Cto era. What’s new?

TSIAFOUTIS IOANNIS
RED CROSS HOSPITAL
ATHENS
Hybrid CTO crossing algorithm

1. Dual injection

2. Ambiguous proximal cap
   1. Poor distal target
   3. Appropriate “interventional” collaterals

3. Lesion length <20 mm

4. Antegrade wiring

5. Antegrade dissection and reentry
   Controlled (Stingray)
   Wire based (LaST)

6. Retrograde
   True lumen puncture

7. Switch Strategy

Brilakis, Grantham, Rinfret, Wyman, Burke, Karmpaliotis, Lembo, Pershad, Kandzari, Buller, De Martini, Lombardi, Thompson. JACC Intv 2012
Cto Innovation

- Wires
- Microcatheters
- Devices
- Techniques
Challenge to overcome Trade-off: “Flexibility” and “Torque”

**Tip Load 0.3gf**
- Better trackability and crossability in severe tortuosity due to high flexibility.

**Combination of Flexibility and maneuverability**
- By loading Composite Core, less torque reduction and high flexibility preservation.

**Enhanced Tip Durability**
- Decrease guide wire tip deformation when crossing the tortuous vessels.
- Avoid reduction of maneuverability and decrease the frequency of wire exchange.
SUOH 03: Tip Flexibility

Tip Load (gf)

The Softest tip 0.3gf

Tip Flexibility

Better trackability and crossability in severe tortuosity due to the flexibility of whole radiopaque area.
Key Features of Gaia Next

ACT ONE
- High torque performance while ensuring tip flex
- Gaia micro-cone tip
- High penetration ability

XTRAND coil
- Anti trapping feature to avoid coil damage
- XTRAND coil features
  - Avoid coil damage/smashing
  - Avoid kinking of the core wire
  - High torque force and response
Tip of Gaia Next

Very fine ball tip makes penetration in the hard lesion easier!!

Gaia: Micro-cone Tip

Previous type
Tip Load of Gaia and Gaia Next

<table>
<thead>
<tr>
<th>Model</th>
<th>Load (gf)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASAHI Gaia First</td>
<td>1.7</td>
</tr>
<tr>
<td>ASAHI Next 1</td>
<td>2.0</td>
</tr>
<tr>
<td>ASAHI Second</td>
<td>3.5</td>
</tr>
<tr>
<td>ASAHI Next 2</td>
<td>4.0</td>
</tr>
<tr>
<td>ASAHI Third</td>
<td>4.5</td>
</tr>
<tr>
<td>ASAHI Next 3</td>
<td>6.0</td>
</tr>
</tbody>
</table>
Because of Gaia micro-cone tip, we can get better penetration force.
**XTRAND coil: Rotation??**

- **Counter clockwise (CCW)**
  - Coil: tight-fitting
- **Clockwise (CW)**
  - Coil: unclench

**Same Technology of Tornus**

If we do CCW with Rope Coil, we can get much higher torque response.

**Torque Response: GAIA vs GAIA NEXT, CCW and CW**

- **ASAHI Gaia Next 1:**
  - CCW: x2.2
  - CW: x1.5

- **ASAHI Gaia Next 2:**
  - CCW: x1.7
  - CW: x1.5

- **ASAHI Gaia Next 3:**
  - CCW: x1.5
  - CW: x1.5
Antegrade fenestration and re-entry: A new controlled subintimal technique for chronic total occlusion recanalization

Mauro Carlino, MD | Lorenzo Azzalini, MD, PhD, MSc | Satonu Mitomo, MD | Antonio Colombo, MD

Abstract

Objectives: To describe and evaluate the efficacy of a novel antegrade dissection/re-entry (ADR) technique, called antegrade fenestration and re-entry (AFR), for chronic total occlusions (CTO) percutaneous coronary intervention (PCI).

Background: The widespread adoption of ADR is limited by several technical, logistic, and financial factors. Therefore, novel ADR techniques are needed.

