

***New Strategies in the Treatment of AMI***

**IS MULTI-VESSEL INTERVENTION  
REASONABLE IN AMI?**

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**Monday, July 14, 2003**



# Incidence of Multiple Vessel Disease in Acute Myocardial Infarction

	No.	SVD	MVD
GUSTO I	2046	61%	39%
STENT PAMI	900	55%	45%
FRESCO Trial	223	49%	51%
CADILLAC	2082	51%	49%
PACT Trial	606	46%	54%
Combined PAMI Trials	3032	42%	58%
Age < 75 yrs		51%	49%
Age > 75 yrs		33%	67%
Brodie Registry	1490	47%	53%
MAHI Registry	2730	37%	63%

# **Multiple Vessel Disease in Acute Myocardial Infarction**

**In patients presenting with acute STEMI**

**40-60% have Multiple Vessel Disease**

**20-25% have Triple Vessel Disease**

# Long-Term Outcome in Patients with AMI Undergoing Primary Percutaneous Intervention

A Pooled Analysis of the **Primary Angioplasty in Myocardial Infarction (PAMI) Trials**

2,970 pts (PAMI-1, PAMI-2, Stent-PAMI, Air PAMI, PAMI-no surgery on site)

	In-Hosp	30-Days	6-Mths	12-Mths
Mortality (%)	3	3.9	5	6.4
Reinfarction (%)	1	1.4	3.1	4.0
Death/Reinfarction (%)	3.2	4.2	7.9	9.8

**Independent predictors of 6-month outcome:**

**Age > 70 yrs, HR > 100 bts/min, final TIMI flow < 3, Multiple Vessel Disease, higher Killip class & lower EF**

# Multivessel CAD: A Key Predictor of Short-Term Prognosis After Reperfusion Therapy for AMI

*Thrombolysis and Angioplasty in Myocardial Infarction (TAMI) Study, 855 pts.*

## *Multivariate Predictors of In-Hospital Mortality*

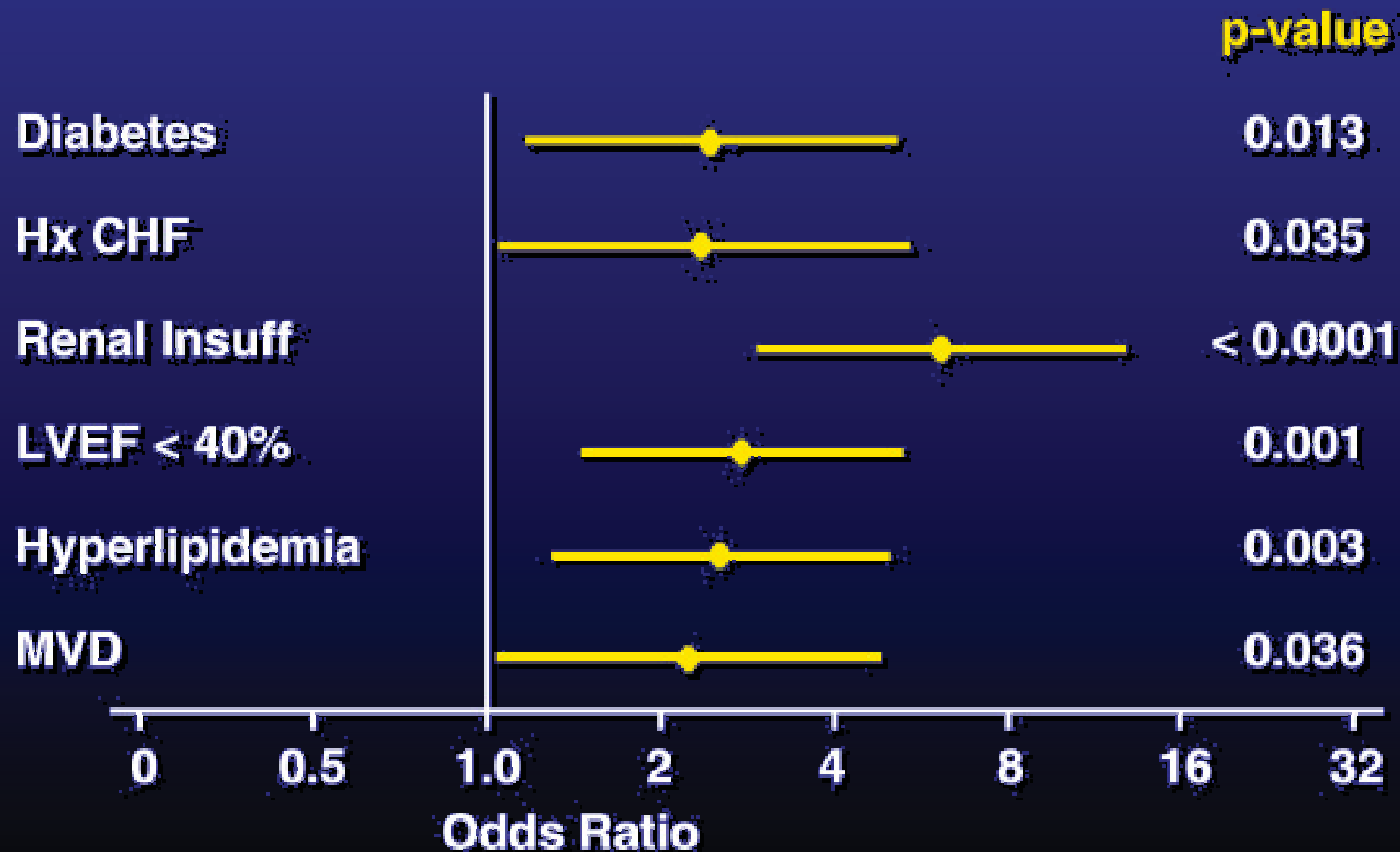
Variable	Beta	Chi-Square	P-value
No. of Diseased Vessels	0.600	9.26	0.002
LVEF	-0.039	6.73	0.01
Patient Age (yr)	0.039	4.68	0.03
TMI Flow (90 min)	-0.740	4.54	0.03

*One additionally diseased vessel equivalent to 15 years of age, or a reduction in LVEF of 16%*



