

**SFA Intervention; The End Justifies the Means**

**Heavy Calcific FP Lesion:  
*How to Cross with Wire and Balloon?***

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# Wire Crossing Strategy For Heavily Calcified FP CTO

## 1. Intraluminal Approach

Conventional wire – wire escalation up to Astato 30g

New intraluminal device – Crosser, Truepath ...

**Bidirectional approach by retrograde puncture**

## 2. Subintimal Approach

Reentry with guidewire – loop method, harder GW

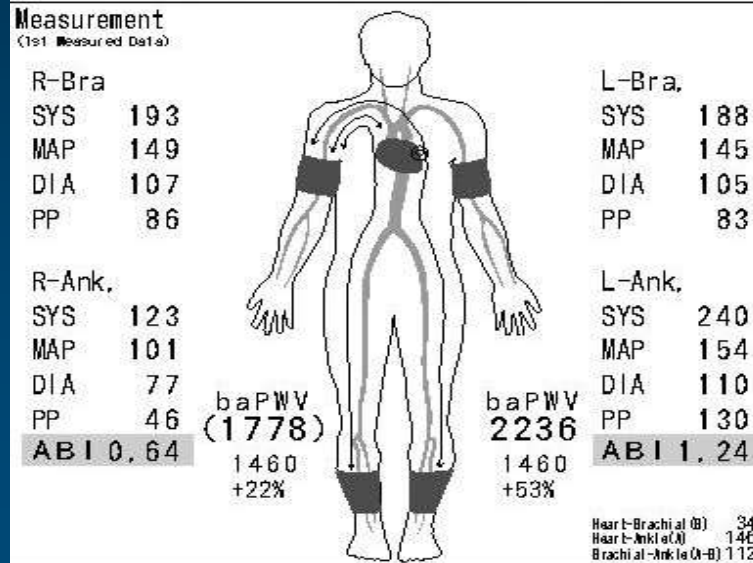
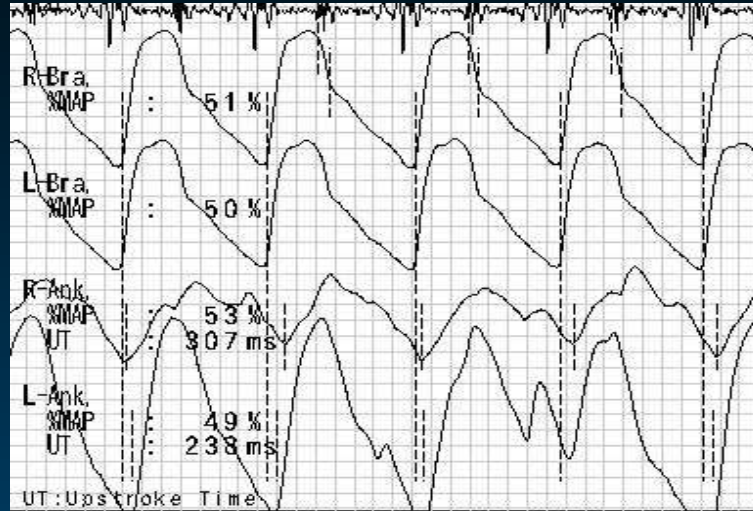
Dedicated reentry device – Outback, Pioneer

**Bidirectional approach by retrograde puncture**

# Learning with Cases

# Focal Severe Calcified CTO Case

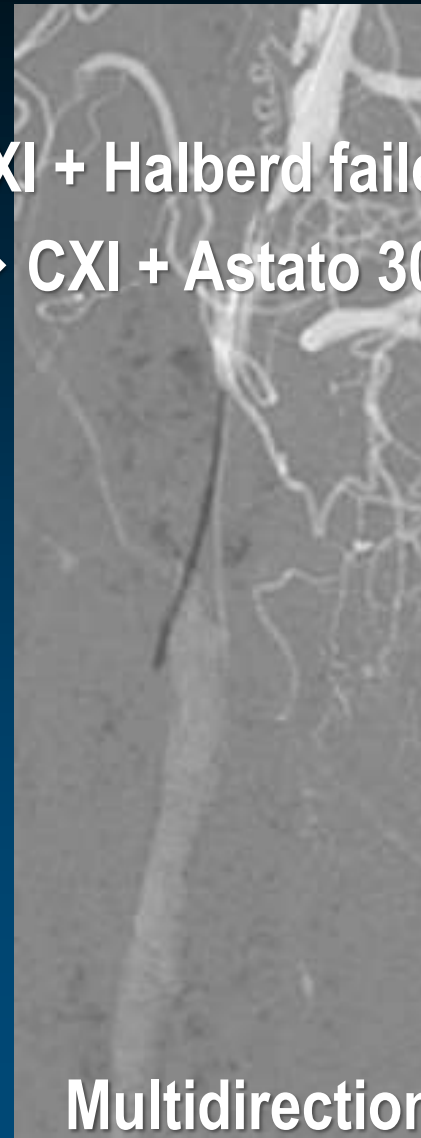
- M / 71
- DM, HTN
- Right 4th toe ulcer



# Antegrade intraluminal wiring - Calcified Focal P1 CTO



CXI + Halberd failed  
→ CXI + Astatato 30g




Multidirectional view helpful



The feeling of strong resistance  
when pulling back the wire inside  
the CTO body

(i.e. The guiding catheter is  
drawn into the lesion)

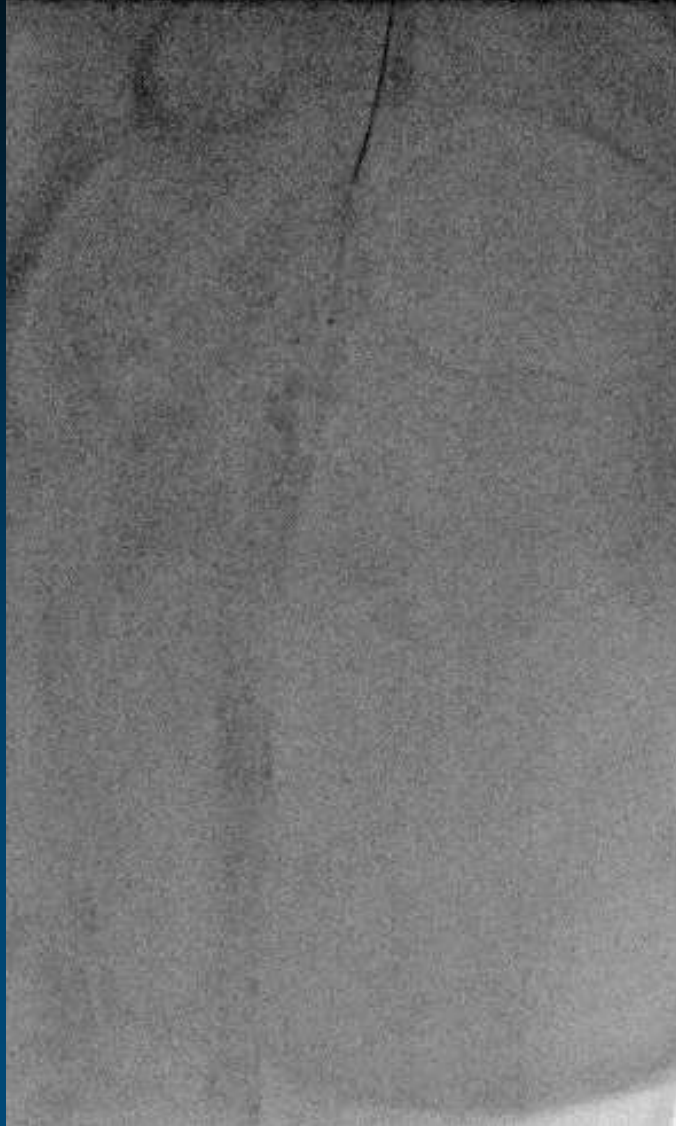
→ GW tip; mostly subintima or  
wrong way



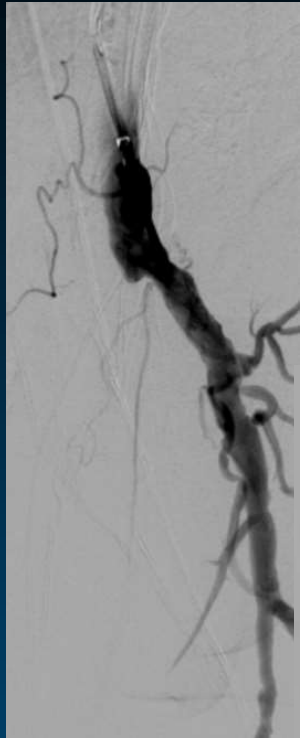
The feeling of no resistance, and the wire tip  
moves freely  
→ GW tip; either in the true lumen  
or in the extravascular space.

CXI + 0.018" Astato 30g

# Calcification Silhouette → Guidance For Intraluminal Passage



# Hard proximal cap case



**SFA ostial CTO**



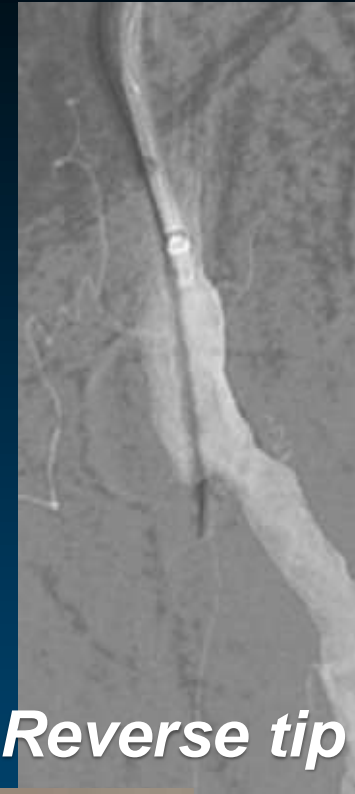
*MP + Terumo*

*→ Cut MP tip + Reverse tip Terumo*

*→ Cut MP tip*

*+ Microcatheter*

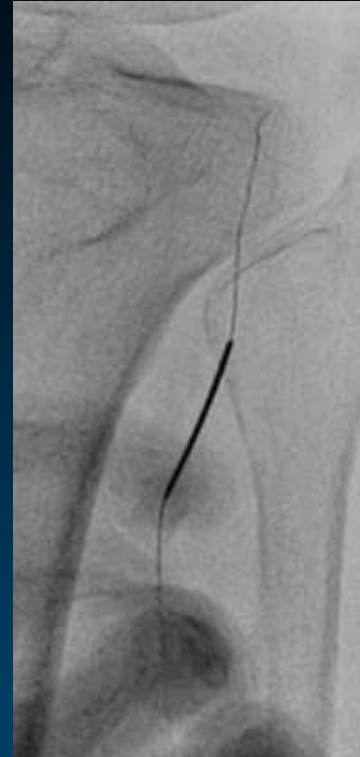
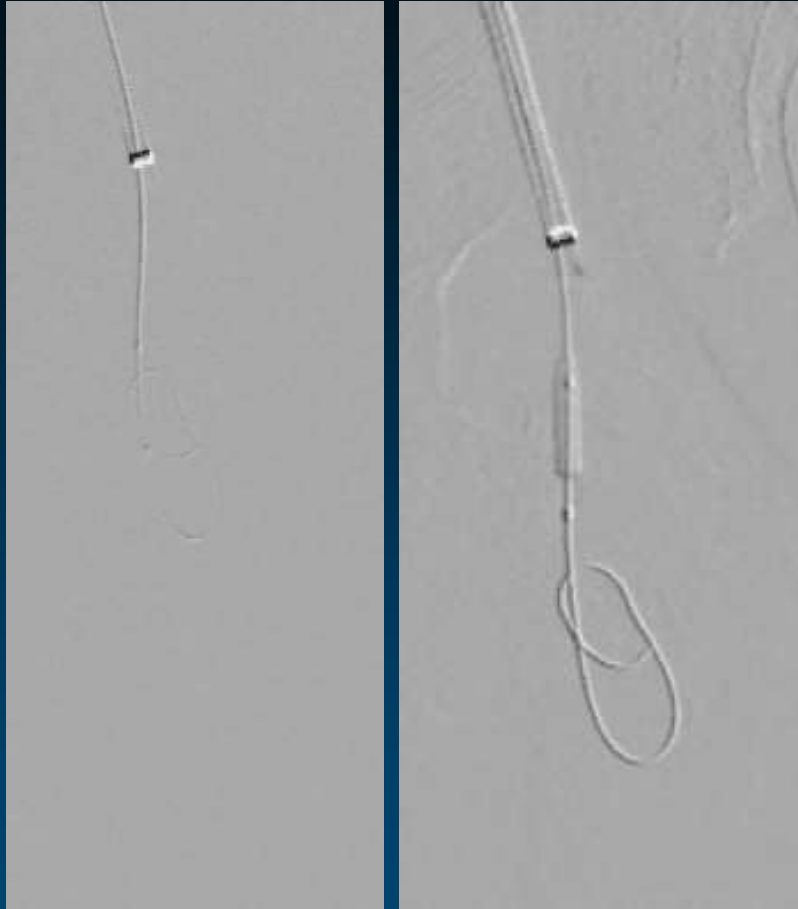
*+ Astato*



