

# DÉCLARATION DE LIENS D'INTÉRÊT AVEC LA PRÉSENTATION

**Intervenant : Jean-Marc PERNES, Antony**

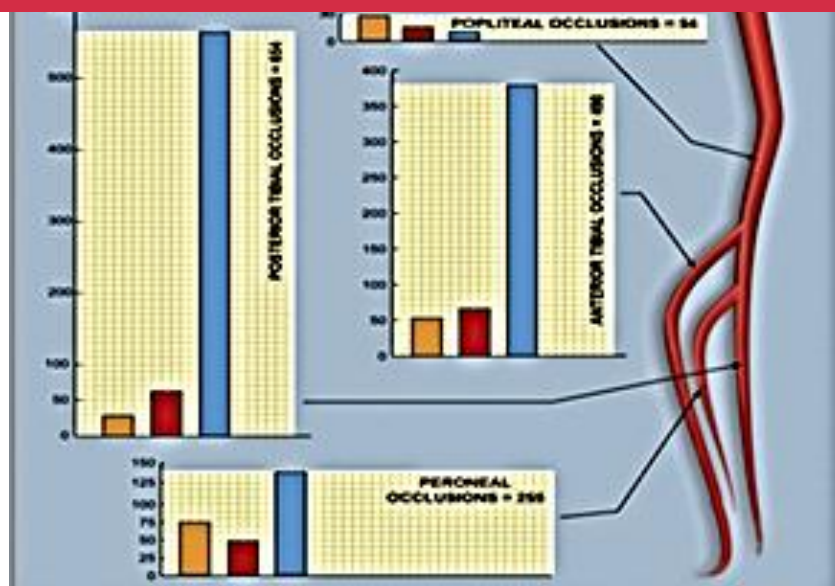
Je n'ai pas de lien d'intérêt à déclarer



# CTO OF BTK: C'est pas sorcier.... Hum..un peu quand même !!!

POTENTIEL DE LA METHODE EV:

LIE AU DEFI TECHNIQUE DE LA RECANALISATION



Vascular involvement in diabetic subjects with ischemic foot ulcer: morphologic categorization of disease severity.

Graziani et al. Eur J Vasc Endovasc Surg 2007;33:453.

**417 diabetics with CLI-2893 lesions**

74% were in the BTK arteries

66% of BTK lesions were occlusions

50% of occlusions were >10cm

# STRATEGIE:

**ANTEGRADE INTRALUMINALE de 1<sup>ère</sup> INTENTION :**

**...+/- OBSESSIONNELLE..**

**ESCALADE DES GUIDES**

## Strategies of BTK crossing

### 1. Antegrade approach

#### 1-1: Intraluminal approach

• Japanese art: 0.014-inch GW

Appropriate GW for BTK

**0.014** or **0.018** or **0.035**  
Japan Euro Not suitable for BTK

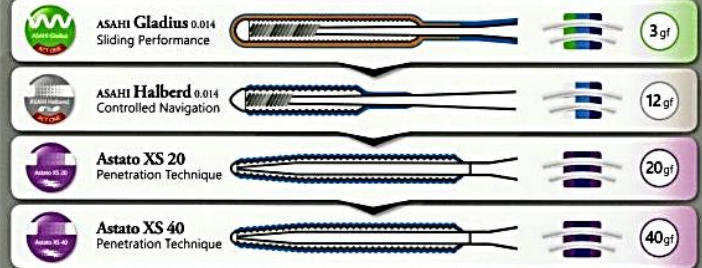
State of art  
Japanese technique with 0.014 GW

Antegrade intraluminal approach

Intraluminal  
=  
circumferential  
treatment

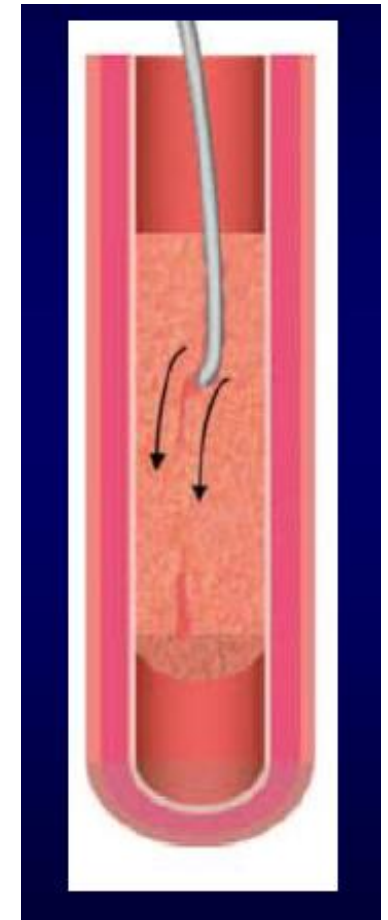
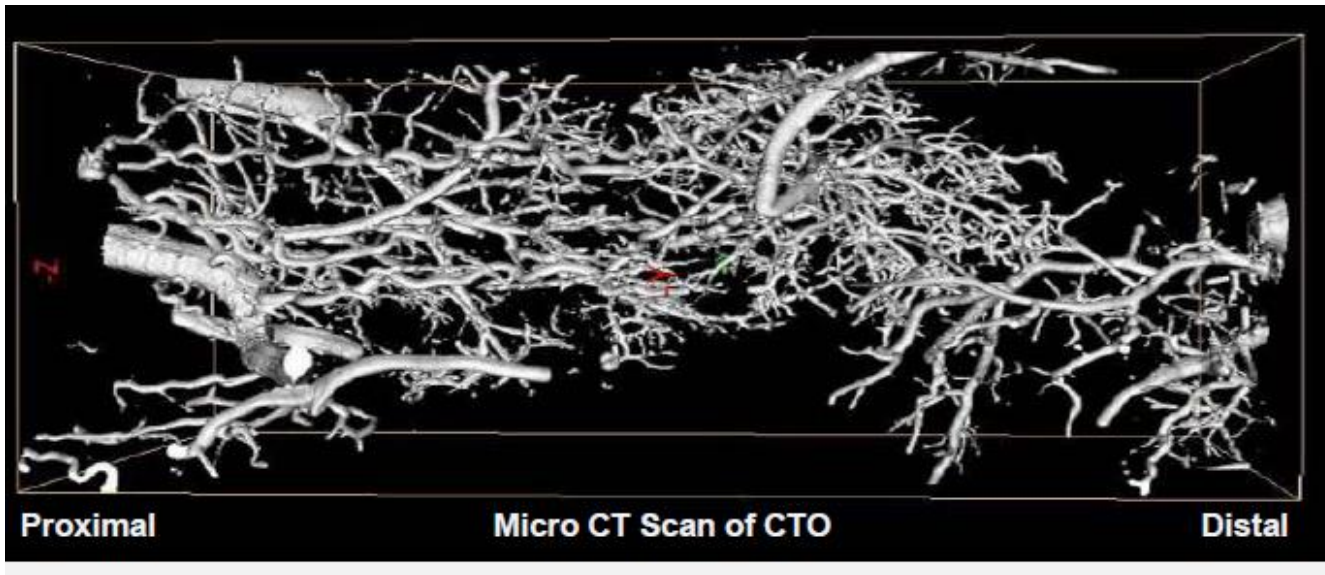


0.36mm (0.014") Antegrade



# SLIDING TECHNIQUE

- IDEALE POUR LES OCCLUSIONS « MOLLES »
- GUIDES EFFILES et PEU ANGULES POUR TROUVER LES MICRO CHENAUX DE REVASCULARISATION



**GUIDES POLYMERIQUES HYDROPHILES, lubrification++++**

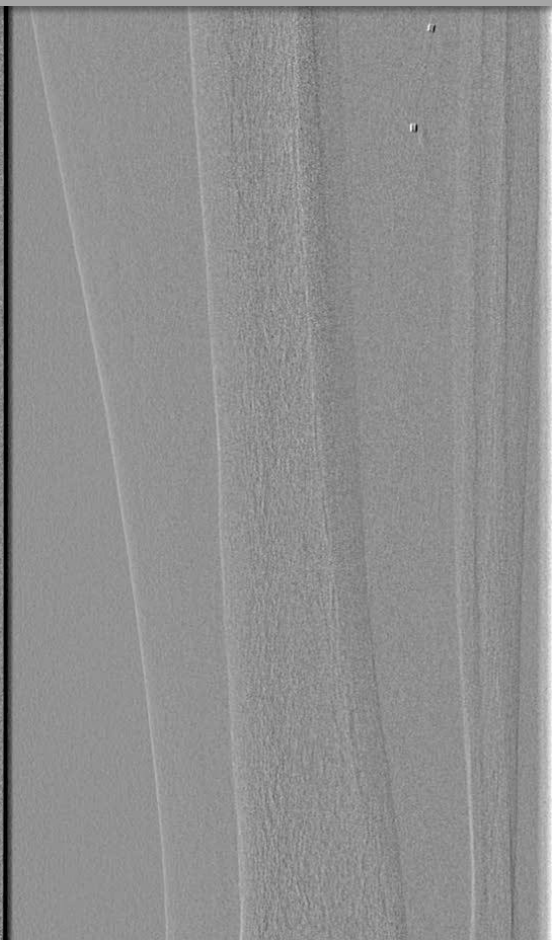
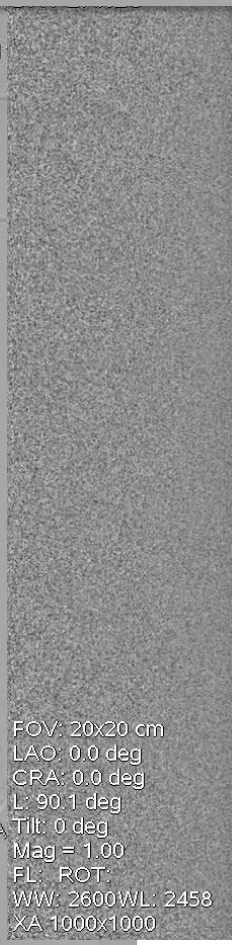
# First choice & main guidewire



- **Fielder XT**
- **Regalia XS 1.0**
- **Chevalier**
- **Command**
- **Jupiter FC**
- **Pilot 50, 200**

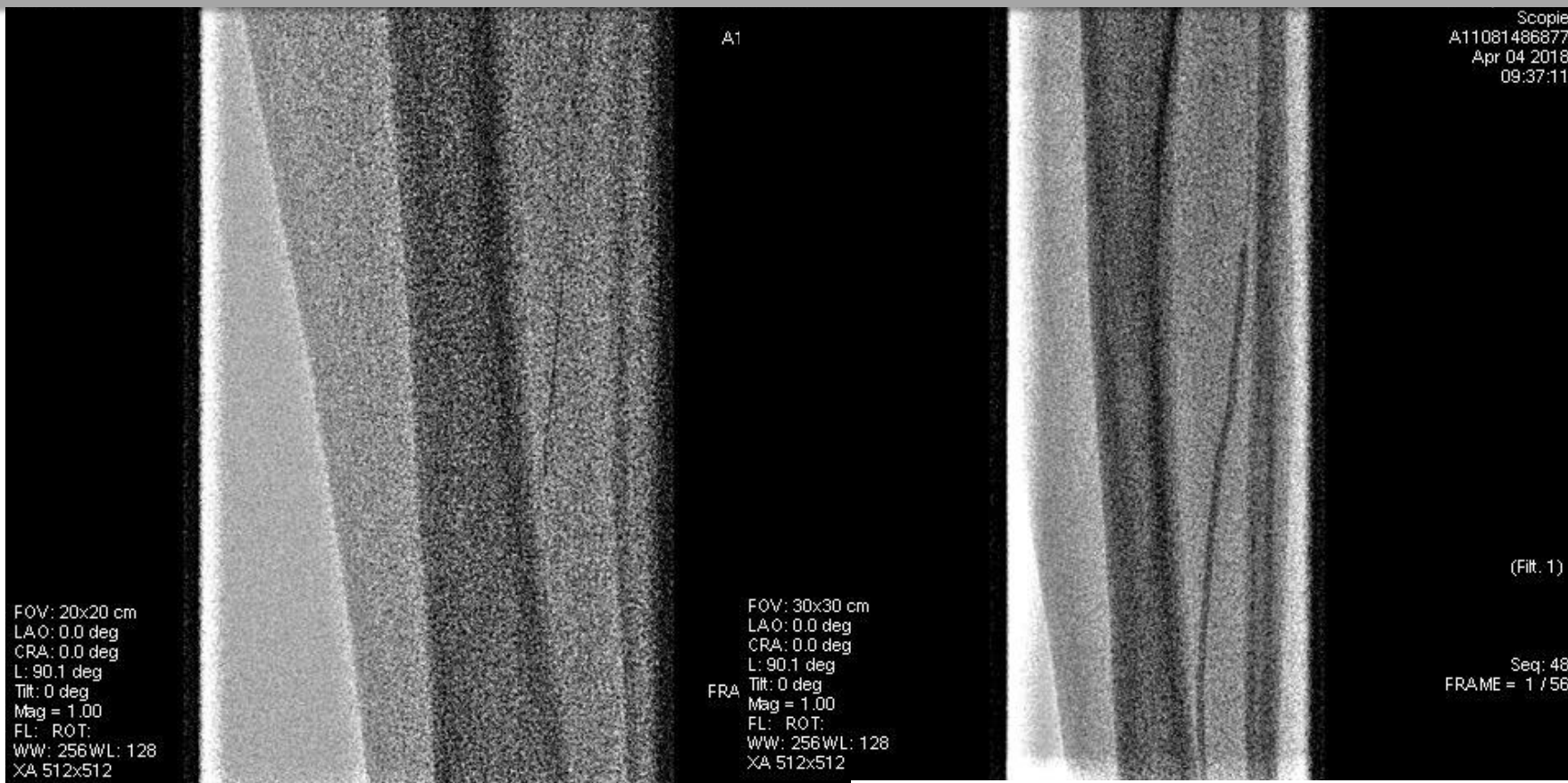
## **Polymer-jacketed GW**

**+ MICRO CATHETER SUPPORT**



A11081486877  
Apr 04 2018  
09:29:53

Seq: 32  
FRAME = 2 / 10  
MASK = 1



DR PERNES

FOV: 30x30 cm  
LAO: 1.4 deg  
CRA: 1.1 deg  
L: 90.1 deg  
Tilt: 0 deg  
Mag = 1.00  
FL: ROT:  
WW: 4096 WL: 2048  
XA 750x750

DR PERNES

FOV: 30x30 cm  
RAO: 5.9 deg  
CAU: 3.0 deg  
L: 90.1 deg  
Tilt: 0 deg  
Mag = 1.00  
FL: ROT:  
WW: 4096 WL: 2048  
XA 750x750



M Sep 12 1949

A11081486877  
Apr 04 2018  
09:48:47

(Filt. 3)

