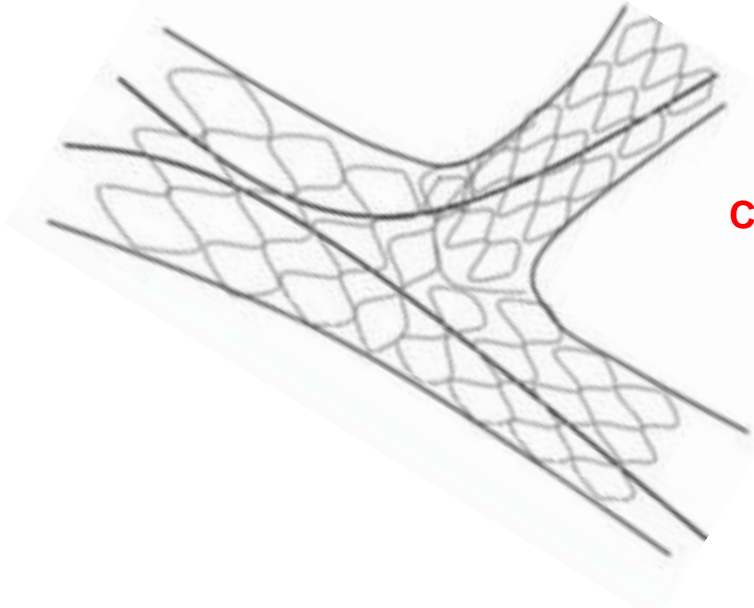


Case presentation

The complication of bifurcation PCI



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Chief of interventional Cardiology Dept, Da Nang Hospital

Outlines

- Overview on bifurcation PCI
- Disadvantages of some bifurcation PCI techniques
- Learning by sharing complication – my case

OVERVIEW

Incidence

- Account for 16-20% PCI
- Procedural complications 9%
- Restenosis as high as 36%

Possible locations






































- LMCA bifurcation
- Non-LMCA bifurcation: + LAD – diagonal
 - + LCX – obtuse marginal
 - + RCA – PDA

Overview

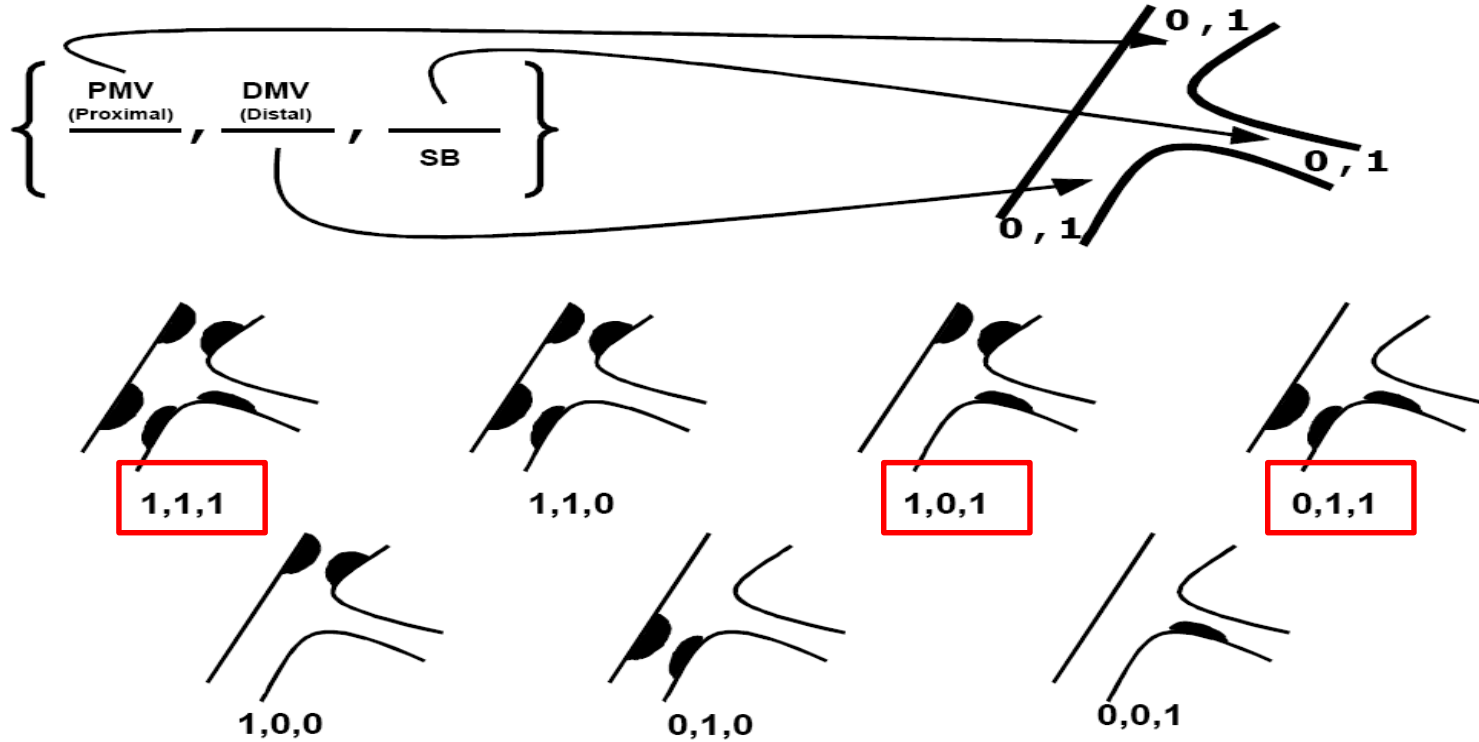
Technical problems

- Difficulty in access to the side branch
- Risk of side branch occlusion
- Plaque shift
- Lesion recoil
- Ineffective lumen expansion
- ...

