

Tibioperoneal Punctures and Retrograde Approach: *Make it Simple*



“the miracle of healed foot”

Vincenzo Foppa, 1464 A.D. - Basilica of San Eustorgio - Milan

GB Danzi
Ospedale Santa Corona
ITALY

The Retrograde Puncture

- This strategy consists in a direct retrograde puncture of a distal patent vessel, followed by the insertion of wires and catheters with the aim to achieve the proximal open lumen were the antegrade approach failed.
- When antegrade and retrograde devices are connected, the procedure can continue with a standard antegrade angioplasty and hemostasis of the distal puncture site.
- A retrograde puncture can be done in every segment of the below-the-groin vessel, from the SFA to the foot vessels, providing good technical and clinical results.

Key points in retrograde puncture (1)

1. **Choice of the puncture site.** Accurate angiographic evaluation using different oblique views is necessary to identify the best target vessel.
2. **Vasodilators.** Especially for the distal vessels, the use of vasodilator (nitroglycerine, verapamil) is essential in avoiding spasm of the vessel. Vasodilators can be administered intra-arterially, as close as possible to the puncture site, and subcutaneously around the needle entry point.
3. **Puncture technique.**
 - The puncture is performed with a 21 Gauge needle, under fluoroscopic guidance with contrast medium injection and at the maximum magnification. The length of the needle must be chosen according to the depth of the target vessel.
 - The operator must keep in mind the concept of parallax technique: the needle should be advanced by maintaining a perfect overlap with the target vessel.
 - Once chosen the correct projection for the puncture, a 90° angulated projection can be useful to check the distance of the needle to the target vessel.

Key points in retrograde puncture (2)

4. **Sheath.** In SFA and popliteal artery a 4F sheath is sometimes necessary to permit retrograde approach with the support of a 4 French catheter. In BTK vessels we avoid standard sheaths and prefer to use a sheathless approach or a micro sheath.
4. **Retrograde crossing strategy.** Every 0.014” and 0.018” wire can be used for retrograde crossing of the CTO. We generally prefer to start with a 0.018” wire, because of the enhanced support. Low profile, support catheters are very useful for wire support, orientation and exchange.

Key points in retrograde puncture (3)

Artery	Preferred oblique view	Preferred segment	Skin puncture site	Needle length
SFA	Controlateral, 30-45°	Distal	Medial aspect of the thigh at the level of the superior edge of the rotula	9-15 cm
Popliteal	Antero-posterior Maintain the supine position with the knee gently flexed and rotated	Medium-distal	Posterior aspect of the knee	7-9 cm
Anterior tibial	Omolateral 20-40°	Every segment	Antero-lateral aspect of the leg	4-7 cm
Posterior tibial	Lateral	Distal, retromalleolar segment, proximal plantar arteries	Medial aspect of the ankle	4-7 cm
Peroneal	Omolateral 20-40°	Every segment	Antero-lateral aspect of the leg; the needle crosses the interosseus membrane	7 cm
Dorsalis pedis	Antero-posterior	Every segment	Dorsum of the foot	4 cm
Foot arteries	Antero-posterior	<ul style="list-style-type: none"> – First metatarsal artery – Tarsal arteries – Collaterals 	Dorsum of the foot Plantar access is not practical because of skin thickness	4 cm

Retrograde approach: Milan experience 2010-2013



2063 PTA

- Rut 4-5-6
- 85% DM
- 19% ESRD-HD
- Mean age 71 ± 14.3 yy
- Only below-the-groin vessel considered

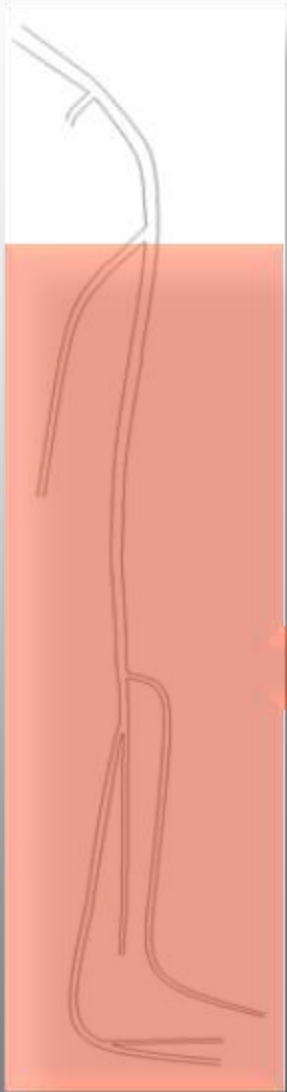
3351 successfully treated lesions

1943 (58%) stenosis
mean length
 $11,6 \pm 10.9$ cm
Standard endoluminal approach

