Joint Coronary Revascularization 2018

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LEFT MAIN CROSS OVER STENTING: WHICH IS THE IMPACT ON MORTALITY, AMI AND TVR OF DIFFERENT STENT OPTIMIZATION TECHNIQUES?

Retrospective study

POPULATION

128 consecutive patients (102 males, mean age 73.39±9.54 years old

INTERVENTION

isolated distal/ bifurcation LM disease and bypass surgery contraindications or refusal enrolled to receive LM cross-over stenting

TIME SPAN

1st January 2012 and the 1st January 2017 at two institutions

METHODS

EXCLUSION CRITERIA

1) Primary PCI during acute ST-elevation myocardial infarction

2) significant (>50%) disease of RCA, LCx and Left anterior descending (LAD) coronary artery assessed by QCA which required stent implantation at the time of LM intervention

3) Inadherence to any of the procedural steps of optimization (as describted below) as withdrawn by the angiographic films and reports review

4) Discontinuation of dual antiplatelet regimen during the first 12 month after te procedure.

METHODS

OPERATIVE CRITERIA

1) Predilation of MV 1:1 with non-compliant balloon;

2) Stenting of MV with stent diameter according to the distal MV reference diameter as currently recommended.

IMPLANTED STENTWS

Second and Third generation DES of the operator's choice including :

-Resolute Integrity (Medtronic Inc., Galway, Ireland)

-Promus Premier (Boston Scientific, Galway, Ireland)

- Orsiro (Biotronik, Bulack, Switzerland),

METHODS

OPTIMIZATION TECHNIQUES

1) Proximal optimization tecnique (POT) only, using a NC balloon (any brand) matching the proximal LM diameter on IVUS. The balloon distal tip was positioned in front of the carena on fluoroscopy magnification and expandend at high pressure (14 to 22 atm) for at least 5 to 10 sec.

2) Classical kissing balloon technique: simultaneous inflation starting with the LCx balloon at high pressure (12 to 22 atm) for at least 5 to10 sec using two NC balloons (any brand), LM to LAD and LM to LCx with a size matching the proximal LAD and LCx diameters. Deflation should start with the LCx balloon.

3) POT-side-POT sequence: after initial POT, a NC balloon (any brand) with a diameter matching the proximal LCx was inflated at high pressure (12 to 22 atm), followed by a final POT.

METHODS

FOLLOW UP

A-physical examination at 1, 6, and 12 months and then yearly.

B-ergometric test, nuclear stress test or stress echocardiography at 6/8 months

C-transthoracic echocardiography at 6 months

D-Angiographic and intravascular ultrasound control was perrformed at the time of additional vessel treatment or driven by clinical symptoms or instrumental evidence of myocardial ischemia

E-Information about the in-hospital outcome was obtained from an electronic clinical database

F-Post-discharge survival status was obtained from the Municipal Civil Registries.

PATIENTS DATA SET

	KB N=38	POT-S-POT N=34	POT N=56	p
Demographics				
Age (years)	72.79±10.33	73.65±6.00	73.64±10.78	0.90
Males, n (%)	30 (78.9)	24 (70.6)	48 (85.7)	0.01
Risk factors				
Dyslipidemia, n (%)	10 (26.3)	8 (23.5)	19 (33.9)	0.06
Arterial hypertension, n (%)	8 (21.1)	15 (44.1)	17 (30.4)	0.18
Diabetes, n (%)	13 (34.2)	7 (20.6)	11 (19.6)	0.40
COPD, n (%)	10 (26.3)	8 (23.5)	17 (30.4)	0.07
Previous smokers, n (%)	5 (13.2)	3 (3.8)	3 (5.4)	0.69
Current smokers, n (%)	6 (15.8)	5 (14.7)	3 (5.4)	0.60
Obesity, n (%)	4 (10.5)	3 (8.8)	7 (12.5)	0.39
Clinical presentation				
Unstable angina	13 (34.2)	11 (32.3)	21 (37.5)	0.80
NSTEMI	25 (65.7)	23 (67.6)	35 (62.5)	0.92
CCS	2.1±0.6	2.2±0.5	2.1±0.4	0.87

