Clinical Outcomes of Unprotected Left Main STEMI

MacKay Memorial Hospital, Taiwan
Chun-Wei Lee

Outline

1. Introduction
2. Treatment trend
3. Literature review
4. New Predictor
5. Asian LM STEMI data

Left Main Culprit

In STEMI

FREQUENCY

0.8 to 5.4% of STEMI patients surviving to the hospital

CHARACTERISTICS

0.8-5.4% of STEMI pts

Older

History of coronary artery disease

Lower left ventricular ejection fraction

Cardiogenic shock

Cardiac arrest

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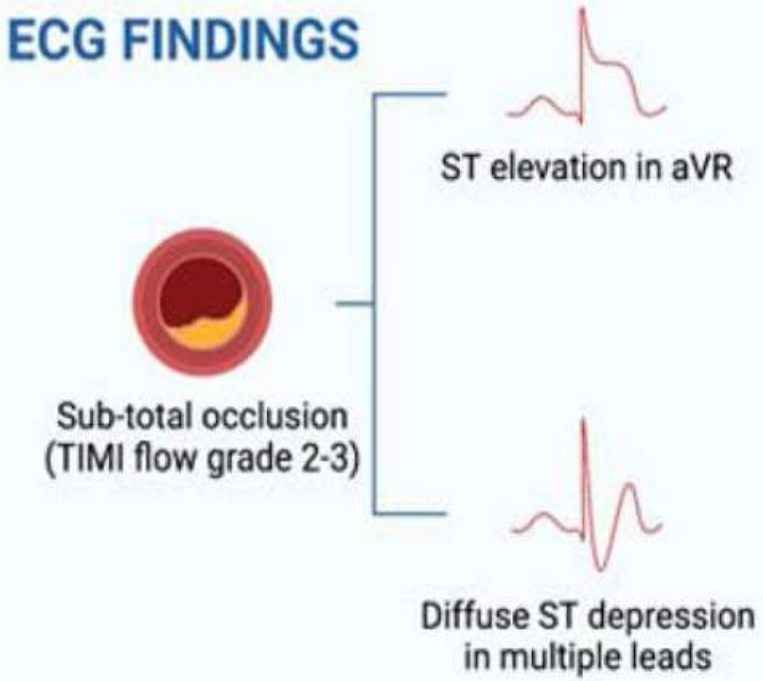
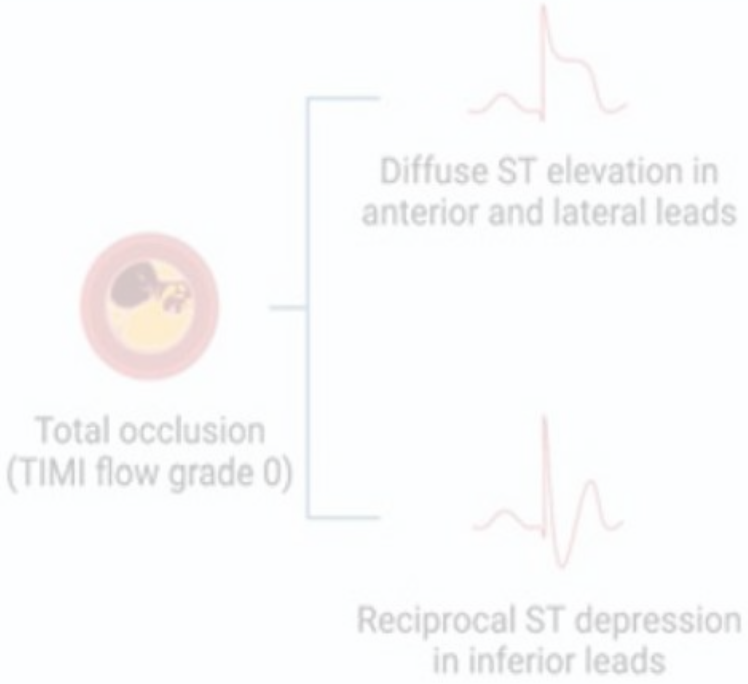
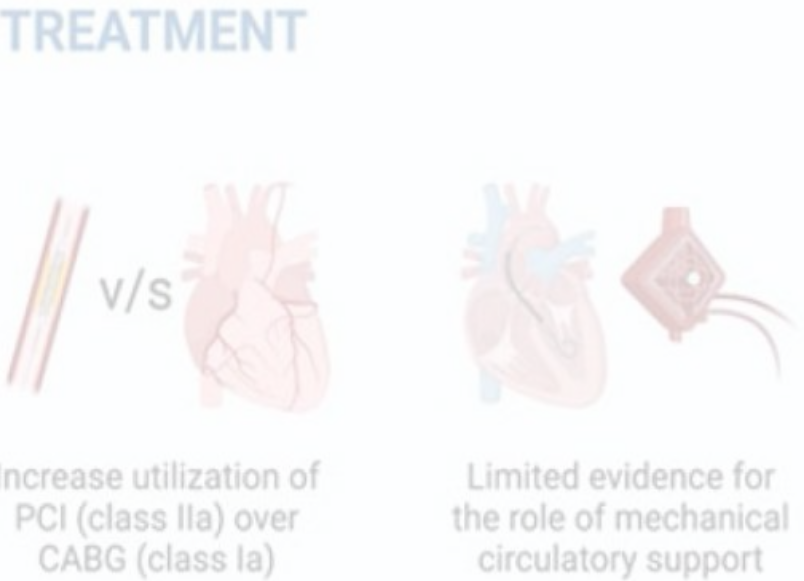






Sub-total:

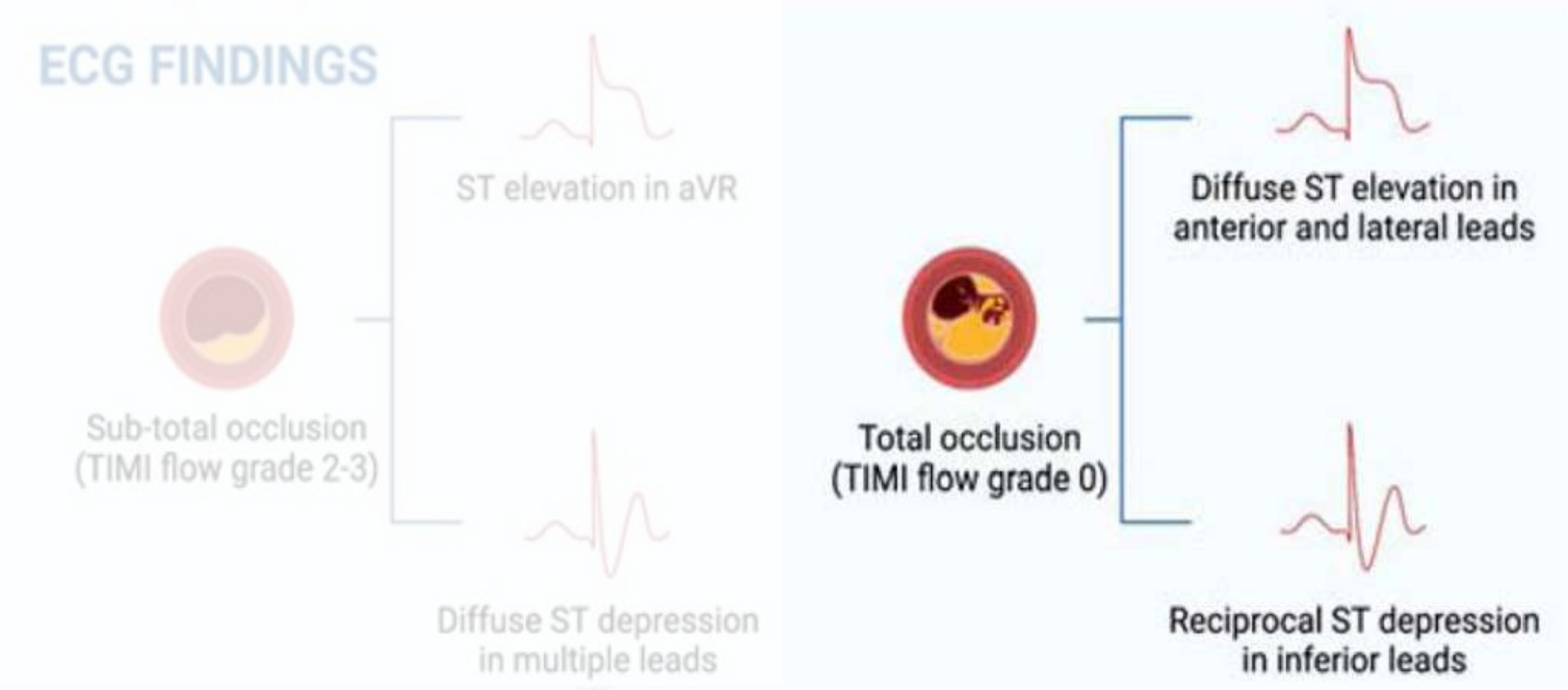
STE in aVR

STD in multiple leads

Total:

Diffuse STE

Reciprocal STD in inf leads



Sub-total:

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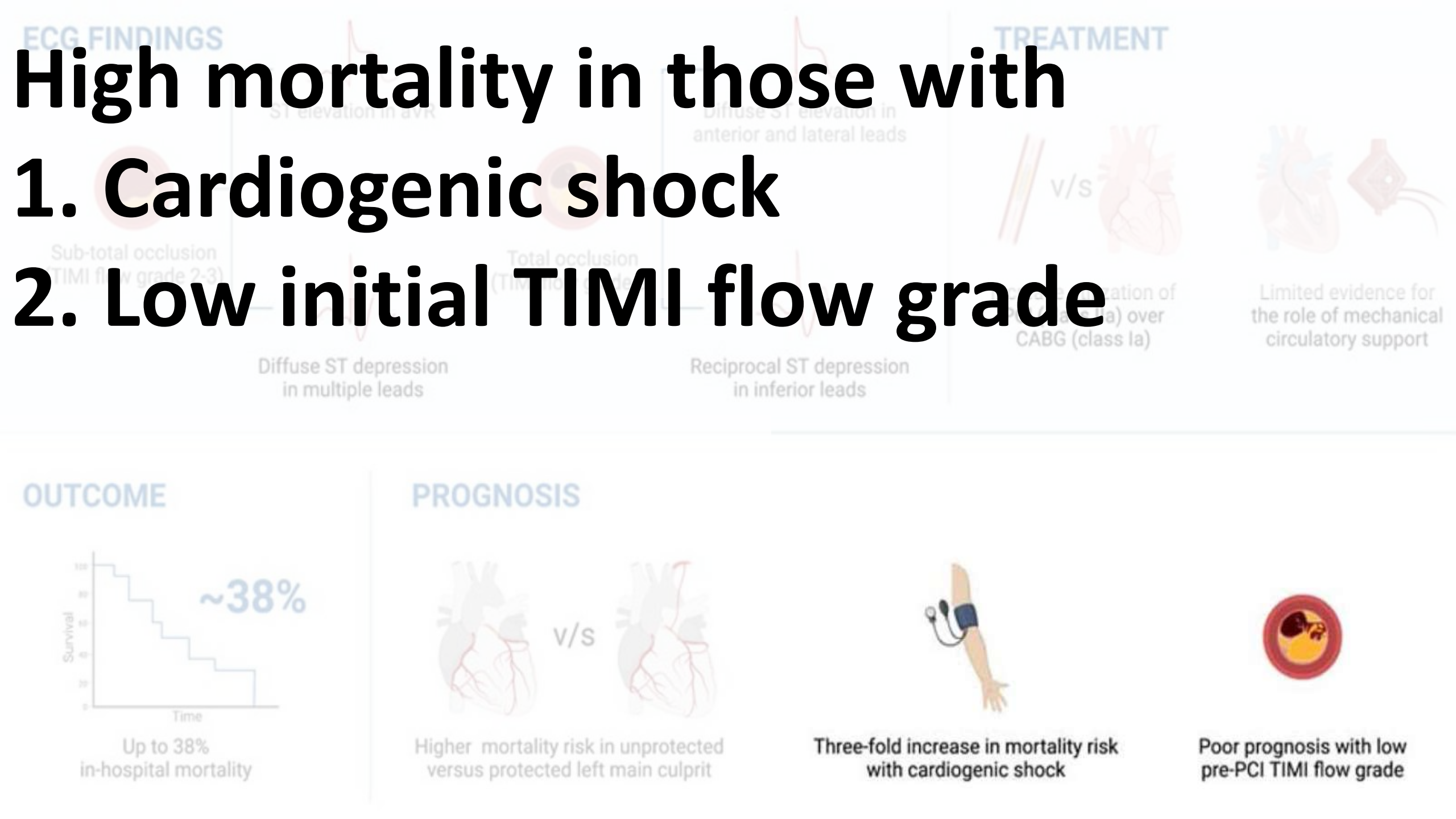
Reciprocal STD in inf leads