1408 (42%) CTOs
mean length
 23.2 ± 11.7 cm

Retrograde approach in 1402 CTOs

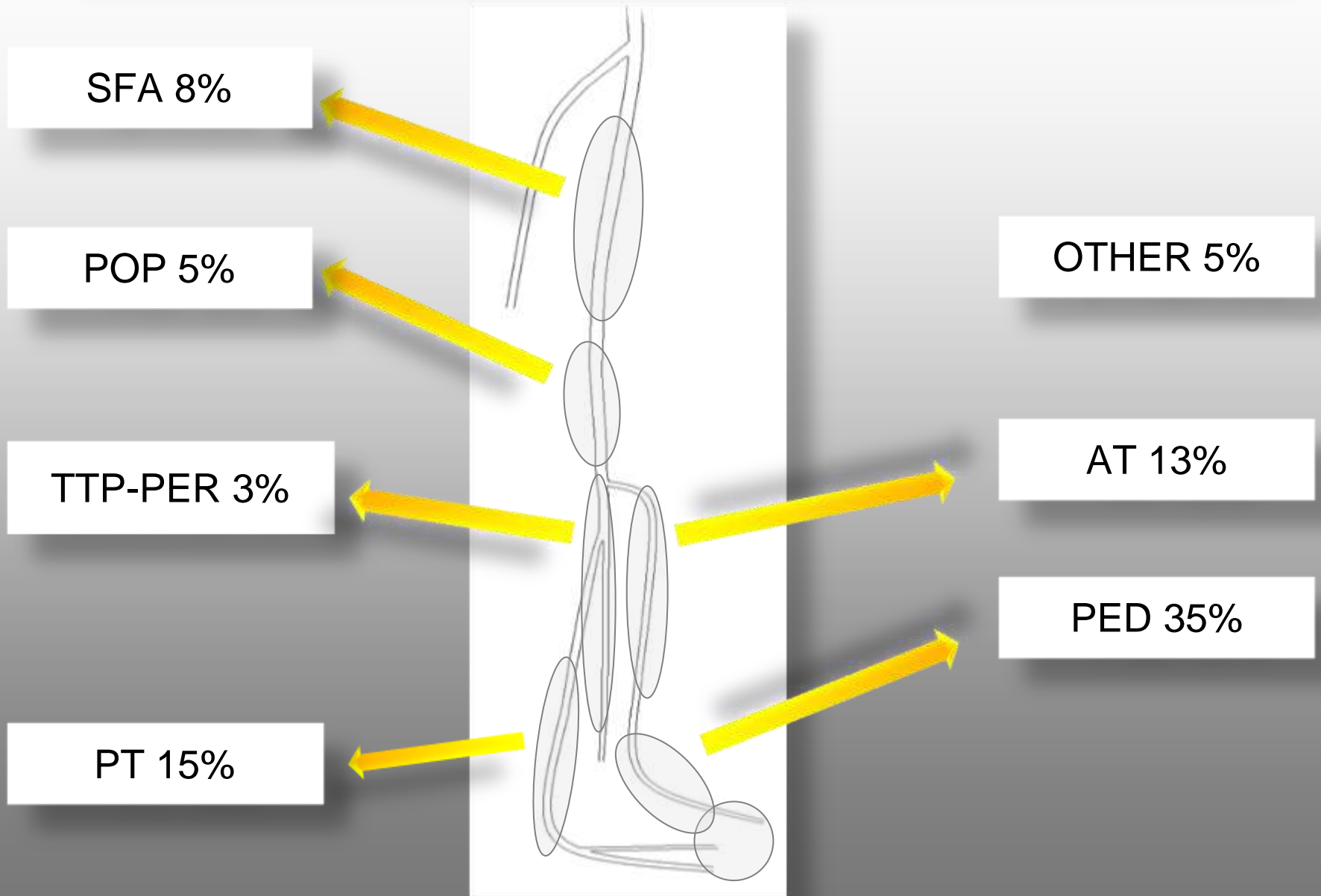
Milan experience 2010-2013



- Retrograde puncture
- Transcollateral
 1. Pedal-plantar loop technique
 2. Peroneal artery branches PTA

Successful
RETRO 147
(10%)

