

14<sup>th</sup>

**AICT**

ASIAN INTERVENTIONAL CARDIOVASCULAR THERAPEUTICS  
THE OFFICIAL CONGRESS OF APSIC

# Do Not Let Perfection Be the Enemy of Good

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Singapore

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# Conflicts of Interest

Speaker's name : Saurabh RASTOGI

- I do not have any potential conflict of interest

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# Clinical History

- 61yr old male
- Pmhx: Ischemic heart disease s/p PCI to proximal RCA'04 / Hyperlipidaemia
- Family history Premature CAD
- Active smoker
- NSTEMI presentation
- No significant findings on exam/ECG



# Left Coronary system

LAD

LCX

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# RCA

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# RCA Lesion preparation

**Ikazuchi 3.0x10 @ 12 atm**

**Scoreflex 3.0 x15 @ 12atm**

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# RCA STENT IMPLANTATION

Angio Post Scoreflex

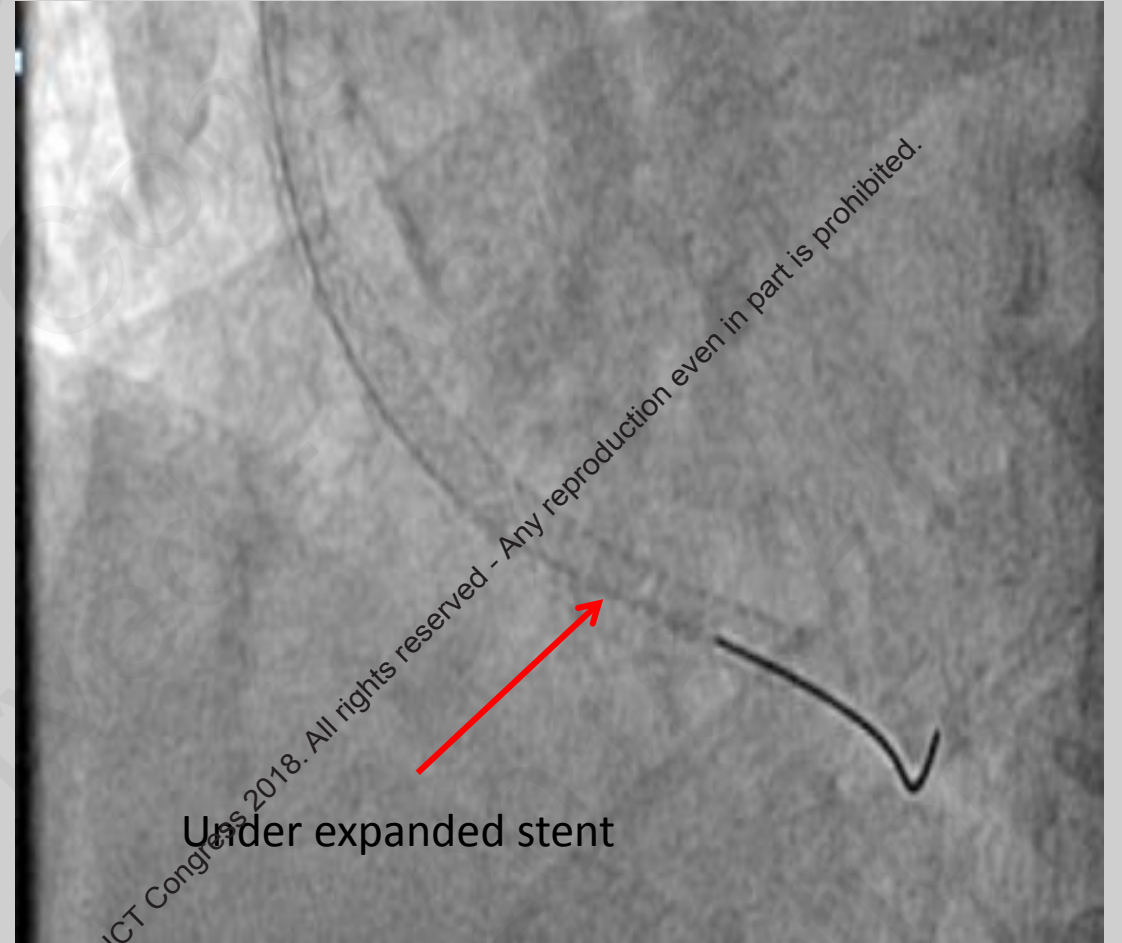