# Multiple Vessel Percutaneous Intervention in the Acute Myocardial Infarct Patient 841 Consecutive Pts, 1998-2002, MAHI

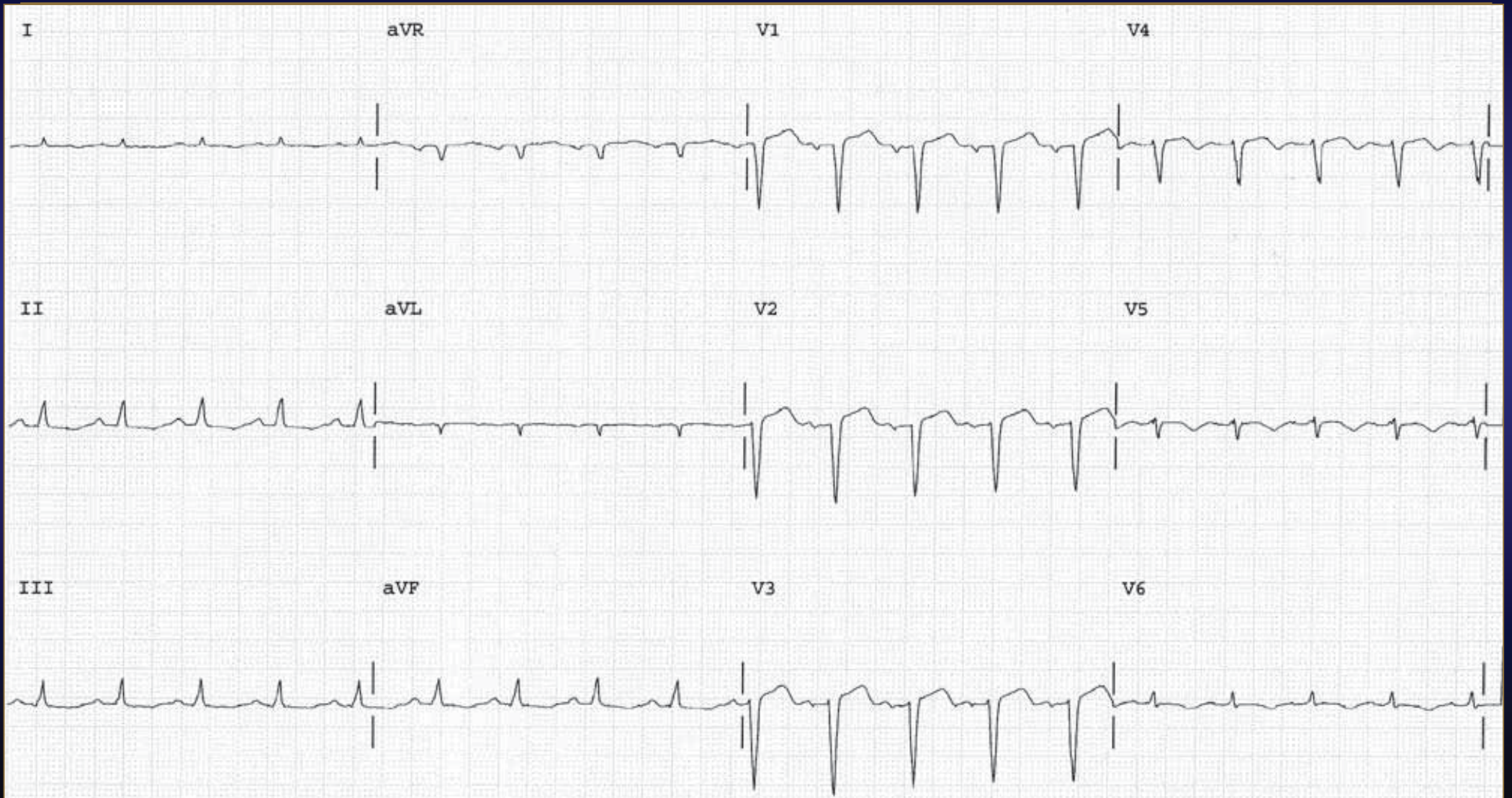
## Multivariate Predictors of 30-Day Mortality





