

Anatomic and physiologic assessment of side branch lesions

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TRANSCATHETER **C**ARDIOVASCULAR THERAPEUTICS **A**SIA **P**ACIFIC

Disclosure Information

John McB. Hodgson MD, FSCAI

The following relationships exist related to this presentation:

Grant support (GS), consultant (C), speakers bureau (SB), stock options (SO), equity interest (EI):

St. Jude/RADI, Boston Scientific, Volcano: GS

Volcano : SB

Technology Solutions Group: EI

Off label use of products will not be discussed in this presentation.

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Side branch ostium

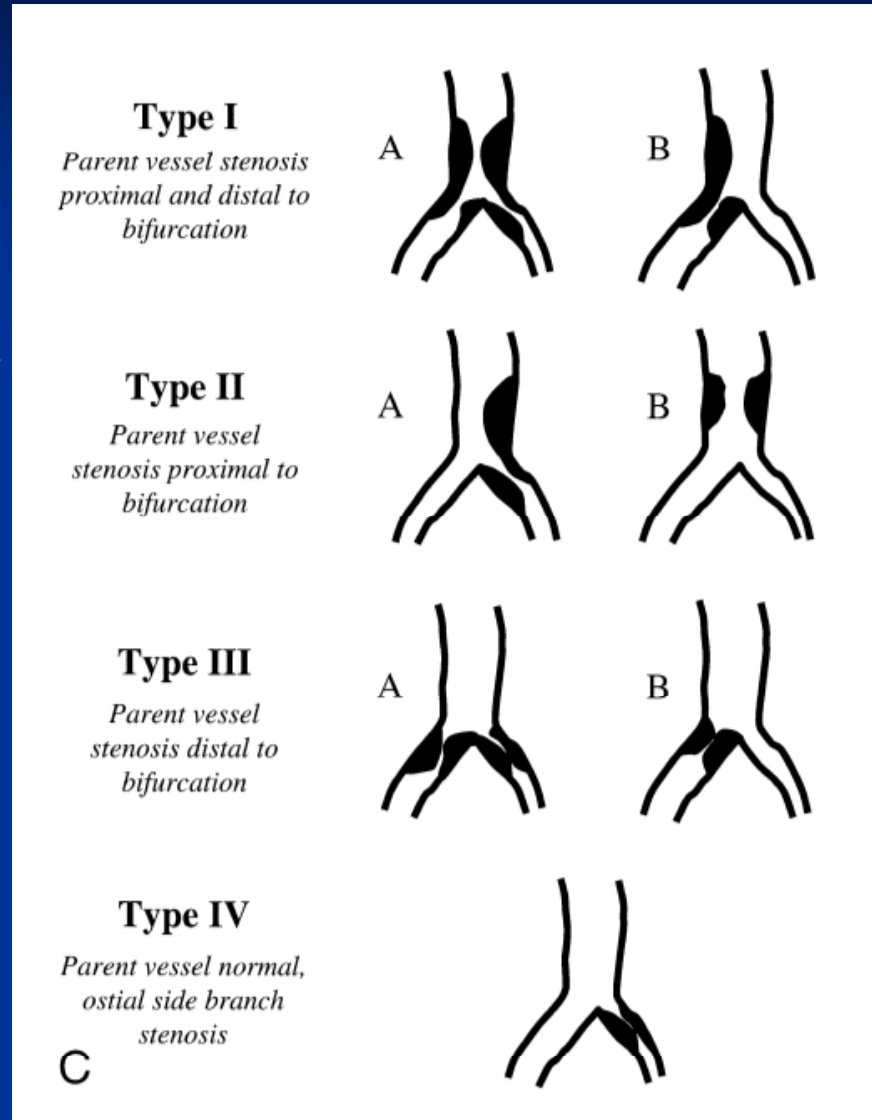
- Implications of treating
- Issues with angiography
- Use of IVUS
- Use of FFR
- Take home message

Implications

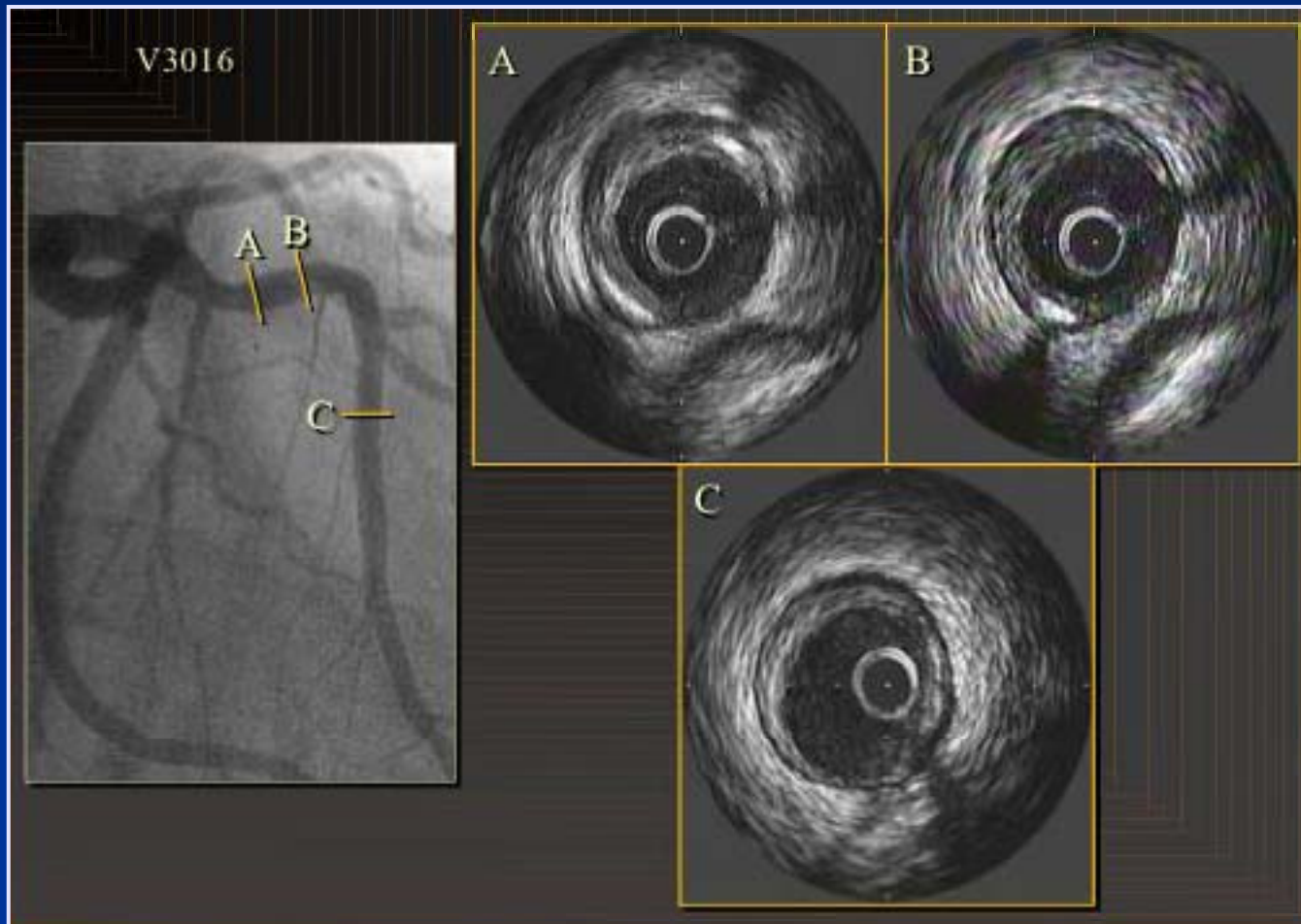
- If side branch is treated:
 - Higher restenosis rate
 - Higher stent thrombosis rate
 - Increased complexity of procedure
 - Increased equipment costs (single vessel payment)
 - Unclear clinical benefit

