

# Effect of clopidogrel on 1-year mortality in hospital survivors of acute ST-segment elevation myocardial infarction in clinical practice

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## KEYWORDS

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infarction;  
Prognosis

**Aims** We sought to assess the effect of clopidogrel on clinical events 1 year after discharge in survivors of ST-elevation myocardial infarction (STEMI) in clinical practice.

**Methods and results** We analysed data of consecutive survivors of acute STEMI and either concomitant therapy with aspirin or aspirin plus clopidogrel at discharge, who were prospectively enrolled in the Acute Coronary Syndromes (ACOS) registry between July 2000 and November 2002. A total of 5886 (3795 with and 2091 without clopidogrel) patients were included into this analysis. Patients were divided into three groups according to the initial reperfusion therapy: no reperfusion therapy ( $n = 1445$ ), fibrinolysis ( $n = 1734$ ), or primary PCI ( $n = 2707$ ). The multivariable analysis for 12 + 2 month mortality after discharge using the propensity score with adjustment for baseline characteristics and treatments (age, sex, diabetes mellitus, hypertension, prior MI, hyperlipidaemia, renal insufficiency, cardiogenic shock, heart rate, systolic blood pressure, anterior infarct location, reduced left ventricular function, elective revascularization, beta-blockers, statins, ACE-inhibitors) showed that mortality was significantly lower in the aspirin plus clopidogrel group compared with the aspirin group in the total group and patients with reperfusion therapy [total group odds ratio (OR) 0.48, 95% confidence interval (CI) 0.48–0.61; no reperfusion therapy OR 0.96, 95% CI 0.65–1.45; fibrinolysis OR 0.53, 95% CI 0.32–0.87; primary percutaneous coronary intervention OR 0.38, 95% CI 0.23–0.62].

**Conclusion** In clinical practice, adjunctive therapy with clopidogrel, in addition to aspirin, in survivors after STEMI is associated with a reduction in 1-year mortality in patients treated with early reperfusion therapy.

## Introduction

Antiplatelet therapy with aspirin has been shown to improve prognosis in patients with acute ST-elevation myocardial infarction (STEMI) and therefore is the standard treatment in all patients with STEMI.<sup>1,2</sup> Aspirin is blocking only the thromboxane-mediated aggregation pathway. Clopidogrel inhibits the ADP-mediated platelet aggregation<sup>3</sup> and acts synergistic with aspirin. In patients with acute coronary syndromes without ST-elevations<sup>4</sup> and patients with elective percutaneous coronary intervention (PCI),<sup>5</sup> the therapy with clopidogrel, a P2Y<sub>12</sub> adenosine diphosphate receptor blocker, in addition to aspirin further reduced the platelet activation and thrombotic and ischaemic complications after 1 year. Recently, the beneficial effect of clopidogrel on outcome after 30 days has been shown in patients with

fibrinolysis in the CLARITY-TIMI 28 Study<sup>6</sup> and in patients with and without reperfusion therapy in the COMMIT Trial.<sup>7</sup> In addition, clopidogrel pre-treatment reduced the ischaemic complication before and after PCI in the PCI-CLARITY Study.<sup>8</sup> However, little is known about the efficacy of clopidogrel after STEMI in clinical practice. We therefore analysed data from the Acute Coronary Syndromes (ACOS) registry to determine the impact of clopidogrel on the clinical outcome of survivors of STEMI treated with or without early reperfusion therapy on 1-year clinical events.

## Methods

### The ACOS registry

ACOS is a prospective, multi-centre, observational registry on current treatment of acute coronary syndromes (STEMI, NSTEMI, and unstable angina).<sup>9</sup> Consecutive patients were recruited within the period from June 2000 to November 2002. The participating hospitals were located throughout Germany and included university

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hospitals, community hospitals, and tertiary care centres all providing intensive care units and early reperfusion therapy. During the entire study period, all patients with acute coronary syndromes were prospectively registered and followed during their clinical course to document patient characteristics, acute therapies, and hospital course. In a pre-defined subgroup of 106 hospitals, patients were followed over 1 year after discharge. The present study is an analysis of pre-specified, consecutive survivors of STEMI discharged with either aspirin monotherapy or dual platelet inhibition with aspirin and clopidogrel.

