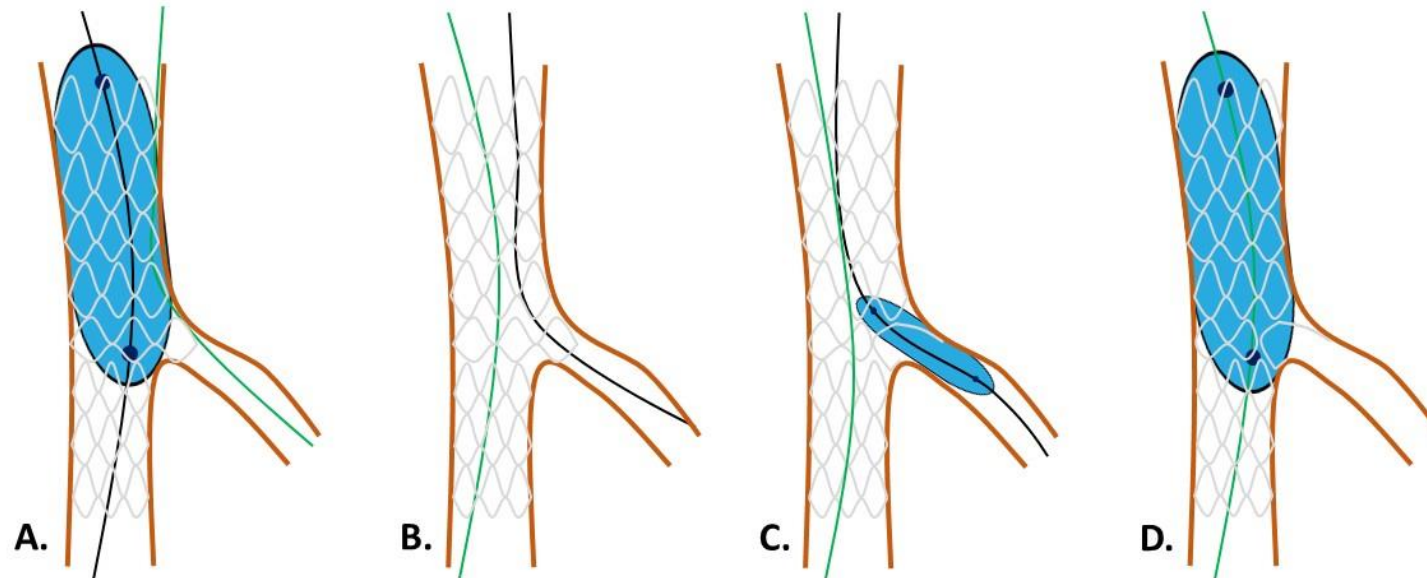


# Quel Rationnel Pour le POT-SIDE-POT?

R. Cherradi CMCV Clinique AGDAL RABAT



EuroIntervention. 2018 Feb 2;13(15):e1804-e1811

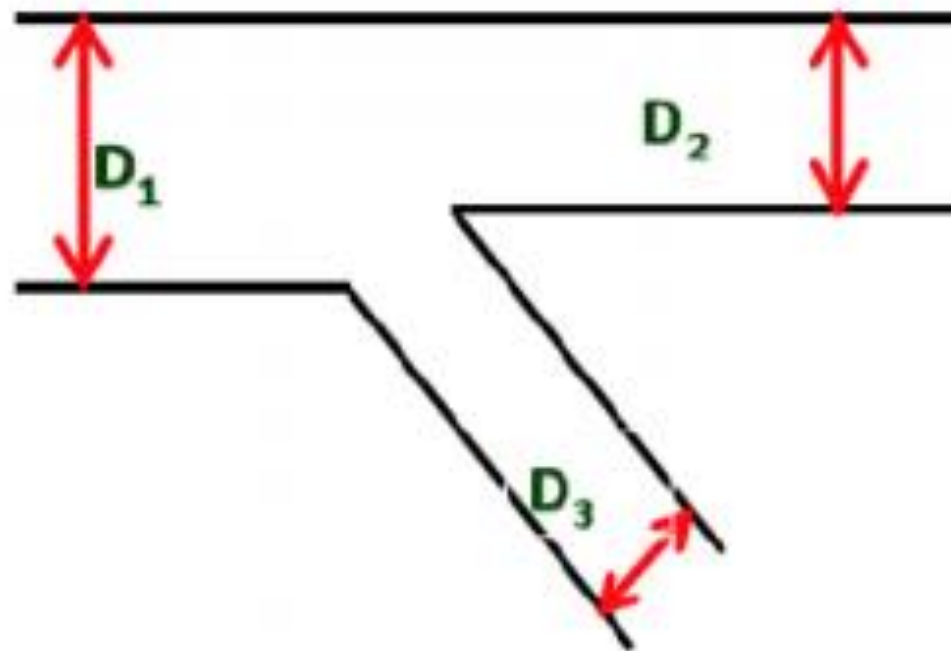
# DÉCLARATION DE LIENS D'INTÉRÊT AVEC LA PRÉSENTATION

**Intervenant : Rhizlan CHERRADI, Rabat**

Je n'ai pas de lien d'intérêt à déclarer

### Finet's law

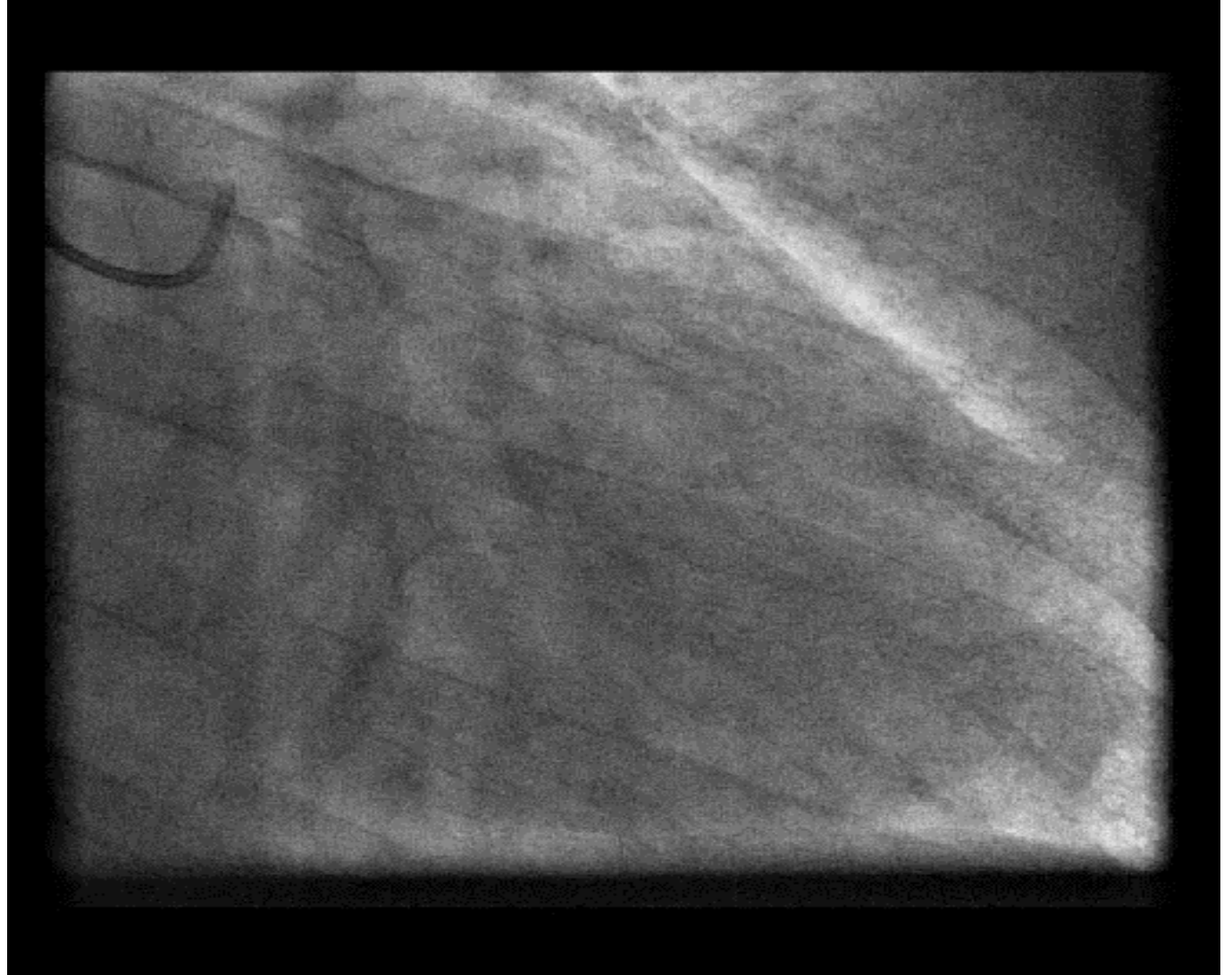
$$D_1 = 0.678 (D_2 + D_3)$$



$$D_1^3 = D_2^3 + D_3^3 \text{ (Murray's law)}$$

# Cas Clinique

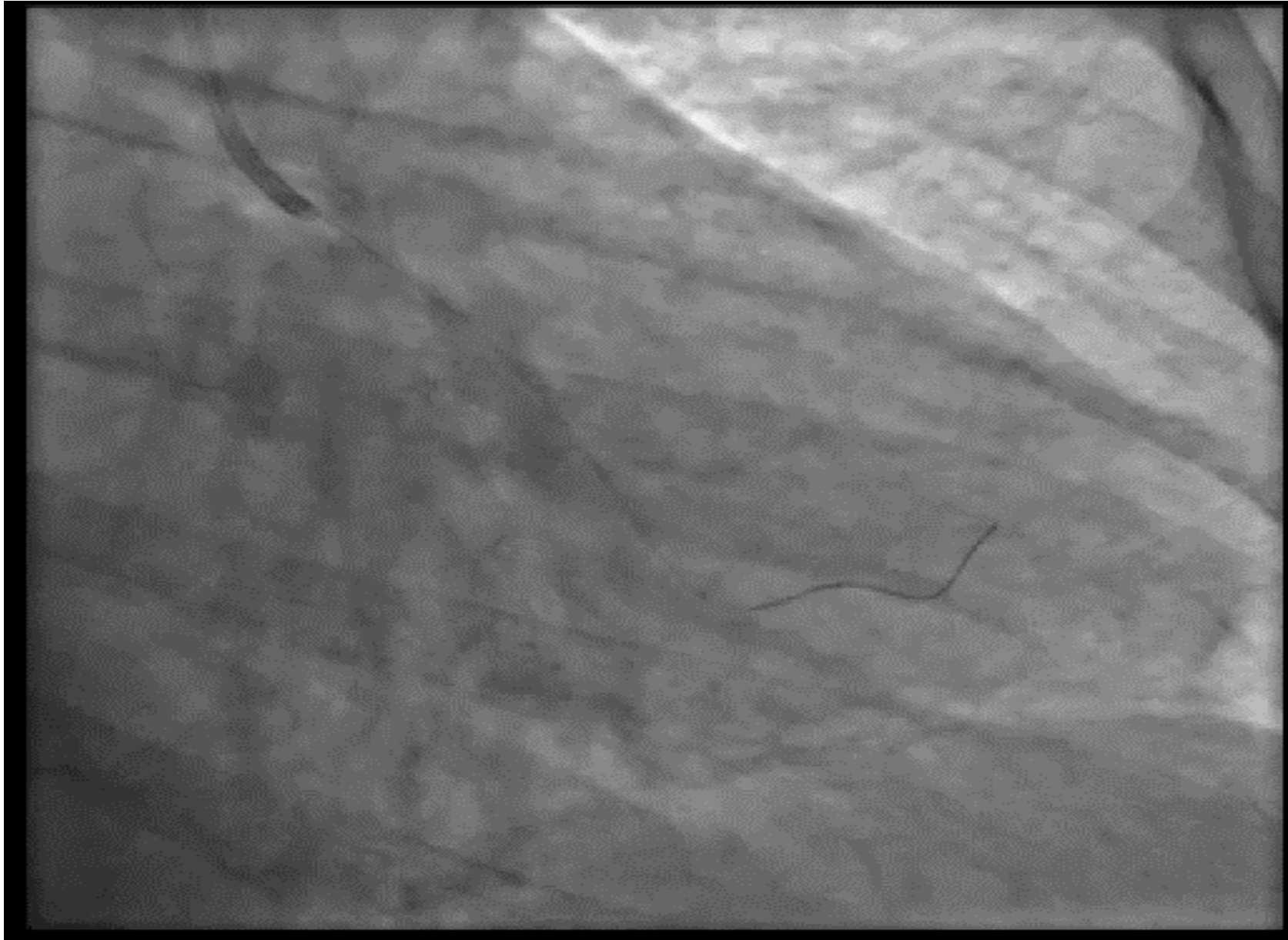
- **Mr AB 61 ans**
- **HTA, Diabète NID et dyslipidémie**
- **Angor d'effort depuis qlq mois**
- **ECG et ETT: RAS**