Branch classification

- Important for strategy
- Difficult to assess with angiography

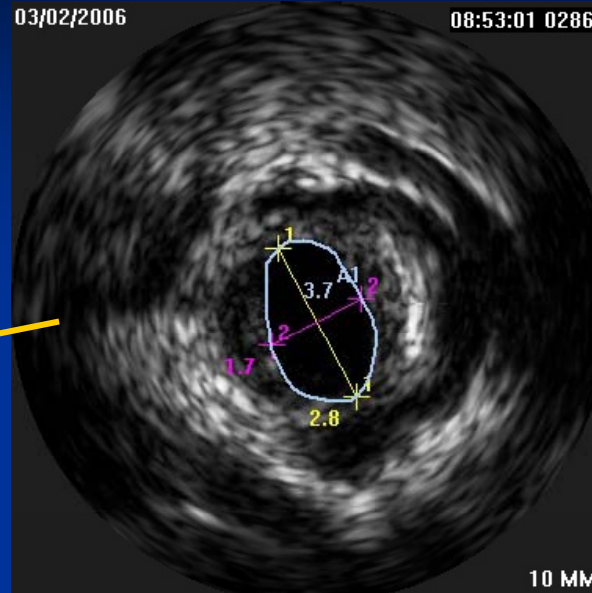


Diffuse, unrecognized disease common

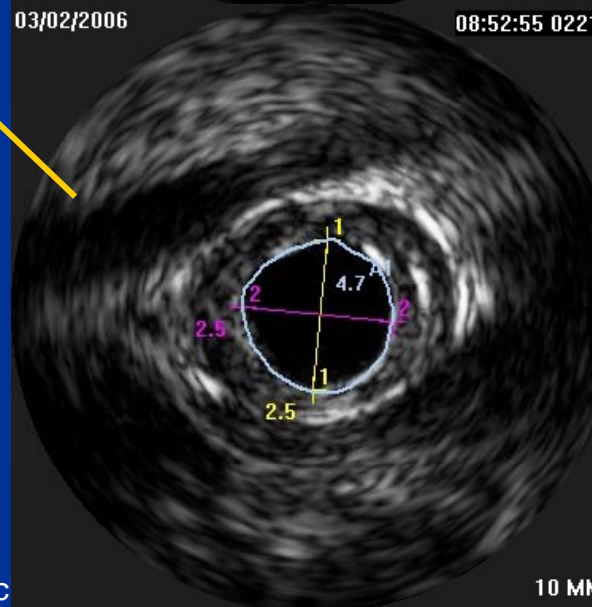


NHLBI WISE study shows over 40% of women at cath have no “significant” narrowings, but do have diffuse disease by ultrasound

