INSTITUT CARDIOVASCULAIRE PARIS SUD

Focus Review: Bifurcation

T. Lefèvre and the ICPS Team

Conflict of interest to disclose

Minor fees from Boston scientific, Abbott Vascular, Terumo and Biosensor

We See Bifurcation Lesions Everyday

- ✓ Need a standardized approach
- ✓ Simple and safe
- ✓ High rate of success
- ✓ Low rate of complications
- ✓ Good long term results

Male 67 years old

Previous smoker

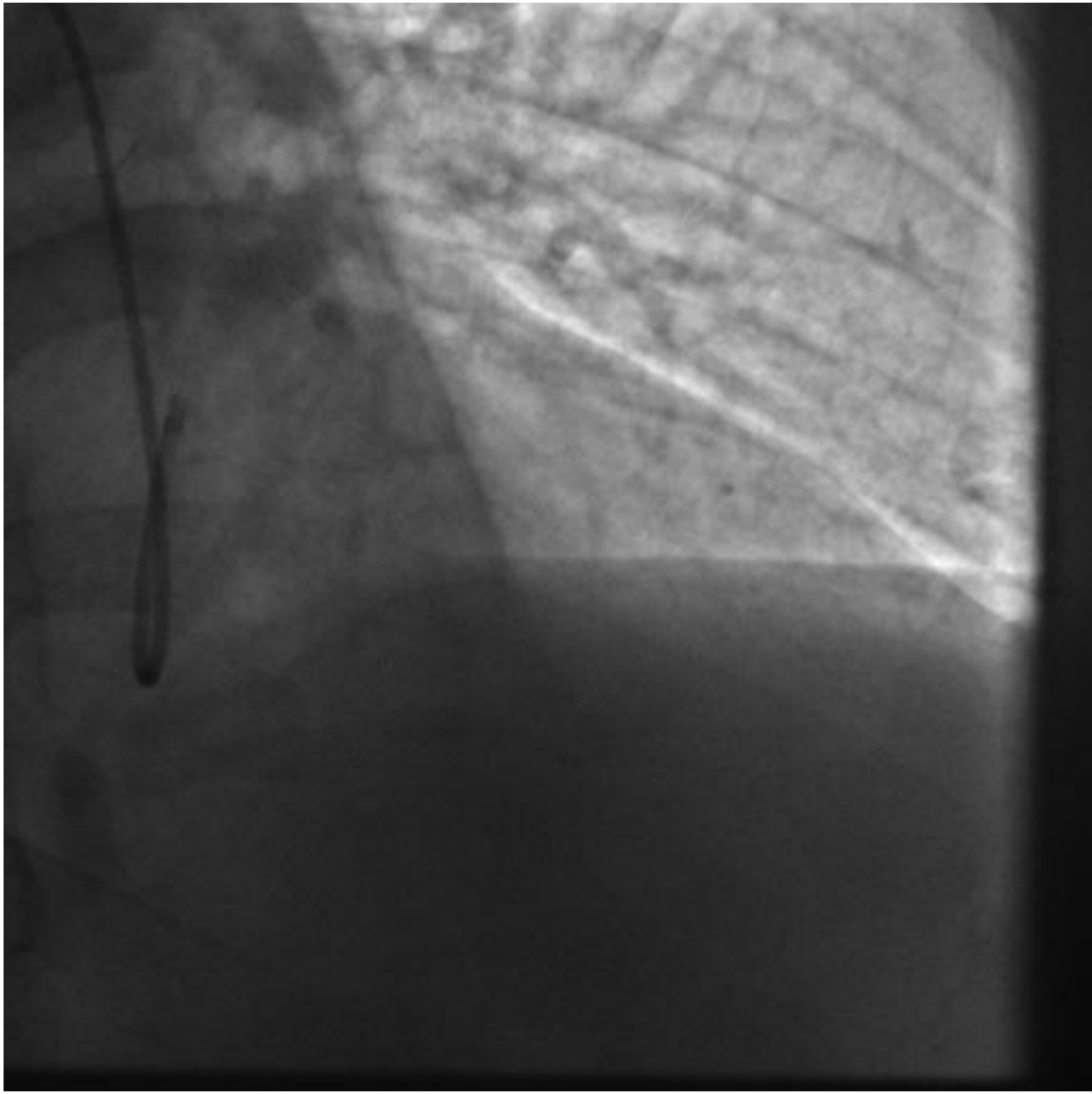
Dyslipidemia

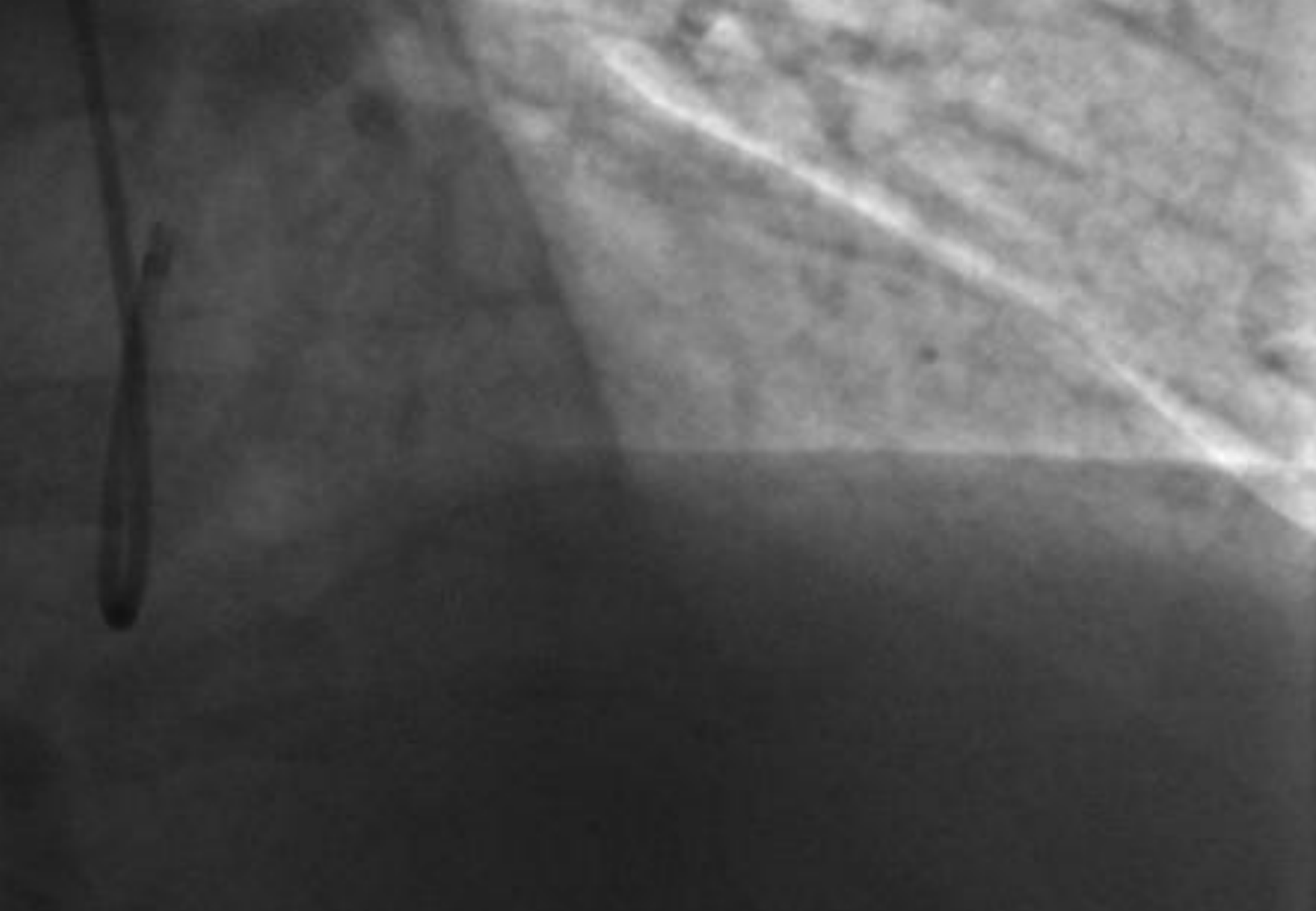
Unstable angina

EF 63%

Already on DAPT

Normal RCA





Questions before Starting the Procedure

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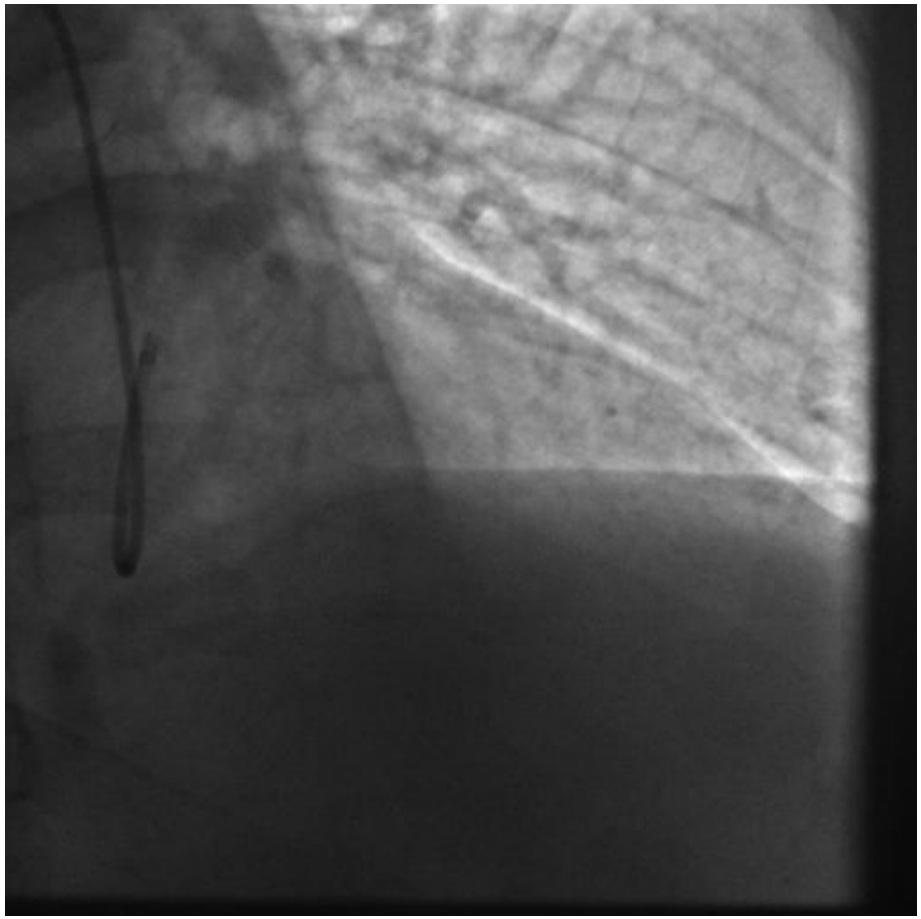
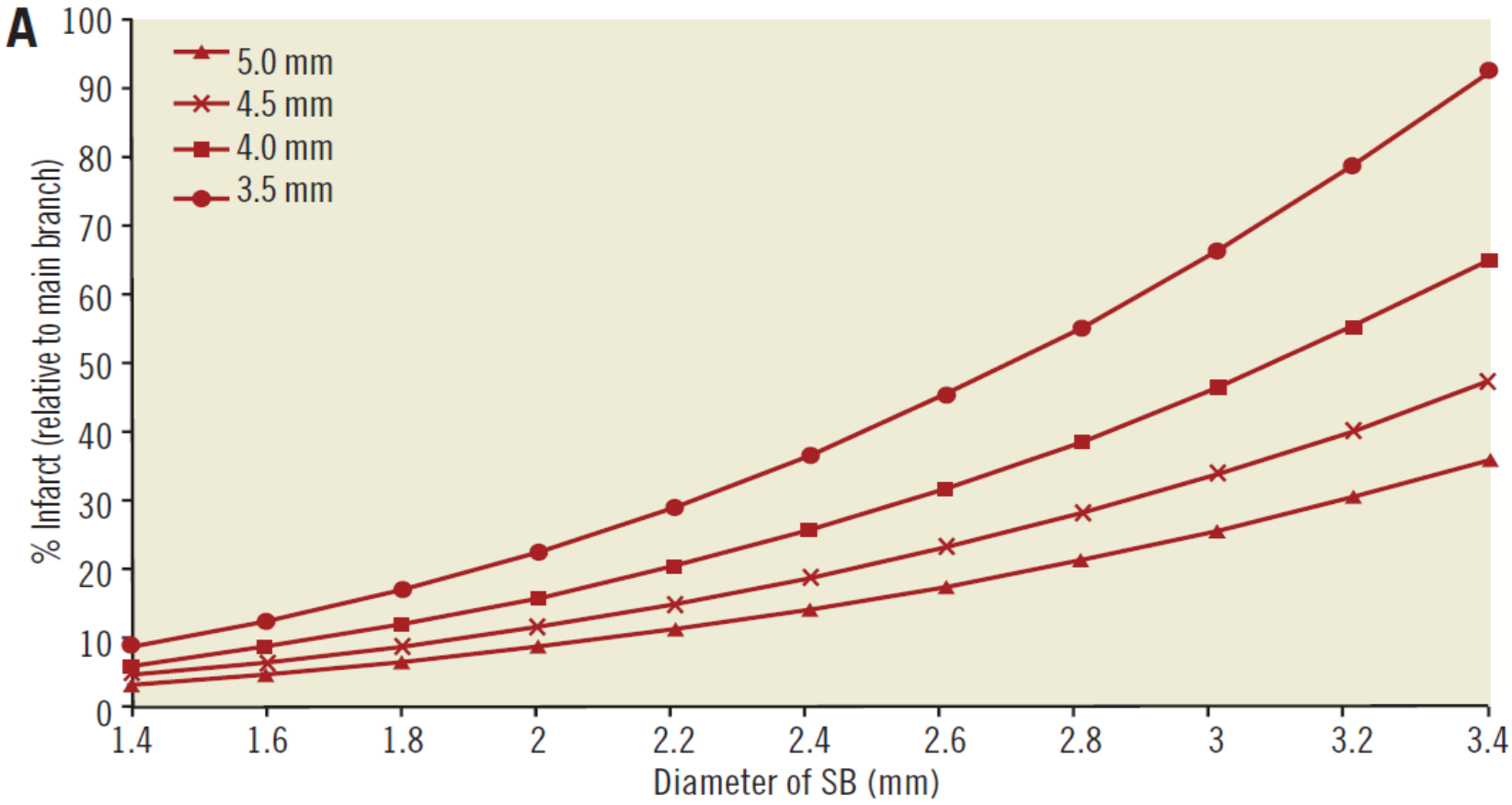


