

14th

AICT

ASIAN INTERVENTIONAL CARDIOVASCULAR THERAPEUTICS
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For Left Main Distal Bifurcation Disease Knowing More than One Technique Is Essential!

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Disclosure Statement of Financial Interest

Within the past 12 months, I have had a financial interest/arrangement or affiliation with the organization(s) listed below.

Affiliation/Financial Relationship

- Grant/Research Support
- Consulting Fees/Honoraria

Company

- Abbott Diagnostics, Beckmann
- Alvimedica, Orbus Neich, Medtronic, Abbott Vascular, Elixir, Boston Scientific, Sanofi, Bayer, Boehringer Ingelheim

Why LM bifurcation is different?

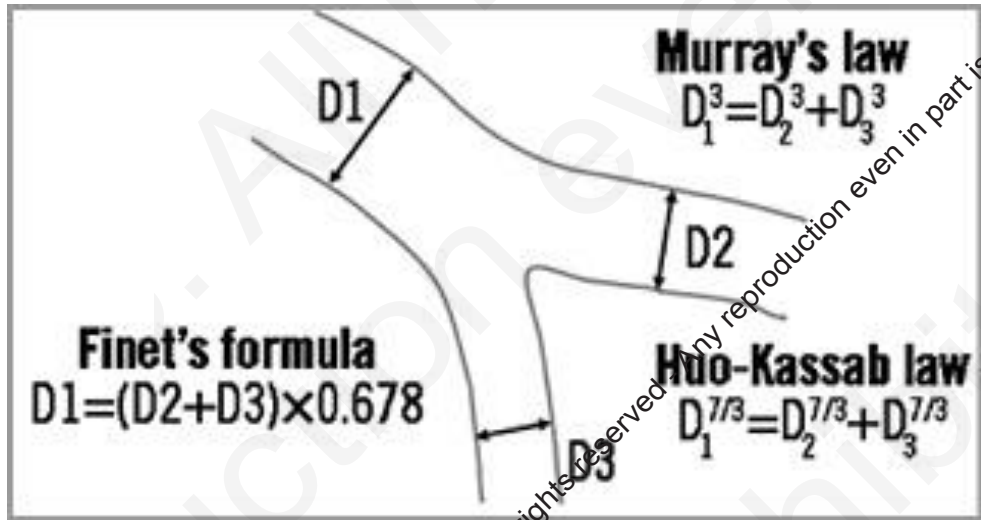
- The ostial position of the main branch
- The angle which is often in a T shape
- 60-70% are complex/true bifurcations (Distal bifurcation was noted in 88% of PCI cases in NOBLE and 81% of EXCEL patients)
- 10% of cases involve trifurcations
- The presence of calcification in the LM is frequent
- Large territory subtended (>50% of LV mass)
- The proximal reference diameter may reach >5 mm – which is close to the dilatation limit of many coronary stents, esp if initially undersized

EBC CONSENSUS ON LM TREATMENT AND TECHNIQUES

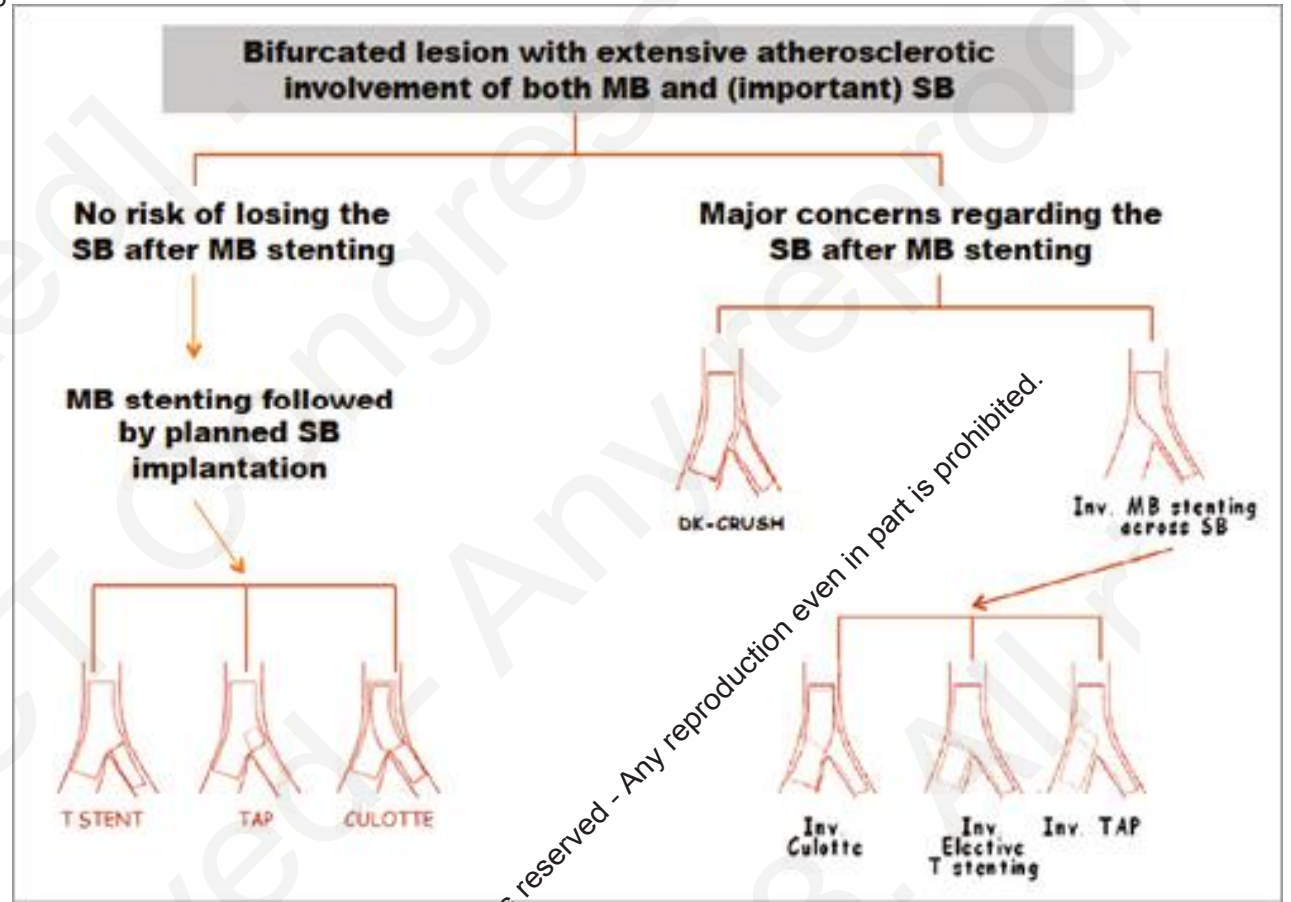
- Primary strategy is a **provisional** SB stenting approach
- SB wire for protection
- Strongly recommend invasive imaging
- Good lesion preparation: consider atherectomy and/or cutting/scoring devices.
- Know the maximal achievable dimensions with the particular stent platform is more important than the type of stent
- Adapting multiple techniques to patient is important

EuroIntervention 2018;13:1540-1553 published online October 2017

**Percutaneous coronary intervention for the left main stem and other bifurcation lesions:
12th consensus document from the European Bifurcation Club**



