Thrombus aspiration in STEMI: Routine or selective?

Gregg W. Stone MD

Columbia University Medical Center
Cardiovascular Research Foundation

CARDIOVASCULAR RESEARCH FOUNDATION

COLUMBIA UNIVERSITY MEDICAL CENTER

Impact of Macroscopic Distal Emboli

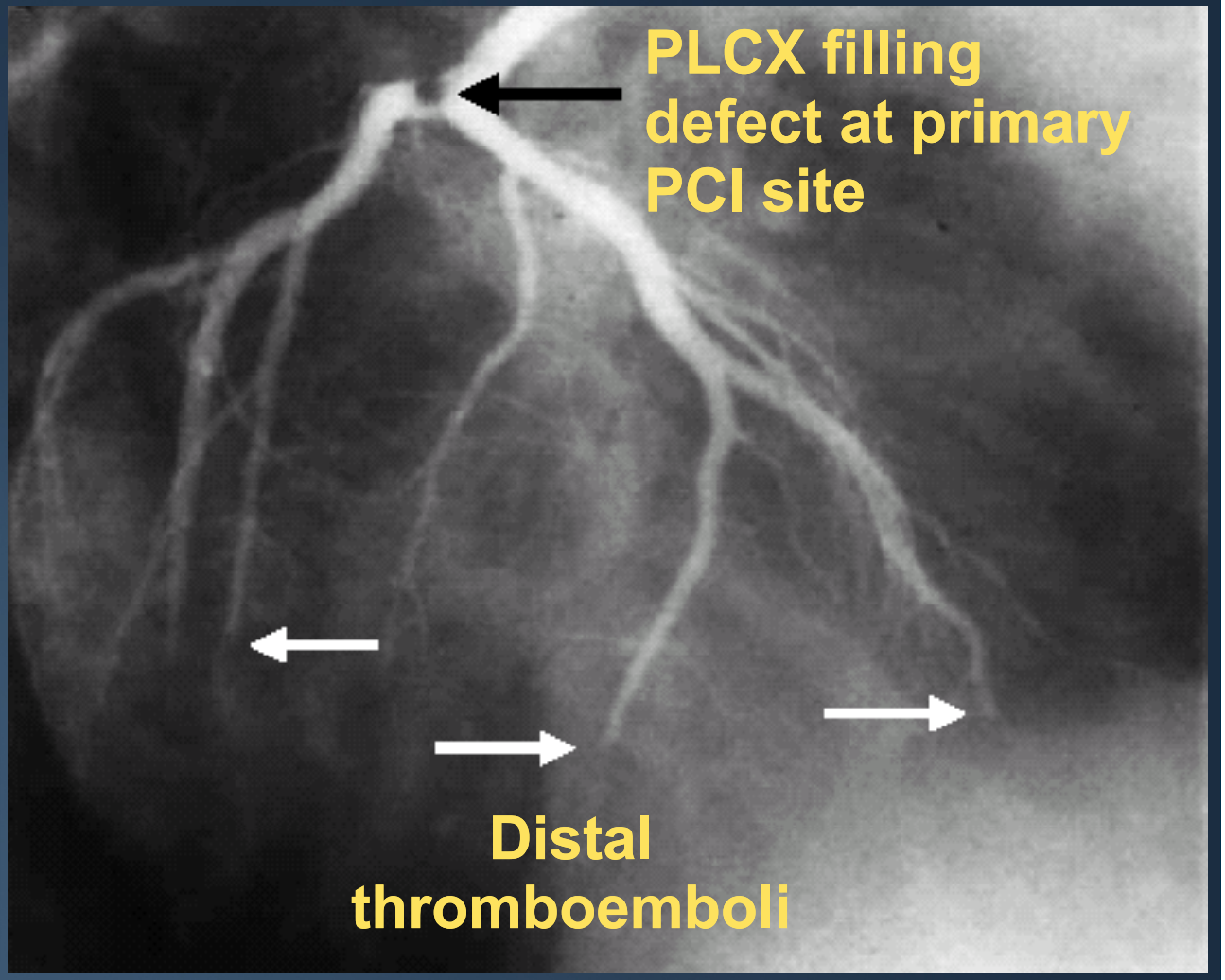
DE occurred in 27 of 178 (15%) pts after primary PTCA

⇒

↓ ST res

↑ Infarct size

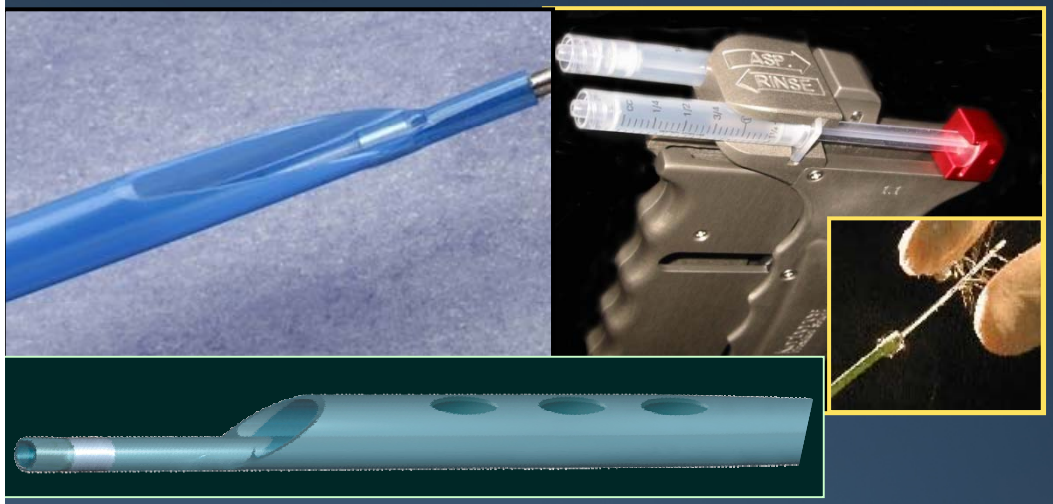
↑ Mortality



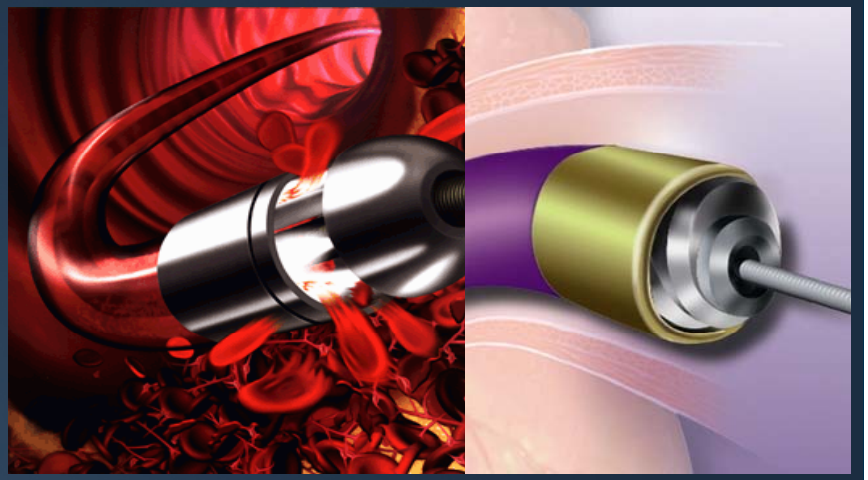
Henriques JPS et al. *EHJ* 2002;23:1112-7

Mechanical Approaches to Thrombus

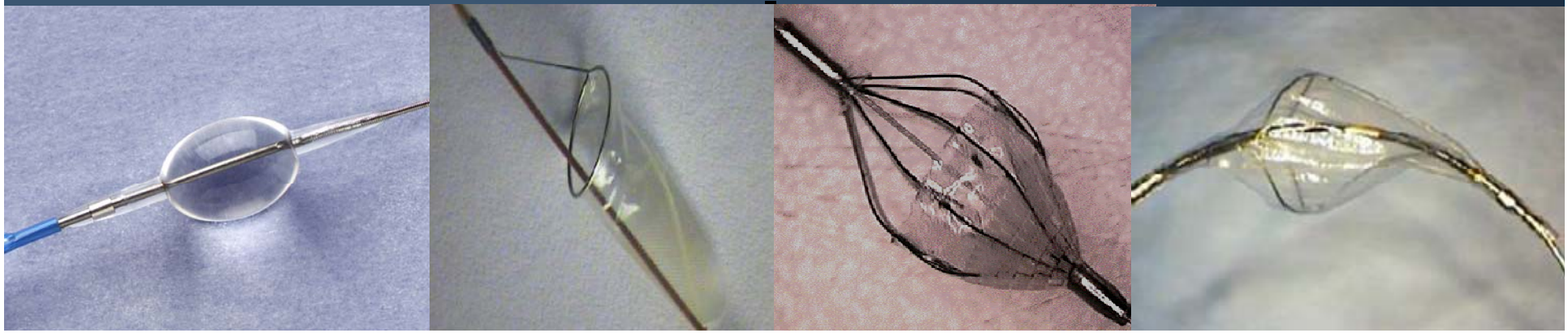
Thrombus aspiration
(Rinspirator, Pronto, Export, Rescue, Diver CE, etc.)