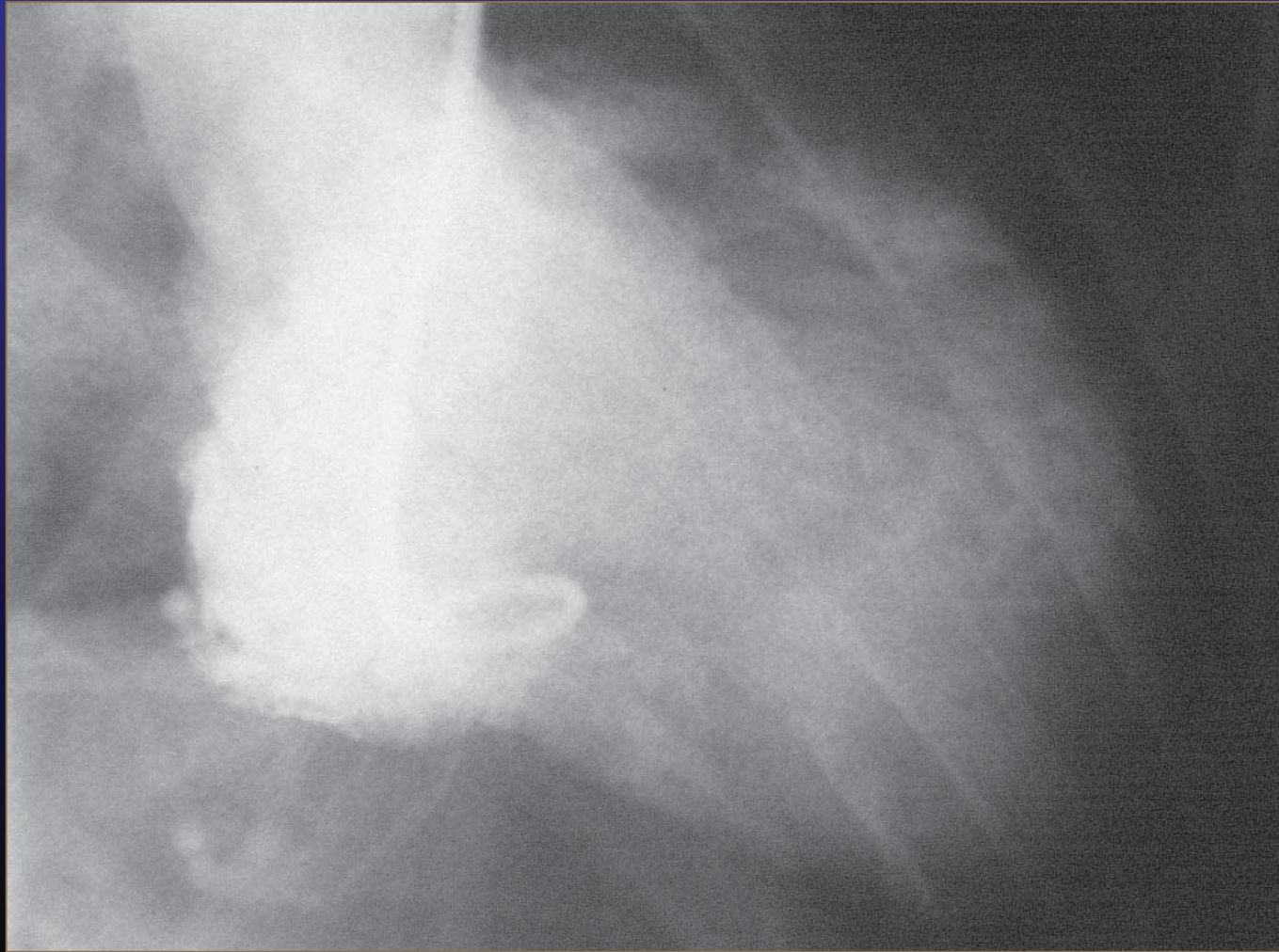
# C.B. 61-Year-Old Male, 12-14-2002

## Acute Anteroseptal Infarction





**C.B. 61-Year-Old Male, 12-14-2002**  
**Acute Anteroseptal Infarction. LVEF 25-30%**

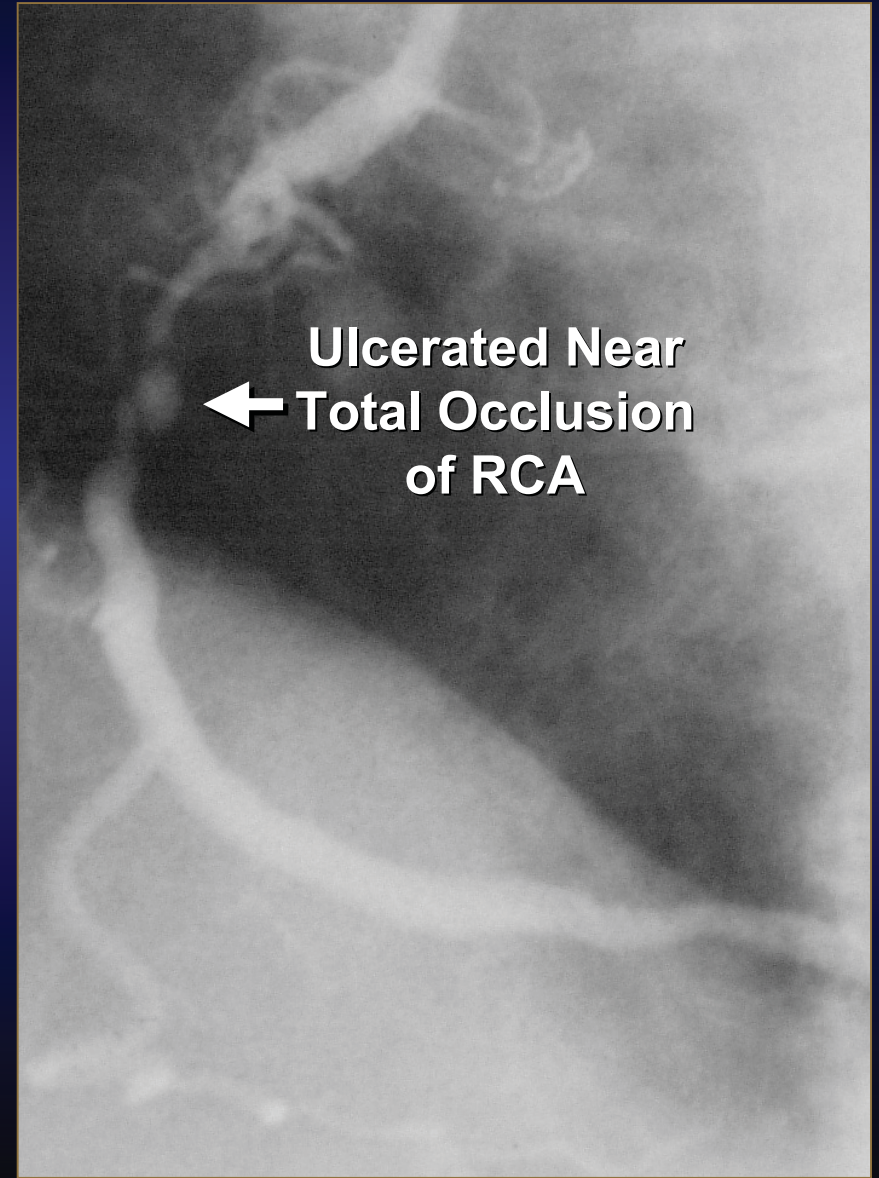
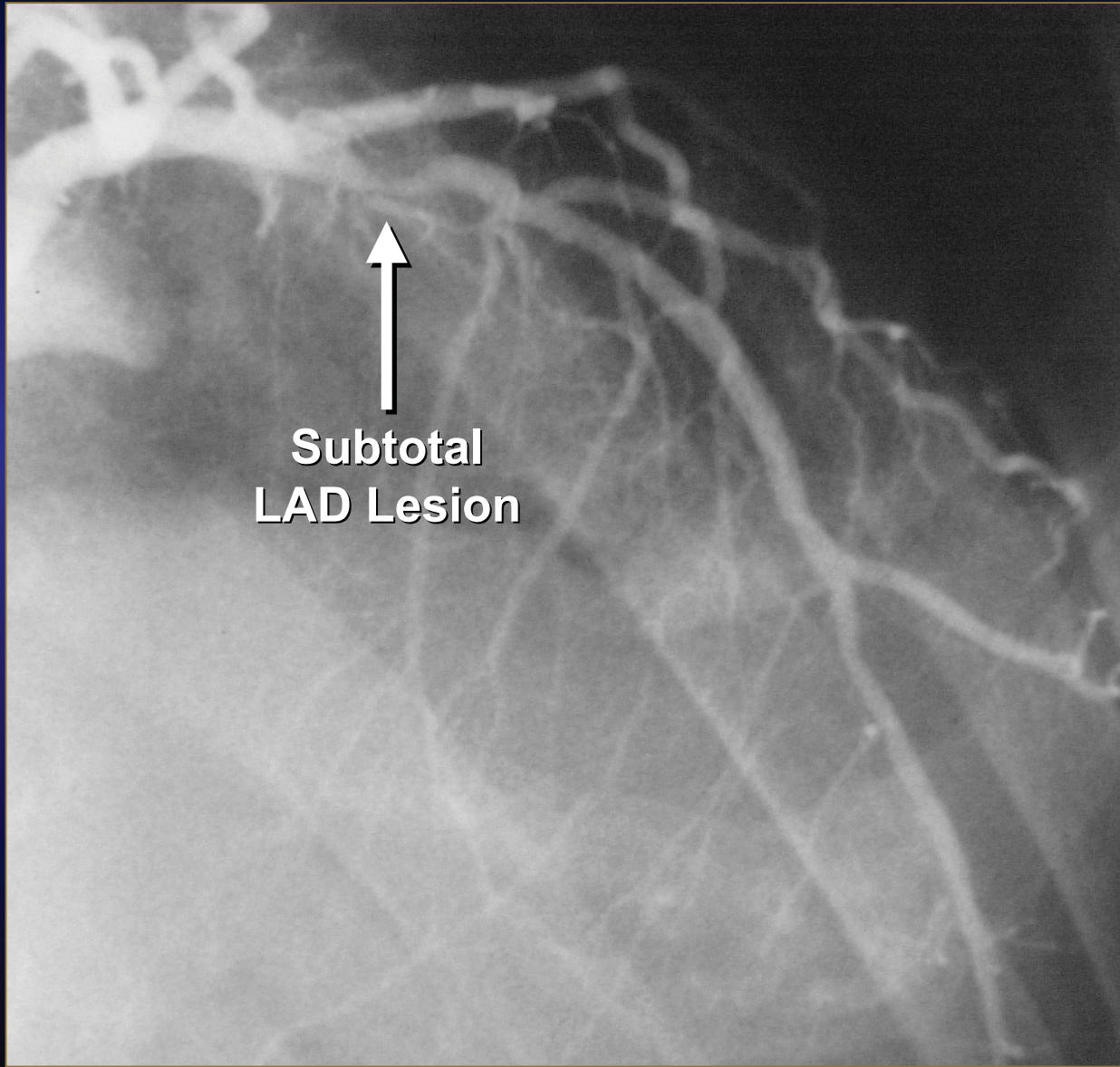