The EBC focus for the years to come is interventional treatment of the LM: the recommendations will likely evolve



EuroIntervention 2018;13:1540-1553 published online October 2017

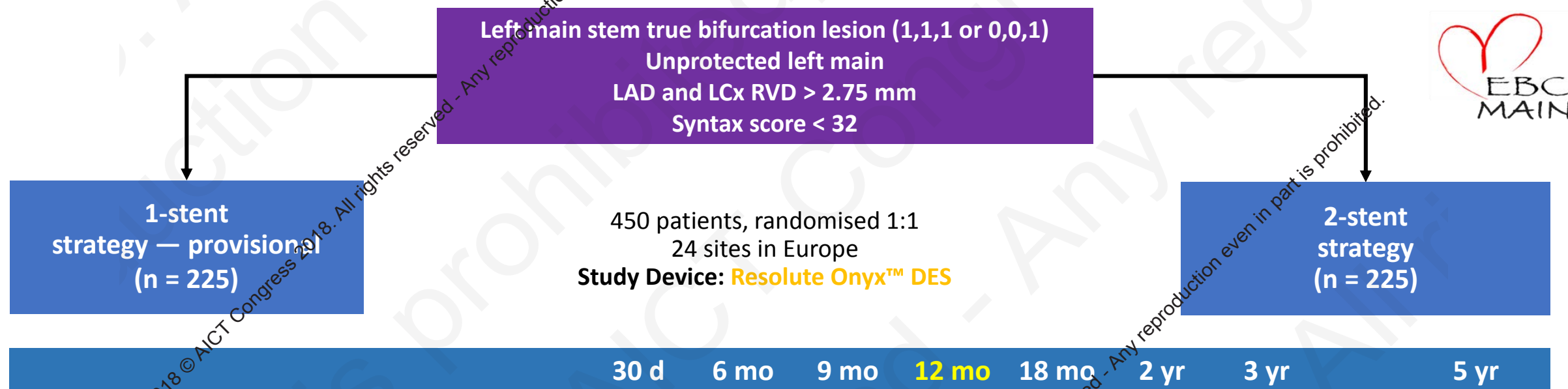
Percutaneous coronary intervention for the left main stem and other bifurcation lesions: 12th consensus document from the European Bifurcation Club

2018 © AMT Congress

Confirming benefits of provisional stenting in left main bifurcation

THE EBC MAIN TRIAL

The first randomised trial to compare 1-stent vs. 2-stent for treatment of true left main bifurcation lesions



Primary endpoint: Composite of death, myocardial infarction (MI) and target lesion revascularisation (TLR) at 12 months

Secondary endpoints: Death, MI, TLR each at 12 months; angina status; stent thrombosis (ST); death, MI, TLR at 3 and 5 years

ESC 2018

- High-volume operator (defined as ≥ 15 LM PCI/year; mean 25/year) vs. a low-volume operator (< 15 LM PCI/year)
- I would say high volume is at least LM 52 cases/year
- Both ESC and EBC seems to favor DK-Crush as a preferred choice if possible for LM bifurcations

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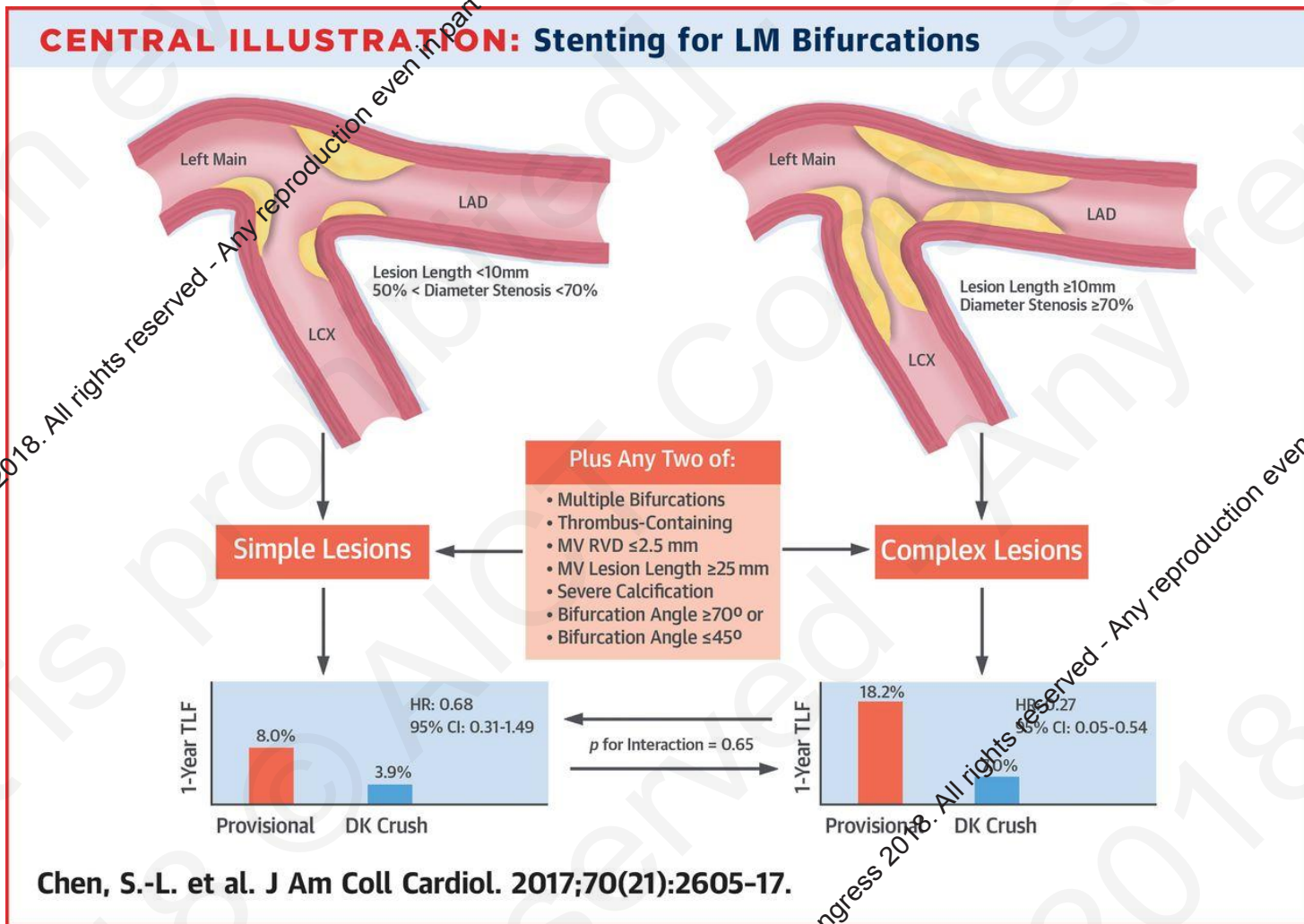
DK Crush

- Essentially a mini-crush technique with modification (Extra Kiss)
- Still need to ensure rewiring into proximal MV stent cell to ensure optimal result
- May not be possible to take an extra step in unstable patients as the SB is often the LCX and LM-LAD the culprit

