Intervention vs. Surgery in Unprotected Left Main Coronary Artery Disease

Toyohashi Heart Center

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Background

The present condition of PCI for unprotected left main coronary artery disease (ULM)

- **Increase of complicated cases:**
  - **Systemic diseases**
    - ✓ **Infectious disease**
    - ✓ **Cerebrovascular disease**
    - ✓ **Illness of Aorta and/or peripheral arteries**
  - **Ungraftable native coronary artery**
    - ✓ **Severe calcification, diffuse lesion (ex. HD pathents)**
- **Advent of new devices: Stents, DCA, Rotablator, etc.**
- **Improvement of operators' skill**

Background

- **Indication began to widely spread from high-risk to low-risk candidates;**
  - ✓ **with adequate consideration of indication**
  - ✓ **with proper device and procedures**
  - ✓ **by skilled operators with a lot of experiences**

Background

- **Advantages of PCI for ULM**
  - ✓ **Psychological matter of patients**
  - ✓ **Shorter admission**
  - ✓ **Repeatable**

Purpose

- **The purpose of present study is to evaluate the mid-term reliability of PCI for ULM comparing with those of CABG.**

Subjects

- **ULM cases who underwent revascularization therapy between May 1999 and November 2002 in our institute:**
  - **243 consecutive cases**
    - ✓**PCI: 104**
    - ✓**CABG: 139**
  - **Acute myocardial infarction containing both LAD and LCX occlusion was excluded.**

Standars for CABG rather PCI

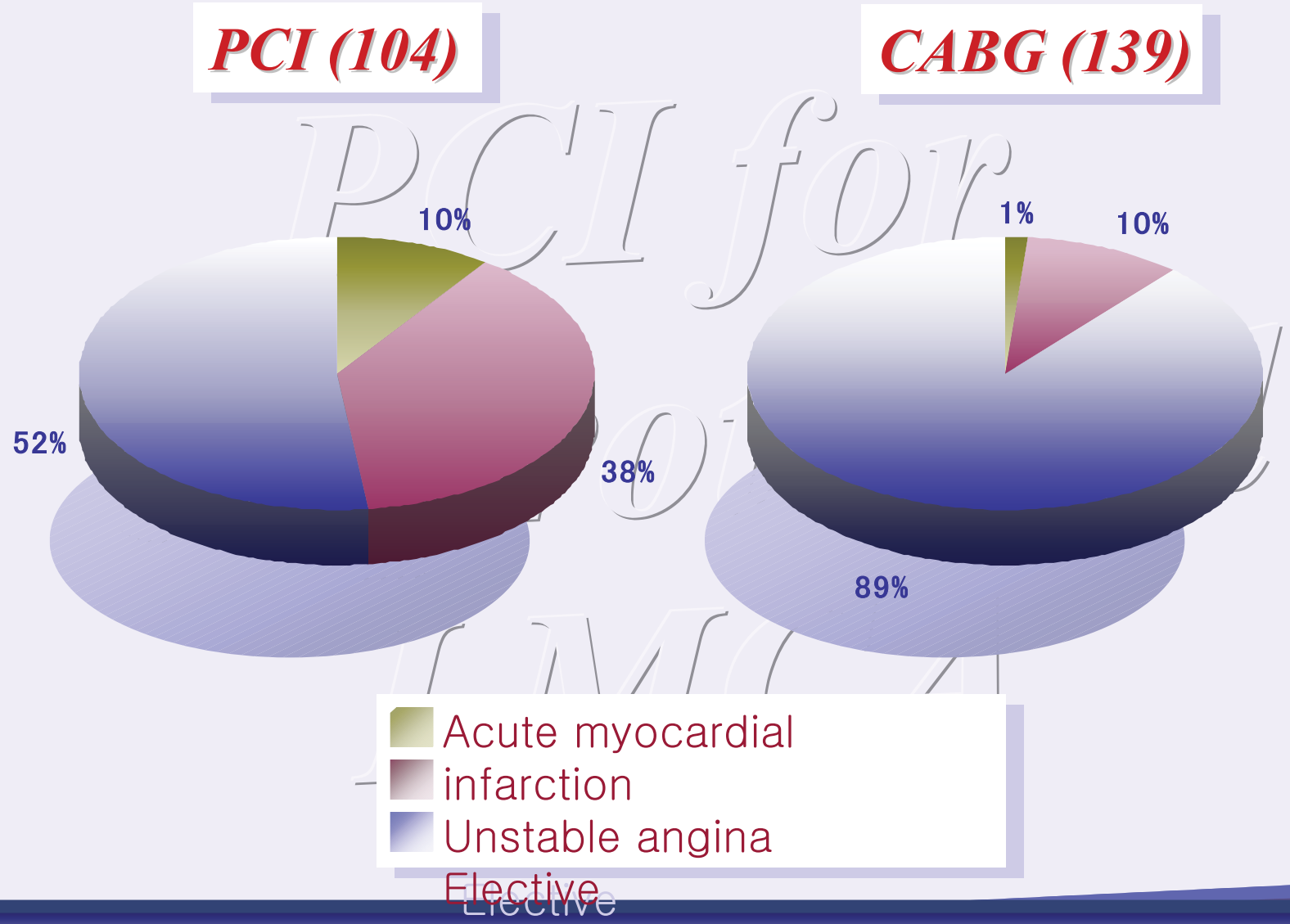
- Referral patient for surgery from other institutes
- Repeated PCI
- Inadequate morphology for PCI
  - ✓ Small left main (less than 3.5mm)
  - ✓ Triple vessel disease
  - ✓ Severely calcified lesion
  - ✓ Diffuse long lesion of LAD or LCX
  - ✓ Containing CTO
  - ✓ Severely bending

…not absolute criteria

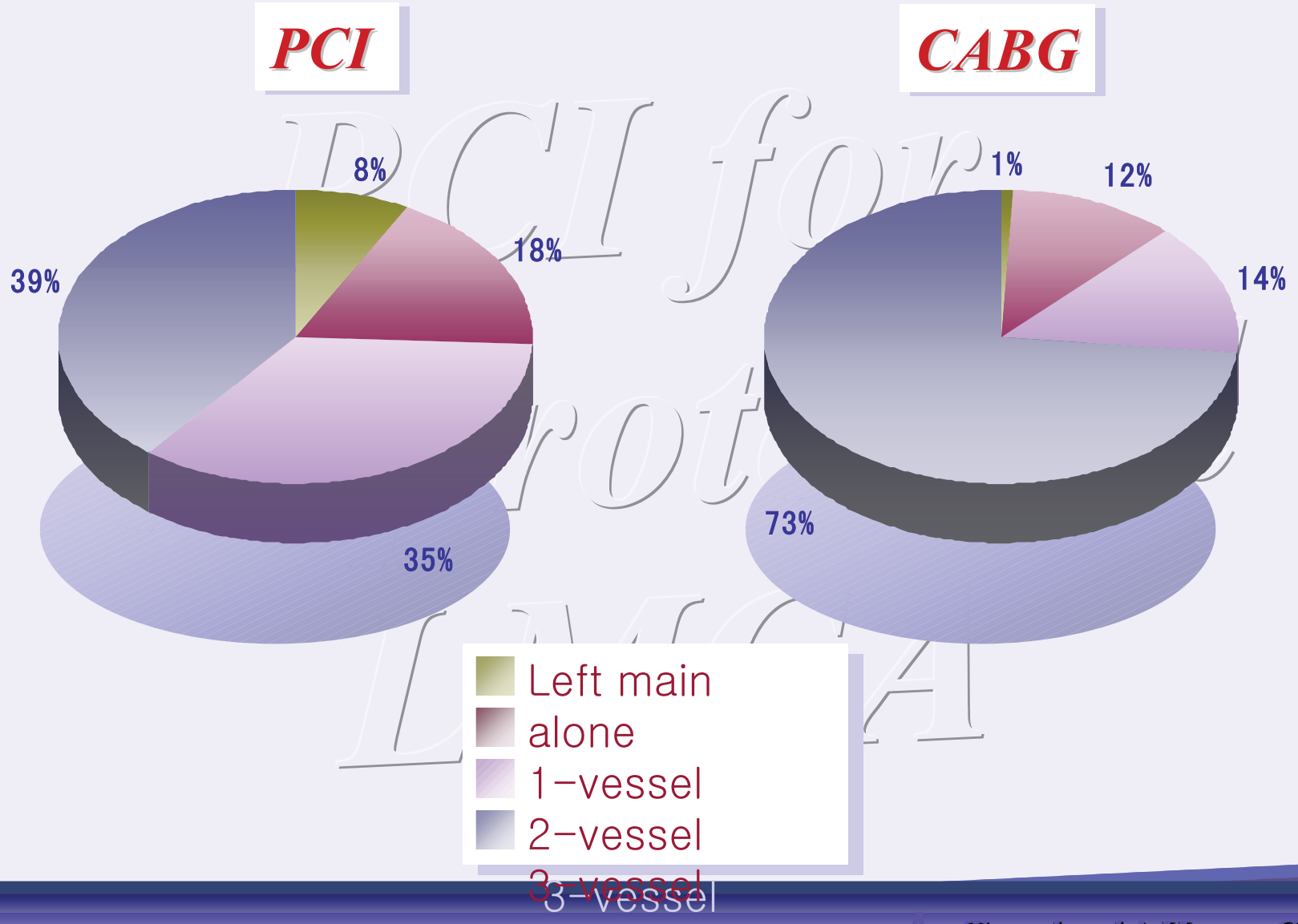
Baseline Characteristics

	PCI	CABG
Total No. , n	104	139
Age (yrs)	68.1±11.5	68.6±8.4
Male gender, n	81 (78%)	99 (71%)
DM, n	36 (35%)	26 (19%)
Cerebrovascular disease, n	7 (7%)	8 (6%)
Previous CABG, n	7 (7%)	-
Over 75 y.o., n	24 (23%)	25 (18%)
LVEF (%)	50.1±11.1	-
Clinical presentation at arrival		
AMI, n	10 (10%)	2 (1%)
UAP, n	40 (38%)	14 (10%)
Elective, n	54 (52%)	123 (89%)

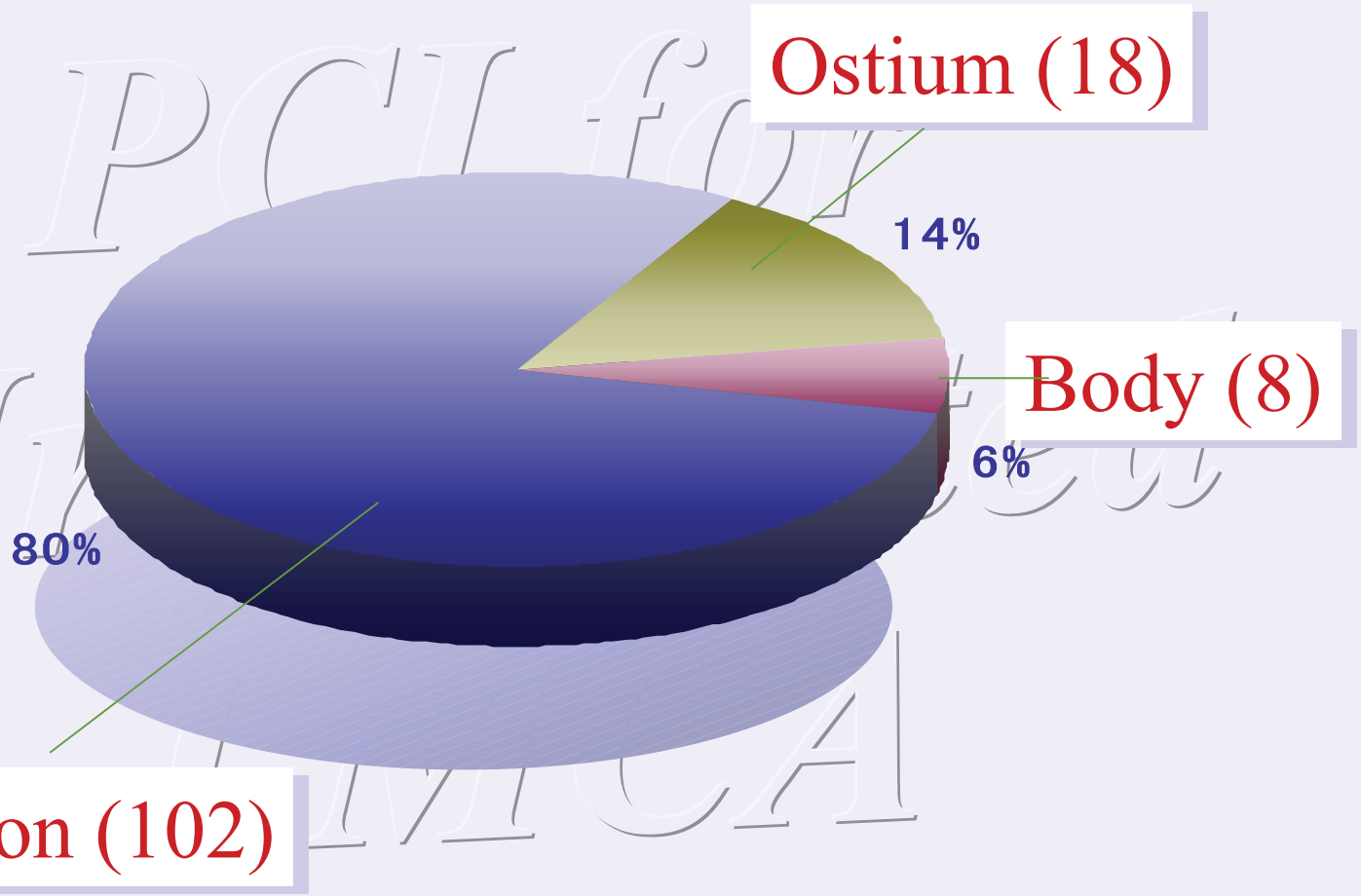
Status at arrival (PCI group)



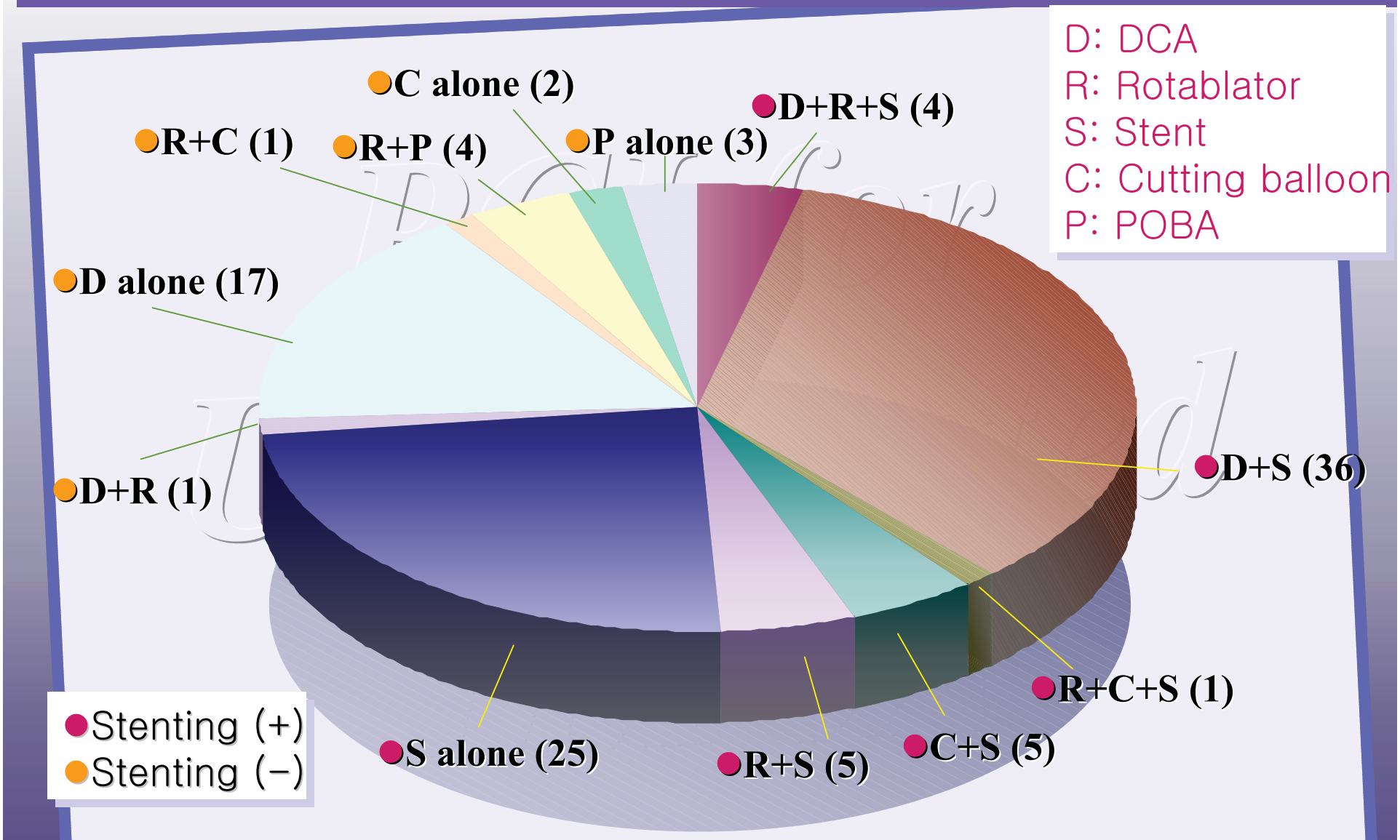
Number of Diseased Vessels



Lesion location (PCI group)



