New CTO guide wires & technique

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Diagnostic angiograms. LAD CTO lesion with a recanalization channel.
Simultaneous angiogram at the time of PCI. A very small and curving channel. Which guide wire should be selected?
Micro channel negotiation

Controllable, taper wire. Fielder XTR could negotiate the channel.
Final angiograms
Proximal and distal RCA CTO lesion. Small recanalization channel? Distal RCA?
Coronary MDCT (MIP)

Vessel course, size, lesion characteristics and calcium distribution.
Coronary MDCT (MPR)

MPR image delineates calcium distribution. Calcium location, deep? Superficial?
Loose tissue tracking

Possibility to pass with a floppy wire. Fielder XTR to negotiate loose tissue.
Wire cross through the proximal CTO

Pass the lesion toward the RV branch.
Simultaneous injection via left coronary guide and micro catheter.

Angiography from the micro catheter
Crossing the distal CTO

Fielder XT-R was also used.
Final angiograms
Composite core provides less whip motion, therefore, an easy wire manipulation and channel tracking are achieved. This structure is resistant to wire fracture. The difference between XTR and XTA is tip load. XTR has its tip load of 0.5 gram and XTA has 1.0 gram.
Both guide wires have initial delay to rotate. Tip movement of XTR is nearly parallel to the ideal line. The tip of Fielder XT does not rotate until whip motion occurs. After this, GW rotates at a burst. It causes difficulty for GW control.
X-treme
Advantages of Fielder XTR

Micro channel selection and loose tissue tracking

- Floppy tip → prevention for subintimal dissection
- Small tip profile → advance into the lesion
- Lubricity and torque response → crossing the lesion
RCA CTO lesion. Collateral channel tracking. Very small septal channel.
Very small septal channel

A very small connection.
Channel crossing by Fielder XTR

Channel tracking by a Fielder XTR. Reverse CART for CTO crossing.
Successful recanalization was achieved.
GAIA: Basic structure

Total Length 1900mm

Coil Length 150mm

SLIP COAT coating (Hydro Coating) Length 400mm

Gaia First: 0.010inch
Gaia Second: 0.011inch
Gaia Third: 0.012inch

Long hydrophilic coating provides smooth manipulation when used in conjunction with a support catheter such as Corsair

Line-up options allow the operator to choose the appropriate wire for a variety of situations

Gaia First
Diameter: 0.010 - 0.014”
Tip load: 1.5gf

Gaia Second
Diameter: 0.011 - 0.014”
Tip load: 3.5gf

Gaia Third
Diameter: 0.012 - 0.014”
Tip load: 4.5gf
LCX in stent occlusion

LCX in stent CTO lesion.
LCX in stent occlusion

Small lumen with many small curves.
Final angiograms
Mid LCX CTO lesion (Second attempt).
Coronary MDCT shows lesion has dense calcium. It was thinking that guide wire passage was blocked by this dense calcium spot.
Some space surrounded by a dense calcium.
Penetration proximal cap and step down.
Advancing the wire

Deflection control of the GAIA second.
Final angiograms
Wire movement in CTO model

In this CTO model, a Conquest pro with its tip curve is 30° could not turn the direction.
Wire movement in CTO model

A Conquest pro with its tip curve is 60° could turn the direction. However, it is difficult to control the direction.
Wire movement in CTO model

A Gaia second with its tip curve is 60° displays good controllability.
GAIA preserves the performance of less delayed torque response and minimum whip motion in the strong resistance.

Initial Delay
GW tip did not rotate while rotating the wire
Difference in torque response

Ultimate 3g (flattened core)

Polymer-filled wire 3g (flattened core)

Gaia second (non-flattened core)

remarkable delay of Initial torque response with a whip

Delay of Initial response

no initial delay no axial whip
Retrograde summit: Number of registry

Retrograde summit has been conducted from 2009. Currently, data were collected from 44 hospitals. Around 1500 CTO cases were performed every year and retrograde approach was done in about 30%.