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DK Crush V



Shao-Liang Chen et al. JACC 2017;70:2605-2617

LM bifurcation technique caveats

- A properly performed provisional technique is a good first choice but often not possible for common complex LM bifurcations
- Unstable or bail out cases should consider minimal number of balloon cross over maneuvers (Provisional, Kissing, Tap, mini-crush)
- When a two-stent technique is needed in a wide angle or T shape (90°) angulated LM, the use of a T-stenting or TAP technique seems preferable
- For elective and stable cases, DK crush has good mid term results

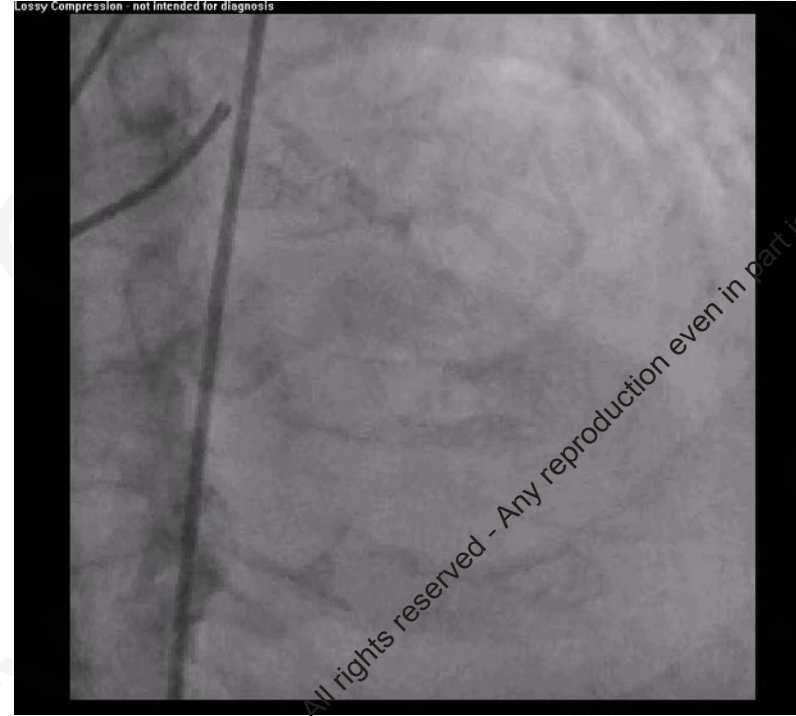
Case

- 84 years old
- Widespread ST depressions in cardiogenic shock

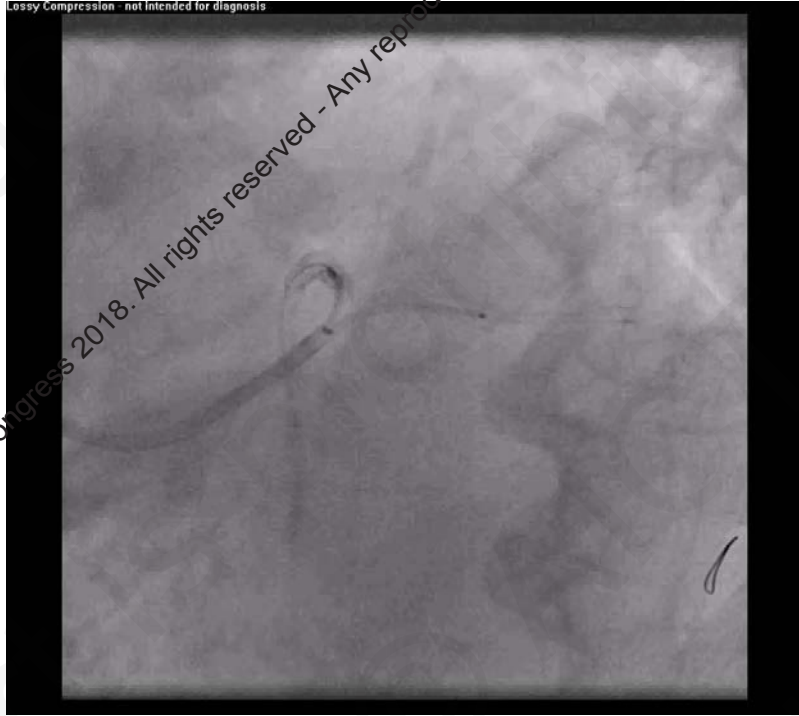
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Short LM unstable patient



V or simultaneous kissing stent (SKS) technique



SKS for KISS (keep it simple, swift and safe)



Comparison of Double Kissing Crush Versus Culotte Stenting for Unprotected Distal Left Main Bifurcation Lesions

Results From a Multicenter,
Randomized, Prospective DKCRUSH-III Study

- Study limitations. Some kind of angle restriction should have been applied in the design of the study.
- >80% cases has a bifurcation angle $>70^\circ$
- Excluded: Heavy calcification, trifurcation, LM RVD 5mm, LVEF $<30\%$, recent AMI

Percutaneous coronary intervention for coronary bifurcation disease: consensus from the first 10 years of the European Bifurcation Club meetings

Jens Flensted Lassen^{1*} MD, PhD; Niels Ramsing Holm¹, MD; Goran Stanekovic², MD, PhD; Thierry Lefèvre³, MD; Alaide Chieffo⁴, MD; David Hildick-Smith⁵, MD; Manuel Pan⁶, MD; Olivier Darremont⁷, MD; Remo Albiero⁸, MD; Miroslaw Ferenc⁹, MD; Yves Louvard³, MD







- For LM PCI: T-stenting, TAP, DK-crush and culotte may be used according to the bifurcation angle.
- More important for post MLA: ostial LCx - 5.0 mm² , ostial LAD - 6.3 mm² , LMCA bifurcation segment - 7.2 mm² , and LMCA - 8.2 mm²
- i.e Intracoronary imaging is recommended >specific technique

Table 1. Advantages and disadvantages of bifurcation stenting techniques.

	Advantages	Disadvantages
Culotte	<ul style="list-style-type: none"> – Complete coverage of SB ostium – Homogenous drug and metal distribution at bifurcation and proximal MB – Suitable for wide angle 	<ul style="list-style-type: none"> – Excessive metal at proximal MB – Not suitable for large size mismatch between proximal MB and SB – Rewiring to MB for FKI
Mini-crush	<ul style="list-style-type: none"> – Complete coverage of SB ostium – Facilitated SB re-access once SB is reopened after crushing 	<ul style="list-style-type: none"> – Difficulty for SB re-access due to multiple layers of stents – Rewiring to SB for FKI – Not suitable for wide angle
Step crush	<ul style="list-style-type: none"> – 6 Fr guiding compatible – Separate manipulation of SB and MB stents – Facilitated SB re-access once SB is reopened after crushing 	<ul style="list-style-type: none"> – Rewiring to SB for FKI – Not suitable for wide angle
DK crush	<ul style="list-style-type: none"> – 6 Fr guiding compatible – Less stent distortion – Improved stent apposition – Facilitated SB re-access 	<ul style="list-style-type: none"> – Complex procedural step
Modified T-technique (T-stenting and small protrusion [TAP])	<ul style="list-style-type: none"> – Suitable for angle close to 90° – Easy FKI 	<ul style="list-style-type: none"> – Not suitable for wide angle – Protrusion of SB stent
V stenting	<ul style="list-style-type: none"> – Suitable for normal proximal MB – No need of SB reopening – Both branch patency during procedure – Short procedural time 	<ul style="list-style-type: none"> – Not suitable for diseased proximal MB – Geographic miss in the proximal MB – 7 or 8 Fr guiding required
Simultaneous kissing stenting	<ul style="list-style-type: none"> – Suitable for large proximal MB – No need of SB reopening – Both branch patency during procedure – Short procedural time 	<ul style="list-style-type: none"> – Not suitable for non-left main bifurcation – 7 or 8 Fr guiding required – Diaphragmatic membrane formation between the two stent struts in the proximal MB