Xience 3.5 x48 mm stent

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# Post stent Implantation

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Under expanded stent

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# Post dilatation

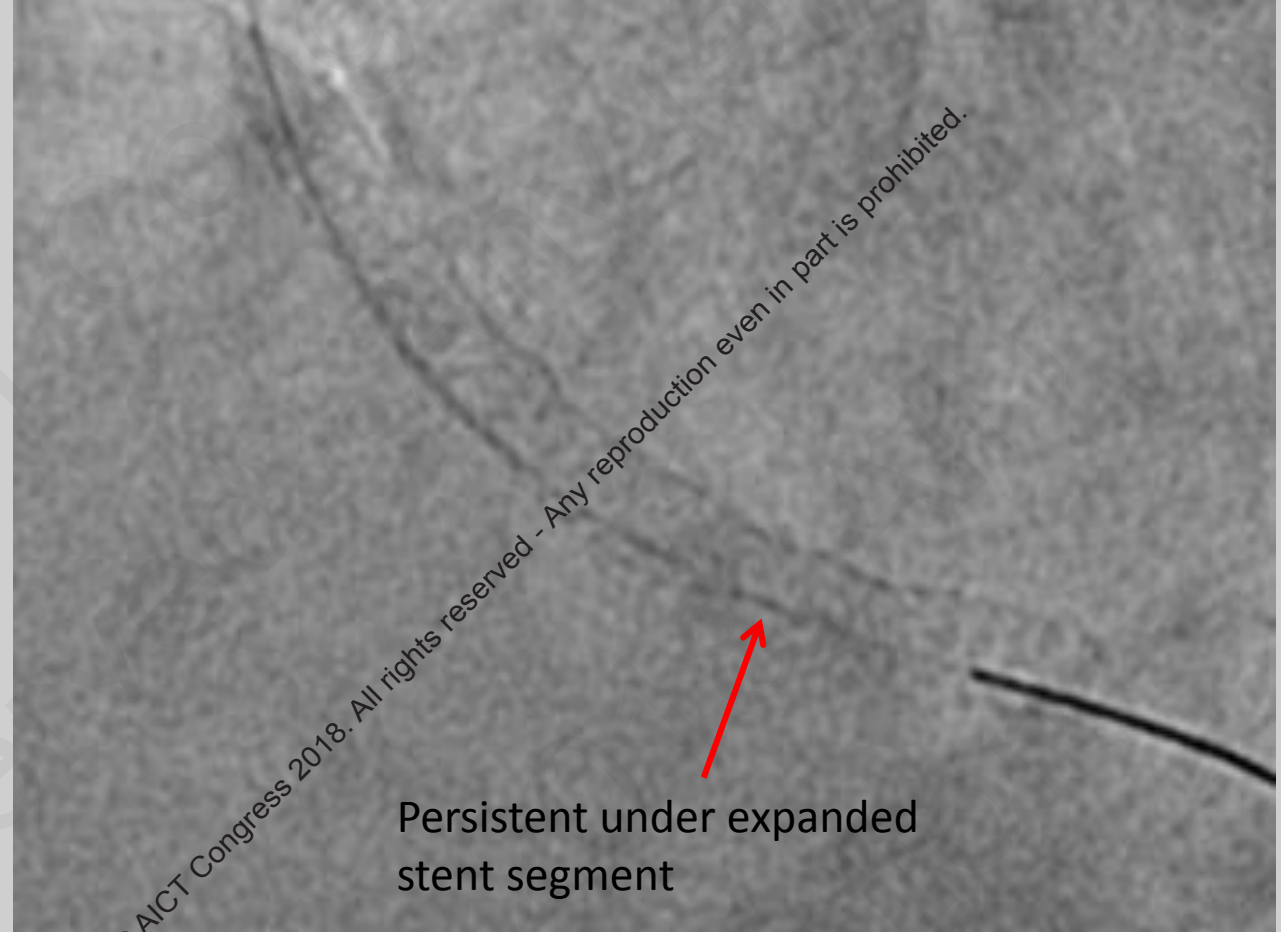
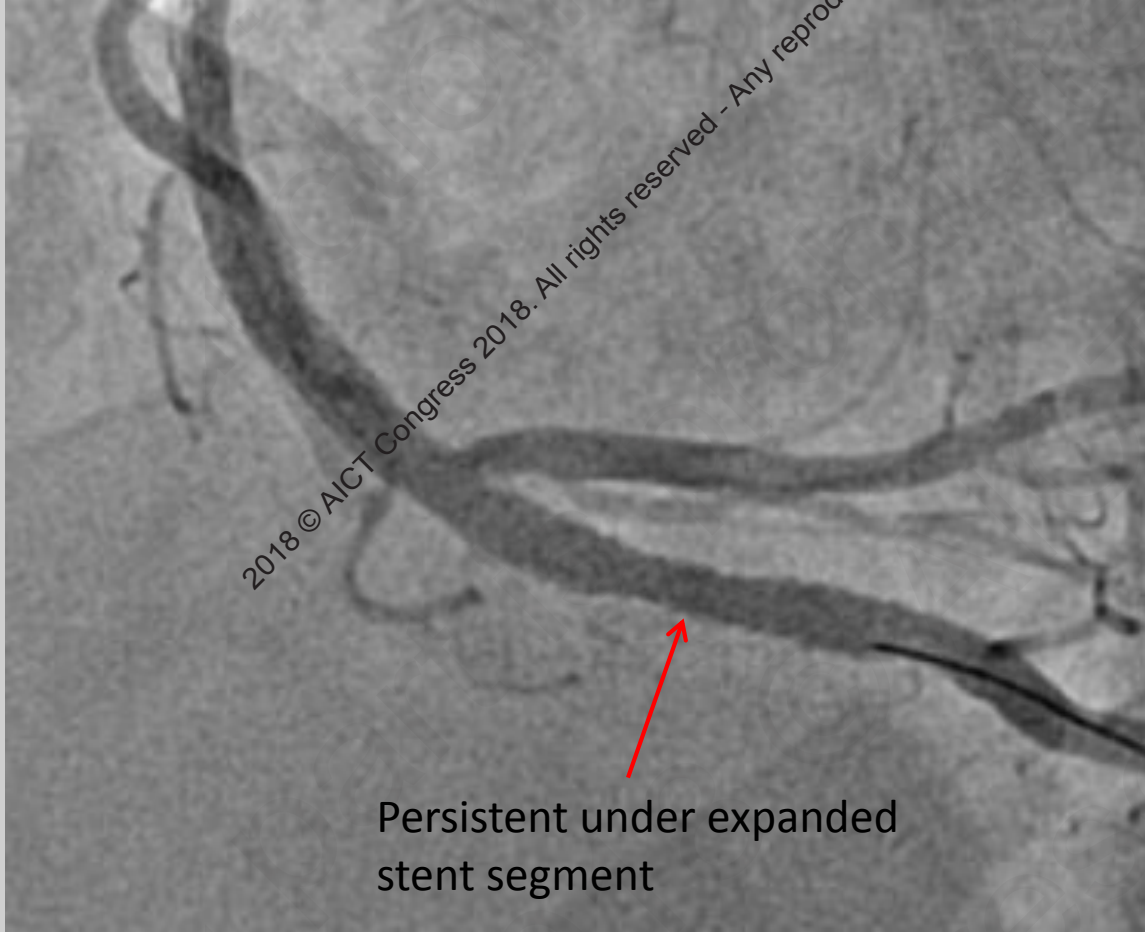
NC 4.0x15 @20atm

Angiogram Post NC balloon dilatation

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# Closer Look



# The aim for perfection

Angio Post NC



Ellis Type 3 Stent Perforation

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# Time for redemption

**Immediate Balloon Seal**

**BE Stent Graft 3.5X21 @11 atm**

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# Redeemed

**Angio post stent graft implantation**

**Angio after post-dilatation with NC 3.5  
X15@12ATM**

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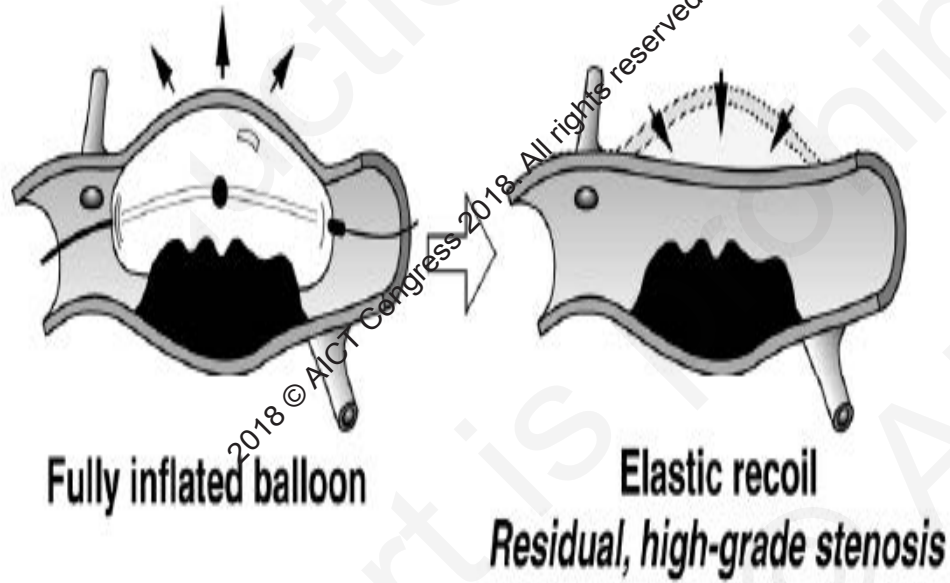


# Redemption still holding 14 months later

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# Looking back....