Procedure in PCI

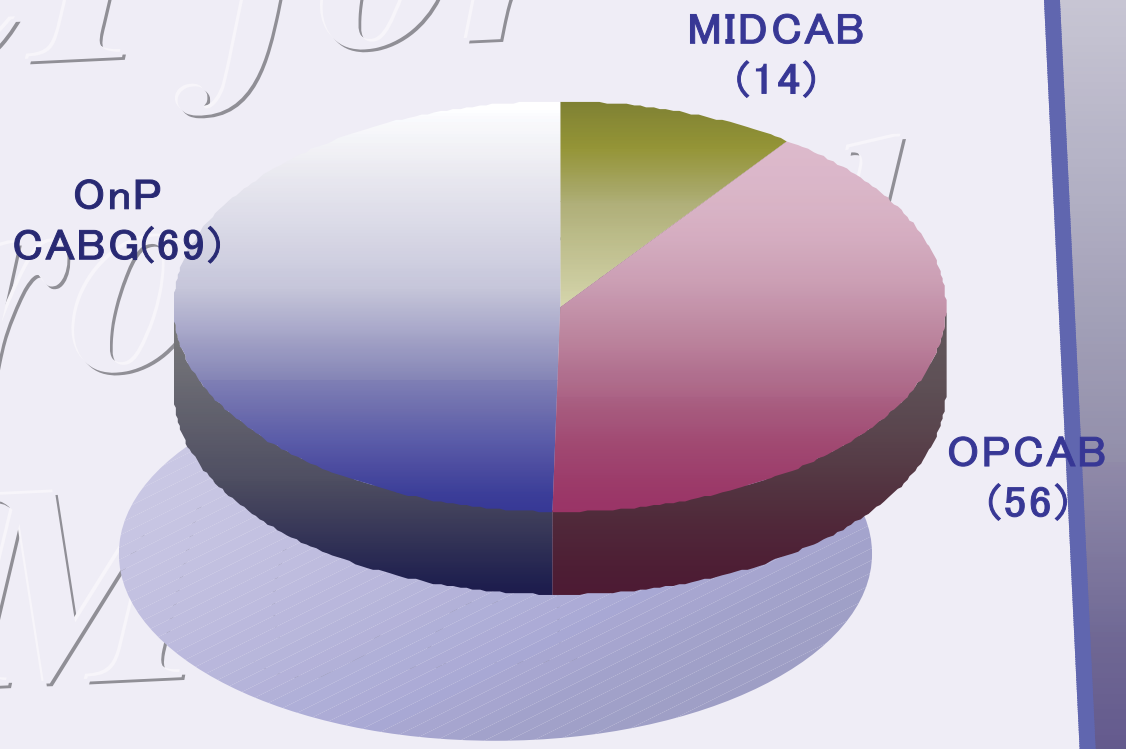


No. of Bypass and Procedure (CABG group)

No. of Bypass Grafts

Graft	n
1	15
2	48
3	46
4	22
5	8

Procedure



In-hospital Outcome

	PCI (n=104)	CABG (n=139)	p
Lesion success, n	104 (100%)	139 (100%)	ns.
Clinical success, n	102 (98%)	137 (99%)	ns.
Complications, n	2 (1.9%)	2 (1.4%)	ns.
Cardiac death, n	1 (1.0%) *	2 (1.4%) #	ns.
Non-cardiac death, n	1 (1.0%) **	0 (0%)	ns.
Q-myocardial infarction, n	0 (0%)	0 (0%)	ns.
Re-PCI or CABG, n	1 (1.0%) *	0 (0%)	ns.

*Low output syndrome with severe diffuse calcified lesion, rejected CABG.
**Peripheral hemorrhage.
#Both congestive heart failure.

Late Phase Outcome within 6 months

	PCI (n=104)	CABG (n=139)	p
Total death, n	4 (3.8%)	7 (5.0%)	ns.
Cardiac death, n	2 (1.9%)	5 (3.6%)	ns.
Non-cardiac death, n	2 (1.9%)	2 (1.4%)	ns.
Q-MI, n	0 (0%)	1 (0.7%)	ns.
TVR, n	17 (16.3%)	4 (2.9%)	0.0002

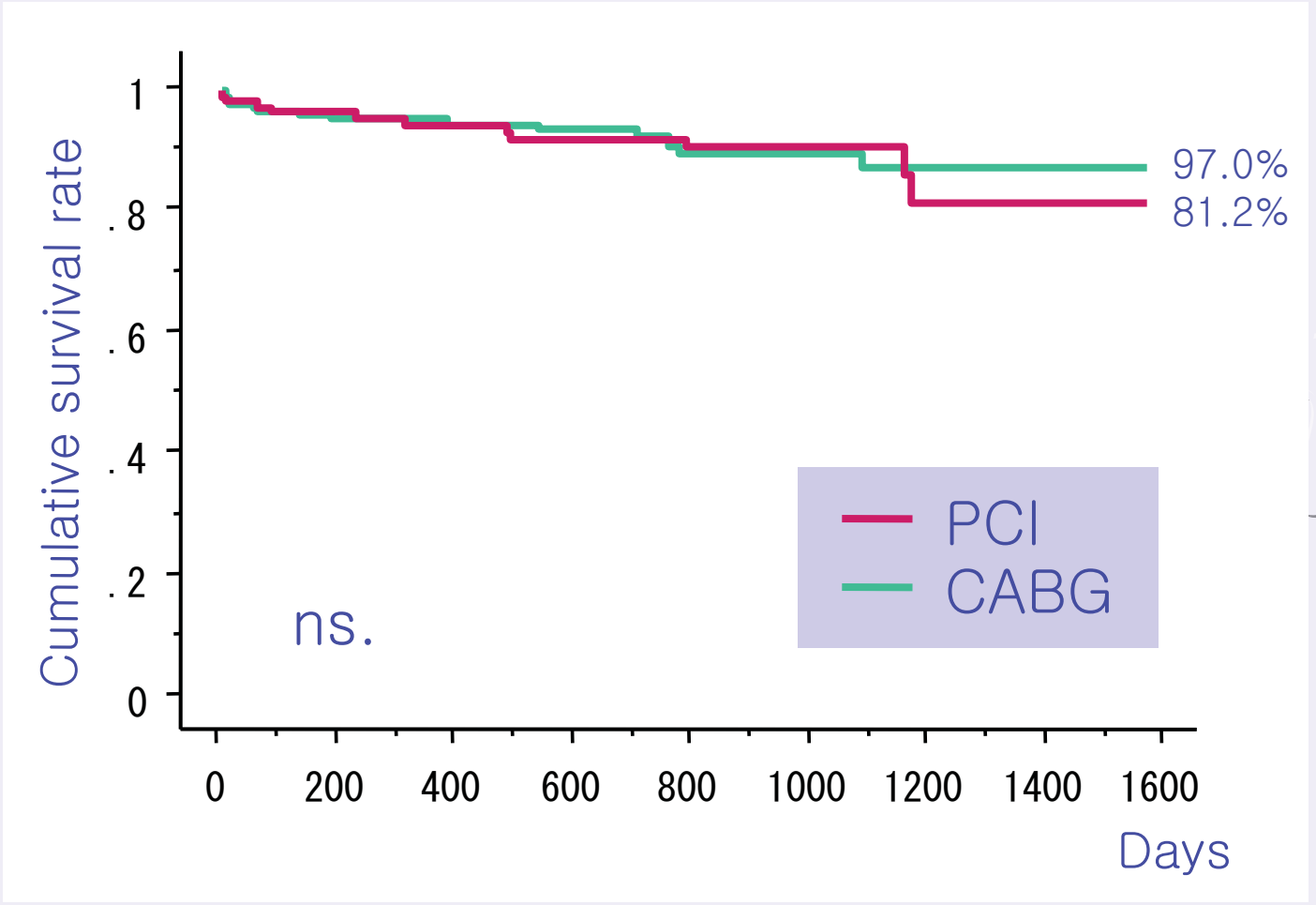
Latephase Outcome within 4 years

	PCI (n=104)	CABG (n=139)	p
Total death, n	10 (9.6%)	13 (9.4%)	ns.
Cardiac death, n	2 (1.9%)	5 (3.6%)	ns.
Cardiac death, MI and TVR, n	20 (19.2%)	19 (13.7%)	ns.
TVR, n	17 (16.3%)	7 (5.0%)	0.0024
Any revascularization, n	42 (40.4%)	14 (10.1%)	<0.0001

Cumulative Survival Rate

(Death-free for any reason)

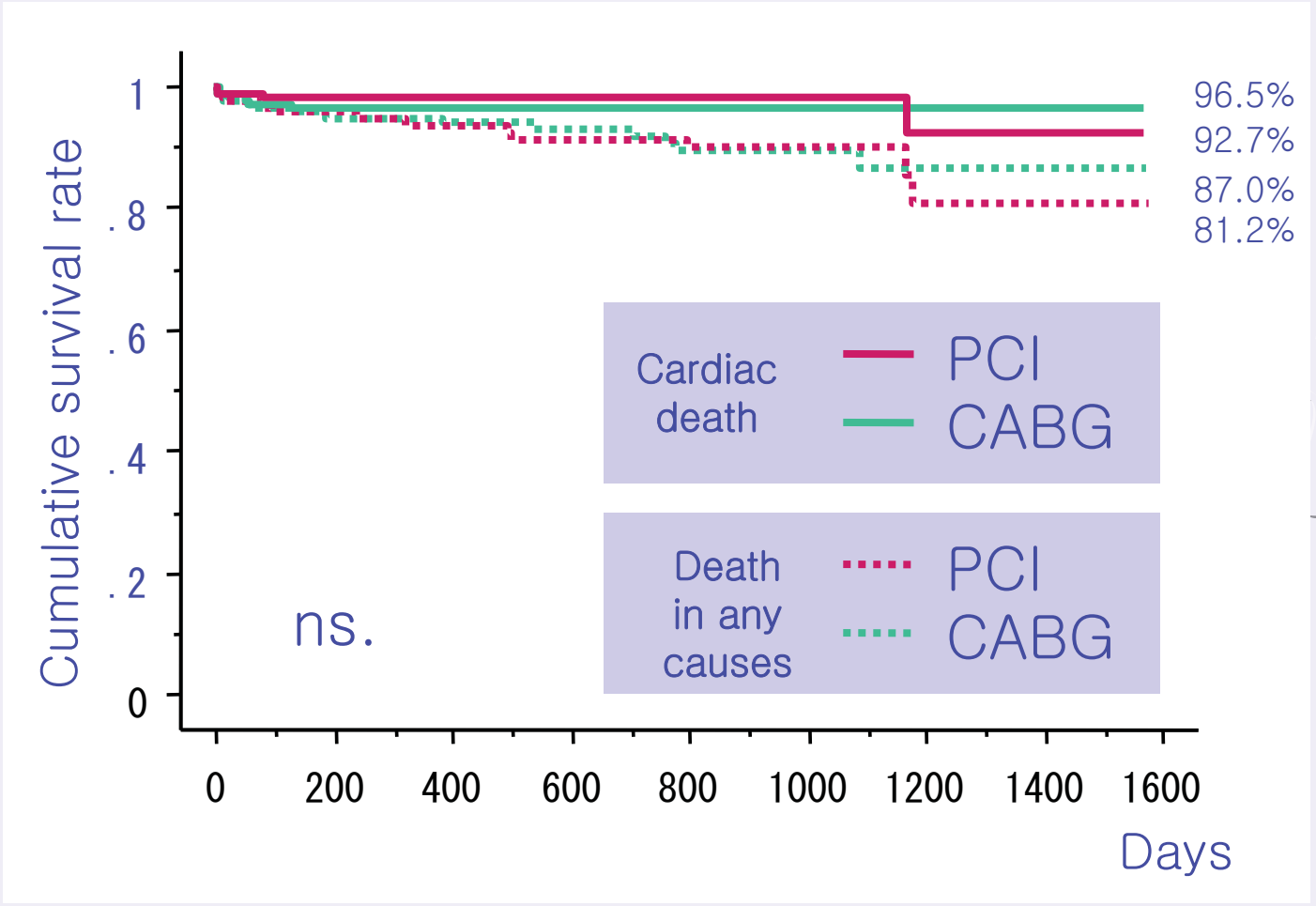
Kaplan-Meier method



Cumulative Survival Rate

(Cardiac death-free)