FKI: final kissing inflation; MB: main branch; SB: side branch

Know your stents for LM Sizing

						
	Element	XIENCE	TAXUS	Integrity	BioMatrix	CYPHER
2.25	Very small workhorse (2 cells) <i>max exp: 3.0 mm</i>	Medium workhorse (6 crowns, 3 cells) <i>max expansion: 4.4 mm</i>	Small workhorse (6 crowns, 2 cells) <i>max expansion: 3.4 mm</i>	Small workhorse (7 crowns, 2 cells*) <i>max expansion: 4.9 mm</i> <i>*1.5 cell in Resolute</i>	Medium workhorse (6 crowns, 2 cells) <i>max expansion: 4.6 mm</i>	Medium workhorse (6 crowns, 6 cells) <i>max expansion: 4.7 mm</i>
2.50	Small workhorse (8 crowns, 2 cells) <i>max expansion: 3.8 mm</i>					
2.75			Medium workhorse (9 crowns, 3 cells) <i>max expansion: 4.8 mm</i>			
3.00	Medium workhorse (8 crowns, 2 cells) <i>max expansion: 4.4 mm</i>			Medium workhorse (10 crowns, 2 cells) <i>max expansion: 5.4 mm</i>		
3.50		Large workhorse: (9 crowns, 3 cells) <i>max expansion: 5.6 mm</i>			Large workhorse (9 crowns, 3 cells) <i>max expansion: 5.9 mm</i>	Large workhorse (7 crowns, 7 cells) <i>max expansion: 6.8 mm</i>
4.00	Large workhorse (10 crowns, 2 cells) <i>max expansion: 5.7 mm</i>		Large workhorse (9 crowns, 3 cells) <i>max expansion: 6.0 mm</i>			
4.50						
5.00						

Nicolas Foin: Maximal diameter of main drug-eluting stents in a virtual bench

Resolute Onyx™ DES: EXPANDING TREATMENT OPTIONS

COMPLEXLV 4.5- and 5.0-mm sizes expand treatment options for extra-large vessels and feature the same proven safety profile of Resolute Onyx™ DES.

STENT LENGTH (mm)

STENT DIAMETER (mm)

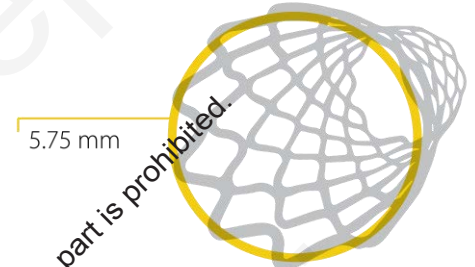
	8	12	15	18	22	26	30		
2.00	8	12	15	18	22	26	30		
2.25	8	12	15	18	22	26	30	34	38
2.50	8	12	15	18	22	26	30	34	38
2.75	8	12	15	18	22	26	30	34	38
3.00	8	12	15	18	22	26	30	34	38
3.50	8	12	15	18	22	26	30	34	38
4.00	8	12	15	18	22	26	30	34	38
4.50		12	15	18	22	26	30		
5.00		12	15	18	22	26	30		

Indicates new sizes



COMPLEXLV

- Left main
- Small vessels
- Long lesions
- CTOs
- Total occlusions
- AMIs
- ISR
- Multivessels
- Diabetes
- ACS
- UA
- Bifurcations



DAPT: Low risk of ST after 1 month¹

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Summary

- Consider each patient's clinical condition, bifurcation morphology and the operator's experience
- Can't be dogmatic when it comes to the LM bifurcation PCI
- I think a final imaging result for MLA is more important than specific technique or stent type

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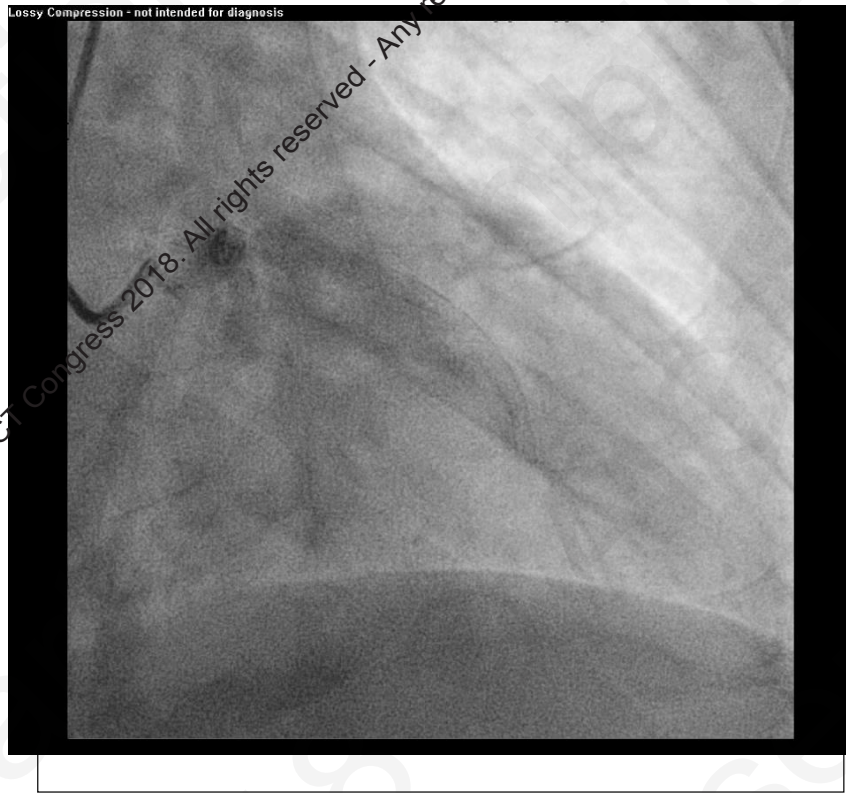
Case Illustration: how you would do it?

