How to Treat Complex Lesions by Radial Approach

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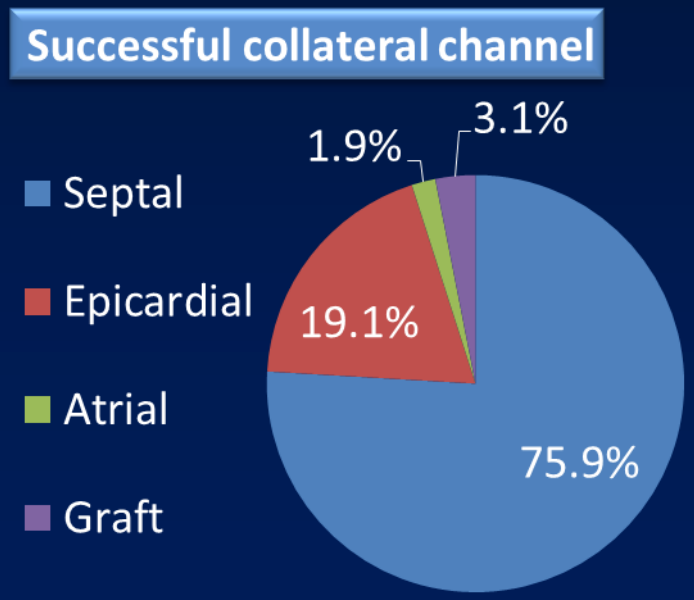
Tsukuba Heart Center
Tsukuba Memorial Hospital

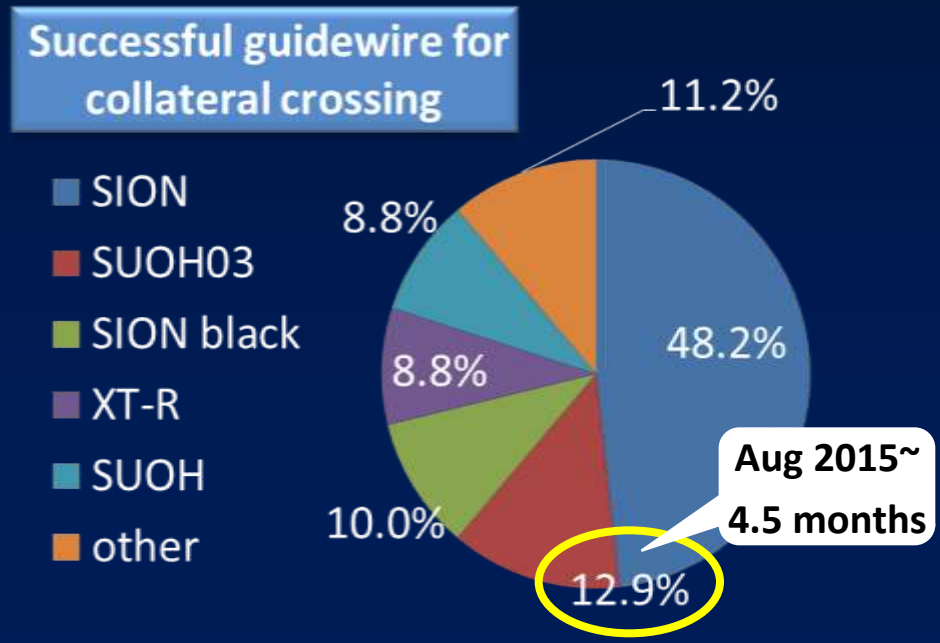
Disclosure Statement of Financial Interest

I, Kenji Wagatsuma DO NOT have a financial interest/arrangement or affiliation with one or more organizations that could be perceived as a real or apparent conflict of interest in the context of the subject of this presentation

Access and collateral channel

- Primary retrograde/ all retrograde: **50.9%** (111/218)
- Access site: **Femoral(87.4%)**, Radial(12.1%)
- Guiding catheter size: **7Fr.(69.3%)**, 8Fr.(22.3%)
- Successful collateral crossing by GW: **78.9%**
- Guidewire# used for collateral crossing: **1.8**





EXCEL

PCI Procedure

935 patients, 1021 planned procedures, 2287 stents

Planned staged procedures	9.1%
Arterial access site*	
- Femoral	72.9%
- Radial	26.9%
- Brachial	0.2%
IVUS guidance	77.2%
FFR assessment	9.0%
Hemodynamic support device*	5.2%
Contrast use* (cc)	256 ± 127
Fluoroscopy time* (min)	24 ± 16

# Vessels treated per pt*†	1.7 ± 0.8
- LM	100.0%**
- LAD	28.3%
- LCX	16.6%
- RCA	26.7%
# Lesions treated per pt*	1.9 ± 1.1
# Stents implanted per pt*	2.4 ± 1.5
- Total stent length (mm)*	49.1 ± 35.6
Type of stents implanted*	
- DES	99.8%
- EES	99.2%
- XIENCE	98.4%

*All procedures (Index + planned staged); **Excludes pts with LM equivalent ds;
†Max 4 vessels, including LM as a separate vessel

Stone GW. TCT16

Transradial vs. transfemoral left main PCI studies

Study (year)	De Maria GL, et al (2015)			Chung S, et al (2015)			Yang YJ, et al (2010)		
Total Patients(n)	467			853			821		
	TRI (n=246)	TFI (n=221)	P	TRI (n=212)	TFI (n=641)	P	TRI (n=353)	TFI (n= 468)	P
Cardiogenic Shock	3.7%	10.9%	0.01	Excluded		-	-	-	-
LV support	9.3%	22.2%	<0.001	-	-	-	-	-	-
True bifurcation	40.2%	60.2%	<0.001	30.2%	45.9%	<0.001	56%	67%	<0.001
Guide cath. 6Fr.	76.9%	72.4%	<0.001	49.5%	6.9%	<0.001	(avg. 6.1Fr.)	(avg. 6.9Fr.)	<0.01
7Fr.≤	23.1%	27.6%		-	-				
Double stent	16.7%	25.8%	0.02	25.9%	45.1%	<0.001	19%	38%	<0.001
Procedural Success	98.4%	95.9%	ns	98.6%†	99.7%†	0.07†	99%	99%	ns
Bleeding	2.0%*	6.3%*	0.02*	2.4%	9.4%	0.01	0.6%	2.8%	0.02
MACE at Follow-up	18.2%**	15.2%**	Ns**	9.9%	14.5%	0.08	10.2%	9.2%	ns

* Access-related complications, ** MACCE at 1 year, † Main vessel

Why is TRI not good for complex PCI ?

Less GC backup support compare to TFI?

Inconvenient to tortuous lesions, calcified lesions, etc.

TRI is something complicated, two or more guidewires insertion through 6Fr. guide makes procedure more complicated

Regarding CTO treatment, 7Fr. guide is mandatory?

Why is TRI not good for complex PCI ?

Less GC backup support compare to TFI?

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Regarding CTO treatment, 7Fr. guide is mandatory?

Mother-Child Catheter and Anchor Balloon: Key techniques for backup enhancement by TRI

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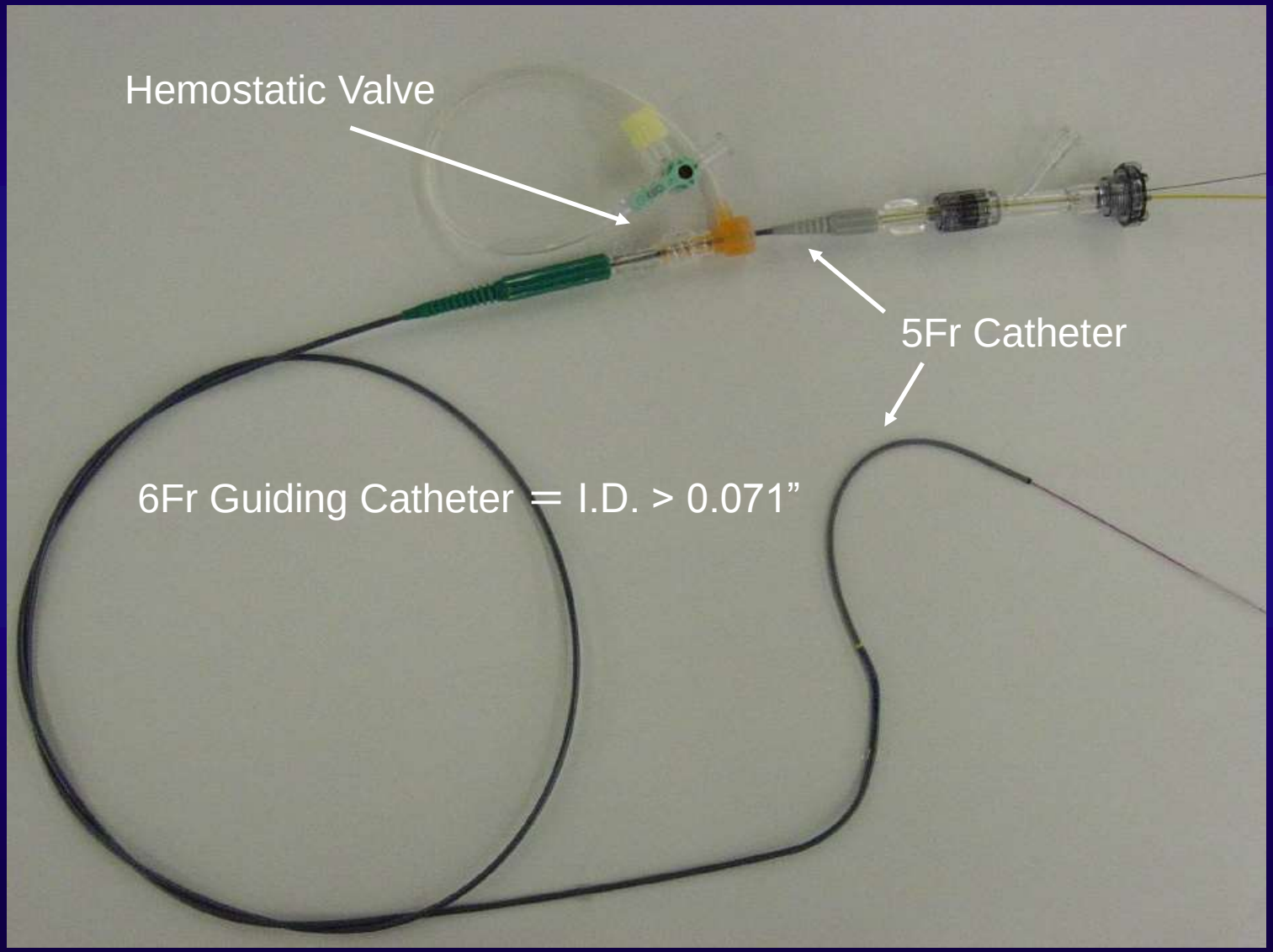
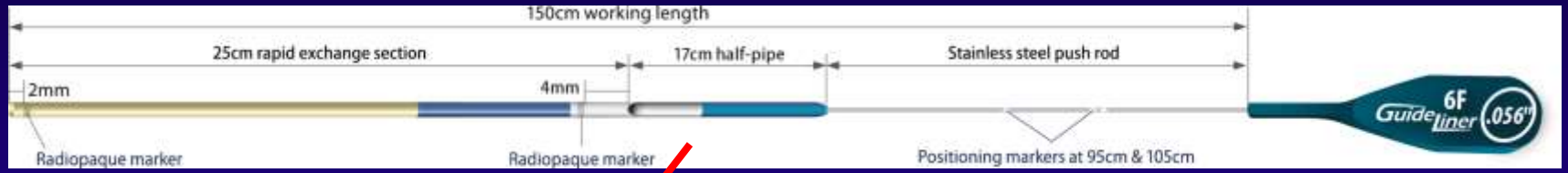
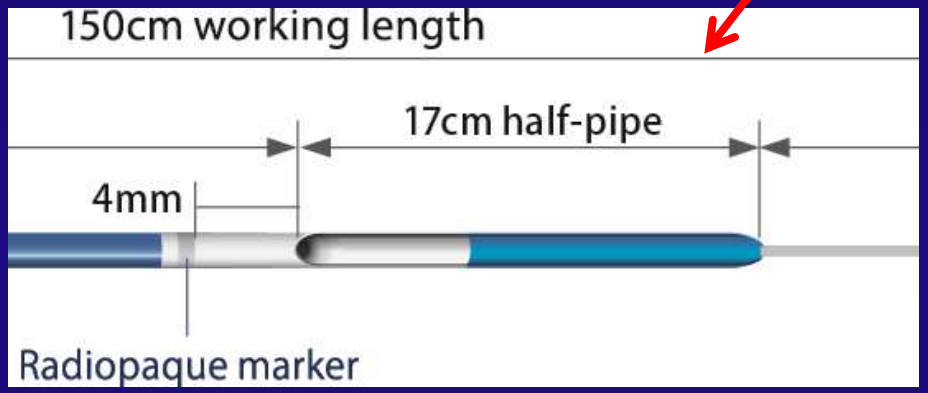
Deep seating

“ 5 in 6 “ system


Hemostatic Valve
5Fr Catheter
6Fr Guiding Catheter ＝ I.D. > 0.071”