Retrograde approach: Milan experience 2010-2013



CASE RETRO 1

Failure of ATA approach

Baseline angio



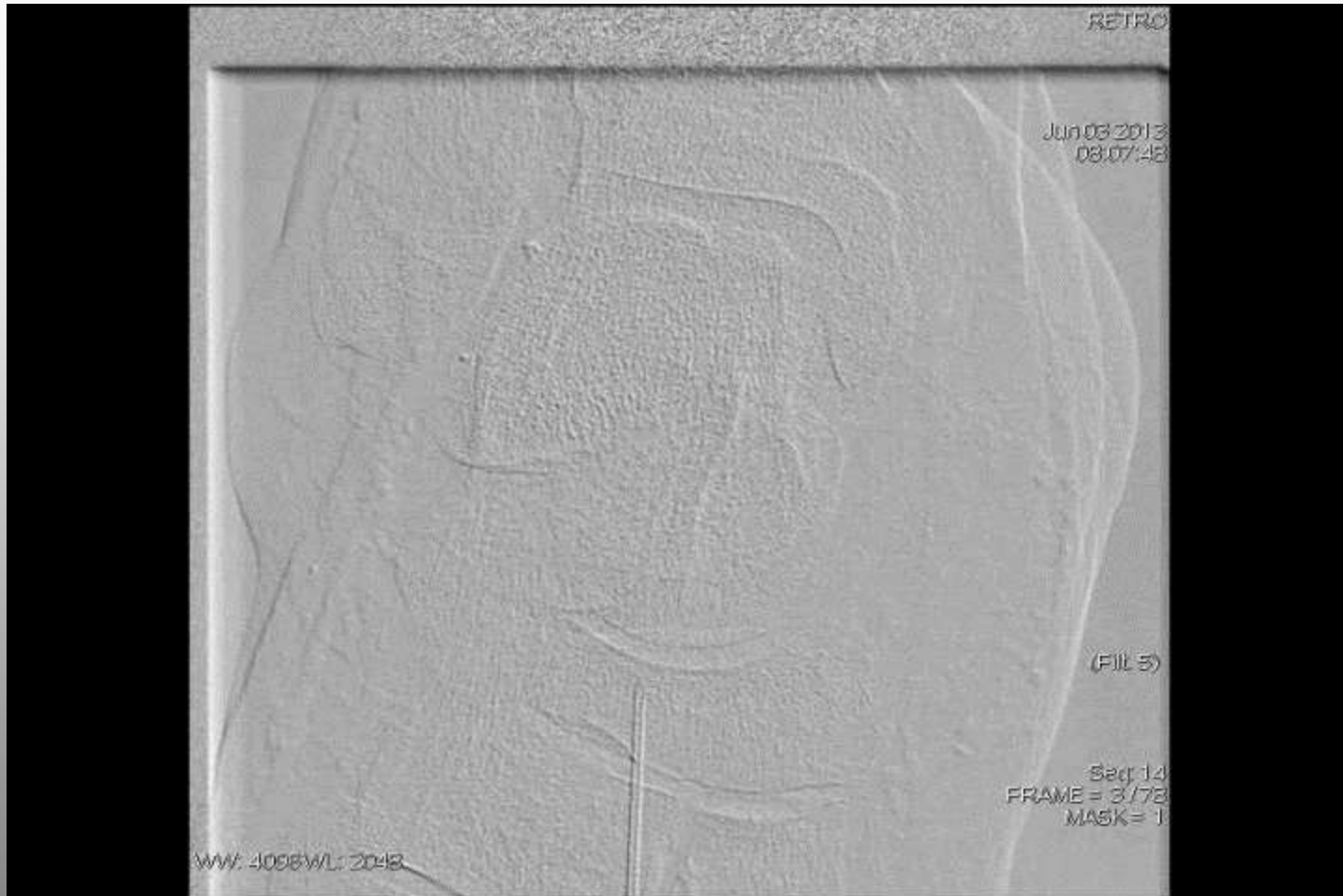
Diagnostic catheter to improve support



Balloon catheter to improve support



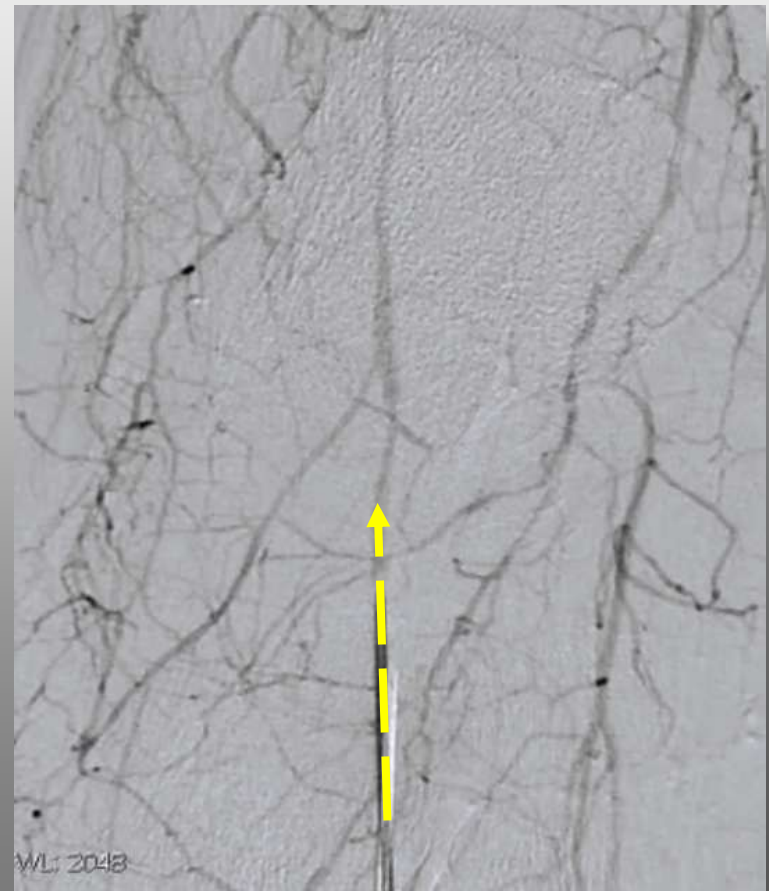
Retrograde puncture of ATA



Shift to antegrade approach and sealing



Parallax technique:
the needle and the
artery are perfectly
aligned



Final result



CASE RETRO 2