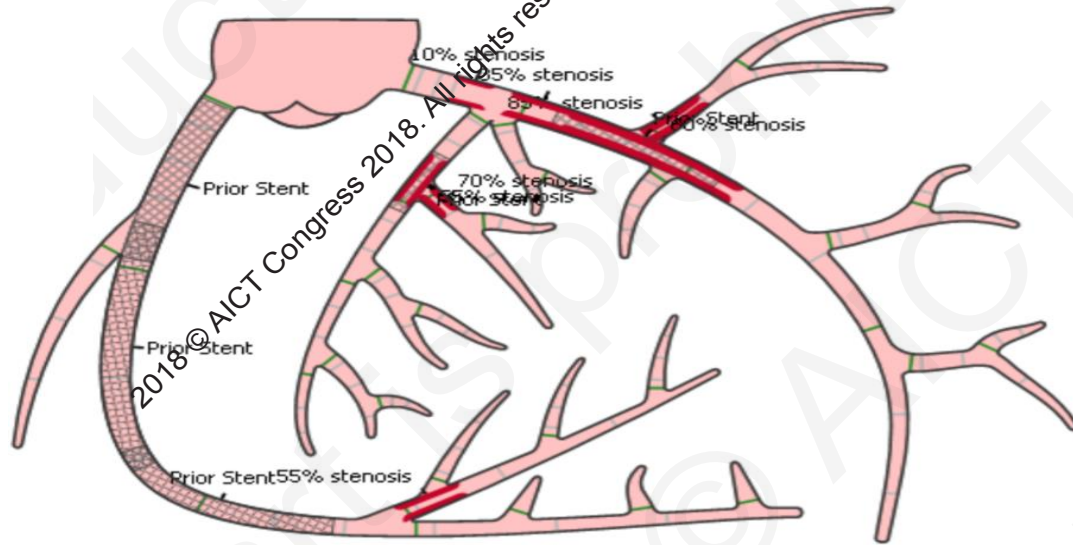
- 75 years old male
- Shortness of Breath, CHF NYHA II-III
- LVEF 35%
- Previous PCI to LAD with 2 BMS (5 Years prior)
- Previous PCI to LCx with 2 BMS (5 Years prior)
- Risk factors:
 - Hypertension, hyperlipidemia, former smoker

Initial Angiogram



Initial Angiogram





Strategy?

- LM and LCX disease bifurcation disease
- Similar vessel diameter LAD-LCx
- Large D1 across prior BMS

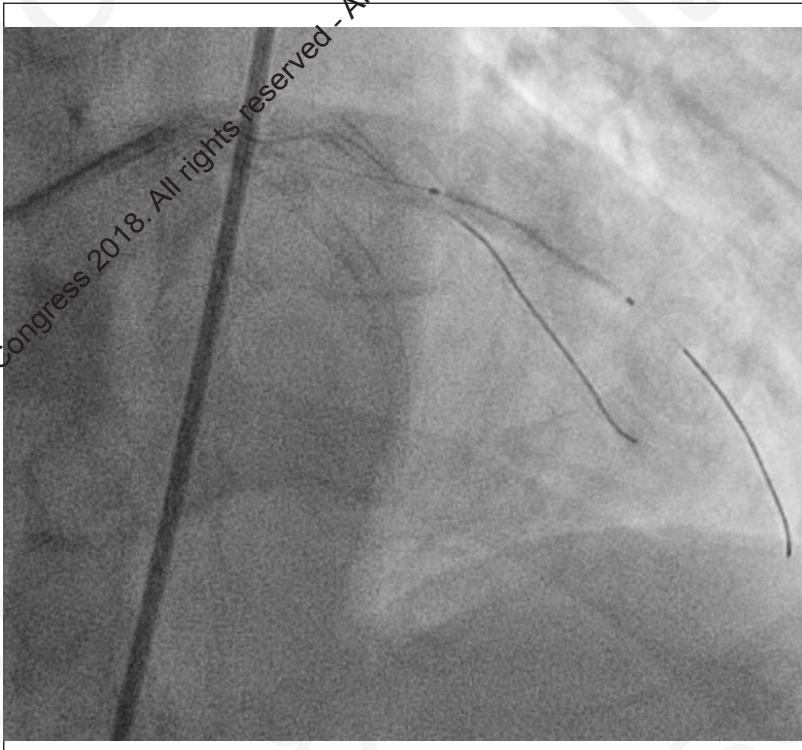
Double Culotte to LAD-D1 and LM bifurcation

PCI to LAD / D1



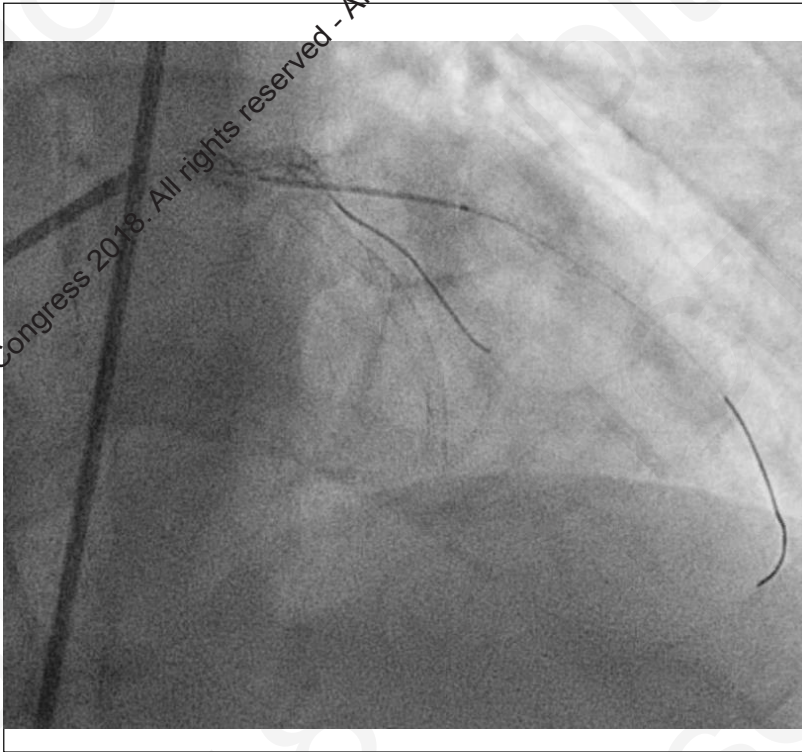
1. Wiring LCx and D1, Predilation
Ostial LCx

PCI to LAD / D1



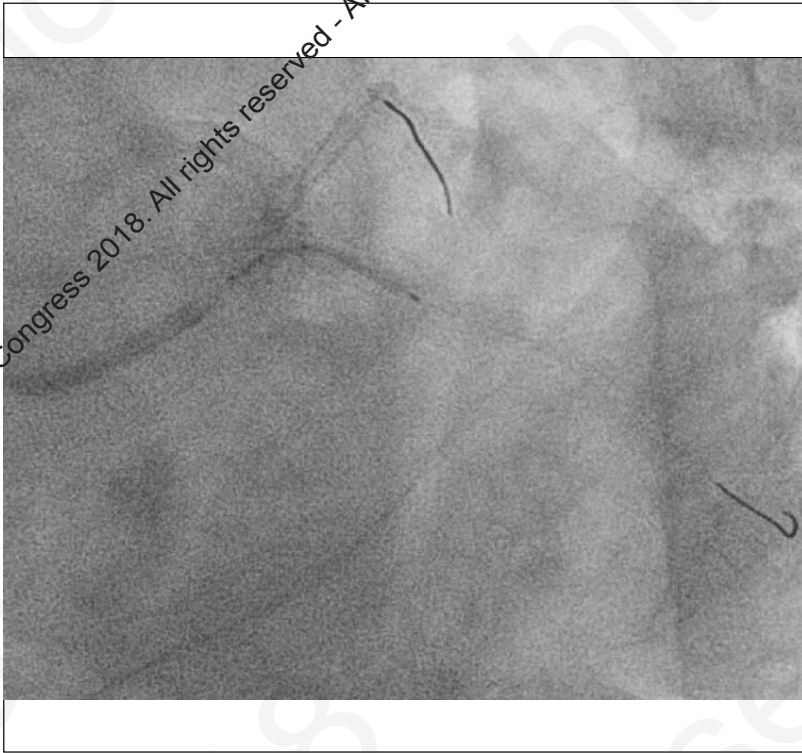
1. Wiring LCx and D1, Predilatation
Ostial LCx
2. Mid-distal D1 stenting