Thrombectomy
(AngioJet, X-Sizer)

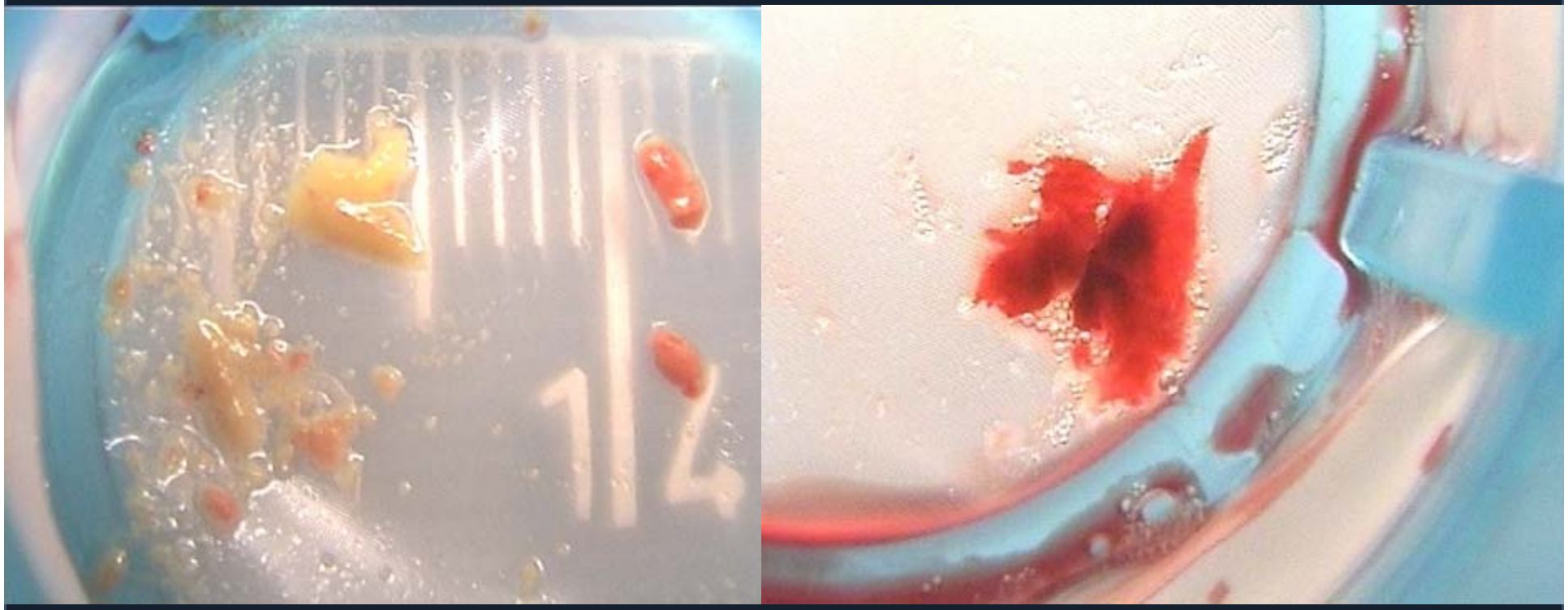


Distal protection (GuardWire, FilterWire, AngioGuard, etc.)



Distal Protection and Thrombectomy in AMI

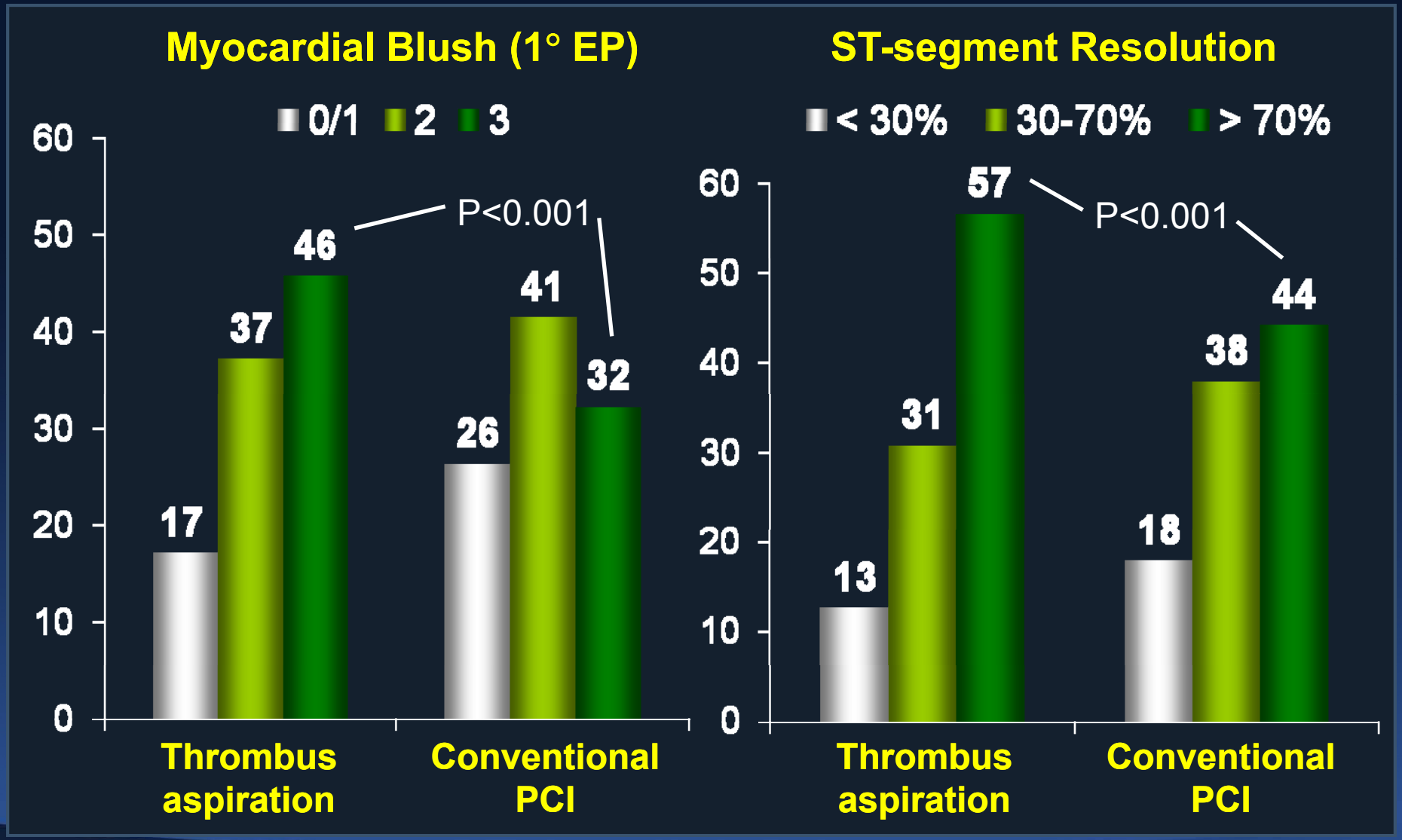
Macroscopic embolic debris can be retrieved from >75% of cases



CARDIOVASCULAR RESEARCH FOUNDATION

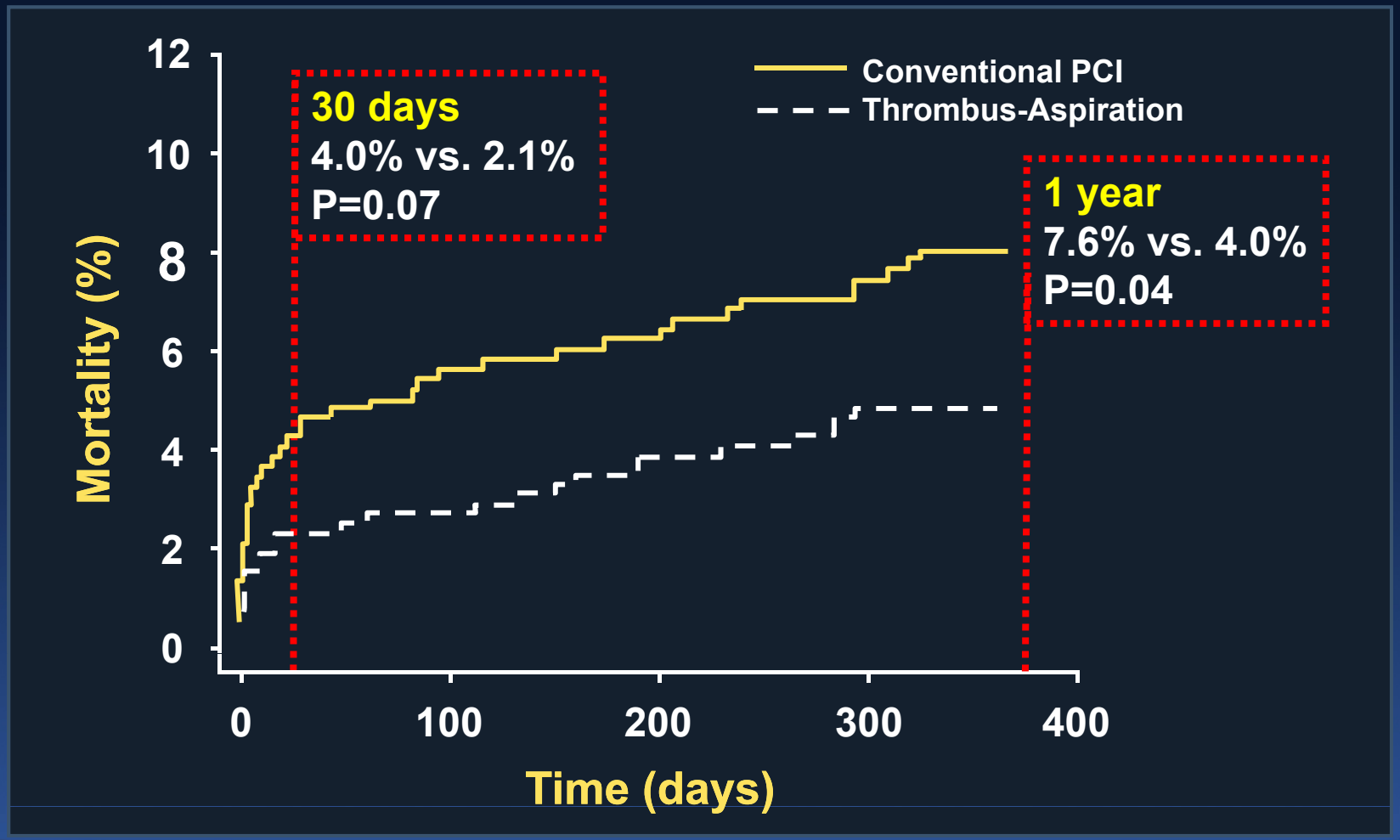
COLUMBIA UNIVERSITY MEDICAL CENTER

TAPAS: 1,071 pts with STEMI undergoing PCI randomized in the ER to aspiration (Export) vs. control



Svilaas T et al. NEJM 2008;358;-557-67

TAPAS: 1,071 pts with STEMI undergoing primary PCI randomized in the ER to manual aspiration (Export) vs. control



Vlaar et al. Lancet 2008;371:1915-20

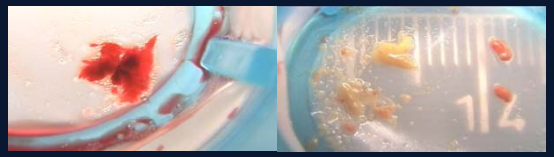
CARDIOVASCULAR RESEARCH FOUNDATION
A Passion for Innovation