# C.B. 61-Year-Old Male 12-14-2002

## Acute Anteroseptal Infarction





## **C.B. 61-Year-Old Male 12-14-2002**

### **Acute Anteroseptal Infarction**

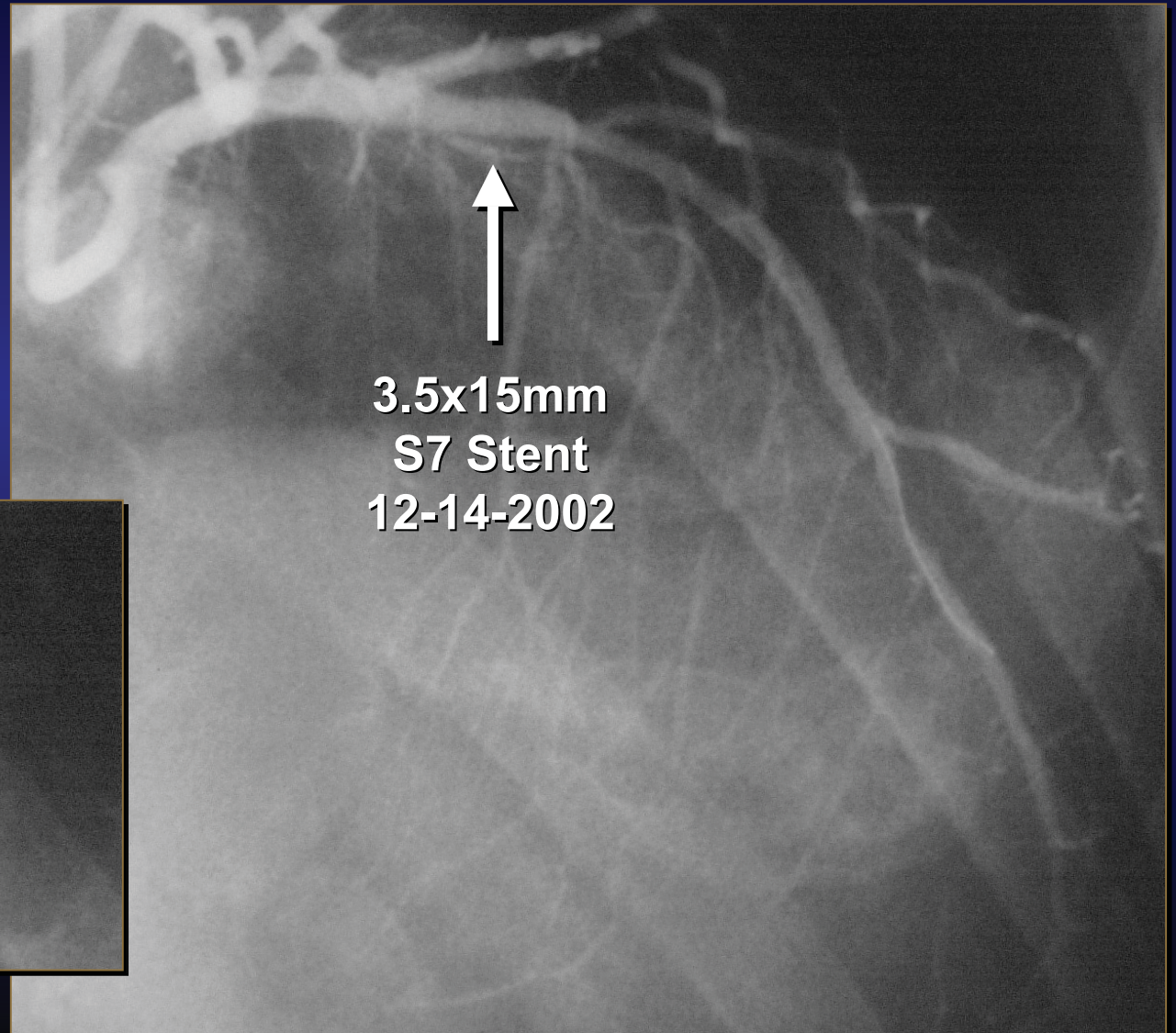
#### ***Approach to Patient?***

- 1. Percutaneous Intervention (PCI) of the infarct related artery (IRA) only?**
- 2. PCI of the IRA (LAD) and non-IRA (RCA) during the same procedure?**
- 3. PCI of the IRA, then staged intervention of the non-IRA?**



