



When and how to treat the side branch in provisional stenting

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Disclosure Statement of Financial Interest

Within the past 12 months, I have received consulting fees / honoraria from the following:

- Cordis, Johnson & Johnson*
- Abbott Vascular*
- The Medicines Company*
- Boston Scientific*

Provisional stenting: the concept

1. Protect the side branch with a wire
2. Dilate and stent the main vessel
3. Evaluate the result in the SB and the flow
4. If necessary, re-wire the SB to optimise with kissing balloon post-dilatation
5. Perform stent implantation to the SB if poor result particularly if TIMI 0 or I flow



When?



When?



WHAT...YOU THINK
I'VE GOT ALL
THE ANSWERS?





- **Desiderius Erasmus of Rotterdam, Dutch Humanist and Theologian (1466-1536) coined the phrase “prevention is better than the cure”**



- **“it is better to stop something bad happening than it is to deal with it after it has happened”**

Wire the side branch

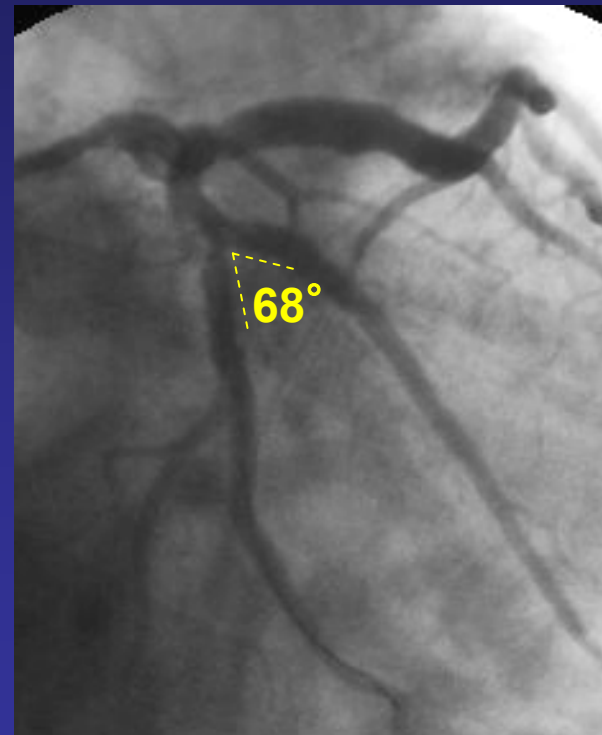
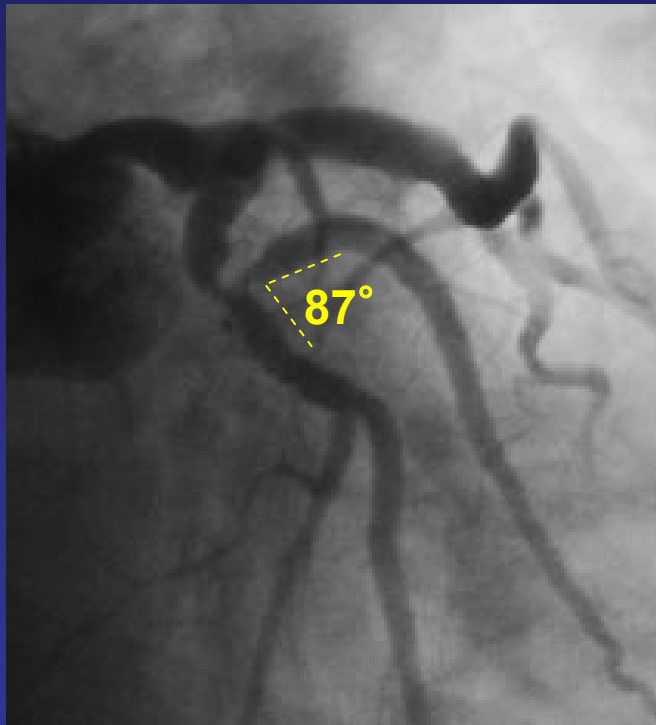
- Compromise of SB occurs to some extent unpredictably

Predictors of Side Branch Failure Insights from the TULIPE Study (n=186)

	Success	Failure	p value
Age (years)	66 ± 11	57 ± 8	0.0007
MB ref diameter (mm)	3.1 ± 0.4	2.8 ± 0.3	0.0085
SB ref diameter (mm)	2.5 ± 0.5	2.2 ± 0.3	0.0413
Final kissing balloon (%)	98.1	76.5	0.0019
Jailed wire (%)	92.9	71.4	0.031

Why wire the side branch?

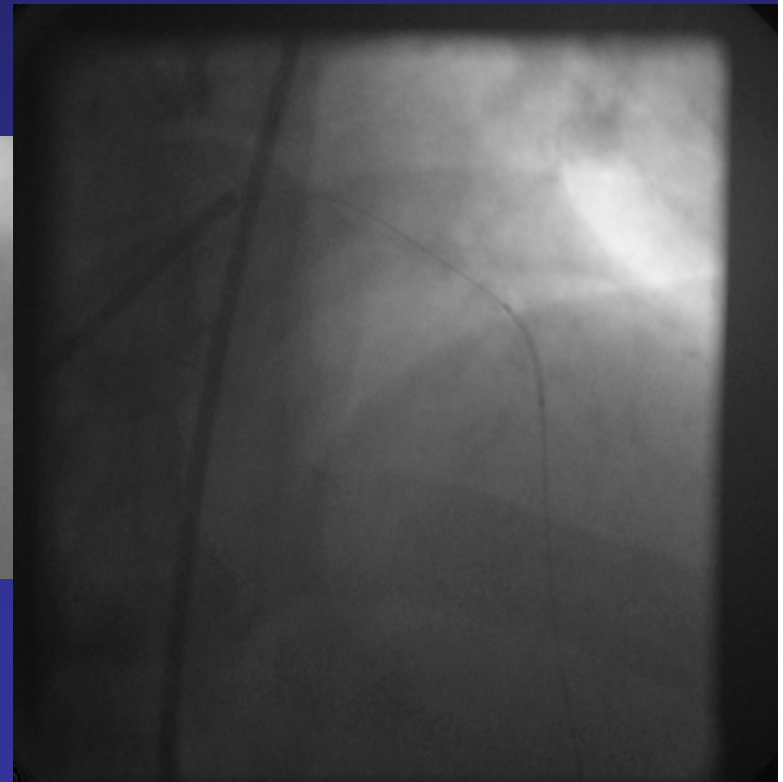
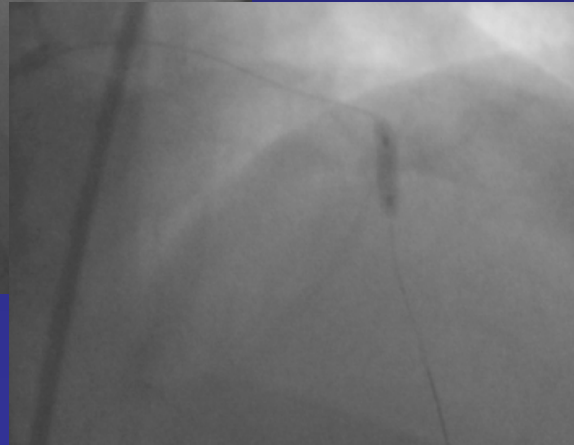
- Favorable modification of the side branch angulation after wiring
 - the lesion becomes Y shape