Seq: 63  
FRAME = 2 / 15



A11081  
Apr  
0

A11081486877  
Apr 04 2018  
09:57:02

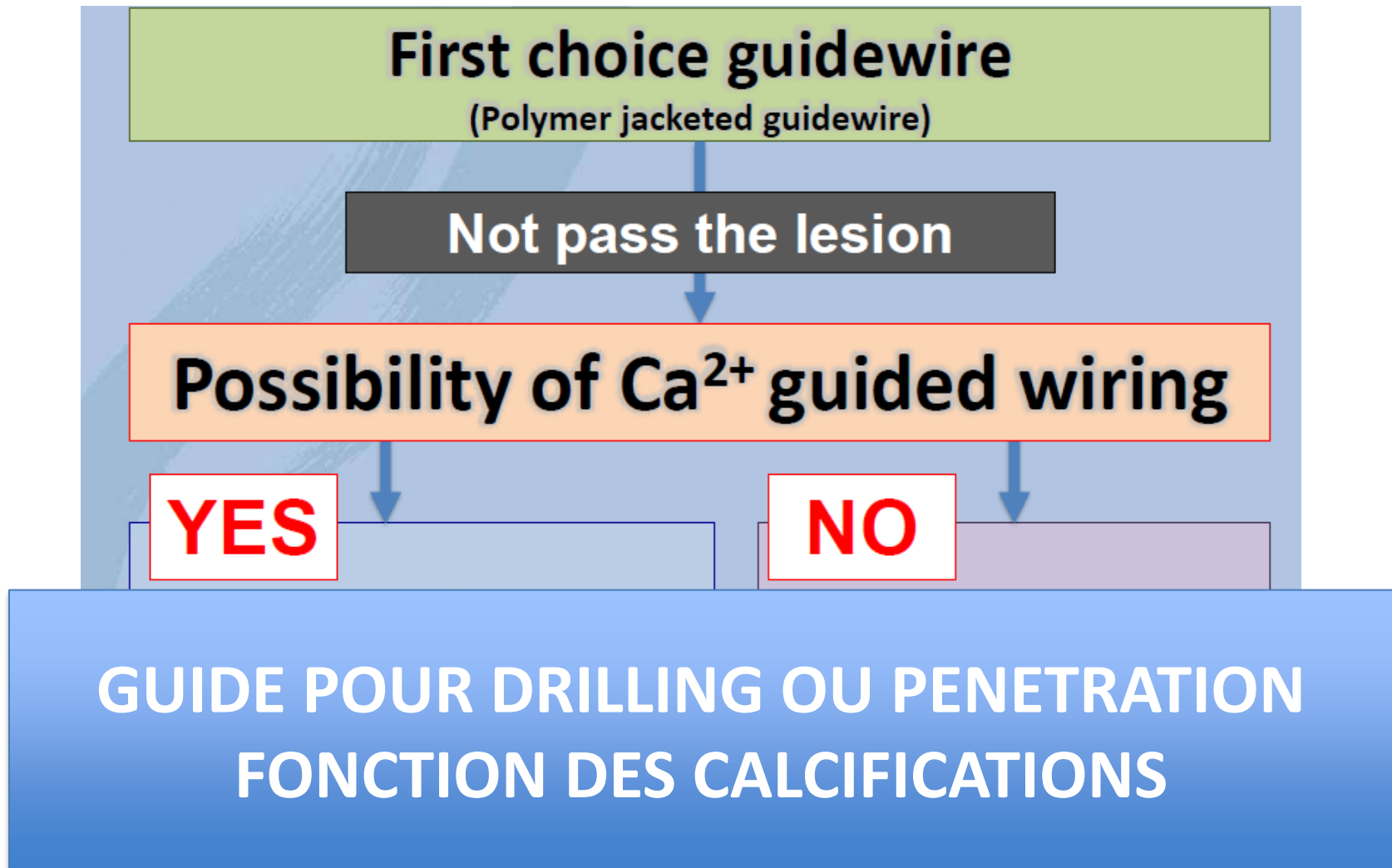
(Filt. 3)

FOV: 30x30 cm  
RAC: 5.9 deg  
CAU: 3.0 deg  
L: 90.1 deg  
Tilt: 0 deg  
Mag = 1.00  
FL: ROT  
WW: 4096WL: 2048  
XA 750x750

FOV: 30x30 cm  
RAC: 22.5 deg  
CAU: 4.0 deg  
L: 90.1 deg  
FRAME Tilt: 0 deg  
M: Mag = 1.00  
FL: ROT  
WW: 4096WL: 2048  
XA 750x750

Seq: 68  
FRAME = 2 / 13  
MASK = 1

# OK...SI ON Y ARRIVE PAS COMME CA.....:



# PAS TROP CALCIFIE...: Drilling

« INTIMAL et Tissu loose » tracking

## 0.014 GW

ASAHI : Halberd

Gaia 2 +++++

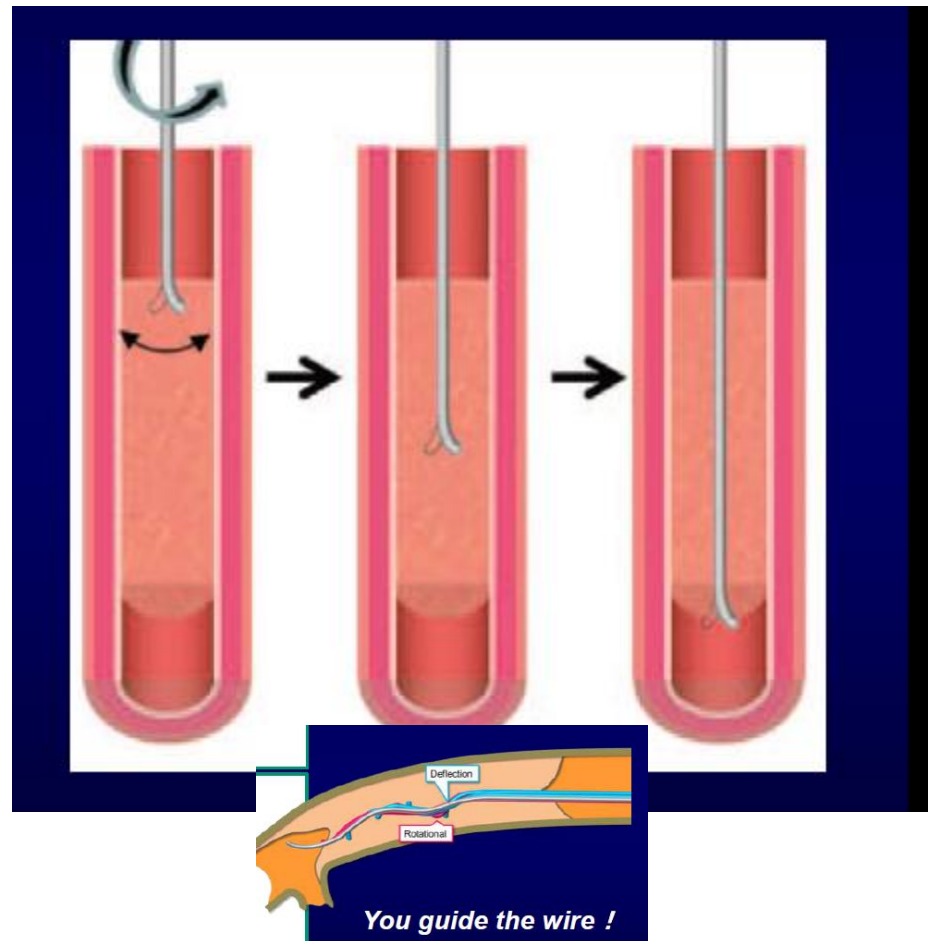
BOSTON: Victory

COOK :

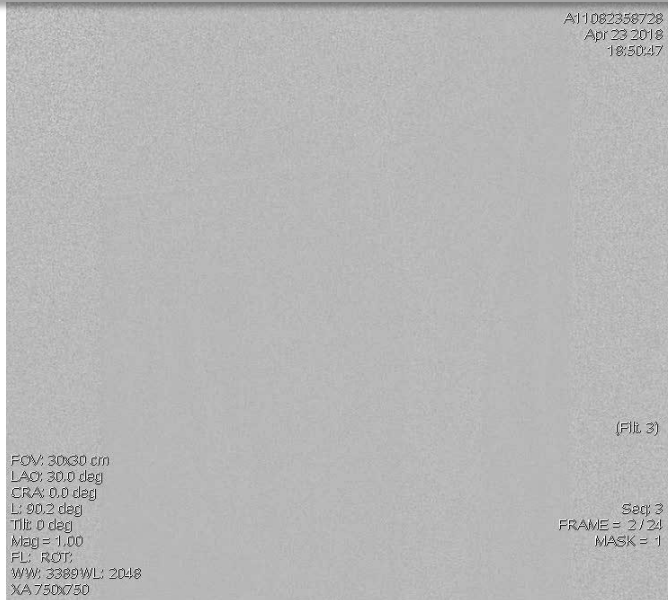
## 0.018 GW:

Asahi : Treasure 12

Abott : Connect flex



GUIDES NON HYDROPHILES, dirigeables et pouvoir de pénétration 4 à 12g



A11082358728  
Apr 23 2018  
18:50:47

(Filt. 3)

FOV: 30x30 cm  
LAO: 30.0 deg  
CRA: 0.0 deg  
L: 90.2 deg  
Tilt: 0 deg  
Mag = 1.00  
FL: ROT  
WW: 3389WL: 2048  
XA 750x750

Seq: 3  
FRAME = 2 / 24  
MASK = 1



A11082358728  
Apr 23 2018  
18:51:00

(Filt. 3)

FOV: 30x30 cm  
LAO: 3.3 deg  
CRA: 0.1 deg  
L: 90.2 deg  
Tilt: 0 deg  
Mag = 1.00  
FL: ROT  
WW: 8883WL: 2048  
XA 750x750

Seq: 4  
FRAME = 2 / 25  
MASK = 1



A11082358728  
Apr 23 2018  
18:52:22

(Filt. 3)

FOV: 30x30 cm  
LAO: 33.4 deg  
CAU: 0.1 deg  
L: 90.2 deg  
Tilt: 0 deg  
Mag = 1.00  
FL: ROT  
WW: 2041WL: 2739  
XA 750x750

Seq: 5  
FRAME = 2 / 28  
MASK = 1



A11082358728  
Apr 23 2018  
19:11:36

(Filt. 3)

FOV: 20x20 cm  
LAO: 34.9 deg  
CRA: 1.2 deg  
L: 90.2 deg  
Tilt: 0 deg  
Mag = 1.00  
FL: ROT  
WW: 4096WL: 2048  
XA 1000x1000

Seq: 12  
FRAME = 2 / 7

DR PERNES

F Dec 06 1950  
Scopie  
A11082358728  
Apr 23 2018  
19:38:15

FOV: 16x16 cm  
LAO: 18.3 deg  
CRA: 1.4 deg  
L: 90.2 deg  
Tilt: 0 deg  
Mag = 1.00  
FL: ROT:  
W/W: 256 WL: 128  
XA 512x512

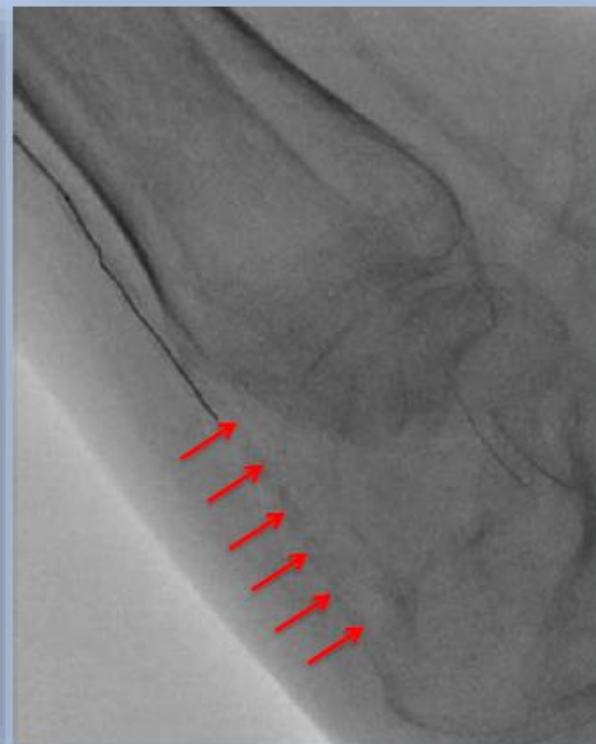
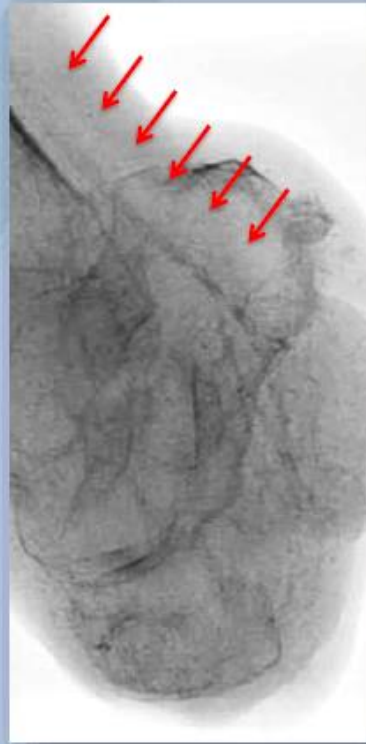
(Filt. 1)

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FRAME = 1 / 450



# C'EST BETONNE.....

Calcium tell us the way to go



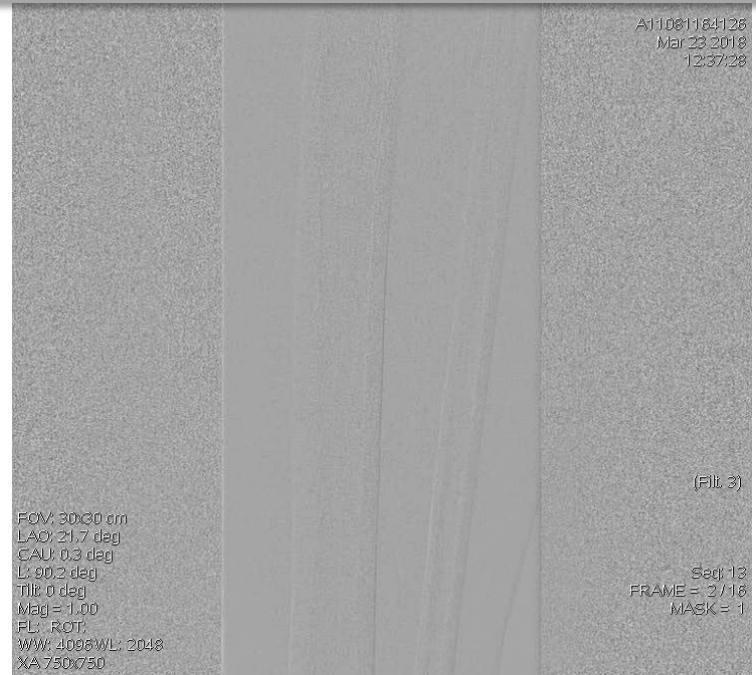
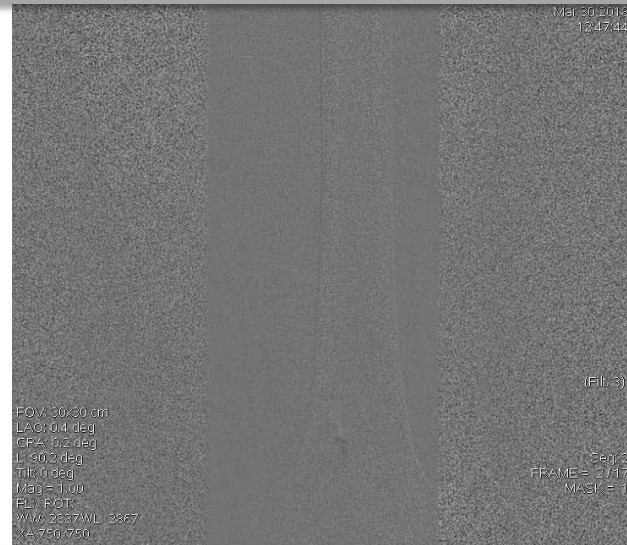
penetration GW