PCI to LAD / D1



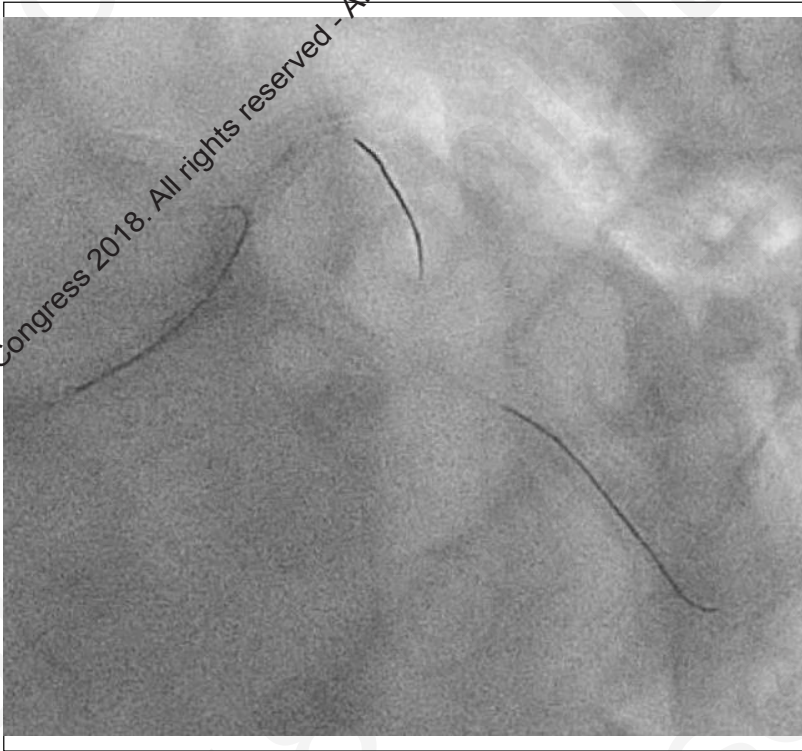
1. Wiring LCx and D1, Predilation
Ostial LCx
2. Mid-distal D1 stenting
3. Ostial D1 stenting

PCI to LAD / D1



1. Wiring LCx and D1, Predilation
Ostial LCx
2. Mid-distal D1 stenting
3. Ostial D1 stenting: Culotte
4. LM-LCx stenting

PCI to LAD / D1



1. Wiring LCx and D1, Predilation
Ostial LCx
2. Mid-distal D1 stenting
3. Ostial D1 stenting
4. LM-LCx stenting
5. LM-LAD Wiring

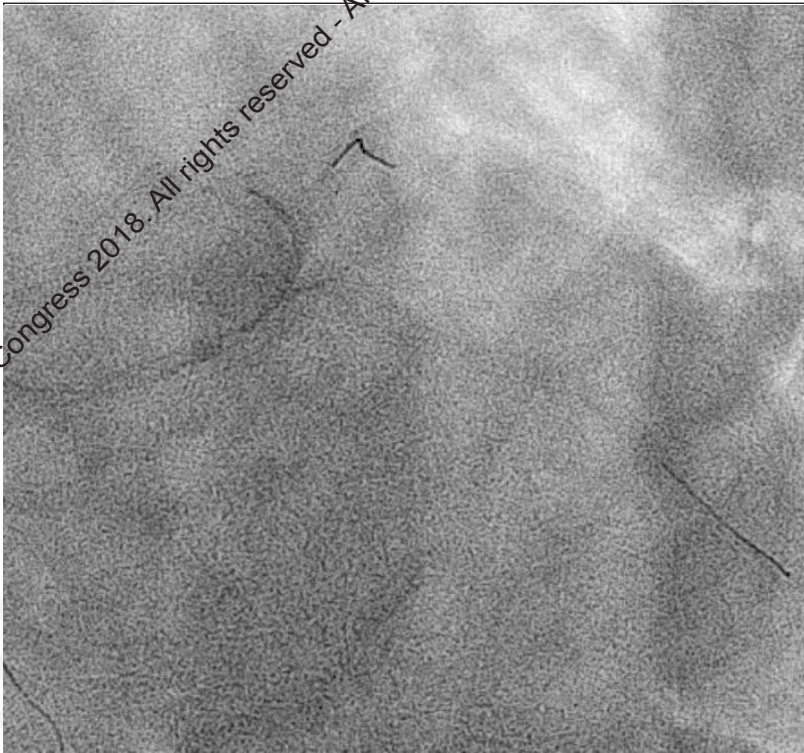
PCI to LAD / D1



1. Wiring LCx and D1, Predilation Ostial LCx
2. Mid-distal D1 stenting
3. Ostial D1 stenting
4. LM-LCx stenting
5. LM-LAD Wiring
6. 2.0 balloon dilation from LAD across LAD-D1 stent strut

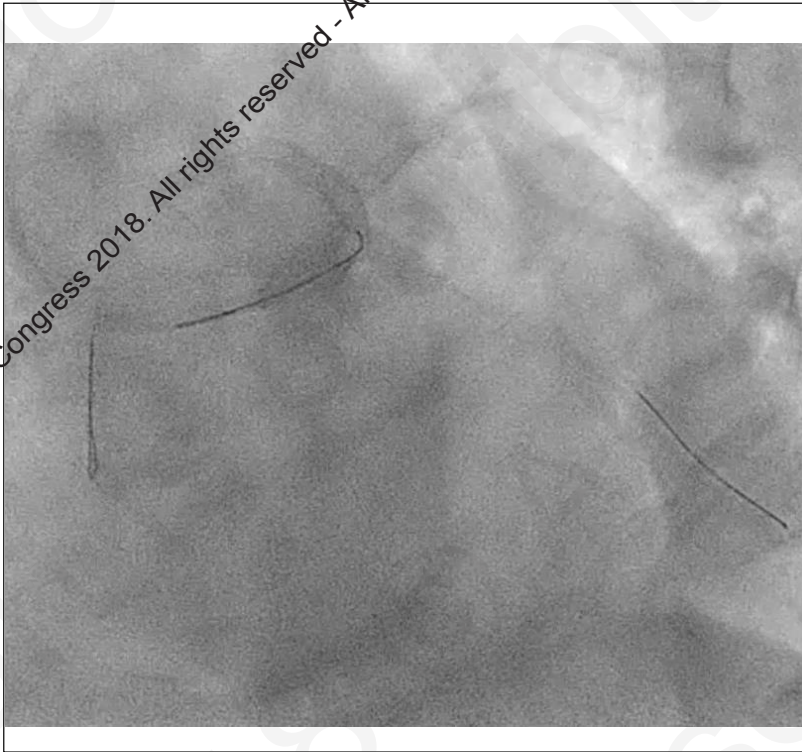
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PCI to LAD / D1