Always use 2 wires!



62 year old man with NYHA II
stable angina

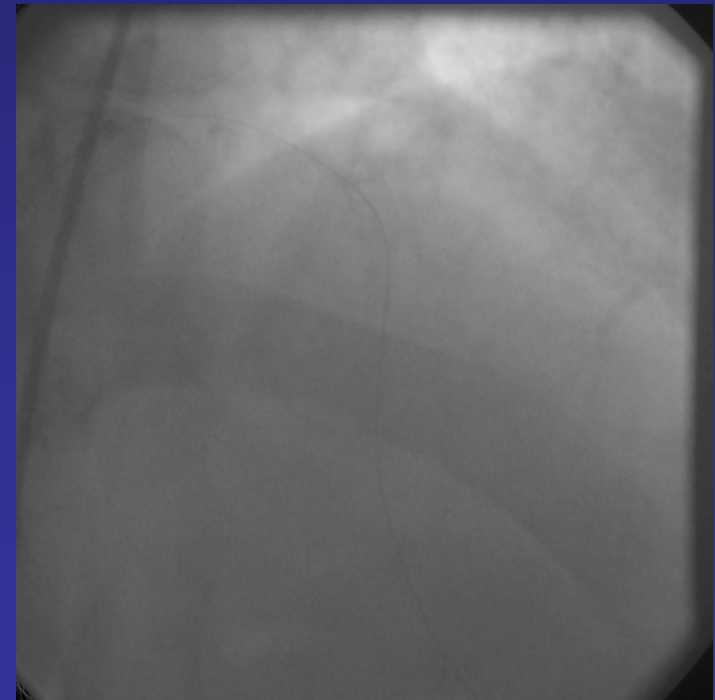
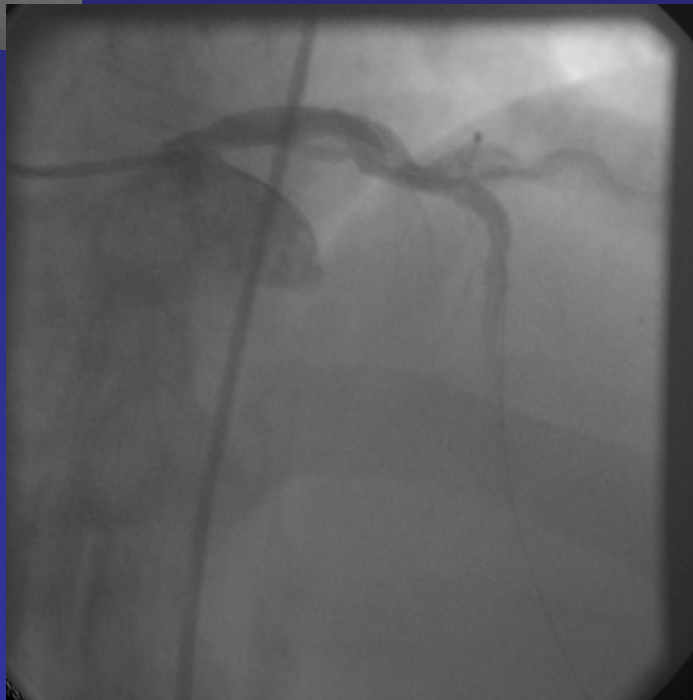


Always use 2 wires!