# Calcium assessment on Angiography

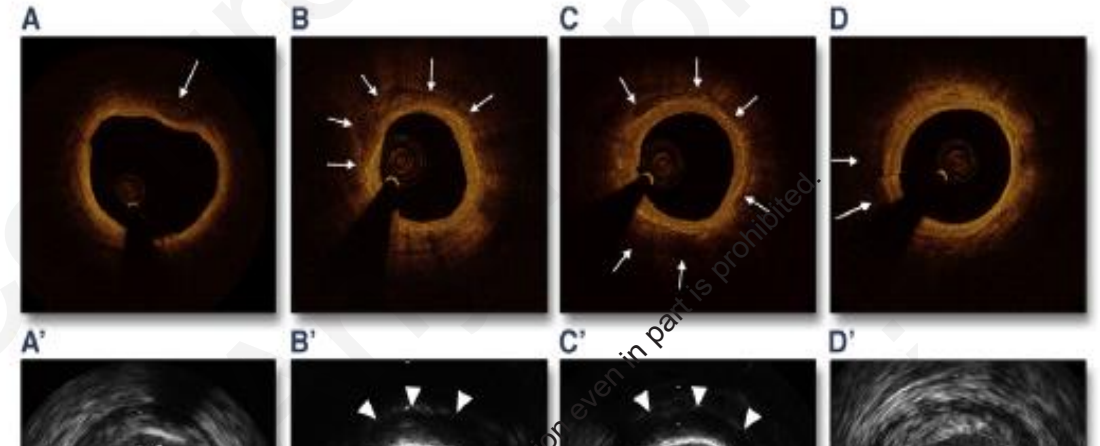
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VOL. 10, NO. 8, 2017  
 ISSN 1936-878X/\$36.00

<https://doi.org/10.1016/j.jcmg.2017.05.014>

## In Vivo Calcium Detection by Comparing Optical Coherence Tomography, Intravascular Ultrasound, and Angiography

Xiao Wang, MD,<sup>a,b,c</sup> Mitsuaki Matsumura, PhD,<sup>a</sup> Gary S. Mintz, MD,<sup>a</sup> Tetsumin Lee, MD,<sup>a,b</sup> Wenbin Zhang, MD,<sup>a,b,d</sup> Yang Cao, MD,<sup>a,b,e</sup> Akiko Fujino, MD,<sup>a,b</sup> Yongqing Lin, MD,<sup>a,b</sup> Eisuke Usui, MD,<sup>f</sup> Yoshihisa Kanaji, MD,<sup>f</sup> Tadaichi Murai, MD,<sup>f</sup> Taichi Yanai, MD,<sup>f</sup> Teunakazu Kaluta, MD, PhD,<sup>f</sup> Akiko Maehara, MD<sup>a,b</sup>



### IVUS Finding

### Sensitivity of Angiography (%)\*

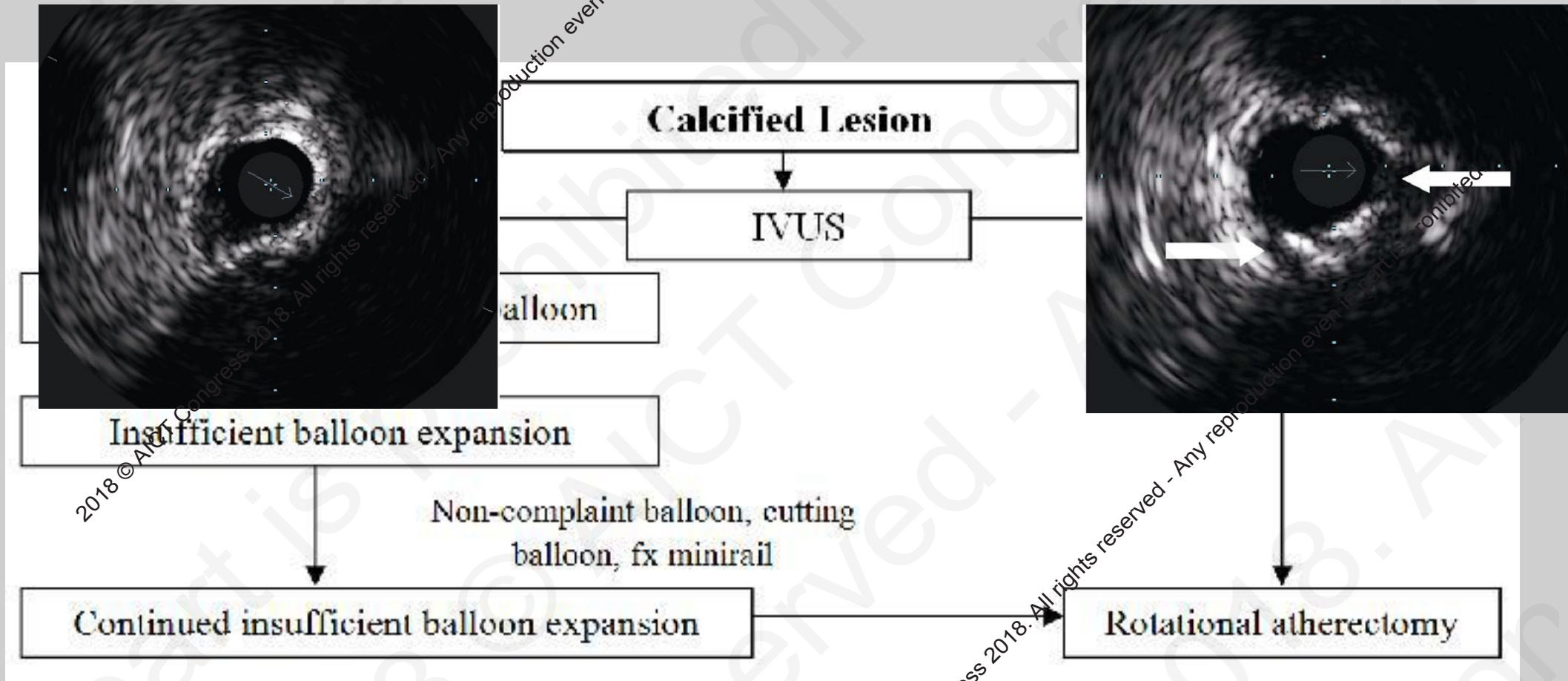
Arc of calcium (degrees):	< 90	25
	91 - 180	50
	181 - 270	60
	271 - 360	85
Length of calcium (mm):	≤ 5	42
	6 - 10	63
	≥ 11	61
Location of calcium:	Superficial only	60
	Deep only	54
	Superficial + deep	24

