Case 4
Challenging Treatment in Left Main In-stent Restenosis

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Disclosure

- **Bruno Scheller, MD**

- Shareholder: InnoRa GmbH, Berlin, Germany
- Lecture fees and consulting honoraria: B.Braun, Medtronic

Management of failed stenting of the unprotected left main coronary artery

Alice Moroni MD[1] | Federico Marin MD[2] | Gabriele Venturi MD[3] | Roberto Scarsini MD[3] | Flavio Ribichini MD[3] | Giovanni Luigi De Maria MD, PhD[2] | Adrian P. Banning MD[2]

	ISR	Early ST*	Late ST*	Very Late* ST
Male sex	≈ 80 %	≈ 67 %	≈ 72 %	≈ 77 %
Diabetes Mellitus	≈ 45 %	≈ 44 %	≈ 38 %	≈ 28%
Current smoking	≈ 15 %	≈ 42 %	≈ 45 %	≈ 42 %
Hypertension	≈ 80 %	≈ 86 %	≈ 88 %	≈ 85 %
Dyslipidemia	≈ 75 %	≈ 86 %	≈ 88 %	≈ 89 %
CKD (eGFR < 60)	≈ 43 %	/	/	/
3-Vessel Disease	≈ 76 %	/	/	/

Catheter Cardiovasc Interv. 2023;101:1001–1013

2018 ESC/EACTS Guidelines on myocardial revascularization

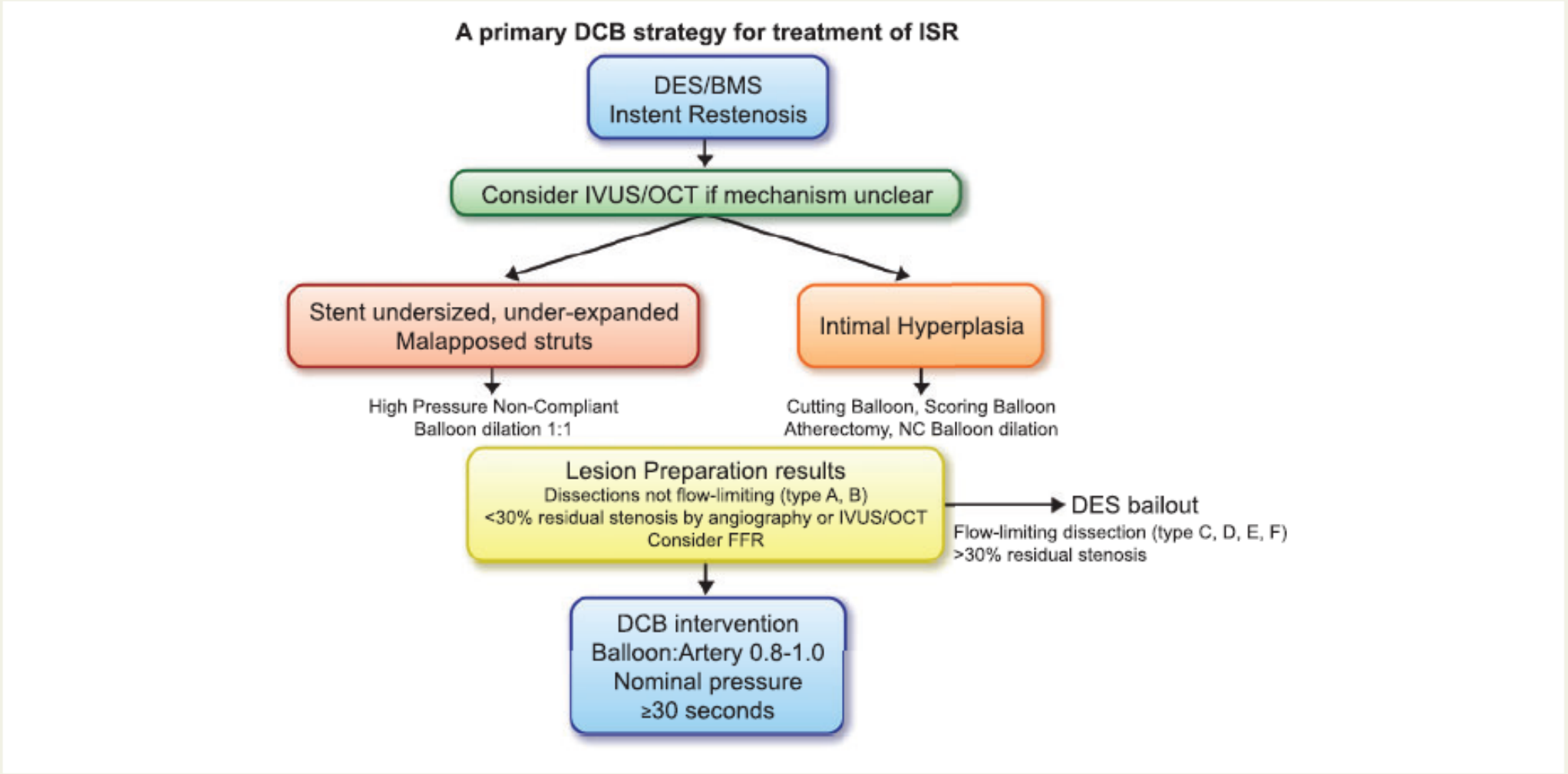
The Task Force on myocardial revascularization of the European Society of Cardiology (ESC) and European Association for Cardio-Thoracic Surgery (EACTS)

Restenosis		
DES are recommended for the treatment of in-stent restenosis of BMS or DES.[373,375,378,379]	I	A
Drug-coated balloons are recommended for the treatment of in-stent restenosis of BMS or DES.[373,375,378,379]	I	A
In patients with recurrent episodes of diffuse in-stent restenosis, CABG should be considered by the Heart Team over a new PCI attempt.	IIa	C
IVUS and/or OCT should be considered to detect stent-related mechanical problems leading to restenosis.	IIa	C

European Heart Journal 2019; 40: 87-165

Paclitaxel-coated balloons: a safe alternative to drug-eluting stents for coronary in-stent restenosis

Alexandra Lansky [1]*, Daniel Grubman [1], and Bruno Scheller [2]



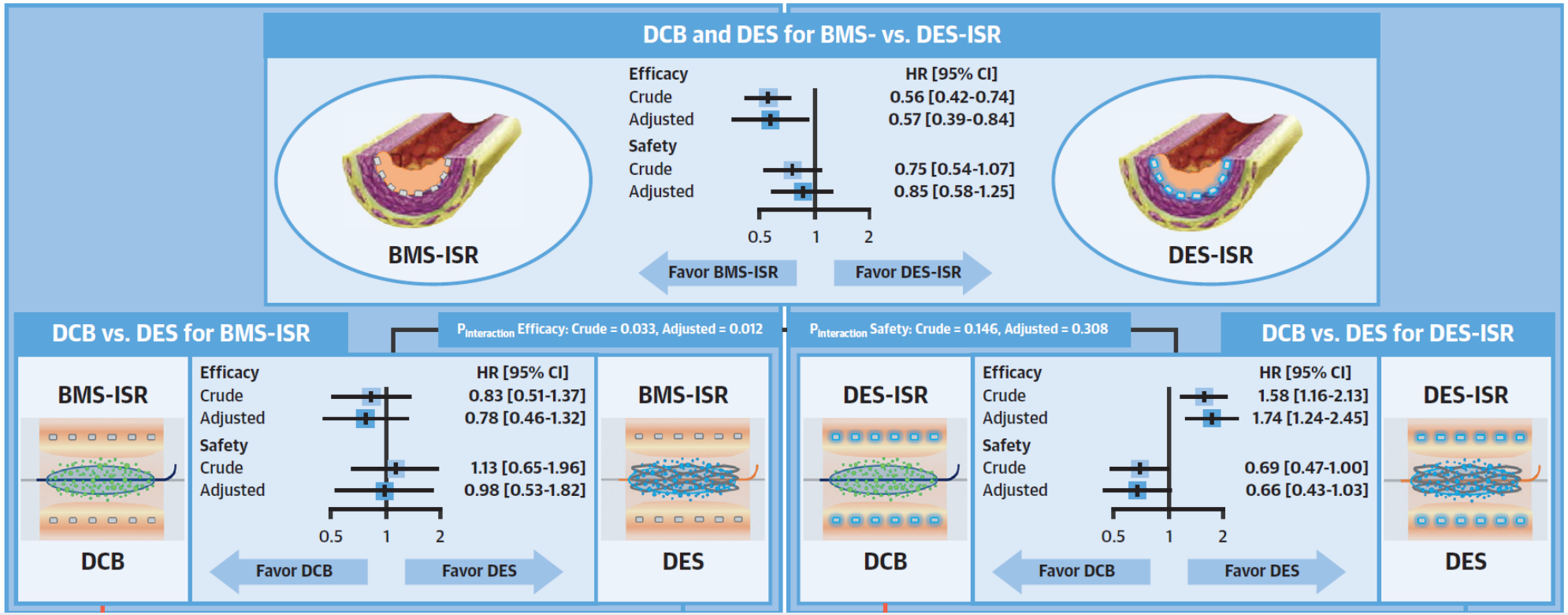
Take home figure Proposed algorithm for treatment of in stent restenosis.

European Heart Journal 2020; 41: 3729–3731

Drug-Coated Balloon Angioplasty Versus Drug-Eluting Stent Implantation in Patients With Coronary Stent Restenosis

Daniele Giacoppo, MD, MSc,[a] Fernando Alfonso, MD, PhD,[b] Bo Xu, MBBS, PhD,[c] Bimmer E.P.M. Claessen, MD, PhD,[d] Tom Adriaenssens, MD, PhD,[e] Christoph Jensen, MD,[f] María J. Pérez-Vizcayno, MD, PhD,[g] Do-Yoon Kang, MD,[h] Ralf Degenhardt, MD, PhD,[i] Leos Pleva, MD, PhD,[j] Jan Baan, MD, PhD,[k] Javier Cuesta, MD, PhD,[b] Duk-Woo Park, MD, PhD,[h] Pavel Kukla, MD,[j] Pilar Jiménez-Quevedo, MD, PhD,[g] Martin Unverdorben, MD, PhD,[i,l] Runlin Gao, MD,[c] Christoph K. Naber, MD, PhD,[f] Seung-Jung Park, MD, PhD,[h] José P.S. Henriques, MD, PhD,[k] Adnan Kastrati, MD,[a,m] Robert A. Byrne, MB BCh, PhD[a,n,o]

CENTRAL ILLUSTRATION Efficacy and Safety of Drug-Coated Balloon Angioplasty and Drug-Eluting Stent Implantation According to In-Stent Restenosis Type

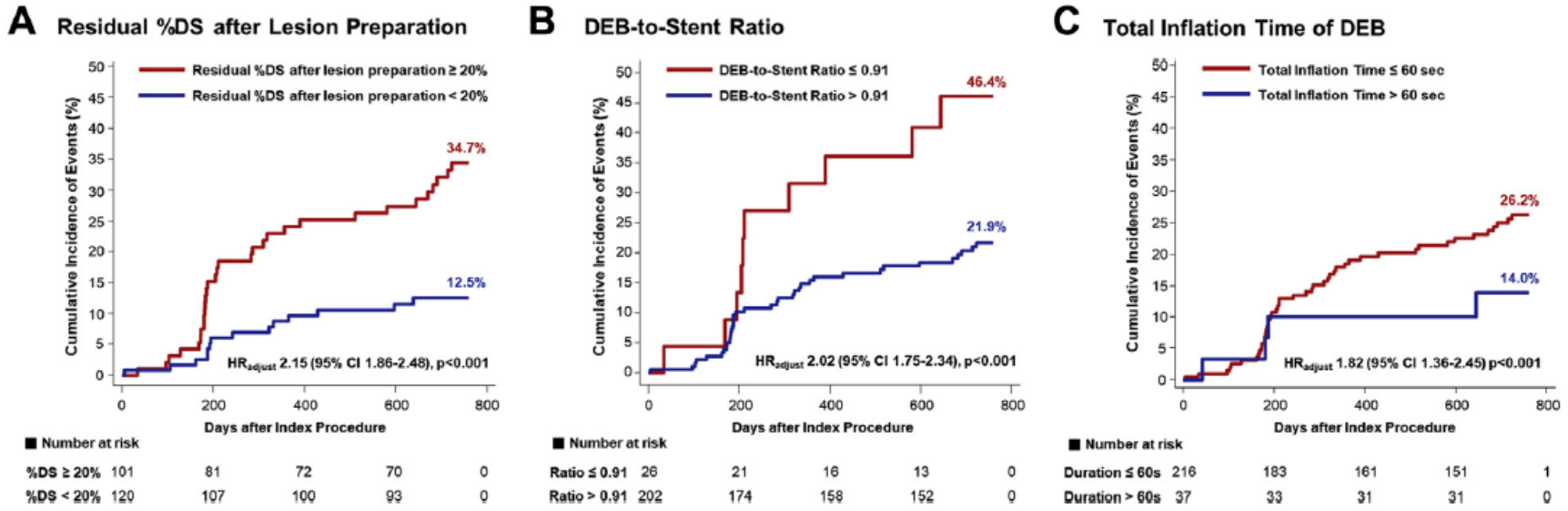


J Am Coll Cardiol. 2020; 75: 2664-78

Impact of Optimized Procedure-Related Factors in Drug-Eluting Balloon Angioplasty for Treatment of In-Stent Restenosis

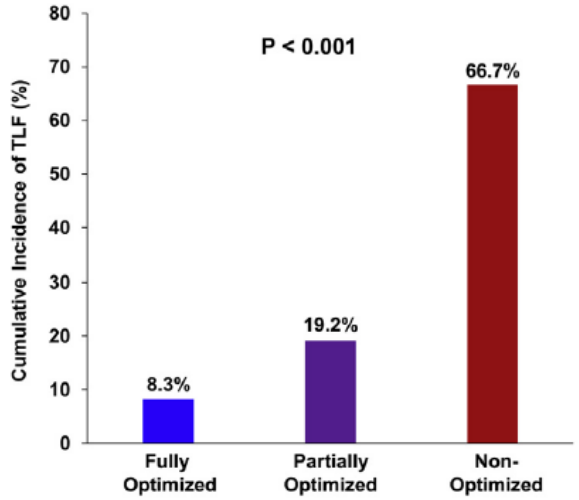
Tae-Min Rhee, MD,[a,*] Joo Myung Lee, MD, MPH, PhD,[b,*] Eun-Seok Shin, MD, PhD,[c] Doyeon Hwang, MD,[a] Jonghanne Park, MD, PhD,[a] Ki-Hyun Jeon, MD,[d] Hack-Lyoung Kim, MD, PhD,[e] Han-Mo Yang, MD, PhD,[a] Jung-Kyu Han, MD, PhD,[a] Kyung Woo Park, MD, PhD,[a] Joo-Yong Hahn, MD, PhD,[b] Bon-Kwon Koo, MD, PhD,[a] Sang-Hyun Kim, MD, PhD,[e] Hyo-Soo Kim, MD, PhD[a]

FIGURE 3 Cumulative Incidence of Target Lesion Failure According to Individual Procedure-Related Factors



The cumulative incidence of target lesion failure, according to **(A)** residual percentage diameter stenosis (%DS) after lesion preparation, **(B)** drug-eluting balloon (DEB)-to-stent ratio, and **(C)** total inflation time of DEB are presented. CI = confidence interval; HR_{adjust} = adjusted hazard ratio.

