



***Practical use of IVUS:
Preintervention***

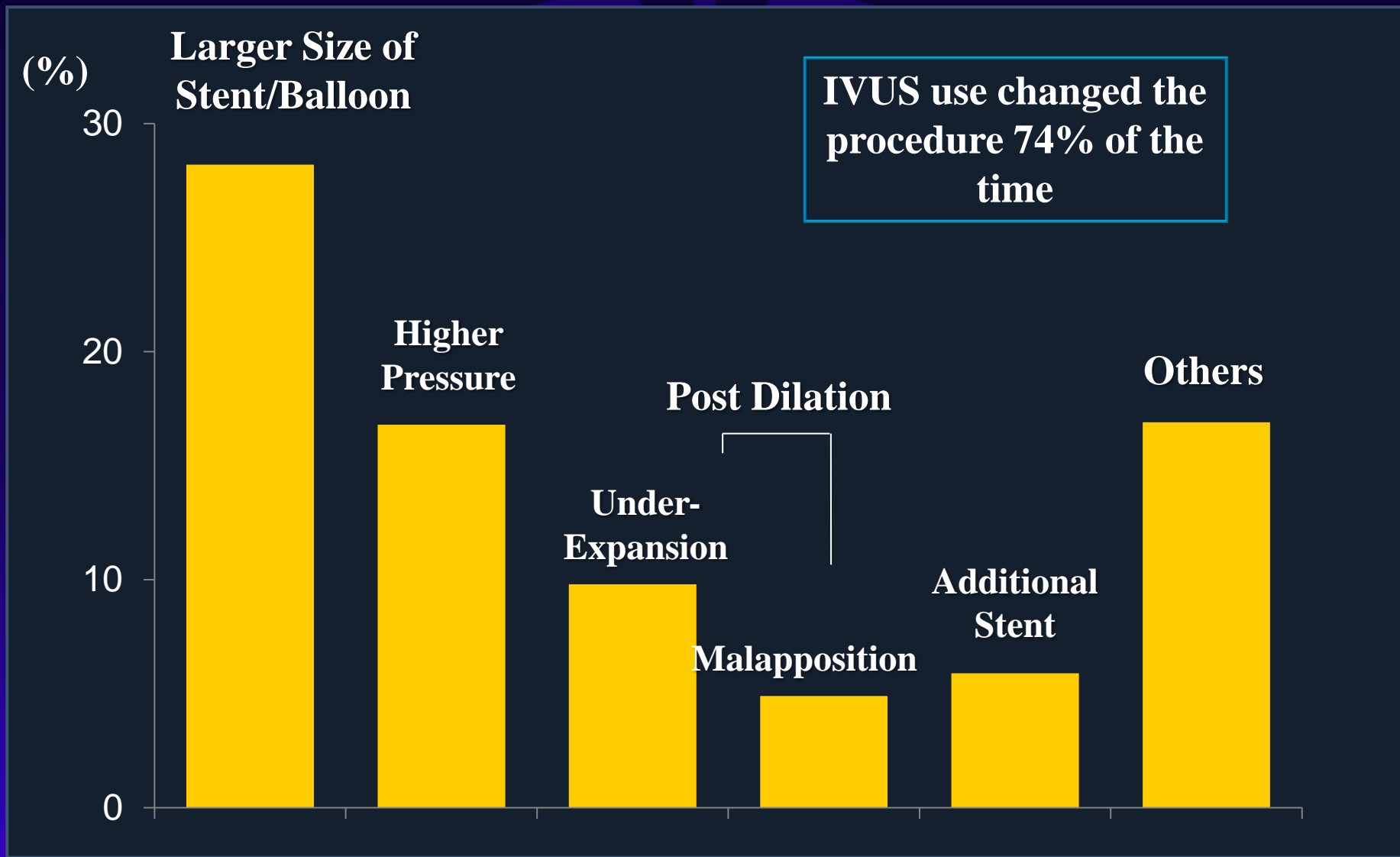
**Junko Honye, MD, PhD
Kikuna Memorial Hospital
Kanagawa, Japan**

Why do we use IVUS?

- 1. To consider**
 - Pathogenesis**
 - Mechanism of vessel expansion**
 - PCI strategy**
- 2. To predict**
 - Probable complications**
 - How to fix it?**
- 3. To verify**
 - Procedures have been appropriately done?**
 - i.e. Passage of the guidewire in CTO**

How IVUS Changed the Procedure

ADAPT-DES 2-year Results



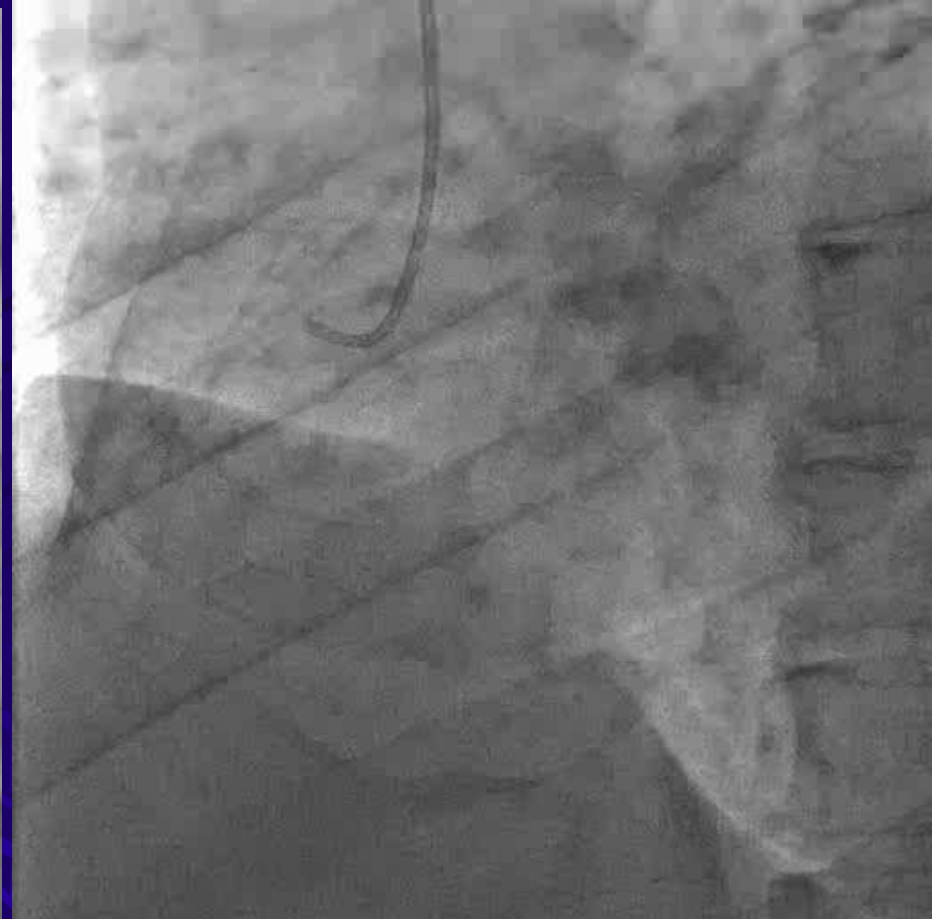
IVUS: Preintervention

- **Pathogenesis of ACS, angiographic unusual lesion morphology**
- **Device selection: direct stenting?**
 - Pretreatment with POBA, scoring balloon or Rotablator?**
- **Vessel size, Stent optimization**
 - Landing zones**
- **Prediction of probable complications**
 - vessel perforation, flow flow/no reflow**
 - edge injury, side branch occlusion**
- **CTO with IVUS guidance**