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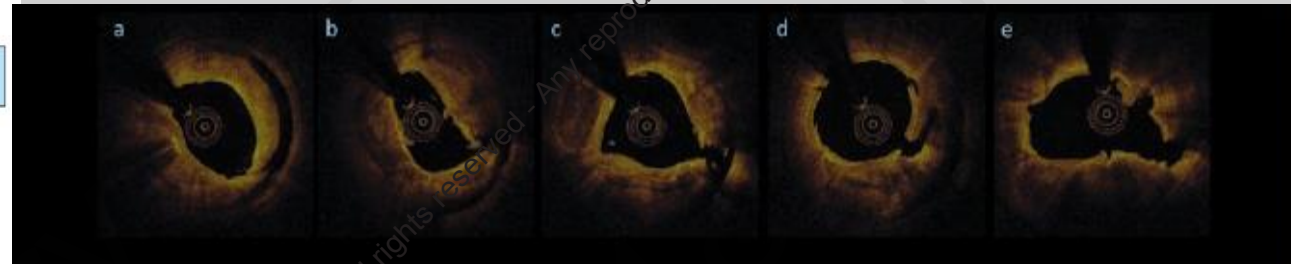
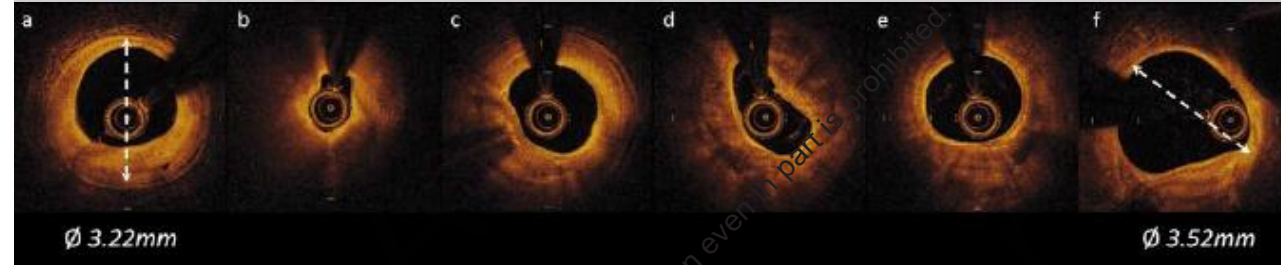
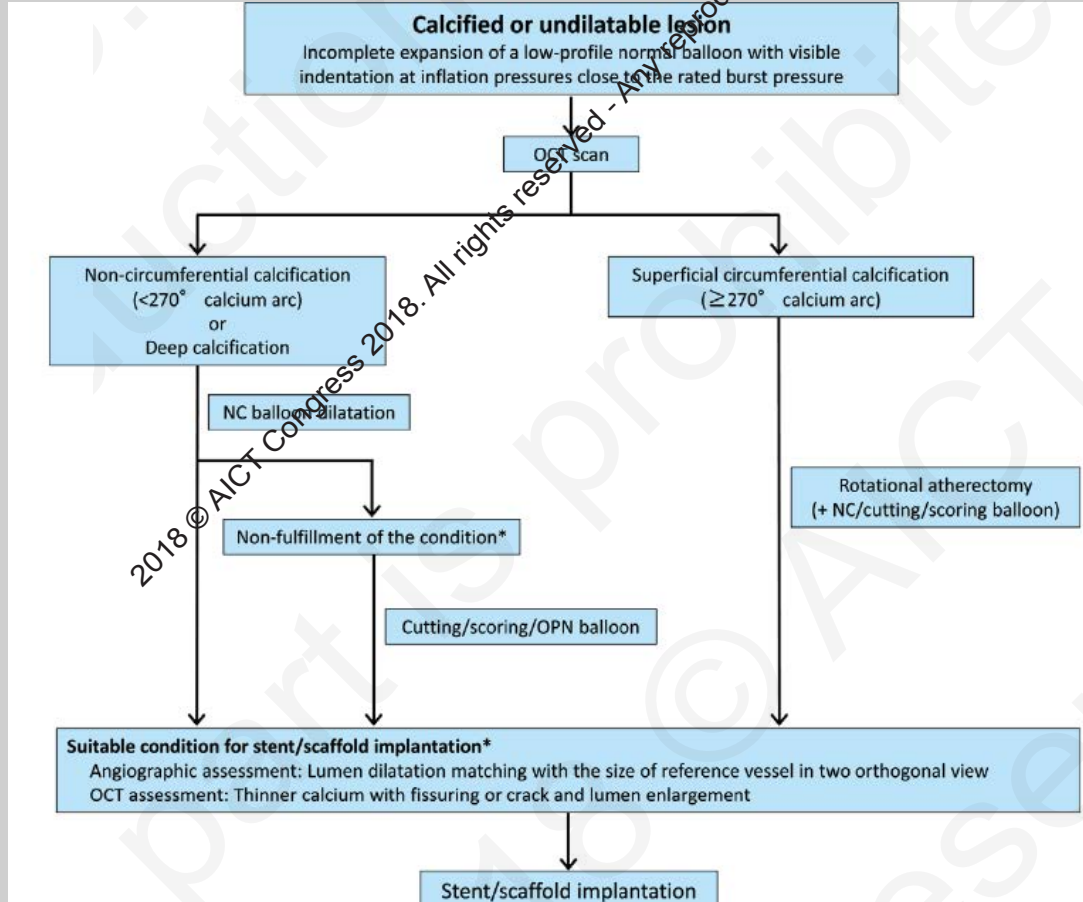
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# Adequate Calcified lesion preparation

