronary arteries : A consensus document : Part 1, Circulation. 2005; 112: 2364-2372

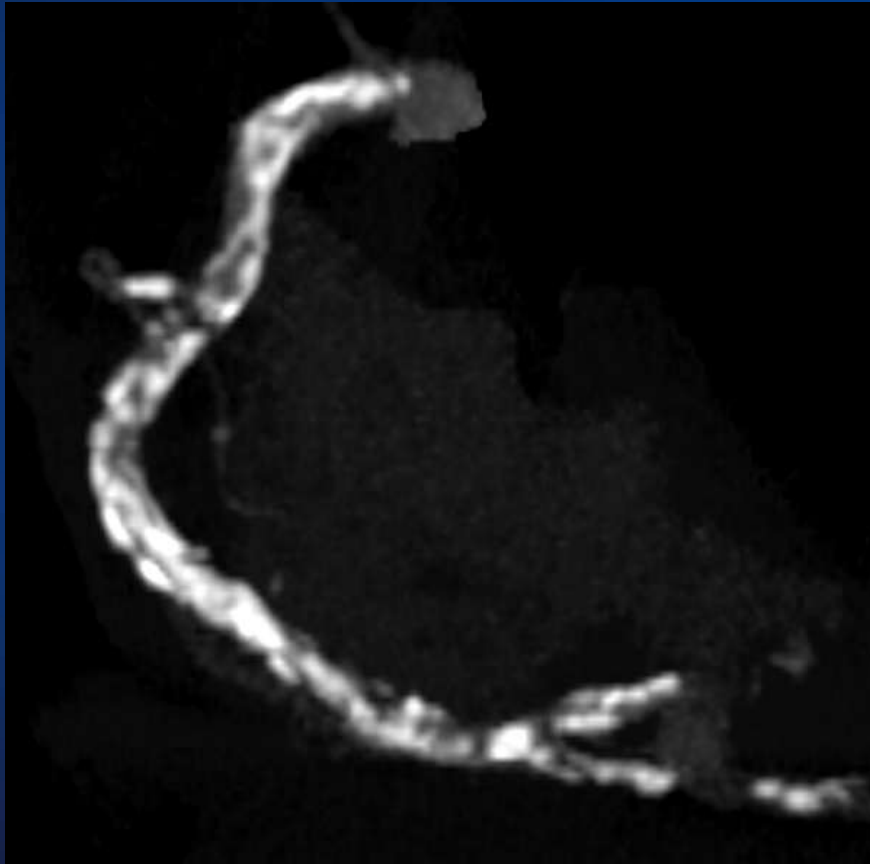
JCHO Hokkaido Hospital , Cardiovascular Center