Lesions and stents

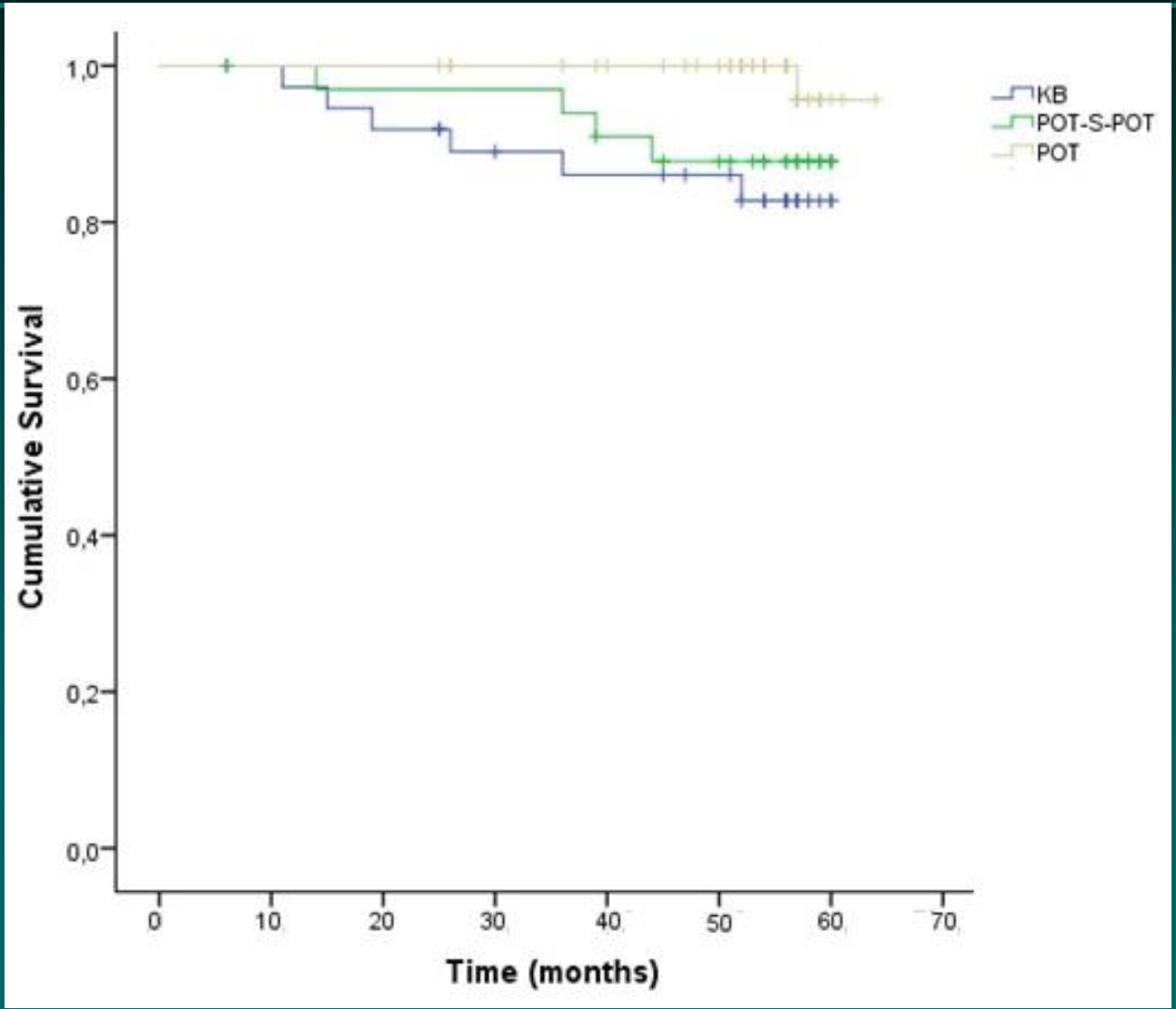
	KB N=38	POT-S-POT N=34	POT N=56	p
Angiographic and procedural data				
SINTAX score	21.1±2.4	22.4±2.5	20.8±2.3	0.75
Medina 1,0,1	22(57.8)	20 (58.8)	32 (57.1)	0.68
Medina 1,0,0	13(34.2)	11 (32.3)	18 (32.1)	0.78
Medina 1,1,0	2(5.2)	2(5.8)	4 (7.1)	0.96
Medina 1,1,1	1 (2.6)	1 (2.9)	2 (3.5)	0.98
Lesion Type A	5(13.1)	4 (11.7)	9 (16.0)	0.59
Lesion Type B	13(34.2)	12 (35.2)	19 (33.9)	0.88
Lesion Type C	20(52.6)	18 (52.9)	28 (50.0)	0.91
IVUS-guidance	26 (68.4)	21 (61.7)	36 (64.2)	0.86
Stent geometries				
Resolute Integrity	20(52.6)	18 (52.9)	31 (55.3)	0.91
Promus Premier	7(18.4)	9 (26.4)	12 (21.4)	0.76
Orsiro	10 (26.3)	7 (20.5)	13 (23.2)	0.74
Diameter*, (mm)	3.46±0.79	3.45±0.59	3.5±0.43	0.91
Length*, (mm)	20.47±7.27	21.82±7.63	22.75±8.72	0.87