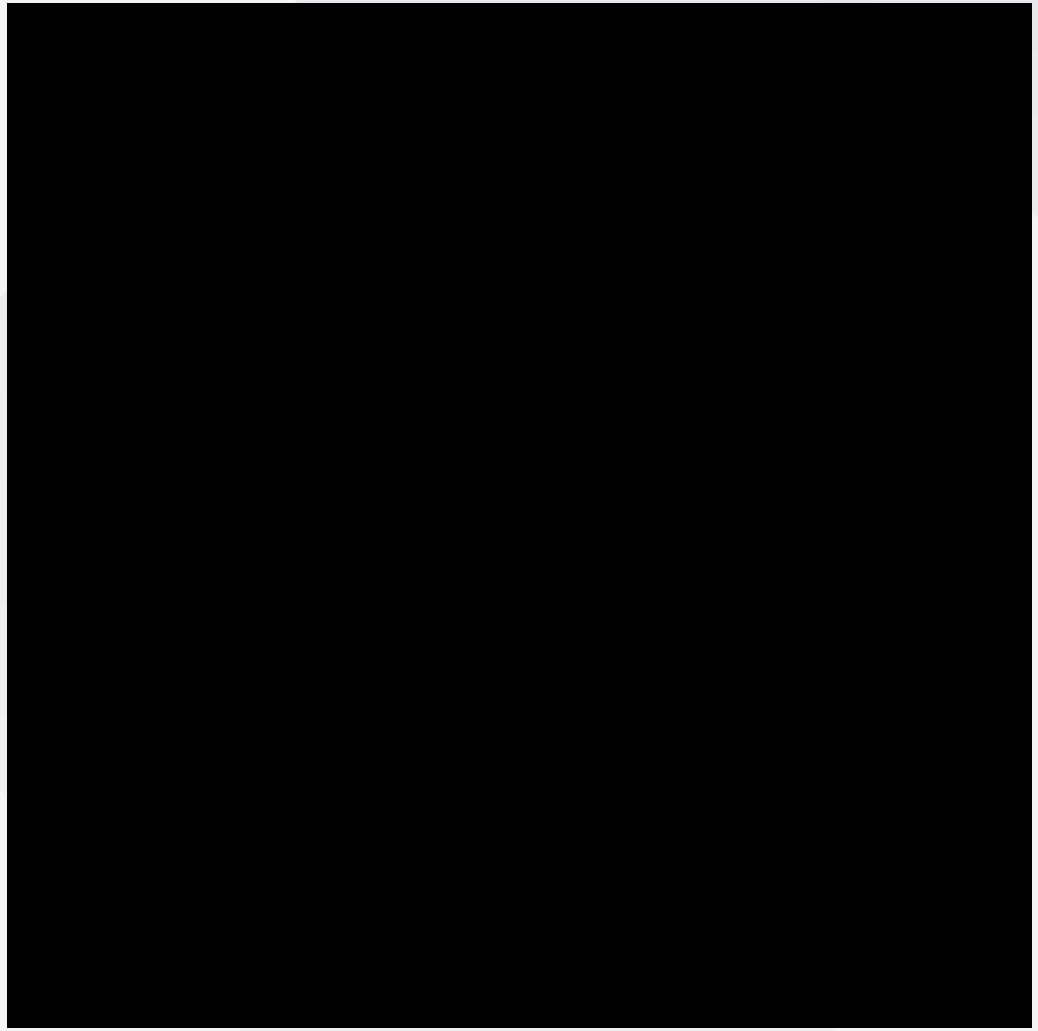
FIGURE 4 Incidence of Target Lesion Failure According to Combined Procedure-Related Factors

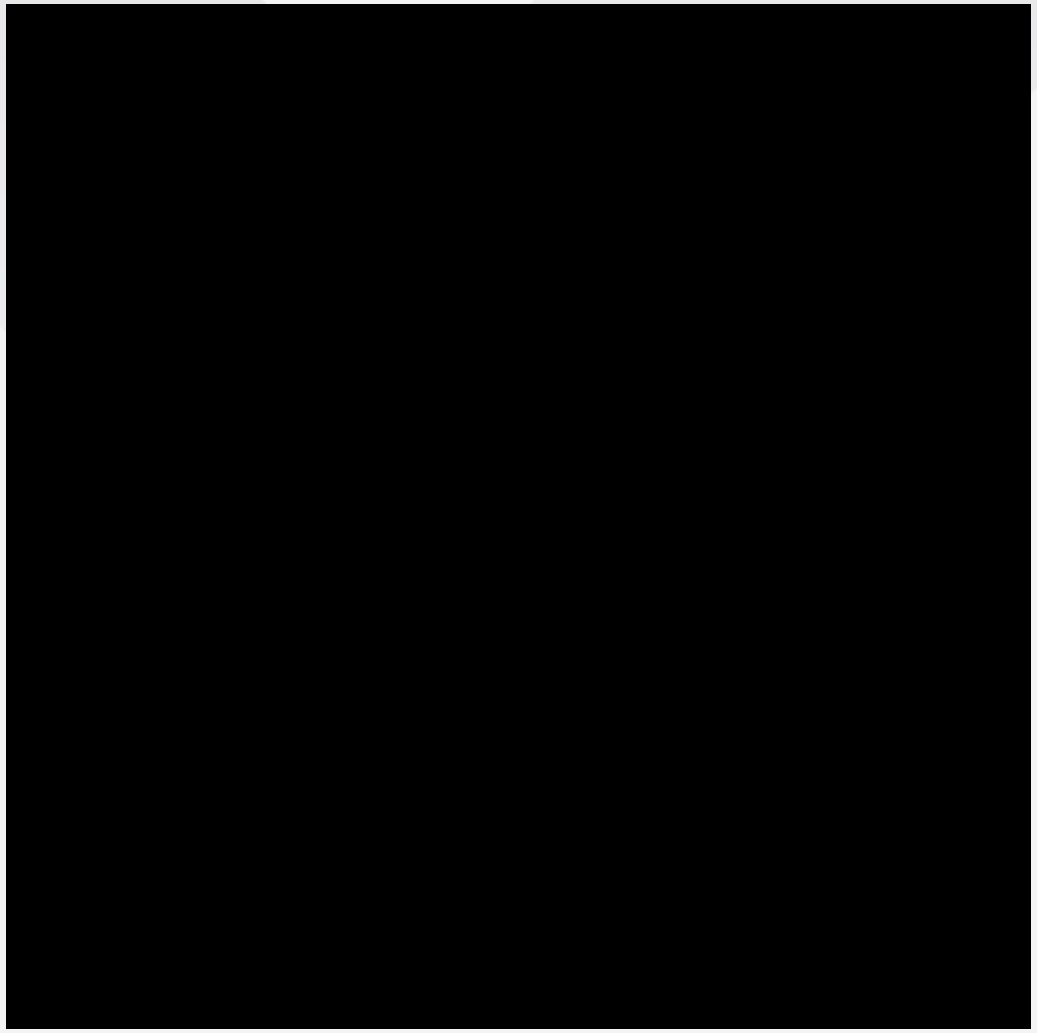


Rates of target lesion failure (TLF) are compared among 3 groups, classified according to the combined procedure-related factors: 1) fully optimized group (drug-eluting balloon-to-stent ratio [BSR] >0.91, total inflation time of drug-eluting balloon [$T_{inflation}$] >60 s, and residual percentage diameter stenosis [%DS] after lesion preparation <20%); 2) partially optimized group (either 1 or 2 of 3 procedural factors were optimized); and 3) nonoptimized group (BSR ≤0.91, $T_{inflation}$ ≤60 s, and residual %DS after lesion preparation ≥20%).

J Am Coll Cardiol Intv 2018;11:969–78

79 year old female, 2015 DES LCA, 2016 CABG, 2017 unstable angina





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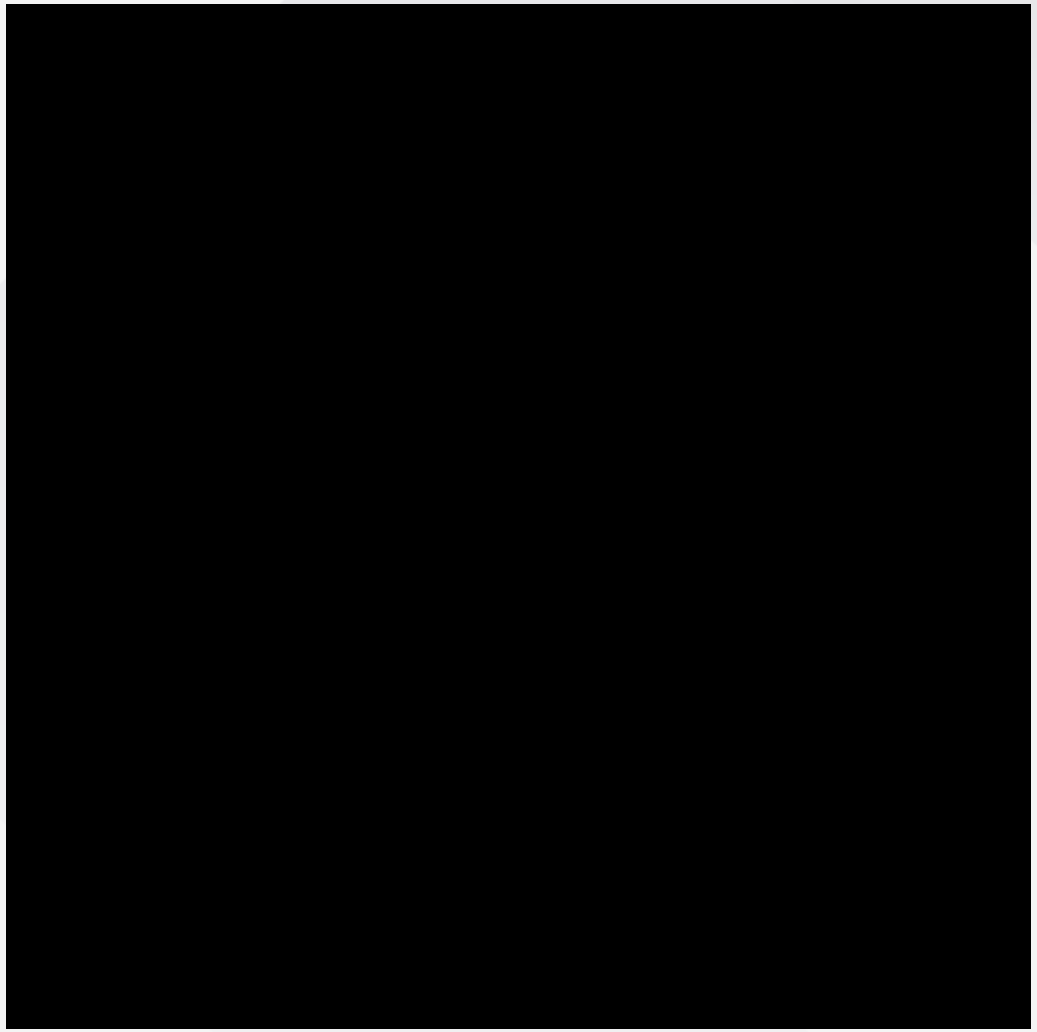

