Long-Term Prognosis of First Myocardial Infarction According to the Electrocardiographic Pattern (ST Elevation Myocardial Infarction, Non-ST Elevation Myocardial Infarction and Non-Classified Myocardial Infarction) and Revascularization Procedures

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The aim of this study was to describe differences in the characteristics and short- and long-term prognoses of patients with first acute myocardial infarction (MI) according to the presence of ST-segment elevation or non–ST-segment elevation. From 2001 and 2003, 2,048 patients with first MI were consecutively admitted to 6 participating Spanish hospitals and categorized as having ST-segment elevation MI (STEMI), non–ST-segment elevation MI (NSTEMI), or unclassified MI (pacemaker or left bundle branch block) according to electrocardiographic results at admission. The proportions of female gender, hypercholesterolemia, hypertension, and diabetes were higher among NSTEMI patients than in the STEMI group. NSTEMI 28-day case fatality was lower (2.99% vs 5.26%, p = 0.02). On multivariate analysis, the odds ratio of 28-day case fatality was 2.23 for STEMI patients compared to NSTEMI patients (95% confidence interval 1.29 to 3.83, p = 0.004). The multivariate adjusted 7-year mortality for 28-day survivors was higher in NSTEMI than in STEMI patients (hazard ratio 1.31, 95% confidence interval 1.02 to 1.68, p = 0.035). However, patients with unclassified MI presented the highest short- and long-term mortality (11.8% and 35.4%, respectively). The excess of short-term mortality in unclassified and STEMI patients was mainly observed in those patients not treated with revascularization procedures. In conclusion, patients with first NSTEMI were older and showed a higher proportion of previous coronary risk factors than STEMI patients. NSTEMI patients had lower 28-day case fatality but a worse 7-year mortality rate than STEMI patients. Unclassified MI presented the worst short- and long-term prognosis. These results support the invasive management of patients with acute coronary syndromes to reduce short-term case fatality. **(Am J Cardiol 2011;108:1061–1067)**

Although we are learning more about the physiopathology of acute coronary syndromes,[1,2] the clinical characteristics that determine its type are not well established. Previous studies have observed that a history of myocardial infarction (MI), advanced age, and the presence of various co-morbidities are associated with a higher probability of presenting with non–ST-segment elevation MI (NSTEMI).[3] However, very little analysis has been done of the characteristics that determine its manner of presentation in patients with first MI. In contrast, ST-segment elevation on admission electrocardiography is 1 of the predictors of in-hospital mortality in patients with MI,[4] although conflicting data have suggested that NSTEMI has a worse long-term prognosis.[5–10] Moreover, although current guidelines recommend the use of invasive management and reperfusion therapy in patients with NSTEMI and those with ST-segment elevation MI (STEMI),[11,12] data regarding the long-term benefits of this approach are scarce.[8,13] The objectives of this study were (1) to determine the factors associated with the different forms of first MI presentation, in terms of whether ST-segment elevation is present at admission or the electrocardiographic results cannot be classified, (2) to evaluate the differences in in-hospital and 7-year mortality for these 3 groups of patients, and (3) to evaluate the effectiveness of revascularization on short- and long-term prognoses in these type of patients.

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This work was partially supported by an unconditional fellowship from Sanofi-Aventis, Paris, France, and grants from Instituto de Salud Carlos III (Red HERACLES RD06/0009 and CIBERESP).

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0002-9149/11/$ – see front matter
doi:10.1016/j.amjcard.2011.06.003

Methods

This prospective register of patients with MI was undertaken by 6 public hospitals in Spain, with long-term follow-up of vital status. All patients aged >18 years who were admitted with first MI <72 hours after symptom onset were prospectively and consecutively included from September 2001 to June 2003. The study was approved by the local ethics committee, and all participants were informed and provided signed consent.

The diagnosis of MI followed the European Society of Cardiology and American College of Cardiology definition, which is that MI is a myocardial necrosis secondary to ischemia. Myocardial necrosis is defined as elevated levels of troponin T or I, or of the creatine kinase-MB fraction, according to the normal levels as defined at each center.

On the basis of electrocardiographic findings at admission, patients were classified into 3 groups: STEMI, NSTEMI or unclassified MI (presence of left branch block or pacemaker rhythm). All electrocardiograms were analyzed by a clinical cardiologist at each of the participant hospitals using standardized criteria.

Exclusion criteria were a history of MI, residence outside the center's service area, and serious illness, unrelated to the admission episode, that limited the patient's life expectancy.

A standardized questionnaire administered by trained personnel was used to prospectively gather demographic variables and co-morbidities such as history of hypertension, diabetes, hypercholesterolemia, smoking, and previous angina. Clinical characteristics of the event were recorded, including MI location, presence of ST-segment elevation on admission electrocardiography, appearance of Q waves, and complications such as the development of pulmonary edema or cardiogenic shock or the presence of malignant arrhythmias within the first 48 hours (defined as the appearance of ventricular fibrillation or sustained ventricular tachycardia requiring immediate medical attention). Finally, information was also collected on the management of the acute event, including medical treatments during the hospital stay and at discharge, reperfusion and procedures such as pharmacologic or stress-testing techniques to determine the presence of ischemia, echocardiography, coronary angiography (number of vessels with severe lesions), and surgical or percutaneous coronary revascularization.