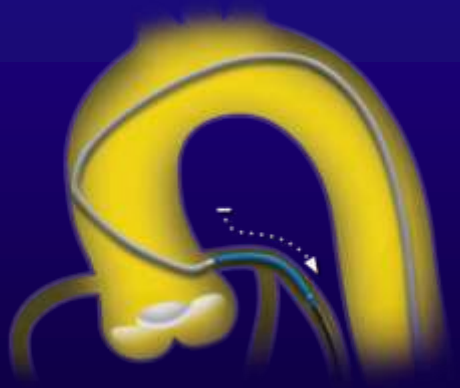
Guide extension system





The Guideliner™ Catheter

Guidezilla™ Guide Catheter Extension



TRI for LCx tortuous lesion

Case

AP, 70 y.o. Male
Rt. radial approach
GC: 6Fr. VL3.5
(Mach 1 BSC)

TRI for LCx tortuous lesion

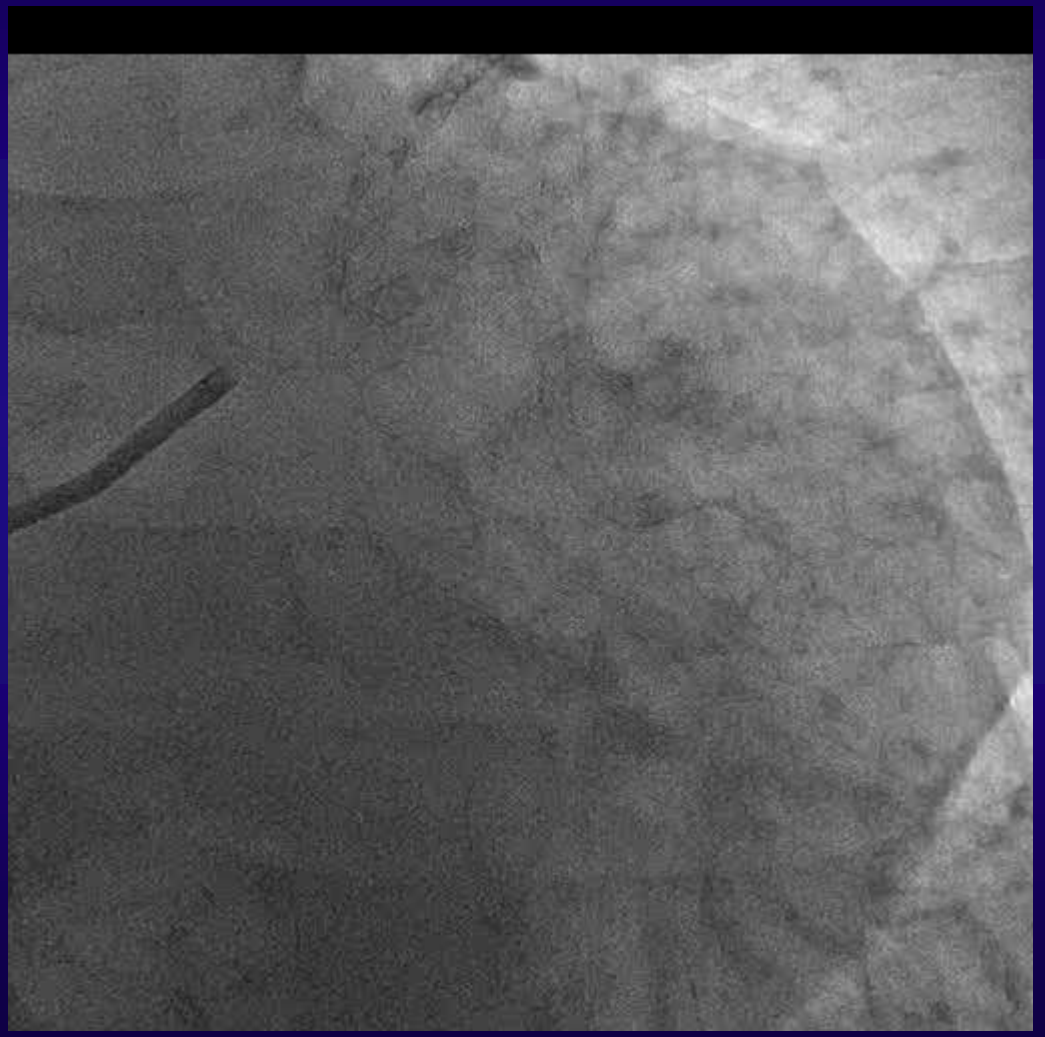
Case

AP, 70 y.o. Male
Rt. radial approach
GC: 6Fr. VL3.5 (Mach 1 BSC)
GW: SION blue (ASAHI INTECC)
Stent: 2.5/30 mm Resolute Integrity (Medtronic)
Inner Catheter: KIWAMI (Terumo)

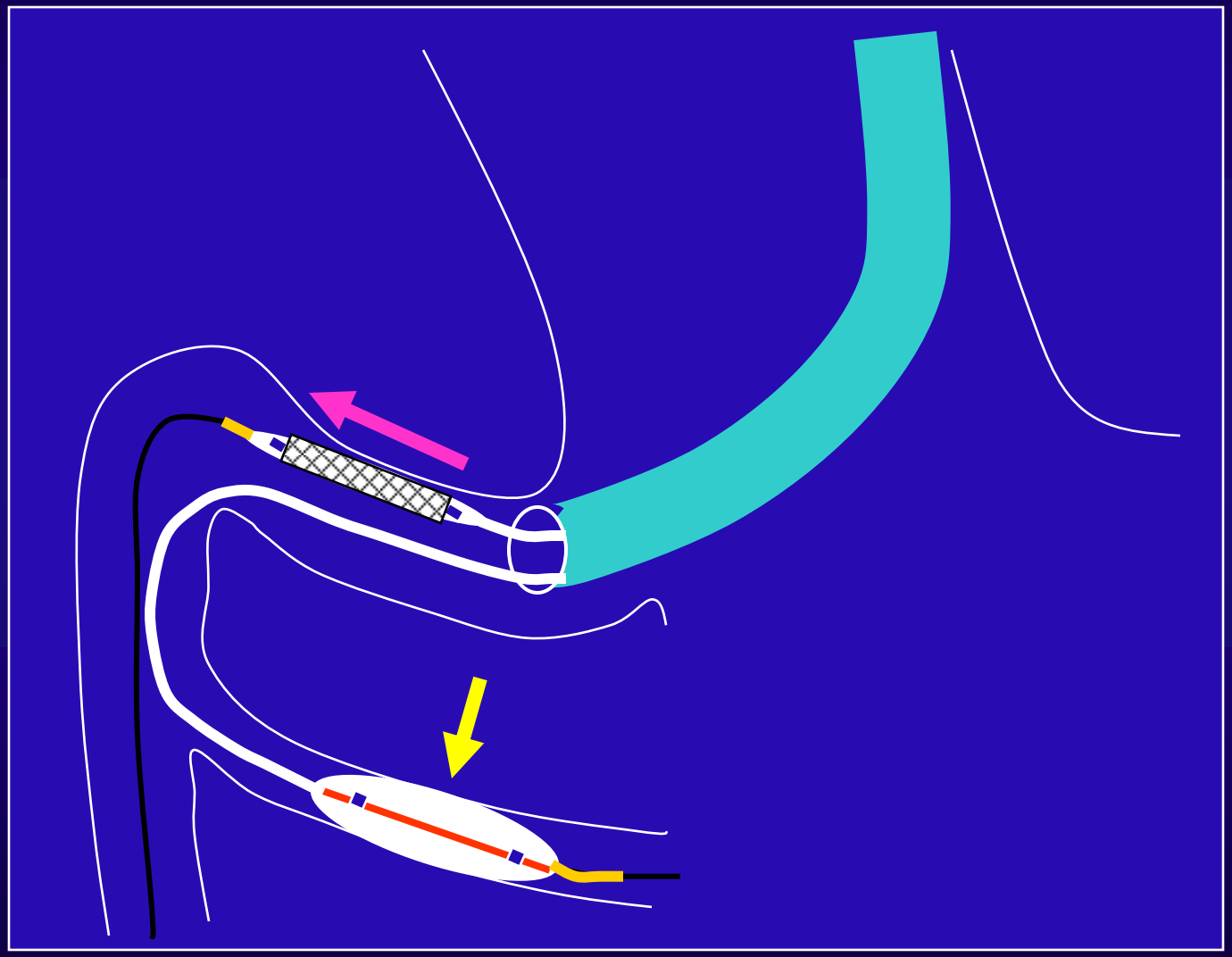
TRI for LCx tortuous lesion

Case

AP, 70 y.o. Male
Rt. radial approach
GC: 6Fr. VL3.5
(Mach 1 BSC)
Final result



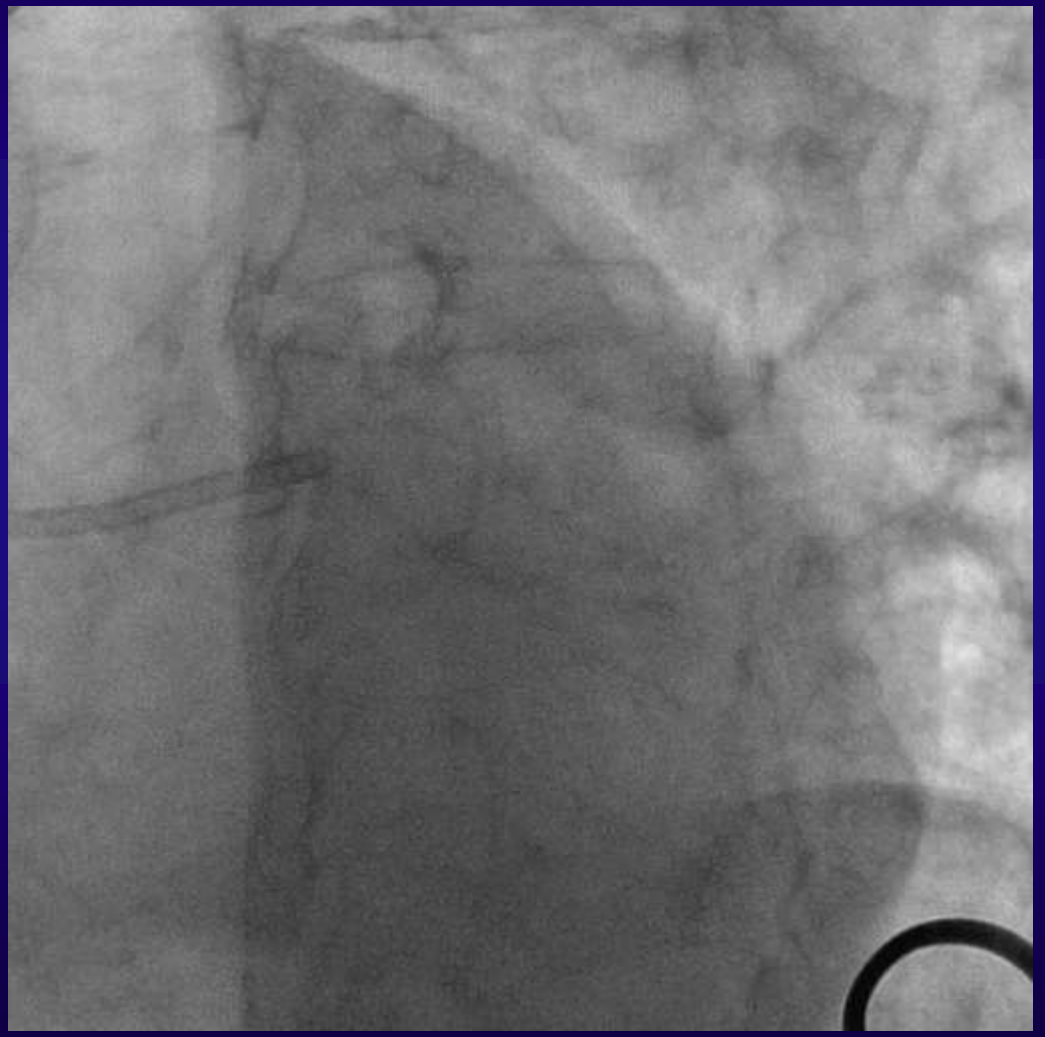
Basic Anchor balloon technique



Balloon Anchoring Technique in TRI

Case

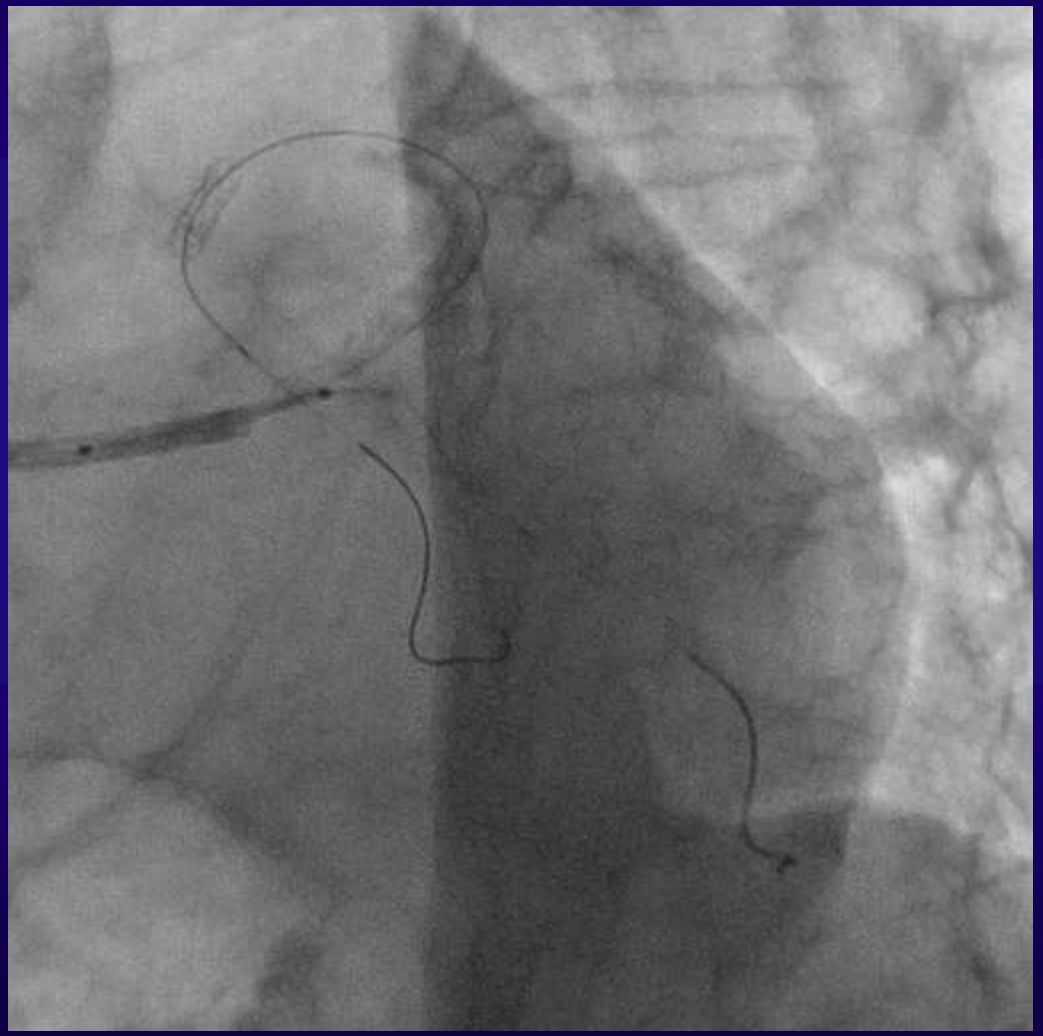
AP, 81 y.o. Male
Lt. radial approach
GC: 6Fr. VL3.5 SH
(Mach 1 BSC)