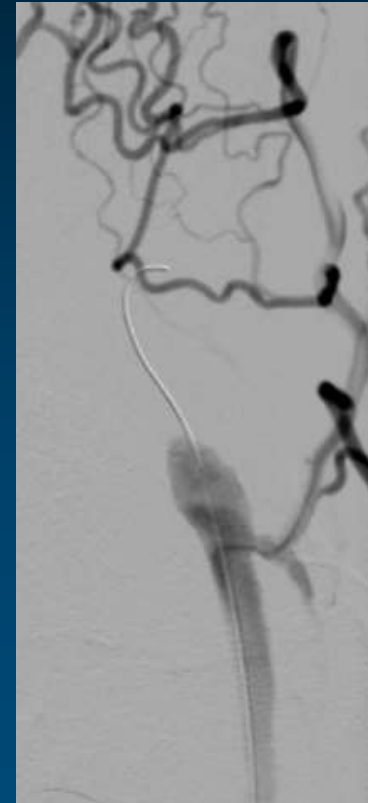
**2.0x15mm**



# Ruptured pSFA Ostial CTO

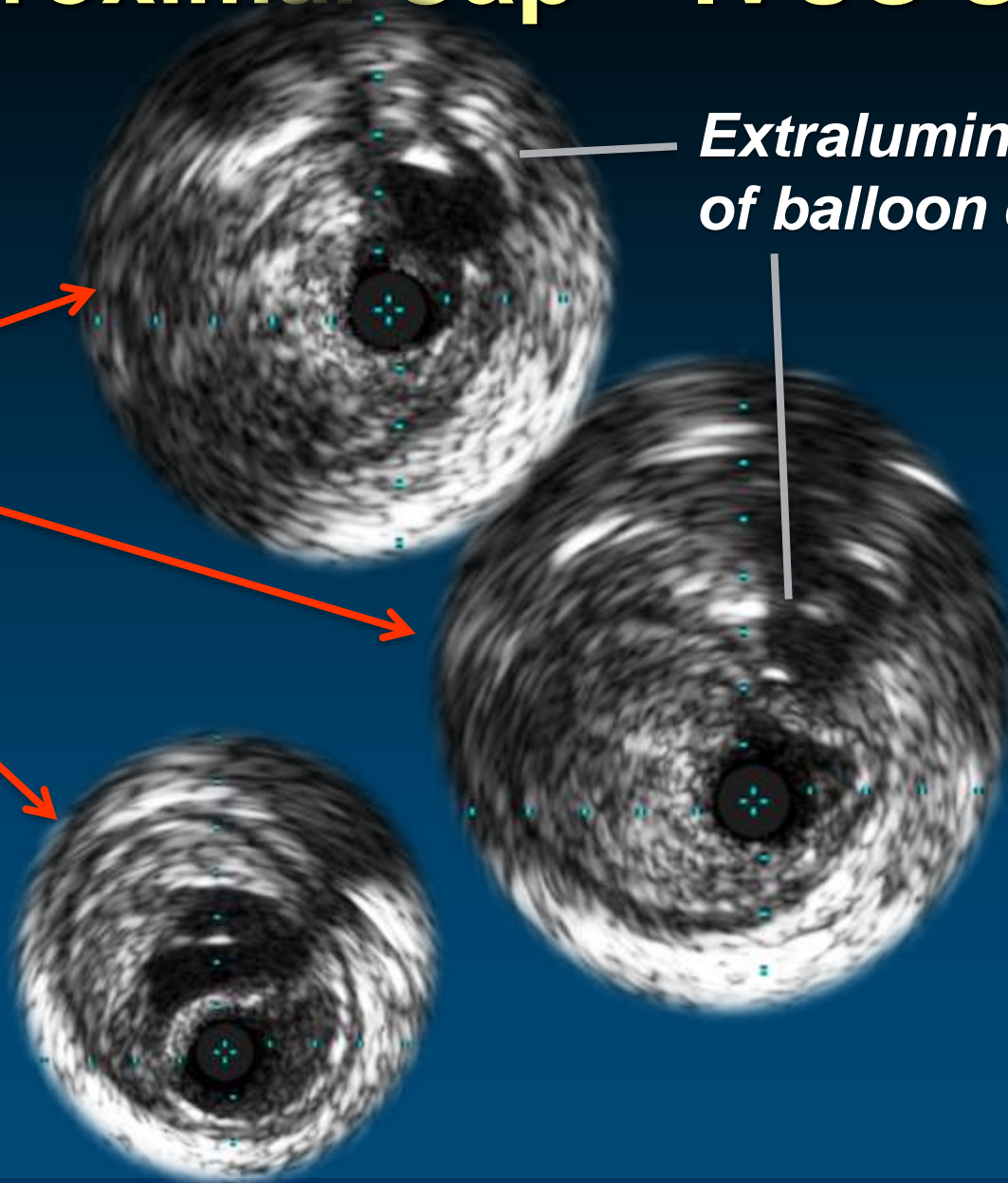
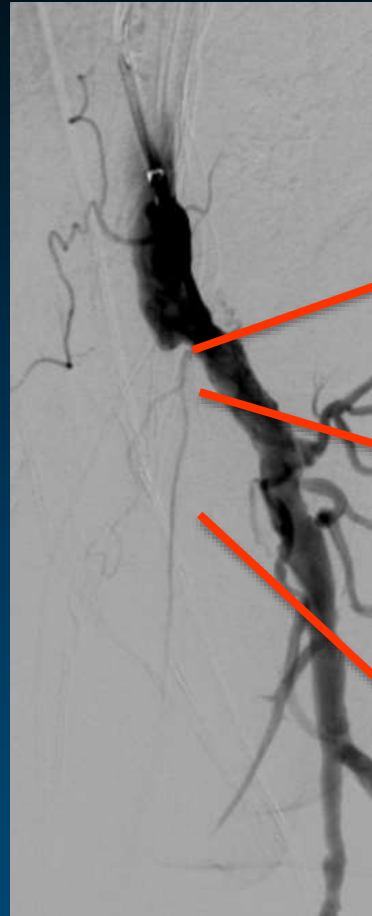


*Retrograde P3 access*



*Rupture → Balloon tamponade*

# Ruptured Hard Proximal Cap – IVUS Study

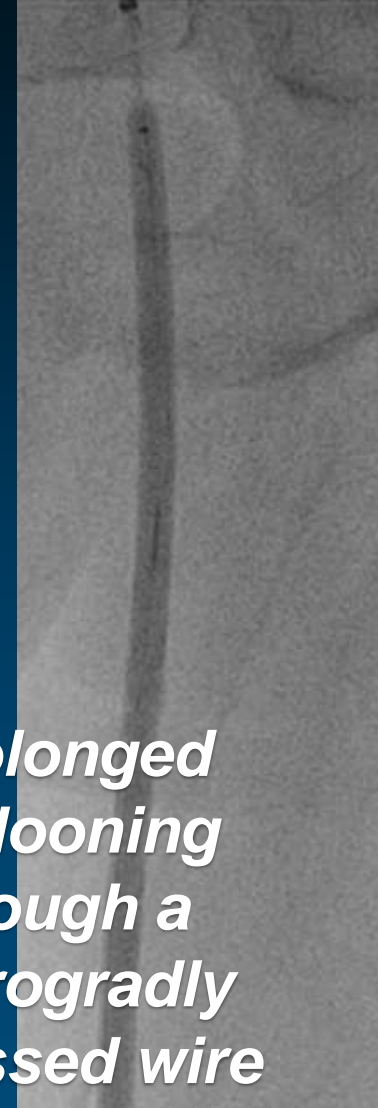


*Extraluminal passage  
of balloon catheter*

# Ruptured Hard Proximal Cap



*Prolonged  
ballooning  
through a  
retrogradly  
passed wire*



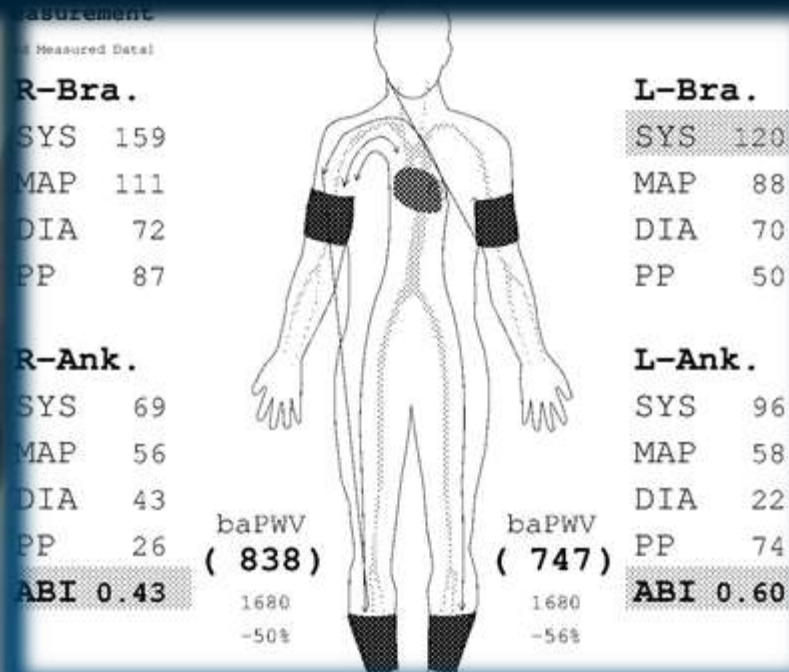
*DCB + Spot  
stenting*



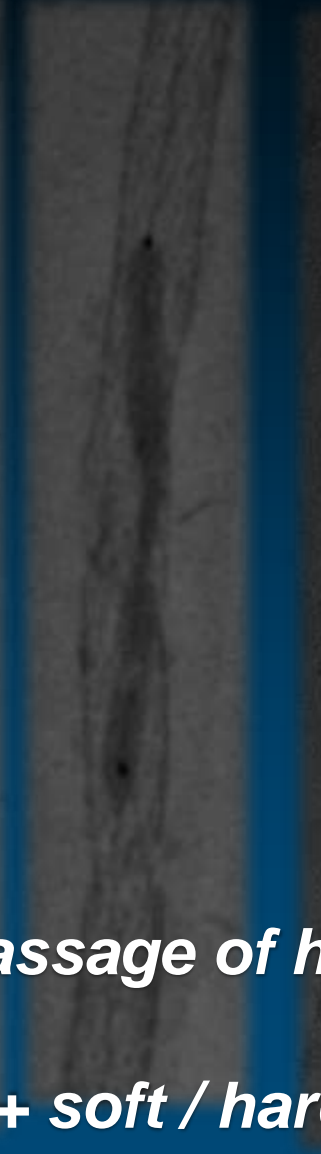
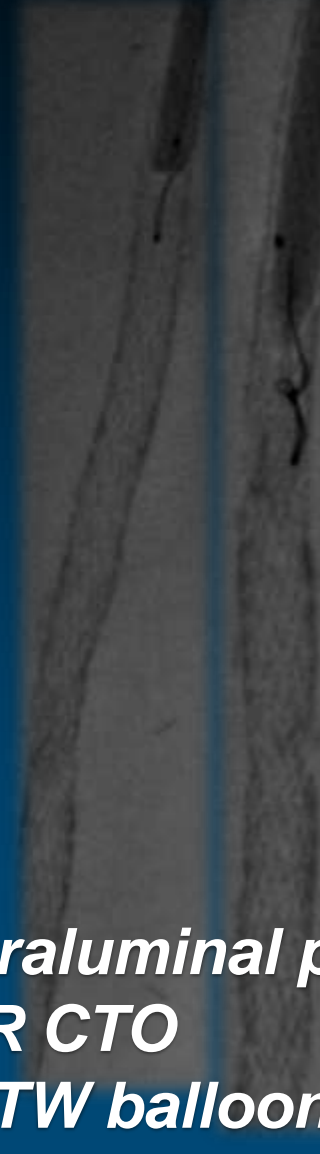
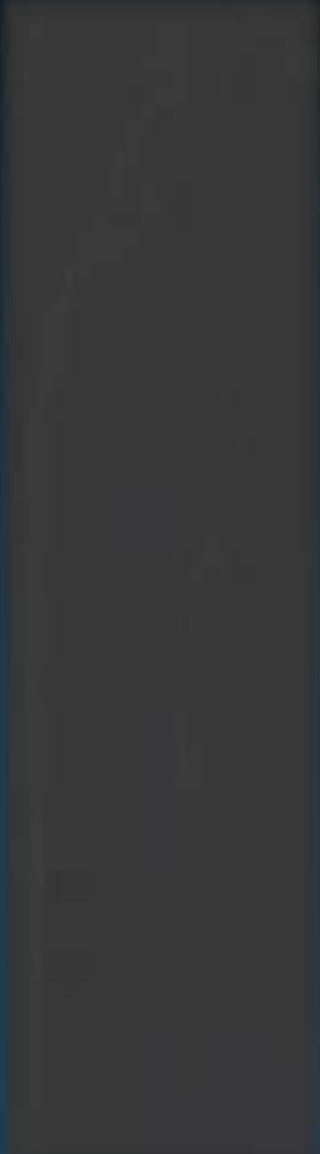
# ISR with Heavy Calcification

*M/85, DM, HTN, S/P CABG 17 YA*

*pSFA and dSFA stenting, 4 YA at the other hospital*



# ISR with Heavy Calcification



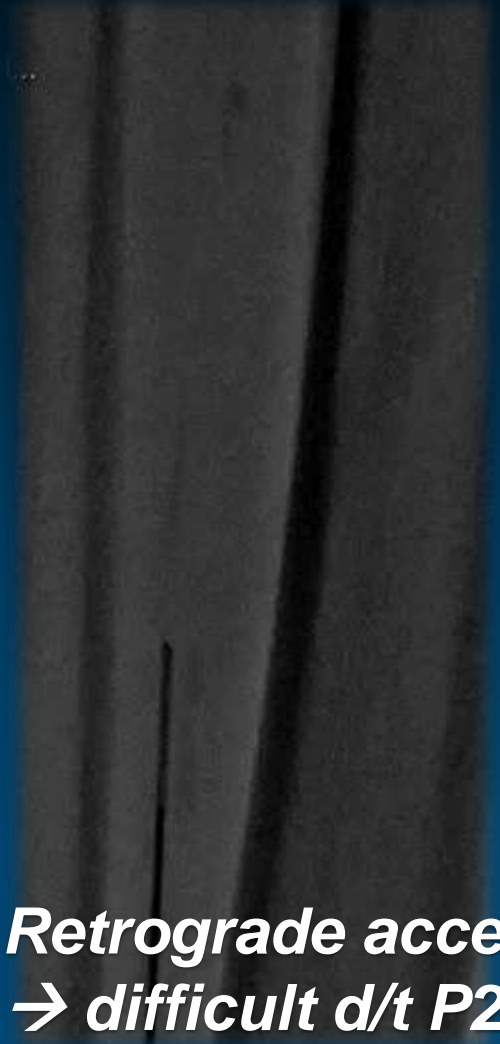
*Intraluminal passage of hard  
ISR CTO  
(OTW balloon + soft / hard GW)*

# ISR with Heavy Calcification

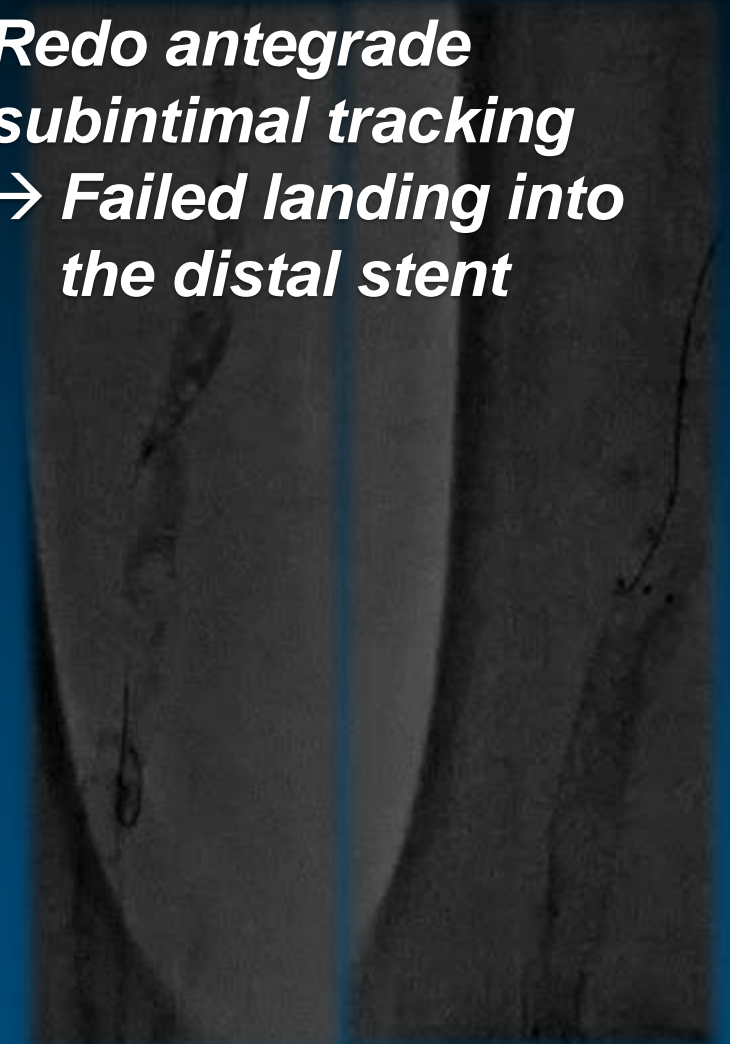
*Failed intraluminal  
→ Subintimal*



*Retrograde access from ATA  
→ difficult d/t P2 calcification*

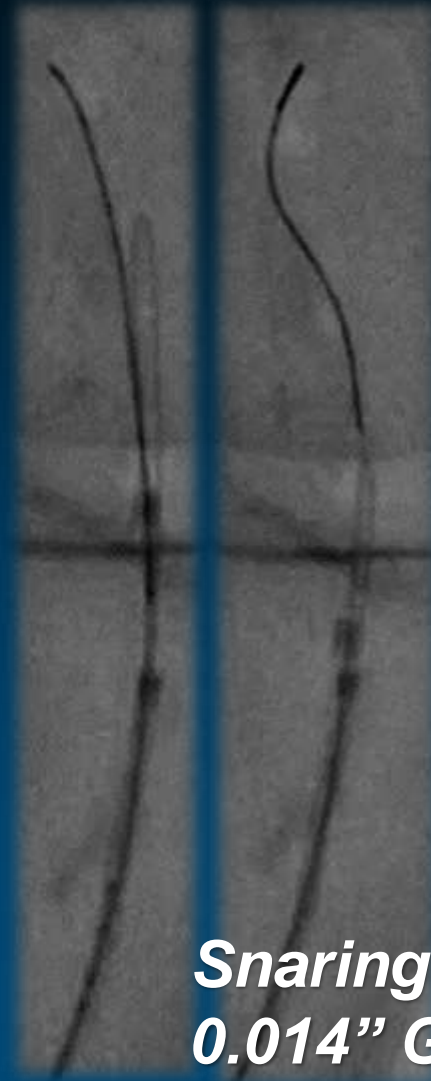


*Redo antegrade  
subintimal tracking  
→ Failed landing into  
the distal stent*