Hazy angiograms



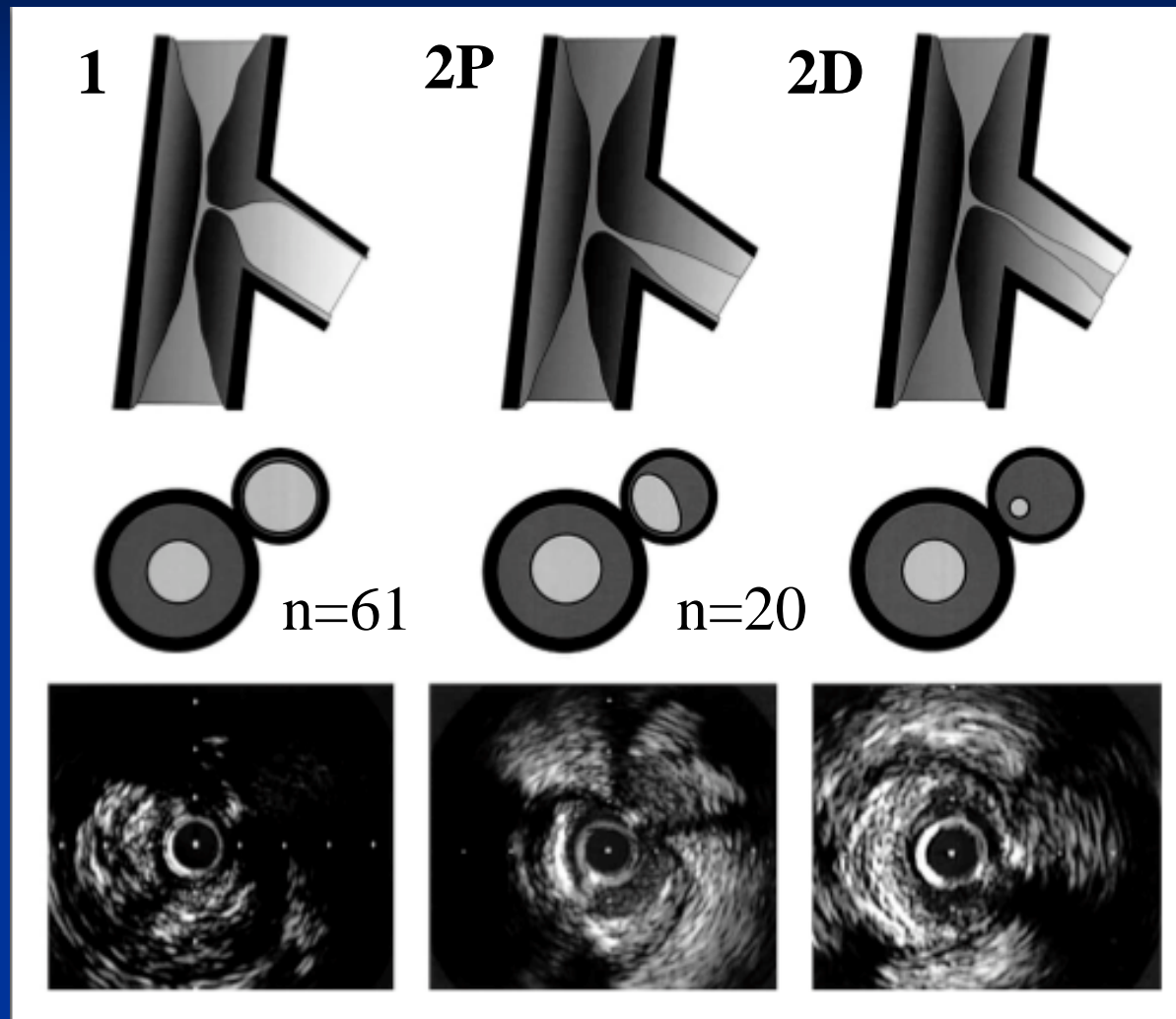
3.7 sq mm
lesion



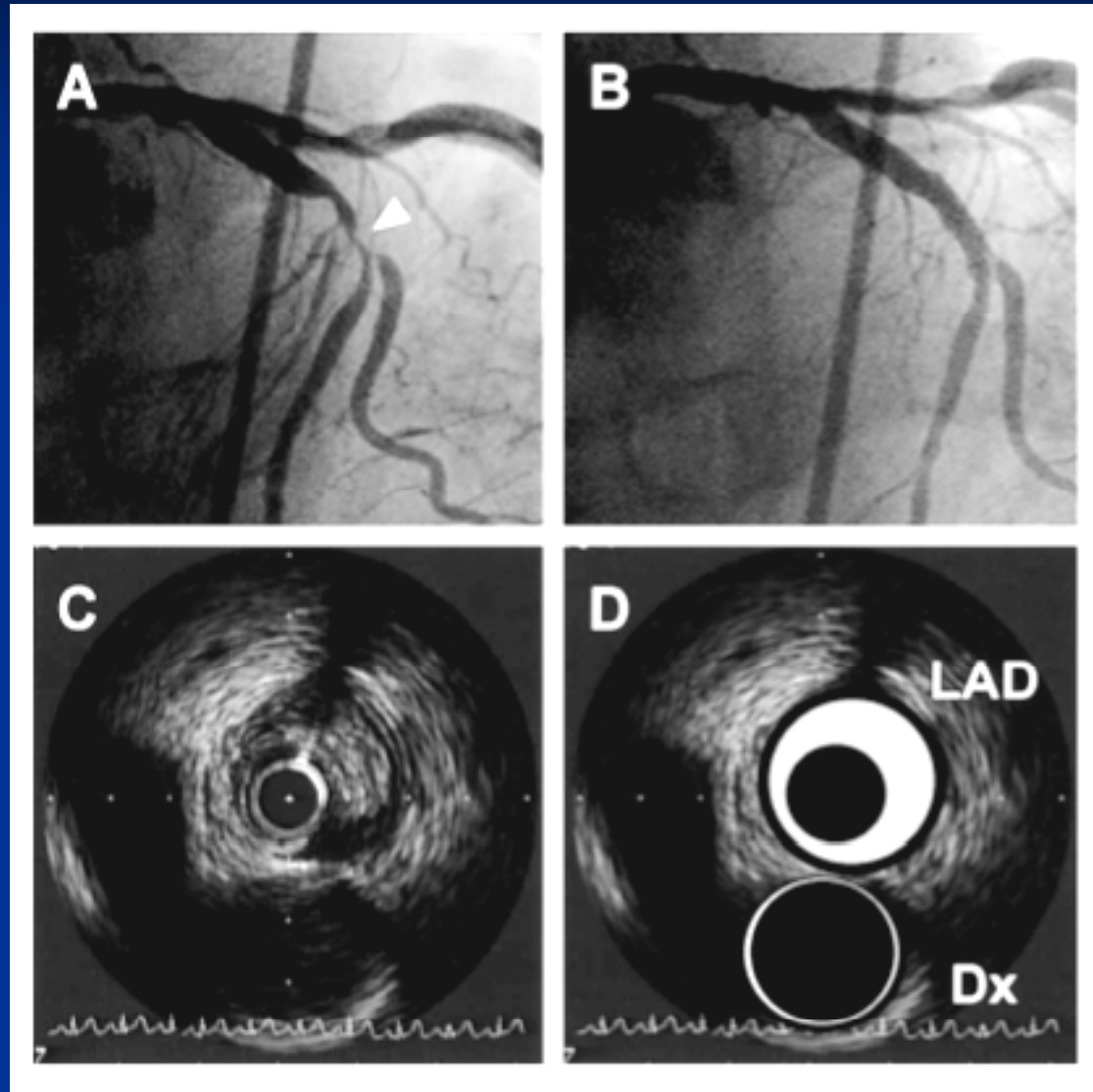
4.7 sq mm
reference

22% AS in
a <2.5 mm
vessel

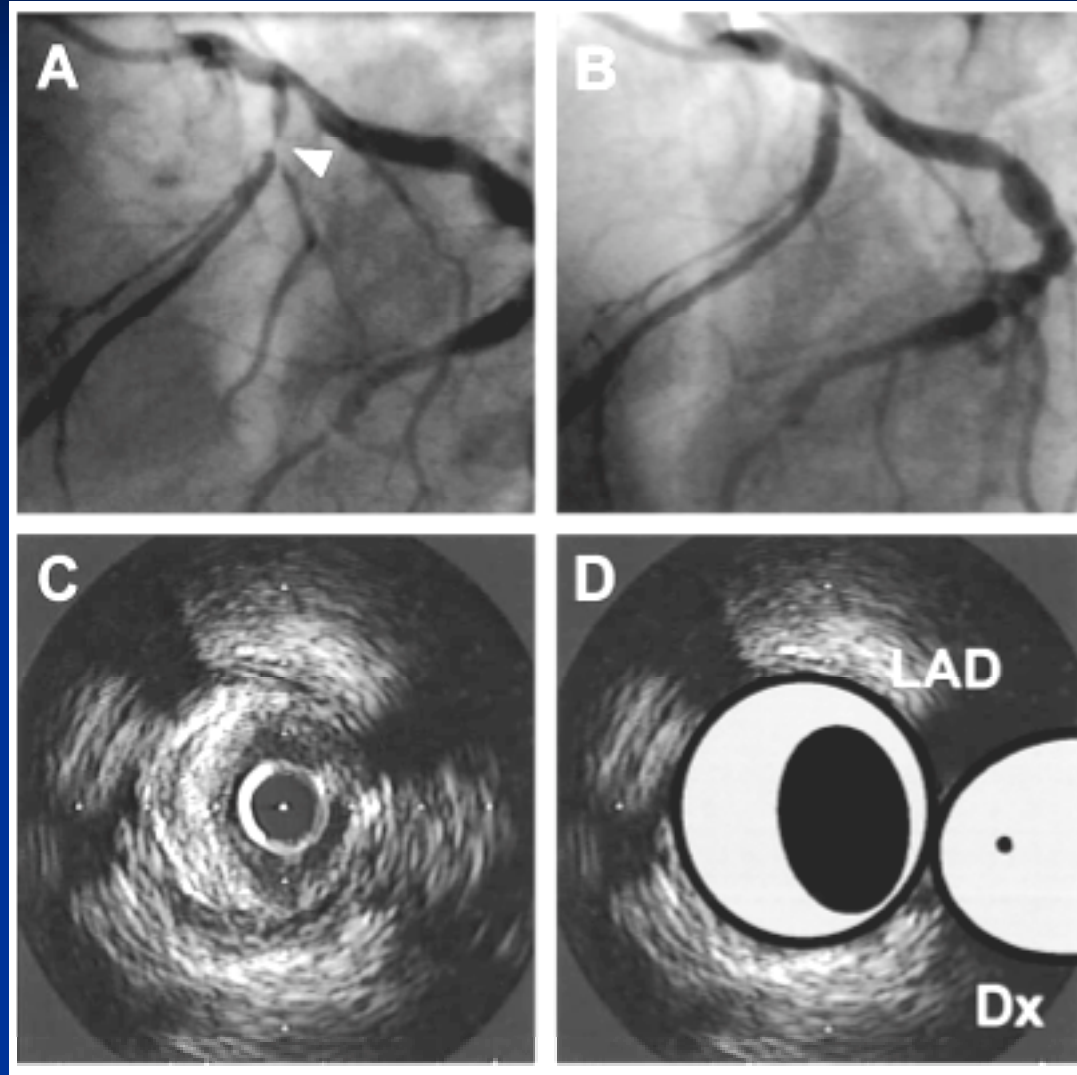
IVUS-defined branch disease



Non-diseased branch: group 1