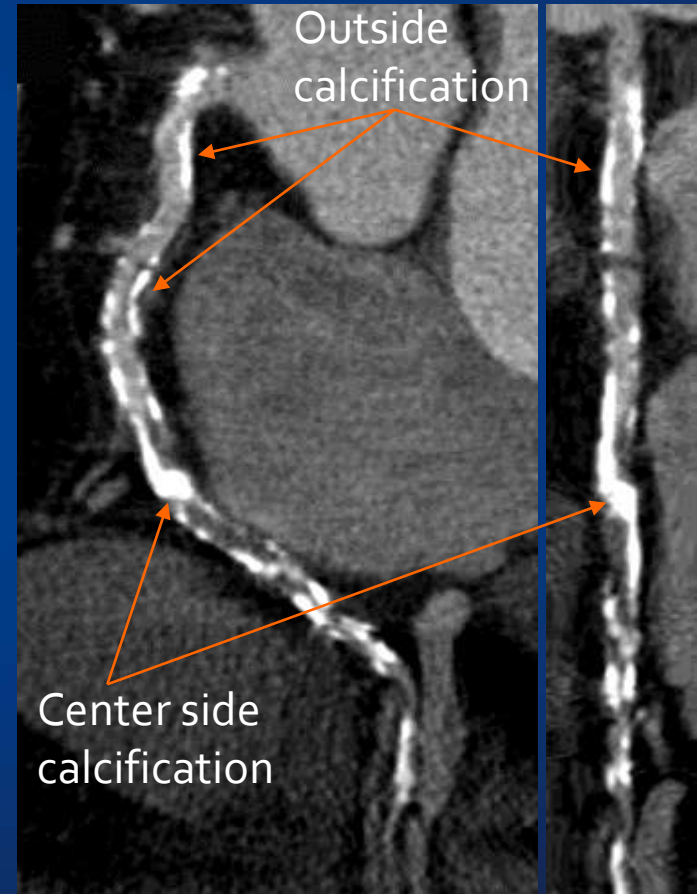
RCA CTO

Distribution of calcium

MIP



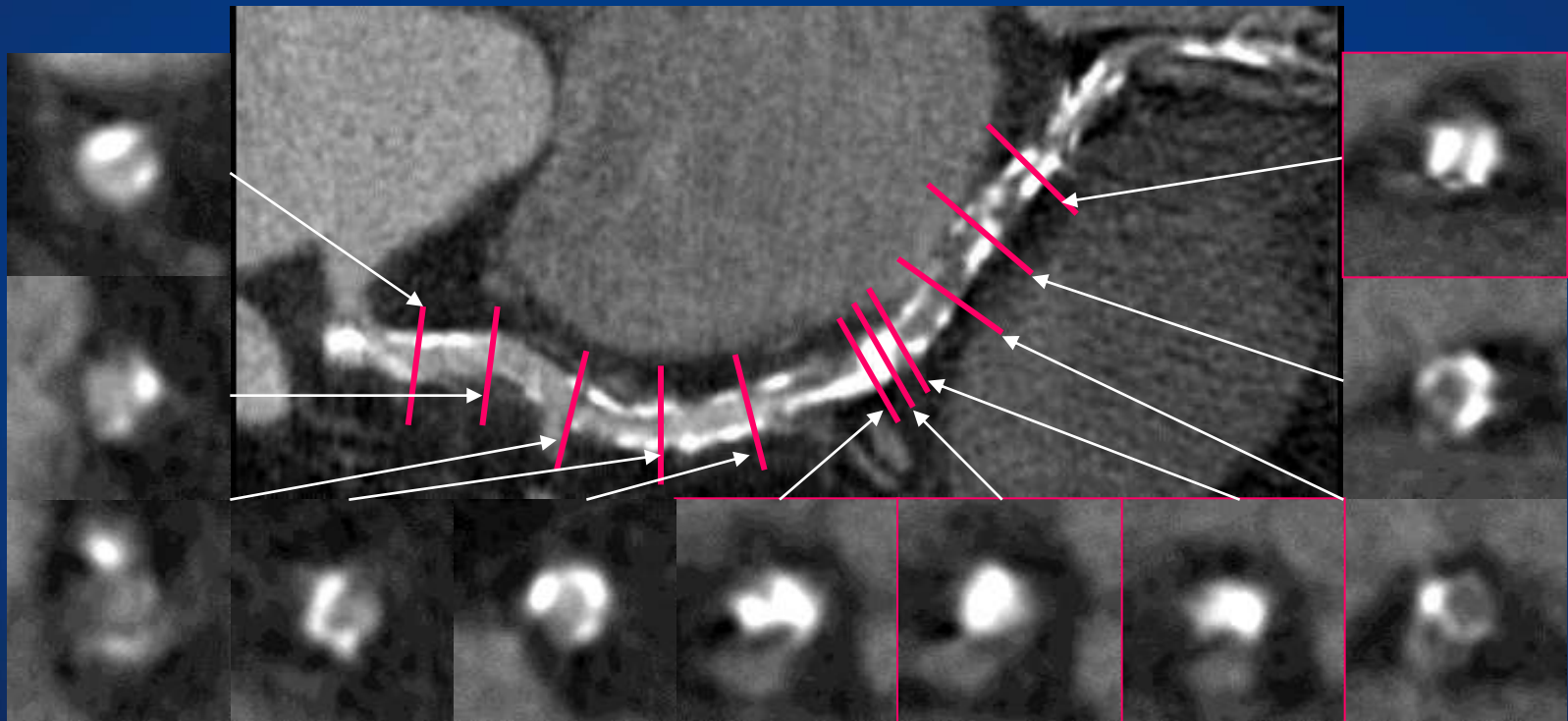
Curved MPR



RCA CTO

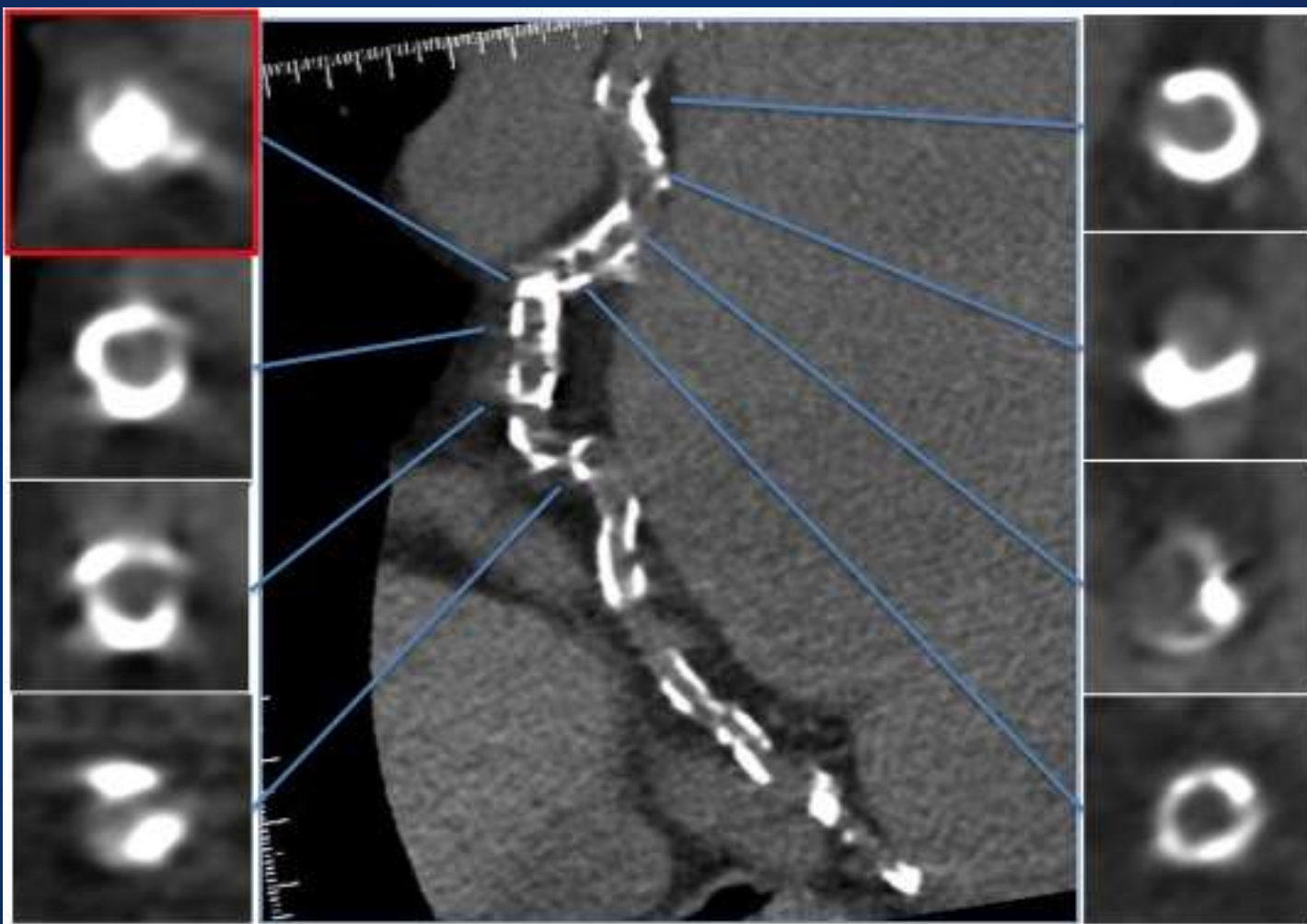
Distribution of calcium

Curved MPR

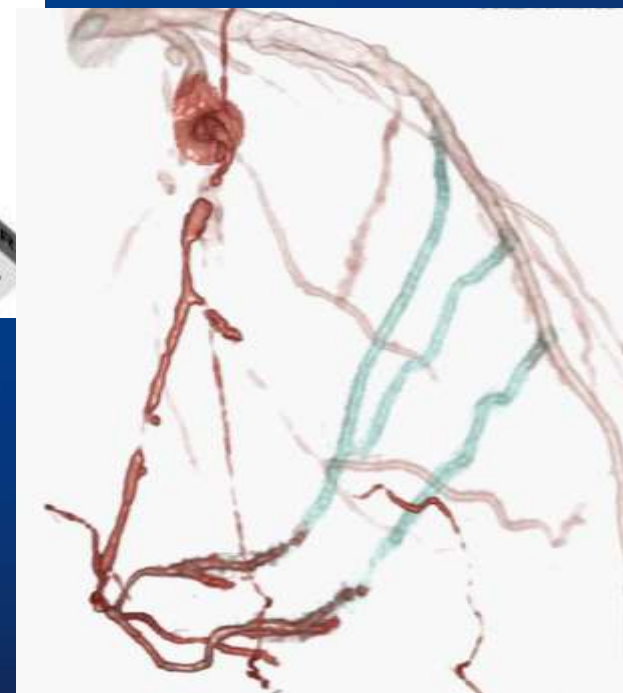