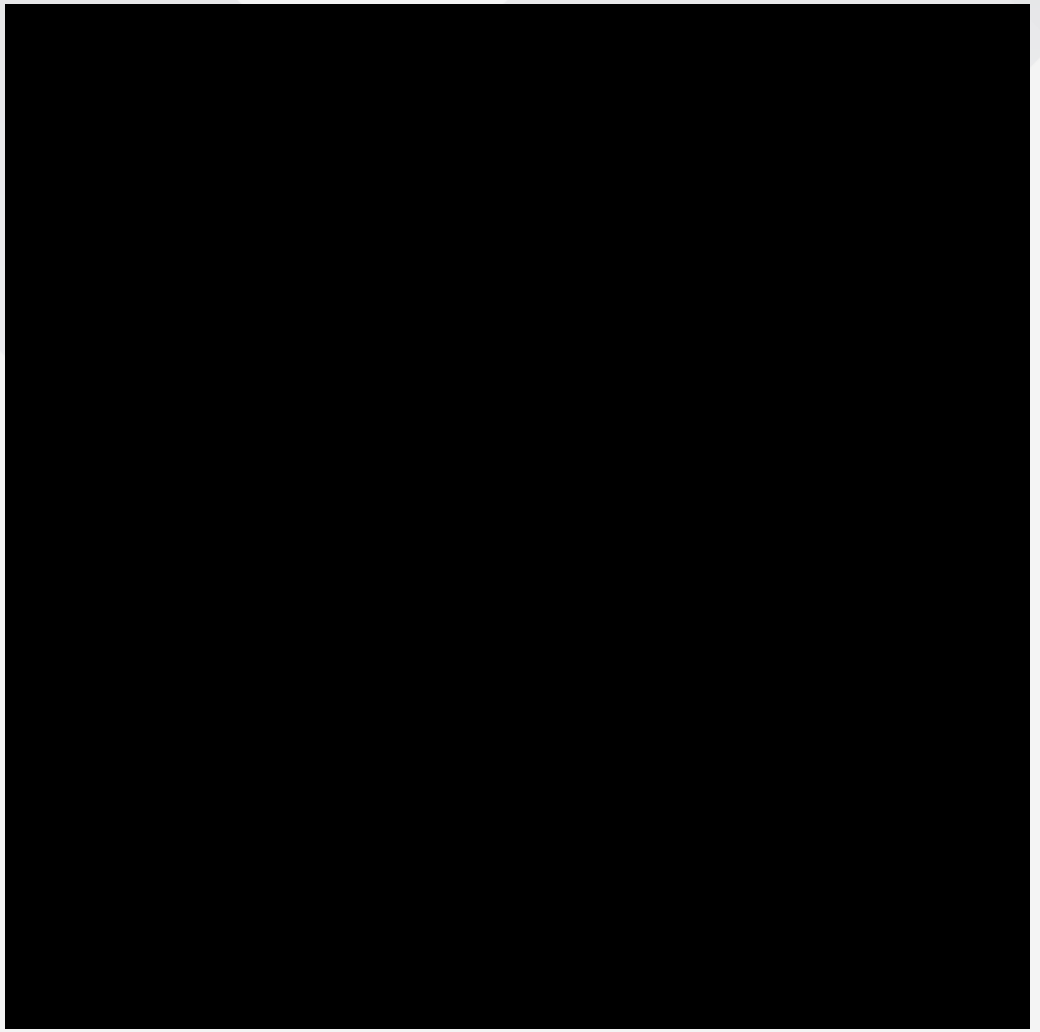

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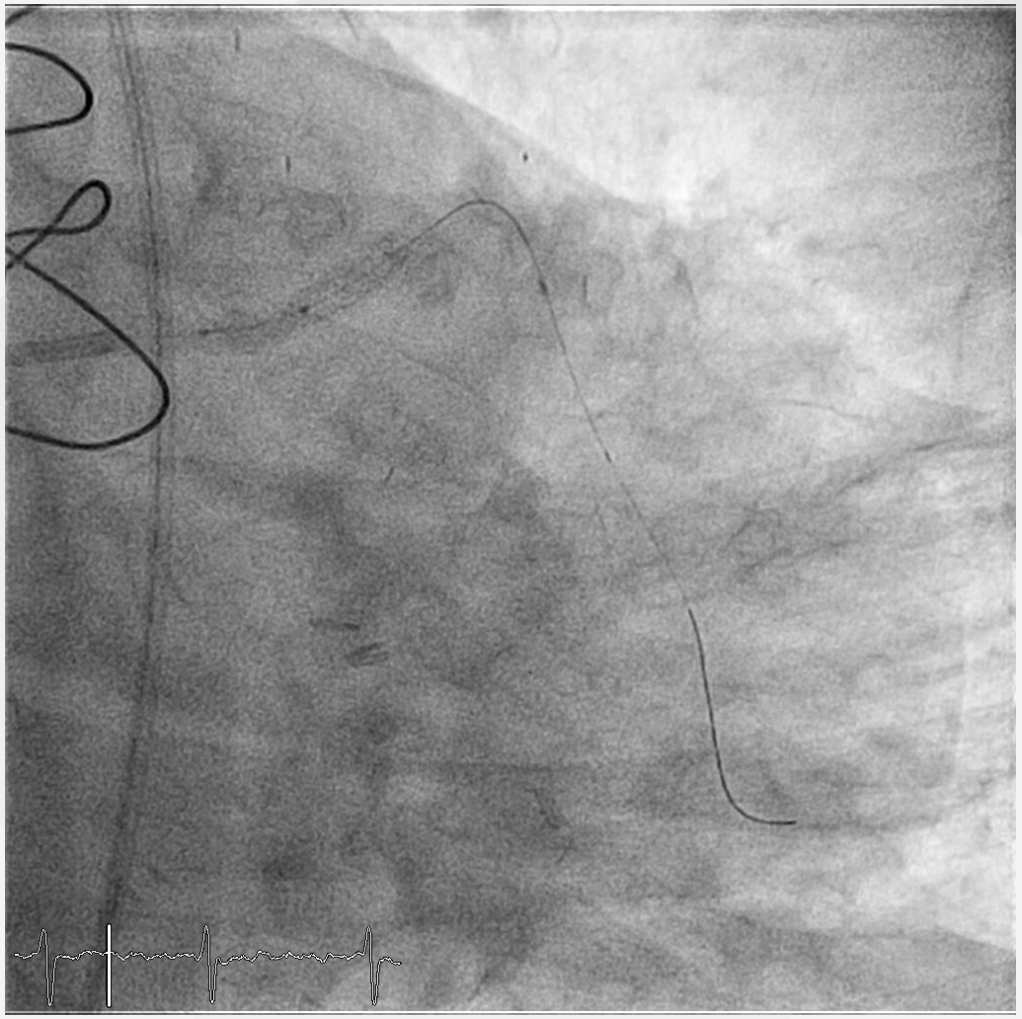
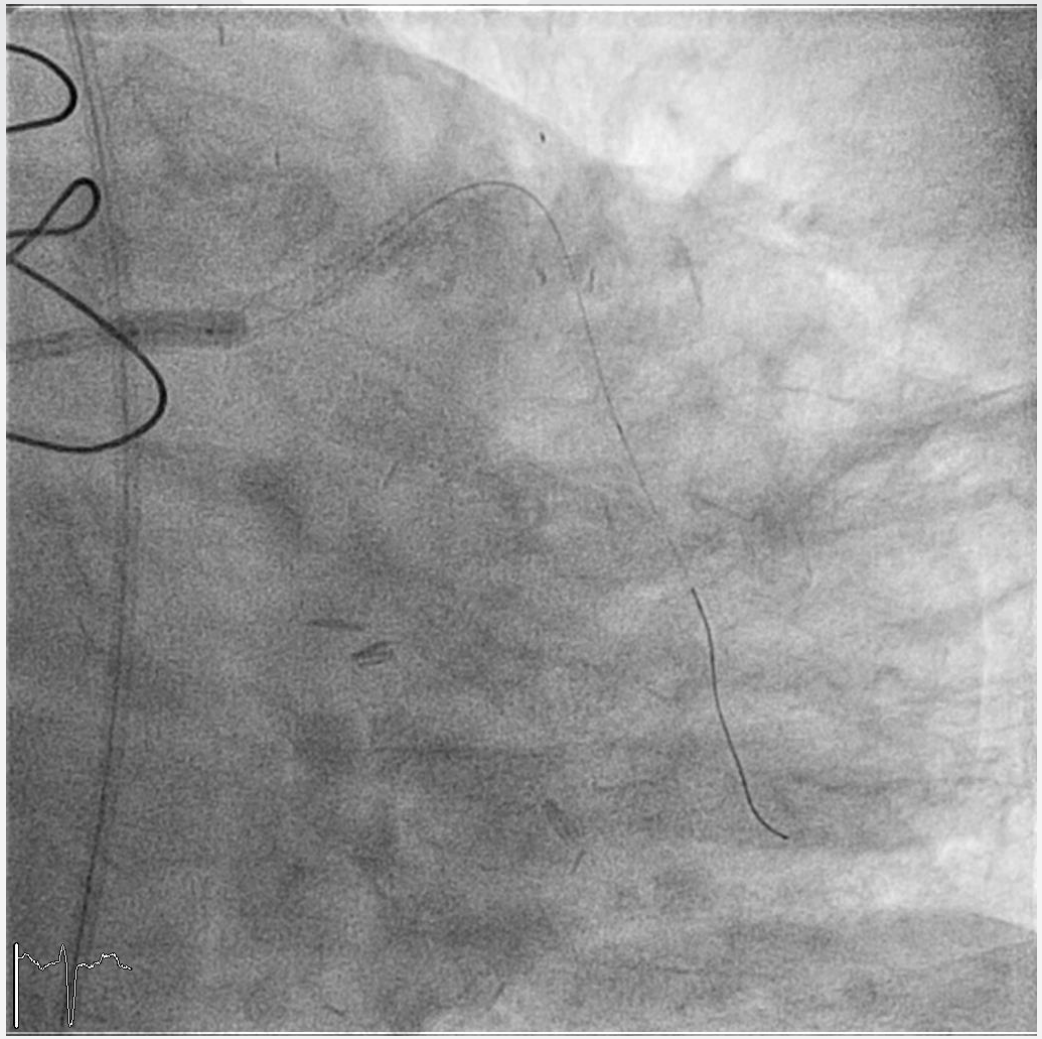
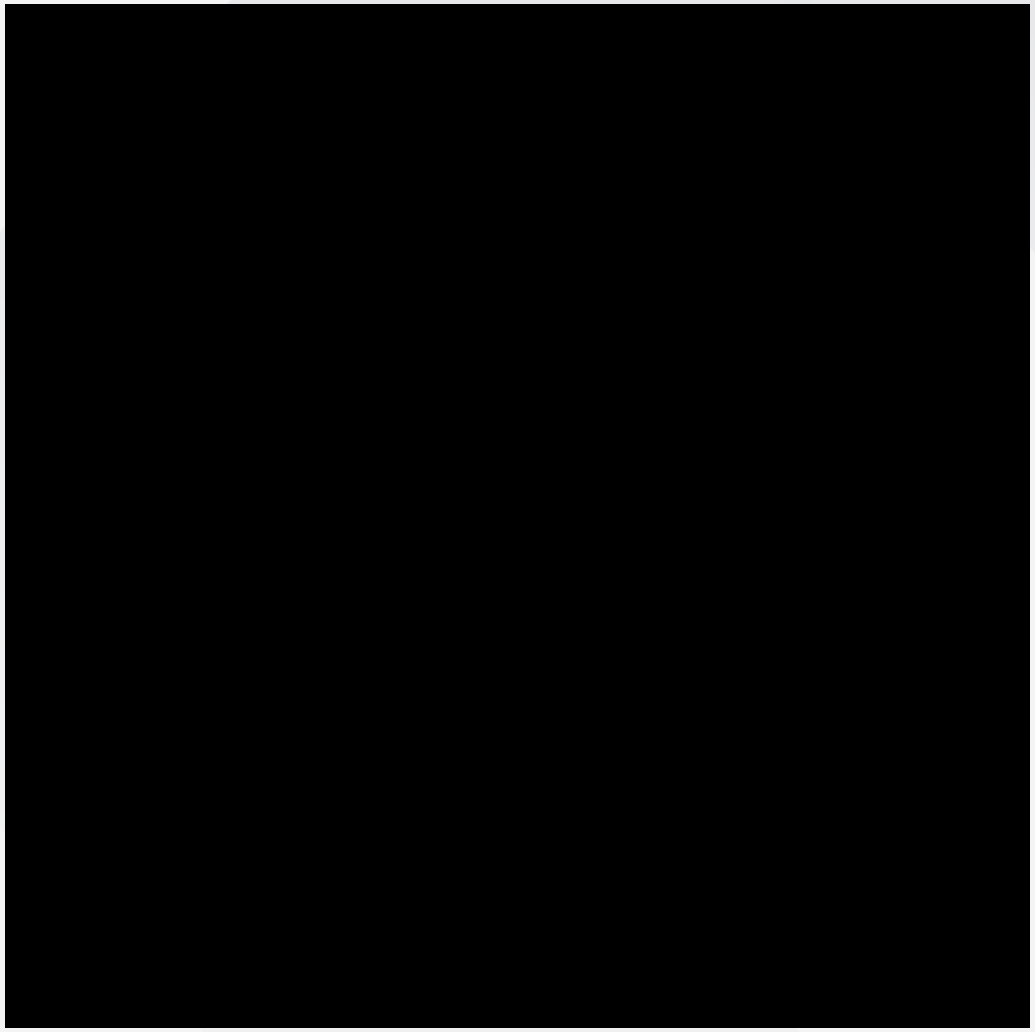
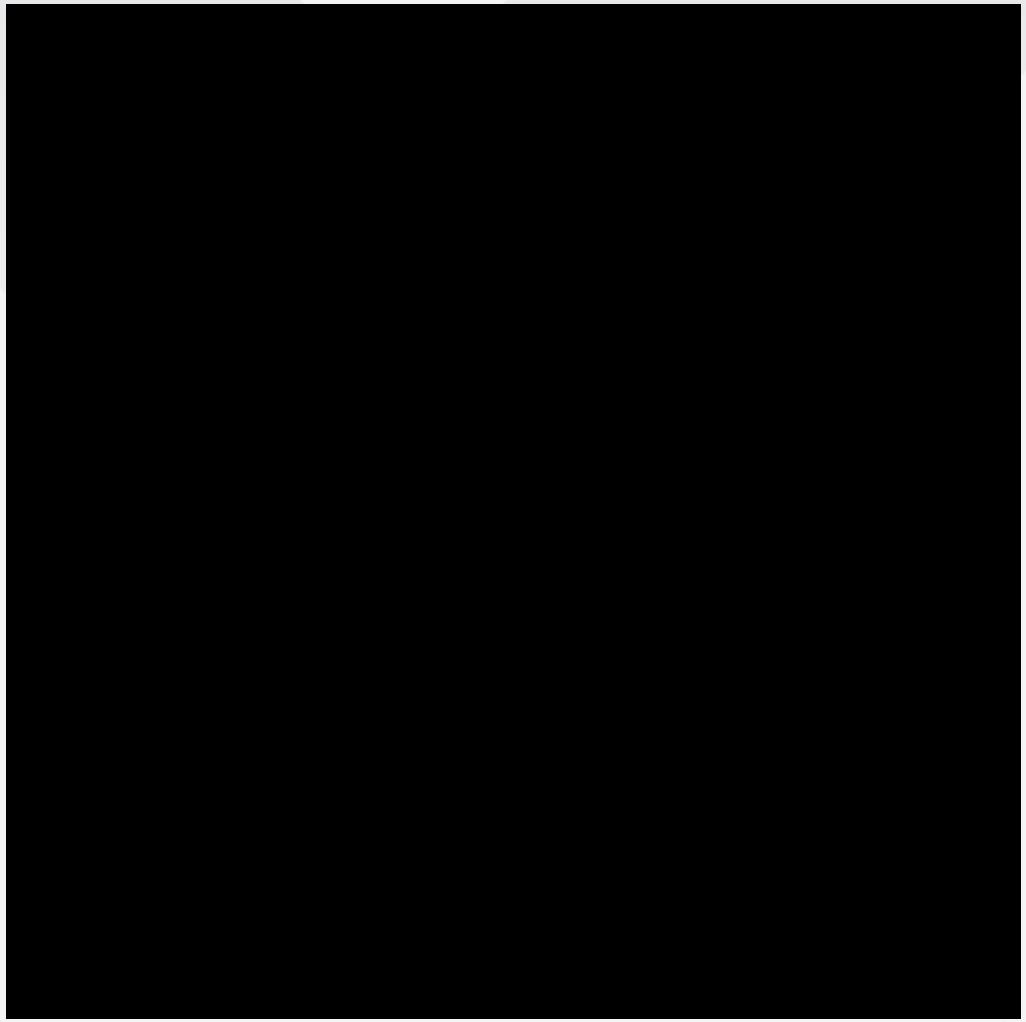