Inferior AMI: 53 y/o M

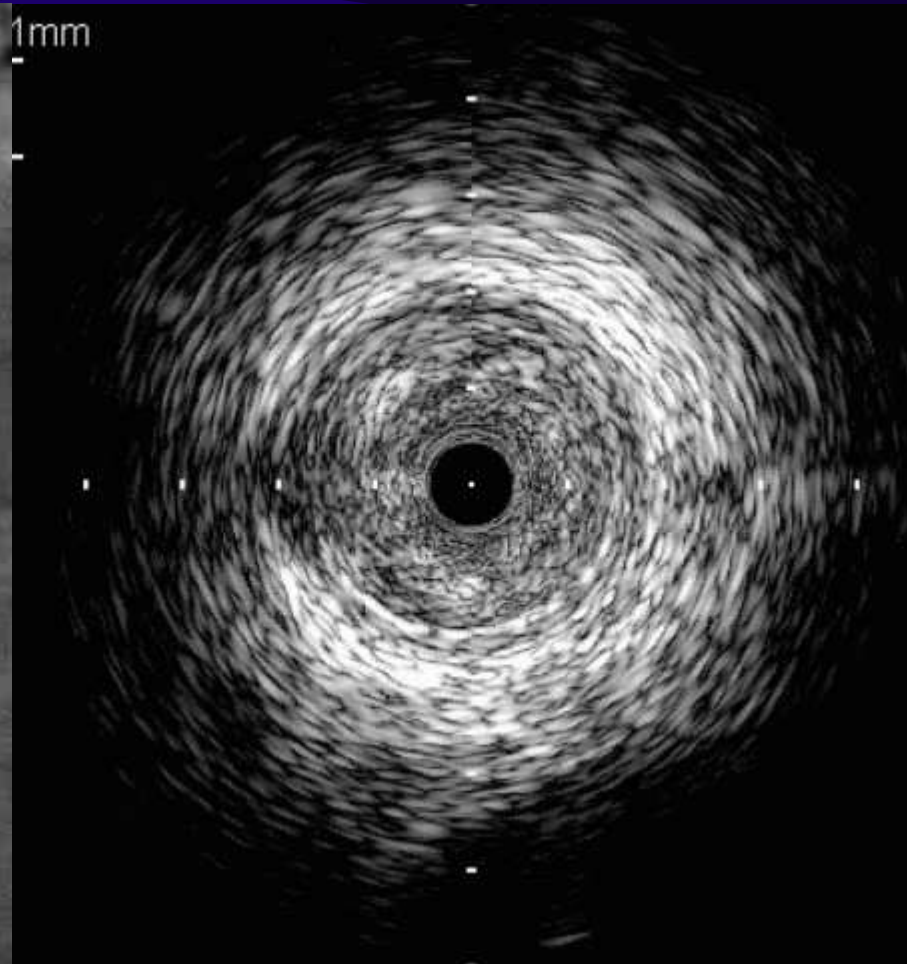
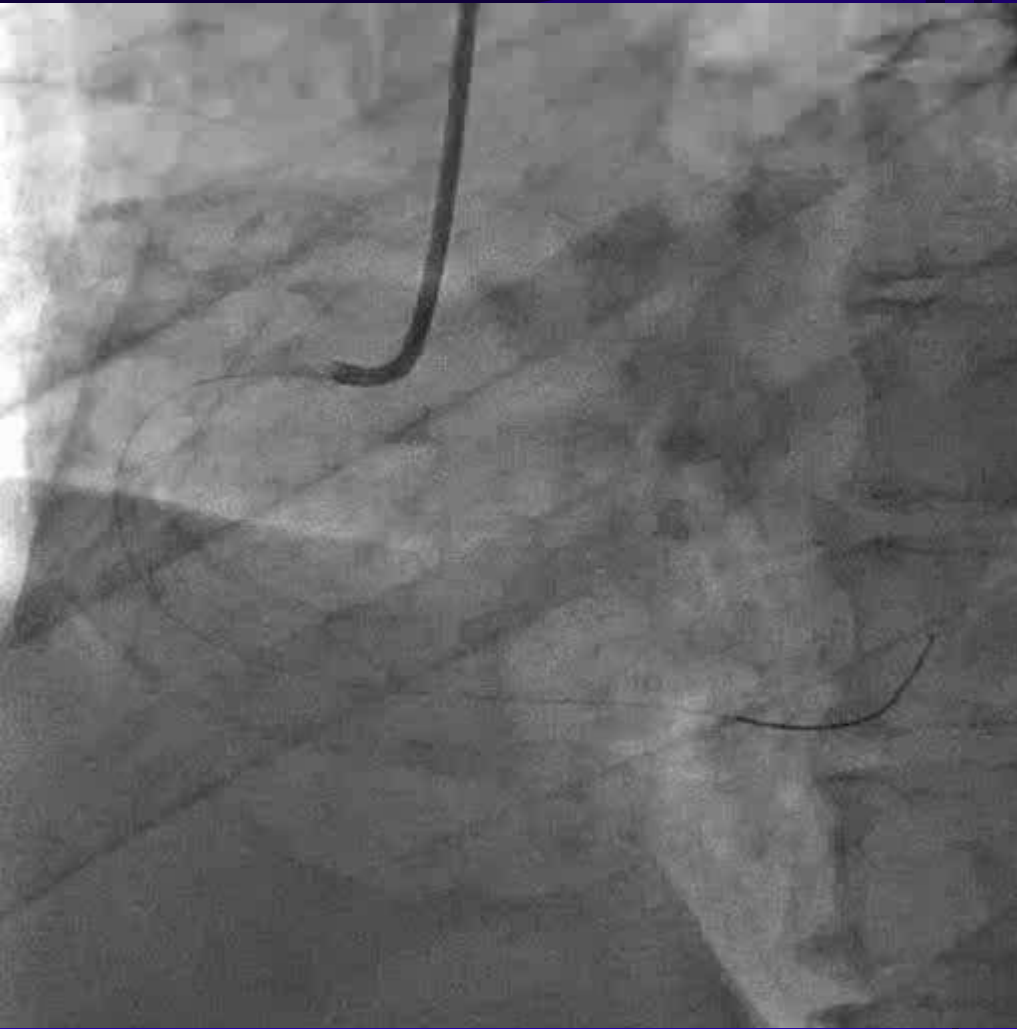


LAD

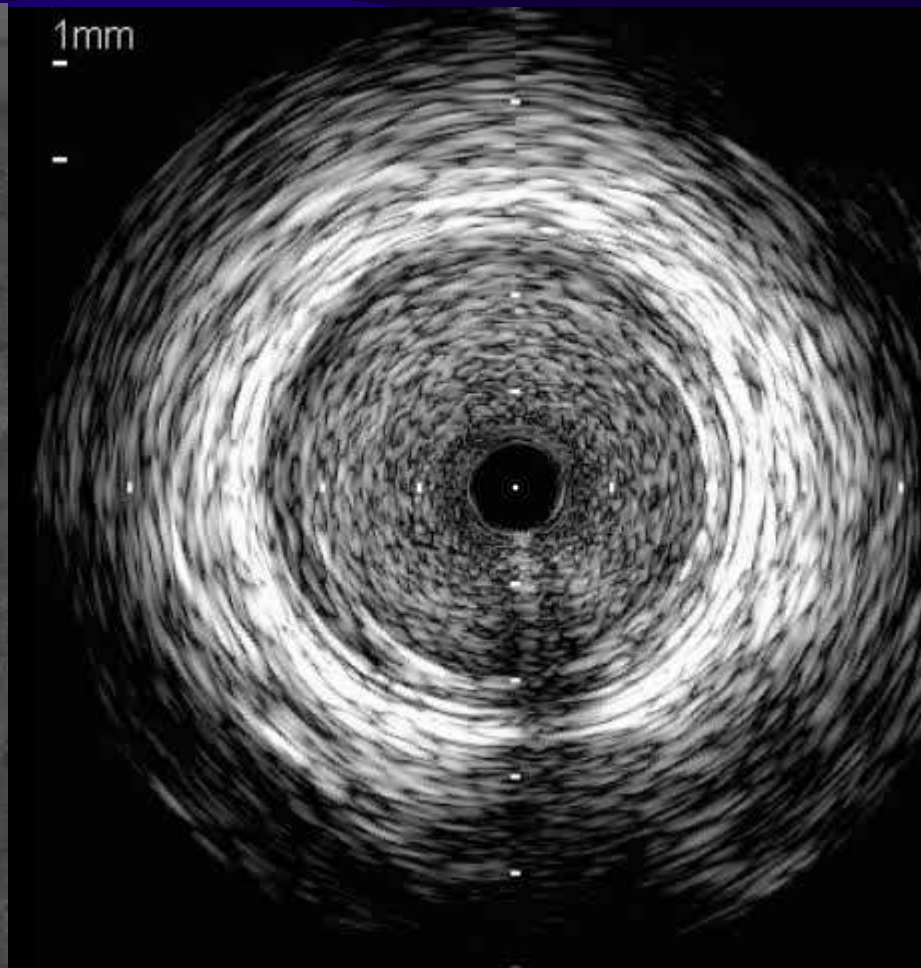
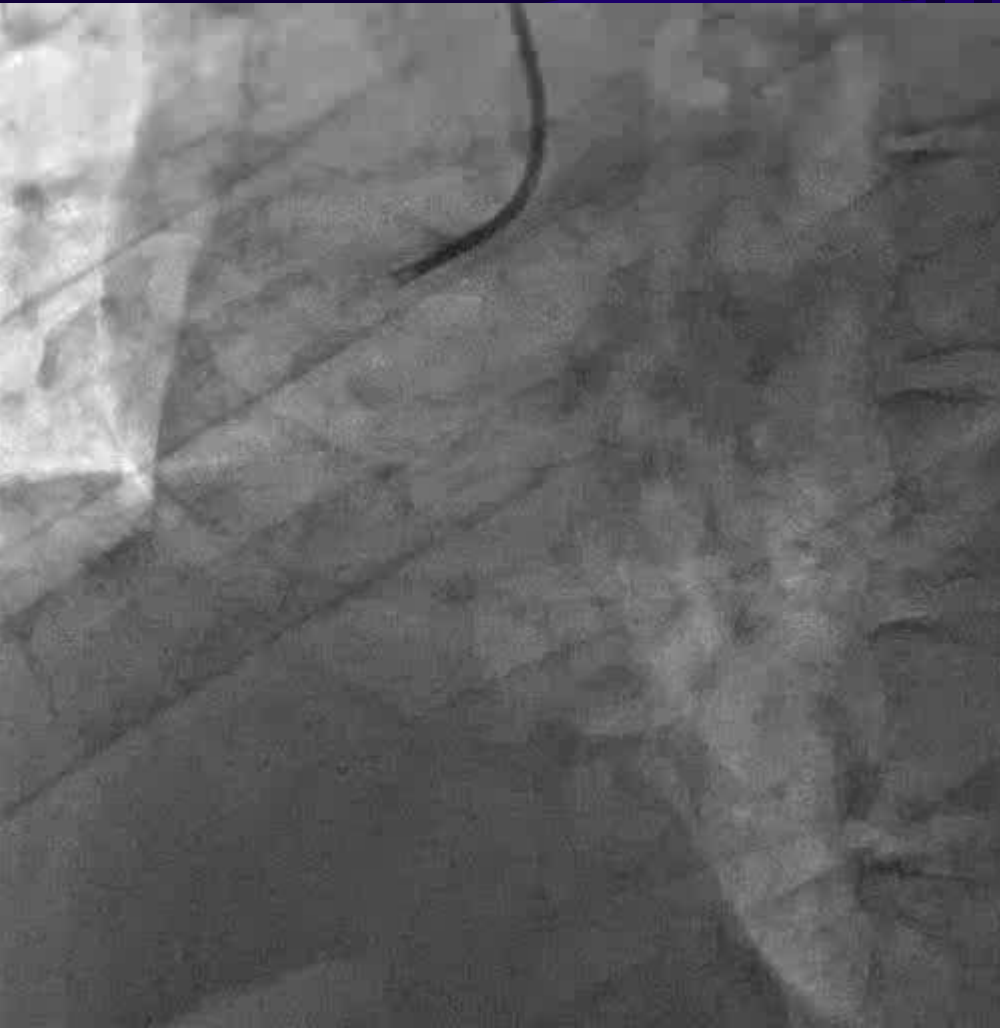