Structure-function scaling laws of vascular trees



Kassab et al. Eurointervention 2013; 8: 1461-3

Questions before Starting the Procedure

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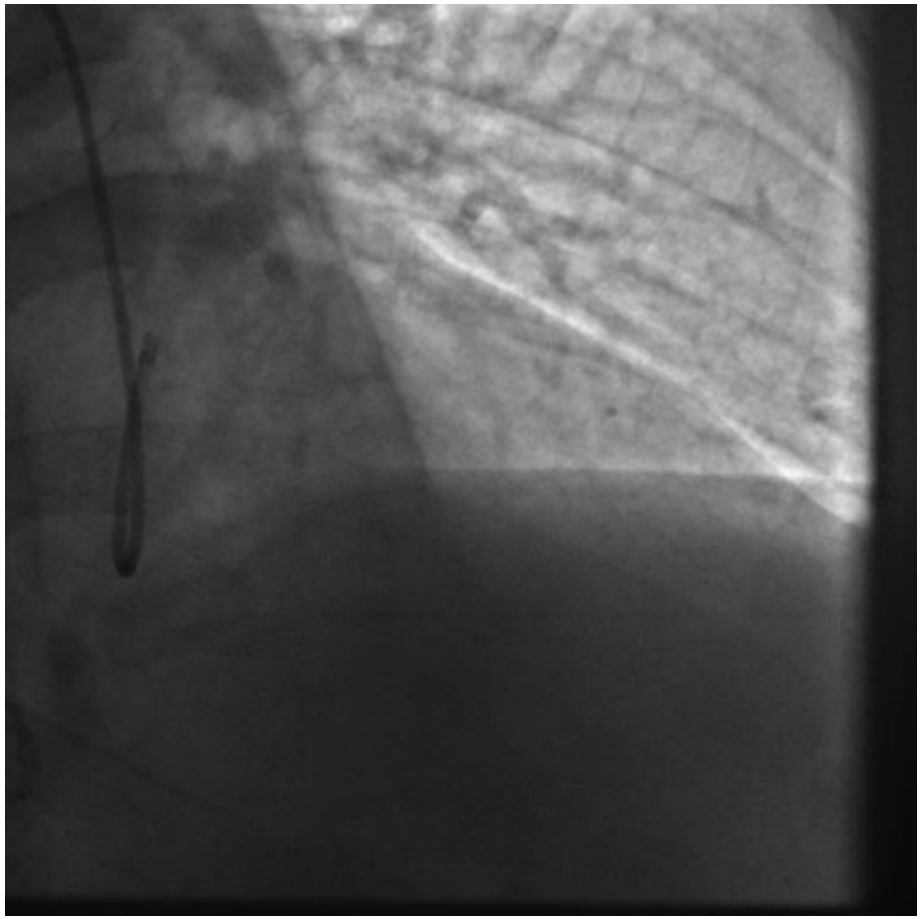

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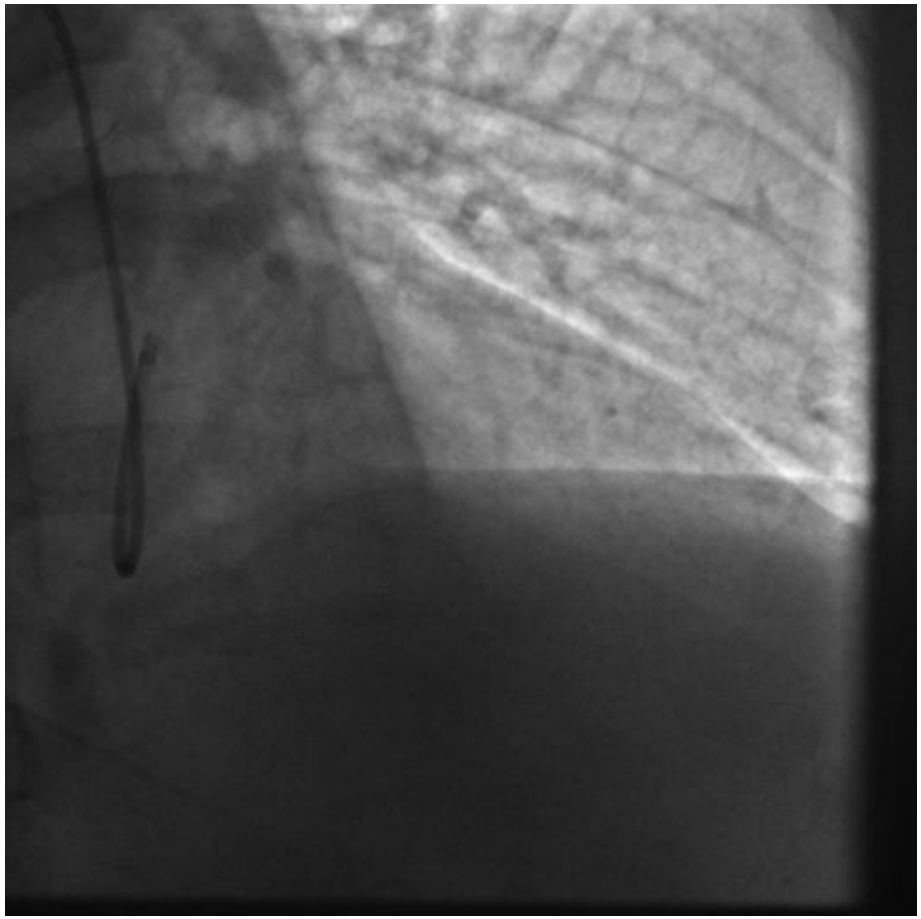

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2. Difficult SB access ?
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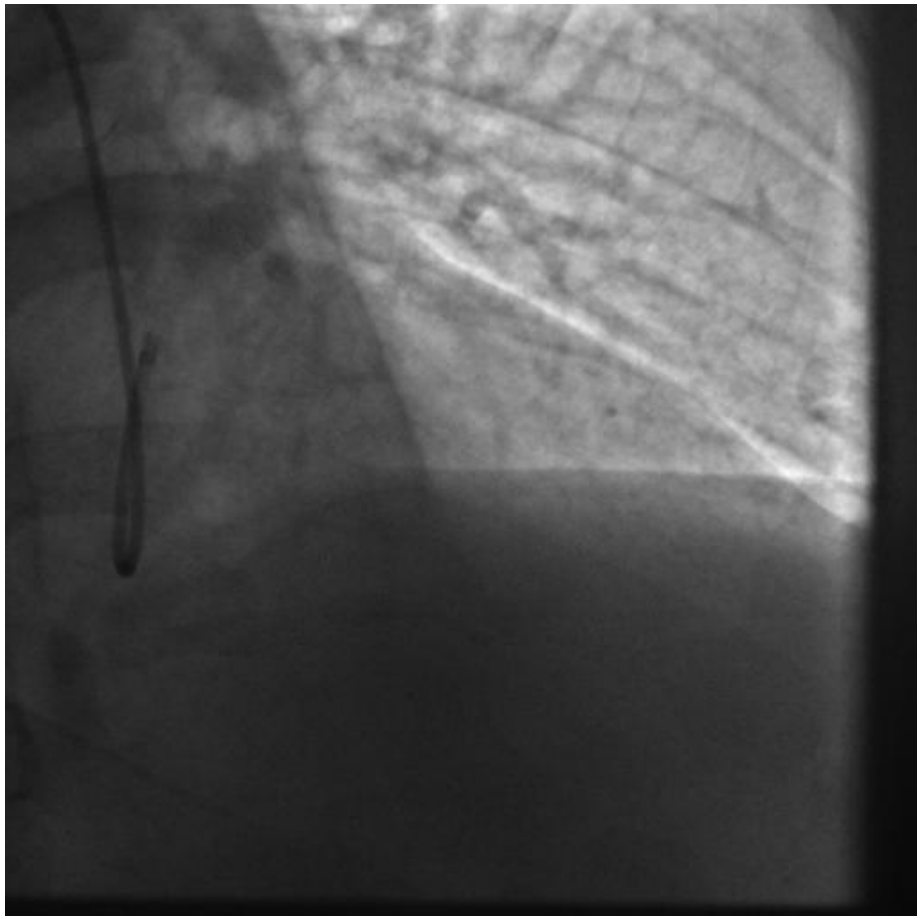
4. Optimal view ?



Questions before Starting the Procedure

1. Ready to loose the SB ?
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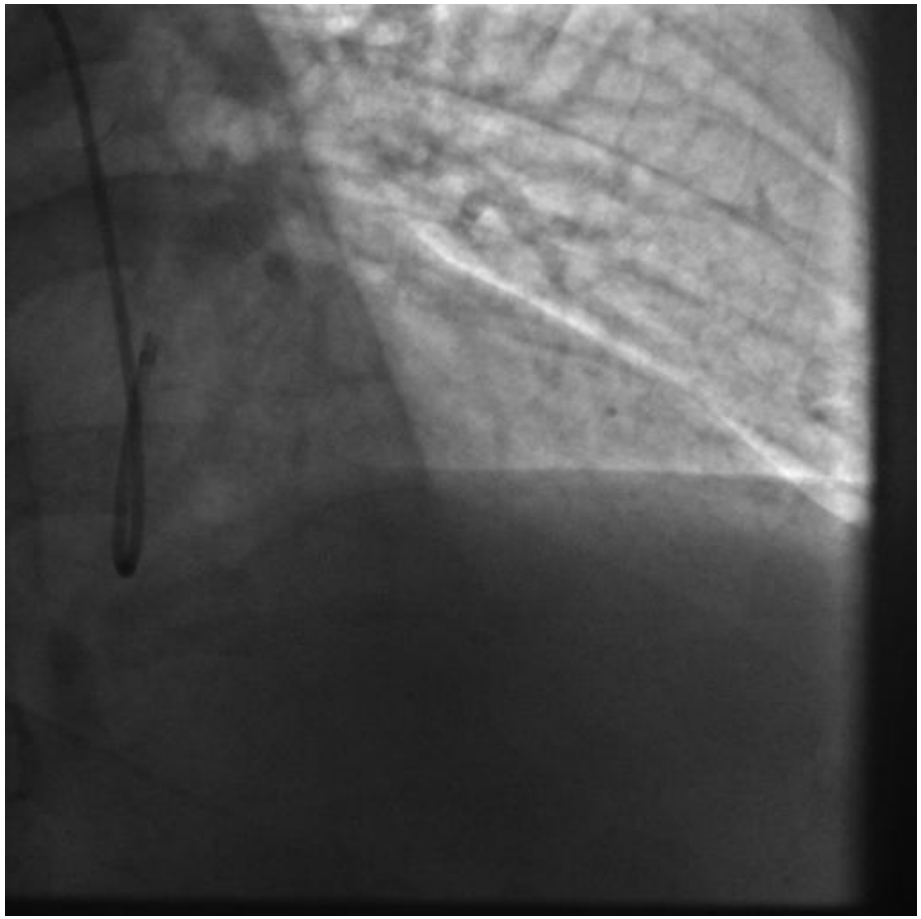
5. One or two stents ?