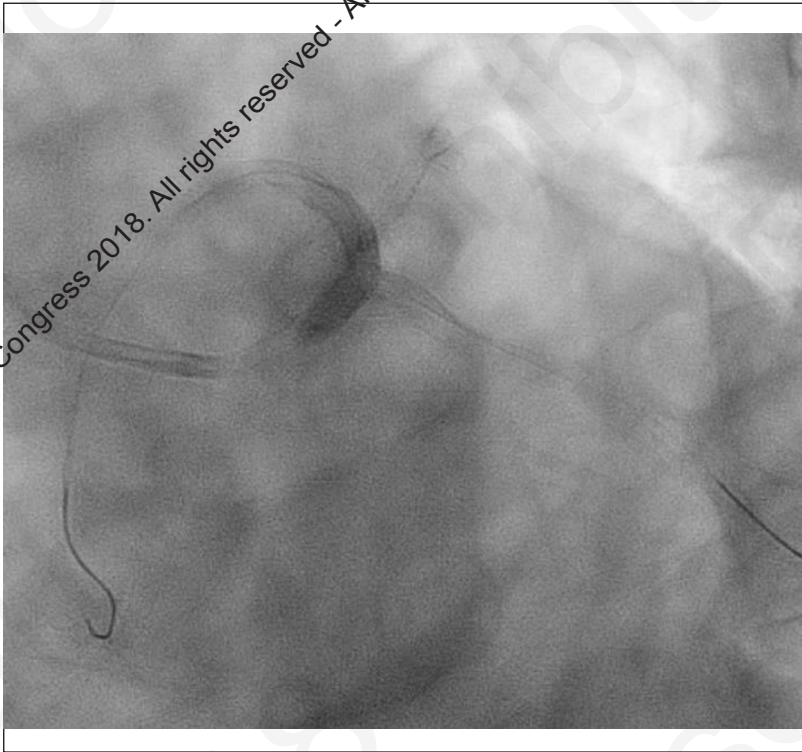
1. Wiring LCx and D1, Predilation Ostial LCx
2. Mid-distal D1 stenting
3. Ostial D1 stenting
4. LM-LCx stenting
5. LM-LAD Wiring
6. LCx stent strut dilated with 2.0 balloon
7. LM-LAD Stenting

PCI to LAD / D1



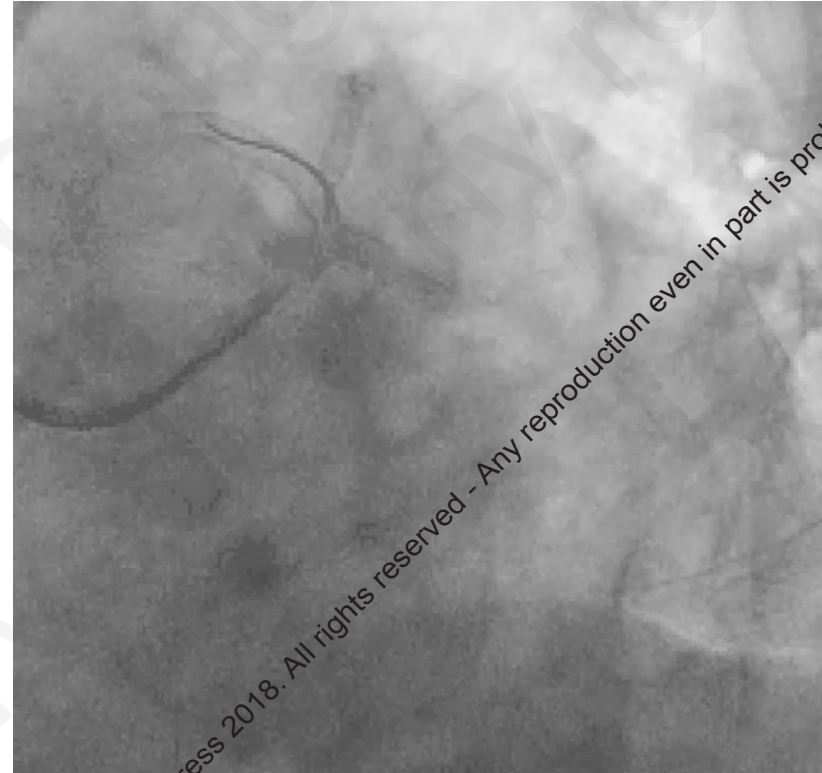
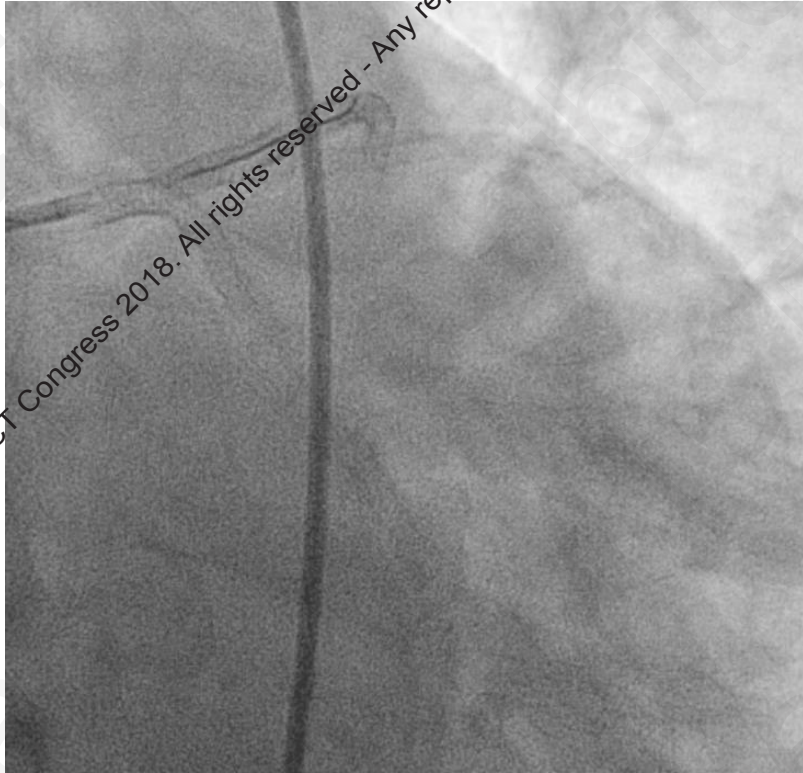
1. Wiring LCx and D1, Predilation
Ostial LCx
2. Mid-distal D1 stenting
3. Ostial D1 stenting
4. LM-LCx stenting
5. LM-LAD Wiring
6. LCx stent strut dilated with 2.0
balloon, Crush D1
7. LAD Stenting, POT
8. LCx rewiring, predilated, LM
Kissing

PCI to LAD / D1



1. Wiring LCx and D1, Predilation
Ostial LCx
2. Mid-distal D1 stenting
3. Ostial D1 stenting
4. LM-LCx stenting
5. LM-LAD Wiring
6. LCx stent strut dilated with 2.0
balloon
7. LAD Stenting, POT
8. LCx rewiring, predilated, LM
Kissing
9. D1 rewiring, LAD-D1 kissing

Final Result: You could have done it at least 10 other ways...it all works...for you



