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

Jérôme BRUNET

Clinique Rhône-Durance - Avignon (France)

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 »

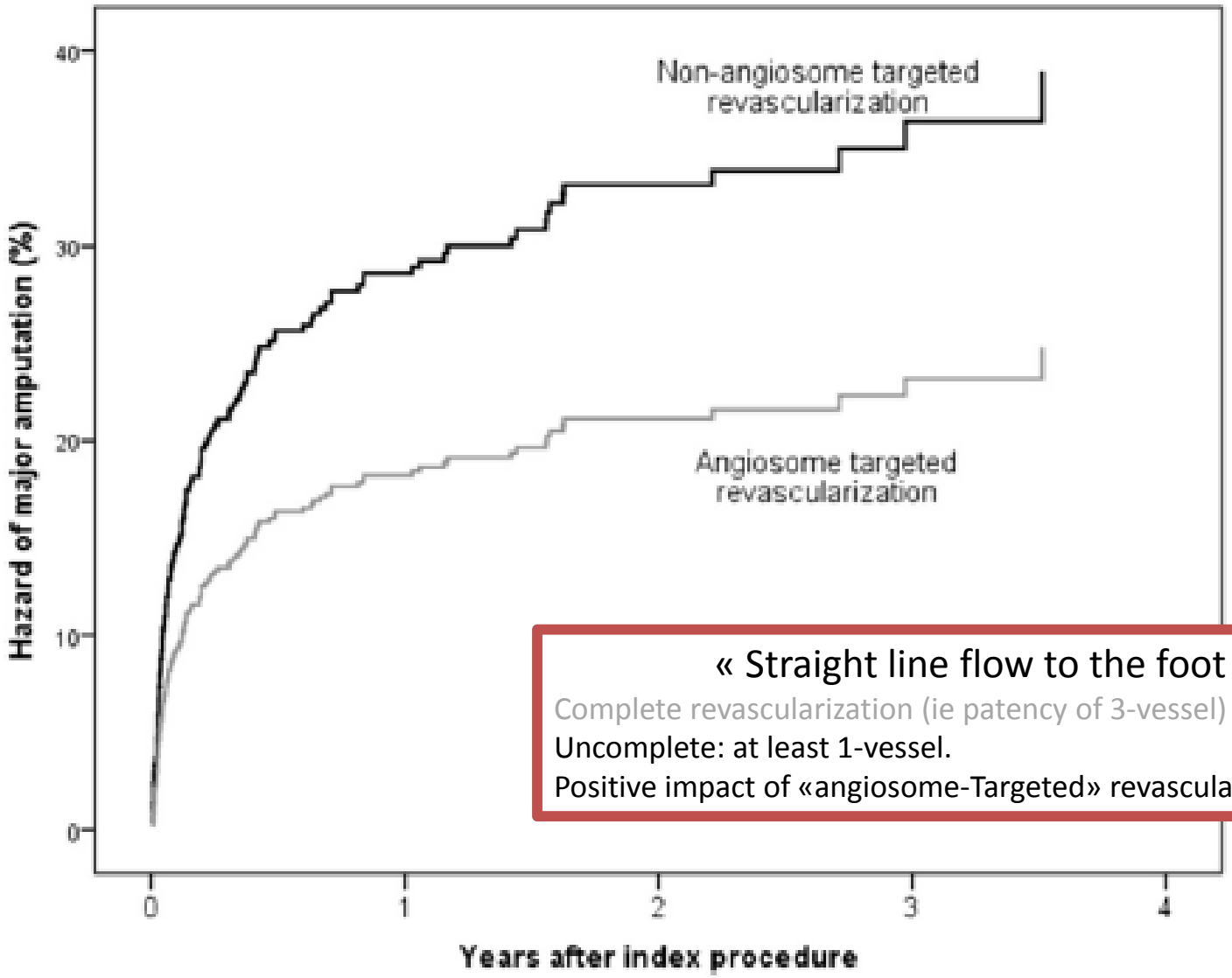
« Straight line flow to the foot »

Complete revascularization (patency of 3-vessel)
Uncomplete : at least 1-vessel

Eur J Vasc Endovasc Surg (2015) ■, 1–8

Differential Impact of Bypass Surgery and Angioplasty on Angiosome-Targeted Infrapopliteal Revascularization

K. Spillerova [a,*], F. Biancari [b], A. Leppäniemi [a], A. Albäck [a], M. Söderström [a], M. Venermo [a]



« Straight line flow to the foot »

Complete revascularization (ie patency of 3-vessel)

Uncomplete: at least 1-vessel.

Positive impact of «angiosome-Targeted» revascularization

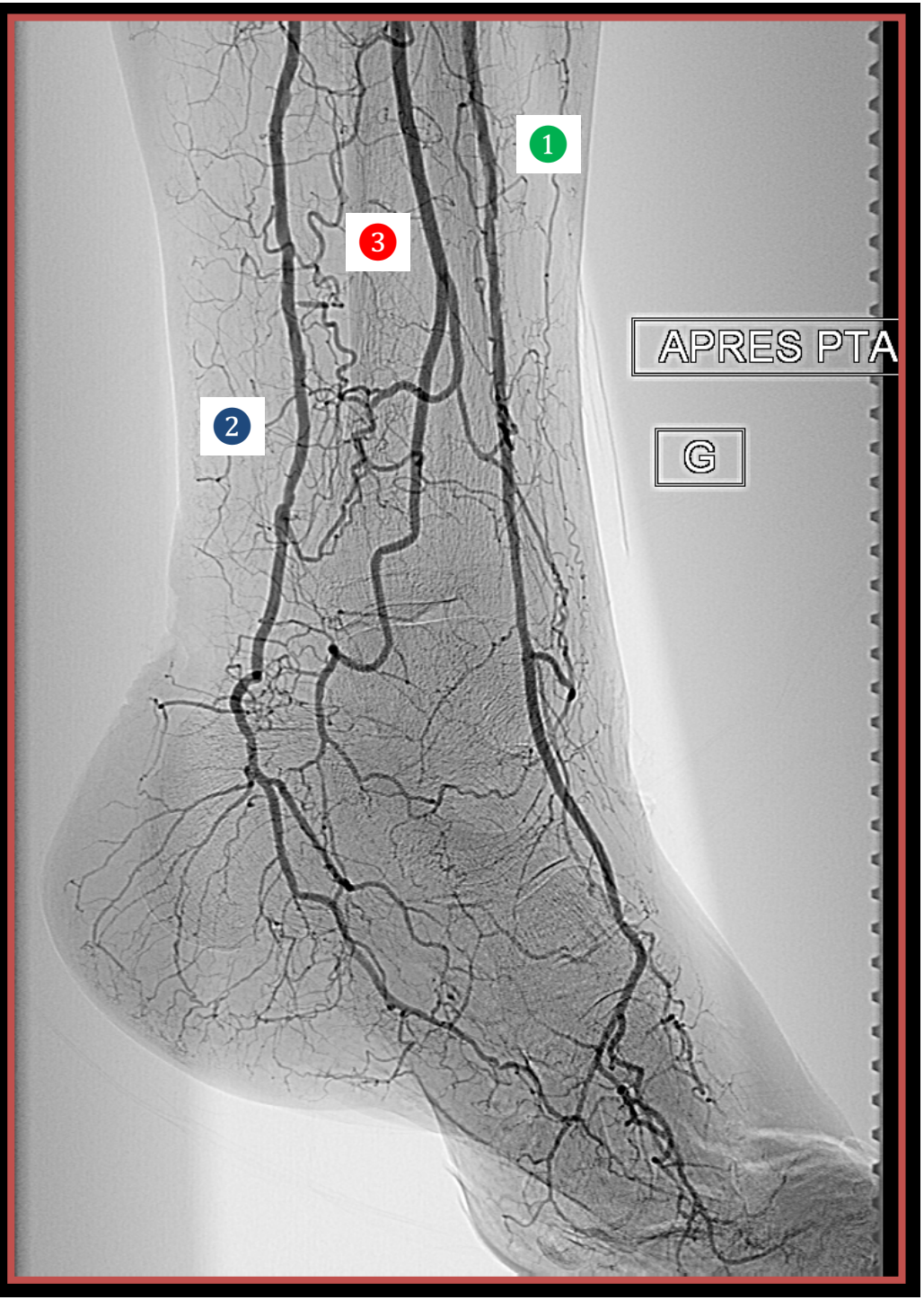
« BTA » lesion and Critical Limb Ischemia