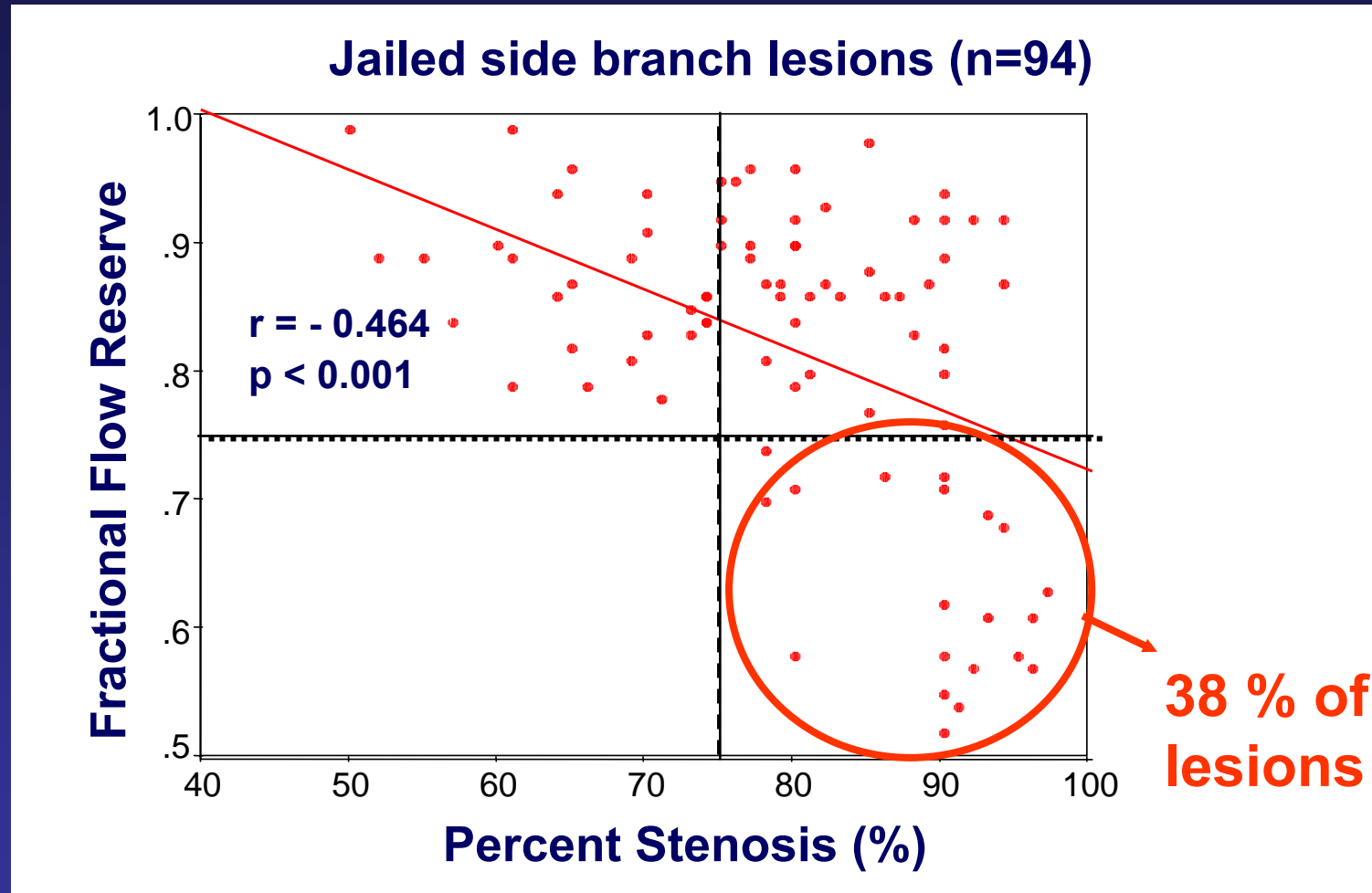


- Severe chest pain
- ST elevation in lateral leads
- CK rise of 800

Final result

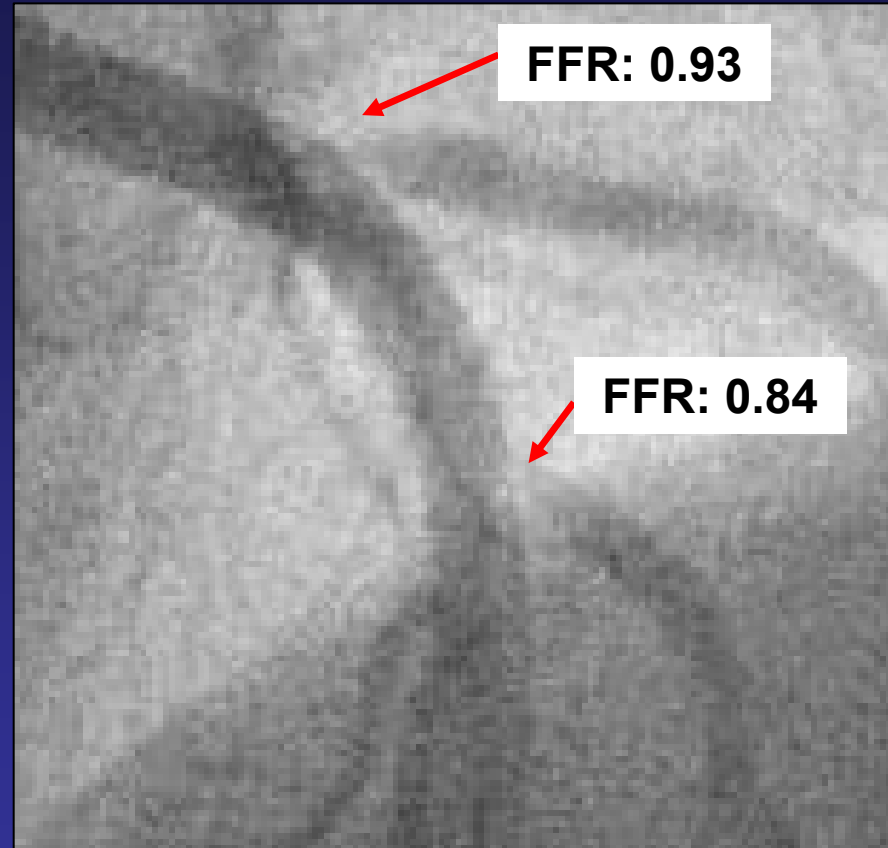
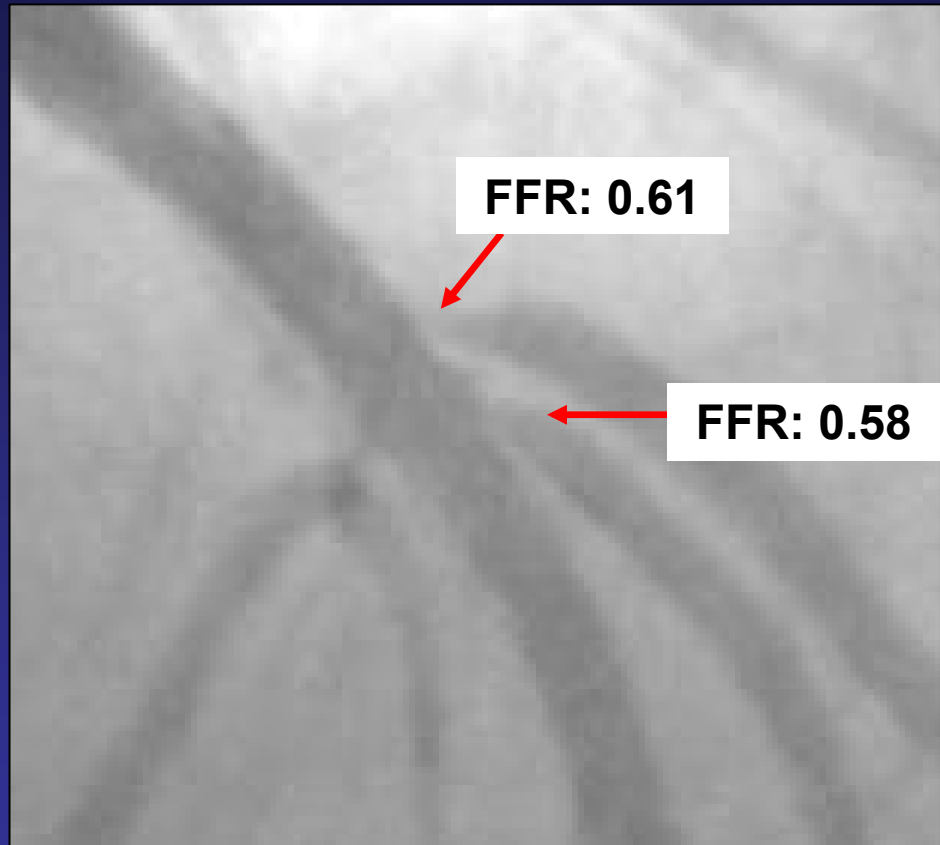