High mortality in those with
1. Cardiogenic shock
2. Low initial TIMI flow grade



European Heart Journal (2009) **30**, 2308–2317
doi:10.1093/eurheartj/ehp353

FASTTRACK
ESC HOT LINE

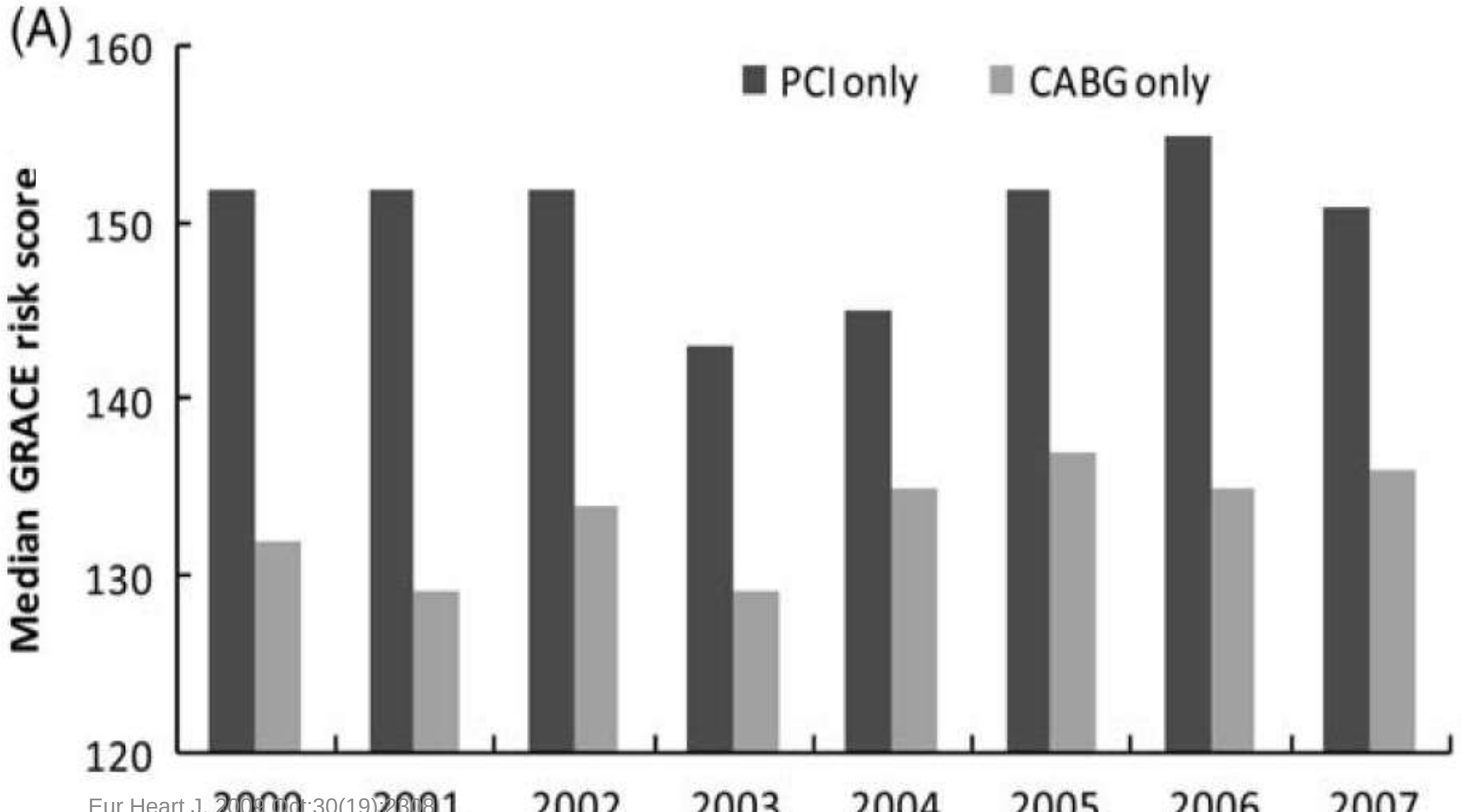
Unprotected left main revascularization in patients with acute coronary syndromes

Gilles Montalescot[1]*, David Brieger[2], Kim A. Eagle[3], Frederick A. Anderson Jr[4], Gordon FitzGerald[4], Michael S. Lee[5], Ph. Gabriel Steg[6], Álvaro Avezum[7], Shaun G. Goodman[8], and Joel M. Gore for the GRACE Investigators[†]

[1]Institut de Cardiologie, Bureau 2-236, Centre Hospitalier Universitaire Pitié-Salpêtrière, 47 Blvd de l'Hôpital, 75013 Paris, France; [2]Concord Hospital, Sydney, NSW, Australia; [3]University of Michigan Cardiovascular Center, Ann Arbor, MI, USA; [4]Center for Outcomes Research, University of Massachusetts Medical School, Worcester, MA, USA; [5]UCLA Medical Center, University of California, Los Angeles School of Medicine, Los Angeles, CA, USA; [6]Department of Cardiology, INSERM U-698, Université Paris 7 and Assistance Publique - Hôpitaux de Paris, Paris, France; [7]Dante Pazzanese Institute of Cardiology, São Paulo, Brazil; and [8]Canadian Heart Research Centre and Terrence Donnelly Heart Centre, Division of Cardiology, St. Michael's Hospital, University of Toronto, Toronto, ON, Canada

Eur Heart J. 2009 Oct;30(19):2308
-17.