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

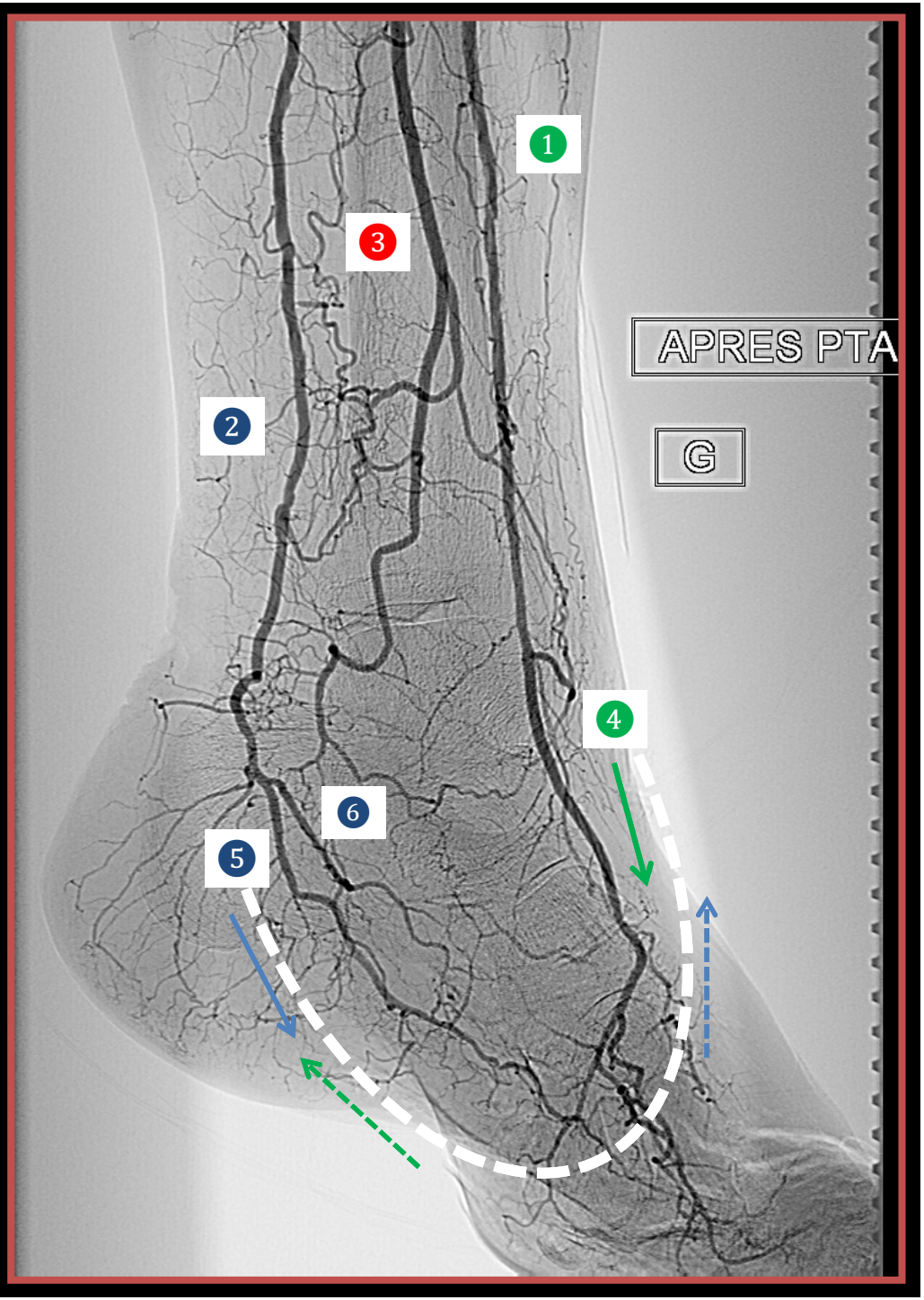


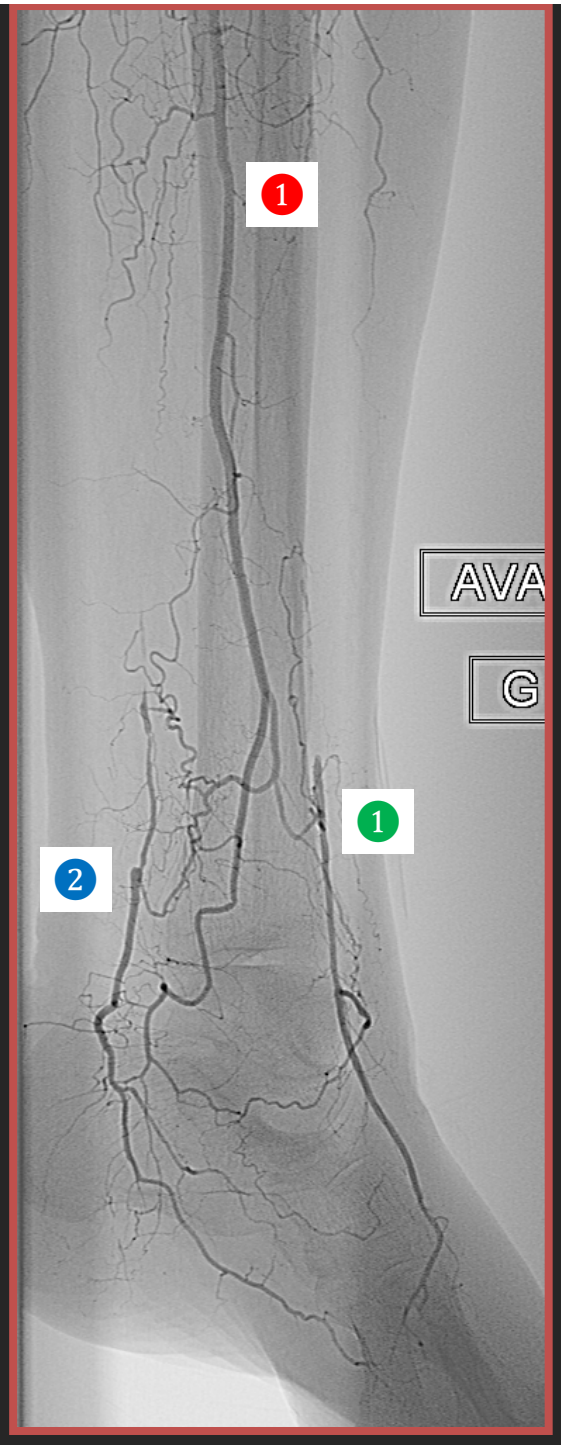
BTK «3-vessel» modal anatomy

- 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)