Methods: AFR consists in creating multiple fenestrations of the dissection flap separating the false and true lumens. This is achieved by advancing a balloon (sized 1.1 with the artery diameter) onto the antegrade wire into the subintimal space, and inflating it at the level of the distal cap. A soft polymers-jacketed guidewire is then advanced across the fenestrations created by balloon inflation from the subintimal space into the true lumen. Following its theoretical formulation, patients undergoing ADR-based CTO recanalization at our institution were considered for AFR treatment.

Results: Between November 2015 and October 2017, 219 CTO PCIs were performed. Of those, ADR was utilized in 33 (15%) cases, of whom AFR was used in 6 (38%). In all but one case, AFR was performed after failed true-to-true lumen crossing, while in the remainder it was utilized after extensive subintimal space disruption following alternative ADR techniques. AFR was successful in all six cases and no complications were observed.

Conclusions: We have developed a novel ADR technique which aims at complementing the CTO operator’s armamentarium. AFR requires no specific device, does not preclude alternative bailout techniques, and is inexpensive and easy to perform. A dedicated study should confirm our findings in a large cohort.

KEYWORDS
antegrade, chronic total occlusion, dissection, percutaneous coronary intervention, re-entry, subintimal
Subintimal tracking as close as possible to the distal true lumen
Fenestrations by false lumen ballooning
Fenestrations are widely open
Fenestrations are collapsing

3-4 sec
Fenestrations have collapsed

False lumen

Collapsed fenestrations

Collapsed true lumen

10 sec
STEP 1

A guidewire is advanced inadvertently antegrade in the subintimal space. The distal tip of the guidewire is located beyond the distal cap.

STEP 2

The microcatheter is removed leaving the first guidewire in place and the occlusion is wired again still through the subintimal space.
STEP 3

A balloon (sized 1:1 with the artery diameter) is advanced on the first guidewire and is placed across the distal cap.

STEP 4

The balloon is inflated.

STEP 5

Immediately after balloon deflation, the second wire is advanced into the true lumen through the fenestrations created by the balloon between the subintimal space and the true lumen, which is now accessible, since balloon dilatation took place across the distal cap.
Cross Boss catheter

• Metal OTW micro catheter with rounded tip to prevent vessel exit

• Device rotated rapidly in either direction using fast spin

• Can advance through the CTO without a wire in the lead

• Subintimal position - true lumen reentry performed

• Smaller subadventitial space –
Sting ray balloon & guide wire system

1mm flat balloon with 3 exit ports connected to the same lumen

Distal exit port – for balloon positioning

Uses guide wire with extreme tapered tip (0.0025) for reentry

Distal true lumen entry confirmed by contralateral injection
Randomized Comparison of a CrossBoss First vs. Standard Wire Escalation Strategy for Crossing Coronary Chronic Total Occlusions: the “CrossBoss First” trial

Emmanouil S. Brilakis, MD, PhD
on behalf of the CrossBoss First Trial Investigators
Primary endpoints

**Crossing time**

- CrossBoss: 56 (33, 93)
- Guidewire: 66 (36, 105)

- **P value**: 0.323

**Procedural MACE**

- CrossBoss: 3.28%
- Guidewire: 4.03%

- **P value**: 1.000

**Variable**

<table>
<thead>
<tr>
<th>Variable</th>
<th>CrossBoss (n=122)</th>
<th>Guidewire (n=124)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crossing time (min)</td>
<td>56 (33, 93)</td>
<td>66 (36, 105)</td>
<td>0.323</td>
</tr>
</tbody>
</table>