# ISR with Heavy Calcification

*Broken MP tip*



*Redo retrograde...  
4 Fr sheath + 4 Fr MP + Stiff Terumo*

*Snaring with bended  
0.014" GW*

# ISR with Heavy Calcification

*Balloon-expandable  
stenting for the  
undilatable  
subintimal path*

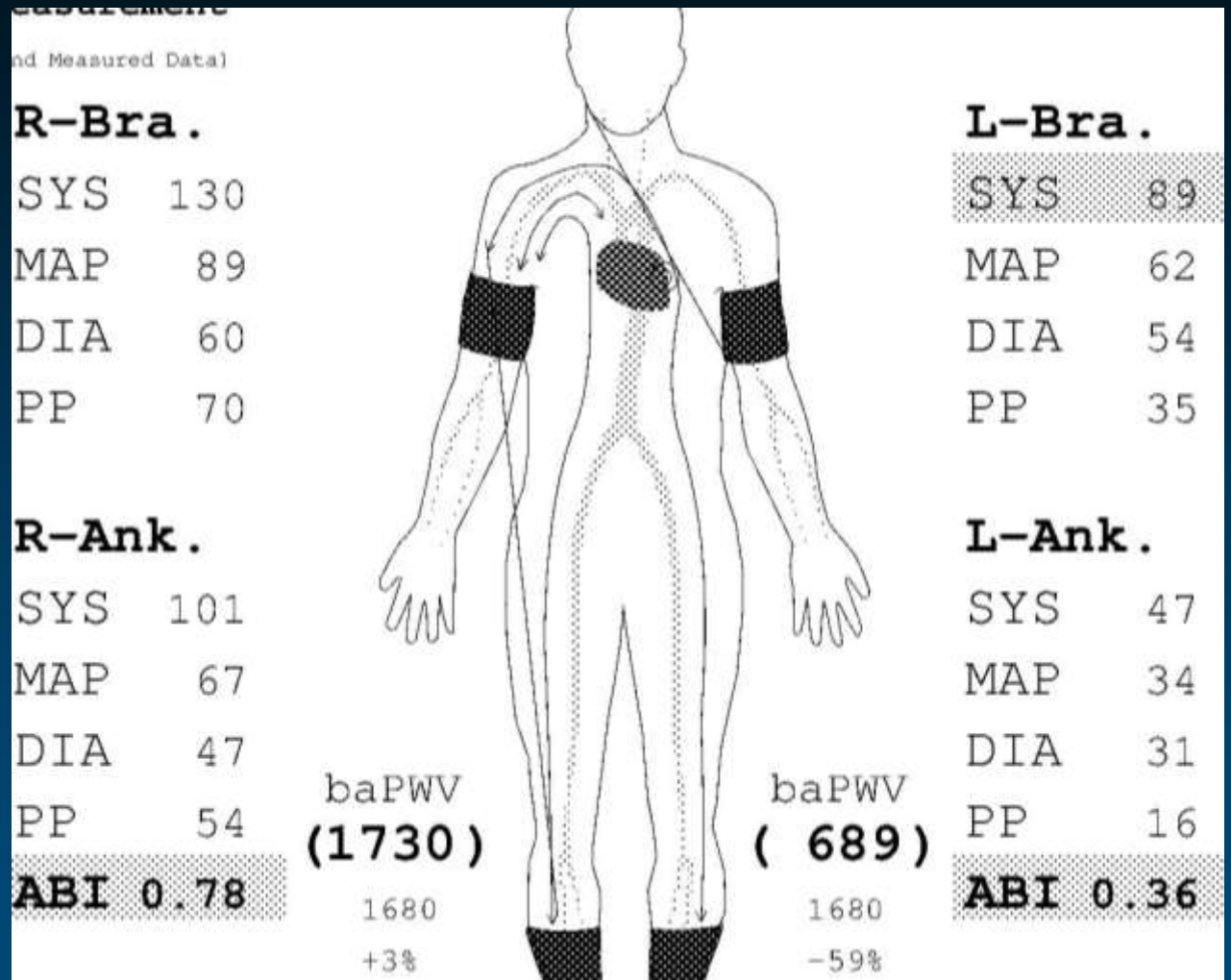
*Direct puncture  
for the stent*

*Redo retrograde  
subintimal tracking  
→ Failed landing into  
the distal stent*

*Retrograde subintimal tracking  
→ Antegrade GW landing to the distal stent*



# ISR with Heavy Calcification



# Devices used

- Back-up catheters (x5)  
5Fr MP x1, 4Fr JR x2,  
5Fr Glide x1 + 4Fr Glide x1
- Microcatheters (x4): CXI x2, CXC x1, Trailblazer x1
- Wires (x29)  
0.035 Terumo wire: Stiff Terumo x4, Angled-J x3,  
Angled x2, Strait x2,  
0.018 wires: V18 x1, Astato 30 gm x2  
0.014 wires: Regalia x6, Command ES x6,  
Astato 20 gm x2
- Balloon catheters (x10) .....

***7 hrs procedure, but bankrupt... T.T.***

# ISR with Heavy Calcification, at 2 months



***Successful limb salvage***

# Failed Device Delivery After GW Passage

## - Suggested solution -

### Augmented guide support

- Ipsilateral antegrade approach >>
- Bigger sheath
- Sheath advancement nearest the lesion
- Mother-child technique using a  
    **Guidezilla / Guideliner**
- Anchor wire / Buddy wire
- Bidirectional access (Retrograde)
  - Give better pushability
  - BADFORM technique

### Lesion Modification

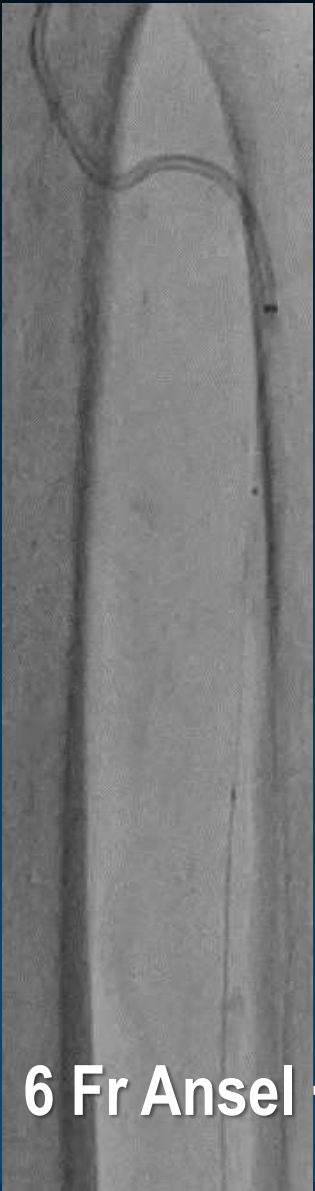
- Balloon assisted microdissection (BAM)  
with the most slender device
  - Armada XT OTW is my favorite
- Microcatheter (Corsair, Tornus...)
- External piercing
- Intentional balloon rupture
- Rotablation

# Focal calcified pATA CTO



Armada XT OTW  
1.5x20 mm  
→ Failed passage  
→ BAM, failed

A close-up grayscale image of a coronary artery. A white arrow points to a focal calcified pATA CTO, which is a localized area of calcification that has caused a chronic total occlusion of the artery. The surrounding artery lumen is visible, and the catheter's position is indicated by the arrow.



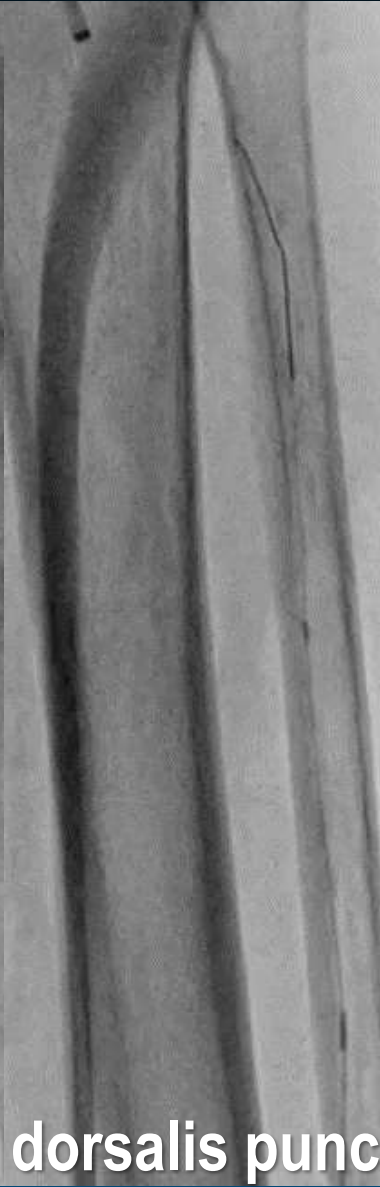
6 Fr Ansel + Guidezilla



+Corsair



Retrograde dorsalis puncture

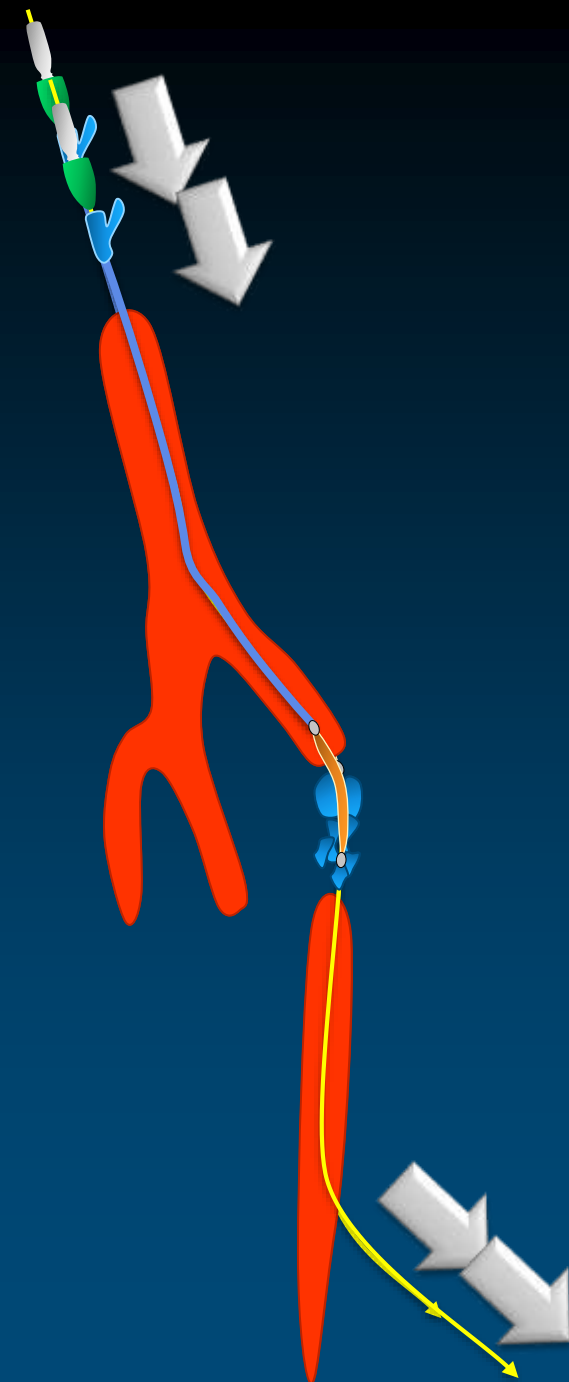


Armada XT OTW  
1.5x20 mm  
→ Failed passage

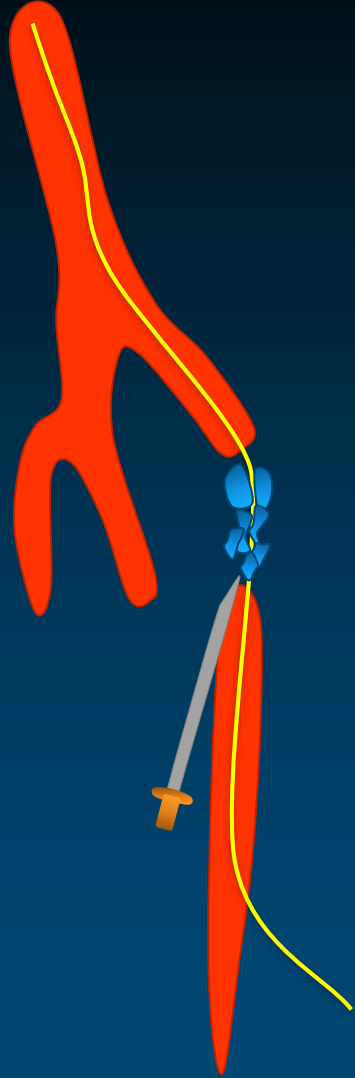
# Simultaneous advancement of both GW and balloons BADFORM (BALloon Dilatation using a FORcible Manner)