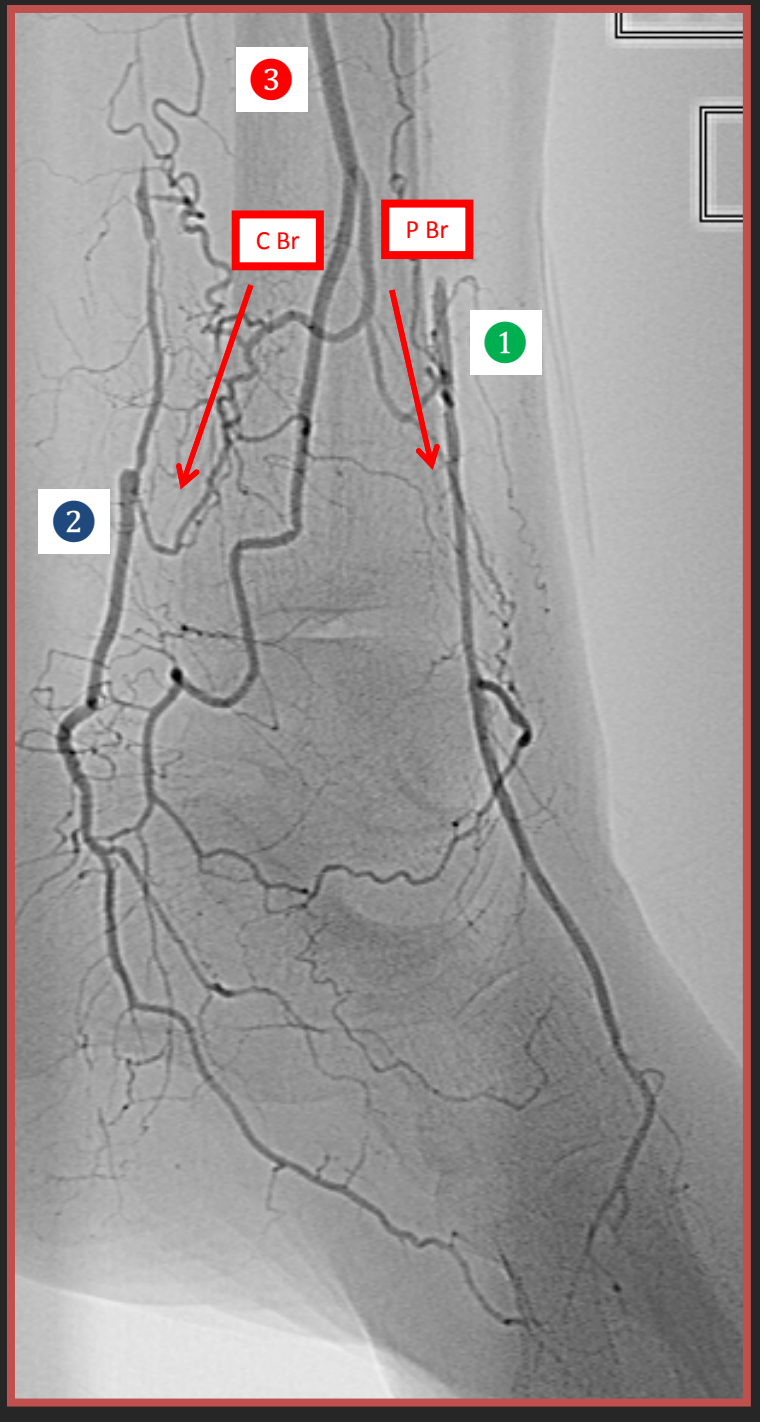


anatomy

- 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

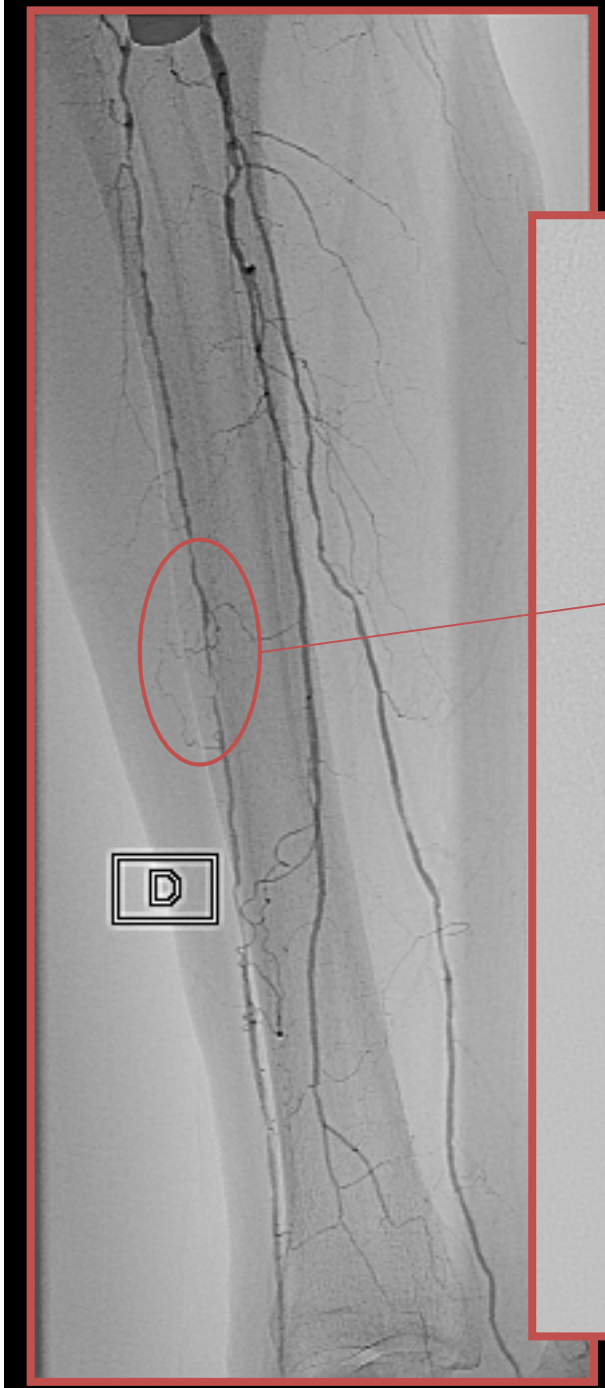


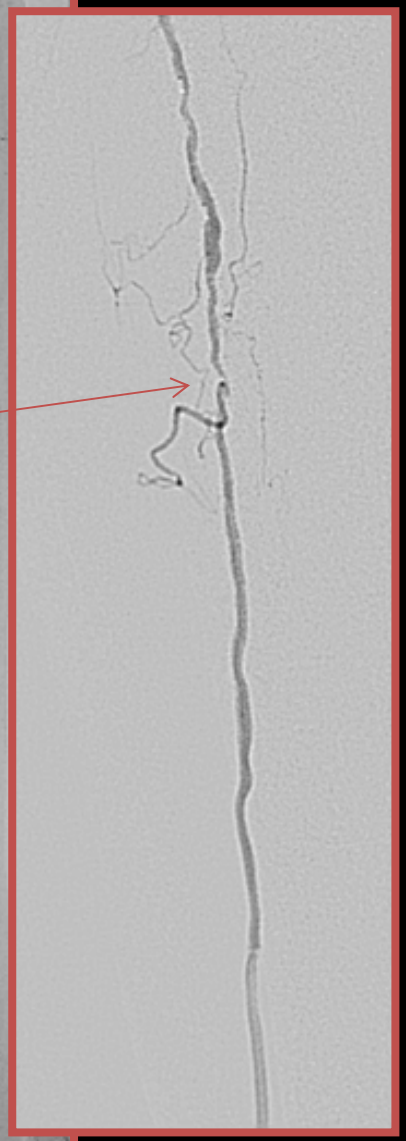
BTA lesion and Critical Limb Ischemia

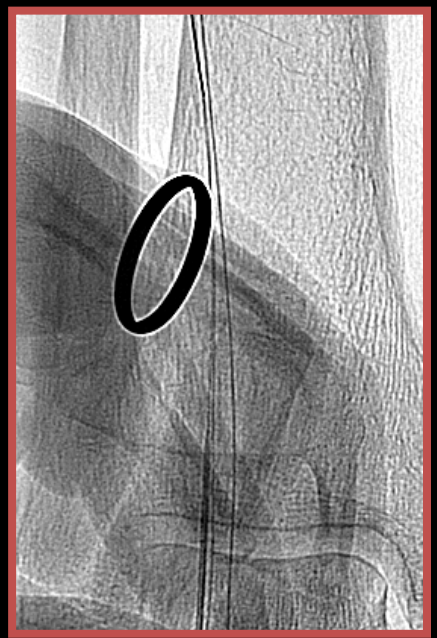
Knowledge of modal anatomy and angiographic variant is mandatory

- 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





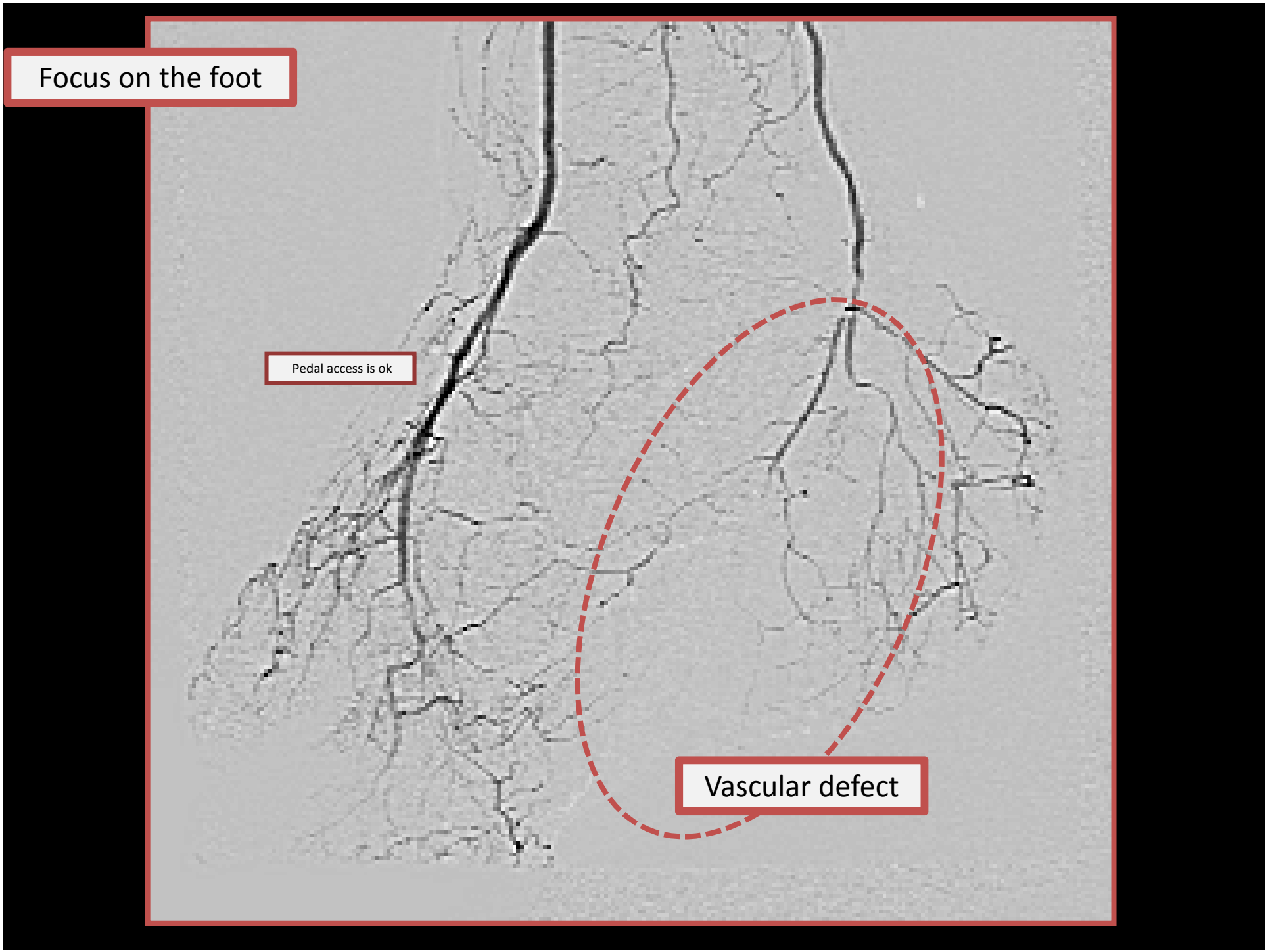


Result after

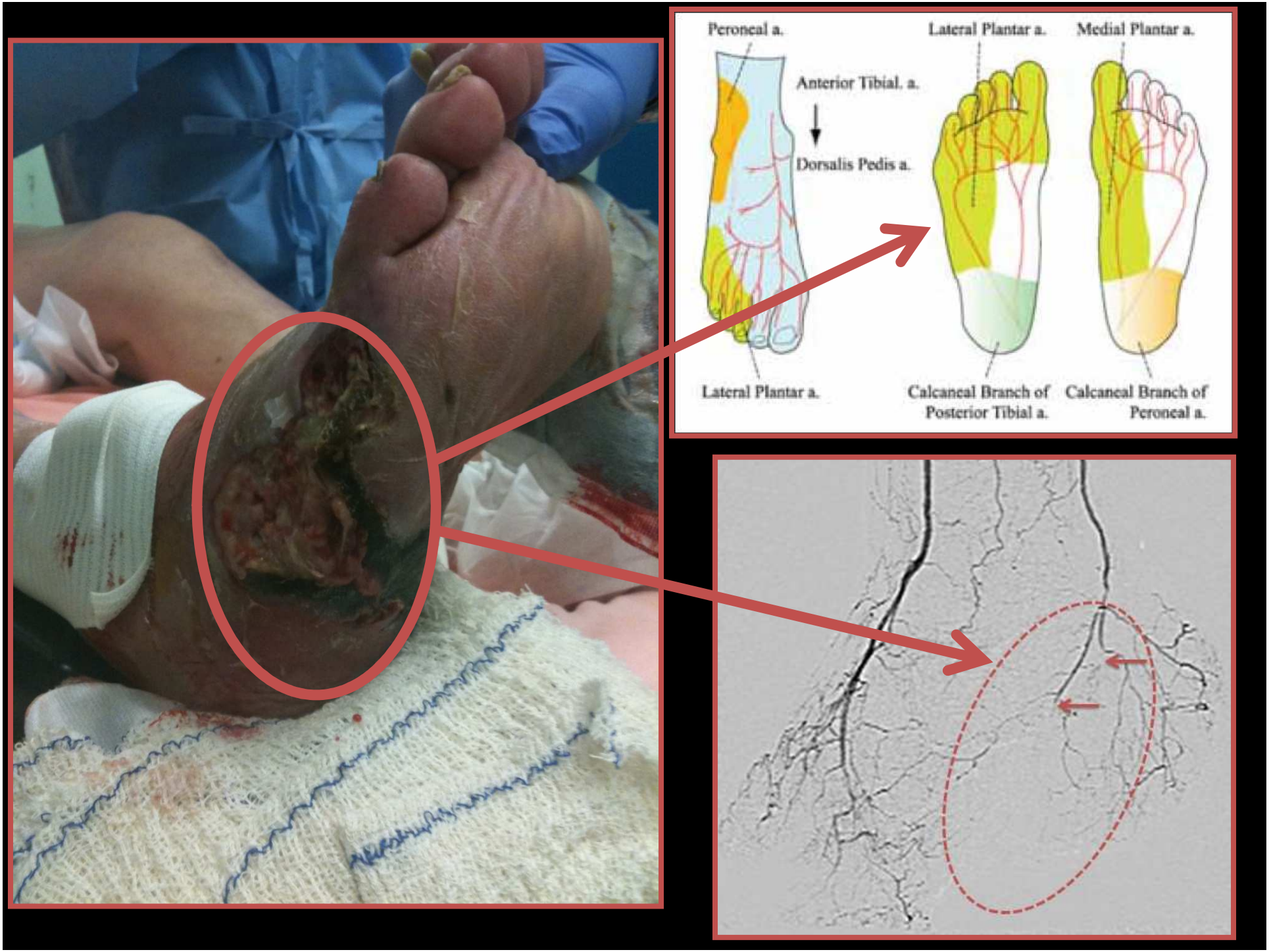
1- Ant. Tib. recanalisation (DES) via pedal access

2- Post. Tib. balloon angioplasty

Is it enough?