Failure of PTA antegrade approach due to loss of the correct subintimal pathway

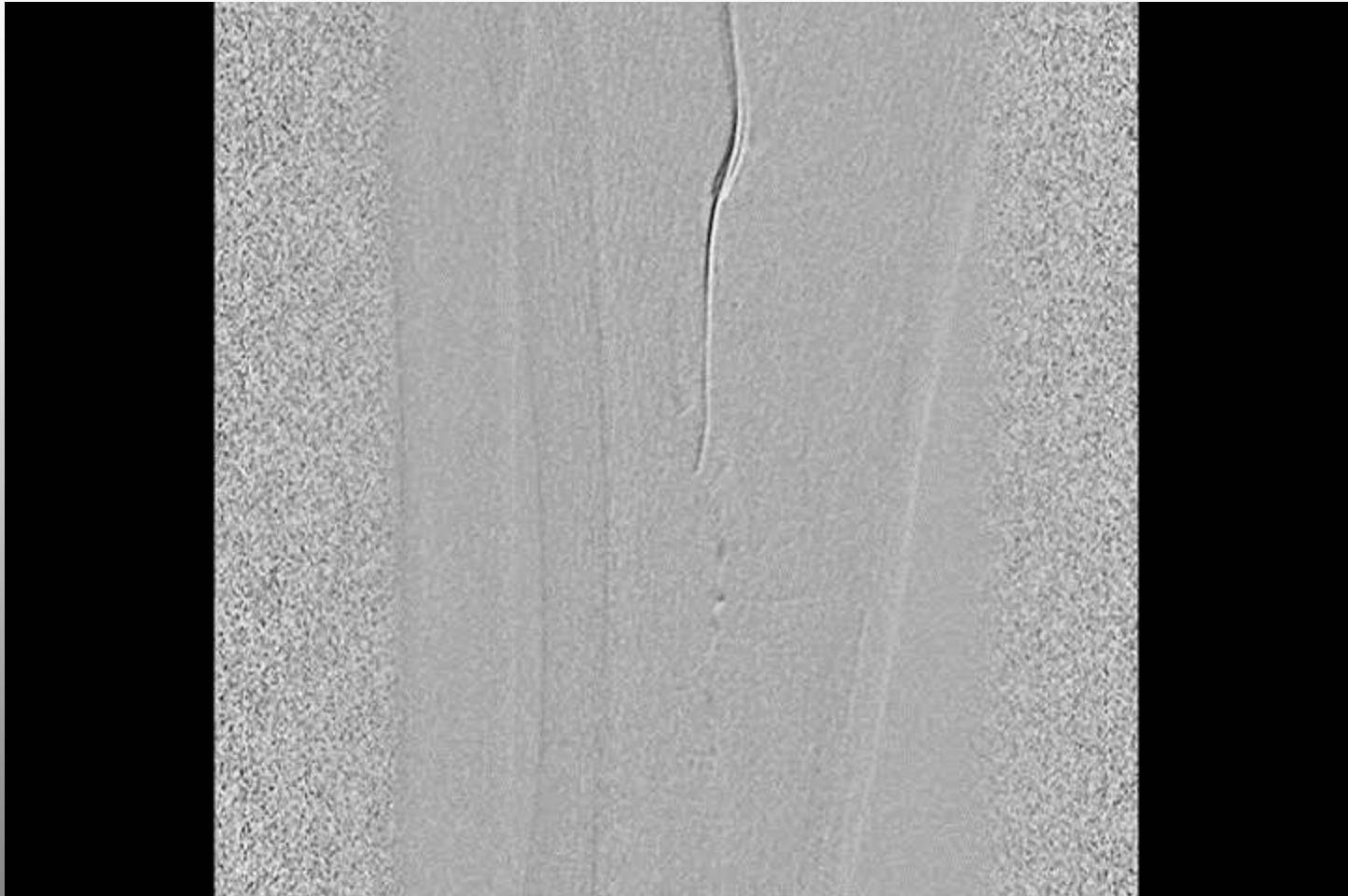
Baseline angio





- Complete occlusion of BTK vessels
- Good distal PTA

Subintimal approach to tibioperoneal trunk



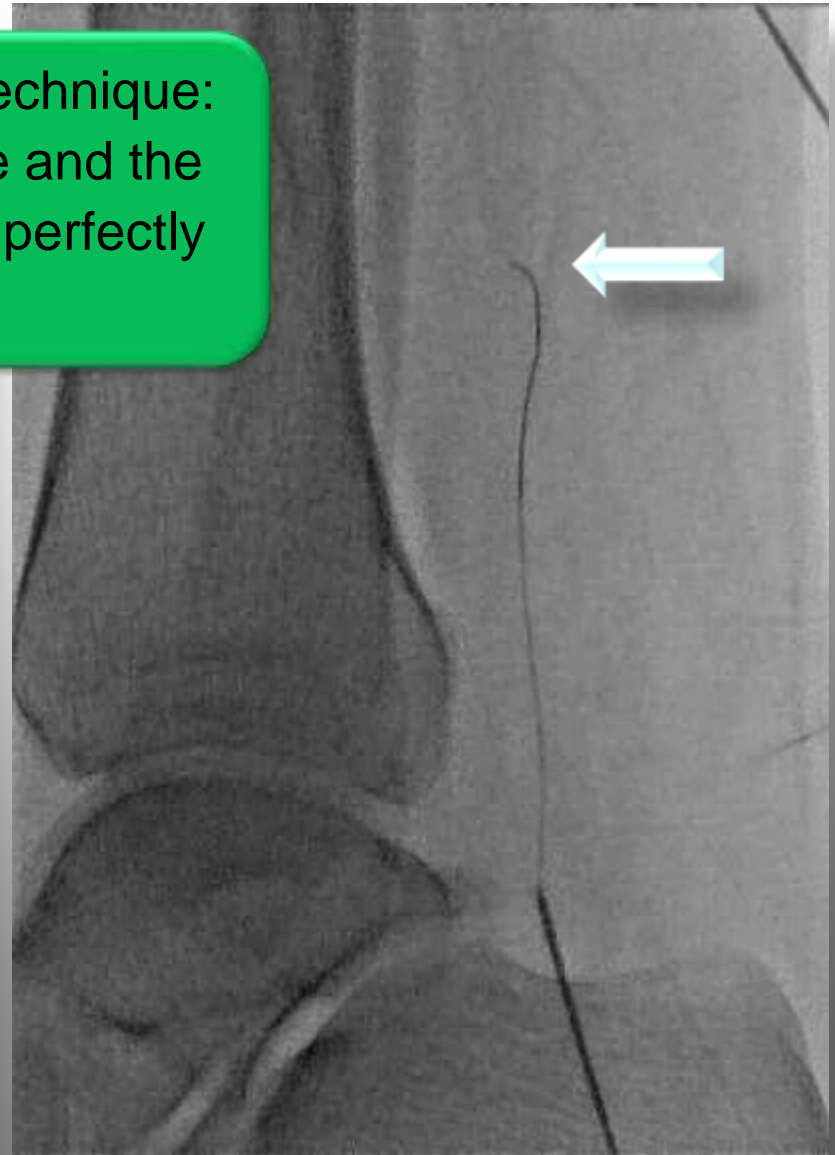
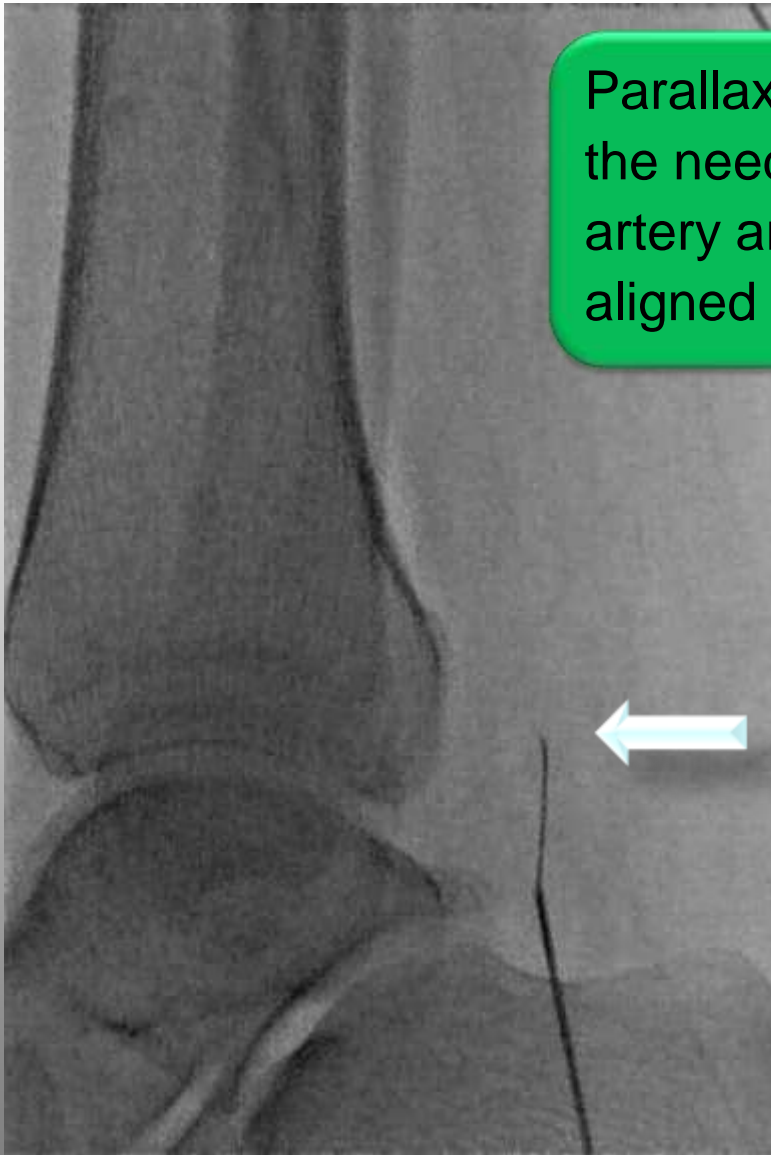
Retrograde puncture





This PTA bifurcation is very high. The puncture is into the medial plantar artery.