## Data collection

Data on patient characteristics on admission were recorded, including age, gender, cardiovascular risk factors, concomitant diseases, prior myocardial infarction, prior stroke, prior cardiovascular interventions, and chronic medical treatment, as well as data on symptoms and pre-hospital delay. Data on electrocardiographic findings, biochemical markers, reperfusion therapy, and adjunctive therapy were documented. At discharge, outcome and major cardiovascular and cerebrovascular adverse events were recorded.

Every participating centre was committed by written consent to include every consecutive patient with acute coronary syndrome. All patients gave informed consent for processing their anonymous data. Data were collected on three record forms by the treating physicians. Completed data sheets were sent to the central data processing centre *Institut für Herzinfarktforschung Ludwigshafen* for uniform monitoring and registration. Source data verification was performed by comparison of the registry data with hospital records in randomly selected patients in 20 randomly selected participating centres. In total, 5% of patients were verified. The registry was approved by the Ethics Committee of Landesärztekammer Mainz.

One year after discharge from hospital, a follow-up on telephone was performed by the *Institut für Herzinfarktforschung Ludwigshafen* to document mortality, adverse events [recurrent infarction, coronary artery bypass graft (CABG), PCI, stroke], and medical therapy. No informations about bleeding complications during follow-up were collected. The entire data were double keyed and regularly checked for inconsistencies and out of range errors.

## Definitions

STEMI was diagnosed in the presence of the two following criteria: persistent angina pectoris for  $\geq 20$  min and ST-segment elevation of  $>1$  mm in two or more than two standard leads or  $\geq 2$  mm in two or more than two contiguous pre-cordial leads, or the presence of a left bundle branch block. Stroke was defined as the occurrence of persistent specific neurologic deficits.

## Statistical methods

Data are presented as absolute numbers, percentage, or medians with 25th and 75th percentiles as appropriate. Whenever possible, percentages were used to describe patient populations. The frequencies of categorical variables in two populations were compared by  $\chi^2$  test and by calculating odds ratios (OR) and 95% confidence intervals (CI). Continuous variables were compared by two-tailed Wilcoxon rank sum test. Since reperfusion therapy is a major predictor of mortality after STEMI, we have created three subgroups of patients according to the initial reperfusion strategy: no early reperfusion, fibrinolysis, and primary PCI.

The effect of clopidogrel on 1-year mortality was evaluated by calculating the OR and 95%-CI. A propensity score was used to adjust for confounding in multivariable analysis. First, a multivariable logistic regression model was developed with the following covariates to estimate each patient's probability of receiving clopidogrel: age, sex, prior myocardial infarction, prior PCI/CABG, prior stroke/transient ischaemic attack (TIA), hypertension,

diabetes mellitus, hypercholesterolaemia, smoking, renal failure, pre-hospital delay, cardiogenic shock, heart rate  $>100$  b.p.m, anterior infarct location, left ventricular ejection  $<40\%$ , PCI  $>48$  h/CABG, beta-blocker, and statins at discharge. For the entire group as well as the different subgroups of patients without reperfusion therapy, with fibrinolysis, and with primary PCI separate propensity score models were developed. The patients were then divided into quintiles defined by their probabilities of treatment with clopidogrel (propensity scores). The *C*-statistic for propensity score models were 0.66 in the entire group, 0.73 in subgroup of patients without reperfusion therapy, 0.66 with fibrinolysis, and 0.62 with primary PCI. The clopidogrel and no clopidogrel group were compared on the above-mentioned covariates after adjustment for their propensity score quintiles (coded as a class variable with four degrees of freedom). The balance was tested statistically by linear regression for variable age and logistic regression for the dichotomous variables. The imbalance between the two groups remained significant at  $P < 0.05$  in age (*F*-statistic 5.83) in the entire group, PCI  $>48$  h/CABG (Wald  $\chi^2$  statistics 10.41) in the no reperfusion group, and PCI  $>48$  h/CABG (Wald  $\chi^2$  statistics 4.93) in the fibrinolysis group. In all other covariables, a balance was achieved after adjustment for propensity score quintiles. Also two-way interactions of quintiles and clopidogrel treatment were examined. The interaction term was significant for age, prior myocardial infarction as well as prior PCI/CABG in the entire group. The propensity score quintiles (coded as a class variable with four degrees of freedom) were then added to the final logistic regression model with use of 1-year death as the outcome and clopidogrel as the independent variable. In addition to the propensity score, covariates with remaining significant imbalance after adjusting as well as significant interaction were also included.