High GRACE risk score in PCI group



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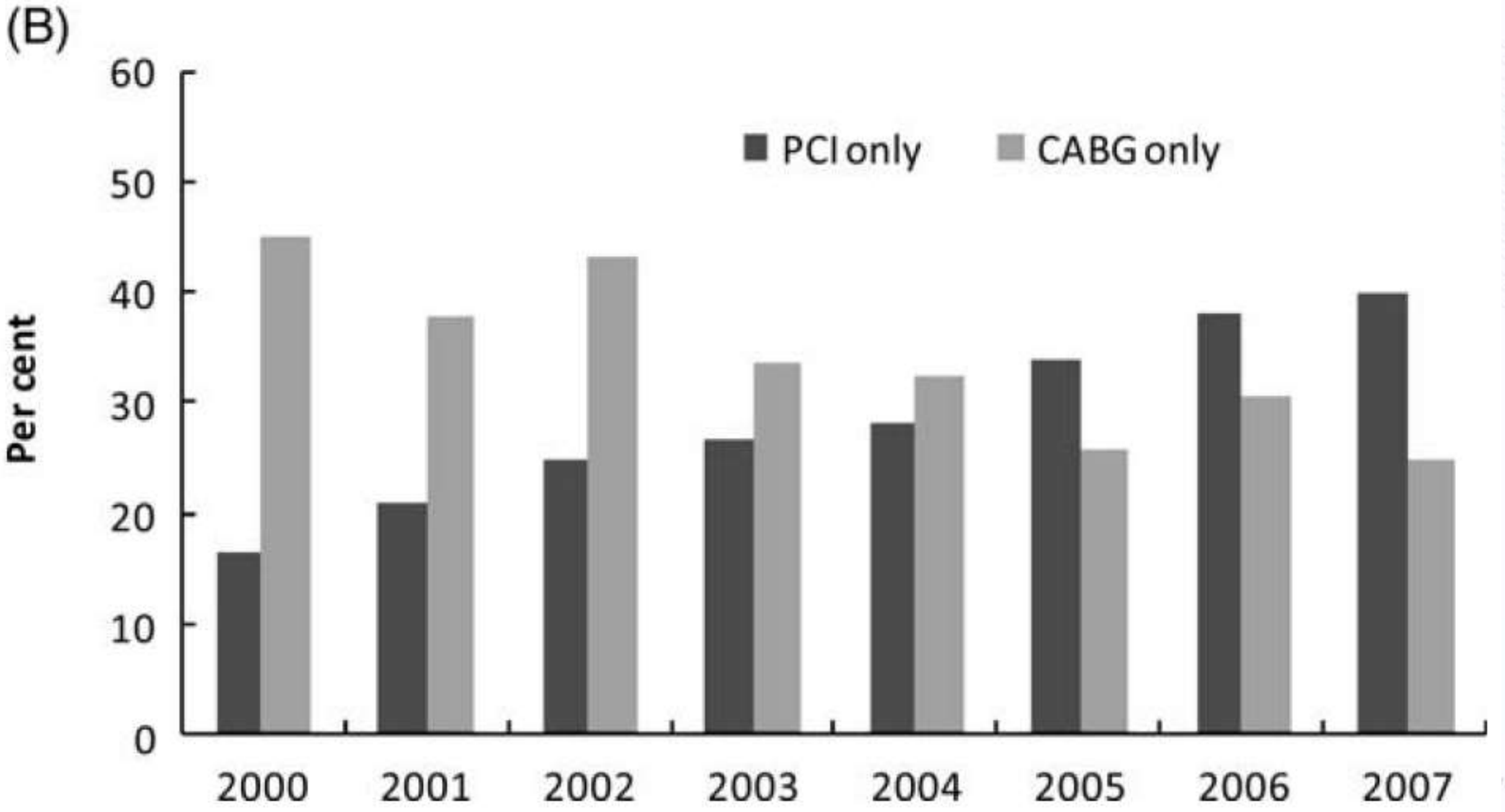
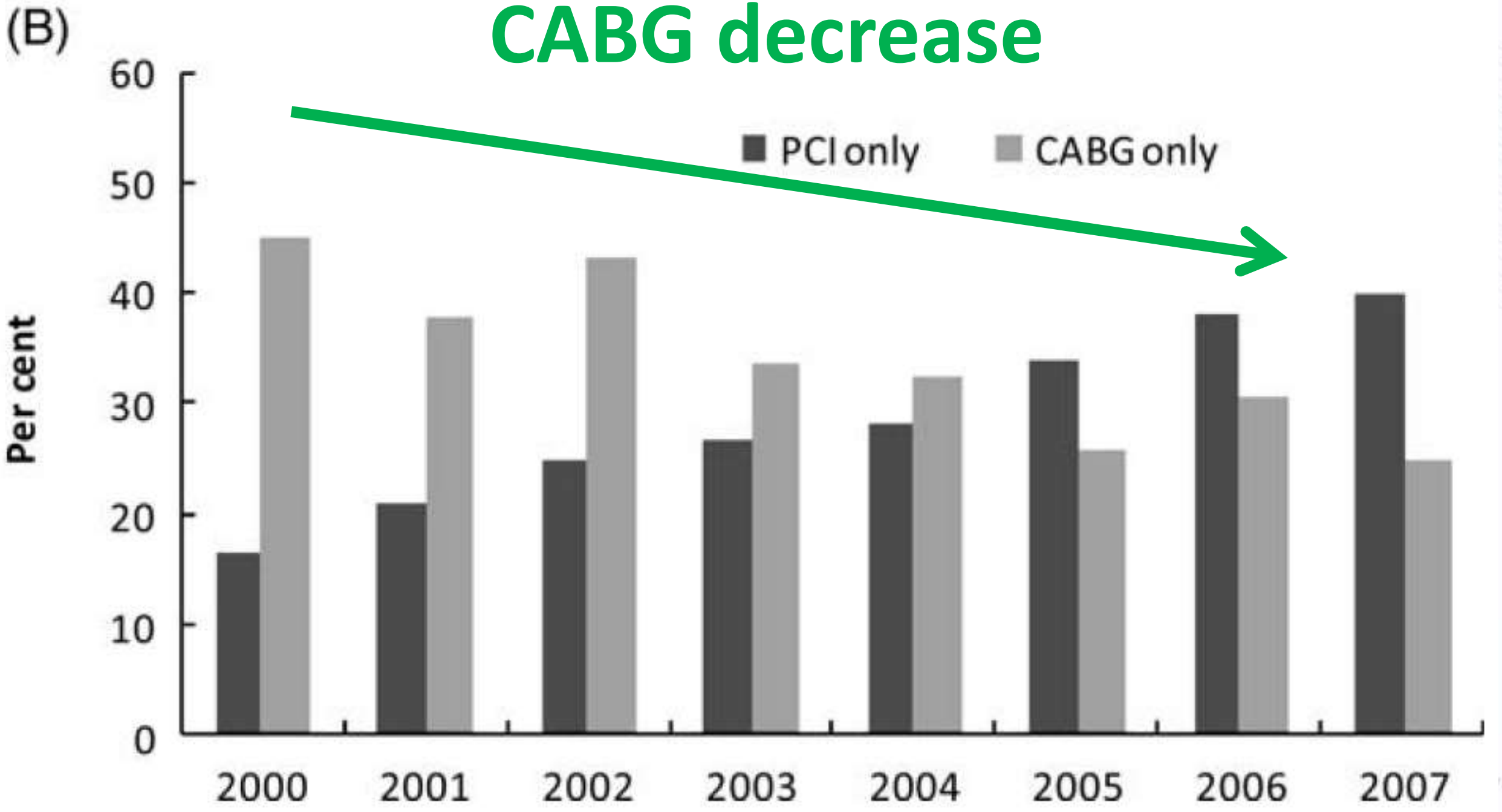
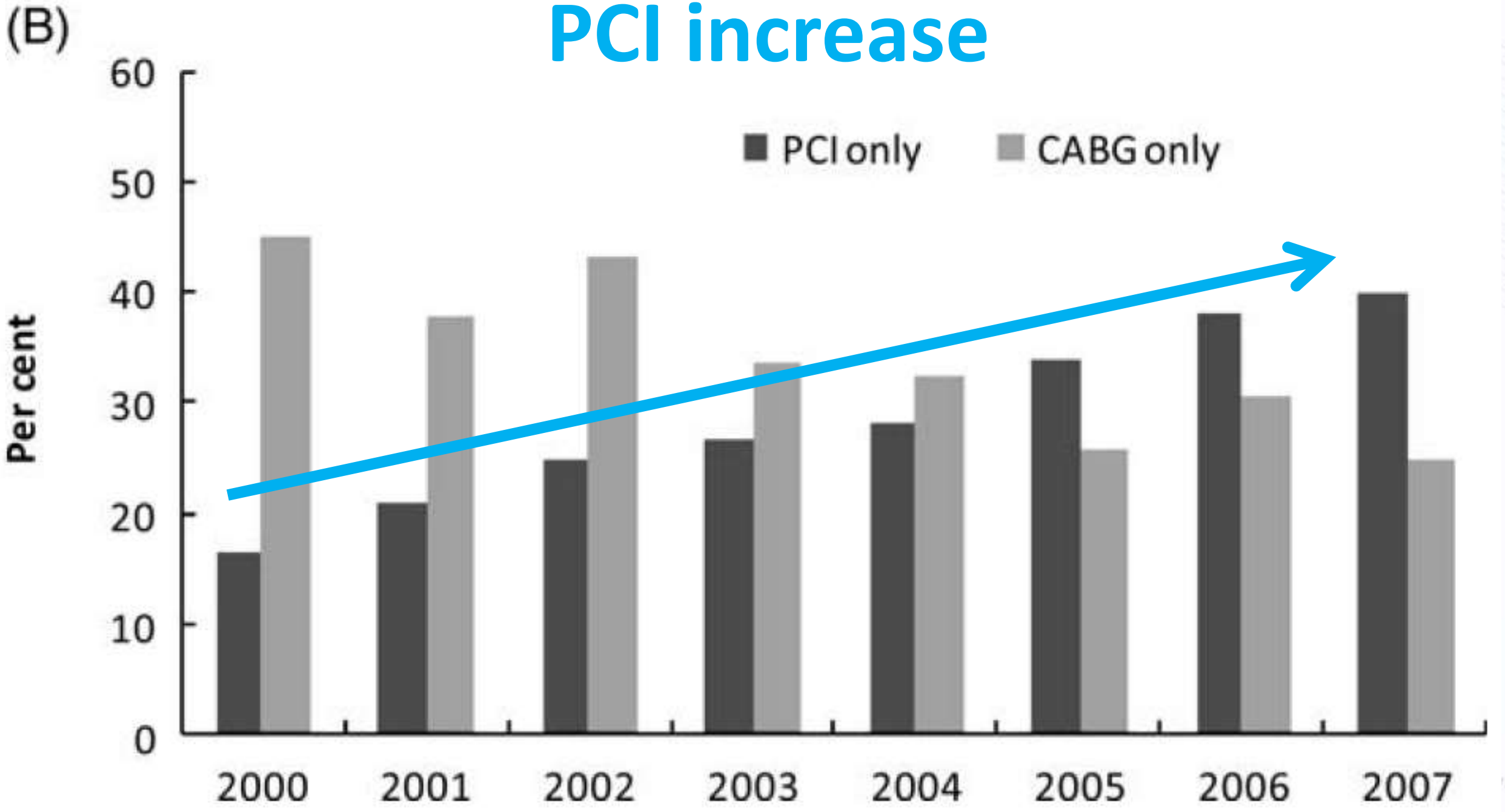

(B)
60
50
40
30
20
10
0
Per cent
PCI only
CABG only
2000
2001
2002
2003
2004
2005
2006
2007

CABG decrease



PCI increase



Summary of recent LM STEMI trials

Table 1 Summary of left main STEMI trials

	Year	*N*	Mean age at presentation	Cardiogenic shock	PCI success	In-house mortality	30-day mortality	1-year mortality
Lee et al	2009	23	70.6 ± 12 years	24% (*n* = 5)	100% (*n* = 23)	8% (*n* = 2)	N/A	N/A
Montalescot et al., GRACE registry	2009	627	70 (median age)	3.4% (*n* = 59)	N/A	11% (*n* = 69)	N/A	N/A
Pedrazzini et al., AMIS registry	2011	348	63.5 ± 12.6 years	12.2% (*n* = 42)	N/A	10.9% (*n* = 38)	N/A	N/A
Papalardo et al	2011	48	70 ± 12.5 years	45% (*n* = 22)	92% (*n* = 44)	21% (*n* = 10)	N/A	10.5% (*n* = 5)
Gagnor et al., The STEMI-Placet Registry	2012	38	67.7 ± 11.45 years	73.7% (*n* = 28)	84.2% (*n* = 32)	42% (*n* = 16)	N/A	N/A
Parma et al	2012	58	67.3 ± 11.5 years	51.7% (*n* = 30)	93.1% (*n* = 54)	N/A	39.6% (*n* = 23)	44% (*n* = 25)
Vis et al., meta-analysis	2013	977	N/A	26% (*n* = 252)	N/A	N/A	15% non-CS, 55% CS	N/A
Almudarra et al., BCIS registry	2014	784	67.3 ± 13.7 years	40% (*n* = 314)	70.9% (*n* = 510)	24.6% (*n* = 193)	28.3% (*n* = 222)	37.6% (*n* = 295)
Yap et al., The Asia–Pacific Left Main ST-Elevation Registry (ASTER)	2017	67	64.2 ± 12.8 years	61% (*n* = 41)	76% (*n* = 51)	47.8% (*n* = 32)	N/A	N/A
Liu et al	2018	372	63.4 ± 11.5 years	21.2% (*n* = 79)	92.8% (*n* = 343)	5.1% (*n* = 19)	6.2% (*n* = 23)	8.1% (*n* = 30)
Zoghbi et al., CathPCI Registry	2018	434	62.9 ± 14.6 years	66.4% (*n* = 288)	71.2% (*n* = 309)	58% (*n* = 252)	N/A	N/A

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Age: 63-71 y/o

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High & variable rate of Cardiogenic shock

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Relatively lack of long-term f/u

Treatment Options

CABG or PCI ?

- Pivotal LM trials (SYNTAX, EXCEL, and NOBLE) excluded AMI pts

- Currently no prospective randomized trials comparing surgical CABG and PCI revascularization options for patients with LM culprit STEMI.

Current AHA/ACC STEMI guideline

- **Rapid revascularization** for all patients with STEMI.

