Effects of Baseline Coronary Occlusion and Diabetes Mellitus in Patients With ST-Segment Elevation Myocardial Infarction Undergoing Primary Percutaneous Coronary Intervention

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Several studies have highlighted the prognostic role of preprocedural Thrombolysis In Myocardial Infarction (TIMI) flow in the infarct-related artery (IRA) in patients with ST-segment elevation myocardial infarction (STEMI). However, the impact of preprocedural IRA occlusion in patients with diabetes with STEMI has been insufficiently studied. The aim of this study was to evaluate the effects of baseline IRA occlusion and diabetic status in patients with STEMI who underwent primary percutaneous coronary intervention by using data from a pooled analysis of randomized trials comparing intracoronary with intravenous abciximab bolus administration. A total of 3,046 patients with STEMI who underwent primary percutaneous coronary intervention were included. Diabetes was present in 578 patients (19%). The primary outcome was mortality after a median follow-up period of 375 days. Secondary end points were reinfarction and stent thrombosis. In patients without diabetes, IRA occlusion versus no occlusion was not associated with increased rates of mortality (4.3% vs 2.7%, p = 0.051) and reinfarction (3.3% vs 2.5%, p = 0.33). Patients with diabetes with IRA occlusion compared with those without occlusion showed higher rates of mortality (10.6% vs 4.6%, p = 0.01) and reinfarction (5.6% vs 2.1%, p = 0.03). Baseline IRA occlusion increased the rate of stent thrombosis in the nondiabetic (2.1% vs 1.0%, p = 0.04) and diabetic (3.2% vs 0.8%, p = 0.05) cohorts. Interaction analysis demonstrated that the risk for death and reinfarction was significantly increased when diabetes and IRA occlusion occurred concomitantly. In conclusion, patients with STEMI with diabetes and baseline IRA occlusion had disproportionately higher rates of death and reinfarction. Preprocedural IRA occlusion increased the risk for stent thrombosis, irrespective of diabetic status. **(Am J Cardiol 2014;114:1145−1150)**

ST-segment elevation myocardial infarction (STEMI) is commonly caused by atherosclerotic plaque rupture or erosion with superimposed thrombus that leads to abrupt coronary vessel occlusion. When performed expeditiously by an experienced team, primary percutaneous coronary intervention (PCI) is the preferred treatment in patients with STEMI because of its superiority to fibrinolysis in reducing the risk for cardiovascular events, including death.[1] In recent decades, the prevalence of diabetes mellitus (DM) in patients with STEMI has steadily increased, but these patients continue to have at least twofold greater risk for death compared with patients without DM.[2] However, the mechanisms underlying the greater STEMI-related mortality in patients with DM remain unclear, because this excess of mortality is independent of comorbidities, left ventricular dysfunction, and coronary patency after reperfusion therapy.[3,4] Although multiple studies have shown the prognostic role of preprocedural Thrombolysis In Myocardial Infarction (TIMI) flow grade in the infarct-related artery (IRA) in patients with STEMI,[5,6] few data are available regarding this association in patients with DM.[7] Against this background, we sought to evaluate the effects of baseline IRA occlusion and DM status in patients with STEMI who underwent primary PCI by using data from a pooled analysis of randomized trials comparing intracoronary with intravenous abciximab bolus administration.

Methods

Detailed data from this pooled analysis have previously been described.[8] Our population is represented by a total of

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See page 1149 for disclosure information.

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Table 1
Baseline characteristics