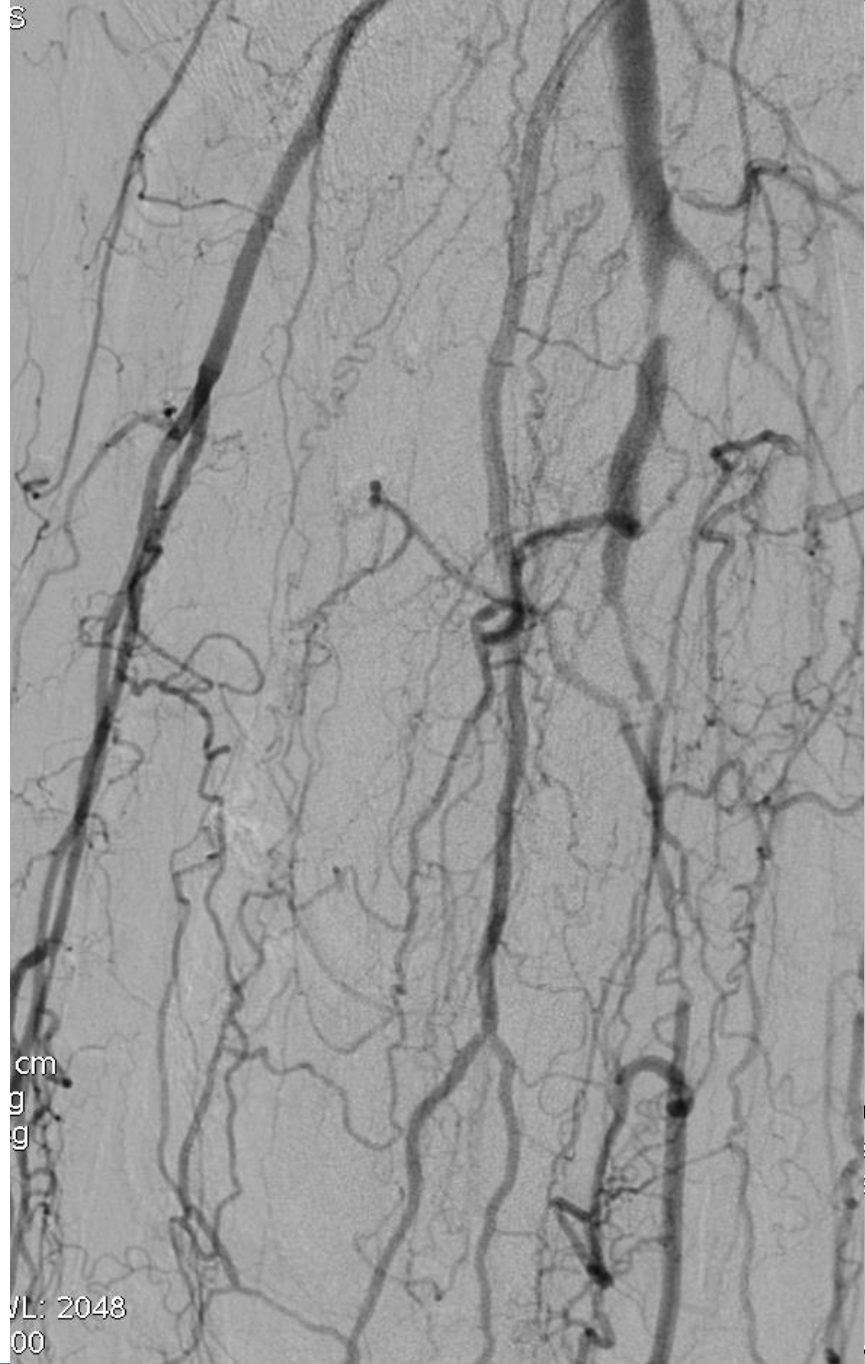
# Penetration Power Calculation d

Guide Wire	Manufacturer	Tip Stiffness (Load) (g)	Tip Diameter	Penetration Power (Tip Load/Area of Tip) (kg/in <sup>2</sup> )
Fielder XT	Asahi	1.2g	0.009"	19 (polymer cover)
Cross-It 100XT	Abbott	1.7g	0.0105"	20*
MiracleBros 3	Asahi	3.9g	0.0125"	32
MiracleBros 4.5	Asahi	4.4g	0.0125"	36
PROGRESS 40	Abbott	4.8g	0.012"	40
Cross-It 200XT	Abbott	4.7g	0.0105"	54
Cross-It 300XT	Abbott	6.2g	0.0105"	72
MiracleBros 6	Asahi	8.8g	0.0125"	72
PROGRESS 80	Abbott	9.7g	0.012"	80
Cross-It 400XT	Abbott	8.7g	0.0105"	101
MiracleBros 12	Asahi	13.0g	0.0125"	106
PROGRESS 120	Abbott	13.9g	0.012"	120
Confianza 9	Asahi	8.6g	0.009"	135
PROGRESS 140T	Abbott	12.5g	0.0105"	140
Confianza Pro	Asahi	9.3g	0.009"	146
Confianza Pro 12	Asahi	12.4g	0.009"	195
PROGRESS 200T	Abbott	13.3g	0.009"	200

**Guides Hydrophobiques , peu dirigeables, risque PERFORATION 280**

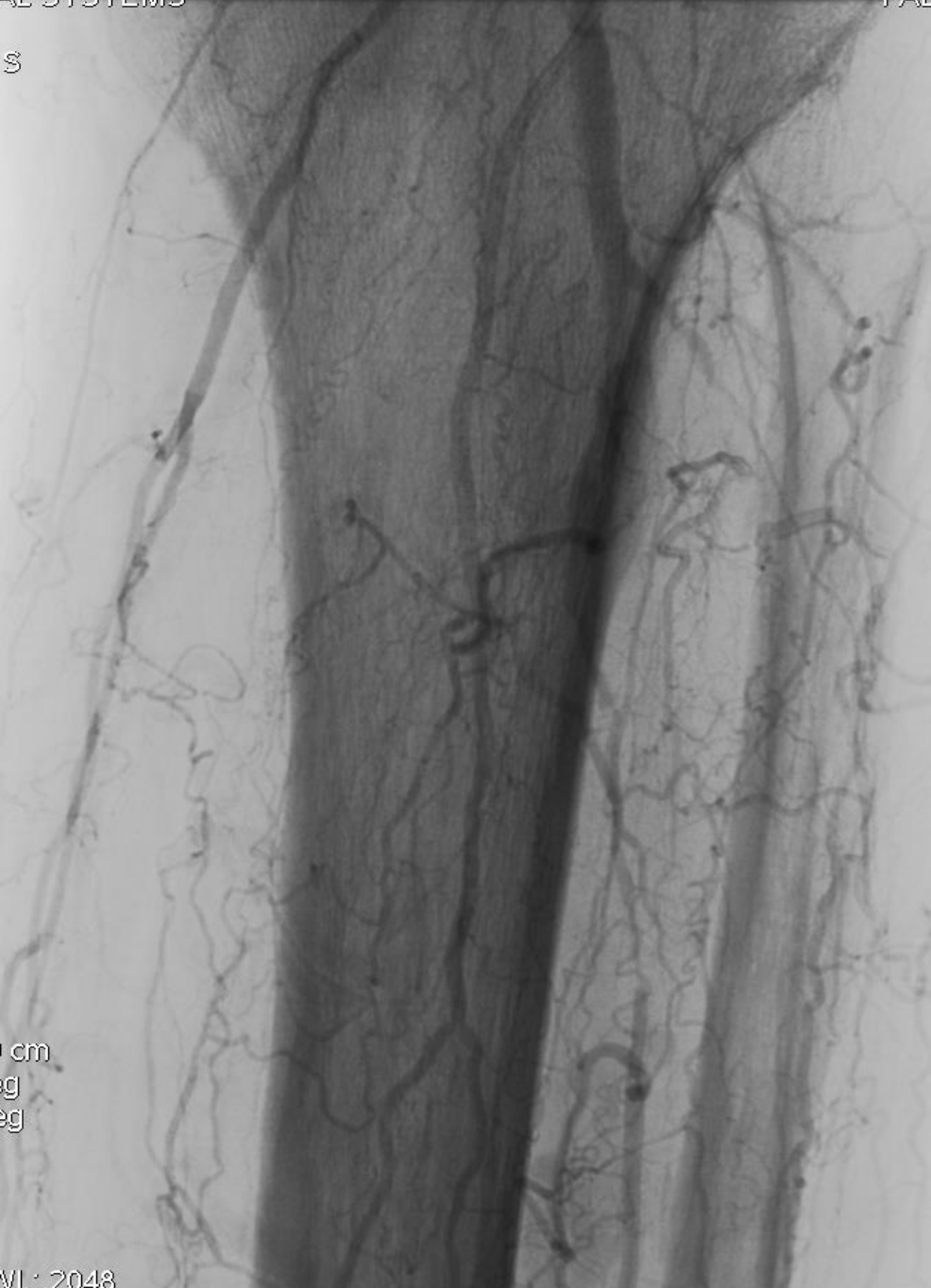






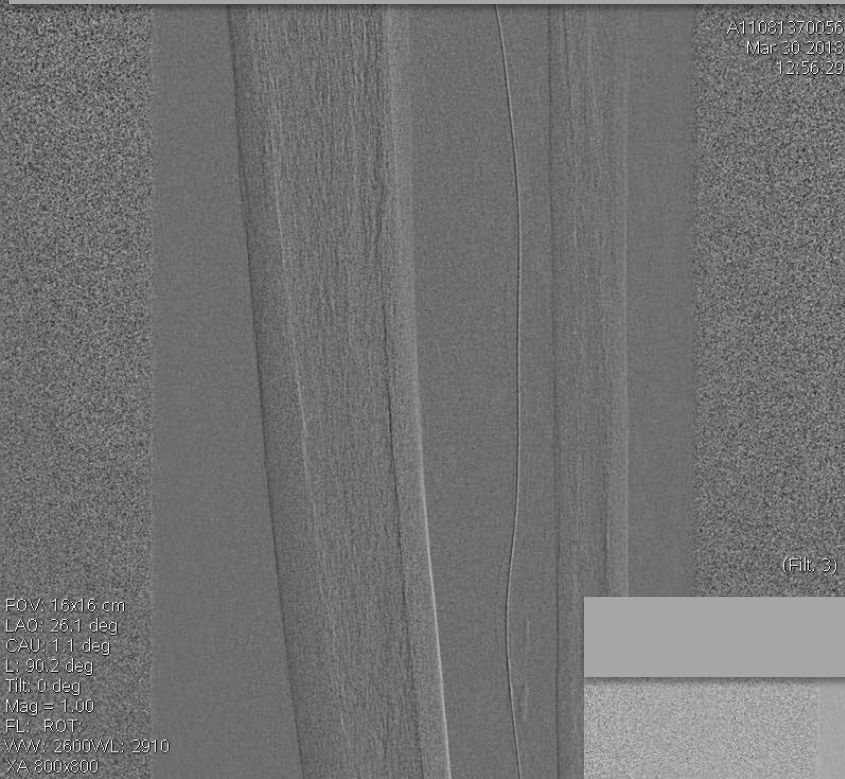
cm  
g  
g

VL: 2048  
00



cm  
g  
g

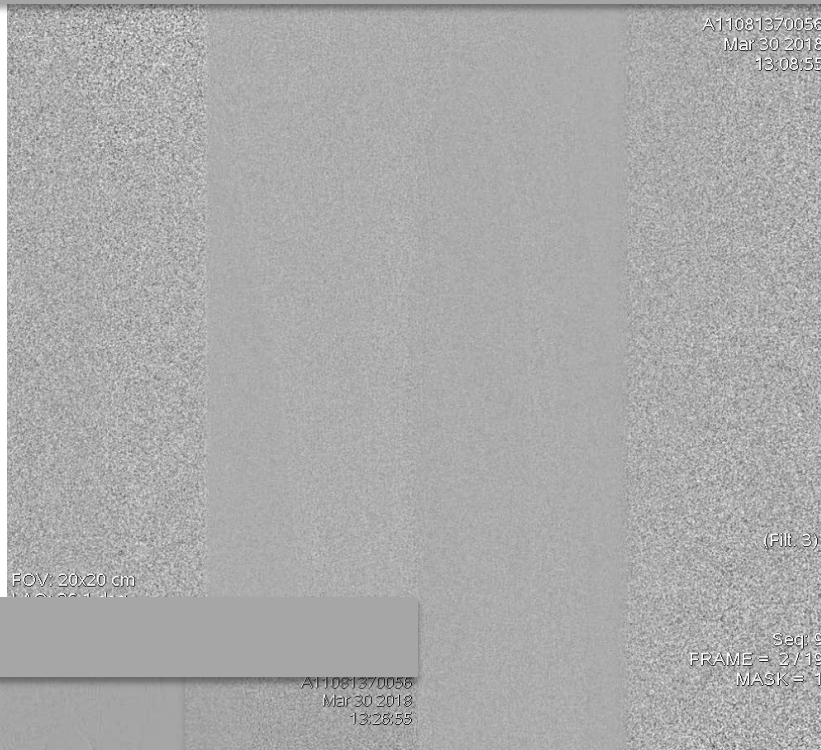
VL: 2048  
00



A11081370056  
Mar 30 2018  
12:56:29

(Filt. 3)

FOV: 16x16 cm  
LAO: 26.1 deg  
CAU: 1.1 deg  
L: 90.2 deg  
Tilt: 0 deg  
Mag = 1.00  
FL: ROT  
WW: 2600/YL: 2910  
XA 800x800



A11081370056  
Mar 30 2018  
13:08:55

(Filt. 3)

Seq: 9  
FRAME = 2 / 19  
MASK = 1

FOV: 20x20 cm



A11081370056  
Mar 30 2018  
13:28:55

(Filt. 3)

FOV: 30x30 cm  
LAO: 28.3 deg  
CAU: 3.1 deg  
L: 90.2 deg  
Tilt: 0 deg  
Mag = 1.00  
FL: ROT  
WW: 4098/WL: 2048  
XA 750x750