# C.B. 61-Year-Old Male, 12-14-2002

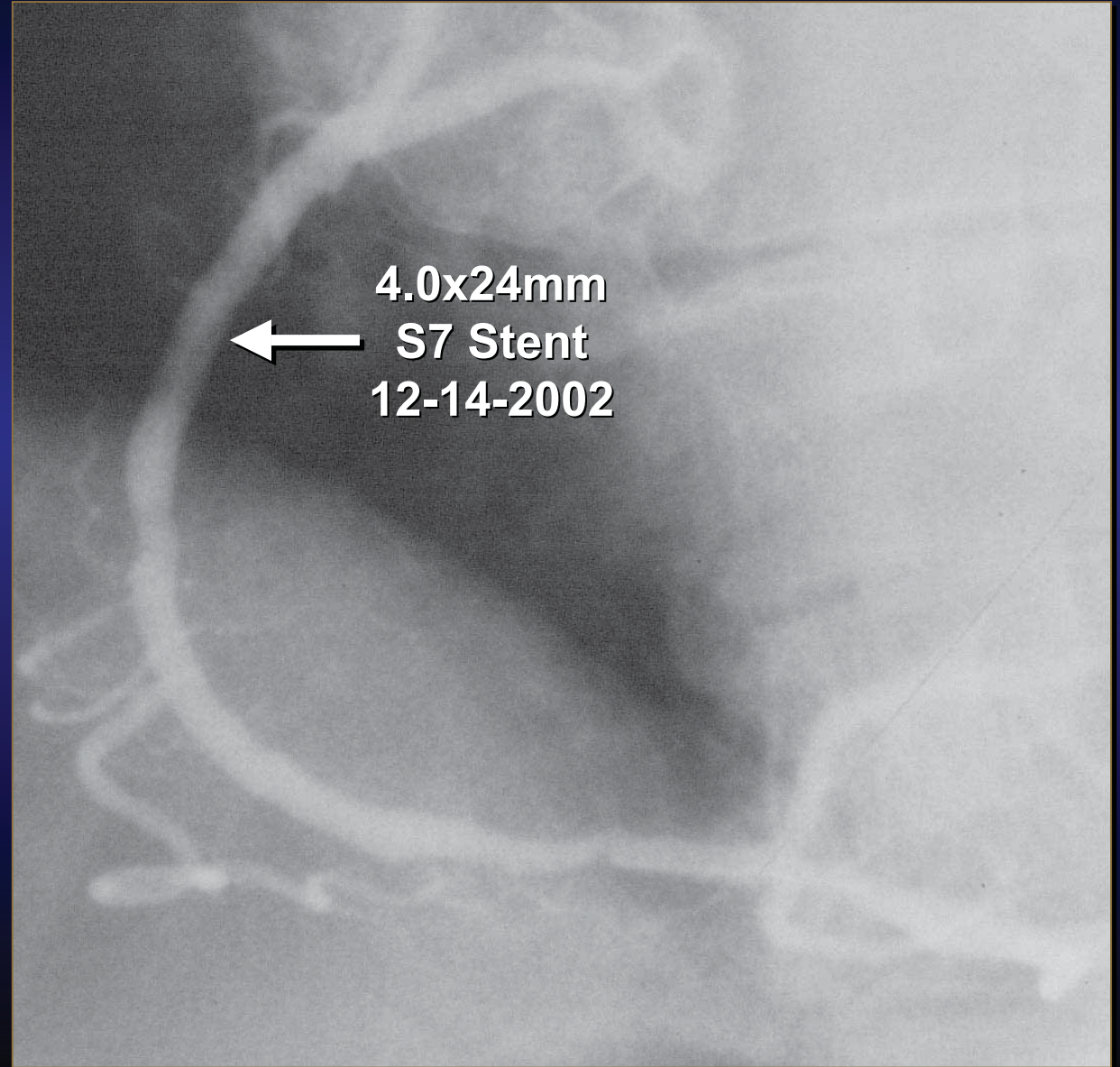
## Acute Anteroseptal Infarction





# C.B. 61-Year-Old Male, 12-14-2002

## Acute Anteroseptal Infarction



# Exaggeration of Nonculprit Stenosis Severity During Acute MI: Implications for Immediate Multivessel Revascularization

*321 pts MVD, 112 had 9 month F/U angiograms.  
48 pts had non-IRA lesions suitable for comparison.*

	Infarct Angio	F/U Angio	P-value
MLD (mm)	1.53 ± 0.51	1.78 ± 0.65	< 0.001
% Diam Stenosis	49.3%	40.4%	< 0.0001
Ref. Vessel Diam	3.1 ± 0.8	3.0 ± 0.8	NS

*21% had non-IRA lesions > 50% → < 50%*



# Multiple Vessel Percutaneous Intervention in Acute Myocardial Infarction

	Multicenter Registry		Stent PAMI		Mayo Clinic	
	IRA only	MV PCI	IRA	ML PCI	IRA	MV PCI
No. Pts	79	79	312	101	431	24
Mortality:						
30-days	14.1%	20.1%*			-	-
6-12 mths	16.5%	21.6%	4.3%	9.9%†	12.9%	11.1%

\*p<0.01

†p=0.02



# Multiple Vessel Percutaneous Intervention in Acute Myocardial Infarction

		Buenos Aires		Ashikaga Hosp, Japan Killip Class III-IV	
		IRA	MV PCI	IRA	MV PCI
No. Pts		96	17	50	31
Mortality					
30-days		6%	0%	36%	16%*
6 mths		10%	0%	50%	20%†

\*p<0.0001

†p=0.004

# Impaired Coronary Blood Flow in Nonculprit Arteries in the Setting of AMI

- ☆ CTFC in 1,817 nonculprit arteries – TIMI 4, 10A, 10B, and 14 thrombolytic trials
- ☆ Nonculprit artery flow was  $30.9 \pm 15.0$  frames at 90 mins (45% slower than normal)
- ☆ Nonculprit artery flow improves at 60-90 mins, and is related to improved flow in culprit artery
- ☆ Correlates of nonculprit artery slow flow:
  - Pulsatile flow in culprit artery
  - LAD culprit artery
  - Decreased systolic BP and cardiac output
  - Decreased double product
  - Greater than 50% lesion of nonculprit artery
  - Greater culprit artery distal bed
- ☆ Relief of culprit artery stenosis by PTCA restores culprit and nonculprit artery flow, but both 45% slower than normal flow





# **Multiple Vessel Percutaneous Intervention in the Acute Myocardial Infarction Patient**

## **MAHI Registry**

**841 consecutive patients**

**Primary PCI for AMI**

**1998 - 2002**

**63% with Multivessel Disease**

**( $\geq 70\%$  stenosis of  $\geq 2$  coronary arteries)**



# Multiple Vessel Percutaneous Intervention in the Acute Myocardial Infarction Patient 841 Consecutive Pts, 1998-2002, MAHI