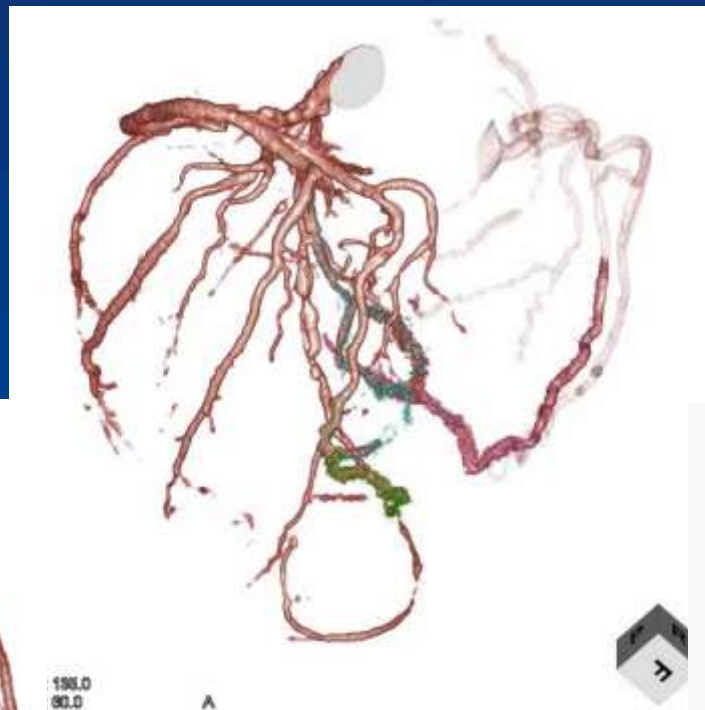


Cross sectional view

non contrast CT



We try to visualize the collateral channel for retrograde approach by CCTA in advance of PCI procedure.