Parallax technique:
the needle and the
artery are perfectly
aligned



How to catch the retrograde wire: 1° method



How to catch the retrograde wire: 2° method



Final result



Spasm of the medial plantar artery at the puncture site



CASE RETRO 3

*Failure of antegrade
approach due to unfavorable
ATA take off*

Basal angio



Baseline angio



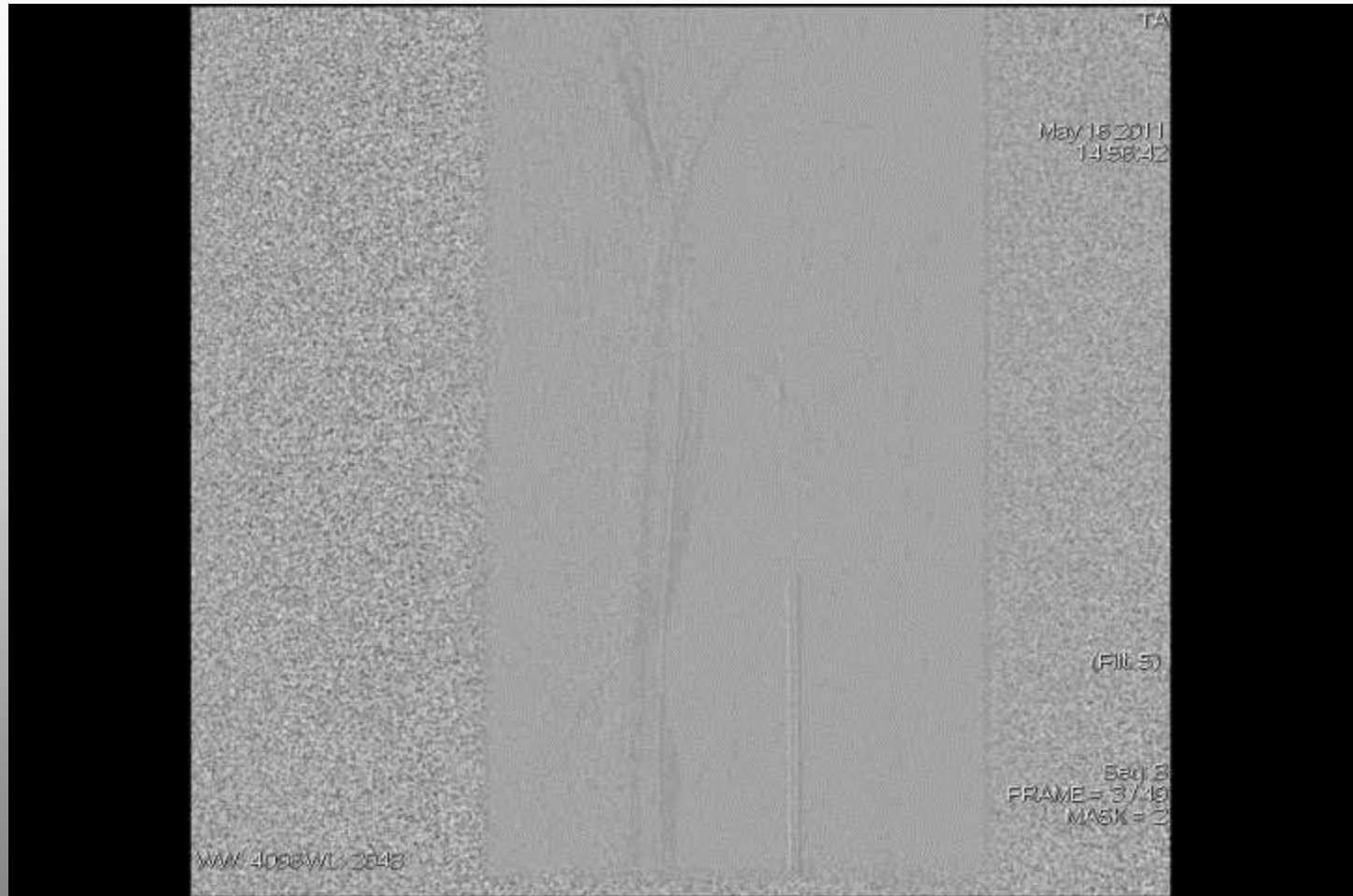
Failure to enter the ATA ostium



Failure to enter the ATA ostium



Retrograde ATA puncture



Retrograde ATA puncture



Snare kit capture of the retrograde wire

