Advanced wiring techniques for below the-knee and below-the-ankle interventions

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Disclosure

Speaker name:

..........................Hiroyoshi Yokoi...............................................................

I have the following potential conflicts of interest to report:

☐ Consulting
☐ Employment in industry
☐ Stockholder of a healthcare company
☐ Owner of a healthcare company
☒ Other(s)  Cook, Termo, BSJ, Medotoronic, Abott, Medicon

☐ I do not have any potential conflict of interest
**Recommendations for revascularization in patients with infrapopliteal lesions**

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Class(^a)</th>
<th>Level(^b)</th>
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<tbody>
<tr>
<td>When revascularization in the infrapopliteal segment is indicated, the endovascular-first strategy should be considered.</td>
<td>IIA</td>
<td>C</td>
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<tr>
<td>For infrapopliteal lesions, angioplasty is the preferred technique, and stent implantation should be considered only in the case of insufficient PTA.</td>
<td>IIA</td>
<td>C</td>
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</table>
From Japanese Multicenter registry

Lesion morphology of patients with CLI (1068 limbs)

No BTK revascularization

No Limbs salvage

Antegrade = standard technique

Advancing into CTO lumen

Wiring in CTO body

Successful penetration
Which wire is appropriate for BTK?

- **0.014** (Japan)
- **0.018** (Euro)
- **0.035** (Not suitable for BTK)

In Japan, **0.014-inch guidewire** is favorable than 0.018-inch guidewire in BTK intervention.
0.014-inch guidewires are mainly used

Hydrophilic polymer jacketed wire

First guidewire

Tapered wire for proximal or distal cap penetration

CTO guidewire
How I shape the tip of guidewires?

**For non-CTO lesions**
- Use a small needle to shape the tip.
- Shaping has smooth curve.
- The diameter of the curve is 3 to 6 mm.

**For CTO lesions**
- We bend the tip.
- 2 bending points.
- Distal bending is only 1 to 2 mm in length.
Intraluminal vs. subintimal

Reconstitution from subintimal space is sometimes difficult.
Antegrade approach sometimes fails

Advancing into CTO lumen
Wiring in CTO body
Successful penetration

20 to 30% Failure
Retrograde access is key to success

Antegrade approach

Antegrade fails

Retrograde approach
Various retrograde access technique

Distal site puncture

Trans-collateral / pedal approach

Posterotibial  Anterotibial

Trans-collateral  Trans-pedal
Differences of both retrograde technique

**Distal Site Puncture (DP)**
- Simple, easy-to-understand
- Good trackability & pushability
  - Puncture site injury

**Trans Collateral Approach (TCA)**
- Bi-directional approach without DP
  - Technical difficulty in channel tracking
  - Losing guidewire performance
Differences of both retrograde technique

Distal Site Puncture (DP)
- Simple, easy-to-understand
- Good trackability & pushability
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Trans Collateral Approach (TCA)
- Bi-directional approach without DP
  × Technical difficulty in channel tracking
  × Losing guidewire performance
Many kind of distal puncture

All arteries could be punctured!
Puncture position is very important

We should understand the appropriate position
Lateral view is appropriate for...

Distal PTA and plantar artery
Frontal view is appropriate for...

ATA, dorsal, metatarsal, and peroneal artery
Tips for the distal puncture

Keep in-line position to target artery
Tips for the distal puncture

Keep narrow puncture angulation
Differences of both retrograde technique

**Distal Site Puncture (DP)**
- Simple, easy-to-understand
- Good trackability & pushability
- × Puncture site injury

**Trans Collateral Approach (TCA)**
- Bi-directional approach without DP
- × Technical difficulty in channel tracking
- × Losing guidewire performance
BTK vessels have many artery to artery connections
Understanding of “Figure of Eight”

Yue-Qi Zhu et al, J Endovasc Ther 2010; 17:712-721
How to cross collateral channels?
Perforator branch from Peroneal.

Peroneal : Peroneal artery
Collateral access for TPT occlusion
Problems of channel tracking

- Tortuosity
- Bending angle
- Channel length
We have to choose the channel

Not tortuous

Not bended

Not long

Select the channel, candidate for wiring
How to success the channel tracking

**Hi-performance guidewire**

*Fielder/Regalia XS 1.0* (Asahi Intecc.)

*Fielder/Regalia XS 1.0 is the best wire for TCA*

**Low-profile microcatheter**

*Corsair* (Asahi Intecc.)

*Prominent* (TOKAI medical products)

*Both of them are selected case by case*
Small, right angled shape is important
After the retrograde system set up

Reverse CART

CART
3Fr sheath or OTW balloon

Double balloon
3Fr sheath or OTW balloon

Wire rendezvous

CART: controlled antegrade and retrograde subintimal tracking
Trans-pedal approach

Ischemic gangrene at 1st toe

BTK 3VD CTO
PTA revascularization

Coyote 2.5x220mm
Trans-pedal retrograde approach

Pedal arch wiring

Retrograde system for ATA to DP
Bi-directional wiring & rendezvous
ATA and pedal dilatation

Coyote 2.5x220mm, Coyote 2.0x220mm
Final angiography
When we should be considered below-the-ankle interventions?
Various type of the Pedal arch

Type1: Patent
Type2A: Incomplete
Type2B: Absent
Type3: Absent

Fig. 2. Classification of pedal arch. Type 1: both dorsalis pedis and plantar arteries patent, type 2A: only dorsalis pedis artery patent, type 2B: only plantar artery patent, type 3: both dorsalis pedis and plantar arteries occluded.

Absence of pedal arch = a serious problem

Indication of pedal artery angioplasty

insufficient wound blush (WB) = indication of pedal angioplasty
Clinical implications of BTA revascularization

Clinical Implications of Additional Pedal Artery Angioplasty in Critical Limb Ischemia Patients With Infrapopliteal and Pedal Artery Disease

Tatsuya Nakama, MD, Nozomi Watanabe, MD, PhD, Toshiyuki Kimura, MD, Kenji Ogata, MD, Shun Nishino, MD, Makoto Furugen, MD, PhD, Hiroshi Koiwaya, MD, PhD, Koji Furukawa, MD, Eisaku Nakamura, MD, PhD, Mitsuhiro Yano, MD, PhD, Takehiro Daian, MD, PhD, Nehiro Kuriyama, MD, PhD, and Yoshisato Shibata, MD

Nakama et al, JEVT 00:000-000 (2015)
**Exceptional wound healing rate**

**Time to wound-healing**

PAA(+): 86.0 ± 18.7 days  
(IQR: 63 - 155)

PAA(-): 152.0 ± 60.2 days  
(IQR: 80 - 365)

P = 0.05

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<th></th>
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<td>7</td>
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Nakama et al, JEVT 00:000-000 (2015)
Take home message

There are many specific techniques for BTK and BTA interventions.

We should learn about strength and weakness of each techniques.

Accumulation of evidence, development of dedicated devices and novel techniques were required for standardization of BTK and BTA interventions.
Thank you for your attention

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The Chair of JET 2016
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