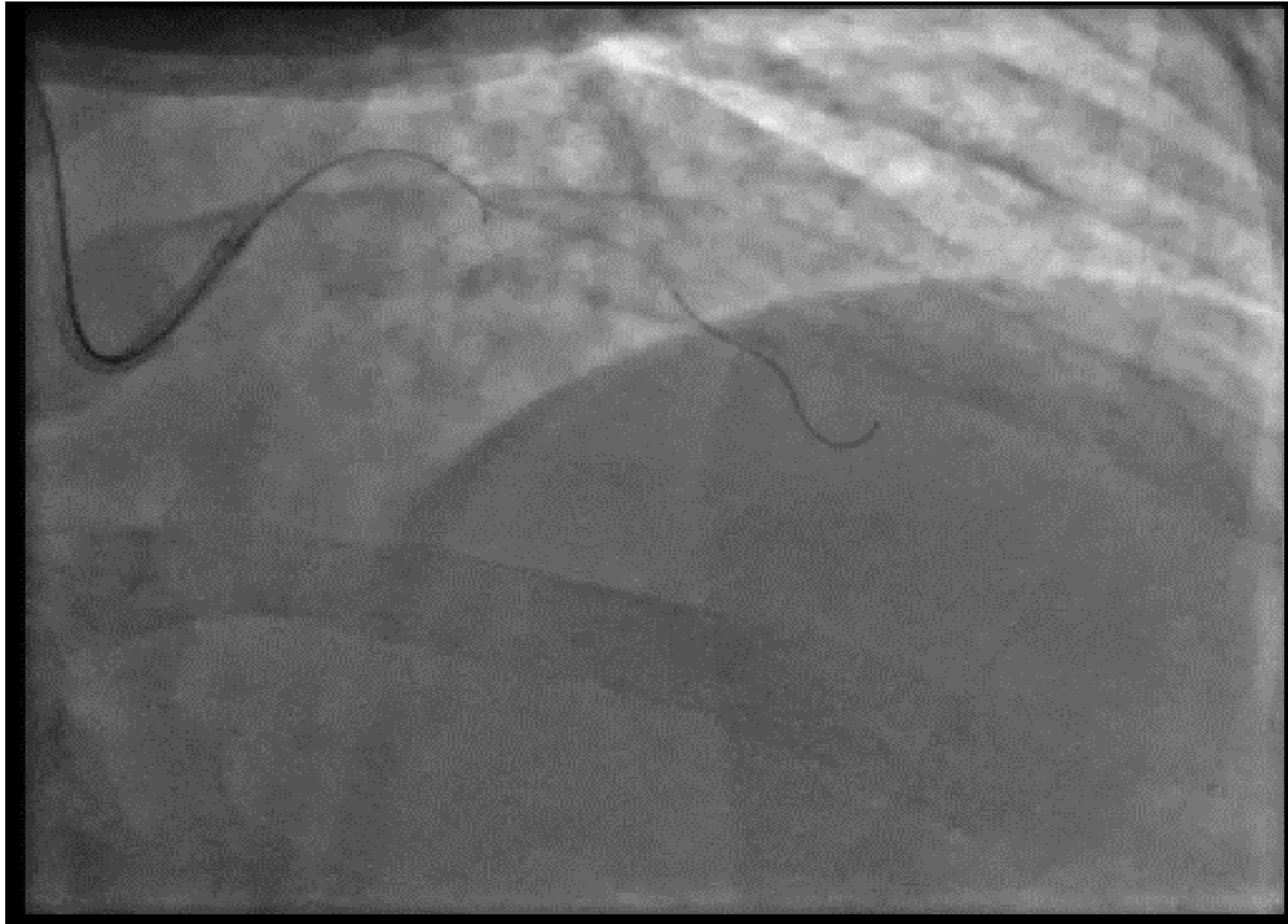






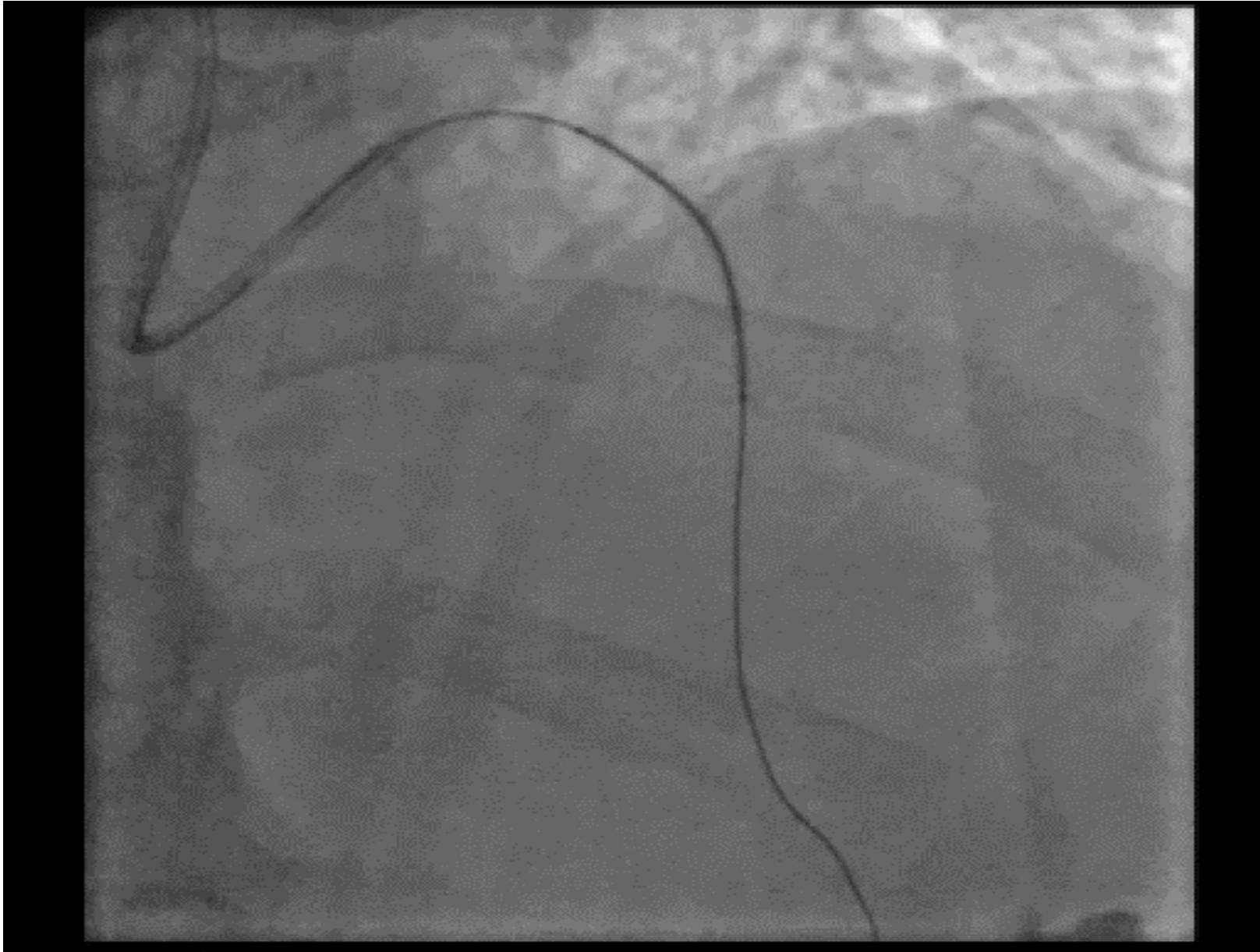


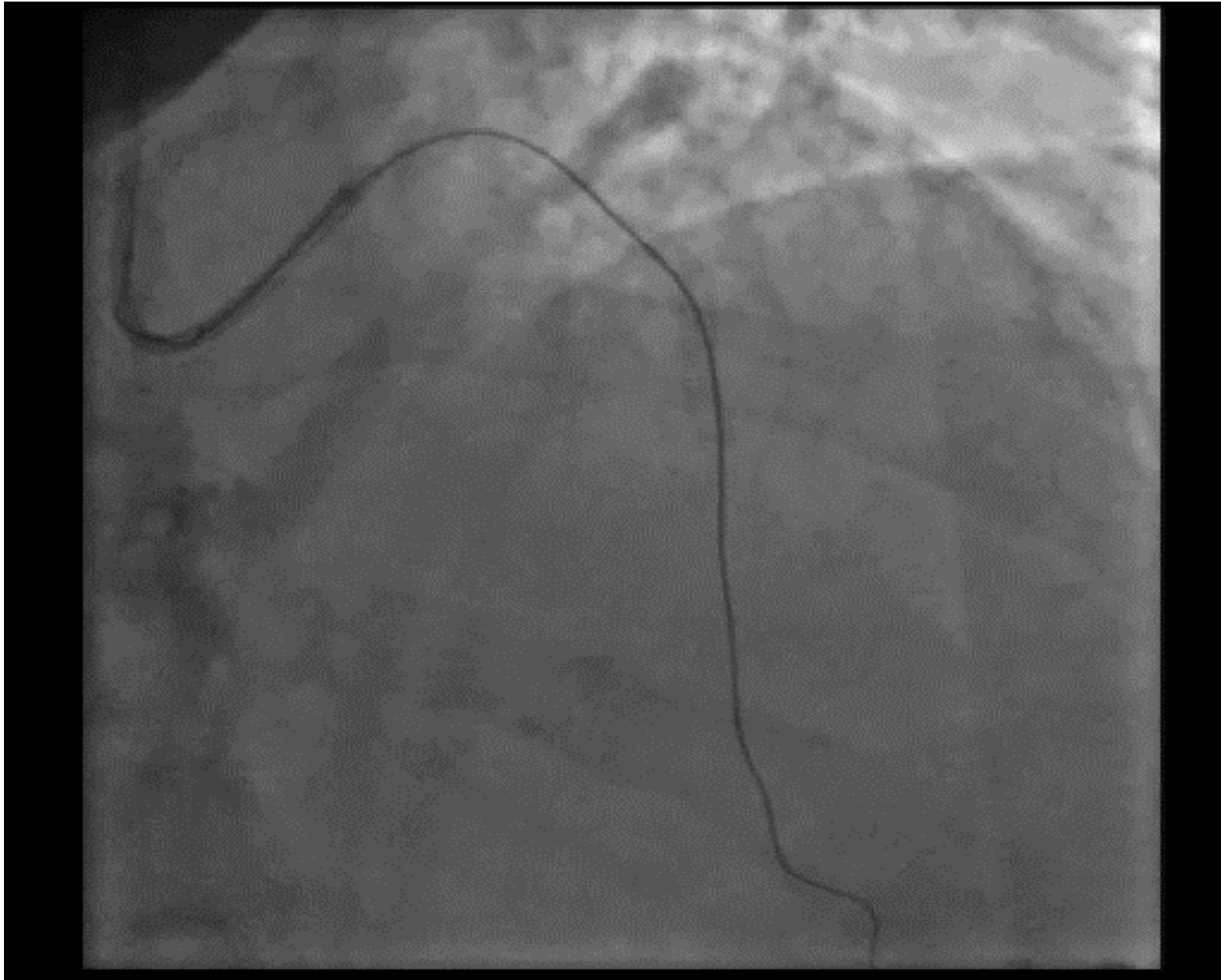


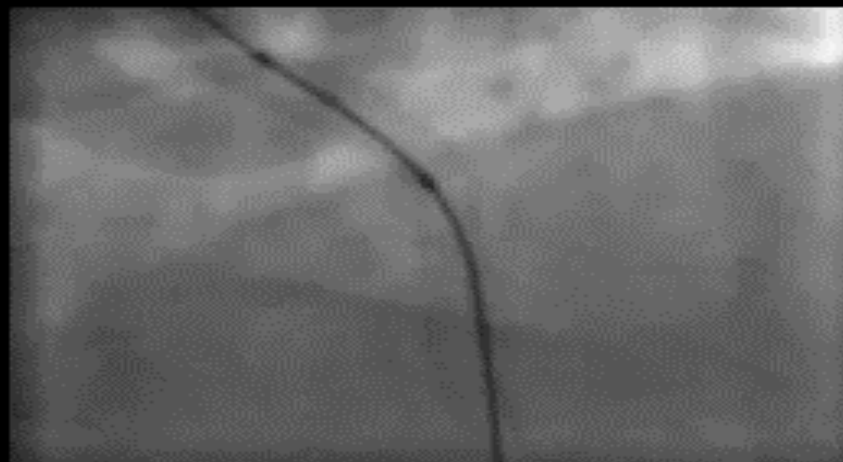