When do we need to treat the SB?



- Ostium SB stenosis is overestimated by angio

QCA versus FFR

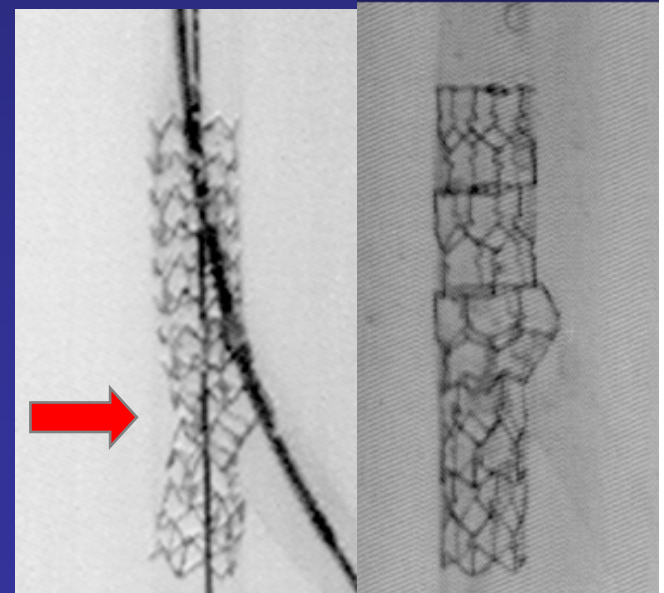


- Visual estimate / QCA of the significance of stenosis of the SB ostium is unreliable

Courtesy of Dr Remo Albeiro

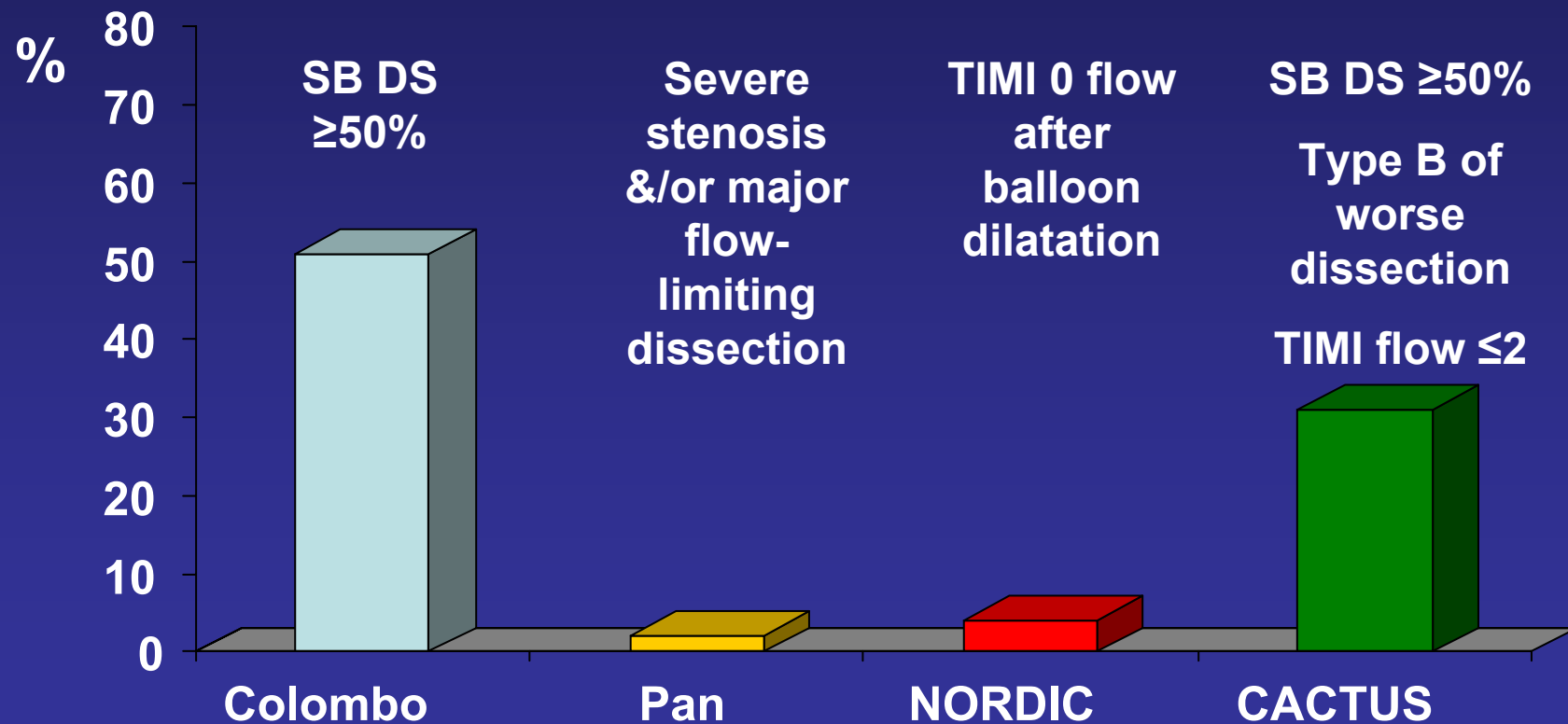
When do we need to balloon the SB in provisional stenting?