Thank you

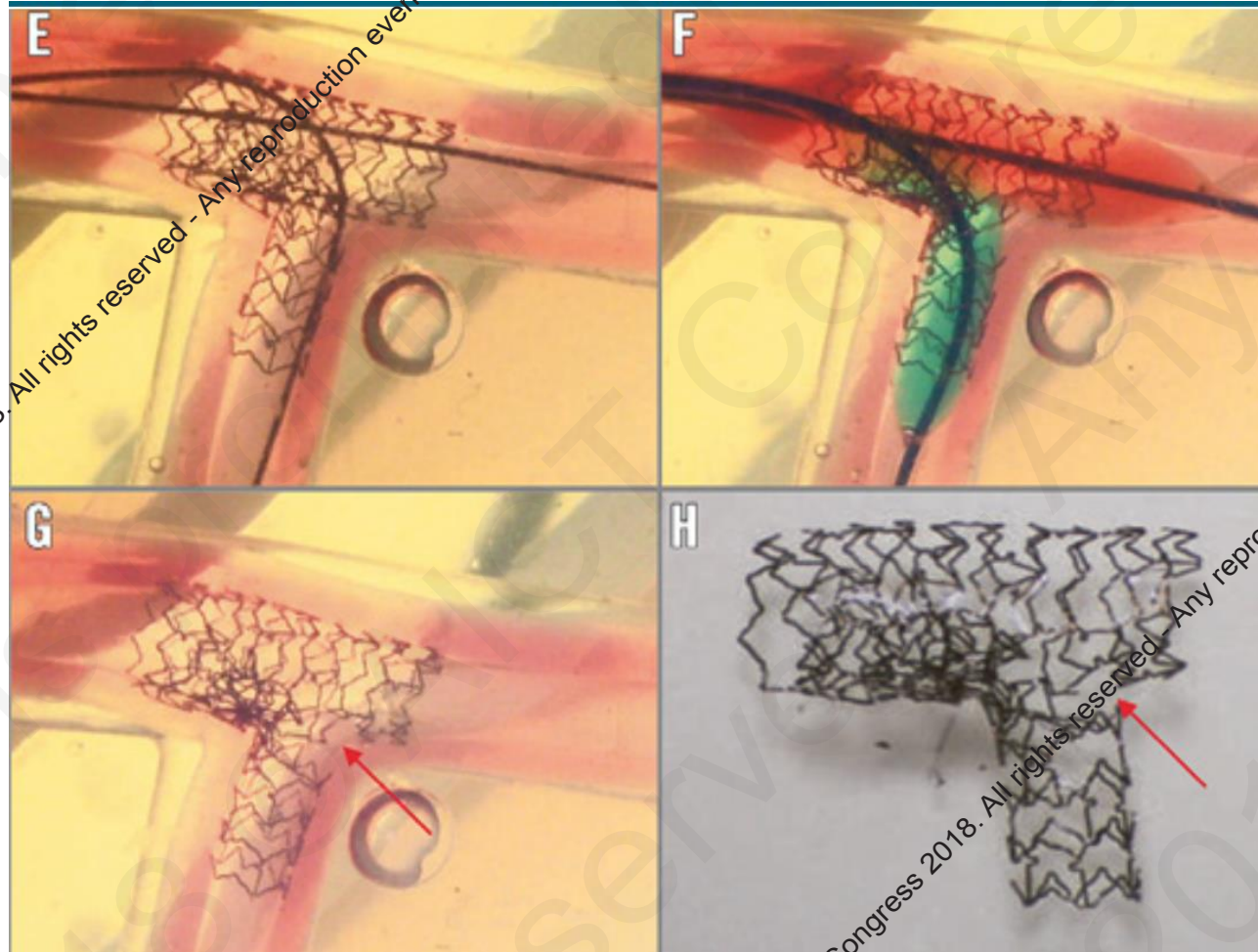
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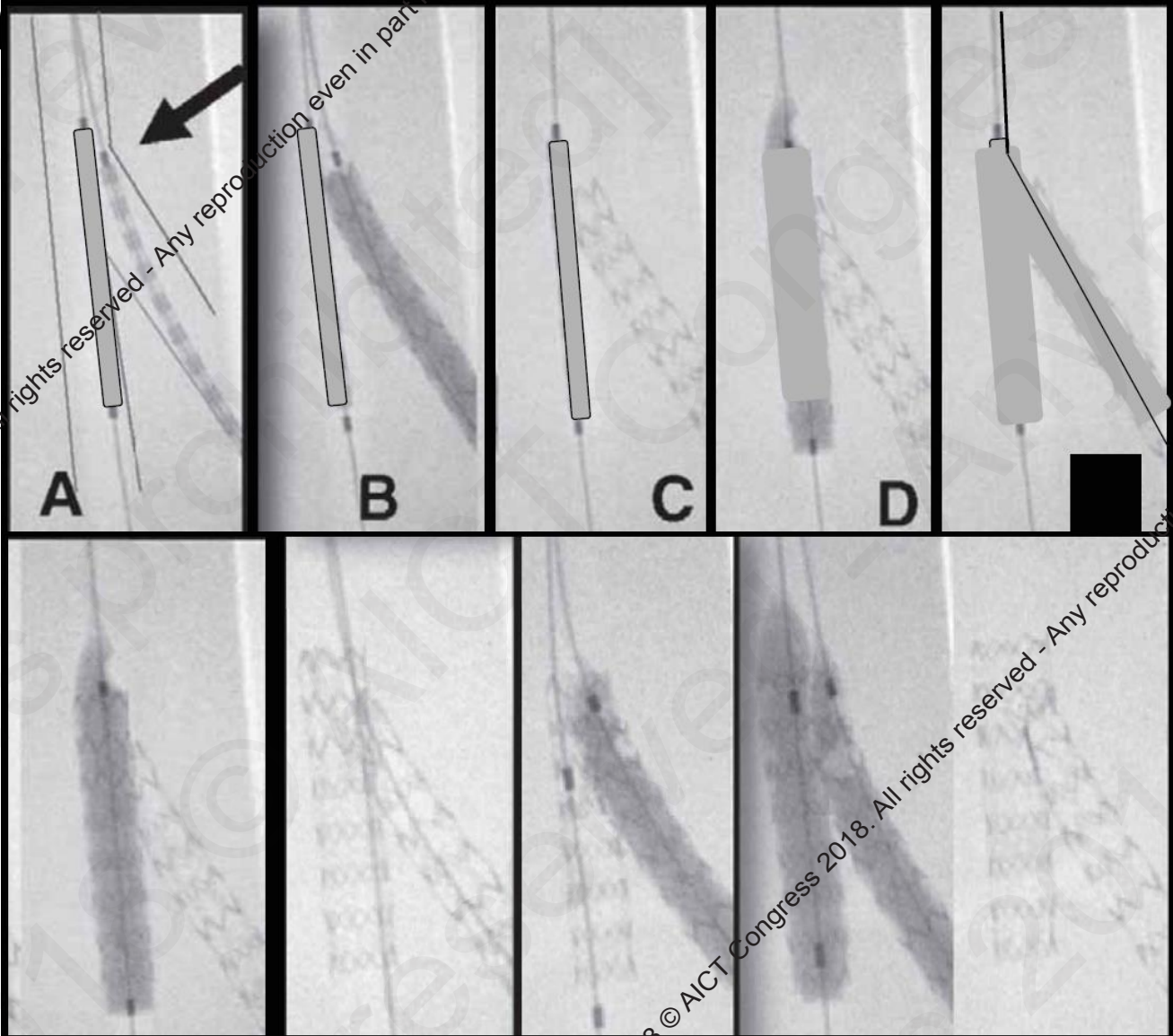
www.singlivecourse.com

Course Director
Prof KOH Tian-Hai

Rewiring at distal MV cell



DK Crush



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