

Techniques for retrograde access



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Disclosure

Speaker name:

Roberto Ferraresi

- I have the following potential conflicts of interest to report:
- Consulting: Medtronic, Abbott, LimFlow
- Employment in industry
- Shareholder in a healthcare company
- Owner of a healthcare company
- Other(s)
- I do not have any potential conflict of interest

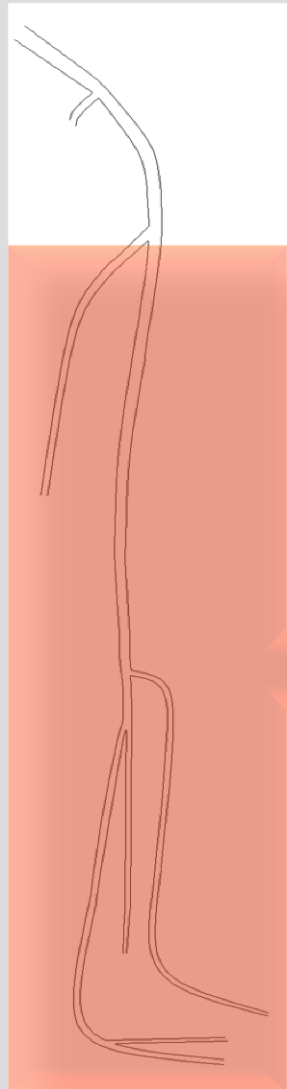
Retrograde approach: rationale

The antegrade approach of a CTO can be unsuccessful due to many reasons:

- 1) Inability to correctly identify the origin of an occluded tibial artery**
- 2) Rupture or loss of the antegrade vessel pathway**
- 3) Inability to re-enter into the true distal patent lumen due to limited distal “landing” zone or vessel calcification**
- 4) High risk to damage, continuing the antegrade subintimal dissection, the distal target vessel which could be the only landing zone of a distal bypass**

In these situations, the problem cannot be solved persevering with an antegrade approach, the only way is to switch to retrograde techniques.

Retrograde approach: Milan experience 2010-2013



1473 pts



2063 PTA



3351 successfully treated lesions

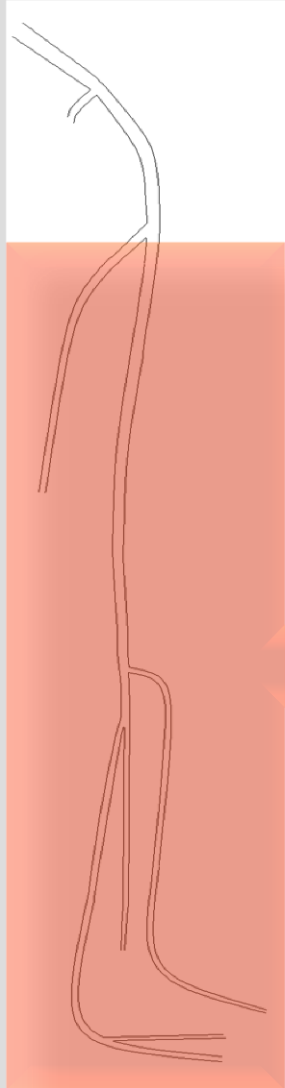


1943 (58%) stenosis
mean length
11,6 ± 10.9 cm
Standard endoluminal approach

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

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

Retrograde approach: Milan experience 2010-2013



Step-by-step approach in CTOs

Antegrade approach

1. Endoluminal
2. Subintimal

Failure

Retrograde puncture

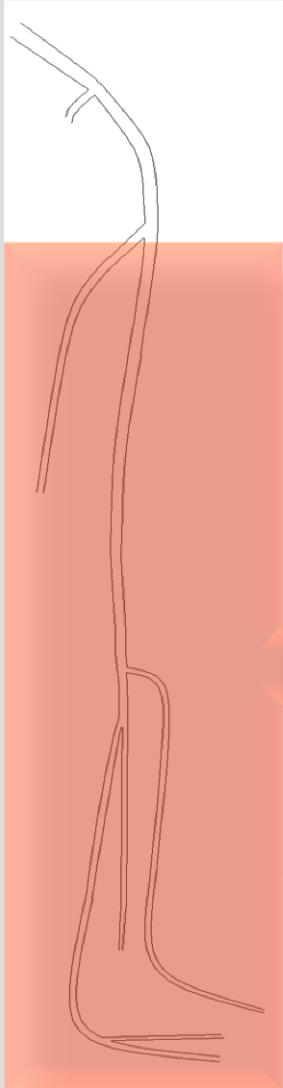
Transcollateral

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

This is the real world of CLI due to below-the-groin vessel disease where we applied the step-by-step approach in CTOs

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

Retrograde approach: Milan experience 2010-2013



Step-by-step approach in CTOs

Antegrade approach

1. Endoluminal
2. Subintimal

Retrograde puncture

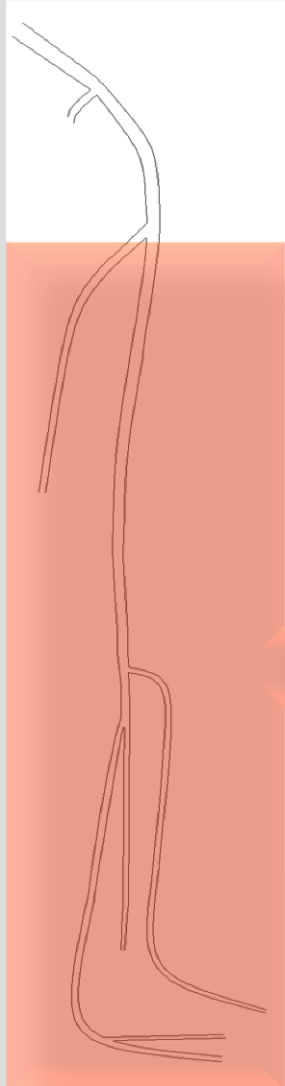
Transcollateral

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

**ENDO successful
56% (792)**

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

Retrograde approach: Milan experience 2010-2013



Step-by-step approach in CTOs

Antegrade approach

1. Endoluminal
2. Subintimal

Retrograde puncture

Transcollateral

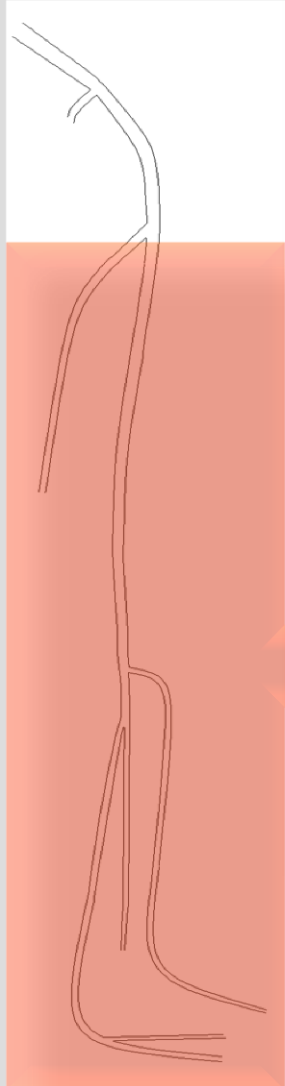
1. Pedal-plantar loop technique
2. Peroneal artery branches PTA