Seq: 13  
FRAME = 2 / 21  
MASK = 1

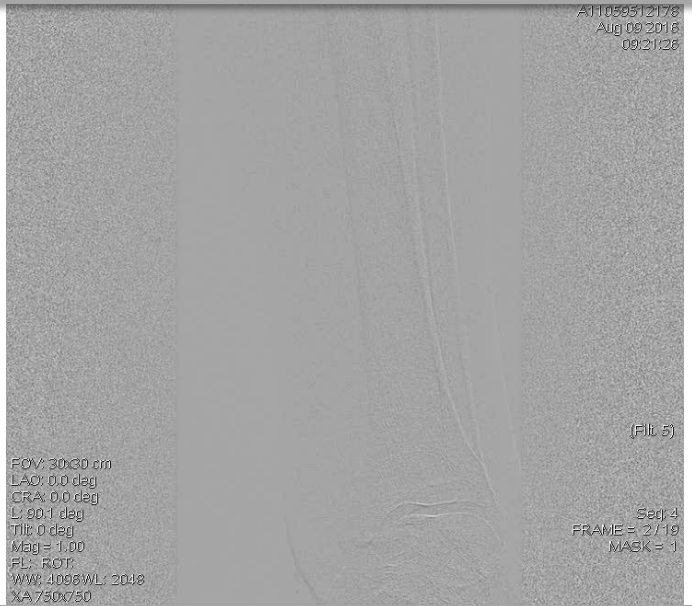
# Stiffer GW have risk of **GW perforation**

Penetration GW

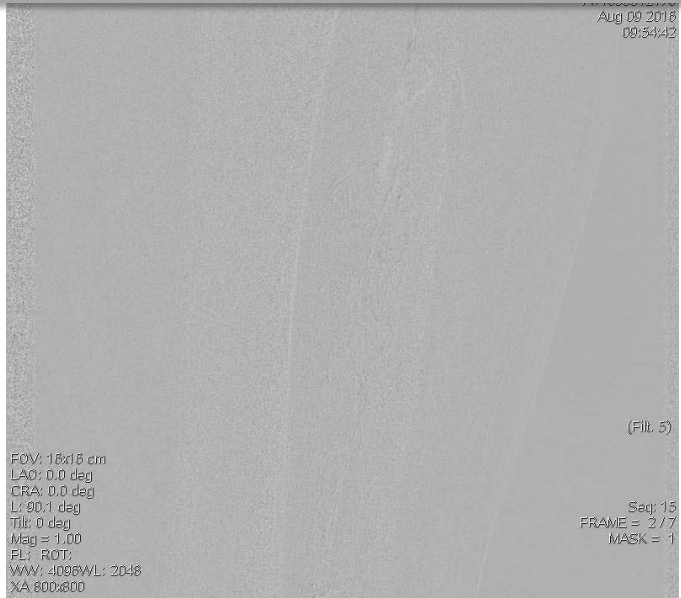
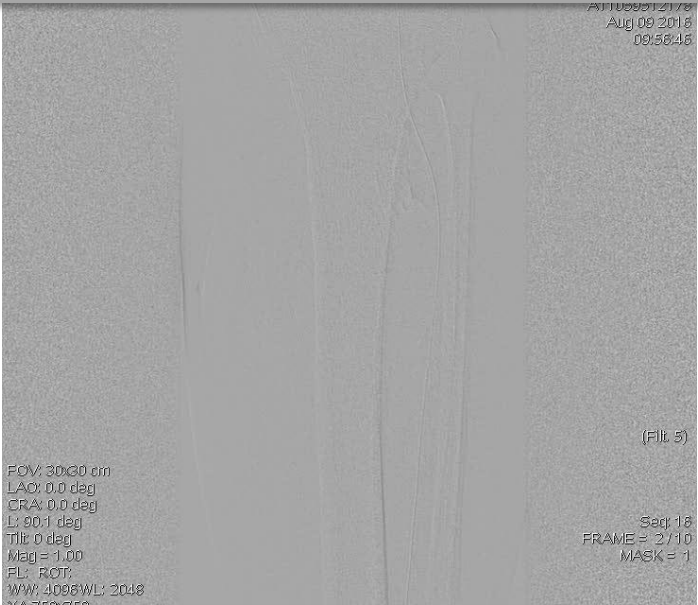


Ca guided wiring

**PARFOIS IMPOSSIBLE**







A11059512178  
Aug 09 2018  
10:28:07

(Flt. 5)

FOV: 20x20 cm  
RAO: 1.5 deg  
CRA: 0.0 deg  
L: 90.1 deg

Seq: 27  
FRAME = 2 / 7

GE MEDICAL SYSTEMS

DENIEL MONIQUE

Seq: 28  
10:28:37

(Flt. 5)

Seq: 28  
FRAME = 2 / 11  
MASK = 1

FOV: 20x20 cm  
RAO: 1.5 deg  
CRA: 0.0 deg  
L: 90.1 deg  
Tilt: 0 deg  
Mag = 1.00  
FLY: ROT  
WV: 4096WL: 2048  
XA: 1000:1000

Seq: 29  
10:29:01

(Flt. 5)

Seq: 29  
FRAME = 2 / 9  
MASK = 1

Seq: 30  
10:29:26  
Seq: 30  
FRAME = 2 / 11  
MASK = 1  
Seq: 30  
FRAME = 2 / 11  
MASK = 1  
Seq: 30  
FRAME = 2 / 11  
MASK = 1



# QUAND CA VEUT PAS , CA VEUT PAS....

Antegrade intraluminal approach

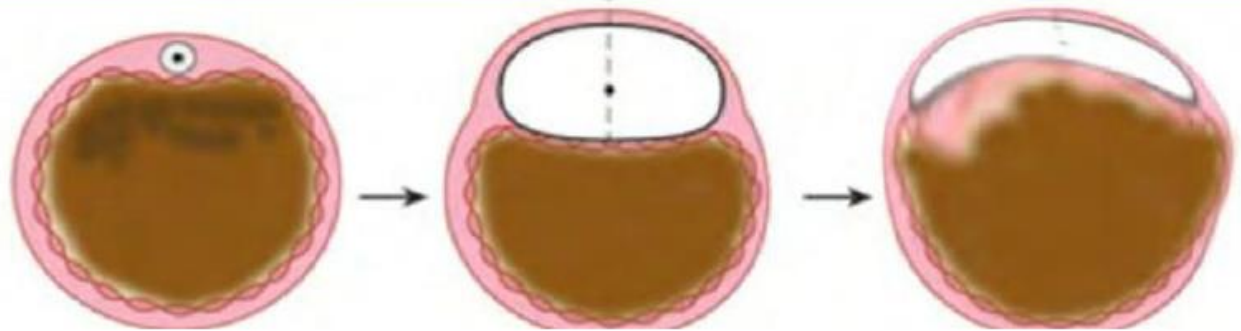
mission accomplished

65.4 % - 95 %

- Workhorse wire first
- CTO wire if needed
- Guidewire ~ (balloon) cath unit
- (CTO devices)

Antegrade subintimal approach

Subintimal  
=  
eccentric  
plaque  
relocation



- Lower technical failure rate :

“not based on blind luck but on technical expertise...”

# Strategies of BTK crossing

## 1. Antegrade approach

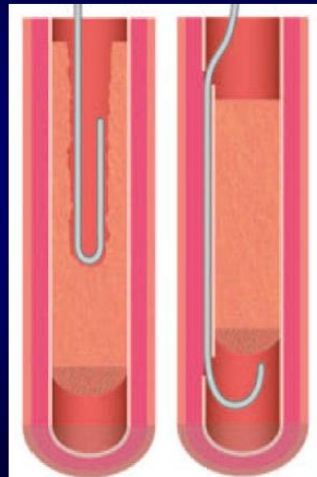
### 1-1: Intraluminal approach

• Japanese art: 0.014-inch GW

### 1-2: Subintimal approach (loop technique)

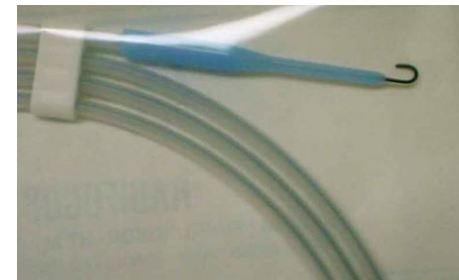
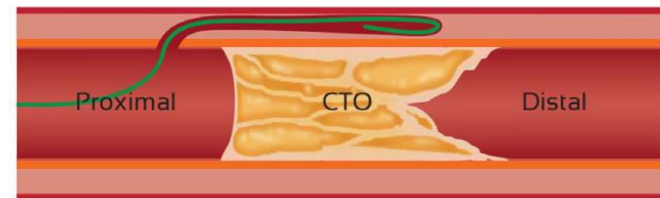
#### J-loop technique

- Knuckle wire intraluminal (lambda)
- Subintimal tracking
- Requires soft hydrophilic tip
- Needs good shape retention

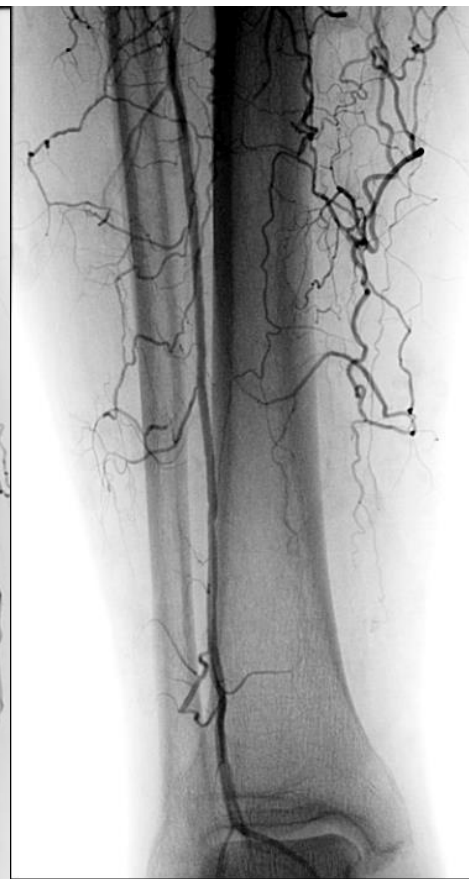


GUIDES STANDARD:0.014,0.018, BOLIA 0.035

Knuckle Wire



STAR et MINI STAR Technique



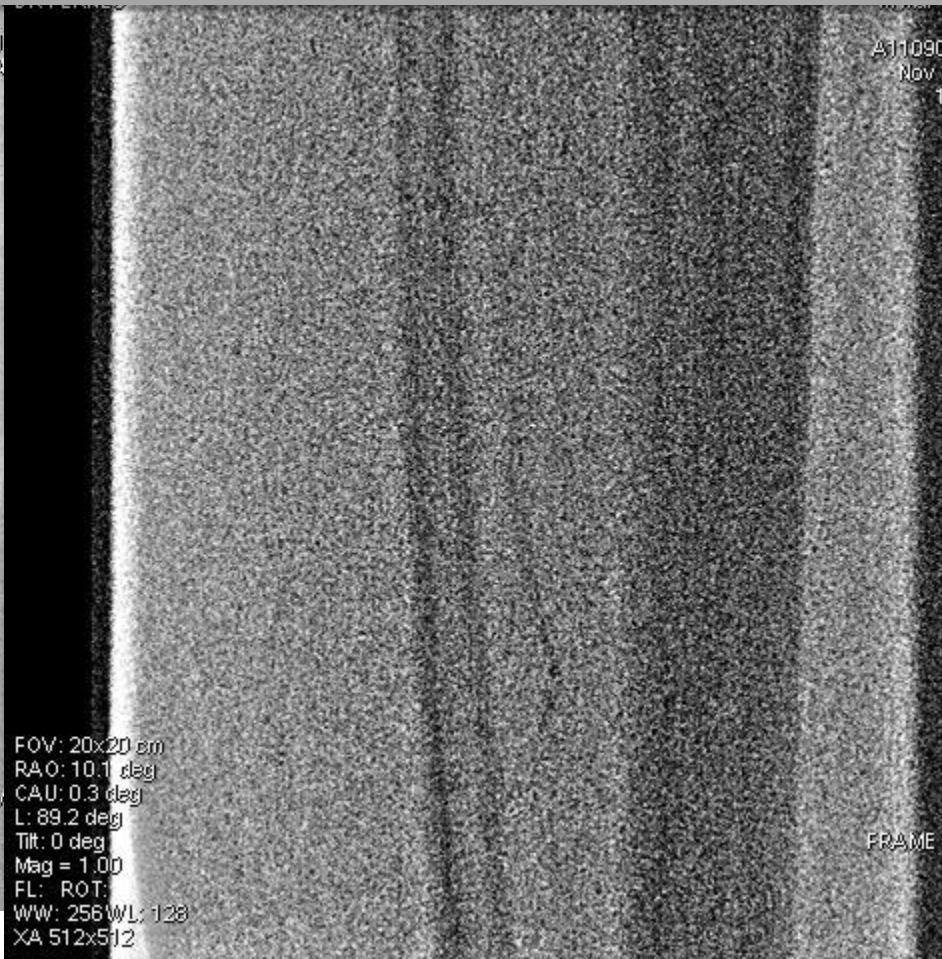




FOV: 20x20 cm  
 RAO: 10.1 deg  
 CAU: 0.3 deg  
 L: 89.2 deg  
 Tilt: 0 deg  
 Mag = 1.00  
 FL: ROT:  
 WW: 256WL: 128  
 XA 512x512

A11  
 A

FRAM



FOV: 20x20 cm  
 RAO: 10.1 deg  
 CAU: 0.3 deg  
 L: 89.2 deg  
 Tilt: 0 deg  
 Mag = 1.00  
 FL: ROT:  
 WW: 256WL: 128  
 XA 512x512

RE  
 78  
 46  
 Scopia  
 A11090336043  
 Nov 20 2018  
 12:56:37

(Fit. 1)

Seq: 14  
 FRAME = 1 / 50



SYSTEMS

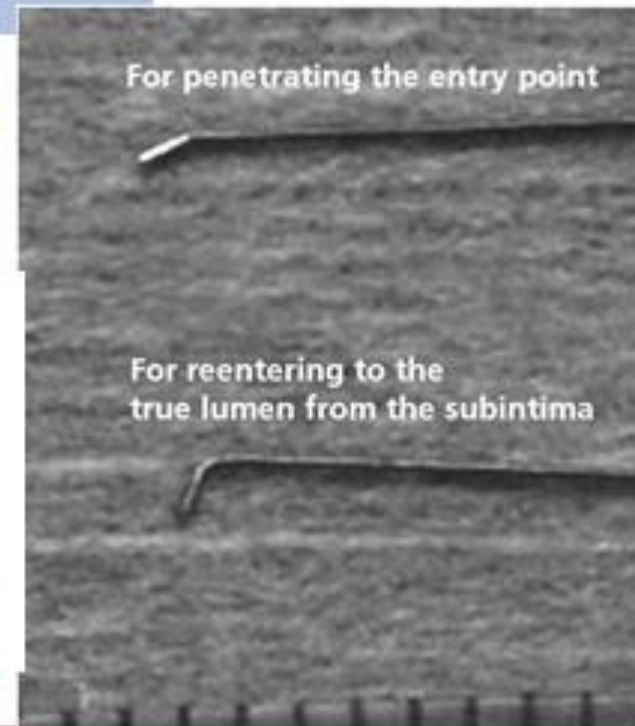
2042

# Definition of micro-knuckle

A technique in which a microcatheter  
advance into the CTO  
without any preceding GW leading