Lumen vs Plaque

Adapted from Furukawa et al. Cir J 2005; 69:325-30

7 Randomized Studies With DES

Sudy	Stent	Patients (n) PS	CS	True Bif. (%)	Cross-over (%) to CS	to PS	CS Technique (n)		Final ki		U (n) CS
BBC One	PES	250	250	83	2.8	1.6	Crush	1			
Nordic	SES	207	206						31	74	151 156
								43			
							Other	69			
CACTUS						ND	Crush		90	92	150 152
BBK					19	3	T stent	120	100	100	ND
				86	2.1	9.1	T stent	45	56	77	80
			43	ND	51.2	4.7	T stent	60	86	95	ND
							V stent	1			
							Y stent	2			

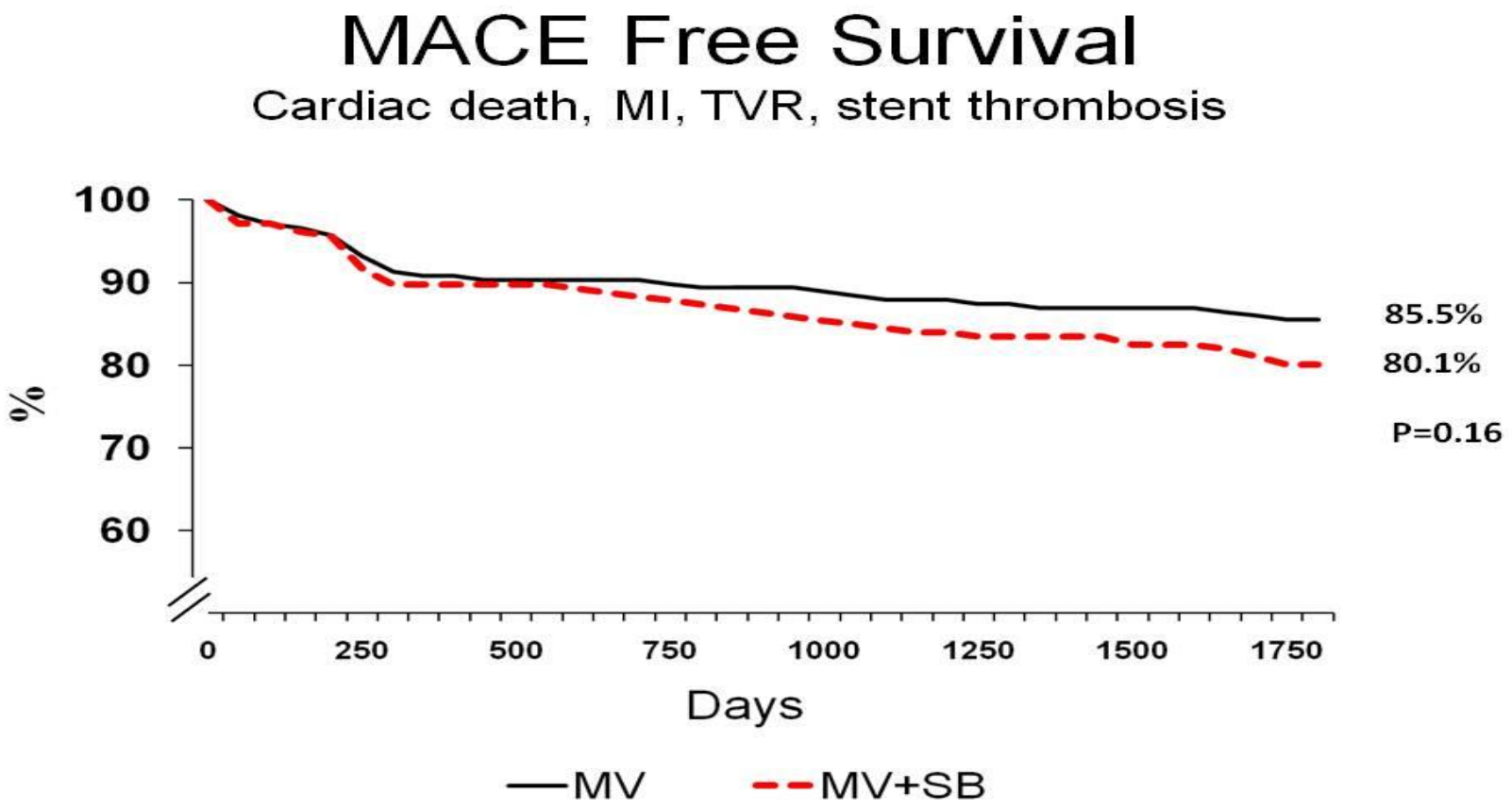
8 Meta-analysis
No advantage for using 2 stents

Nordic I
Procedural Data

Procedural Characteristics	MV n=207	MV+SB n=206	P value
SB stented	9 (4.3)	196(95.1)	<0.0001
Final kissing balloon	65 (32)	152 (74)	<0.0001
Procedural success	200 (97)	194 (94)	0.35
Procedure time, min	62±51	76 ±40	**<0.0001**
Fluoroscopy time, min	15±9	21±10	**<0.0001**
Contrast volume, mL	233±93	283±117	**<0.0001**
Biomarker Elevation	**n=153**	**n=126**	**P value**
>3 elevation (%)	8	18	**0.011**
>5 elevation (%)	4	13	**0.008**
>10 elevation (%)	3	5	NS

Steigen TK et al. Circulation. 2006;114:1955-1961

Nordic I (n=413)
5 Years Safety and Efficacy



Thuesen L et al. Presented at ACC 2011.

One stent when we can

An optimal strategy will help to decrease the need for SB stenting

Two stents when needed

Develop strategies to make it easy, safe and effective

Questions before Starting the Procedure

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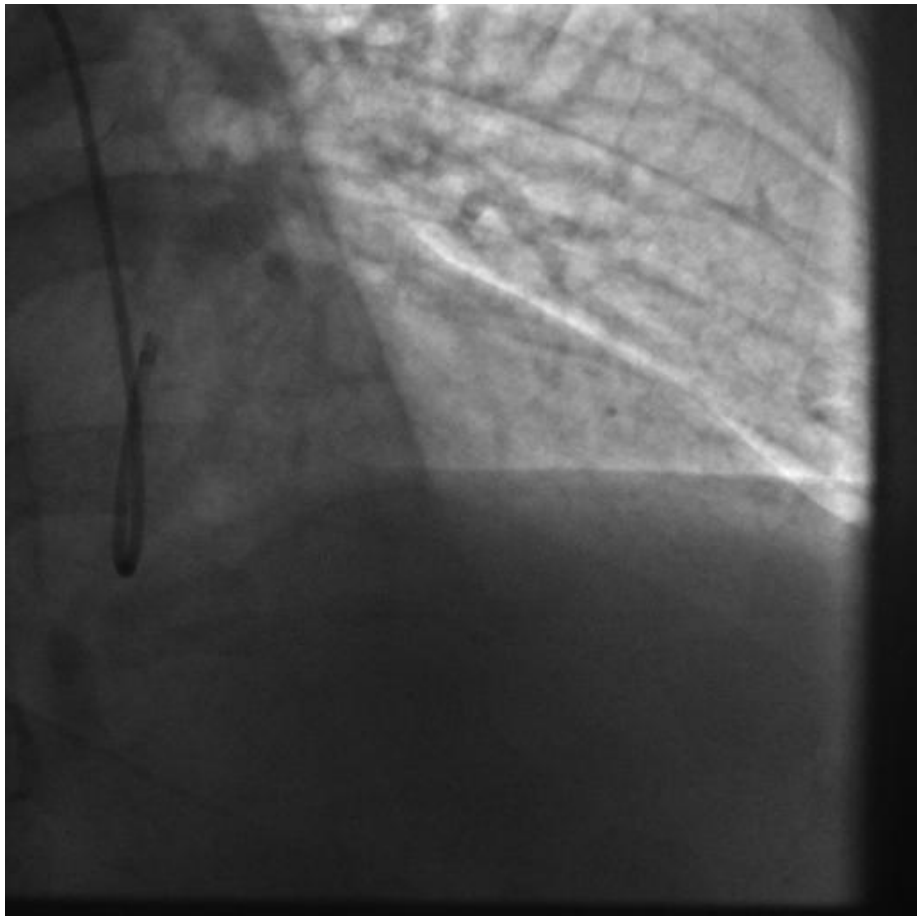
2. Difficult SB access ?
3. Good support ?
4. Optimal view ?
5. One or two stents ?
6. One or two wires ?



Start with 2 Wires

- ✓ Keep the SB open ?*
- ✓ Good Marker of the SB ostium in case of occlusion
- ✓ Modified favorably the angle between MB and SB**
- ✓ Not working with 2 wires is a predictor of SB occlusion***
- ✓ Decrease the risk of TVR ***

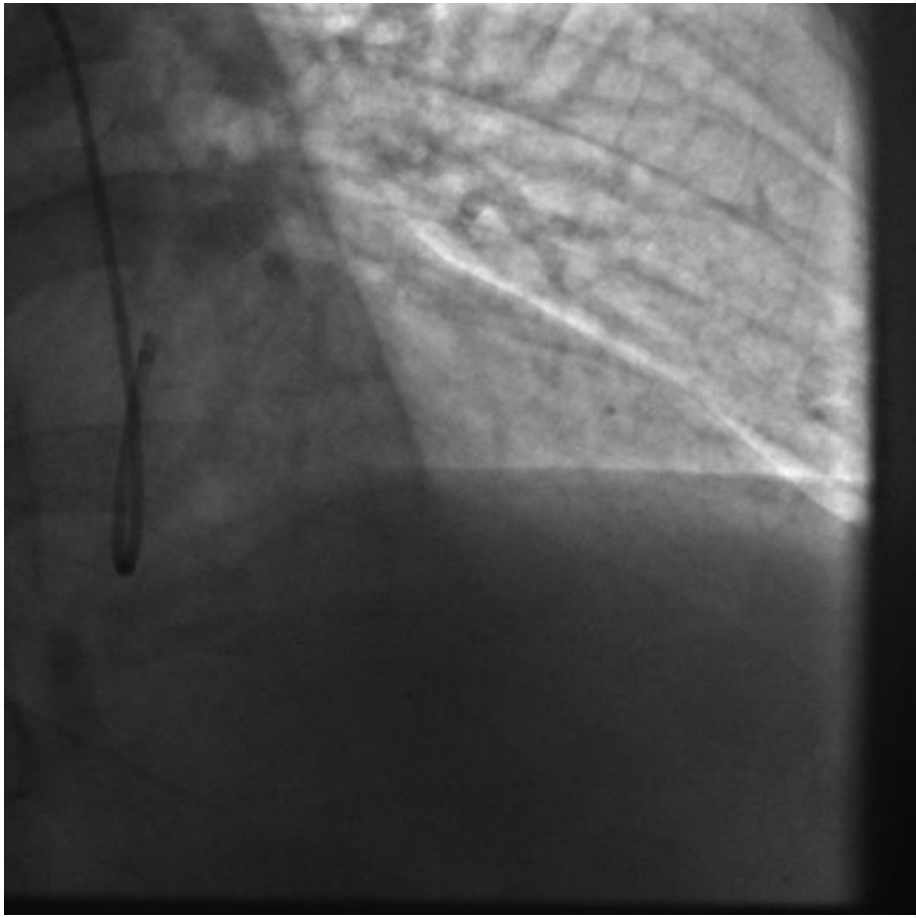
Colombo et al. personnal communication, TCT 2008

*** Louvard et al. TCT 2003*

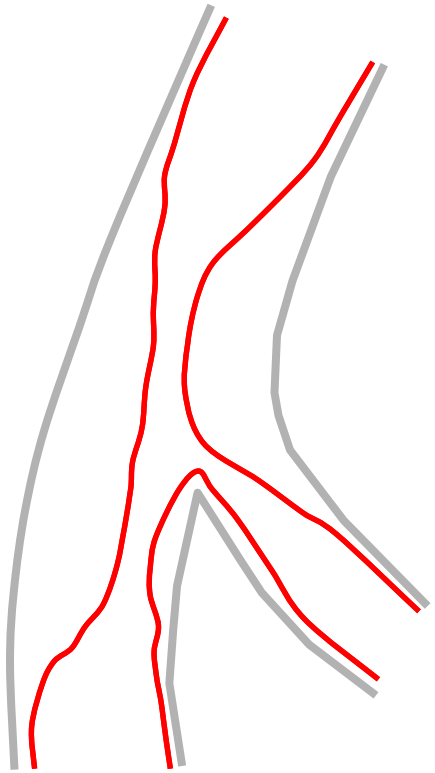
**** Brunel et al. TULIP Study, CCVI 2006*

Questions before Starting the Procedure

1. Ready to loose the SB ?
2. Difficult SB access ?
3. Good support ?
4. Optimal view ?
5. One or two stents ?
6. One or two wires ?
7. SB Predilatation ?