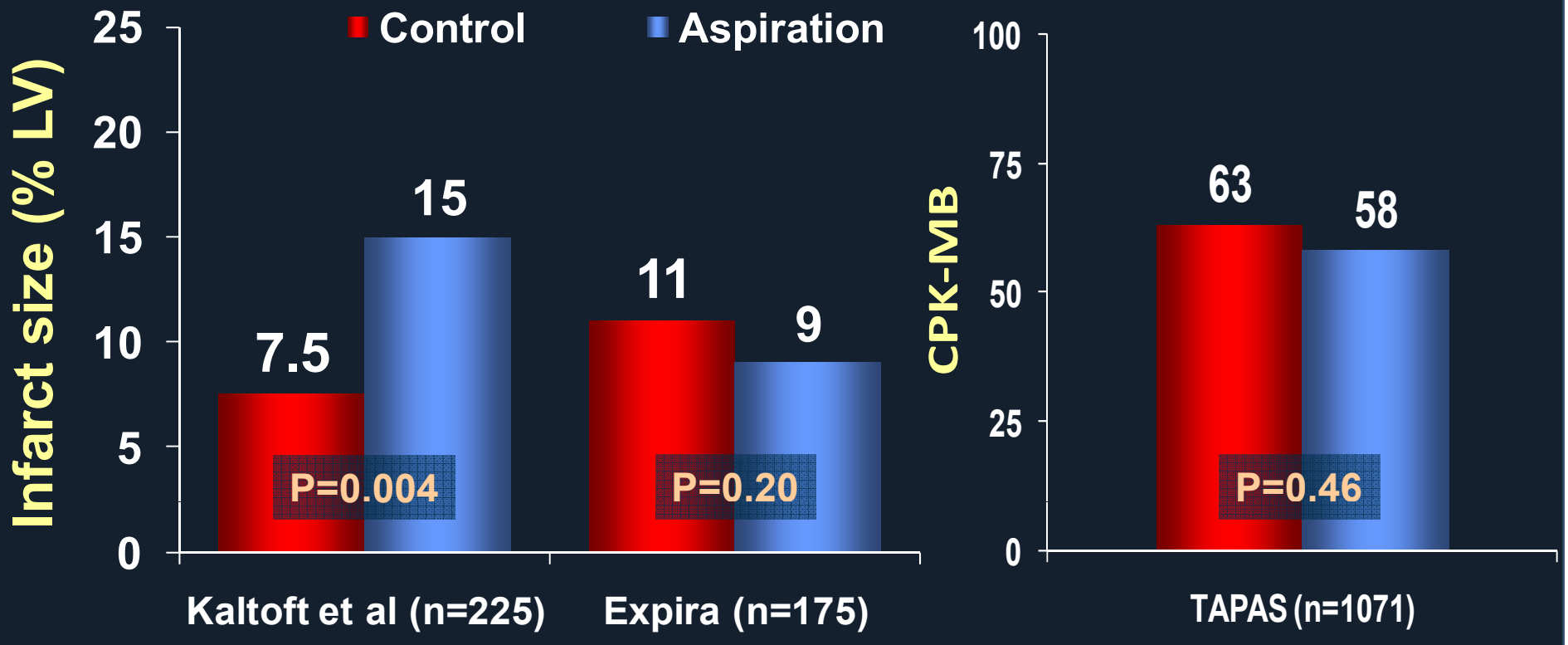
COLUMBIA UNIVERSITY MEDICAL CENTER
NewYork-Presbyterian