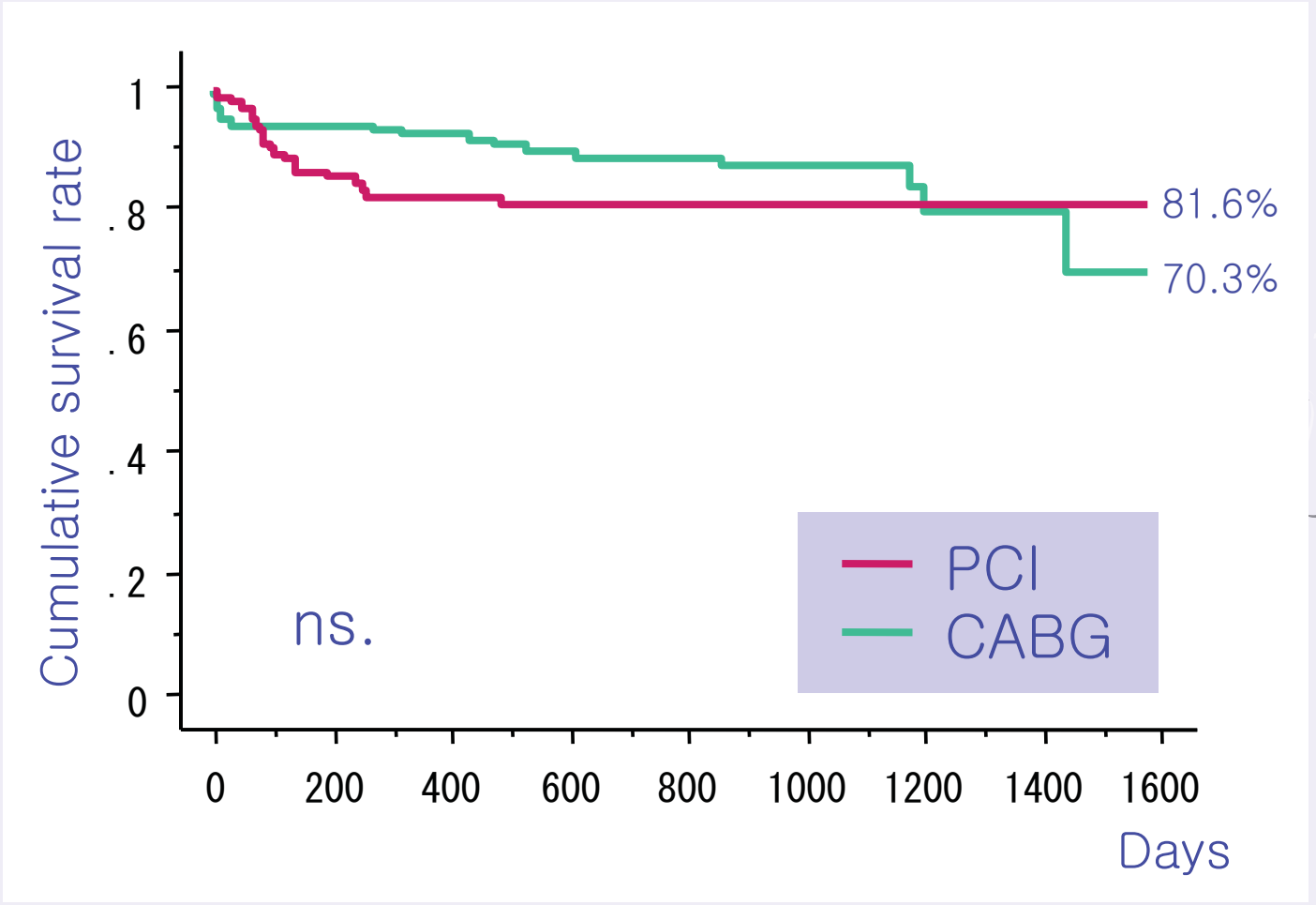
Kaplan-Meier method



Cumulative MACE-free Rate

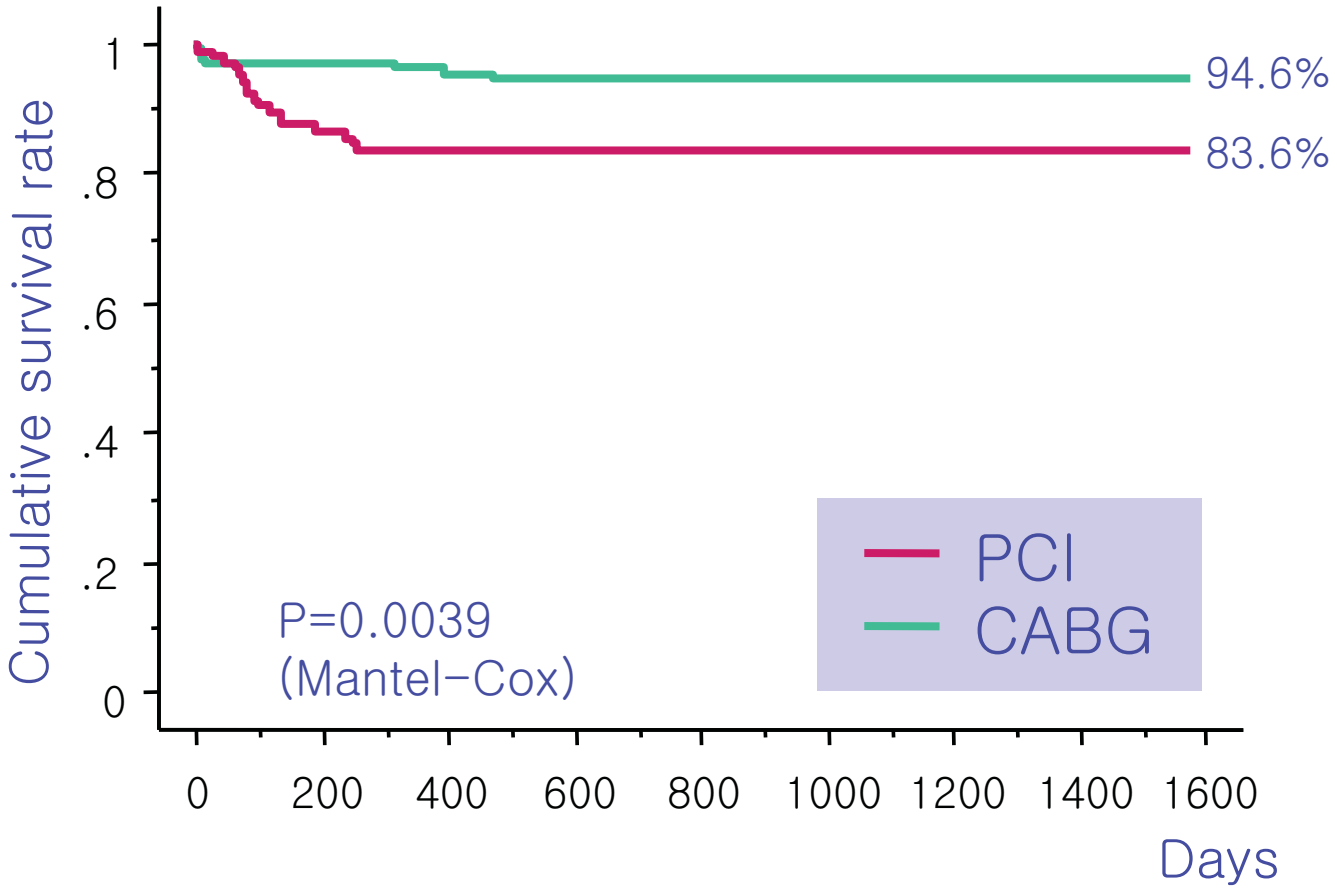
(MACE: Death, MI, TVR and CHF)

Kaplan-Meier method



Cumulative TVR-free Rate

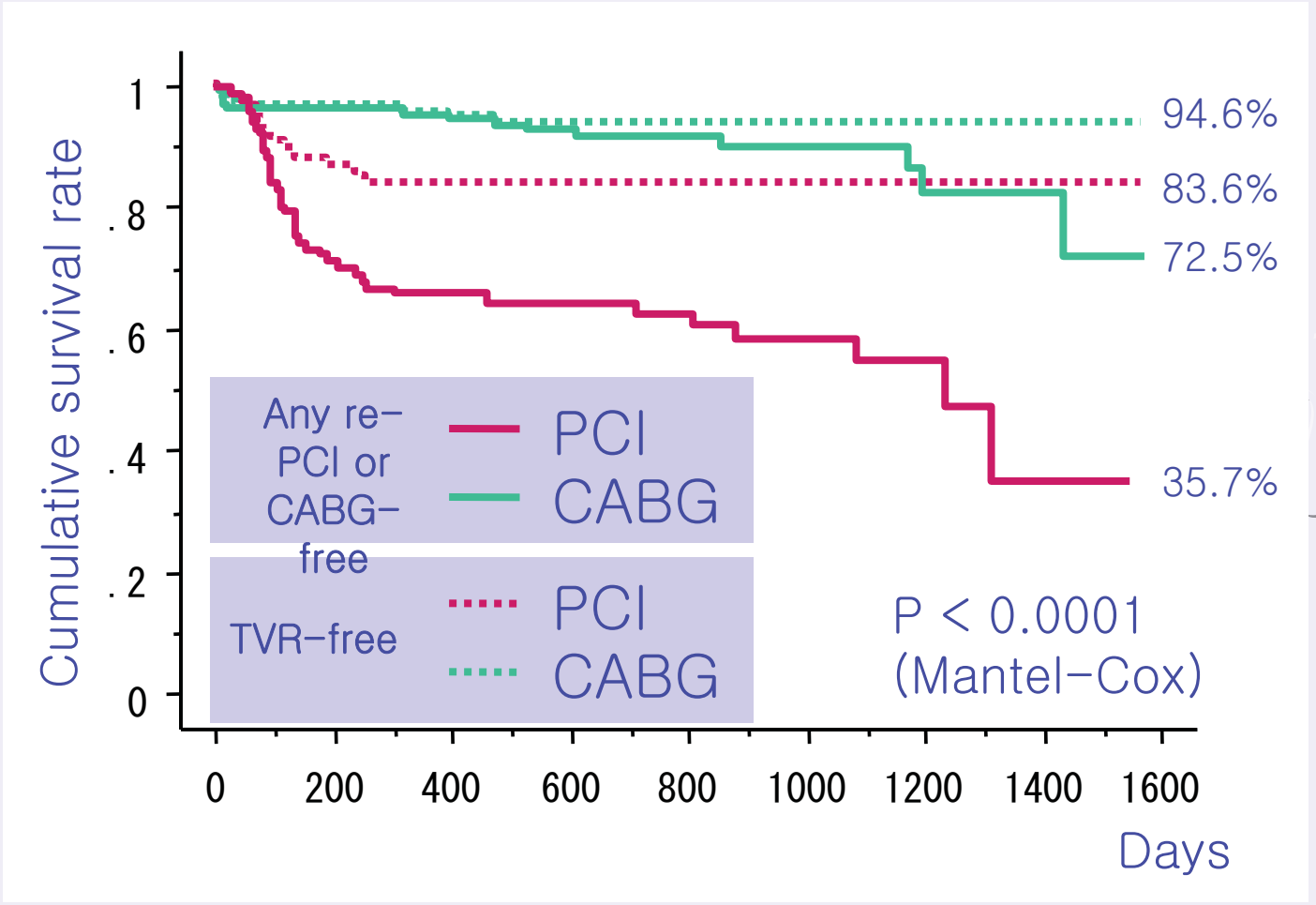
Kaplan-Meier method



Cumulative Any Revascularization-free Rate

(including progressive or restenosis lesion of non-target vessel)

Kaplan-Meier method



Change in Cardiac Death and TVR rate

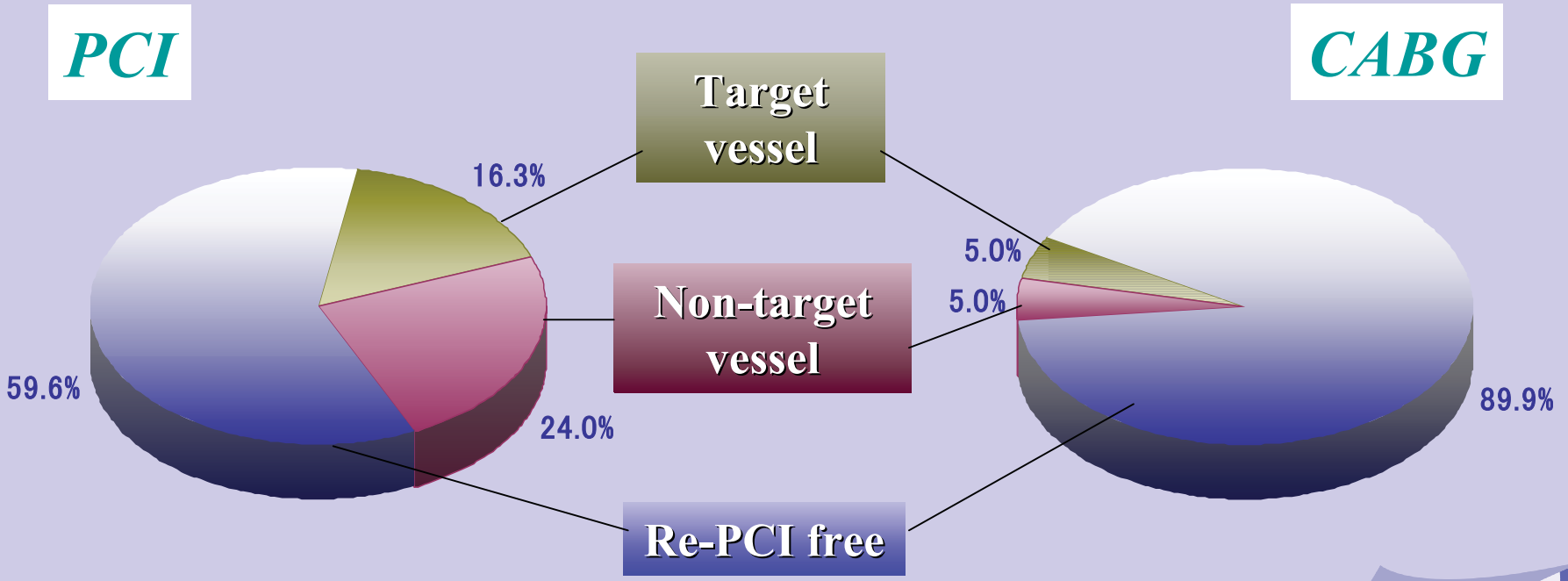
Change in Cardiac Death Rate

	PCI (n=104)	CABG (n=139)	p
In-hospital, n	1 (0.9%)	2 (1.4%)	ns.
6 months, n	2 (1.9%)	5 (3.6%)	ns.
4 years, n	2 (1.9%)	5 (3.6%)	ns.

Change in TVR Rate

	PCI (n=104)	CABG (n=139)	p
In-hospital, n	1 (1.0%)	0 (0%)	ns.
6 months, n	17 (16.3%)	4 (2.9%)	0.0002
4 years, n	17 (16.3%)	7 (5.0%)	0.0035

Contents of Revascularization within 4 years



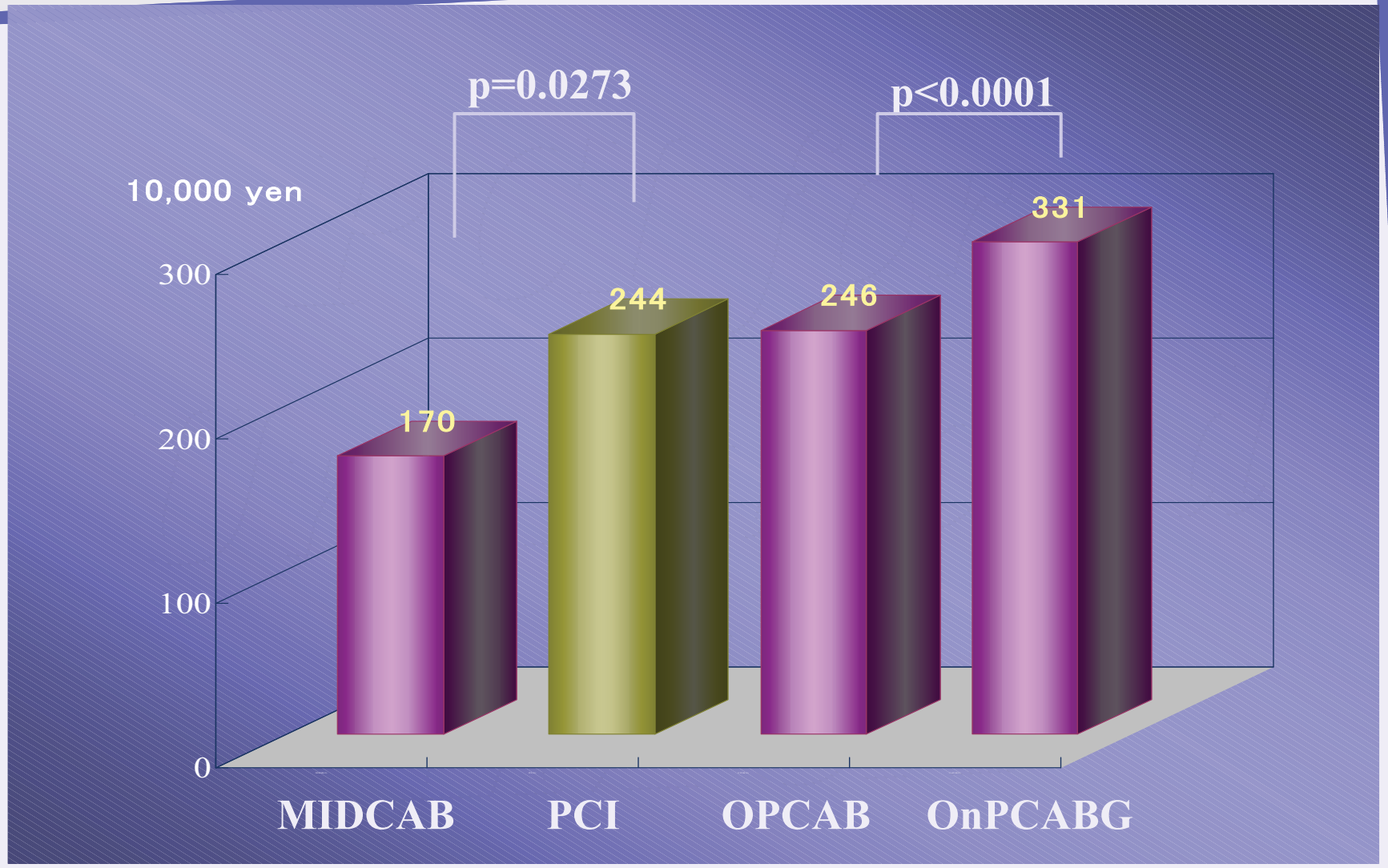
Contents of Target Lesion Revascularization