CLINICAL OUTCOMES

	KB N=38	POT-S-POT N=34	POT N=56	p
MACE				
TVR	3 (7.8)	1 (2.9)	0	0.06
AMI	2 (5.2)	0	0	0.58
Stent-thrombosis, n (%)	3 (7.8)	1 (1.7)	0	0.06
CV-death (5-years follow-up)	6 (15.8)	4 (11.7)	1 (1.7)	0.04

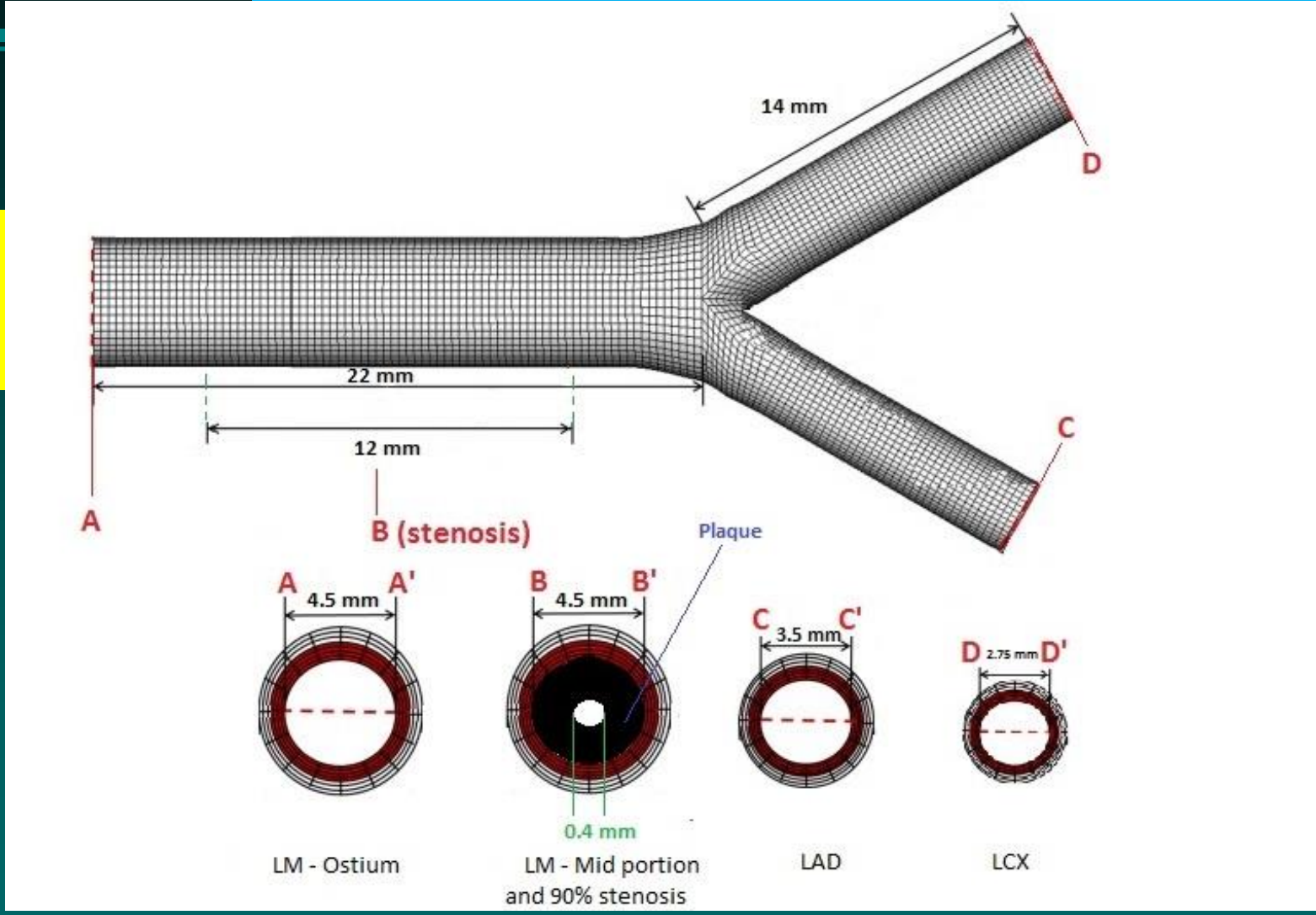
	Chi-square	p (Log-rank Mantel-Cox)
KB vs POT-S-POT	0.34	0.55
POT-S-POT vs POT	3.64	0.05
KB vs POT	6.86	0.009