Kissing balloons



Final result



Baseline angio

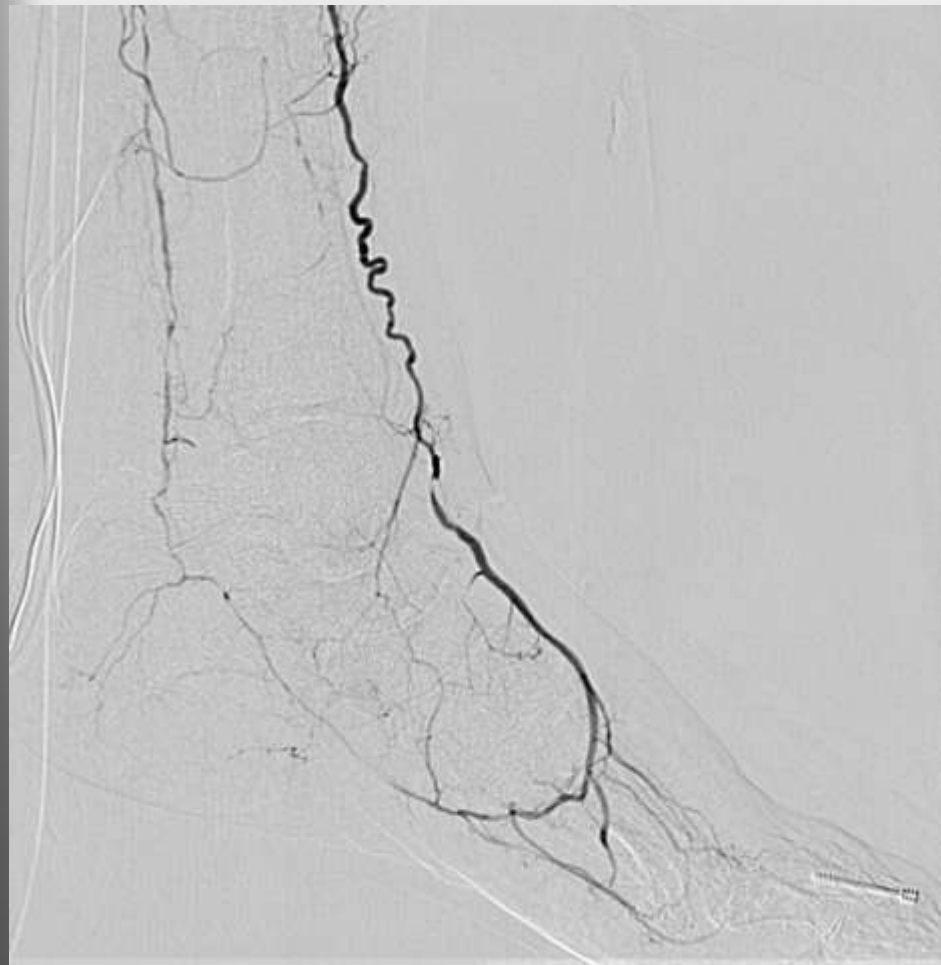


Final result



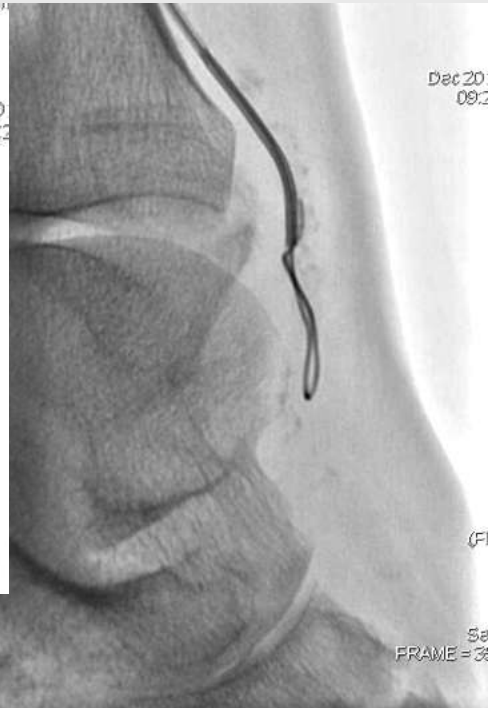
CASE RETRO 4

*Failure of subintimal approach in a
very calcified dorsalis pedis*

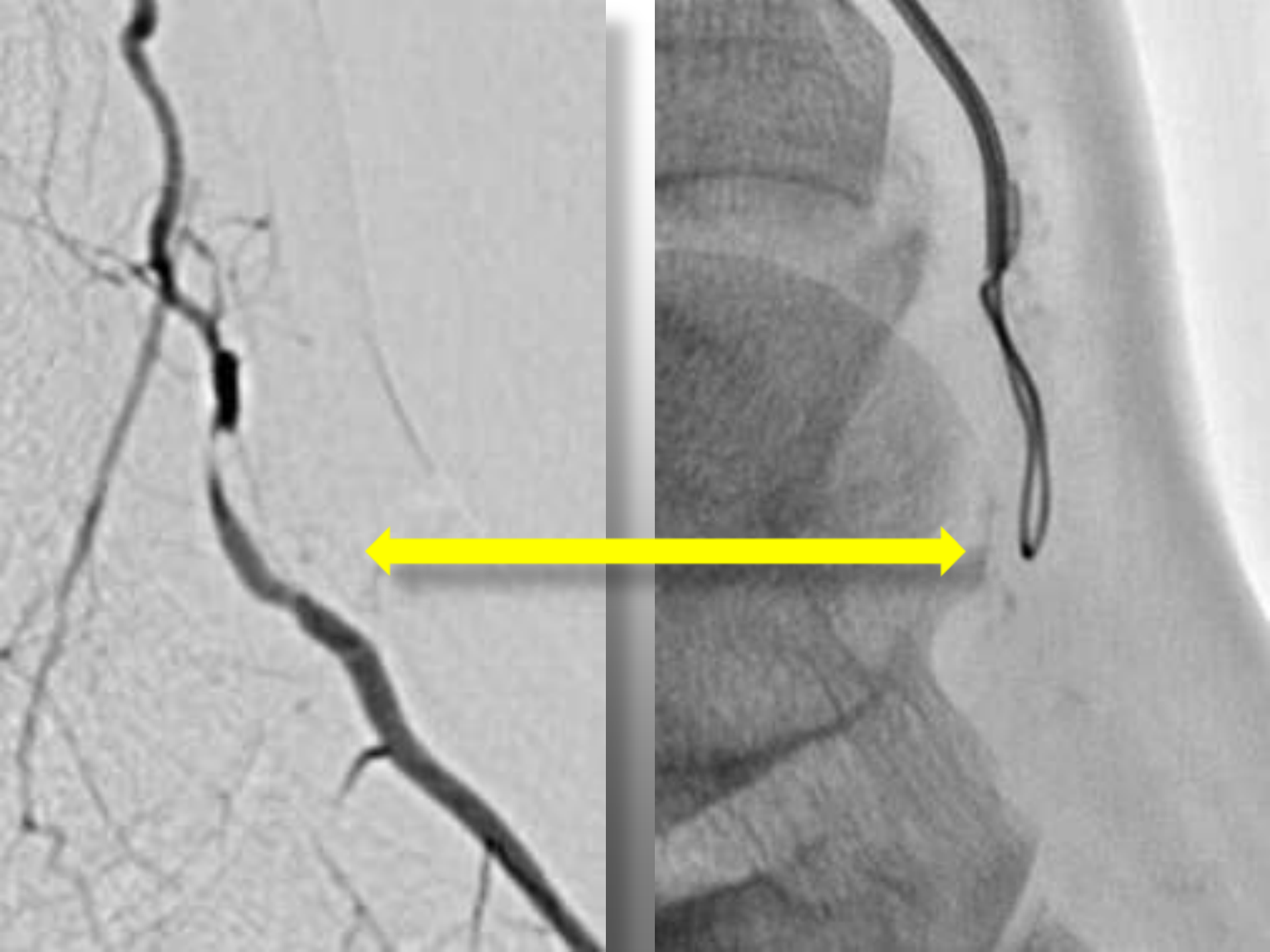


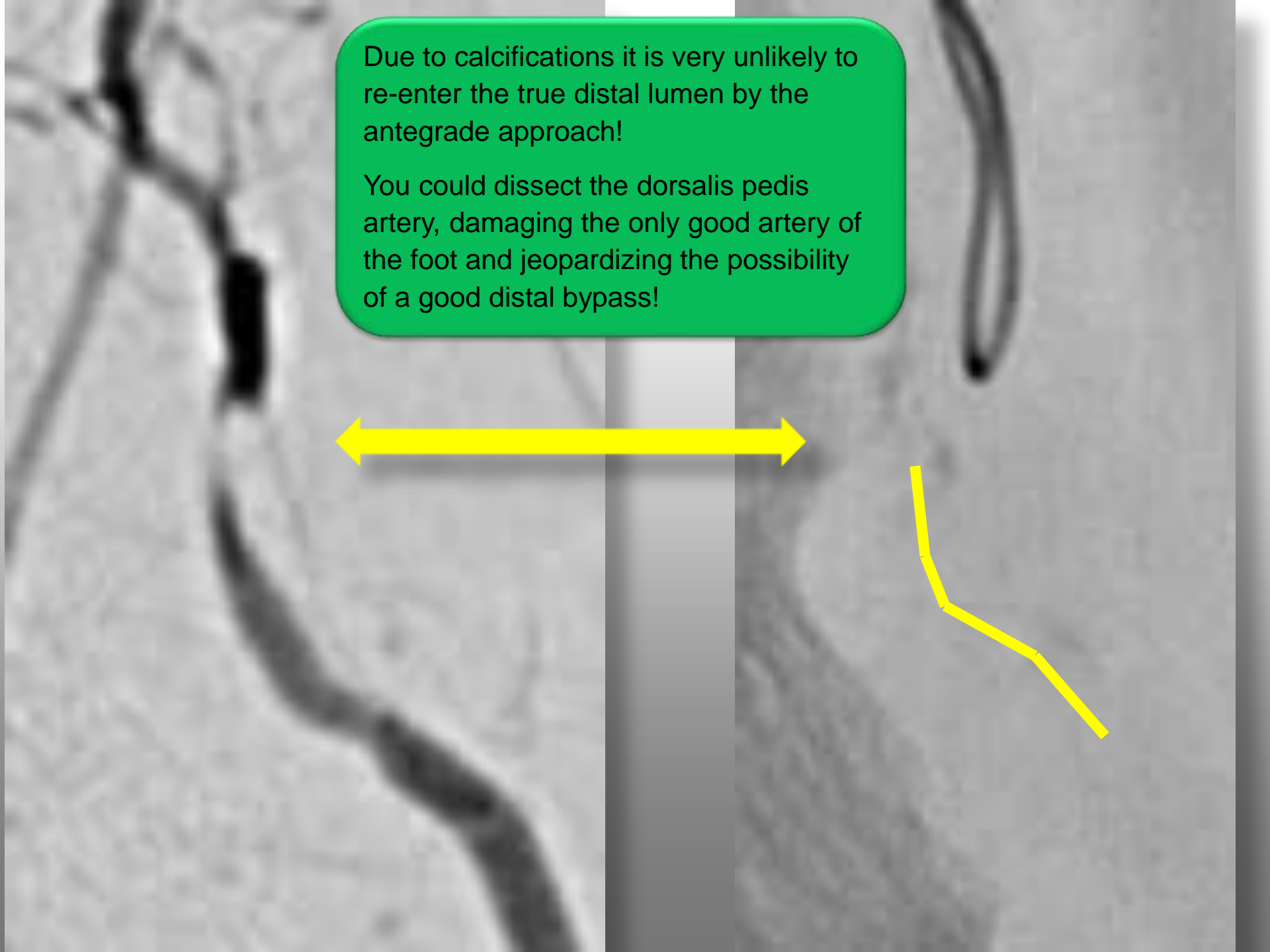
- Hypoplastic ATA
- Occluded Peroneal artery
- Big and healthy dorsalis pedis

Subintimal approach in peroneal artery







The image is a grayscale medical scan, likely an angiogram, showing a blood vessel. A