Remove friction between  
the wire and the balloon

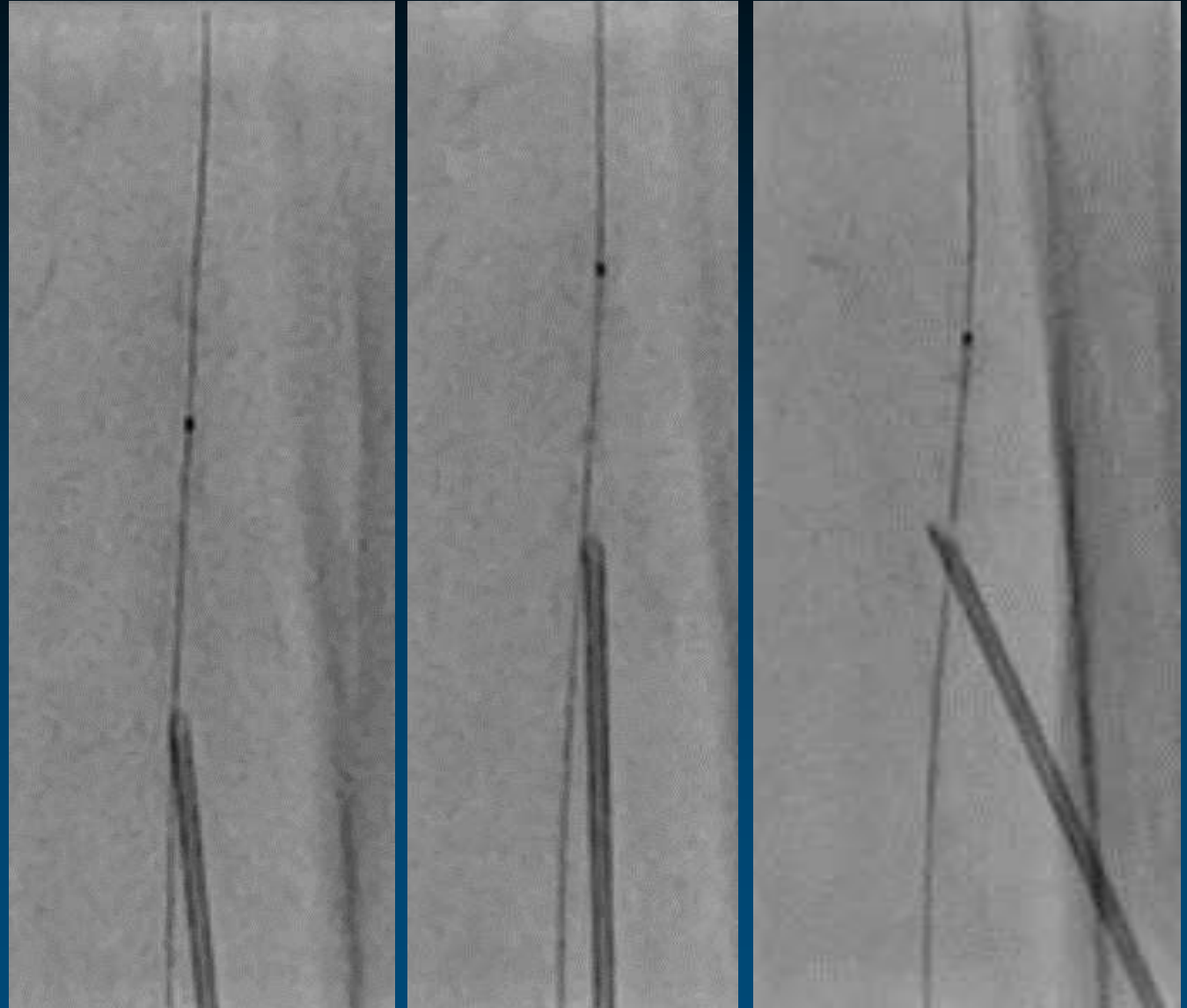
→ Easier delivery



# When all the efforts fail



**External piercing**





# Treatment Options for Complicated FP Disease

- Balloon PTA alone
- BMS
- Atherectomy
  - Directional / Rotational

- *Drug-coated balloons*
- *Atherectomy + DCB*
- *Interwoven nitinol stent*
- *Drug-coated stents*



**The main devices  
of these days**

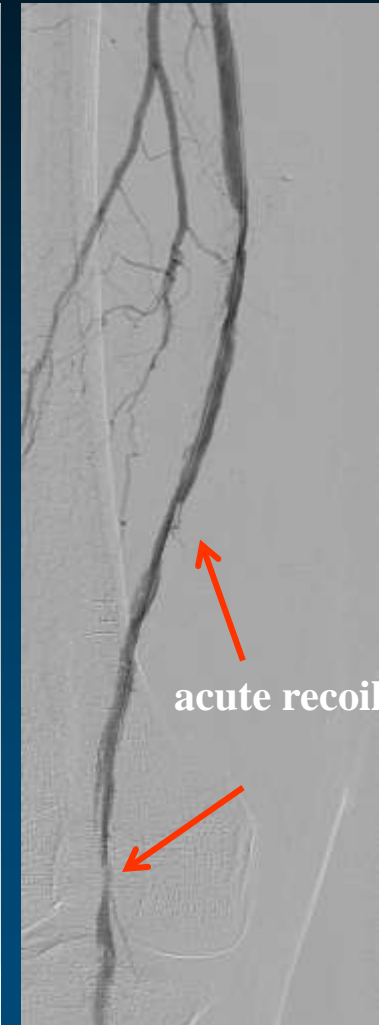
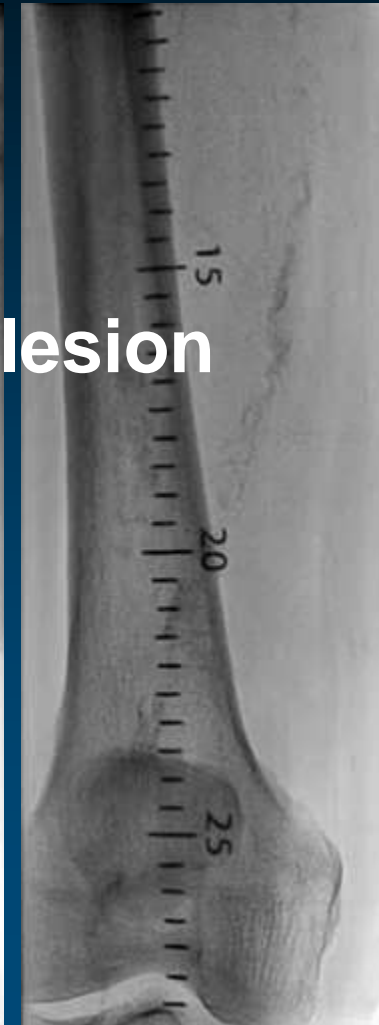
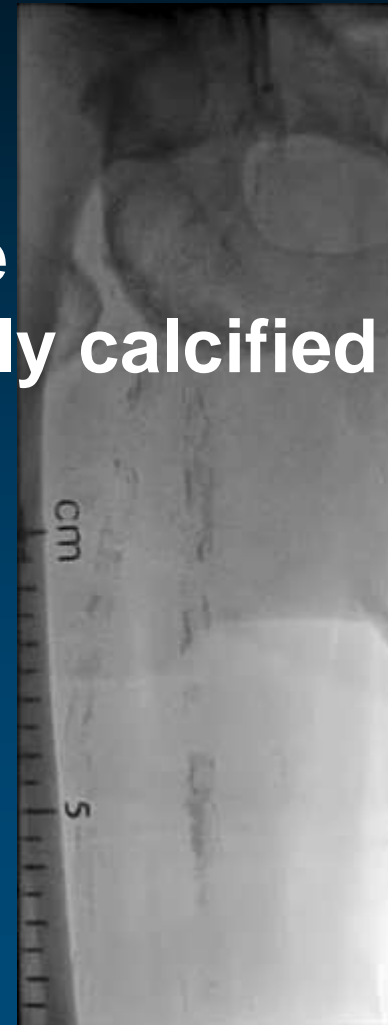
- Graft stent

.....

# Limitation of DEB for TASC II C/D FP Disease

## Just a balloon itself...

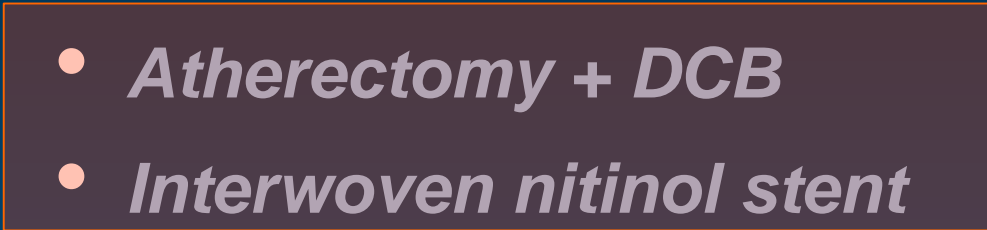
- Smaller lumen gain
- Elastic recoil
- Dissection and Acute closure
- Low drug efficiency for heavily calcified lesion



# Treatment Options for Complicated FP Disease

- Balloon PTA alone
- BMS
- Atherectomy
  - Directional / Rotational
- *Drug-coated balloons*
- *Atherectomy + DCB*
- *Interwoven nitinol stent*
- *Drug-coated stents*
- Graft stent

*Atherectomy + DCB*  
*Interwoven nitinol stent*



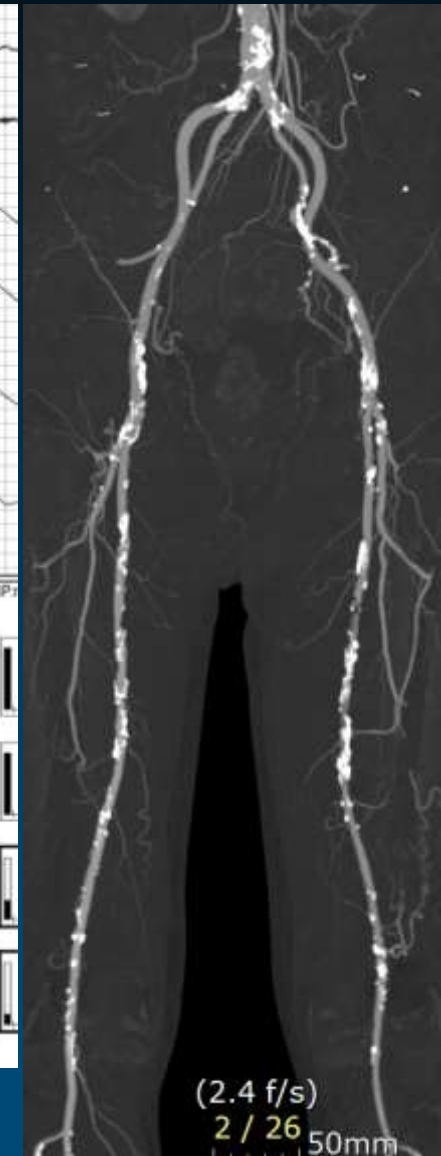
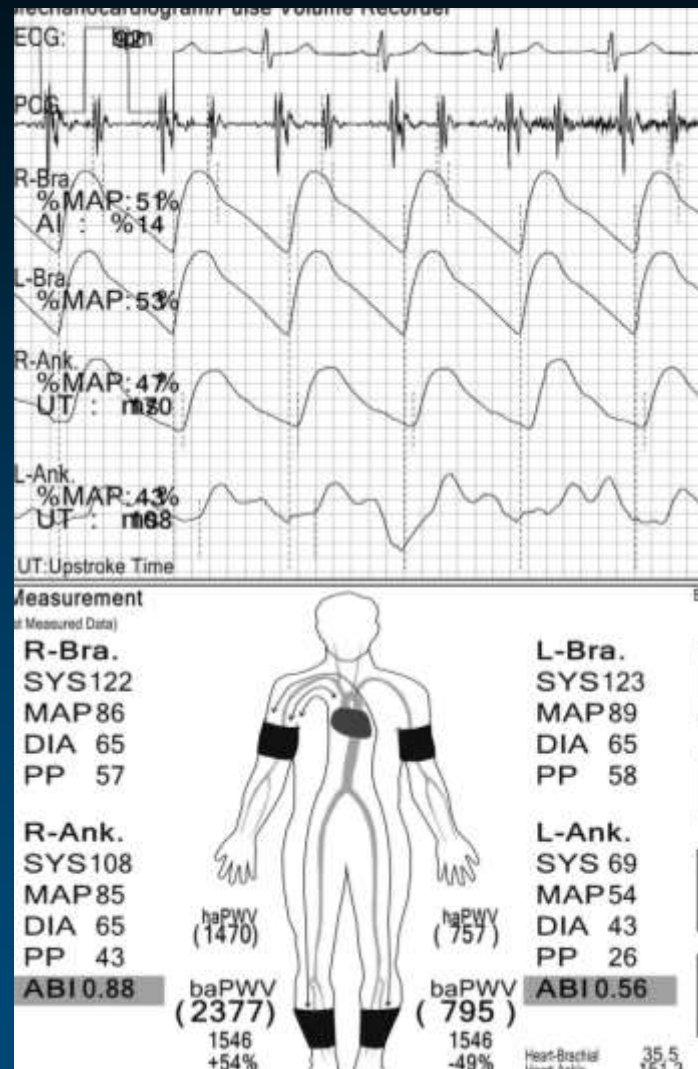
**The main devices  
for calcified lesion**

Atherectomy Requires  
Intraluminal GW passage

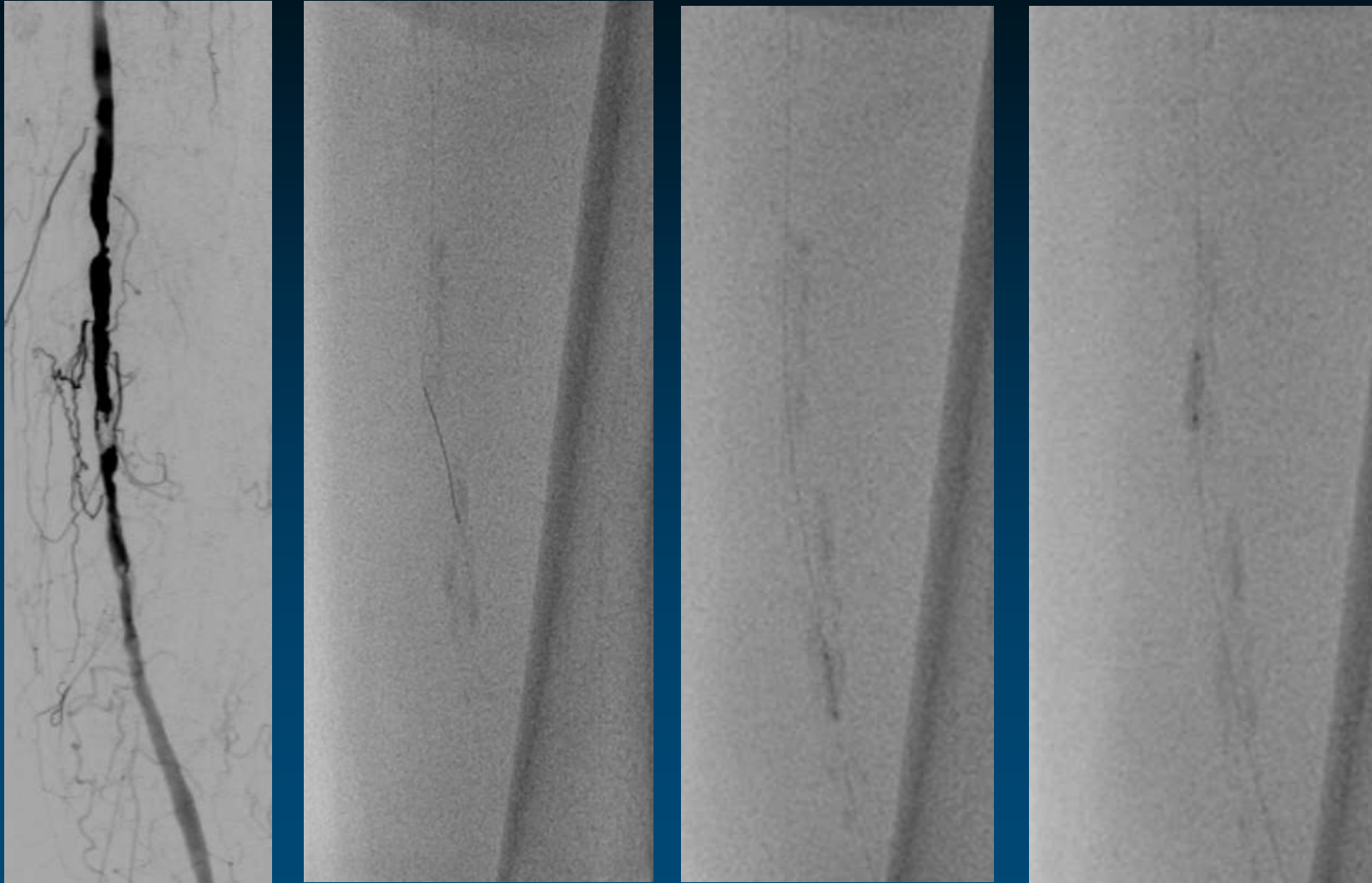
.....