Aspiration Trials to Decrease Infarct Size

Have been mostly met with frustration

The concept of reducing embolic load

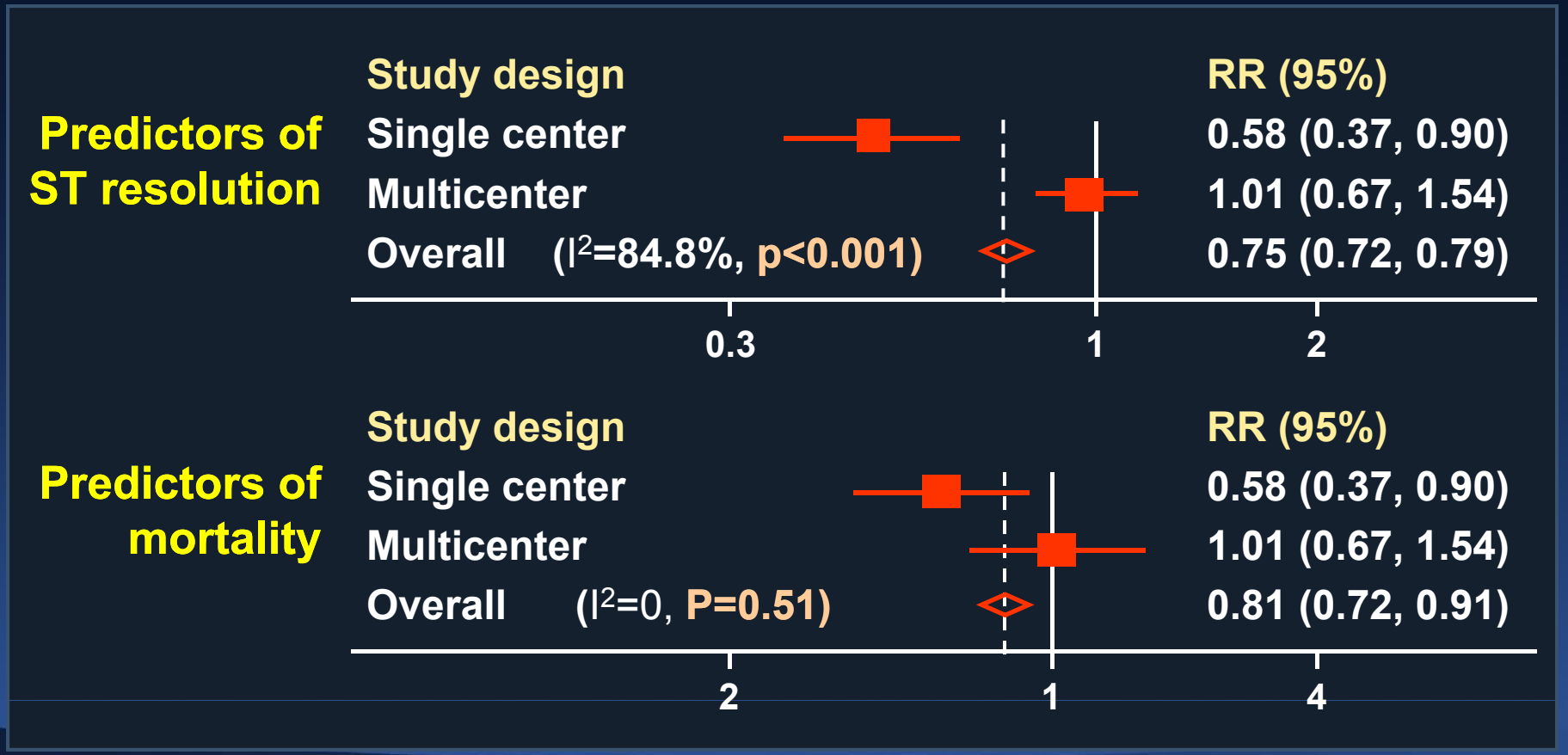




Embolic Protection During Primary PCI:
Impact of single vs. multicenter studies

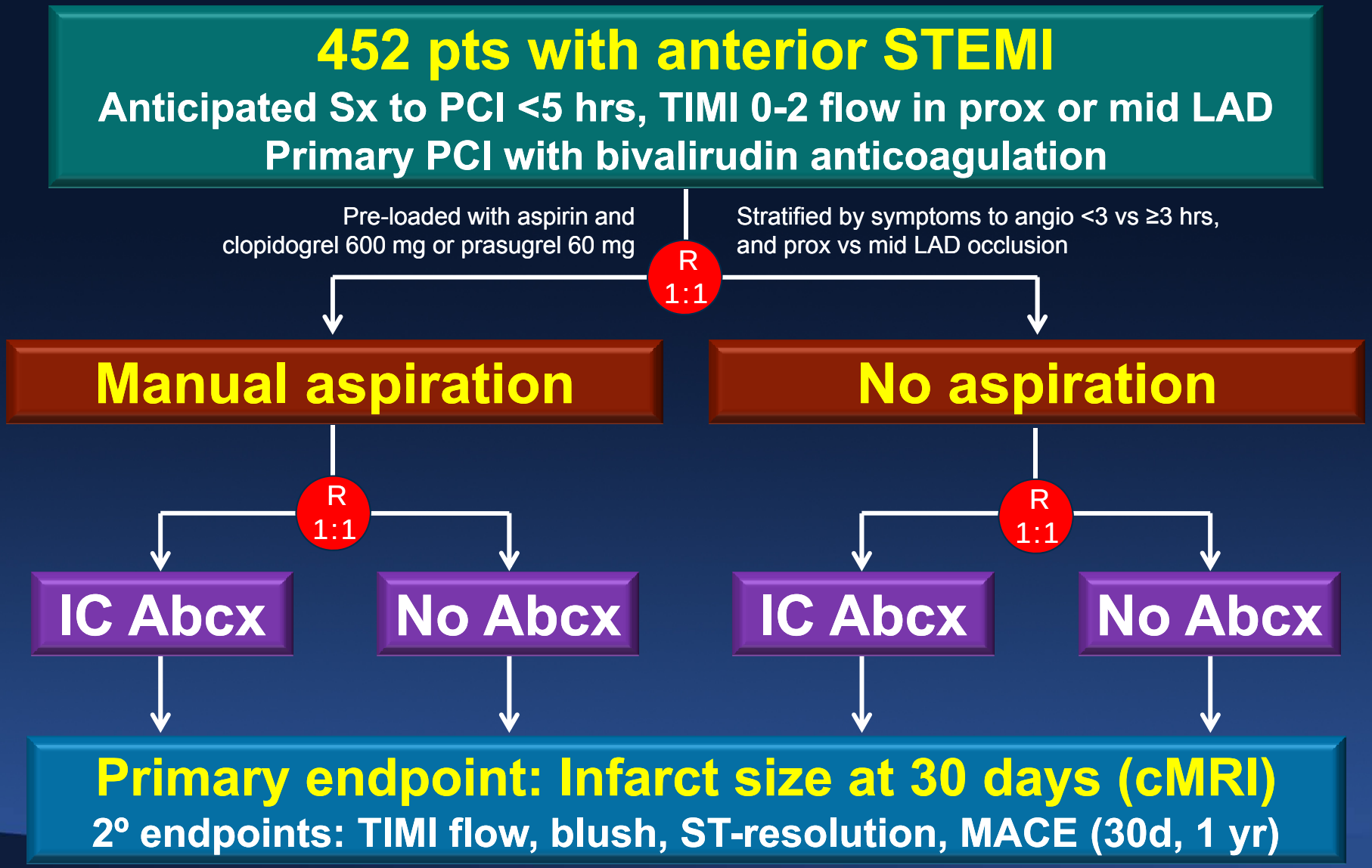
25 RCTs, 5919 pts

2460 pts in single center trials, 3459 pts in multicenter trials



Inaba Yet al. *Eurointervention*; 2009;5:375-83

INFUSE-AMI Trial



Stone GW et al. JAMA 2012;307:0n-line

INFUSE-AMI

Manual aspiration
vs.
no aspiration

Pooled across the abciximab randomization

INFUSE-AMI: Baseline characteristics

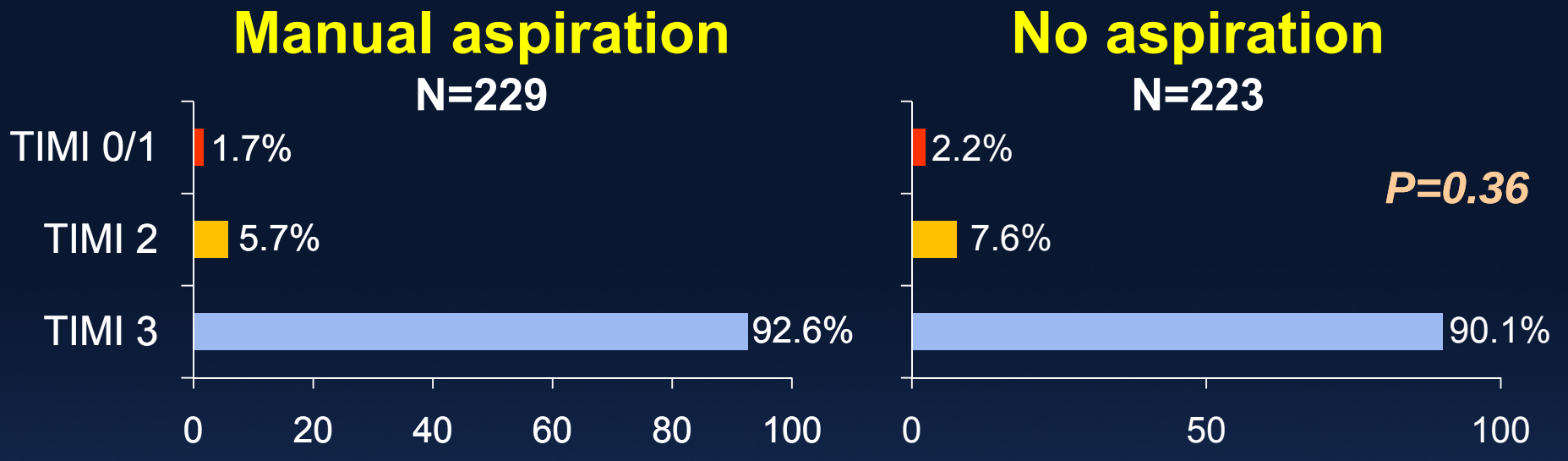
	Manual aspiration N=229	No aspiration N=223
Age (years)	61 [53, 70]	60 [51, 69]
Male	73.8%	74.0%
Hypertension	33.2%	29.6%
Hyperlipidemia	16.7%	14.8%
Diabetes mellitus	14.9%	7.6%
Cig. smoking, current	43.4%	48.9%
Prior MI	0.4%	1.4%
Prior PCI	2.2%	2.3%
Killip class II-IV	20.6%	16.6%
Sx - hosp arrival, mins	98 [65, 152]	100 [70, 145]
Infarct artery		
- Proximal LAD	64.6%	66.8%
- Mid LAD	35.4%	33.2%
LVEF, % (site)	40 [35, 50]	40 [35, 50]

INFUSE-AMI: Meds and procedures

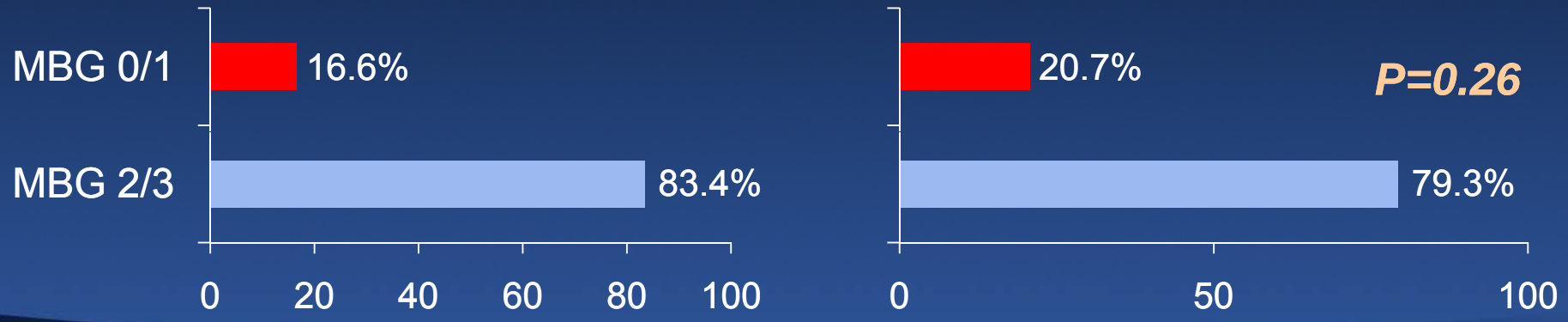
	Manual aspiration N=229	No aspiration N=223	P value
TIMI flow pre-PCI 0/1*	73.4%	70.0%	0.42
Blush pre-PCI 0/1*	85.5%	82.4%	0.37
Hospital - 1st device, mins	43 [30, 63]	48 [35, 70]	0.02
Aspiration performed	98.3%**	4.0%	<0.001
Abciximab administered	50.7%	50.2%	0.93
N lesions treated	1.1 ± 0.4	1.1 ± 0.4	0.46
DES implanted	74.2%	70.9%	0.42
Stent length (mm)	24 [18, 32]	24 [18, 35]	0.30
Max stent diameter (mm)	3.0 [3.0, 3.5]	3.0 [3.0, 3.5]	0.20

*Core laboratory assessed; **6F Export used in all but 3 cases, with thrombus retrieved in 78.9%

INFUSE-AMI: Reperfusion post-PCI*

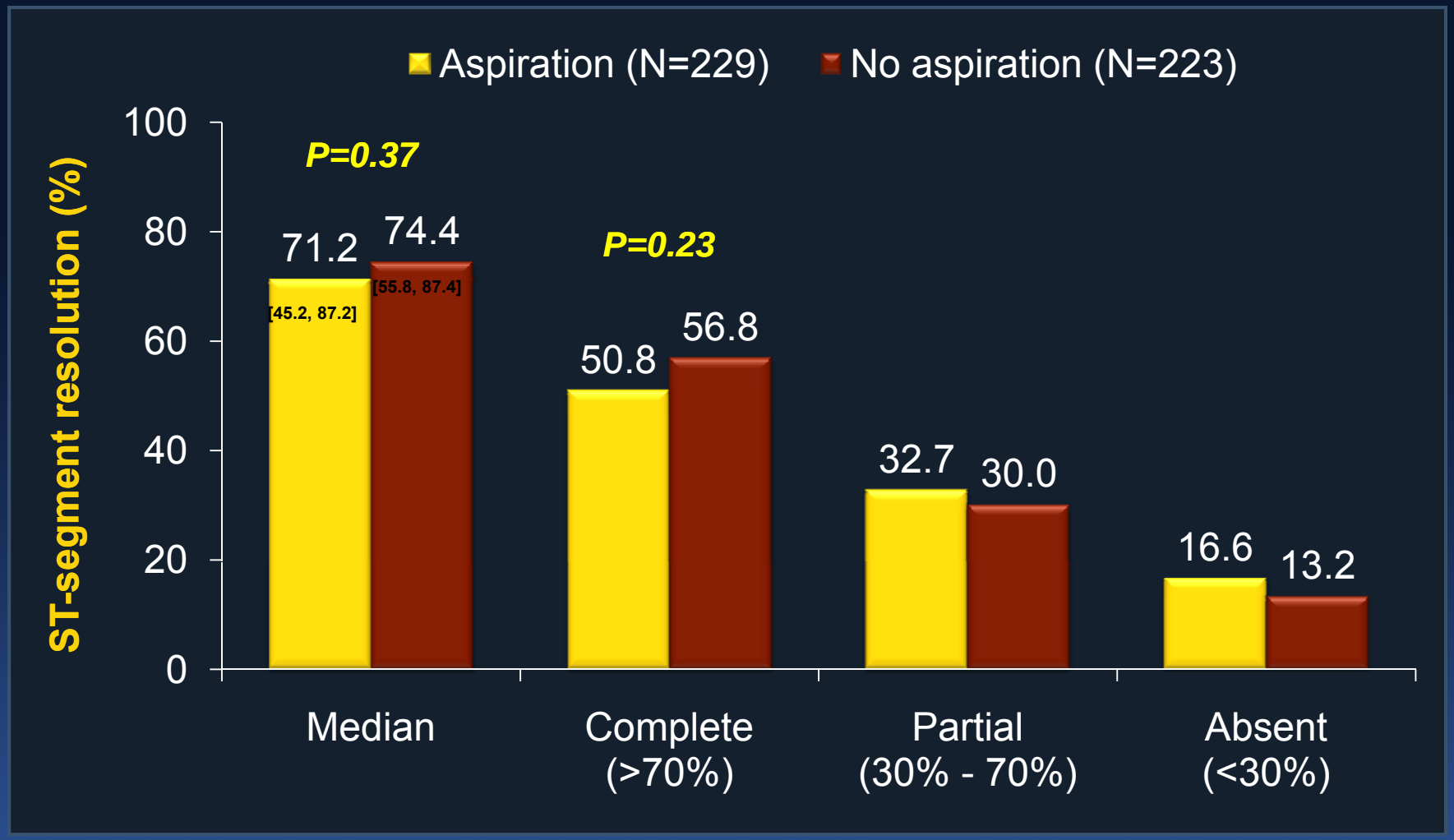


Corrected TIMI frame counts: **20 [16, 26]** **vs.** **20 [16, 26]** ***P=0.40***