prominent, dark, irregular mass representing a calcification is visible on the vessel wall. A yellow arrow points from the right side of the image towards this calcification. A green text box is overlaid on the upper part of the image, containing text about the difficulty of antegrade approaches due to such calcifications and the risk of damaging the dorsalis pedis artery.

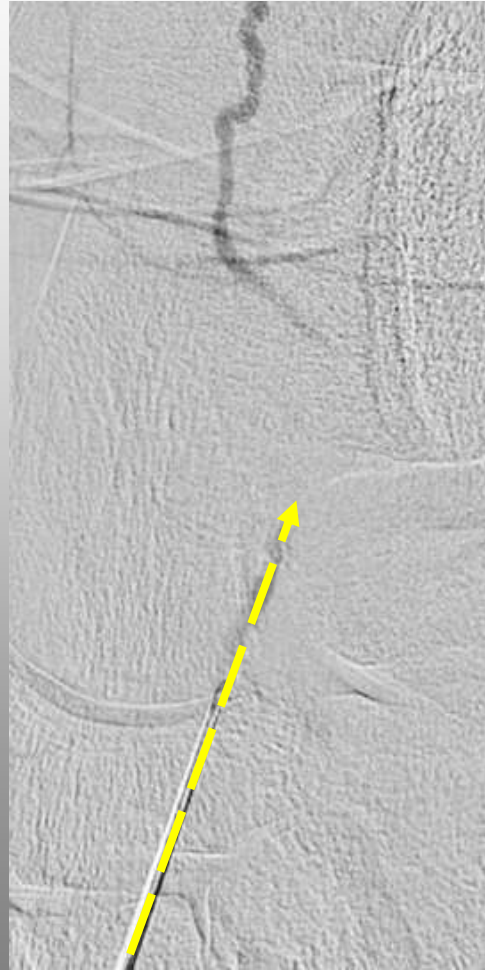
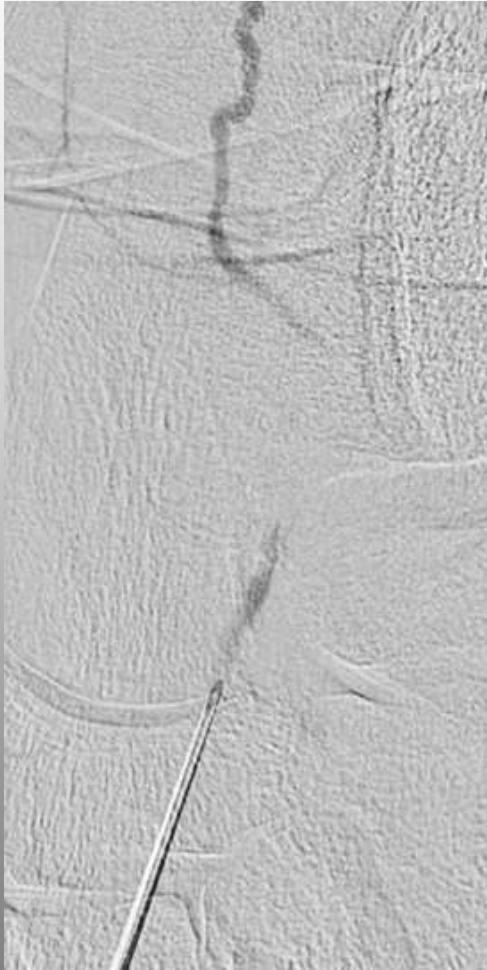
Due to calcifications it is very unlikely to re-enter the true distal lumen by the antegrade approach!

