

# Entrapment of Rotablation Burr in Calcified LAD with Poor LV Function

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56-years-old Female

HTN, T2DM, CKD stage 5

**NSTEMI**, Killip III s/p ETT in May 2016,  
s/p POBA over LAD (balloon un-dilatable lesion)  
s/p PTCA with BMS over LCX-P, RCA-M,  
s/p tracheostomy with MV dependent

Echo: Generalized LV hypokinesia especially  
basal to middle, apical anterior wall , and  
basal inferior wall, Moderate AR, **LVEF: 41%**

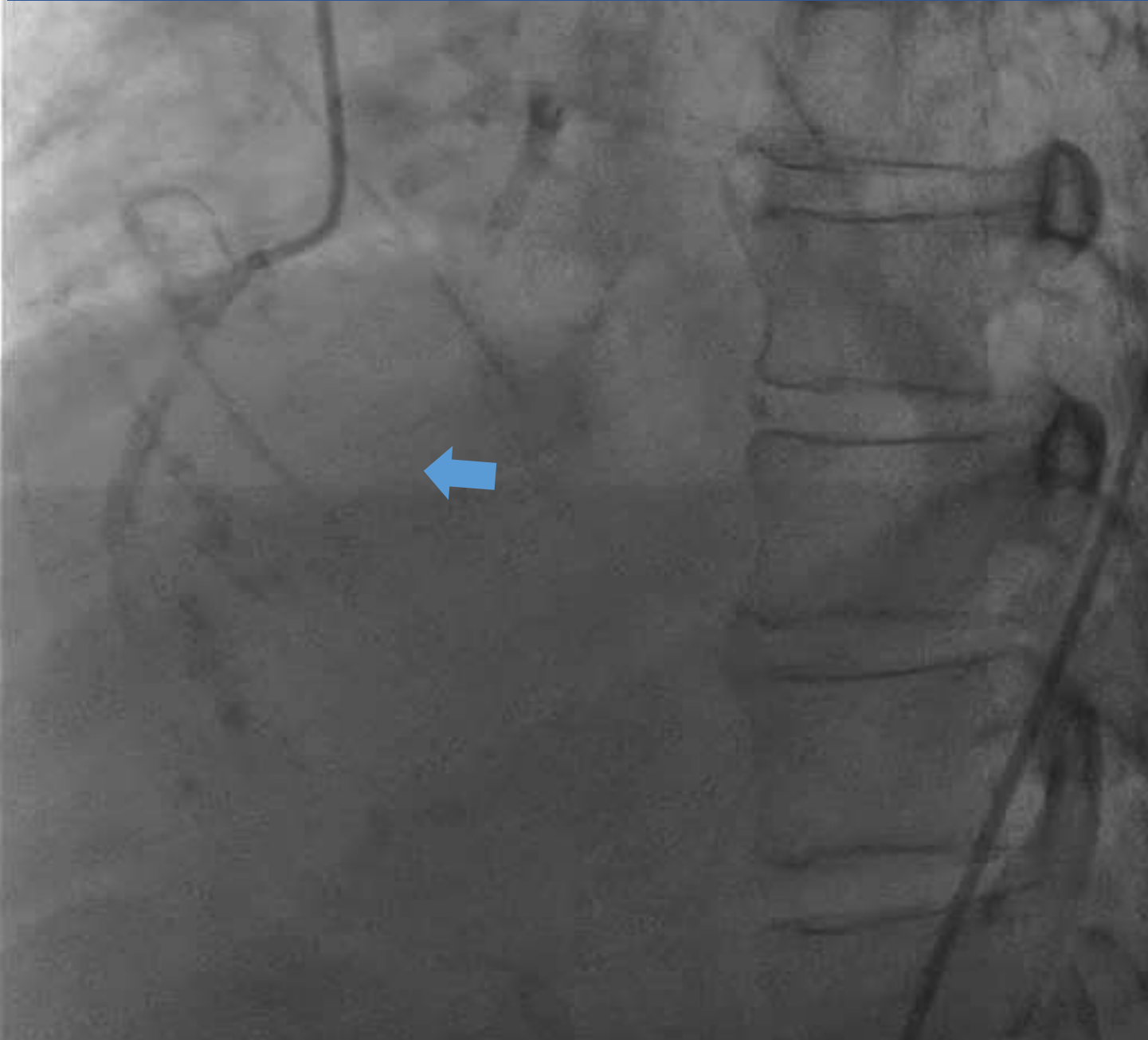
After 3 months.....

2<sup>nd</sup> episode of NSTEMI, in Aug 2016,  
complicated with **Vf** s/p CPR with ROSC

Echo: Generalized LV hypokinesia, especially apex,  
anterior septal wall, anterior wall, Moderate AR,  
**LVEF: 28%**