PCI cases (n = 17)

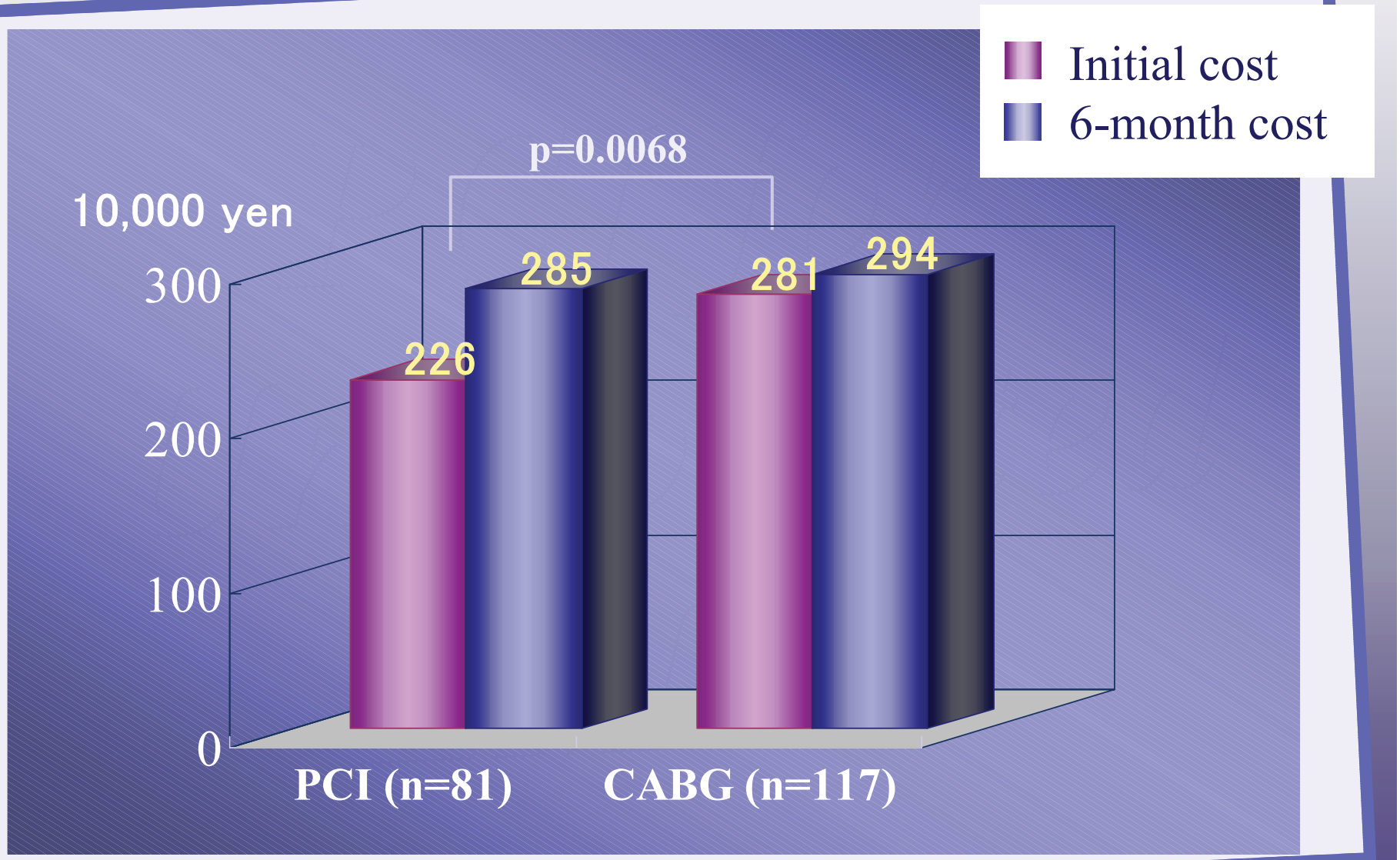
CABG	**11**
Stent	**2**
Cutting balloon	**2**
DCA	**1**
None (died in other institute	**1**

In-Hospital Days

Initial Costs



Initial and 6-months Cumulative Costs



Summary (1)

- Initial success rate was 100% in both groups. There were 1 and 2 in-hospital cardiac death in each group, respectively.
- Cardiac death rate at 6 months was 1.6% and 3.6% in each group (no significance). TVR rate at 6 months was significantly higher in PCI group (16.3% vs. 2.9%, p = 0.0002).

Summary (2)

- **Cumulative cardiac death-free rate of both groups were quite similar (98.1% vs. 96.4%), although the rate of any adverse cardiac events was higher in CABG group (no significance).**
- **Cumulative TVR rate at 4 years was significantly lower in PCI group than CABG group (94.5% vs. 82.9%, p = 0.0032). Also, revascularization-free rate was significantly lower in PCI group (51.4% vs. 72.4%, p < 0.0001).**

Conclusion

- **PCI for ULM is acceptable in the aspect of safety and prognosis: mid-term survival rate and adverse events. Although, target lesion revascularization and total re-PCI is significantly more frequent than CABG. That is still an issue of PCI in general.**
- **Proper case selection (good systemic condition and cardiac function, large vessel size, simple lesion morphology, etc.) may improve the outcome.**

PCI for Unprotected Left Main Lesion

Unprotected LMCA

Debulking Stent

Case: K.N.(11746) 77 y.o. Male

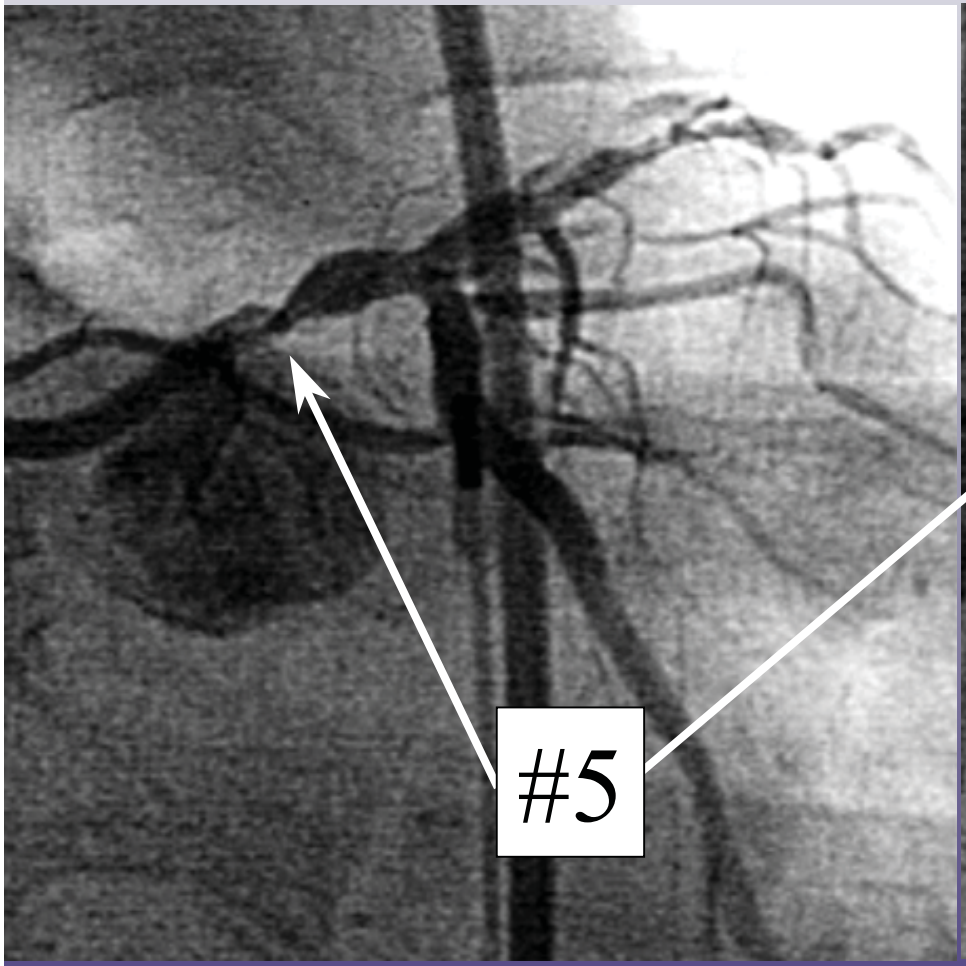
- **Diagnosis : Unstable Angina**
- **CCS angina class : Class-II**
- **Prior PCI : None**
- **Coronary Risk Factors : Hypertention**
- **CAG findings (Sep.5, '91)**

LVG: Seg.2,3,6 mildhypokinesis, LVEF=56%

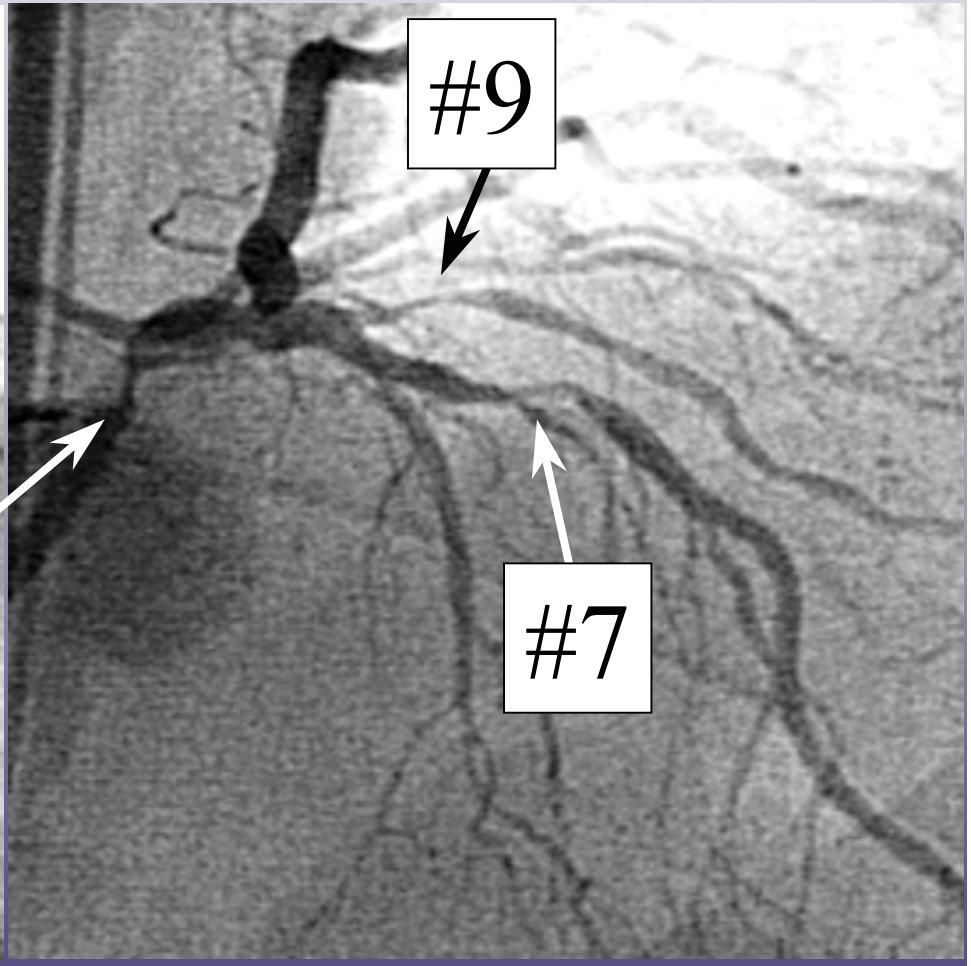
CAG: Seg.5:90%, Seg.7:90%, Seg.9:99%
Seg.4PL:90%