In coronary angiography, collateral channels may be missed due to overlap by other vessels.



CAG



LAD CTO

CT

Appropriate projection angle for tracking

RCA CTO case

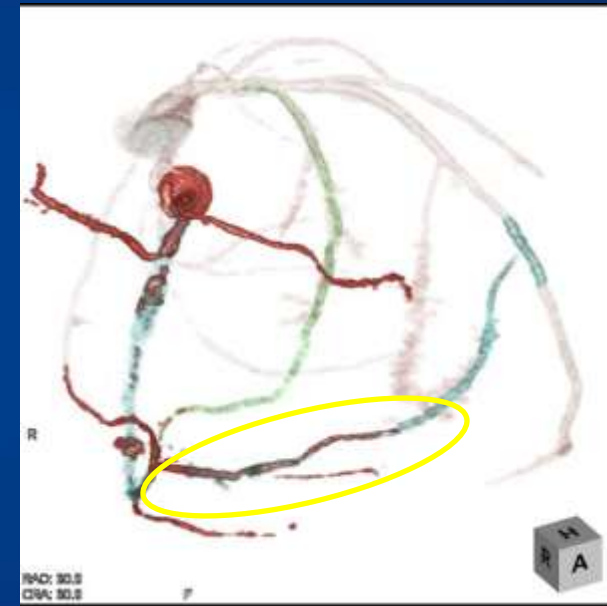
3rd septal channel is good candidate for retrograde approach.