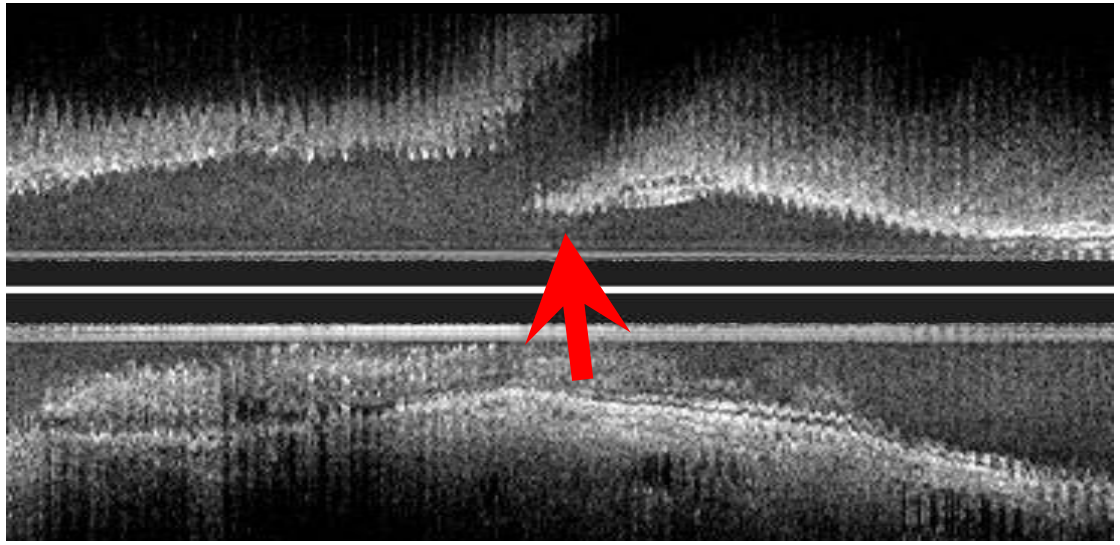
What About Carena Disease ?

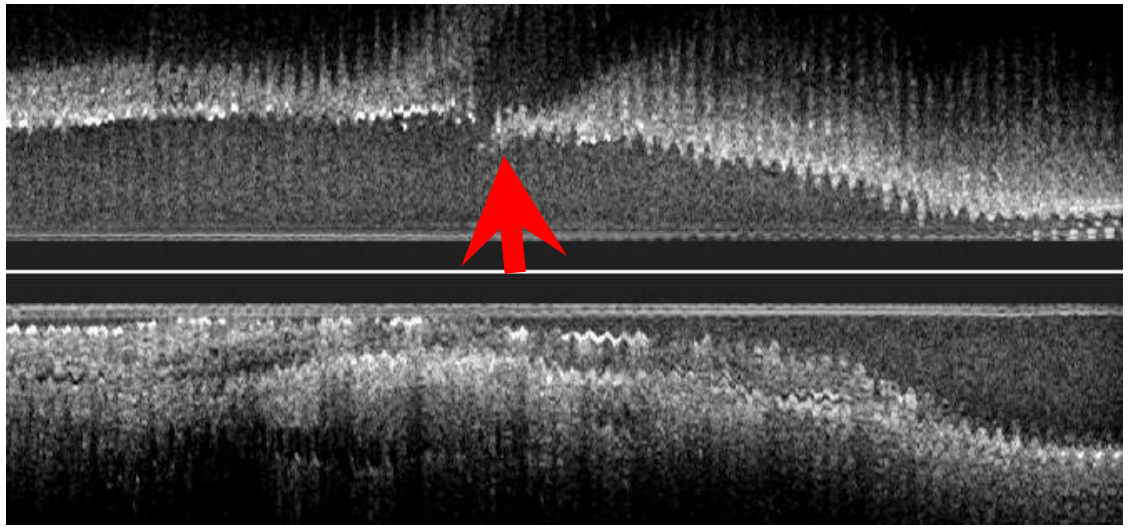


Carena is usually free of disease

Virmani EBC 2007
Oviedo et al ACC 2008
Van der Giessen, et al. Euroint 2008
Nakazawa G, et al. JACC 2010
Suarez de lezzo, Euroint 2011

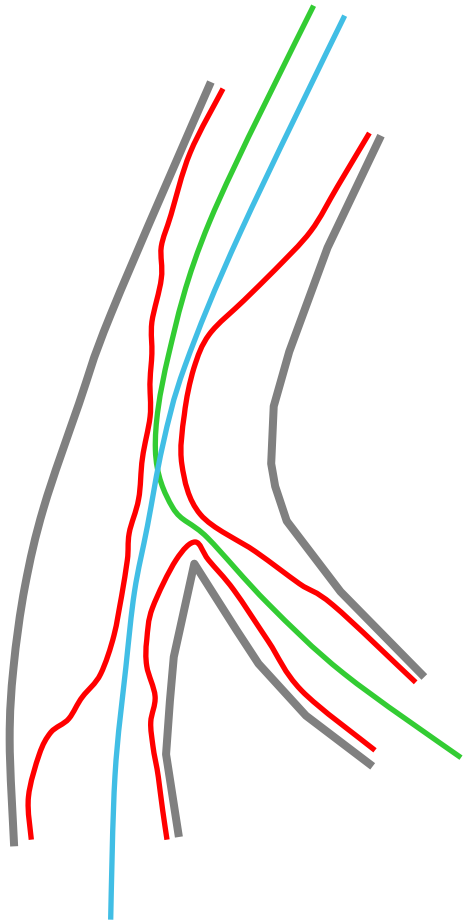
Carena Shifting





Koo et al EBC 2008

Side Branch Predilatation ?



Remo Albiero EBC IV, Prague 2008

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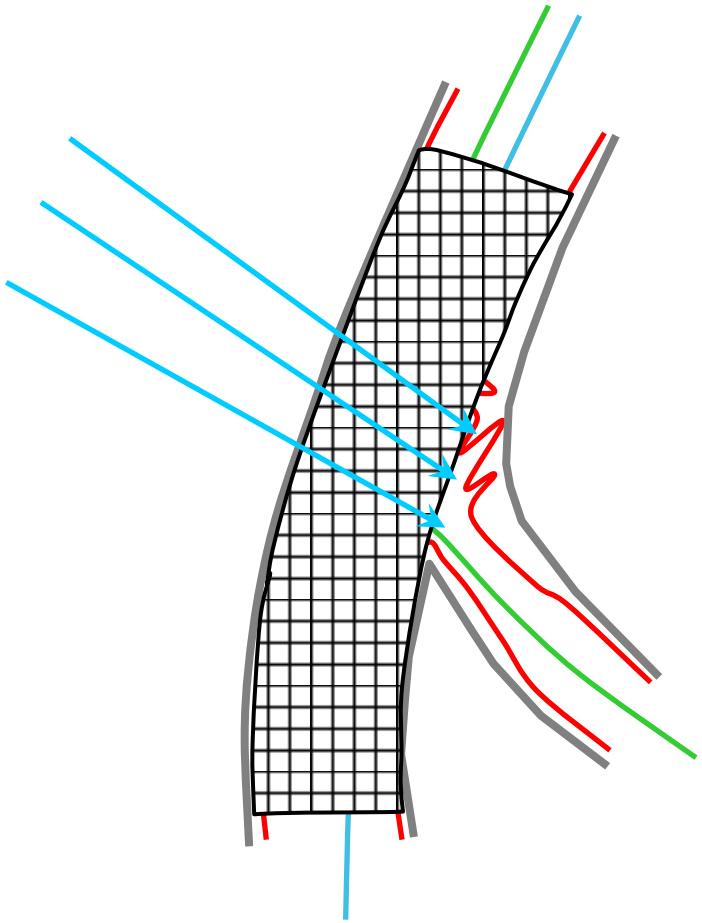

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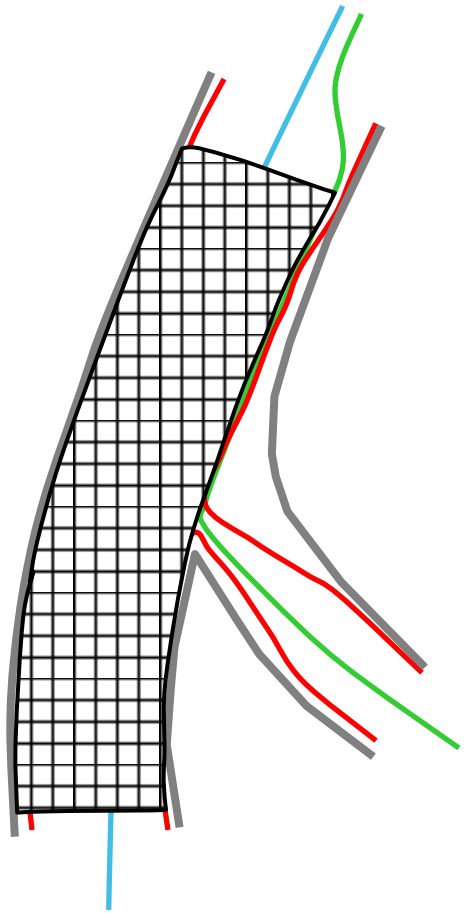

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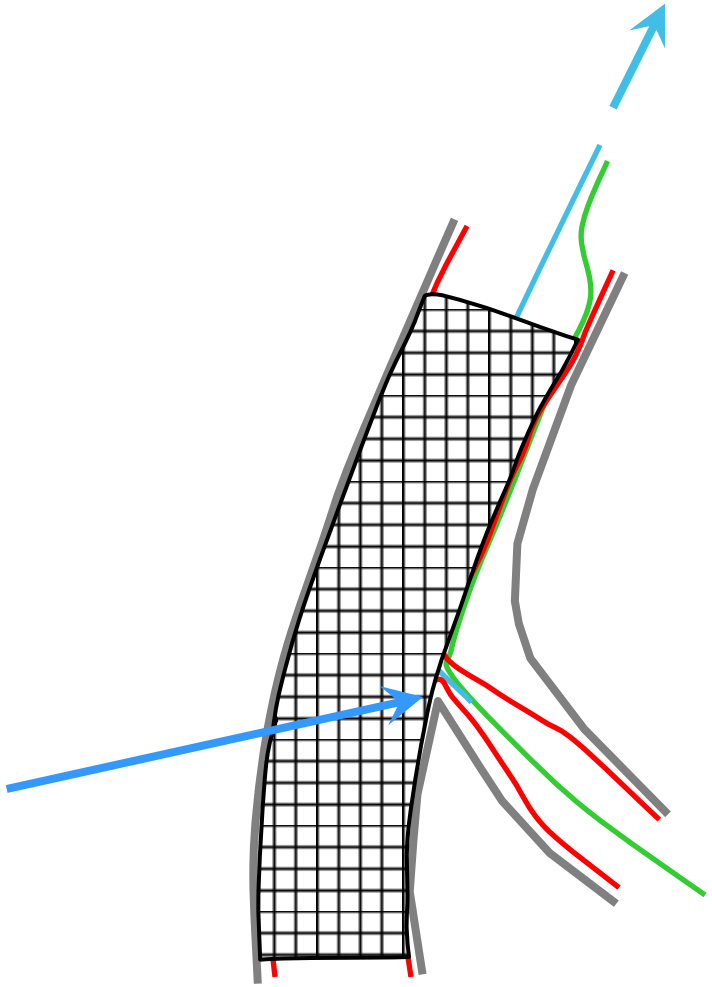
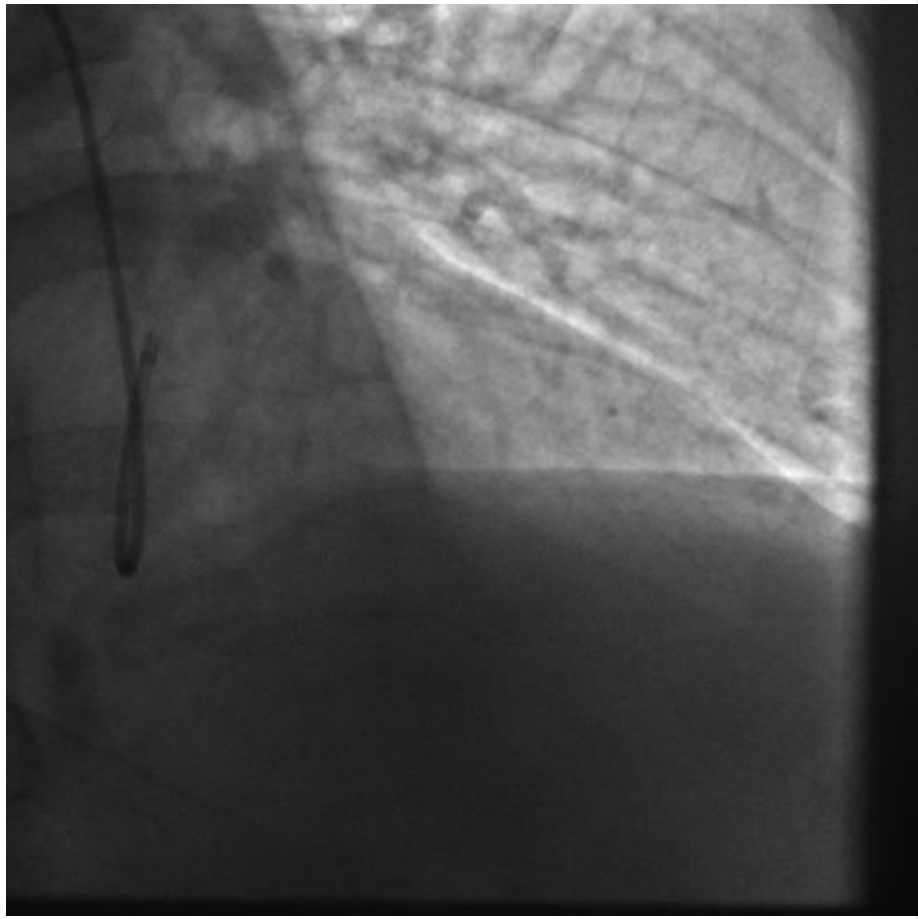