**ENDO successful
56% (792)**

**SUBI successful
34% (469)**

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

Retrograde approach: Milan experience 2010-2013



Step-by-step approach in CTOs

Antegrade approach

1. Endoluminal
2. Subintimal

Retrograde puncture

Transcollateral

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

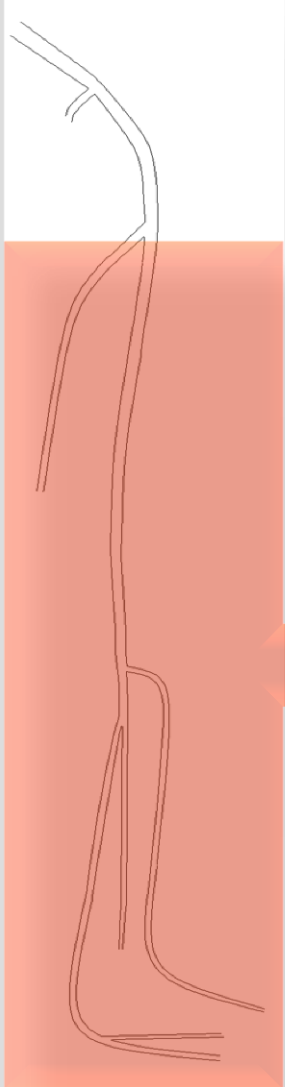
ENDO successful
56% (792)

SUBI successful
34% (469)

SUBI+RETRO
successful
10% (147)

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

Retrograde approach: the retrograde puncture



Retrograde puncture

Transcollateral

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

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.

Key points in retrograde puncture (2)

- 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.
- 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, but other types of wires can be selected according to the different situations. 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

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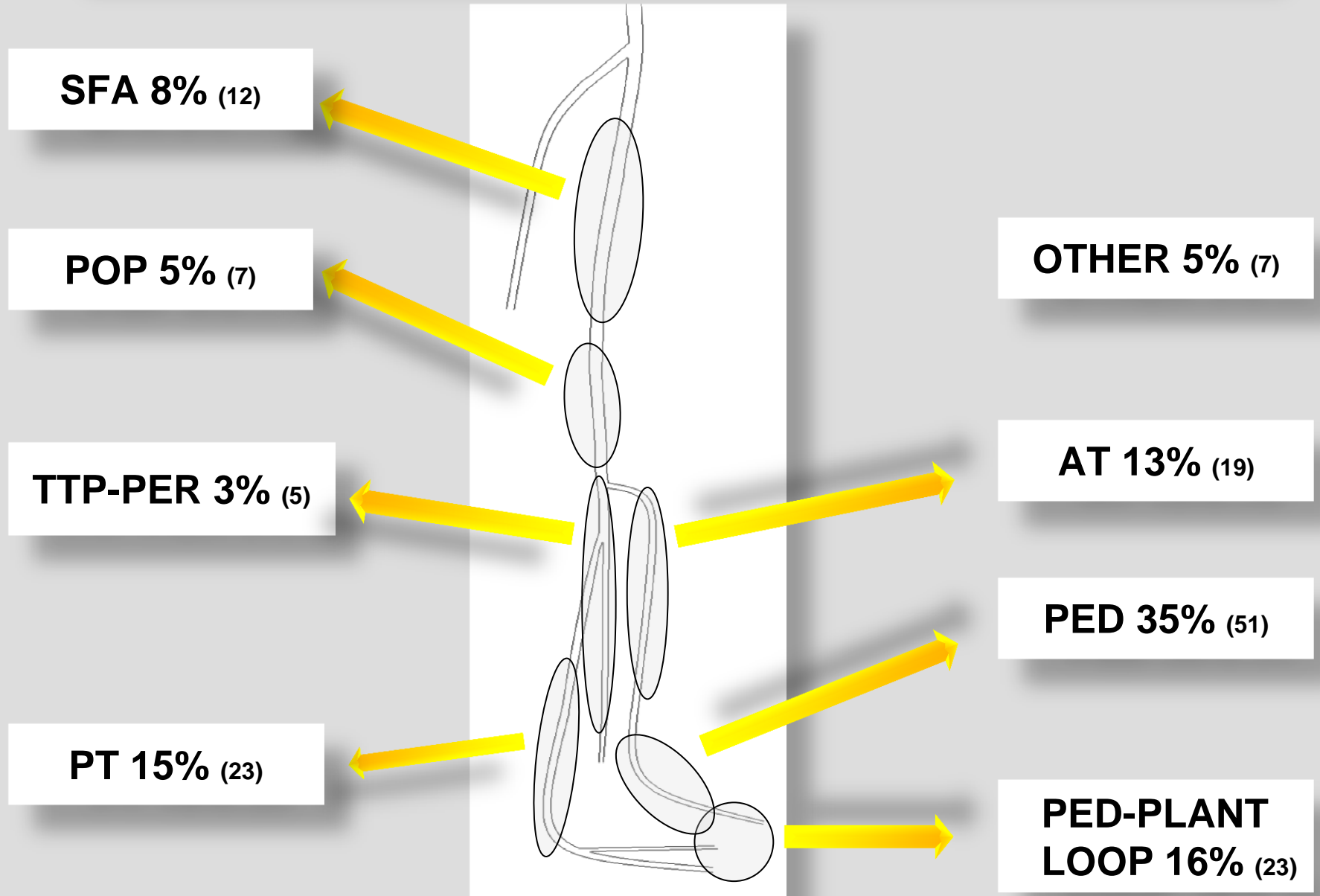