Classification of bifurcation lesions

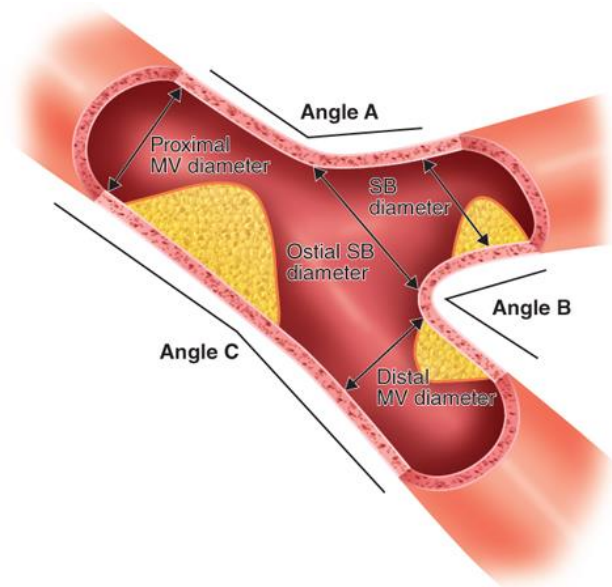
Sanborn	Type I 	Type II 	Type III 	Type IV 	Type V 		
Safian	Type IA 	Type IB 	Type IIA 	Type IIB 	Type IIIA 	Type IIIB 	Type IV 
Duke	Type A 	Type B 	Type C 	Type D 	Type E 	Type F 	
Lefevre	Type 1 	Type 2 	Type 3 	Type 4 	Type 4a 	Type 4b 	
Medina	1,1,1 	1,1,0 	1,0,1 	0,1,1 	0,1,0 	0,0,1 	1,0,0 
Movahed	BL2V 	BS2T 	BL1mT 	BS1mV 	BS1sT 	BL1sV 	

Medina Classification



Bifurcation lesion- 3 main basic assessments

1. Three diameters: pMB, dMB, SB
2. Length and plaque distribution.
3. Angle btw MB-SB and SB ostium.



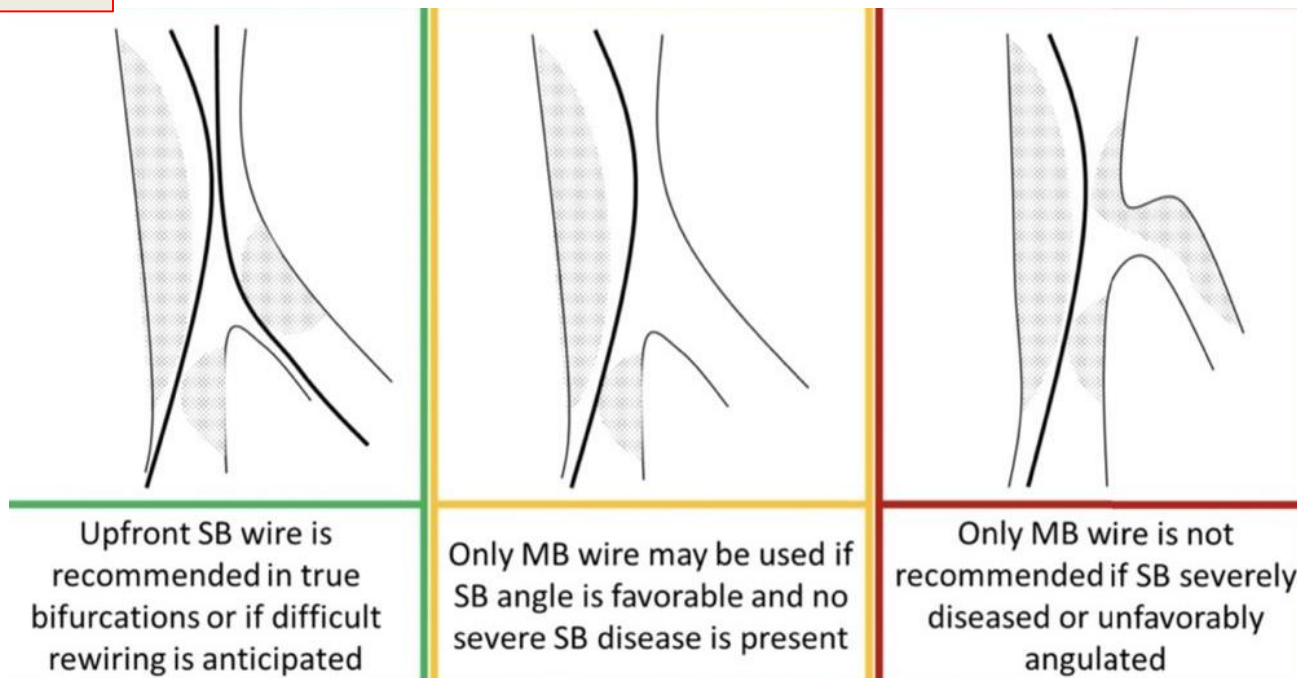
Source: R. R. Baliga, Scott M. Lilly, William T. Abraham:
Color Atlas and Synopsis of Interventional Cardiology
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Please keep in mind ...

The SB is not only >2 mm in diameter
but also is what you don't want to loose

- Long-term clinical outcomes mainly depend on the success of MB stenting
- Well-prepared lesions before stenting is imperative

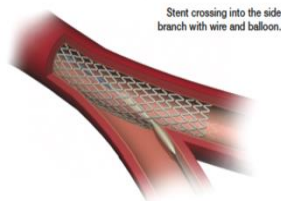
Wiring

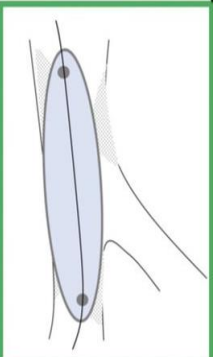
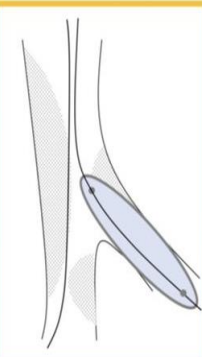
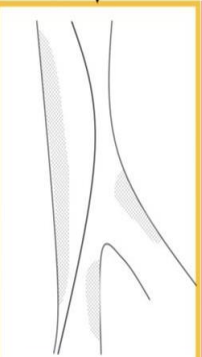
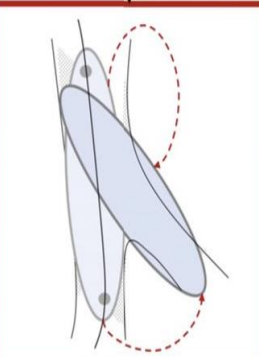


- ❖ SB wiring is always recommended in true bifurcation lesions.
- ❖ The most angulated branch should be wired first to avoid wire wrap.