LAST (Limited Antegrade Subintimal Tracking)

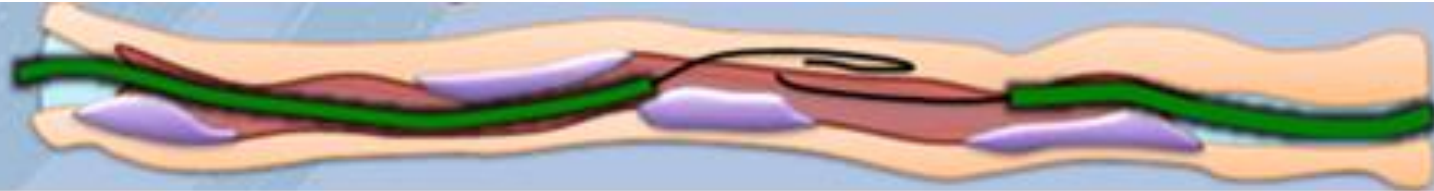
Corsair, Finewire, Micro catheter Progreat Terumo



- Pilot 200, Confianza 12, Progress 200

# PAS LA PANACEE NON PLUS.....

**TAUX ECHEC DE RE ENTREE :  
20%(artères peu calcifiées) à 50%..**



**L'ABORD RETROGRADE EST LA CLE DU SUCCES!!!**



**APPROCHE ANTEROGRADE**

**APPROCHE RETROGRADE**



APP

Ipsilateral Antegrade intraluminal approach

ère)

mission accomplished

ng

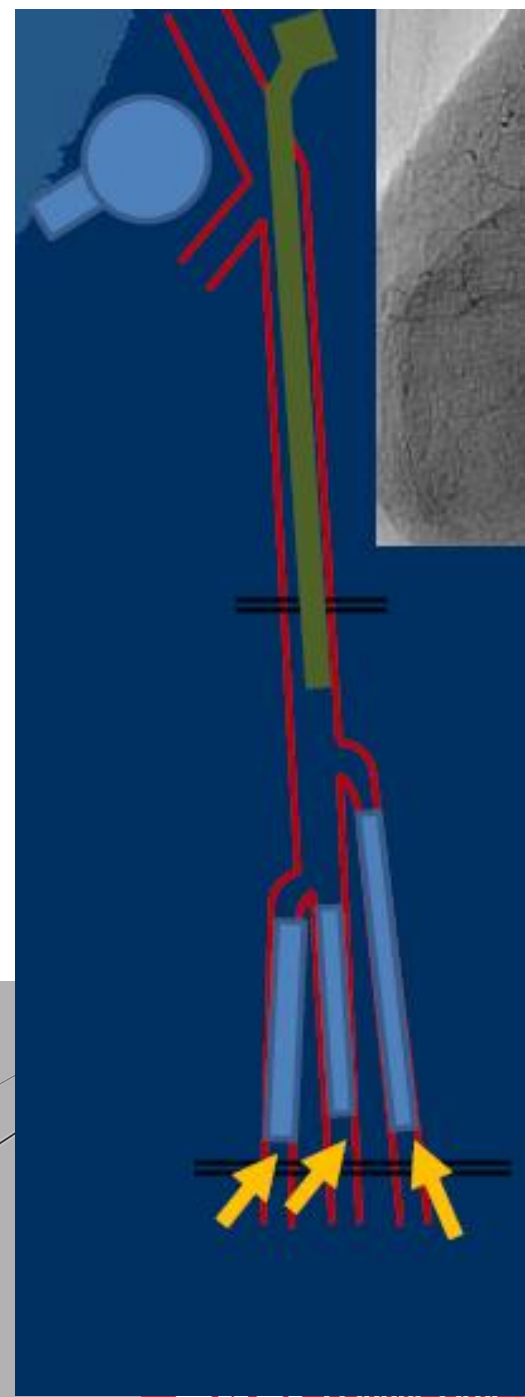
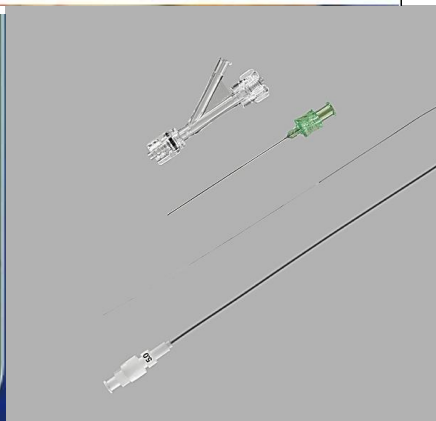
Ipsilateral Antegrade subintimal approach

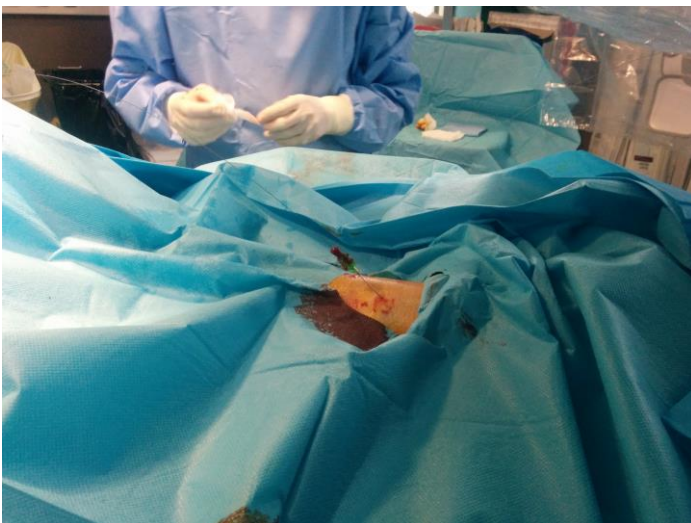
Successful re-entry

Ipsilateral bidirectional approach

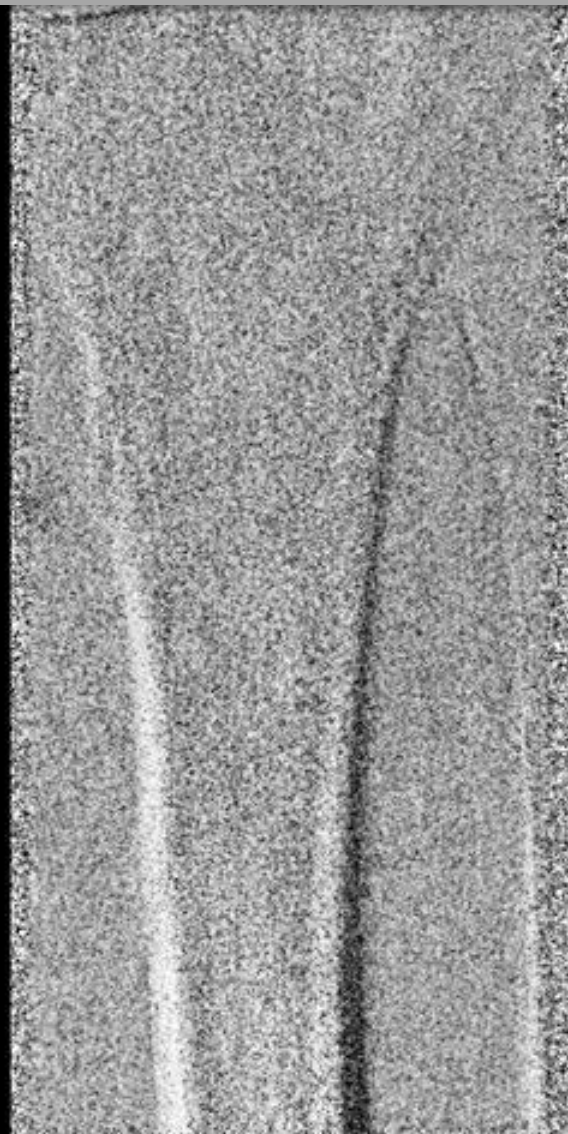
# Retrograde Access Technical Aspects

- Ultrasound vs fluoro guidance
- Micropuncture with V18 or Command 18
- CXI or Quickcross CTO microcatheter support
- 3 or 4 Fr sheath if needed (<10% of cases)
- Pass wire from retrograde and externalize, then treat from antegrade direction
- Dorsiflexion and plantar flexion of foot





FOV: 20x20 cm  
LAO: 32.9 deg  
CAU: 1.7 deg  
L: 90.2 deg  
Tilt: 0 deg  
Mag = 1.00  
FL: ROT:  
WW: 256 WL: 128  
XA 512x512



Scopie  
A11082358728  
Apr 23 2018  
20:05:25

(Filt. 1)

Seq: 32  
FRAME = 1 / 297

# Various retrograde access technique



Distal site puncture



Trans-collateral



Trans-pedal  
(Pedal plantar loop)

## Strategies of BTK crossing

### 1. Antegrade approach

#### 1-1: Intraluminal approach

- Japanese art: 0.014-inch GW

#### 1-2: Subintimal approach

- Hydro-dynamic boost (SUICA)
- Micro-knuckle

### 2. Retrograde approach

#### 2-1: Distal puncture

#### 2-2: Trans-collateral or pedal

### The fathers of pedal-plantar loop technique



Critical Limb Ischemia: EVI 2006

Leif Erik Espersen and Anders Møller

Service of Endovascular Medicine, "Ottone Cremonesi" (Cremona), 25100 Brescia, Italy. www.clinicalvision.org



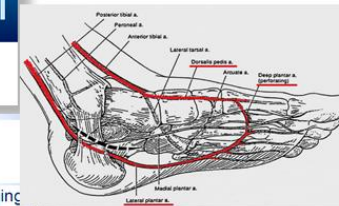
Pedal-Plantar Loop Technique for a Challenging Below-the-Knee Chronic Total Occlusion: A Novel Approach to Percutaneous Revascularization

Massimiliano Fusaro, MD, Luca Dalla Paola, MD, Giuseppe Blondi-Zoccal, MD

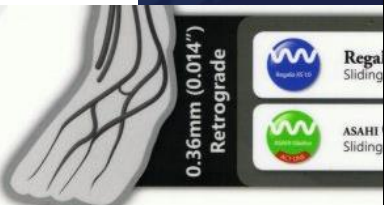
Journal of Cardiovascular Surgery 2009 June;50(3):331-7

Clinical results of below-the-knee intervention using pedal-plantar loop technique for the revascularization of foot arteries

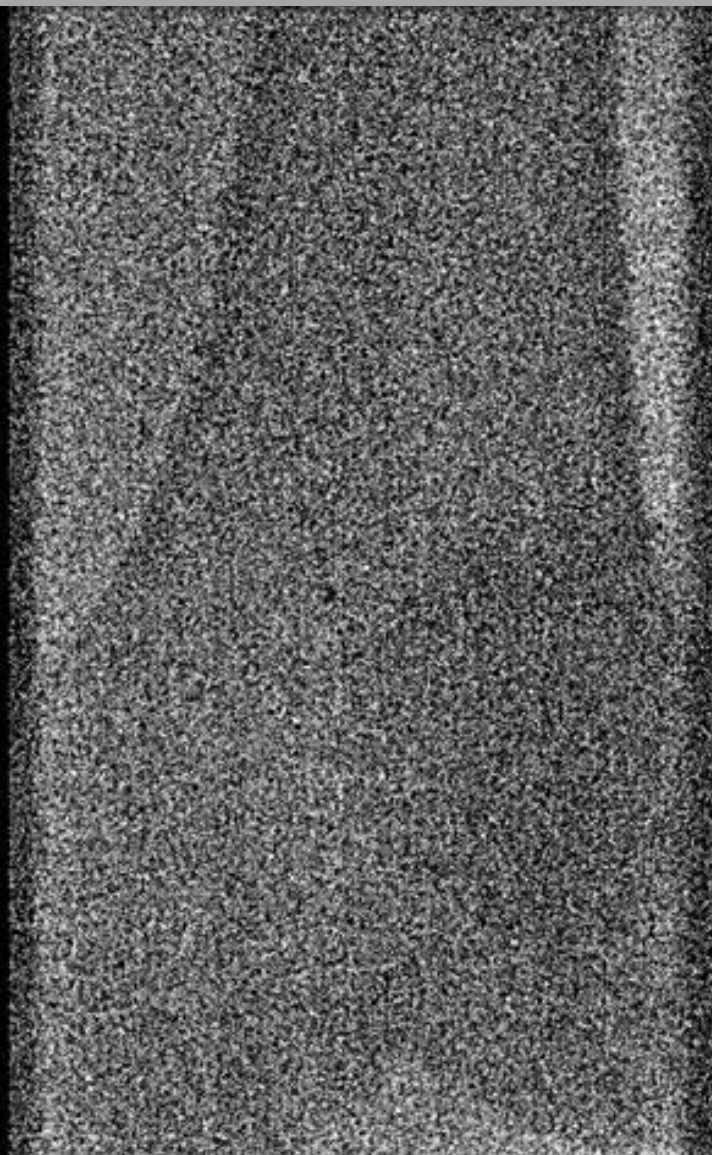
Manni M, 1, Fucini M, 2, Caraccioli T, 1, Franta G, 1, Dalla Paola L, 3, Rocchi F, 3



To pas



Scopie  
A11082358728  
Apr 23 2018  
20:11:03



TIP STYLE	TIP STIFFNESS (GRAM)
Straight	4
Straight	4
Straight	4
Straight	12
Straight	12
Straight	12
Straight	30
Straight	30
Straight	30