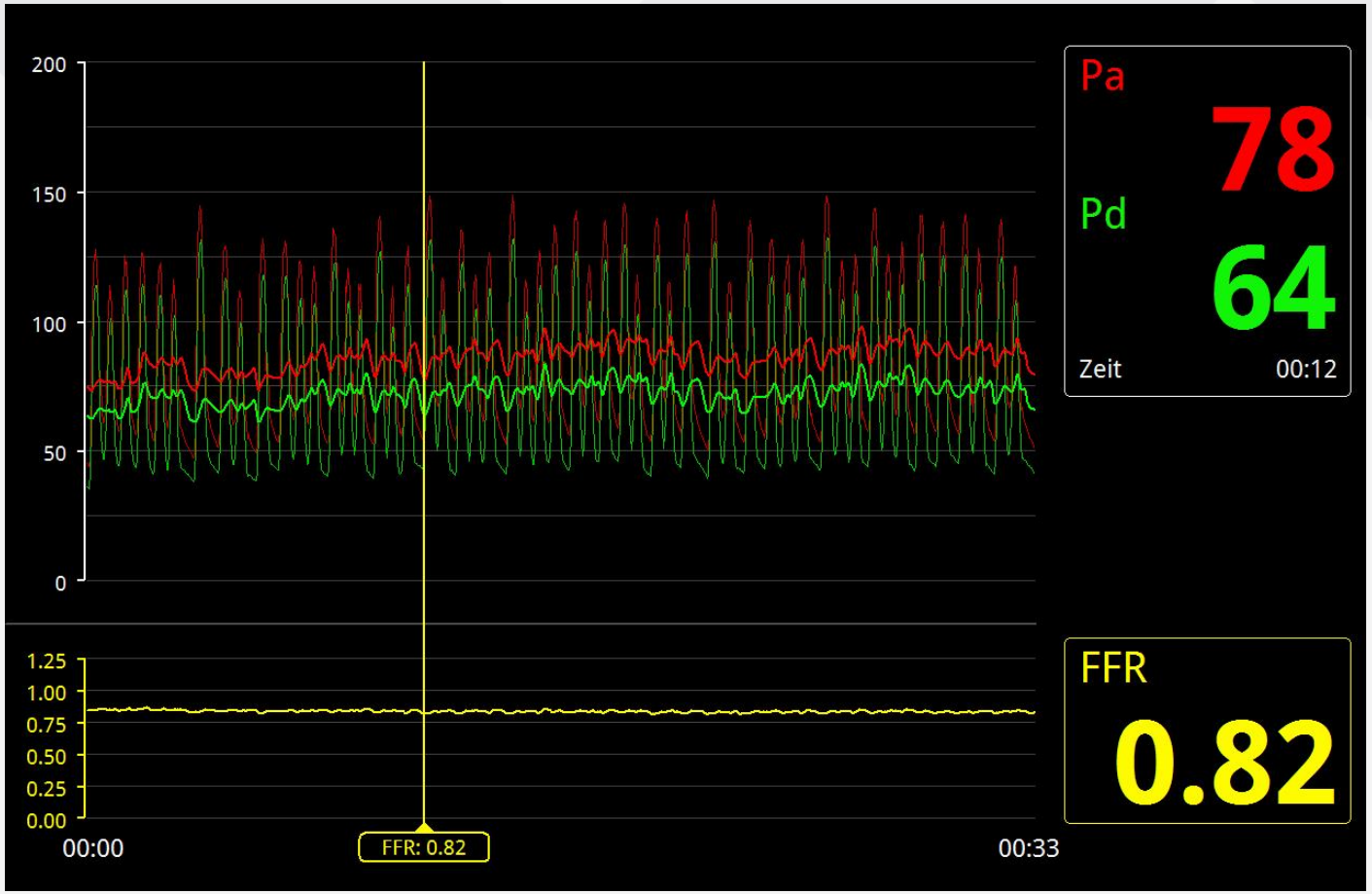


79 year old female, 2015 DES LCA, 2016 CABG, 2017 unstable angina

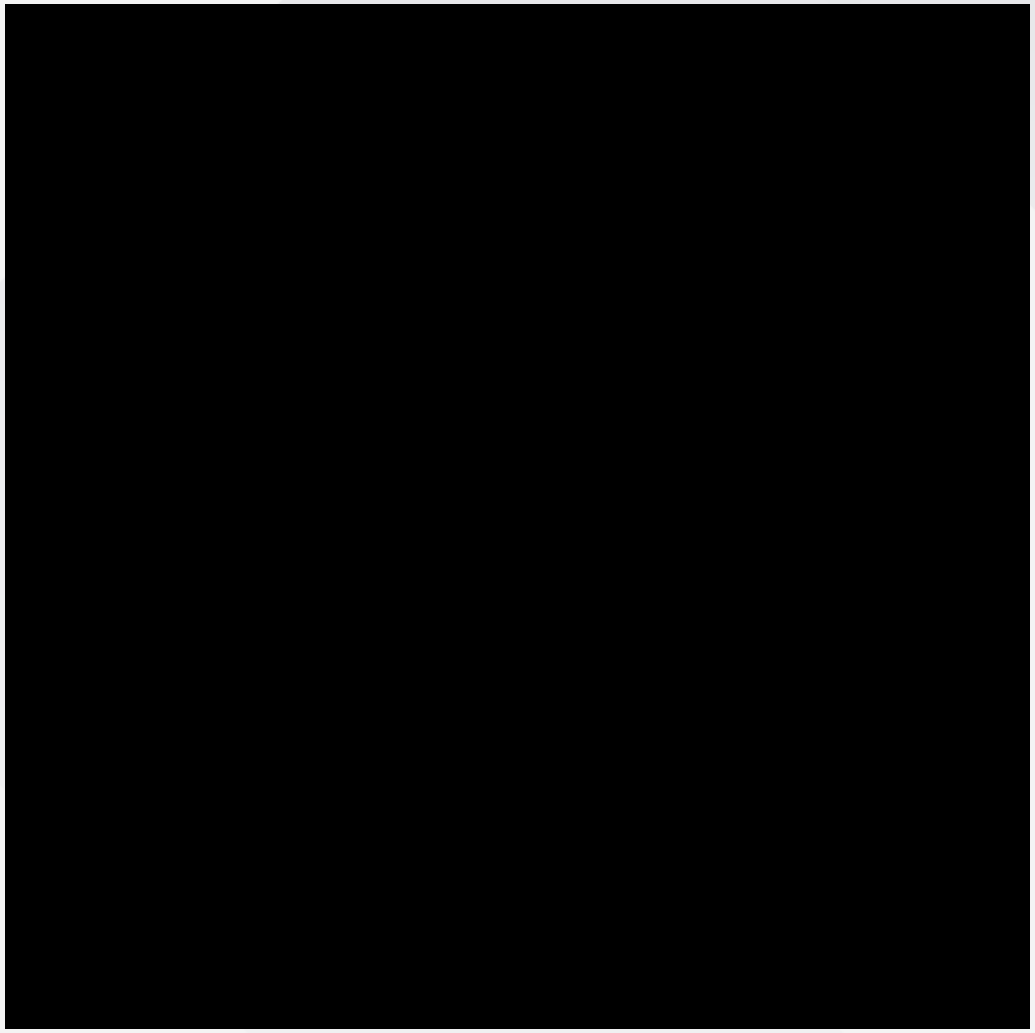


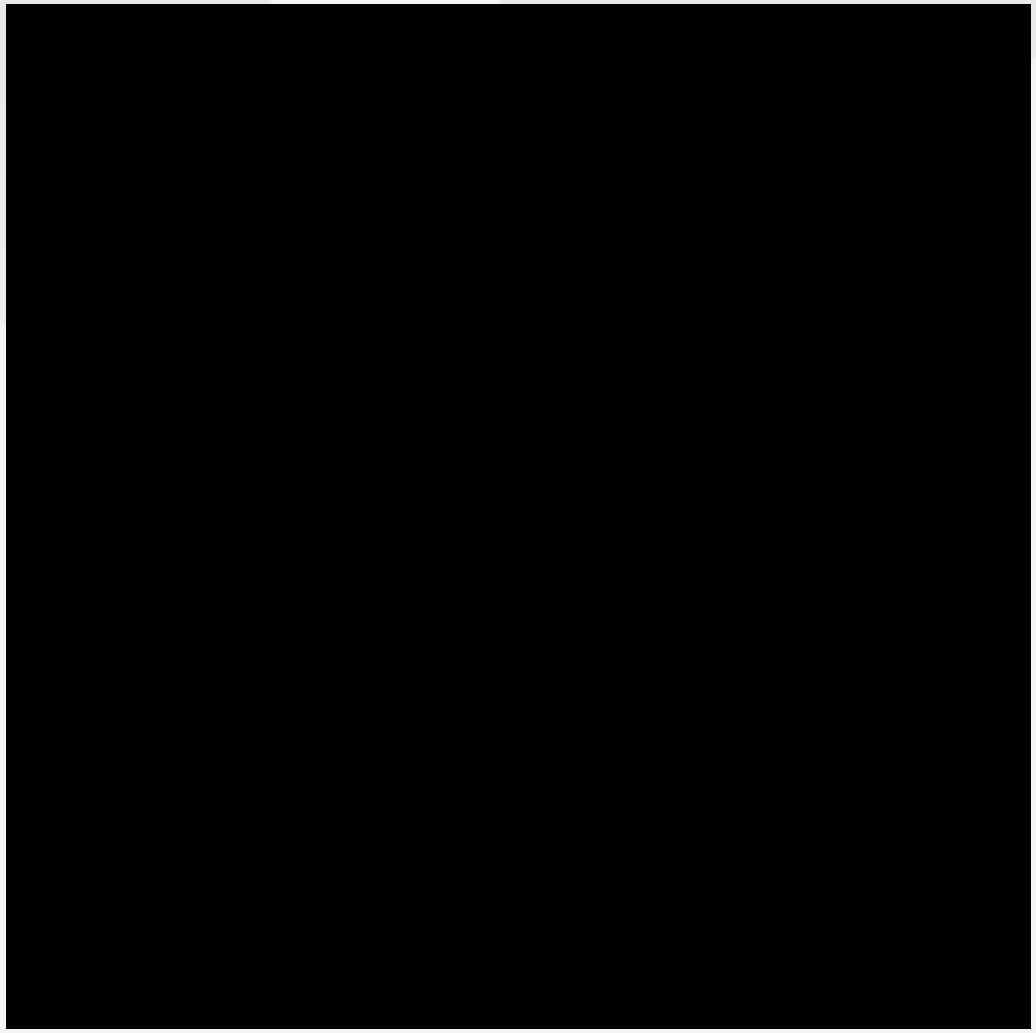


79 year old female, 2015 DES LCA, 2016 CABG, 2018 14 months later



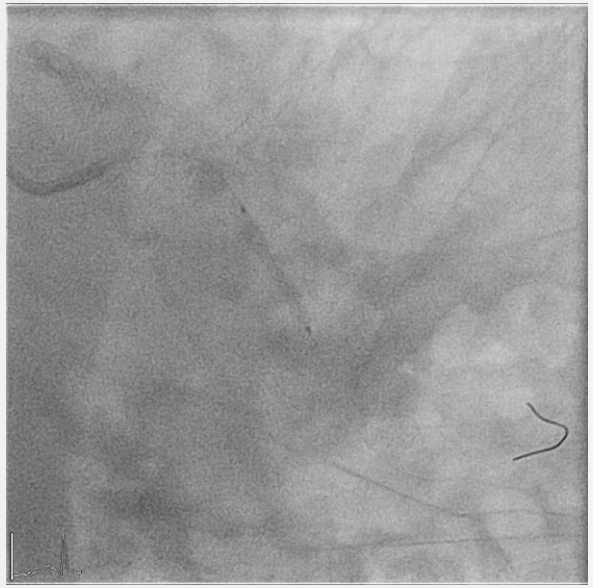
77 year old male, DES LCA 1.5 years before