Follow up CAG suggested due to **Vf**

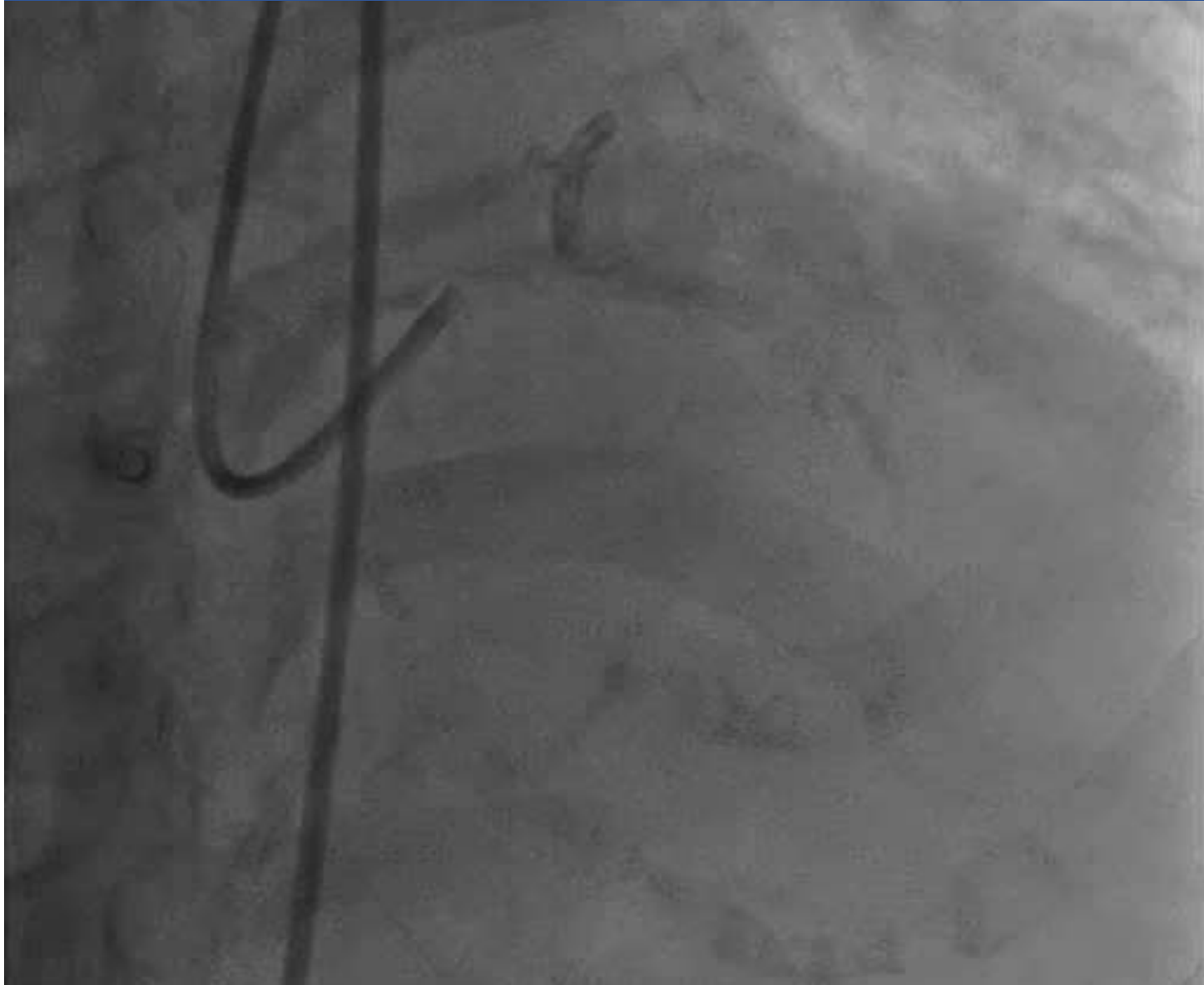
# RCA: Focal ISR over RCA-M



# Patent BMS over LCX-P

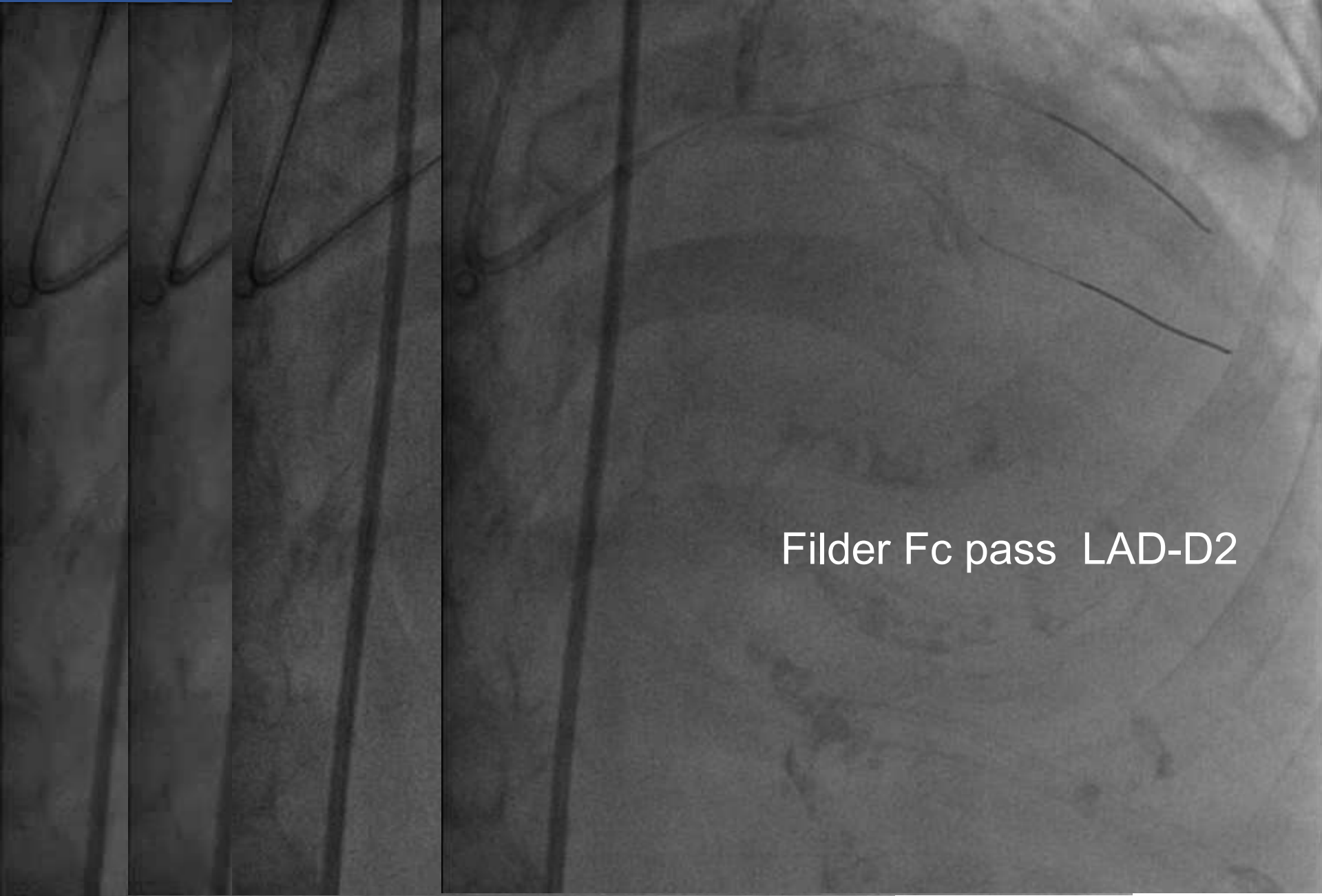


# LAD: ostium total occlusion



Poor LV function

# Filder Fc with finecross



Filder Fc pass LAD-D2