Retr



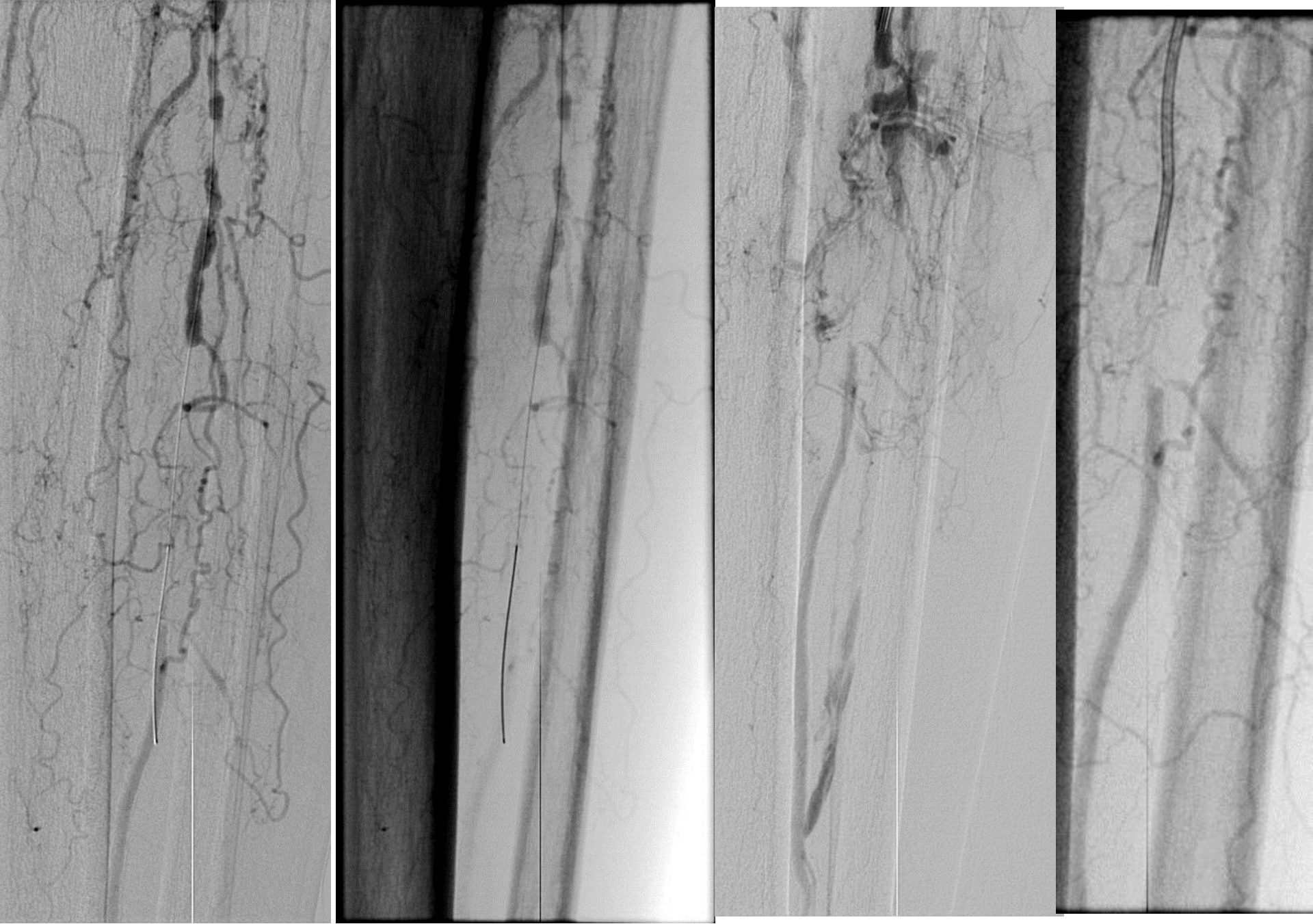
FOV: 16x16 cm  
LAO: 11.8 deg  
CAU: 1.7 deg  
L: 90.2 deg  
Tilt: 0 deg  
Mag = 1.00  
FL: ROT:  
WW: 256 WL: 128  
XA 512x512

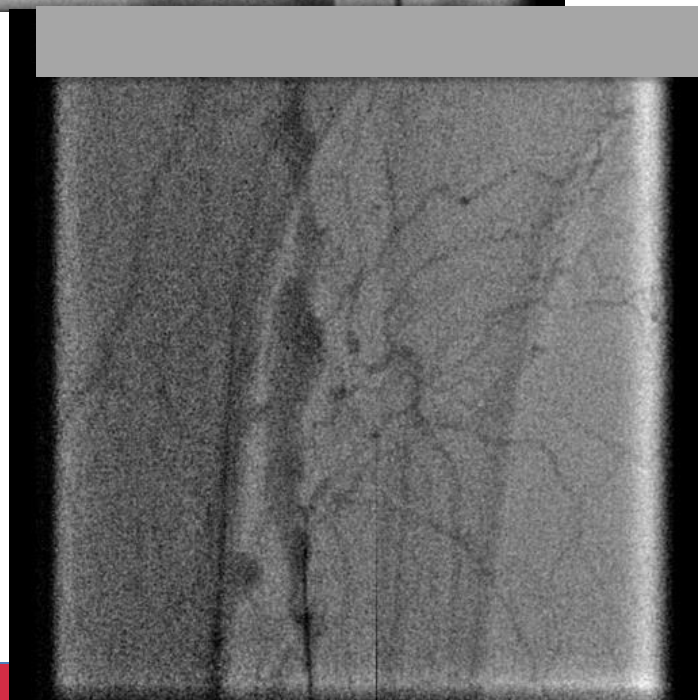
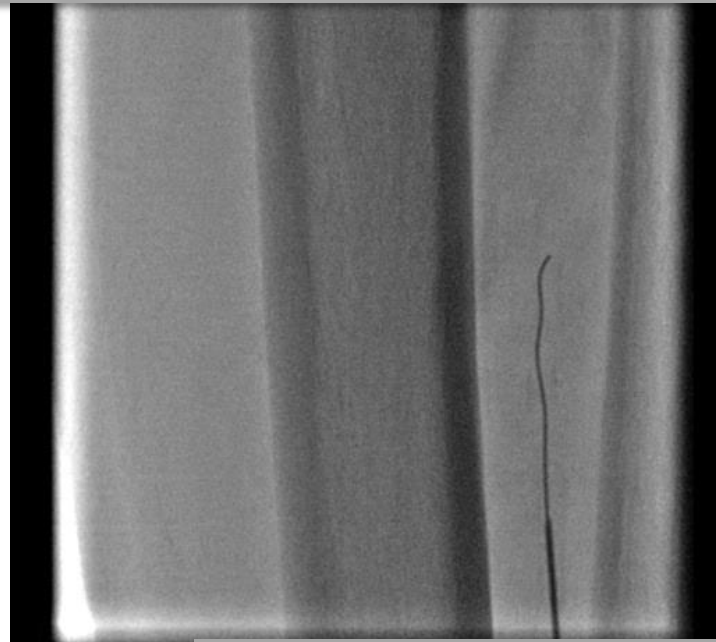
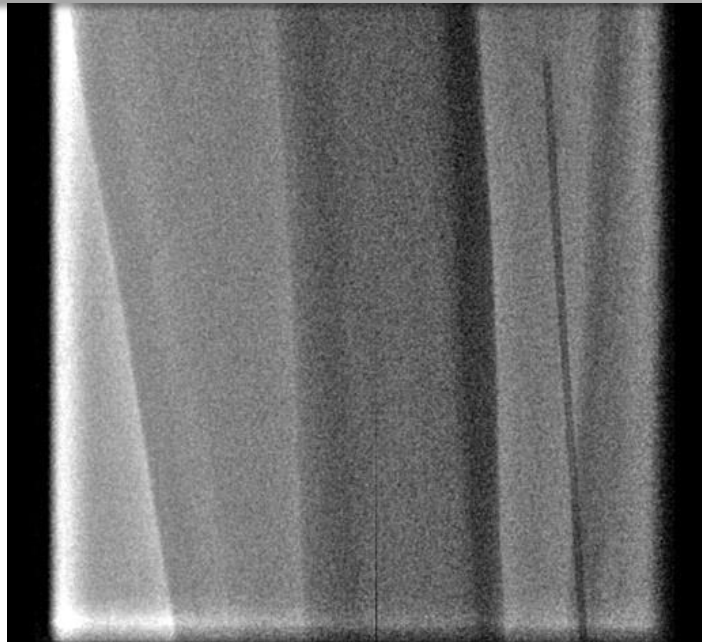
(Filt. 1)

Seq: 34  
FRAME = 1 / 190

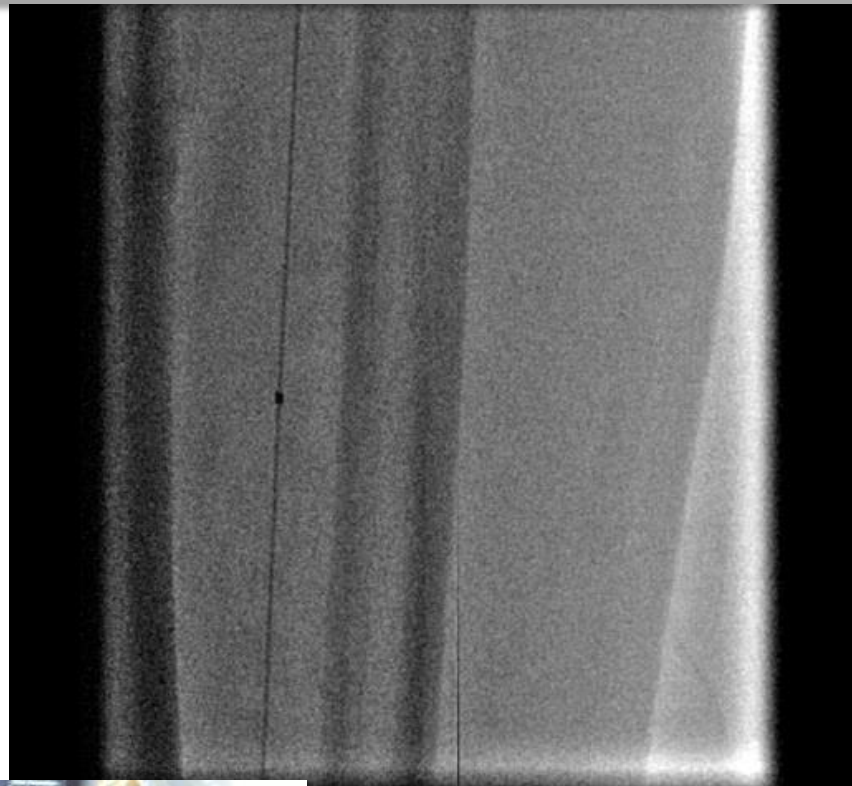
**Franchissement rétrograde souvent plus aisé**

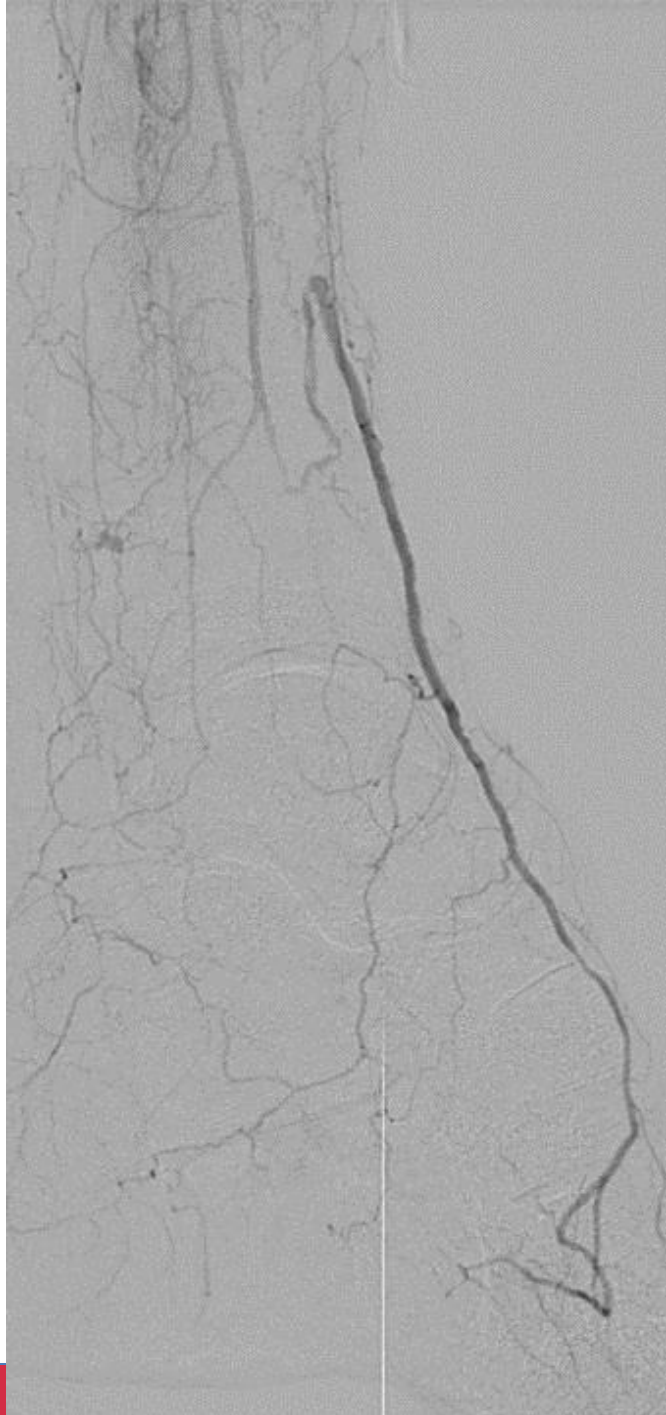
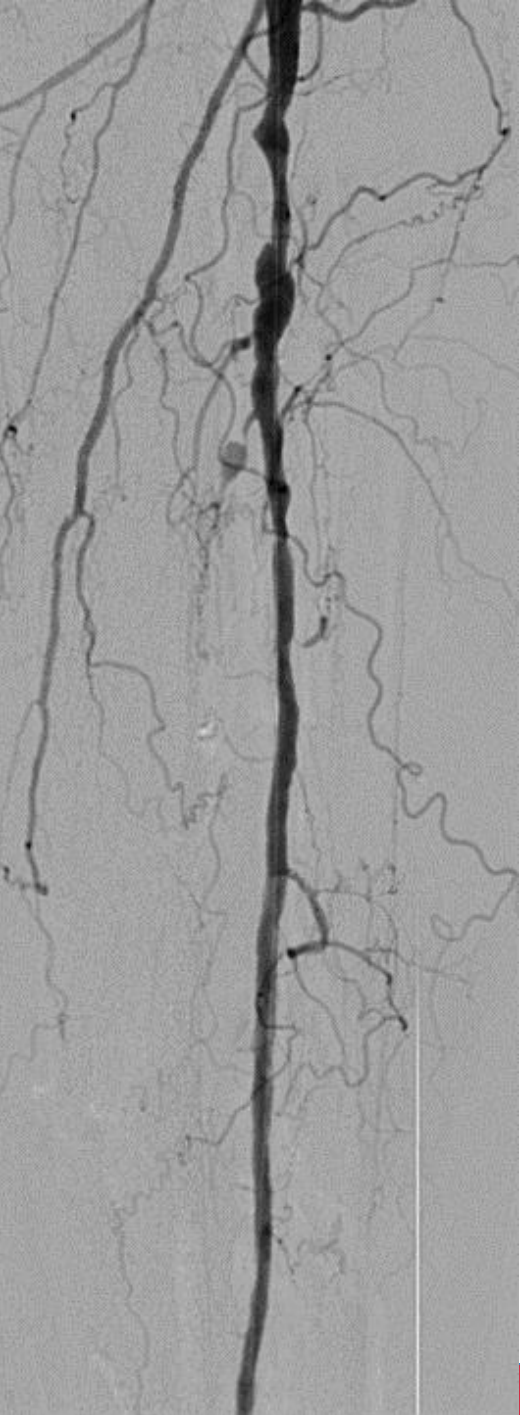