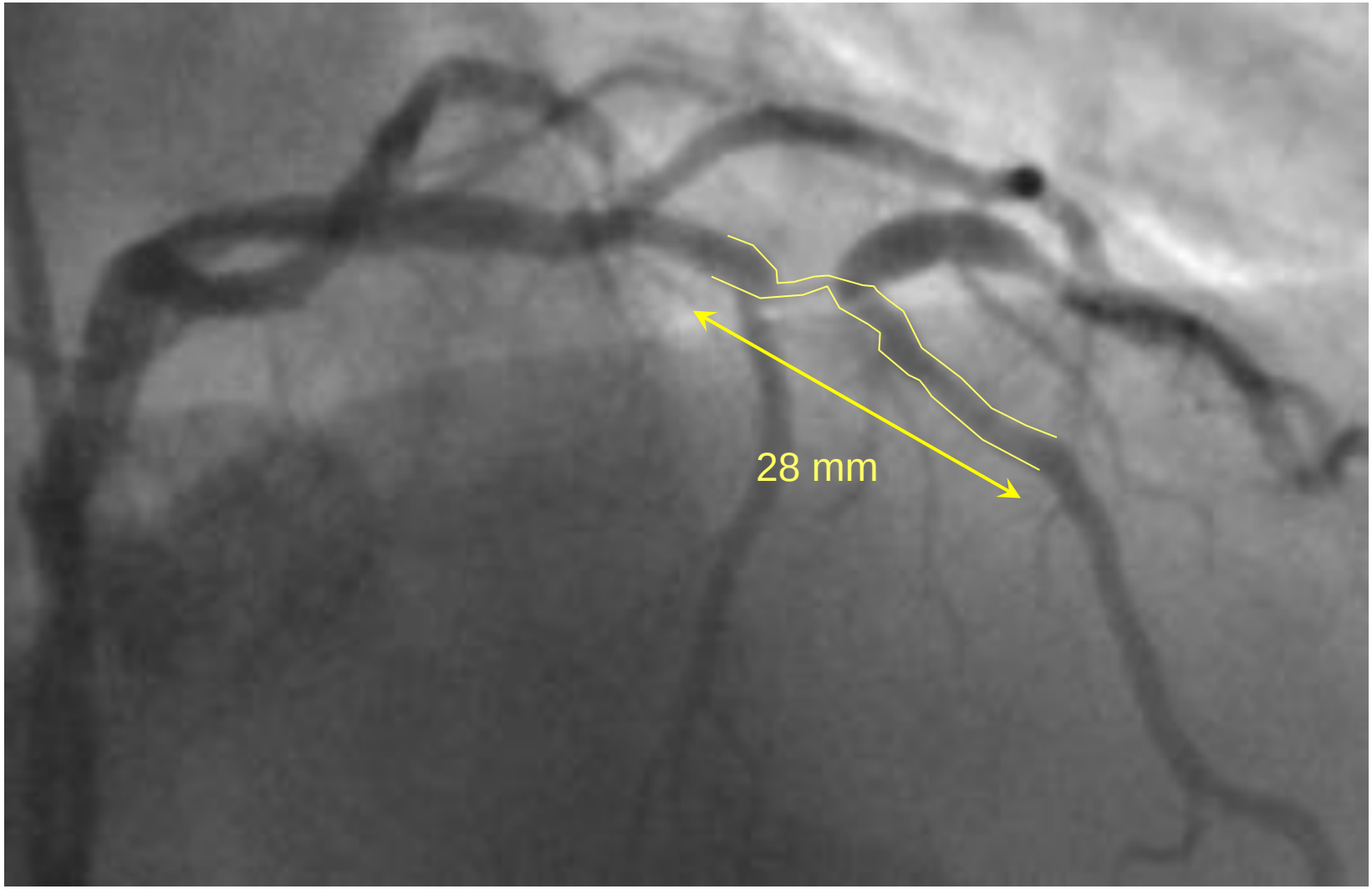
Remo Albiero EBC IV, Prague 2008

Questions before Starting the Procedure

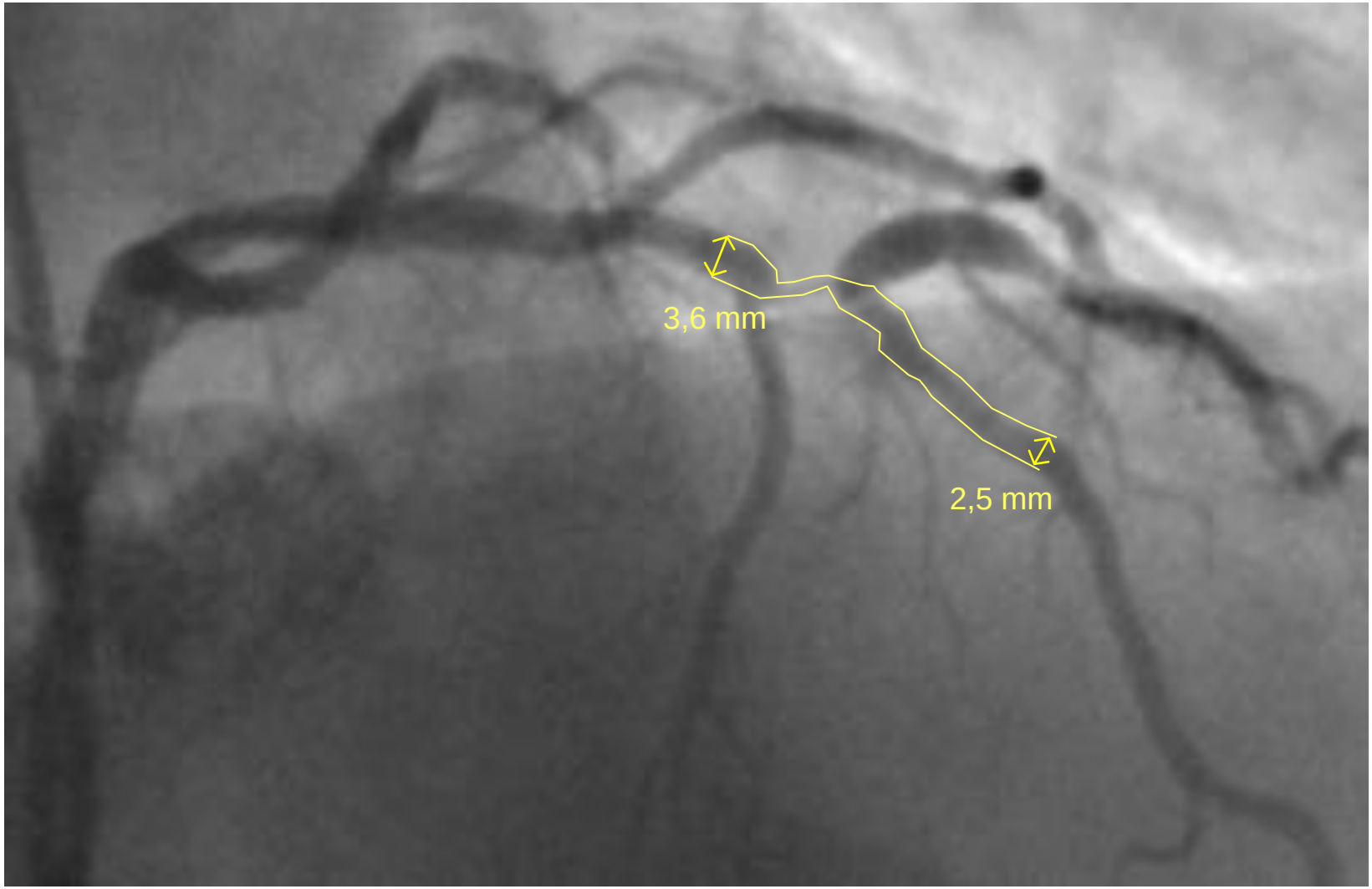
1. Ready to loose the SB ?
2. Difficult SB access ?
3. Good support ?
4. Optimal view ?
5. One or two stents ?
6. One or two wires ?
7. SB Predilatation ?
8. Stent length and diameter ?



Stent length ?



Stent Diameter ?



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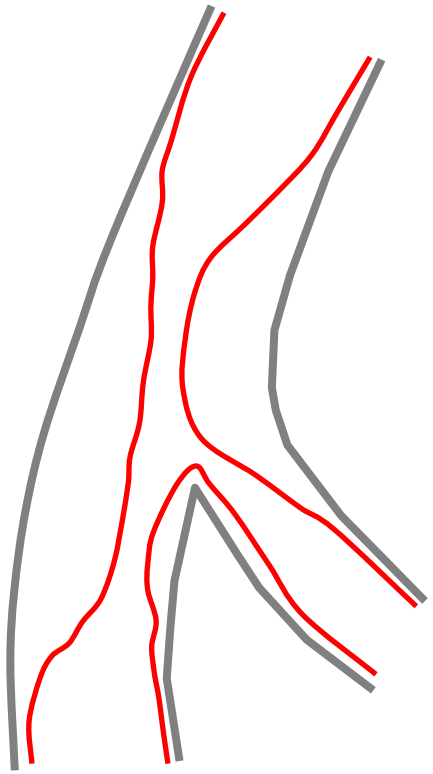


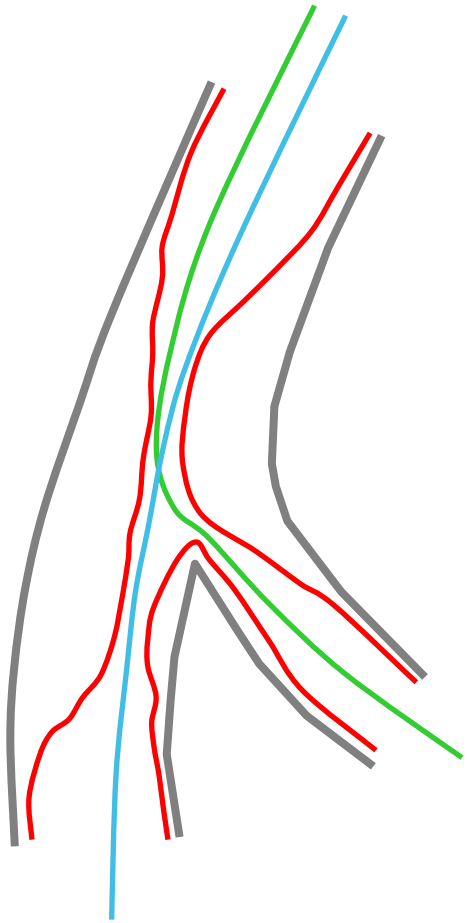
$$D^3_{mother} = D^3_{mother} + D^3_{mother}$$

Murray CD. The physiological principle of minimum work. Proc Nat Acad Sci 1926

$$R = \frac{D_{mother}}{D_{daughter\ 1} + D_{daughter\ 2}} = \mathbf{0.678}$$

Finet et al. Eurointervention 2007

Stent Diameter ?