RAO CAU



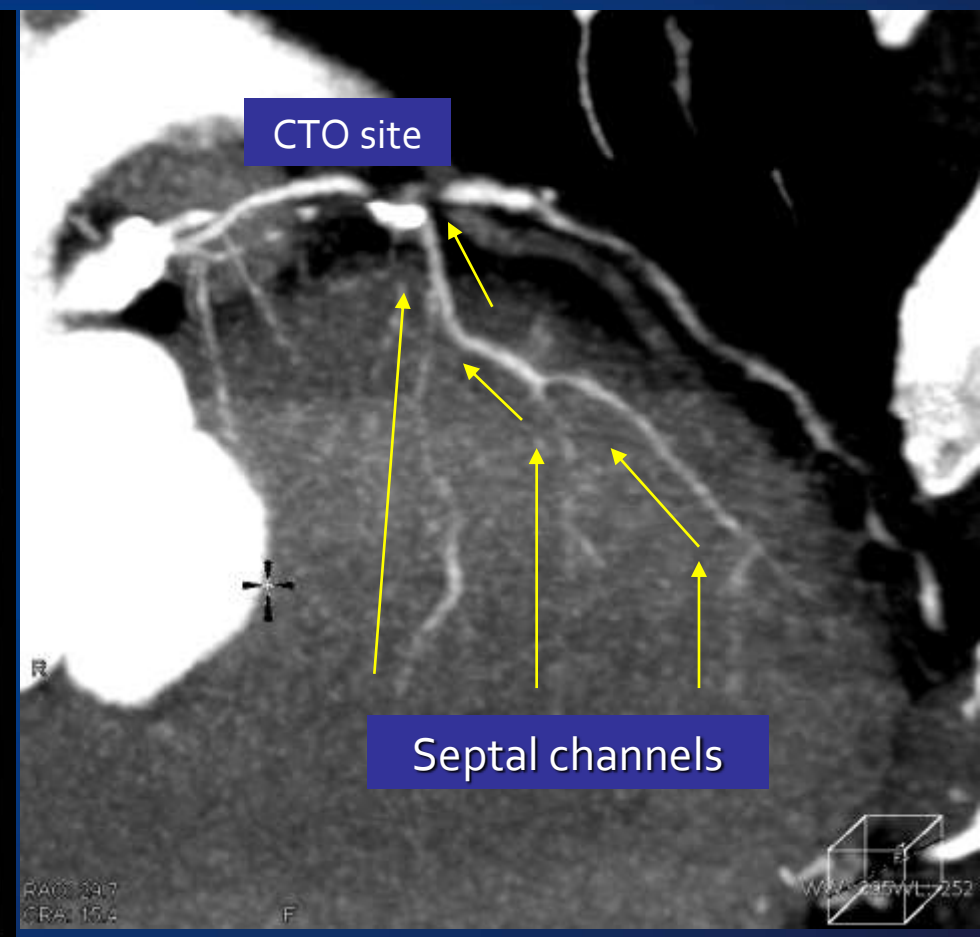
RAO



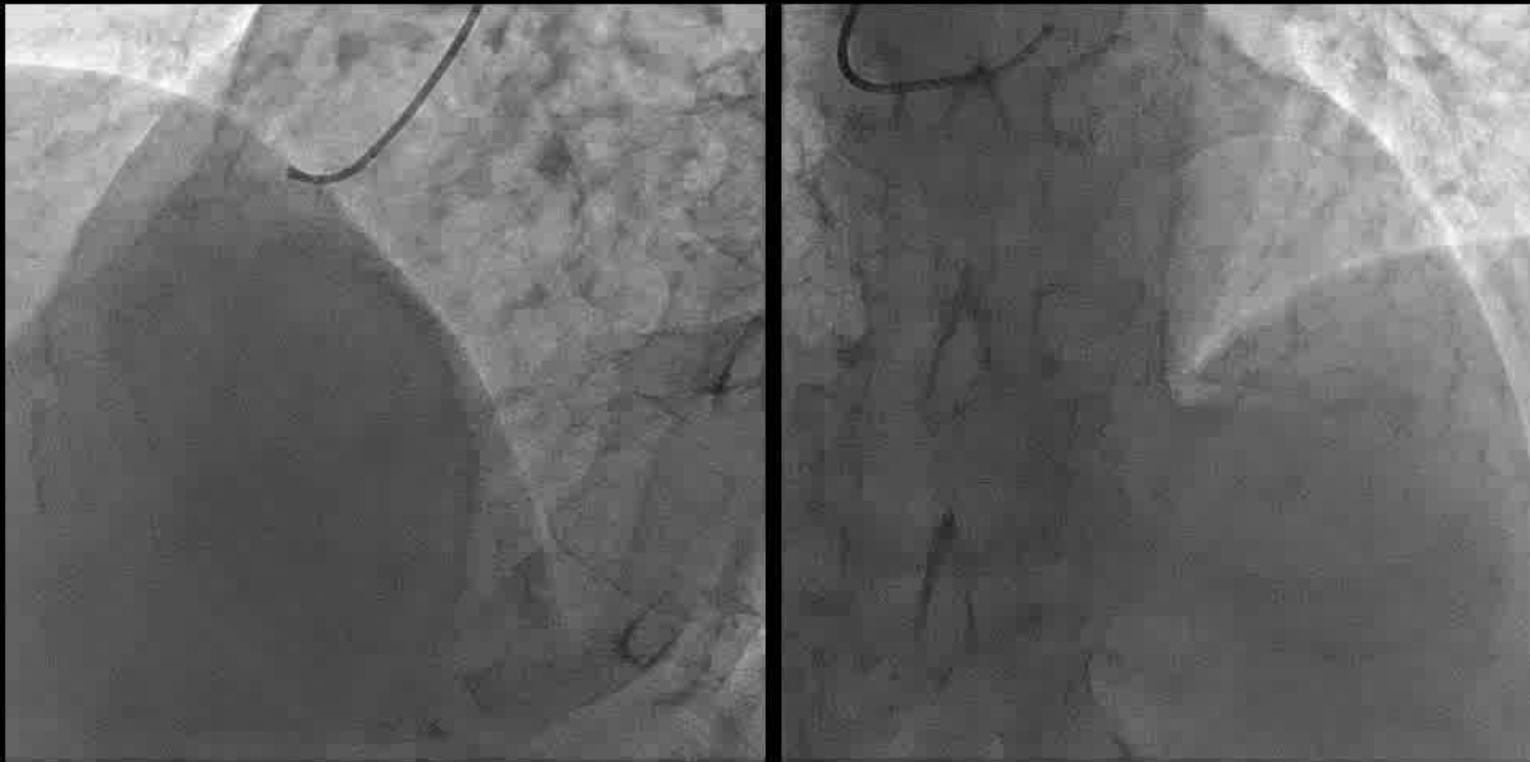