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Tips and tricks for a correct “endo approach”

R. FERRARESI¹, L. M. PALENA², G. MAURI³, M. MANZI⁴

Retrograde approach: Milan experience 2010-2013

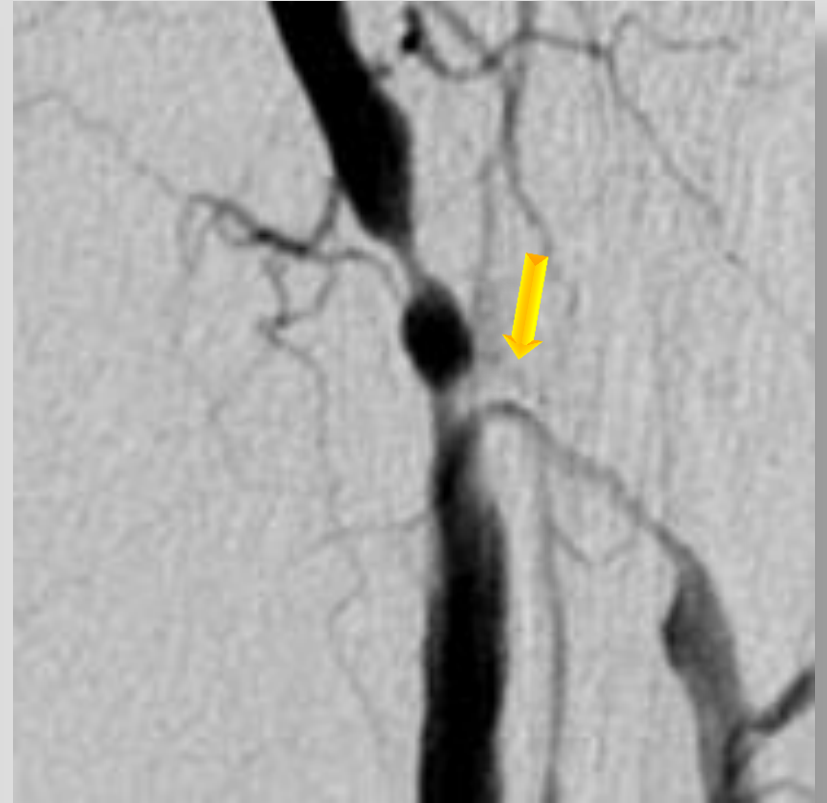


CASE RETRO 1

Why the retrograde approach?