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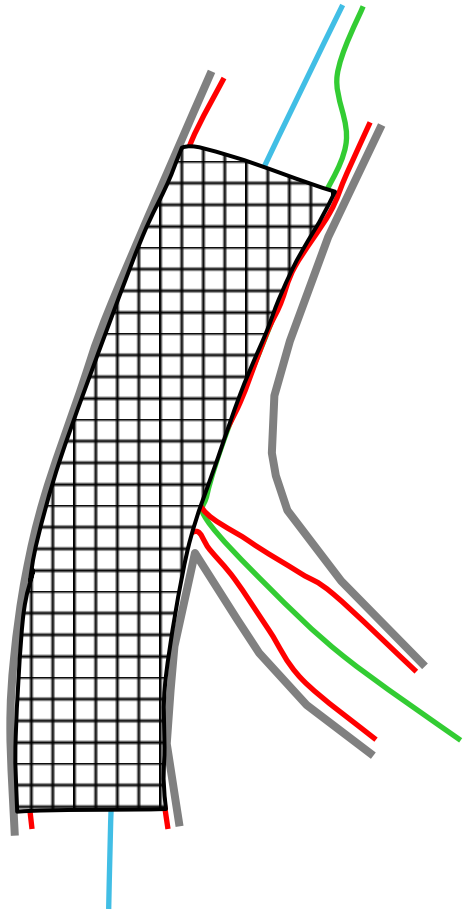
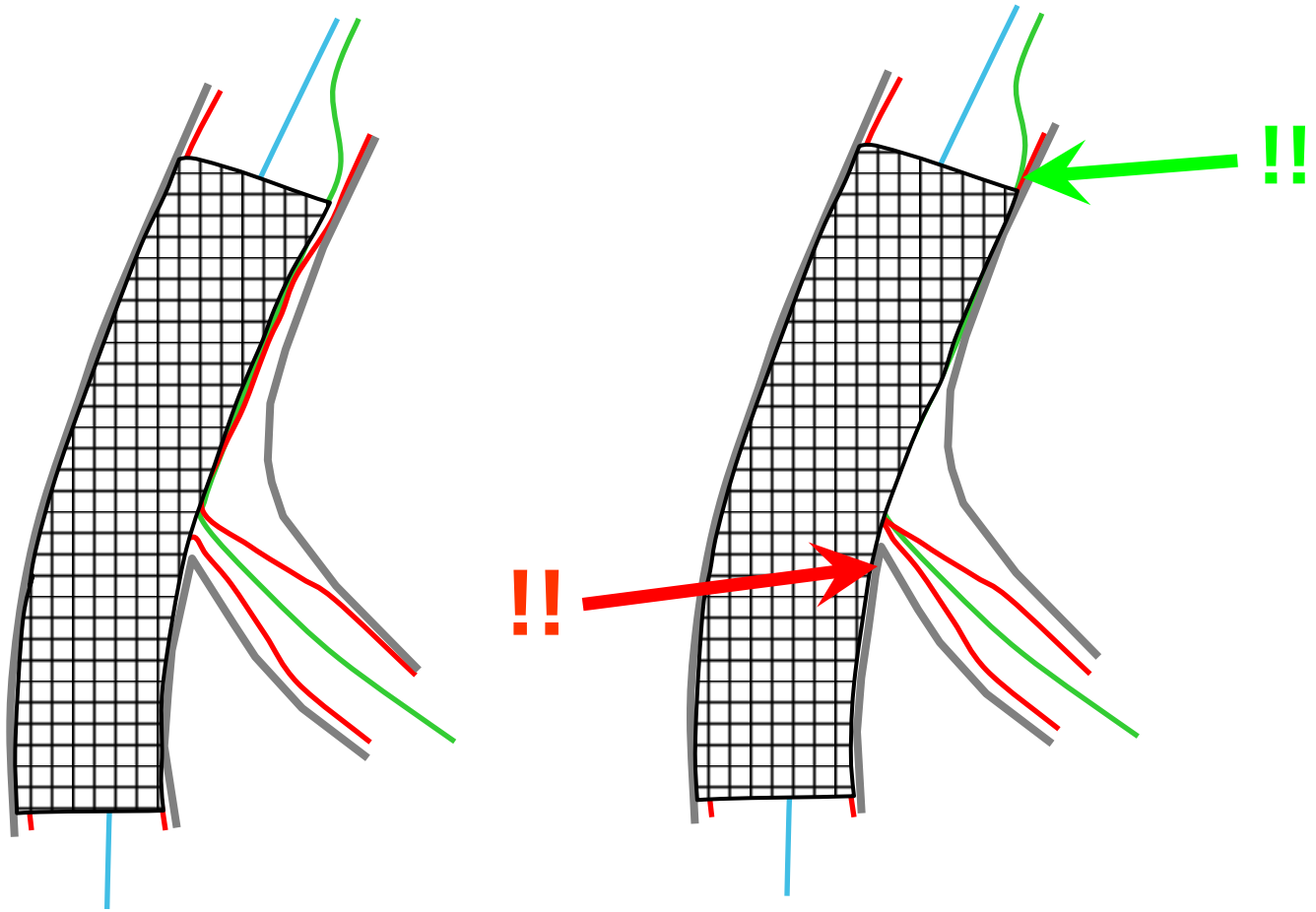


Stent sized according to the distal reference

1. Low risk of carena shifting
2. Wire not really jailed

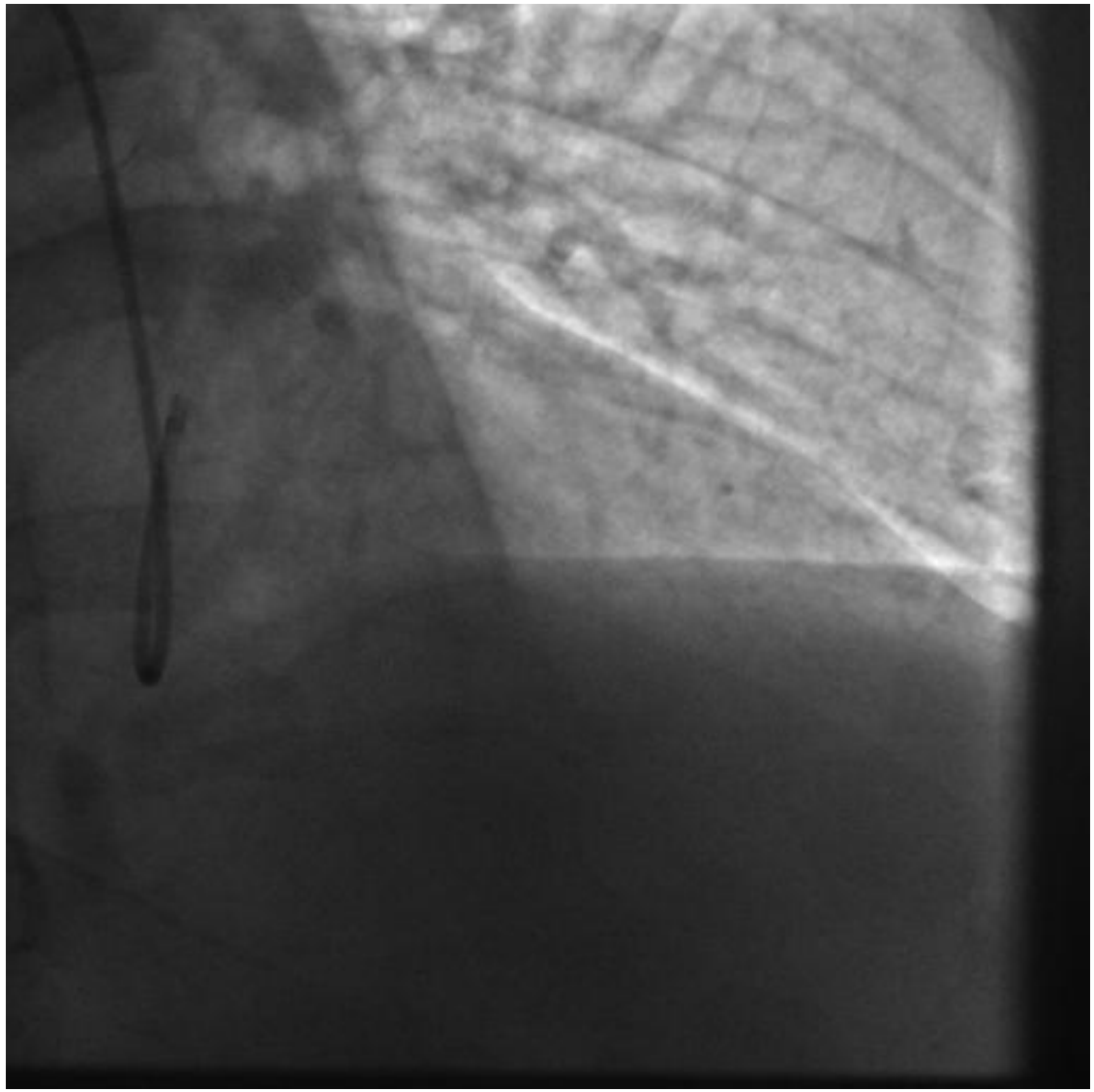
Stent Diameter ?



Respect of the fractal law

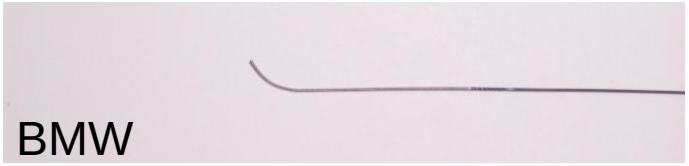
Fractal law not respected

Ready to Start ?



Difficult Access ?

- ✓ Most difficult Branch first



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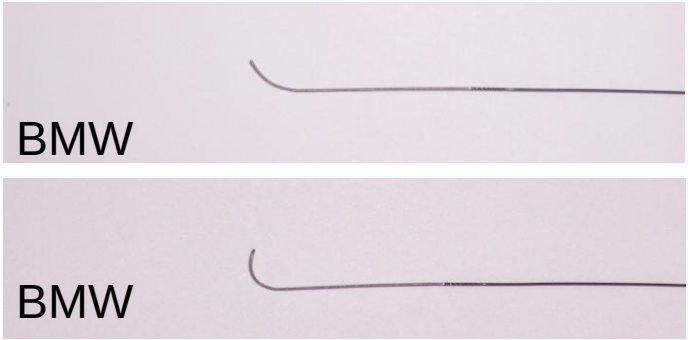

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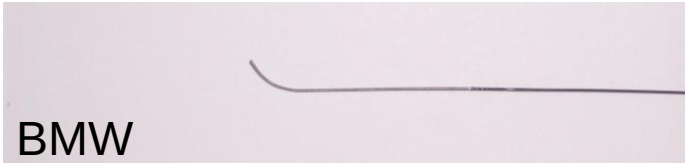
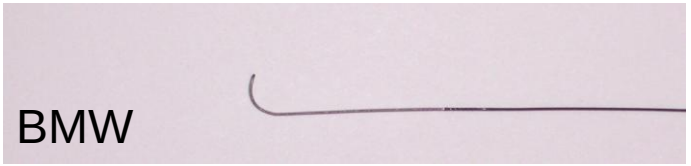
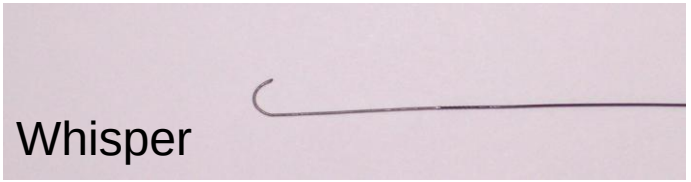


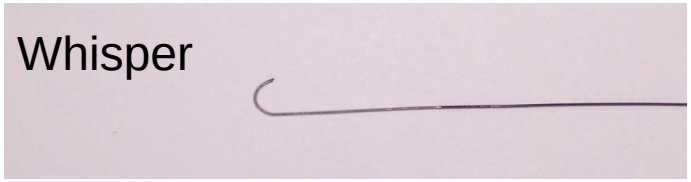




Difficult Access ?