*Core laboratory assessed

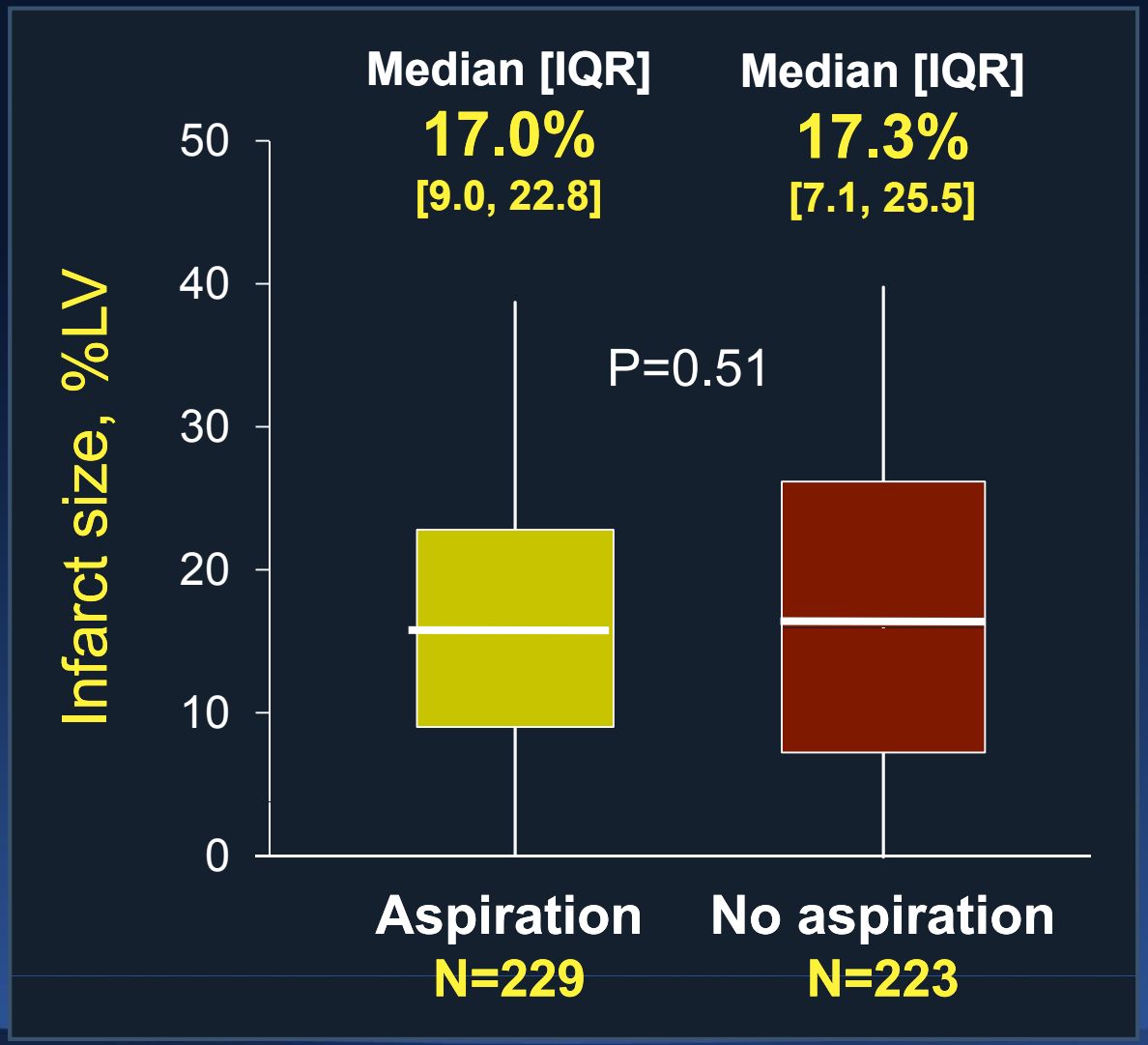
INFUSE-AMI: STR 60 minutes post-PCI*



*Core laboratory assessed

INFUSE-AMI: Infarct size at 30 days*

- Primary endpoint -



*Core laboratory assessed. No interaction was present between the 2 randomization groups for the primary 30-day infarct size endpoint (p=0.46)

INFUSE-AMI: cMRI at 30 days*

	Manual aspiration N=186	No aspiration N=186	P value
Total LV mass, grams	128.3 [108.9, 149.8]	132.0 [107.6, 156.1]	0.50
Infarct mass, grams	20.3 [9.7, 31.7]	21.0 [9.1, 34.1]	0.36
Infarct mass (% of total LV mass)	17.0 [9.0, 22.8]	17.3 [7.1, 25.5]	0.51
Total abnormal wall motion score	7.5 [2.0, 10.0]	7.5 [2.0, 10.0]	0.89
LVEF (%)	49.6 [43.3, 56.8]	49.5 [41.8, 57.6]	0.66

*Core laboratory assessed

INFUSE-AMI: 30-day clinical efficacy

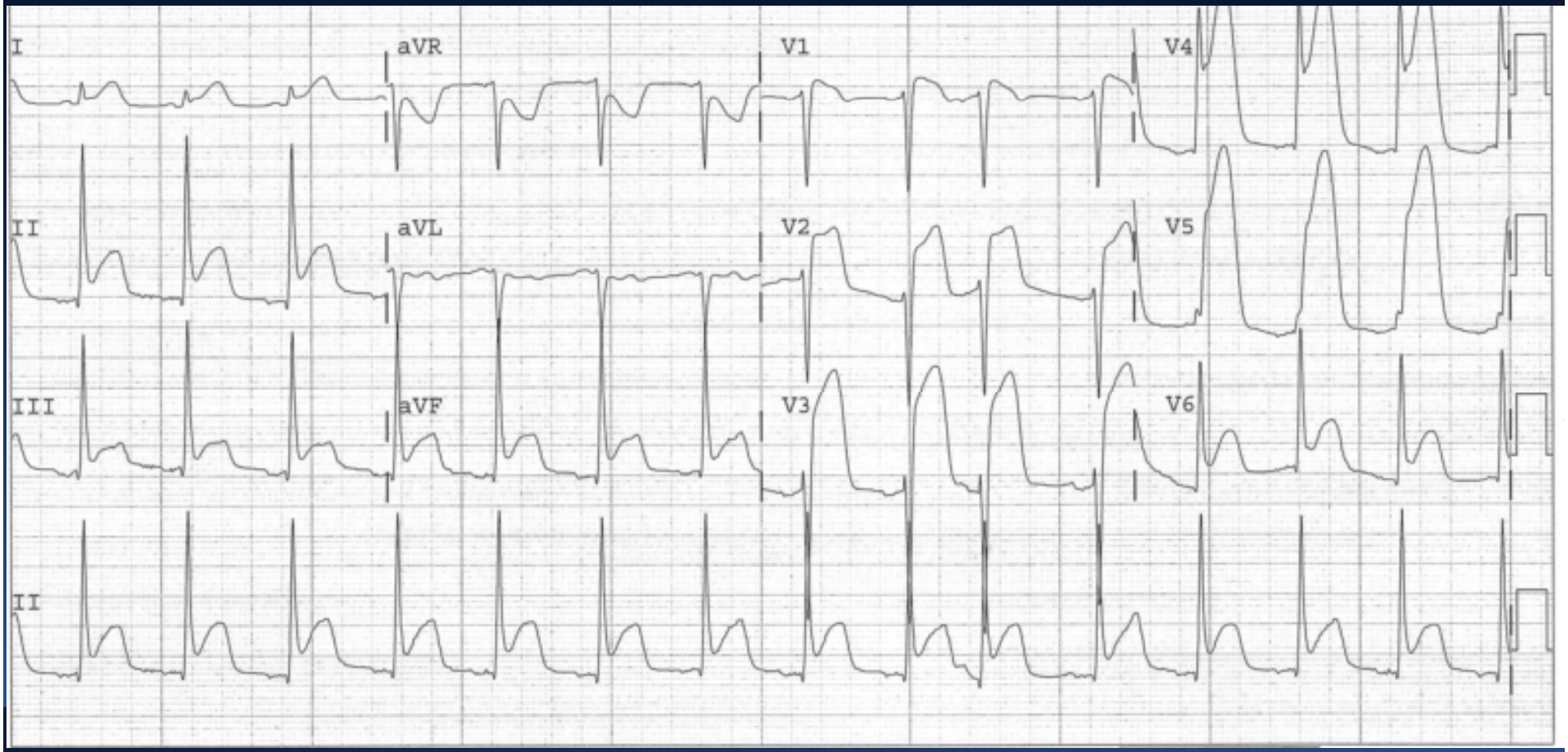
	Manual aspiration N=229	No aspiration N=223	P value
Death	3.1% (7)	2.7% (6)	0.81
Reinfarction	0.5% (1)	0.9% (2)	0.55
New onset severe HF	3.5% (8)	4.1% (9)	0.77
Rehospitalization for HF	0.0% (0)	0.9% (2)	0.15
Stroke	0.0% (0)	0.5% (1)	0.31
Clinically-driven TVR	0.5% (1)	1.8% (4)	0.17
Stent thrombosis, def/prob*	1.4% (3)	0.5% (1)	0.33
MACCE	3.1% (7)	5.0% (11)	0.31
MACE	6.6% (15)	7.2% (16)	0.81

Data are Kaplan-Meier estimates (n of events). *No cases of acute (<24 hr) stent thrombosis occurred. MACE = death, reinfarction, new onset severe heart failure (HF) or rehospitalization for HF; MACCE = death, reinfarction, stroke or clinically-driven TVR