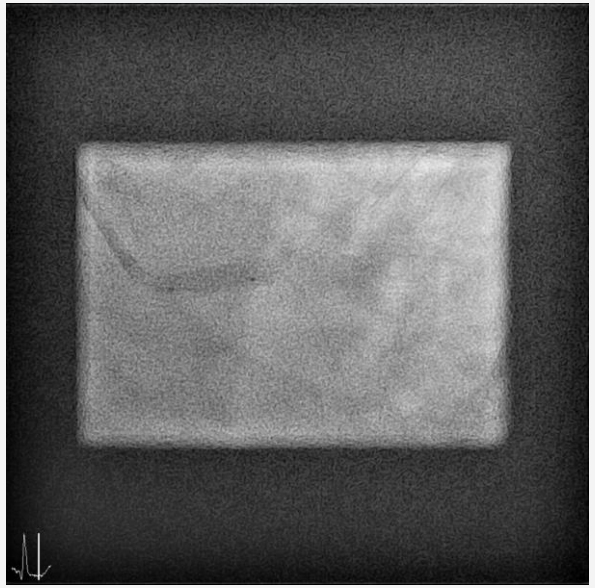




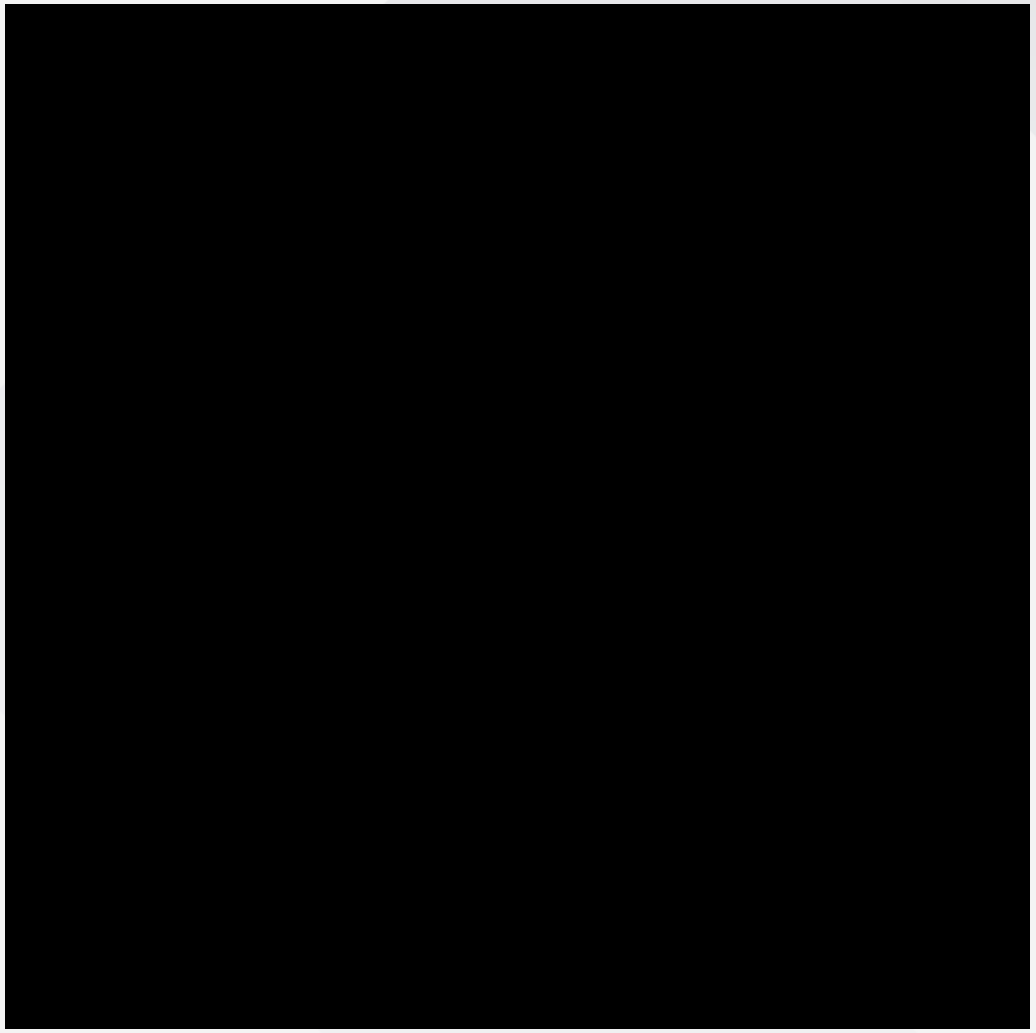
77 year old male, DES LCA 1.5 years before

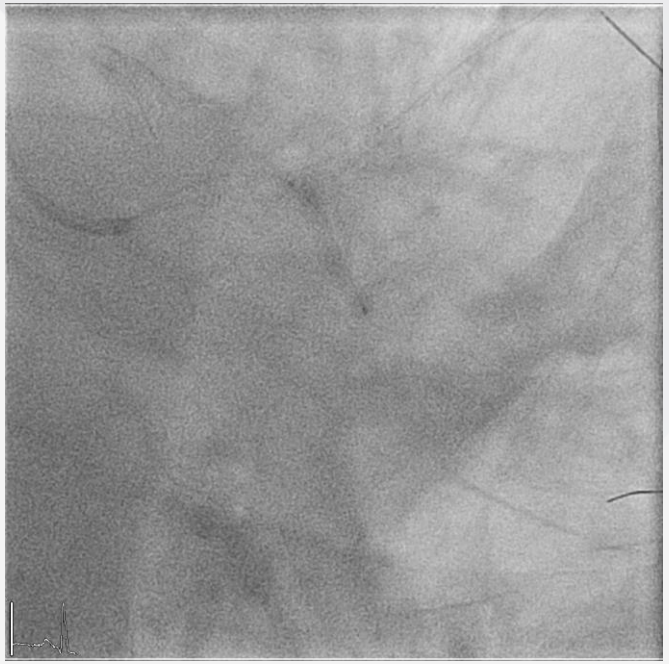
Intervention:
EBU 3,75, komplexe Drahtung der RCx durch die Stentmaschen (Runthrough NS), PTCA der prox. RCx (Sequent Neo 2,0 mm x 20 mm; Sequent Neo 3,0 mm x 20 mm), langstreckige DCB/PTCA der RCx (SeQuent Please NEO 3,0 mm x 20 mm, SQP 2,5 x 15mm, SQP 2,5 x 20mm), bei Hypotonie Gabe von Akrinor i.v., Wechsel auf Zweidrahttechnik, Drahtung der LAD (Runthrough NS), Scoring-PTCA der prox. LMCA (NSE Alpha Lacrosse 3,5 x 13mm) bei ISR, weitere PTCA mittels Hochdruck-Ballon (Terumo Accuforce 3,0 x 8 mm, Terumo Accuforce 3,5 x 15 mm, Terumo Accuforce 4,0 x 15mm) der LMCA und Hochdruck-PTCA (Terumo Accuforce 4,5 x 8mm) des ostialen Hauptstammes. Nachfolgend DCB-PTCA (SQP Neo 4,0 x 15mm mit 12 atu) der LMCA. Abschließend insgesamt gutes Primärergebnis (TIMI III-Fluss).

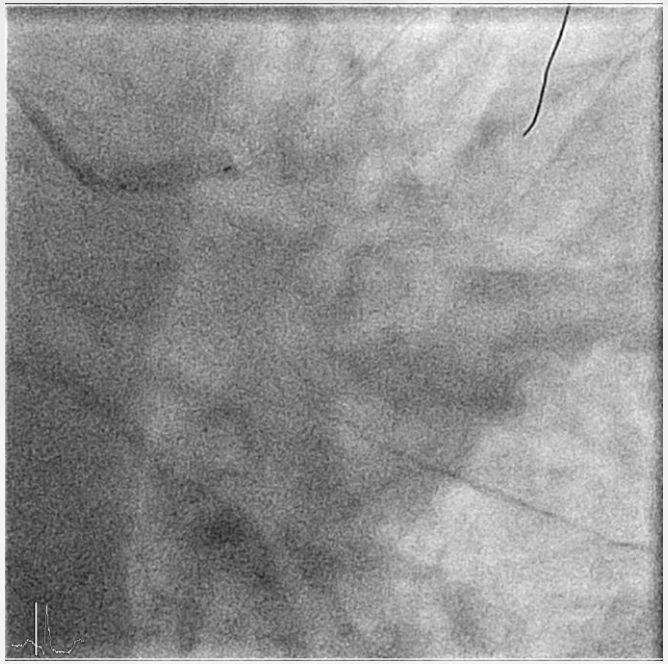




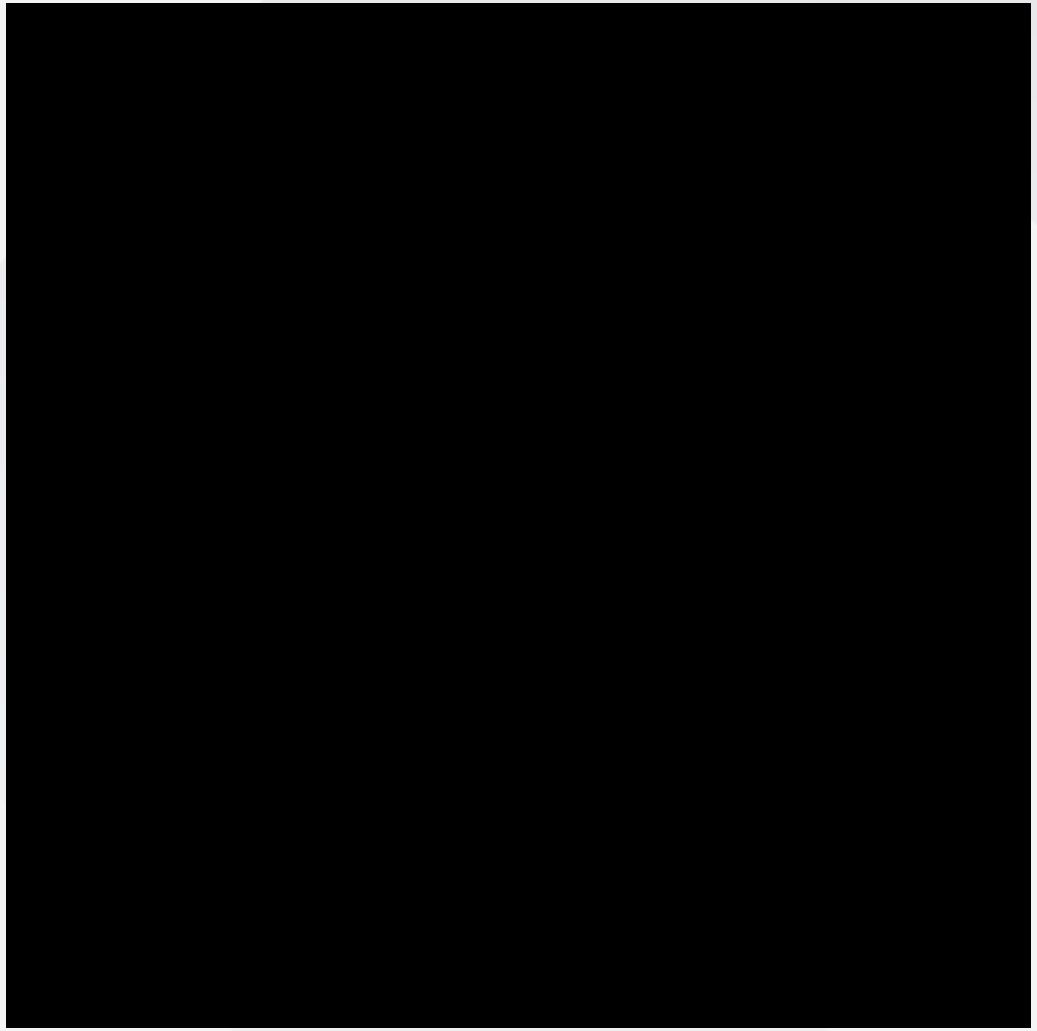
77 year old male, DES LCA 1.5 years before – post lesion preparation