Target lesions

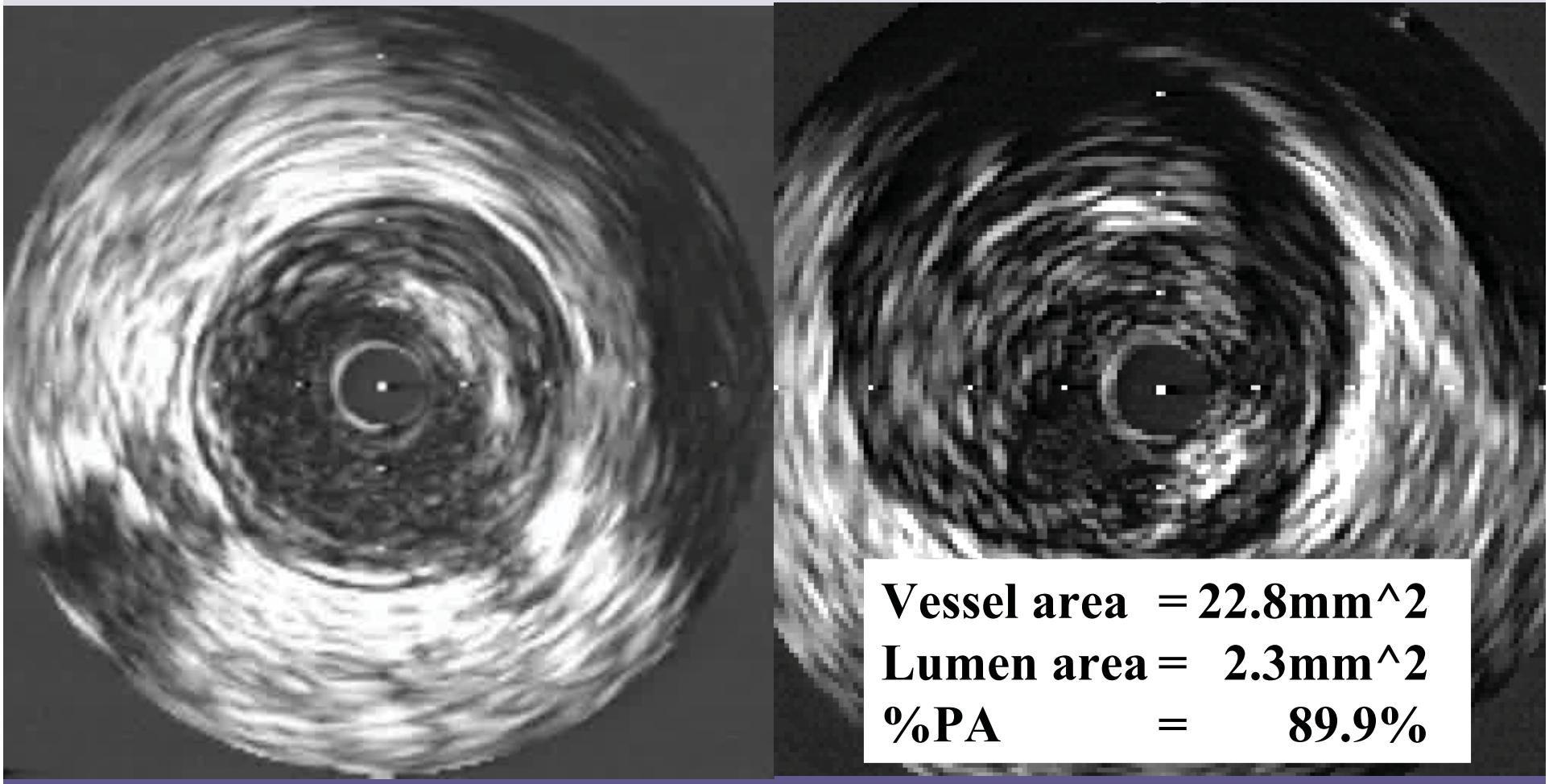
Straight Caudal View



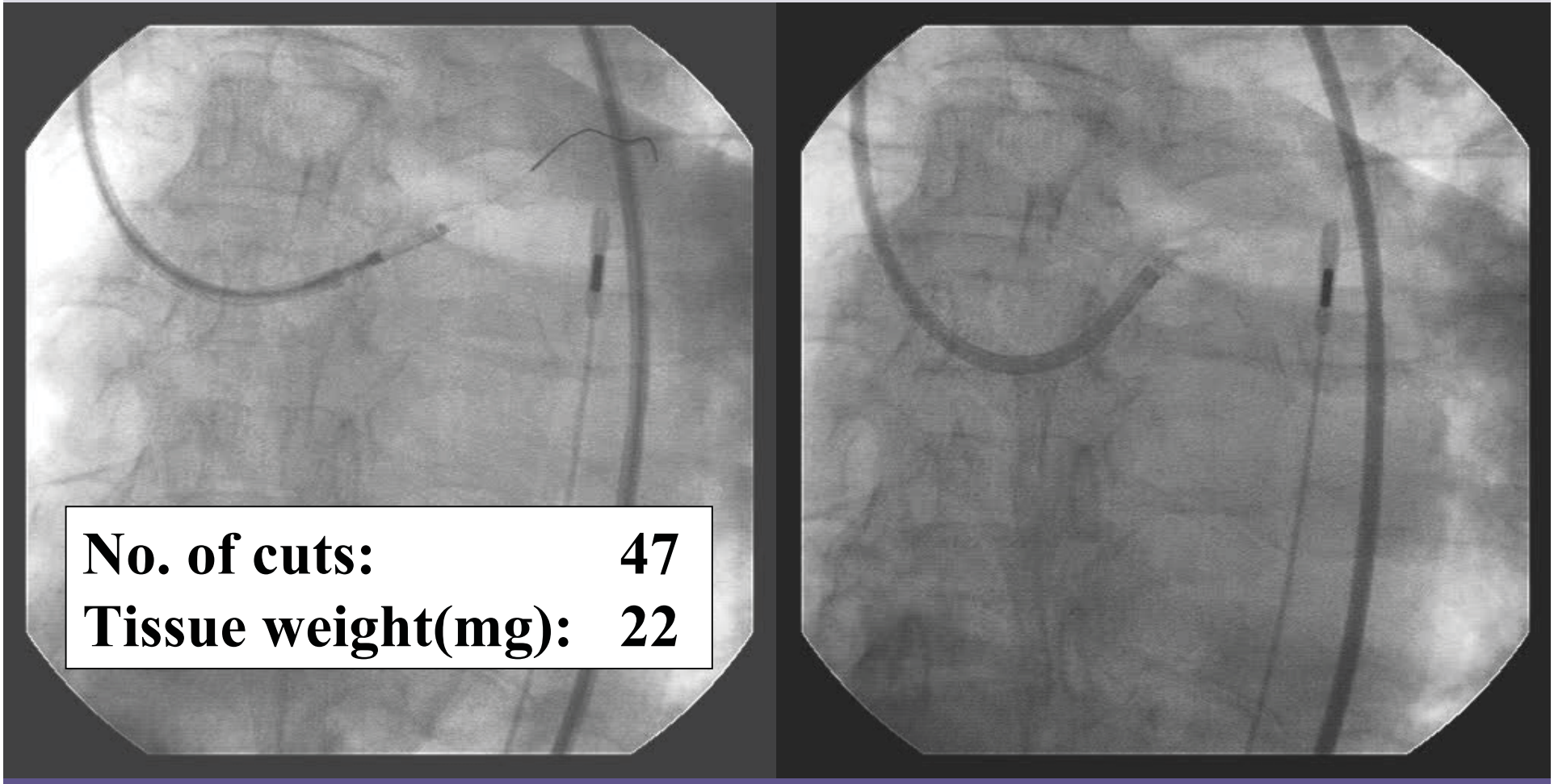
Straight Cranial View



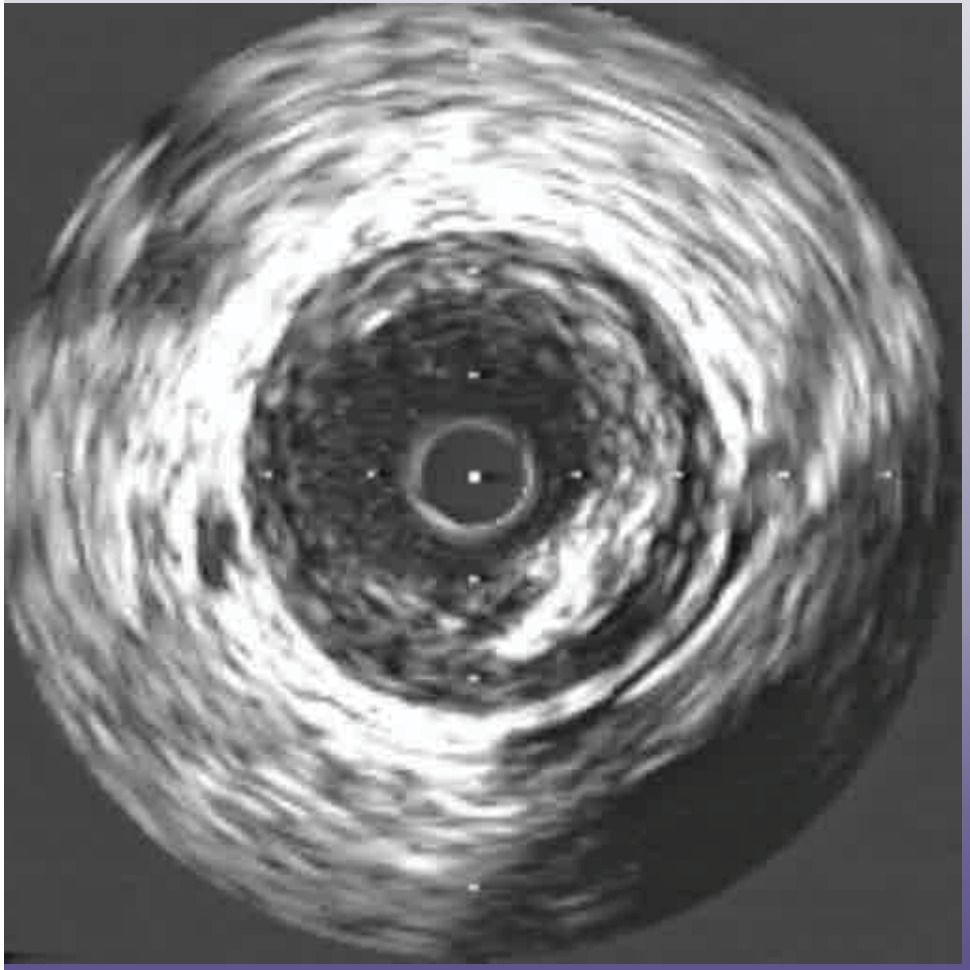
Baseline IVUS

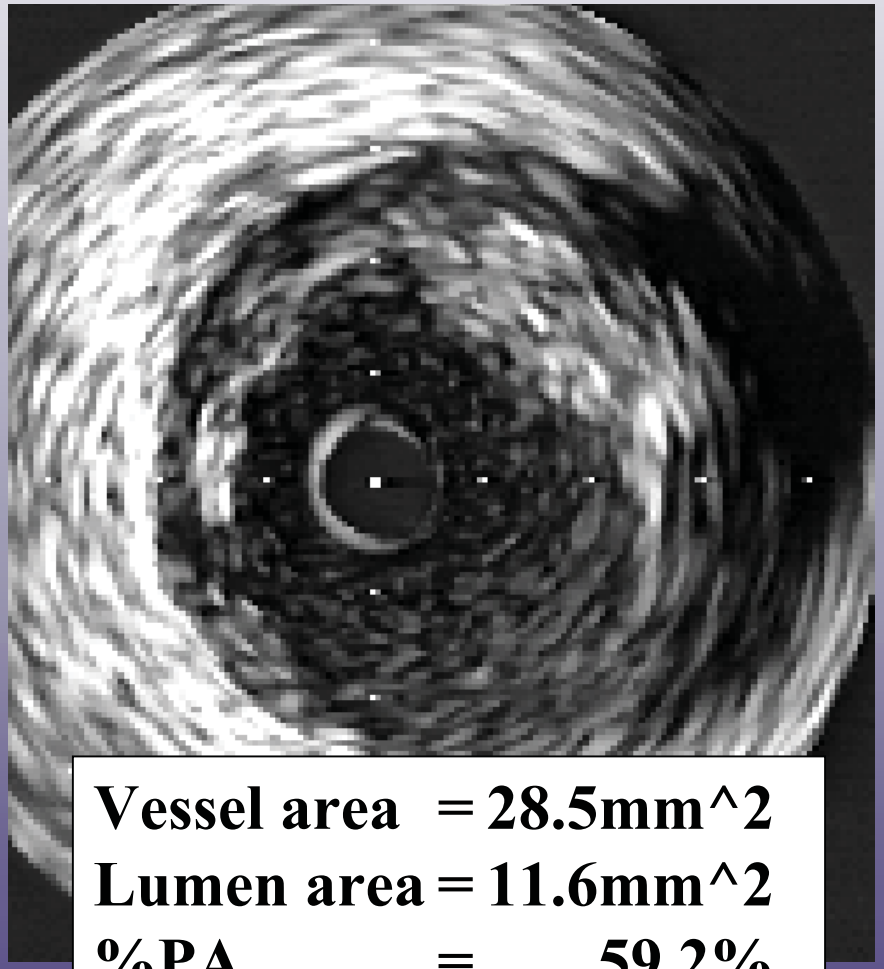


DCA for LMT (Flexi-cut™ L)



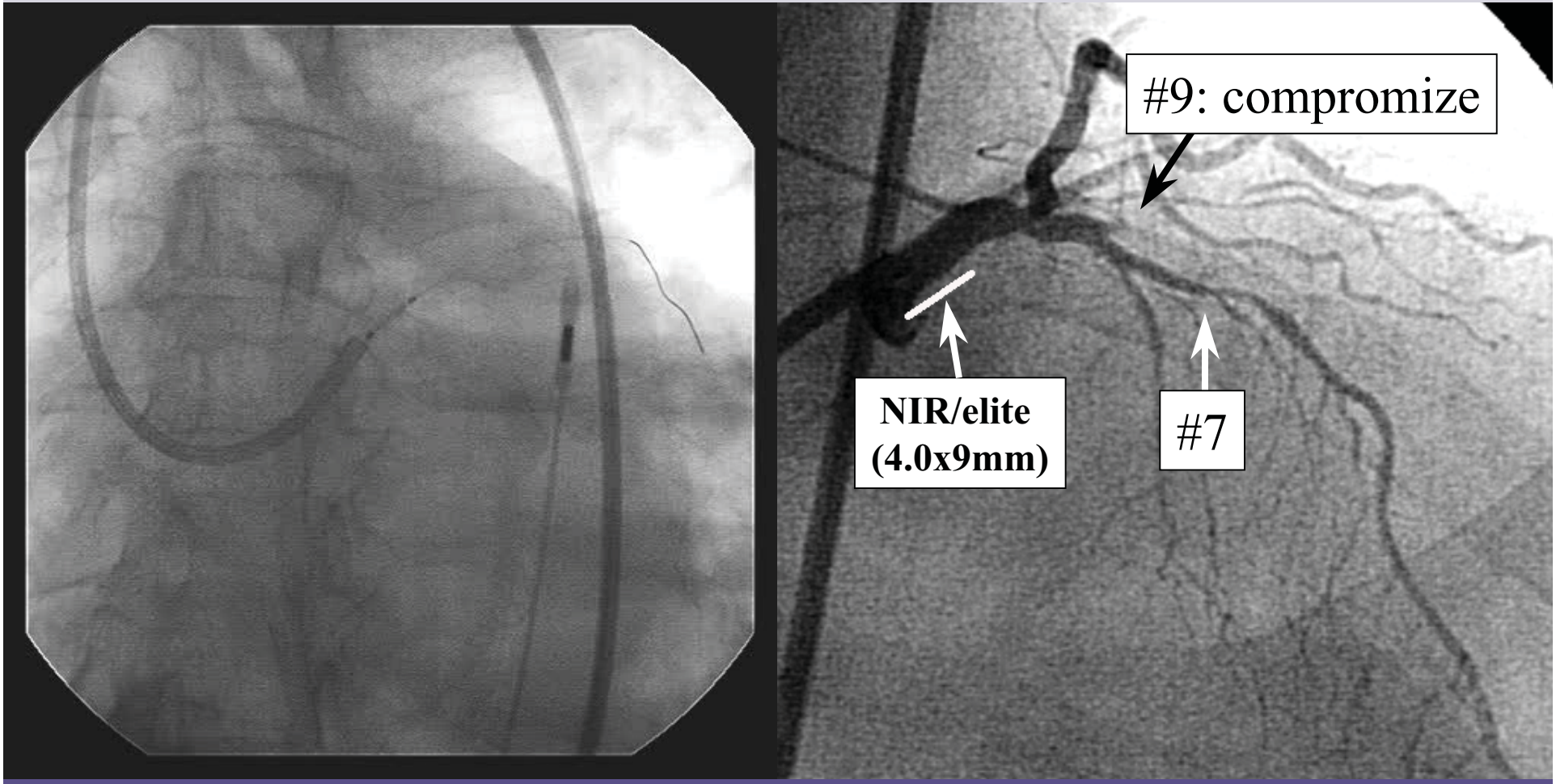
IVUS (post DCA)