Focus on the foot
Pedal access is ok
Vascular defect

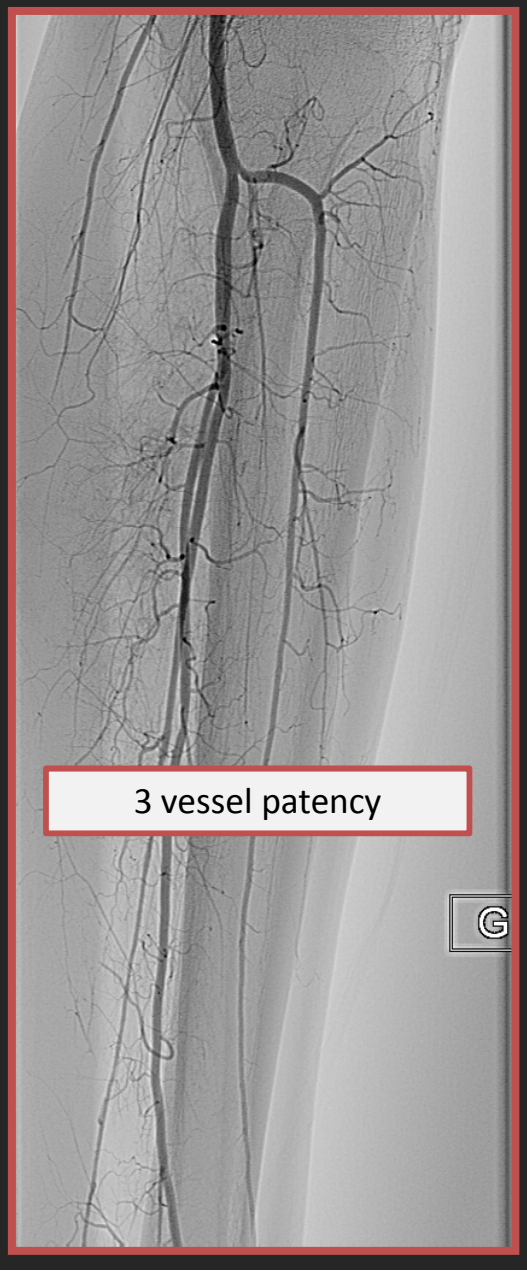

Focus on the foot
Plantar arteries occlusion
(both lateral and medial)

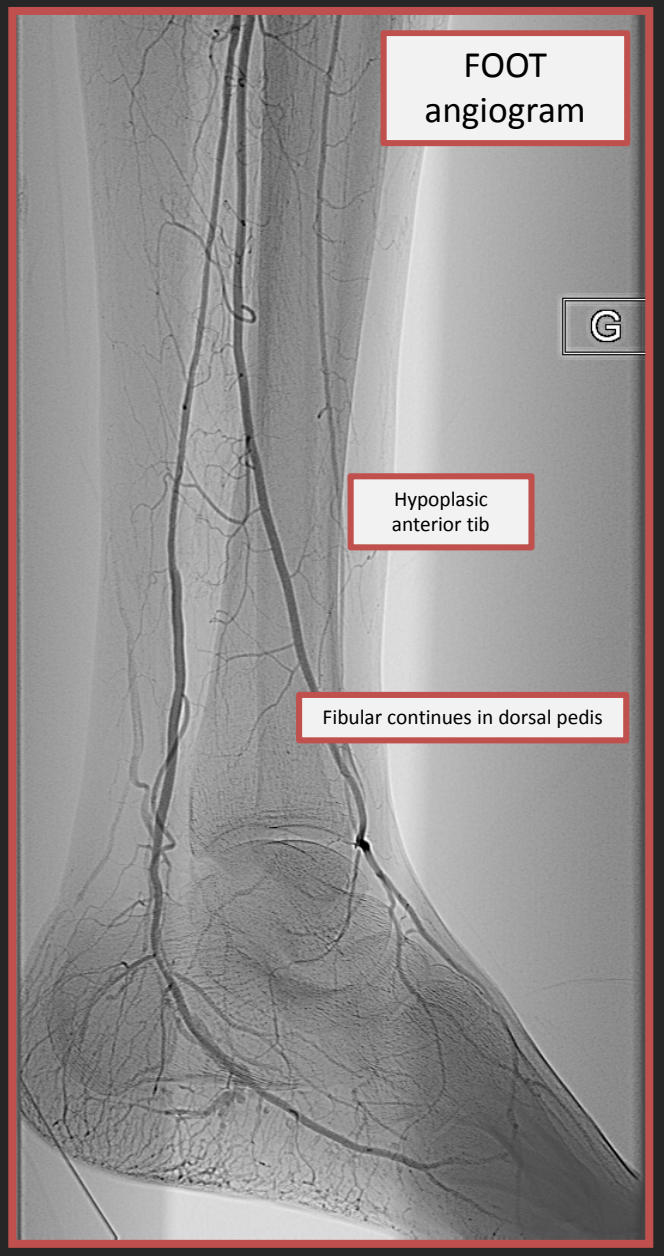

Peroneal a.
Anterior Tibial. a.
Dorsalis Pedis a.
Lateral Plantar a.
Lateral Plantar a.
Medial Plantar a.
Lateral Plantar a.
Calcaneal Branch of Posterior Tibial a.
Calcaneal Branch of Peroneal a.


Final result
Plantar angioplasty
Balloon 1.5mm

Variant angiographic anatomy in foot vascularization

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





Variant angiographic anatomy

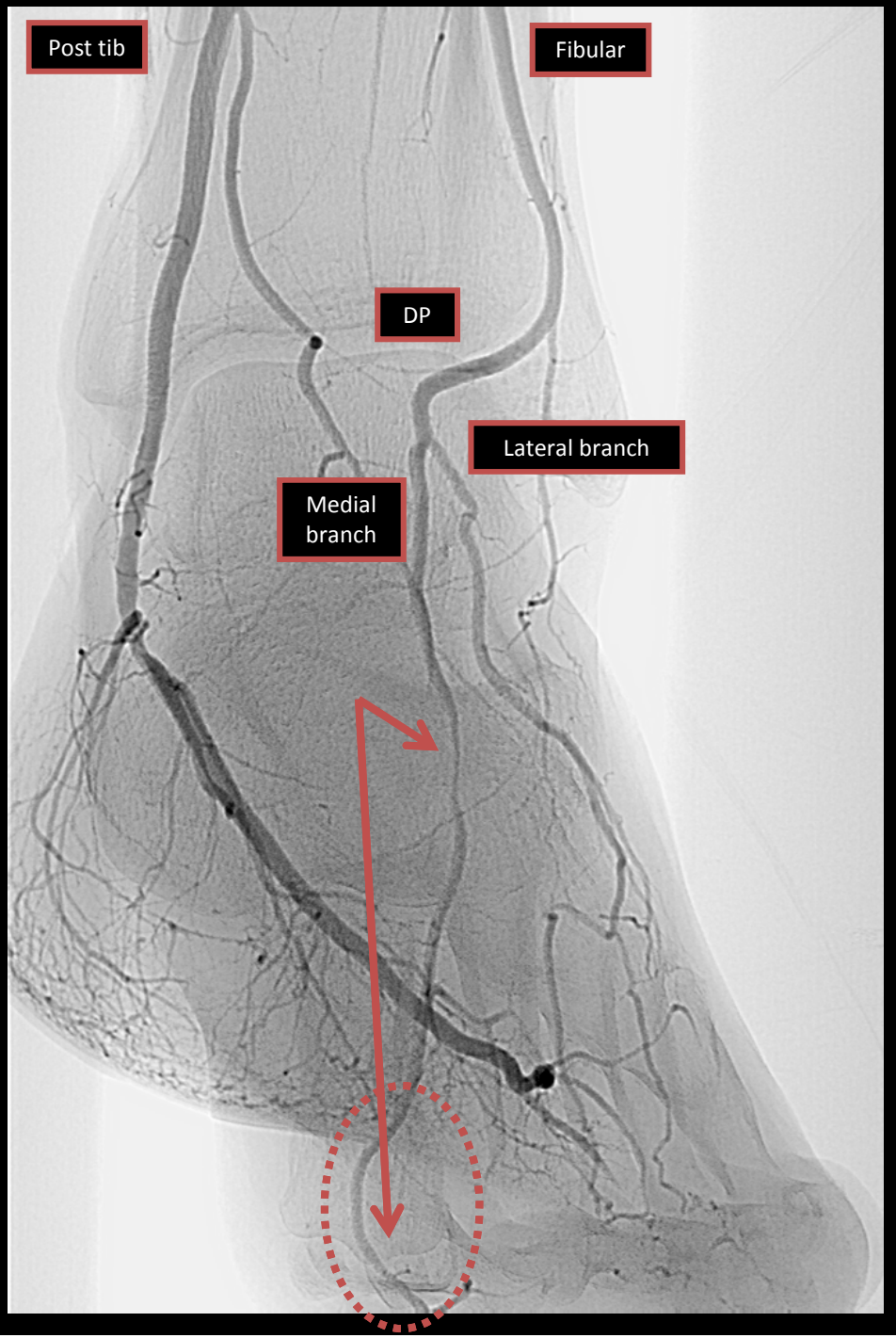
Anterior tibial artery is hypoplasic

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

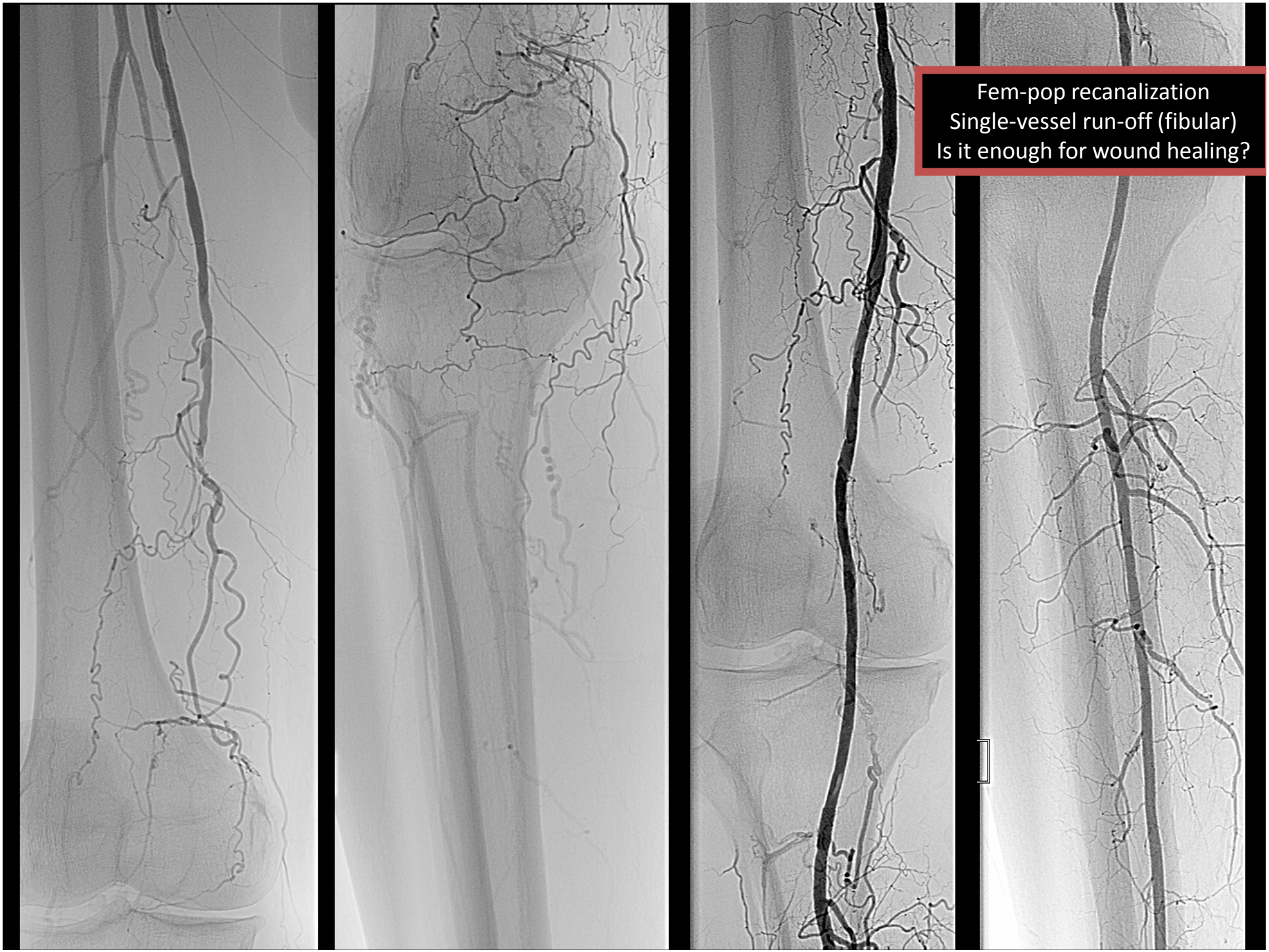
Severe stenosis of medial branch going to the 1st toe