# Next Step ?

1.0 Ballo

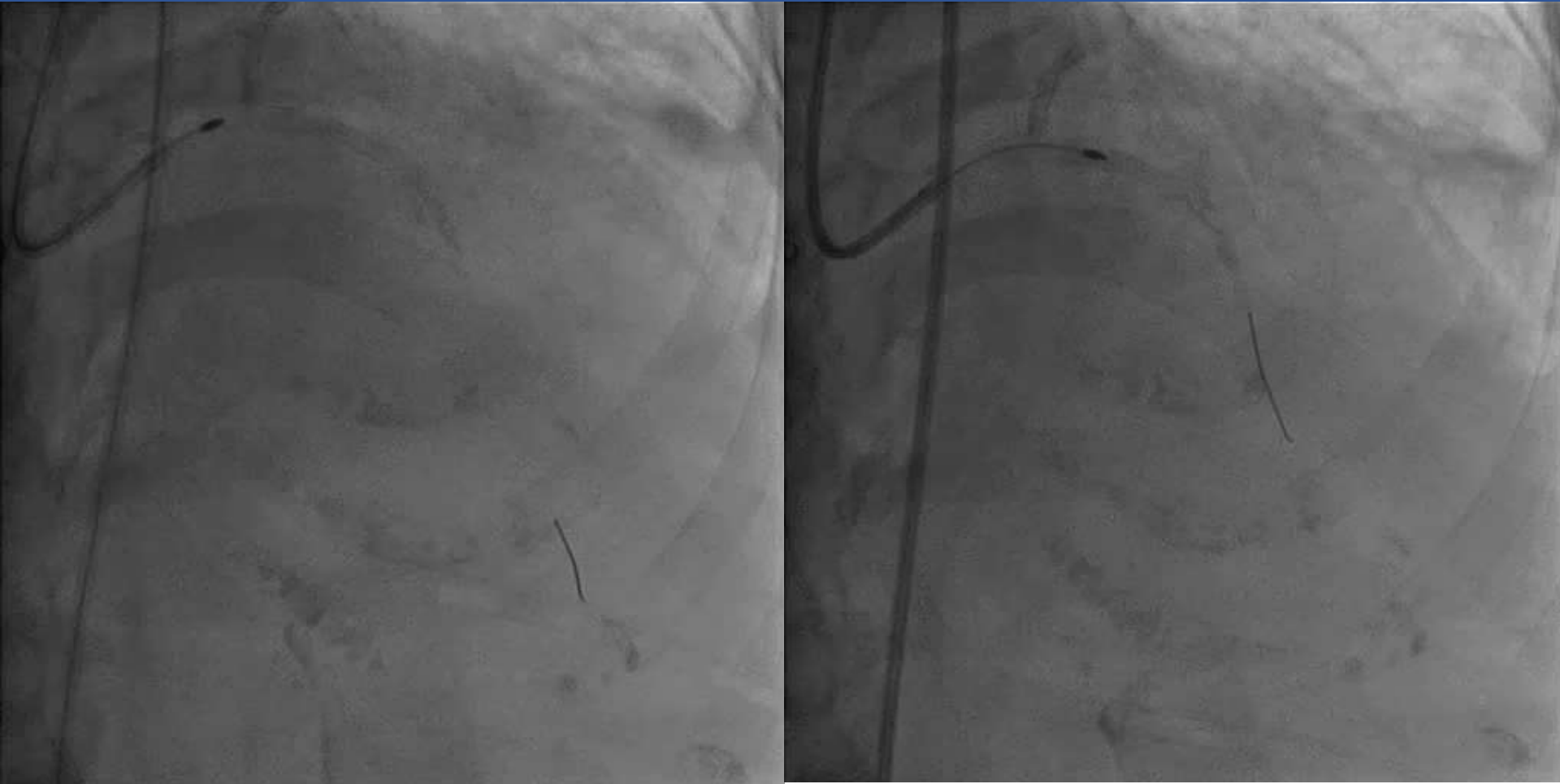
Gaia 3

The most distal part finecross could go

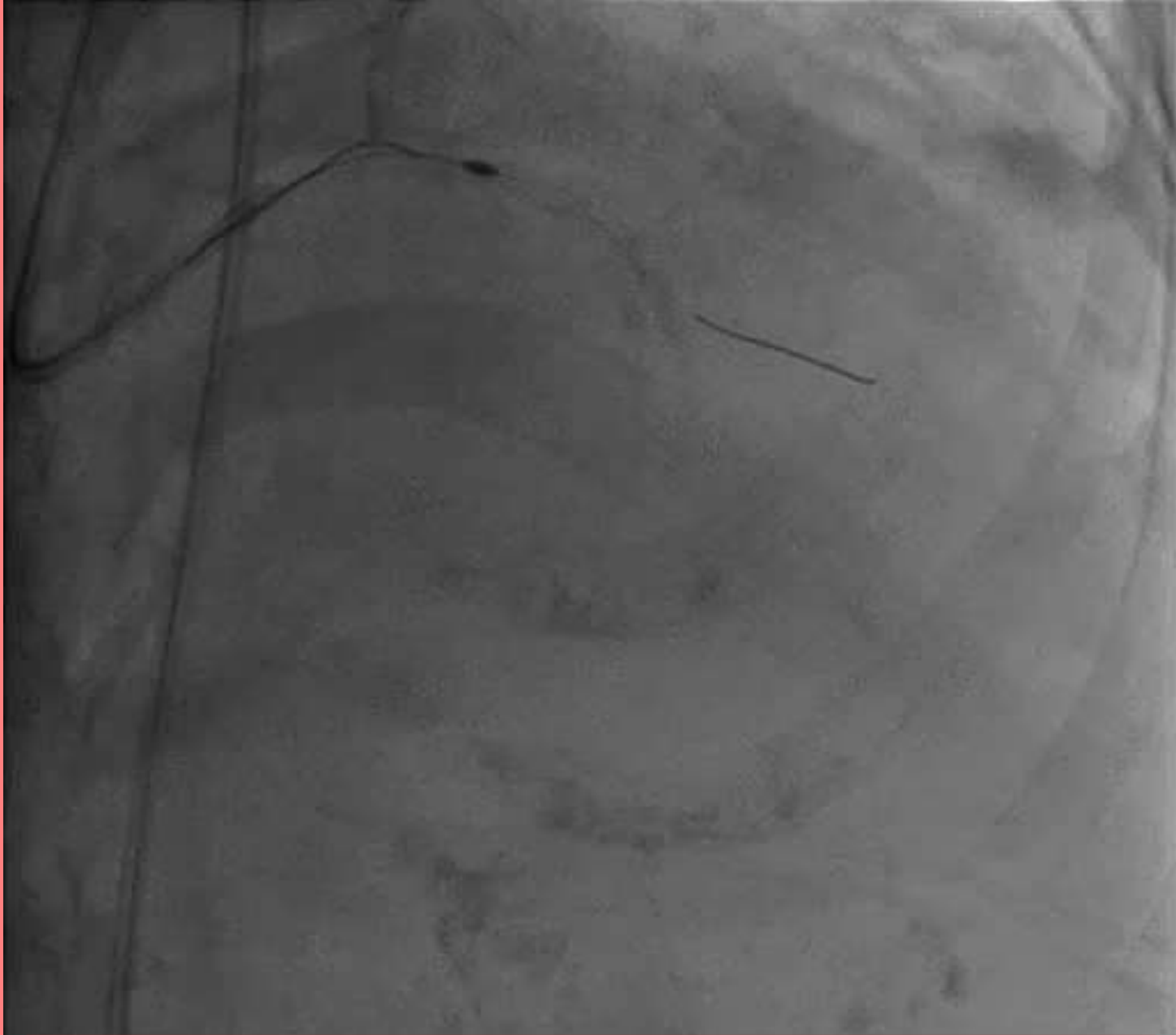




# Rota floopy wire pass LAD-D with finecross



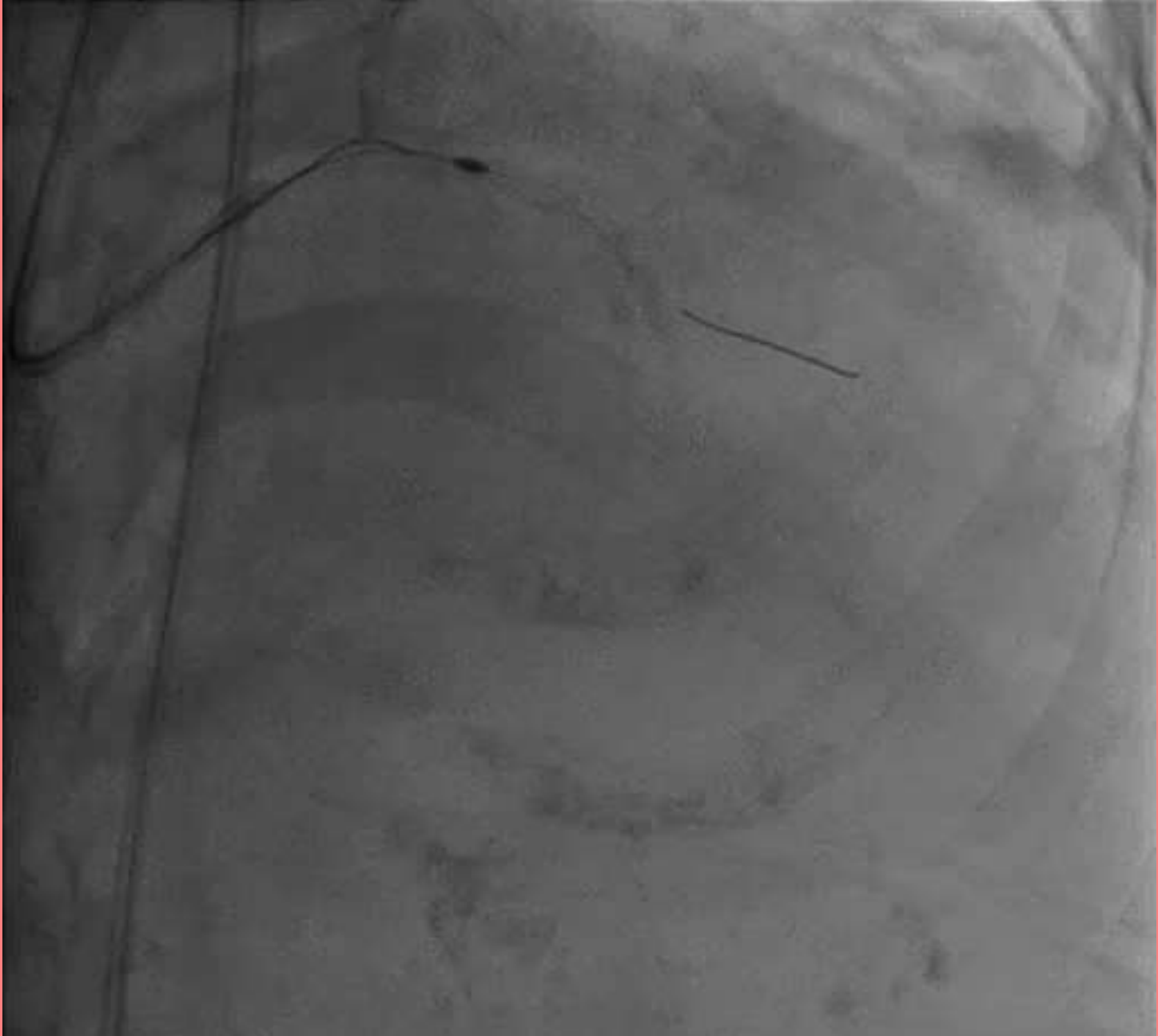
1.5 burr 180,000 rpm



Rota burr failed to advance



**Houston,  
what it is...  
we have a  
problem**



Rota burr failed to advance



***Symposium: Rotational atherectomy updating***

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Guest Editor: Prof. Wei-Hsian Yin