RAO CRA

Inappropriate collateral channel

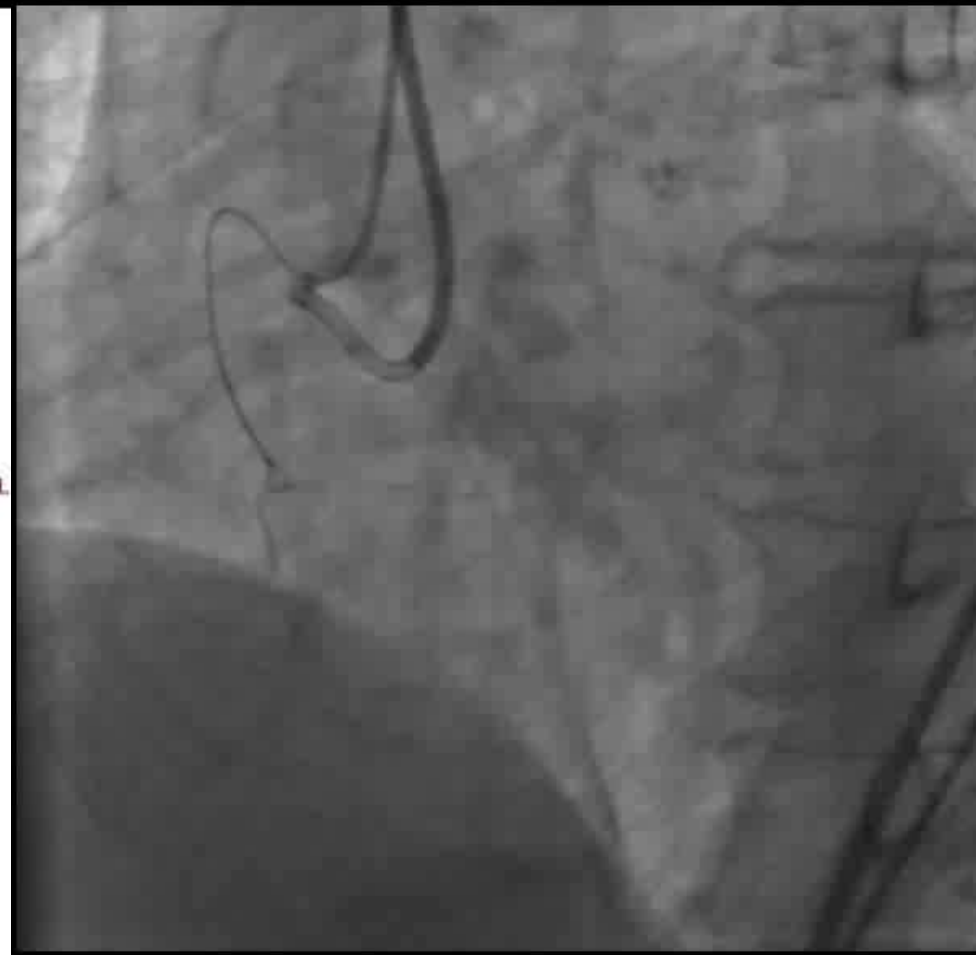