Single Vessel Disease  
(N = 314)

(Group 1)

Multivessel Disease  
(N = 527)

PCI of IRA only  
(N = 354)

(Group 2)

PCI of IRA + non IRA  
at same procedure  
(N = 26)

(Group 3)

PCI of IRA + non IRA  
Staged w/in 30 days  
(N = 147)

(Group 4)



# Clinical Characteristics AMI patients 1998-2002

## Multivessel Disease

	Single Vessel Disease	Multivessel Disease			p value
		PCI of IRA only	PCI of IRA + nonIRA, same procedure	PCI of IRA + nonIRA, staged within 30 days	
N	314	354	26	147	
Prior CHF	5.7%	6.8%	26.9%	4.8%	<0.001
Prior MI	7.6%	21.5%	26.9%	16.3%	<0.001
Prior CVA	7.6%	9.9%	3.8%	9.5%	0.58
Prior PAD	3.2%	6.8%	0%	4.1%	0.09
Cr ≥ 1.5 mg/dl	2.9%	3.4%	3.8%	2.7%	0.96



# Clinical Characteristics AMI patients 1998-2002

	Single Vessel Disease	Multivessel Disease			p value
		PCI of IRA only	PCI of IRA + nonIRA, same procedure	PCI of IRA + nonIRA, staged within 30 days	
N	314	354	26	147	
EF < 40%	23.9%	25.7%	23.1%	23.8%	0.94
Killip Class IV	1.9%	3.4%	11.5%	1.4%	0.02
IABP	12.4%	13.8%	26.9%	9.5%	0.10
IIb/IIIa use	29.6%	39.3%	30.8%	30.6%	0.05
Stent	86.6%	86.7%	92.3%	98.6%	0.02



# Multiple Vessel Percutaneous Intervention in the Acute Myocardial Infarct Patient

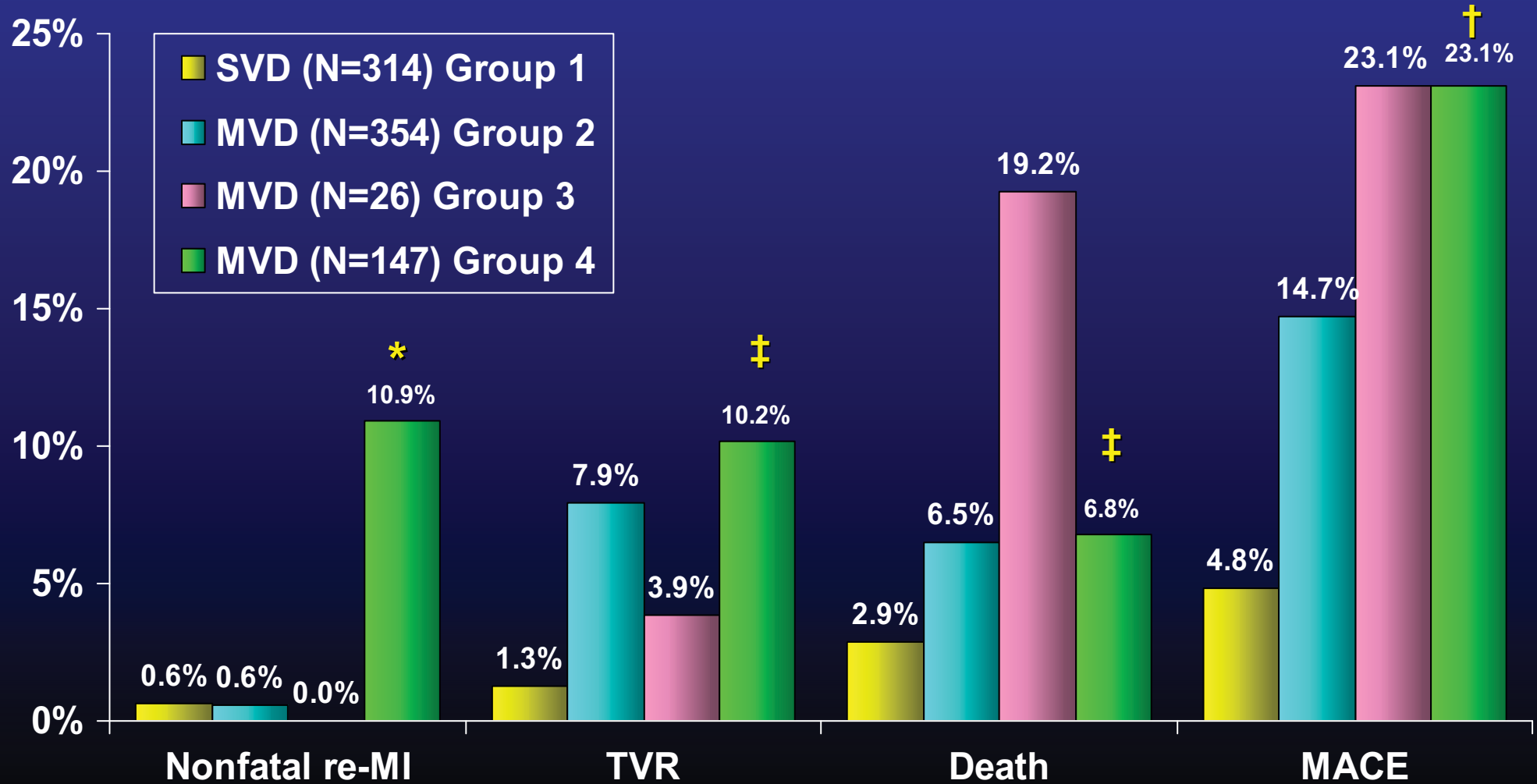
*841 Patients, 1998-2002, MAHI*

30-Day Outcomes	Group 1	Group 2	Group 3	Group 4
Number of pts	314	354	26	147
Death (%)	2.8	6.5	19.2*	6.8
MACE (%)	4.7	14.7	23.0	23.1