**Mechanism and management of burr entrapment: A nightmare of interventional cardiologists**

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# Mechanism of burr entrapment

Two mechanisms have been proposed previously. First, a small burr can be advanced beyond a heavily calcified plaque before sufficient ablation, especially when the burr is pushed firmly at high rotational speed. During high speed rotation, the frictional heat may enlarge the space between plaques.<sup>[9]</sup> Meanwhile, the coefficient of friction during motion is less than that at rest, which may facilitate the burr to pass the calcified lesion easily without debulking a significant amount of calcified tissue. In this situation, the ledge of calcium proximal to the burr may prevent burr withdrawal. This phenomenon was named “kokesi” after the Japanese doll by Kaneda *et al.*<sup>[9]</sup>

Second, the burr can be entrapped within a severely calcified long lesion, especially angulated and concomitant coronary spasm.<sup>[10]</sup> When a large burr was pushing vigorously against such lesion without sufficient pecking motion, the rotational speed may decrease significantly and this type of entrapment may occur.

## 1. Kokesi Phenomenon

Advanced beyond a heavy calcified lesion without sufficient ablation

## 2. Calcified long lesion

Angulated and concomitant coronary spasm



# How to retrieve the entrapped burr I

## 4 How to retrieve the entrapped burr?

An emergent open surgery would be the most reliable and always the last option for removing the entrapped burr, just as the case 3 we reported. However, surgical removal is invasive, time consuming and usually not immediately available, especially for hemodynamic unstable cases. Before sending the patient to surgery, several non-surgical techniques may be tried to retrieve the stuck burr. In order to prevent thrombosis, sufficient heparinization and glycoprotein IIb/IIIa are recommended before these attempts.<sup>[9,11]</sup> To relief spasm and facilitate antegrade coronary flow, intracoronary nitroglycerin and/or verapamil injection are also suggested.<sup>[9,12,13]</sup>

The simplest method to retrieve the entrapped burr is pulling back the rotator system manually. In some cases, as the case 2 and 5 of our series, the stuck burr can be withdrawal successfully by manual traction with on-Dynaglide or off-Dynaglide rotation but the vessel may perforate and proximal segment may be injured.<sup>[14]</sup> Extreme force on the burr and burr shaft may also result in shaft fracture. Disengaged the GC from vessel ostium and sending another GW deep into aorta may prevent vessel injury by avoid deep seating of GC during traction. In some cases, set the rotator-

✓ **Emergent open surgery**  
would be the most reliable

Invasive, not immediately

Hemodynamic unstable (X)

Always the last option for  
removing the entrapped burr

# How to retrieve the entrapped burr II

## 4 How to retrieve the entrapped burr?

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✓ Pull back the rotablator system manually

Vessel may perforate

Proximal part may be injured



# How to retrieve the entrapped burr III

Second, if simple manual traction failed, passing a second GW beyond the entrapped burr followed by balloon dilatation for the calcified lesion proximal to it may create a crack between the burr and vessel wall to retrieve it.<sup>[12,13,15,16]</sup> The lesion surrounding the entrapped burr is always heavily calcified and usually need a hydrophilic-coated wire to pass it<sup>[16]</sup> and sometimes stiffer wire such as Conquest wire may be needed to pass the adjacent hard plaque<sup>[10,13,15]</sup> as the case 4 of our series. However, the profile of the rotablation drive shaft sheath is 4.3 Fr, which may prohibit introducing of a balloon catheter (mostly 3 Fr in diameter) into the GC if it is a 6 or 7 Fr one. In this situation, introducing another GC via another vascular access may be needed for the second GW and balloon.<sup>[12,13]</sup> Alternatively, the GC may be exchanged to a 8 Fr one after cutting off the burr and sheath near the advancer.<sup>[10,13,15]</sup> Sakura *et al.*<sup>[16]</sup> demonstrated a novel idea to remove the drive shaft sheath after cut off the system near the advancer. After retracting the sheath and leaving the transected uncoupled burr, a second GW and balloon catheter can easily pass through the GC even it is a 6 Fr one.

- ✓ Passing a second GW beyond the entrapped burr followed by balloon dilatation
- Choose Hydrophilic-coated wire
- Conquest Pro wire
- Another GC from another vascular route
- 8F guide after cutting the burr and sheath

# How to retrieve the entrapped burr IV

Third, a snare was reported to remove an entrapped burr successfully by Parsan *et al.*<sup>[11]</sup> The rotablation system was cut at the hub as described above, which allowed direct access of the snare to the burr shaft. After encircled the burr shaft by the snare and the noose tightened immediately proximal to the entrapped burr, the burr was successful withdrawal by simultaneously retracting on the snare and the GC. Applying the traction force locally to the entrapped burr is a more controlled manner and may reduce the risk of proximal vascular trauma. This technique was inspired by pacemaker lead extractors used to remove infected pacing wires.

- ✓ Direct access of **the snare** to the burr shaft after cutting the drive shaft and sheath of Rotablator advancer
- Retracting the snare and Rota burr simultaneously

# How to retrieve the entrapped burr IV

Fourth, using a child catheter was also reported to retrieve the stuck burr either by over-the-wire 5Fr 120-cm straight GC (Heartrail ST01, Terumo, Japan)<sup>[10]</sup> or monorail 5 Fr Guideliner (Vascular Solutions, Minnesota, USA) GC.<sup>[17]</sup> After cut off the drive shaft and sheath near the advancer, the child catheter can be inserted through the remaining rotablation system to the entrapped burr. By simultaneous traction on the burr shaft and counter-traction on the child catheter, the catheter tip can act as a wedge between the burr and the surrounding plaque, which may exert a larger and more direct pulling force to retrieve the burr. Furthermore, the child catheter may protect the proximal vessel on coronary tree and facilitate following interventional procedures after successful removal of the burr by taking advantage of the child-in-mother technique.