First shot

After thrombus aspiration

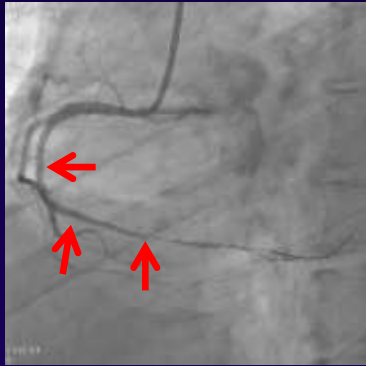


Intracoronary ISDN

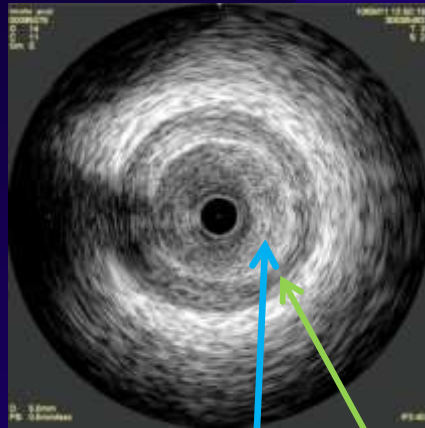


Comparison of IVUS images

Spasm



proximal



mid



distal

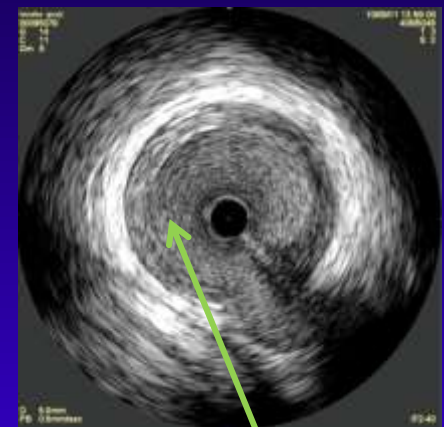
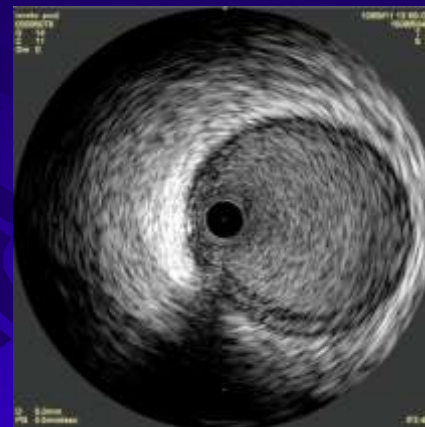
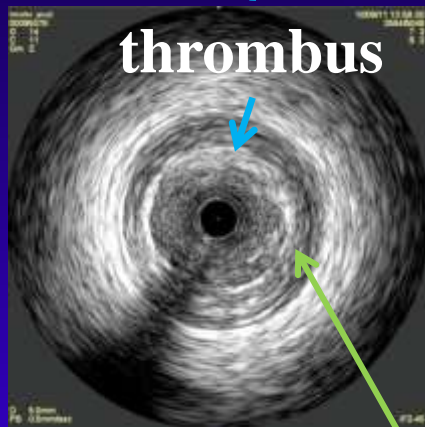


high echoic area on intimal surface

Post ISDN



thrombus



residual intimal thickening

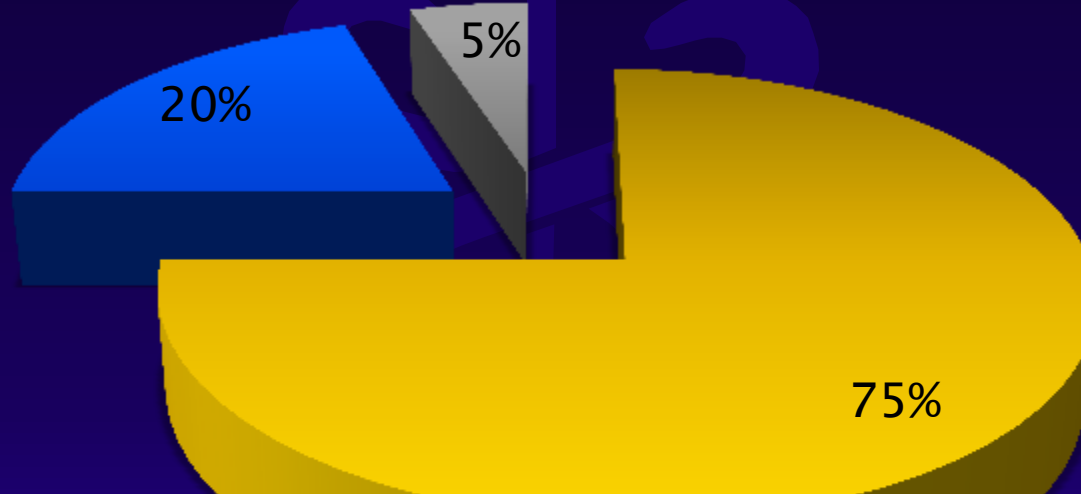
IVUS: Preintervention

- **Pathogenesis of ACS, angiographic unusual lesion morphology**
- **Device selection: direct stenting?**
Pretreatment with POBA, scoring balloon or Rotablator?
- **Vessel size, Stent optimization**
Landing zones
- **Prediction of probable complications**
vessel perforation, flow flow/no reflow
edge injury, side branch occlusion
- **CTO with IVUS guidance**

Mechanisms of ISR

Underexpansion is underappreciated contributor to ISR

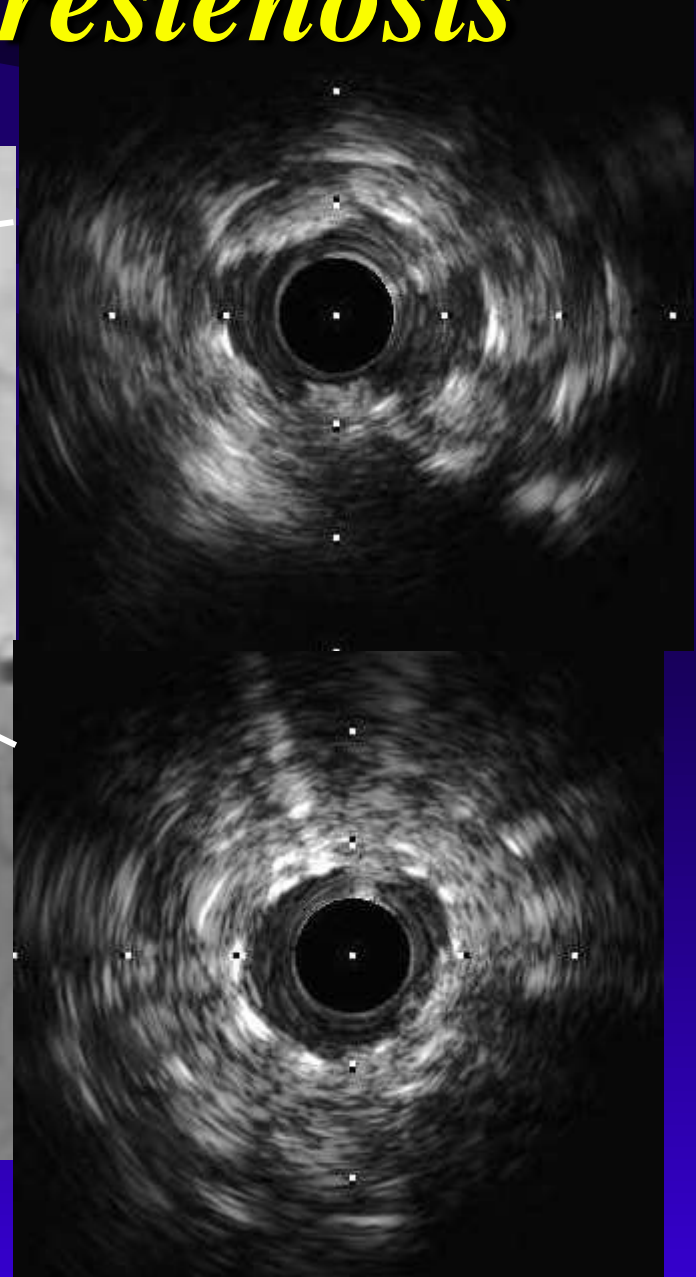
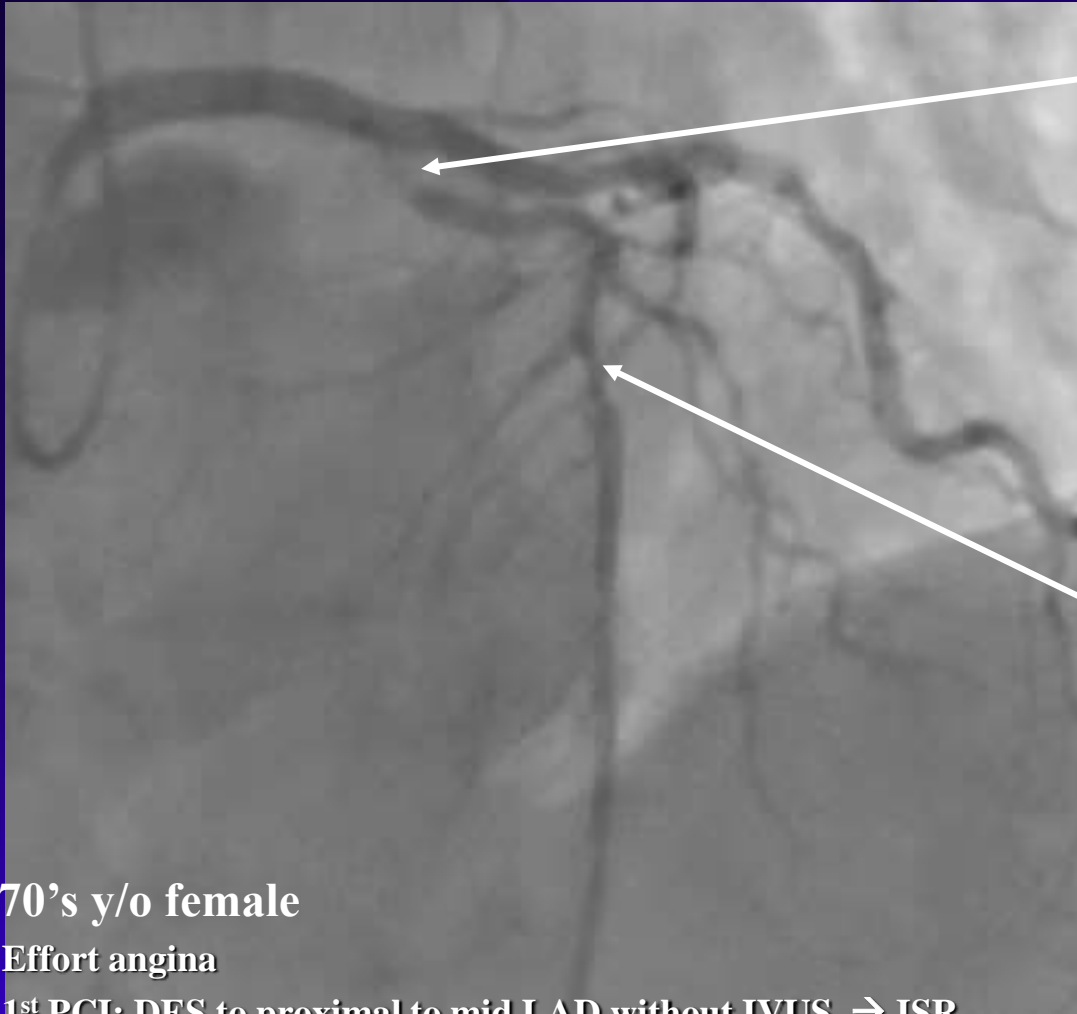
- 1090 ISR lesions referred
- IVUS performed