You could dissect the dorsalis pedis artery, damaging the only good artery of the foot and jeopardizing the possibility of a good distal bypass!

Retrograde dorsalis pedis puncture

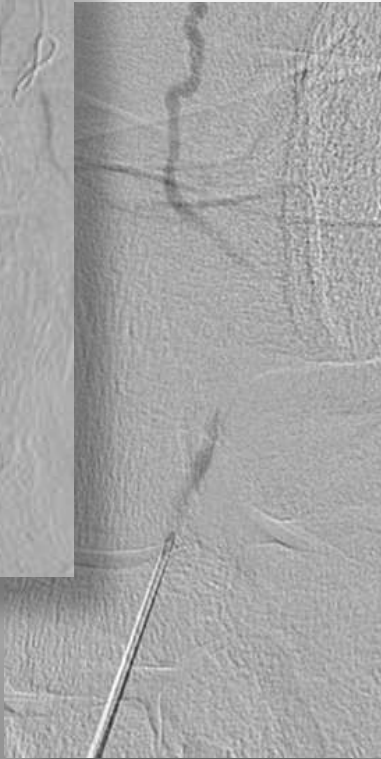


Retrograde dorsalis pedis puncture

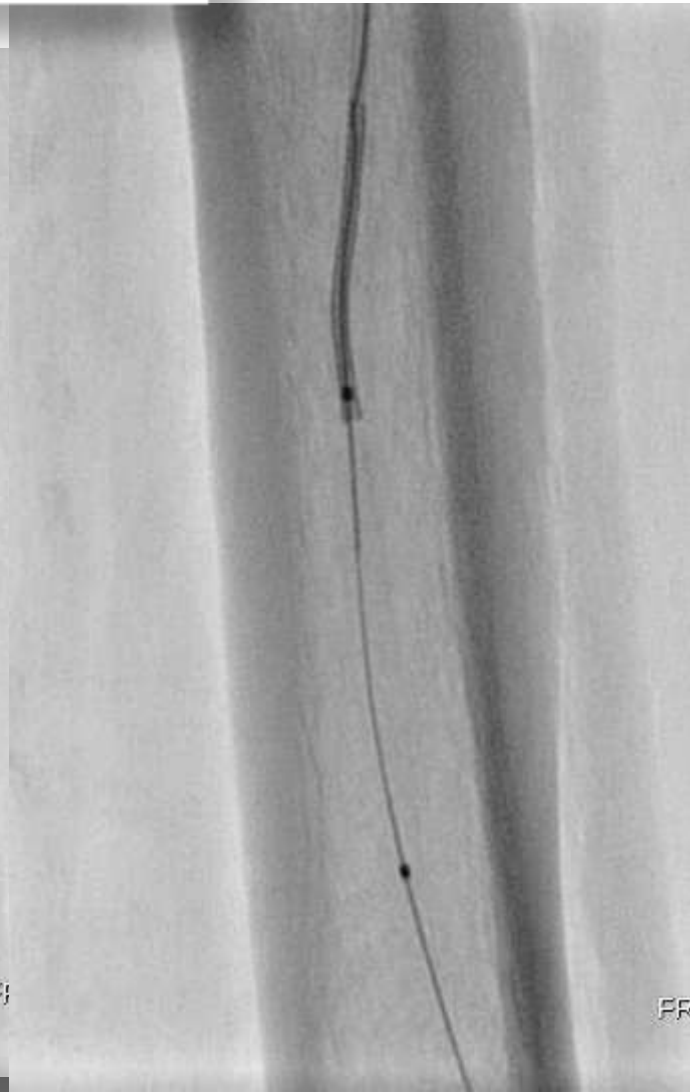
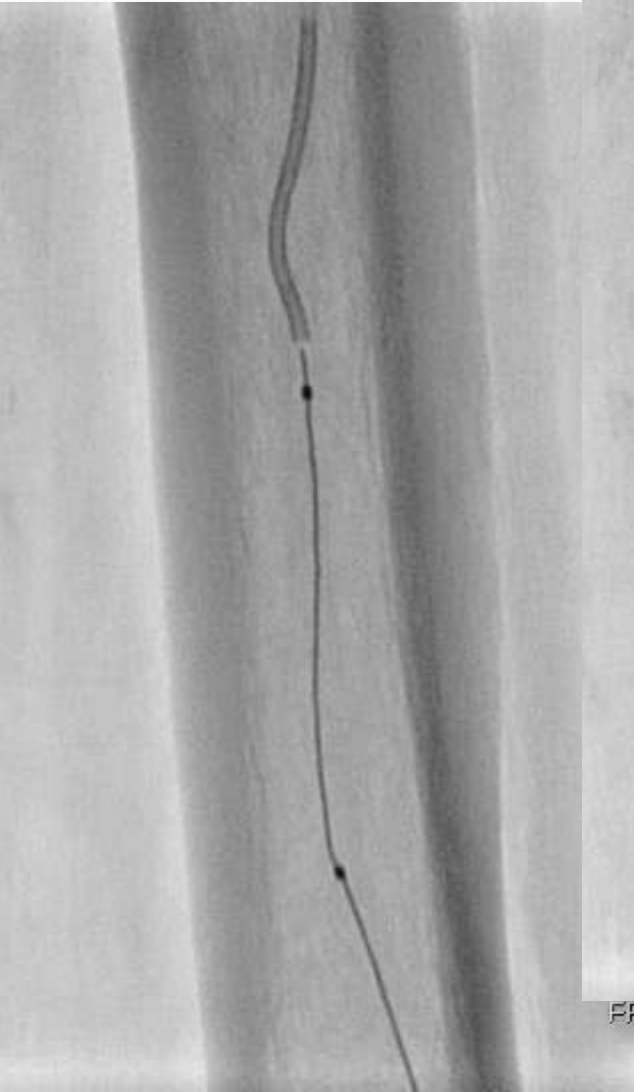


Parallax technique:
the needle and the
artery are (perfectly)
aligned

Retrograde dorsalis pedis puncture



Retrograde dorsalis pedis puncture



Shift to antegrade approach



Final result



Retrograde approach: essential bibliography

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