# Case

- M / 76
- DM, HTN
- Left calf claudication,  
Rutherford 3
- 2VD  
→ medical treatment



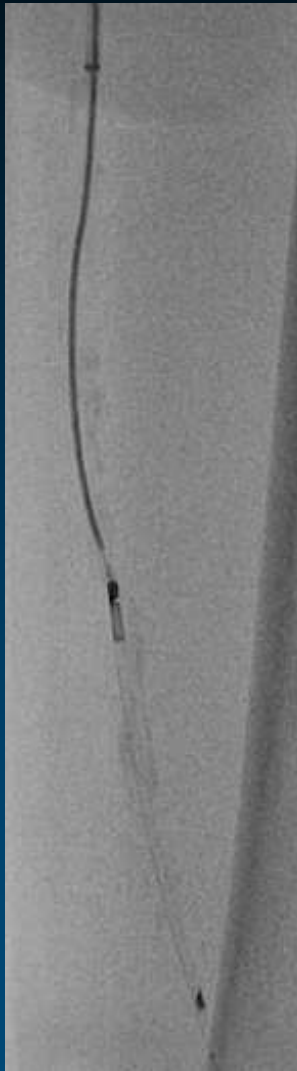
# mSFA calcific severe stenosis



**Calcified mSFA stenosis**

**3.0 mm balloon**

# DAART

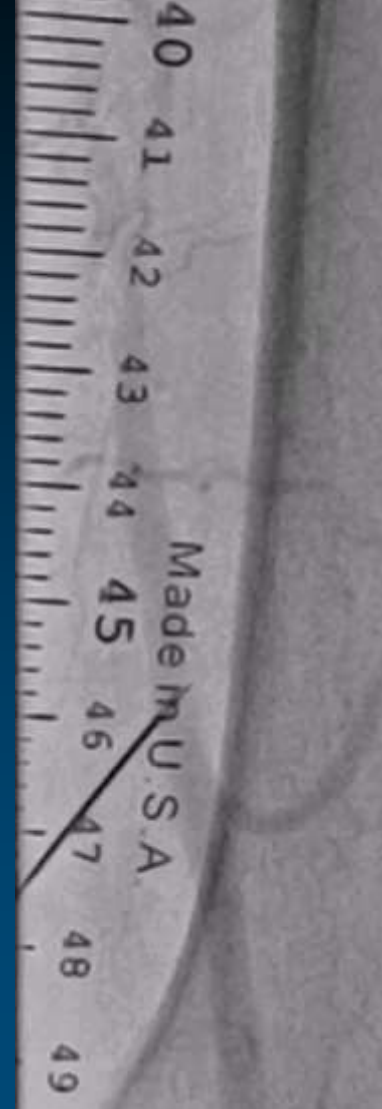
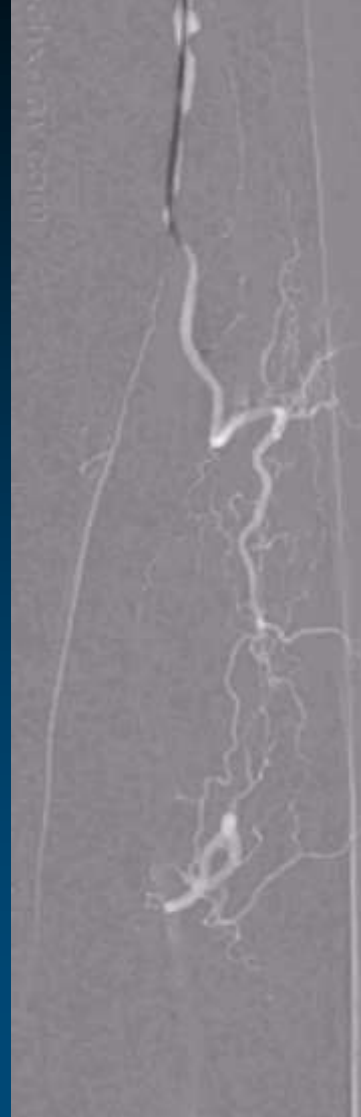
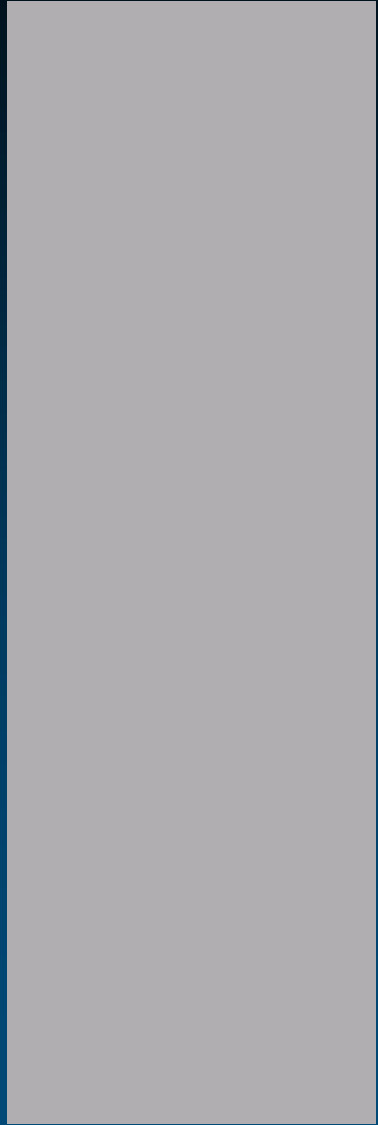


LX-C

5.0x150mm DCB

Final

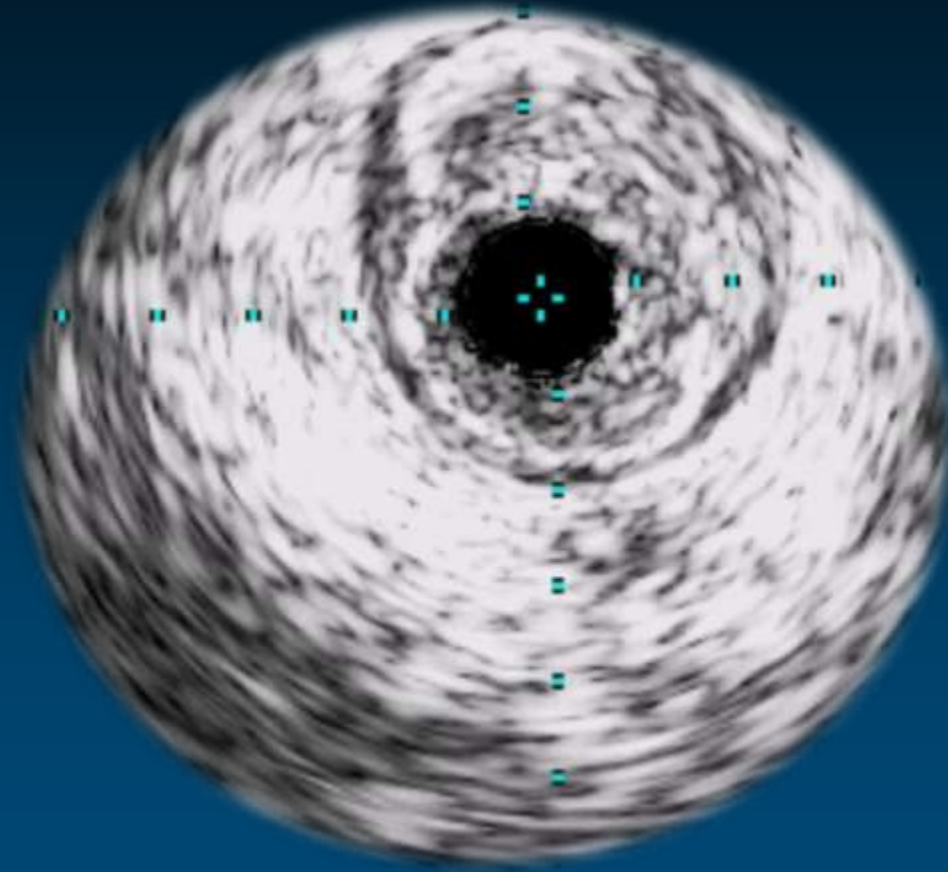
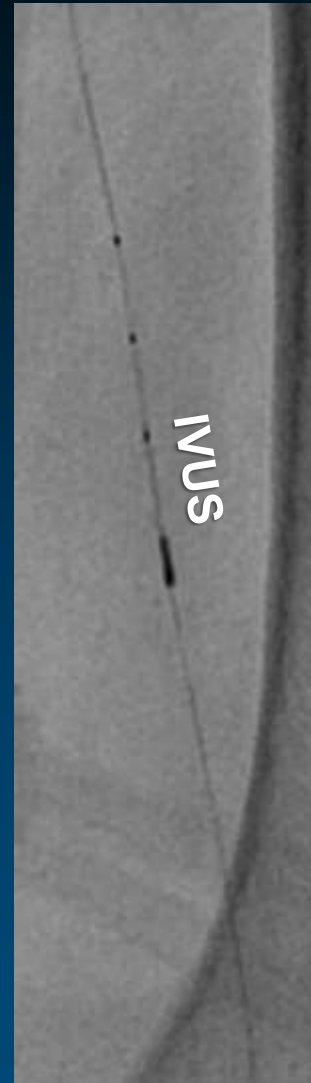
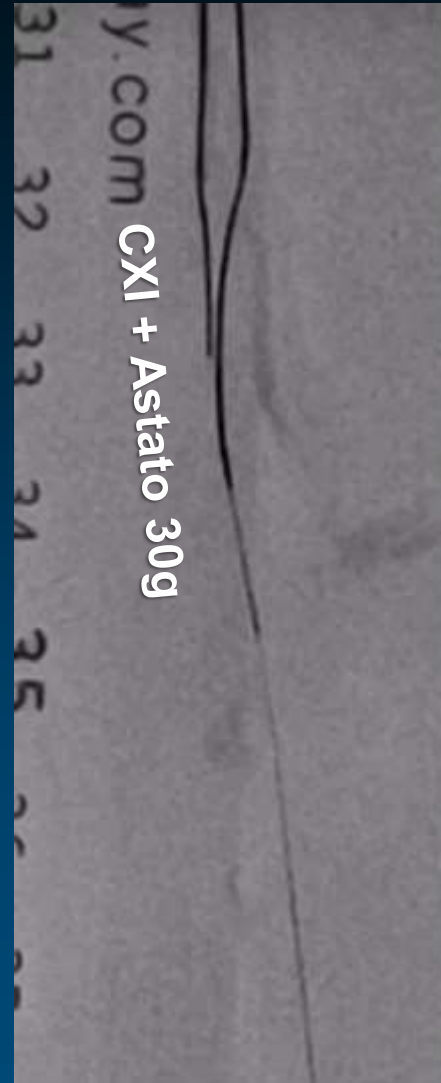
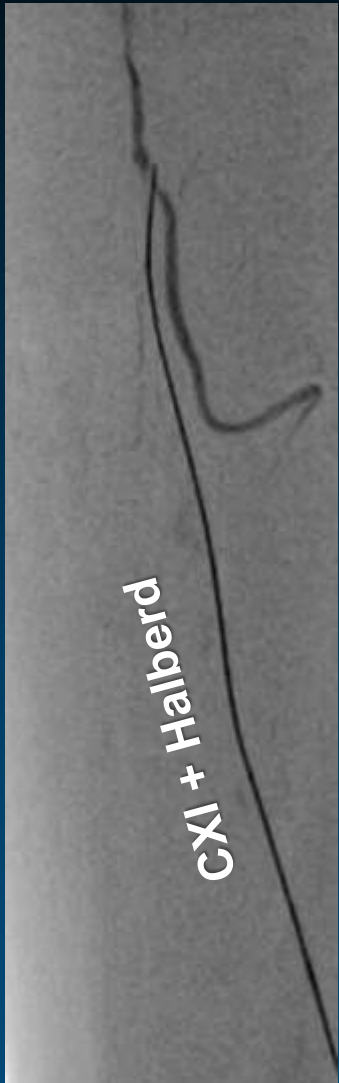
# 68/M, ESRD on HD, Rutherford 3 claudication Calcified SFA CTO



Long calcified SFA CTO → RAART planned

Failed proximal cap digging → Retrograde

# Bidirectional Approach → Failed Intraluminal Passage



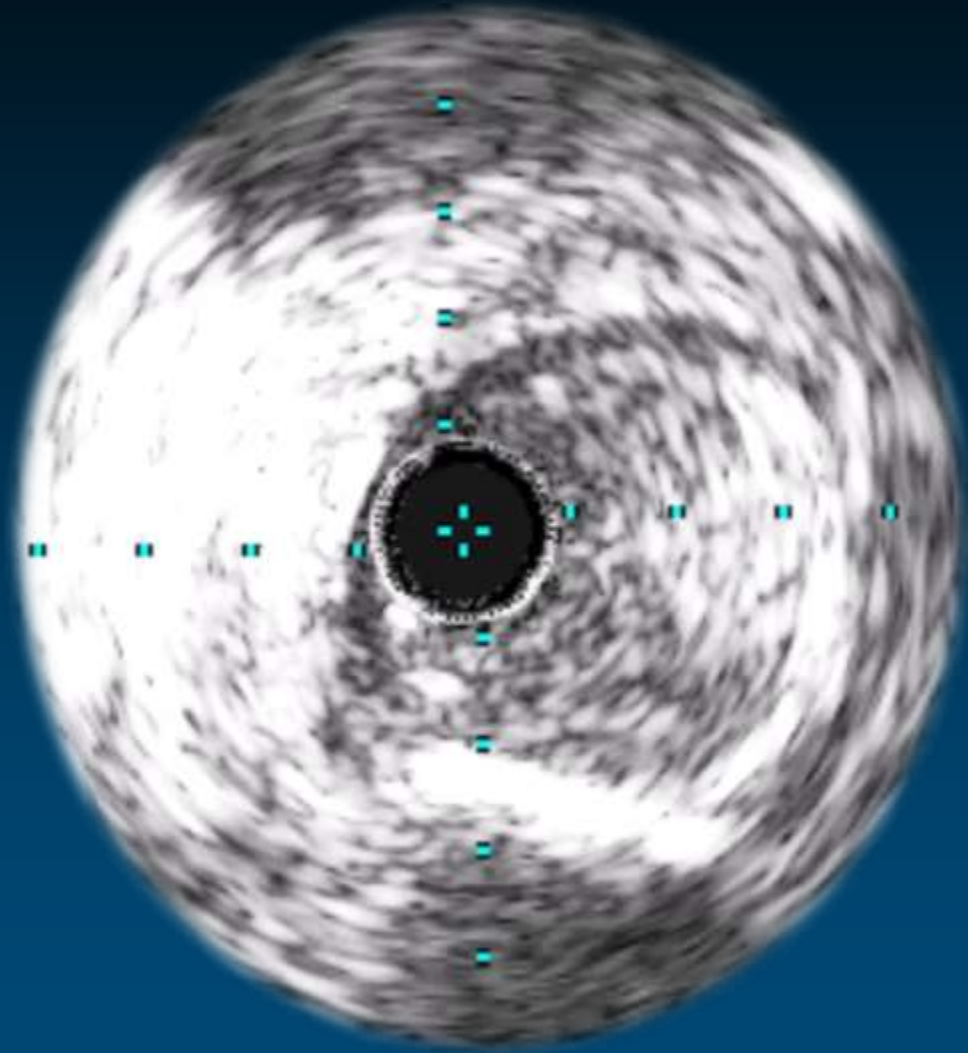
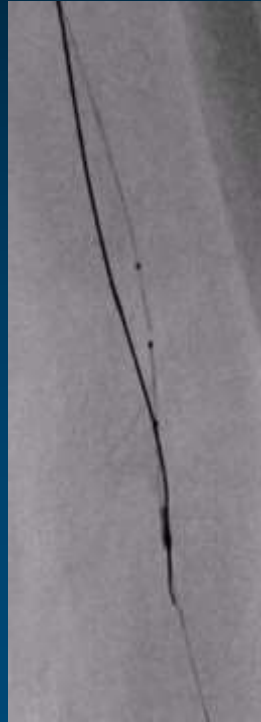
Bidirectional GW passage → 1.5 mm balloon → IVUS → Subintimal passage confirmed