*Standardized mean difference: 0.094*
Primary endpoints: ISR cases

Crossing time

- **CrossBoss**
  - Crossing time (min): 41 (23, 58)
  - P value: 0.046

- **Guidewire**
  - Crossing time (min): 66 (32, 111)
  - P value: 0.046

Procedural MACE

- **CrossBoss**
  - P value: 0.302
- **Guidewire**
  - P value: 4.17%

Standardized mean difference: 0.534
Cross Boss in stent CTO
Cross Boss in stent CTO - 17.5 min fluoroscopy time
• Pt 70 yrs
With angina with mild exertion
Medical History: Dyslipedemia, Hypertension, ex smoker
Prior MI with no coronography
Coro: Cto dominate LCX, collaterals from right (epicardial)
Jcto score: 1
Progress cto score : 1
Biradial access 6Fr, EBU 3.5, JR4. Antegrade wire escalation Gaia 2\textsuperscript{nd}, Confianza pro12, Hornet 14, Caravel micro. Single wire – 2 wires parallel technique. Dissection – no reentry
Epicardial collateral from RCA next choice
Suoh wire, Caravel micro, beating heart surfing
Injection from micro
A Gaia 3\textsuperscript{rd} successfully passed retrogradely and an RG3 was externalized through a Guide extension (Guidezilla).
A guide extension was used through EBU to facilitate the ext
Two DES Promus 3.0x18mm. 2.5x20mm
71.5 min Fluoroscopy time, 21079 cGy/cm2 DAP. Progress Cto compl score: 4
Dual Lumen Microcatheters

- Usable length
- GW exit port
- Radiopaque marker
- Cross section of distal shaft

Reverse wire technique
Wiring acute angulated bifurcations
Bifurcation CTO wiring
Parallel wiring technique
RCA prox CTO second attempt in staged total revasc. Biradial access 7fr AL 1, 6fr EBU 3.5
Microcatheter Caravel, PT2 moderate support successful pass
After dialatations big marginal branch occluded
Sasuke (Asahi) double lumen catheter was used to wire the branch
Successful pass of a PT2 moderate support and after that stenting the bifurcation
Final result
Total revasc. **Show respect to collaterals!**
3 VD pt refused CABG
First procedure: fix LAD without covering first septal, so that can be used for retro approach
First procedure: fix LAD without covering first septal, so that can be used for retro approach
CTO RCA: Biradial 7fr AL1, 6fr EBU3.5
Antegrade 1st approach Fielder xt, Pilot 200, ambiguous course, branch at prox cap
Retrograde 2nd approach: Caravel MC, Sion black septal surfing successful to distal RCA
Pilot 200, Gaia 2\textsuperscript{nd}, Confianza Conquest pro12 escalation for retro
Reverse CART
Difficulty to trap the wire in Guide
Gaia 2\textsuperscript{nd} successful passed in the antegrade Guide
Despite trapping Gaia 2\textsuperscript{nd}, Caravel couldn’t pass the lesion. A guide extension (Guidezilla) was advanced to “kiss” the Micro and give the opportunity to advance and externalize RG3 wire.
After that everything was easy. “Kissing” technique for Extension and Micro
Last procedure: Stent prox LAD (1st septal) and LCX. Total Revasc
Remember: Protect the collaterals
“Comparison Between Traditional and Guide-Catheter Extension Reverse Controlled Antegrade Dissection and Retrograde Tracking: Insights From the PROGRESS-CTO Registry.”


MAMBA MicroCatheter (BSC)

MAMBA Microcatheter
2.4F crossing profile
3 coil taper zones for exceptional antegrade wire penetration support
Highly pushable and torqueable

MAMBA Flex 135/150 Microcatheters
2.1F crossing profile
5 coil taper zones for enhanced flexibility, deliverability, and wire follow
Excellent deliverability through tortuous vessels
135 cm length for antegrade
150 cm length for retrograde
Why CTO PCI will make you a better interventionalist

Top 10
Benefits of attempting CTO for the interventionalist

- Humility
- Growth
- Angiograms evaluation
- Equioment Understanding
- Joining a community
- Radiation management
- Management of complications
- Improved workflow
- Increased PCI volume
- Familiarity with complex lesions

Red Cross Hospital Cath lab CTO program. Nothing comes by fortune!