55 yo man with crushing chest pain

Symptoms to ER 78 minutes

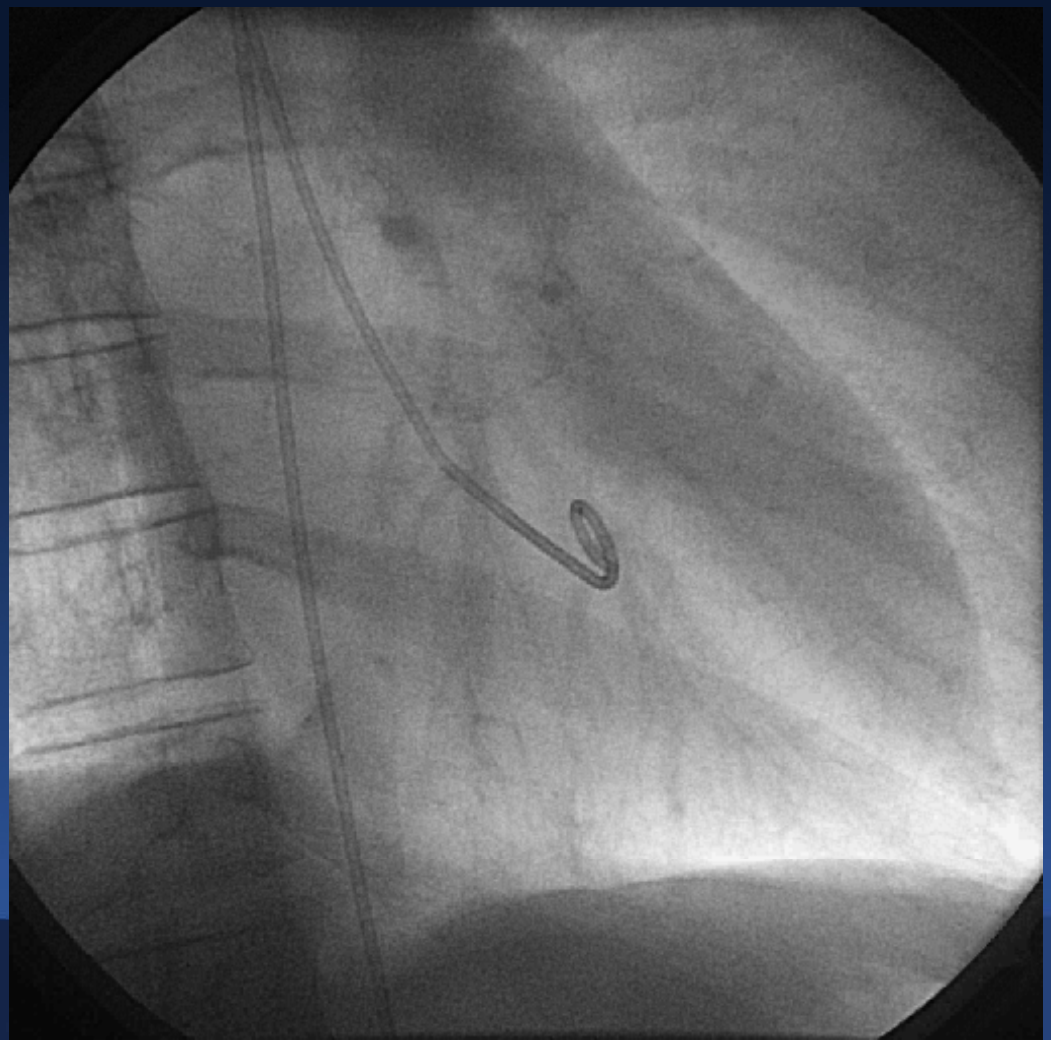
Baseline ECG



55 yo man with crushing chest pain

Symptoms to ER 78 minutes

Baseline LV gram



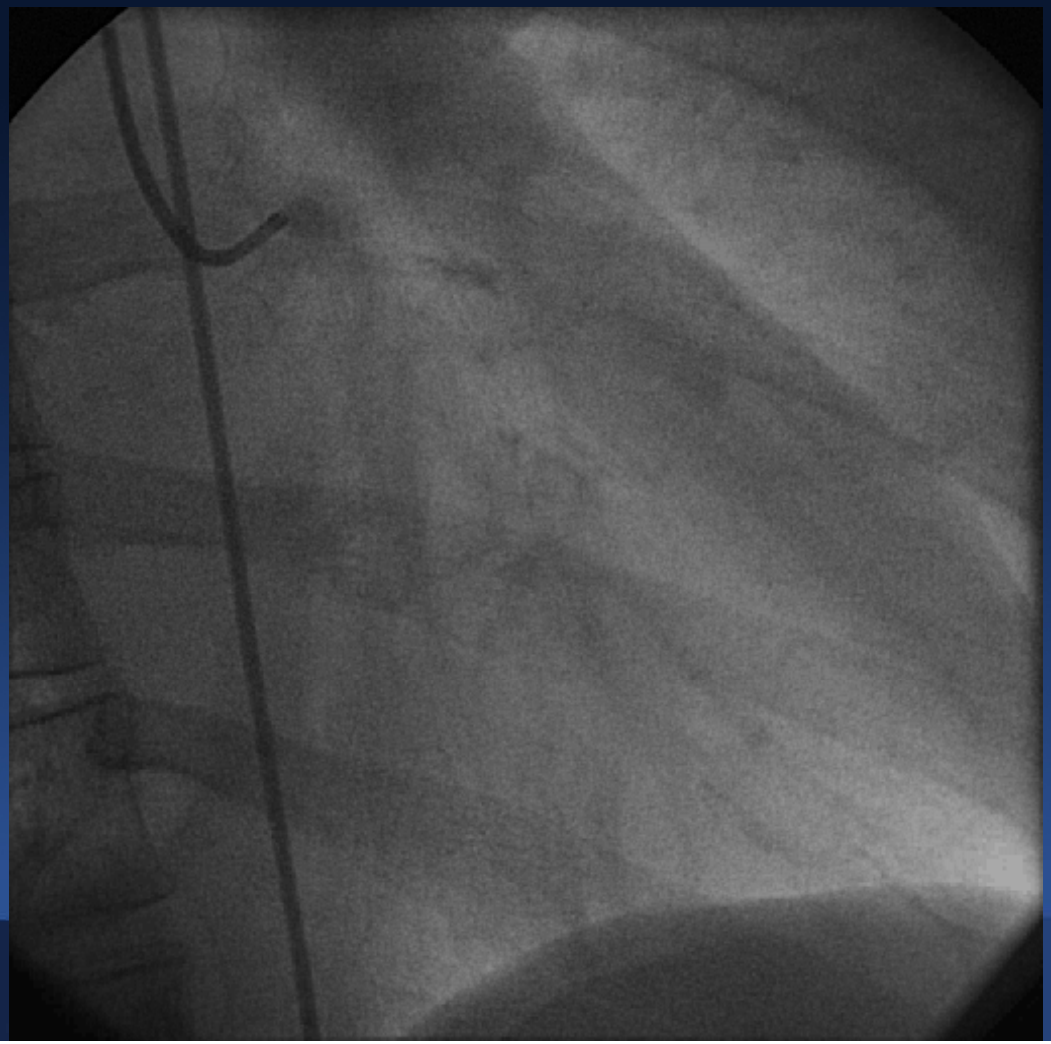
Anterior, apical akinesis

LVEF 33%

55 yo man with crushing chest pain

Symptoms to ER 78 minutes

Baseline LCA

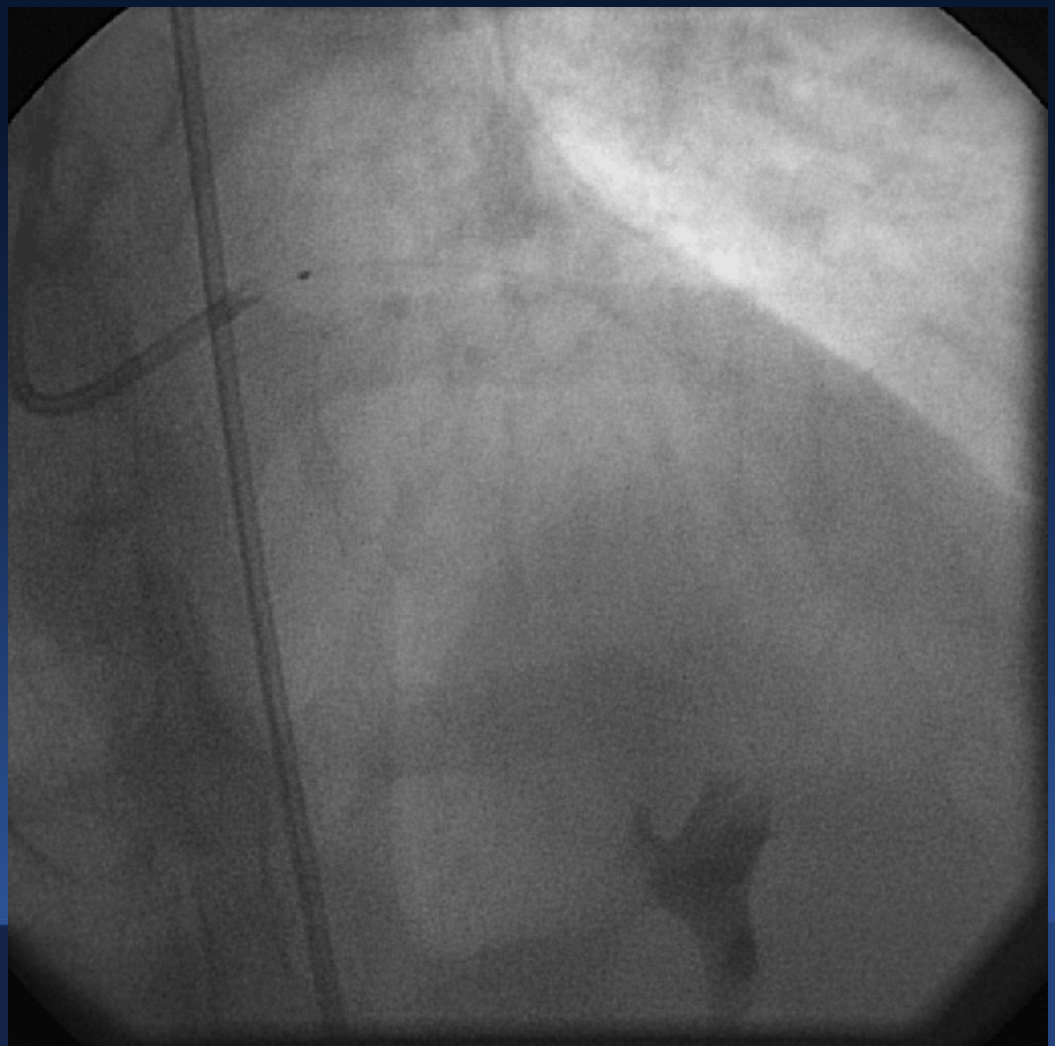