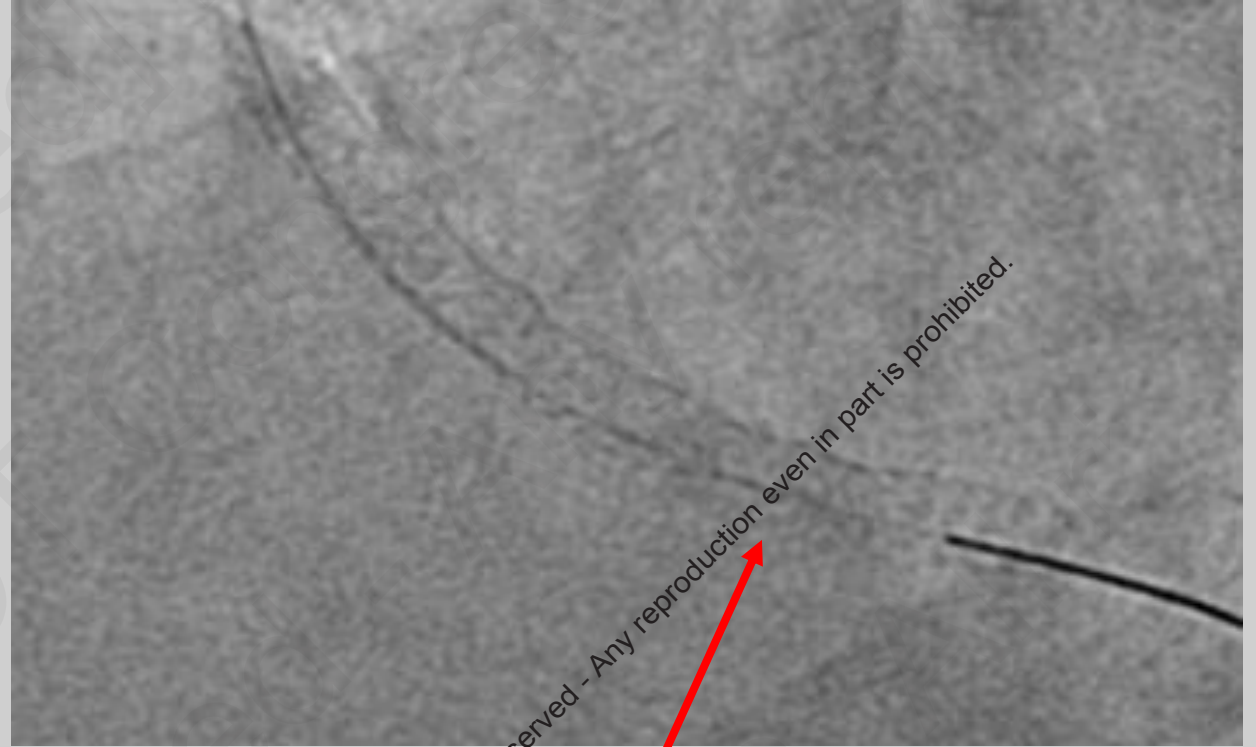


# Adequate Calcified lesion preparation



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# Back to the Title



**STENT UNDER-EXPANDED OR  
ASYMMETRIC EXPANSION**

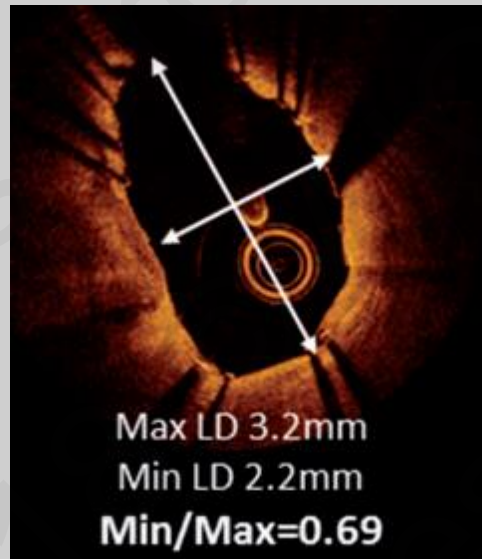
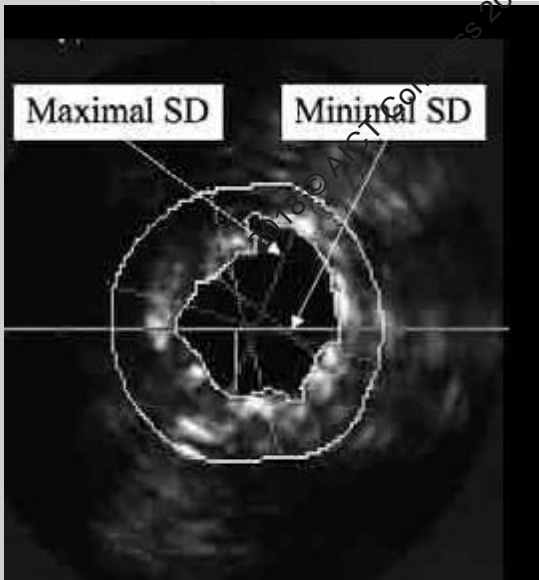
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# ASYMMETRIC STENT EXPANSION

*J Cardiol* 2007 Jun; 49(6): 313-21

## Impact of Highly Asymmetric Stent Expansion After Sirolimus-Eluting Stent Implantation on Twelve-Month Clinical Outcomes