25% of lesions without significant neointimal hyperplasia

■ NIH ■ Underexpansion ■ Mechanical

Recurrent in-stent restenosis



70's y/o female

Effort angina

1st PCI: DES to proximal to mid LAD without IVUS → ISR

2nd PCI: Another DES to ISR without IVUS again! → ISR

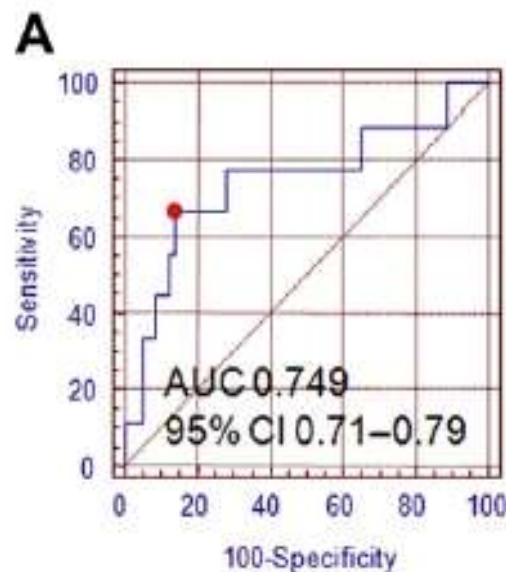
3rd PCI: Planned to use drug-coated balloon to the ISR segment

IVUS: Preintervention

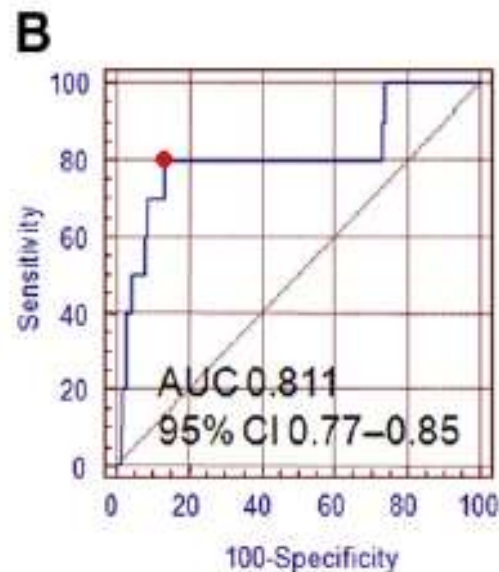
- **Pathogenesis of ACS, angiographic unusual lesion morphology**
- **Device selection: direct stenting?**
 - Pretreatment with POBA, scoring balloon or Rotablator?**
- **Vessel size, Stent optimization**
 - Landing zones**
- **Prediction of probable complications**
 - vessel perforation, flow flow/no reflow**
 - edge injury, side branch occlusion**
- **CTO with IVUS guidance**

Intravascular Ultrasound Predictors for Edge Restenosis After Newer Generation Drug-Eluting Stent Implantation

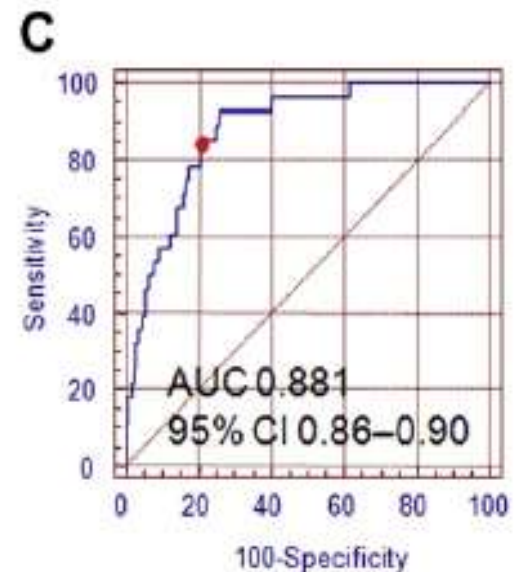
Soo-Jin Kang, MD, PhD^a, Young-Rak Cho, MD^a, Gyung-Min Park, MD^a, Jung-Min Ahn, MD^a, Won-Jang Kim, MD^a, Jong-Young Lee, MD^a, Duk-Woo Park, MD, PhD^a, Seung-Whan Lee, MD, PhD^a, Young-Hak Kim, MD, PhD^a, Cheol Whan Lee, MD, PhD^a, Gary S. Mintz, MD^b, Seong-Wook Park, MD, PhD^a, and Seung-Jung Park, MD, PhD^{a,*}



Plaque burden 56.3%
Sensitivity 67%
Specificity 86%



Plaque burden 57.3%
Sensitivity 80%
Specificity 87%

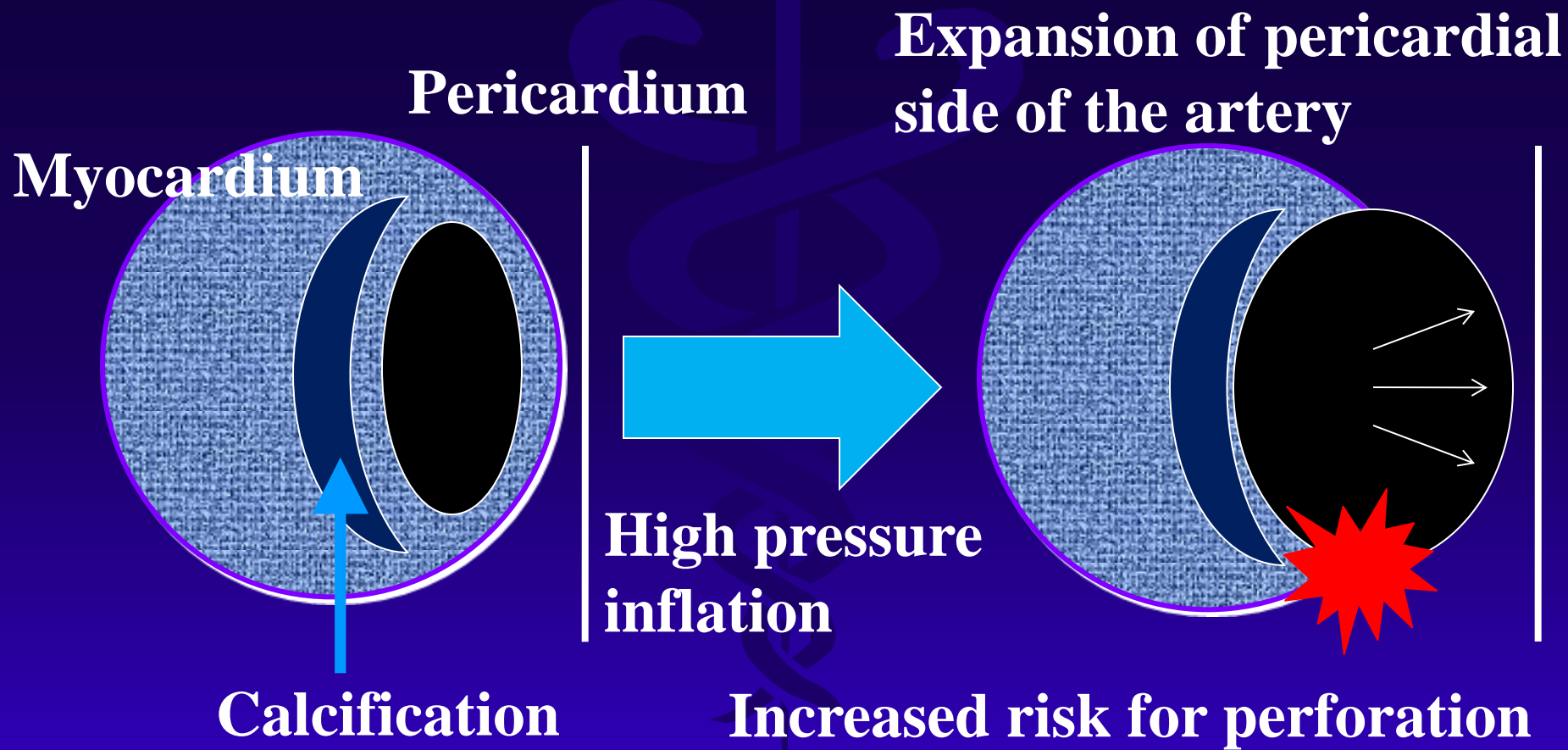


Plaque burden 54.2%
Sensitivity 86%
Specificity 80%

IVUS: Preintervention

- **Pathogenesis of ACS, angiographic unusual lesion morphology**
- **Device selection: direct stenting?**
Pretreatment with POBA, scoring balloon or Rotablator?
- **Vessel size, Stent optimization**
Landing zones
- **Prediction of probable complications**
vessel perforation, flow flow/no reflow
edge injury, side branch occlusion
- **CTO with IVUS guidance**

Calcified eccentric lesion → high risk for coronary perforation



Avoid direct stenting, perform Rotablator or predilatation.

Attenuated Plaque Detected by Intravascular Ultrasound

**Clinical, Angiographic, and Morphologic Features and Post-Percutaneous Coronary
Intervention Complications in Patients With Acute Coronary Syndromes**

Sung Yun Lee, MD,* Gary S. Mintz, MD,† Seok-Yeon Kim, MD,*
Young Joon Hong, MD,* Sang Wook Kim, MD,* Teruo Okabe, MD,*
Augusto D. Pichard, MD,* Lowell F. Satler, MD,* Kenneth M. Kent, MD, PhD,*
William O. Suddath, MD,* Ron Waksman, MD,* Neil J. Weissman, MD*