55 yo man with crushing chest pain

Symptoms to ER 78 minutes

Aspiration with the Export

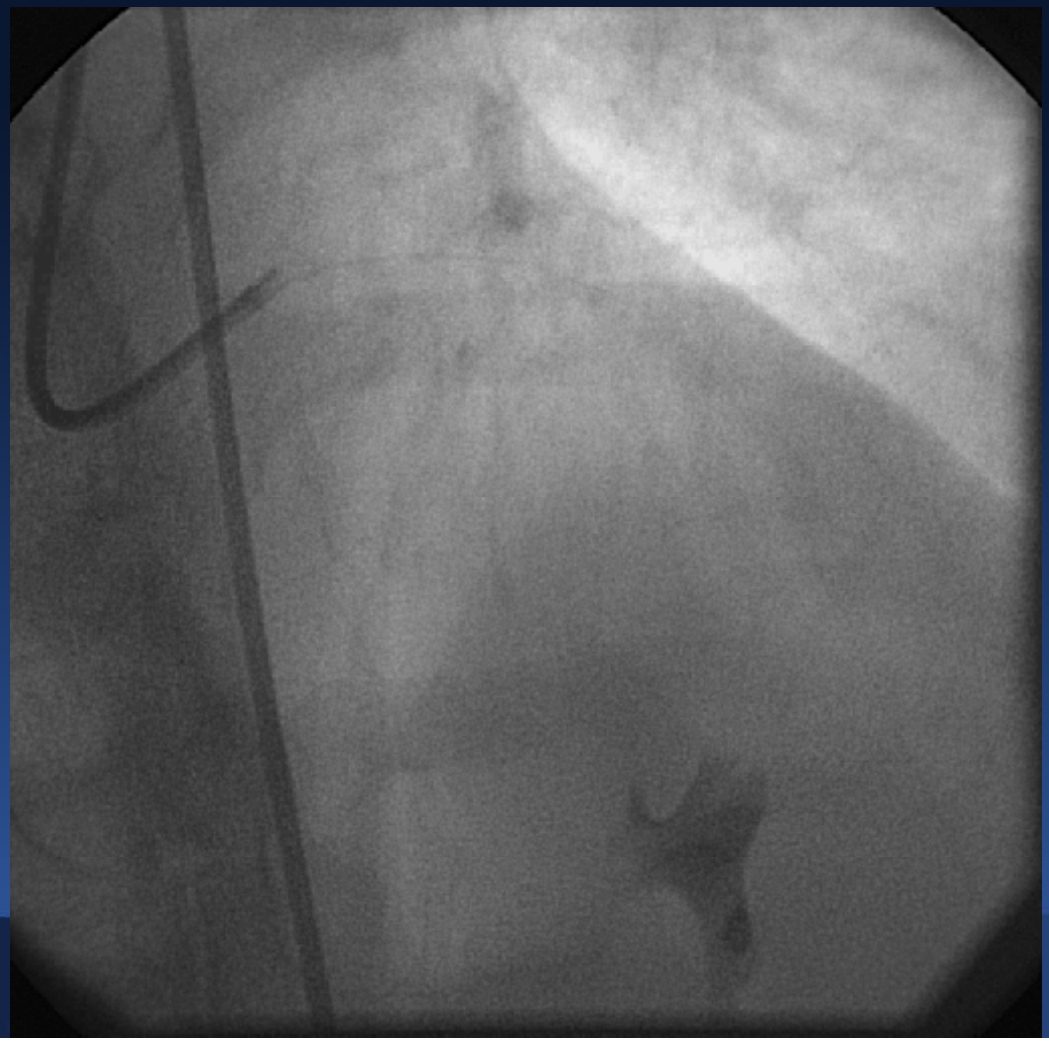
ER to device
45 mins



55 yo man with crushing chest pain

Symptoms to ER 78 min; ER to device 45 min

Post aspiration



TIMI 2 flow

MBG 0

55 yo man with crushing chest pain

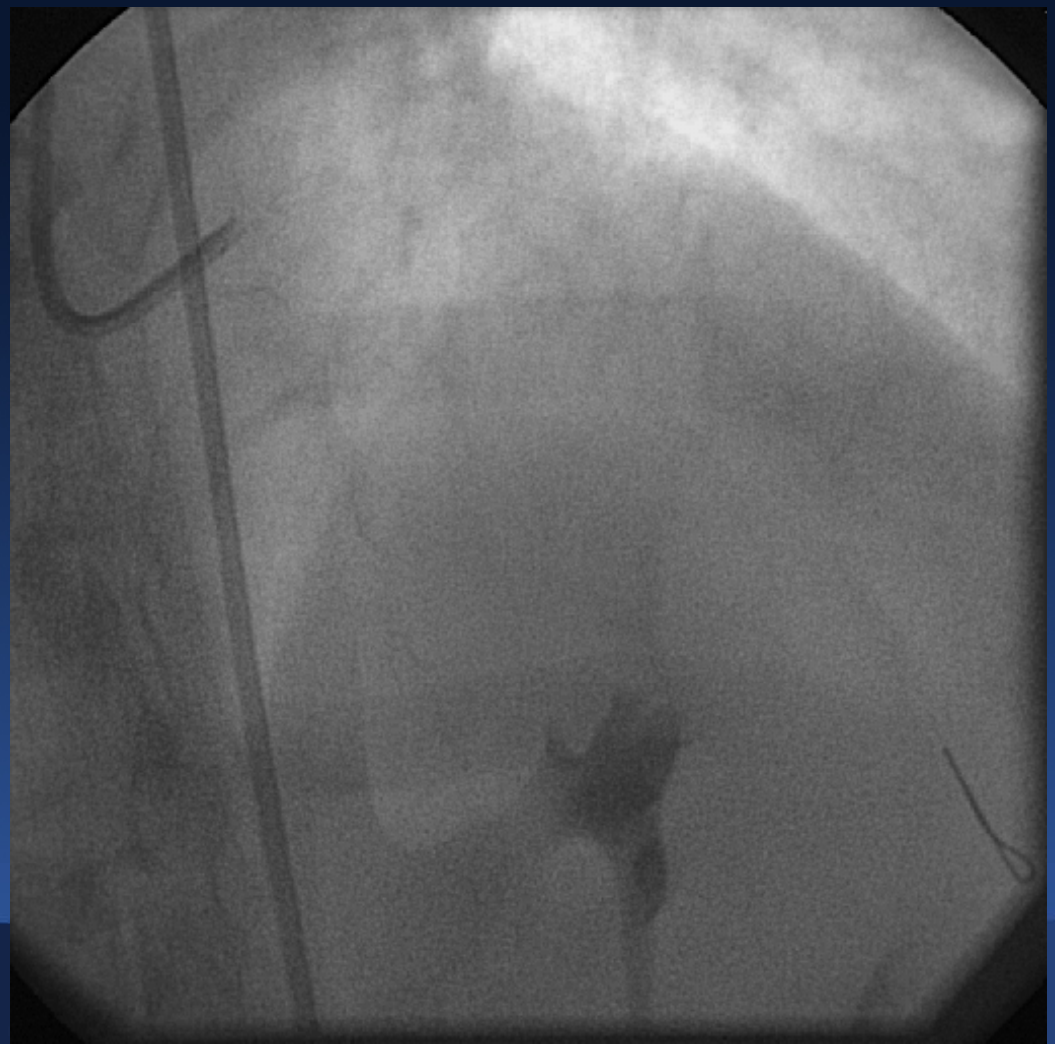
Symptoms to ER 78 min; ER to device 45 min