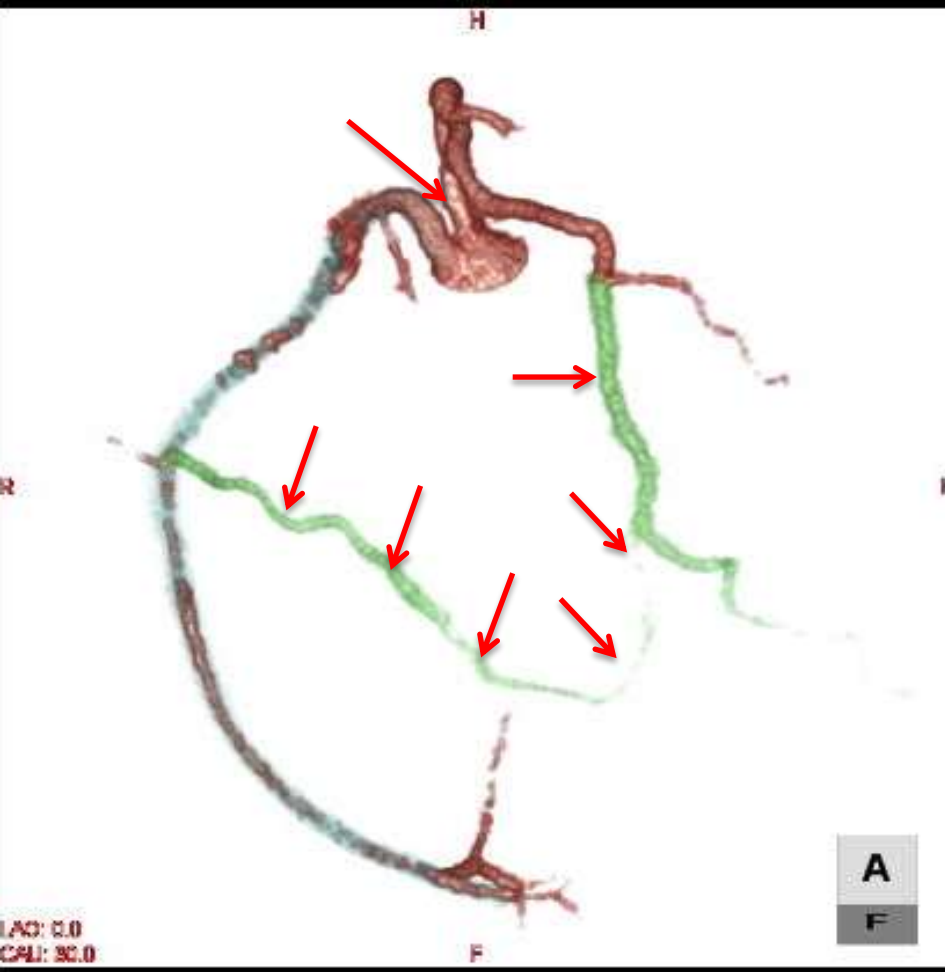
LAD CTO case



Long CTO ?