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

Basal angio



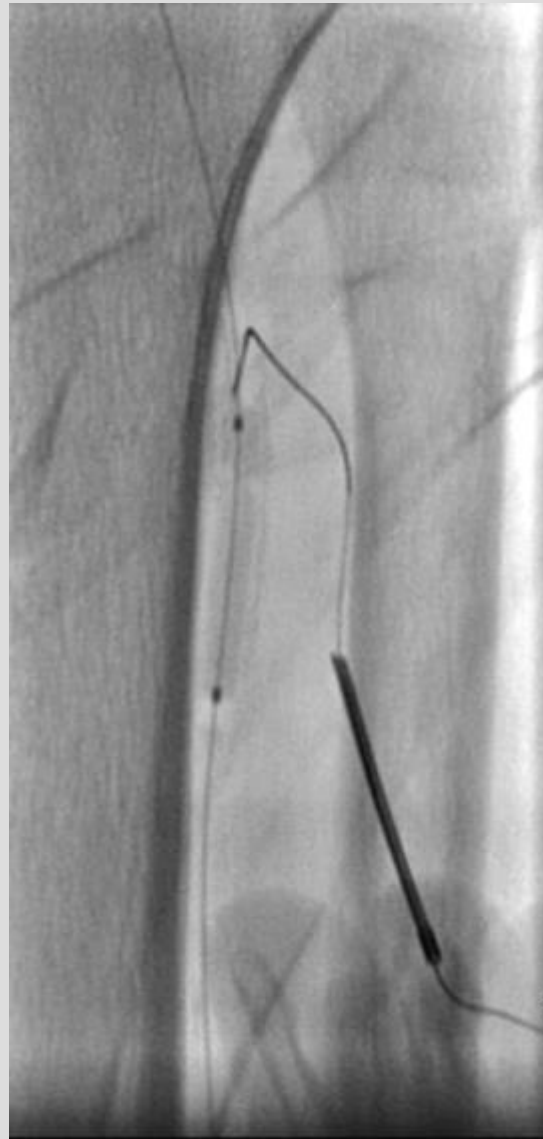
Failure to enter the ATA ostium



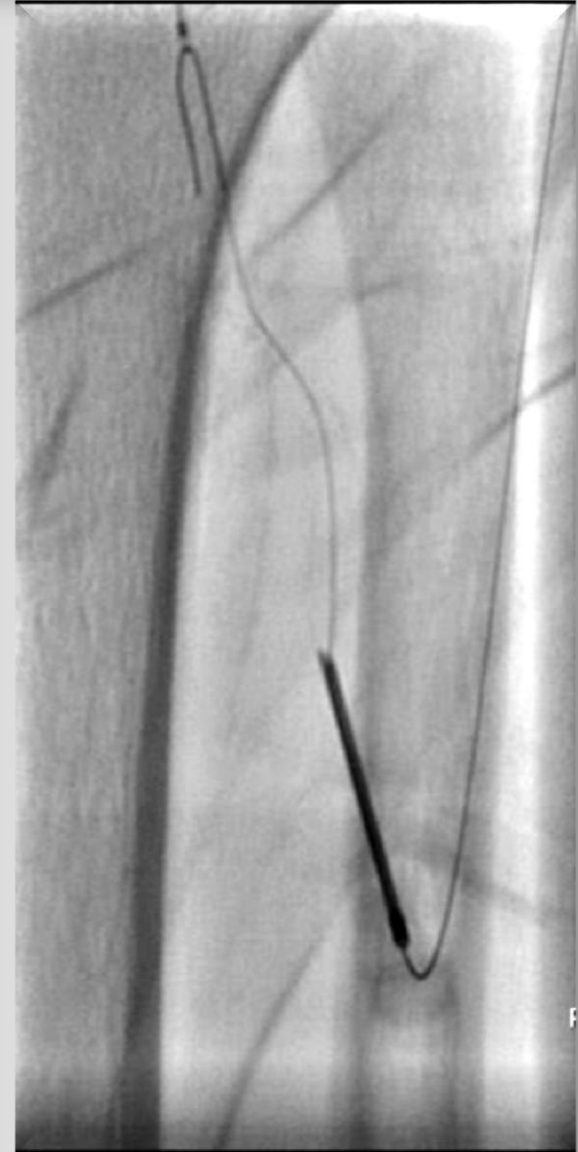
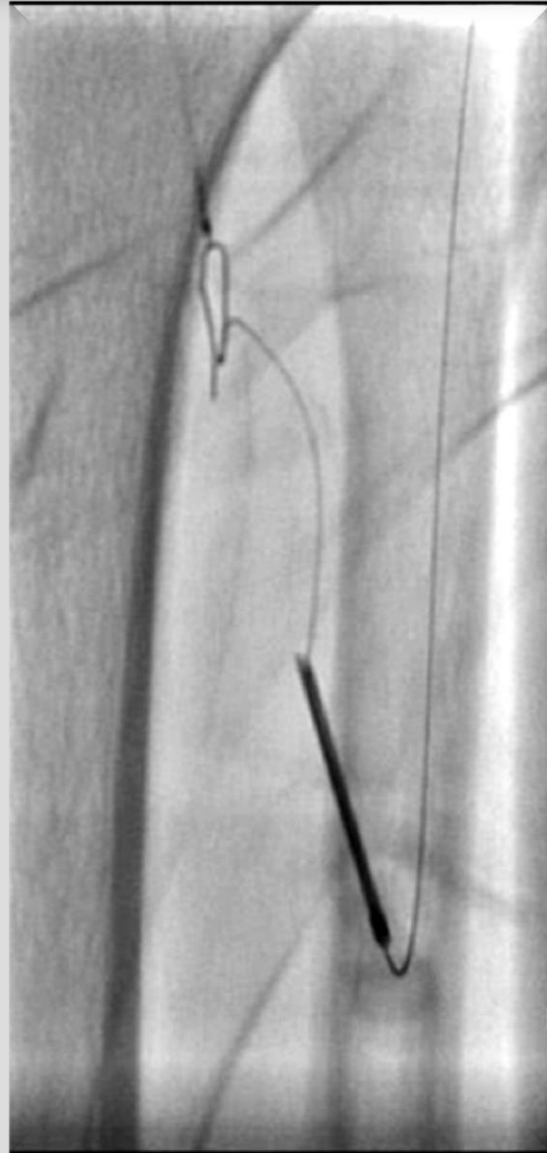
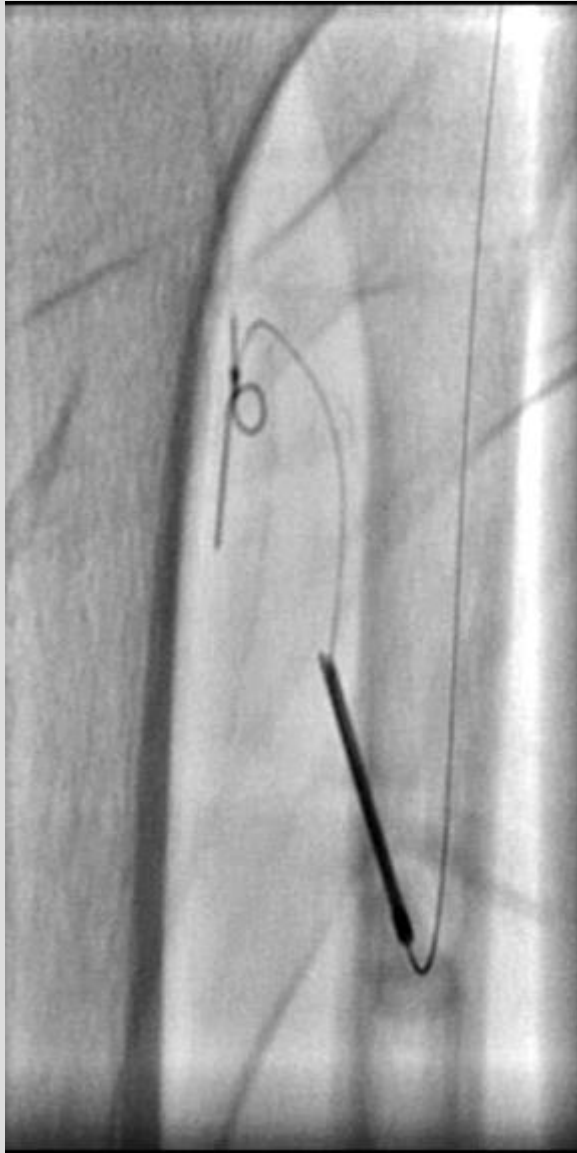
Retrograde ATA puncture

Retrograde puncture of proximal ATA

A 0.014" wire is inserted through a 21 G needle: impossible to go retrogradely into the POP artery despite a balloon inflated in the TPT with the aim to prevent the wrong direction of the wire.