- If presenting to a **non-PCI capable hospital** with first medical contact to balloon time>120 min may be treated with **fibrinolytics** if there is **ST elevation in aVR and reciprocal precordial ST segment depressions.**

- If patients presenting to a **PCI capable hospital**

→ Primary PCI, a Class IIa recommendation

New Predictors

Research Article

New Predictors of Early and Late Outcomes after Primary Percutaneous Coronary Intervention in Patients with ST-Segment Elevation Myocardial Infarction and Unprotected Left Main Coronary Artery Culprit Lesion

Cãlin Homorodean,[1,2] Adrian Corneliu Iancu,[1,3] Daniel Leucuța,[1] Șerban Bãlãnescu,[4] Ioana Mihaela Dregoesc,[1,3] Mihai Spînu,[1] Mihai Ober,[2] Dan Tãtaru,[1,2] Maria Olinic,[1,2] Dan Bindea,[1,3] and Dan Olinic[1,2]

Angiographic characteristics	N = 81
Lesion Location	
Proximal LM	31 (38.3)
Mid LM	8 (9.9)
Distal LM	42 (51.8)
Pre-procedural TIMI Flow Grade	
TIMI 0	11 (13.6)
TIMI 1	8 (9.9)
TIMI 2	18 (22.2)
TIMI 3	44 (54.3)
Rentrop collaterals to LCA	10
Occluded RCA	16 (19.7)
Rentrop collaterals to RCA	11 (13.5)
Extent of coronary artery disease	
LM only	25 (30.8)
LM + 1vessel	19 (23.5)
LM + 2 vessels	20 (24.7)
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LM stenosis	
70-89%	20 (24.7)
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EuroScore II	12.2 (3.88-28.6)
SYNTAX Score I	28 (18-34)
Residual SYNTAX Score	2 (0-11)
SYNTAX Revascularization Index	89.4 (64.3-100)
SYNTAX Score II PCI	43.1±15.7
Procedural characteristics	
Bifurcation technique	56 (69.1)
Kissing stents	3 (3.7)
Provisional	49 (60.5)
V stenting	1 (1.2)
T stenting	2 (2.5)
Mini crush	1 (1.2)
BMS	48 (59.3)
DES	33 (40.7)
Post-PCI TIMI Flow	
0	0
1	5 (6.2)
2	5 (6.2)
3	71(87.6)
Technical success	76 (92.8)

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Table 4: Multivariate logistic regression for the prediction of 30 days and 1-year all-cause mortality (adjusted for cardiogenic shock and TIMI flow). BMS = bare-metal stent, DES = drug-eluting stent, LM = Left Main, PCI = percutaneous coronary intervention, and TIMI = Thrombolysis in Myocardial Infarction.

	30 days			One year		
	OR	95% CI	p	OR	95% CI	p
LM TIMI flow 0/1	3.73	1.107-13.7	0.038	2.89	0.91-9.9	0.077
Cardiogenic shock before PCI	9.83	3.28-34.65	< 0.001	5.13	1.96-14.26	0.001
Age (years)	1.05	1.002-1.101	0.053	1.06	1.02-1.12	0.008
Total ischemic time (min)	1	0.99-1.003	0.966	1	0.99-1.002	0.98
Diabetes	1.94	0.61-6.36	0.261	1.21	0.42-3.49	0.71
Cardiac arrest before PCI	1.78	0.47-6.53	0.386	1.47	0.39-5.29	0.55
Left ventricular ejection fraction (<40%)	1.54	0.37–6.89	0.551	1.19	0.35–4.06	0.76
EuroSCORE II	1.001	0.97-1.035	0.941	1.02	0.98-1.05	0.30
Number of diseased vessels	1.05	0.62-1.78	0.849	1.405	0.88-2.30	0.16
SYNTAX Score	1.02	0.97-1.078	0.414	1.029	0.98-1.08	0.252
SYNTAX Revascularization Index	0.97	0.95-1	0.057	0.979	0.95-0.99	0.046
PCI SYNTAX II Score	1.03	0.99-1.07	0.163	1.059	1.02-1.11	0.006
Residual SYNTAX Score	1.05	0.99-1.11	0.107	1.053	1-1.12	0.069
DES vs BMS	0.74	0.23-2.38	0.617	0.46	0.15-1.3	0.148

Conclusion

1. **Baseline condition: age, LM TIMI flow 1/0, cardiogenic shock**
2. SYNTAX revascularization index (HR: 0.9; p=0.01)
3. Residual SYNTAX score (HR: 1.03; p=0.04)

→ major predictors of long-term mortality among pts undergoing PCI for treatment of unprotected LMC STEMI.

Conclusion

1. Baseline condition: age, LM TIMI flow 1/0, cardiogenic shock
2. **SYNTAX revascularization index (HR: 0.9; p=0.01)**
3. Residual SYNTAX score (HR: 1.03; p=0.04)

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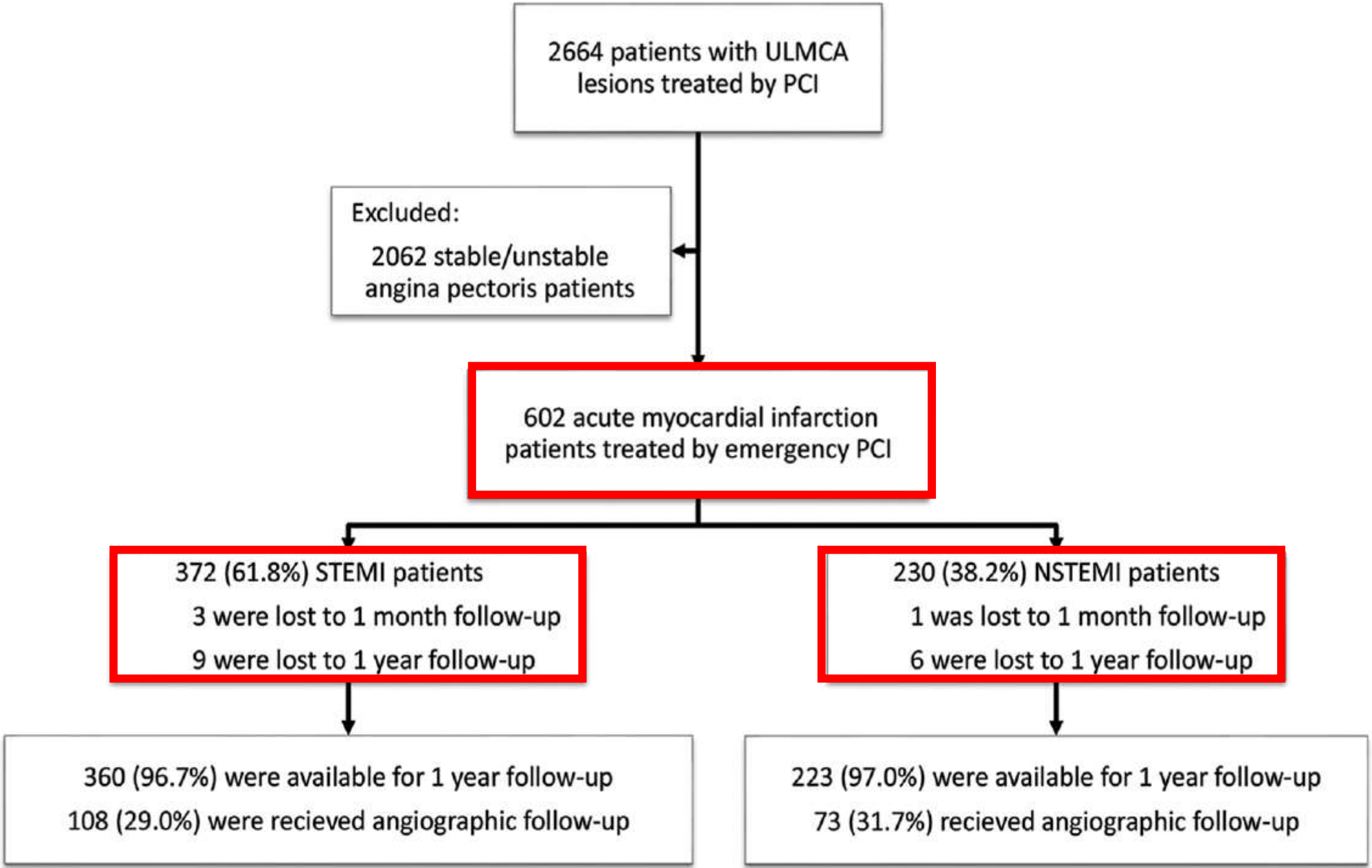
Asian LM STEMI data

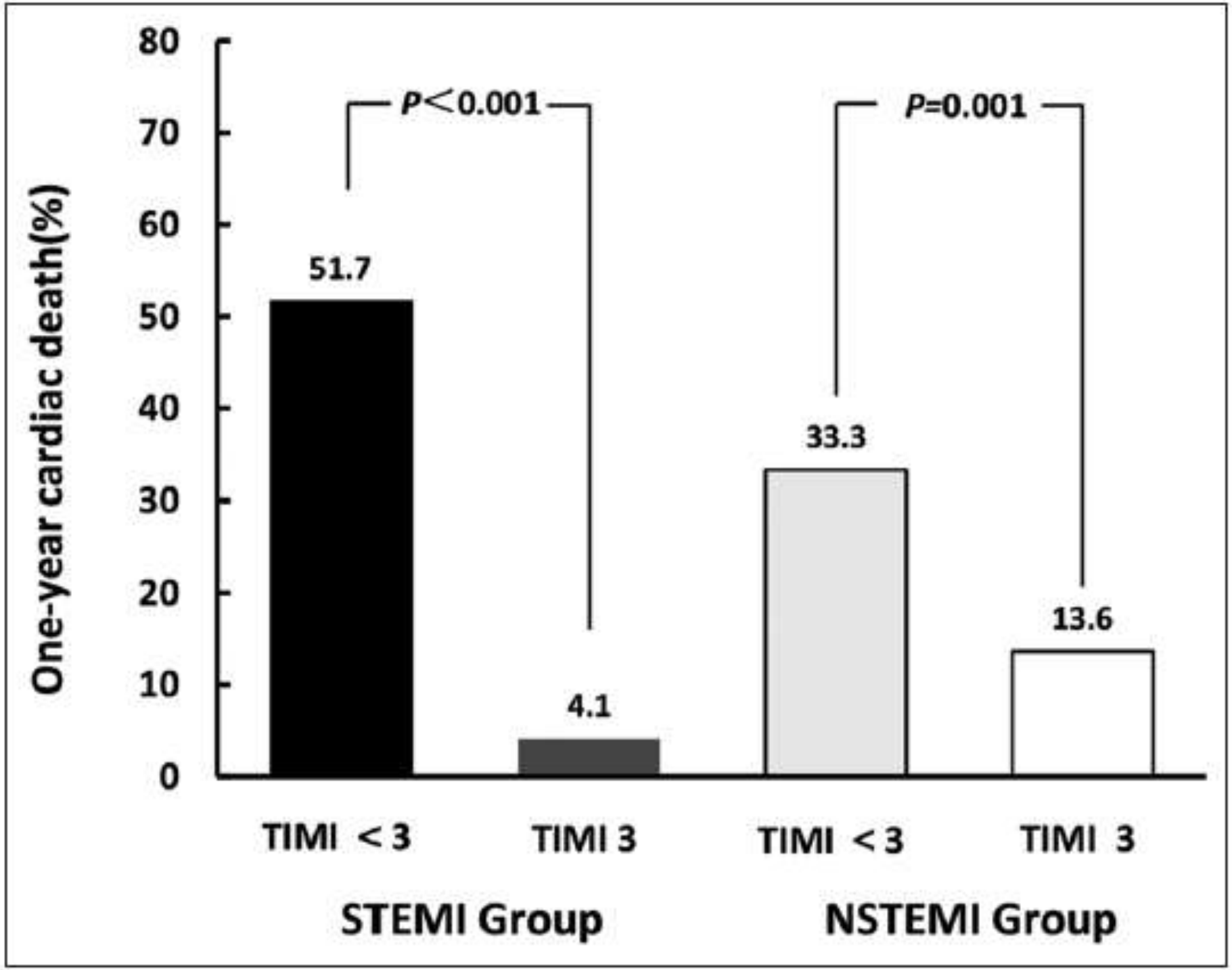
Original Article

One-year Outcomes in Patients with ST-segment Elevation Myocardial Infarction Caused by Unprotected Left Main Coronary Artery Occlusion Treated by Primary Percutaneous Coronary Intervention