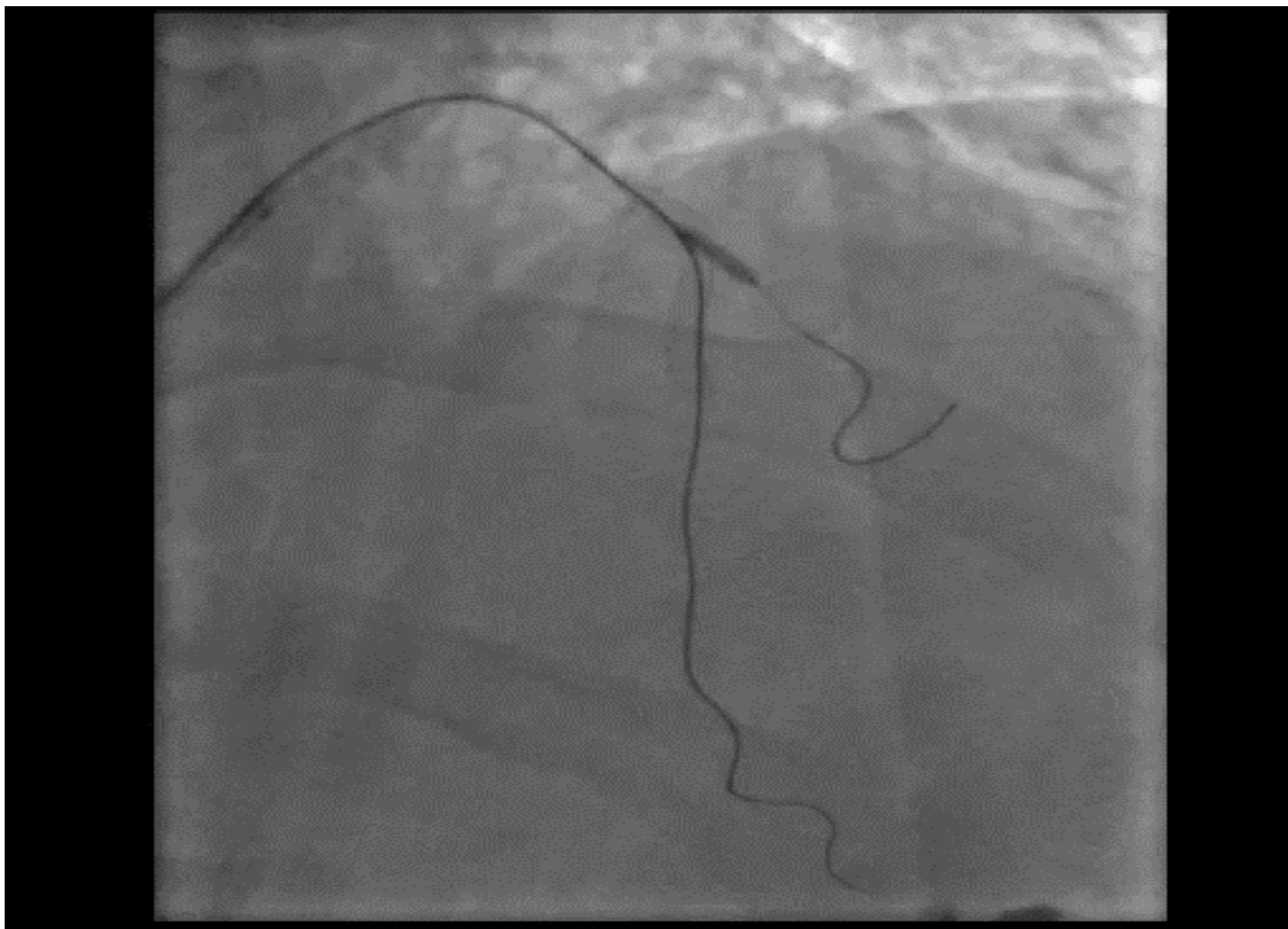


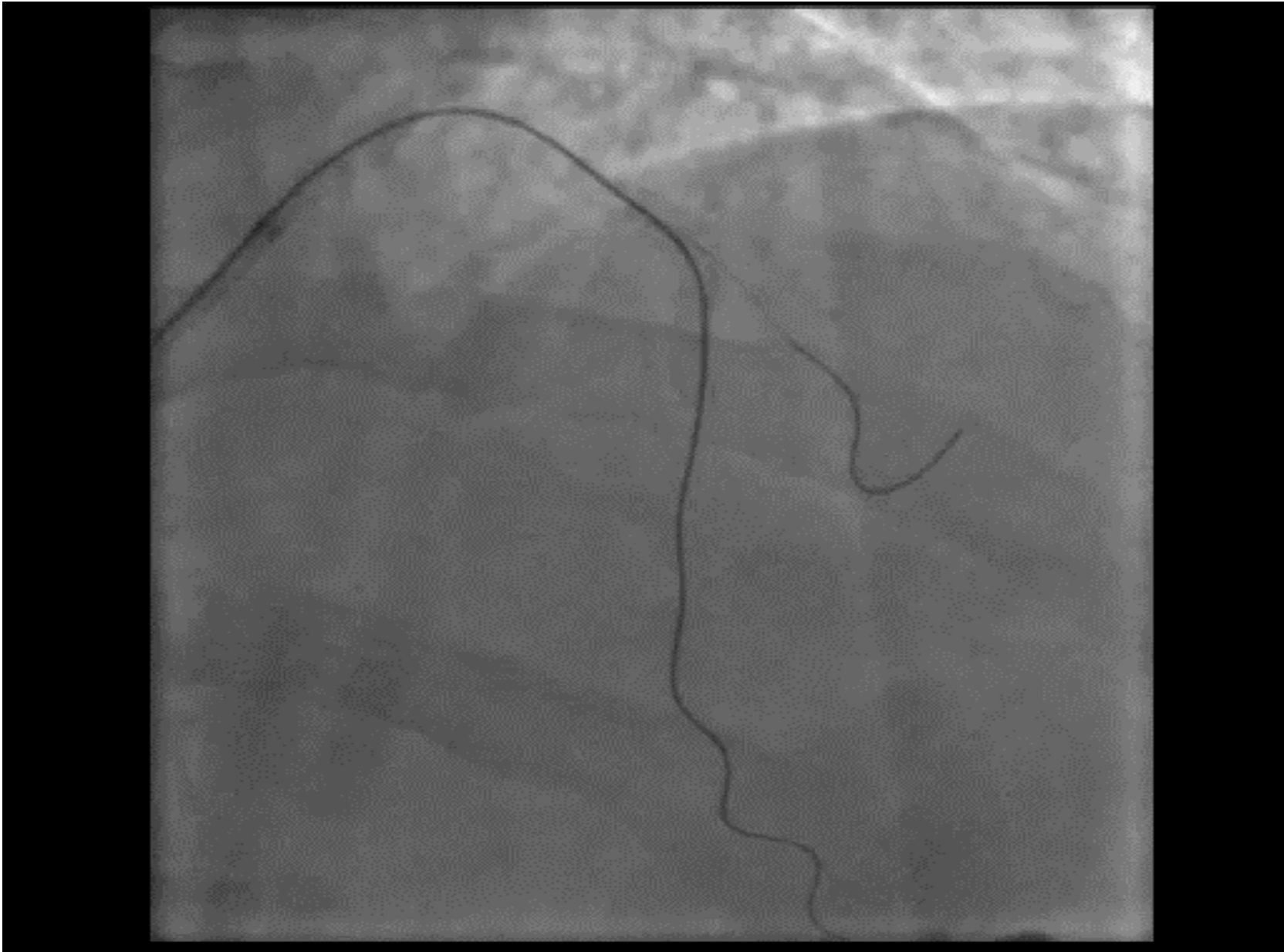
Stent 3.0x34 mm



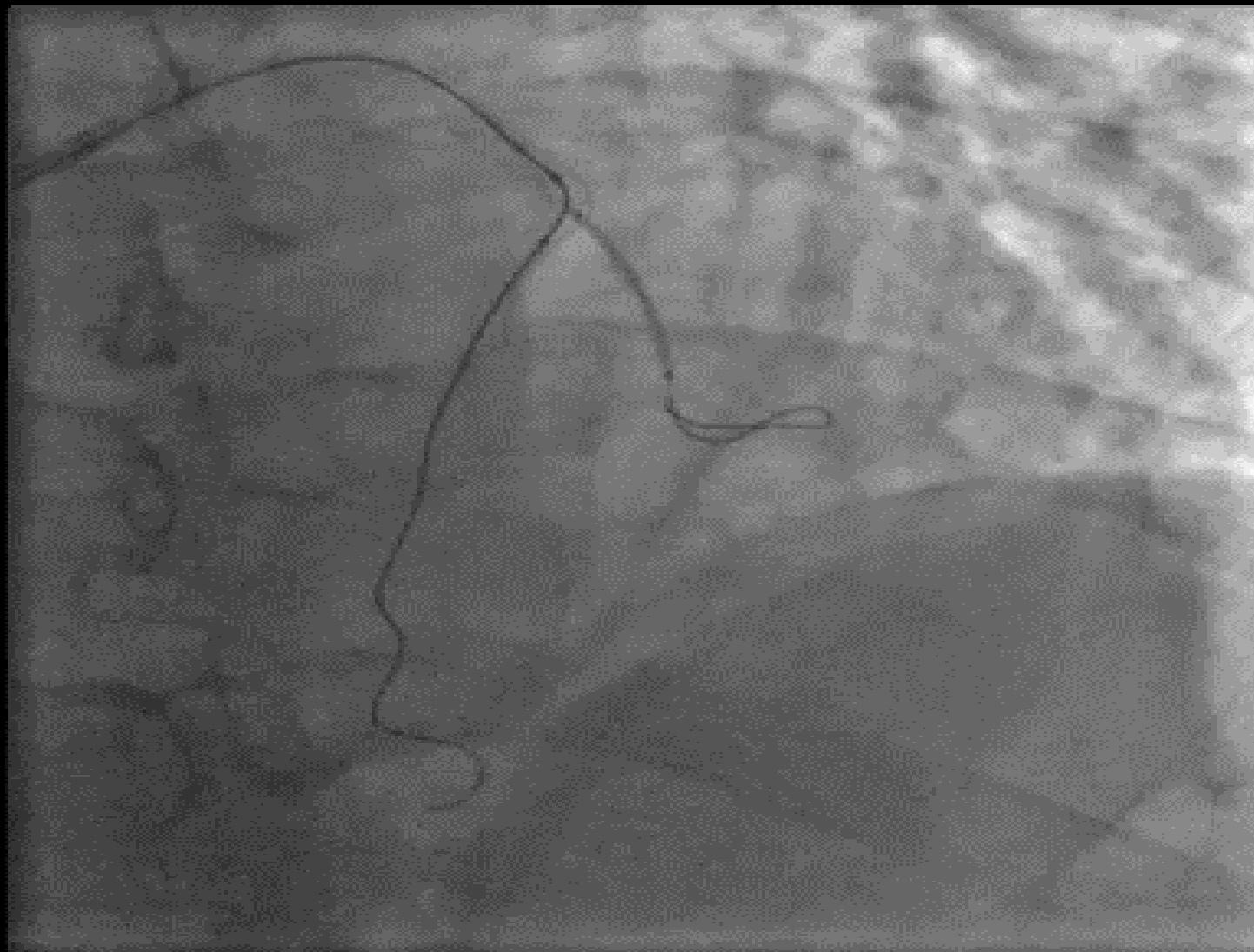