Balloon Anchoring Technique in TRI

Case

AP, 81 y.o. Male
Lt. radial approach
GC: 6Fr. VL3.5 SH (Mach 1 BSC)
GW: BMW universal II x2 (Abbott Vascular)
Stent: 2.25/16 mm Promus Element (BSC)



Balloon Anchoring Technique in TRI

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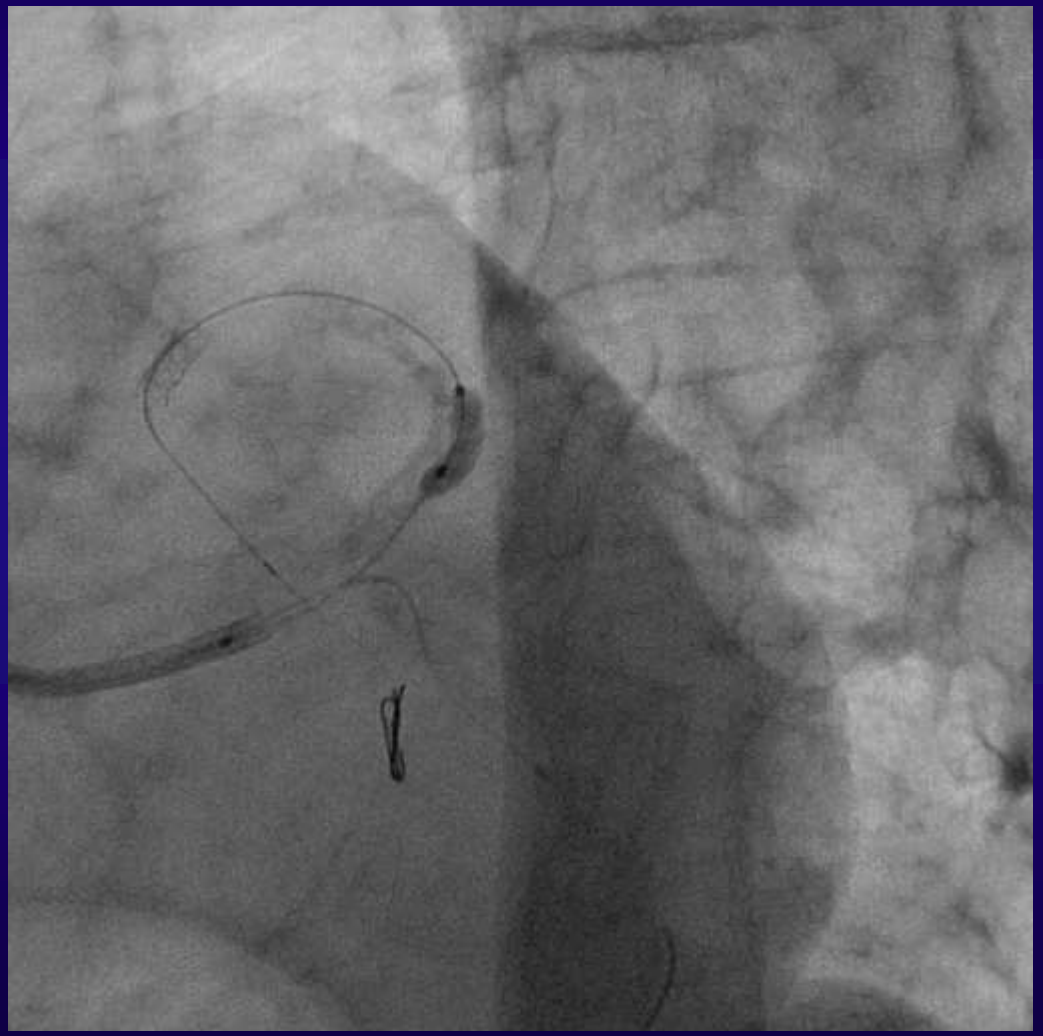
AP, 81 y.o. Male
Lt. radial approach
GC: 6Fr. VL3.5 SH (Mach 1 BSC)
GW: BMW universal II x2 (Abbott Vascular)
Stent: 2.25/16 mm Promus Element (BSC)
Anchor balloon: 2.5/15mm Tazuna (Terumo)



Balloon Anchoring Technique in TRI

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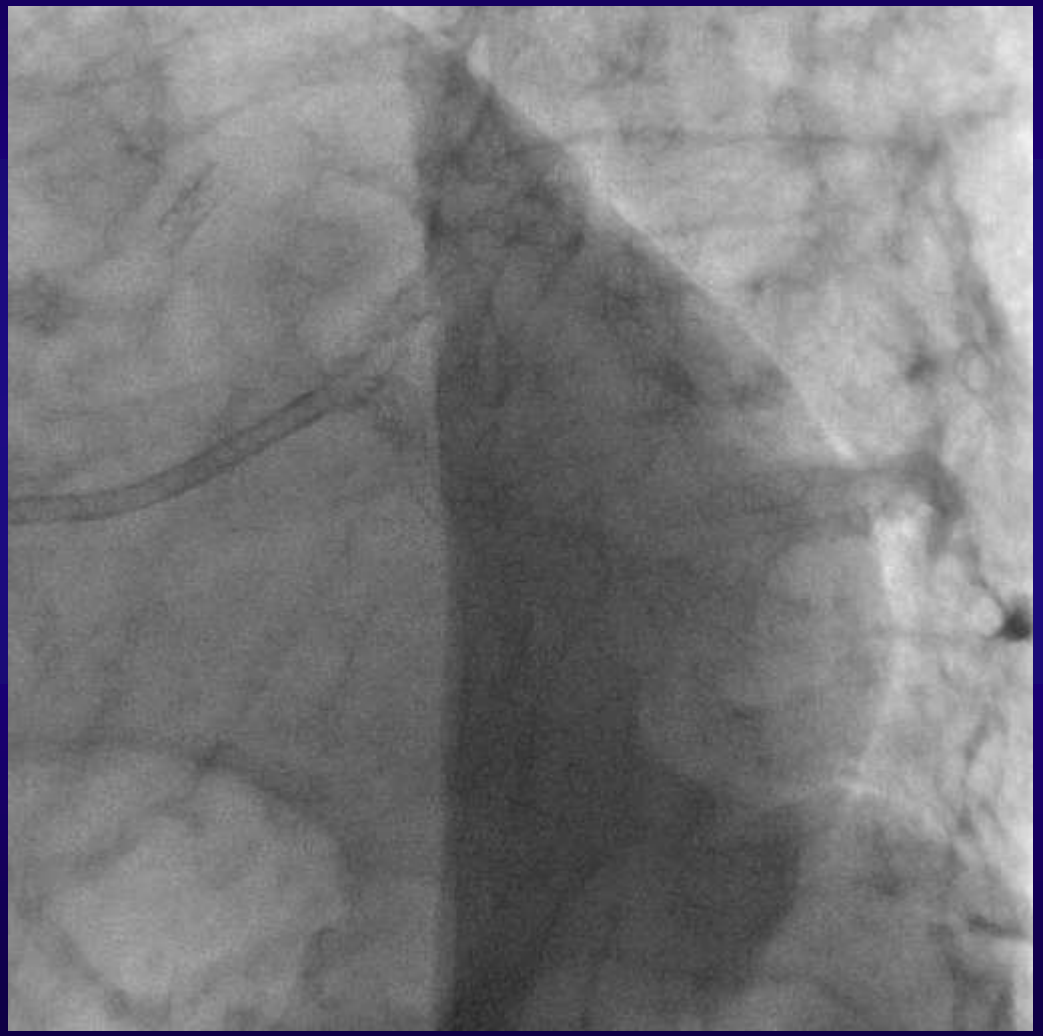
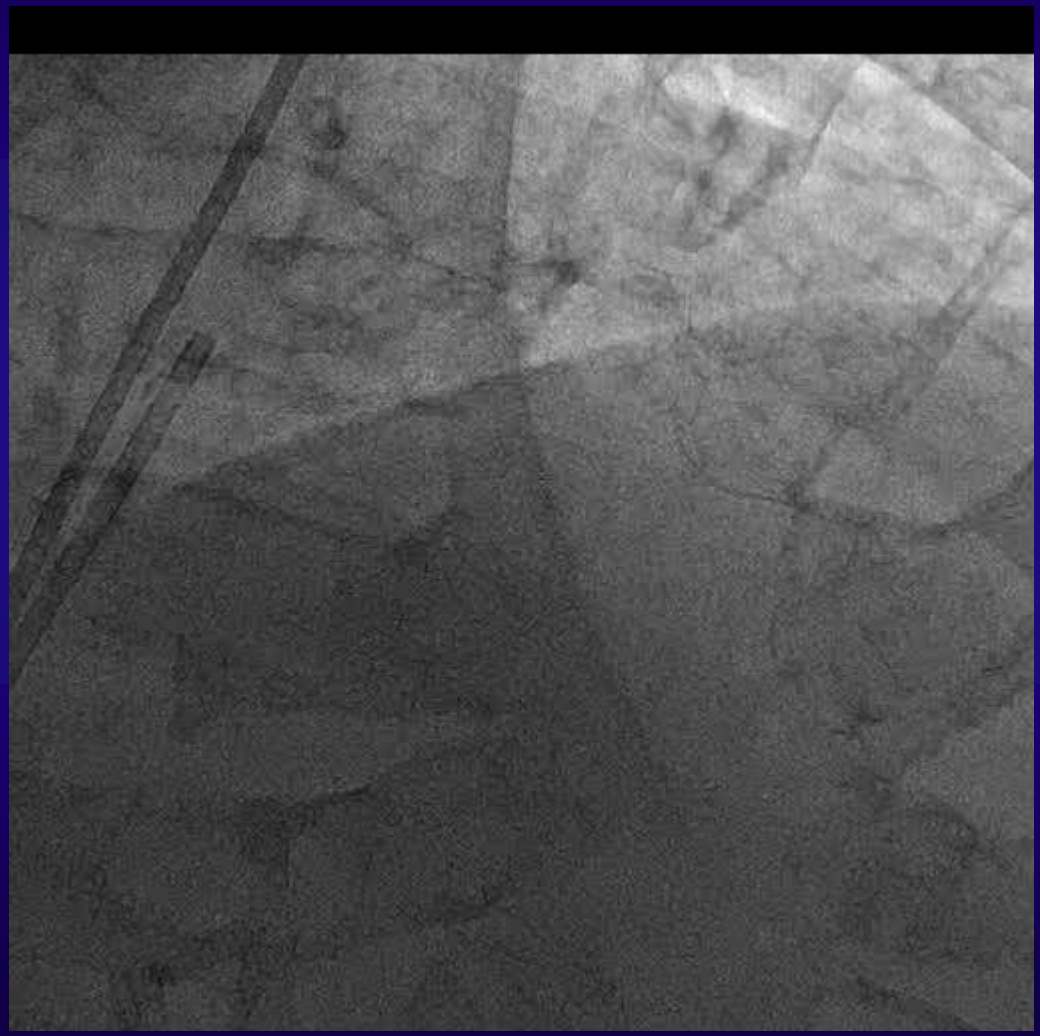
AP, 81 y.o. Male
Lt. radial approach
GC: 6Fr. VL3.5 SH
(Mach 1 BSC)
Final result



How about heavily calcified lesion?