Hai-Wei Liu[1], Ya-Ling Han[1], Quan-Min Jin[1], Xiao-Zeng Wang[1], Ying-Yan Ma[1], Geng Wang[1], Bin Wang[1], Kai Xu[1], Yi Li[1], Shao-Liang Chen[2]

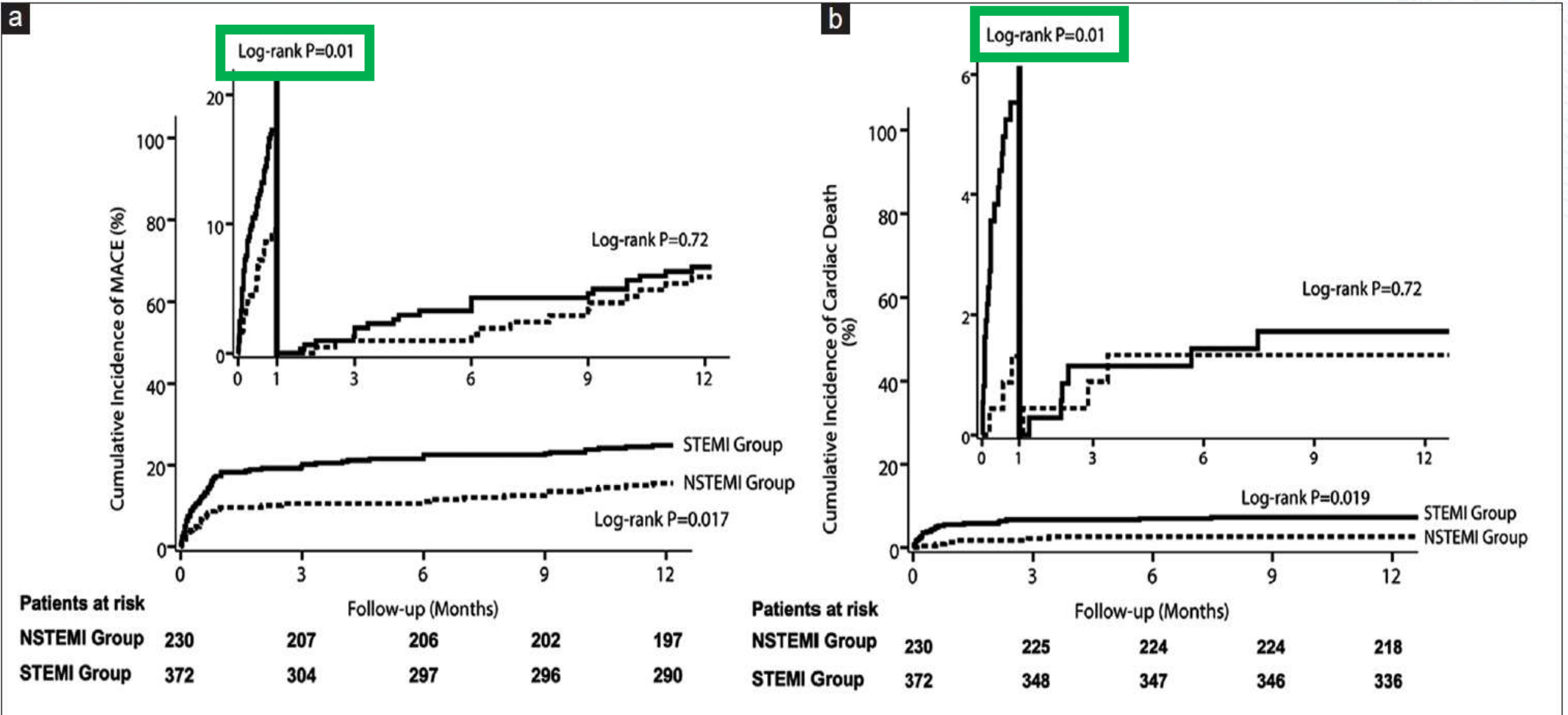
[1]Department of Cardiology, General Hospital of Shenyang Military Region, Shenyang, Liaoning 110016, China
[2]Department of Cardiology, Nanjing First Hospital, Nanjing, Jiangsu 210006, China


2664 patients with ULMCA lesions treated by PCI
Excluded:
2062 stable/unstable angina pectoris patients
602 acute myocardial infarction patients treated by emergency PCI
372 (61.8%) STEMI patients
3 were lost to 1 month follow-up
9 were lost to 1 year follow-up
230 (38.2%) NSTEMI patients
1 was lost to 1 month follow-up
6 were lost to 1 year follow-up
360 (96.7%) were available for 1 year follow-up
108 (29.0%) were recieved angiographic follow-up
223 (97.0%) were available for 1 year follow-up
73 (31.7%) recieved angiographic follow-up


One-year cardiac death(%)
80
70
60
50
40
30
20
10
0
P<0.001
P=0.001
51.7
4.1
33.3
13.6
TIMI < 3
TIMI 3
TIMI < 3
TIMI 3
STEMI Group
NSTEMI Group

MACE & CV death is critical in the first month

No difference afterwards



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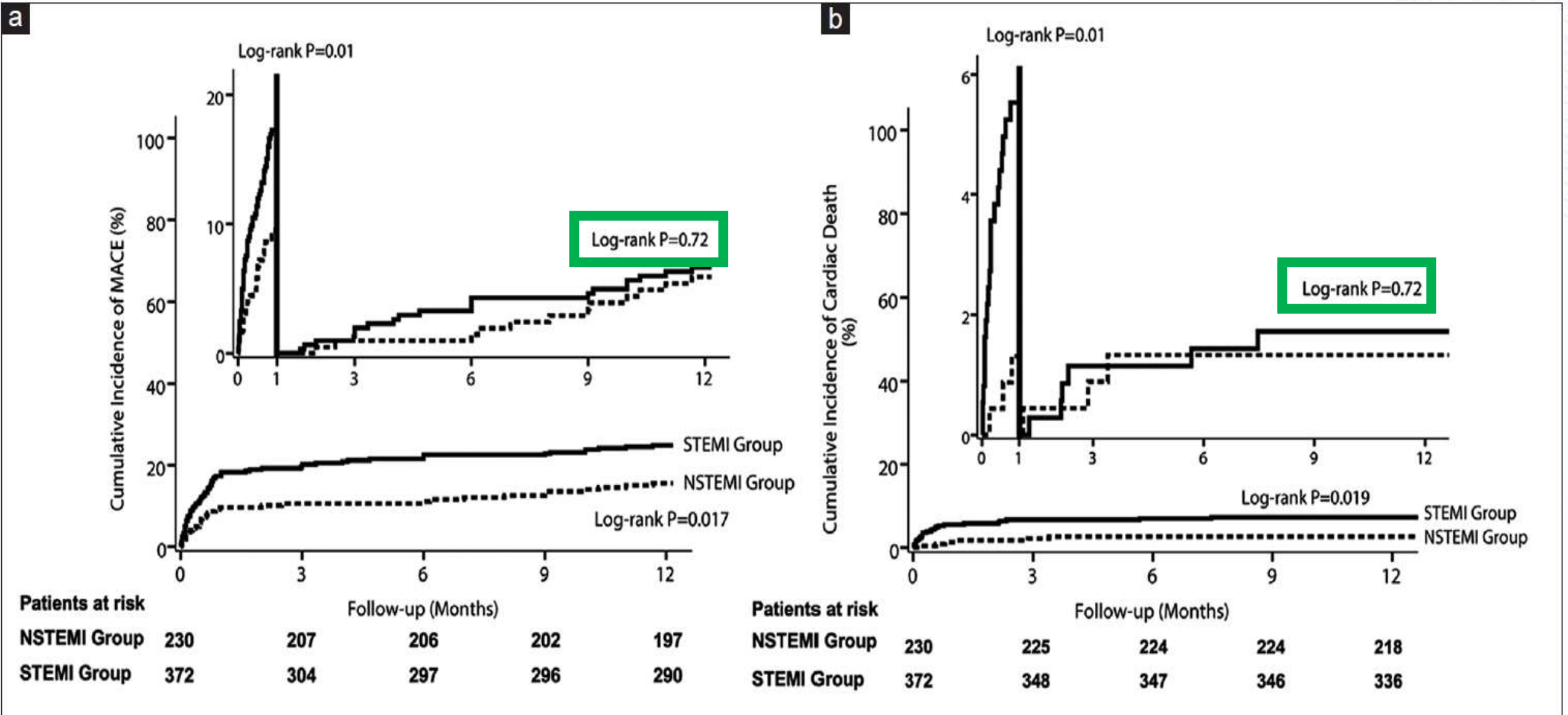
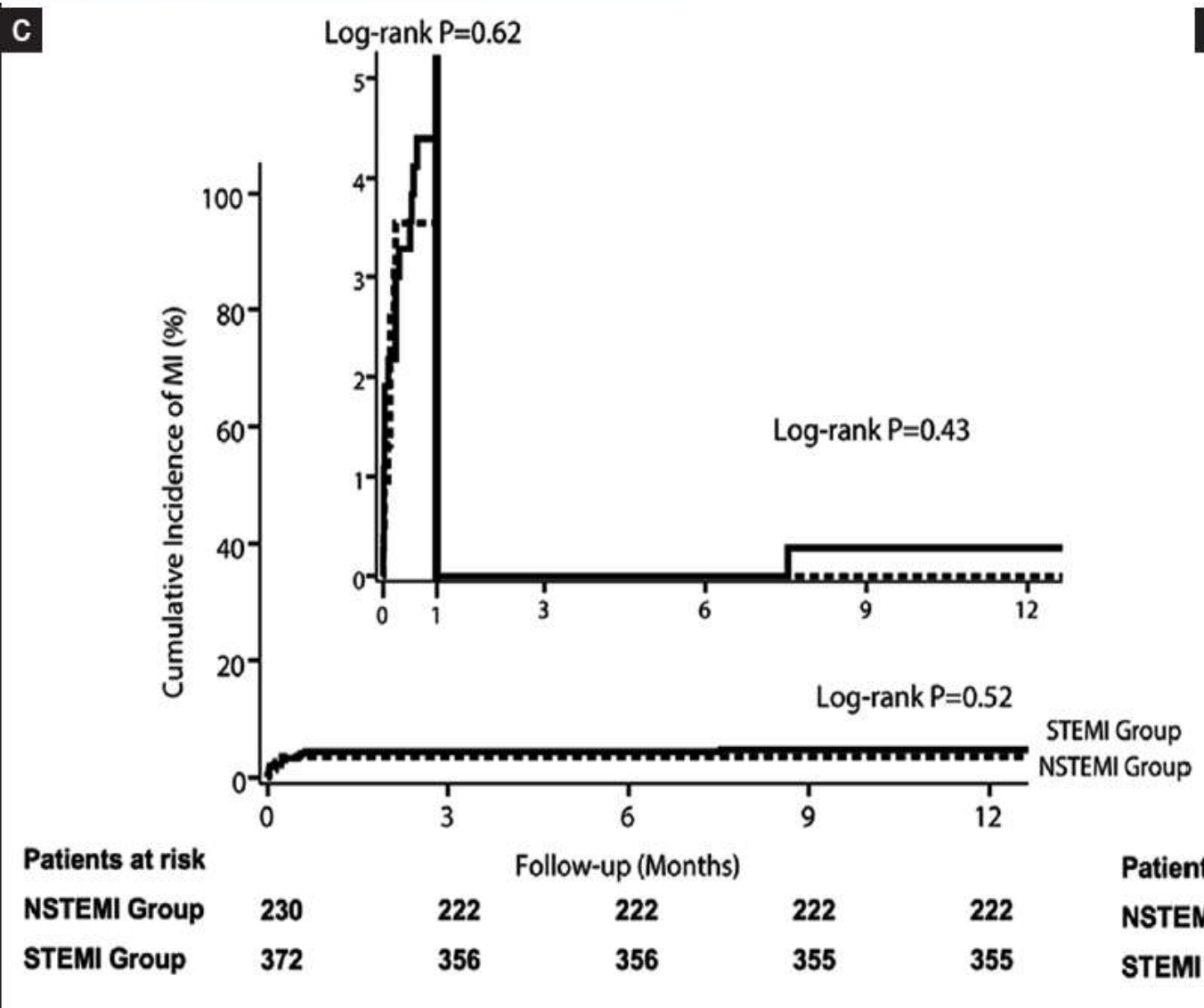