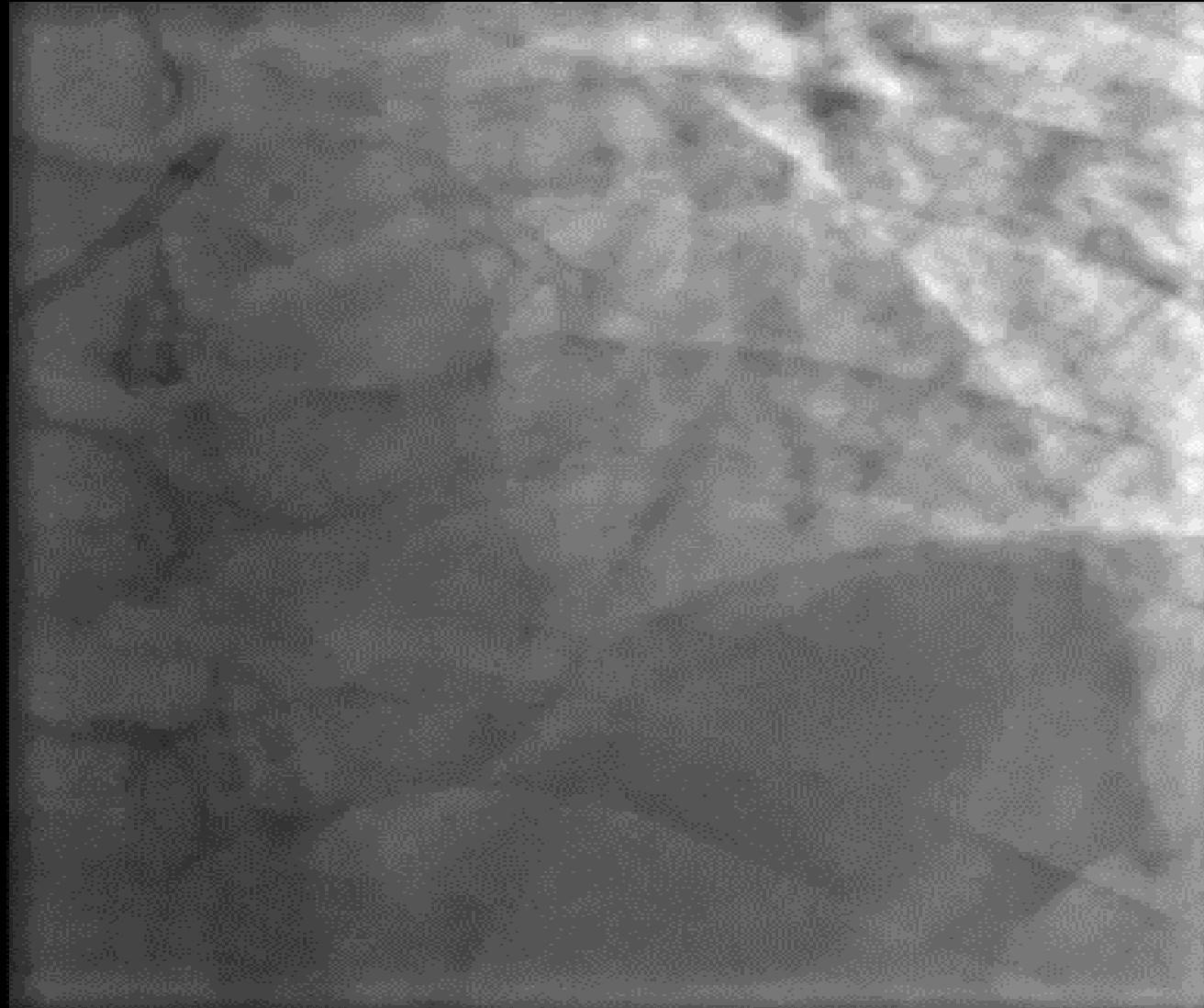




Stent 2,5x22mm

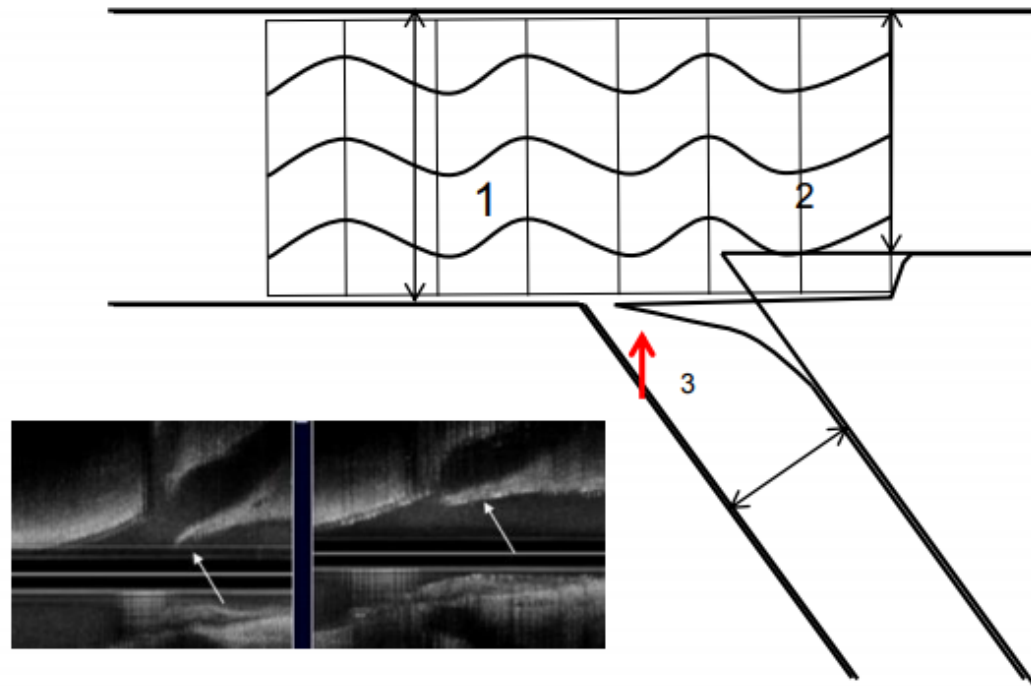






# Stent sizing in provisional technique

Que s'est-il passé?