Main points in bifurcation PCI technique

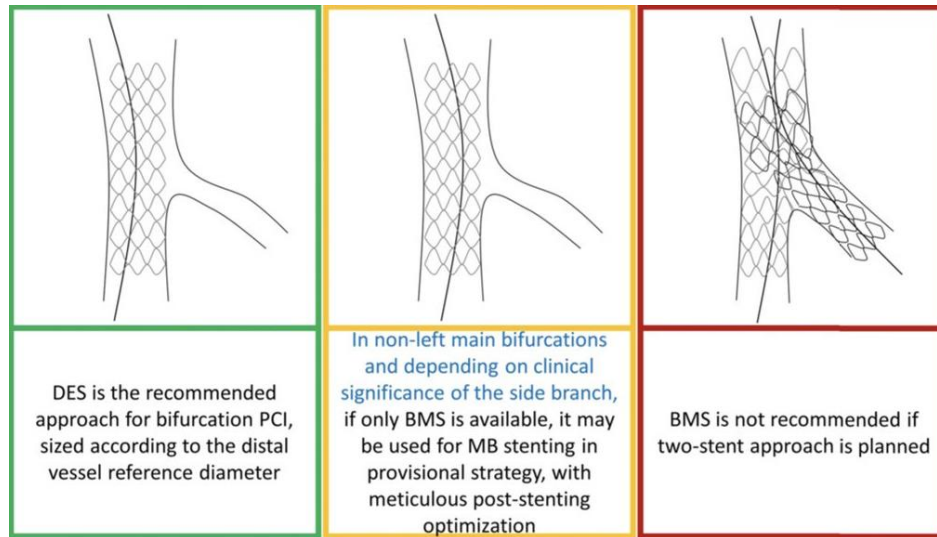
Predilatation



			
MB predilatation for facilitation of the optimal MB stent expansion and apposition	SB predilatation if SB flow impaired, access difficult and in presence of severe/calcified lesions	No routine SB predilatation is required in provisional strategy and no MB predilatation, if soft plaque is expected. <i>If upfront two-stent strategy is planned routine SB predilatation should be considered.</i>	When performing SB predilatation it is not recommended to use the same balloon as for MB predilatation, unless MB and SB diameters are comparable

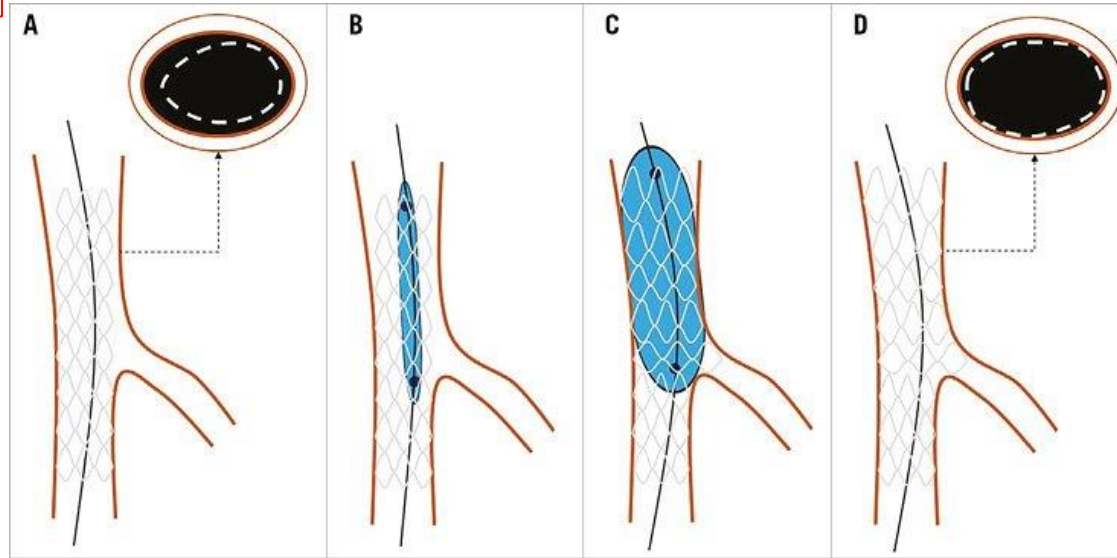
- MB should routinely predilate to facilitate optimal MB stent expansion and apposition.
- Direct stenting if the lesions are soft & no signs of fibrotic/calcified.
- SB predilatation if It is severe,calcified or difficult to access.

MB stenting



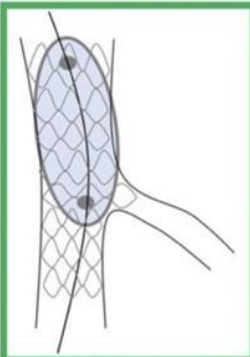
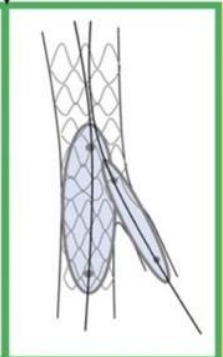
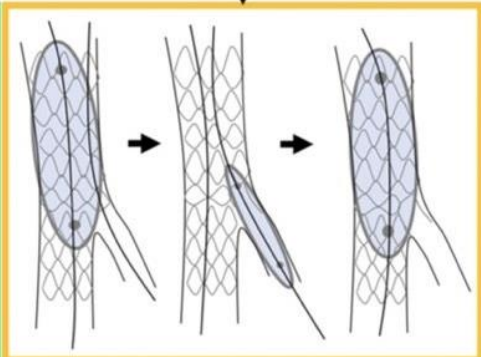
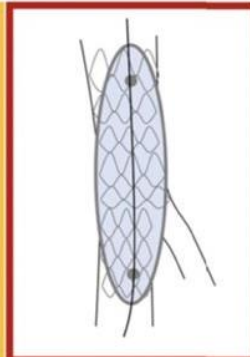
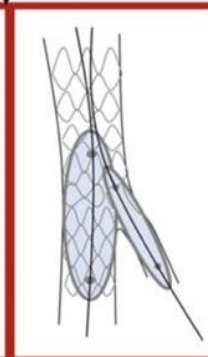
- ❑ DES not BMS is recommended.
- ❑ MB stent diameter is the reference diameter of the dMB.
- ❑ MB stent should extend at least 8-10 mm proximal to the carina.
- ❑ Oversizing the MB stent increase the SB occlusion.

MB stent optimisation- POT's aims:



- ❑ Correct the malapposition in pMB.
- ❑ Facilitate to rewire to SB by modifying the orientation of the ostium
- ❑ Facilitate the SB ostium scaffolding.