Retrograde ATA puncture



Snare kit capture of the retrograde wire

Kissing balloons



Basal angio



Final result

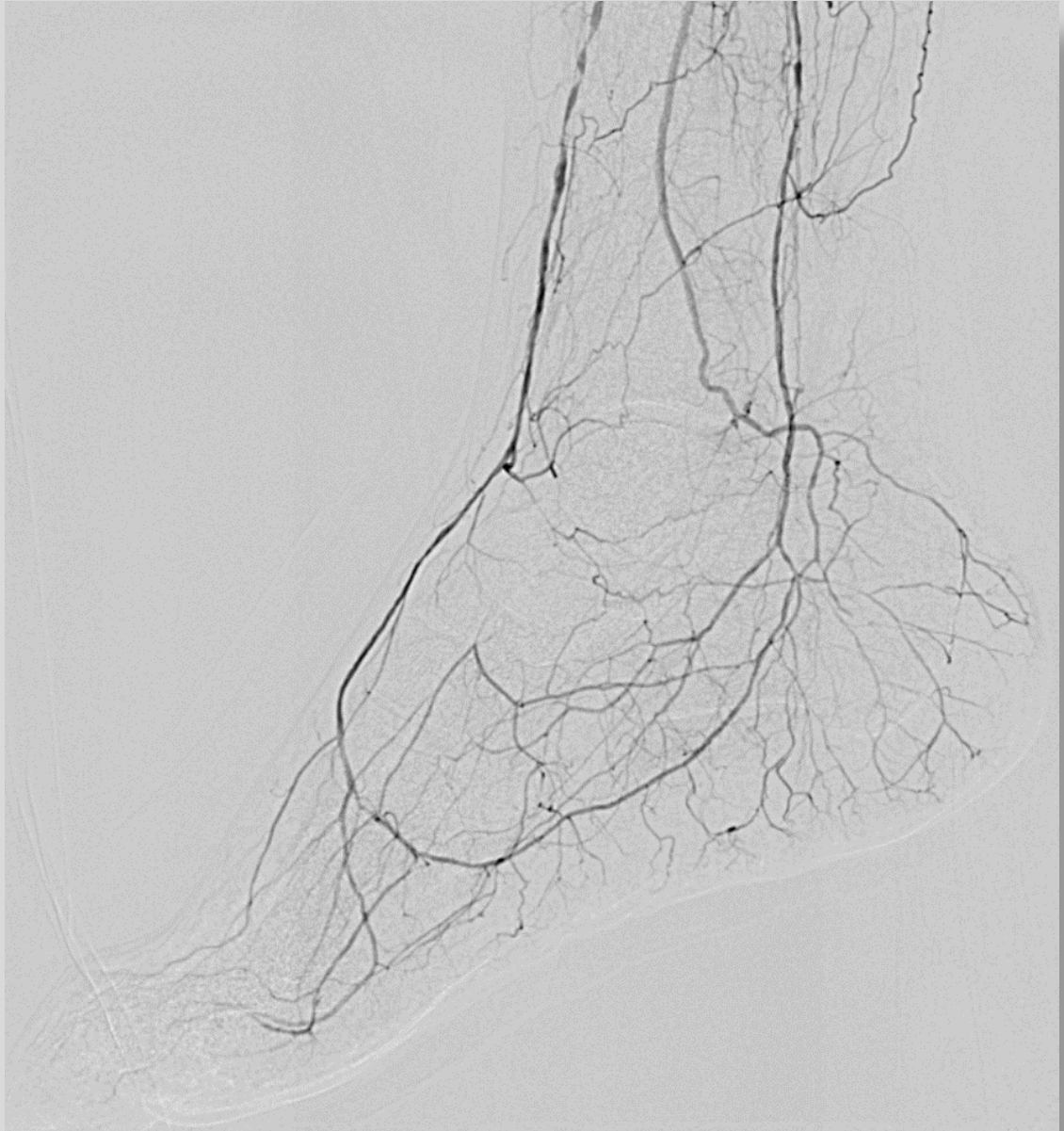


CASE RETRO 2

Why the retrograde approach?

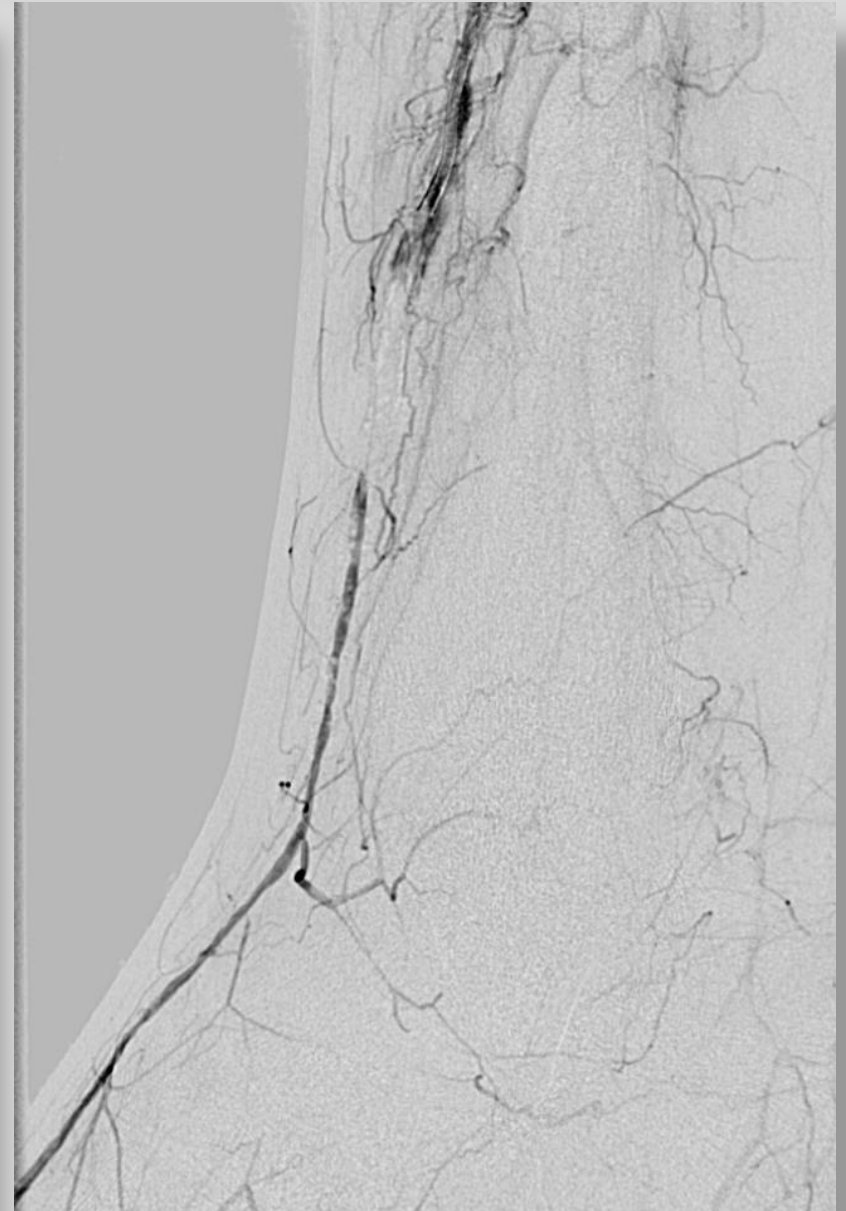
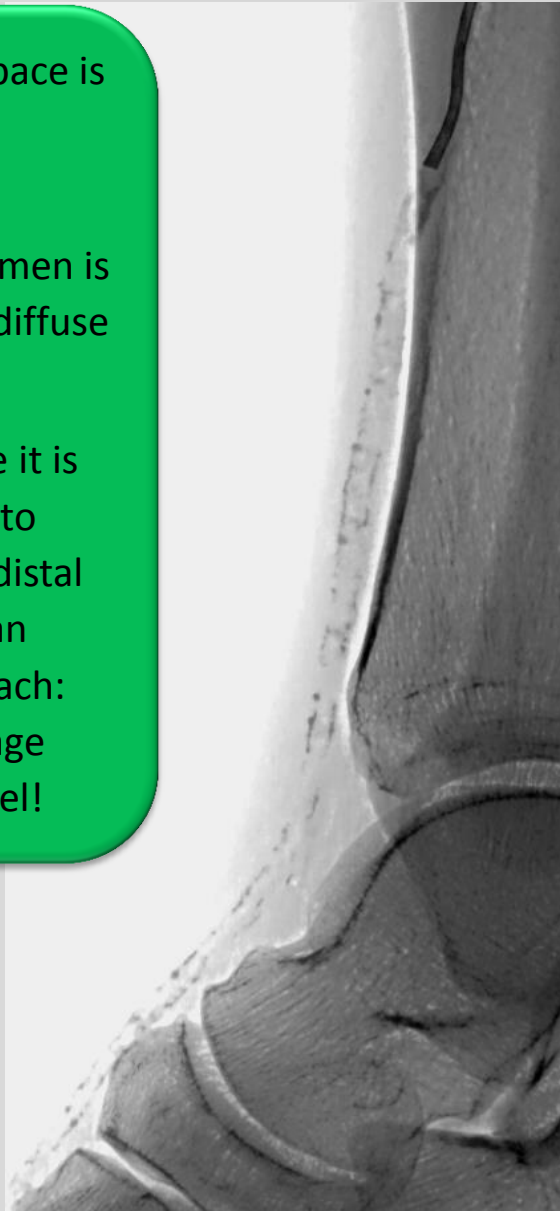
***Diffuse calcific disease of dorsalis pedis:
impossible to enter the true distal
lumen and high risk of damaging the
distal target vessel***