Diseased branch: group 2



2D

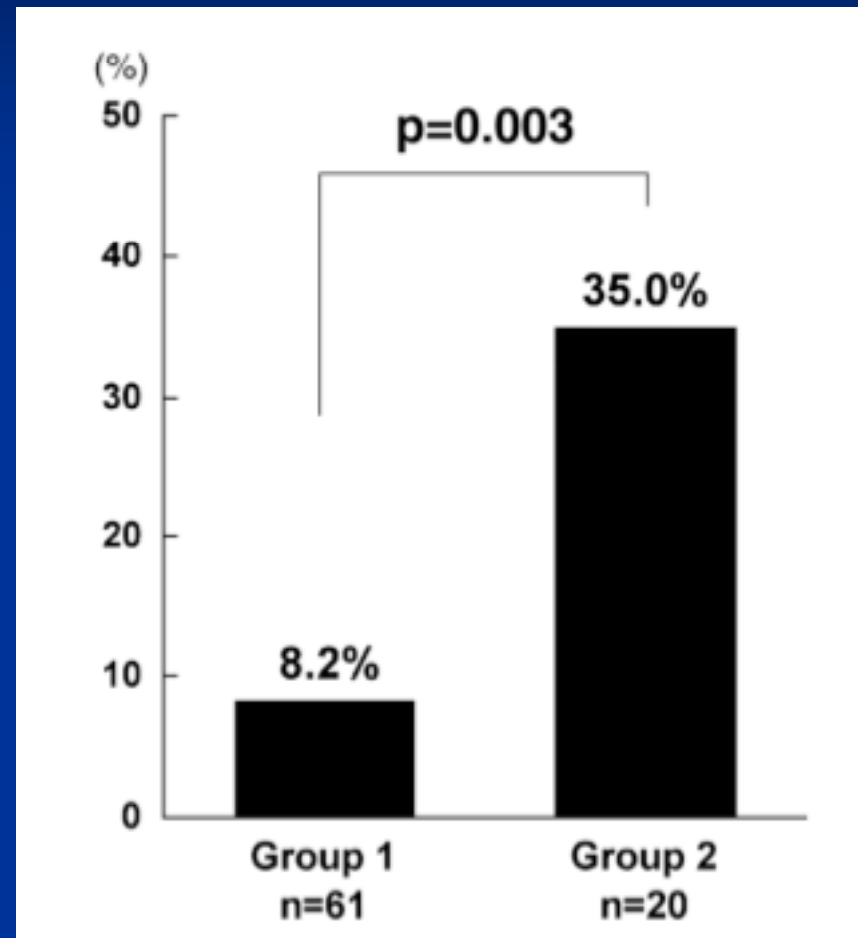
IVUS predicts occlusion

Frequency of side branch occlusion

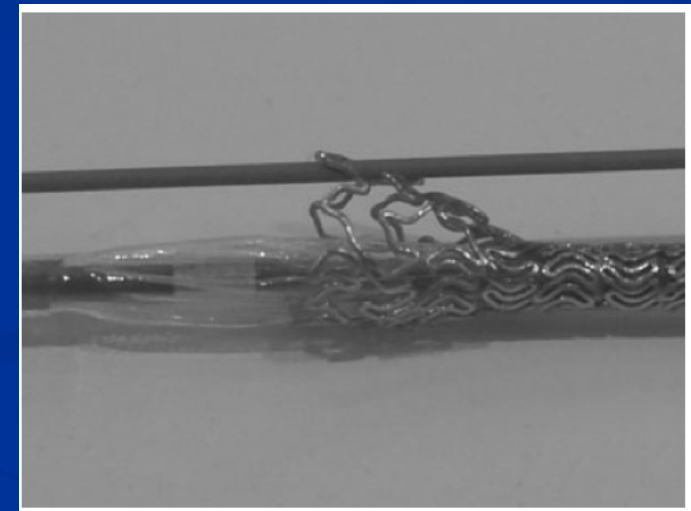
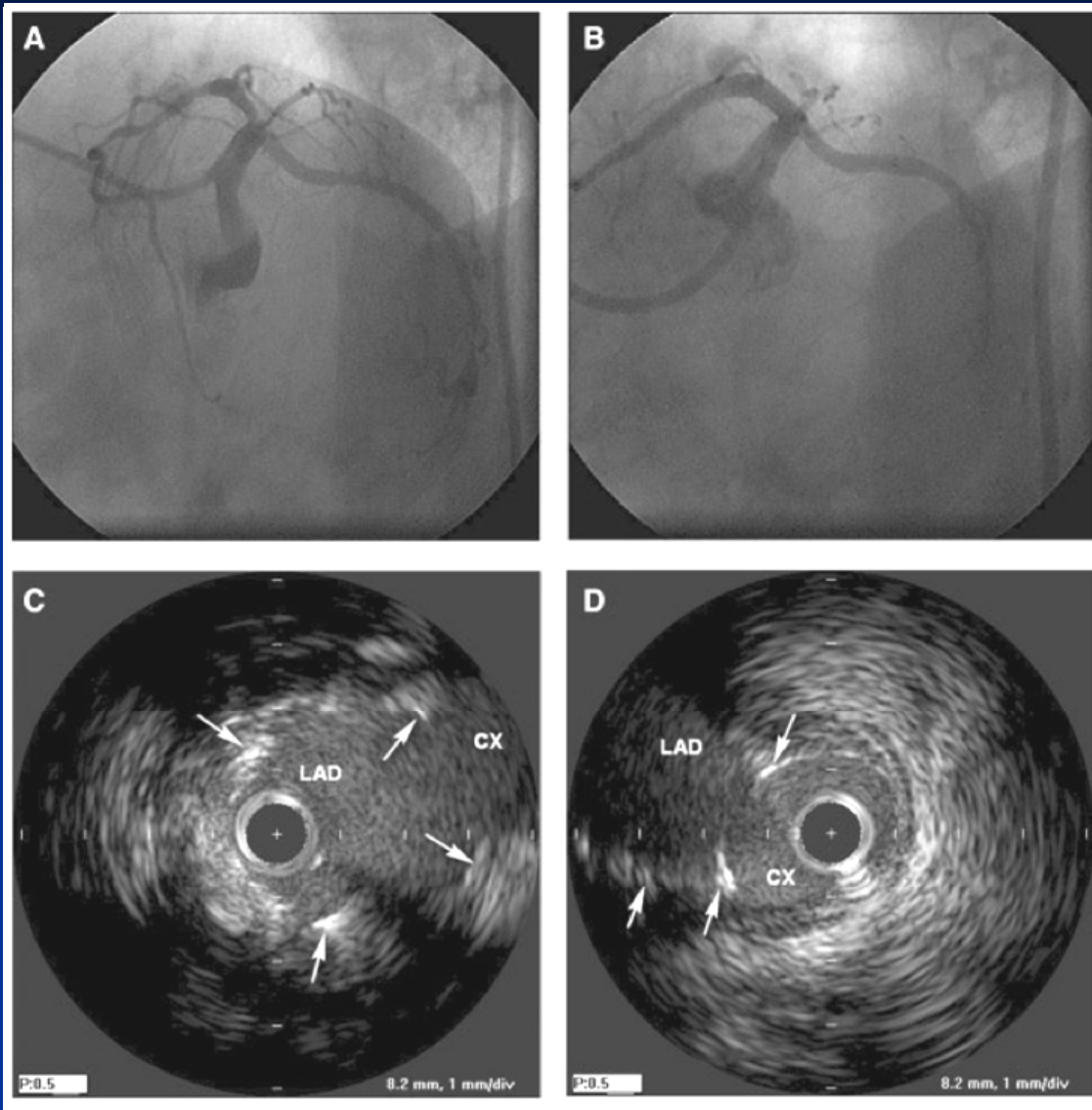
Group 1: branch without disease