## ✓ Child Catheter

- Over-the-wire 5Fr 120-cm straight GC (Heartrail ST01)
- Monorail 5 Fr Guideliner
- Protect the proximal vessel

# How to retrieve the entrapped burr IV

Format: Abstract ▾

Send to ▾

*Catheter Cardiovasc Interv.* 2011 Oct 1;78(4):558-64. doi: 10.1002/ccd.22995. Epub 2011 May 5.

## Successful retrieval of an entrapped Rotablator burr using 5 Fr guiding catheter.

Kimura M<sup>1</sup>, Shiraishi J, Kohno Y.

### ⊕ Author information

#### Abstract

**BACKGROUND:** Although burr entrapment is a rare complication of the Rotablator, it is extremely difficult to retrieve a fixedly entrapped burr without surgical procedure.

**CASE REPORT:** An 84-year-old male with effort angina had heavily calcified coronary trees as well as severe stenosis in the mid LCx, and moderate stenosis in the proximal LCx, and in the LMT. We planned to perform rotational atherectomy in the LCx lesions. Using 7 Fr Q-curve guiding catheter and Rotawire floppy, we began to ablate using 1.5-mm burr at 200,000 rpm. Because the burr could not pass the proximal stenosis, we exchanged the wire for Rotawire extrasupport and the burr for 1.25-mm burr, and restarted the ablation at 220,000 rpm. Although the burr could manage to pass the proximal stenosis, it had become trapped in the mid LCx lesion. Simple pull on the Rotablator, rotation of the burr, and crossing the Conquest (Confianza) wire could not retrieve it. Thus, we cut off the drive shaft and sheath of the Rotablator, inserted 5 Fr 120-cm straight guiding catheter (Heartrail ST01; Terumo) through the remaining Rotablator system, pushed the catheter tip to the lesion around the burr as well as simultaneously pulled the Rotablator, and finally could retrieve it. Then we implanted stents in the LCx and in the LMT without difficulty.

**CONCLUSIONS:** The 5 Fr straight guiding catheter might be useful for retrieving an entrapped burr (1.25-mm burr).

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# Try Filder Fc wire to pass hard plaque

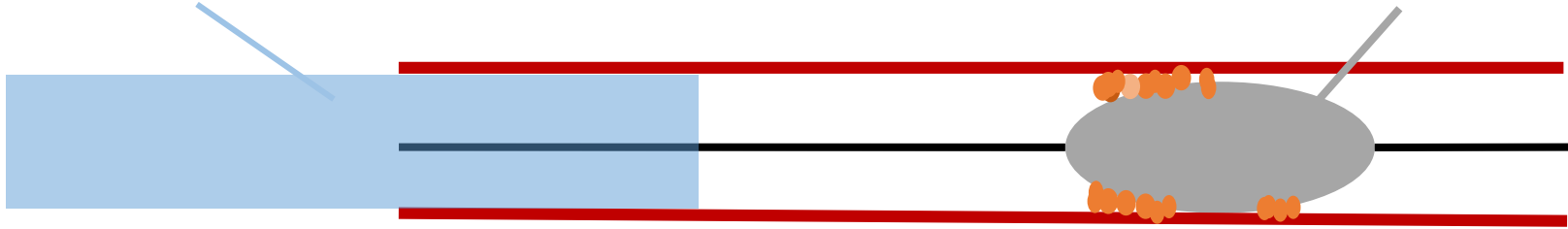


Failed to pass Filder Fc to  
distal LAD

**Next step ?**

Heartrail ST01

Entrapped Rotablaor Burr







TIMI III flow

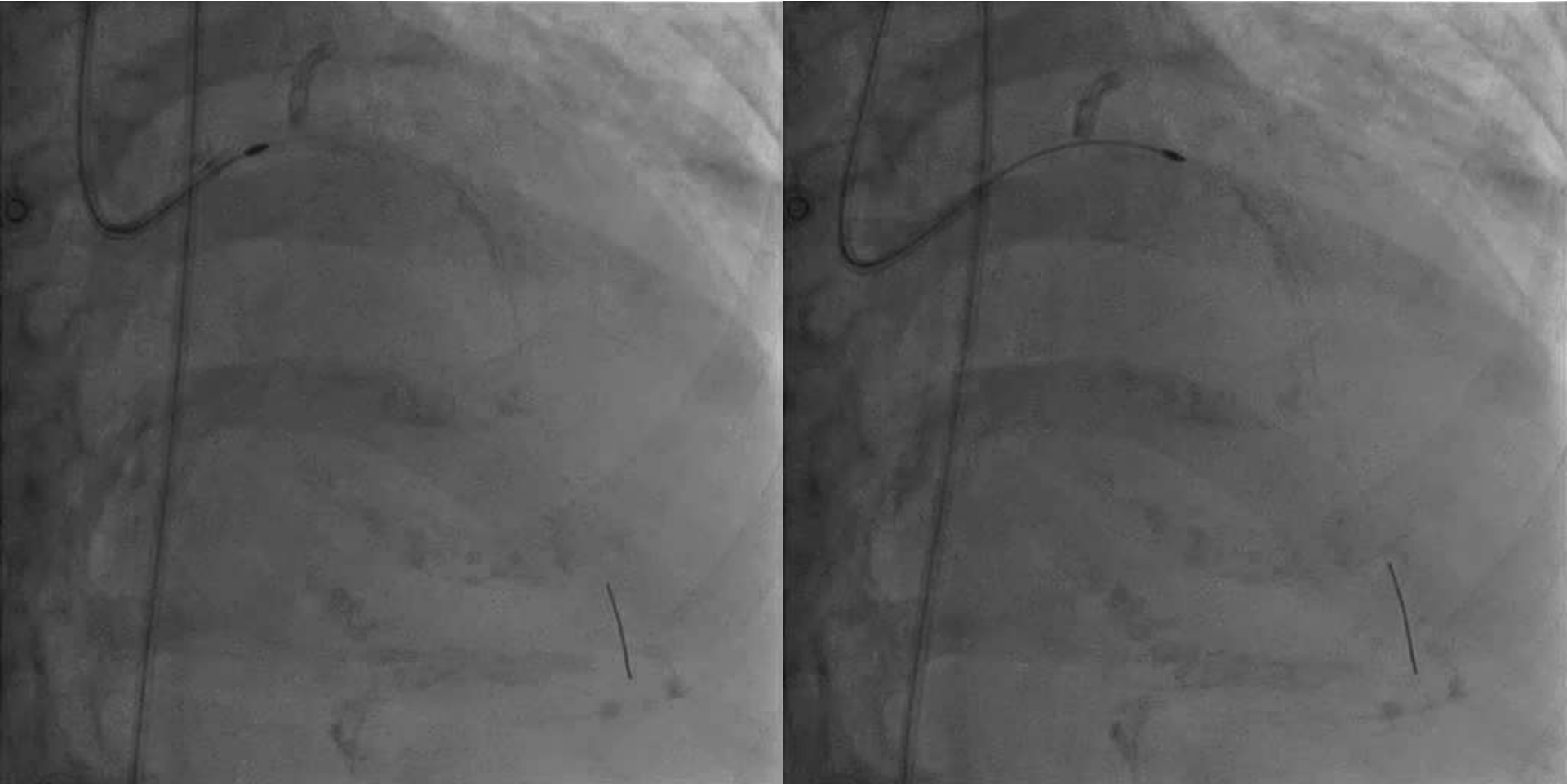
Should we stop here ?