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?

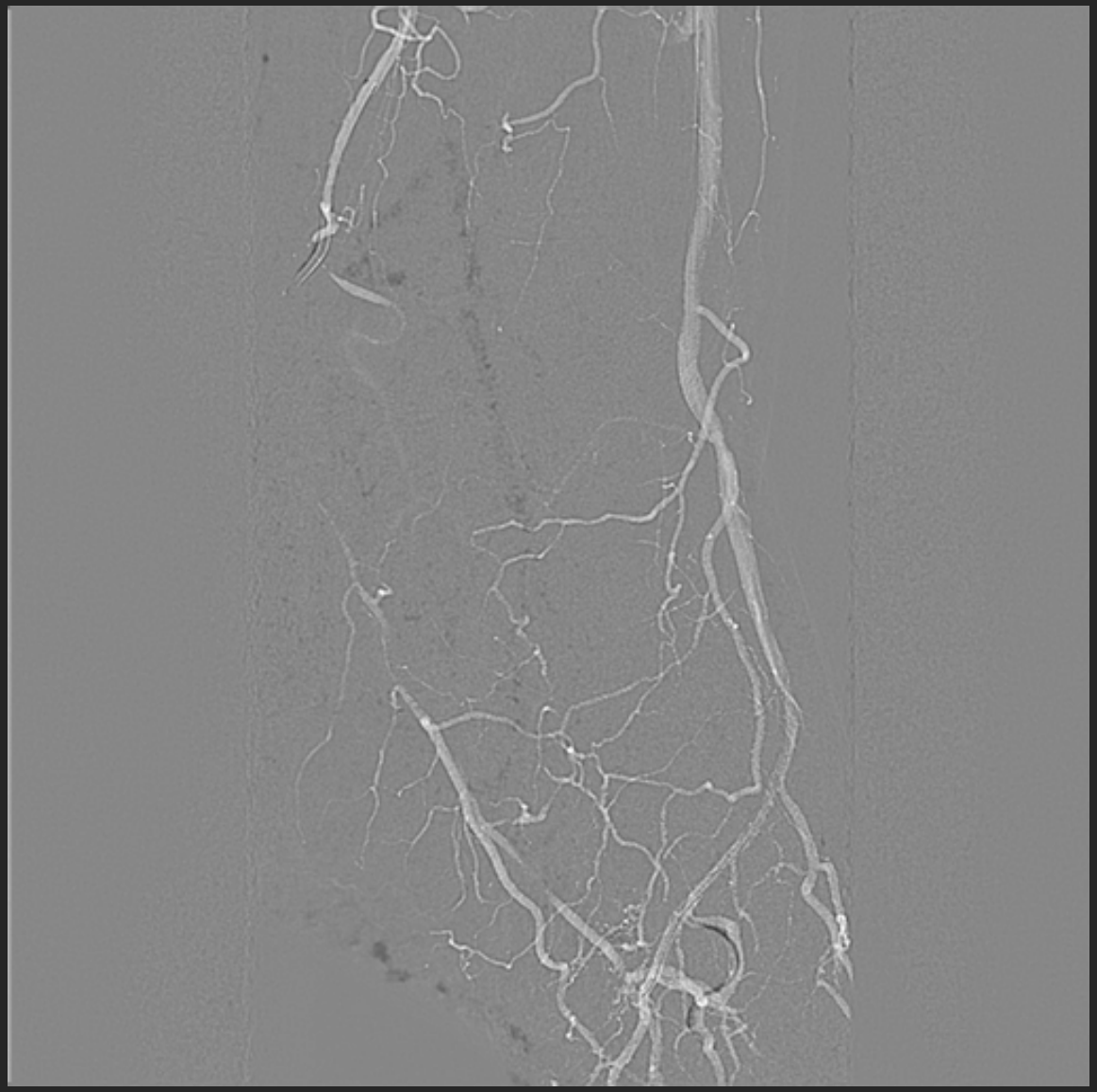

Variant angiographic anatomy
Single-vessel run-off (fibular) …
…. but connected to dorsalis pedis and lateral plantar
Tibial recanalisation isn't indicated
Fibular
Post tib
D
DP
MP
LP
Fibular
Post tib
DP

BTA lesion and Critical Limb Ischemia

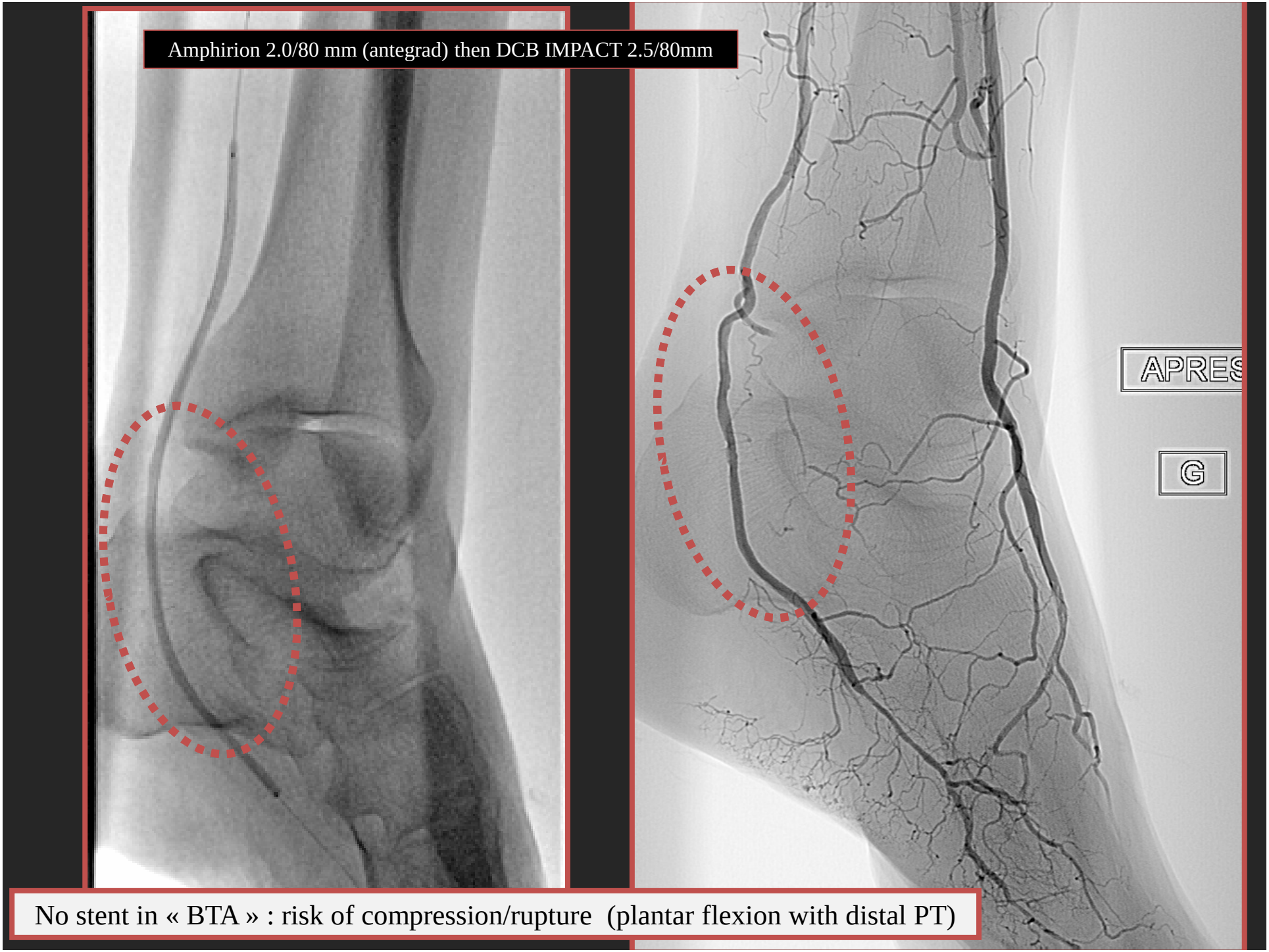
Knowledge of modal anatomy and angiographic variant is mandatory