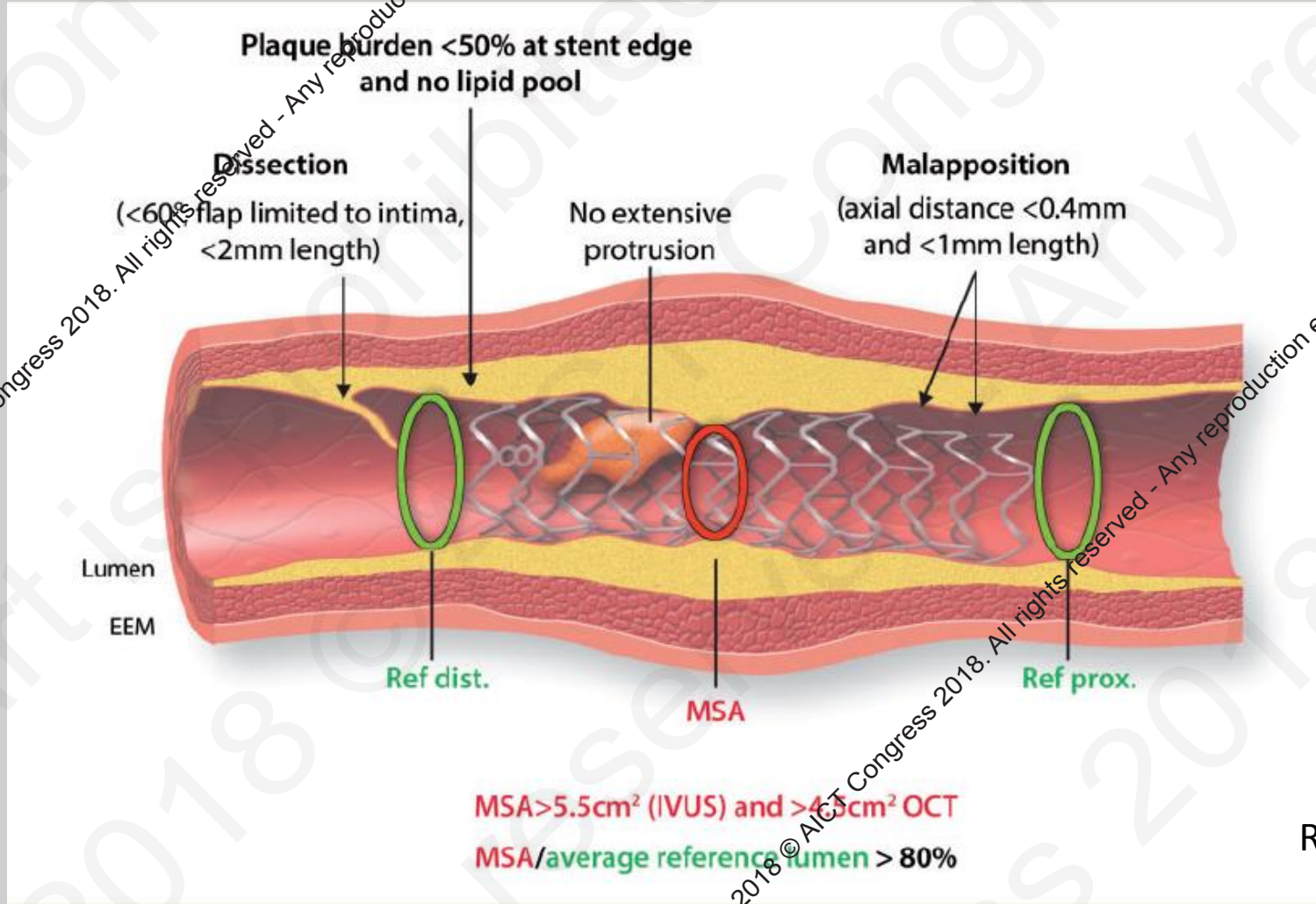
	O group (n=145)	S group (n=26)	p value
Reference proximal site			
EEM CSA (mm <sup>2</sup> )	19.7±5.5	1.5±5.7	0.128
Lumen CSA (mm <sup>2</sup> )	8.3±2.7	9.7±3.9	0.089
Plaque CSA (mm <sup>2</sup> )	11.3±4.1	11.9±2.8	0.358
<b>Minimal stent area site</b>			
Minimal stent diameter (mm)	2.51±0.45	2.06±0.31	<0.001
Maximal stent diameter (mm)	3.08±0.50	3.12±0.33	0.710
EEM CSA (mm <sup>2</sup> )	17.9±5.1	16.9±4.6	0.231
<b>Lumen CSA (mm<sup>2</sup>)</b>	<b>6.6±2.0</b>	<b>5.8±1.6</b>	<b>0.03</b>
Plaque CSA (mm <sup>2</sup> )	11.3±4.0	11.2±2.8	0.877
Reference distal site			
EEM CSA (mm <sup>2</sup> )	14.4±5.4	13.9±5.8	0.668
Lumen CSA (mm <sup>2</sup> )	6.8±0.9	6.7±2.6	0.870
Plaque CSA (mm <sup>2</sup> )	7.9±3.7	7.2±4.2	0.620
Stent symmetry index	0.81±0.05	0.63±0.04	<0.001
Stent expansion ratio	0.91±0.22	0.76±0.27	0.002
Stent expansion ratio < 0.65	12(8.2)	8(30.1)	0.001
Calcification behind struts at MSA site	61(42.1)	26(100)	<0.001

	O group	S group	p value
Number of follow-up patients	93	25	
Stent thrombosis	0	0	
Acute myocardial infarction	0	0	
Cardiac death	0	0	
Non-cardiac death	2(2.1%)	1(4.0%)	0.602

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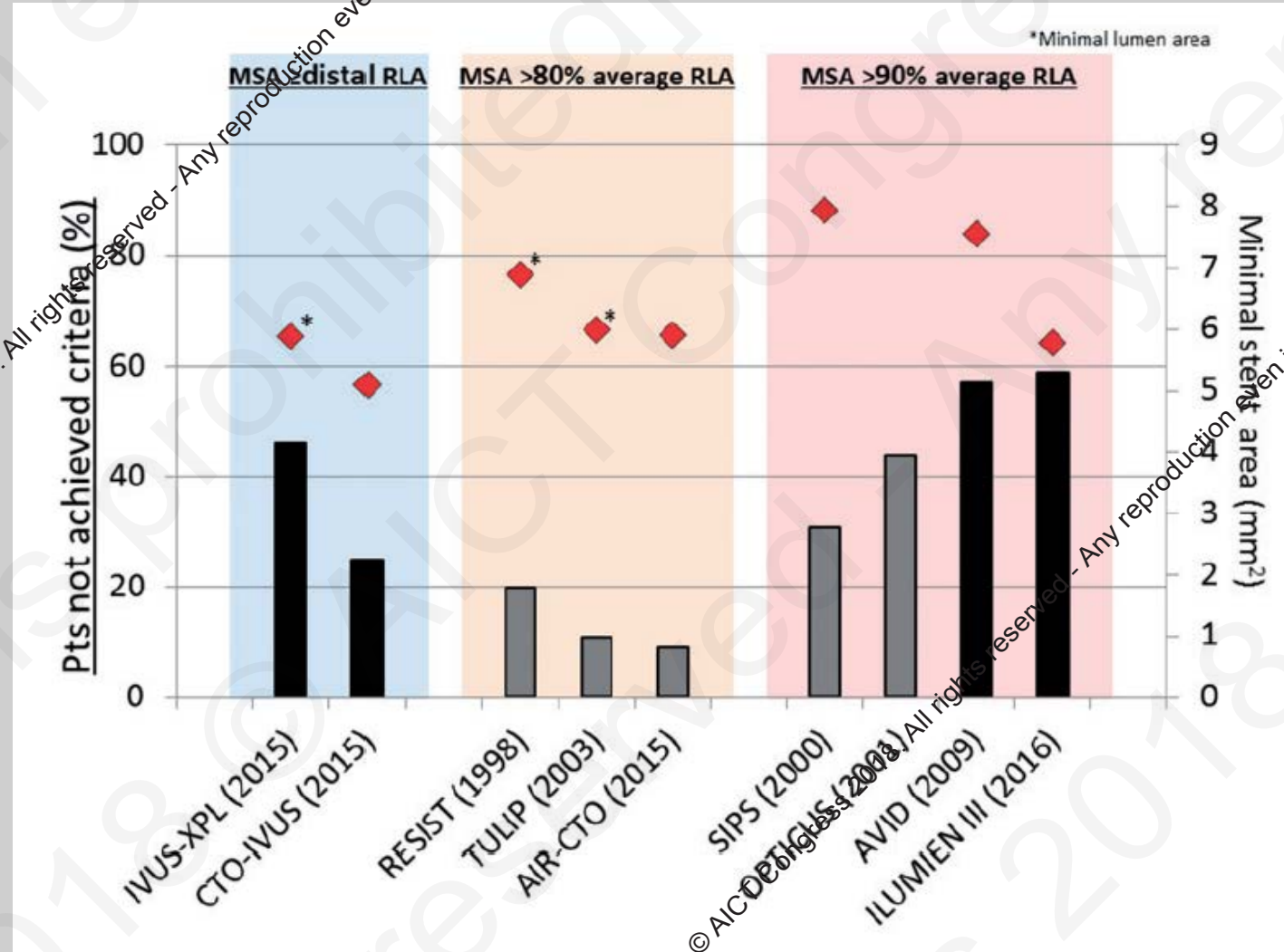