- Is final kissing balloon dilatation mandatory?
 - Await the results of randomised studies (NORDIC KISS and CROSS)
- < TIMI 3 flow
- “Significantly stenosed”.....?
- Must be performed optimally
 - After dilatation of SB, kissing balloon dilatation is essential to correct the MV stent deformation



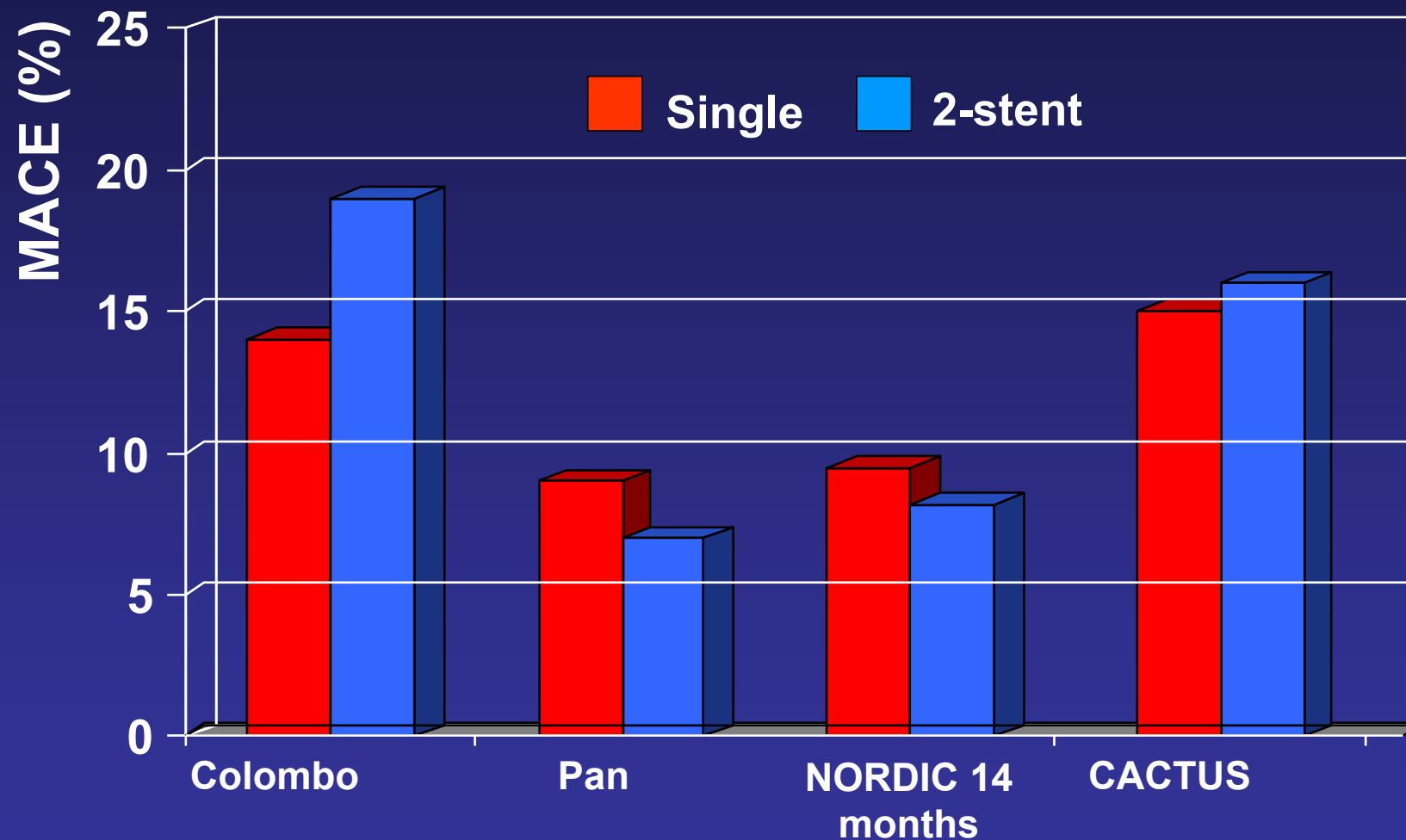
When do we need to stent the SB?

- Crossover to a 2nd stent in the provisional stenting group of randomised studies



Colombo et al Circ 2004; Pan et al AHJ 2004; Steigen et al Circ 2006; Colombo et al

Provisional stenting: MACE rates

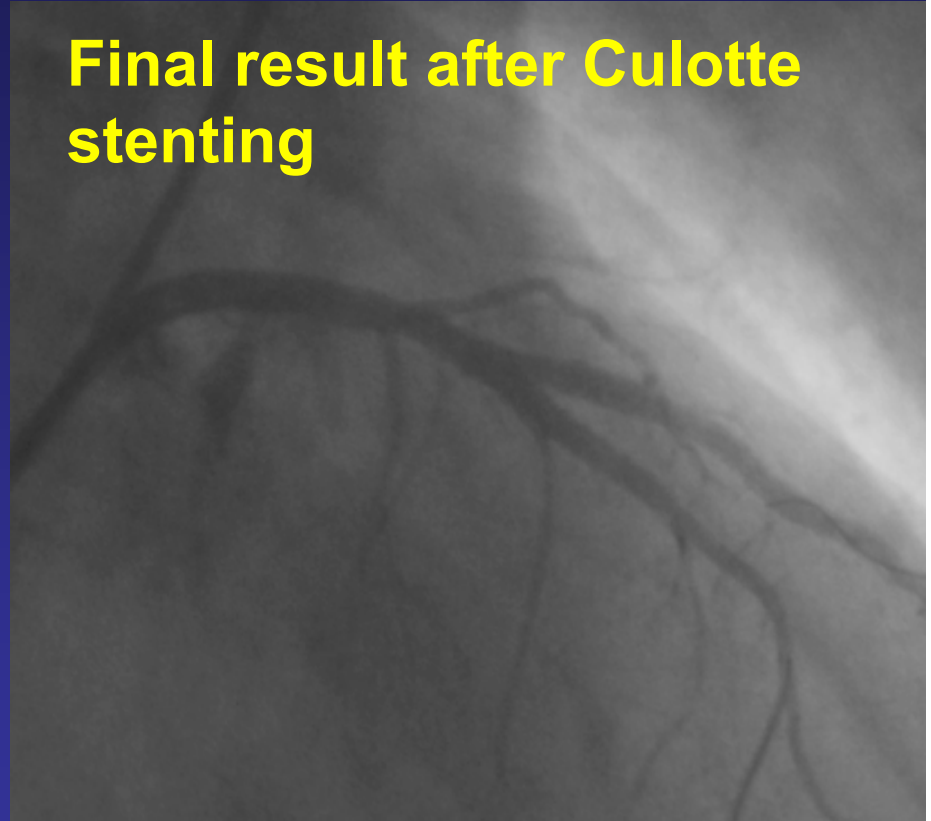


Colombo et al Circ 2004; Pan et al AHJ 2004; Jensen et al Eurointervention 2008; Colombo et al