Group 2: branch with disease

Of Group 2 lesions, those with diffuse pattern ALL occluded



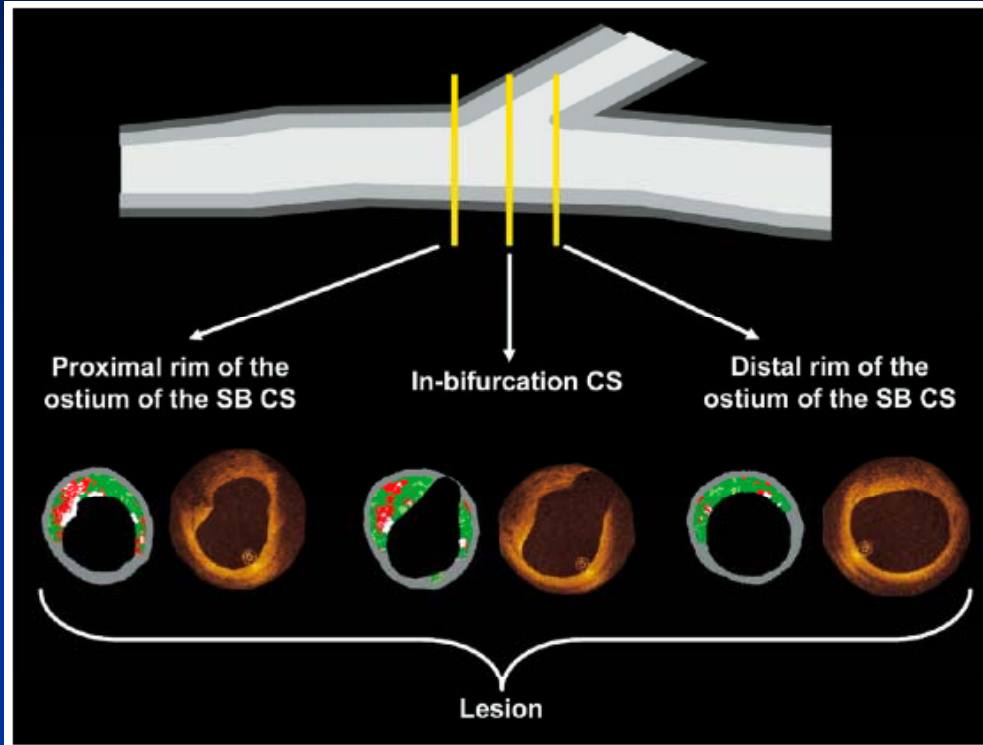
Precise positioning



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CCI 2008;72:331-334

New imaging techniques



VH-IVUS, OCT

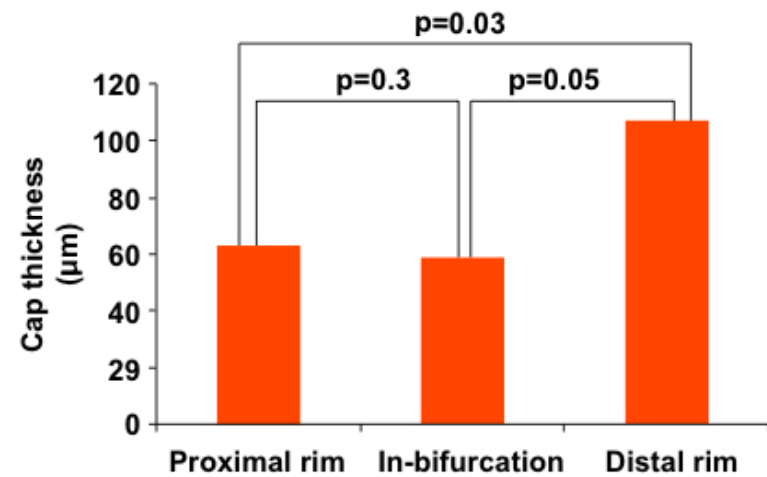


Figure 8. Cap Thickness Distribution in Thin-Cap Fibroatheromas

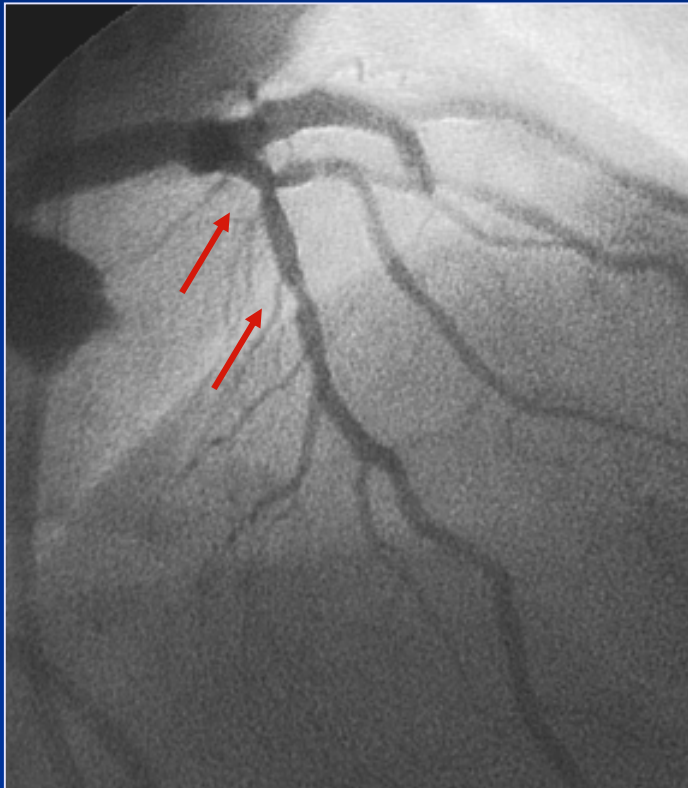
Mean cap thickness in the proximal rim of the ostium of the side branch, in-bifurcation, and distal rim cross-sections in thin-cap fibroatheromas.

J Am Coll Cardiol Img 2009;2;473-482

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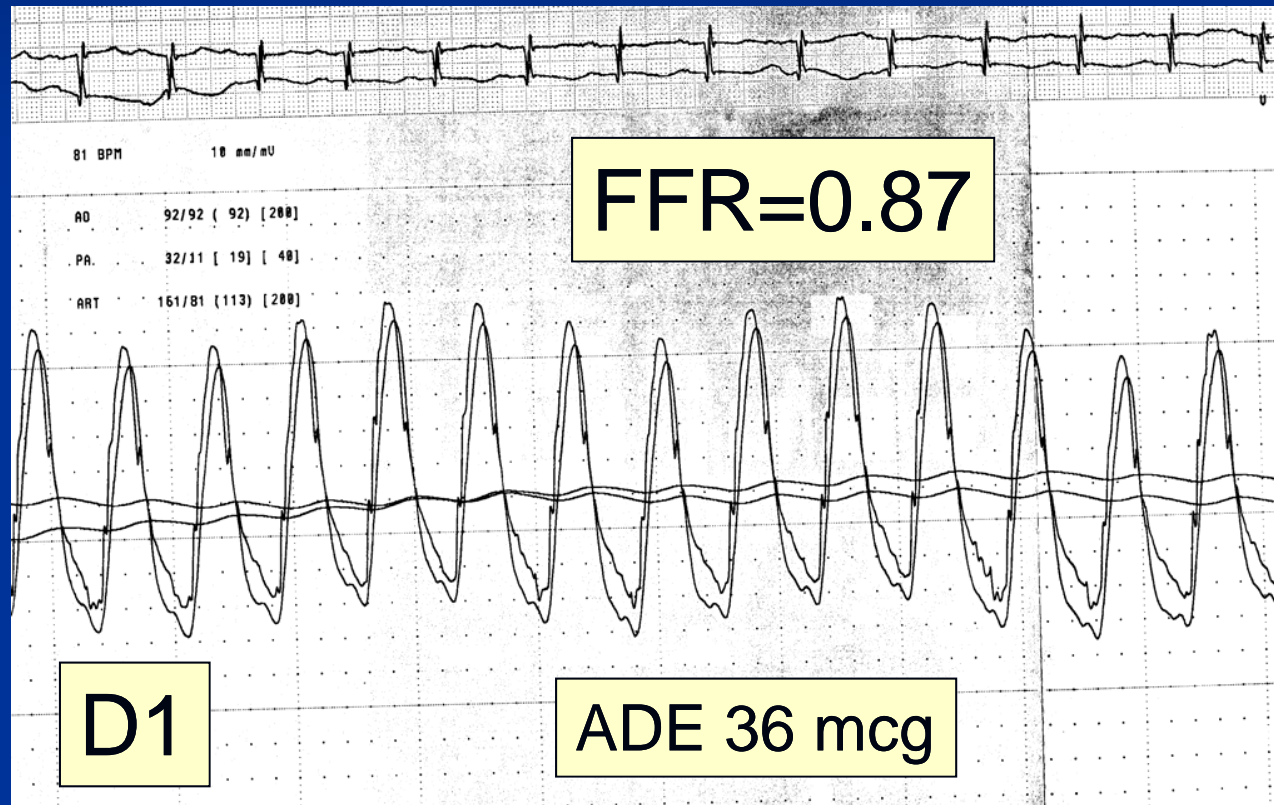
FFR in PCI: optimizing therapy