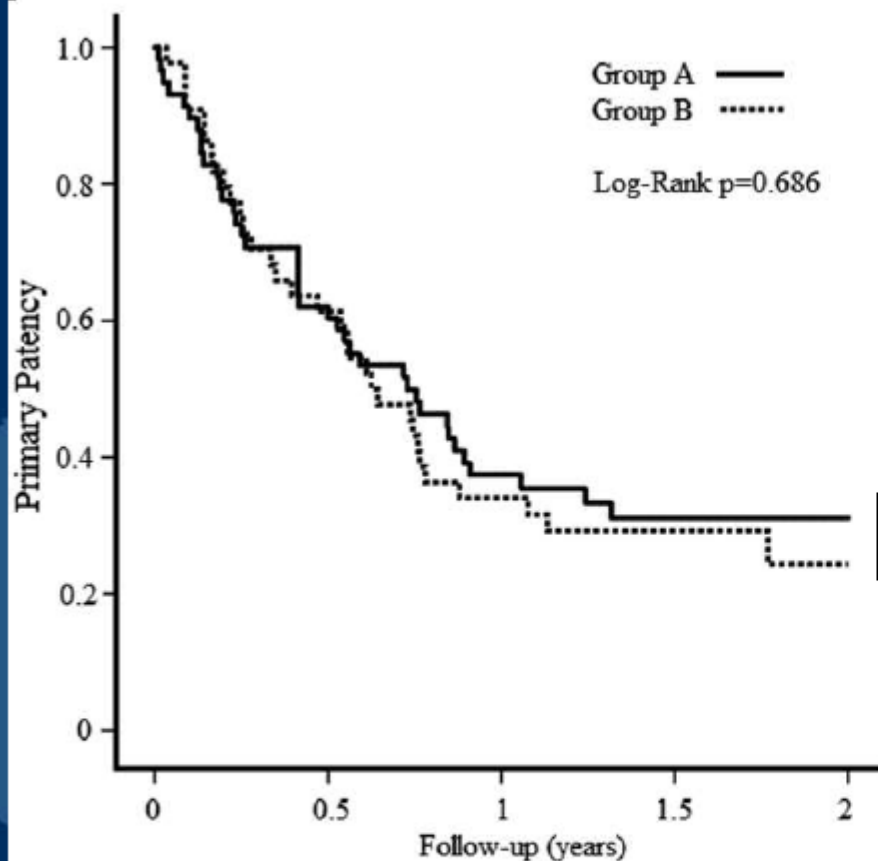








Primary Patency the same, whether using unidirectional or bidirectional access.



Antegrade approach  
Antegrade and retrograde

		0	0.5	1	1.5	2
Group A	No. at risk	58	36	21	13	5
	Rate	100%	62%	37%	31%	31%
	SE	0%	6.4%	6.4%	6.3%	6.3%
Group B	No. at risk	44	27	15	11	3
	Rate	100%	61%	34%	29%	24%
	SE	0%	7.3%	7.1%	6.9%	7.3%

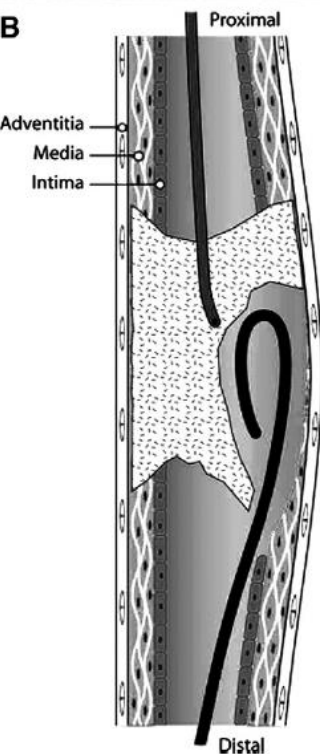
Chou et al.  
J Endovasc Ther 2016;23:330

# MAIS PAS TOUJOURS EN INTRALUMINAL..PAS DE PANIQUE!!!

## BAIL-OUT TECHNIQUES:

- Bolia retro 0.035
- Safari (2 ballons)
- Reverse CART et/ou CART

An overview of connecting antegrade and retrograde channels for successful retrograde cross.



Wire position

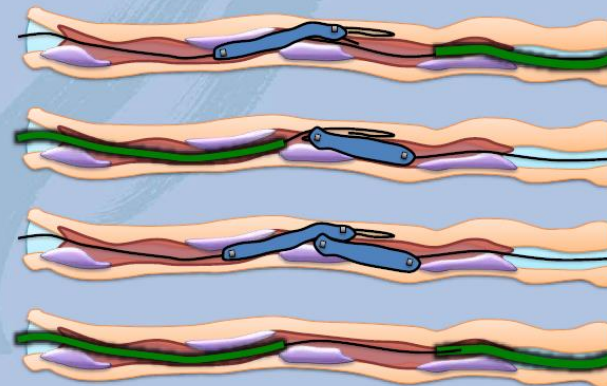
Strategy

Antegrade intimal  
Retrograde intimal

Antegrade subintimal  
Retrograde subintimal  
(Ideal situation)

Antegrade intimal  
Retrograde subintimal  
(least favourable)  
Antegrade subintimal  
Retrograde intimal