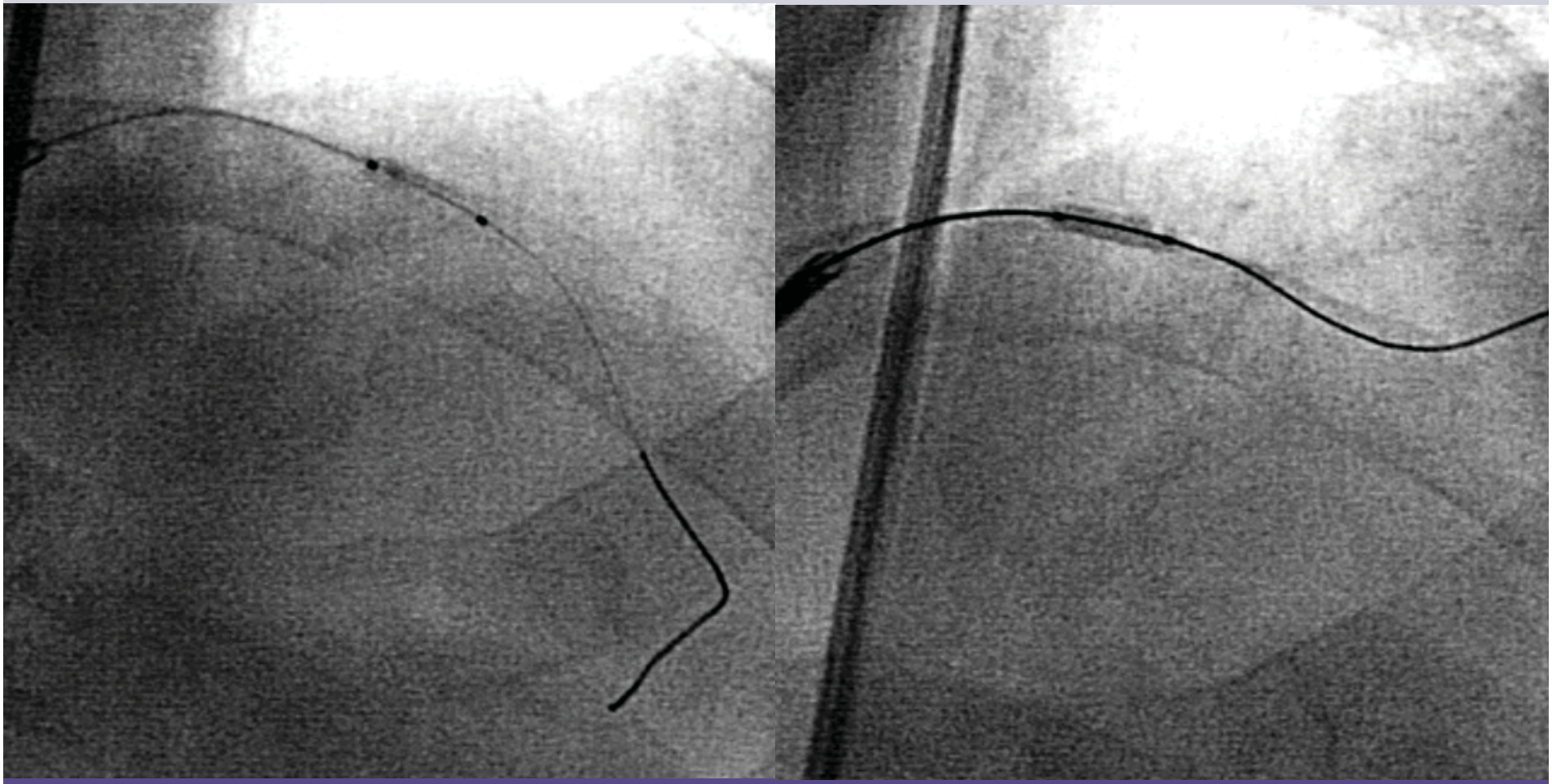


Vessel area = 28.5mm^2
Lumen area = 11.6mm^2
%PA = 59.2%

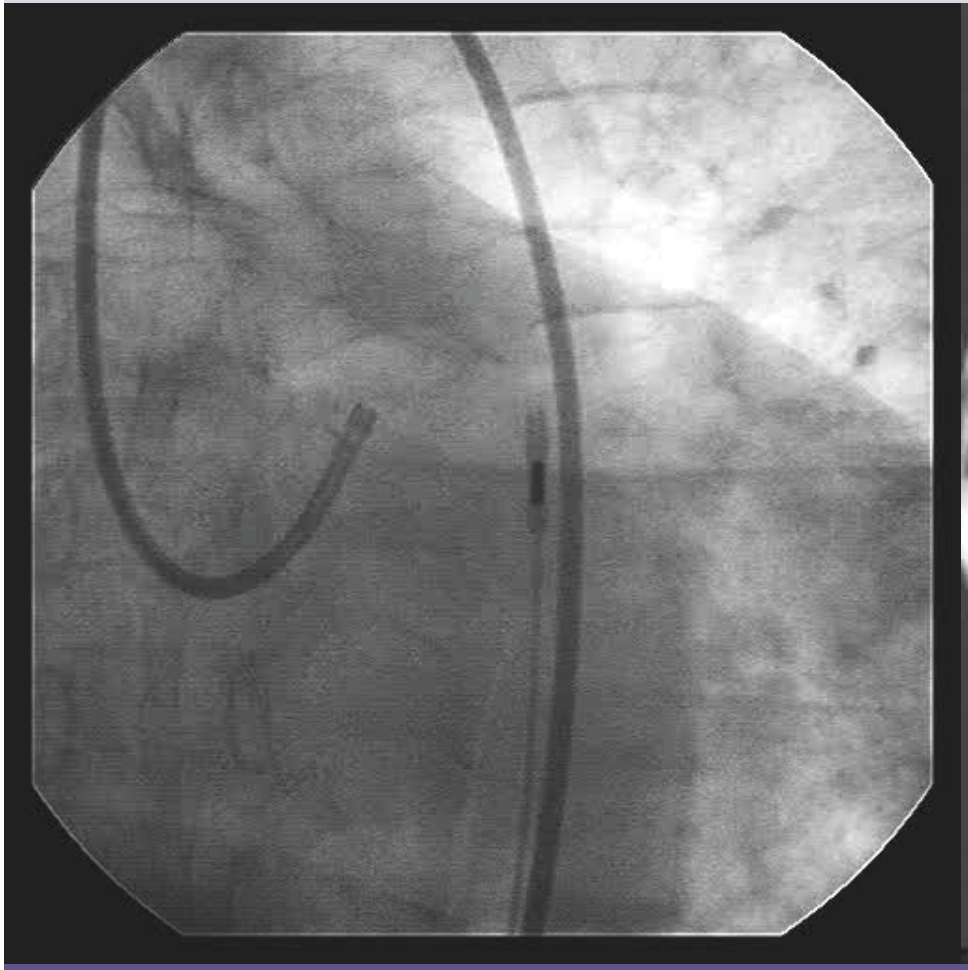
Stenting for LMT (NIR/E 4.0x9mm)

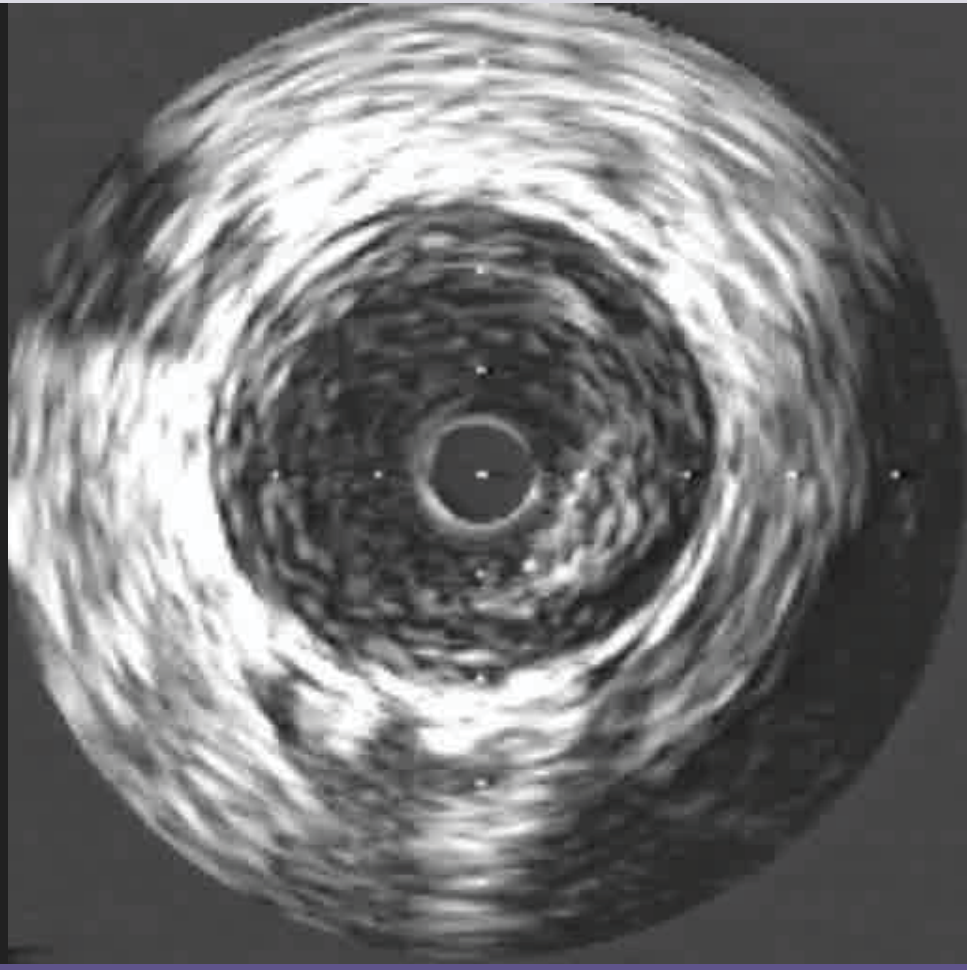


Cutting balloon(3.0x10m) for LAD & D1

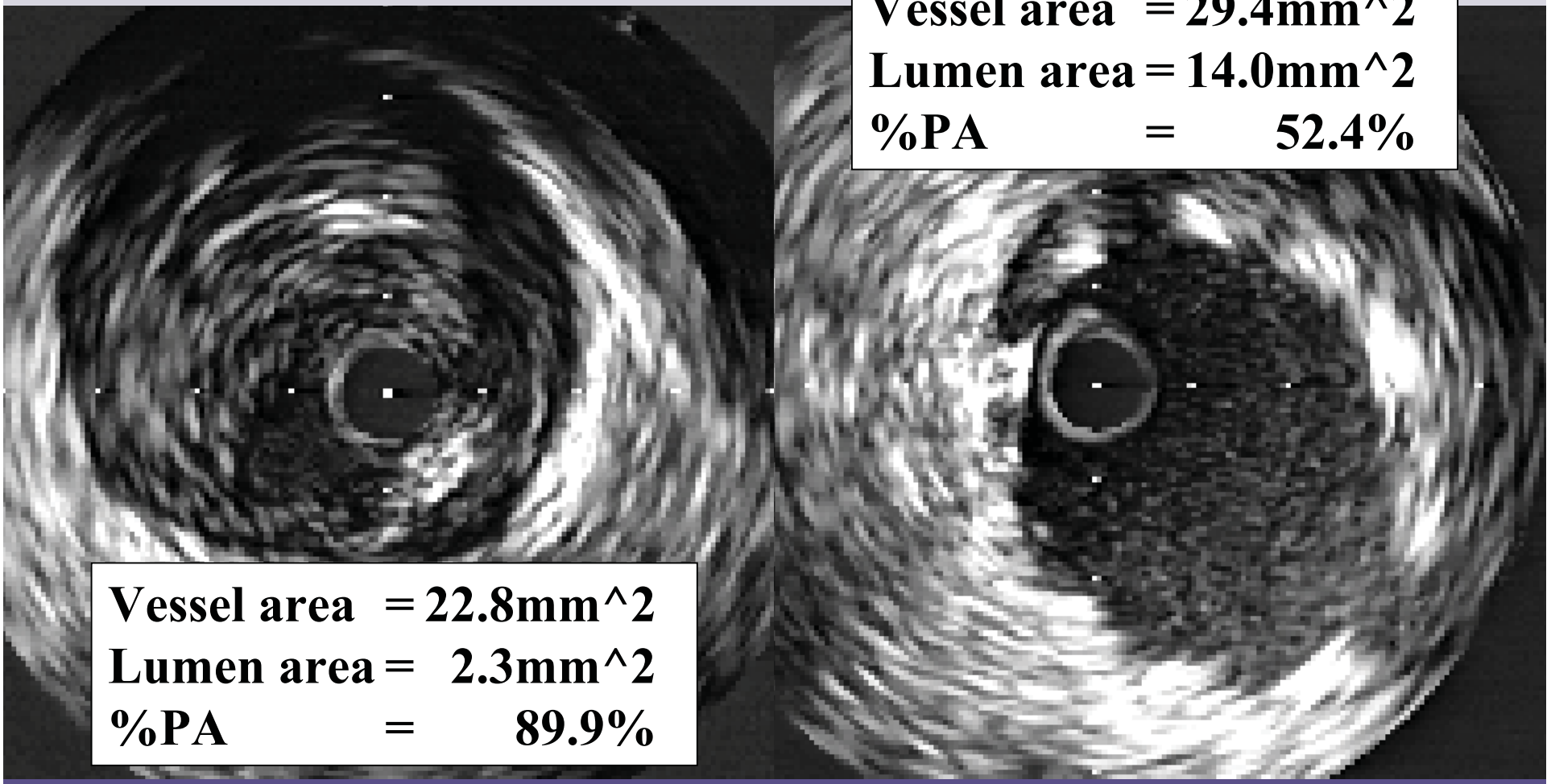


Final CAG & IVUS





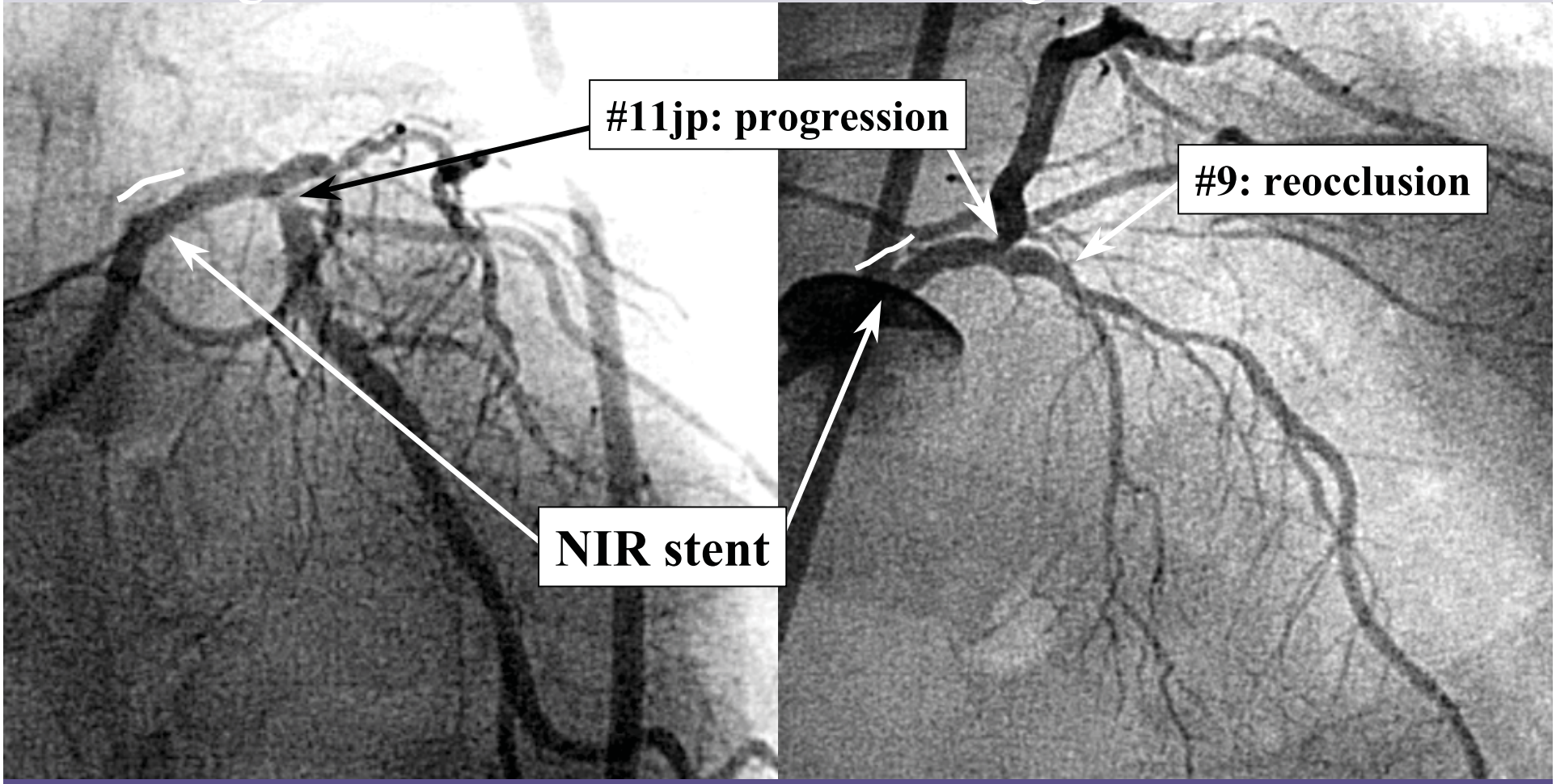
IVUS (baseline vs. final)