LAD/D1 bifurcation lesion



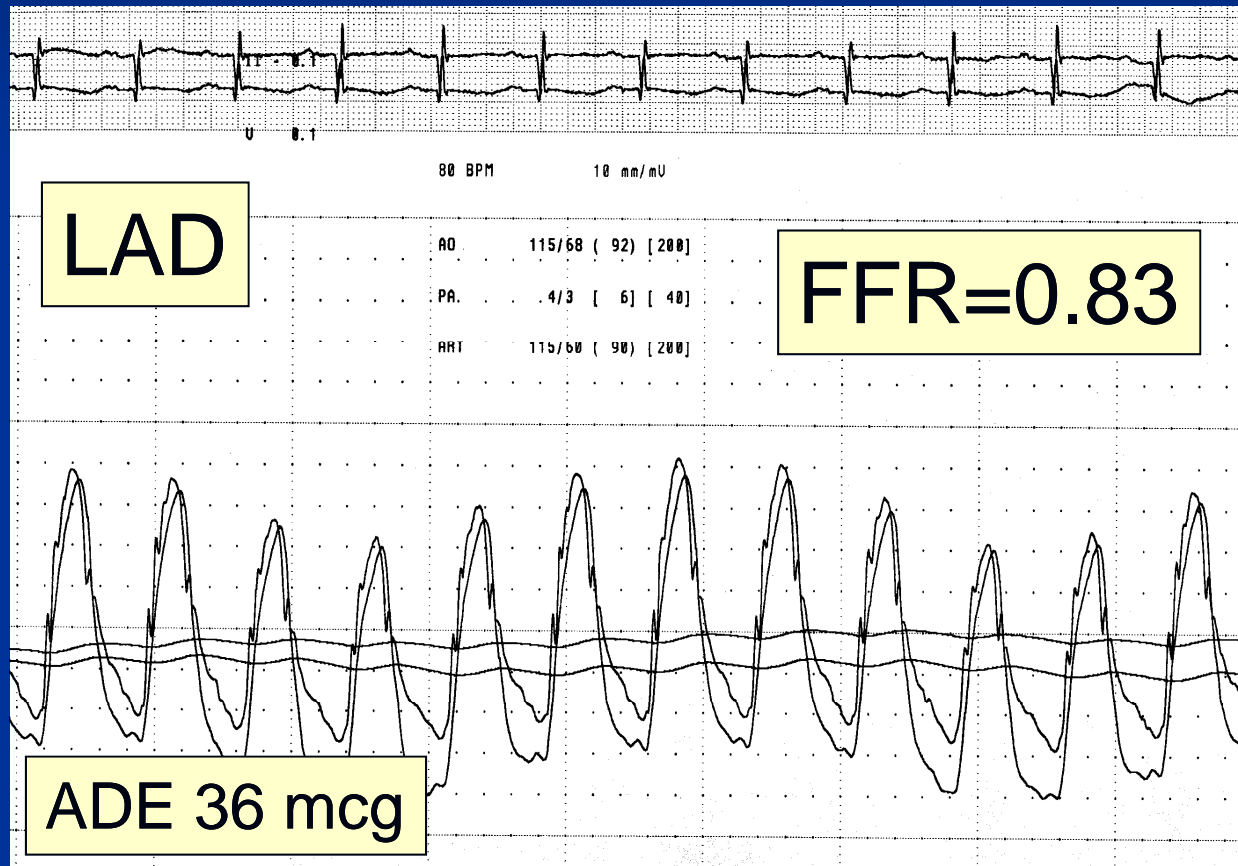
FFR in PCI: optimizing therapy

Evaluate LAD/D1 lesion with FFR

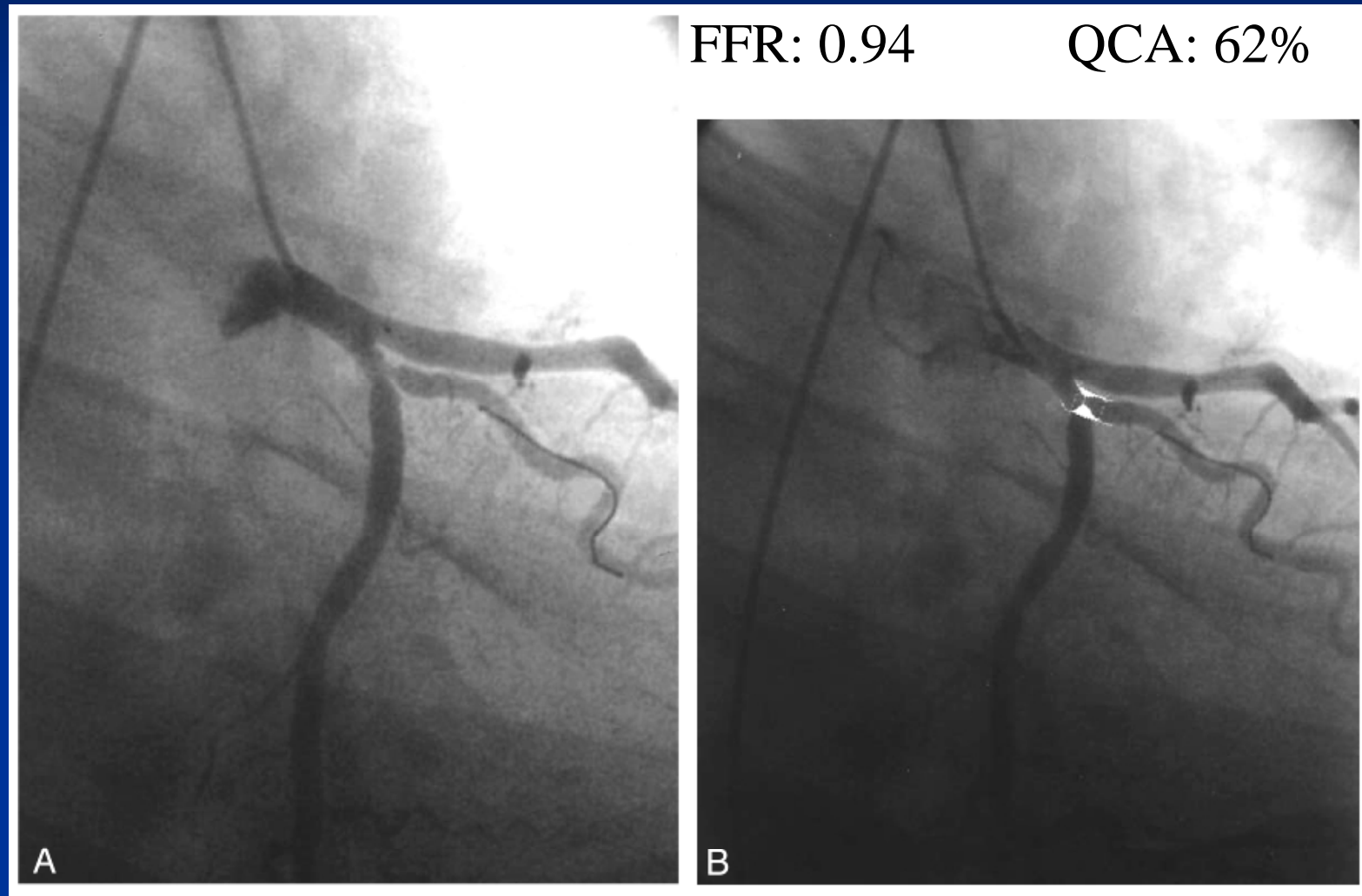


FFR in PCI: optimizing therapy

Evaluate LAD/D1 lesion with FFR



FFR for evaluating ostia



Ostial lesion evaluation

55 ostial lesions evaluated with QCA and FFR

TABLE 2 Ostial Lesions: Angiography Versus Fractional Flow Reserve

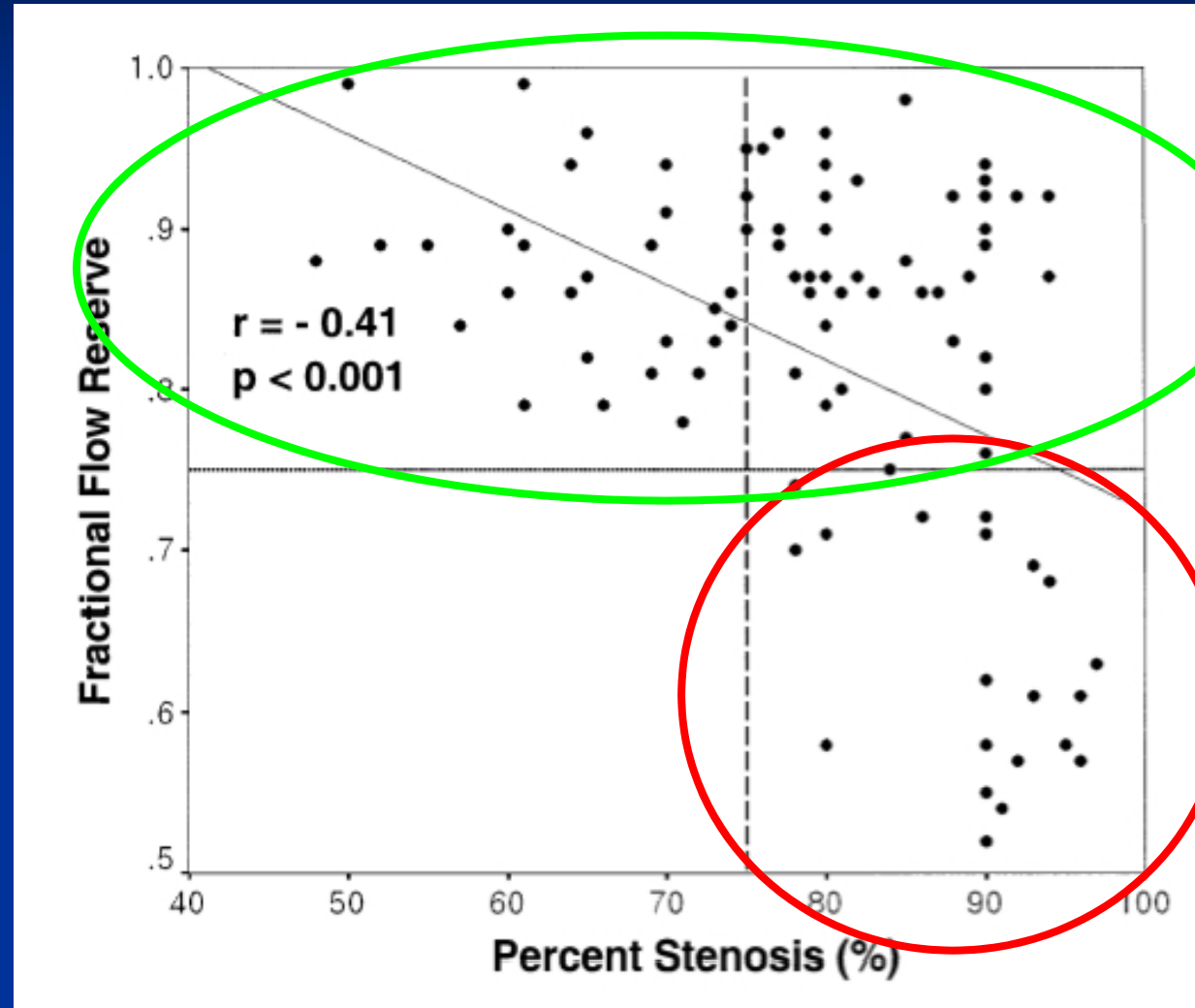
FFR	$\geq 70\%$ Angiographic Stenosis	$50\% - 70\%$ Angiographic Stenosis