# PCI OPTIMIZATION



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# Reel/Real life Results

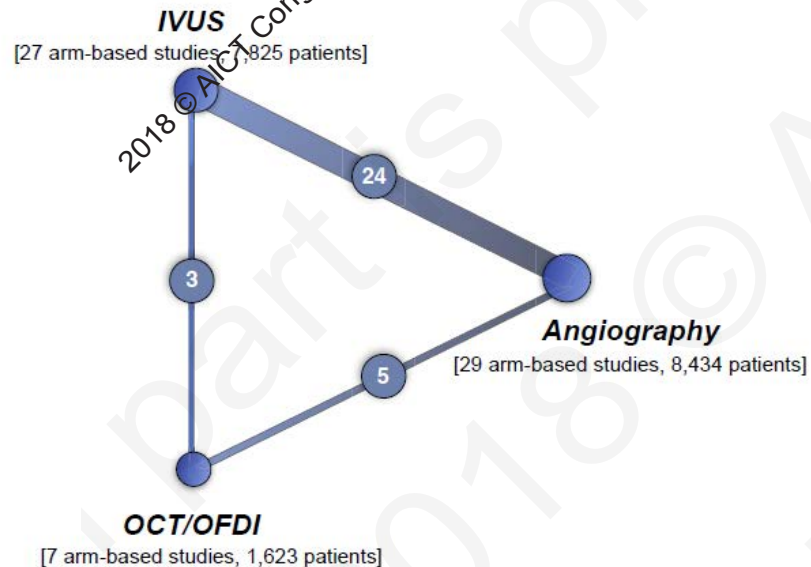


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## Clinical Outcomes Following Intravascular Imaging-Guided Versus Coronary Angiography-Guided Percutaneous Coronary Intervention With Stent Implantation

A Systematic Review and Bayesian Network Meta-Analysis of 31 Studies and 17,882 Patients



	Angiography	IVUS	OCT/OFDI
<b>MACE</b>			
Angiography	–	0.79 (0.67–0.91)	0.68 (0.49–0.97)
IVUS	1.30 (1.10–1.50)	–	0.87 (0.61–1.30)
OCT/OFDI	1.50 (1.00–2.00)	1.10 (0.78–1.60)	–
<b>Cardiovascular death</b>			
Angiography	–	0.47 (0.22–0.66)	0.31 (0.13–0.66)
IVUS	2.10 (1.50–3.10)	–	0.66 (0.27–1.50)
OCT/OFDI	3.20 (1.50–7.60)	1.50 (0.66–3.70)	–
<b>Myocardial infarction</b>			
Angiography	–	0.72 (0.52–0.93)	0.79 (0.44–1.40)
IVUS	1.40 (1.10–1.70)	–	1.10 (0.60–2.10)
OCT/OFDI	1.30 (0.72–2.30)	0.90 (0.47–1.70)	–
<b>Target lesion revascularization</b>			
Angiography	–	0.74 (0.58–0.90)	0.66 (0.35–1.20)
IVUS	1.40 (1.10–1.70)	–	0.88 (0.47–1.60)
OCT/OFDI	1.50 (0.83–2.90)	1.10 (0.61–2.10)	–
<b>Stent thrombosis</b>			
Angiography	–	0.42 (0.20–0.72)	0.39 (0.10–1.20)
IVUS	2.40 (1.40–5.10)	–	0.93 (0.24–3.40)
OCT/OFDI	2.60 (0.80–10.0)	1.10 (0.29–4.20)	–

# Coronary Perforations

Canadian Journal of Cardiology 27 (2011) 843–850

## Systematic Review/Meta-analysis

### Coronary Artery Perforation During Percutaneous Coronary Intervention: A Systematic Review and Meta-analysis

Avi Shimony, MD,<sup>a</sup> Lawrence Joseph, PhD,<sup>b</sup> Salvatore Mottillo, BSc,<sup>a,c</sup> and Mark J. Eisenberg, MD, MPH<sup>a,b</sup>

- 16 studies 197000 patients
- 0.35-0.52 % Incidence
- Upto 3% with debulking devices

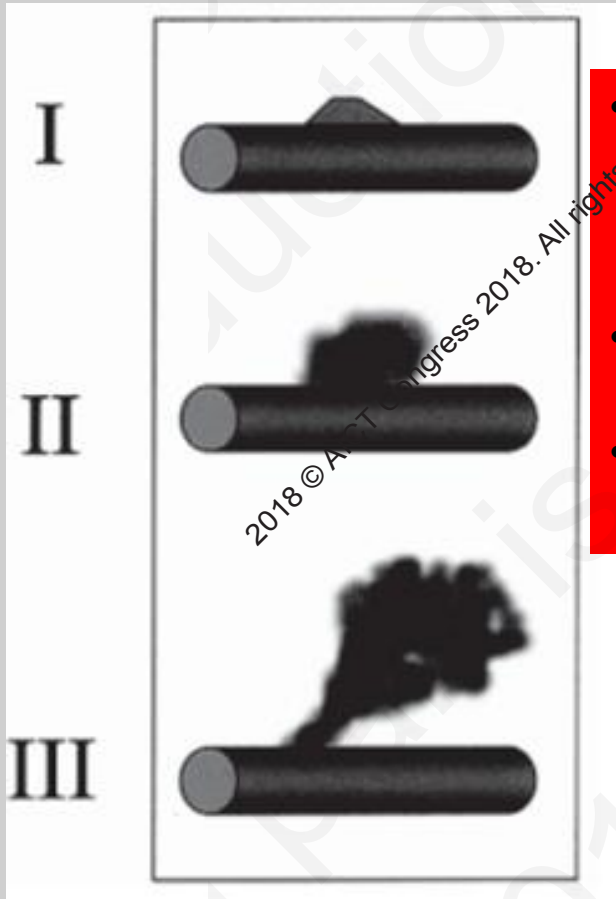
### Risk Factors for coronary perforation

- Female
- Older patients
- Complex coronary anatomy
- Use of oversized balloons or stents (>1.1-1.3/1)
- Excessive postdilatation
- Use of atheroablative devices
- Hydrophilic guidewires