No difference in MI & TVR



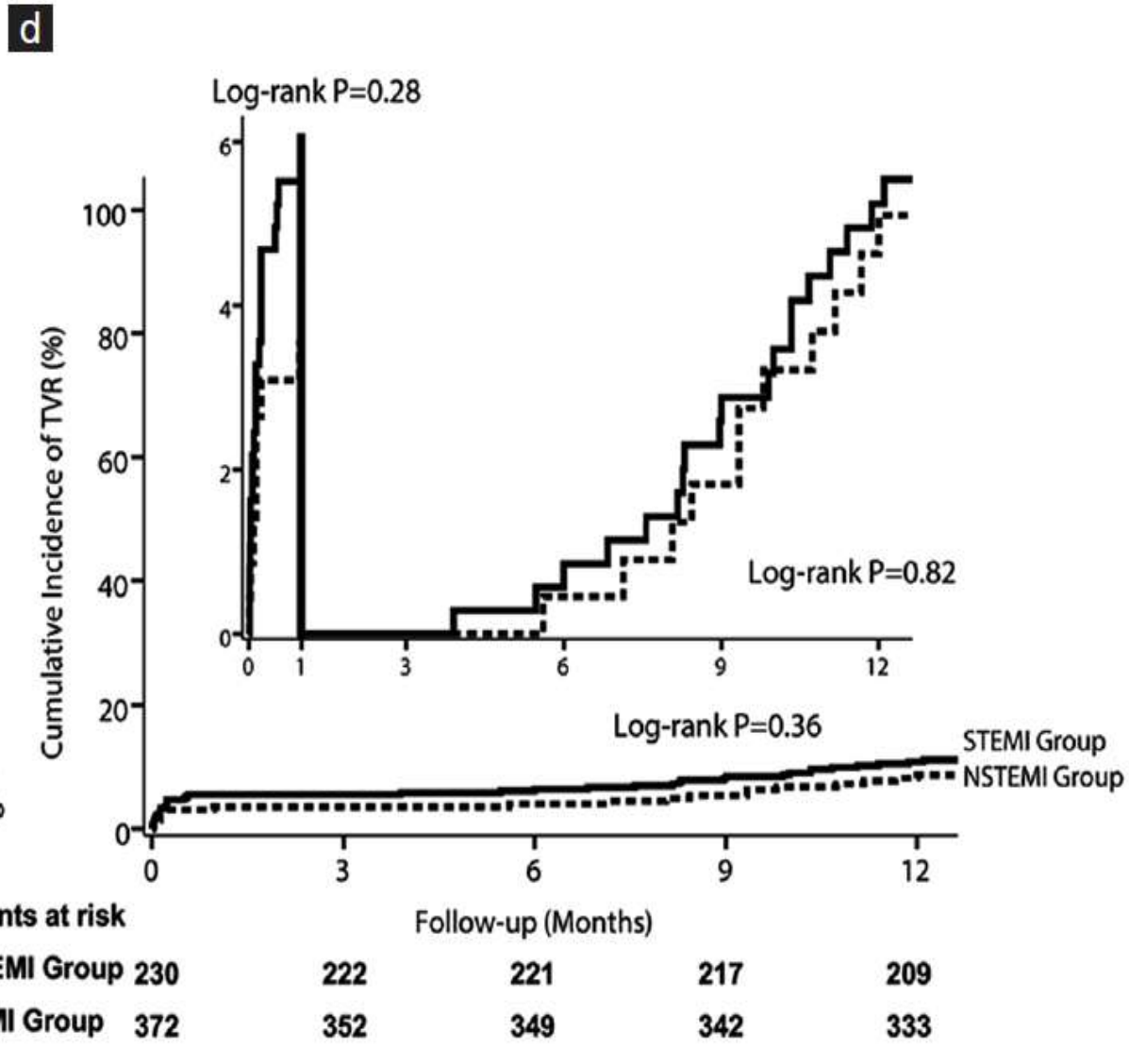


Table 4: Multivariable analysis showing independent predictors of the 1-year MACE

Variables	STEMI (n = 372)	
	HR (95% *CI*)	*P*
Renal insufficiency	1.24 (0.43–3.54)	0.691
Previous MI	1.73 (0.68–4.40)	0.250
LVEF <35%	3.06 (1.95–4.82)	<0.001
Killip class ≥III	2.76 (1.39–5.49)	0.004
LM distal bifurcation	0.82 (0.45–1.50)	0.516
Two-stent for distal LM lesions	0.97 (0.55–1.69)	0.914
Post-PCI TIMI flow grade >2	0.02 (0.01–0.04)	0.018
IABP support	1.79 (1.07–3.01)	0.027

Conclusion

- 1.Unprotected LM STEMI has a higher MACE and CV death in the first month, then the risk is similar with NSTEMI

- 2. LVEF, Killip class & Post-PCI TIMI grade are significant predictors

Circulation Journal
Circ J 2019; 83: 198–208
doi:10.1253/circj.CJ-18-0896

ORIGINAL ARTICLE
Ischemic Heart Disease

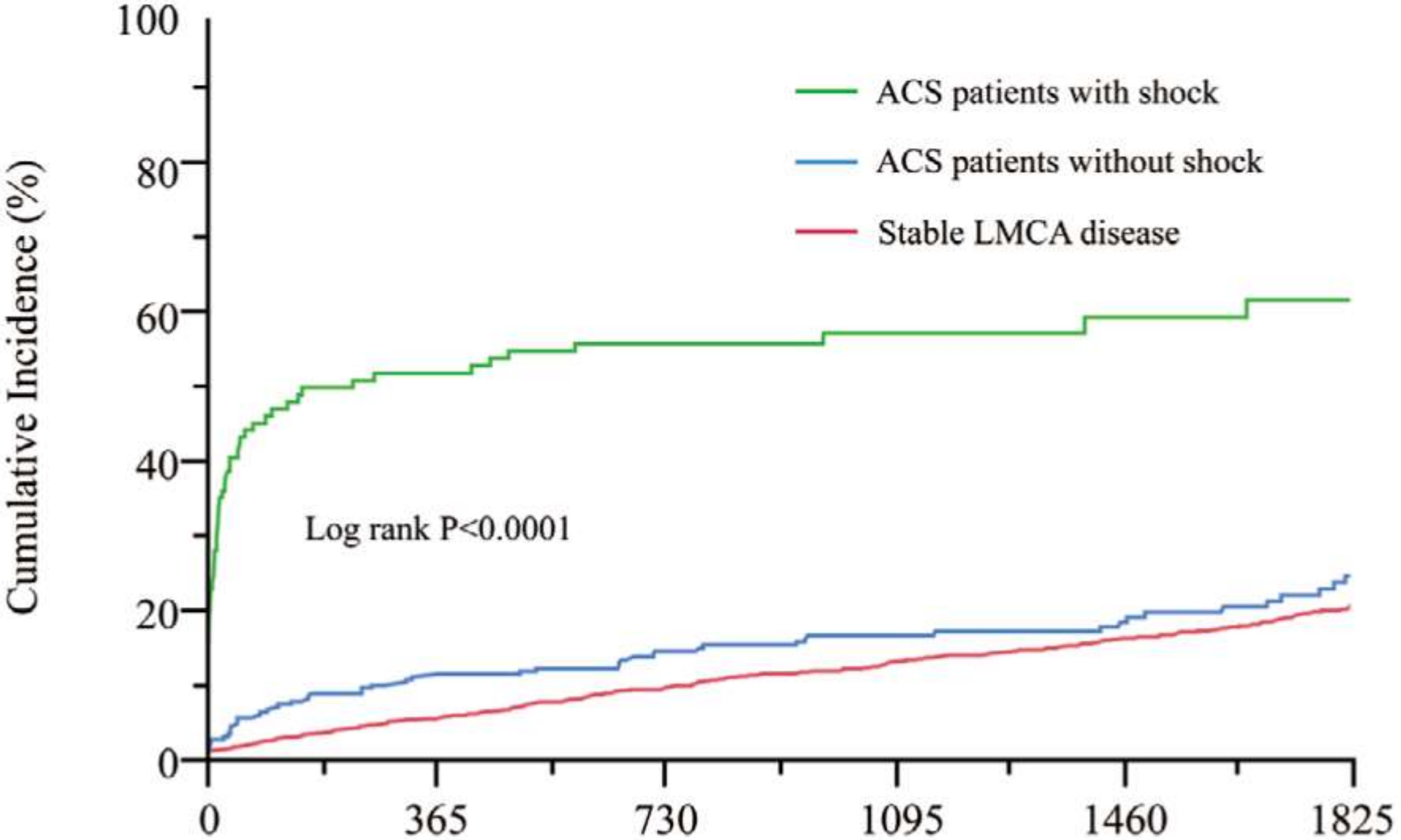
Acute Coronary Syndrome With Unprotected Left Main Coronary Artery Culprit