Collateral from separate conus branch missed by CAG



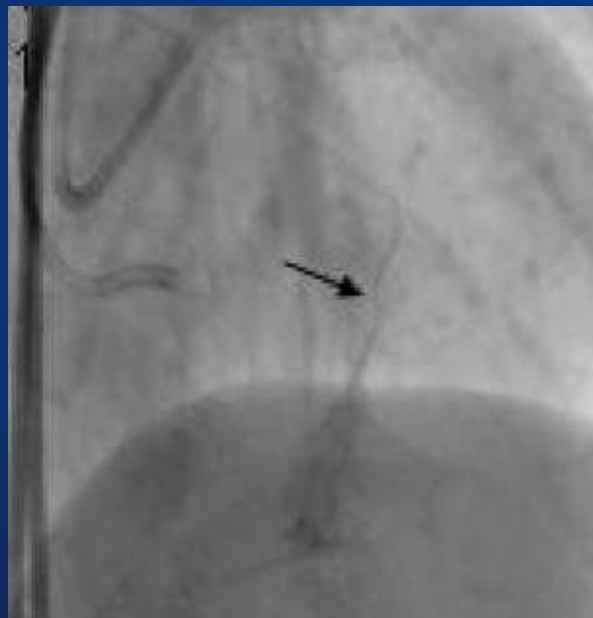
Collateral channel grade (CC grade) in **CAG**

CC 0 : no continuous connection between donor and recipient vessel

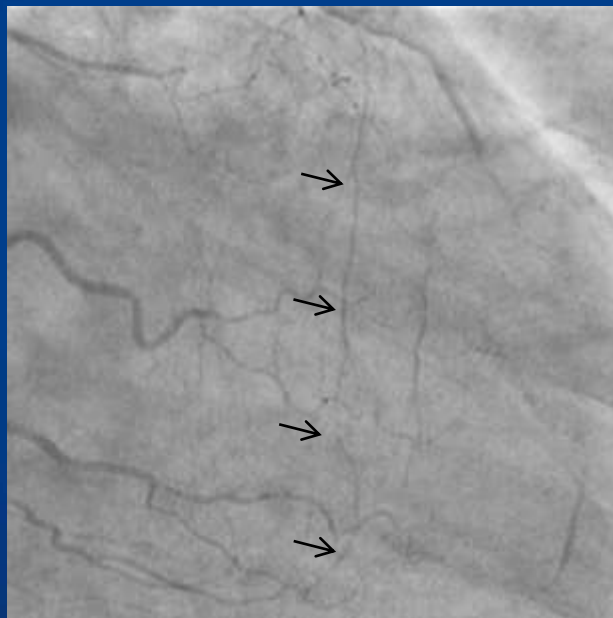
CC 1 : continuous thread-like connection

CC 2 : continuous, small sidebranch-like connection

Sudhir Rathore, Osamu Katoh, et al. Circ Cardiovasc Intervent. 2009;2:124-132



CC 0



CC 1



CC 2

Collateral channel grade (CC grade) in CT

CT-CC 0 : no continuous connection between donor and recipient vessel

CT-CC 1 : continuous thread-like connection

CT-CC 2 : continuous, small sidebranch-like connection



CC 0



CC 1



CC 2

CAG vs CT

in visualization of collateral channel (CC)

	All collateral channel (n=55)	CT-CC 0 (n=28)	CT-CC 1 (n=6)	CT-CC 2 (n=21)
CC grade (CAG)				
0	15	14	0	1
1	28	13	5	10
2	12	1	1	10

Detection rate of CT-CC is **65.0 %**
if CAG is considered as gold standard.

(CT-CC 1+2 / CAG-CC 1+2 = 26 / 40)

Collateral visualized by CT is easy for crossing by wire and micro catheter

	All collateral channel (n=55)	CT-CC 0 (n=28)	CT-CC 1 and 2 (n=27)	p value
Wire				
cross	33	13	20	0.0364
no cross	22	15	7	
Micro catheter				
cross	30	11	19	0.0206
no cross	25	17	8	
Collateral complication				
minor perforation	4	3	1	NS
major perforation	1	0	1	NS
AV fistula	1	1	0	NS



Summary

- 3D-MAP is useful to know vessel shape of CTO lesion correctly.
- CCTA can provide us with appropriate projection angle using 3D information of CT.
- Non-contrast CT may be enough to evaluate the calcification and vessel shape for CTO lesion in patients with renal dysfunction.
- CT angiography can reveal the useful collateral channel for retrograde approach.