ROTAXUS: Angiographic and Procedural Characteristics

	RA + PES (n = 146)	Standard Therapy (n = 176)	p Value
Location			0.06
Left main, protected	3 (2.1)	2 (1.1)	
Left anterior descending	101 (69.2)	111 (63.1)	
Left circumflex	7 (4.8)	22 (12.5)	
Right coronary artery	35 (24.0)	41 (23.3)	
Reference vessel diameter, mm	3.1 ± 0.4	3.1 ± 0.3	0.54
Lesion length, mm	20.6 ± 9.3	18.5 ± 9.2	0.04
Diameter stenosis, %	81.5 ± 10.2	80.0 ± 10.8	0.19
Ostial location	27 (18.5)	31 (17.6)	0.89
Bifurcation	72 (49.3)	82 (46.6)	0.79
Moderate/severe tortuosity	67 (46.2)	83 (47.2)	0.87
Severe calcification	65 (44.5)	86 (49.1)	0.61
B2/C lesion	137 (93.8)	152 (86.3)	0.15
7-F guiding catheter	122 (83.6)	50 (28.4)	<0.001
Balloon pre-dilation	130 (89.0)	160 (90.9)	0.48
Maximum pre-dilation balloon size, mm	2.5 ± 0.3	2.6 ± 0.4	0.41
Maximum pre-dilation balloon pressure, atm	13.6 ± 5.1	15.8 ± 4.9	0.003
Starting burr size, mm	1.5 ± 0.2	—	—
Maximum burr size, mm	1.5 ± 0.2	—	—
Use of >1 burr	8 (5.5)	—	—
Rotational speed, RPM	165,947 ± 8,919	—	—
No. of stents/lesions	1.3 ±0.6	1.3 ±0.6	0.38
Total stent length/lesions, mm	27.7 ± 12.2	25.2 ± 11.5	0.06
Balloon post-dilation	92 (63.0)	116 (65.9)	0.58
Maximum post-dilation balloon size, mm	3.3 ± 0.5	3.3 ± 0.4	0.84
Maximum post-dilation balloon pressure, atm	21.7 ± 5.8	21.5 ± 5.8	0.32

Abdel-Wahab M, et al. J Am Coll Cardiol Intv. 2013;6(1):10-19

Rotablator: Burr Size and Guide Selection

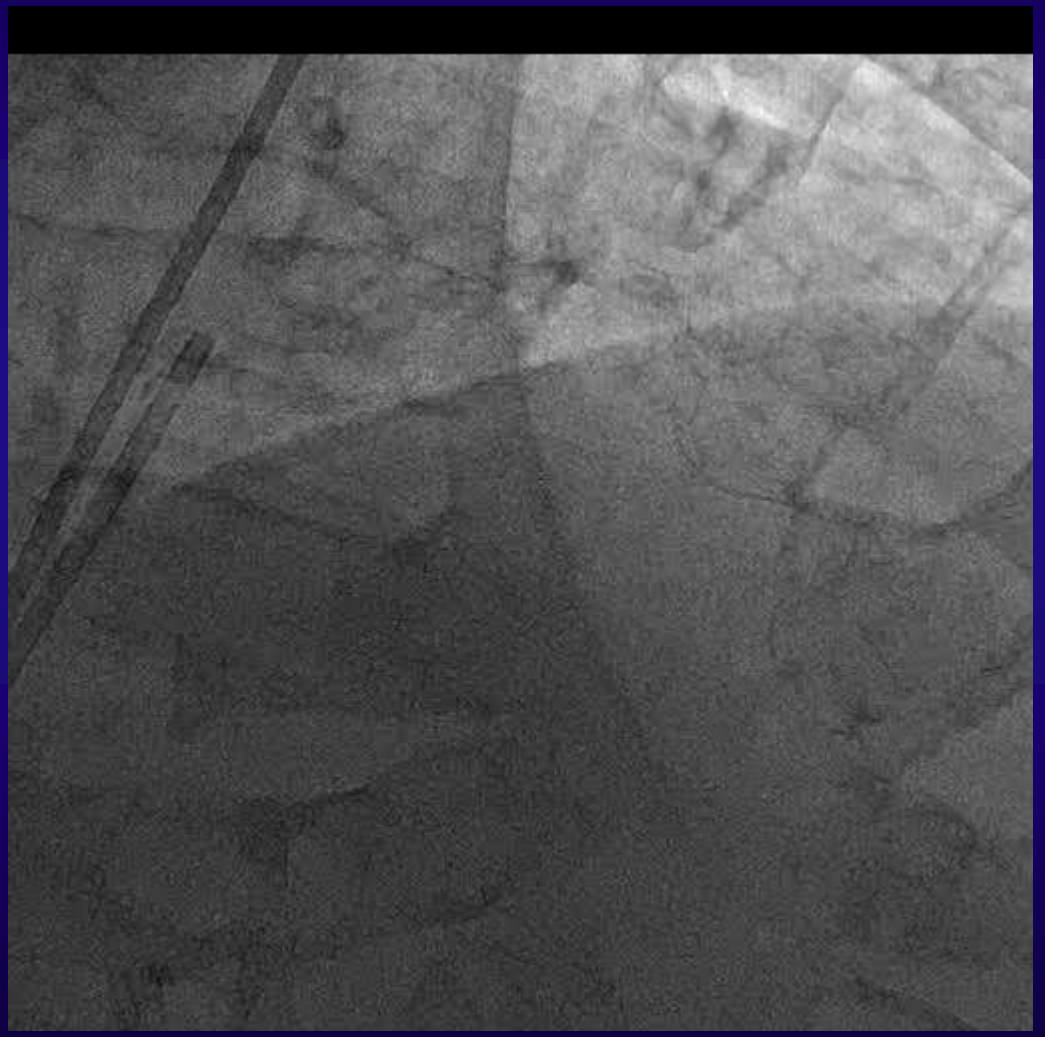
Burr Diameter			Minimum I.D. required (Inches)	Recommended GC French / Inner Diam.(Inches)	
mm	inches	french	inches	french	I.D.(inch)
1.25	0.049	3.75	*2 0.060	6F	0.070
1.50	0.059	4.50	0.063	6F	0.070
1.75	0.069	5.25	0.073	7F	0.081
2.00	0.079	6.00	0.083	8F	0.091
2.15	0.085	6.45	0.089	8F	0.091
2.25	0.089	6.75	0.093	NA	
2.38	0.094	7.14	0.098	NA	
2.50	0.098	7.50	0.102	NA	

Rotablator for Heavily Calcified Lesions by Radial Approach

TRI for Heavily Calcified Lesions

Case

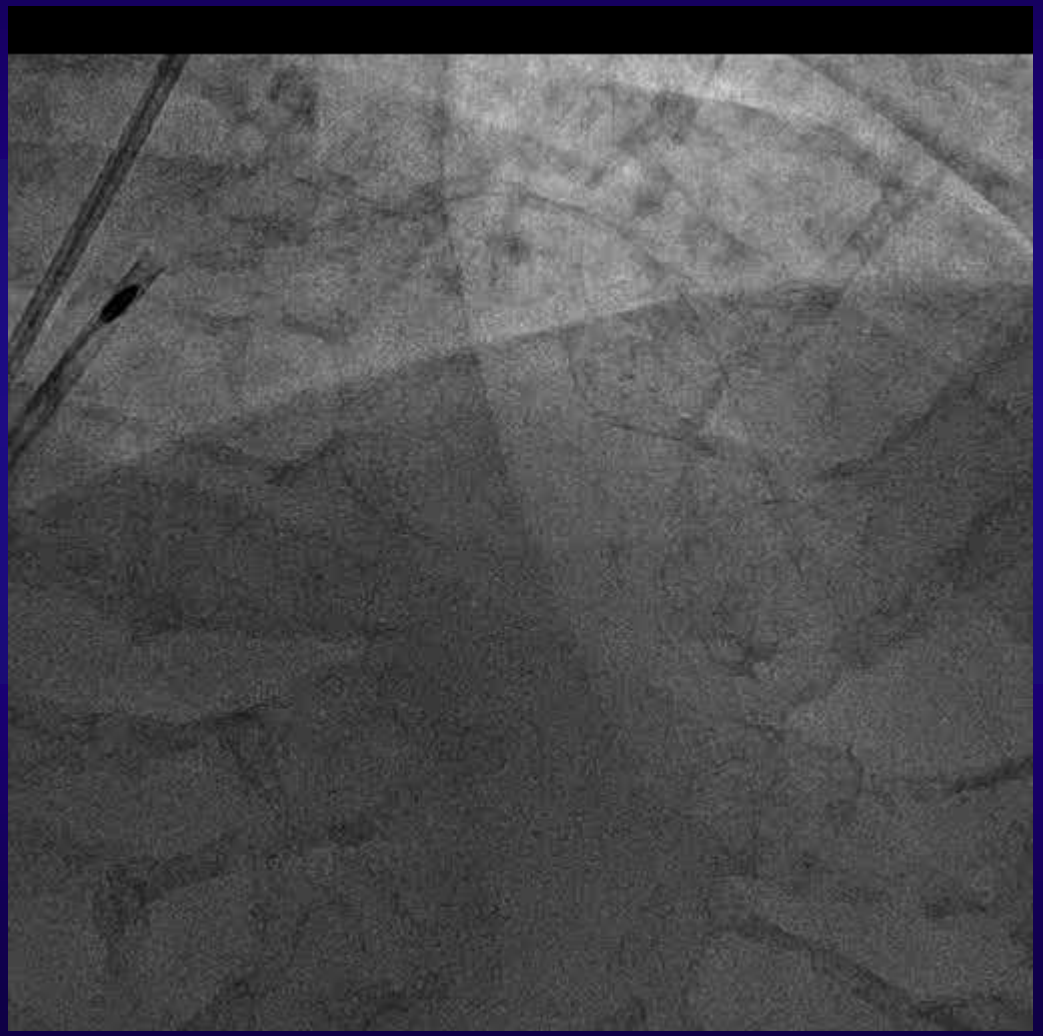
UAP, 79 y.o. Male
Lt. radial approach
GC: 6Fr. VL3.5
(Mach 1, BSC)



TRI for Heavily Calcified Lesions

Case

UAP, 79 y.o. Male
Lt. radial approach
GC: 6Fr. VL3.5 (Mach 1, BSC)
GW: RotaWire™ Floppy (BSC)
Rotablator:
RotaLink™ Plus
Burr size: 1.5mm (BSC)



TRI for Heavily Calcified Lesions

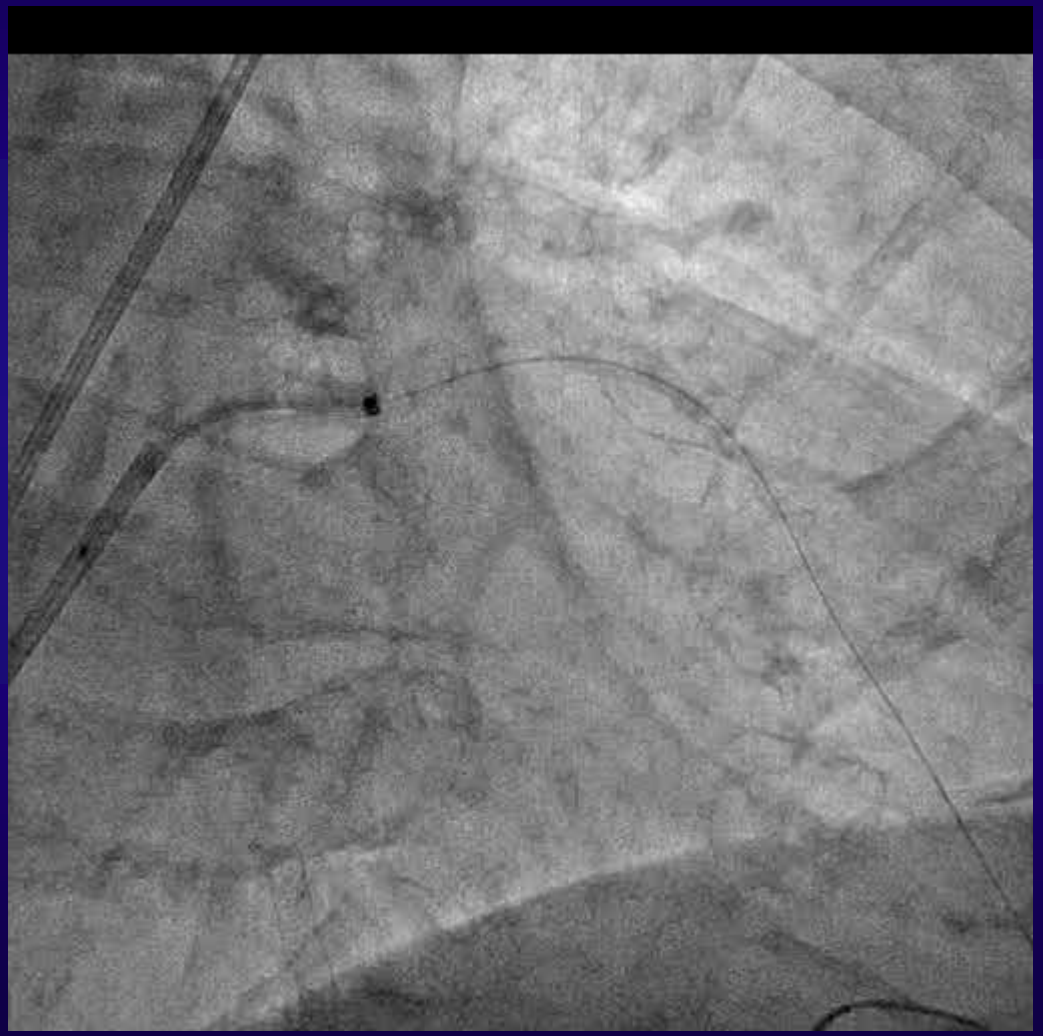
Case

UAP, 79 y.o. Male
Lt. radial approach
GC: 6Fr. VL3.5 (Mach 1, BSC)
GW: RotaWire™ Floppy (BSC)
Rotablator:
RotaLink™ Plus
Burr size: 1.5mm (BSC)