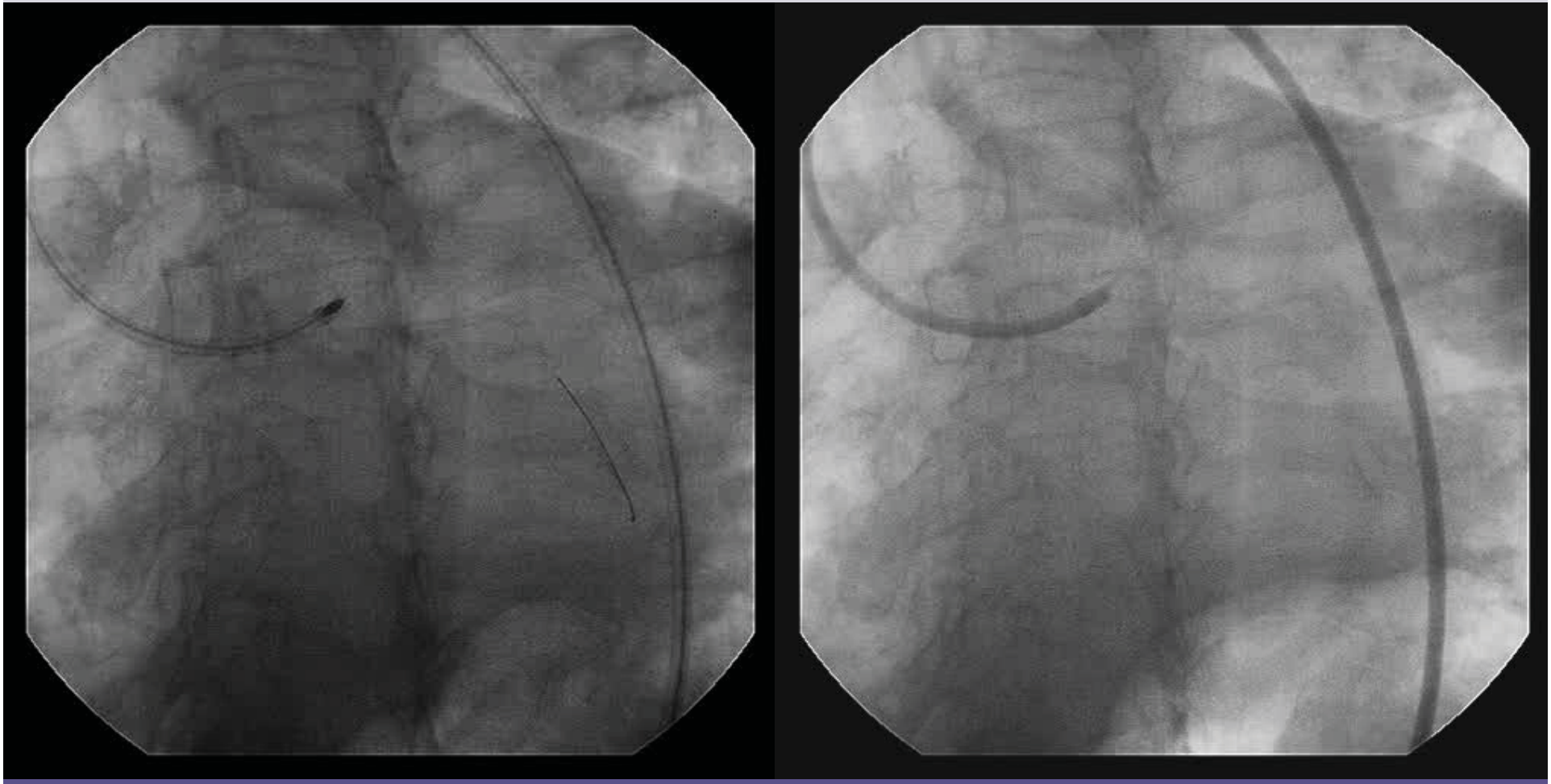
Left Coronary Artery

Straight Caudal View

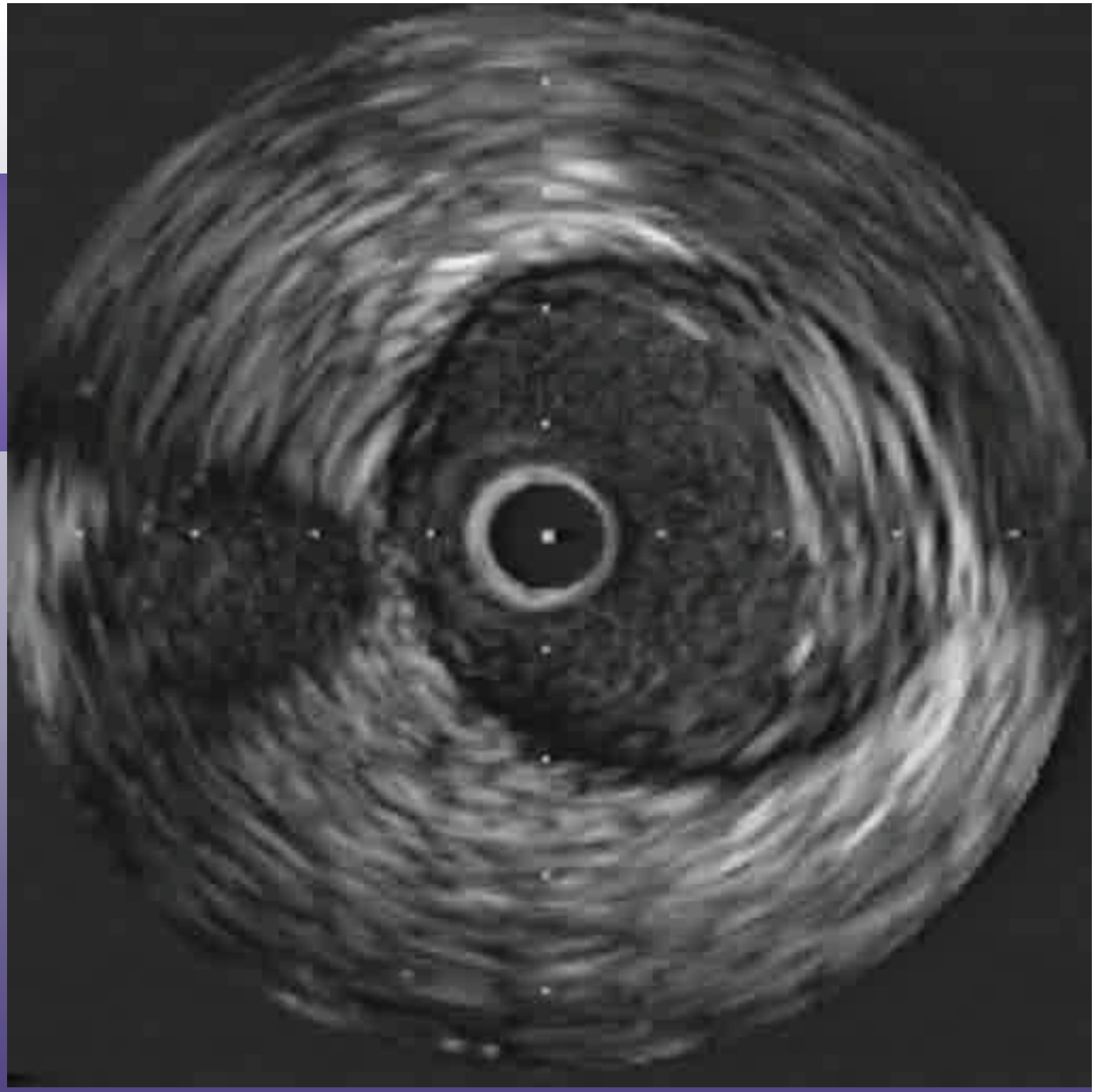
Straight Cranial View

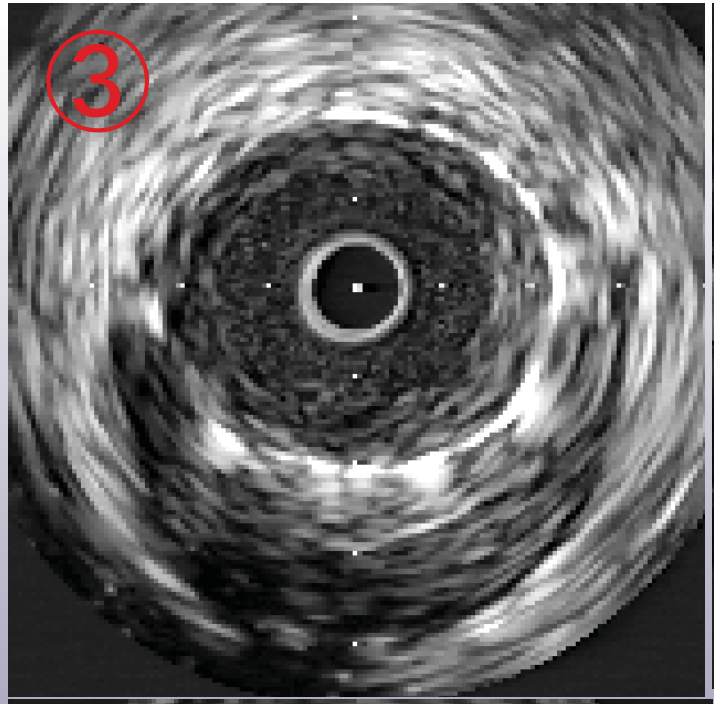


Rota ablation (1.75→2.25mm)



IVUS
(post Rotablator
/1.75mm)

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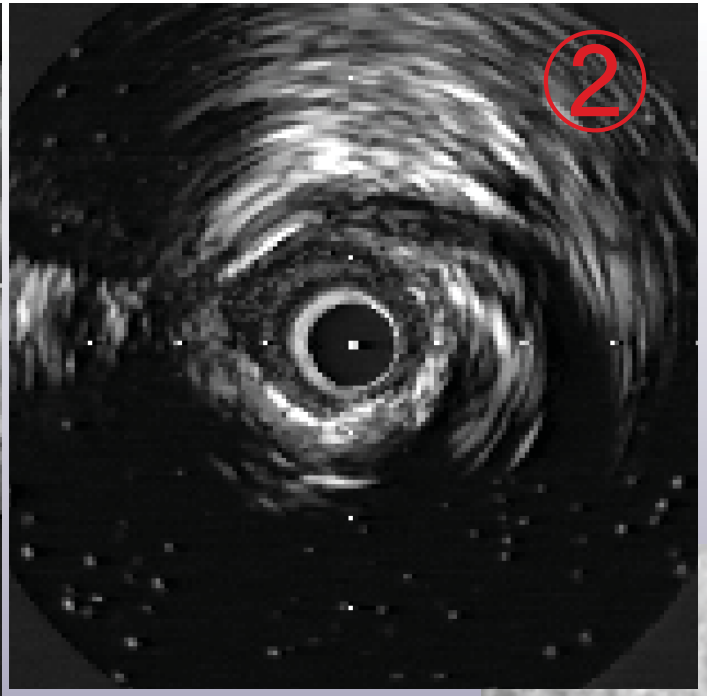
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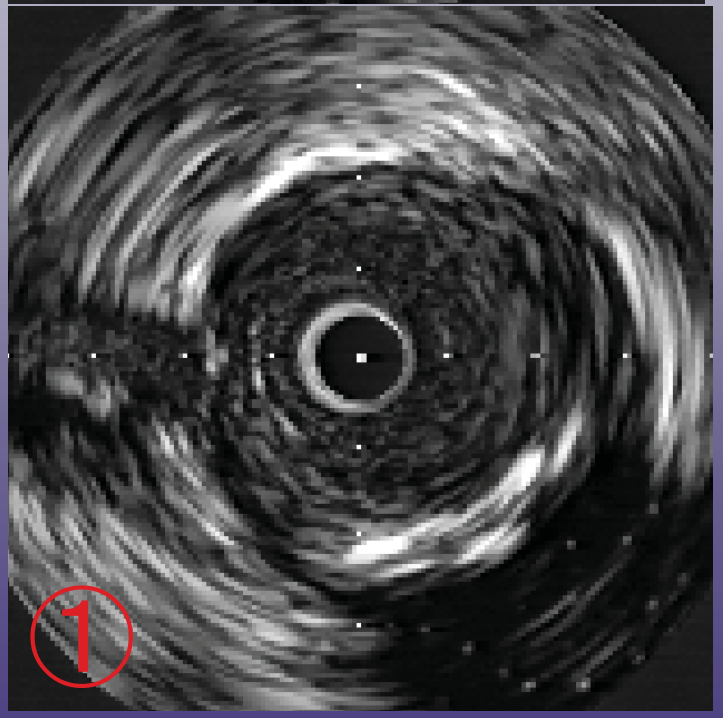
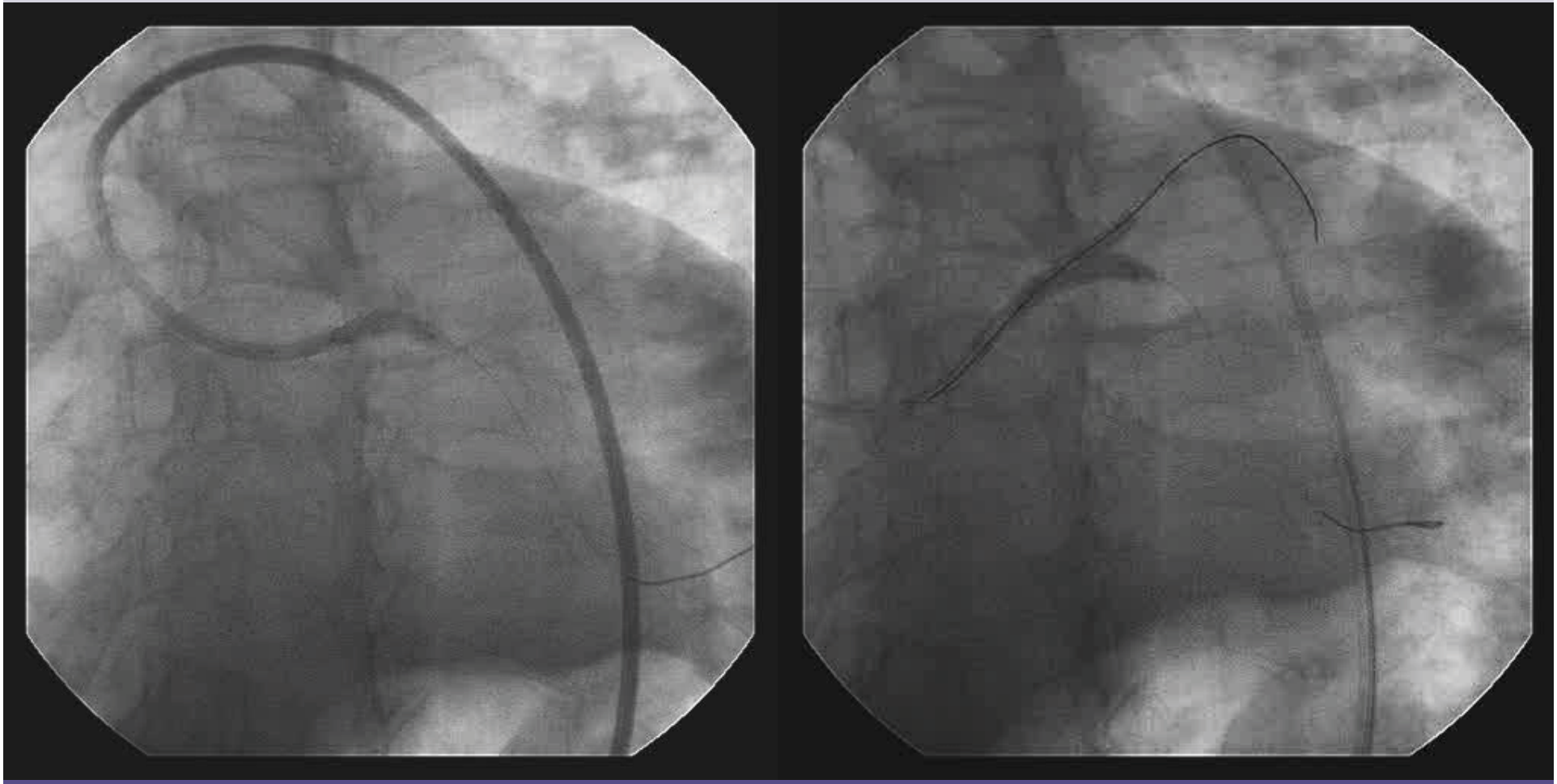