MB stent optimization: POT, Kissing balloon & SB dilatation

				
POT should be routinely performed with short NC balloon to correct for stent undersizing in the proximal MB	For KBI, two NC balloons are recommended, sized according to SB and distal MB, with short proximal overlap	POT-side-POT could be considered as an alternative to KBI and SC balloons may be used for POT instead of the NC balloon, taking into account the length of the stented MB segment and maximum inflation size of the available SC vs. NC balloons	It is not recommended to post-dilate the MB stent distally to the carina with the balloon sized according to the proximal MB	Routine KBI is not recommended in a single-stent strategy



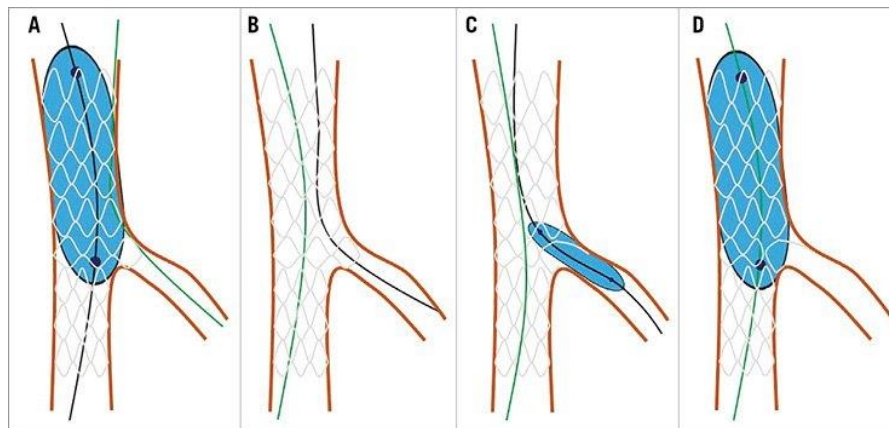
The lesion $>75\%$ or TIMI flow <3 SB, ostium lesion should be reopen and KB may restore normal flow of the SB

Optimisation after MB stenting:

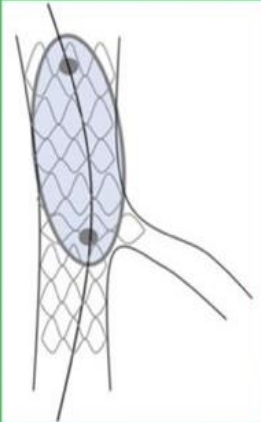
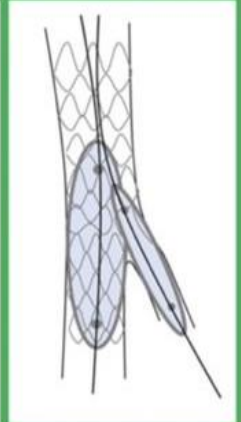
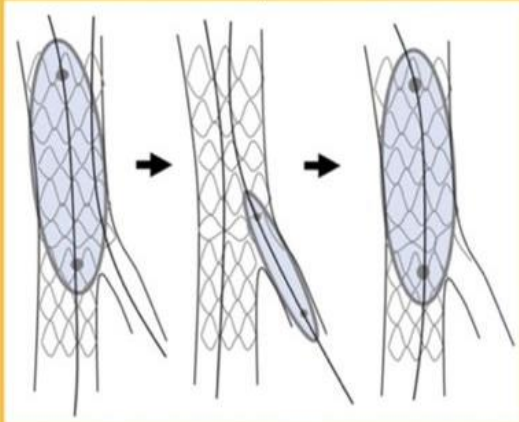
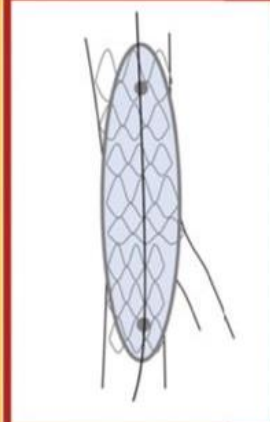
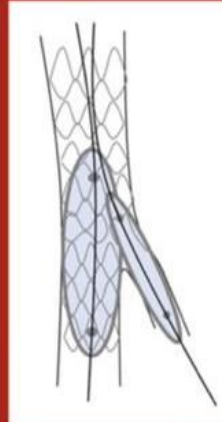
KB & SB dilatation: POT-side-POT

POT-side-POT could be considered as an alternative to KB

- ❑ First POT after MB stenting with a short NC or SC balloon.
- ❑ Wire exchange.
- ❑ SB dilatation with an NC or SC balloon.
- ❑ Second/final POT with the same short NC or SC balloon as the first POT.

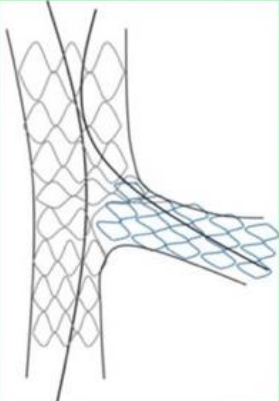
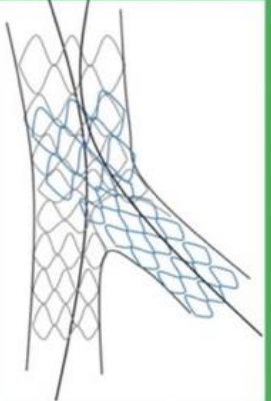
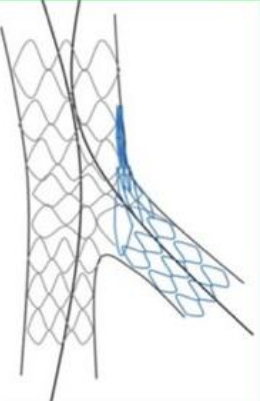
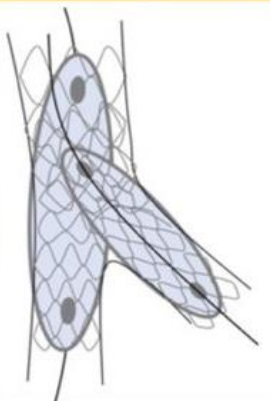



Optimisation after MB stenting

				
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Second stent in a provisional single-stent strategy

				
T- and TAP stenting is recommended in bifurcations with wide angles ($>70^\circ$)	If bifurcation angle is smaller ($<70^\circ$), either Culotte (left) or DK-Crush (right) technique can be used, while considering SB stenting first in case of SB dissection or difficult access		With two-stent techniques, stent delivery balloons may be used for final KBI. If in TAP stenting final POT is performed, the balloon must be meticulously positioned to avoid distortion of the metallic neo-carina.	When performing two-stent bifurcation PCI, final KBI should not be omitted