≥ 0.75	20	30
< 0.75	5	0

< 10% were significant

Sensitivity 100%, specificity 55%, and test accuracy 60%.

FFR vs Angio evaluation of SB

n = 97
%sten > 50%
ref > 2 mm



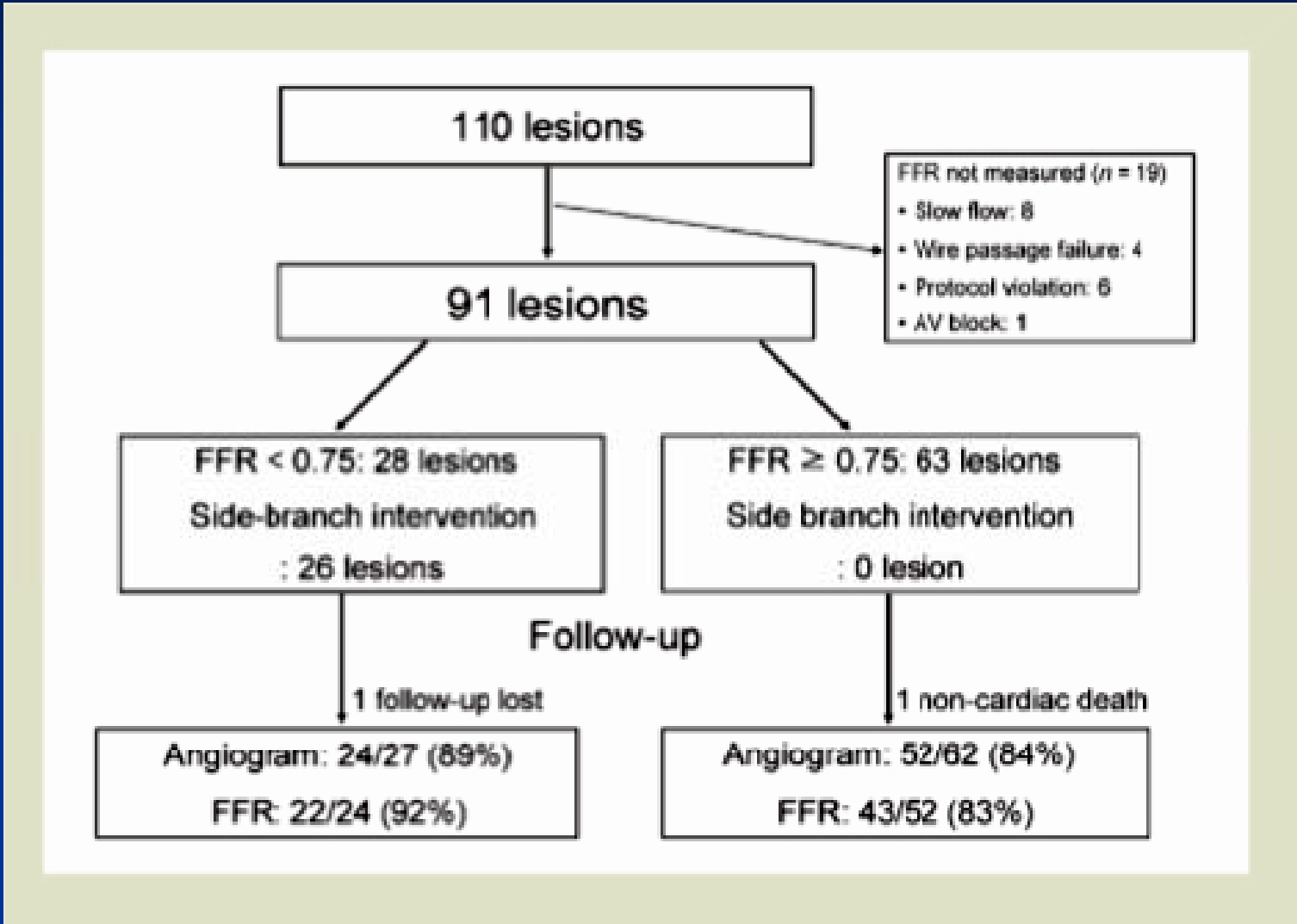
FFR to define significant SB

Table 3. Fractional Flow Reserve and Angiographic Percent Stenosis in Jailed Side Branches

	% Stenosis	
	≥50, <75	≥75
All lesions (n = 94)		
FFR <0.75	0	20 (27%)
FFR ≥0.75	20	53
Vessel size ≥2.5 mm (n = 28)		
FFR <0.75	0	8 (38%)
FFR ≥0.75	7	13

FFR = fractional flow reserve.