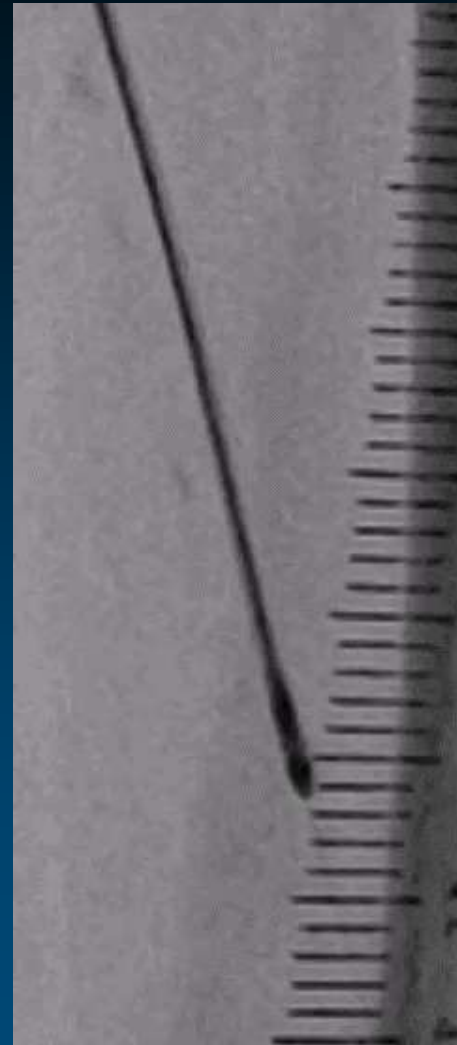
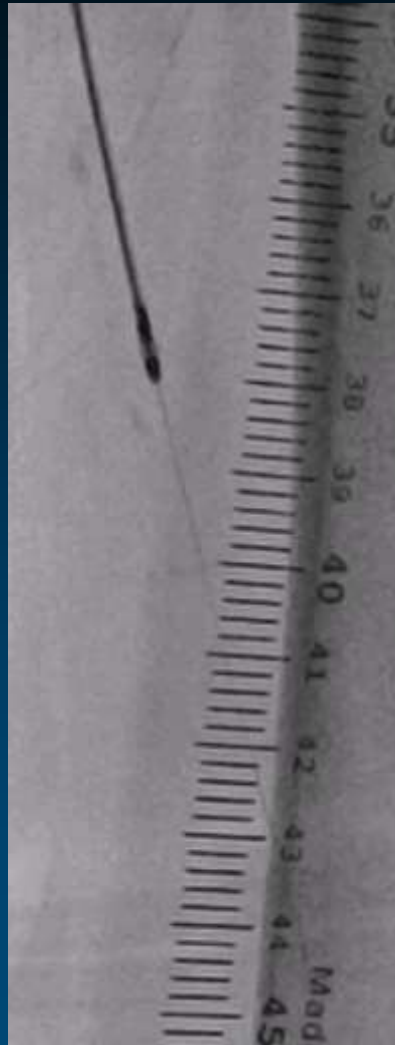
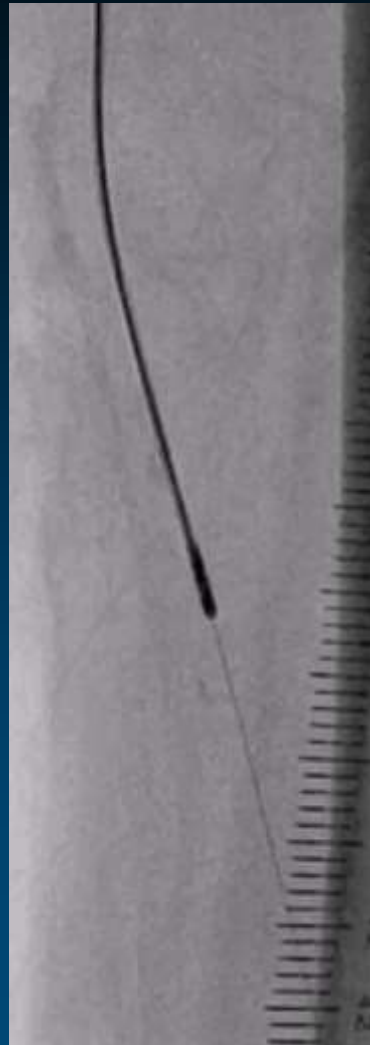
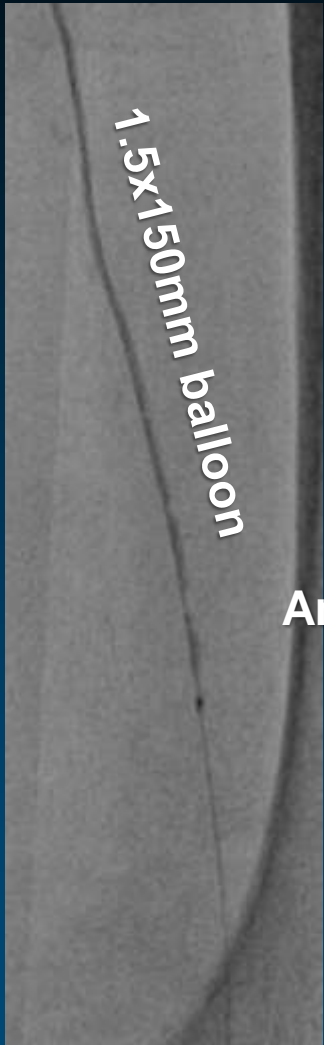
# IVUS-assisted Redirection of Guidewire



0.014" Command + IVUS  
CXI + 0.018" Astato 30g

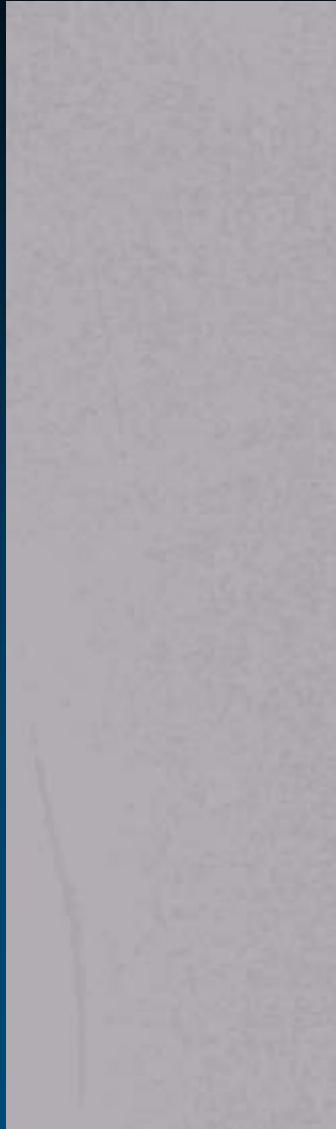


# RAART with 2.4/3.4 mm Jetstream Device



Sticky burr, BD → Repeat until free motion → BU → Final exit (BD → BU)

# DCB Angioplasty & Final Result



After balloon angioplasty



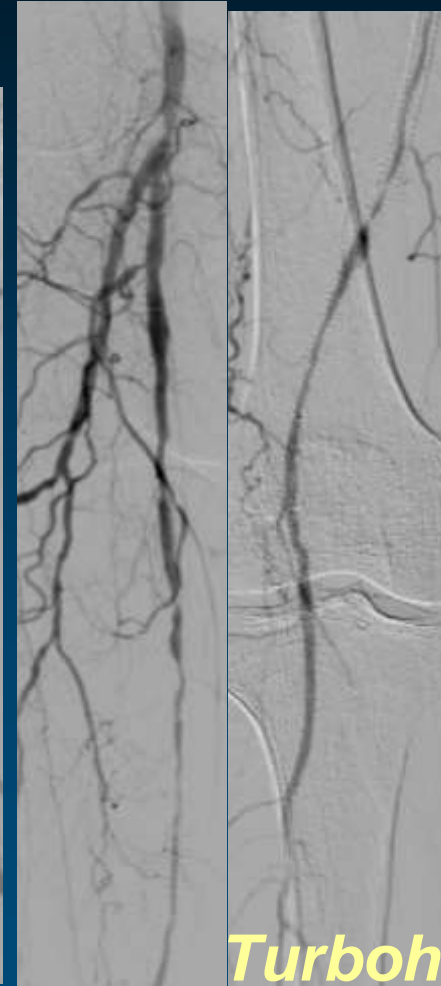
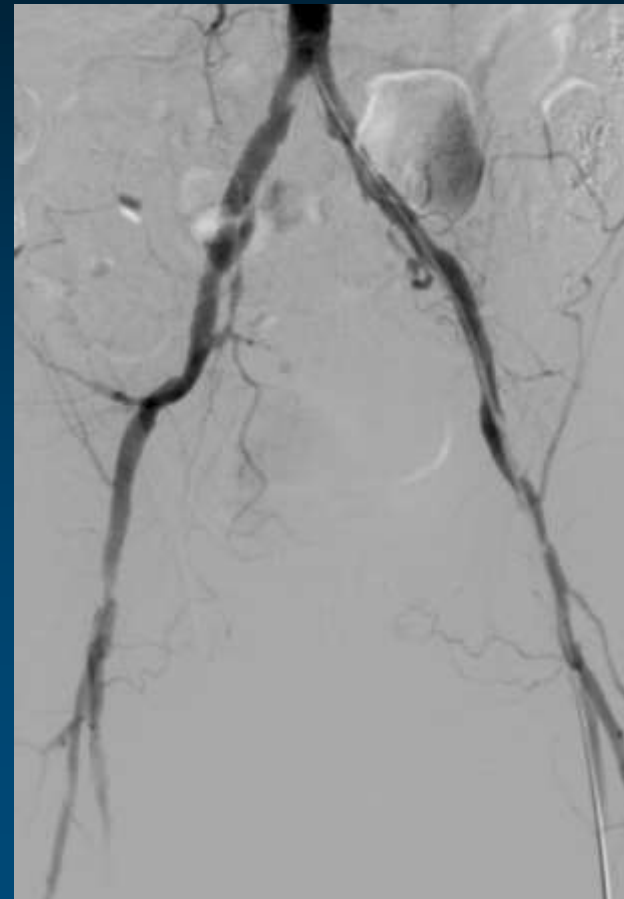
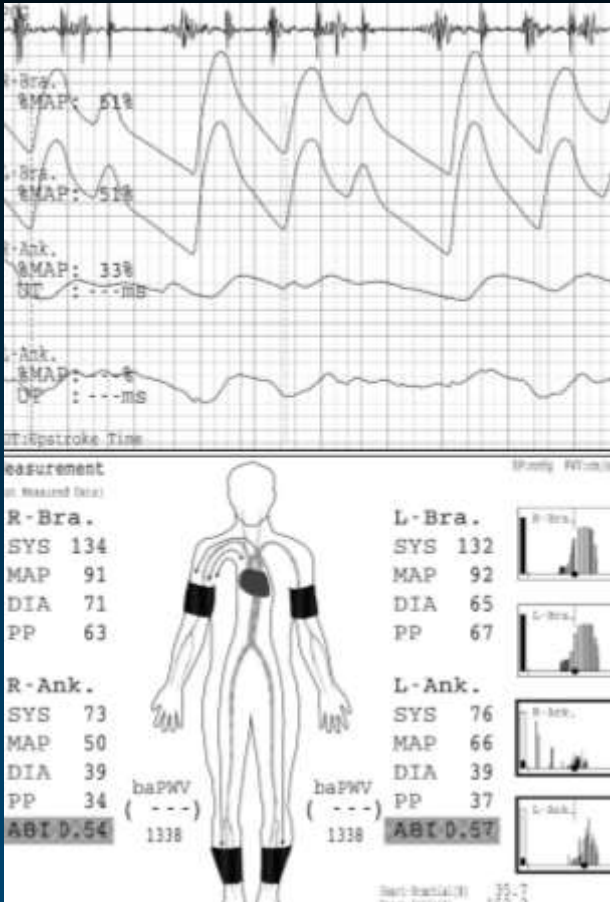
Final

# In-Stent Restenosis

M/69, DM

Both L/E CLI & Claudication, Rutherford 5 / 3  
S/P both SFA long stenting, 3 YA

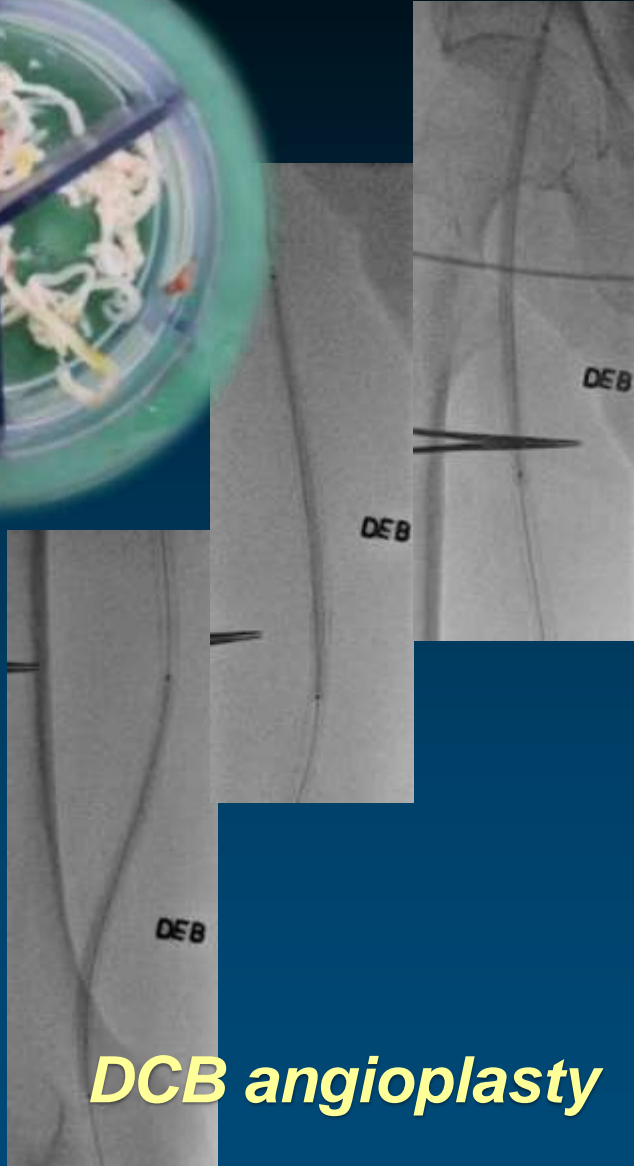
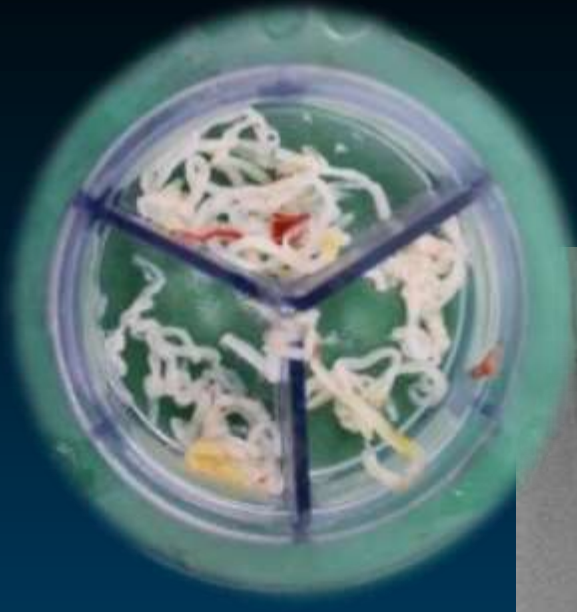
→ 6 sessions of repeat intervention  
(other hospital)