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

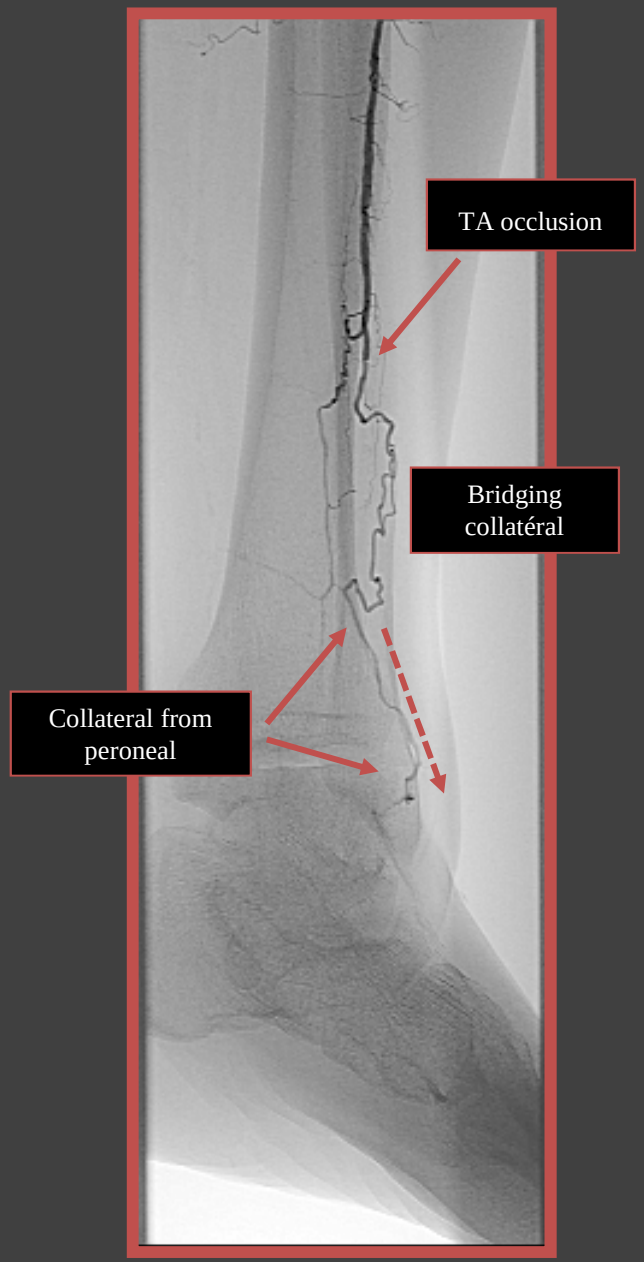

Pop
Ant tib
Post tib
Distal posterior tibial occlusion
Dorsalis pedis



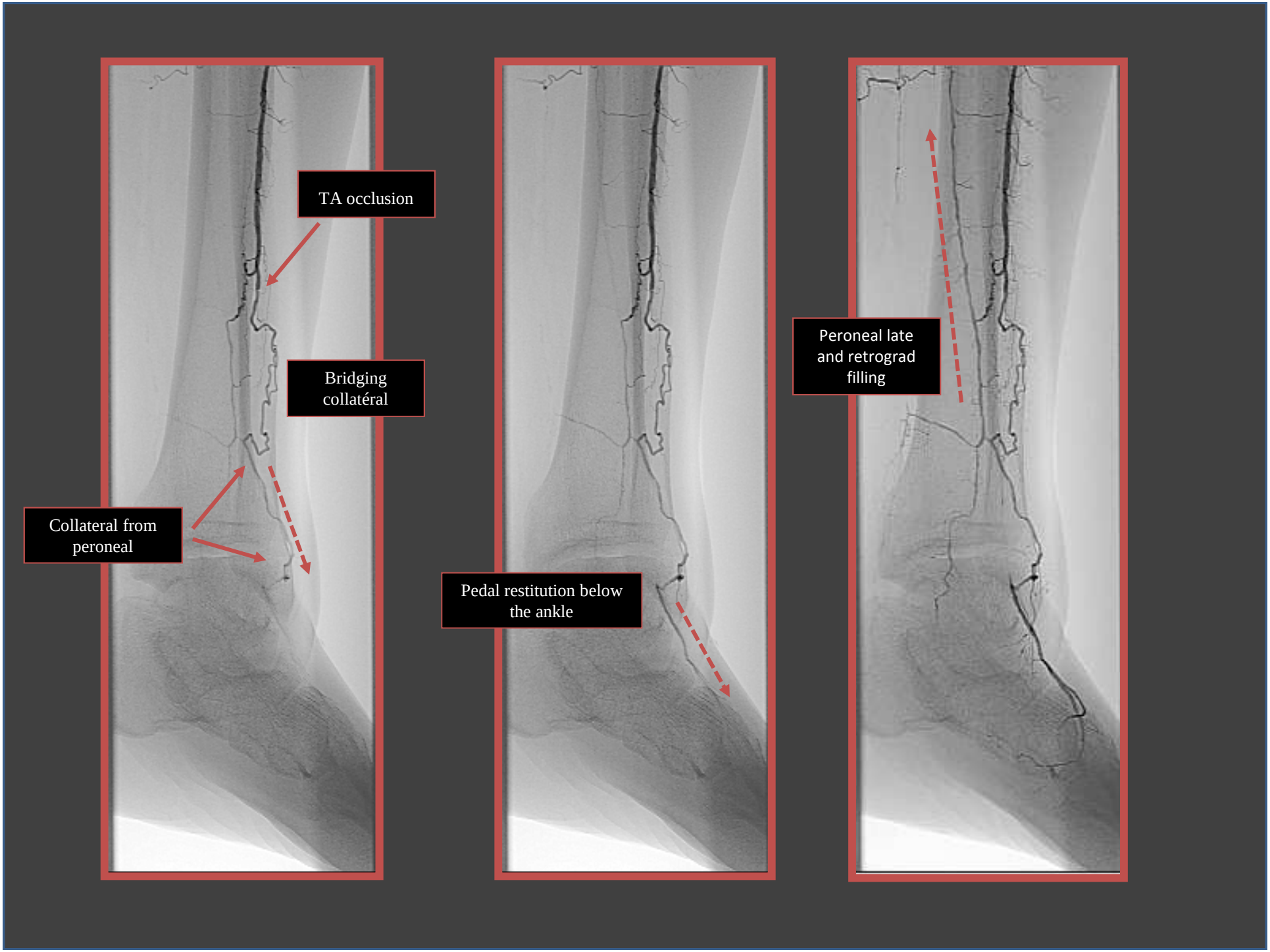
Connection dorsalis pedis- lateral plantar


Amphirion 2.0/80 mm (antegrad) then DCB IMPACT 2.5/80mm
APRES
G
No stent in « BTA » : risk of compression/rupture (plantar flexion with distal PT)

TPT occlusion


TA occlusion
Bridging collatéral
Collateral from peroneal

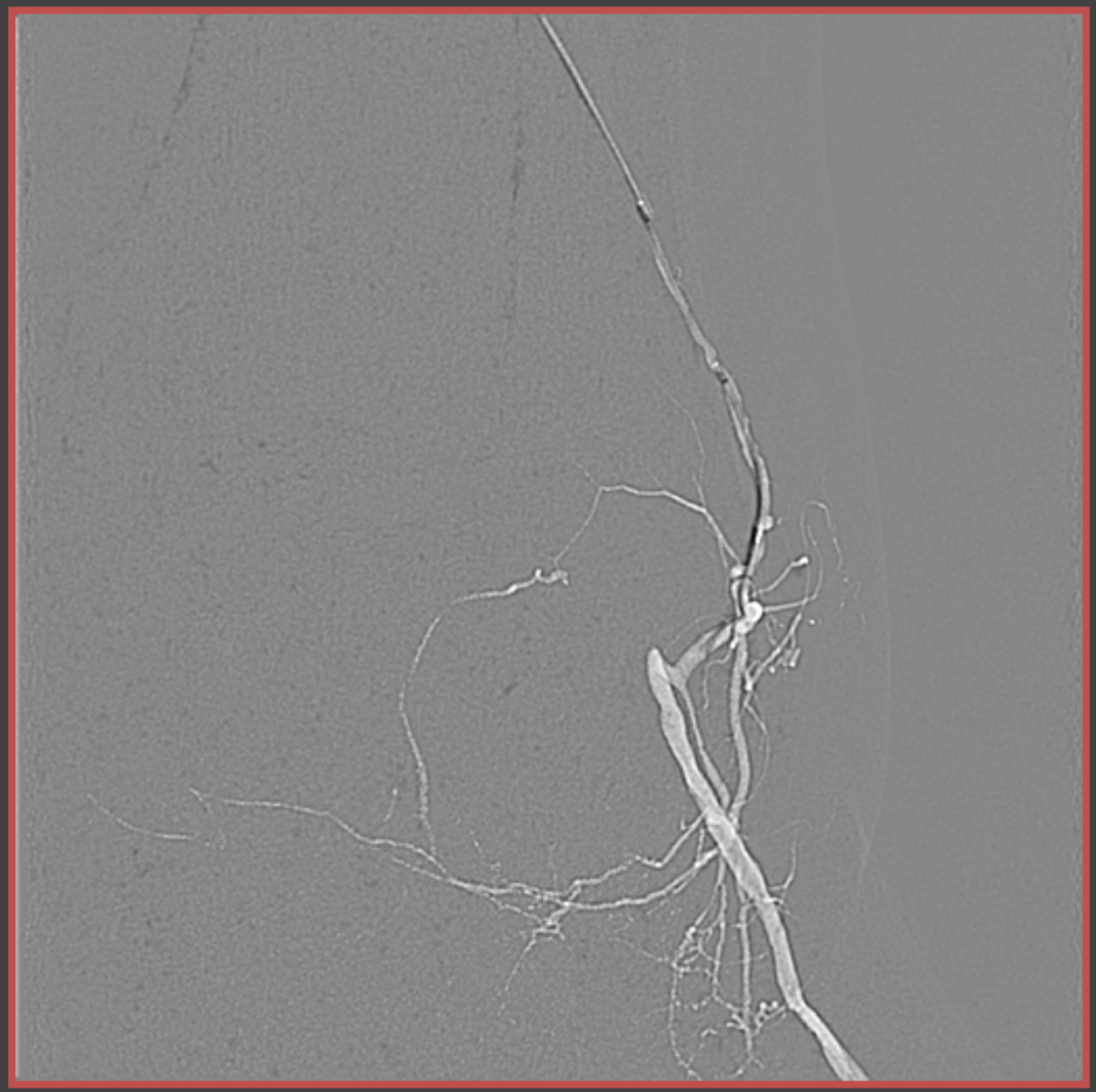

TA occlusion
Bridging collatéral
Collateral from fibular
Pedal restitution below the ankle

