« Below-the-ankle » angioplasty and stenting for CLI

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Disclosure

Speaker name:

.....BRUNET JEROME.................................................................

I have the following potential conflicts of interest to report:

■ Consulting

☐ Employment in industry

☐ Shareholder in a healthcare company

☐ Owner of a healthcare company

☐ Other(s)

☐ I do not have any potential conflict of interest
Critical Limb Ischemia

« Straight line flow to the foot »
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Complete revascularization (patency of 3-vessel)
Uncomplete: at least 1-vessel
Differential Impact of Bypass Surgery and Angioplasty on Angiosome-Targeted Infrapopliteal Revascularization

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« Straight line flow to the foot »
Complete revascularization (ie patency of 3-vessel)
Uncomplete: at least 1-vessel.
Positive impact of «angiosome-Targeted» revascularization
« BTA » lesion and Critical Limb Ischemia

1st step: anatomical consideration

- Modal anatomy
- Variant angiographic anatomy in foot vascularization
BTK "3-vessel" modal anatomy

- 1 Anterior tibial artery
- 2 Posterior tibial artery
- 3 Fibular artery
BTK «3-vessel» modal anatomy
- 1 Anterior tibial artery
- 2 Posterior tibial artery
- 3 Fibular artery

BTA «2-vessel» modal anatomy
- Dorsalis pedis from anterior tibial : 4
- Plantar branches of the posterior tibial : lateral plantar 5 and medial plantar 6
- Fibular is not directly connected to the pedal-plantar arch (4 ------ 5)
anatomy

- **3 Fibular** is not directly connected to the pedal-plantar arch but can gives collaterals:
  - to the **2 Posterior tibial** via a **communicating branch** of the fibular
  - to the **1 Anterior tibial** via **perforating branch** of the fibular
BTA lesion and Critical Limb Ischemia

Knowledge of modal anatomy and angiographic variant is mandatory

– Diagnosis is sometimes difficult
– Anatomy will help to define optimal treatment according to hybrid strategy in CTO recanalization
84 years. Diabete. Creat 28mg
Trophic disorder
ED: no arteriopathy
Result after

1- Ant. Tib. recanalisation (DES) via pedal access

2- Post. Tib. balloon angioplasty

Is it enough?
Focus on the foot

Pedal access is ok

Vascular defect
Focus on the foot

Plantar arteries occlusion (both lateral and medial)
Plantar angioplasty
Balloon 1.5mm

Final result
Male, 49yrs  
CAD (left main)  
Ischemic 1st left toe (isolated)  
Rest pain and coldness 

FOOT angiogram 

- Hypoplastic anterior tib 
- Fibular continues in dorsal pedis 

Variant angiographic anatomy in foot vascularization 

3 vessel patency
Variant angiographic anatomy

Anterior tibial artery is hypoplasic

Dorsal pedis given by fibular divide in 2 branches medial (1st toe) and lateral (2nd to 5th toe)

Severe stenosis of medial branch going to the 1st toe

The arch cannot supply because of this particular anatomy: good anatomic-clinic correlation

No trophic disorder
Medical treatment
CLI
Forefoot ulcers
Distal SFA occlusion (1)
Re-injection on tibial bifurcation (2)
Fem-pop recanalization
Single-vessel run-off (fibular)
Is it enough for wound healing?
Variant angiographic anatomy

Single-vessel run-off (fibular) ... **but** connected to dorsalis pedis and lateral plantar

Tibial recanalisation isn’t indicated
BTA lesion and Critical Limb Ischemia

Knowledge of modal anatomy and angiographic variant is mandatory

1. Diagnosis is sometimes difficult
2. Will help to define optimal treatment according to hybrid strategy in CTO recanalization
   - Antegrad
   - Retrograd
     - Via the arch
     - Via collateral
     - Via ultradistal access
Failure to cross distal tib post occlusion

0.14 dorsalis pedis

Connection dorsalis pedis - lateral plantar
Amphirion 2.0/80 mm (antegrade) then DCB IMPACT 2.5/80mm

No stent in « BTA » : risk of compression/rupture  (plantar flexion with distal PT)
TPT occlusion

Ant. tib
TA occlusion

Bridging collatéral

Collateral from peroneal
TA occlusion

Bridging colléal

Collateral from fibular

Pedal restitution below the ankle
TA occlusion
Bridging collatéral
Collateral from peroneal
Pedal restitution below the ankle
Peroneal late and retrograd filling
Fibular recanalization will give an access for retrograd TA crossing via fibular collateral
b 2.0/20mm (retrograd)

Amphirion 2.0/80 mm (antegrad) then DCB IMPACT 2.5/120mm
No stent in « BTA »: risk of compression/rupture (dorsiflexion with dorsalis pedis)
1 month follow up

Final result

3 years follow-up: focal restenosis post DEB at 12 month on anterior tibial (prox cap) treated with Everolimus DES

No stent: risk of compression/rupture in dorsiflexion
Final example

Female 76 yrs (2009)
CLI
Rest pain
Ischemic forefoot
Toe ulceration

Foot angiogram:
- Distal posterior tibial artery occlusion ❶
- Hypoplastic anterior tibial artery ❷
- Fibular artery perforating branch continues as the dorsalis pedis ❸
Posterior tibial occlusion

Result after balloon angioplasty

Medial plantar

Lateral Plantar

Post Tib.

Lateral Plantar
Good initial clinic evolution....

...but recurrent rest pain at day 4 leading to hospital readmission

Angio: re-occlusion
Final result after bail-out stenting

Stent 2.5/24mm
6 years follow-up

Wound healing - No MACE

*Posterior tibial artery* still patent (ED) despite stent compression

Residual plantar forefoot pain specially when driving (clutch pedal)

Switch for automatic transmission 1 year later (no amputation but new car : cost effective?)
« Below-the-ankle » lesion require specific analysis
  - Anatomical consideration
  - Ultraselective angio (focus on the foot)

Hybrid approach for crossing
  - Antegrade
  - Retrograde (via pedal-plantar arch, via collateral, via ultradistal retrograd access)

Treatment = Balloon Angioplasty (DCB)

Stenting only for bail-out
  - High restenosis rate with nitinol stents
  - Compression/rupture with bare stents
    - Foot dorsiflexion with dorsalis pedis
    - Foot plantar flexion with distal tibial post