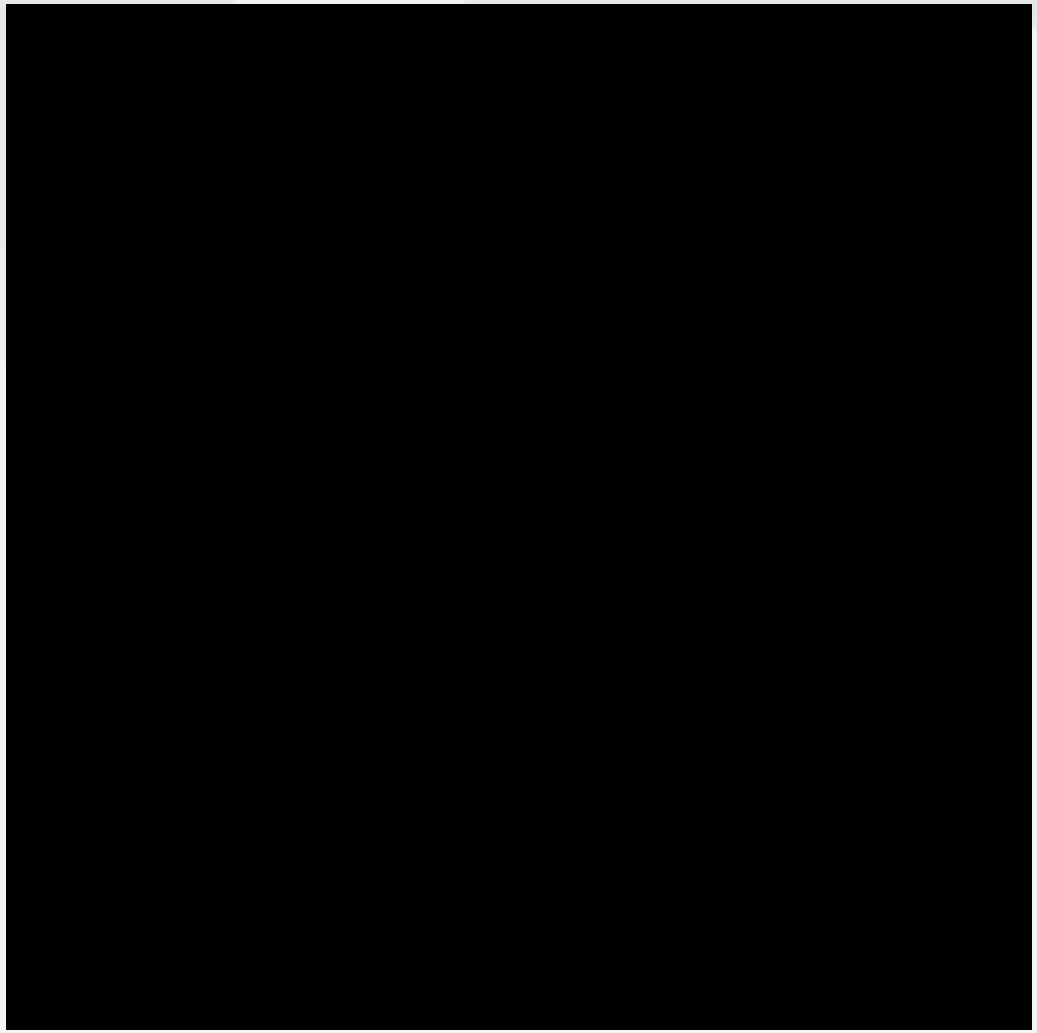






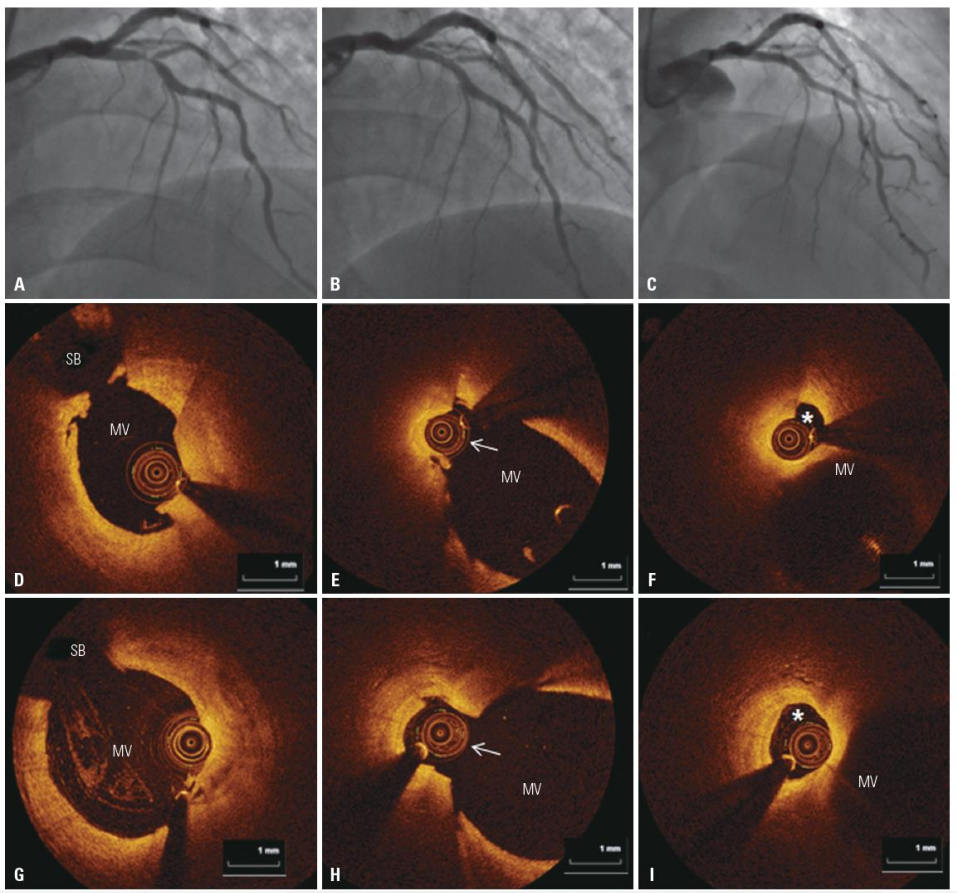
77 year old male, DES LCA 1.5 years before – final result and 3 years follow-up





Serial Morphological Changes of Side-Branch Ostium after Paclitaxel-Coated Balloon Treatment of *De Novo* Coronary Lesions of Main Vessels

Ae-Young Her[1], Soe Hee Ann[2], Gillian Balbir Singh[2], Yong Hoon Kim[1], Takayuki Okamura[3], Scot Garg[4], Bon-Kwon Koo[5], and Eun-Seok Shin[2]



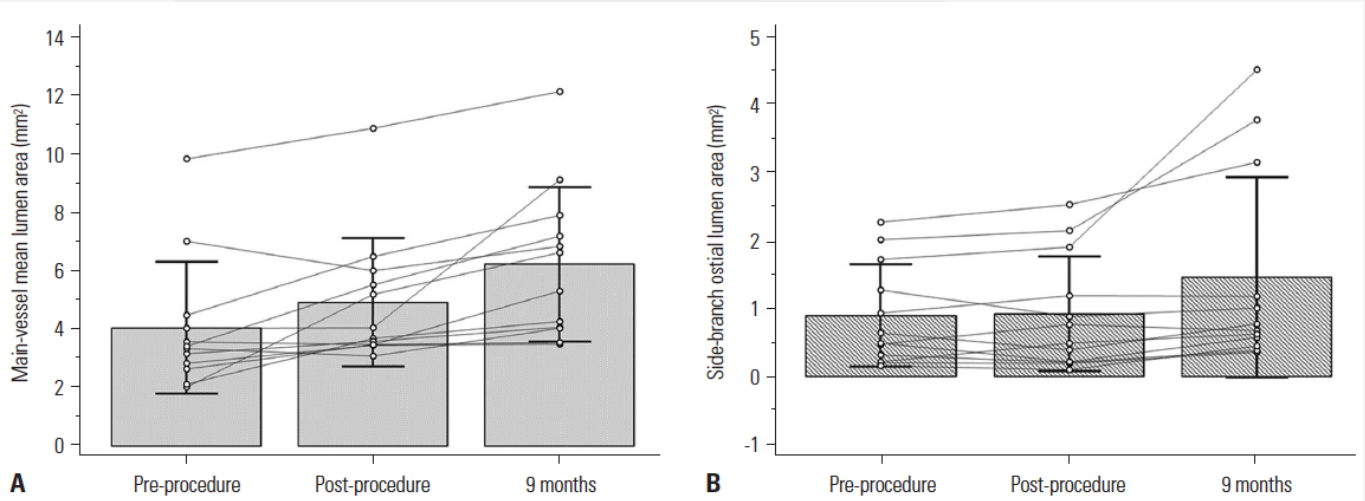
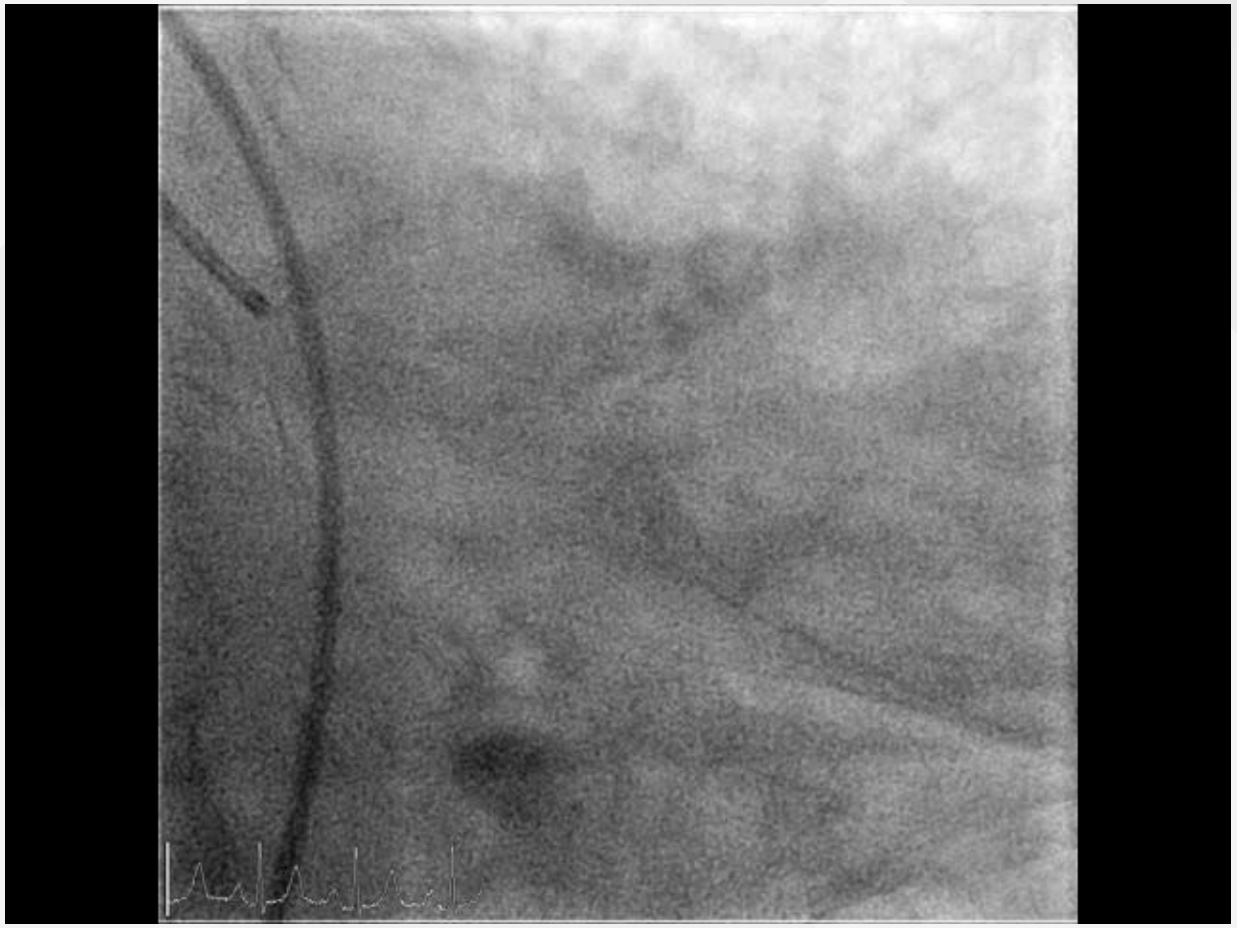
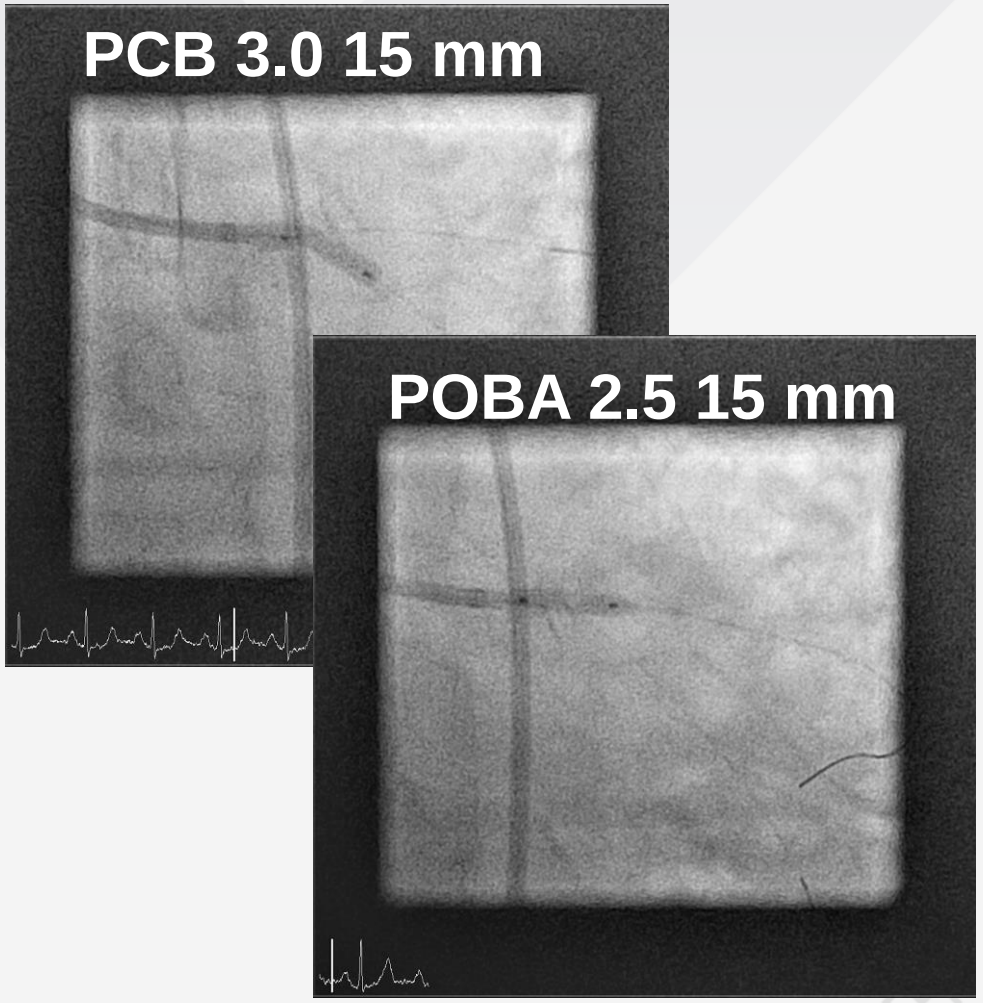


Fig. 4. The changes in the main vessel lumen area (A) and the SB ostial lumen area (B) pre-procedure, post-procedure and at 9-months follow-up. SB, side-branch.