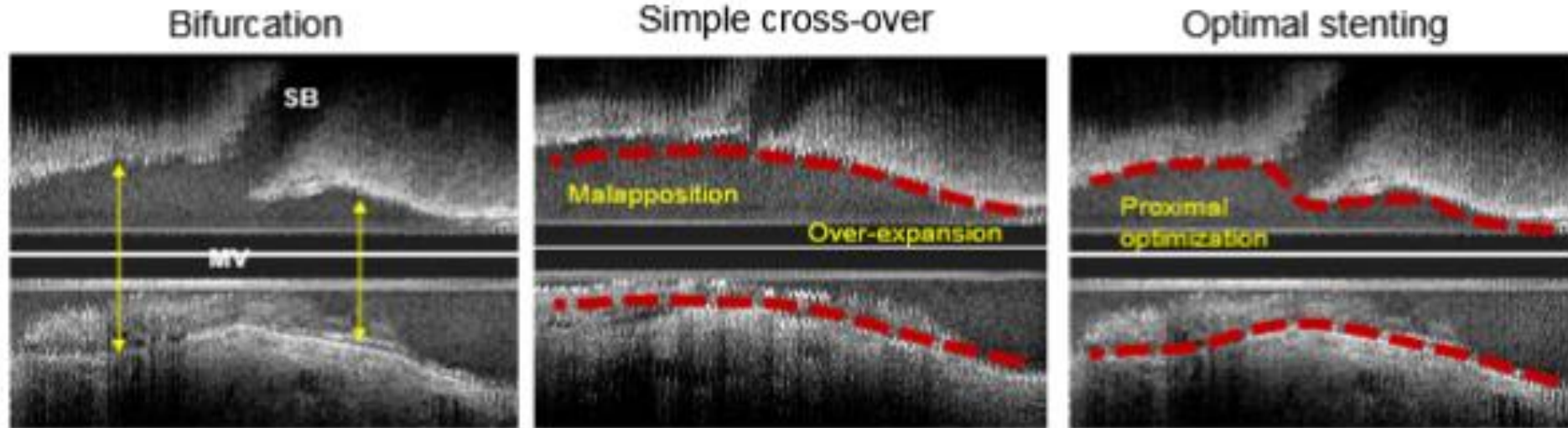


***$D_2$  has to be reference stent choice diameter***

## Vessel size relationship

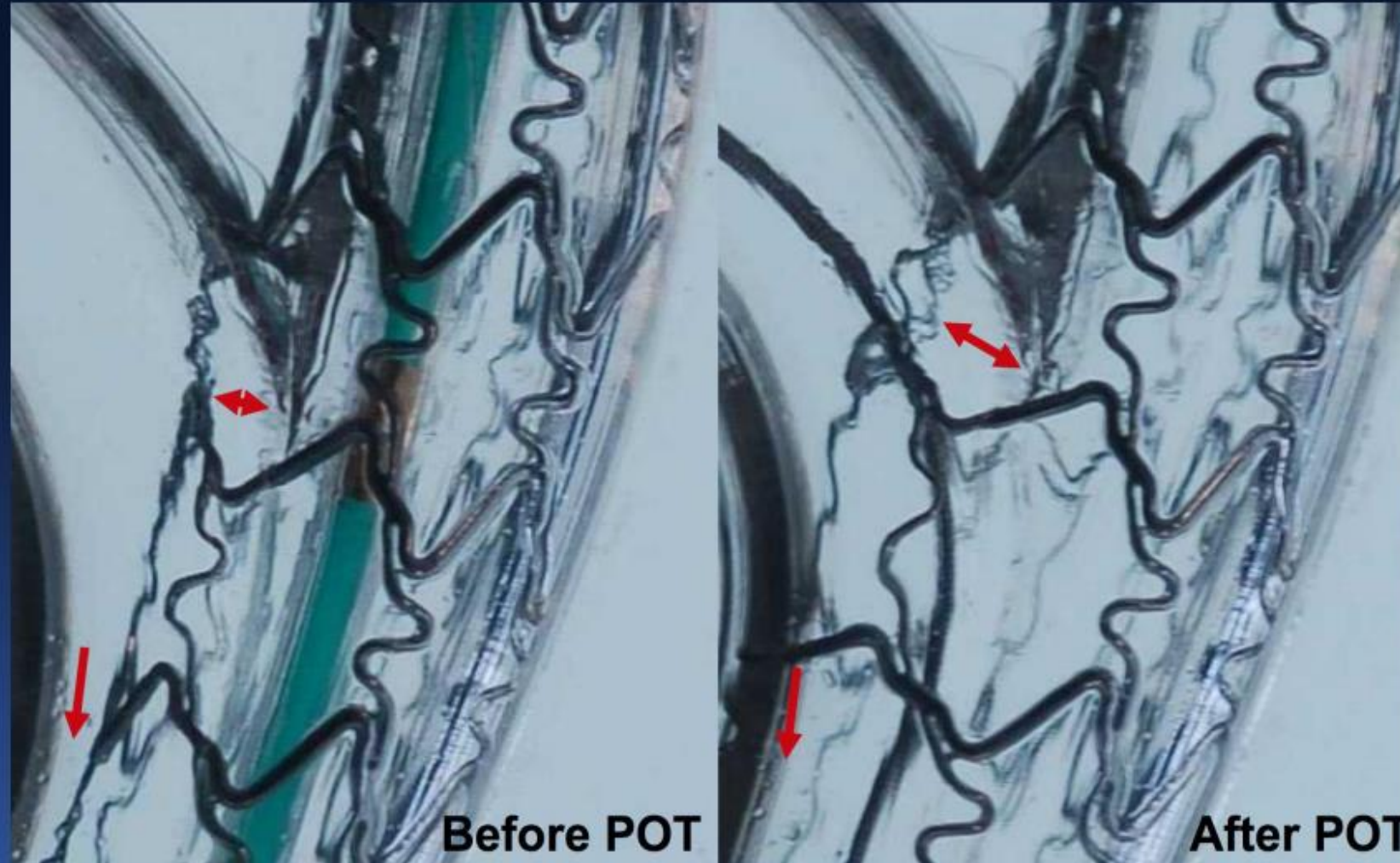
### Inferences

- 1) Simple cross-over will end up with proximal malapposition and distal over-expansion
- 2) For optimal stenting, we need proximal optimization after stenting sized to distal MV



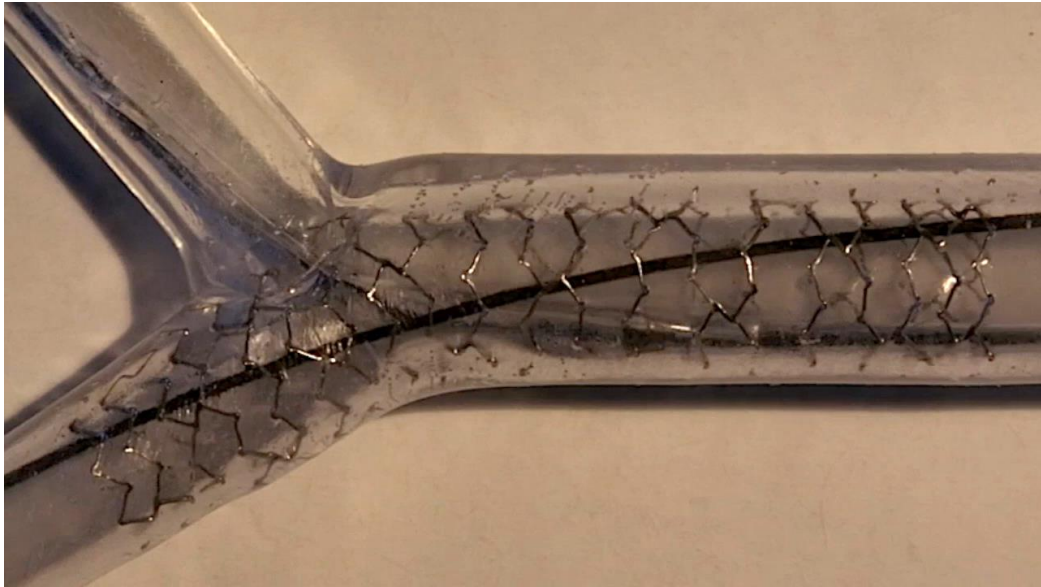
MV = main vessel, SB = side branch

# POT: Facilitate distal crossing

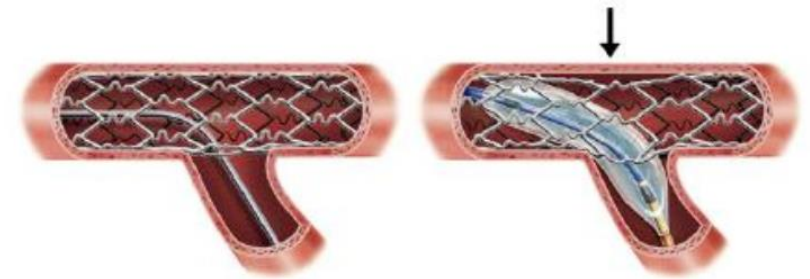




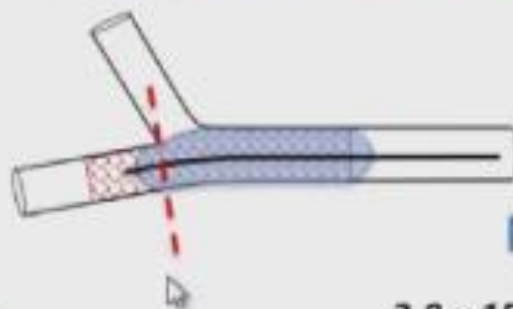
# The re-POT sequence



SB fenestration → Stent distortion → need for KBT



# What balloon positioning for POT ?



## Compliant Balloons

3.0 x 15 mm *TREK™* (Abbott)



3.0 x 15 mm *Maverick™* (Boston)



3.0 x 15 mm *Euphora™* (Medtronic)



3.0 x 15 mm *Hityu™* (Terumo)



distal

## Non-compliant Balloons

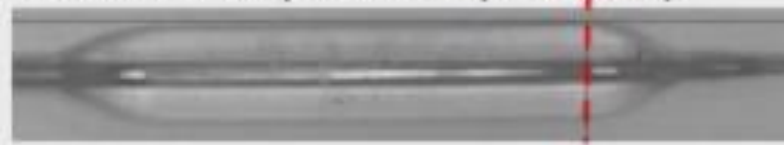
3.0 x 15 mm *TREK NC™* (Abbott)



3.0 x 15 mm *Emerge™* (Boston)



3.0 x 15 mm *Euphora NC™* (Medtronic)



3.0 x 15 mm *Accuforce™* (Terumo)



Courtesy Dr G Finet



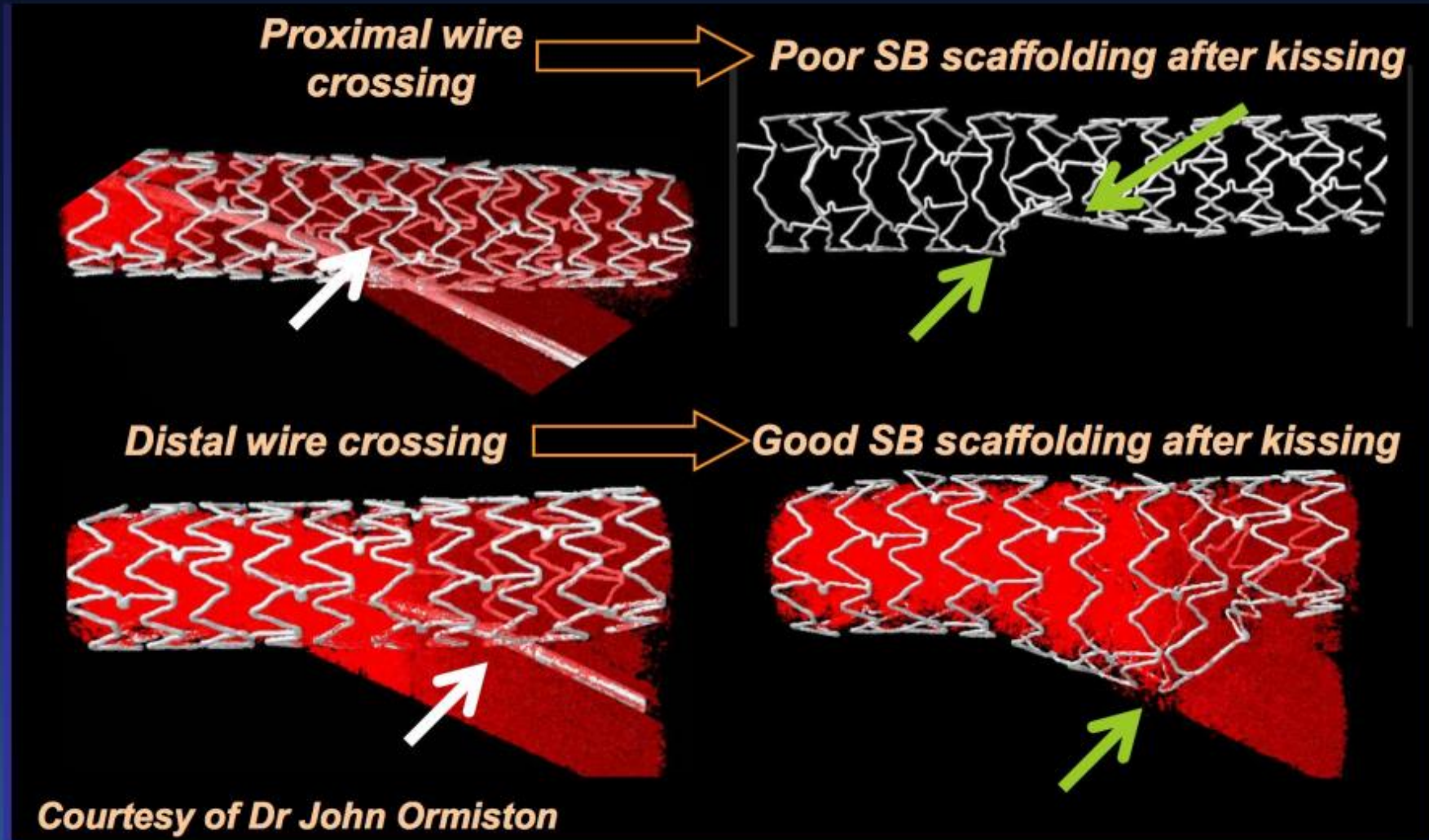
# Understanding Stent Designs



|      | Synergy                                  | Xpedition                             | Res. Onyx                                | Ultimaster                            | BioMatrix A                           | Orsiro                                |
|------|--|---------------------------------------|--|---------------------------------------|---------------------------------------|---------------------------------------|
| 2.25 | Small vessel (8 crowns, 2-4 connectors)  | Small vessel (6 crowns, 3 connectors) | Small vessel (6.5 crowns, 2 connectors)  | Small vessel (8 crowns, 2 connectors) | Small vessel (6 crowns, 2 connectors) | Small vessel (6 crowns, 3 connectors) |
| 2.50 |  |                                       |  |                                       |                                       |                                       |
| 2.75 |  |                                       | Medium vessel (8.5 crowns, 2 connectors) |                                       |                                       |                                       |
| 3.00 | Workhorse(8 crowns, 2-4 connectors)      | 4.1mm                                 |  |                                       |                                       |                                       |
| 3.50 |  |                                       | Large vessel (9 crowns, 3 connectors)    | Large vessel (8 crowns, 2 connectors) | Large vessel (9 crowns, 3 connectors) | Large vessel (6 crowns, 3 connectors) |
| 4.00 | Large vessel (10 crowns, 2-5 connectors) |                                       |  |                                       |                                       |                                       |
| 4.50 | 5.7                                      | 5.6                                   | 5.6                                      | 5.8                                   | 5.9                                   | 5.3                                   |
| 5.00 |  |                                       | 6.0                                      |                                       |                                       |                                       |