The survival functions were compared by log rank test. *P*-values  $<0.05$  were considered significant. All *P*-values are results of two-tailed tests. The analysis was performed with the SAS<sup>®</sup> system release 8.2 on a personal computer (SAS Institute, Inc., Cary, NC, USA).

## Results

### Baseline characteristics

From 2000 to 2002, a total of 16 817 consecutive patients with acute coronary syndromes were enrolled into the ACOS registry. Of these, 8305 had STEMI, of the latter 786 died during the index hospitalization; 648 patients were excluded who were not treated with aspirin at discharge; in 985 patients, no follow up was planned (these were not different from the analysed cohort); therefore, this analysis contains 5886 patients from 106 hospitals, 2091 (35.5%) discharged with aspirin alone, and 3795 (64.5%) with aspirin and clopidogrel. From these, 1445 (25.4%) were treated without early reperfusion therapy, 1734 (29.4%) with fibrinolysis, and 2707 (45.2%) with primary PCI. The baseline characteristics of the patients in the entire cohort and the three reperfusion strategy subgroups are shown in *Table 1*. In the primary PCI group, successful PCI as defined as TIMI 3 patency and  $<50\%$  stenosis after PCI was observed in 75% of patients after aspirin alone and 89% after aspirin plus clopidogrel ( $P = 0.01$ ). The follow-up after  $12 \pm 2$  months was completed in 94.8% of the patients.

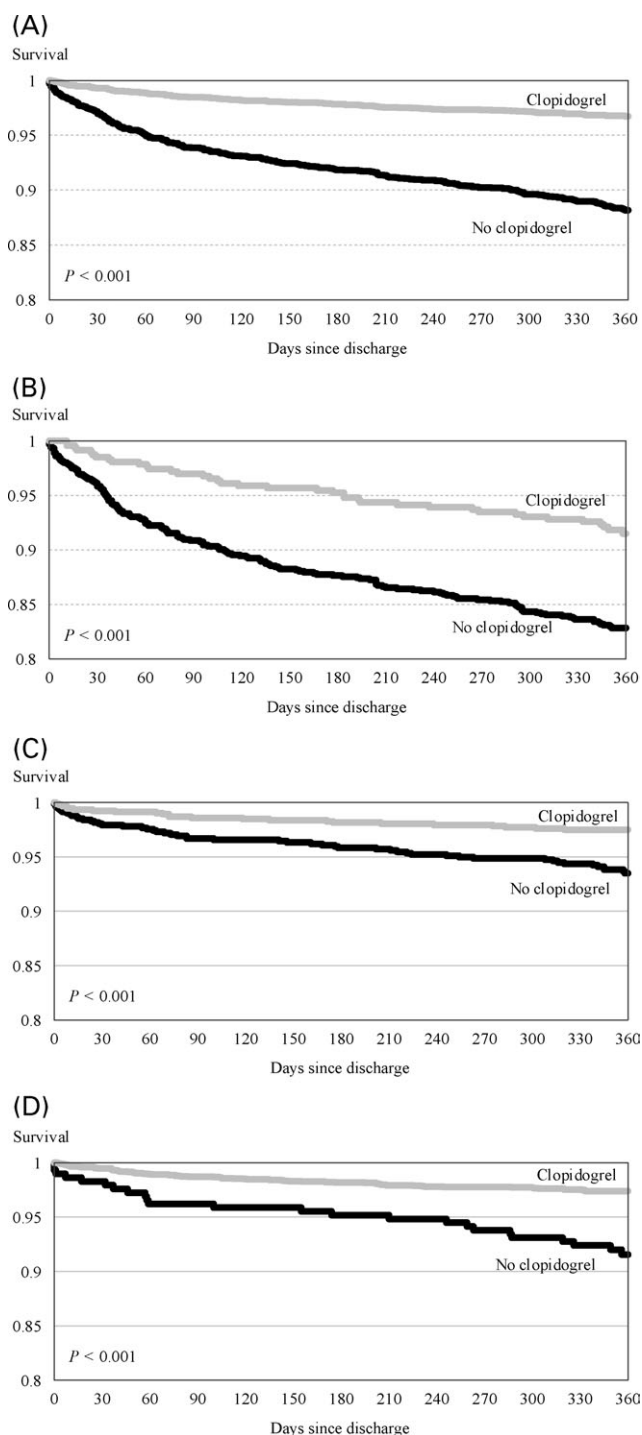
### One-year mortality and MACCE

The mortality 1 year after discharge was lower in patients treated with clopidogrel plus aspirin compared with the group treated with aspirin alone (*Figure 1*), whereas there were no significant differences in the rates of non-fatal

