Successful limb salvage in a critical limb ischemia with bilateral variant of arterial anatomy in below-the-knee lesion

Yu Sakaue, Tetsuya Nomura, Yusuke Hori, Daisuke Ueno, Kenichi Yoshioka, Hiroshi Kubota, Daisuke Miyawaki, Masakazu Kikai, Natsuya Keira, Tetsuya Tatsumi
Department of Cardiovascular Medicine, Kyoto Chubu Medical Center
Disclosure

Speaker name: Yu Sakaue

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)

I do not have any potential conflict of interest
Infrapopliteal artery disease is predominant in critical limb ischemia (CLI). And, infrapopliteal arteries usually show a wide variety of anatomy in contrast to iliac and femoro-popliteal arteries. Therefore, it is important to grasp the precise anatomy of infrapopliteal arteries for optimal outcomes in endovascular treatment (EVT).
Case Presentation

【Patient】88-year-old Japanese male
【Comorbidity】Hypothyroidism
【Present illness】
He was admitted to our hospital for treating of refractory ulcerations on both feet. Contrast CT showed the patency of ATA alone in both lower limbs. We performed EVT for both lower limbs.
Physical Examination

Height: 169cm  Weight: 51.4kg  Body Mass Index: 18.0

BT 36.3℃  BP 174/78mmHg  HR 54bpm

Skin ulcerations on both heels

【Rutherford Classification】6

【ABI】 right: 0.67  left: 0.83
Contrast CT of lower limbs
EVT for the left lower limb
(1st session)

Left femoral approach

GC:
Parent Plus 4.5Fr

GW:
Cruise

Balloon:
Amphilion Deep 2.0-2.5/210mm
EVT for the left lower limb (1st session)

Left femoral approach

GC:
Parent Plus 4.5Fr

GW:
Cruise

Balloon:
Amphilion Deep 2.0-2.5/210mm

We could not detect the precise entry points of the PA and the PTA.
EVT for the left lower limb (1st session)

Left femoral approach

GC: Parent Plus 4.5Fr

GW: Cruise

Balloon: Amphilion Deep 2.0-2.5/210mm

Performed 2.0-2.5mm balloon inflation in the ATA
EVT for the left lower limb (1st session)

We antegradeley advanced a GW towards the PA, but could not penetrate the distal cap.

⇒ We changed to the strategy to perform trans collateral approach (TCA) because the collateral artery from the ATA to the PA was clearly visualized.
EVT for the left lower limb (1st session)

- Antegrade Approach
  - GC: Parent Plus 4.5Fr
  - GW: Joker PV Treasure XS Astato 9-40
  - MC: Prominent Balloon: Amphilion Deep 2.0-2.5/210mm

- Retrograde Approach
  - GW: Cruise Chevalier 15G Ruby hard
  - MC: Prominent BTa

Rendezvous with Astato 9-40 antegradeley
EVT for the left lower limb (1st session)

- Antegrade Approach
  GC: Parent Plus 4.5Fr
  GW: Joker PV Treasure XS Astato 9-40
  MC: Prominent Balloon: Amphilion Deep 2.0-2.5/210mm

- Retrograde Approach
  GW: Cruise Chevalier 15G Ruby hard
  MC: Prominent BTa

Cruise GW successfully passed the collateral artery
EVT for the left lower limb (1\textsuperscript{st} session)

- Antegrade Approach
  
  GC:
  Parent Plus 4.5Fr

  GW:
  Joker PV
  Treasure XS
  Astato 9-40

  MC:
  Prominent
  Balloon:
  Amphilion Deep 2.0-2.5/210mm

- Retrograde Approach
  
  GW:
  Cruise
  Chevalier 15G
  Ruby hard

  MC:
  Prominent BTa

Performed 2.0-2.5mm balloon inflation in the PA
EVT for the left lower limb (1st session)

- Surgical time: 4h 58m
- Fluoroscopy time: 2h 1m
- Radiation dose: 0.553Gy
- Contrast medium: 208ml

We found the PA supplied blood flow to the left heel

Final angiography
EVT for the right lower limb (2nd session)

Right femoral approach

- Antegrade Approach

GW:
Treasure XS
Ruby hard
Astato 9-40

MC:
Prominent

Balloon:
Amphilion Deep 2.0-2.5/210mm

- Retrograde Approach

GW:
Cruise
Chevalier PLX

MC:
Prominent BTa
EVT for the right lower limb (2^{nd} session)

- Right femoral approach
  - Antegrade Approach

GW :
Treasure XS
Ruby hard
Astato 9-40

MC :
Prominent

Balloon :
Amphilion Deep 2.0-2.5/210mm

- Retrograde Approach

GW :
Cruise
Chevalier PLX

MC :
Prominent BTa

Performed 2.0-2.5mm balloon inflation in the ATA
EVT for the right lower limb (2nd session)

**Similar pattern of collateral arteries from the ATA to the PA**

Left (1st session)  
Right (2nd session)
EVT for the right lower limb (2\textsuperscript{nd} session)

- Right femoral approach
  - Antegrade Approach

GW: Treasure XS
Ruby hard
Astato 9-40

MC: Prominent

Balloon: Amphilion Deep 2.0-2.5/210mm

- Retrograde Approach

GW: Cruise
Chevalier PLX

MC: Prominent BTa
EVT for the right lower limb (2\textsuperscript{nd} session)

- Right femoral approach
  - Antegrade Approach

GW:
- Treasure XS
- Ruby hard
- Astato 9-40

MC:
- Prominent

Balloon:
- Amphilion Deep 2.0-2.5/210mm

- Retrograde Approach

GW:
- Cruise
- Chevalier PLX

MC:
- Prominent BTa

Rendezvous with Astato 9-40 antegradely
EVT for the right lower limb (2nd session)

Right femoral approach

· Antegrade Approach

GW:
Treasure XS
Ruby hard
Astato 9-40

MC:
Prominent

Balloon:
Amphilion Deep 2.0-2.5/210mm

· Retrograde Approach

GW:
Cruise
Chevalier PLX

MC:
Prominent BTa

Performed 2.0-2.5mm balloon inflation in the PA
EVT for the right lower limb (2nd session)

Surgical time
2h 47m

Fluoroscopy time
0h 54m

Radiation dose
0.221Gy

Contrast medium
94ml

Final angiography

We found the PA supplied blood flow to the right heel
Treatment results

ABI

Right: 0.67 → 0.97
Left: 0.83 → 1.01
Clinical course

Right heel

Left heel
A variant of the infrapopliteal artery was observed in 10.8% and can be a cause of failed revascularization and limb salvage.


This case is categorized as type III-A that the PTA was absent and the PA perfused the heel.


A variant of the infrapopliteal artery was observed in 10.8% and can be a cause of failed revascularization and limb salvage.
When the variant of the infrapopliteal artery is observed in one side, 28-50% have the variant in the opposite side and about 75% of them are the same type.

Awareness of anatomical variations for infrapopliteal arteries could lead to lesser surgical time, radiation dose, and consumption of contrast medium.

Successful limb salvage in a critical limb ischemia with bilateral variant of arterial anatomy in below-the-knee lesion

Yu Sakaue, Tetsuya Nomura, Yusuke Hori, Daisuke Ueno, Kenichi Yoshioka, Hiroshi Kubota, Daisuke Miyawaki, Masakazu Kikai, Natsuya Keira, Tetsuya Tatsumi
Department of Cardiovascular Medicine, Kyoto Chubu Medical Center