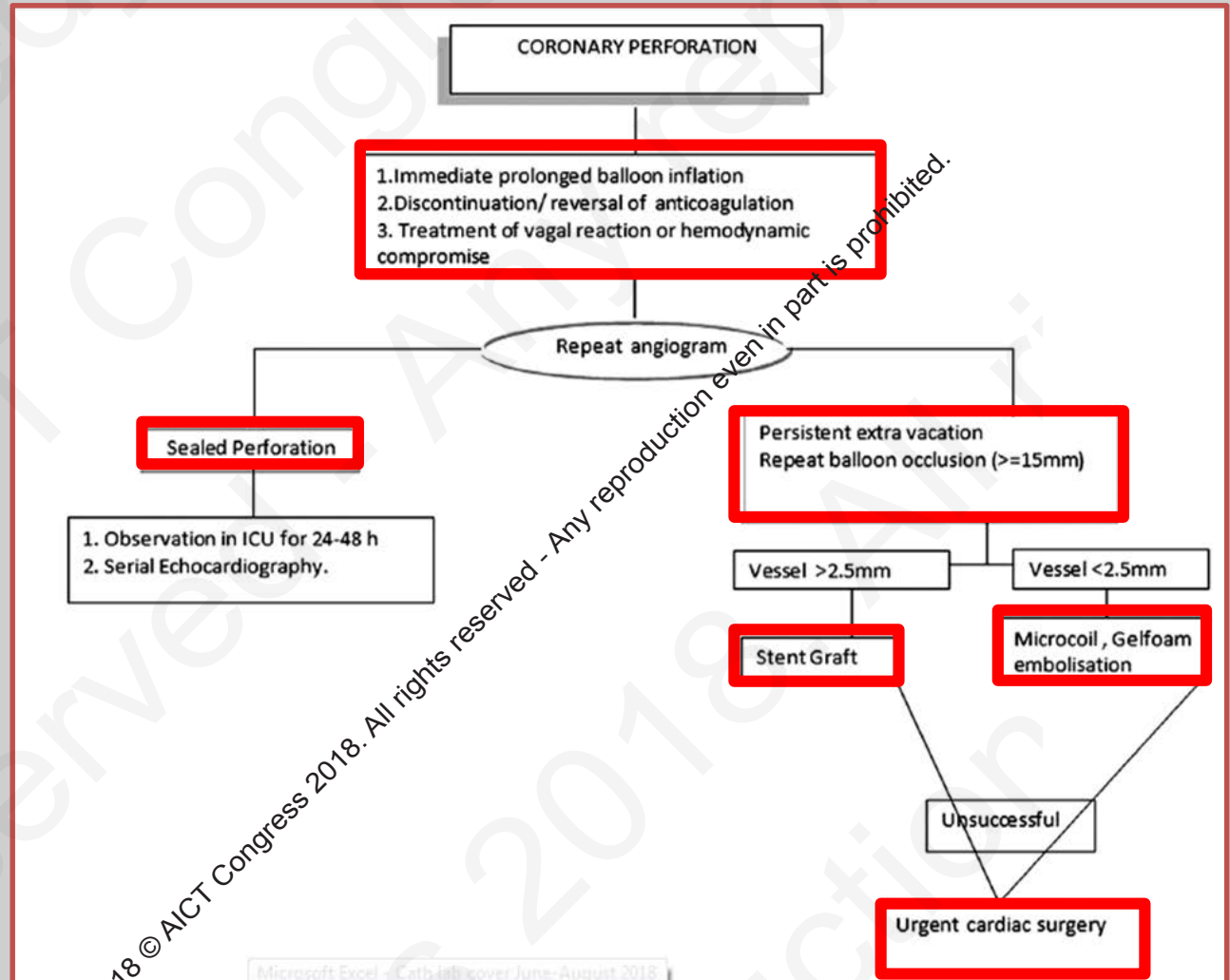



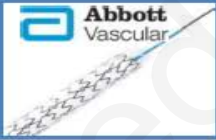



# Coronary perforation management

## Ellis Classification



- 10 fold increase tamponade and death Type 3 compared to Type 2
- Similar mortality rates Type 1 and 2
- Increasing rate of MI from Type 1-3



					
<b>Graft Material</b>	ePTFE sleeve (89±5µm)	ePTFE film (75±10µm x 2.5 wrapped)	Equine pericardium cylinder (105±5µm)	ePTFE Polymer (???)	E-spun PU (90µm)
<b>Stent Material (Composition)</b>	CoCr (L-605)	Stainless Steel (316L)	Stainless Steel (316L)	Stainless Steel (316L)	CoCr (L-605)
<b>Stent Graft Design</b>	Single Stent Single Cover outside ePTFE sleeve clamped at stent ends	„Sandwich Stent Design“ ePTFE captures in-between to stents	Single Stent Single Cover Pericardium sutured with PP suture onto stent	„Multi Layer Design“ ePTFE captures in-between to stents	Single Stent Single Cover outside
<b>Strut Width</b>	70µm (∅2.5mm) 80µm (∅2.75 – 4.0mm) 70µm (∅4.5 – 5.0mm)	???	???	???	60µm (∅2.5 – 3.0mm) 80µm (∅3.5 – 4.0mm) 120µm (∅4.5 – 5.0mm)
<b>Guide Catheter Compatibility</b>	<b>5F for all sizes</b>	6F (∅ 3.0-4.0 mm) 7F (∅ 4.5-4.8 mm)	6F	6F (∅???) 7F (∅???)	5F (∅2.5 – 4.0mm) 6F (∅4.5 – 5.0mm)
<b>Guide Wire</b>	0.014“	0.014“	0.014“	0.014“	0.014“
<b>Shaft Size</b>	2.7F dist. / 1.9F prox. 3.2F dist. / 1.9F prox. (4.5-5.0mm)	2.7F dist. 2.0F prox.	2.6F dist. 2.3F prox.	2.7F dist. 1.9F prox.	2.6 F dist. / 2.0F prox. 2.8F dist. / 2.0F prox. (4.0-5.0)
<b>Nominal Diameter @</b>	11 atm (∅2.5 – 5.0mm) 10 atm (∅4.5 – 5.0mm)	15 atm* *minimum deployment pressure	9 atm	8 atm	8 atm (∅2.5 – 3.5mm) 7 atm (∅4.0 – 5.0mm)
<b>Rated Burst Pressure @</b>	16 atm (∅2.5 – 5.0mm) 14 atm (∅4.5 – 5.0mm)	16 atm	15 atm	16 atm	16 atm (∅2.5 – 3.5mm) 14 atm (∅4.0 – 5.0mm)
<b>Crimped Profile</b>	< 1.30 mm (∅5.0x24 mm)	1.50 mm (∅ 4.8x26 mm)	1.44 mm (∅4.0x13mm)	1.63 mm (∅4.0x19 mm)	1.51 mm (∅5.0x26 mm)

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# Conclusions

- Respect Calcium
- Imaging should be strongly considered for PCI optimization of calcified lesions
- Meticulous attention to device sizing and “blind high pressure technique”
- Be mindful of increased risk of coronary perforations in calcified lesions and have a game plan for bail out



# THANK YOU



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