**Table 1** Baseline characteristics and treatments during the index hospitalization in the entire group and subgroups according to the initial reperfusion strategy

Patients	Entire group (n = 5886)			Without early reperfusion therapy (n = 1445)			Treated with fibrinolysis (n = 1734)			Treated with primary PCI (n = 2707)		
	Aspirin n = 2091	Aspirin + clopidogrel n = 3795	P-value	Aspirin n = 992	Aspirin + clopidogrel n = 452	P-value	Aspirin n = 814	Aspirin + clopidogrel n = 920	P-value	Aspirin n = 285	Aspirin + clopidogrel n = 2422	P-value
<b>Baseline characteristics</b>												
Age (years), median	68.3 (58.5–77.4)	62.8 (53.3–71.1)	<0.0001	73.7 (63.6–80.5)	67.3 (59.9–75.1)	<0.0001	63.9 (53.9–73.0)	60.5 (51.4–67.4)	<0.0001	65.0 (53.7–73.4)	63.1 (53.3–71.3)	0.06
Women	702 (33.6%)	980 (25.8%)	<0.0001	399 (40.3%)	159 (35.2%)	0.07	211 (25.9%)	198 (21.5%)	<0.05	91 (31.9%)	623 (25.7%)	<0.05
<b>Medical history</b>												
Prior myocardial infarction	373 (17.8%)	485 (12.8%)	<0.0001	220 (22.2%)	94 (20.8%)	0.55	104 (12.8%)	101 (11.0%)	0.25	49 (17.2%)	289 (11.9%)	<0.05
Prior PCI or CABG	165 (7.9%)	370 (9.7%)	<0.05	73 (7.4%)	57 (12.6%)	<0.01	56 (6.9%)	76 (8.3%)	0.28	36 (12.6%)	237 (9.8%)	0.13
Prior stroke/TIA	132 (6.3%)	170 (4.5%)	<0.01	88 (8.9%)	29 (6.4%)	0.11	30 (3.7%)	29 (3.2%)	0.54	14 (4.9%)	112 (4.6%)	0.83
<b>Risk factors</b>												
Hypertension	1284 (61.4%)	2177 (57.4%)	<0.01	665 (67.1%)	290 (64.2%)	0.27	442 (54.3%)	479 (52.1%)	0.35	176 (61.8%)	1407 (58.1%)	0.24
Diabetes mellitus	610 (29.2%)	848 (22.3%)	<0.0001	362 (36.5%)	139 (30.8%)	<0.05	175 (21.5%)	175 (19.0%)	0.20	72 (25.3%)	534 (22.0%)	0.22
Hypercholesterolaemia <sup>a</sup>	1301 (62.2%)	2462 (64.9%)	<0.05	591 (59.6%)	284 (62.8%)	0.25	519 (63.8%)	630 (68.5%)	<0.05	190 (66.7%)	1547 (63.9%)	0.35
Smoker	675 (32.3%)	1582 (41.7%)	<0.0001	238 (24%)	144 (31.9%)	<0.01	340 (41.8%)	441 (47.9%)	<0.05	96 (33.7%)	997 (41.2%)	<0.05
Renal impairment <sup>b</sup> (%)	69(3.3%)	61(1.6%)	<0.0001	43 (4.3%)	17 (3.8%)	0.61	19 (2.3%)	6 (0.7%)	<0.01	7 (2.5%)	38(1.6%)	0.27
<b>Findings on admission</b>												
Pre-hospital delay >3 h	1101 (55.7%)	1821 (49.8%)	<0.0001	680 (74.5%)	320 (76.9%)	0.34	252 (31.8%)	282 (31.5%)	0.89	168 (62.2%)	1219 (52.0%)	<0.01
Cardiogenic shock	141 (6.7%)	181 (4.8%)	<0.01	57 (5.8%)	15 (3.3%)	<0.05	65 (8.0%)	52 (5.7%)	0.05	19 (6.7%)	114 (4.7%)	0.15
Heart rate >100 b.p.m.	417 (20%)	452 (11.9%)	<0.0001	262 (26.4%)	86 (19.0%)	<0.01	108 (13.3%)	98 (10.7%)	0.09	47 (16.5%)	267 (11.0%)	<0.01
Anterior infarct location	1093 (52.3%)	1746 (46%)	<0.01	551 (55.5%)	231 (51.1%)	0.29	407 (50.0%)	414 (45.0%)	0.19	136 (47.7%)	1090 (45.4%)	0.65
<b>Findings before discharge</b>												
Left ventricular ejection fraction <40%	553/1903 (29.1%)	736/3646 (20.2%)	<0.0001	333/887 (37.5%)	125/427 (29.3%)	<0.01	160/478 (21.4%)	165/896 (18.4%)	0.13	60/268 (22.4%)	446/2322 (19.2%)	0.21
<b>Revascularization procedures during hospitalization</b>												
PCI >48 h	115/1745 (6.6%)	872/3717 (23.5%)	<0.0001	50/816 (6.1%)	217/430 (50.5%)	<0.0001	61/646 (9.4%)	610/884 (69.0%)	<0.0001	4/283 (1.4%)	45/2402 (1.8%)	0.62
Total stent rate	132 (6.3)	2762 (72.3%)	<0.001	8 (7.9%)	96 (20.9%)	<0.001	40 (5.1%)	522 (28.2%)	<0.001	84 (29.1%)	2144 (88.5%)	<0.0001
CABG	120/1729 (6.9%)	61/3419 (1.8%)	<0.0001	75/820 (9.1%)	20/410 (4.9%)	<0.01	7/778 (0.9%)	30/644 (4.7%)	<0.0001	38 (15.1%)	11 (0.5%)	<0.0001
<b>Medication at discharge</b>												
Beta-blocker	1806 (86.4%)	3503 (92.3%)	<0.0001	814 (82.1%)	392 (86.7%)	<0.05	735 (90.3%)	876 (95.2%)	<0.0001	256 (89.8%)	2234 (92.2%)	0.16
ACE-inhibitors	1651 (79%)	3174 (83.6%)	<0.0001	788 (79.5%)	368 (81.4%)	0.49	637 (78.3%)	474 (81.2%)	0.13	225 (78.9%)	2058 (85.0%)	<0.01
Statins	1457 (69.7%)	3286 (86.6%)	<0.0001	614 (62%)	369 (81.6%)	<0.0001	614 (75.4%)	804 (87.4%)	<0.0001	229 (80.4%)	2112 (87.2%)	<0.01