- ✓ Most difficult Branch first

- ✓ **In some cases, access is easier when pulling back from the other branch**



Male 67 years old, ACS

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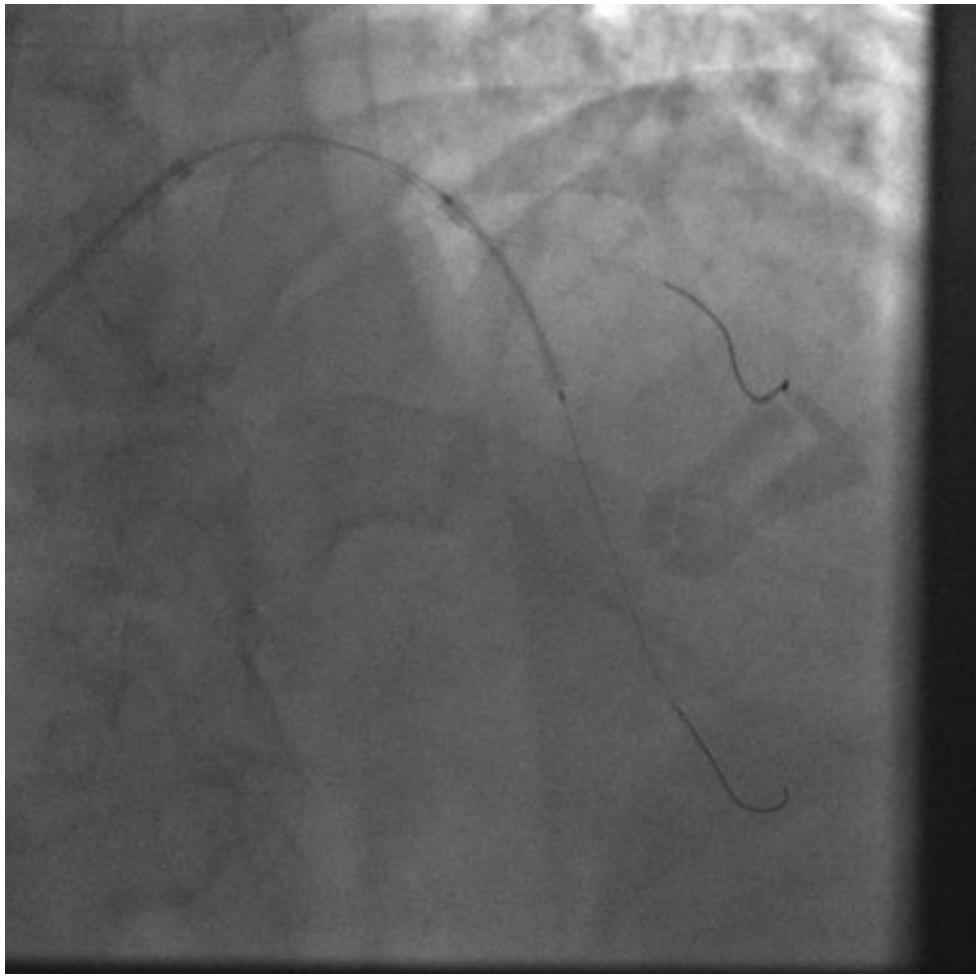
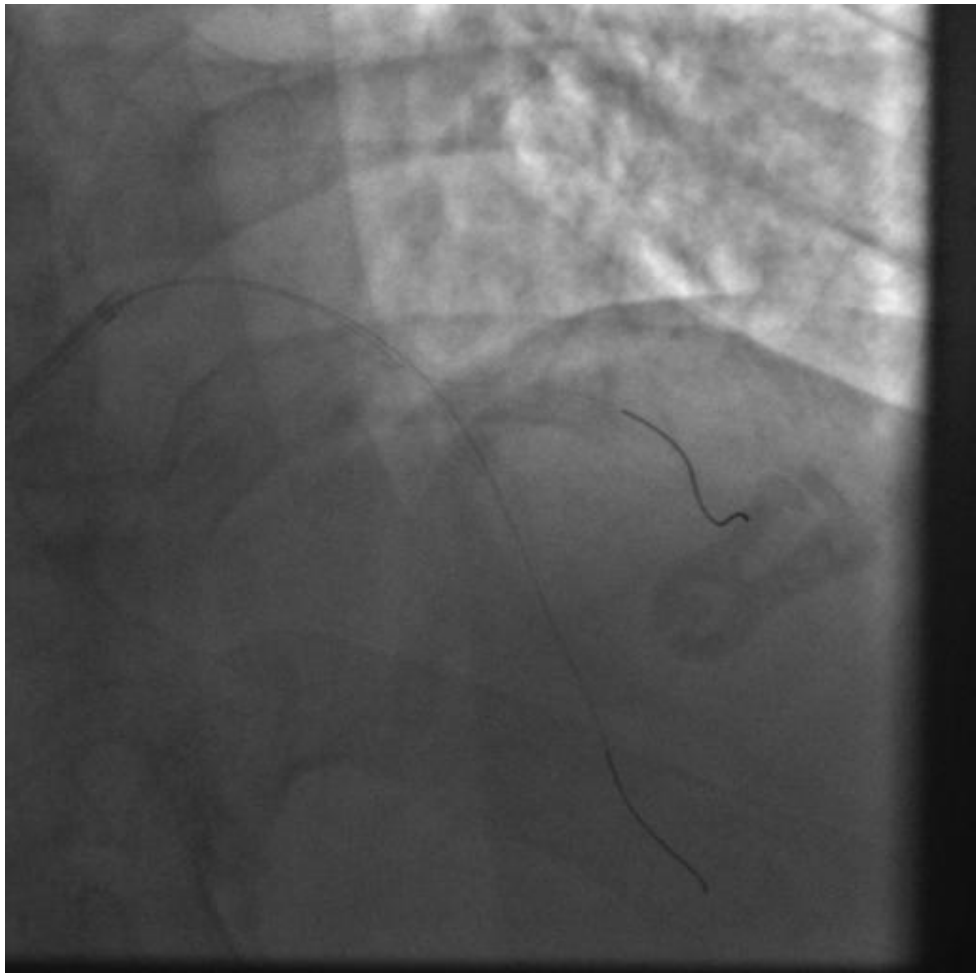


Cypher select 2.75 x 28 mm, 12 ATM

Male 67 years old, ACS

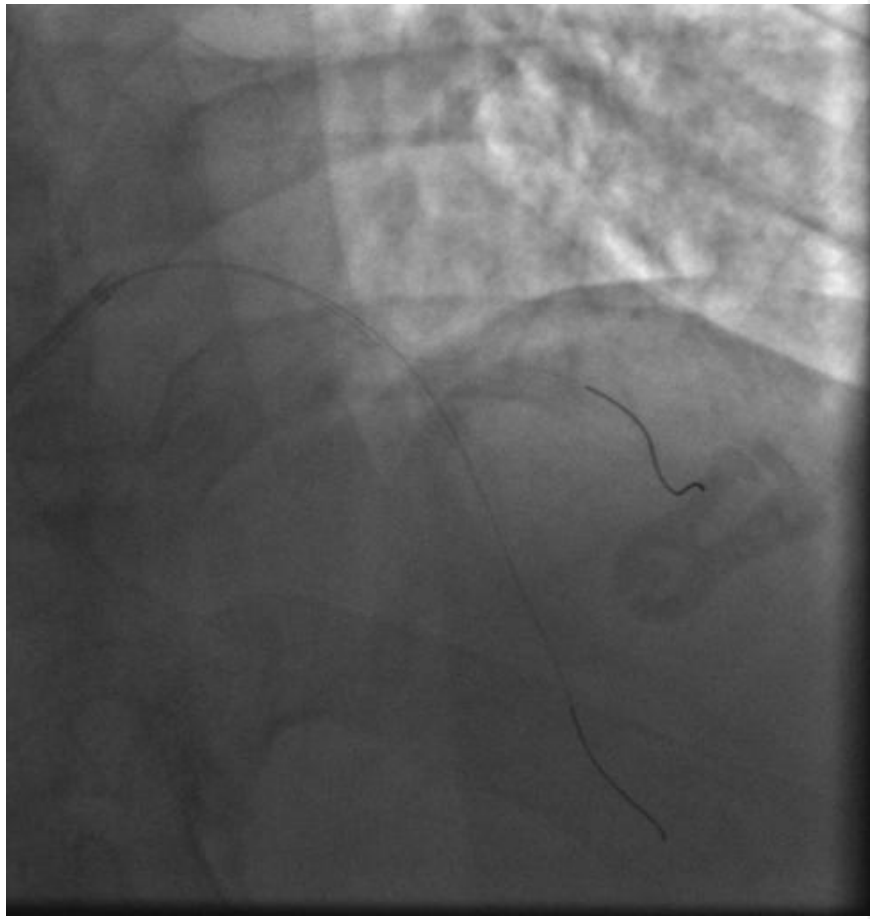


Limited carena shifting

Male 67 years old, ACS

Should we do a final Kiss ?

1. *Better rheology*
2. *Access to a big branch in the future*
3. *Carena repositionning*
4. *Stent apposition proximal to the carena*



Nordic III

Routine Final Kissing in 1 Stent Strategy Angiographic Restenosis

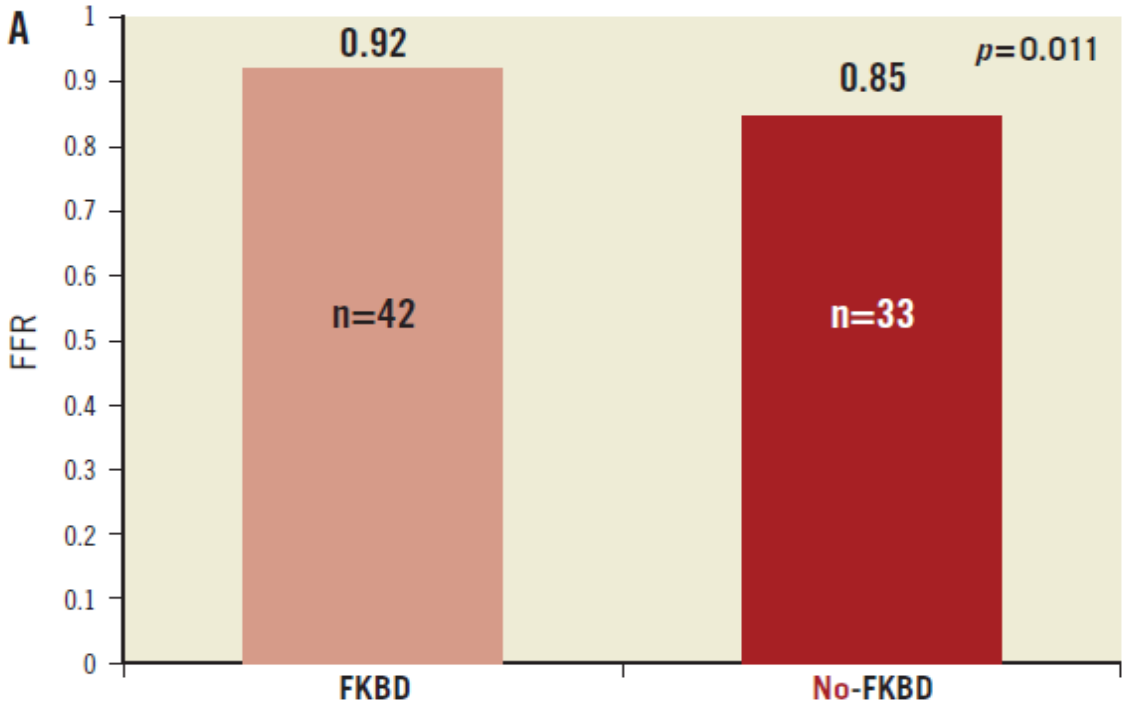
	True Bifurcation Subgroup			Nontrue Bifurcation Subgroup		
Variable	FKBD (n=92)	No FKBD (n=80)	*P*	FKBD (n=72)	No FKBD (n=82)	*P*
In-segment MV						
DS, %	22±15	22±15	0.85	22±14	21±12	0.90
≥50% DS, n (%)	3 (3.8)	2 (2.2)	0.67	3 (4.2)	1 (1.2)	0.34
Ostial 5 mm of the SB						
MLD, mm	1.71±0.42	1.50±0.53	0.005	1.79±0.54	1.77±0.61	0.79
DS, %	25±14	32±21	0.009	23±15	27±19	0.21
≥50% DS, n (%)	7 (7.6)	16 (20)	0.024	6 (8.3)	9 (11)	0.79

DS indicates diameter stenosis; MLD, minimal luminal diameter. The Fisher exact test, χ^2 test, or independent-samples *t* test was used.