Retrieve all things

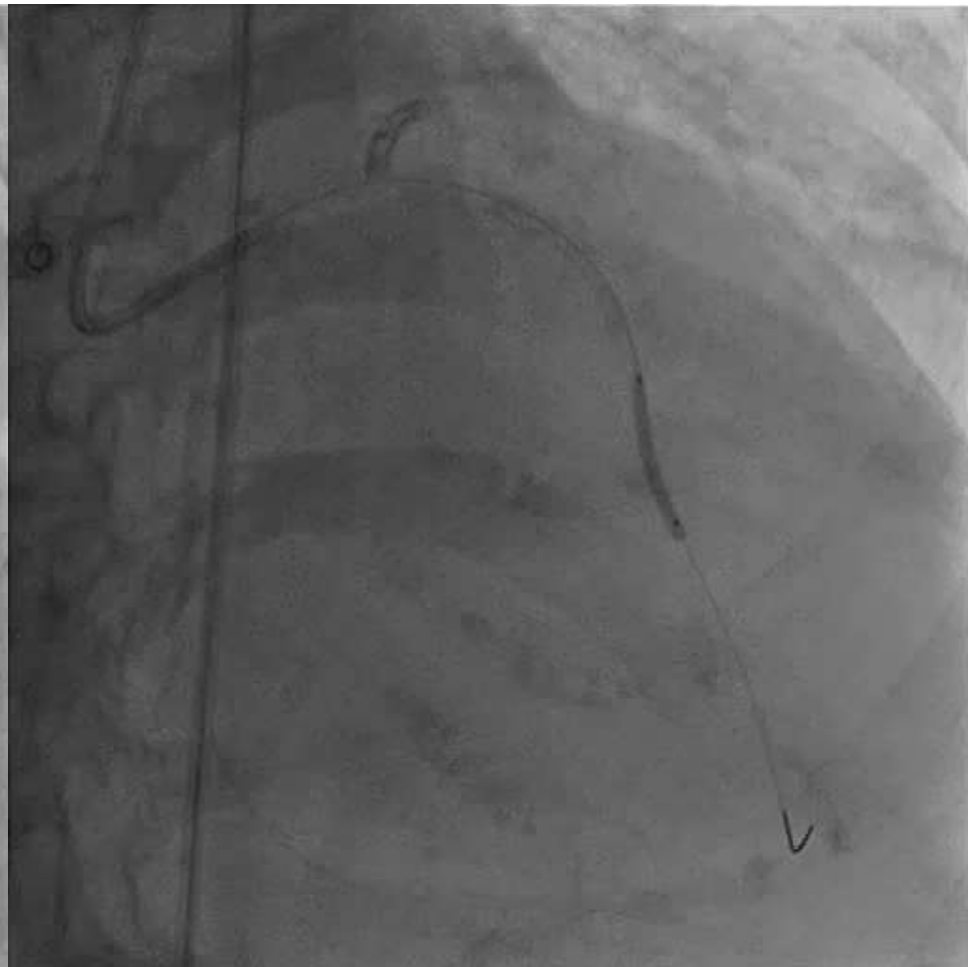
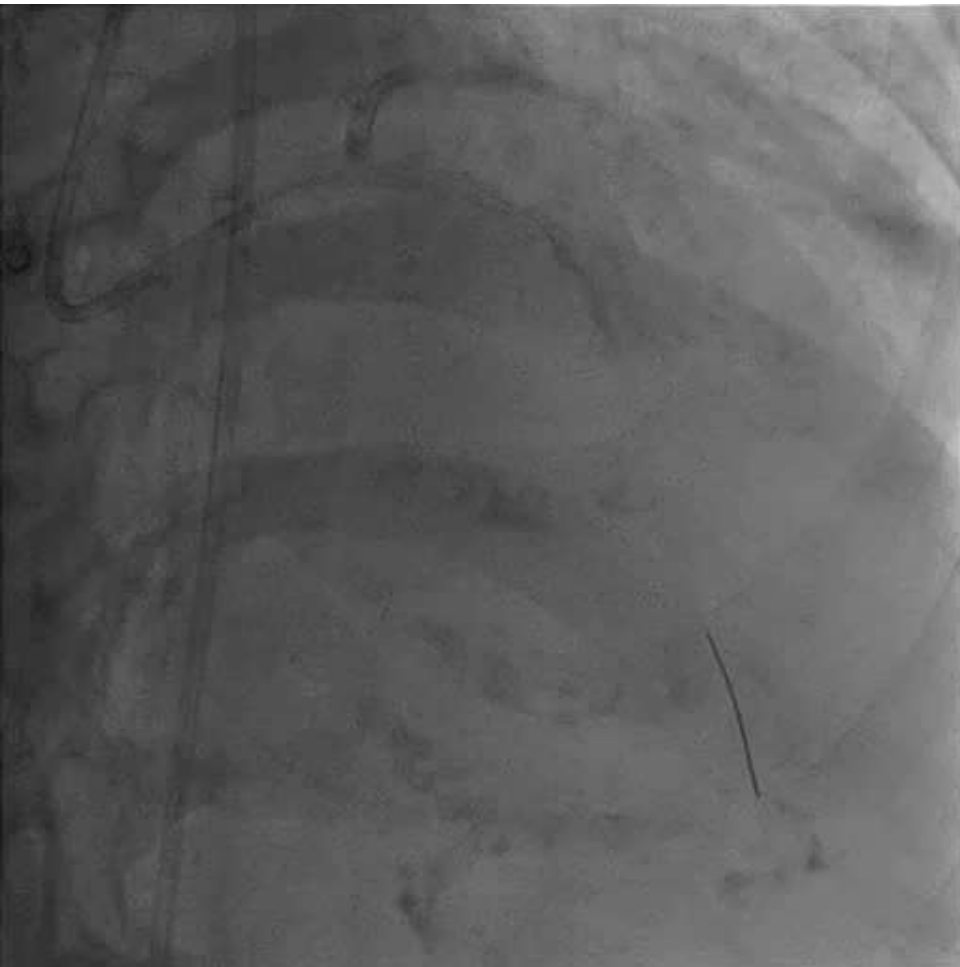
Immediate angio after remove all things