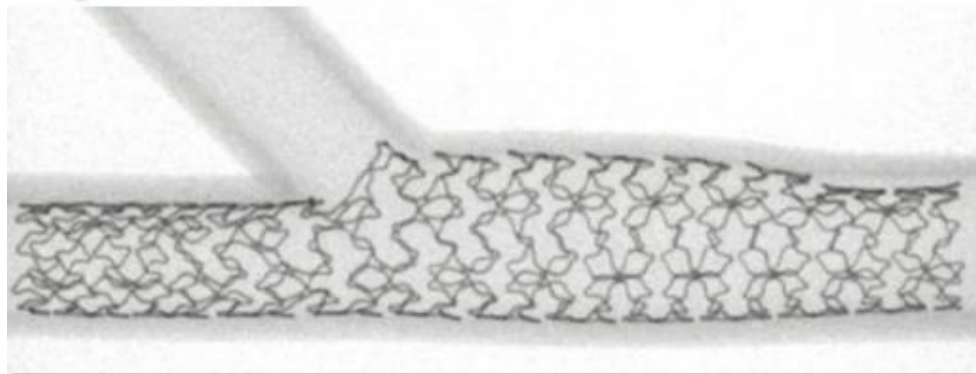
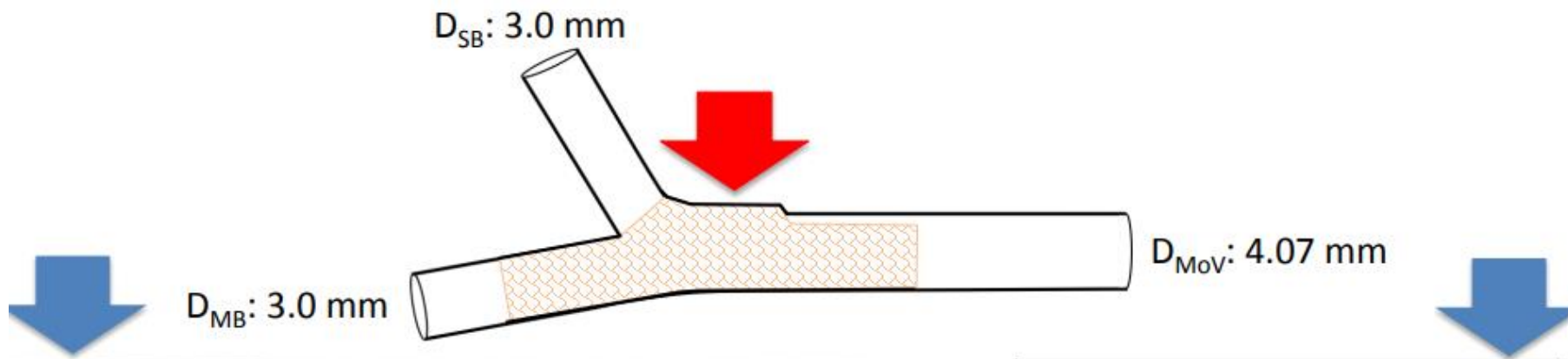
|                     | OVEREXPANSION WITH 6.0mm SC at 14 ATM | CROSS-SECTION |
|---------------------|---------------------------------------|---------------|
| Synergy             |                                       |               |
| Xience Xpedition    |                                       |               |
| Orsiro              |                                       |               |
| Ultimaster          |                                       |               |
| Resolute Onyx       |                                       |               |
| BioMatrix A. Chroma |                                       |               |

# POT: Faciliate distal crossing

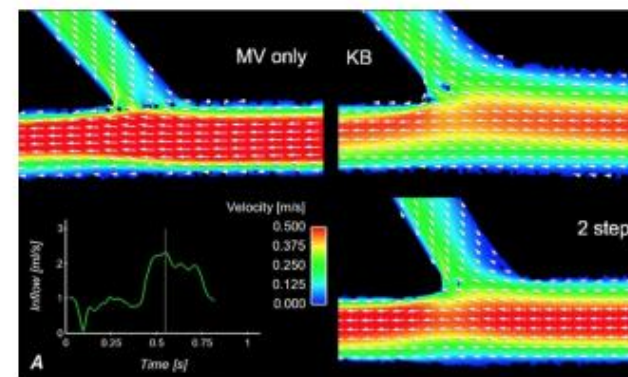
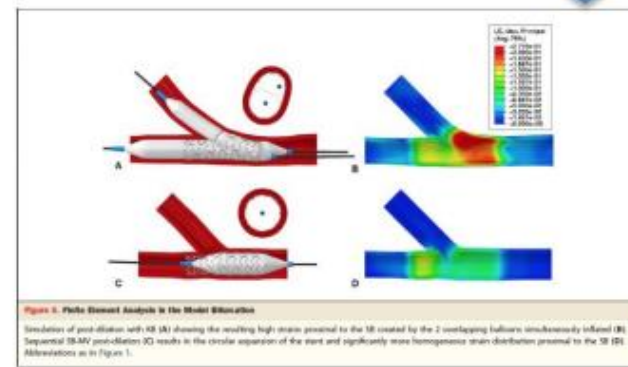
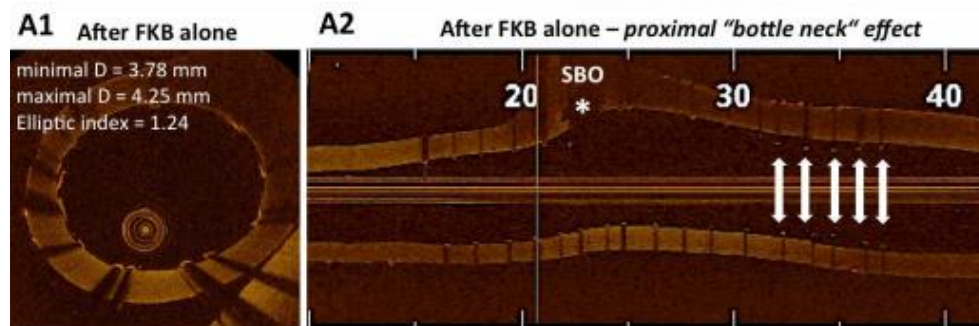




# The detrimental effects of kissing balloon inflation

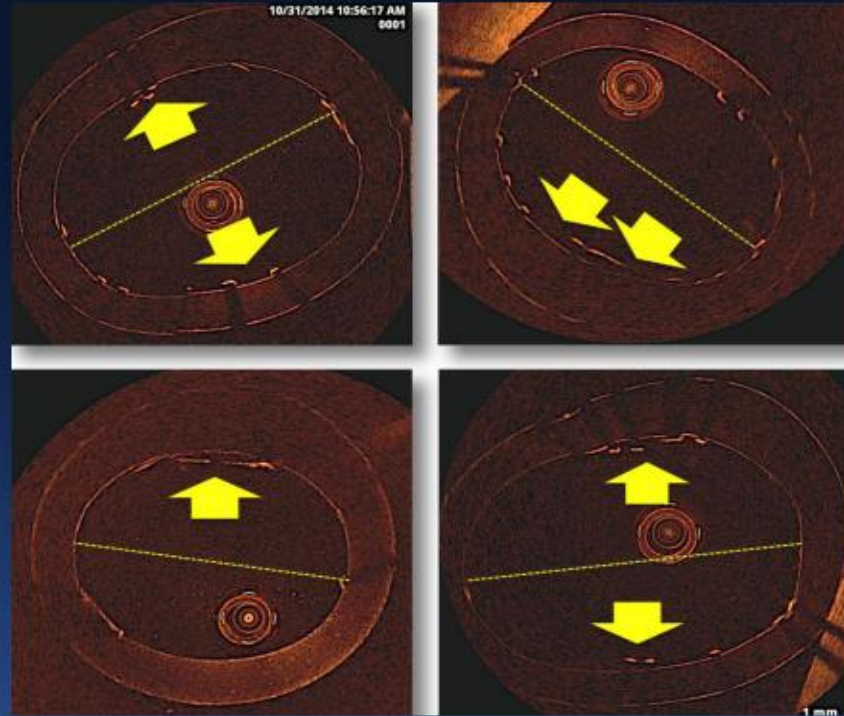


Foin et al. EuroIntervention 2011.



# Detrimental effect after FKB

*Opposite strut malapposition in the proximal segment*



*XII European Bifurcation Club meeting – Rotterdam – October 2015*

# Comparative Analysis of Sequential Proximal Optimizing Technique Versus Kissing Balloon Inflation Technique in Provisional Bifurcation Stenting

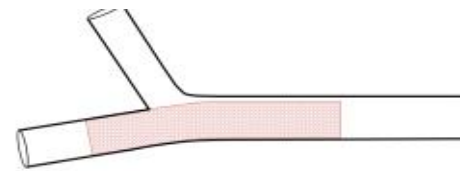


## Fractal Coronary Bifurcation Bench Test

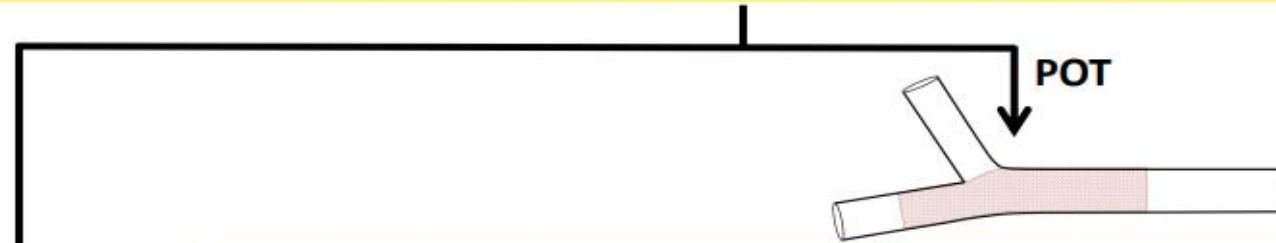
G rard Finet, MD, PhD,\* Fran ois Derimay, MD, MSc,\* Pascal Motreff, MD, PhD,† Patrice Guerin, MD, PhD,‡  
Paul Pilet, B Eng,‡ Jacques Ohayon, PhD,§ Olivier Darremont, MD,|| Gilles Rioufol, MD, PhD\*



Promus Premier™ stent (Boston)  
 Ultimaster™ stent (Terumo)



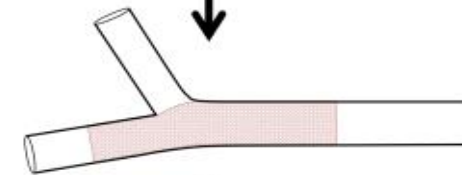
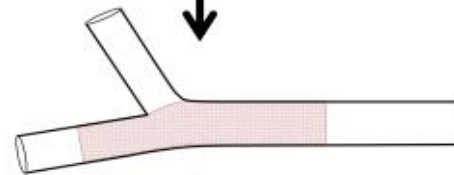
2D-3D OCT run after stent implantation at the MB reference diameter



2D-3D OCT run after proximal optimizing technique

KBI

no KBI



**KBI  
 symmetric BIP  
 (12/12 atm)**

**KBI  
 symmetric BIP  
 (12/12 atm)**

**KBI  
 asymmetric BIP  
 SB @ 12 atm  
 to 4 atm w/  
 MV @ 12 atm**

**KBI  
 asymmetric BIP  
 SB @ 12 atm w/  
 MV @ 4 atm**

**SB inflation  
 alone  
 SB @ 12 atm**

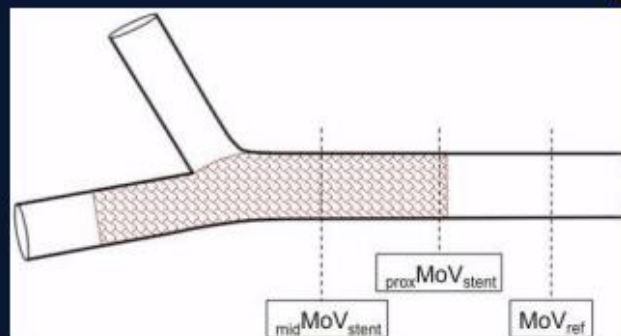
**SB inflation  
 SB @ 12 atm  
 +  
 Final POT  
 (re-POT)**