FKBD reduced angiographic side branch (re)stenosis, especially in patients with true bifurcation lesions

Thuesen L et al. ACC 2011

Nordic III
Routine Final Kissing in 1 Stent Strategy
SB FFR Substudy



Kumsar et al. Eurointrevention 2012; 7:1155-61

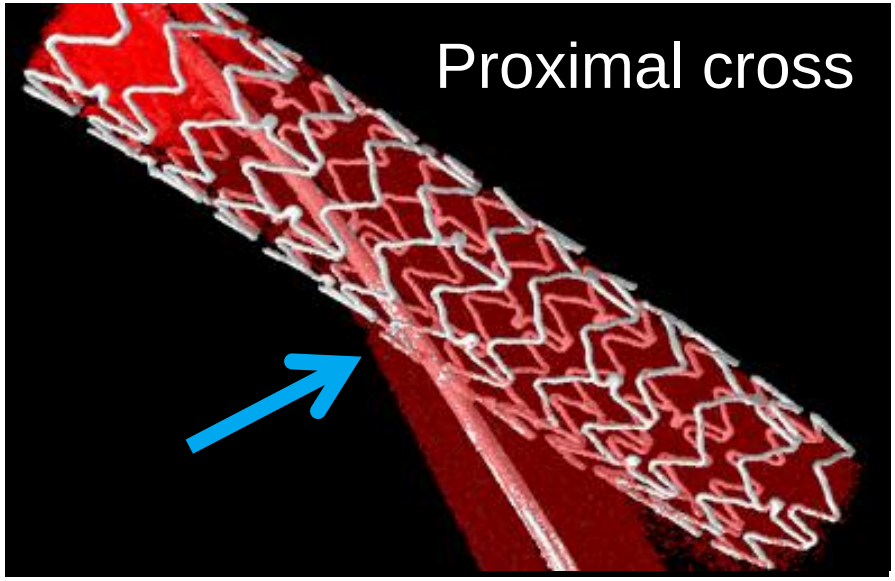
Male 67 years old, ACS

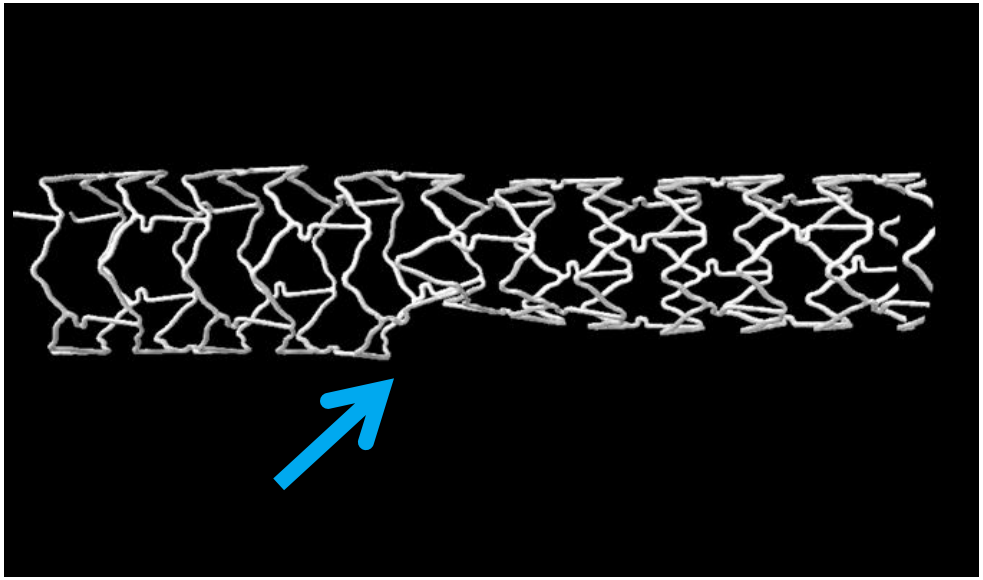
How to do a good Kiss ?

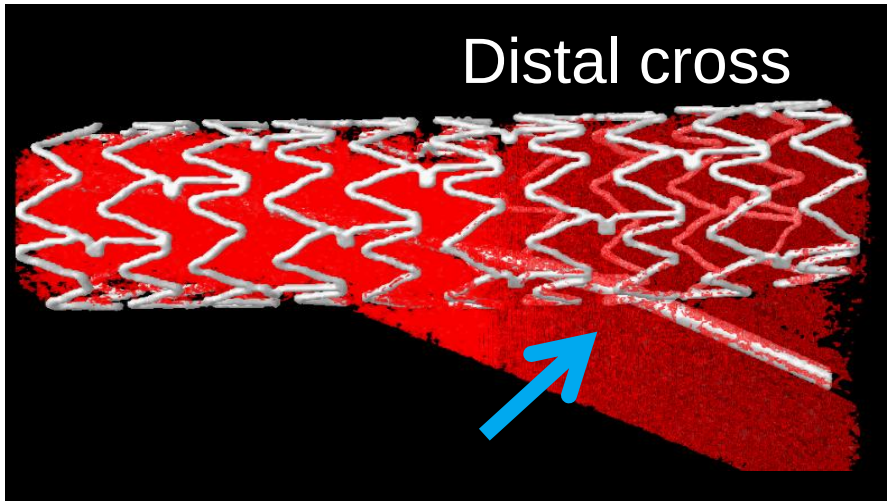
1. *Distal strut*
2. *Short NC balloons*
3. *Distal reference (MB and SB)*

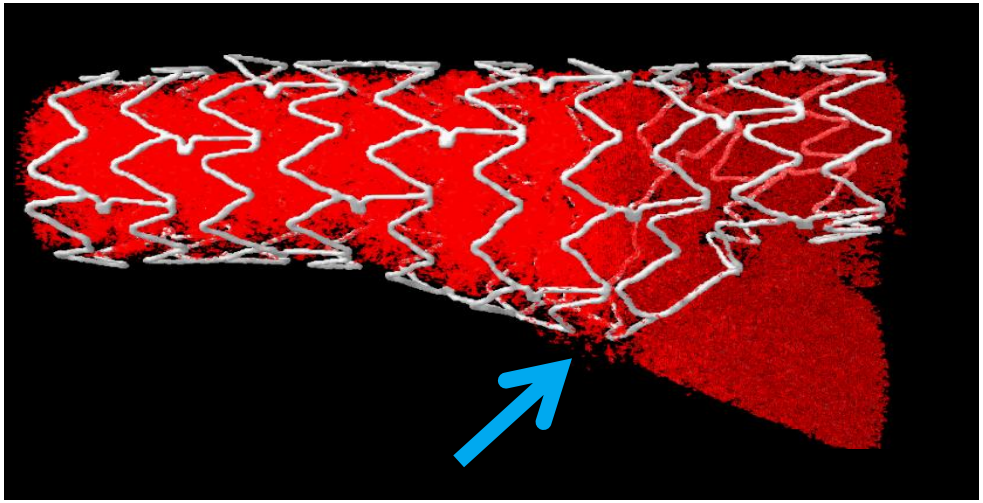
NC balloons 2.75x15 et 2.5x 0

Proximal vs Distal Crossing







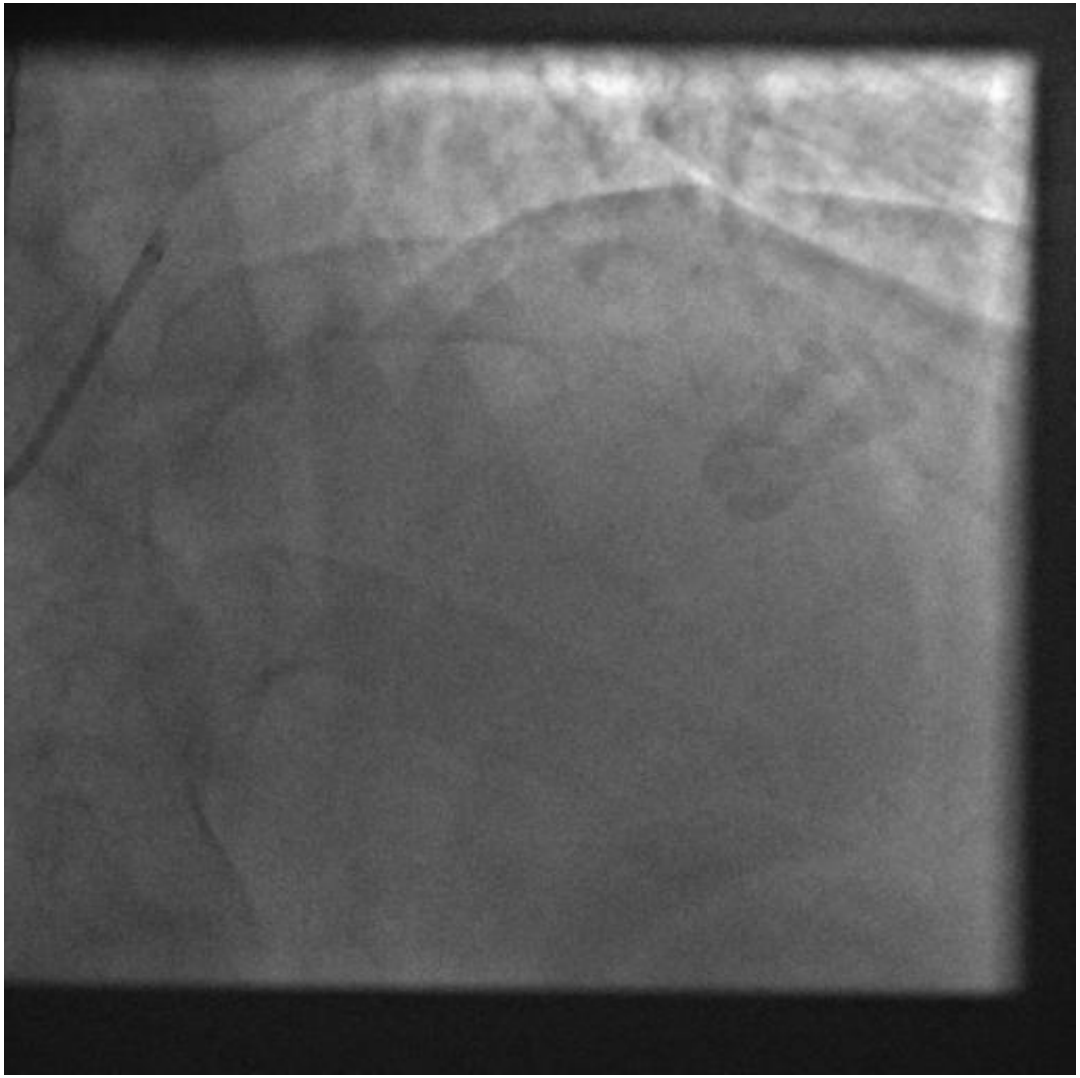


Courtoisie du Dr John Ormiston

Male 67 years old, ACS

SB stenting necessary ?

1. *Optimal view ?*
2. *Benefit ?*
3. *Risk ?*



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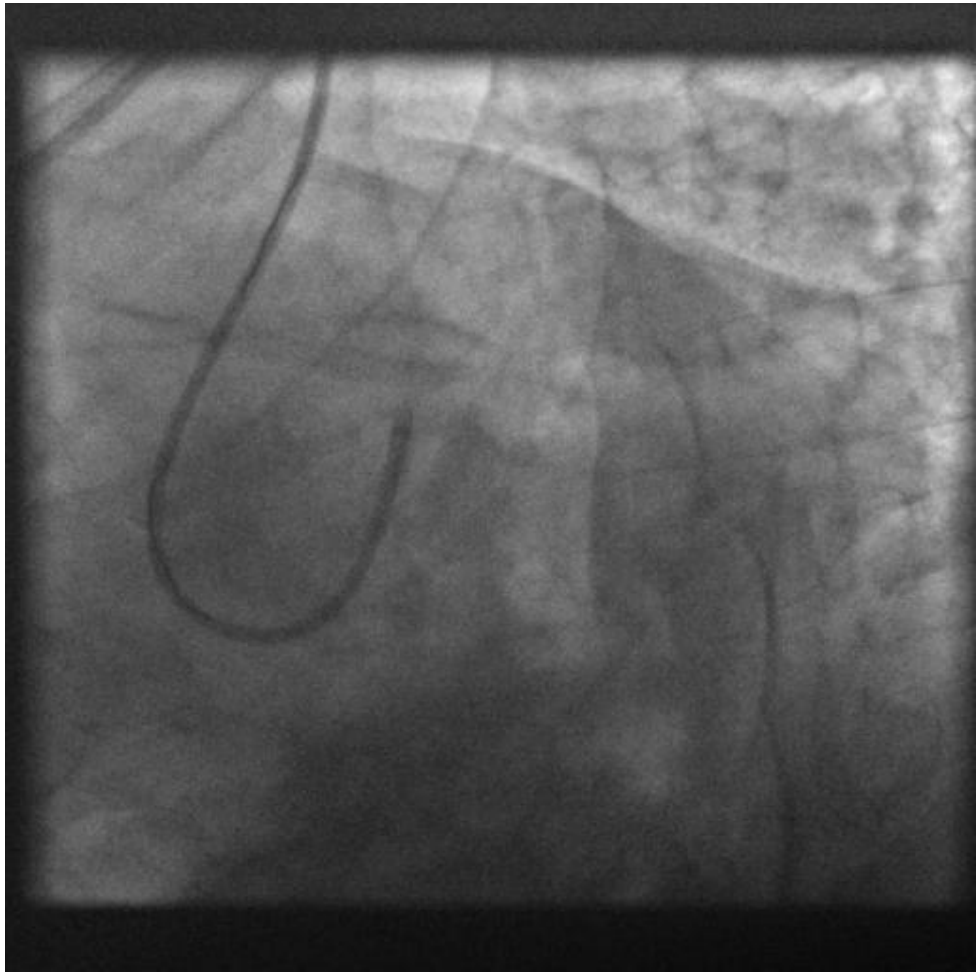

Conclusion

Today the Gold standard technique in the treatment of bifurcation lesions with DES is provisional side branch stenting.

With a standardized approach, it is relatively simple and safe, and it can be used in the vast majority of cases.

Conclusion

✓ With an optimal technique a systematic two stents approach is needed in less than 5% of cases.

✓ And provisional SB stenting required in less than 10% of cases.

✓ When two stents are used, an optimal technique, including systematic kissing balloon inflation is warranted.

When SB stenting is needed