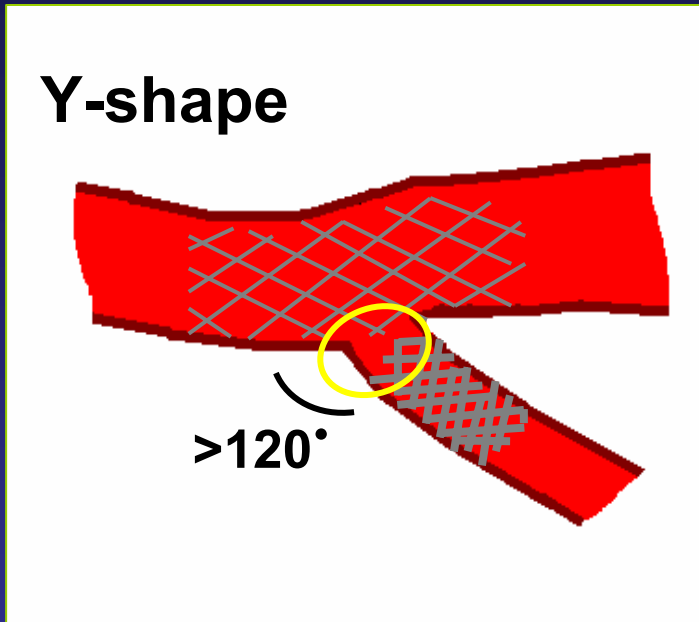
When do we need to stent the SB?

- Long lesion (eg >10mm) in an important vessel
- Significant (\geq type C) dissection
- TIMI 0 or 1 flow
- Significantly stenosed.....?

Final result after Culotte stenting

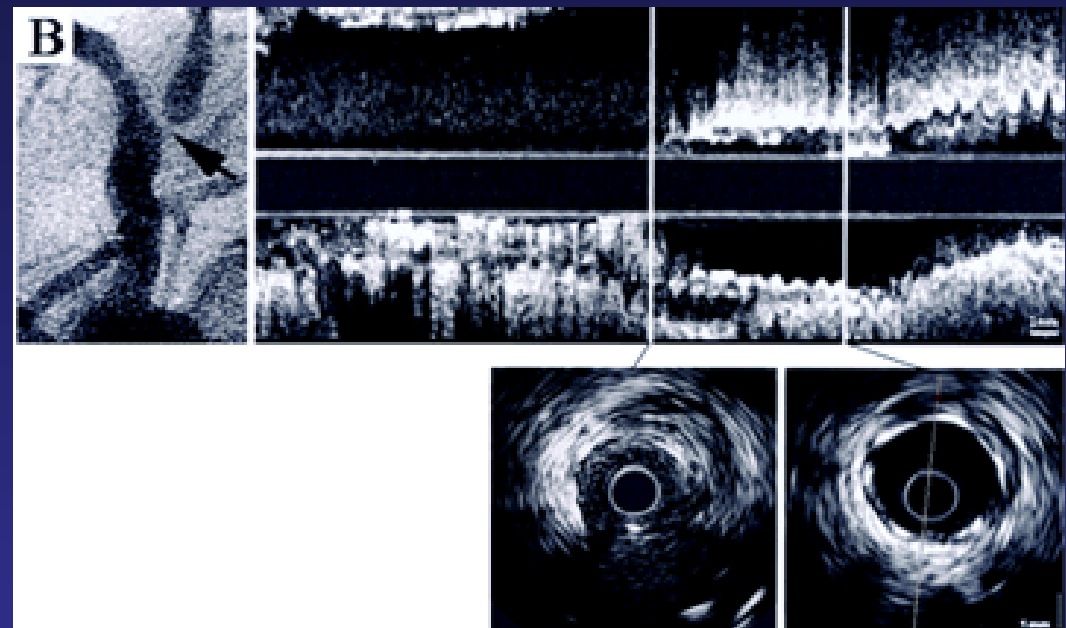


Assess the angulation



Y-shape incidence ~ 75%

- ✓ Culotte
- ✓ Crush



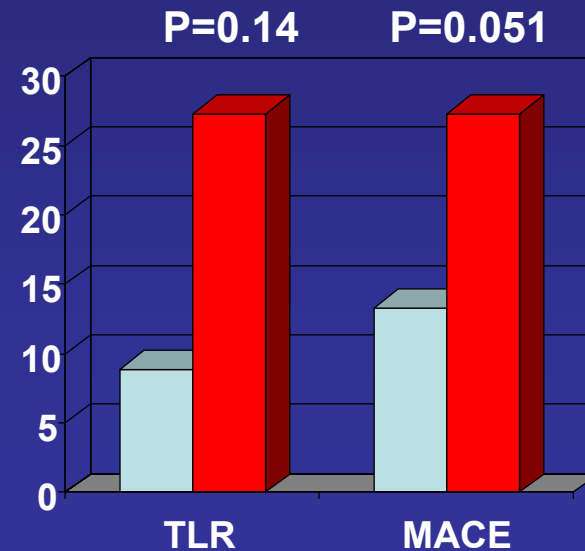
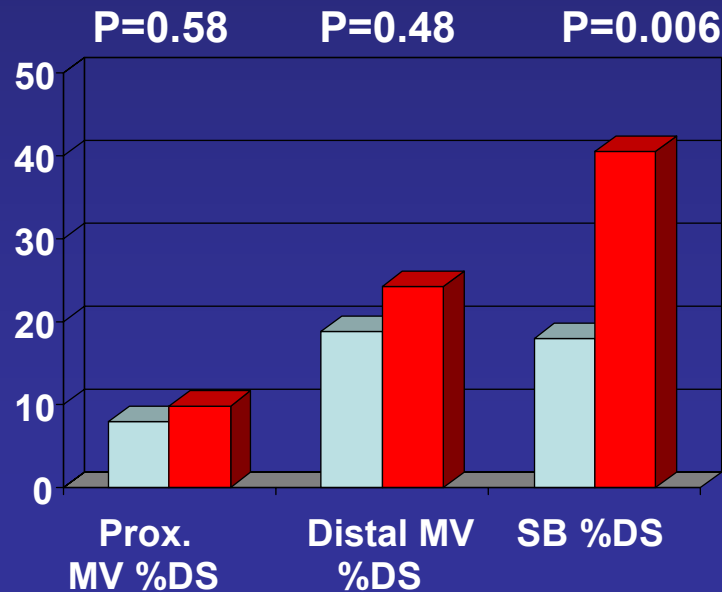
Ostial restenosis was associated with incomplete coverage