Final 2D-3D OCT run





# Final (Re-)POT?



Quantitative analysis of the different bifurcation stenting protocols (1-stent strategy)

## RESULTS

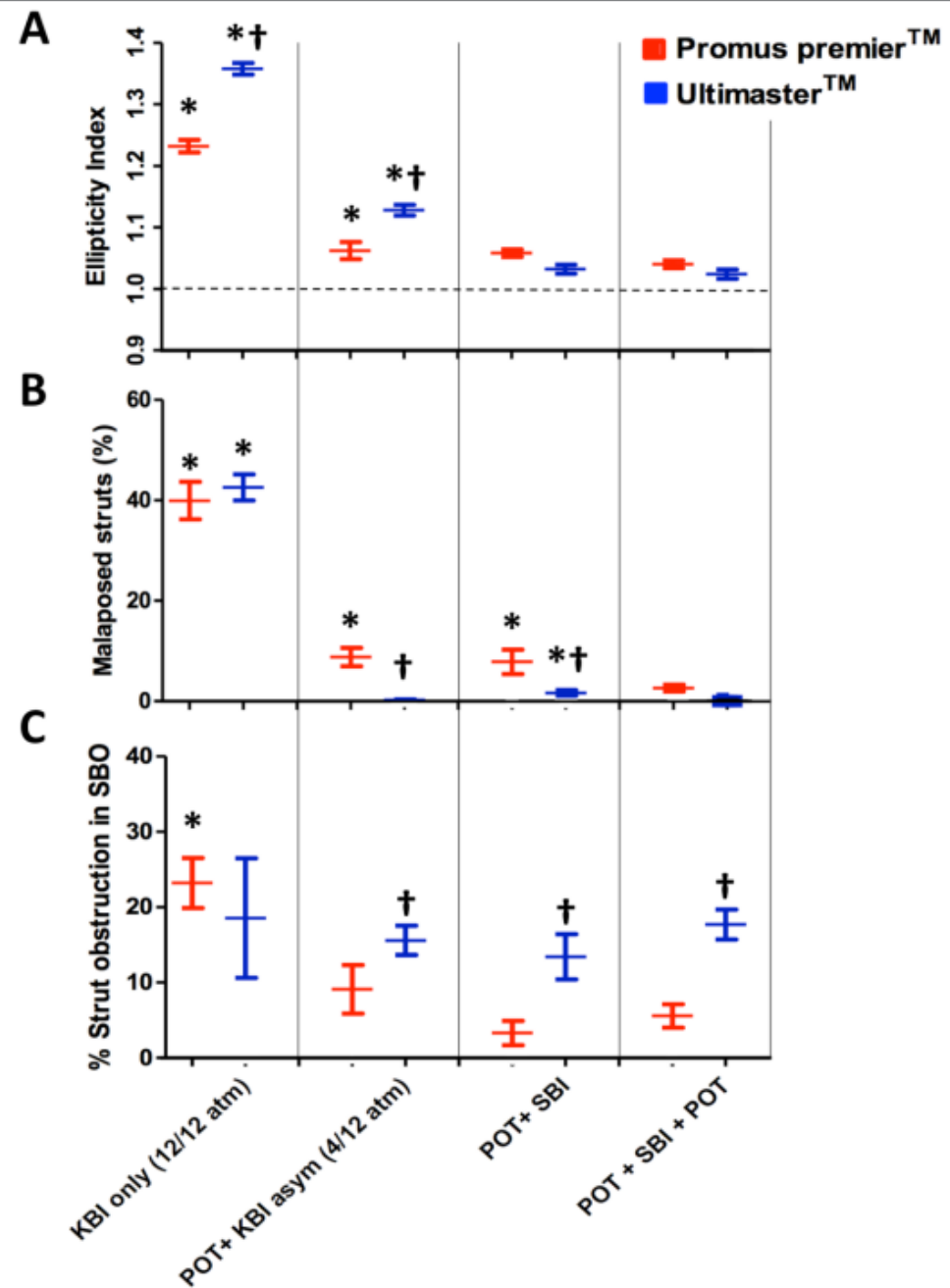
| Promus premier™ stent (Boston)       | Total (n=25) | with FKB       |                |                              |                              | without FKB      |                          | P*     |
|--------------------------------------|--------------|----------------|----------------|------------------------------|------------------------------|------------------|--------------------------|--------|
|                                      |              | no POT         | with POT first |                              |                              | with POT first   |                          |        |
|                                      |              | symFKBi<br>n=5 | symFKBi<br>n=5 | assymFKBi<br>4 atm MV<br>n=5 | assymFKBi<br>4 atm SB<br>n=5 | +SB alone<br>n=5 | +SB and final POT<br>n=5 |        |
| Prox area overstretch (MoV) %        |              | 13.7±1.41      | 7.25±4.38      | 5.73±1.92                    | 5.75±1.66                    | 5.25±3.01        | 5.62±2.74                | <0.05  |
| Prox Elliptic ratio (MoV)            |              | 1.25±0.02      | 1.08±0.05      | 1.03±0.01                    | 1.04±0.03                    | 1.04±0.02        | 1.03±0.01                | <0.05  |
| Mid area overstretch (MoV) %         |              | 13.81±2.20     | 13.0±1.19      | 6.16±1.25                    | 6.21±1.96                    | 5.19±3.71        | 5.79±4.30                | <0.05  |
| Mid elliptic ratio (MoV1)            |              | 1.23±0.02      | 1.17±0.02      | 1.09±0.02                    | 1.06±0.03                    | 1.06±0.01        | 1.04±0.01                | <0.05  |
| Final linear fractal geometric ratio |              | 0.66±0.01      | 0.66±0.01      | 0.65±0.01                    | 0.64±0.01                    | 0.64±0.01        | 0.64±0.01                | <0.05  |
| Stent strut obstruction in SBO %     |              | 22.7±5.7       | 9.1±5.6        | 3.7±4.5                      | 7.3±4.7                      | 3.3±2.7          | 5.6±2.7                  | <0.001 |

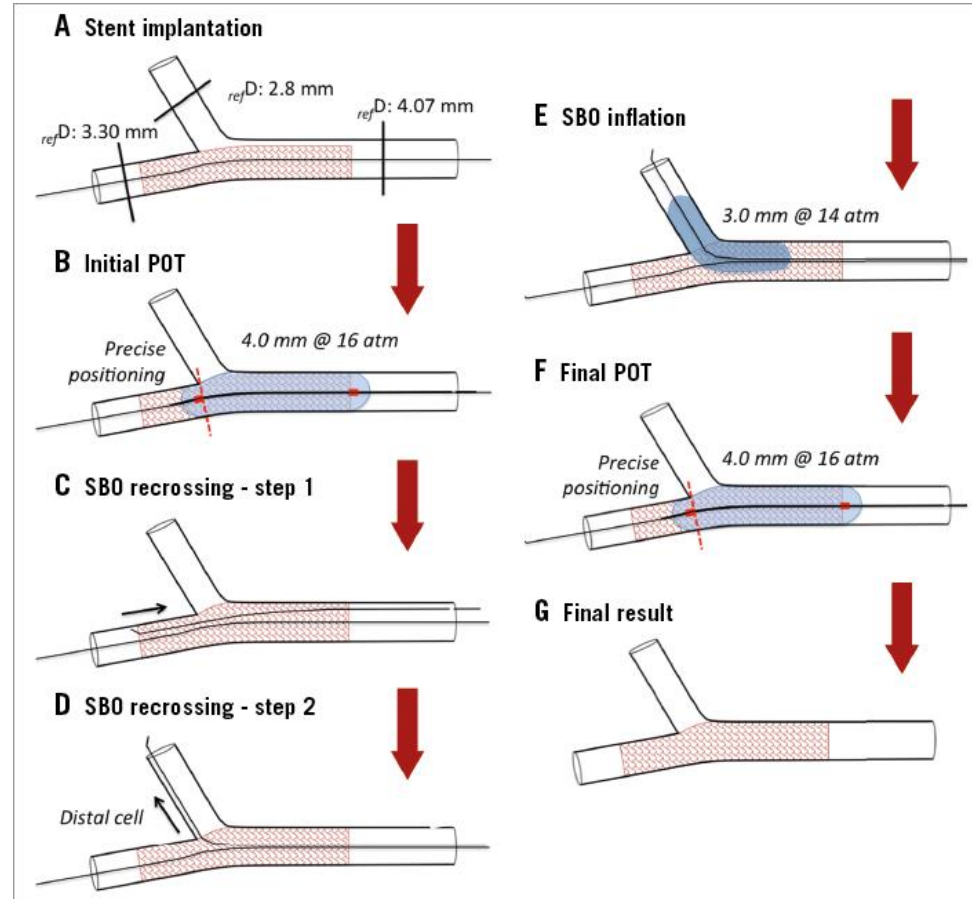
\*P value between re-POT and no POT+symFKBi

## RESULTS

Comparison of ellipticity index, global malapposed strut ratio (%), and strut obstruction ratio in side branch ostium (SBO) (%)

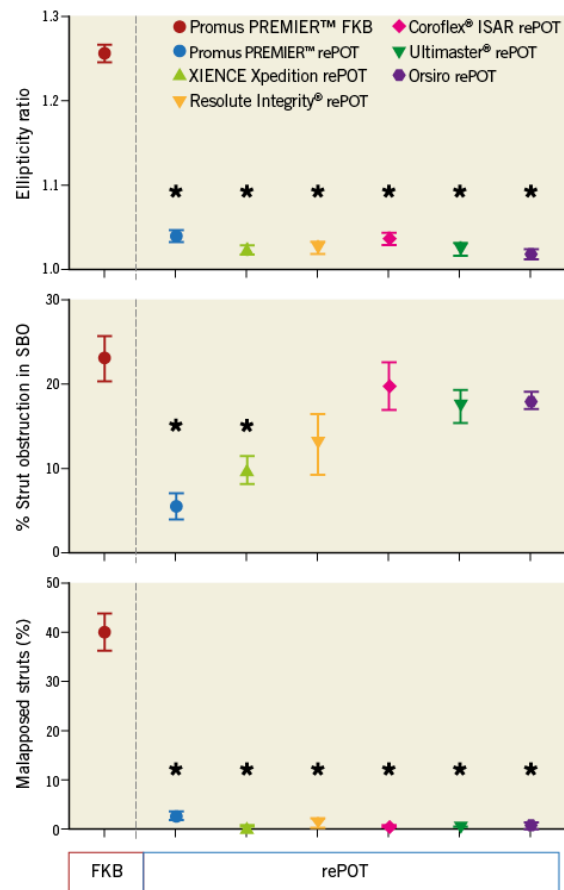
POT-side-POT was better than FKB in terms of ellipticity, malapposition, and SB obstruction





EuroIntervention 2017;13:e1092-e1095 published online May 2017 published online e-edition October 2017

**Influence of platform design of six different drug-eluting stents in provisional coronary bifurcation stenting by rePOT sequence: a comparative bench analysis**



EuroIntervention 2017;13:e1092-e1095 published online May 2017 published online e-edition October 2017

**Influence of platform design of six different drug-eluting stents in provisional coronary bifurcation stenting by rePOT sequence: a comparative bench analysis**

# Comparative Analysis of rePOT sequence with six contemporary drug-eluting stents in Provisional Bifurcation Stenting- *Fractal Coronary Bifurcation Bench Test*