Final KB and POT must not be skipped in two-stent bifurcation PCI

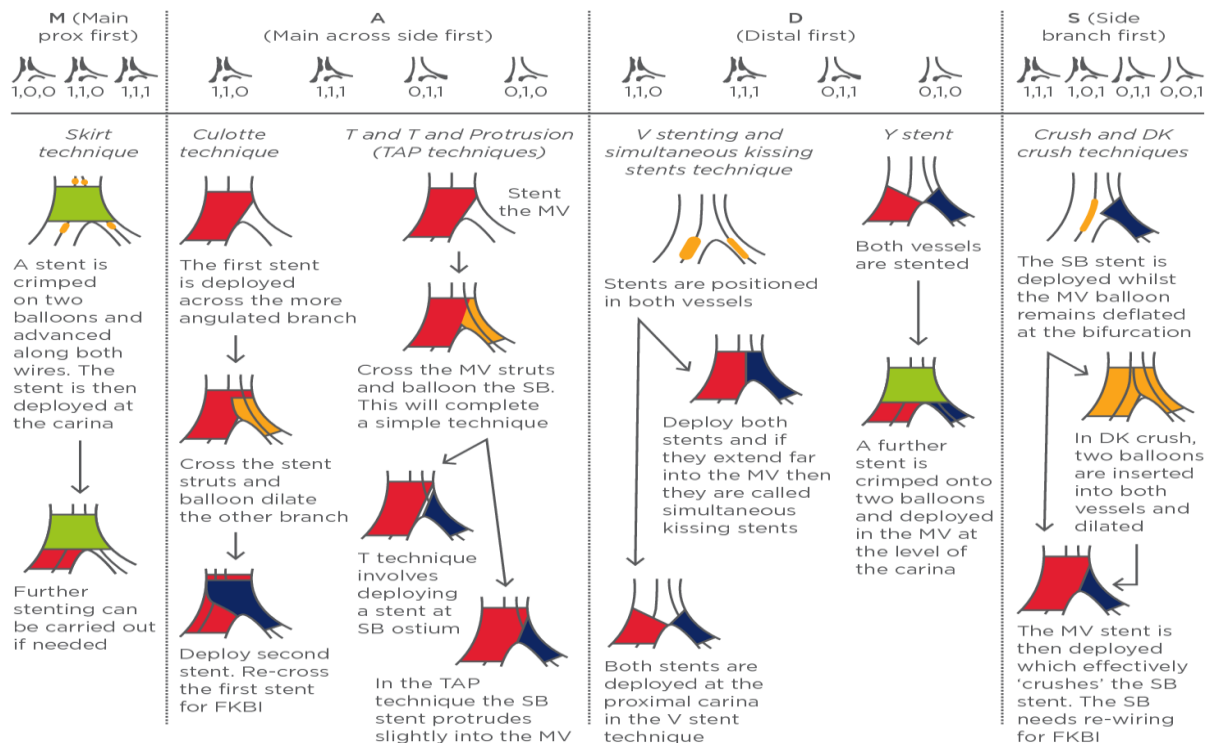
LIMITATIONS OF BIFURCATION PCI

- Procedural complications 9%
- Restenosis as high as 36%
- MB stent distortion by side access
- Side branch and wire jailing

Limitations of bifurcation PCI

- Limitations in re-wiring, re-ballooning and stenting of SB
- First kissing with danger of dissection
- Incomplete coverage of bifurcational area
- Complexity, duration, contrast and X ray exposure

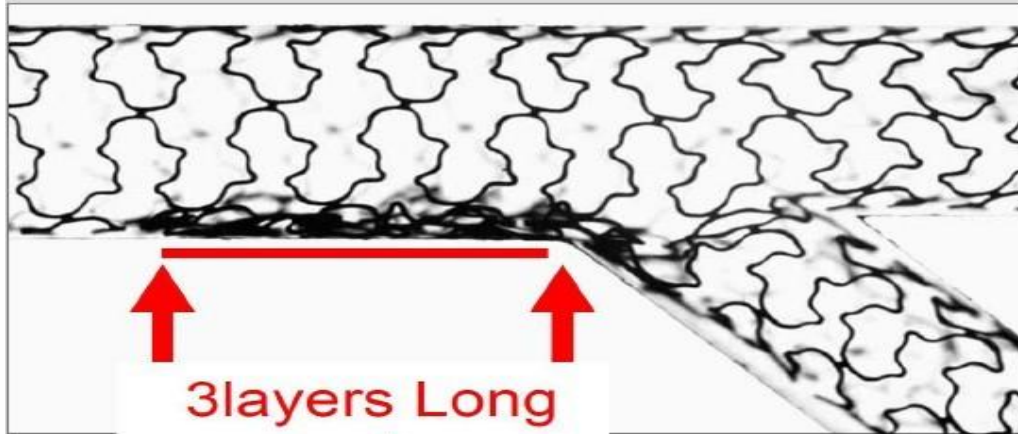
Different complex technique procedures according to MADS (Main, Across, Distal, Side)



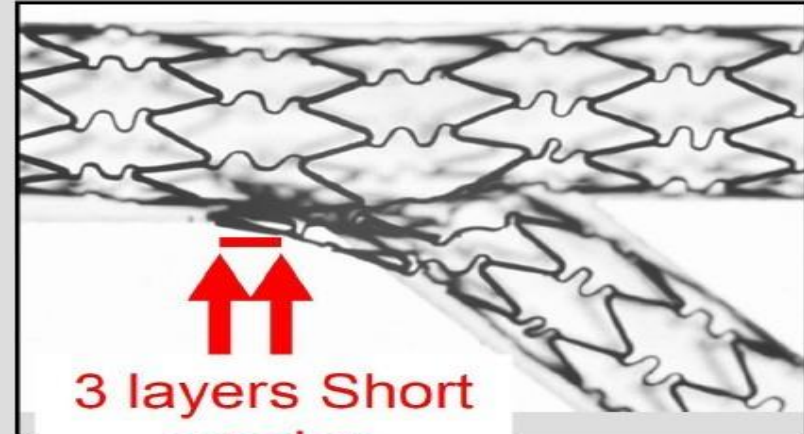
→ Do the technique you usually do

The Crush technique

It may be wise to limit the length of the 3 layers of overlap



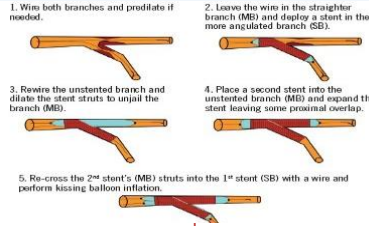
3 layers Long
overlap



3 layers Short
overlap

- ✓ Inability to wire the SB
- ✓ Inability to pass balloon into SB

The culotte technique

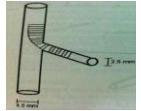


Advantages

- ✓ It provides near-perfect coverage of the carina & SB ostium
- ✓ Best immediate angiographic result
- ✓ Indication in all bifurcation lesions irrespective of angle.
- ✓ Open-cell stents are preferred when SB diameter is >3 mm.