WEB registry started from 2012
# Procedure outcome

<table>
<thead>
<tr>
<th></th>
<th>Total (1573)</th>
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<tbody>
<tr>
<td>Successful CTO crossing by guidewire</td>
<td>89.8%</td>
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<tr>
<td>Number of guidewire used for CTO approach</td>
<td>3.3 ± 2.3</td>
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<tr>
<td>Number of stent</td>
<td>1.7 ± 1.2</td>
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<tr>
<td><strong>Procedure success</strong></td>
<td><strong>88.6%</strong></td>
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<tr>
<td>Procedure time, min</td>
<td>141.2 ± 87.2</td>
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<tr>
<td>Contrast dose, ml</td>
<td>227.2 ± 107.9</td>
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<tr>
<td>Fluoroscopy time, min</td>
<td>72.6 ± 188.0</td>
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</table>
## Procedure outcome

<table>
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<tr>
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<th>Antegrade (1371)</th>
<th>Retrograde (493)</th>
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<tbody>
<tr>
<td>Number of guidewire used for CTO approach</td>
<td>3.1±2.2</td>
<td>5.1±2.7</td>
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<tr>
<td>Number of stent</td>
<td>1.6±1.1</td>
<td>2.2±1.5</td>
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<tr>
<td><strong>Procedure success</strong></td>
<td><strong>77.8%</strong></td>
<td><strong>83.0%</strong></td>
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<tr>
<td>Procedure time, min</td>
<td>134.1±83.6</td>
<td>202.3±92.9</td>
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<tr>
<td>Contrast dose, ml</td>
<td>226.1±108.4</td>
<td>268.6±120.8</td>
</tr>
<tr>
<td>Fluoroscopy time, min</td>
<td>70.4±200.6</td>
<td>94.5±45.8</td>
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Fielder FC and XT were the main current in 2009 and 2010. After launching of XTR, XT usage decreased rapidly. The advent of newly designed coil wires, the position of polymer jacket wires has changed dramatically. The percentages of polymer jacket wires (FC and XTR, not XT) last year was less than 30%. A newly designed coil wires (SION and SION blue) became the main current in use. Recently, SUOH, a prototype of SION, and SION black, an improved type of FC were used in some special cases.
Manner of retrograde CTO Crossing

Figure 13. 4 Patterns of Success in Retrograde Wire Technique
Reverse CART is the main method for CTO crossing. However, some change has been seen from 2011. After innovation of GAIA, there is a trend of increasing retrograde wire crossing. GAIA obviously influenced the retrograde procedure.
SION blue and SION

W coil structure produce good controllability. Frontline guide wire for channel crossing
Tip Load 0.5g～0.7g
Superior lubricity - Full Hydrophilic coating (SION)
Importance of less whip motion

Conventional GW

SION
Case (RCA CTO)

Proximal RCA CTO lesion. Mid RCA also has diffuse atherosclerosis. Distal RCA is supplied via atrial collateral channel from LCX.
Channel negotiation using SION

The atrial channel is tortuous. However, a SION wire successfully crossed the channel.
Distal RCA CTO lesion. Distal RCA was supplied via septal collateral.
Septal channel looks thread like and it seems easy to negotiate the channel.
Underestimating the channel sometimes causes complications. Sometimes GW advanced into small branches. Reattempt toward main channel was successful in this case.
Entry and exit of CTO are also abrupt type of occlusion. A stiff wire was needed to penetrate the lesion. CTO entry was penetrated using a Conquest pro 12. However, it advanced just straightly. Change the wire to GAIA third and advance it toward exit. Retrograde wire (Gaia third) almost kissed within the bend lesion. Then, the antegrade wire advanced to distal true lumen.
Final angiograms
RCA CTO

Distal RCA CTO lesion at bifurcation.
Antegrade wiring was performed by IVUS guidance. A GAIA first wire, following GAIA second wire was advanced into the CTO lesion via parallel wire technique, however, it went into subintima.
Very tortuous atrial channel

Channel crossing using a SION wire is difficult. Therefore, I used a SUOH, a prototype of SION family.
Channel crossing was achieved using a SUOH. Because of an antegrade wire was far from true lumen that was estimated retrograde tip angiography, a retrograde wire intentionally advanced into the estimated true lumen using a GAIA second wire and it was successfully crossed toward proximal true lumen.
SUOH

- Tip Load: 0.5g
- Radio-opacity: 3cm
- Coil: 21cm
- Diameter: 0.014inch
- Length: 175cm

SLIP COAT®
Stainless steel high-tension Core
PTFE Coating

Rope Coil
Final angiograms
Recent technological advances of GW changes the CTO PCI strategy both in antegrade and retrograde.

Channel crossing was achieved using new coil wires in many cases.

High success rate was achieved.

After innovation of new guide wires, conventional and kissing wire crossing the CTO lesion have been increasing in retrograde approach.