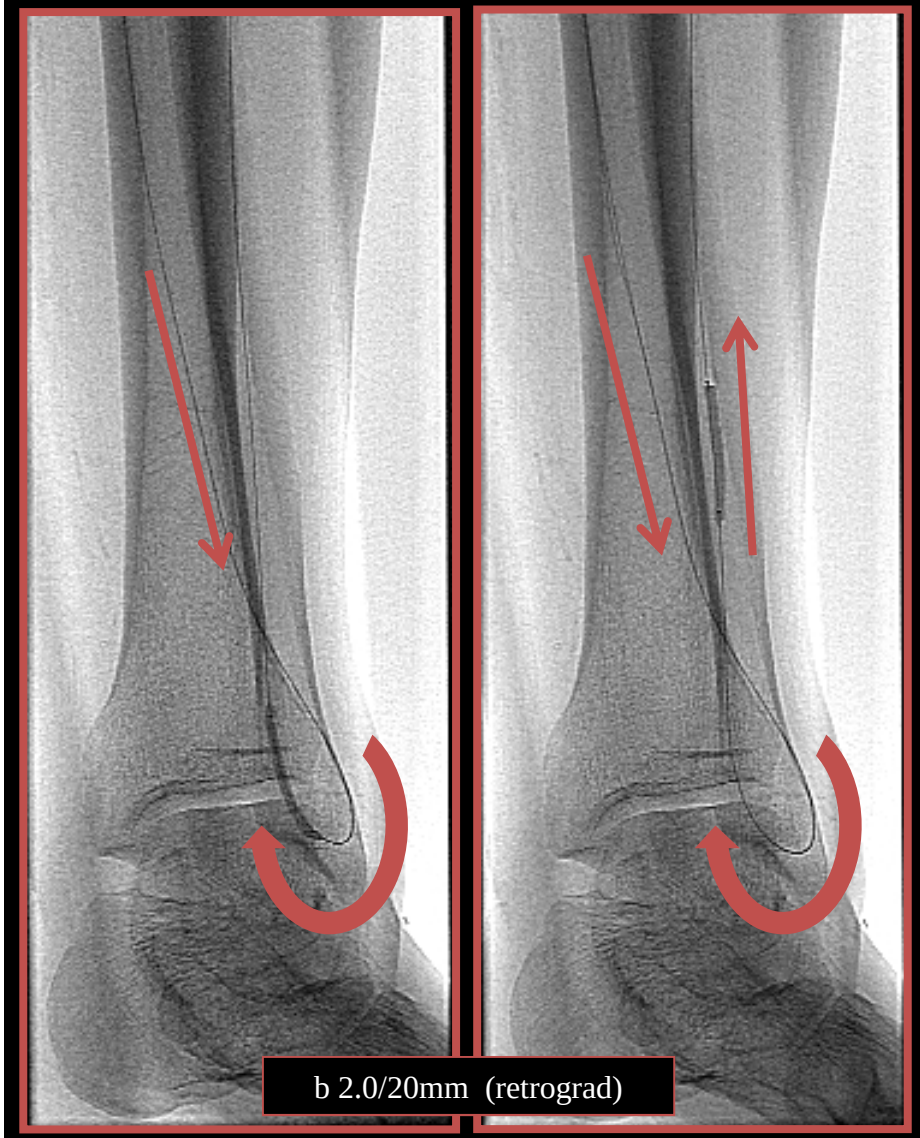

TA occlusion
Bridging collatéral
Collateral from peroneal
Pedal restitution below the ankle
Peroneal late and retrograd filling

TPT recanalization

TPT Cypher 3.5/18mm

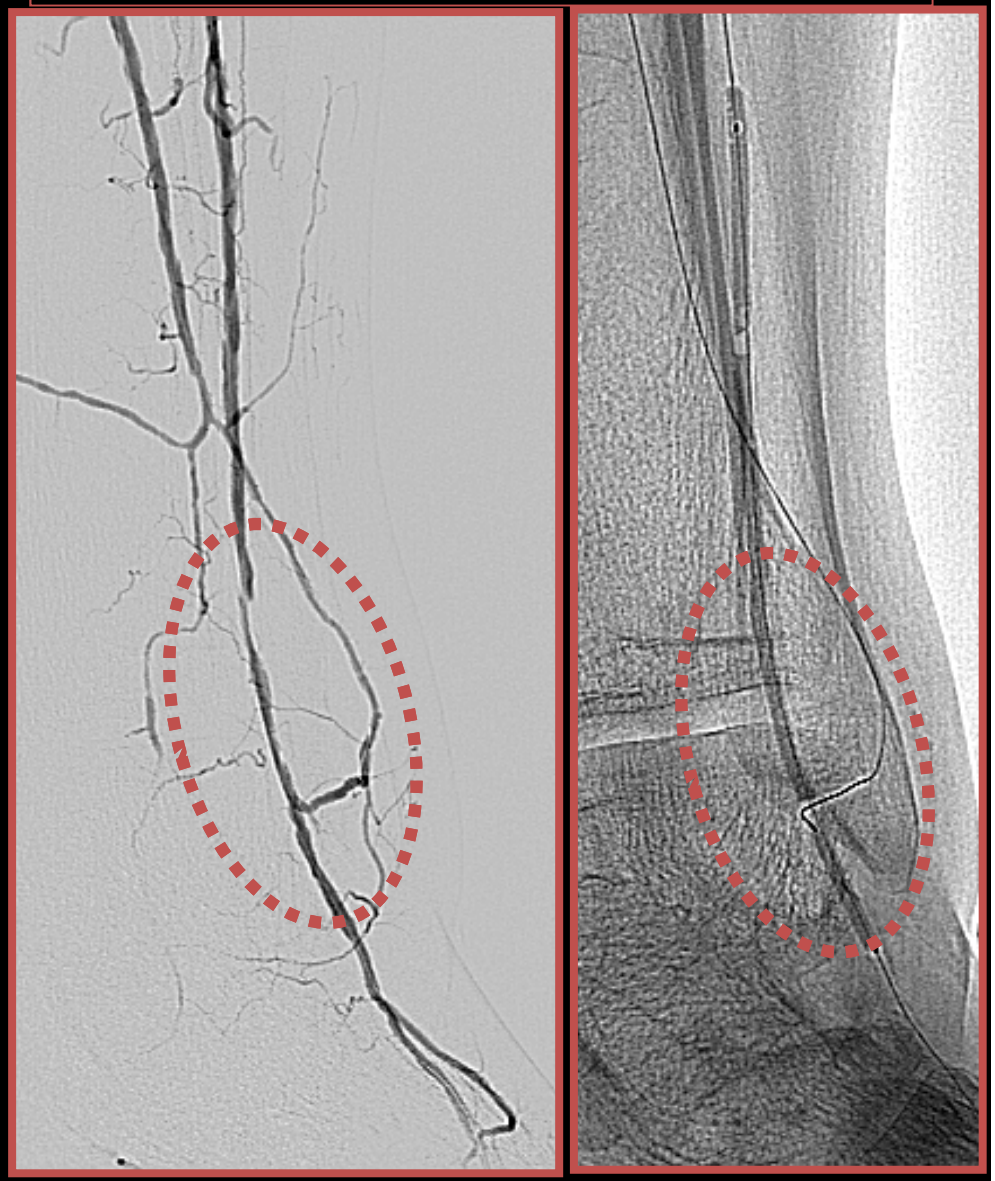
Fibular recanalization will give an access for retrograd TA crossing via fibular collateral