Disadvantages

- Complexity in rewiring through the stent struts in both branches
- Not advisable if both branches are dissected after predilatation
- Can not attain good apposition if diameter of pMB >>> SB



LEARNING BY SHARING COMPLICATION – MY CASE

Brief Case Summary

VAN HONG H , male, 61 Yo

Hospitalized for typical angina

Medical history

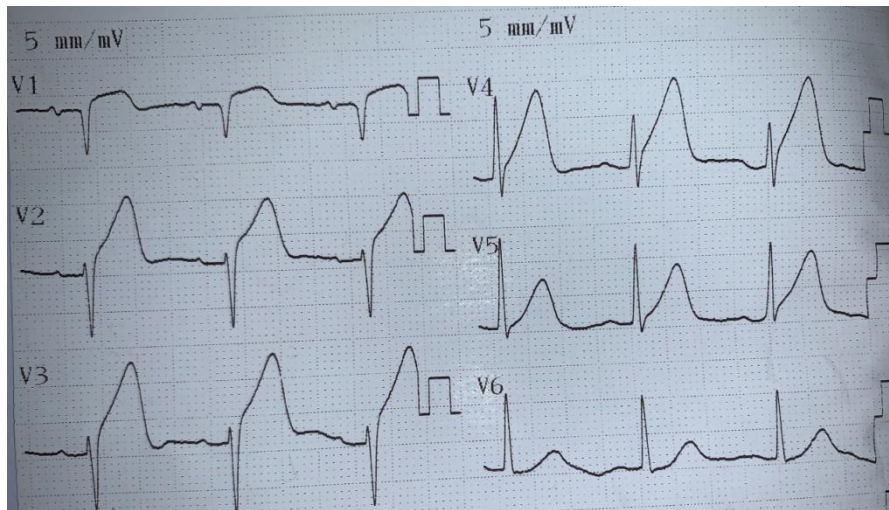
- No previous MI, PCI, CABG, Diabetes
- Hypertension: Y
- Hyperlipidemia: Y
- Current smoking : Y
- Family history: N

Brief Case Summary

Clinical presentation:

Typical angina, BP 150/80 , Heart rate 79, No arrhythmia

Rest ECG:



Echo: LV hypertrophy, LVEF: 47%, IVS motionn disorder

Troponin hs : 0,03 → >10ng/ml

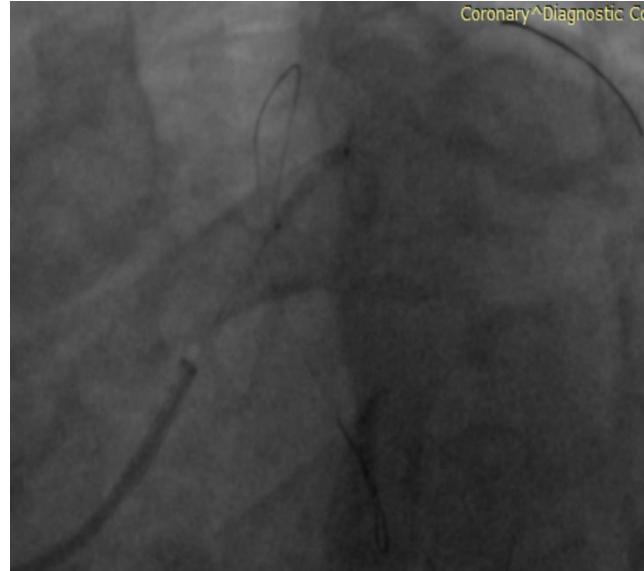
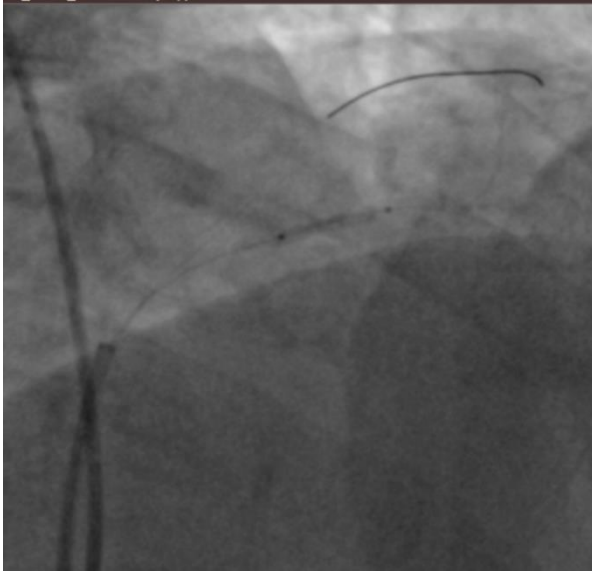
Angiogram



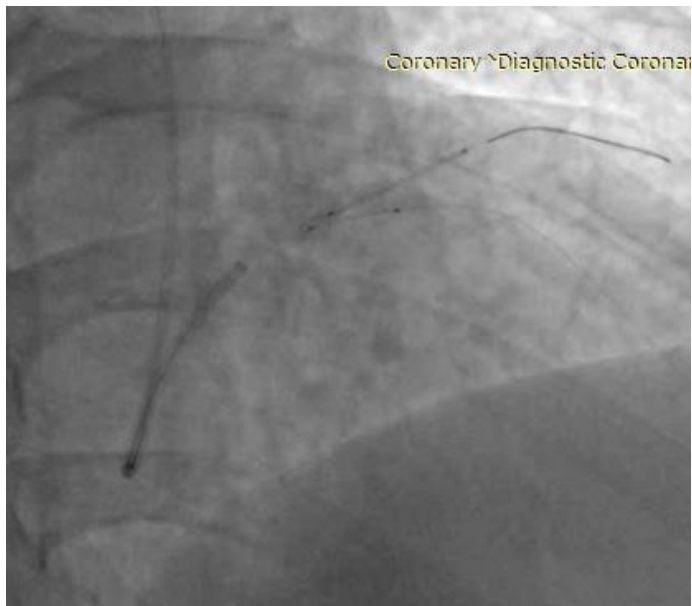
Note 1: The bifurcation lesion angiogram image must be clearly

Mini Crush technique

Wire and predilate both SB,MB



Stenting for SB

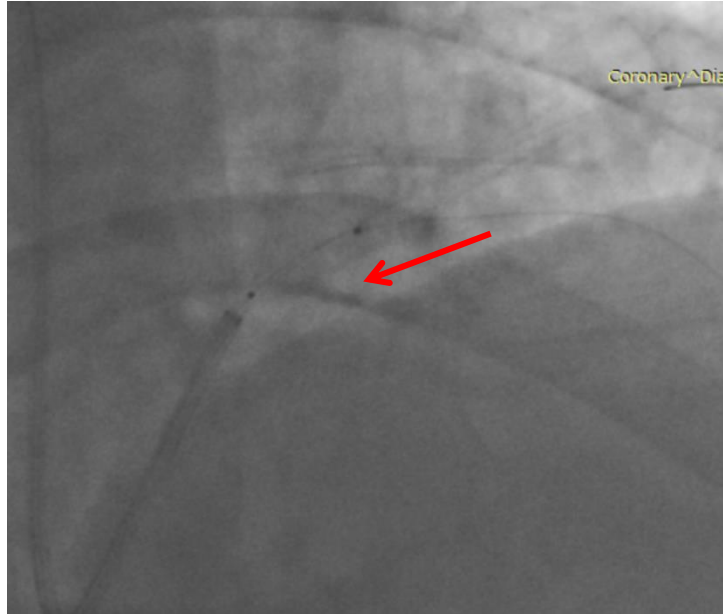


clip



What happened...