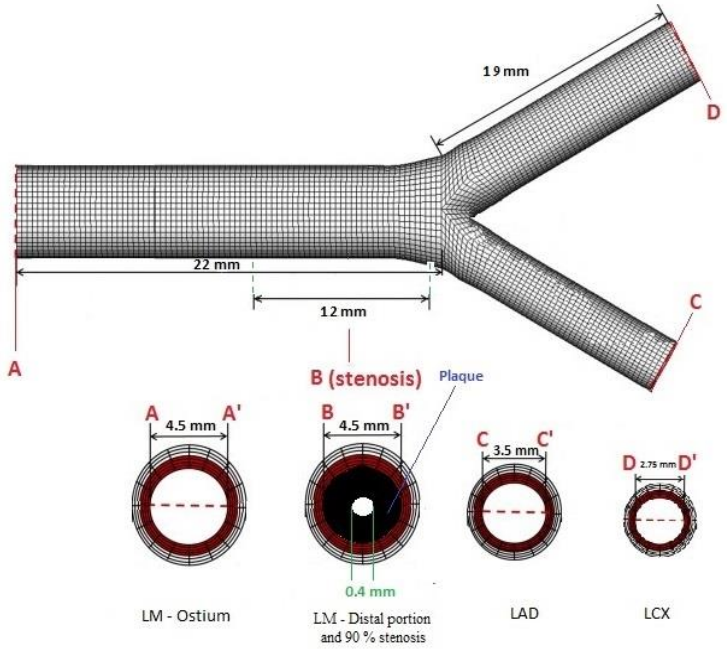
LONG TERM RESULTS



Computed flow dynamic in Left Main: model building up

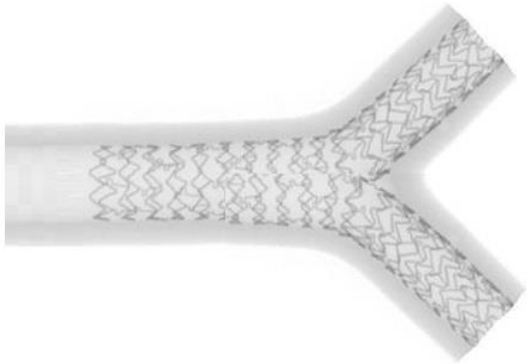
Coronary Left Main Model



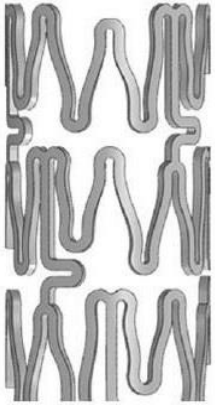

19 mm
D
22 mm
12 mm
C
A
B (stenosis)
Plaque
A
4.5 mm
A'
B
4.5 mm
B'
C
3.5 mm
C'
D
2.75 mm
D'
0.4 mm
LM - Ostium
LM - Distal portion and 90 % stenosis
LAD
LCX