✗ T-stent

Importance of lesion coverage

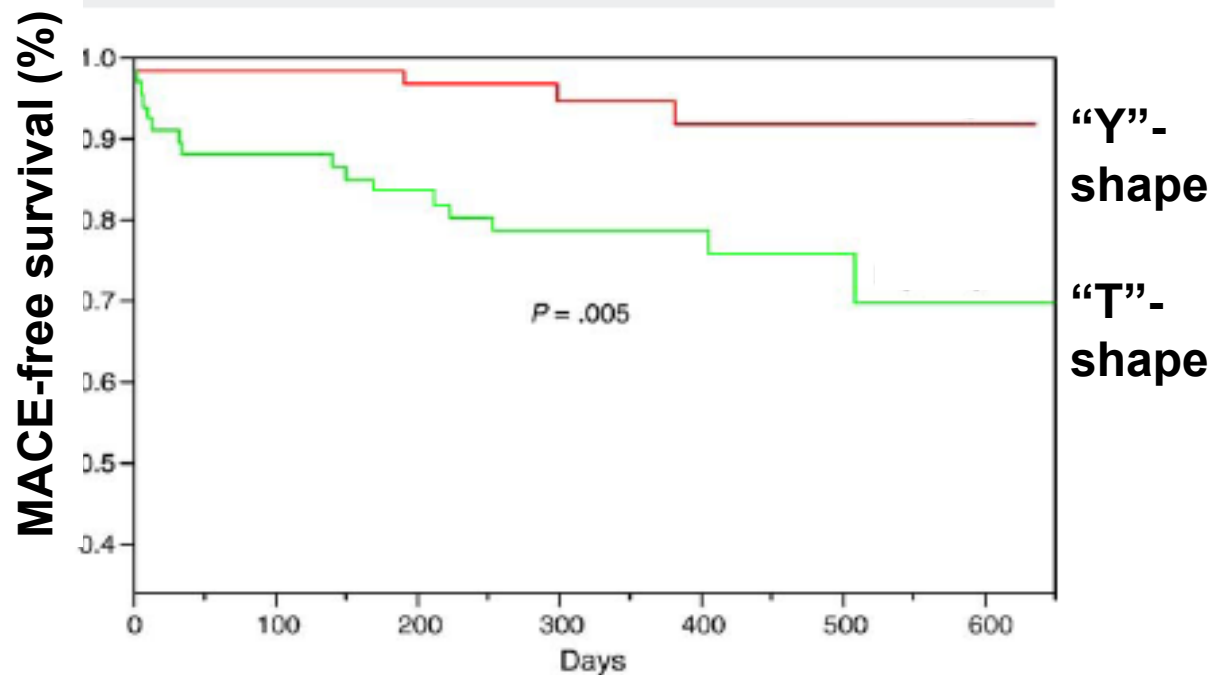
- 178 consecutive patients undergoing provisional stenting
- 80 (45%) required a 2nd stent, and were treated with either Culotte (n=45) or T-stenting (n=35)
- FU angio at 6 months
- Mean bifurcation angle was $57 \pm 22^\circ$

Culotte
T-stent



Crush stenting: influence of bifurcation angle

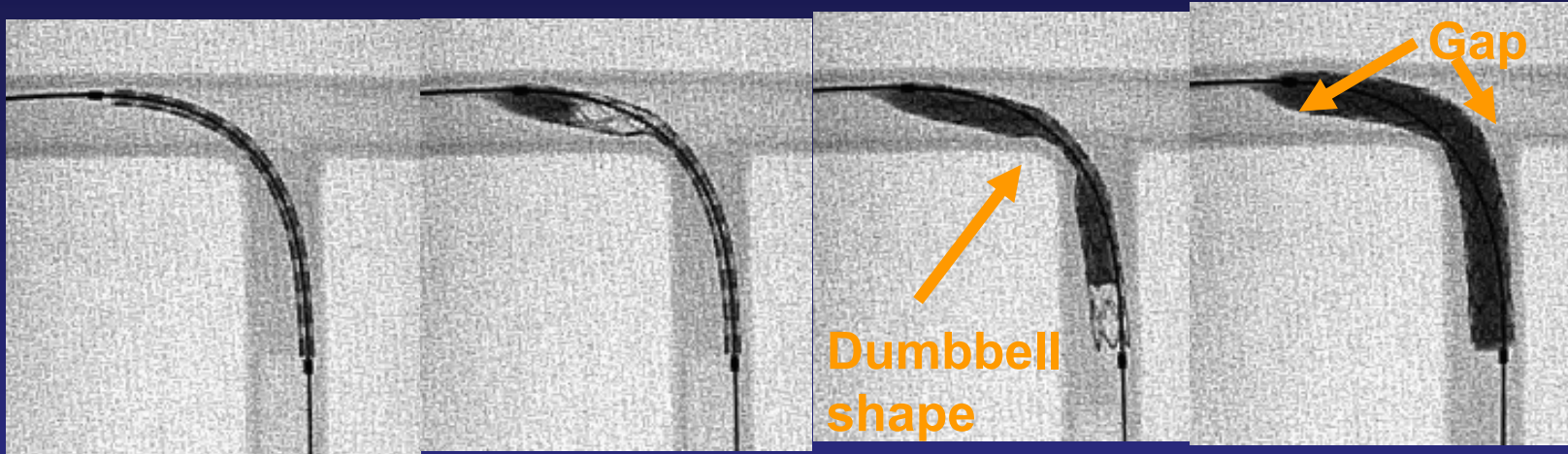
Influence of bifurcation angle on outcome following use of the crush technique