Washington, DC; and New York, New York

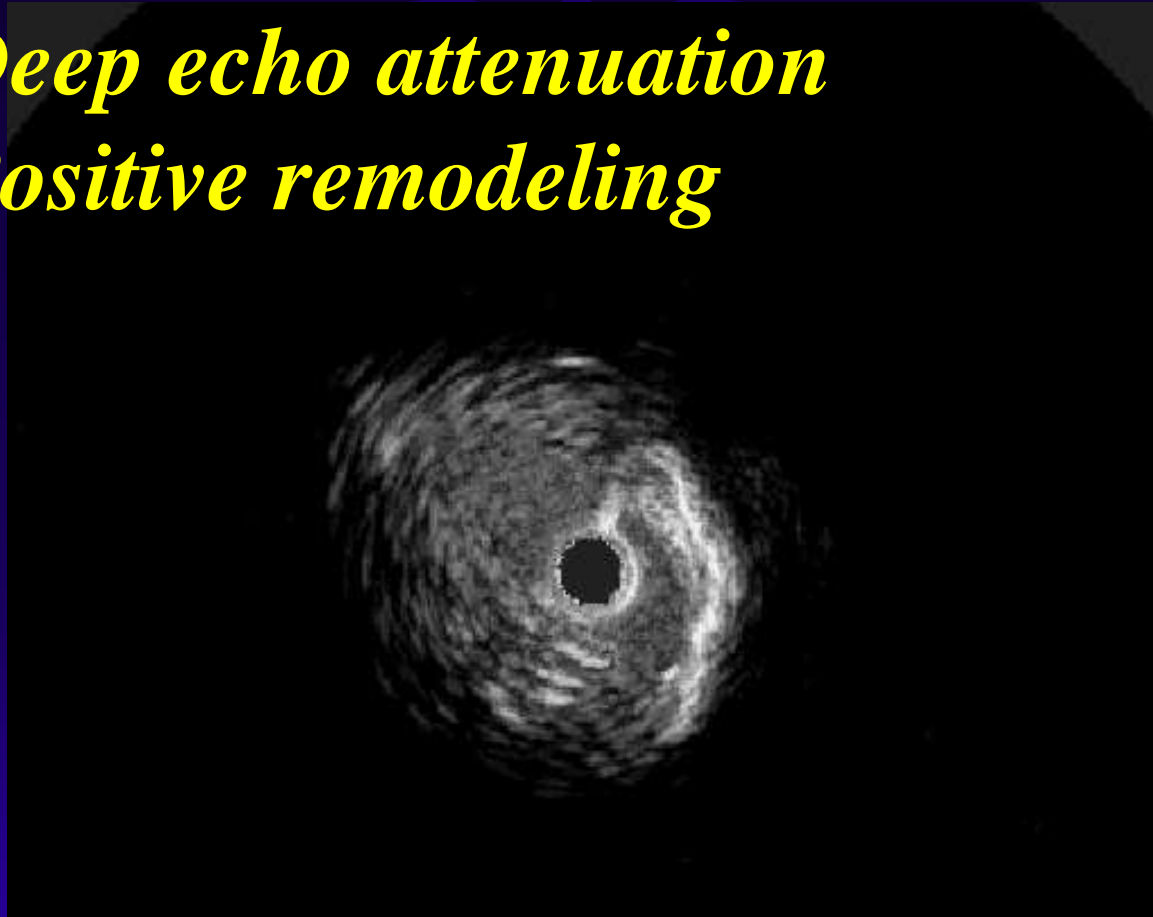
Atherosclerotic Plaque With Ultrasonic Attenuation Affects Coronary Reflow and Infarct Size in Patients With Acute Coronary Syndrome — An Intravascular Ultrasound Study —

Hiroyuki Okura, MD; Haruyuki Taguchi, MD; Tomoichiro Kubo, MD; Iku Toda, MD;
Kiyoshi Yoshida, MD*; Minoru Yoshiyama, MD**; Junichi Yoshikawa, MD†

High risk findings for distal embolization

Deep echo attenuation

Positive remodeling



It may be related to total amount of the plaque.

Amount = angle, vessel size, length (>5mm)

**→ concomitant use of distal protection device and
prepare pharmacological agents**

To predict side branch occlusion

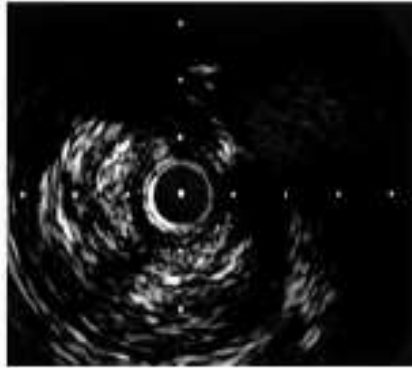
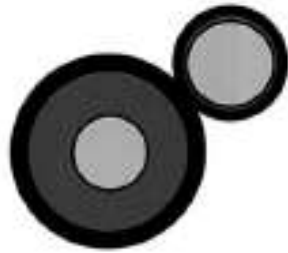
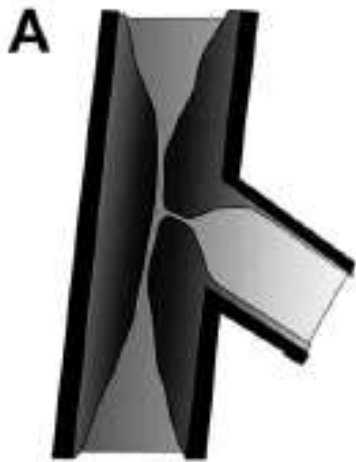
Intravascular Ultrasound Predictors of Side Branch Occlusion in Bifurcation Lesions After Percutaneous Coronary Intervention

Eri Furukawa, MD; Kiyoshi Hibi, MD; Masami Kosuge, MD; Tomoyori Nakatogawa, MD; Noritaka Toda, MD; Takeshi Takamura, MD; Kengo Tsukahara, MD; Jun Okuda, MD; Fumiyuki Ootsuka, MD; Yoshio Tahara, MD; Teruyasu Sugano, MD; Tsutomu Endo, MD; Kazuo Kimura, MD; Satoshi Umemura, MD*

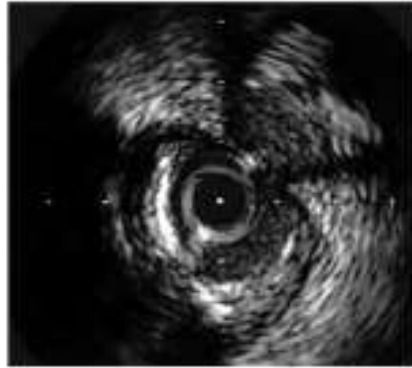
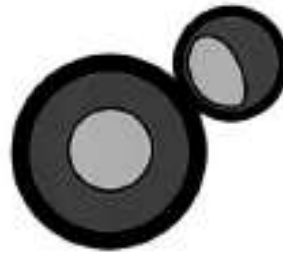
Background Percutaneous coronary intervention (PCI) of bifurcation lesion has been associated with a low success rate and a high incidence of procedural complications, including side branch occlusion and myocardial infarction. It remains controversial whether preintervention intravascular ultrasound (IVUS) findings can help to identify side branches likely to occlude after PCI of bifurcation lesions.

Methods and Results From our IVUS database we identified 81 bifurcation lesions in 72 patients. Side branches were classified into 2 groups: group 1 had ostial side branch stenosis due to atherosclerotic plaque only in the main vessel (n=61), and group 2 had plaque truly involved in the side branch ostium (n=20). There was no significant difference between the 2 groups in the extent of ostial stenosis as assessed by angiography. After PCI, 7 side branches occluded in group 2, compared with 5 side branches occluded in group 1 (35% vs 8%, p=0.003).

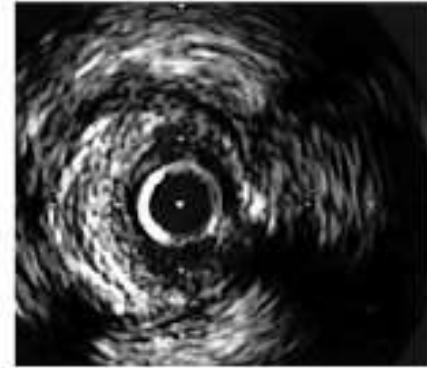
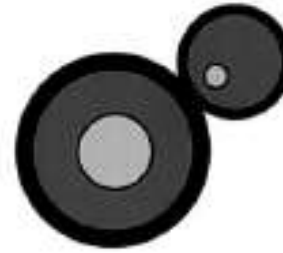
Conclusion Ostial plaque distribution as assessed by IVUS may be one of the consistent predictors of side branch occlusion after PCI. (*Circ J* 2005; **69**: 325–330)



Group 1



Group 2



Plaque >50% is the predictor for side branch occlusion after stent implantation.