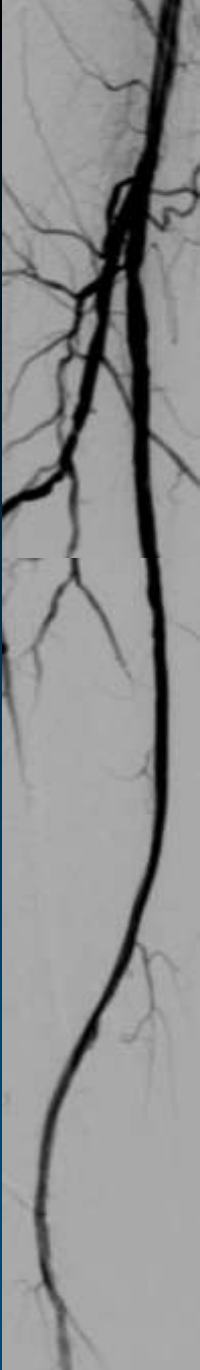
**Turbohawk Artherectomy**



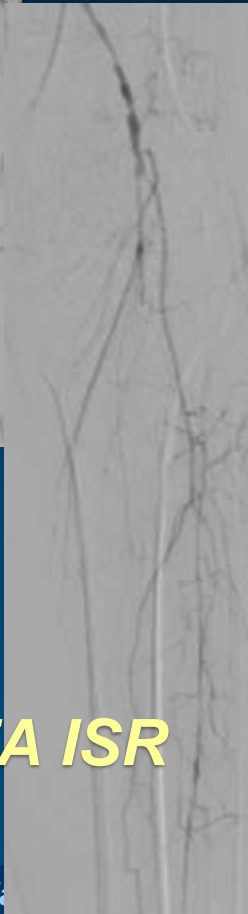
**After directional  
atherectomy**



**DCB angioplasty**



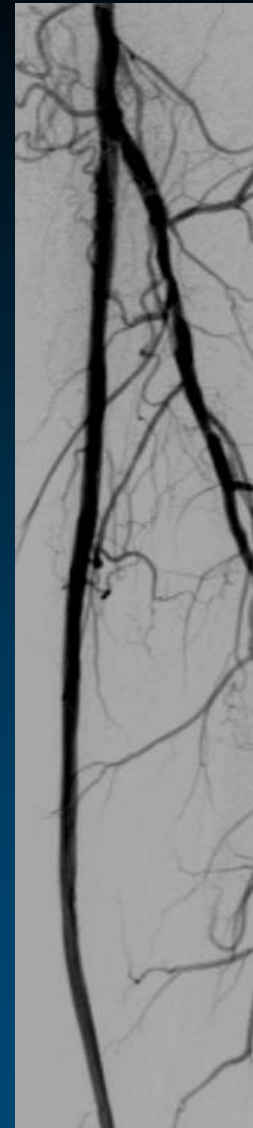
**Final**



**Left SFA ISR**



**Turbohawk atherectomy  
& DCB angioplasty**



**Final**

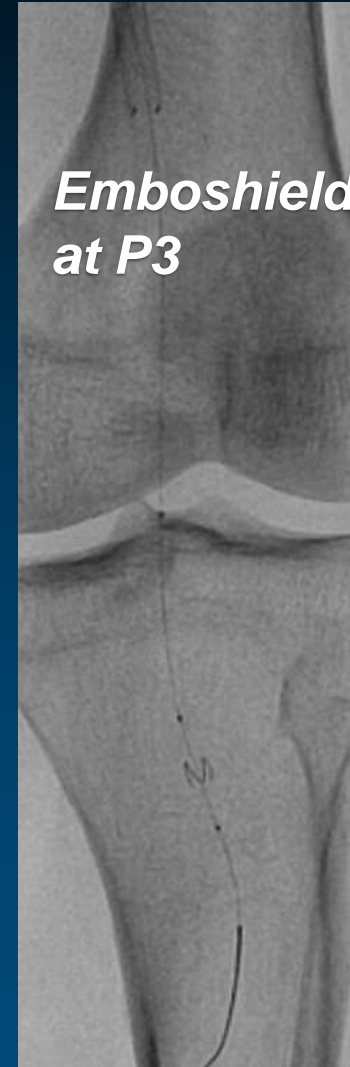
# Recurred claudication at 3 years ABI 0.78/0.95



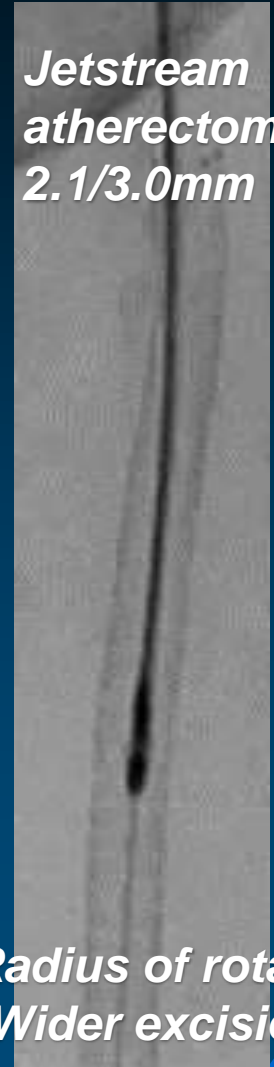
*Contralateral approach  
7 Fr Ansel sheath*



*Rotational  
angiogram  
to confirm  
GW entry*



*Emboshield  
at P3*



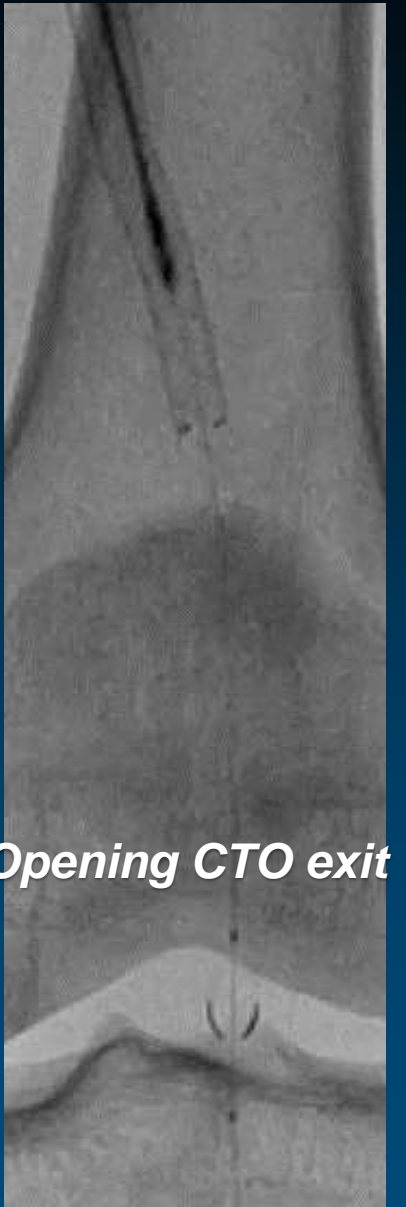
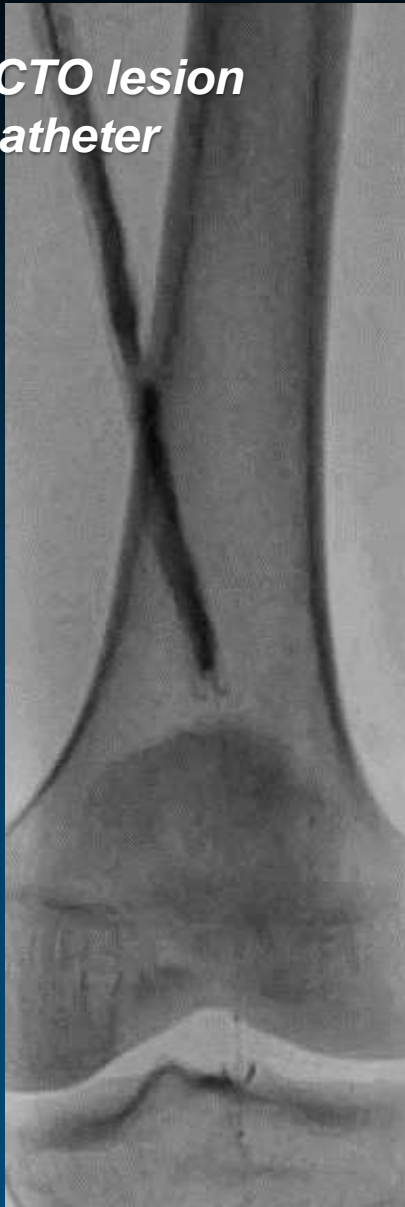
*Jetstream  
atherectomy  
2.1/3.0mm*

*↑ Radius of rotation  
→ Wider excision*

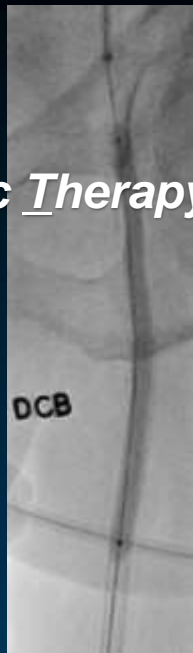


*No reflow after Jetstream,  
Mechanism?*

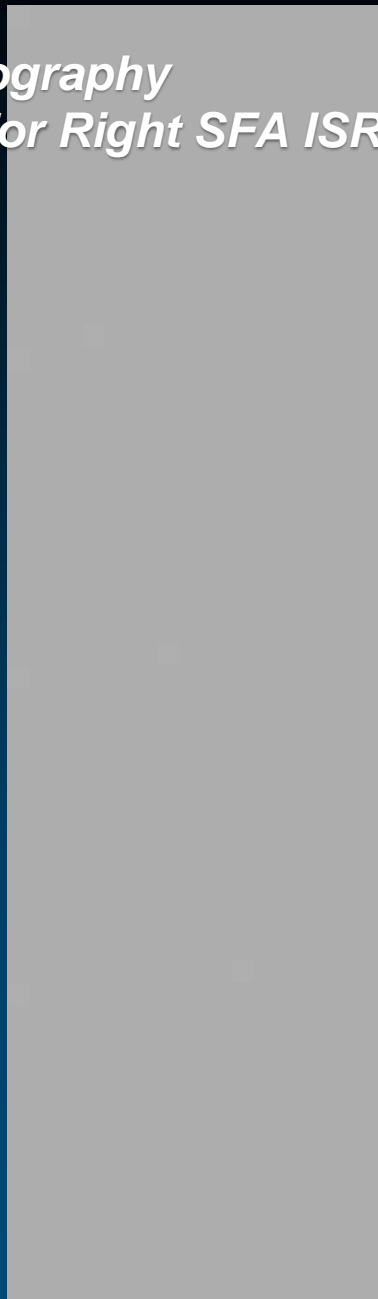
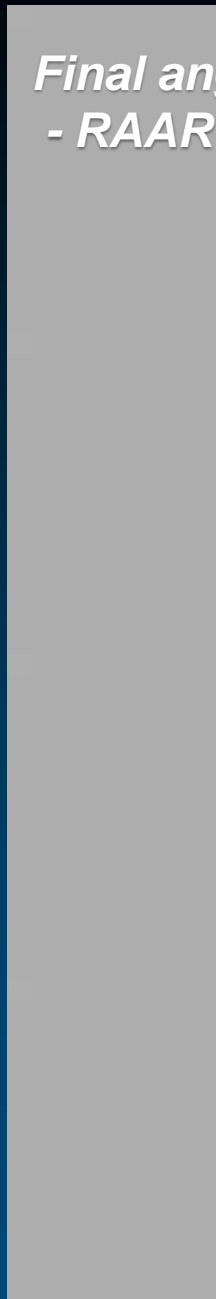
*Injection in the CTO lesion  
with a suction catheter*