Culotte stenting

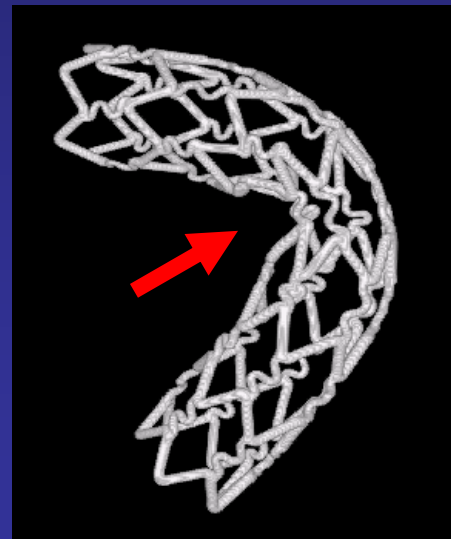
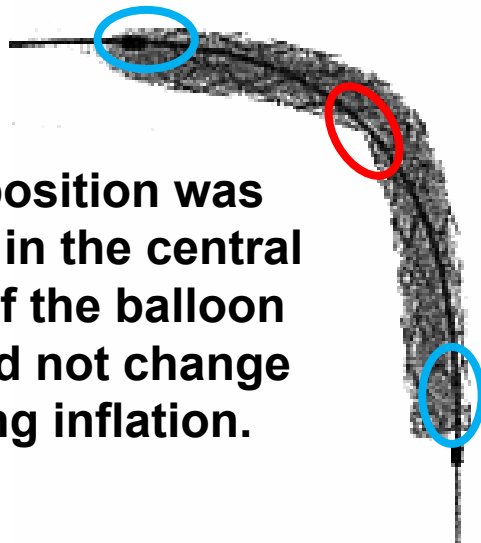
Independent predictors of binary restenosis	Odds ratio (95% CI)	p value
Age (increase of 10 years)	2.38 (1.21-4.96)	0.01
Bifurcation angle (increase of 10°)	1.53 (1.04-2.23)	0.03
Baseline main vessel DS (increase of 10%)	1.47 (1.03-2.09)	0.03
SB ref. vessel diameter (decrease by 1mm)	31.83 (1.71-592.77)	0.02
Kissing balloon post-dilatation	0.37 (0.13-1.10)	0.07

Stents don't like large bends



Maximal inflation pressure

GW position was biased in the central core of the balloon and did not change during inflation.



- ✓ T-stenting
- ✓ Mini-crush

Courtesy of Dr Murasato

Mini-crush

- Relatively straightforward technique, appears suitable irrespective of bifurcation angle
- Registry data of 457 patients

	9 month angio FU		2 years
No. pts	MV binary restenosis (%)	SB binary restenosis (%)	MACE (%)

“These results may confirm the advantage of using prescheduled 2-stent technique to give a complete coverage of the side branches` ostium”

T-stent				
2-stents	88	19	19**	26

* p≤0.001, **p≤0.01

TAP: T-stenting & small protrusion



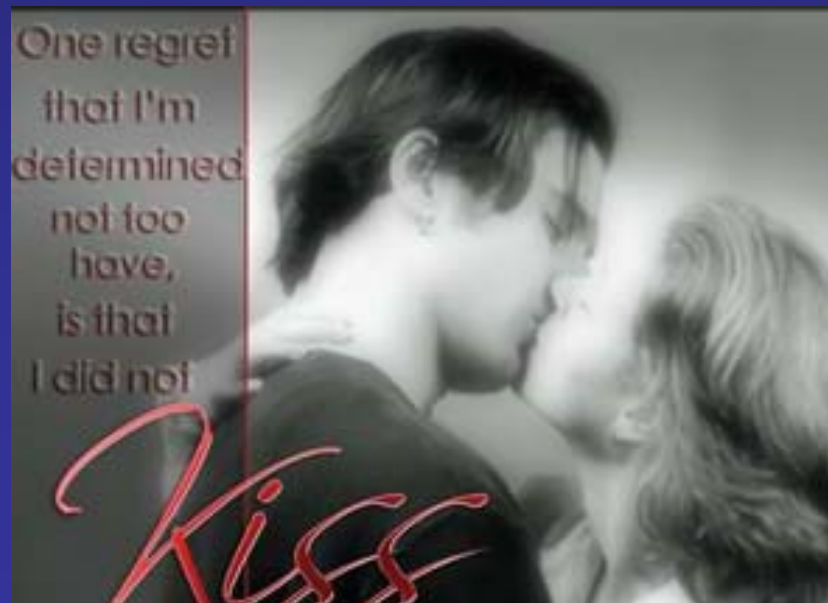
- **73 patients**
 - Mortality rate 4%
 - AMI 0
 - TLR: 7%
 - 1 definite and 1 suspected stent thrombosis
- **MACE-free survival at 9-months 90%**

Choice of stenting strategy for the SB: importance of the angle

	T-shape bifurcation	Y-shape bifurcation
T-stenting	✓	X
Internal crush	X	✓
Culotte	X	✓
TAP	✓	✓

Final kissing balloon post-dilatation

- Significant reduction in MV and SB restenosis
- Must be performed optimally using appropriately sized balloons:
 - Sequential high pressure balloon dilatation of the SB stent then MV stent
 - Finalise with lower pressure kissing balloon dilatation



Summary & Conclusions

1. Try to avoid SB compromise in the first place
 - Pre-wire the SB especially if high angle and / or significant SB disease at baseline
2. Avoid pre-dilatation of the SB
3. Significance of any “stenosis” in the ostium of the SB is overestimated on angiography
4. Definite indications for use of a 2nd stent are reduced flow +/- significant dissection
5. When implanting a SB stent, choice of technique depends on the angulation

Thankyou!