Basal angio

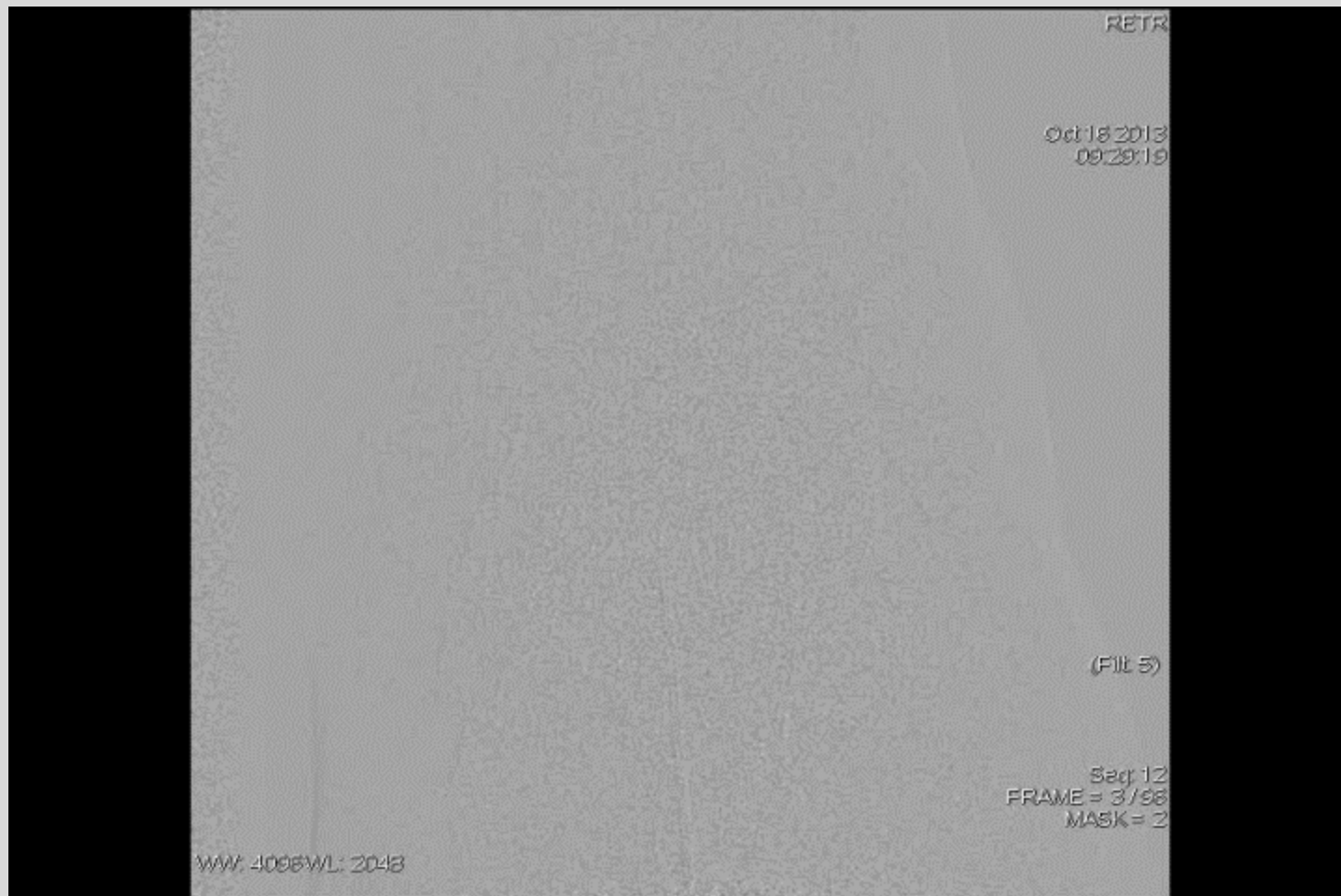


Failure of ATA approach

- The subintimal space is outside of the calcifications
- The true distal lumen is very thin due to diffuse disease
- In our experience it is quite impossible to reenter into the distal target vessel by an antegrade approach: high risk to damage the last foot vessel!