TRI for Heavily Calcified Lesions

Case

UAP, 79 y.o. Male
Lt. radial approach
GC: 6Fr. VL3.5 (Mach 1, BSC)
GW: BMW univ. II (Abbott Vascular)
Stent: 2.5/24 mm Nobori (Terumo)
Inner Catheter: 6Fr. Guideliner ™ (Vascular Solutions)



TRI for Heavily Calcified Lesions

Case

UAP, 79 y.o. Male
Lt. radial approach
GC: 6Fr. VL3.5
(Mach 1, BSC)
GW: BMW univ. II
(Abbott Vascular)
Balloon: 2.25/15 mm
NC Euphora (Medtronic)
Inner Catheter:
4Fr. KIWAMI
(Terumo)

TRI for Heavily Calcified Lesions

Case

UAP, 79 y.o. Male
Lt. radial approach
GC: 6Fr. VL3.5 (Mach 1, BSC)
GW: BMW univ. II (Abbott Vascular)
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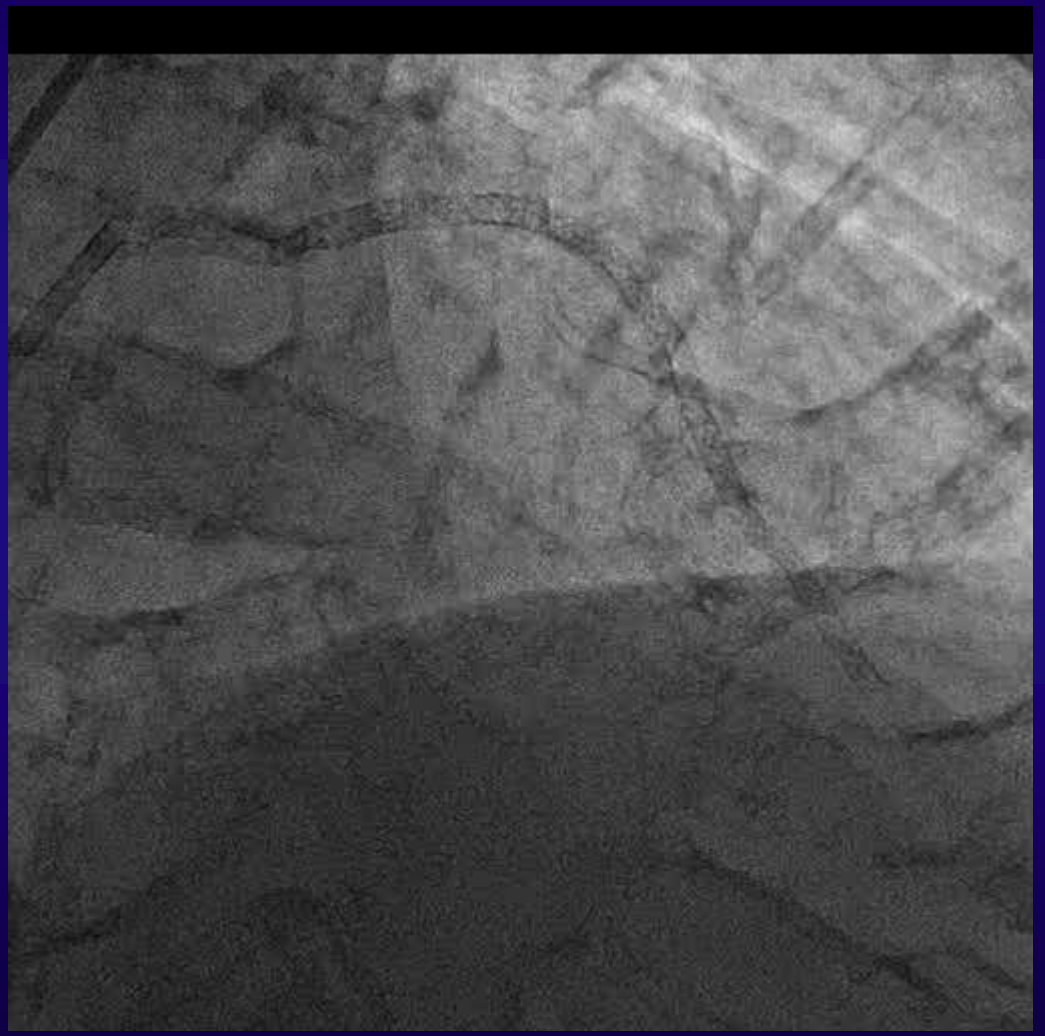
TRI for Heavily Calcified Lesions

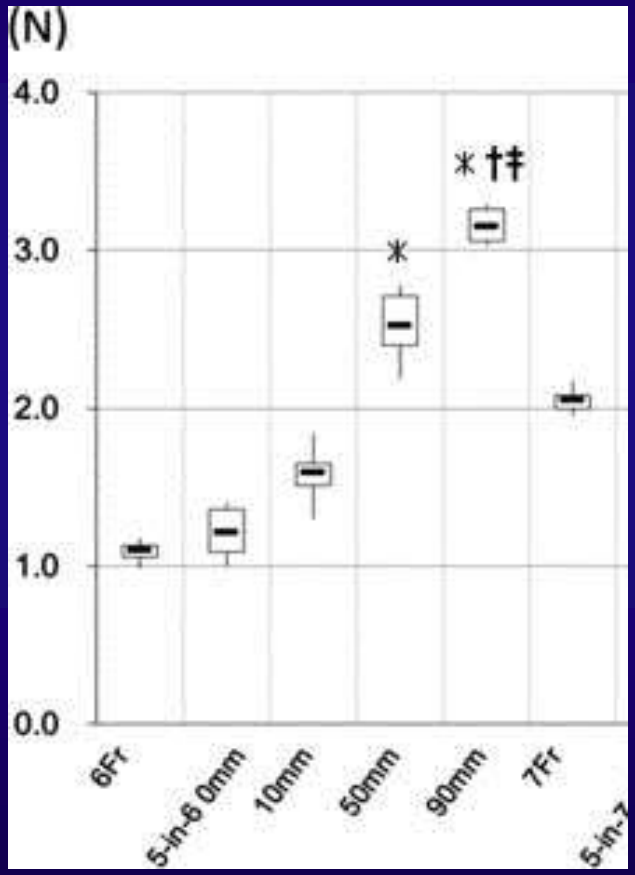
Case

UAP, 79 y.o. Male
Lt. radial approach
GC: 6Fr. VL3.5
(Mach 1, BSC)
Final result

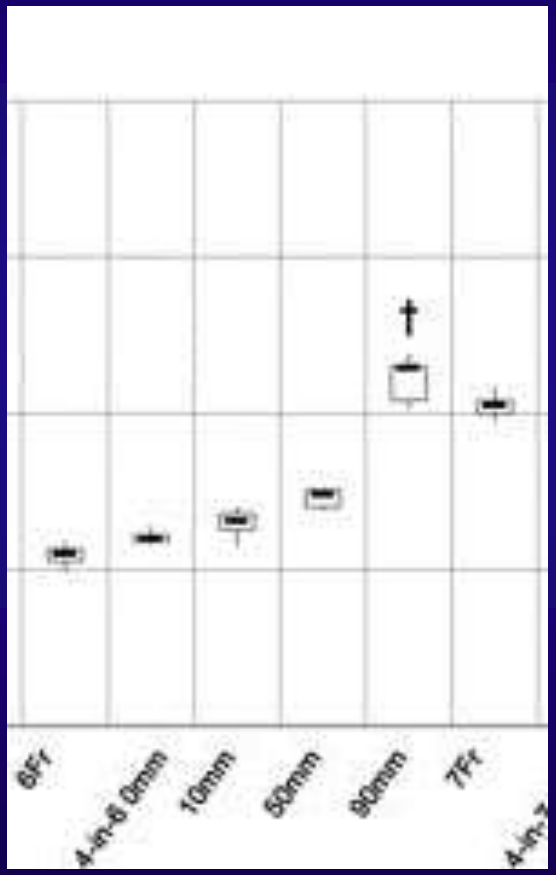


Backup support of the mother–child technique: Technical considerations for the size of the mother guiding catheter

“5 in 6”

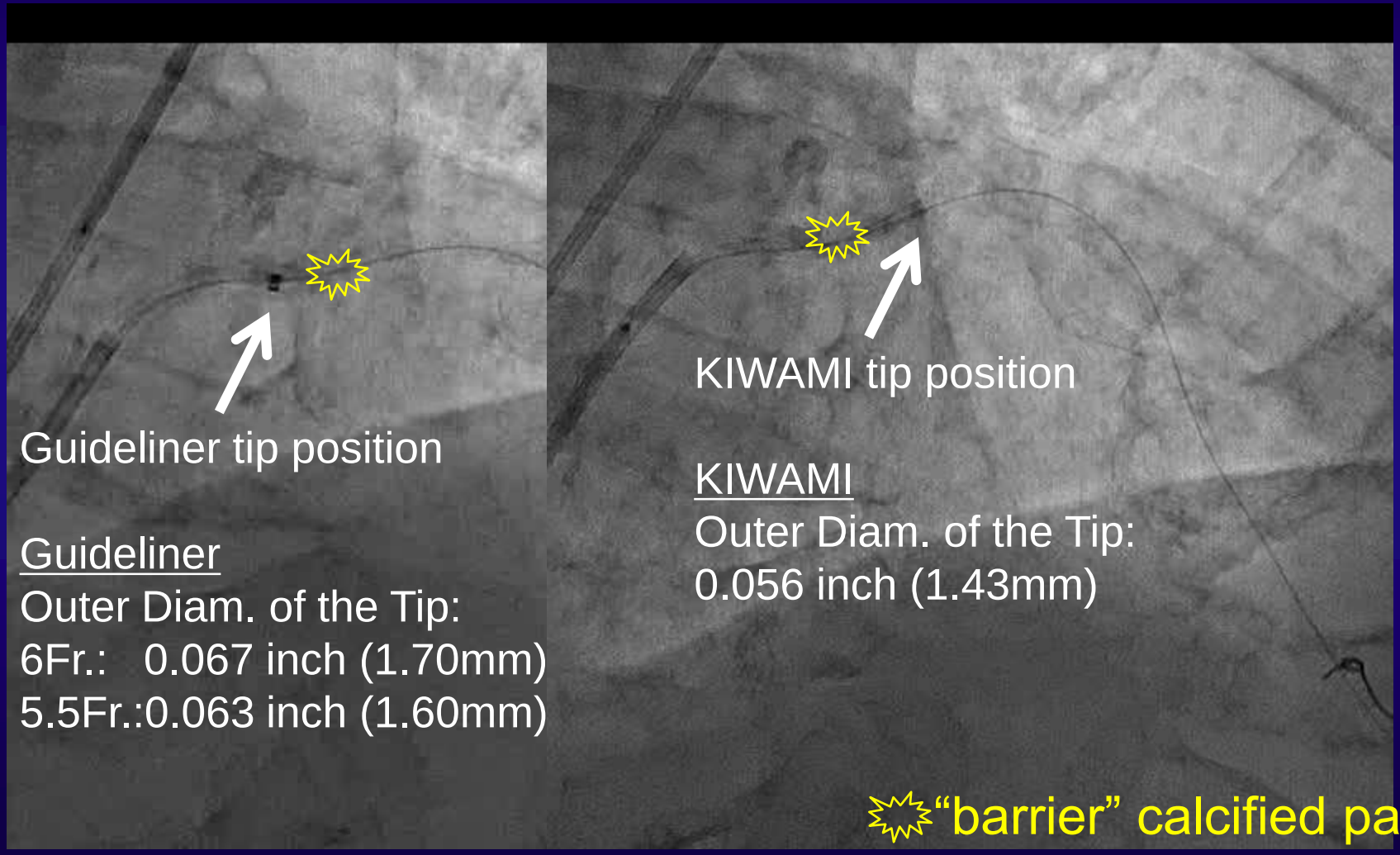


“4 in 6”