\*p < 0.001



# Multiple Vessel Percutaneous Intervention in the Acute Myocardial Infarct Patient 30-Day Outcomes



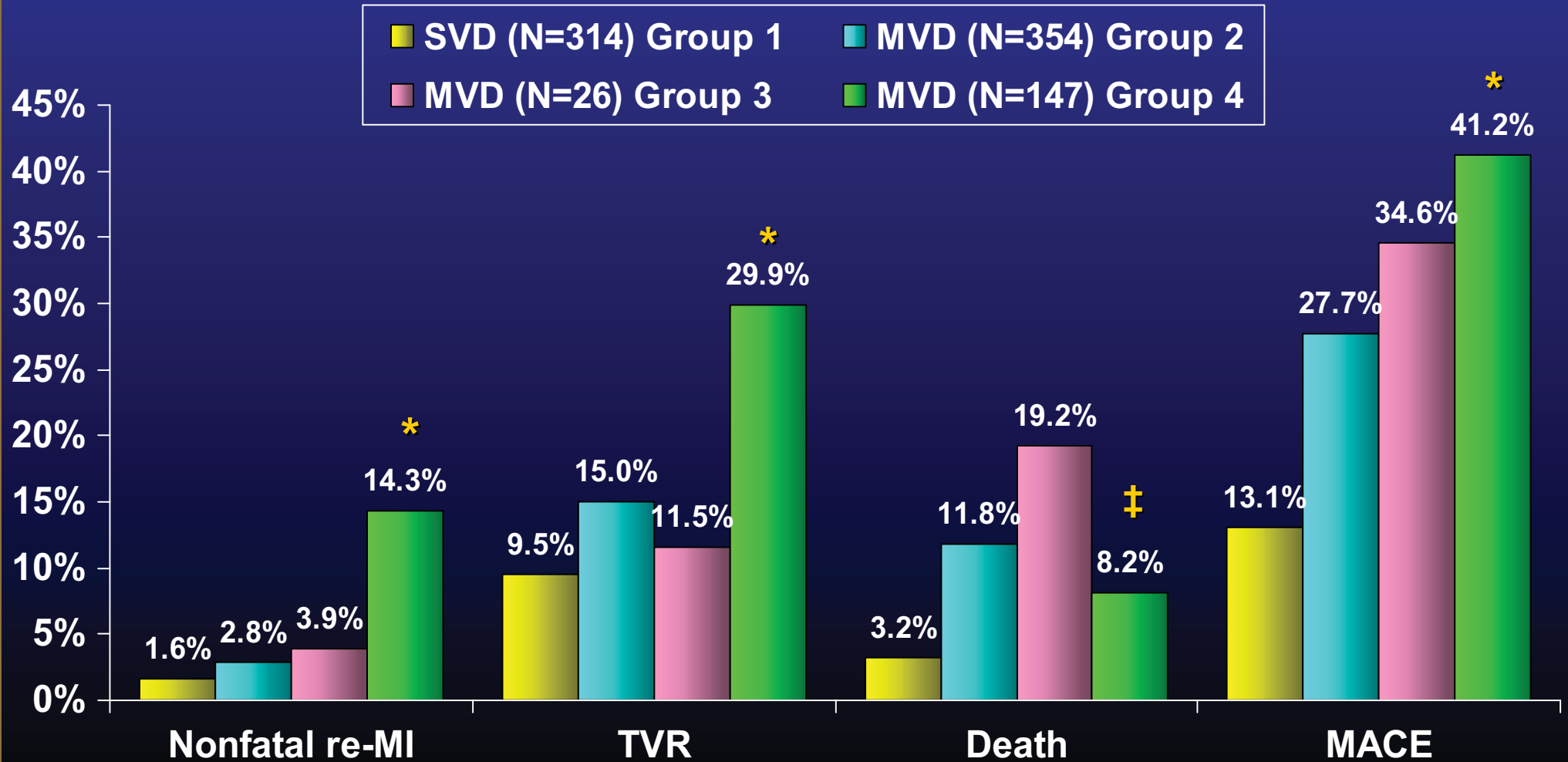
\*  $p < 0.001$  group4 vs group2

†  $p = 0.02$  group4 vs group2

‡  $p = \text{NS}$  group4 vs group2



# Multiple Vessel Percutaneous Intervention in the Acute Myocardial Infarct Patient 1 Year Outcome



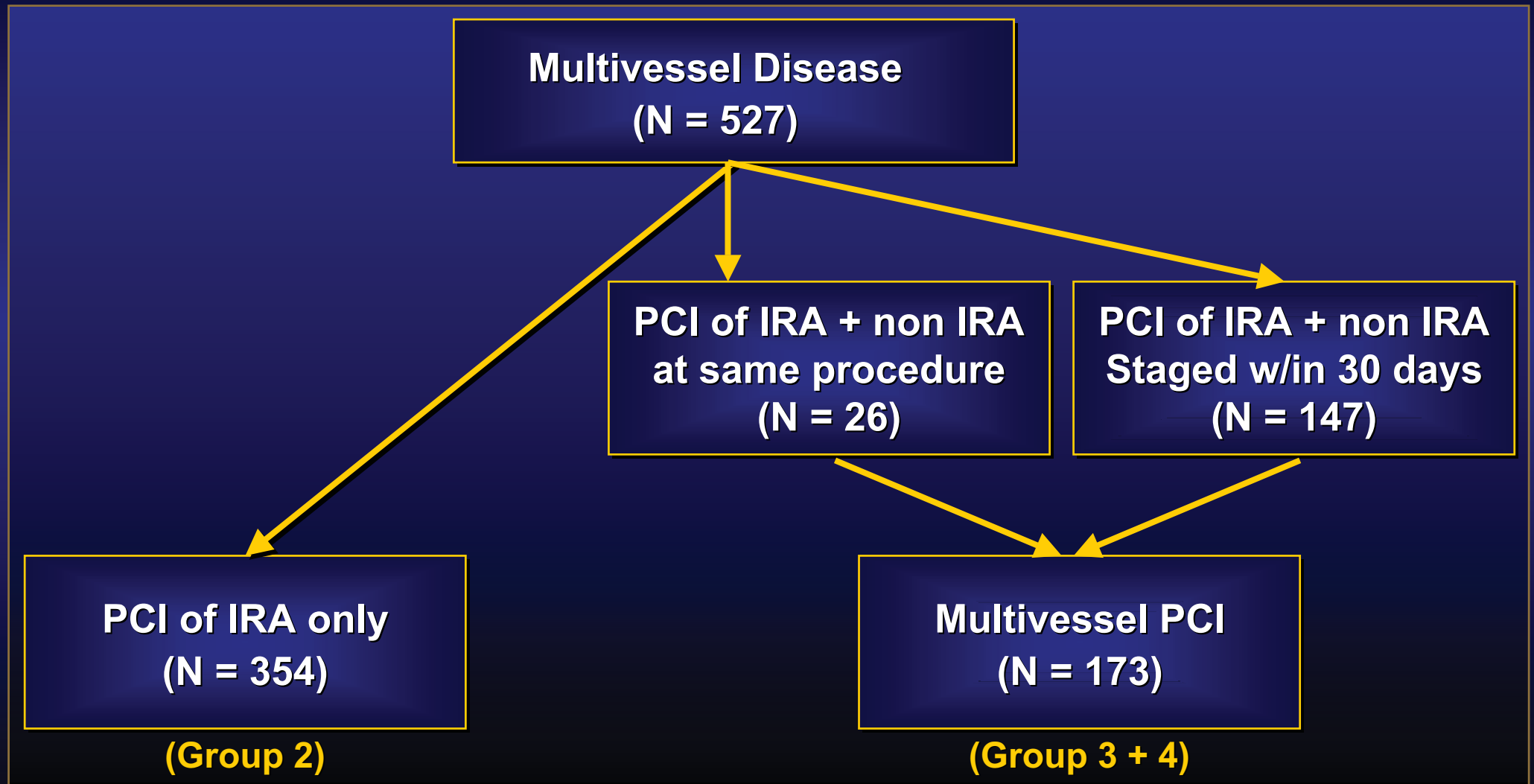
\*  $p < 0.001$  group4 vs group2

‡  $p = \text{NS}$  group4 vs group2



# Multiple Vessel Percutaneous Intervention in the Acute Myocardial Infarct Patient

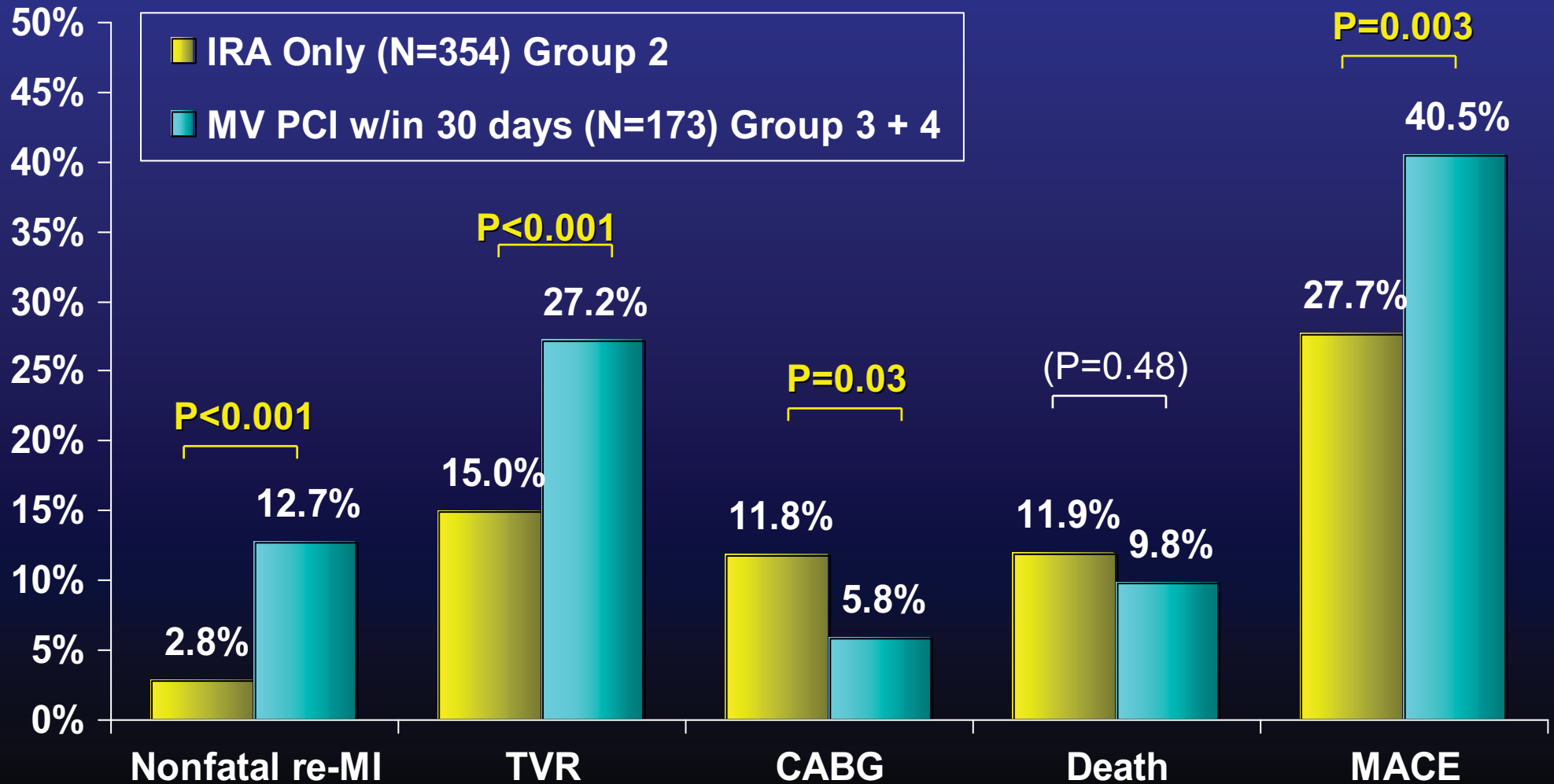
527 Consecutive Pts with Multivessel Disease 1998-2002







# Multiple Vessel Percutaneous Intervention in the Acute Myocardial Infarct Patient 1 Year Outcomes





# Multiple Vessel Percutaneous Intervention in the Acute Myocardial Infarction Patient

## CONCLUSIONS

- ✧ Multiple vessel disease occurs in 50-60% of STEMI patients
- ✧ Multiple vessel disease is a major predictor of 30-day and 1-year mortality



# Multiple Vessel Percutaneous Intervention in the Acute Myocardial Infarction Patient

## CONCLUSIONS

- ✧ Reduced flow and myocardial perfusion in both the IRA and non-IRA
- ✧ Reduced flow related to large anterior infarcts and hemodynamic instability
- ✧ Non-IRA lesions may “improve” at follow-up



# Multiple Vessel Percutaneous Intervention in the Acute Myocardial Infarction Patient

## CONCLUSIONS

- ✧ PCI of the IRA and non-IRA during the same procedure is not justified
- ✧ PCI of the IRA and staged PCI of the non-IRA's can be safely undertaken, however this strategy is associated with higher rates of TVR, re-AMI and MACE at 1 year
- ✧ PCI of the IRA and ischemia driven (recurrent symptoms, objective testing) staged PCI of non-IRA's is probably the strategy of choice