FFR evaluation of SB: outcomes



Stability of FFR over time

6.7 ± 1.2 month follow-up

Table 2 Serial changes in fractional flow reserve during 6-month follow-up

	Post-intervention	Follow-up	P-value ^a
Main branch	0.96 ± 0.04	0.96 ± 0.04	0.9
Jailed side branch	0.87 ± 0.06	0.87 ± 0.09	0.7
KB group	0.86 ± 0.05	0.84 ± 0.11	0.4
Non-KB group	0.87 ± 0.06	0.89 ± 0.07	0.1

KB, kissing balloon inflation.

^aNot adjusted for multiple comparisons.

Balloon treated ostial lesions

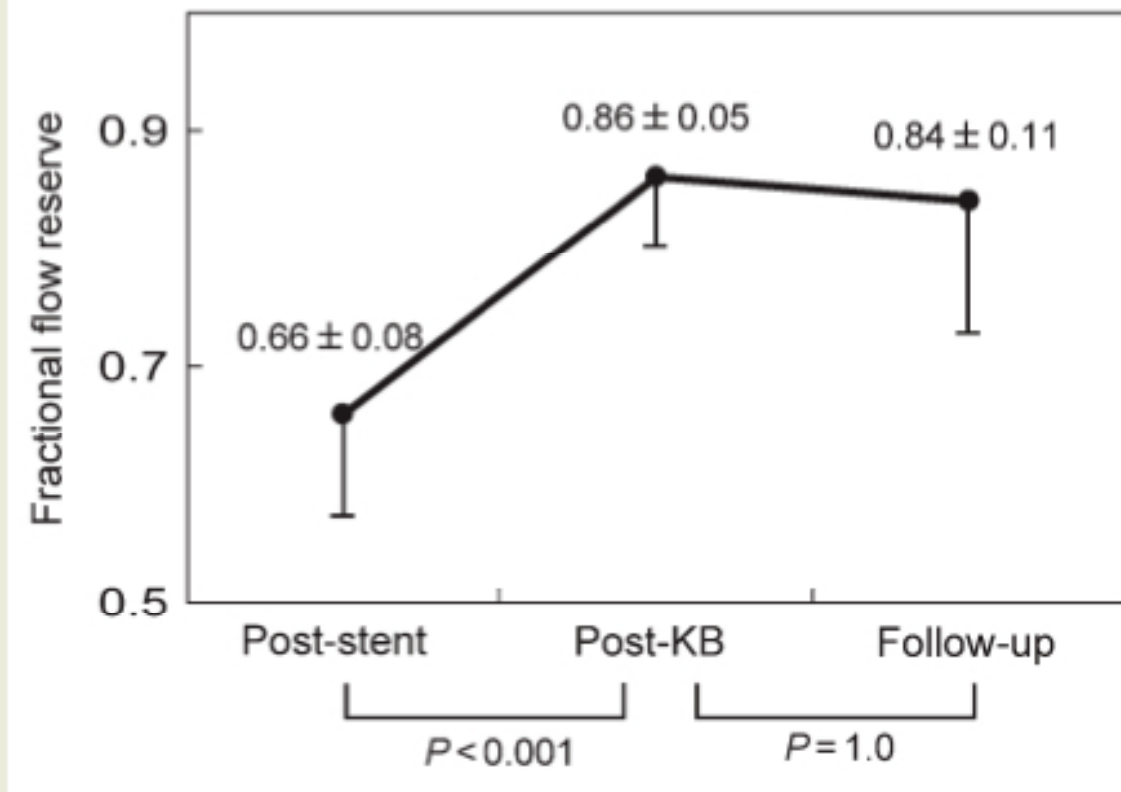
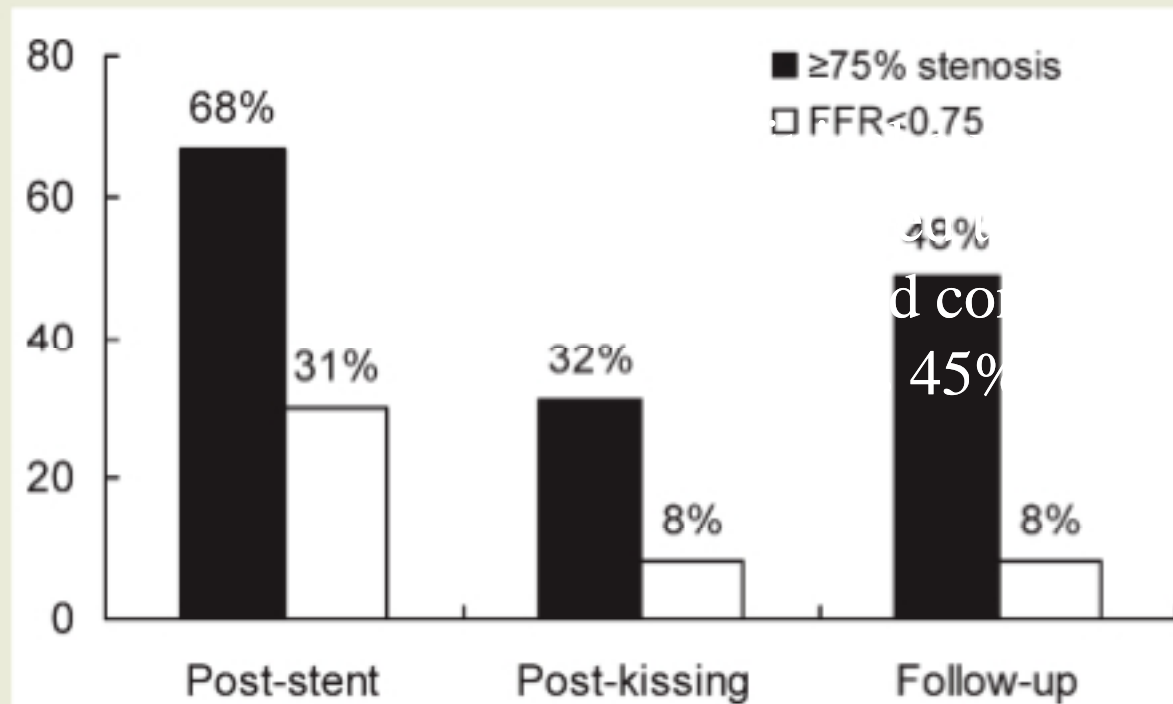


Figure 3 Serial changes of fractional flow reserve in 22 lesions with kissing balloon inflation (KB, kissing balloon inflation).

Clinical outcome

Table 3 Comparison of clinical outcomes between fractional flow reserve intervention group (FFR_i) and percutaneous coronary intervention group (PCI)

Cardiac death
Myocardial infarction
Target vessel revascularization, n (%)



Summary

- Angiography OVER estimates need for SB PCI
- IVUS provides better evaluation of true SB involvement
- FFR is accurate way to determine those SB needing PCI
- Decisions on SB PCI require adjunctive techniques

Take Home Protocol

- Try to avoid SB PCI if possible
- Do pre-intervention IVUS
- If IVUS shows no SB disease: stent MB
- If IVUS shows diffuse SB disease: stent BOTH
- If IVUS shows focal SB disease: provisional
- If post MB stent the SB looks $> 70\%$, do FFR
- If FFR > 0.75 no further TX
- If FFR < 0.75 kissing balloon to SB; stent only if repeat FFR not > 0.80