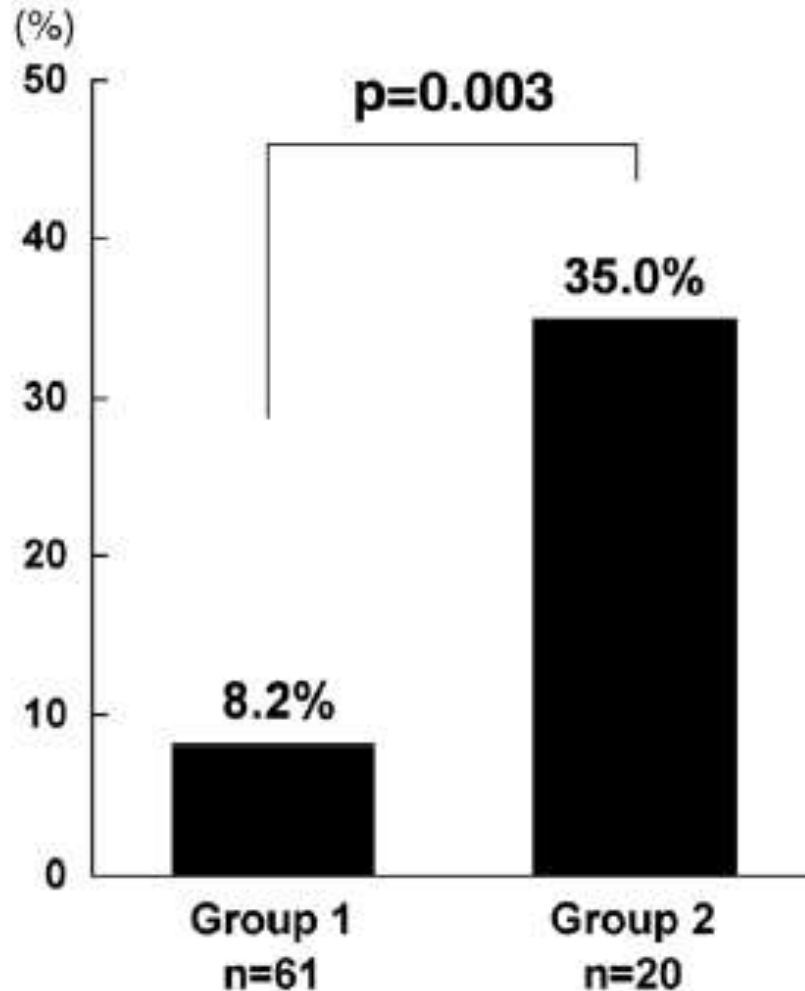
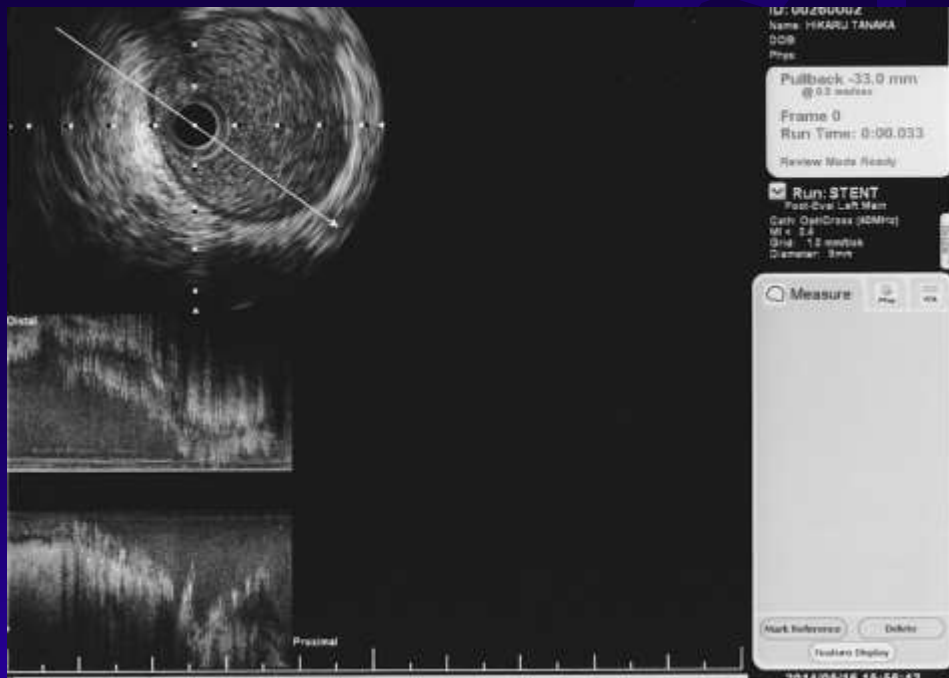
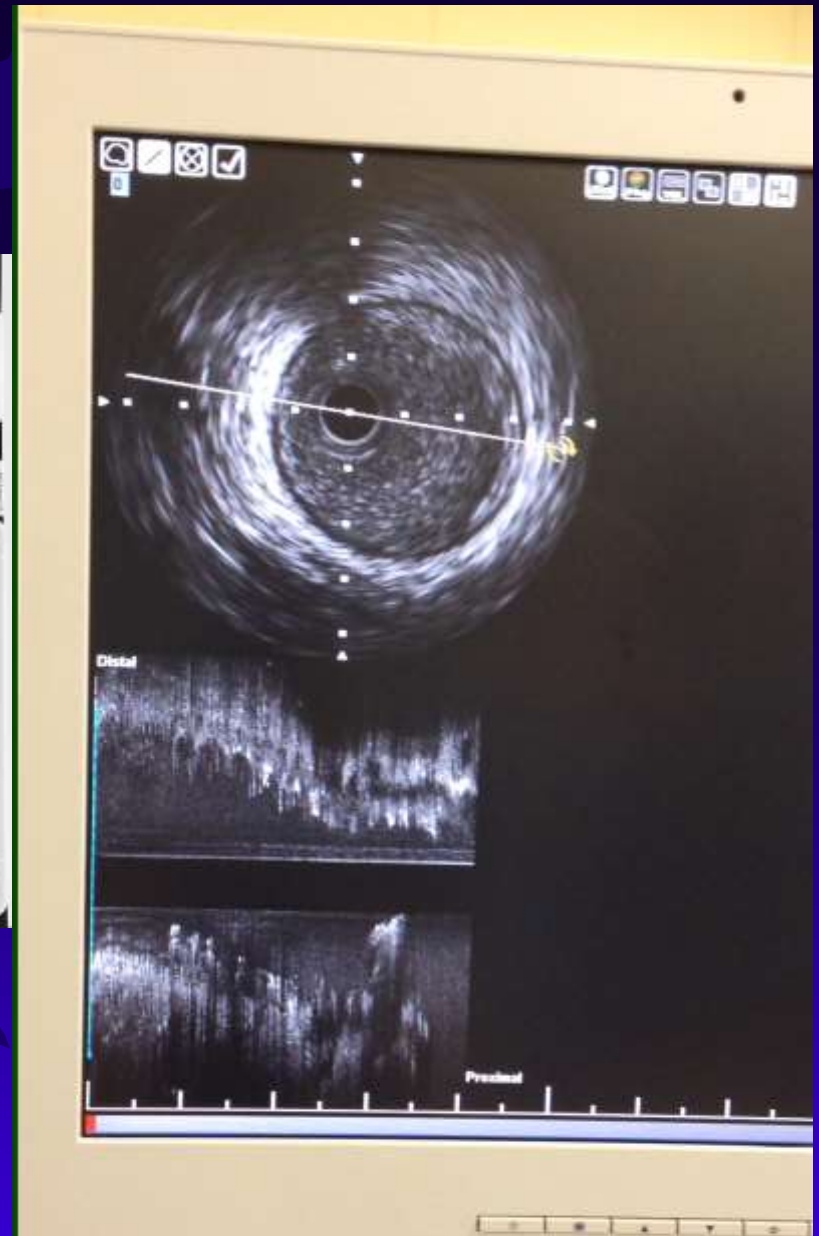


Fig 2. Frequency of side branch occlusion after percutaneous coronary intervention (PCI).

Longitudinal view to check guidewire position



Find the best view to be able to separate bifurcation.



IVUS in CTO lesions

Antegrade approach

- 1. Check the entry of CTO located at bifurcation**
Guidewire manipulation to the right direction
- 2. IVUS-guided wiring**
- 3. Guidewire position**
Subintimal space or not?