Takeshita S et al, *Cathet Cardiovasc Interv* 2012

Big inner catheter does not always provide sufficient back-up support



How to treat complex LM lesions/CTOs by radial approach

Tsukuba Heart Center, Tsukuba Memorial Hospital

TRI for trifurcated left main lesion

Case

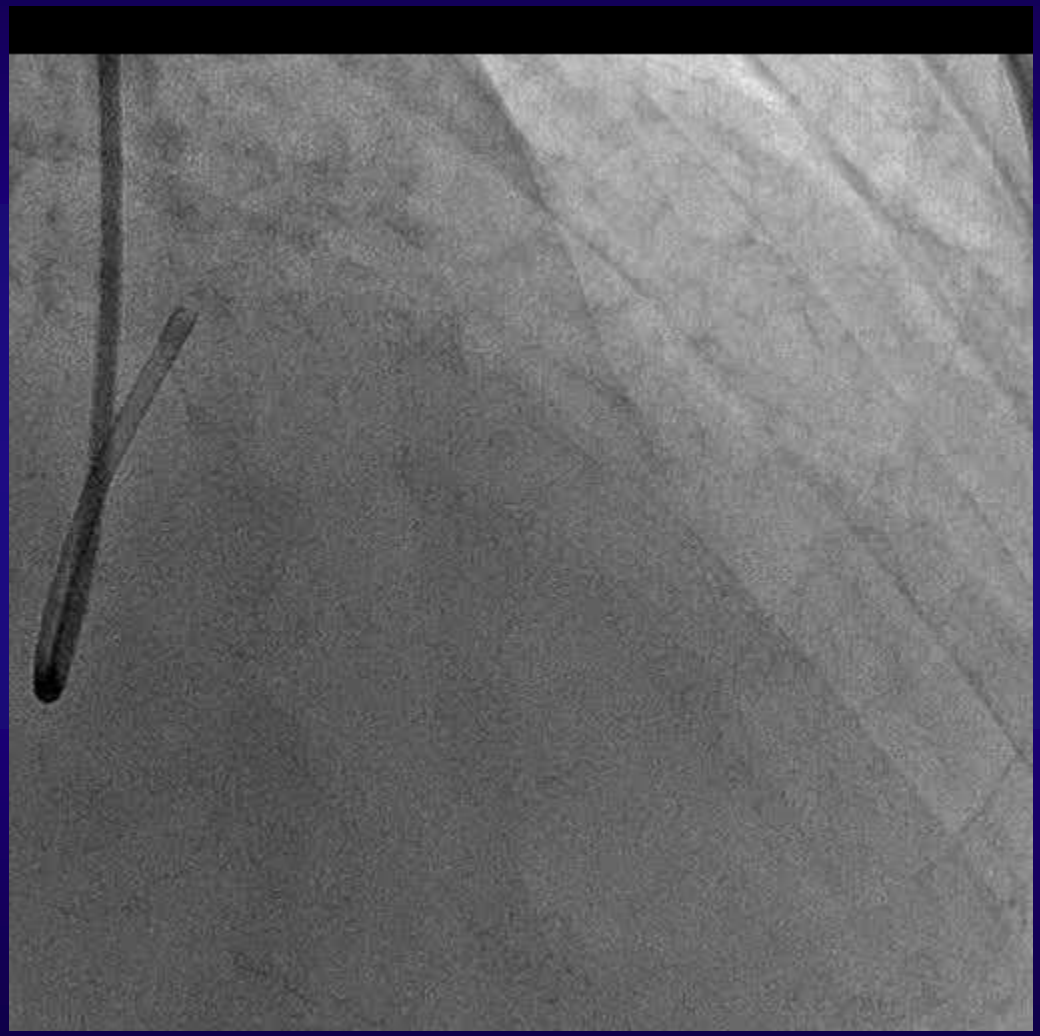
UAP

75 y.o. Male

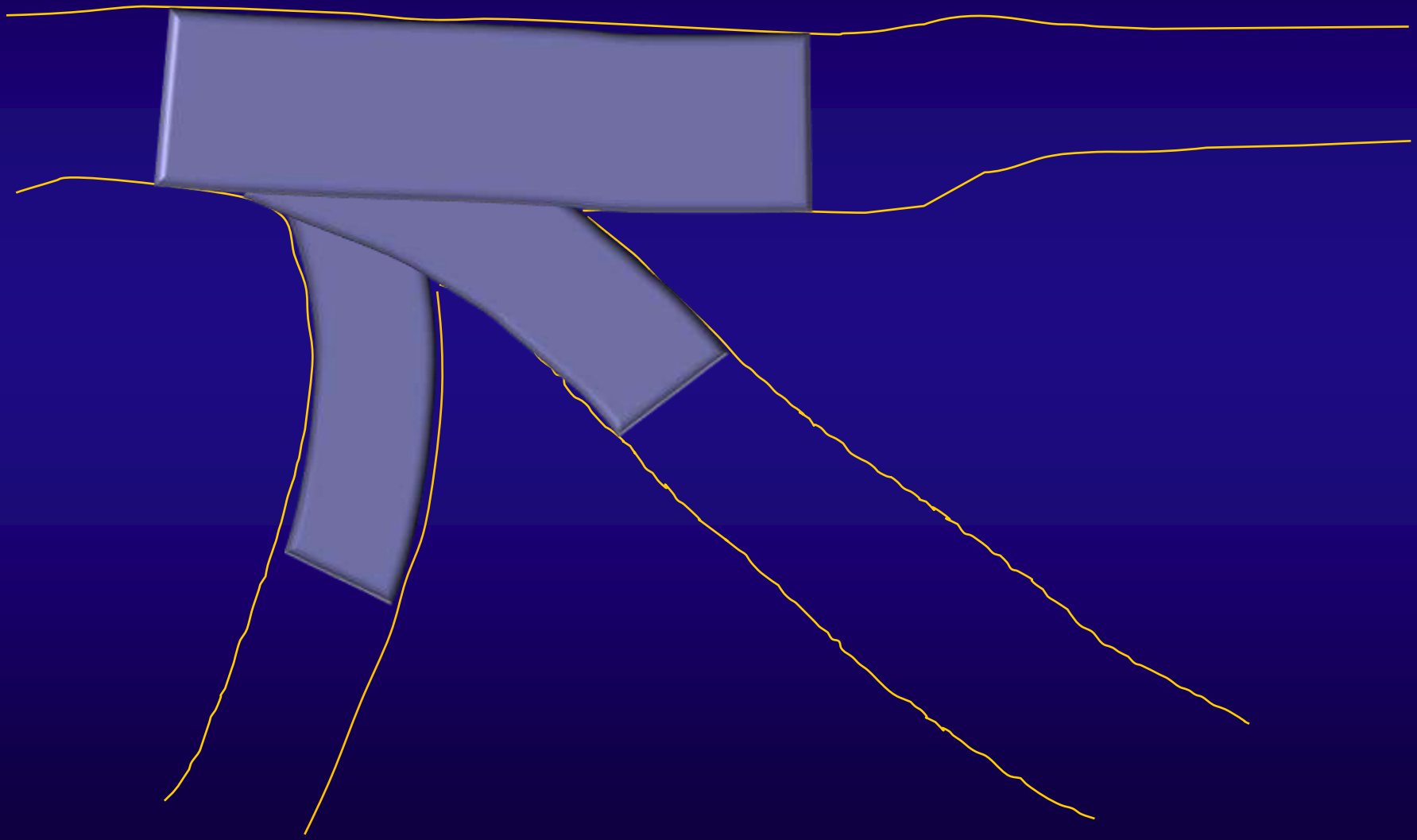
Lt. radial approach

GC: 6Fr. VL3.5

(Mach 1, BSC)



Double Mini-Crush Technique for Trifurcation Lesions by TRI



TRI for trifurcated left main lesion

Case

UAP

75 y.o. Male

Lt. radial approach

GC: 6Fr. VL3.5

(Mach 1, BSC)

Final result

Case: LM bifurcation and LAD CTO

PCI planning

LMT true bifurcation

LAD ost. CTO

→Antegrade

→Parallel wiring

→Retrograde

7Fr. Bilateral TRI

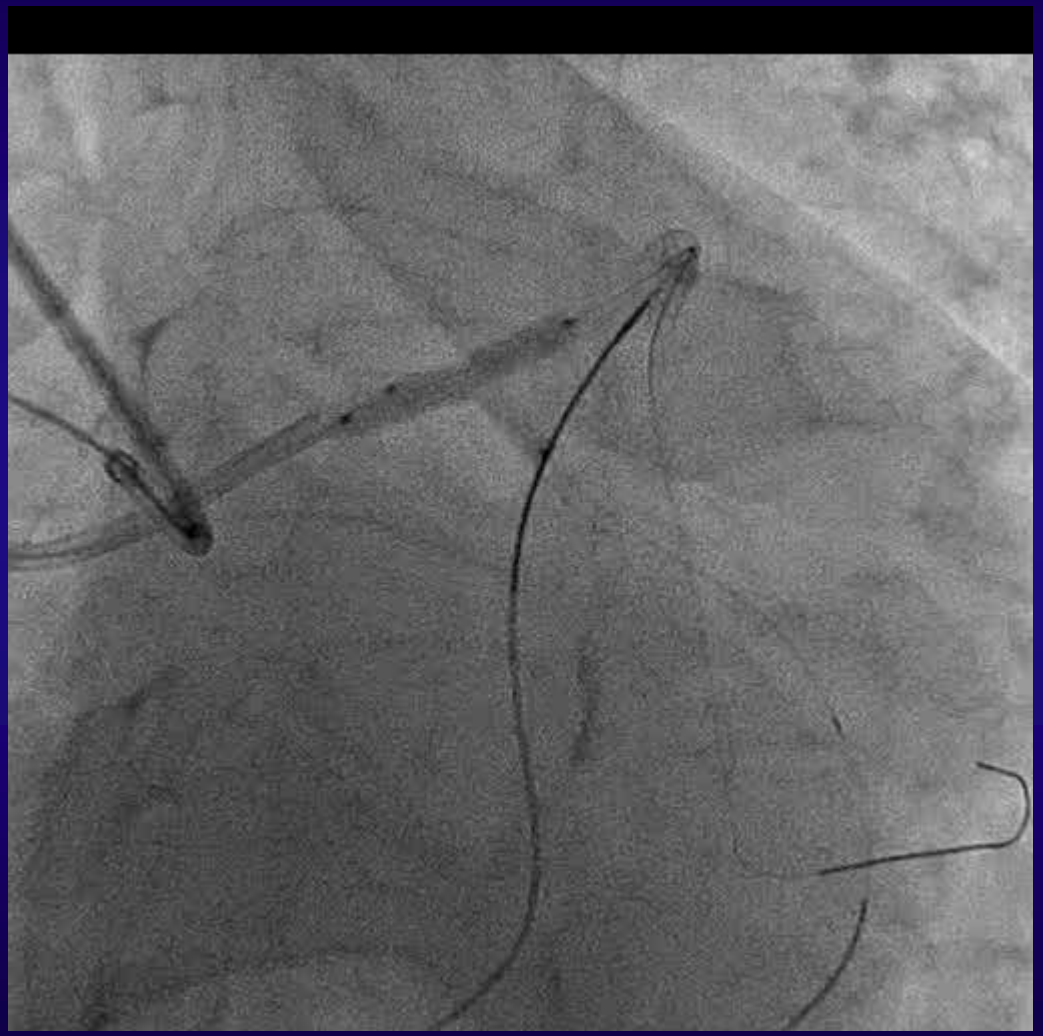
Case: LM bifurcation and LAD CTO

PCI planning

LMT true bifurcation

LAD ost. CTO

- →*Antegrade*
- →*Parallel wiring*
- →*Retrograde*



7Fr. Bilateral TRI

Case: LM bifurcation and LAD CTO

PCI planning

LMT true bifurcation

LAD ost. CTO

- →*Antegrade*
- →*Parallel wiring*
- →*Retrograde*

7Fr. Bilateral TRI

Characteristics of Successful and Failed CTO Cases With the Transradial Approach

	Success (209 Lesions)	Failure (71 Lesions)	p Value
Age, yrs	66.3 ± 11.5	71.4 ± 7.5	<0.001
Prior failed CTO	9 (4.3)	5 (7.0)	0.36
Absent stump	94 (44.0)	43 (60.6)	0.02
Calcification at CTO			<0.001
None or mild	183 (87.6)	47 (66.2)	
Moderate	21 (10.1)	21 (29.6)	
Severe	5 (2.4)	3 (4.2)	
Tortuosity at CTO			0.25
None or mild	179 (85.7)	55 (77.5)	
Moderate	27 (12.9)	15 (21.1)	
Severe	3 (1.4)	1 (1.4)	
CTO length >20 mm	65 (31.1)	39 (54.0)	<0.001
Bridging collateral vessels	21 (10.1)	11 (15.5)	0.21
In-stent CTO	20 (9.6)	8 (11.3)	0.68
J-CTO score			<0.001
<3	199 (95.2)	53 (74.6)	
≥3	10 (4.8)	18 (25.4)	
Guiding catheter size (F)			0.03
4.0 to 6.5	185 (88.5)	69 (97.2)	
7.0 to 7.5	24 (11.5)	2 (2.8)	