## After the retro-set up



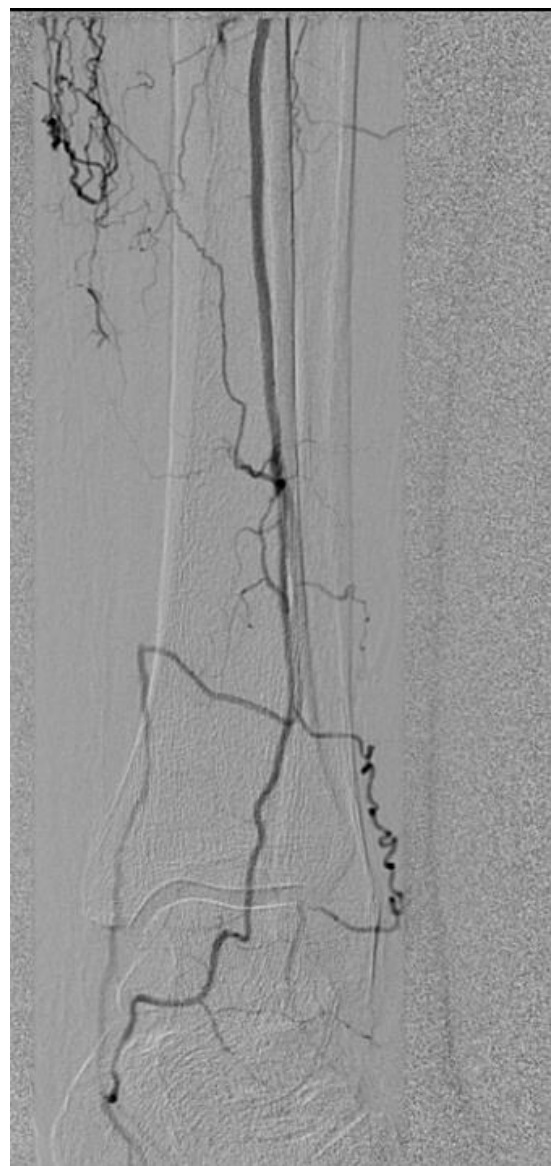
Reverse  
CART

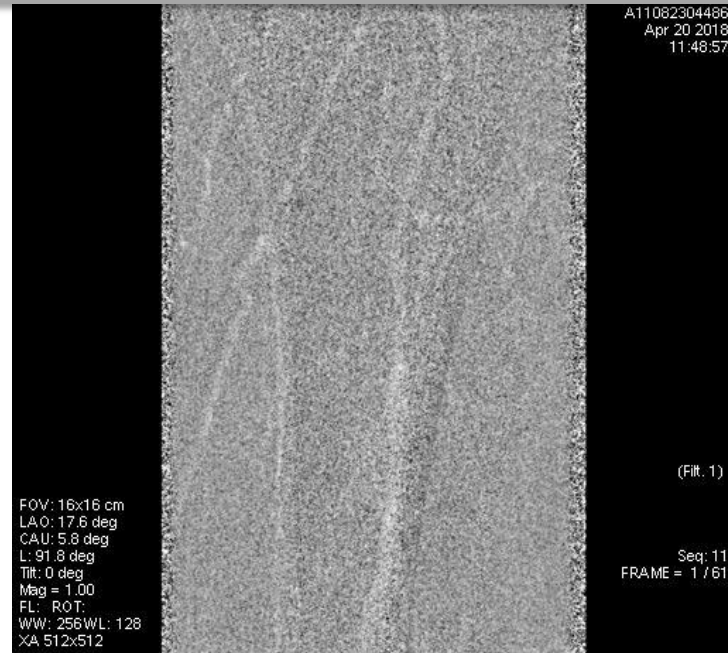
CART

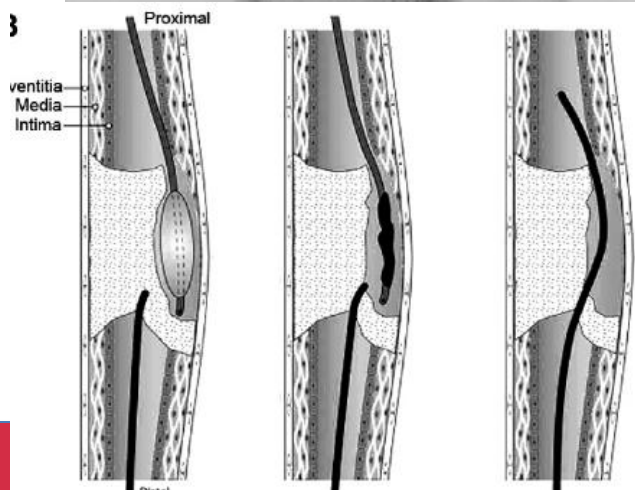
Double  
balloon

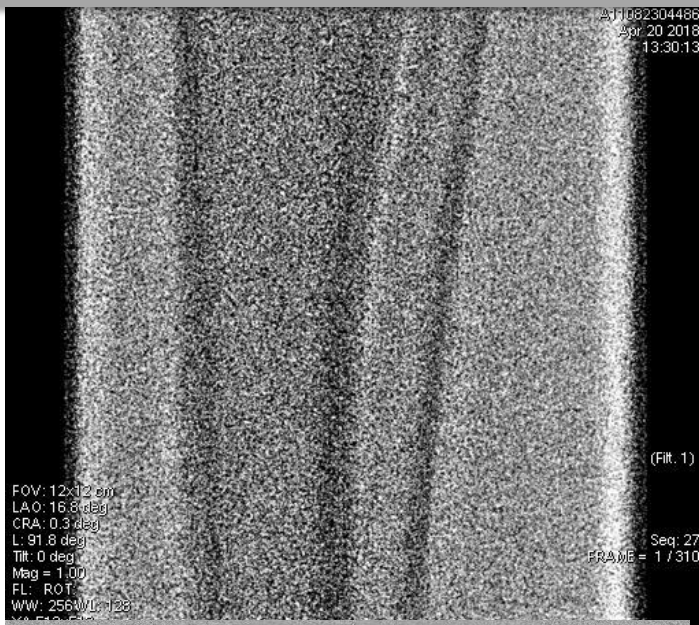
Wire  
rendezvous

Several technique for reconstitution

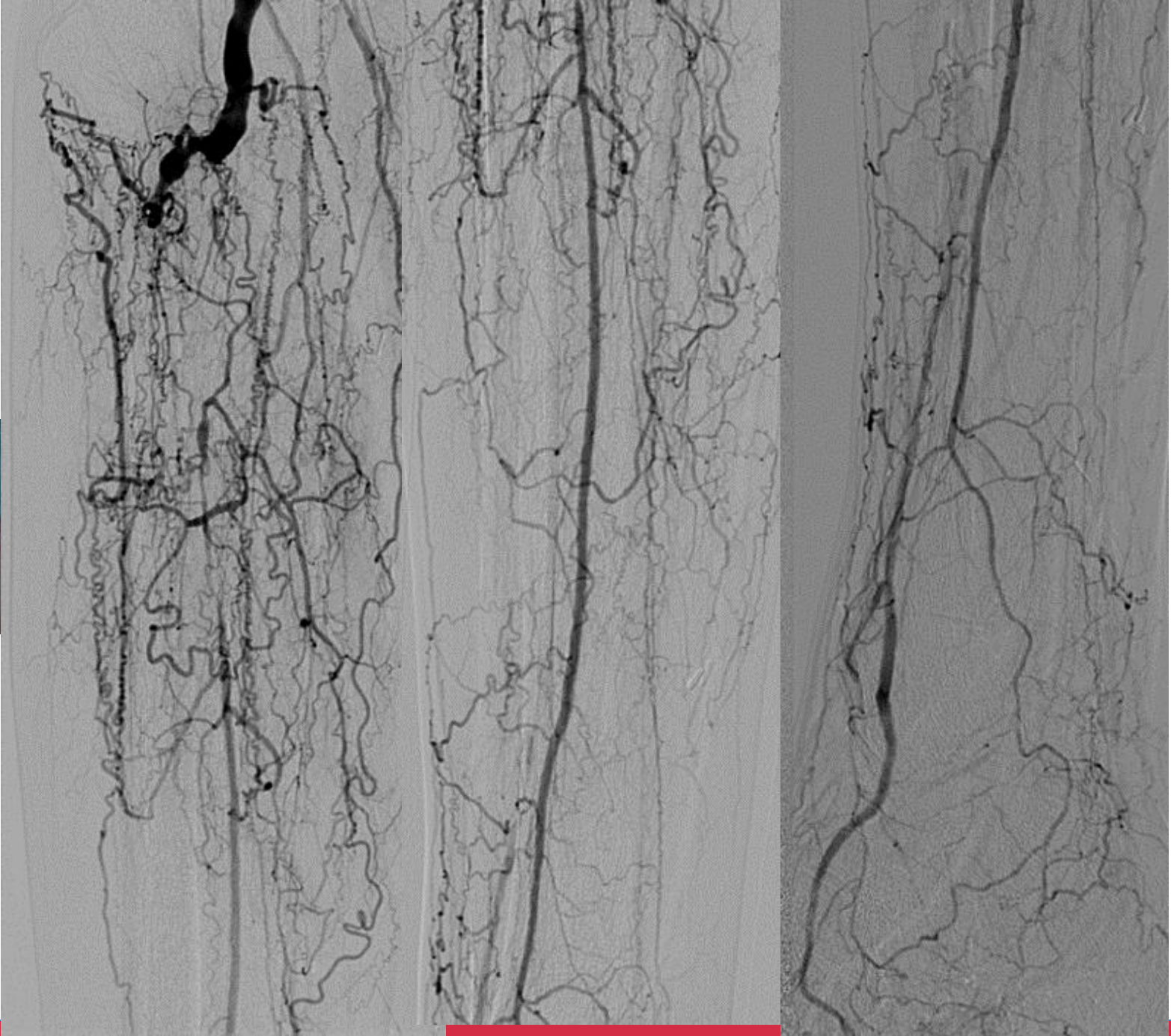


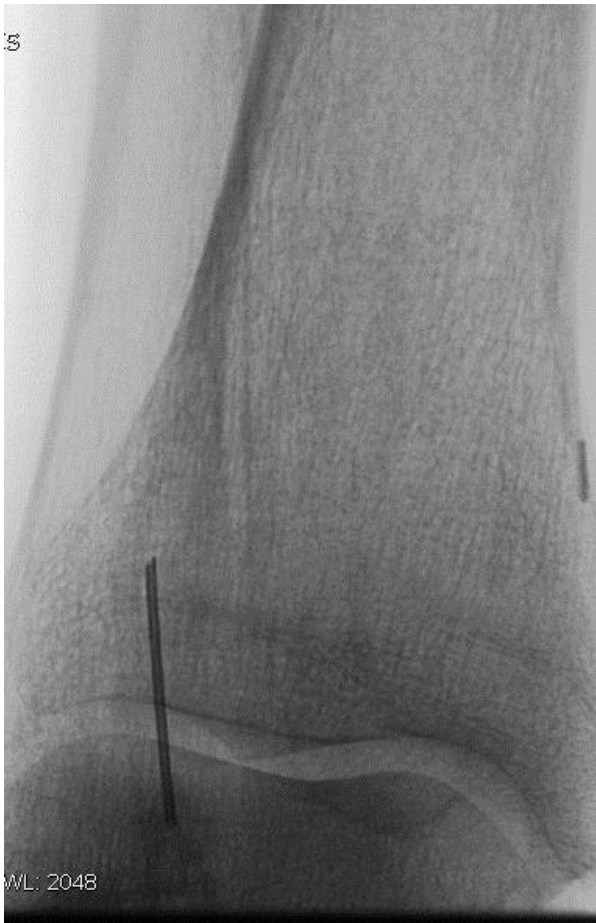


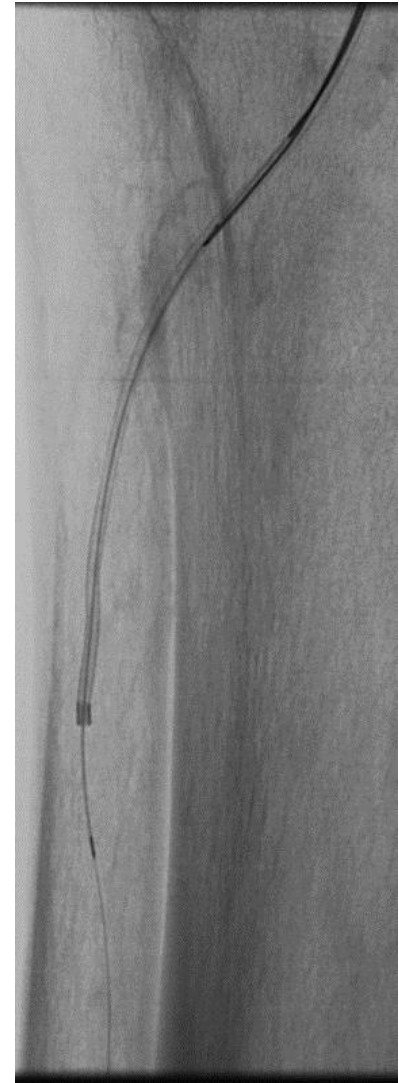
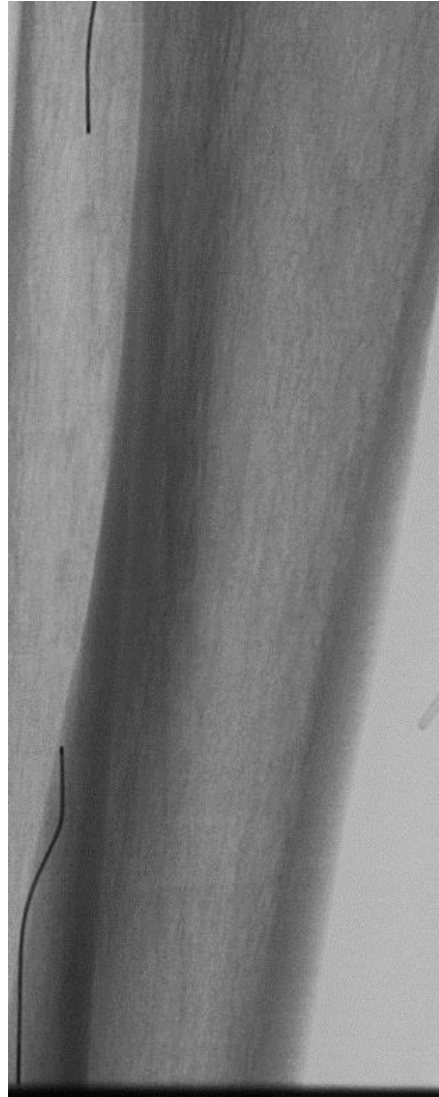


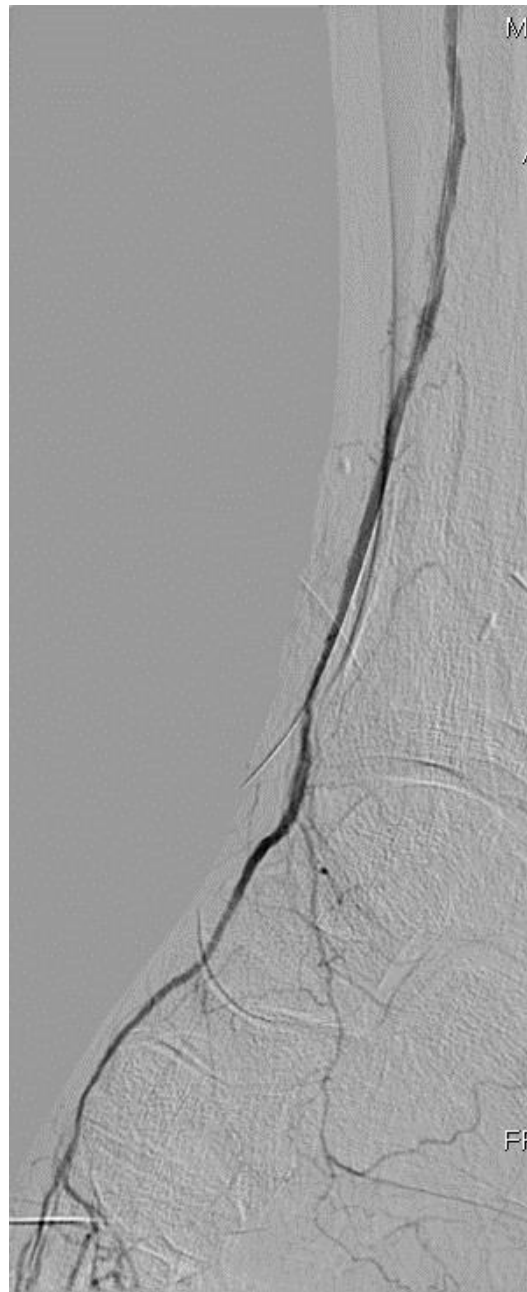
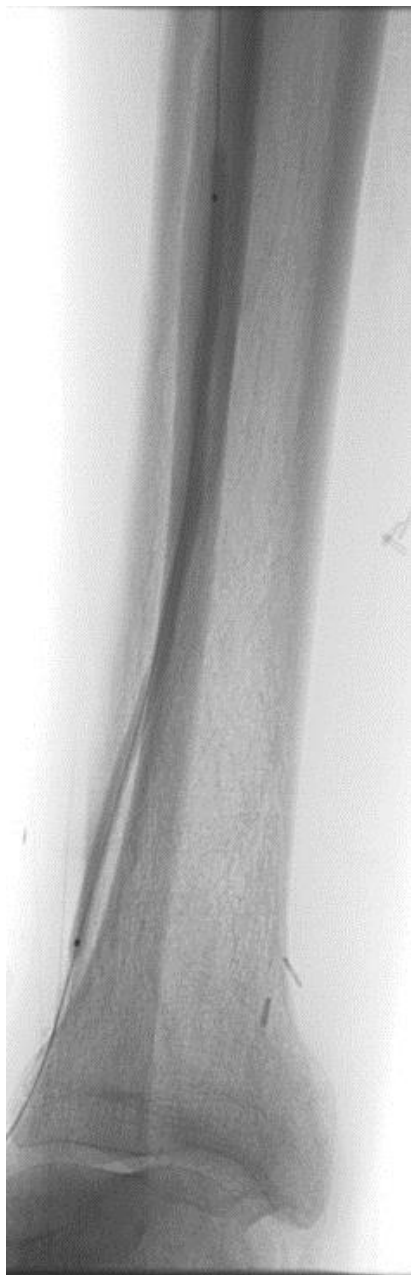
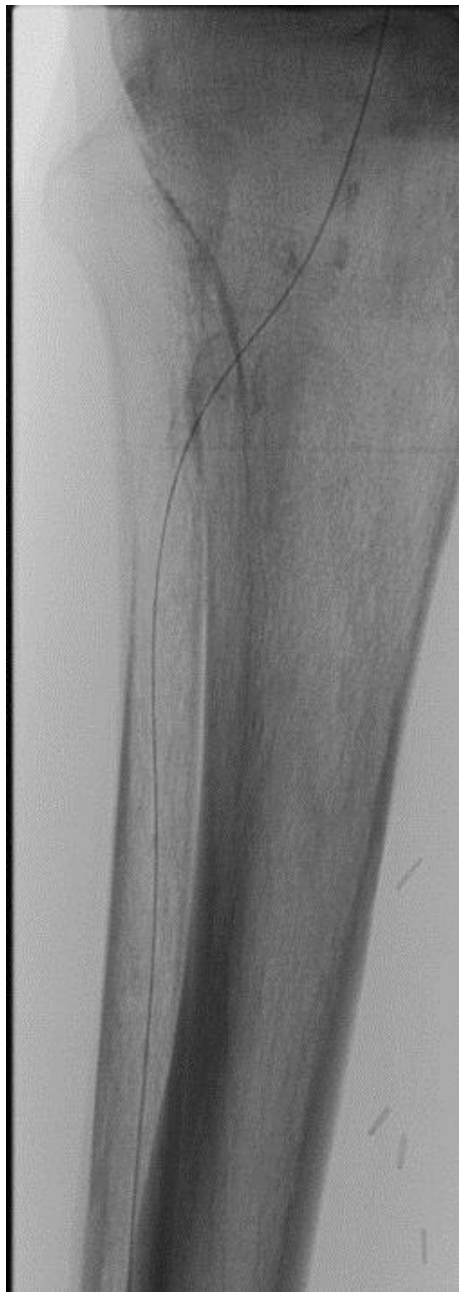










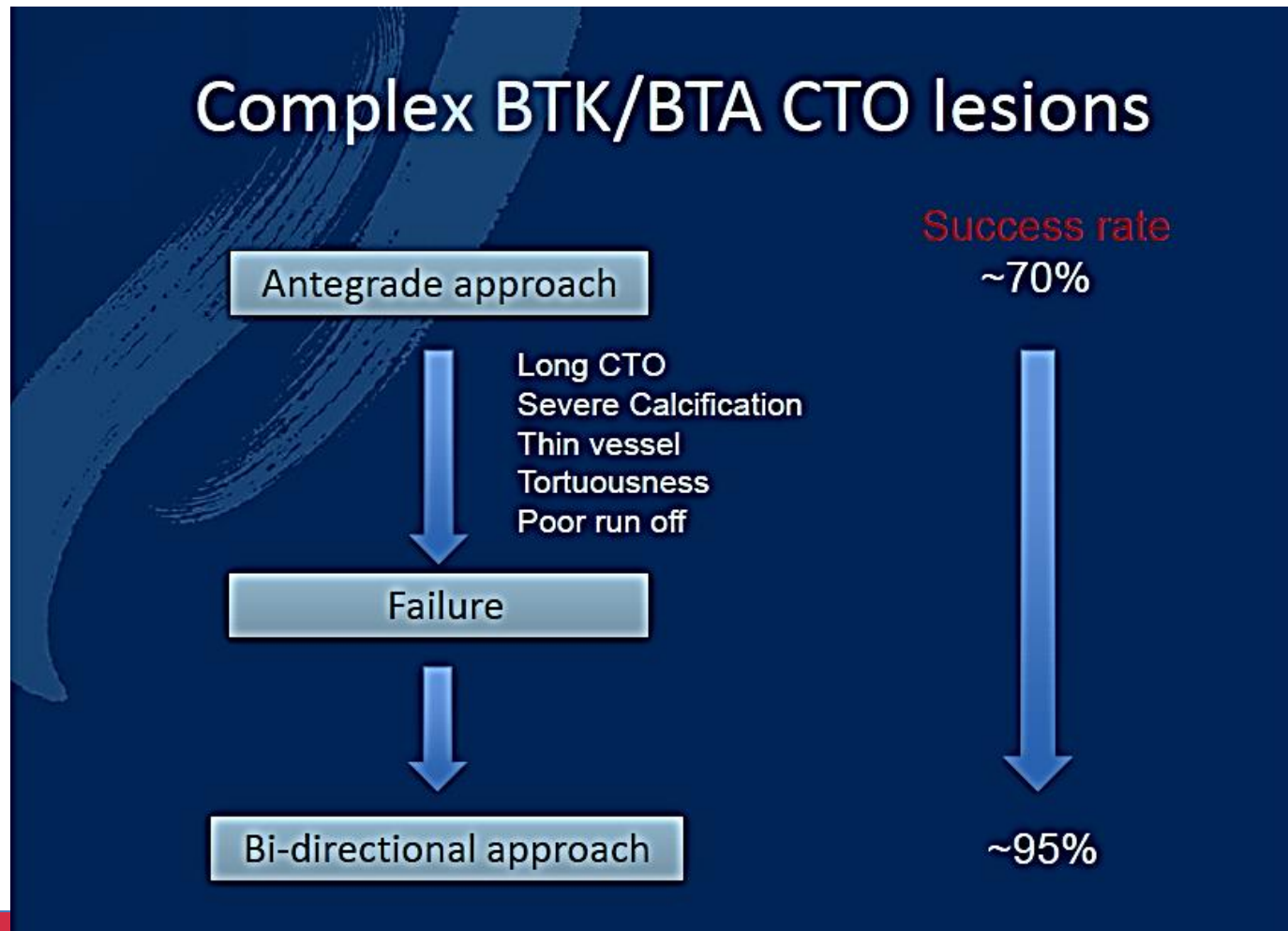


# CHANGEMENT DE PARADIGME:

TENDANCE A ZAPPER LE SOUS INTIMAL ANTEGRADE  
APRES 15 mn D'ECHEC



RETRO!!





**ET LES ANGIOPLASTICIENS!!!!**