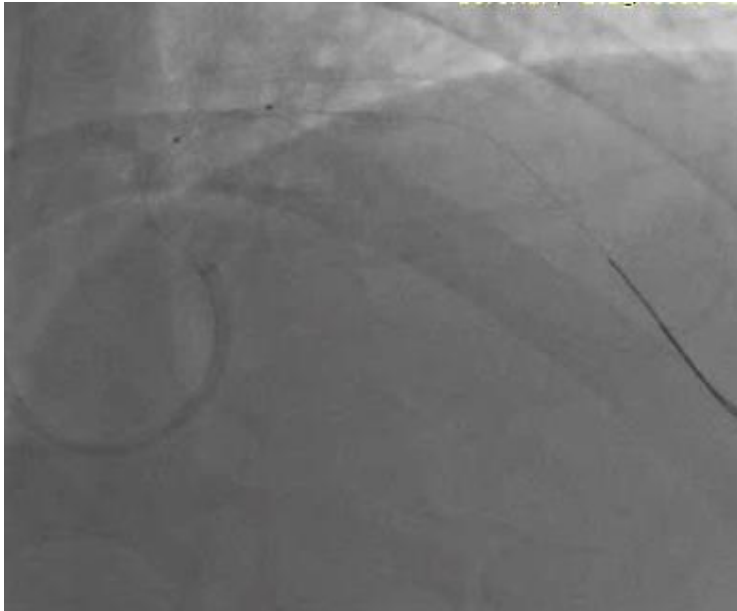
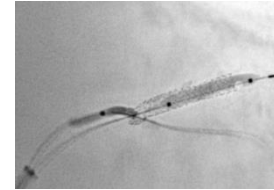
NC balloon slips out of position after pt cough



Note 2: Fit all tools in their position

What happened...

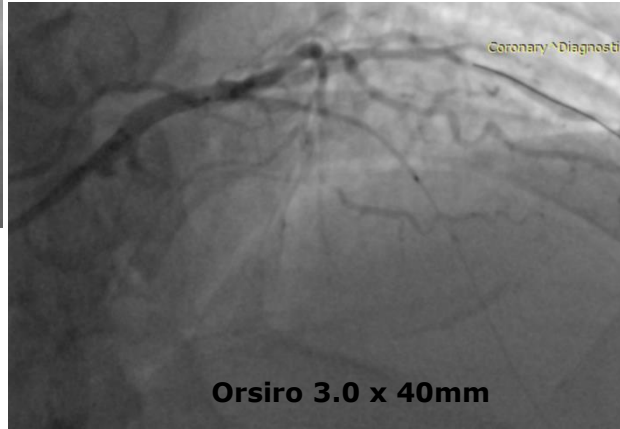
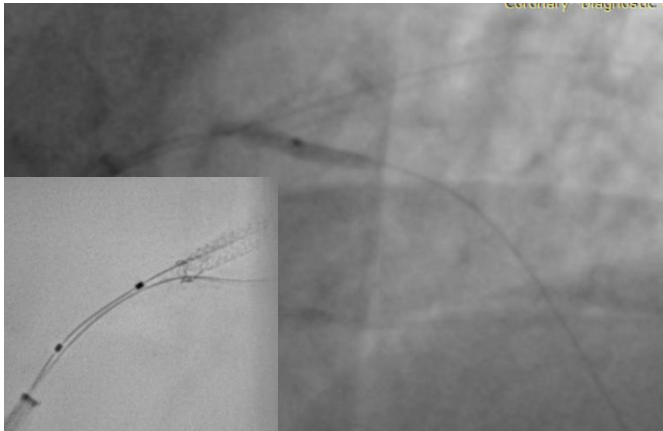
Fail to reaccess the balloon



clip

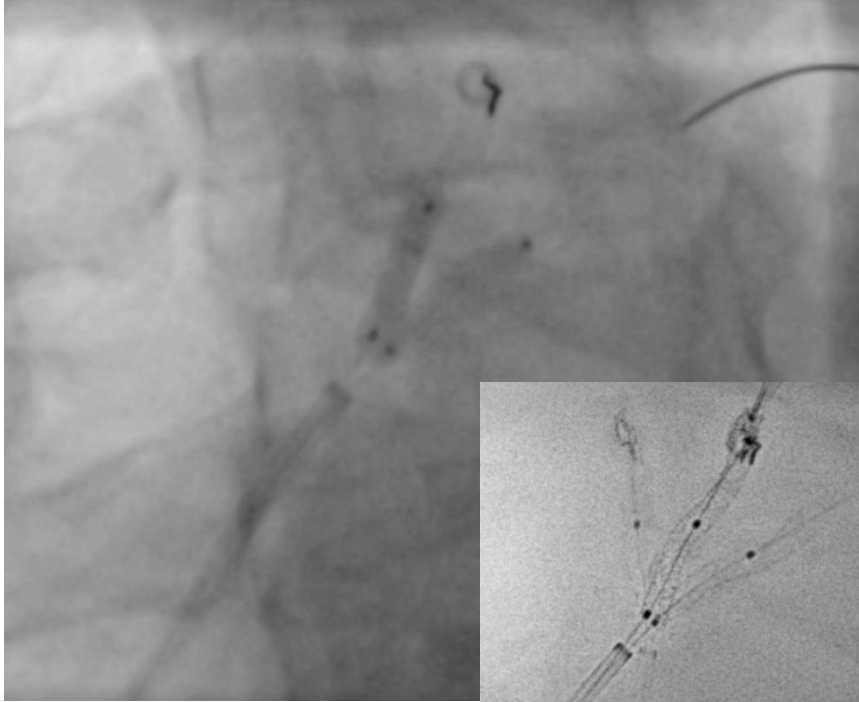


What happened...