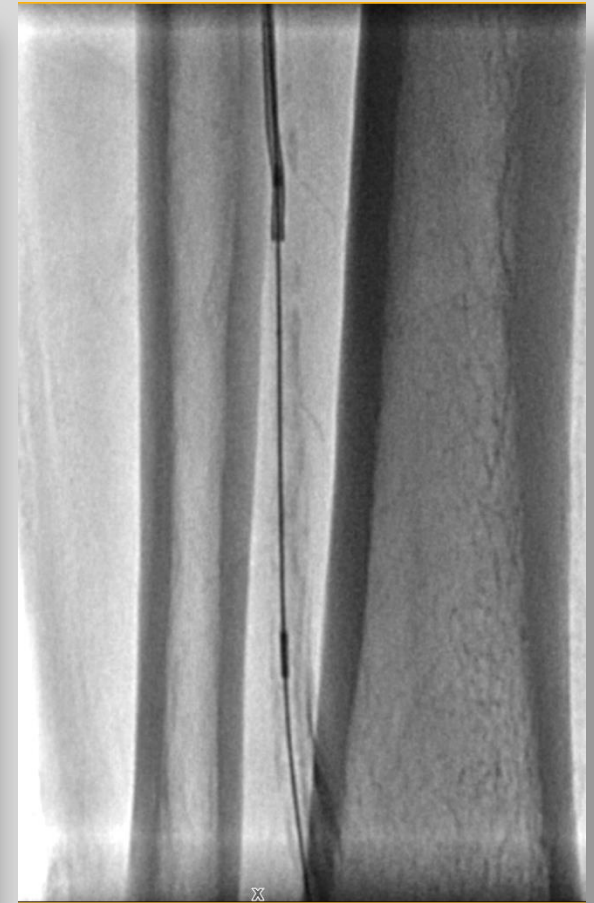
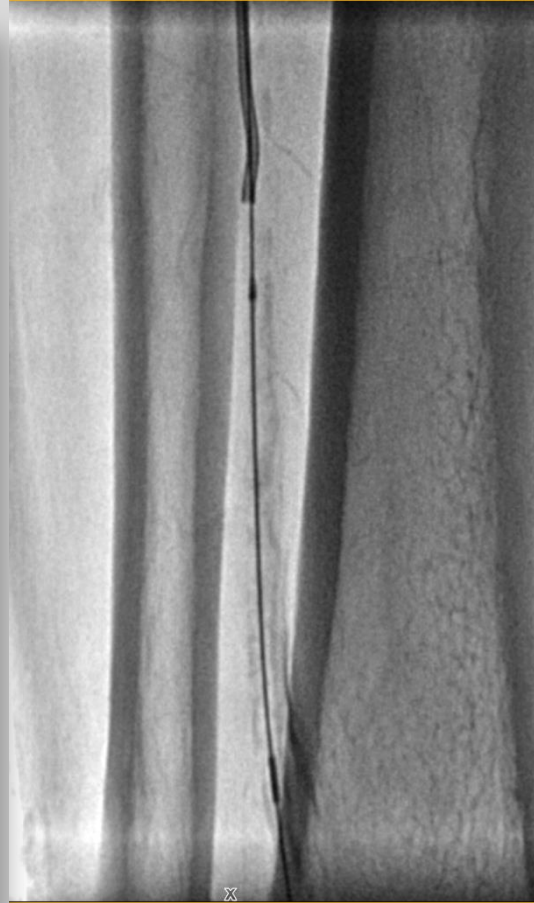
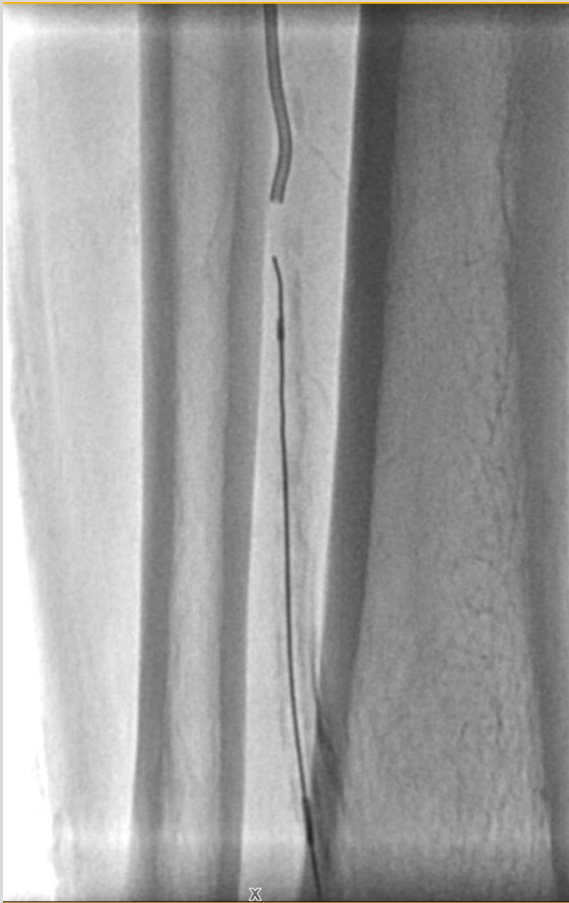
Retrograde puncture of ATA