<sup>a</sup>LDL cholesterol >130 mg/dL and/or history of hypercholesterolaemia and/or actual medication for hypercholesterolaemia;<sup>b</sup>Creatinin >2 mg/dL.



**Figure 1** Kaplan-Meier estimates for 1-year mortality in patients discharged after STEMI and treated with aspirin alone or combination therapy with aspirin and clopidogrel in the entire group (A), patients without early reperfusion therapy (B), with fibrinolysis (C), and with primary PCI (D).

reinfarction and non-fatal stroke (Table 2). The incidence of MACCE (death, non-fatal reinfarction, and non-fatal stroke) after 1 year is shown in Figure 2. The OR for 1-year mortality in the propensity score analysis were 0.48 in the entire group (95% CI 0.38–0.61), 0.96 in patients without early reperfusion therapy (95% CI 0.65–1.45), 0.53 after fibrinolysis (95% CI 0.32–0.87), and 0.38 after primary percutaneous intervention (95% CI 0.23–0.62). When successful PCI was

included in the analysis, the benefit of clopidogrel remained still significant (OR 0.51, 95% CI 0.32–0.71).

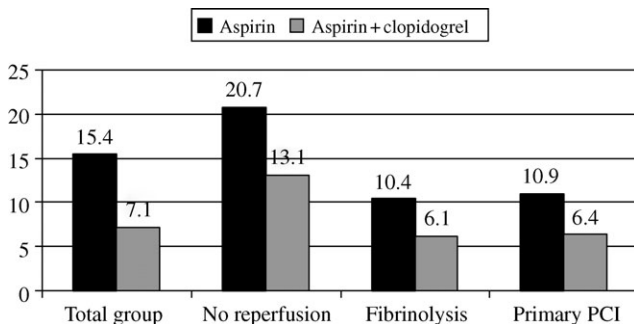
## Discussion

One-year mortality of survivors of STEMI in clinical practice, who were discharged with clopidogrel in addition to aspirin, was significantly lower than in patients who were discharged with aspirin alone regardless of the initial reperfusion strategy. Our analysis is the first evaluation of a large registry with STEMI patients that investigates the effect of clopidogrel after STEMI. The beneficial effect of a short-term therapy up to 4 weeks with clopidogrel has been demonstrated in the COMMIT Study,<sup>6</sup> which included a large number of patients with STEMI treated with fibrinolysis or without early reperfusion therapy. The CLARITY Trial showed the safety and efficacy of clopidogrel in addition to fibrinolysis in patients <75 years.<sup>5</sup> In addition clopidogrel reduced cardiovascular death and reinfarction in patients in CLARITY treated with PCI during the index hospitalization.<sup>7</sup> However, little is known about the effect of clopidogrel in patients with STEMI at a longer follow-up.

In the ACOS registry, consecutive patients were enrolled, including high-risk patients with advanced age, renal insufficiency, cardiogenic shock, and resuscitated patients.<sup>9</sup> The reduction in mortality with clopidogrel was seen in the entire cohort and in patients with early reperfusion therapy. The absolute mortality benefit of around 8% was greatest in the group of patients without early reperfusion therapy, who had the highest 1-year mortality of 18%. However, after adjustment for confounding factors including the propensity score, this difference was not statistically significant any more. The reduction of mortality was around 5% in both patients with fibrinolysis and primary PCI, and remained significant after adjustment in the multivariable analysis. Our registry results are the first showing a mortality advantage for clopidogrel. In the CURE Trial, in which the clinical benefit of clopidogrel was observed not only during the first 30 days but to the nearly same extent between day 30 and 1 year, no significant reduction in mortality was observed.