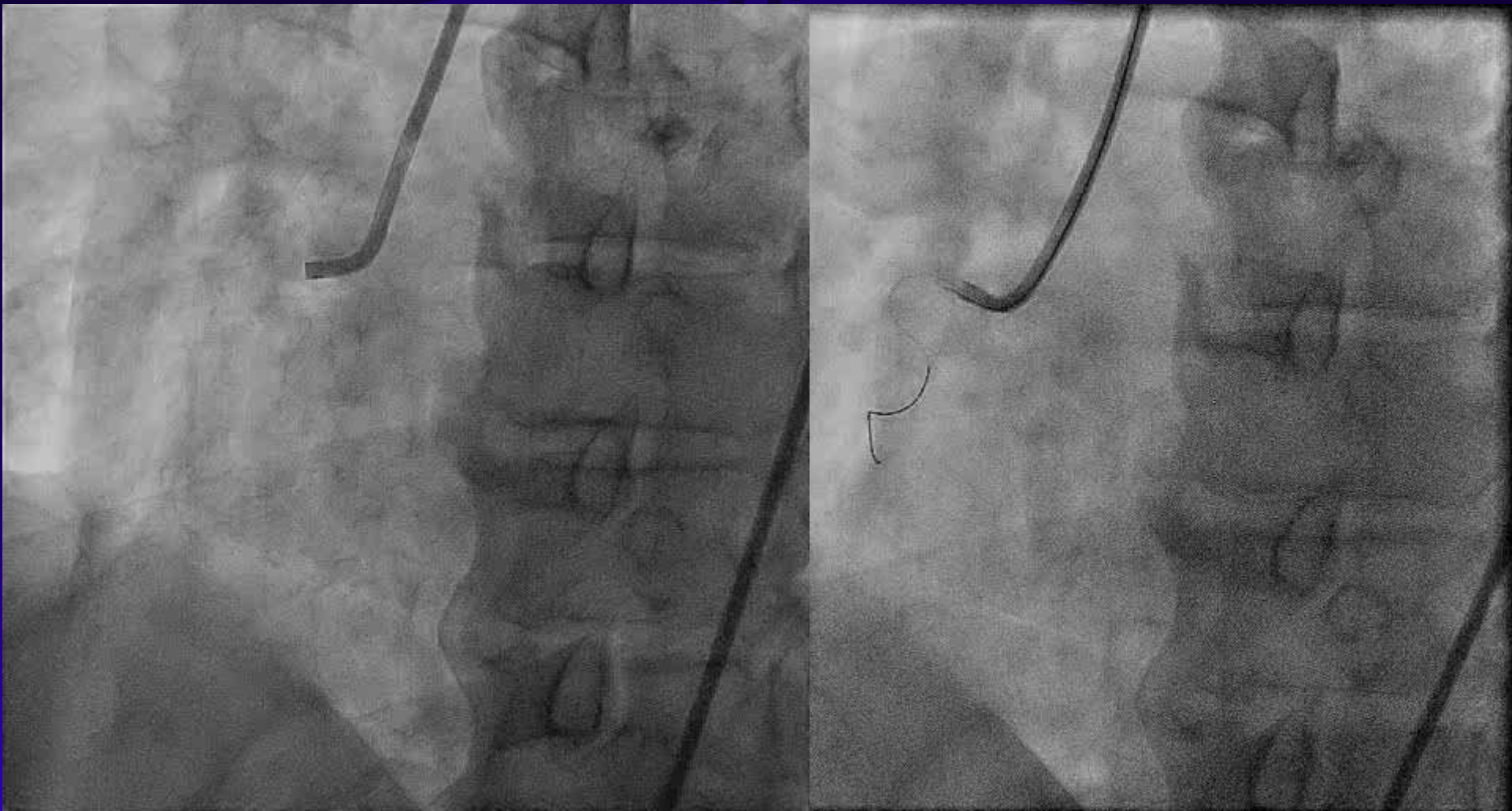
Regrograde approach

- 1. Position of the retrograde wire**
- 2. Appropriate balloon size**

Through the procedure

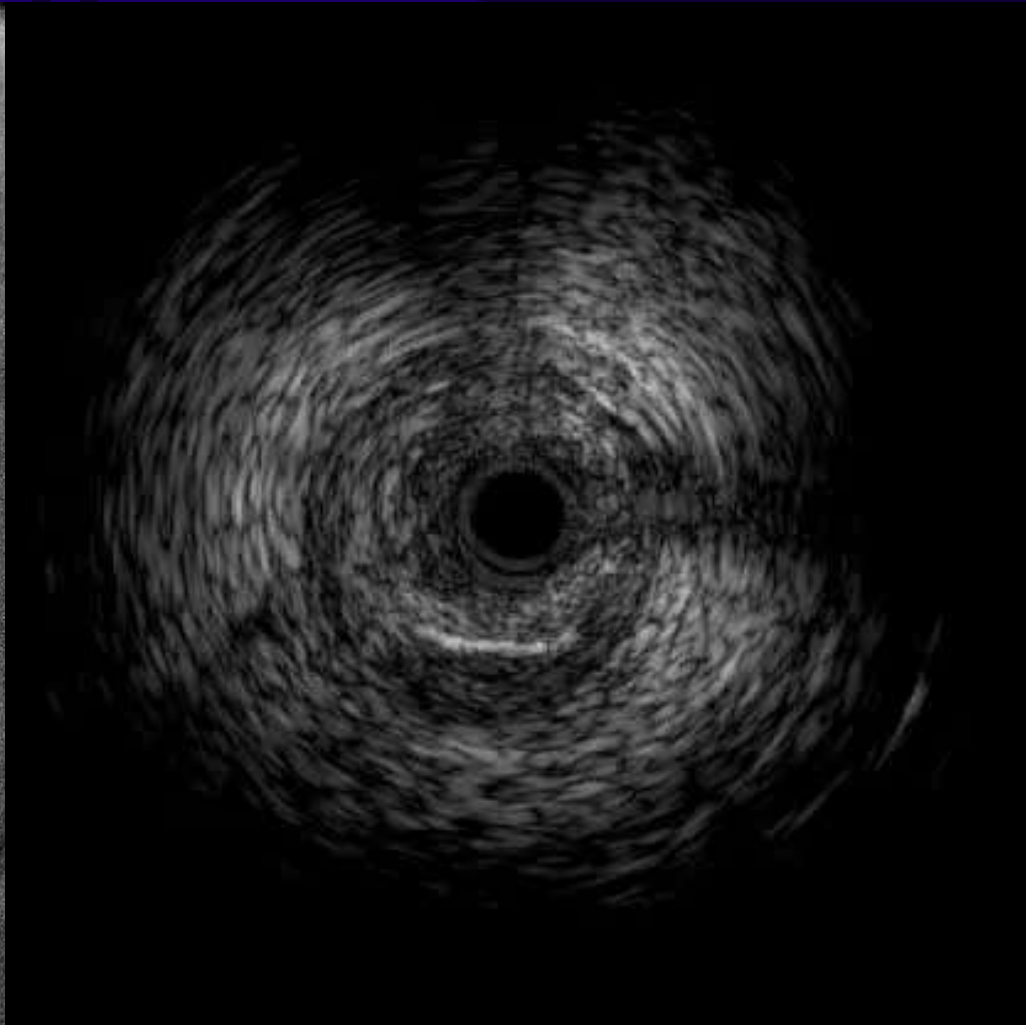
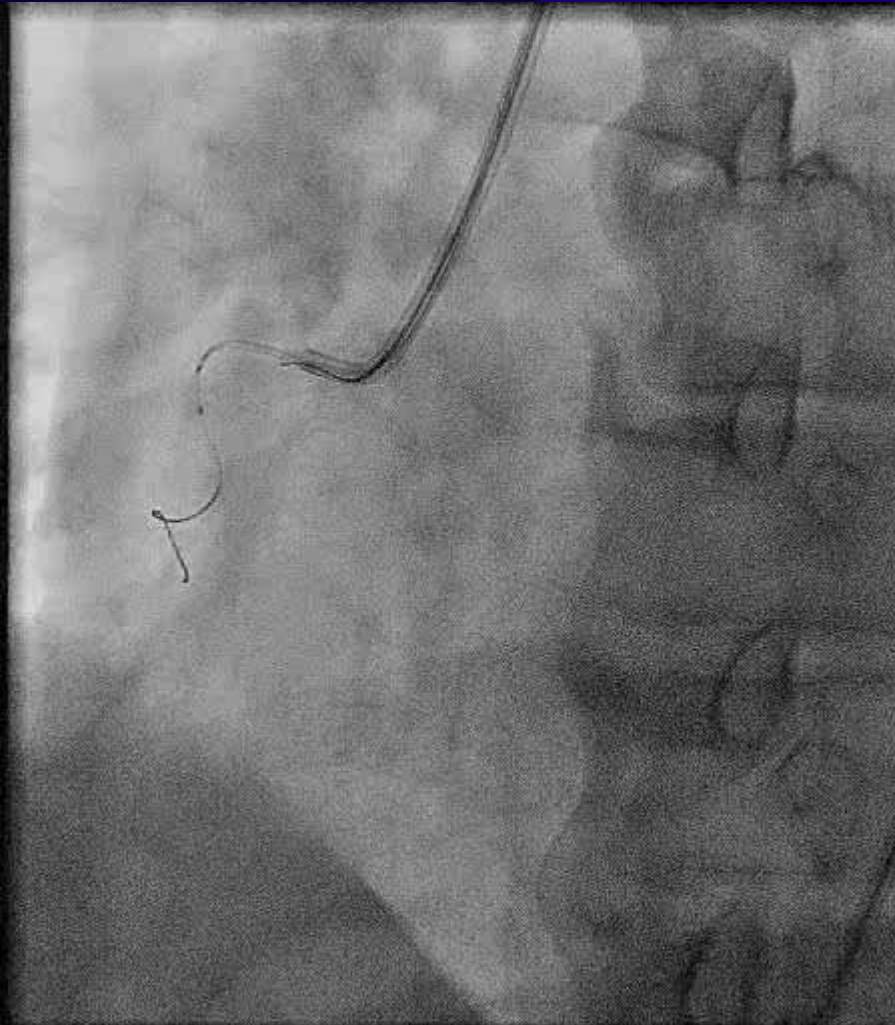
- 1. Extravascular damage (hematoma, perforation)**
- 2. Verify guidewire passage**

RCA CTO



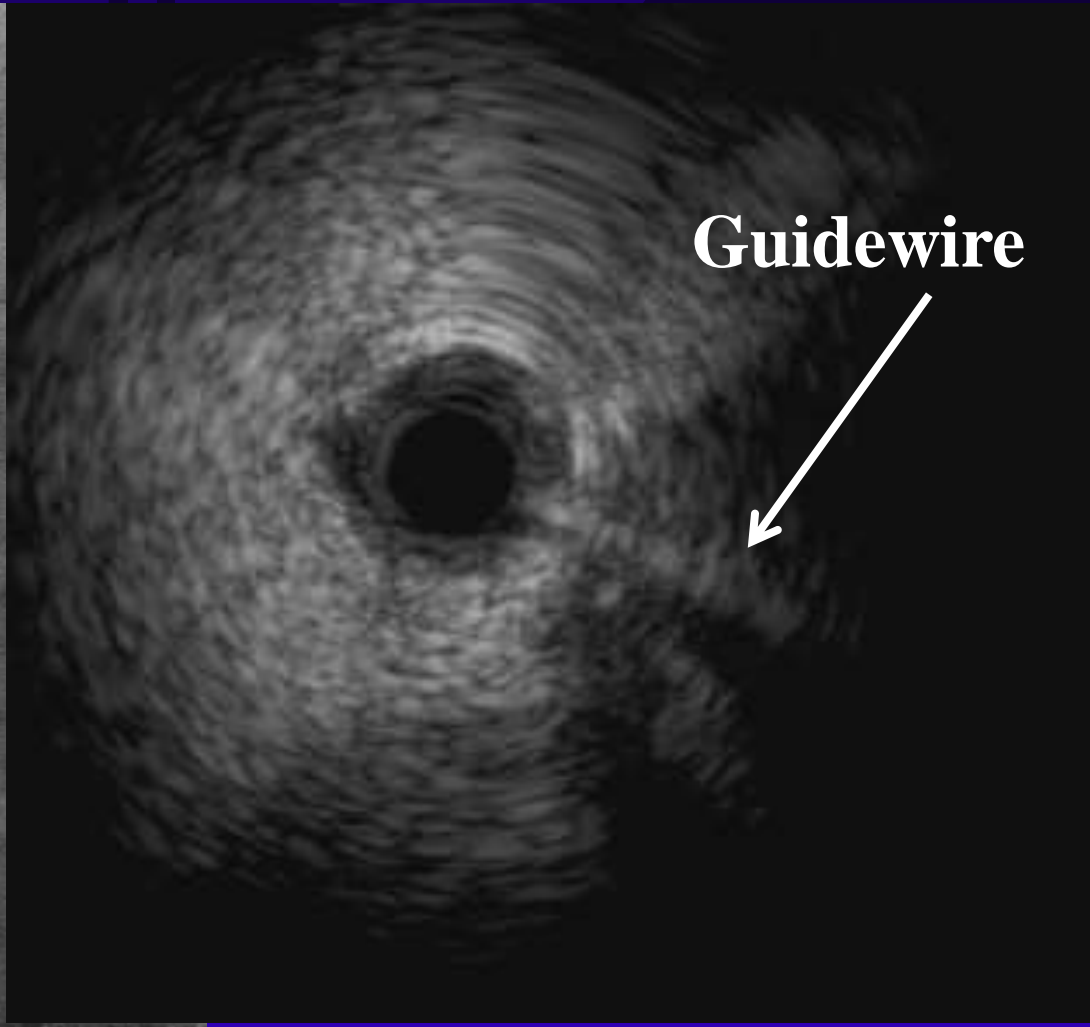
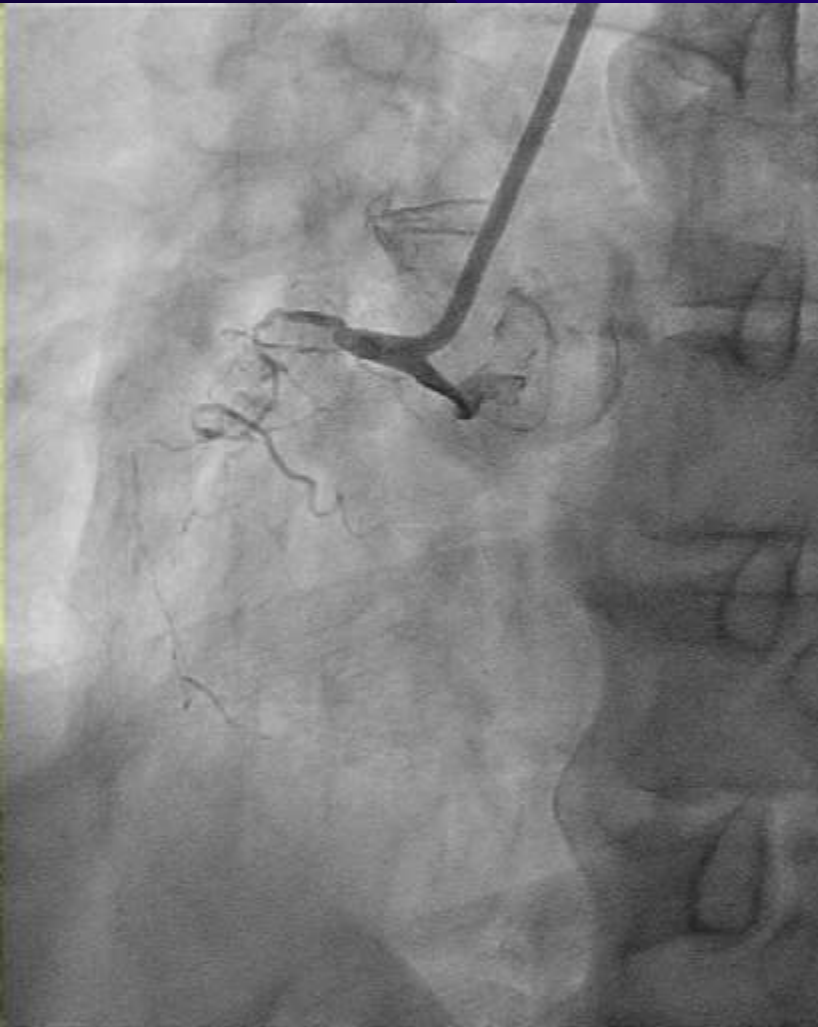
Operator: Dr. Yasushi Asakura