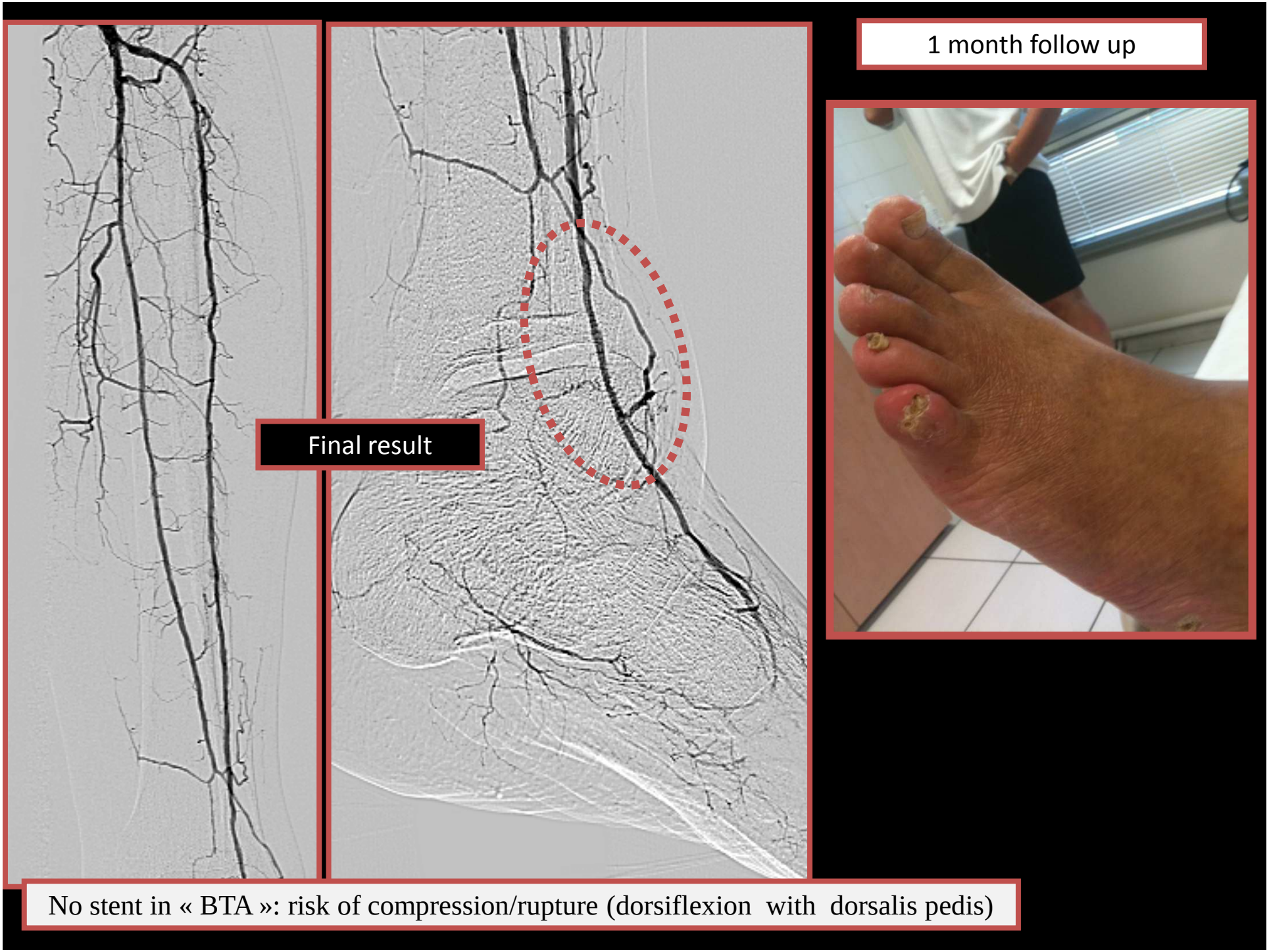


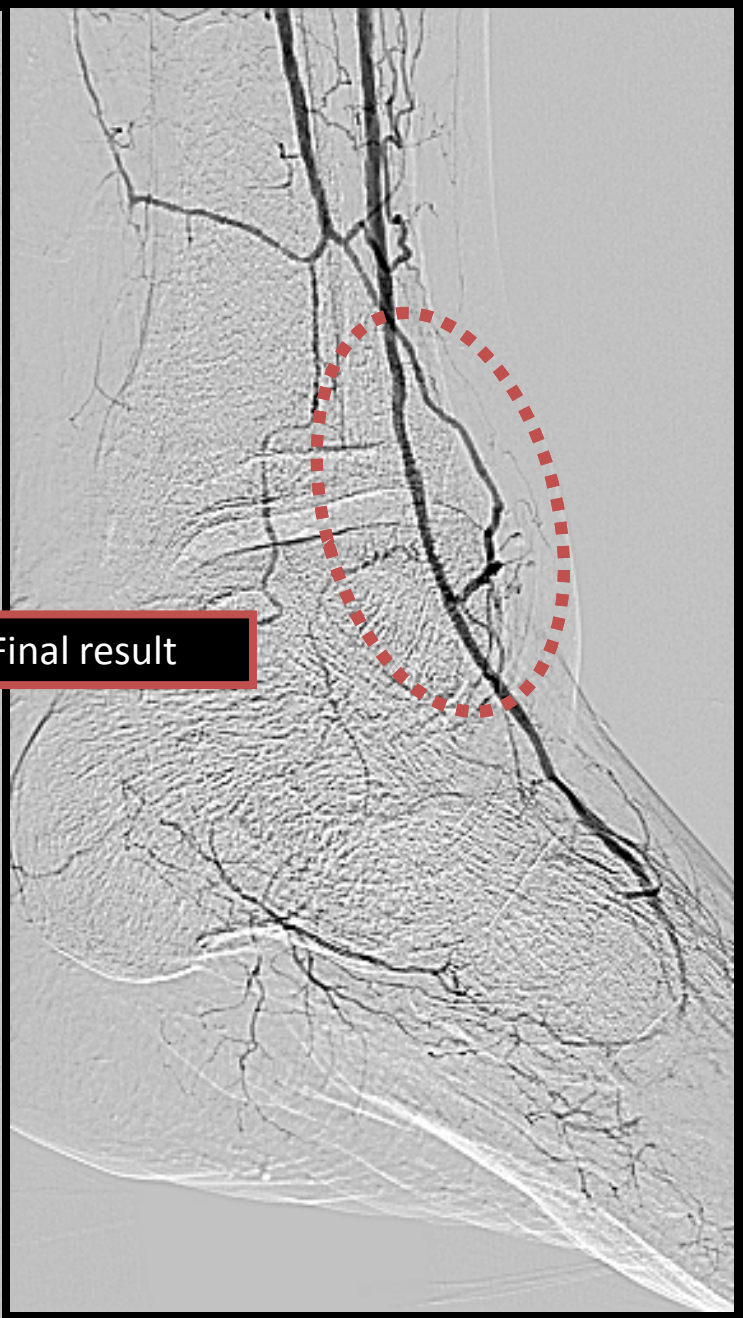


b 2.0/20mm (retrograd)

Amphirion 2.0/80 mm (antegrad) then DCB IMPACT 2.5/120mm




1 month follow up
Final result
No stent in « BTA »: risk of compression/rupture (dorsiflexion with dorsalis pedis)



Final result

1 month follow up

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

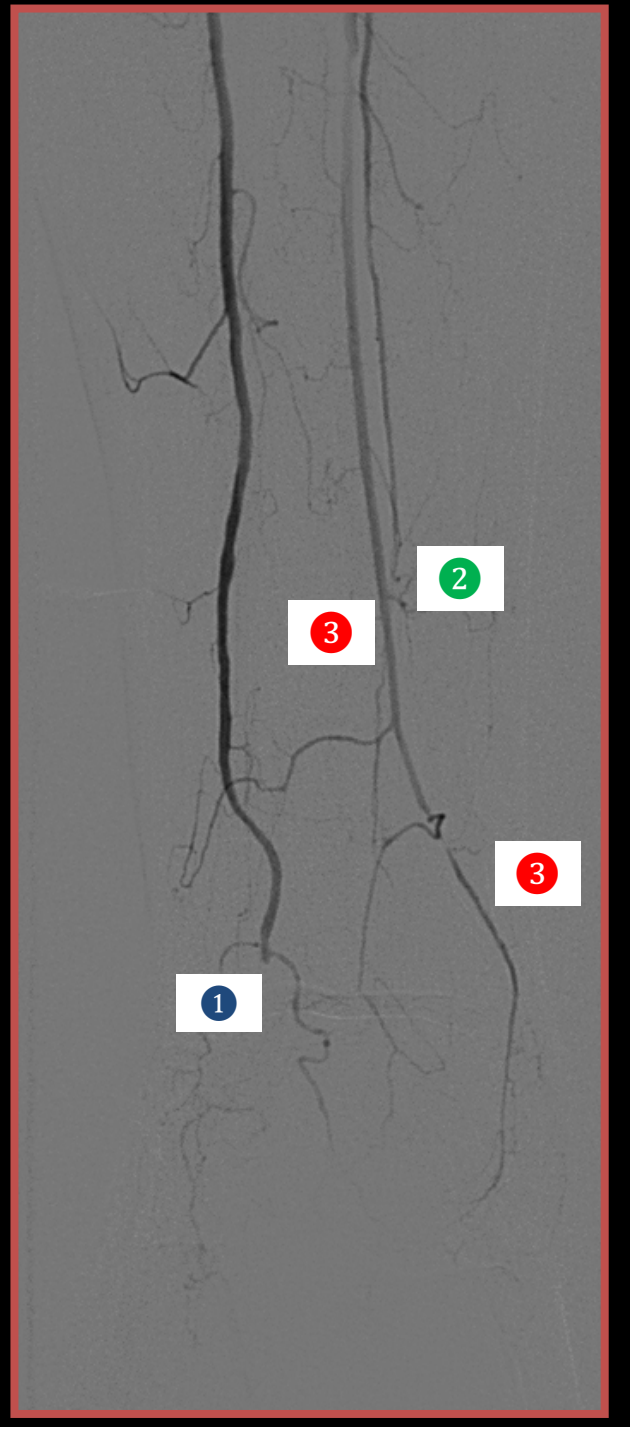
Female 76 yrs (2009)
CLI
Rest pain
Ischemic forefoot
Toe ulceration

Foot angiogram :

- Distal posterior tibial artery occlusion 1

- Hypoplasic anterior tibial artery 2

-Fibular artery perforating branch continues as the dorsalis pedis 3



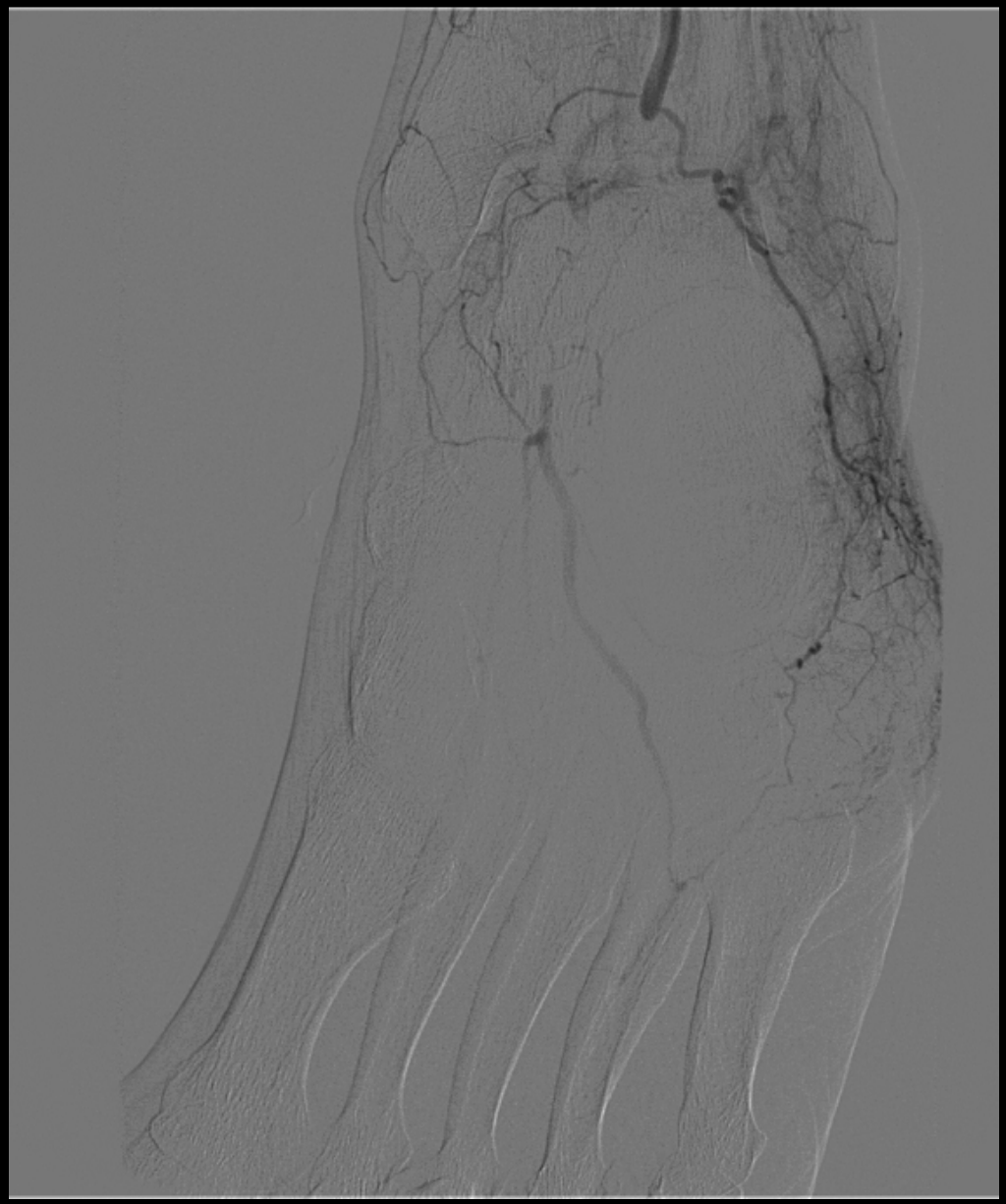
Posterior tibial occlusion

Result after balloon angioplasty

Good initial clinic evolution ….

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

Angio : re-occlusion



Final result
after bail -out stenting

Final result
after bail -out stenting

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?)

Conclusion

- « 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 dorasalis pedis
    - Foot plantar flexion with distal tibial post