— An Observation From the AOI-LMCA Registry —

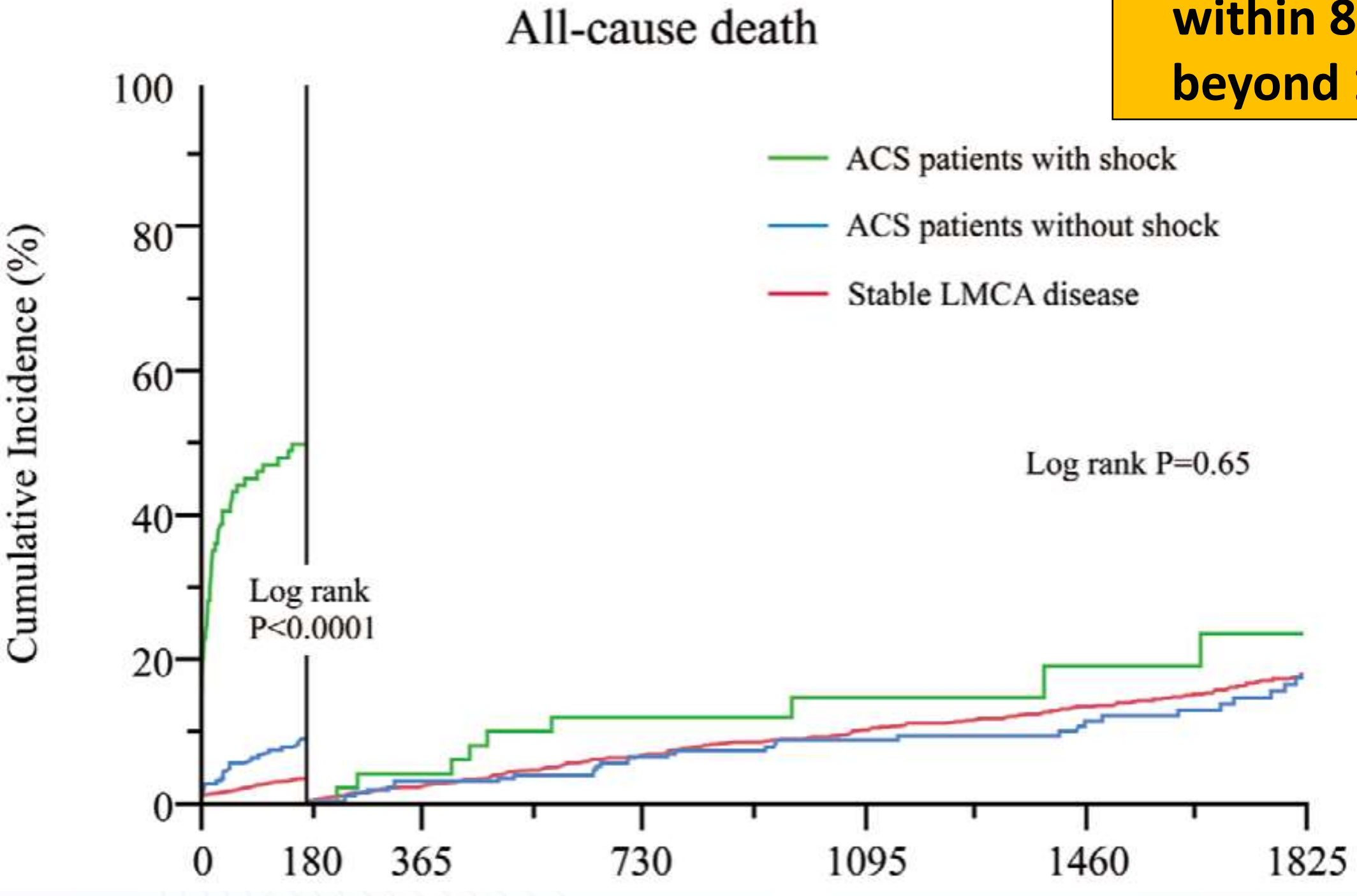
Hirooki Higami, MD; Mamoru Toyofuku, MD; Takeshi Morimoto, MD; Masanobu Ohya, MD; Yasushi Fuku, MD; Kyohei Yamaji, MD; Hiromi Muranishi, MD; Yuhei Yamaji, MD; Koji Nishida, MD; Daisuke Furukawa, MD; Tomohisa Tada, MD; Euihong Ko, MD; Kenji Ando, MD; Hiroki Sakamoto, MD; Takashi Tamura, MD; Kazuya Kawai, MD; Kazushige Kadota, MD; Takeshi Kimura, MD
on behalf of the AOI-LMCA Stenting Registry Investigators

All-cause death

Entire study period



within 80 days & beyond 180 days



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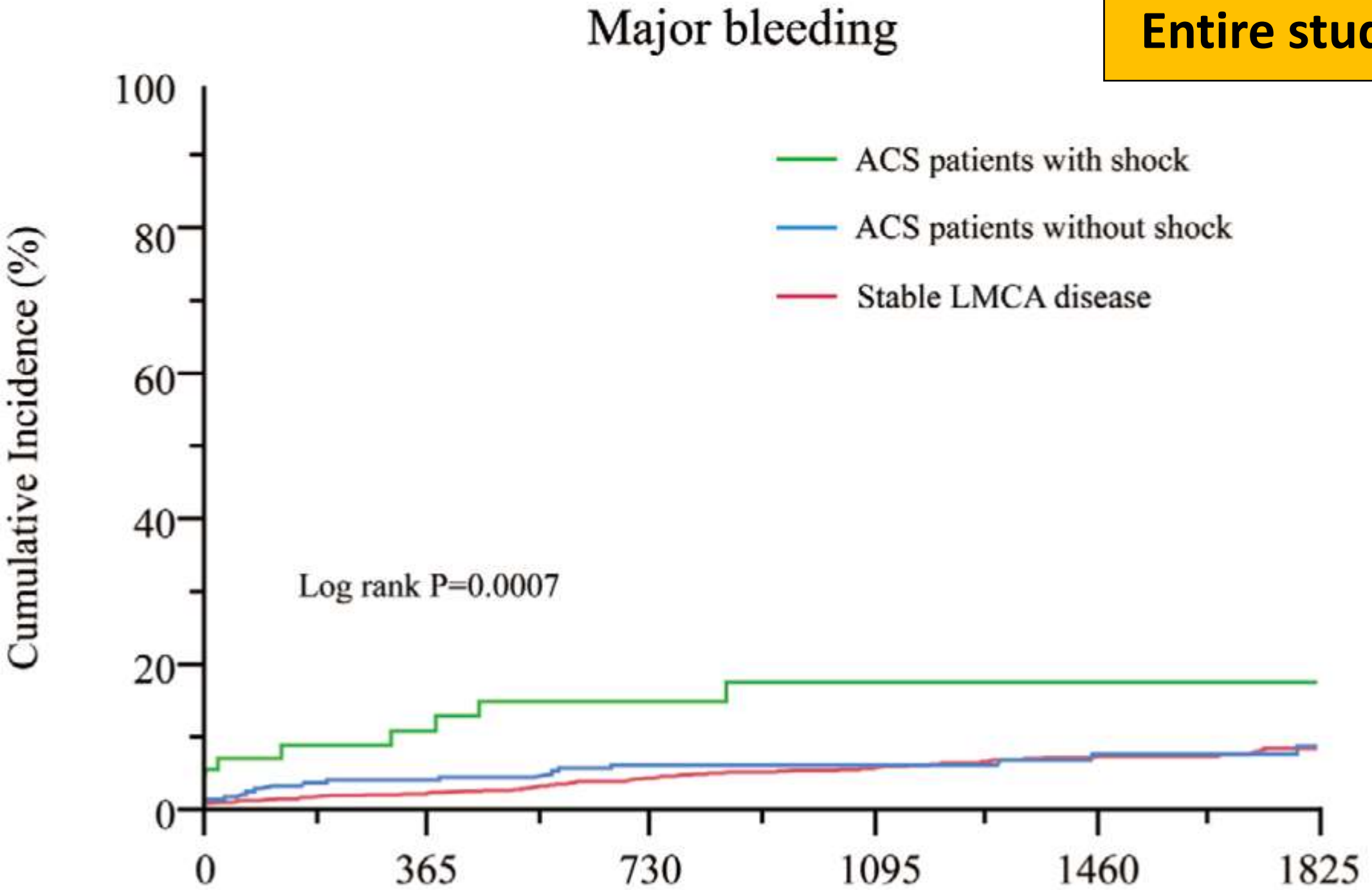

