Novel Infra-popliteal Bi-directional Angioplasty in a Patient with Chronic Total Occlusion of the Tibial Artery Complicating Critical Lower Limb Ischemia

Kansai Rosai Hospital Cardiovascular Center

Osamu Iida, Masaaki Uematsu, Tetsuya Watanabe, Masashi Fujita, Masaki Awat, Fusako Sera, Shin Okamoto, Nobuaki Tanaka, Takayuki Ishihara, Tomoharu Dohi, Tuyoshi Mishima, Kiyonori Nanto, Yukika Mizukami, Seiki Nagata

Osaka University Graduate School of Medicine, Department of Advanced Cardiovascular Therapeutics

Shinsuke Nanto
Case: 88 y/o, Male, Non healing ulcer (Rutherford 6)

- PH: 80 years CAD (CABG)
- Risk factors: Hypertension, Diabetes mellitus, Renal insufficiency
- PI: Non healing ulcer with intractable rest pain for 2 months

Ankle brachial index (ABI): 0.73  Skin perfusion pressure (SPP): 23/19mmHg
Initial angiogram

Lt TPT: 100%
Lt PTA: 100%
Lt ATA: 100%

Lt SFA 100%

Peroneal A (Communicating branch)
Dosalis Pedis A
Plantar A
Clinical issue of this patients

Although the lesions were intense, the patient could not undergo surgical distal bypass due to several comorbidities:

- He was 88 years old with limited life expectancy;
- Minimal ambulatory capability;
- Functional dementia;
- MRSA in the ulcer;
- A low left ventricular ejection fraction of 42% evaluated by echocardiography;
- Suitable saphenous vein conduits could not be found.

We alternatively offered endovascular therapy (EVT) to the patient.
EVT for Lt SFA and TPT-Peroneal artery

SFA 100% ⇒ 0%
(Smart stent 8.0mm × 100mm × 3)

TPT-Peroneal a 100% ⇒ 0%
(3.0 × 100mm, only angioplasty)

Regional perfusion measured by SPP after these procedures was not sufficient for the ulcer to be healed
EVT for Lt ATA (initial angiogram)

ATA and PTA were totally occluded and collateral artery from peroneal artery supplied for distal ATA and plantar artery.
EVT for Lt ATA (Failed angioplasty)

- Approach
  Antegrade mono-directional approach from the left femoral artery
- Sheath
  4Fr 45cm long sheath (Terumo)
- Guide wire
- Cruise (St Jude Medical)
- Treasure (St Jude Medical)
- Micro catheter
  Excelsior (Boston scientific)

We failed to cross the ATA using mono-directional antegrade approach with treasure wire.

**Bi-directional approach (tibial puncture???)**
Dorsalis pedis artery was not sufficient vessel diameter to be punctured for retrograde approach.

- Peroneal artery (antegrade)
- Arterial connection
- Anterior tibial a (retrograde)
EVT for It ATA (retrograde approach)

Cruise and Astato wire were advance up to the site of ATA-CTO. But the wires didn’t cross the lesion. Hence, we used the CART technique.
EVT for il ATA (CART technique)

After the angioplasty (2.0 × 20mm), antegrade flow revealed to the pedal arch.
EVT for l.t. ATA (wire cross)

Crise wire (hydrophilic wire) successfully crossed the site of ATA-CTO.
EVT for Lt ATA (Final angiogram)

Anterior tibial artery 100%, TPT-Peroneal artery 90% ⇒ 0% (angioplasty)
After two weeks, transmetatarsal amputation was performed by a plastic surgeon, and the wound was completely healed, avoiding an additional major amputation.
Summary

✓ The patient was successfully treated with the EVT for the ATA by using a novel infra-popliteal bi-directional angioplasty through collaterals.
✓ Intractable rest pain immediately disappeared following the angioplasty and SPP was significantly improved.
✓ Transmetatarsal amputation was performed for the ulcer and the wound healed within 3 months.
✓ No complication occurred, and a major amputation of the limb was unnecessary.
Conclusion

Novel Infra-popliteal bi-directional angioplasty is useful in a patient with chronic total occlusion of the tibial artery complicating critical lower limb ischemia.