Variable	Diabetes Mellitus						p*	p**
	Yes (n = 578)			No (n = 2,468)				
	Occluded IRA (n = 339)	Non-occluded IRA (n = 239)	p	Occluded IRA (n = 1,483)	Non-occluded IRA (n = 985)	p		
Age (years)	69 (59–76)	70 (59–75)	0.44	61 (51–71)	62 (52–71)	0.76	<0.001	<0.001
Men	228 (67.3%)	155 (64.9%)	0.55	1,150 (77.5%)	779 (79.1%)	0.36	<0.001	<0.001
Hypertension	286 (84.4%)	193 (80.8%)	0.26	853 (57.5%)	558 (56.6%)	0.67	<0.001	<0.001
Dyslipidemia	189 (55.8%)	129 (54.0%)	0.67	522 (35.2%)	334 (33.9%)	0.51	<0.001	<0.001
Current smoker	110 (32.4%)	75 (31.4%)	0.79	699 (47.1%)	463 (47.0%)	0.95	<0.001	<0.001
Family history of coronary artery disease	105 (31.0%)	64 (26.8%)	0.27	497 (33.5%)	351 (35.6%)	0.28	0.37	0.009
Previous myocardial infarction	53 (15.6%)	29 (12.1%)	0.23	156 (10.5%)	80 (8.1%)	0.047	0.008	0.051
Previous revascularization	59 (17.4%)	36 (15.1%)	0.45	163 (11.0%)	85 (8.6%)	0.06	0.001	0.003
Ischemic time (hours)	3.7 (2.5–6.6)	3.5 (2.5–5.8)	0.26	3.5 (2.2–5.3)	3 (2.2–4.5)	<0.001	0.009	0.001
Randomization to intracoronary abciximab	171 (50.4%)	128 (53.6%)	0.46	740 (49.9%)	499 (50.7%)	0.71	0.86	0.42
Thrombectomy	105 (31.0%)	57 (23.8%)	0.06	487 (32.8%)	317 (32.2%)	0.73	0.51	0.01
Anterior myocardial infarction	155 (45.7%)	121 (50.6%)	0.24	653 (44.0%)	492 (49.9%)	0.004	0.57	0.85
No. narrowed coronary arteries			0.09			0.68	0.007	<0.001
1	148 (43.7%)	83 (34.7%)		767 (51.7%)	495 (50.4%)			
2	99 (29.2%)	79 (33.1%)		417 (28.1%)	276 (28.1%)			
3	92 (27.1%)	77 (32.2%)		299 (20.2%)	212 (21.6%)			
Infarct-related vessel			0.20			<0.001	0.25	0.28
No infarct-related artery	0	0		1 (0.1%)	1 (0.1%)			
Left anterior descending	148 (43.7%)	104 (43.7%)		641 (43.3%)	472 (48.0%)			
Left circumflex	46 (13.6%)	32 (13.4%)		173 (11.7%)	126 (12.8%)			
Right	142 (41.9%)	94 (39.5%)		663 (44.8%)	371 (37.7%)			
Left main	1 (0.3%)	6 (2.5%)		2 (0.1%)	11 (1.1%)			
Saphenous-vein graft	2 (0.6%)	2 (0.8%)		1 (0.1%)	2 (0.1%)			

Continuous variables are reported as median and 25th and 75th percentiles.

Hypertension was defined as values >140 mm Hg of systolic blood pressure and/or >90 mm Hg of diastolic blood pressure, or the use of antihypertensive medications at hospital admission. Dyslipidemia was defined as a diagnosis of hyperlipidemia or the use of lipid-lowering therapy.

IRA = infarct-related artery.

* p values for the comparison of diabetes mellitus and occluded IRA vs. no-diabetes mellitus and occluded IRA.

** p values for the comparison of diabetes mellitus and non-occluded IRA vs. no-diabetes mellitus and non-occluded IRA.

3,158 patients enrolled in 5 randomized trials.[9–13] Briefly, all patients with STEMI were admitted <12 hours after symptom onset and received dual-antiplatelet therapy with aspirin and a clopidogrel (300 to 600 mg) or prasugrel (60 mg) loading dose. Periprocedural anticoagulation consisted of intravenous unfractionated heparin in all cases. Patients were randomized to receive intracoronary (n = 1,590 [50.43%]) or intravenous (n = 1,568 [49.7%]) bolus abciximab at the time of primary PCI. In patients randomized to the intracoronary route, abciximab bolus was administered through the guiding catheter. We found no significant effect of intracoronary abciximab on reperfusion and clinical outcomes.[8] For the purpose of this analysis, only patients with available information on baseline TIMI flow grade in the IRA were included. They were stratified according to the presence or the absence of DM and preprocedural IRA occlusion, as defined by TIMI flow grade 0 (vs 1 to 3). DM was defined as known DM at admission. The definitions of the study end points have previously been reported.[8] The primary end point of the present analysis was death from any cause. Secondary end points included reinfarction and the composite of definite or probable stent thrombosis according to Academic Research Consortium definitions.[14] Reperfusion end points were postprocedural TIMI grade 3 flow, myocardial blush grade (MBG) 2 or 3, and complete (>70%) ST-segment resolution (STR) at 60 to 90 minutes.

All analyses were carried out using SPSS software version 20.0 (IBM, Armonk, New York). Continuous variables are presented as mean ± SD or as median (interquartile range) according to their distribution. Categorical variables are expressed as counts and percentages. The normality of distribution of continuous variables was evaluated by using the Kolmogorov-Smirnov goodness-of-fit test and consequently compared with independent-samples Student's *t* tests or Mann-Whitney U tests. Categorical variables were compared with chi-square or Fisher's exact tests as appropriate. Survival analyses were performed using the Mantel-Cox method, and survival curves are presented as simple, nonstratified Kaplan-Meier curves across all trials. Cox regression analysis was used to test the differences in the risk for end points across 4 subgroups after correction for baseline characteristics. Risk estimates are expressed as odds ratios with 95% confidence intervals. To explore the effect of the biologic interaction between DM and coronary occlusion on the risk for study end points, we evaluated the interaction as departure from additivity according to the method proposed by Andersson et al.[15] Three interaction measures were calculated: (1) relative excess risk due to interaction, (2) attributable proportion due