RCA CTO

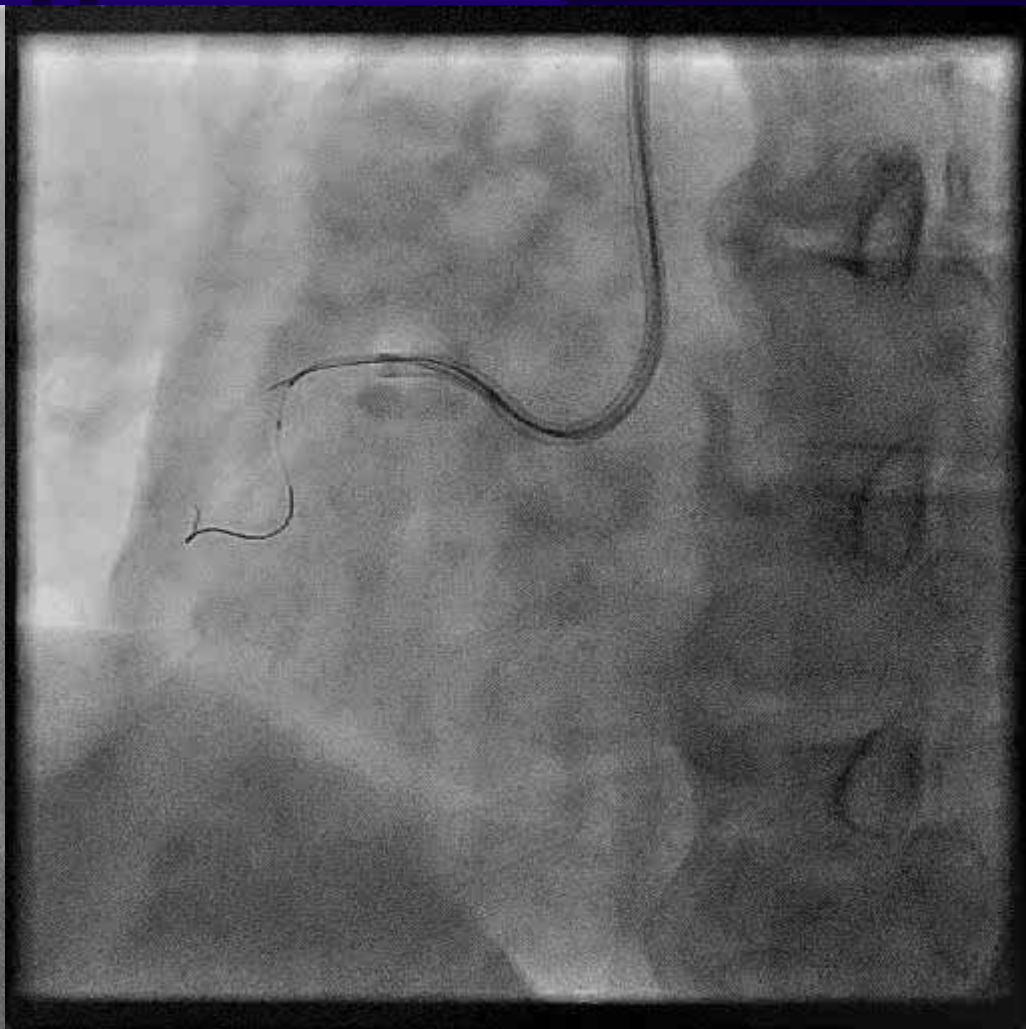
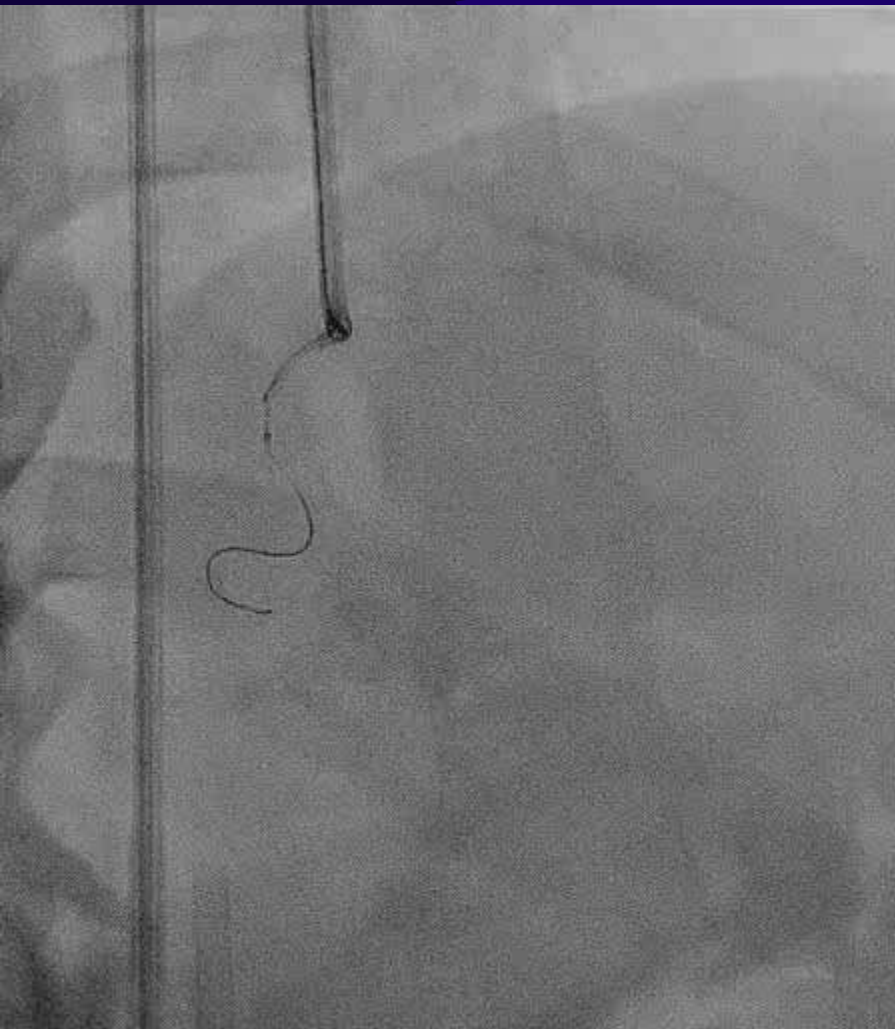


Short-tip IVUS catheter

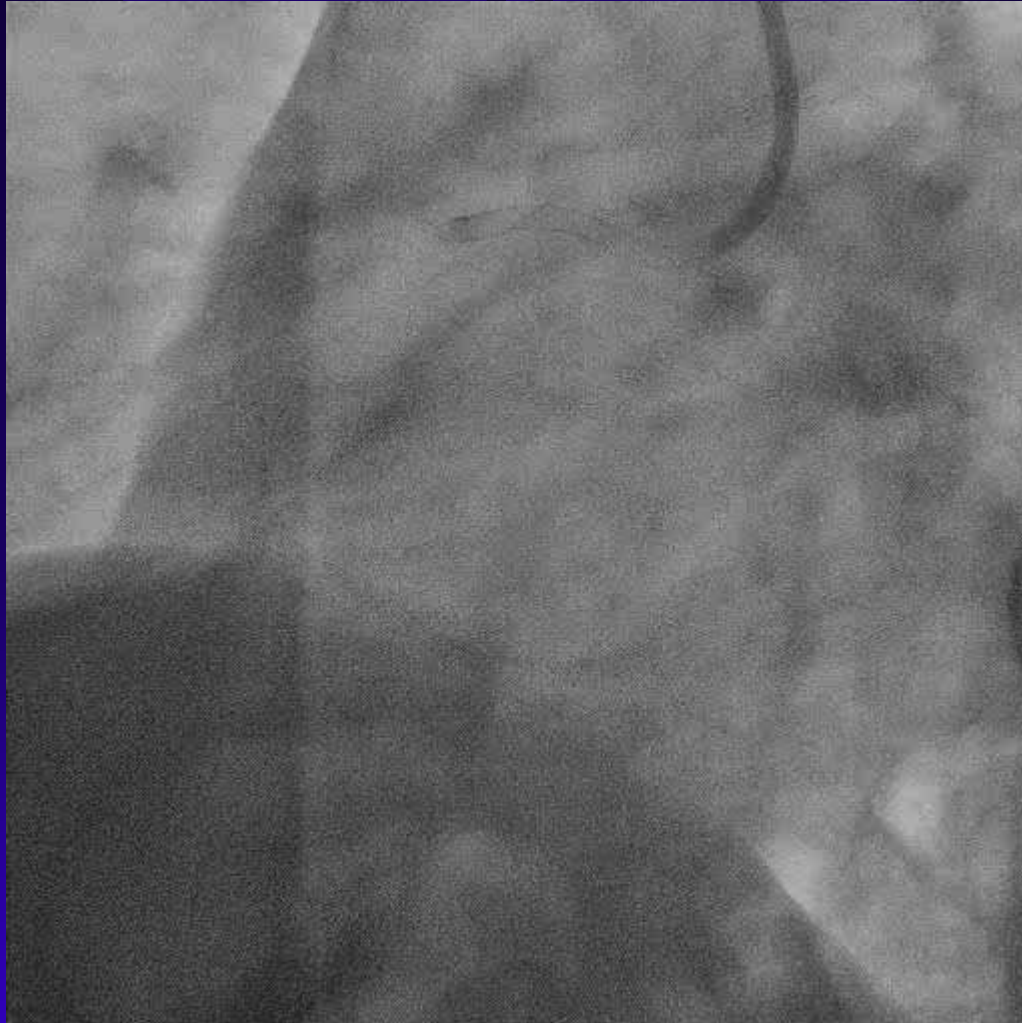
Entry?



Entry?



Final CAG



IVUS can demonstrate

- **Pathogenesis of ACS in each particular patient**
- **Mechanism of ISR and appropriate strategy**
- **Actual vessel size, landing zones**
- **Lesions likely to have probable complications then try to minimize them**
 - Perforation: avoid direct stenting**
 - Attenuated plaque: use distal protection device**
 - Side branch occlusion: guidewire insertion, etc**
- **Entry of CTO if you put IVUS catheter to the side branch**