<sup>10</sup> In CURE, the absolute benefit of clopidogrel was greatest in the high-risk subgroup of patients (combined endpoint of cardiovascular death, myocardial infarction, and stroke 20.7 vs. 15.9%) compared with the low-risk subgroup (5.7 vs. 4.1%).<sup>11</sup> As ACOS is a clinical registry for acute coronary syndromes and not a randomized clinical trial, it can only be speculated on reasons for our findings. The mortality in our patients was higher than that in the CURE and CREDO Trials, which means that our patients certainly belong to a higher risk group. Therefore, the absolute benefit might be more pronounced than in the trial patients. The beneficial effect was seen only in mortality and not in the rate of non-fatal reinfarction and non-fatal stroke. One possible explanation is that reinfarction might have been fatal in a high proportion of patients and events were reported in a hierarchical order, therefore masking a reduction in the overall rate of fatal and non-fatal reinfarction. Since drug-eluting stents were not used in our patients, late stent thrombosis may not account for the difference in events in patients after stenting. However, we do not have information why some patients with stents were not treated with clopidogrel therapy beyond the index hospitalization. The mortality curves were

**Table 2** Mortality and non-fatal events 1 year after discharge in patients with dual antiplatelet therapy compared with aspirin alone in the univariate analysis

	Aspirin	Aspirin + clopidogrel	P-value	OR (95% CI)
Entire group	N = 2091	n = 3795		
Death	259 (12.4%)	139 (3.7%)	<0.001	0.27 (0.22–0.33)
Non-fatal-reinfarction	44/1828 (2.4%)	102/3147 (2.9%)	0.30	1.21 (0.84–1.74)
Non-fatal stroke	15/1818 (0.8%)	32/3301 (1.0%)	0.60	1.18 (0.64–2.18)
No reperfusion	N = 992	n = 453		
Death	177 (17.9%)	44 (9.7%)	<0.0001	0.50 (0.35–0.70)
Non-fatal reinfarction	15/869 (1.7%)	10/392 (2.6%)	0.33	1.49 (0.66–3.35)
Non-fatal stroke	12/867 (1.4%)	5/391 (1.3%)	0.88	0.92 (0.32–2.64)
Fibrinolysis	N = 814	n = 920		
Death	58 (7.1%)	24 (2.6%)	<0.0001	0.35 (0.21–0.57)
Non-fatal reinfarction	24/701 (3.4%)	24/791 (3.0%)	0.67	0.88 (0.50–1.57)
Non-fatal stroke	(2/695) (0.3%)	7/791 (0.9%)	0.16	3.09 (0.64–14.94)
Primary PCI	N = 285	n = 2422		
Death	24 (8.4%)	71 (2.9%)	0.00002	0.38 (0.24–0.60)
Non-fatal reinfarction	5/258 (1.9%)	62/2127 (2.9%)	0.37	1.52 (0.61–3.81)
Non-fatal stroke	1/256 (0.4%)	20/2119 (0.9%)	0.37	2.43 (0.32–18.18)