Bolus abciximab infusion through the Clearway Rx

55 yo man with crushing chest pain

Symptoms to ER 78 min; ER to device 45 min

Post IC abciximab



TIMI 3 flow

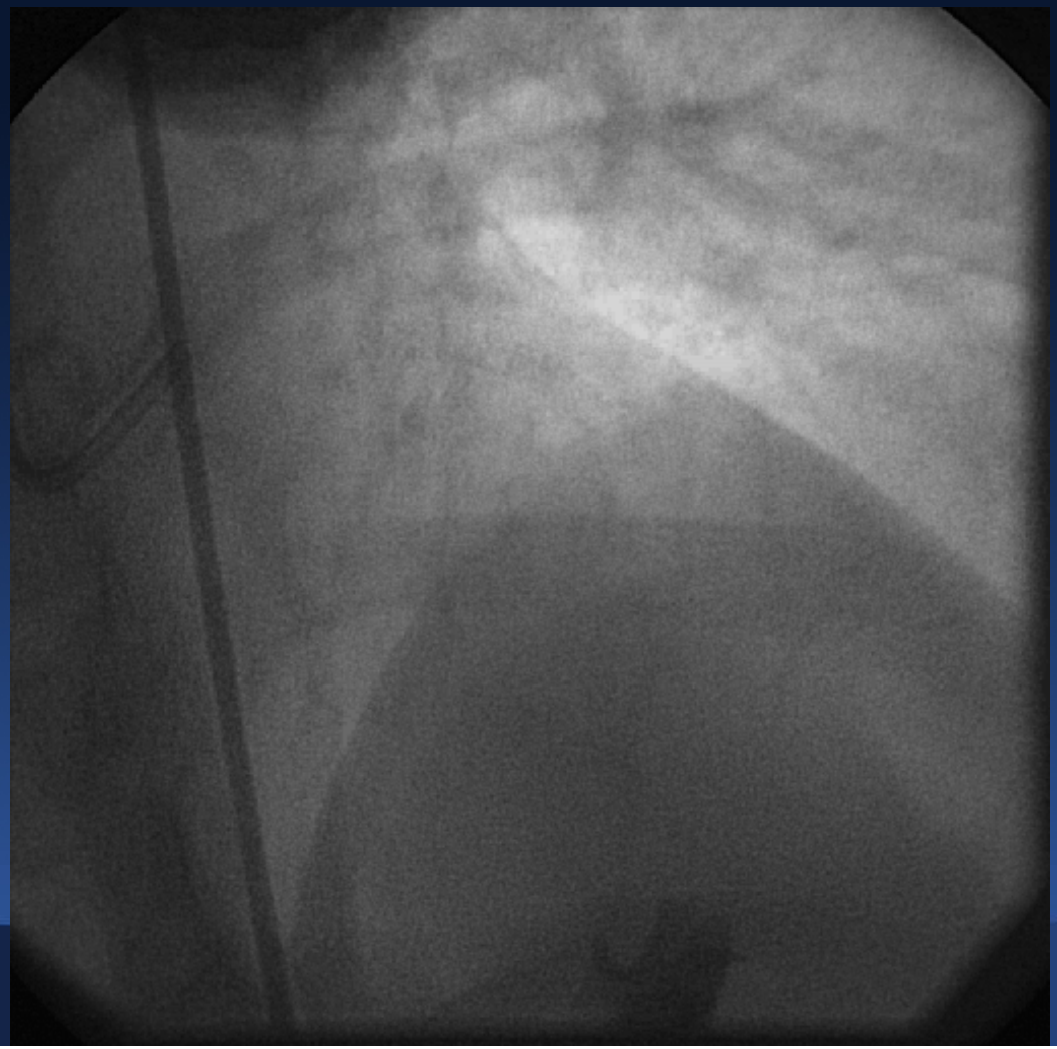
cTFC 32

MBG 2

55 yo man with crushing chest pain

Symptoms to ER 78 min; ER to device 45 min

Final post stent



TIMI 3 flow

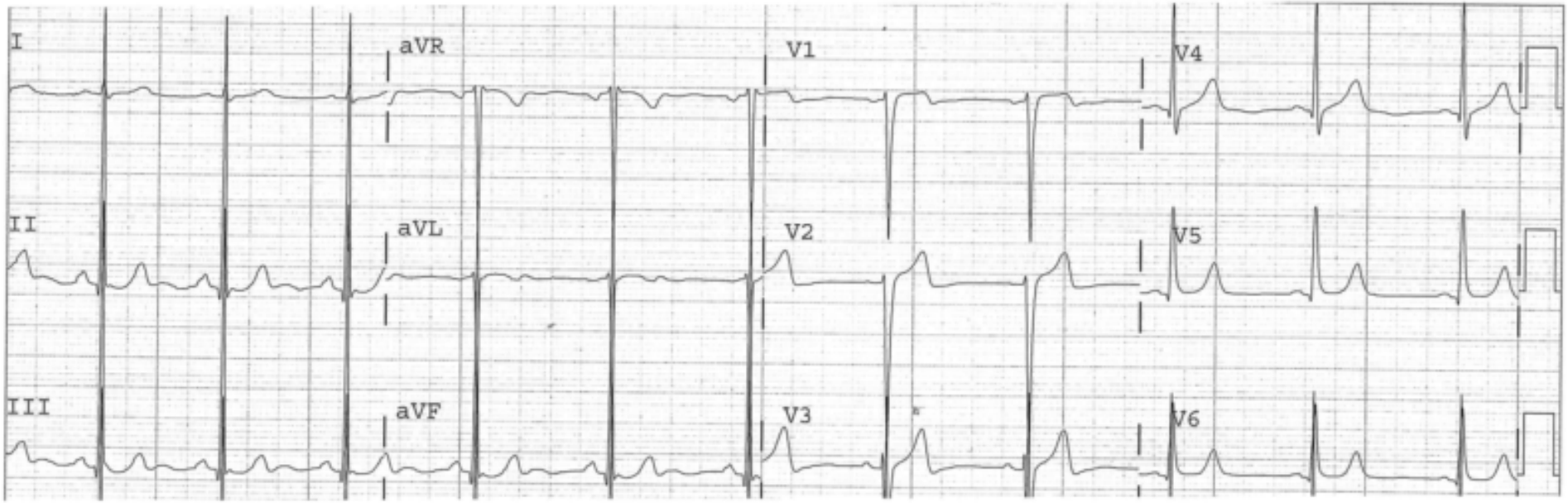
cTFC 17

MBG 3

55 yo man with crushing chest pain

Symptoms to ER 78 min; ER to device 45 min

60’ Post-PCI ECG

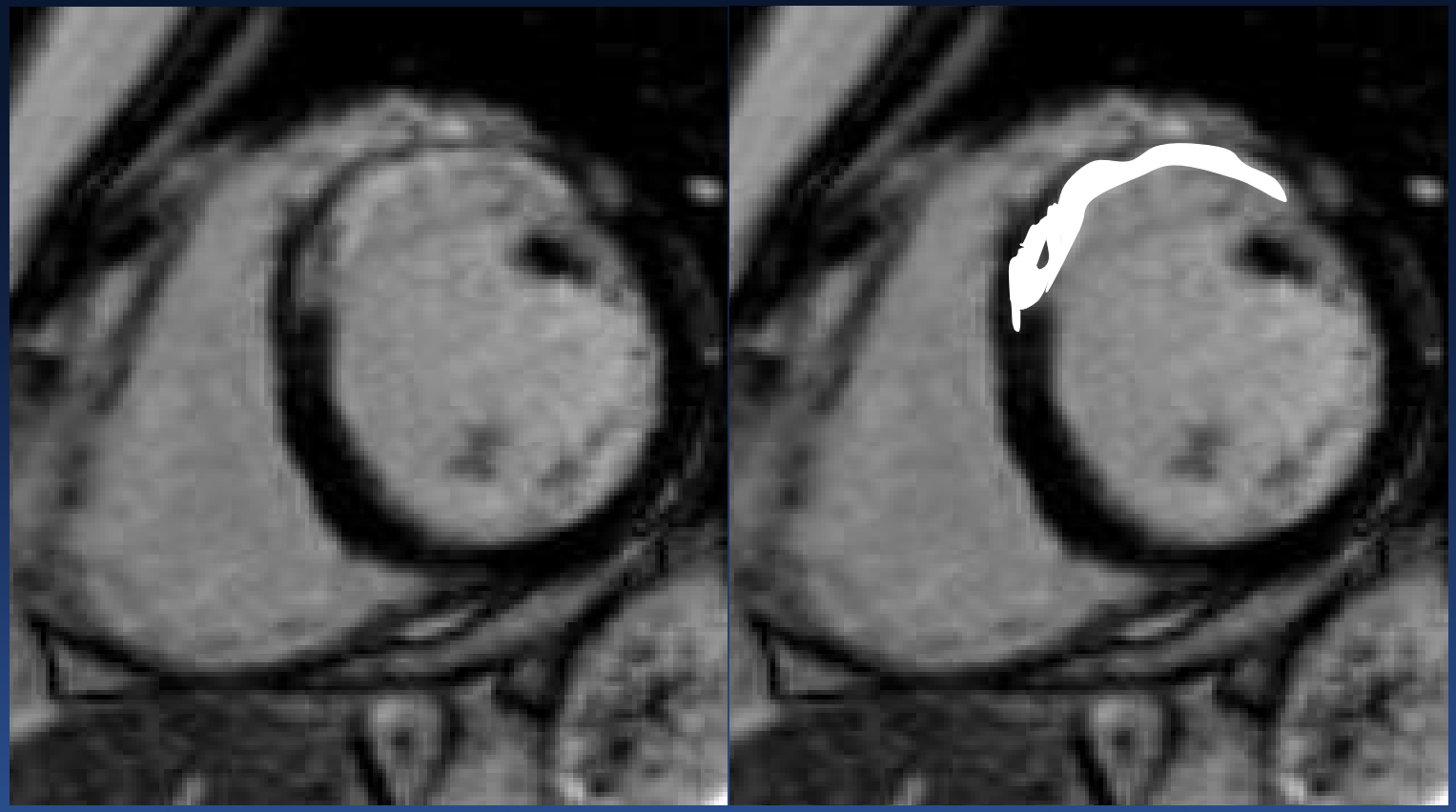


ST-segment resolution 92%

55 yo man with crushing chest pain:

Symptoms to ER 78 min; ER to device 45 min

30-day cMRI

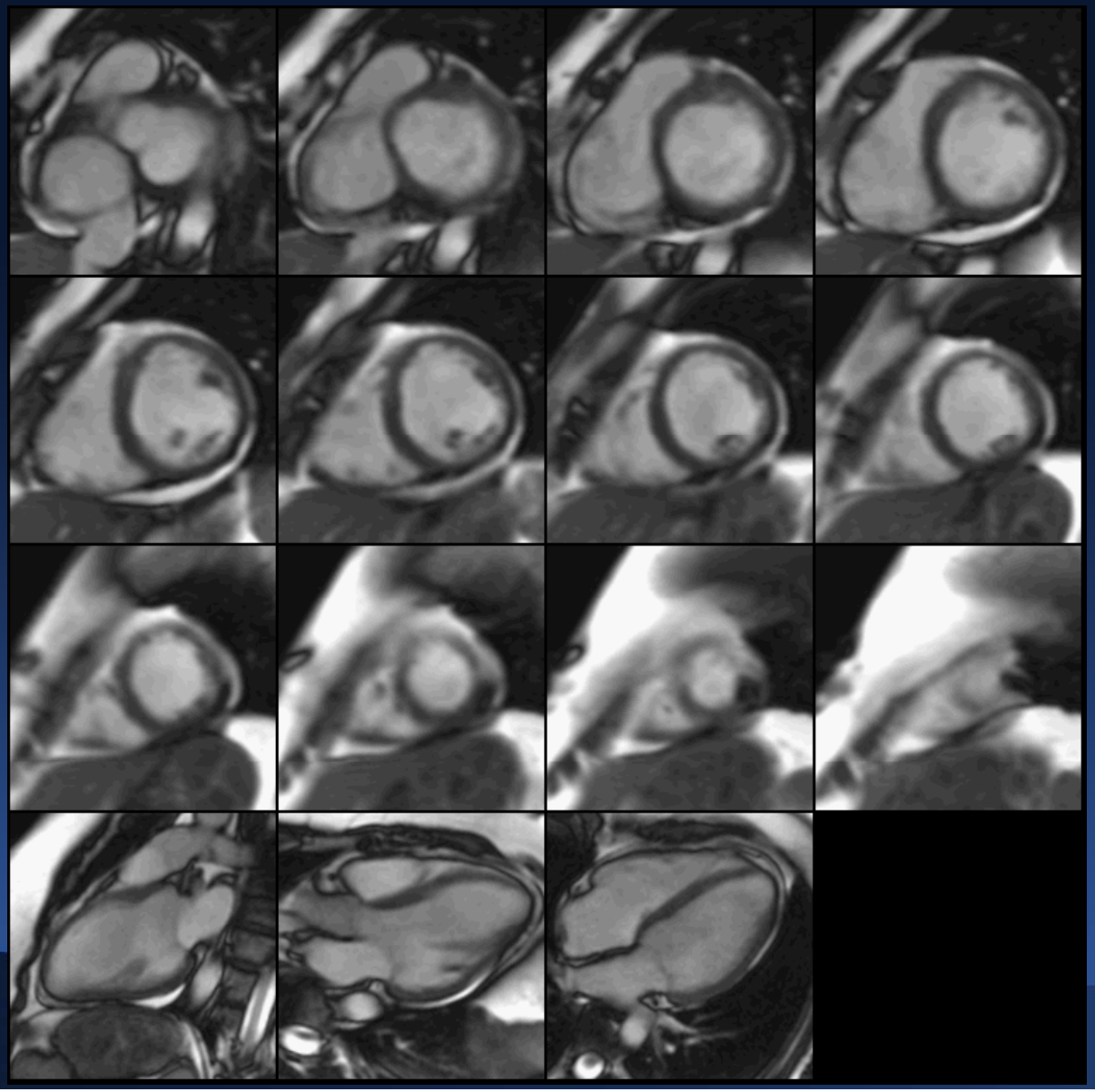


Total myocardial mass = 79.9 g; infarct size = 27.6 g;

Isz = 34.6% of LV

55 yo man with crushing chest pain:

Symptoms to ER 78 min; ER to device 45 min



30-day cMRI

LVEDV = 147.2 ml;
LVESV = 72.1 ml;

LVEF 51.0%

Anterior, apical and septal akinesis

INFUSE-AMI: Conclusions & Implications

In patients presenting early in the course of a large evolving anterior STEMI undergoing primary PCI with bivalirudin anticoagulation:

Manual aspiration with the 6F Export Catheter did not reduce infarct size

- The final word on aspiration in STEMI awaits the ongoing large-scale randomized TOTAL and TASTE trials
- Until this time, aspiration in STEMI should be used selectively, in cases of massive thrombus after wire passage, or refractory thrombus after PCI