Combined Use of Contact wire technique and Parallel wire technique for Complex CTO

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Evolution of CTO-PCI

- Contralateral angiography
- Dedicated hard CTO wires
- Two wires technique
- Retrograde approach
Evolution of CTO-PCI

- Contralateral angiography
- Dedicated hard CTO wires
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- Retrograde approach
Parallel wire technique, which is a typical technique of two wires technique, is very useful when 1st wire get into the subintima and make a false lumen
Parallel Wire Technique

Selection of 2\textsuperscript{nd} wire is dependent on the lesion characteristics or/and operator preference (I usually use Conquest pro series).
Example of parallel wire technique

M/72, pLAD / pLCX CTOs
In parallel wire technique, delivery of 2nd wire to the CTO site is sometimes cumbersome or difficult.

Double lumen MC (Crusade MC)

Guide wires movement through the “double layer lumen”
Double lumen (Crusade) Microcatheter

**Parallel wire technique**

- Crusade can be delivered to target site along the 1st wire like the monorail balloon catheter and then 2nd wire can be delivered to target site through the side hole.

- Makes it possible to deliver the 2nd wire easily regardless of proximal lesion anatomy.

- Because both 2nd and 1st wires are supported by this MC, alternate use of both wires is possible with easily changing their roles as a marker of the wrong plane.

**See-saw techniques**

- Similar concept to See-Saw wire technique.
Example of double lumen catheter

M/64, pRCA CTO, prior failed case
Very difficult to deliver the wire to the CTO site
Anchor balloon technique
Parallel wire technique with Crusade mc
Patient Summary

- Patient: 61-yr-old male
- HTN, DM under medications
- EKG, cardiac enzyme: Non-specific finding
- Treadmill test: positive finding at stage II
- Echocardiography: Non-specific finding

*Dx: stable angina*
Baseline Angiography
Baseline Angiography
How should we approach this case?

• **Bad signs**
  a) Can’t find any stump at any projection
  b) Two big side branch arteries at proximal occlusion site
     → Trifurcation stumpless CTO
  c) Collateral connections for retrograde approach
     → Possible, but not so good

• **Good signs**
  a) Relatively straight mid-LAD CTO lesion
  b) Not so long length of occlusion body
  c) Definite calcification is not seen
IVUS examination

- 8-Fr. EBU, 3.75 guiding catheter
- Fielder-FC wire to septal branch
- IVUS examination
After finding the entry point of proximal cap by IVUS, we attempted to enter the CTO body under the IVUS guiding.

But, Wire repeatedly entered the 1st septal branch.

Therefore, we removed the IVUS catheter with leaving the Fielder FC wire on septal branch, and then we tried to penetrate the proximal cap of CTO with variable wires.(fielder XT, Miracle 3g & 12g, Conquest Pro) with the support of Crusade double lumen microcatheter.
However, any wire couldn’t get into the CTO proximal cap and all of them repeatedly slipped into the septal branch (We couldn’t manipulate wires to intended direction due to acute angle of entry point).

What shall we do?
Contact wire Technique

Fielder FC in septal branch was exchanged for Miracle 3g, and then Miracle 12g was tried again to puncture the proximal CTO cap.

2 stiff hydrophobic wires could create contact resistance, which could make a pivot to desired direction.
However, punctured M12 repeatedly got into the false lumen in CTO body.

Switching to Retrograde Approach?
However, there was a possibility that the M12 altered the vessel axis, which could make handling of 2\textsuperscript{nd} wire easier.

**Parallel wire technique**

Septal M3 was removed and C-pro was used as a 2\textsuperscript{nd} wire
2nd Parallel wire technique

1st Conquest pro

2nd Conquest pro

Crusade MC
Final Angiography
How could we get over this stumpless big side branch CTO?
Message at home

• Various kinds of double wire technique play a important role for increasing the success rate of complex CTO-PCI.

• Contact wire technique, which takes advantage of wire bias (contact resistance), can be used for stumpless branching point CTO

• If the 1st wire is in trouble, you should not hesitate to early use the parallel wire technique before the false lumen compress the collateral flow.

• Double lumen MC, which make wire exchange easier and act like two microcatheters, is useful tool for double wire technique.