## RESULTS

|                                  | KBI*<br>alone              | rePOT sequence              |                                   |                                 |                      |                            |                  |
|----------------------------------|----------------------------|-----------------------------|-----------------------------------|---------------------------------|----------------------|----------------------------|------------------|
|                                  | Promus<br>Premier<br>20 mm | Promus<br>Premier™<br>20 mm | Xience<br>Xpedition<br>™<br>23 mm | Resolute<br>Integrity™<br>22 mm | Ultimaster™<br>24 mm | Coroflex<br>Isar™<br>27 mm | Orsiro™<br>22 mm |
|                                  | <i>Boston</i>              | <i>Boston</i>               | <i>Abbott</i>                     | <i>Medtronic</i>                | <i>Terumo</i>        | <i>BBraun</i>              | <i>Biotronik</i> |
| <b>Mother Vessel</b>             | n=5                        | n = 5                       | n = 5                             | n = 5                           | n = 5                | n = 5                      | n = 5            |
| Mean diameter (mm)               | 4.26±0.09                  | 4.18±0.07                   | 4.33±0.06                         | 4.23±0.05                       | 4.29±0.05            | 4.22±0.03                  | 4.29±0.02        |
| Elliptic ratio (MoV)             | 1.23±0.02                  | 1.04±0.01                   | 1.04±0.01                         | 1.03±0.01                       | 1.04±0.03            | 1.04±0.01                  | 1.02±0.01        |
| stent/artery ratio               | 1.11±0.06                  | 1.02±0.01                   | 1.07±0.02                         | 1.04±0.01                       | 1.07±0.03            | 1.02±0.01                  | 1.05±0.01        |
| <b>Main Branch</b>               |                            |                             |                                   |                                 |                      |                            |                  |
| Mean diameter (mm)               | 3.47±0.05                  | 3.48±0.05                   | 3.46±0.06                         | 3.50±0.05                       | 3.36±0.03            | 3.42±0.05                  | 3.5±0.06         |
| Elliptic ratio (MoV)             | 1.03±0.01                  | 1.04±0.01                   | 1.04±0.01                         | 1.03±0.1                        | 1.04±0.02            | 1.04±0.02                  | 1.05±0.02        |
| stent/artery ratio               | 1.07±0.04                  | 1.07±0.02                   | 1.05±0.03                         | 1.06±0.02                       | 1.09±0.02            | 1.03±0.2                   | 1.08±0.3         |
| <b>Strut obstruction in SBO%</b> | 23.2±6.0                   | 5.6±8.39                    | 9.9±5.3                           | 13.1±8.1                        | 17.7±4.4             | 20.1±6.3                   | 18.4±2.3         |
| <b>Global stent MAP</b>          |                            |                             |                                   |                                 |                      |                            |                  |
| Malapposed struts<br>n(%)        | 353 (40%)                  | 20 (2.6%)                   | 6 (0.4%)                          | 14 (1%)                         | 1 (0.1%)             | 4 (0.2%)                   | 6 (0.5%)         |



# Benefit of a new provisional stenting strategy, the re-proximal optimisation technique: the rePOT clinical study

Derrimay et al

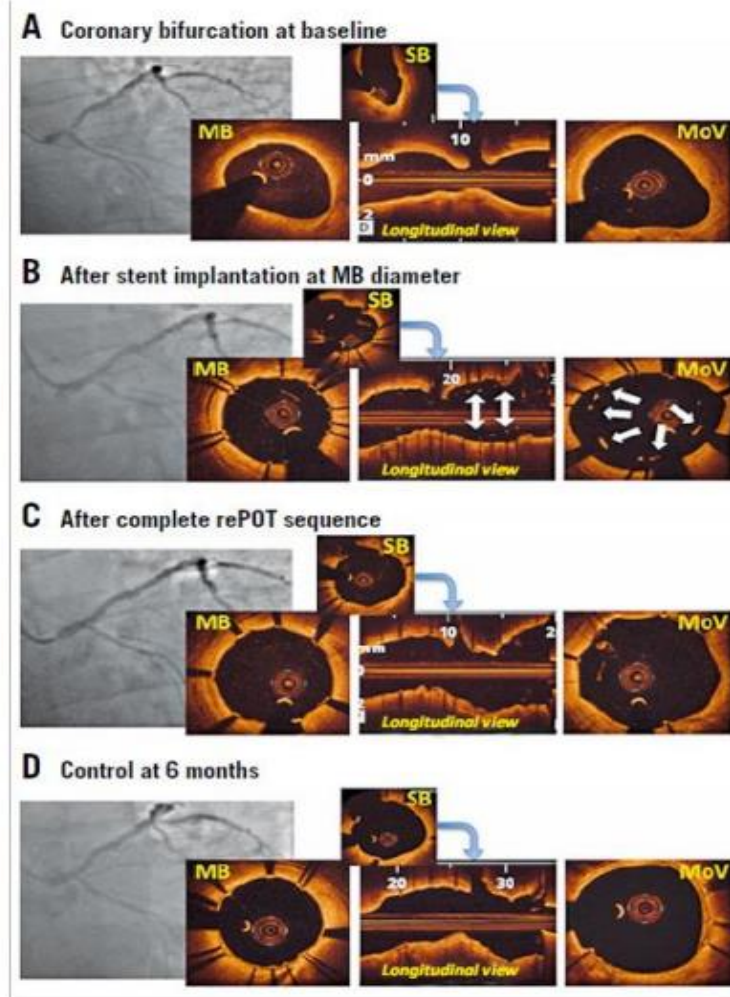
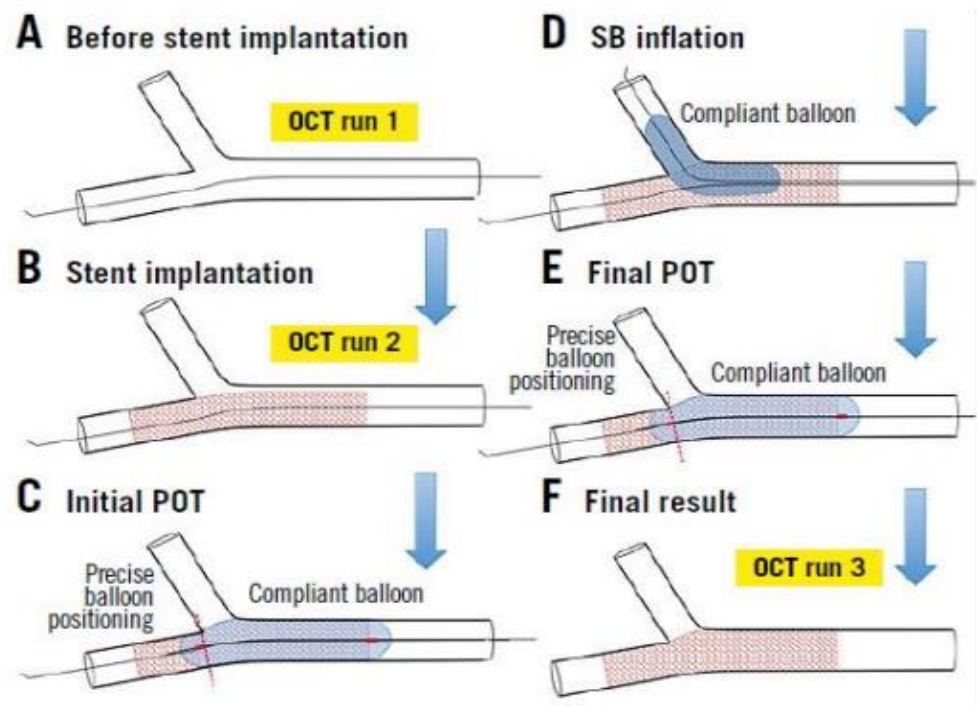




Table 3. Baseline, post-implantation and post-rePOT OCT data.

|  | All (n=106) | LM bifurcation (n=43) | Non-LM bifurcation (n=63) |
|--|-------------|-----------------------|---------------------------|
| <b>Stent implantation at MB reference diameter</b> |             |                       |                           |
| D <sub>m</sub> MoV (mm)                            | 3.75±0.66   | 4.31±0.43*            | 3.39±0.51                 |
| D <sub>m</sub> stent (mm)                          | 3.10±0.52   | 3.44±0.51*            | 2.89±0.39                 |
| D <sub>m</sub> SB (mm)                             | 2.20±0.62   | 2.58±0.60*            | 1.96±0.5                  |
| Delta diameter MoV-stent (mm)                      | 0.65±0.42   | 0.87±0.41*            | 0.50±0.36                 |
| SAR MoV  | 0.84±0.09   | 0.80±0.09*            | 0.86±0.09                 |
| SAR MB   | 1.08±0.16   | 1.09±0.17             | 1.08±0.15                 |
| SB obstruction (%)                                 | 44.3±12.9   | 46.7±13.5             | 45.1±10.2                 |
| Global stent MAP (%)                               | 18.9±13.4   | 25.0±13.9*            | 15.1±11.5                 |
| SBR  | 1.03±0.04   | 1.03±0.07             | 1.03±0.08                 |

Table 3. Baseline, post-implantation and post-rePOT OCT data.

|                                      | All (n=106)            | LM bifurcation (n=43)   | Non-LM bifurcation (n=63) |
|--------------------------------------|------------------------|-------------------------|---------------------------|
| <b>After complete rePOT sequence</b> |                        |                         |                           |
| D <sub>m</sub> MoV (mm)              | 3.90±0.66 <sup>†</sup> | 4.42±0.46* <sup>†</sup> | 3.54±0.53 <sup>†</sup>    |
| D <sub>m</sub> MB (mm)               | 3.07±0.52 <sup>†</sup> | 3.37±0.50* <sup>†</sup> | 2.86±0.41 <sup>†</sup>    |
| D <sub>m</sub> SB (mm)               | 2.41±0.70 <sup>†</sup> | 2.83±0.73* <sup>†</sup> | 2.11±0.05 <sup>†</sup>    |
| D <sub>carina</sub> (mm)             | 3.14±0.57              | 3.63±0.69*              | 2.90±0.42                 |
| Delta MoV-stent diameter (mm)        | 0.04±0.12 <sup>†</sup> | 0.01±0.09* <sup>†</sup> | 0.06±0.13 <sup>†</sup>    |
| SAR MoV                              | 1.04±0.09 <sup>†</sup> | 1.05±0.10 <sup>†</sup>  | 1.04±0.08 <sup>†</sup>    |
| Ellipticity ratio MoV                | 1.13±0.12 <sup>†</sup> | 1.13±0.16               | 1.12±0.08                 |
| Ellipticity ratio MB                 | 1.11±0.08 <sup>†</sup> | 1.11±0.08 <sup>†</sup>  | 1.11±0.08 <sup>†</sup>    |
| SB obstruction (%)                   | 17.0±14.3 <sup>†</sup> | 4.9±10.7 <sup>†</sup>   | 18.9±18.7 <sup>†</sup>    |
| Global stent MAP (%)                 | 3.2±3.9 <sup>†</sup>   | 3.4±4.0 <sup>†</sup>    | 3.0±3.8 <sup>†</sup>      |
| SBR                                  | 1.05±0.09 <sup>†</sup> | 1.06±0.09 <sup>†</sup>  | 1.05±0.09 <sup>†</sup>    |
| Carina ratio                         | 1.04±0.15              | 1.09±0.17*              | 1.02±0.14                 |
| Fractal ratio                        | 0.72±0.10              | 0.73±0.11               | 0.72±0.09                 |

Values shown as mean±standard deviation. \**p*<0.05 vs. non-LM bifurcation, <sup>†</sup>*p*<0.05 vs. stent implantation. D<sub>m</sub>: mean diameter; LM: left main; MAP: malapposition; MB: main branch; MoV: mother vessel; SAR: stent/artery ratio; SB: side branch; SBR: stent/bifurcation ratio

# TAKE HOME MESSAGE