**Figure 2** Incidence of MACCE (death, non-fatal reinfarction, non-fatal stroke) after 1 year in survivors of STEMI treated with aspirin or aspirin and clopidogrel at discharge.

continuously diverging over time, excluding an effect of early stent thrombosis during the first 4 weeks after stenting as primary cause of the difference in mortality.

Clopidogrel given over up to 1 year in addition to aspirin after planned PCI in the randomized CREDO Trial and in patients with non-ST-elevation acute coronary syndromes in the CURE Study has been shown to be cost effective.<sup>12</sup> As mentioned earlier, there are no 1-year follow-up data available in randomized trials with clopidogrel in patients with STEMI. In the light of our results, clopidogrel might be a very cost-effective therapy in STEMI patients as well.

## Limitations

The present report is not a randomized, controlled study evaluating the effect of clopidogrel in addition to aspirin in patients surviving STEMI. In the ACOS registry, treatment with clopidogrel was left to the discretion of the physician. This could result in selection bias, which cannot be fully eliminated by a multivariable analysis including adjustment by propensity score. However, we do not have information why some patients with stents were not treated with clopidogrel therapy beyond the in-hospitalization. In addition,

we do not have definitive information about the length of clopidogrel therapy in about 50% of the patients.

## Conclusion

In conclusion, our data suggest that clopidogrel improves the clinical course of survivors of STEMI. The 'real-world' patient, who is often a high-risk patient, seems to gain even more benefit from therapy with clopidogrel, compared with patients in randomized trials with partly low-risk patients. Therefore, in clinical practice, adjunctive therapy with clopidogrel in survivors of STEMI is associated with a reduction in 1-year mortality especially in patients treated with early reperfusion strategy.

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## Clinical vignette

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### Arrhythmogenic right ventricular dysplasia/cardiomyopathy assessed with 64-slice computed tomography

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A 69-year-old man was admitted to hospital because of sustained ventricular tachycardia with right bundle branch block morphology. After abolition of ventricular tachycardia, an electrocardiogram showed atrial fibrillation, complete right bundle block, abnormal Q wave in III, and ST-depression in V4–V6.

Multislice computed tomography (CT) was performed with a 64-slice scanner (Aquilion 64, Toshiba Medical Systems) after an intravenous injection of contrast medium. Axial CT images demonstrated low-density areas (–120 to –50 HU) indicative of focal fatty infiltration in the anterior wall of right ventricular outflow tract and along the right ventricular side of interventricular septum. In addition, conspicuous trabeculations with low attenuation (–10 HU) and a wedge-shaped low-density areas (–50 to –60 HU) in the left ventricular myocardium were observed. Cinematic display of basal short axis images reconstructed from the same CT data set revealed marked wall thinning and wall motion abnormalities in the inferior wall of left ventricle and interventricular septum. Of note, a localized right ventricular aneurysm was noted in the inferior wall of right ventricle (Panel A–C).

An endomyocardial biopsy specimen from right ventricle disclosed extensive replacement of the myocardium with fibroadipose tissue (Panel D) and the patient was diagnosed with arrhythmogenic right ventricular dysplasia/cardiomyopathy (ARVD/C). The presence of normal coronary angiograms suggested left ventricular involvement.

Multislice CT has demonstrated morphological and functional changes in ARVD/C. And multislice CT can be used in patients with an implantable cardioverter-defibrillator. Therefore, multislice CT may have a significant role in the assessment and follow-up of ARVD/C.

Panels A–C. Contrast-enhanced multislice CT images in ventricular short-axis (Panel A) and long axis (Panel B and C) plane also reconstructed showed the ventricular septal aneurysm. Multislice CT images showed fatty replacement of the RV and LV myocardium (black arrows).

Panel D. Microscopic examination of myocardial biopsy specimen demonstrated extensive fatty infiltration composed of mature adipose tissue, replacing preexisting myocardium (hematoxylin-eosin stain), which are features supporting the diagnosis of ARVC.