1


③
②
①

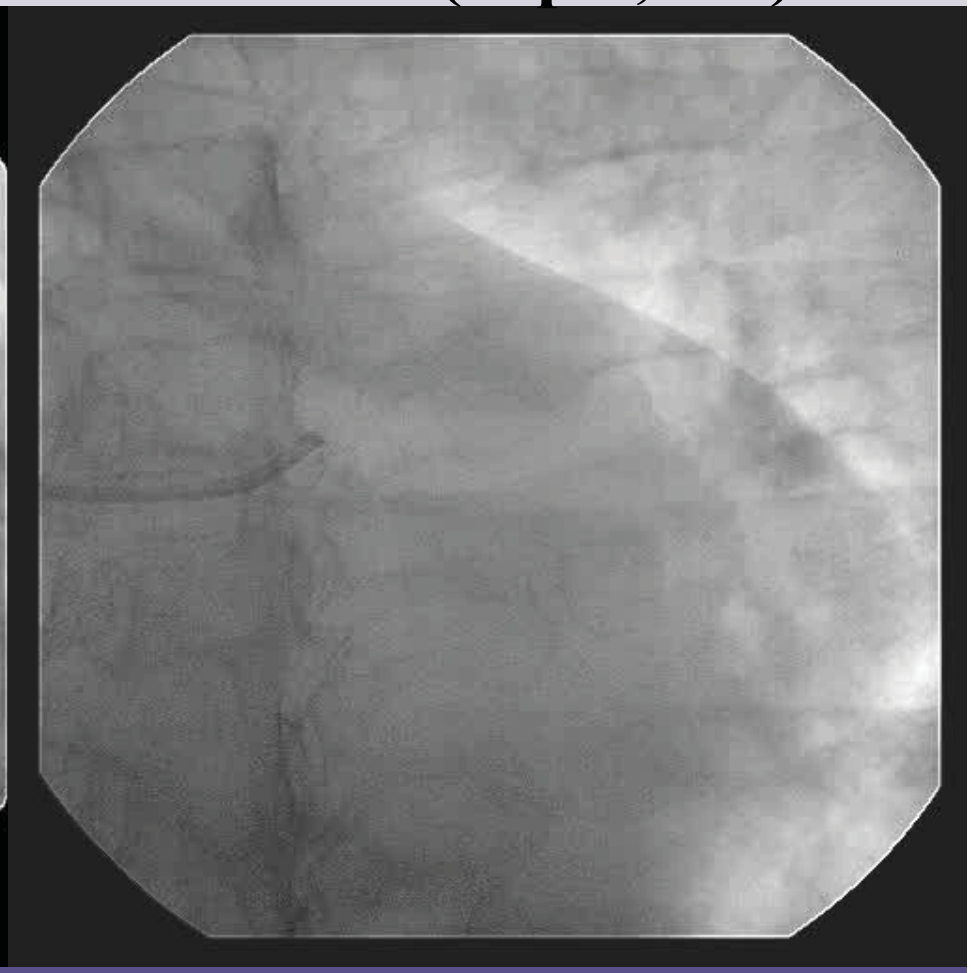
Stenting (Multilink™ 3.5x15mm)



Follow up CAG

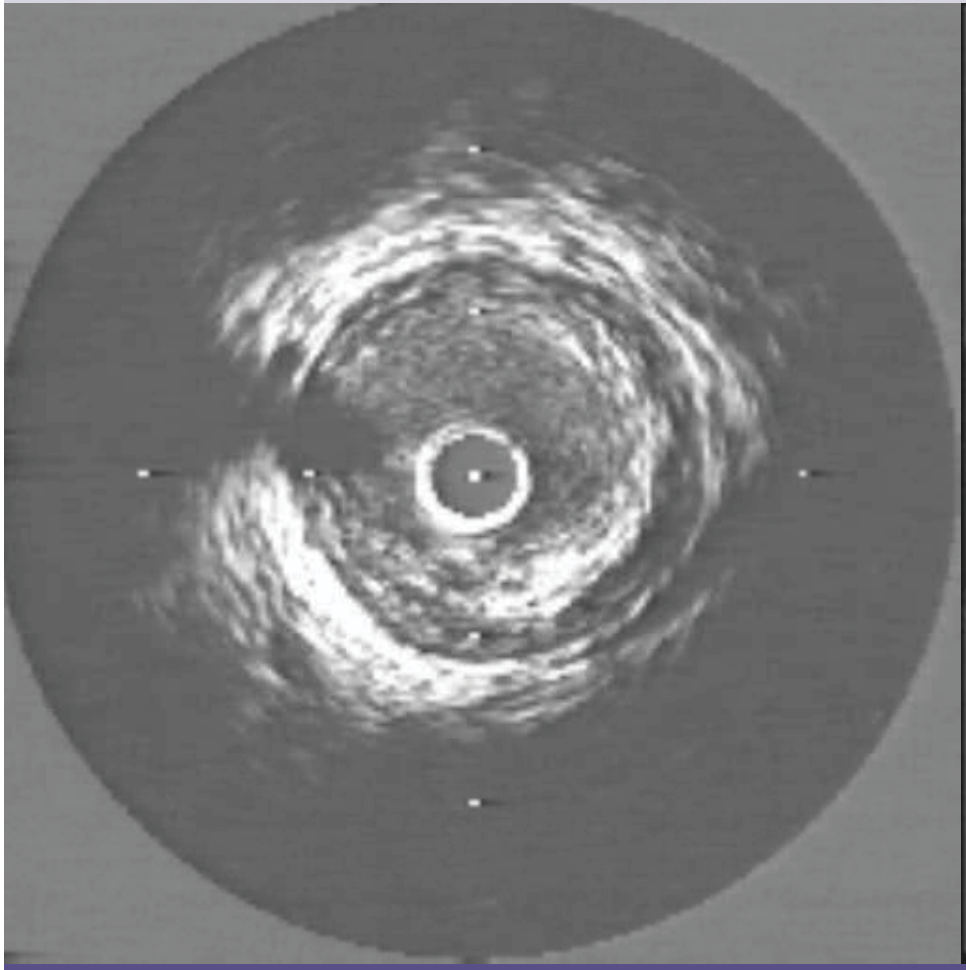
8mos. (Nov.5, ’02)

16mos. (Sep.2, ’03)

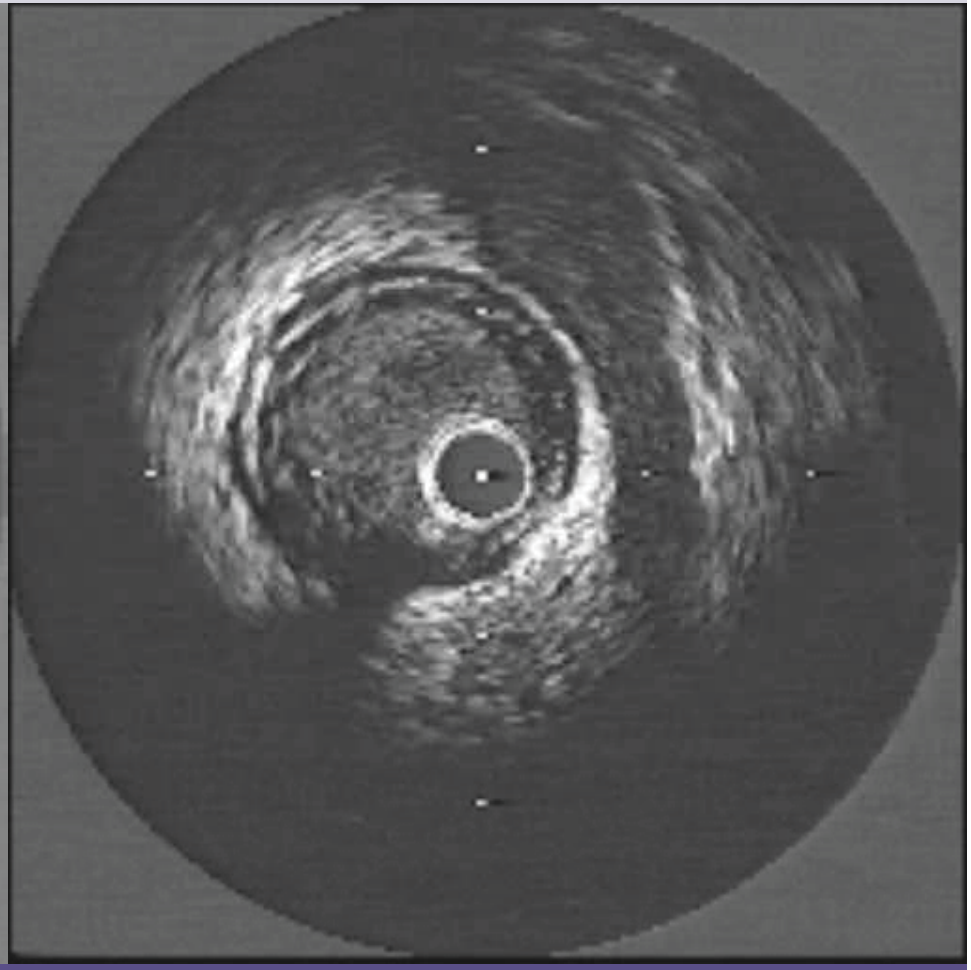


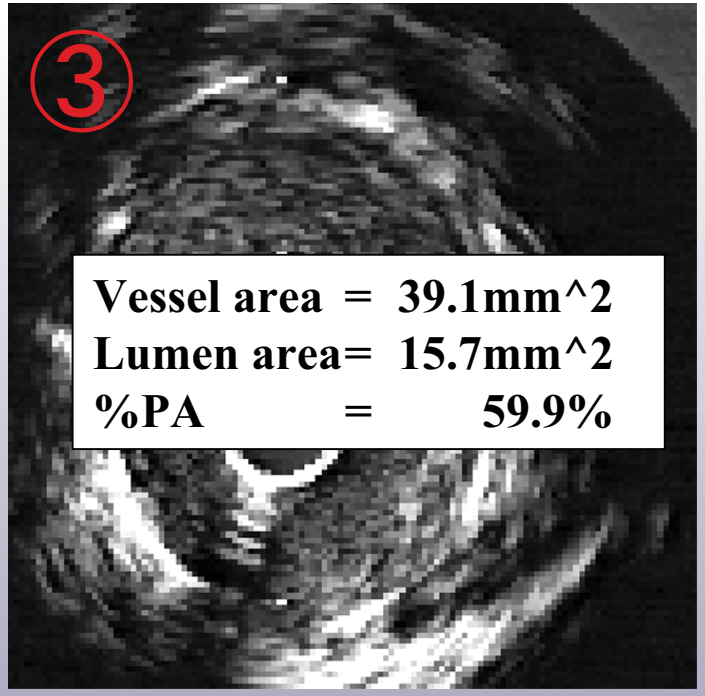
IVUS (16mos. Follow up)

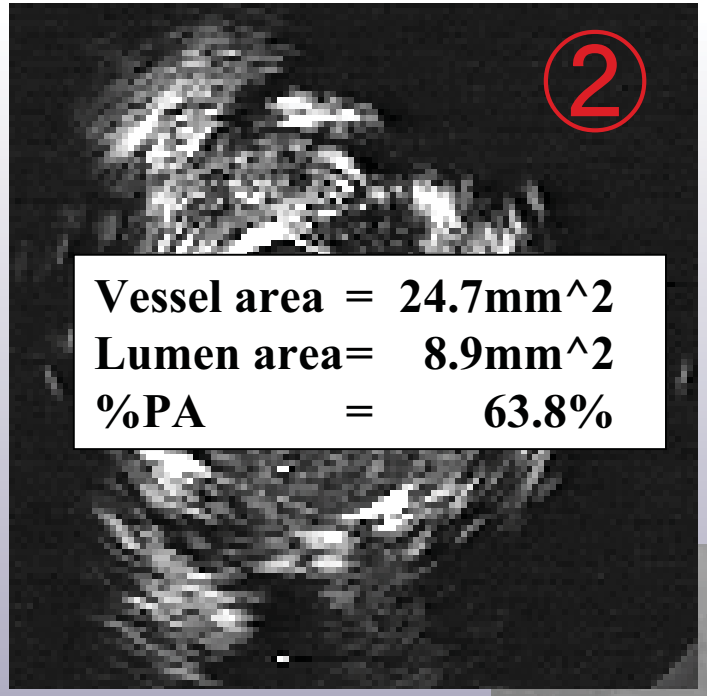
LAD-LMT

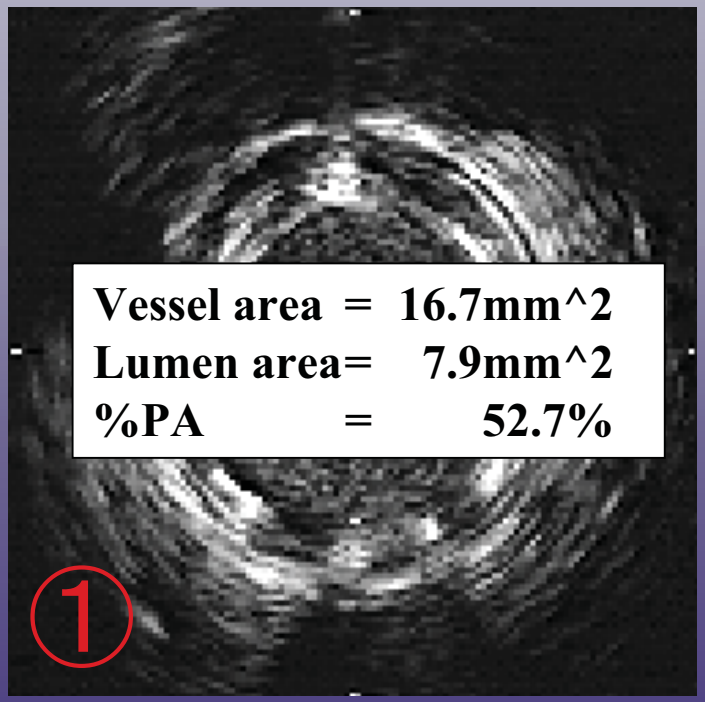


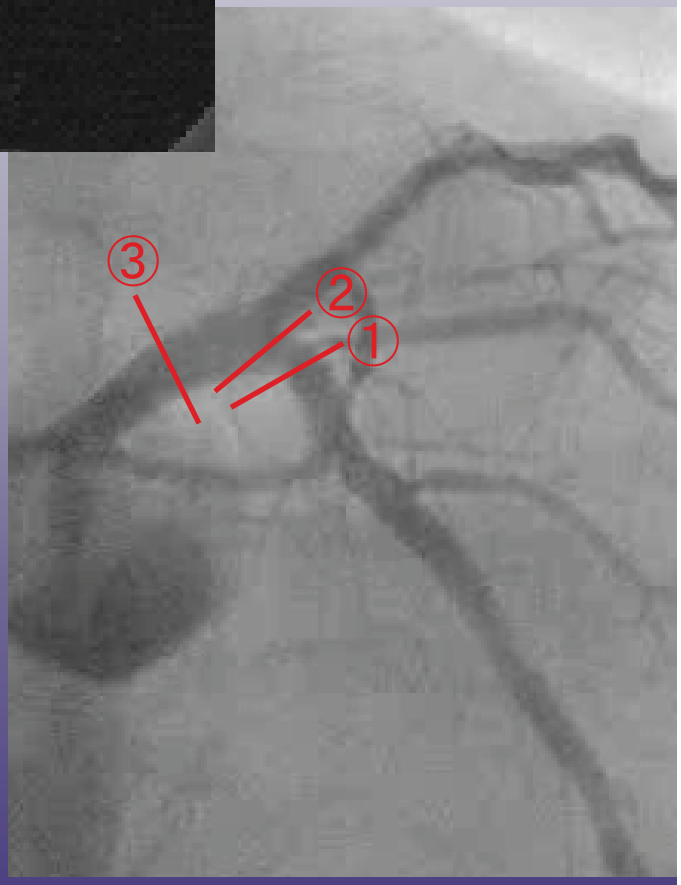
LCX-LMT




③
Vessel area = 39.1mm^2
Lumen area= 15.7mm^2
%PA = 59.9%


②
Vessel area = 24.7mm^2
Lumen area= 8.9mm^2
%PA = 63.8%


Vessel area = 16.7mm^2
Lumen area= 7.9mm^2
%PA = 52.7%
①


③
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