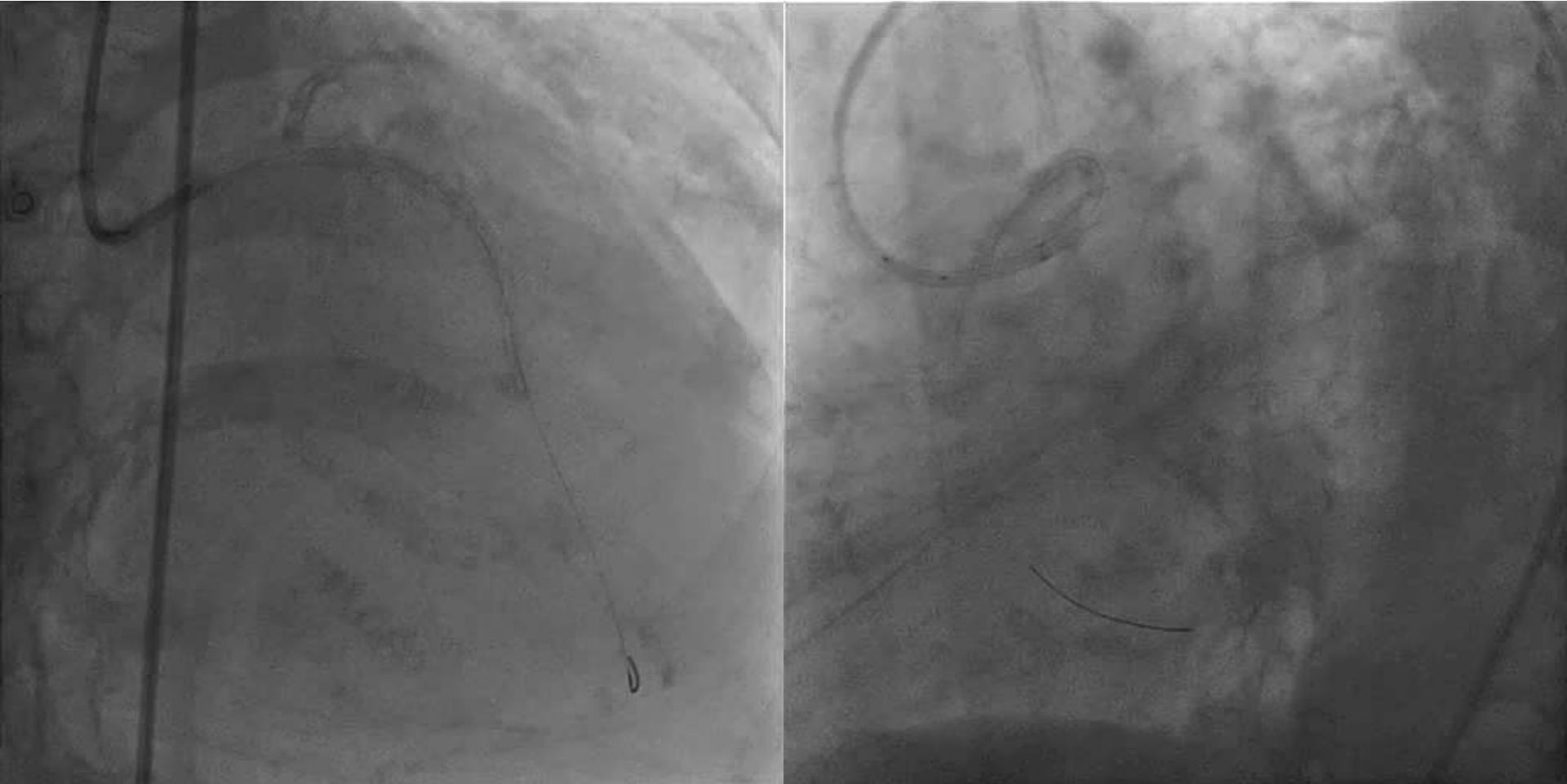
Keep on Rotablaton, 1.5 burr



# Things are ongoing



# Final Angiogram





Weaning successful in few days

Follow-up at OPD regularly

# Take Home Message

- ✓ **Rota burr entrapment** is a catastrophic complication leading both Doctor and Patient to cardiogenic shock, which could be avoided by serial method.
- ✓ **Child catheter** is feasible and maybe the safest method to retrieve entrapped burr and leaving the open surgery

Thanks for Your Attention



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