**DCB angioplasty  
(ART; AntiRestenotic Therapy)**



**Final angiography  
- RAART for Right SFA ISR CTO**

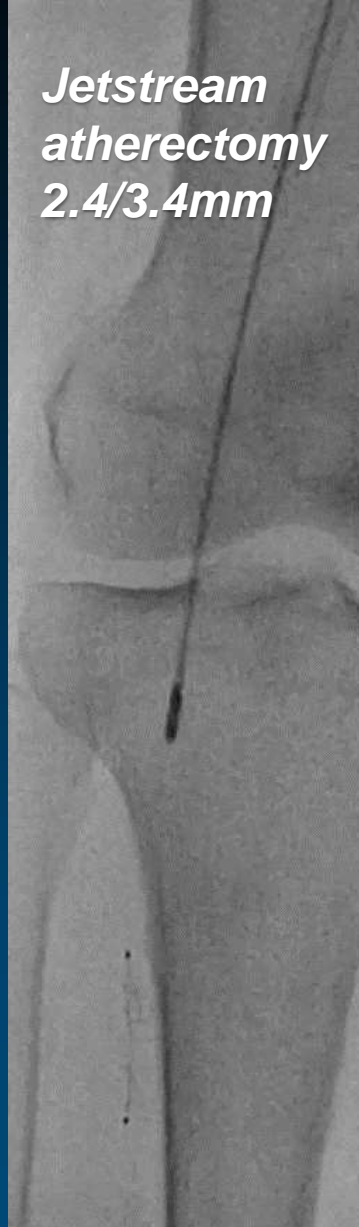


**After Jetstream  
atherectomy**

*Right SFA ISR CTO  
Ipsilateral antegrade approach  
7 Fr sheath*



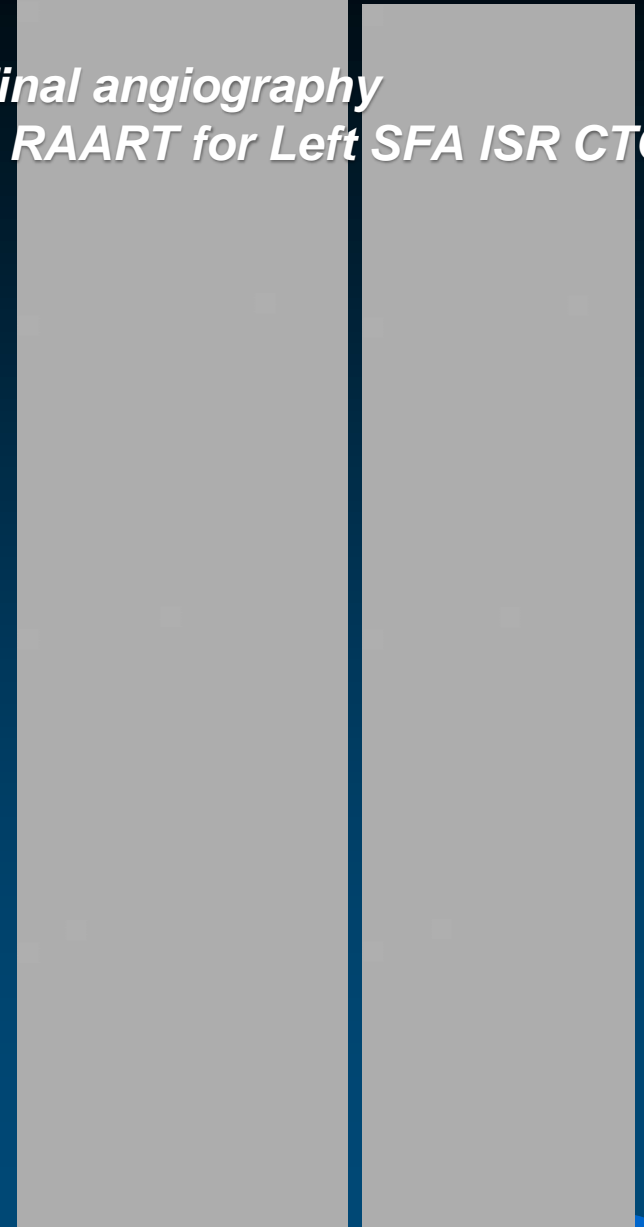
*Jetstream  
atherectomy  
2.4/3.4mm*



*Fully filled  
Emboshield*

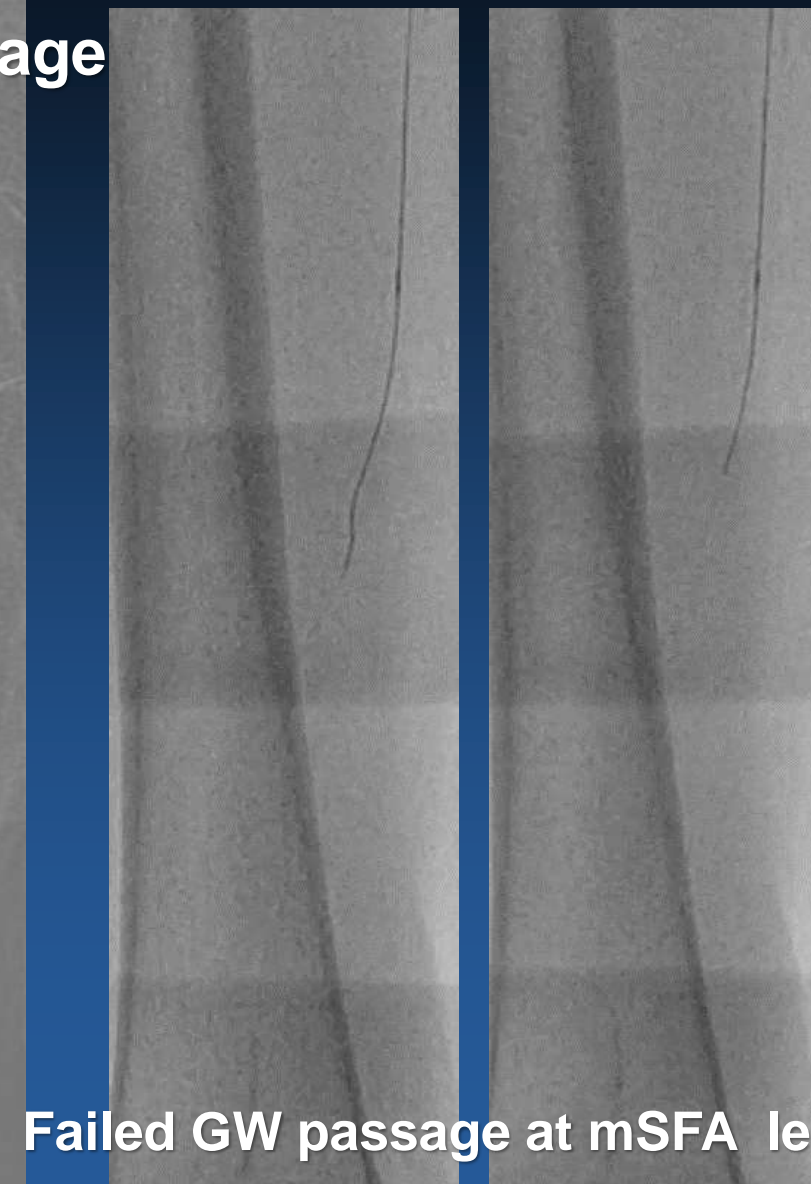


*Final angiography  
- RAART for Left SFA ISR CTO*



# 85/F, Resting claudication

Intraluminal guide wire passage

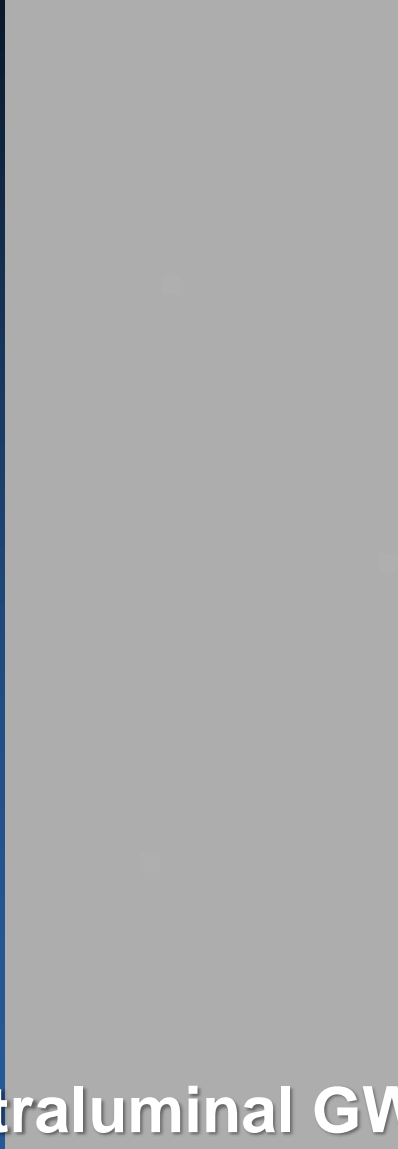
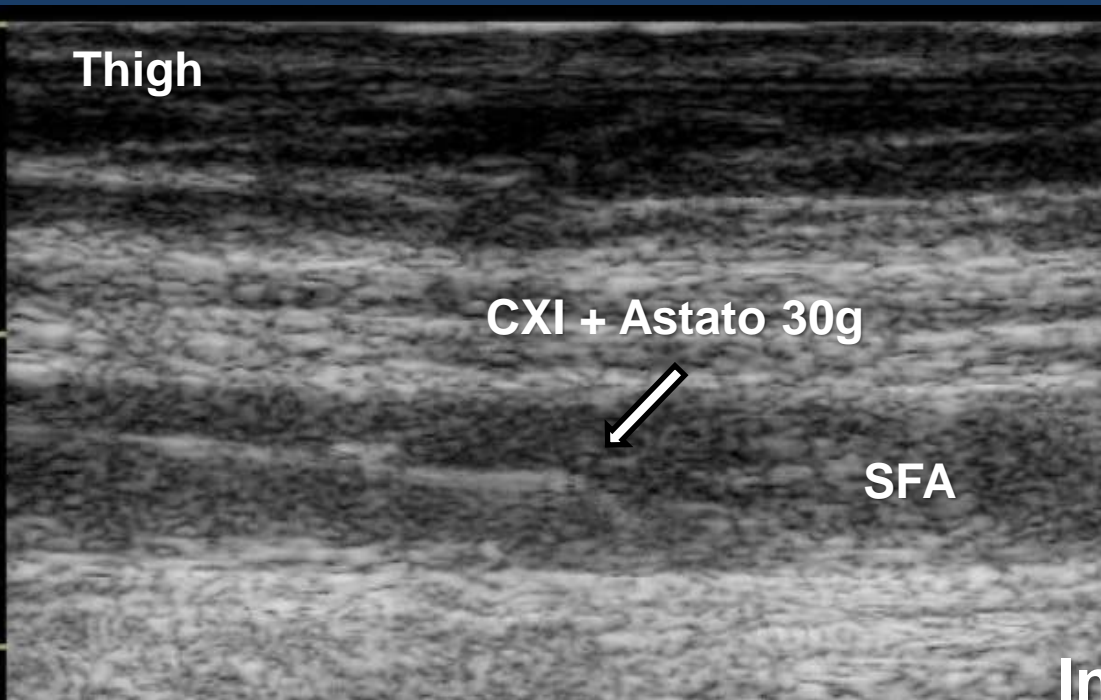
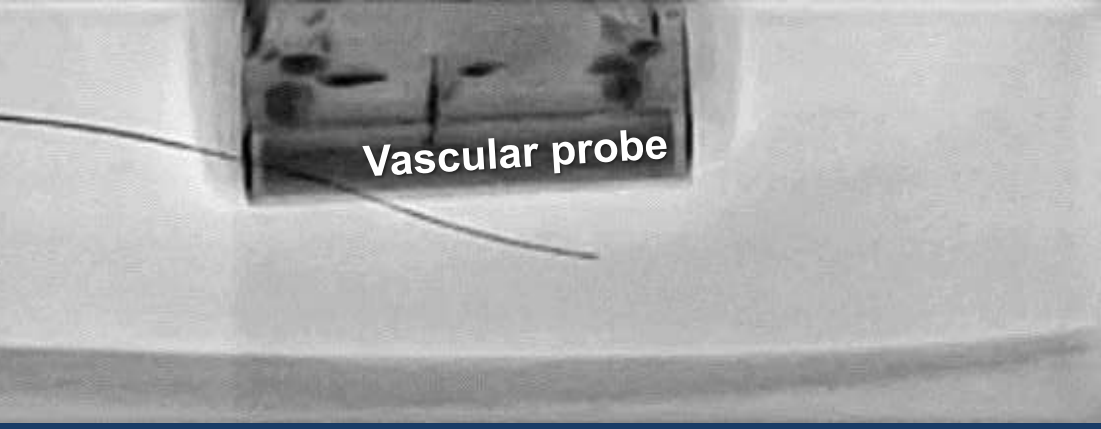


SFA

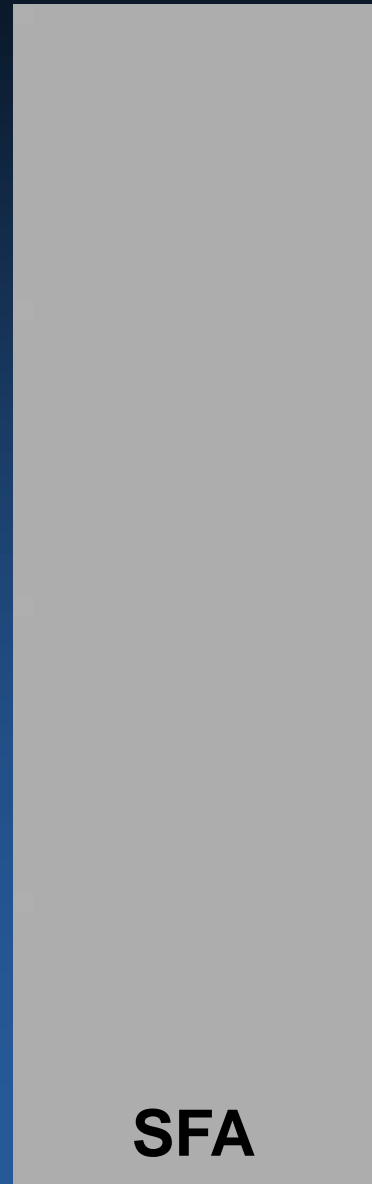
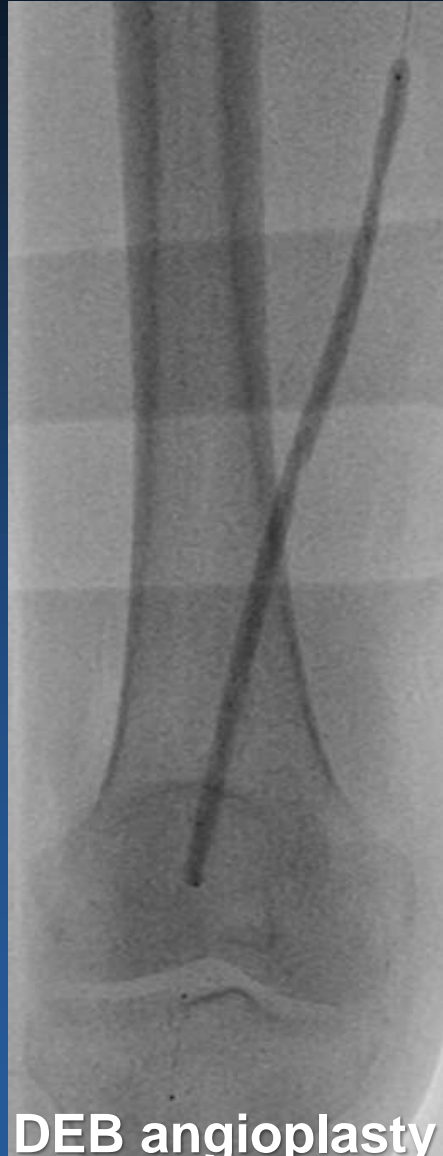
Pop and BTK

Failed GW passage at mSFA level

# USG-guided Intraluminal wiring



# *Jetstream Atherectomy and DEB Angioplasty*



# Wire Crossing Strategy For Heavily Calcified Femoropopliteal CTO

## 1. Intraluminal Approach

Conventional wire – wire escalation up to Astato 30g

New intraluminal device – Crosser, Truepath ...

**Bidirectional approach by retrograde puncture**

## 2. Subintimal Approach

Reentry with guidewire – loop method, harder GW

Dedicated reentry device – Outback, Pioneer

**Bidirectional approach by retrograde puncture**

# My Favorable Wire Crossing Strategy For Heavily Calcified Femoropopliteal CTO

## 1. Intraluminal Approach

Conventional wire – wire escalation up to Astato 30g

*\*IVUS-assisted parallel wire technique*

*\*Surface ultrasound-guided intraluminal access*

Bidirectional approach by retrograde puncture

To accomplish atherectomy and DCB angioplasty

AART (Atherectomy + Anti-Restenotic Therapy)

## 2. Subintimal Approach

**Late option** for ugly Ca<sup>++</sup>, failed intraluminal, poor condition





***AART for Calcified CTO  
Better Results with Nothing Behind !!  
Thanks for the Time***