Yonsei Med J 2016 May; 57(3): 606-613

50 year old female, 2015 DES LCA, 09/2018 unstable angina





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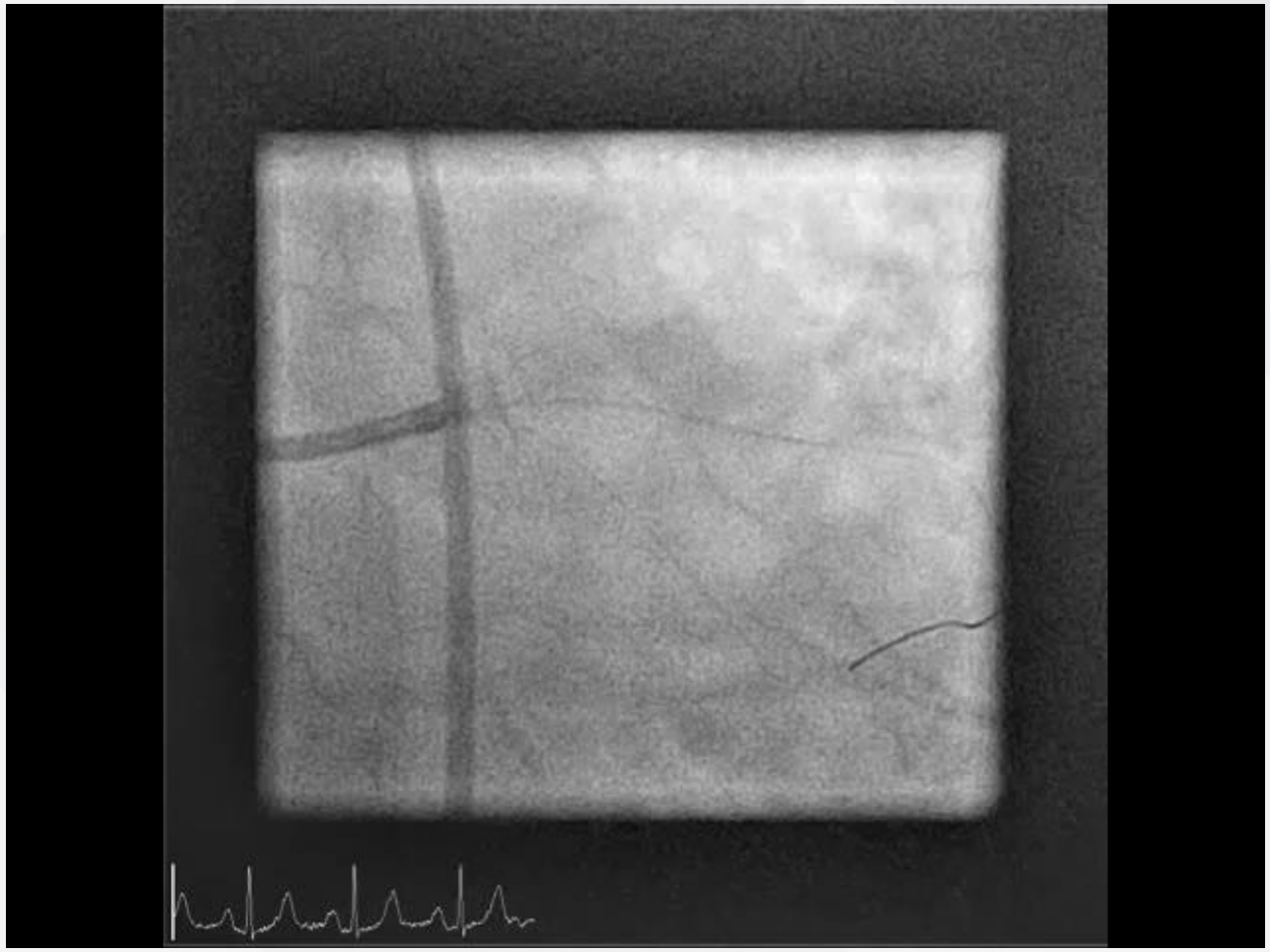

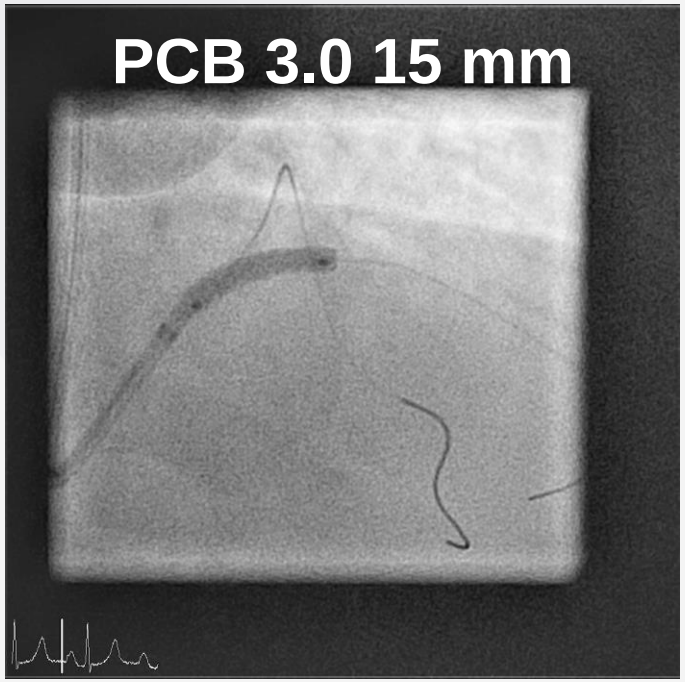

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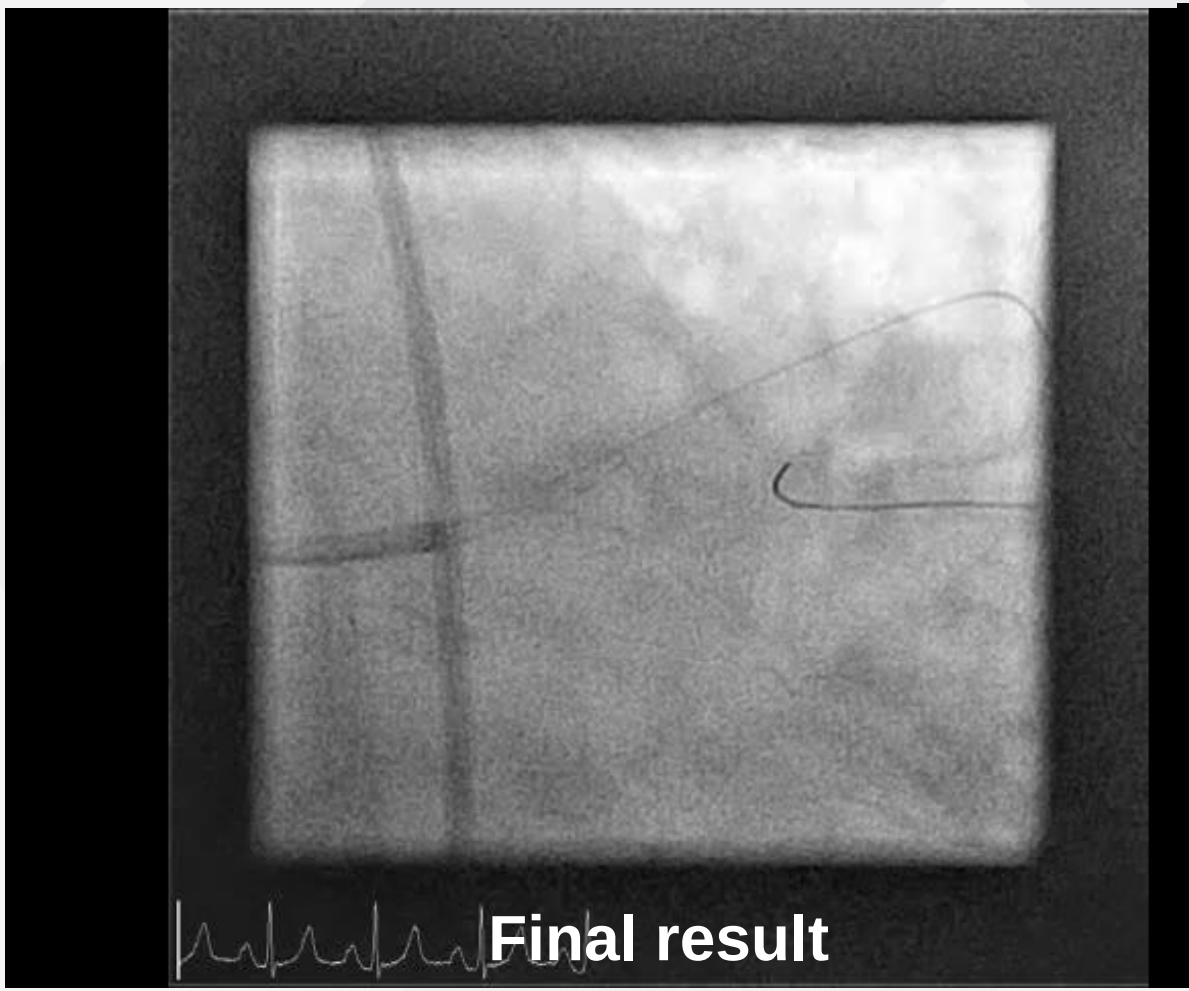
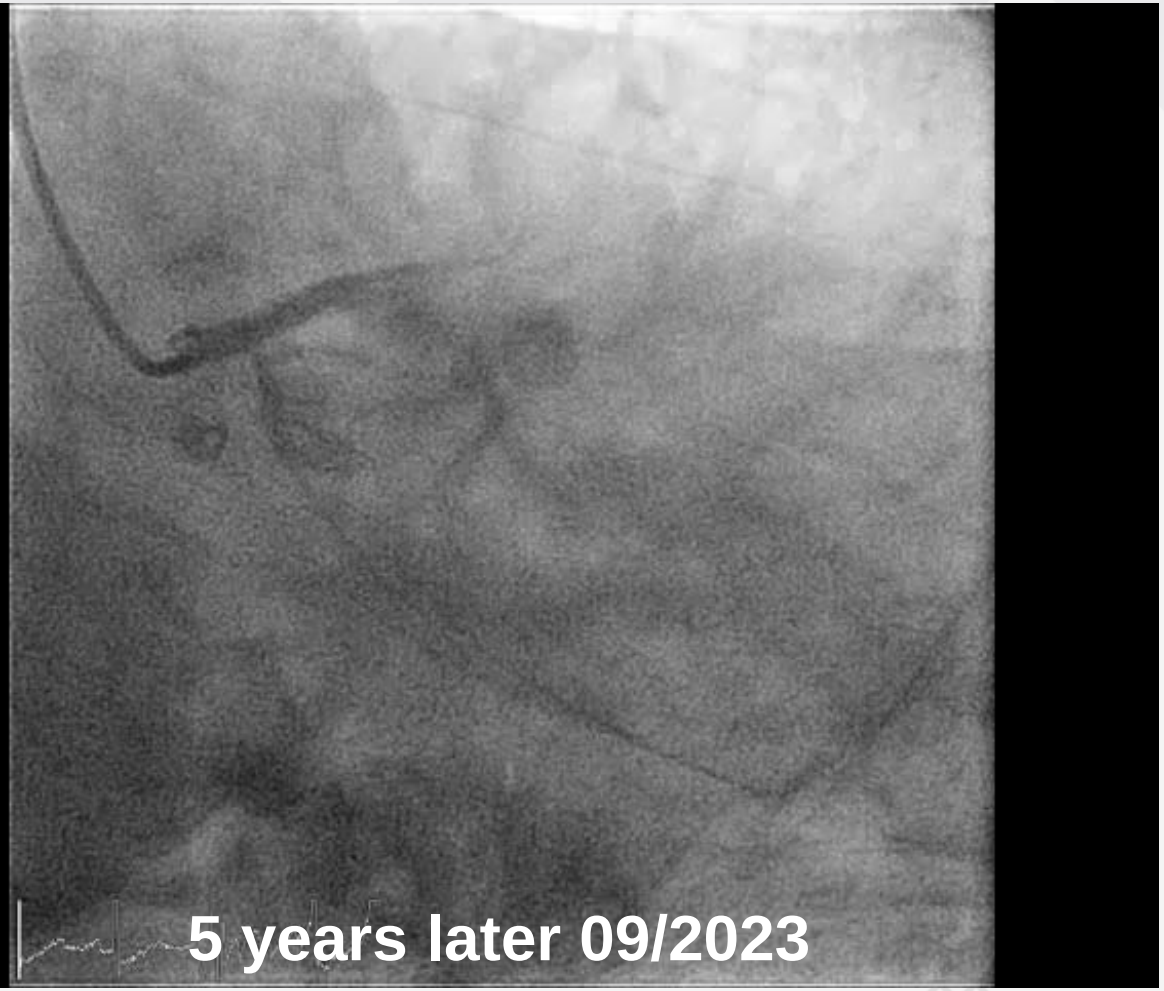
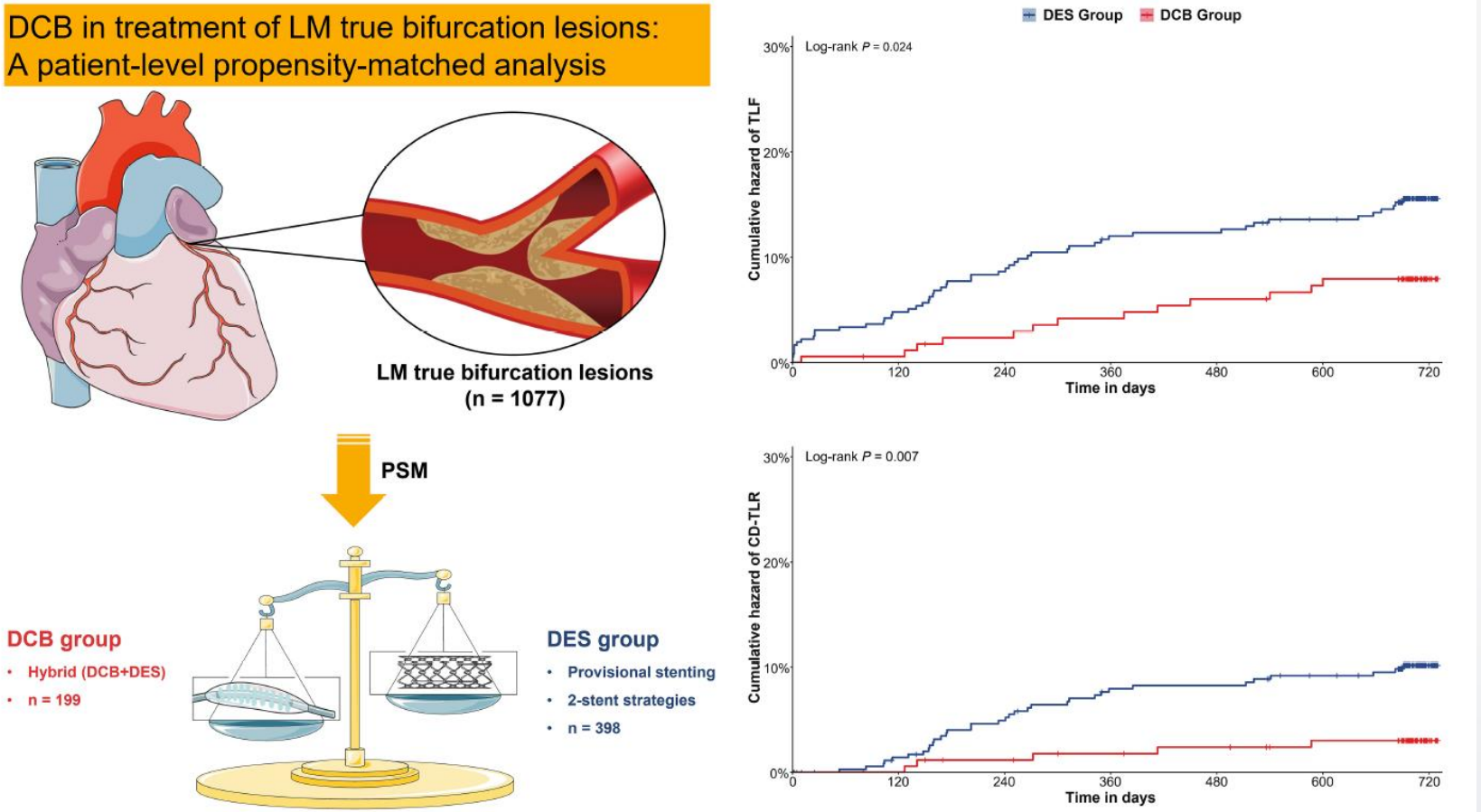