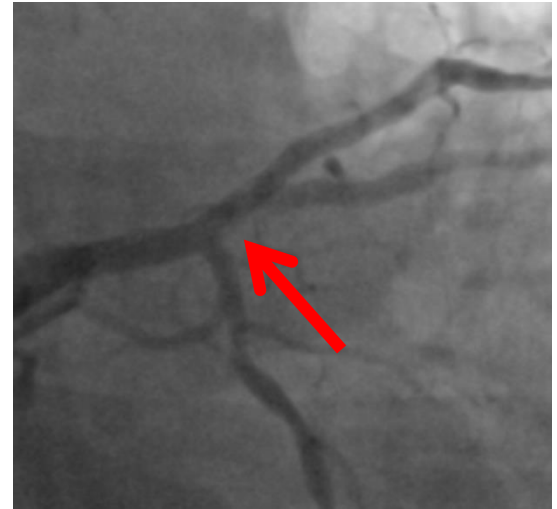


Note 3: keep calm anytime and make the stratory flexible- Change to culotte technique

Kissing balloons

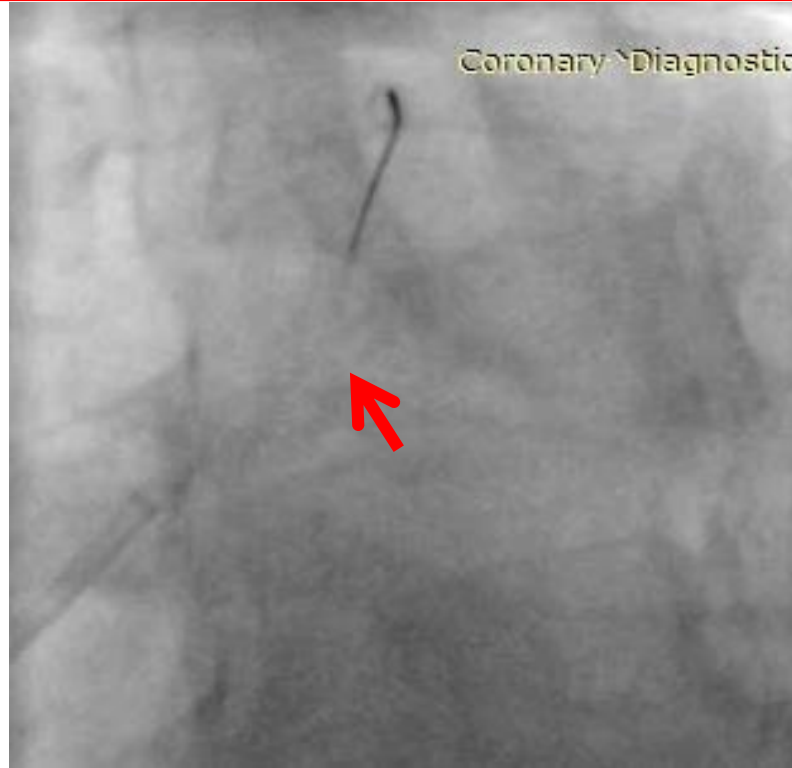


What happened.....thrombosis



And...

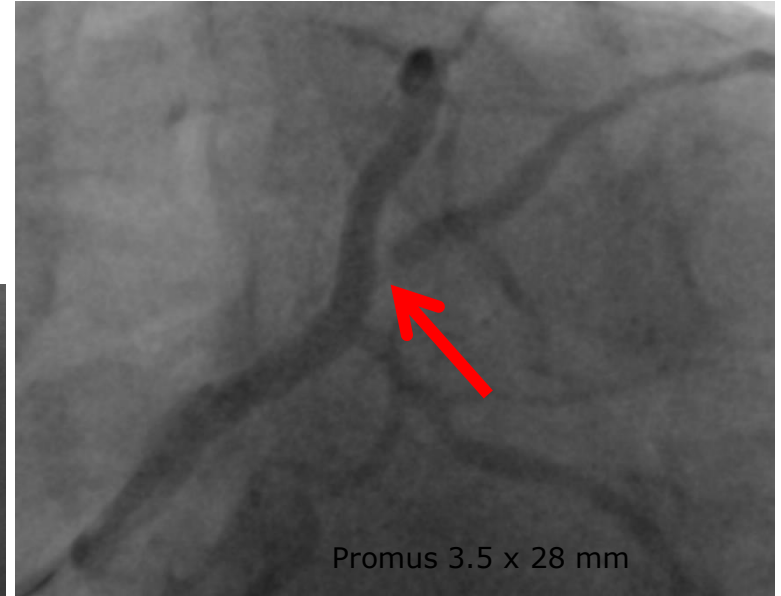
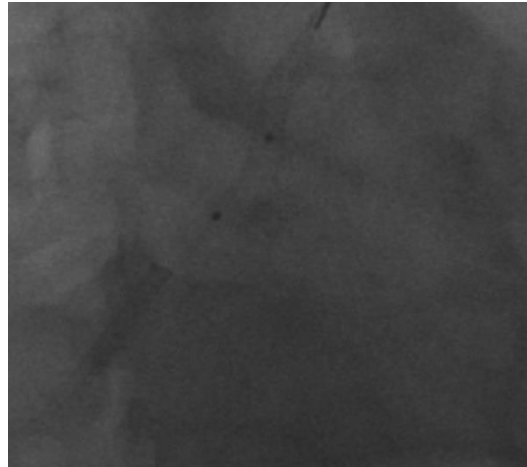
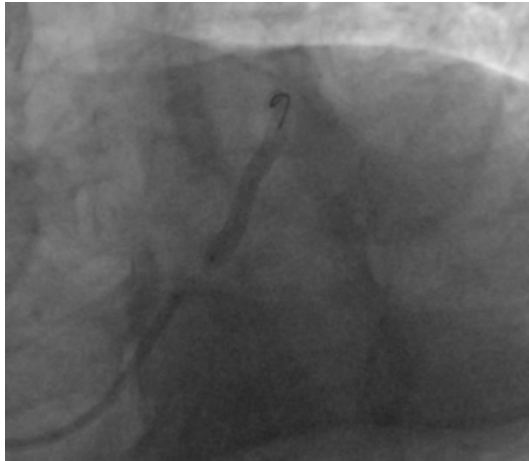
clip



Note 4: do strictly all steps and requirements of the selected technique
(not enough 8-10mm proximal to carina)

...Finally

One more stent LM-LAD to cover the thrombosis, dissection



Note 5: Let the MB flow

Take home messages

- ✓ Clearly, obviously bifurcation lesion angiogram image is necessary
- ✓ Having enough DES, short NC/SC balloon, 7Fcatheter...
- ✓ Performing bifurcation PCI technique step by step. Final kissing balloons and final POT are obligatory
- ✓ Long- term outcome mainly bases on the MB, not SB flow→ Get the MB flow as soon as possible.
- ✓ The simpler is the better in chosing bifurcation PCI strategy.

*Thank
you*