Tanaka Y et al, J Am Coll Cardiol Interv 10: 235-243, 2017

Key techniques in retrograde CTO procedure

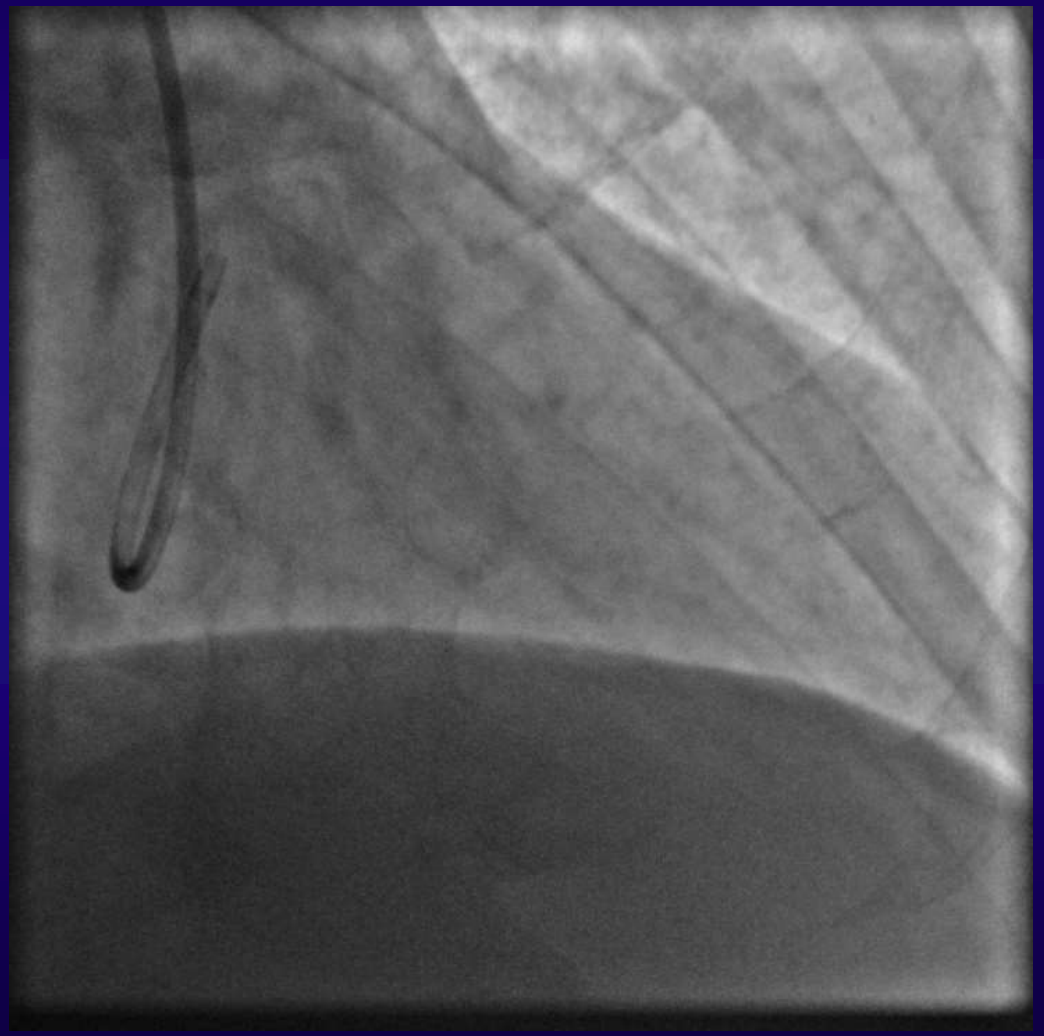
	6Fr.	7Fr.	8Fr.
Parallel Wiring (microcatheter + microcatheter)	OK	OK	OK
Parallel Wiring (Corsair + microcatheter)		OK	OK
Parallel Wiring (Corsair + Corsair)		OK	OK
Balloon trapping/Anchor balloon technique + microcatheter	OK	OK	OK
Balloon trapping/Anchor balloon technique + Corsair	OK	OK	OK
IVUS + microcatheter		OK	OK
IVUS + Corsair		(OK)*	OK

* BSC/Terumo IVUS + Corsair

TR retrograde approach by single guiding catheter

Case

AP, 56y.o. Male



TR retrograde approach by single guiding catheter

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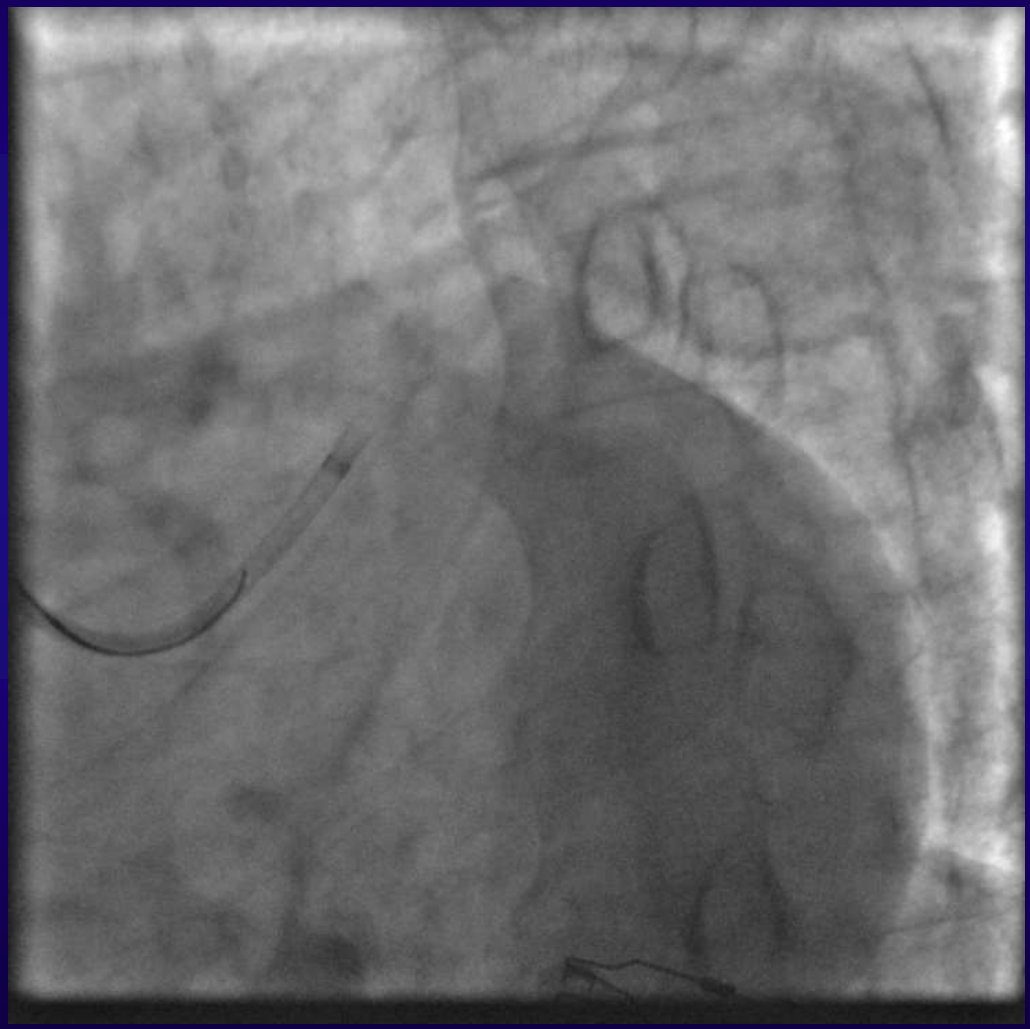
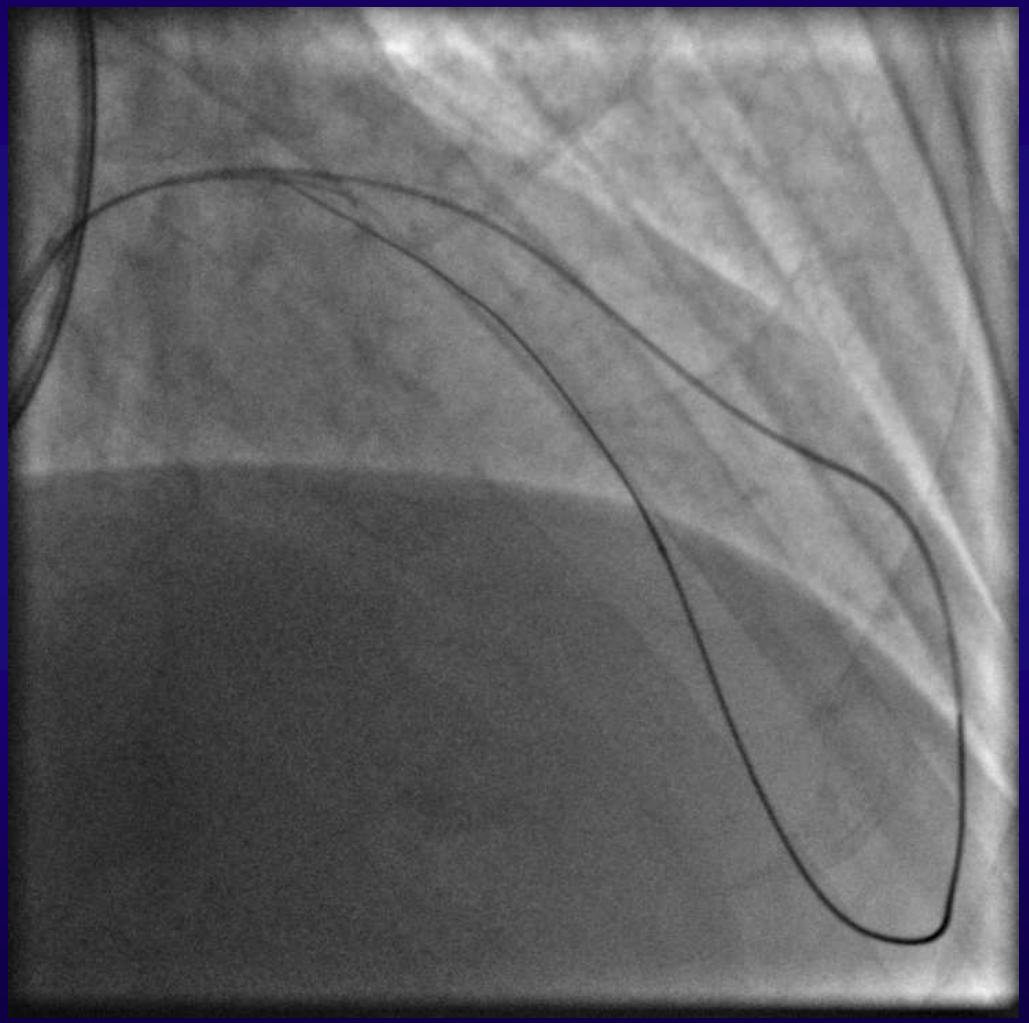


TR retrograde approach by single guiding catheter

Case

AP, 56y.o. Male
Rt. radial approach
GC: 90cm 7Fr. EBU3.75 (Launcher, Medtronic)
Microcatheter: Retrograde; Corsair 150 cm (ASAHI INTECC)
Guidewire: XT-R→Gaia 1st→Gaia 2nd→Conquest Pro (ASAHI INTECC)



TR retrograde approach by single guiding catheter

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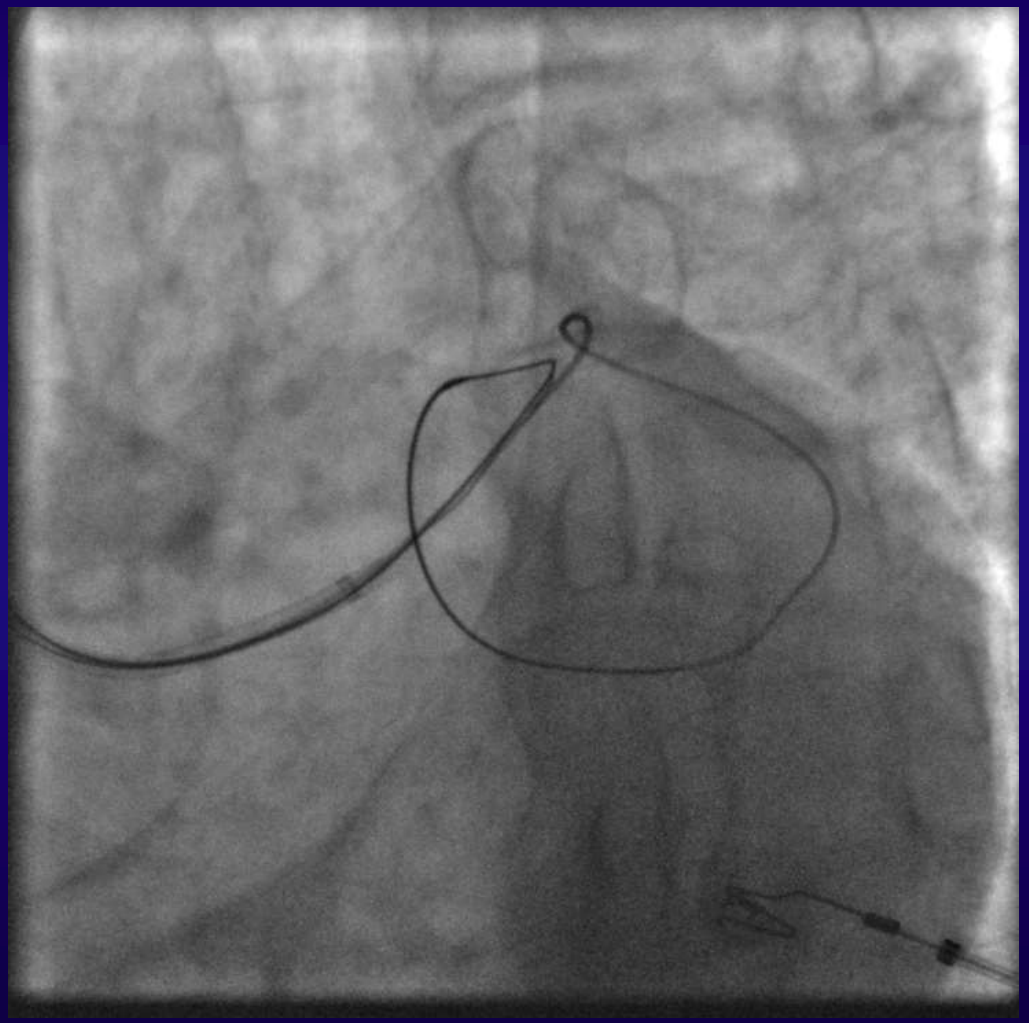
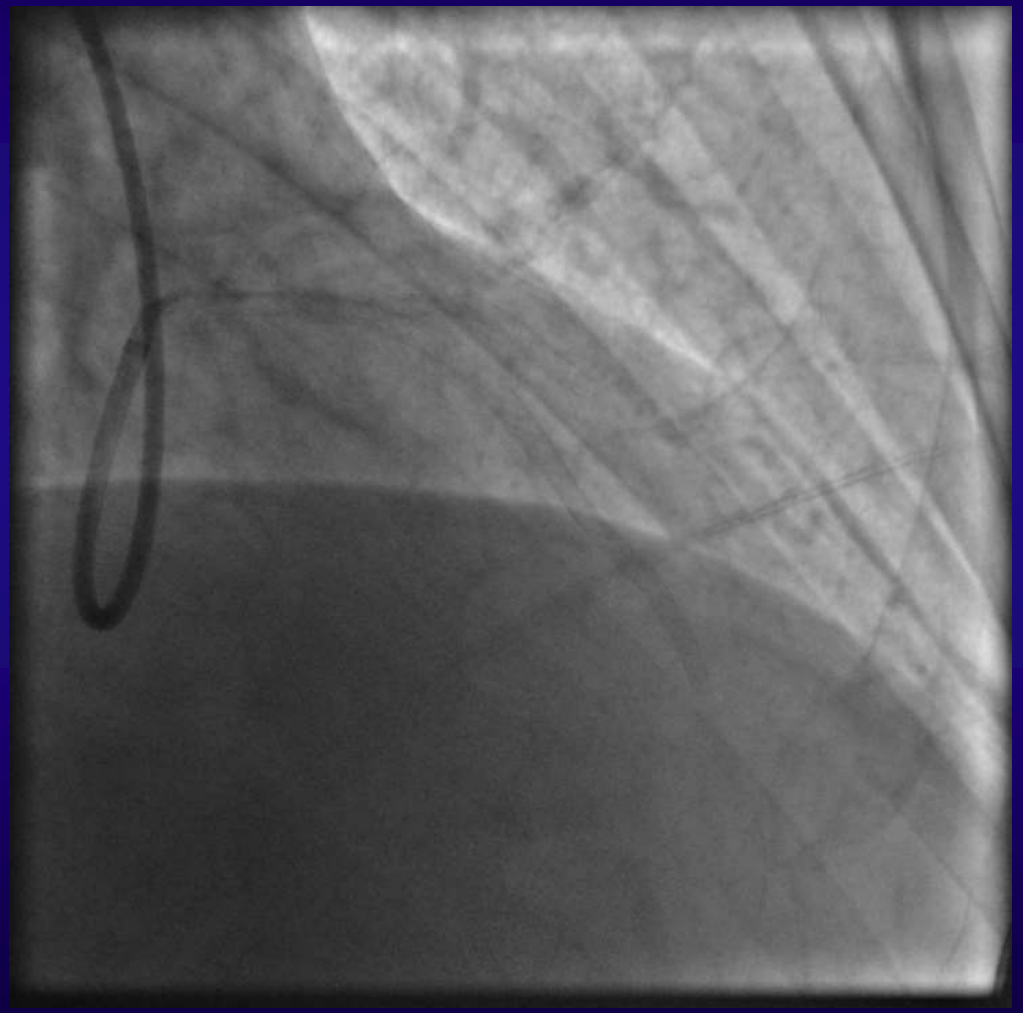
Microcatheter: Retrograde; Corsair 150 cm (ASAHI INTECC)
Guidewire: XT-R→Gaia 1st→Gaia 2nd→Conquest Pro (ASAHI INTECC)