Retrograde puncture of ATA



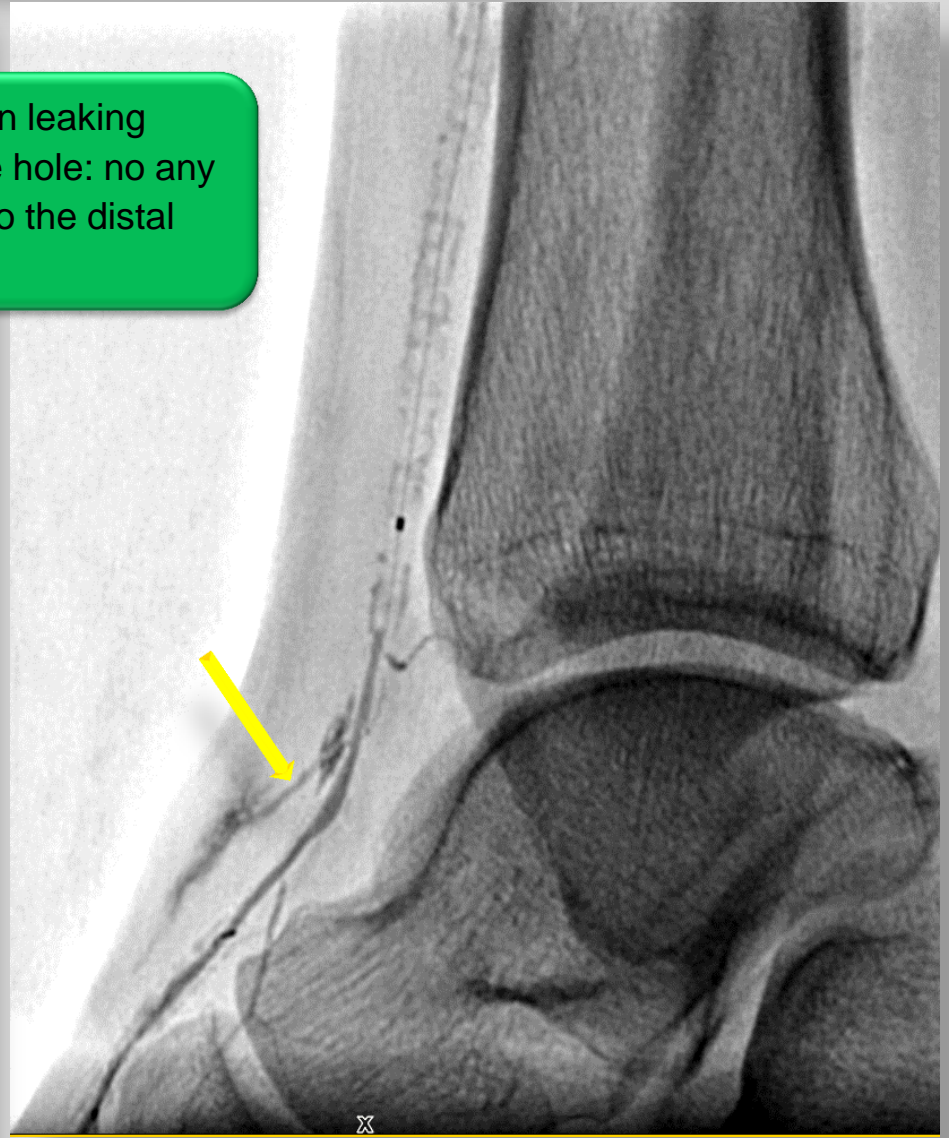
Retrograde advancement of a support catheter



A support catheter (65 cm long, 2.6 Fr, 0.018", angulated tip) is easily advanced on the 0.018" retrograde wire and is able to enter into the antegrade Berenstein catheter. The 0.018" wire is exchanged with a 0.014" antegrade wire.

Shift to antegrade approach and sealing

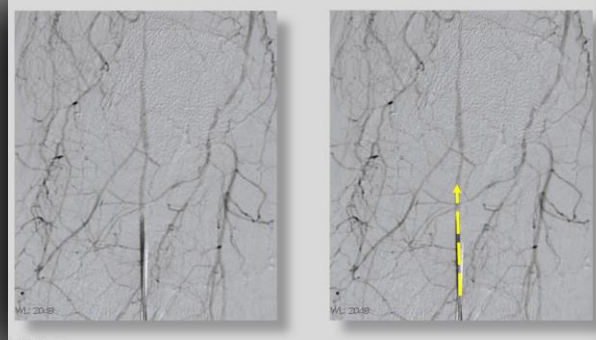
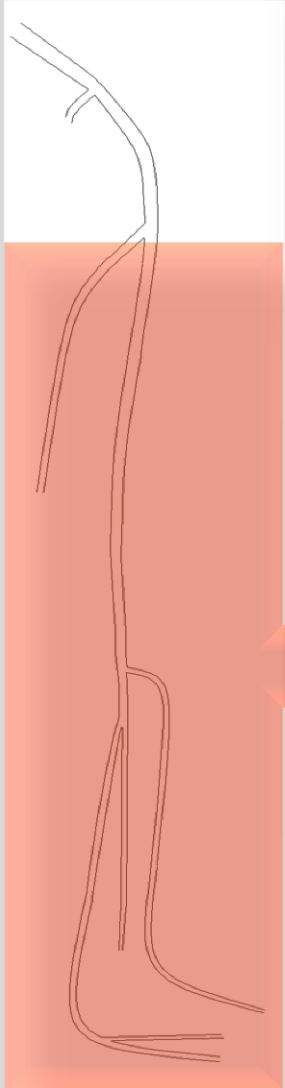
Observe the thin leaking
from the needle hole: no any
other damage to the distal
target vessel



Final result



Retrograde approach: the retrograde puncture



Retrograde puncture

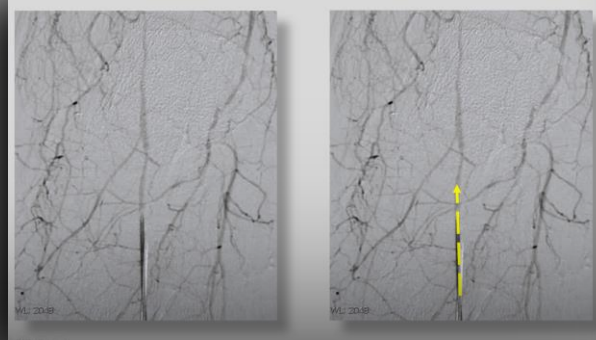
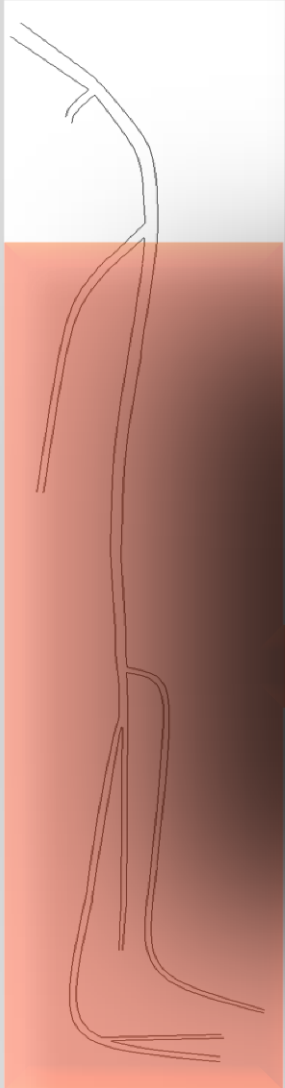
Transcollateral

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

Parallax technique: the needle and the artery must be perfectly aligned



Retrograde approach: the retrograde puncture



Retrograde approaches are essential in saving different and complex situations.

You need only a needle, a wire, your will and a lot of patience...

Parallax technique: the needle and the artery must be perfectly aligned