A

B



C



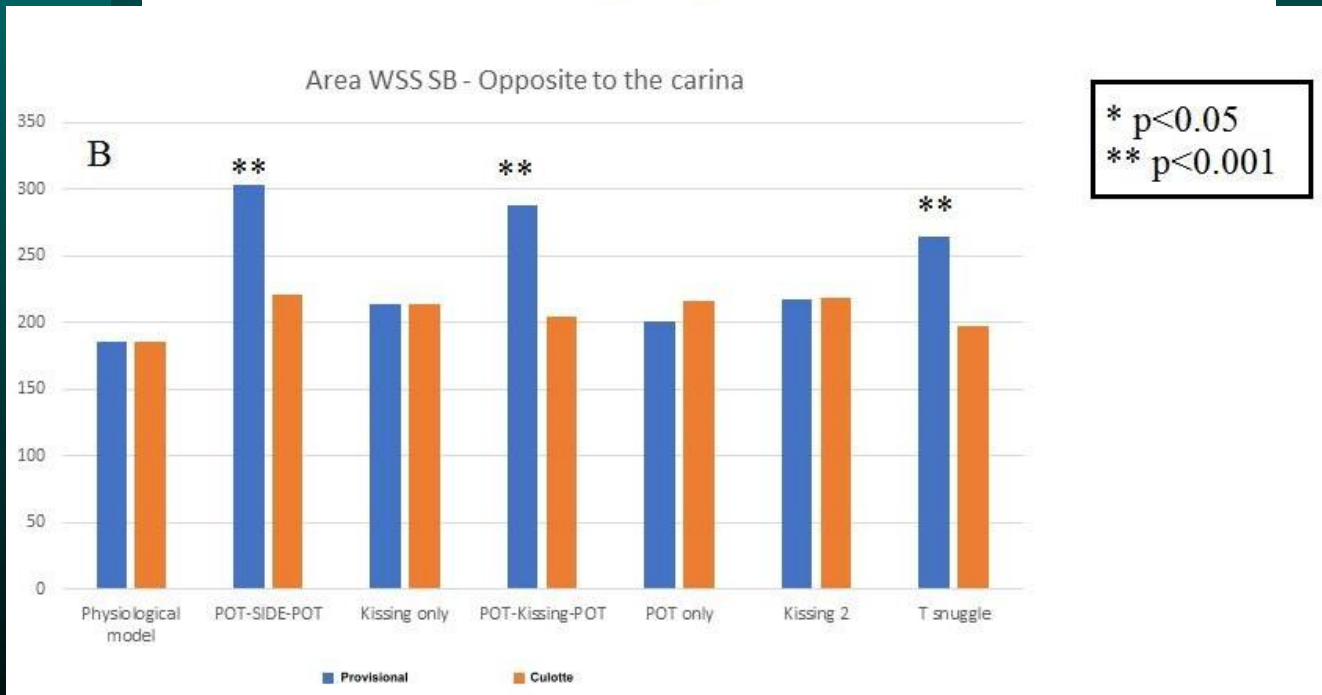
D

Provisional stenting

	Pressure at the carena (mmHg)	WSS LAD (Pa)	WSS LCX (Pa)	WSS Carena (Pa)	Area of lower WSS at carena (mm2)	WSS opposite to the carina (Pa)	Area of lower WSS opposite to the carina (mm2)
Physiological Model	80 *	10.624* **	12.803*	3.266*	201* ** ***	2.28* **	186 * **
POT-Side-POT	79.2	9.210	10.657	2.740	508 **	2.96 **	304 **
KB only	80.8	10.407	12.06	3.100	254	3.02	214
POT-KB-POT	79.3*	8.415*	9.729*	2.503*	489*	2.44*	288 *
POT only	79.5	9.608	11.12	2.860	278	2.52	201
2SK	79.4	9.665	11.99	3.025	233	2.19	218
SKB	79.3	.897**	9.554 **	2.478 **	471 ***	3.58	265

Culotte stenting

	Pressure at the carena (mmHg)	WSS LAD (Pa)	WSS LCX (Pa)	WSS Carena (Pa)	Area of lower WSS at carena (mm2)	WSS opposite to the carina (Pa)	Area of lower WSS opposite to the carina (mm2)
Physiological Model	80.0	10.624* **	12.800* **	3.266* **	208* **	2.28	186
POT-Side-POT	80.2	10.150	12.324*	3.102	249 **	2.11	221
KB only	80.2	10.204	12.477	3.189	236*	2.16	214
POT-KB-POT	79.9	10.769	12.698	3.403*	220	2.45	205
2SK	79.8	10.125*	12.355	3.279	228	2.14	219
SKB	79.8	9.995**	12.239**	3.104**	209	2.35	198



* p<0.05
** p<0.001

Computed flow dynamic in coronary Left Main

Computed flow dynamic Results summary

Answers

-in LM provisional stenting, POT, Kissing Balloon, 2-SK showed a similar beneficial impact on the bifurcation rheology at both carena and SB wall opposite to the carena

-in LM Culotte stenting, POT-Kissing balloon-POT and Snuggle Kissing performed slightly better than the other techniques, probably reflecting a better strut apposition.

CONCLUSIONS….

✓THGIS IS THE FIRST CLINICAL STUDY EVER IN ENGLISH LITERATURE ON OPTIMIZATION IN LEFT MAIN CROSS-OVER STENTING

✓ON LONG TERM POT ONLY SEEMS THE MOST PROEFFICIENT

✓THIS RESULTS APPEARS IN LINE WITH COMPUTATION STUDY WHICH SHOWED THAT POT ONLY AND KB ARE DIFFERENT BUT NOT SO MUCH