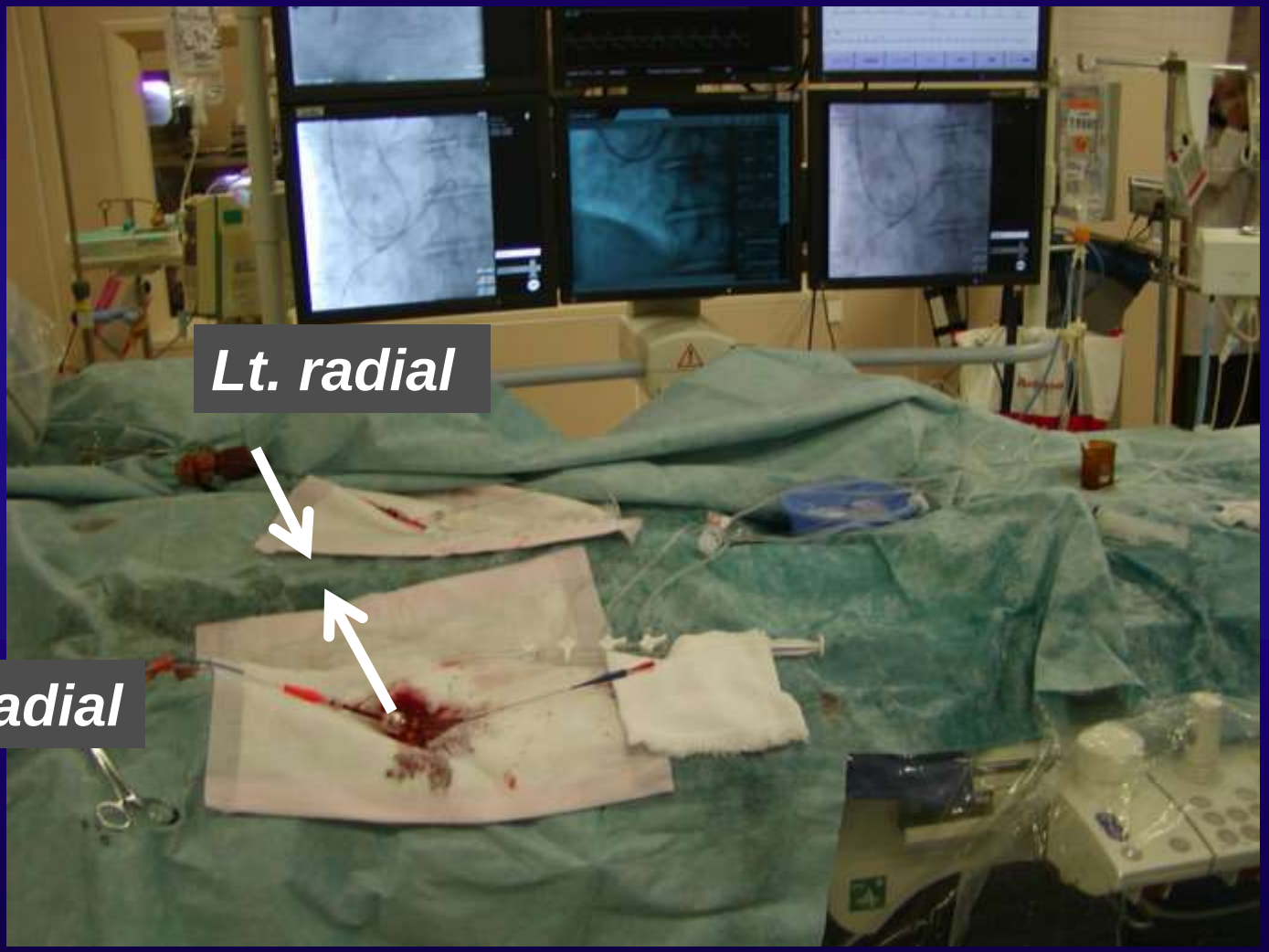
TR retrograde approach by single guiding catheter

Case

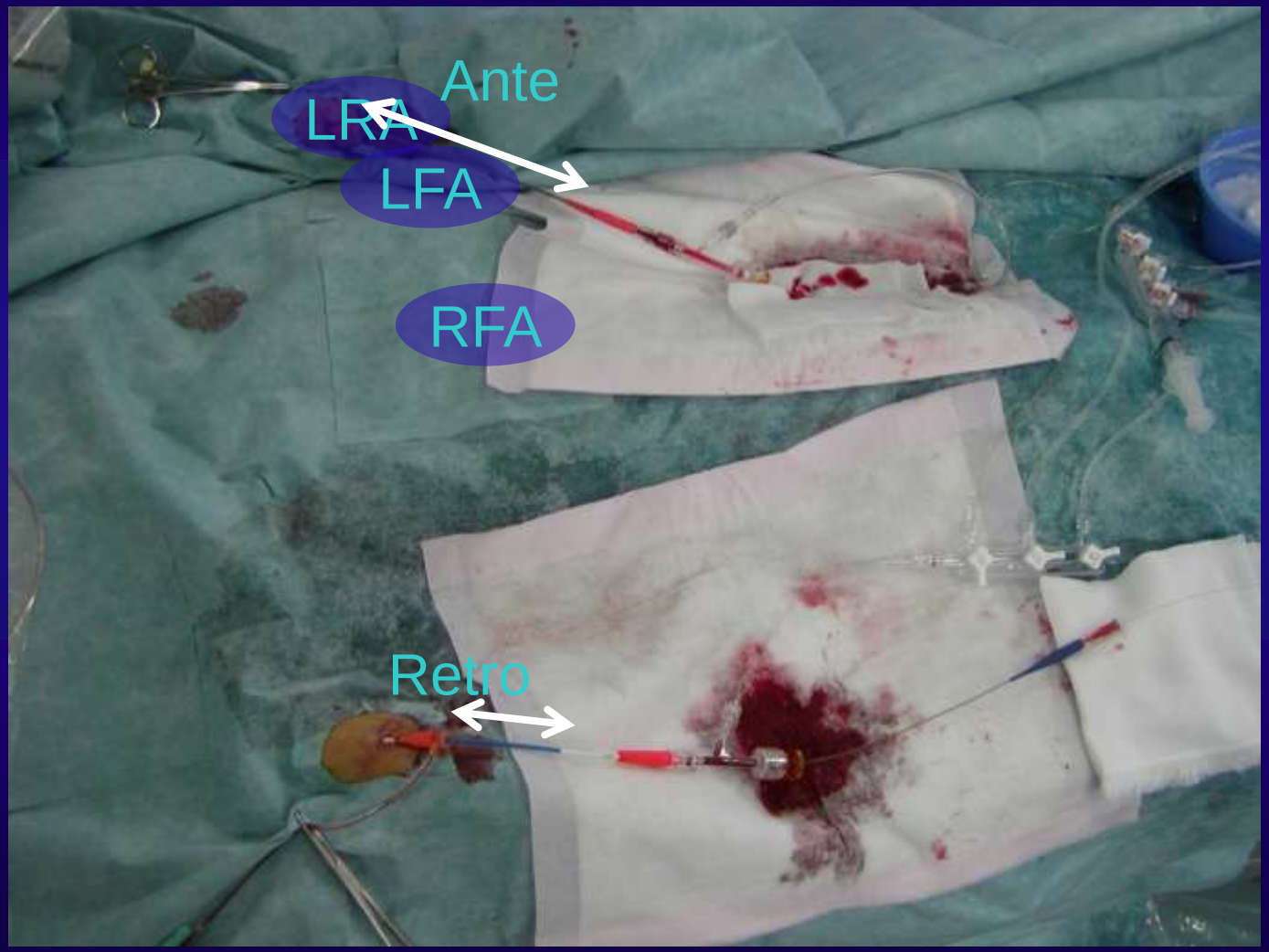
AP, 56y.o. Male
Rt. radial approach
GC: 90cm 7Fr. EBU3.75 (Launcher, Medtronic)
Final result



Bilateral transradial retrograde approach for CTO lesions

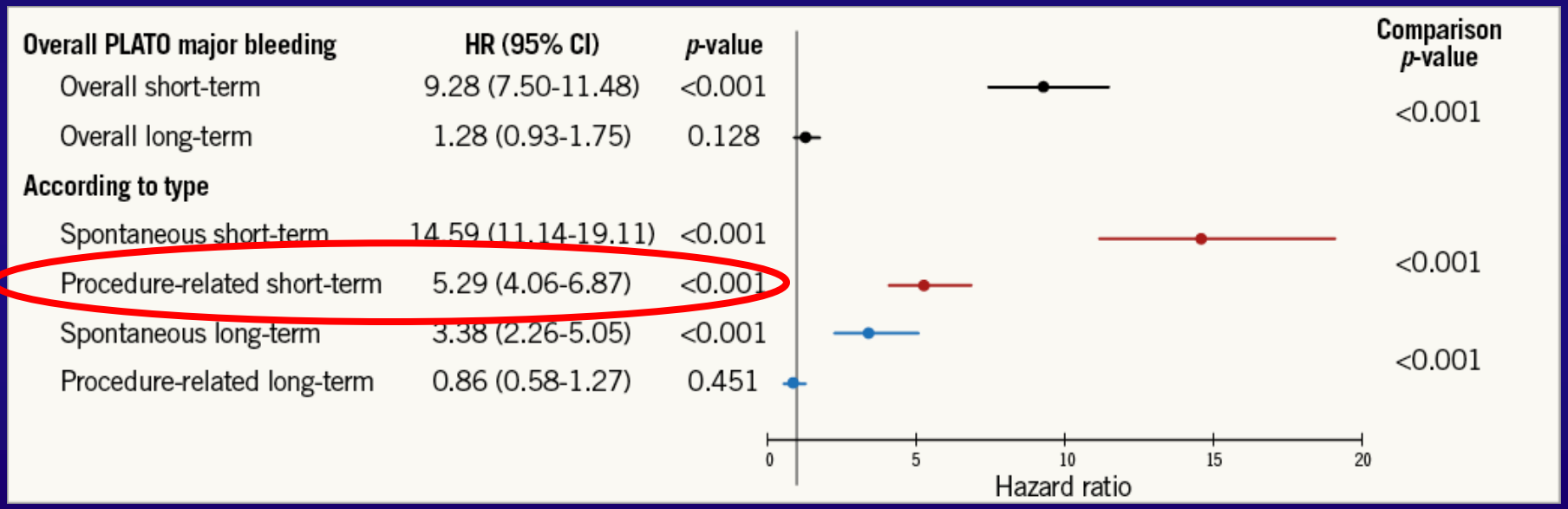


Bilateral transradial retrograde approach for CTO lesions



TRI has many advantages…

Relationship between PLATO major bleeding and mortality according to bleeding type



Ducrocq G et al, EuroIntervention. 2015 Nov;11(7):737-45

Thank You