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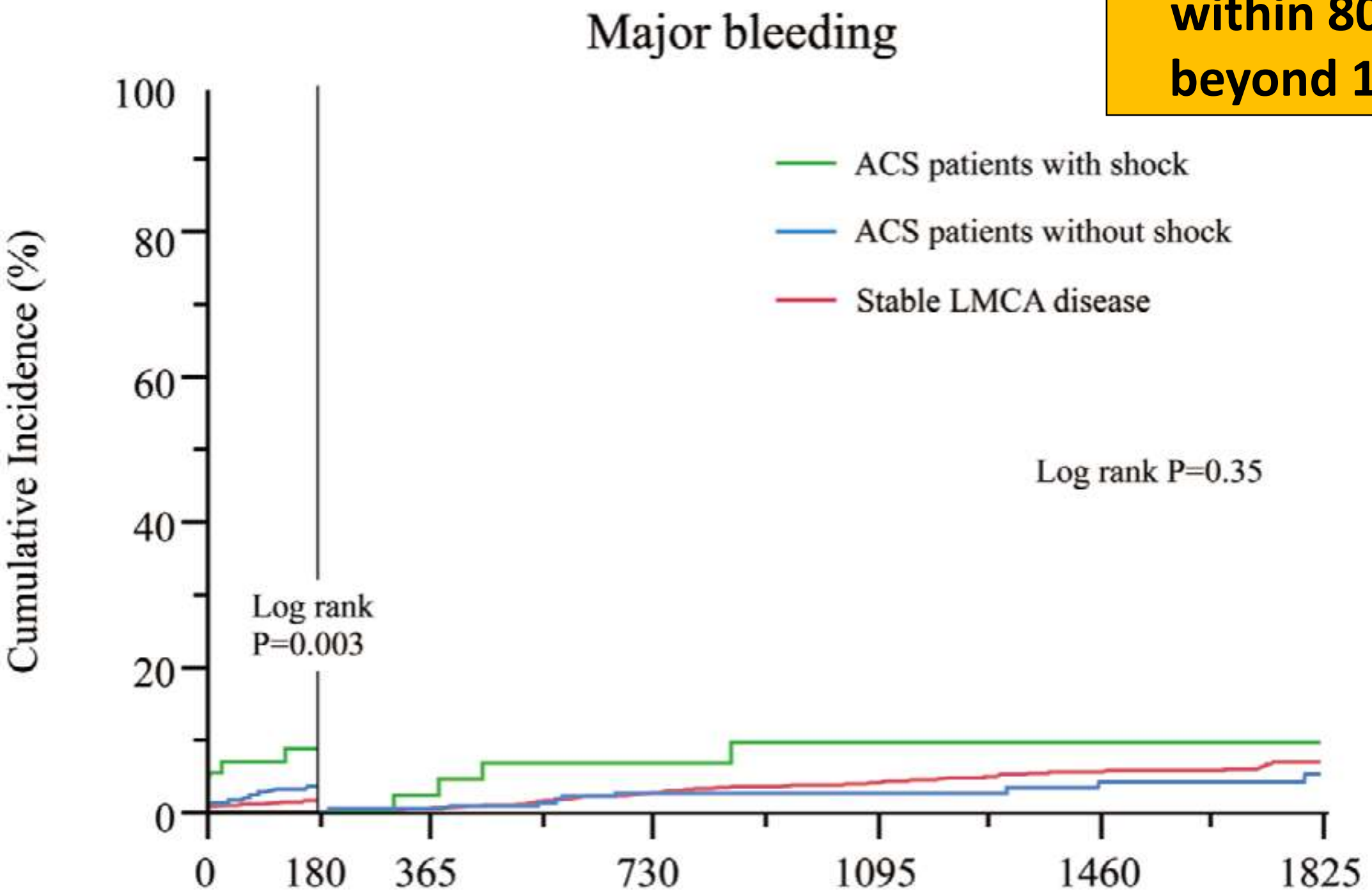
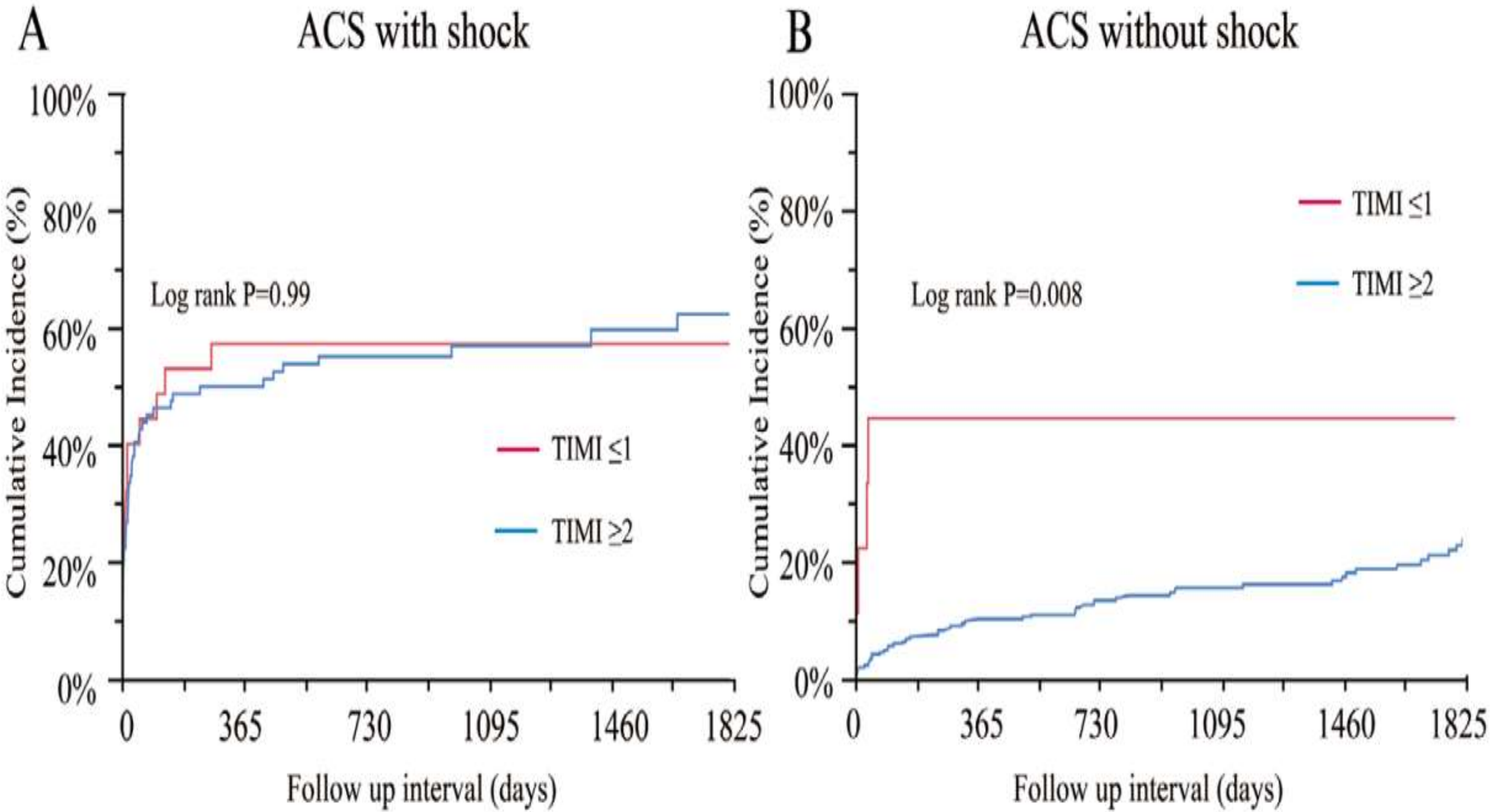



A
ACS with shock
100%
80%
60%
40%
20%
0%
Cumulative Incidence (%)
Log rank P=0.99
TIMI ≤1
TIMI ≥2
0
365
730
1095
1460
1825
Follow up interval (days)
B
ACS without shock
100%
80%
60%
40%
20%
0%
Cumulative Incidence (%)
Log rank P=0.008
TIMI ≤1
TIMI ≥2
0
365
730
1095
1460
1825
Follow up interval (days)

LMCA Disease

Culprit Lesion

- Cardiogenic shock
- Hemodynamic instability
- Initial TIMI 0-1 flow
- High perioperative risk
- Octogenerians
- Favorable anatomy
- Isolated LMCA lesion

→ **PCI**

- Stable status
- Calcified lesion
- Multivessel disease and high SYNTAX score
- LV dysfunction and diabetes
- Valvular disease or mechanical complication

→ **Urgent Surgery**

Non-culprit Lesion

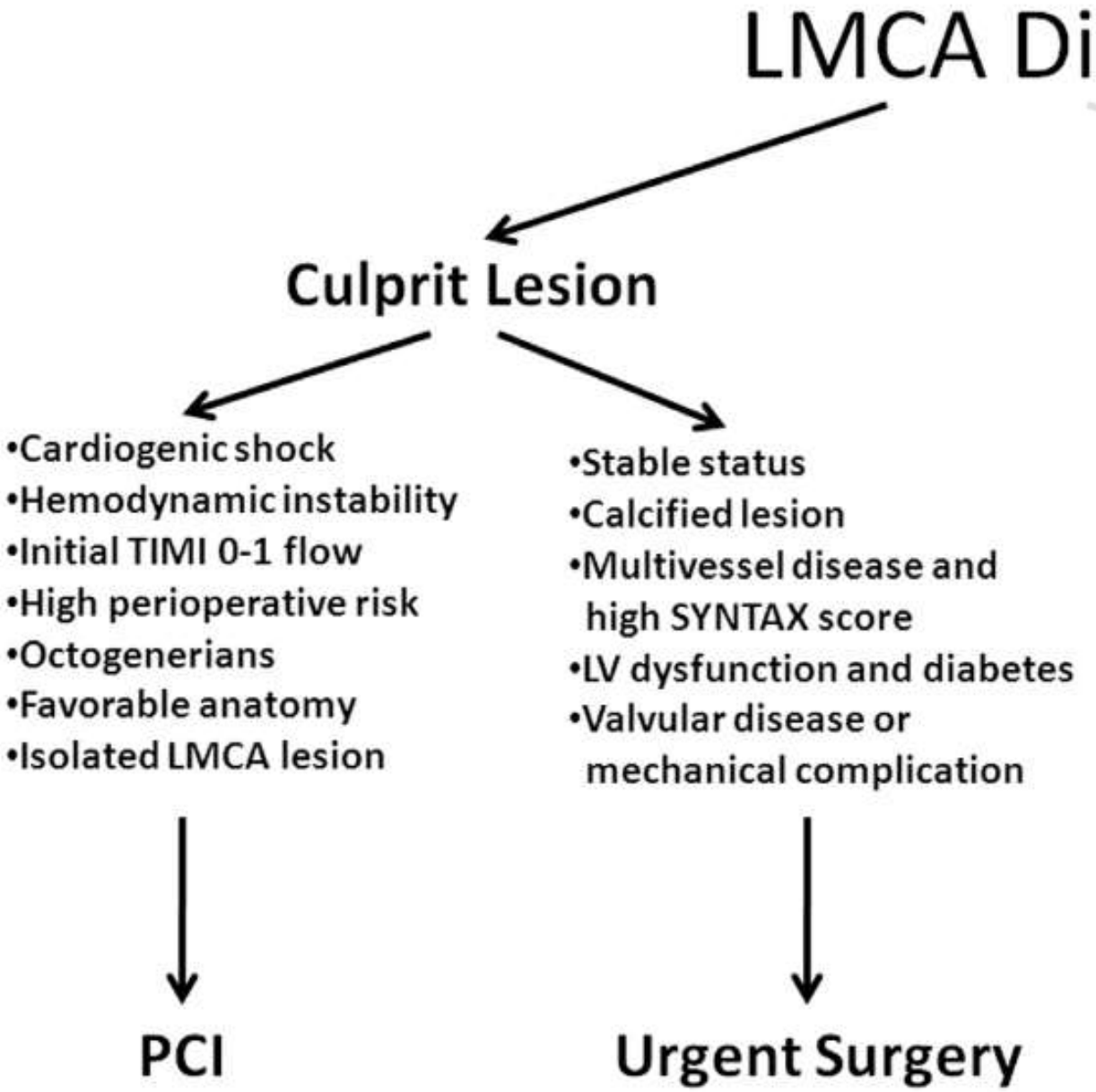
- Cardiogenic shock
- Elderly with favorable anatomy
- Isolated osteal or shaft lesion
- LAD or CX culprit lesion with advanced LMCA stenosis
- RCA culprit lesion with favorable features for PCI*

→ **PCI**

- Stable status
- Unfavorable anatomy for PCI
- Multivessel disease and high SYNTAX score
- LV dysfunction and diabetes
- Moderate to severe valvular disease

→ **Elective Surgery**

*Elective PCI for RCA culprit lesion



1. Cardiogenic shock?
2. Initial LM TIMI flow?
3. Will CABG be in time?
4. OP risk, LVEF

*Elective PCI for RCA culprit lesion

Take Home Message

For the Clinical Outcomes of Unprotected LM STEMI

- **1.Unprotected LM STEMI has a higher MACE and CV death in the first month, then the risk is similar with NSTEMI afterwards**
- 2. PCI is more favorable with those pts with cardiogenic shock, initial LM TIMI flow 0-1, high OP risk.
- 3. Take CABG time into concern
- 4. Initial age, LVEF & Killip class & Post-PCI TIMI grade are significant predictors
- 5. SYNTAX revascularization index & Residual SYNTAX score major predictors of long-term mortality among pts undergoing PCI for treatment of unprotected LMC STEMI.

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MacKay Memorial Hospital, Taiwan

Chun-Wei Lee

Conclusion

- Summarize the most important points of your lecture (24pt / Arial)