Drug-coated balloon in the treatment of coronary left main true bifurcation lesion: A patient-level propensity-matched analysis



GRAPHICAL ABSTRACT

DCB, drug-coated balloon; LM, left main; PSM, propensity score matching; DES, drug-eluting stent; TLF, target lesion failure; CD-TLR, clinically driven target lesion revascularization.

Front. Cardiovasc. Med. 2022; 9:1028007

Drug-coated balloon-only strategy for percutaneous coronary intervention of *de novo* left main coronary artery disease: the importance of proper lesion preparation

Sanna Uskela (✉)[1], Antti Eranti[1], Jussi M. Kärkkäinen[2], Tuomas T. Rissanen[2]

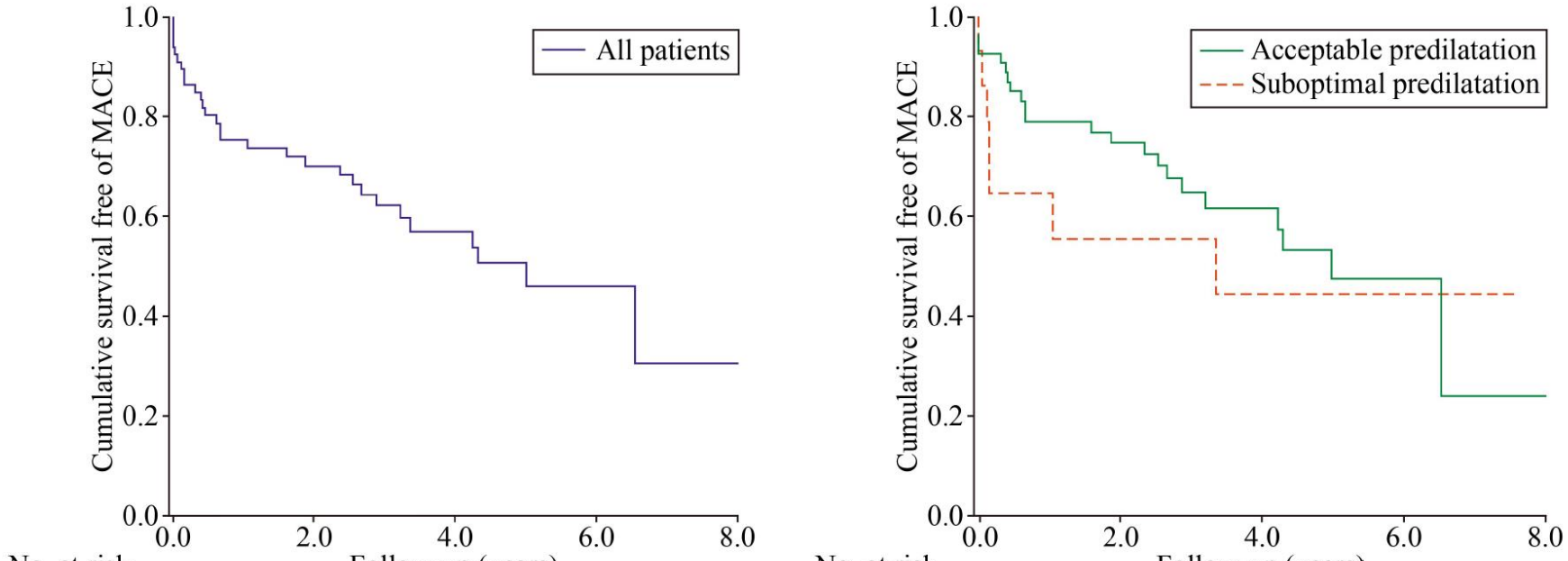


Fig. 2 Kaplan–Meier plots for survival free of MACE in all patients, and according to the predilatation result.

Drug-eluting balloon: Very short-term exposure and overlapping

Bodo Cremers[1]; Ulrich Speck[2]; Nicola Kaufels[2]; Dirk Mahnkopf[3]; Michael Kühler[4]; Michael Böhm[1]; Bruno Scheller[1]

[1]University of Saarland, Homburg/Saar, Department of Internal Medicine III, Germany; [2]Humboldt University Berlin, Campus Charité Mitte, Department of Radiology, Germany; [3]IMTM GmbH, Immune Technologies & Medicine, Rottmersleben, Germany; [4]B. Braun Melsungen AG, Vascular Systems, Berlin, Germany

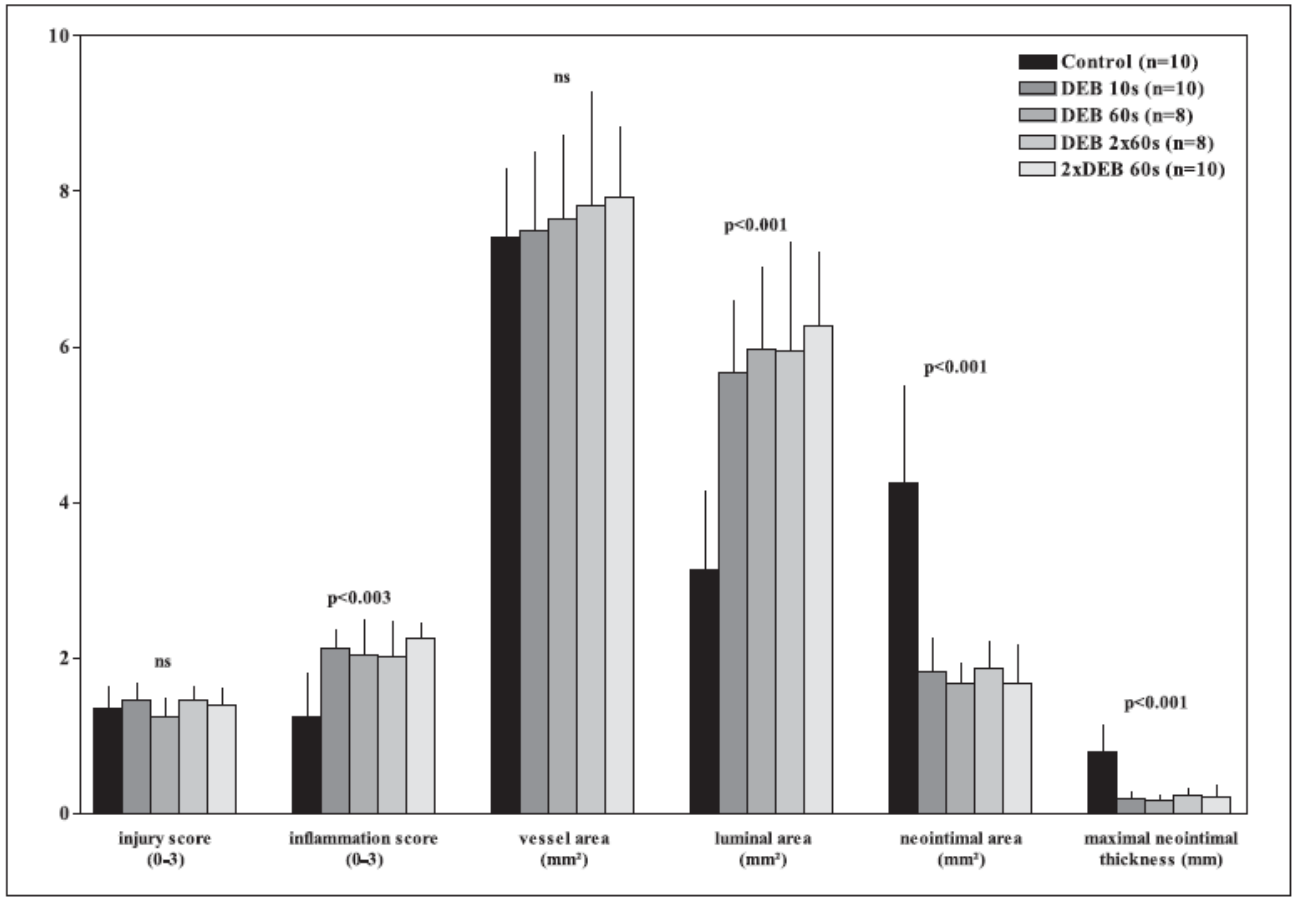
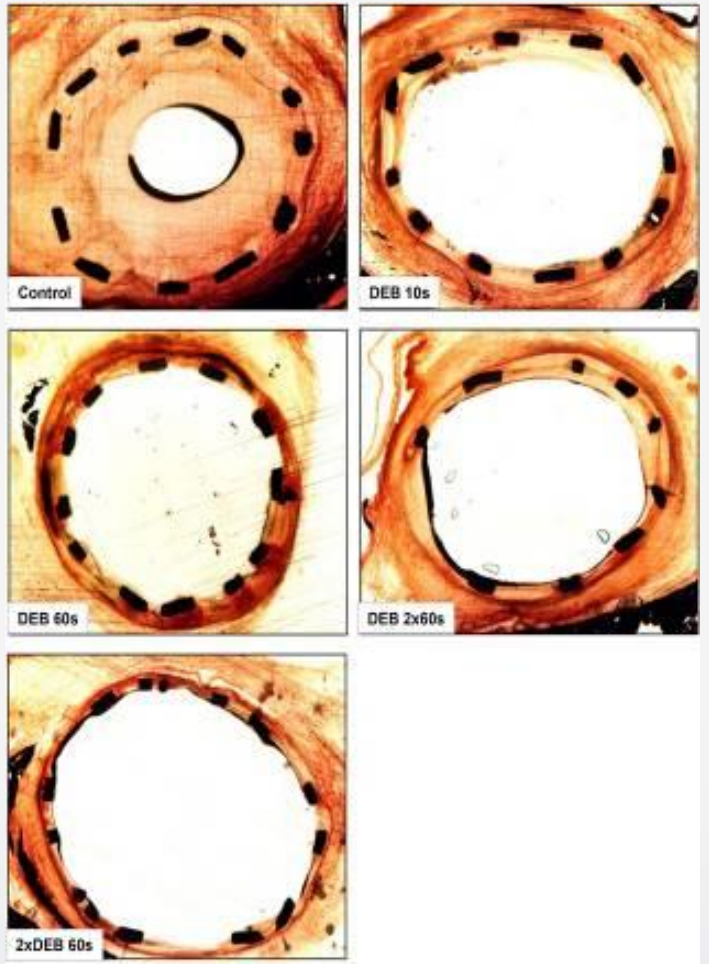


Figure 1: Results of histomorphometry of stented porcine coronary arteries after 28 days. Implantation of bare metal stents using conventional PTCA catheters and paclitaxel-coated PTCA catheters. Abbreviations are as defined in text. Values are mean ± SD.



Thromb Haem 2009; 101: 201-6

DCB for left main ISR

- DCB as first treatment does not limit future options
- Disadvantage in angiographic outcomes and especially TLR related to quality of lesion preparation
- Reduced need for prolonged dual antiplatelet therapy
- Repeatability of the procedure
- Potential long-term benefit on hard clinical endpoints