No standards were established for clinical management of the patients, so each of the participating hospitals used its own treatment protocols. Nonetheless, all the hospitals used protocols that followed the national and international clinical practice guidelines in force at the time of the study.[14–16]

Events of interest were defined as 28-day and long-term mortality, with 7-year follow-up of vital status until December 31, 2009. To identify long-term fatal cases, we accessed the National Death Registry. This is an exhaustive and mandatory official database collecting individual data of all individuals who have died in Spain from 1987 until the present. This database is promoted by the Spanish health ministry to public institutions (health care administrations, research centers, etc) and provides information regarding vital status and date of death, although it does not indicate a specific cause of death. We used individual data of the patients included in this registry (family name, name, date of birth, city of residence) to link our data with the National Death Registry. Given the demographic trends of the study area, specifically the lack of international out-migration, we assumed that study participants who did not appear in this registry were alive at the end of the follow-up.

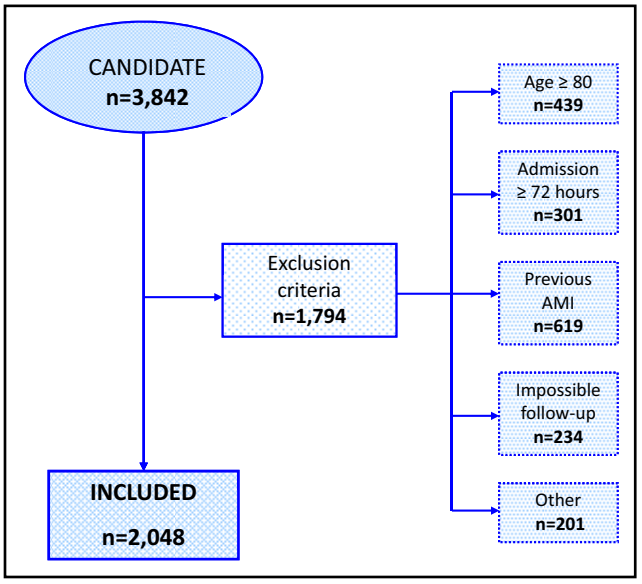

Figure 1. Flowchart of registered and included patients in the study.

In the comparison of the 3 study groups (STEMI, NSTEMI, and unclassified MI), analysis of variance or the Kruskal-Wallis test was used for continuous variables and the chi-square test for categorical variables. Logistical regression and Cox regression were used to determine the associations between the 3 electrocardiographic patterns and 28-day and long-term mortality, respectively, adjusting for the confounding variables identified. We tested for the interaction between the use of revascularization procedures during hospitalization and the 3 electrocardiographic patterns on 28-day and 7-year prognoses.

In the multivariate analyses, multiple imputation methods[17,18] were performed to replace missing values in the adjustment variables, for which the "mi" and "mitools" R packages were used, and to avoid potential selection bias and loss of statistical power. A p value <0.05 was considered significant. R version 2.11.1 (R Foundation for Statistical Computing, Vienna, Austria) was used for the analysis.

Results

The study registered consecutively 3,842 patients. After excluding those patients with exclusion criteria (Figure 1), 2,048 were included in the analyses: 60.3% with STEMI, 32.7% with NSTEMI, and 7.0% with unclassified MI. The demographic and clinical characteristics of the 3 patient groups are listed in Table 1. Patients with NSTEMI had a higher prevalence of cardiovascular risk factors (hypertension, tobacco use, and diabetes) and previous angina and a larger proportion of women than in the STEMI group. Patients with unclassified MI were older and also had a higher prevalence of cardiovascular risk factors and angina than the STEMI group.

Table 1
Patient characteristics by electrocardiographic results on admission

Variable	STEMI (n = 1,235)	NSTEMI (n = 670)	Unclassified MI (n = 143)	p Value*	p Value†	p Value‡	p value
Age (years)	61.0 ± 29.4	63.2 ± 12.5	65.9 ± 10.9	0.058	0.049	0.021	0.022
Men	998 (80.8%)	499 (74.6%)	100 (69.4%)	0.002	0.001	0.204	<0.001
Hypertension	574 (47.5%)	401 (60.8%)	91 (66.4%)	<0.001	<0.001	0.222	<0.001
Diabetes mellitus	310 (25.9%)	195 (30.0%)	60 (43.2%)	0.054	<0.001	0.003	<0.001
Current smoker	596 (49.7%)	393 (60.8%)	83 (66.4%)	<0.001	<0.001	0.241	<0.001
Previous angina pectoris	434 (36.3%)	331 (51.5%)	61 (50.8%)	<0.001	0.002	0.897	<0.001
Admission Killip class III or IV	89 (7.3%)	56 (8.5%)	30 (23.1%)	0.335	<0.001	<0.001	<0.001
Ejection fraction				<0.001	0.014	<0.001	<0.001
≤30%	104 (8.5%)	28 (4.2%)	20 (14.1%)				
31%–45%	319 (26.0%)	82 (12.3%)	33 (23.2%)				
46%–60%	504 (41.0%)	301 (45.3%)	44 (31.0%)				
>60%	302 (24.6%)	254 (38.2%)	45 (31.7%)				
Number of affected vessels				<0.001	0.003	0.075	<0.001
0	44 (5.37%)	26 (5.42%)	9 (12.9%)				
1	362 (44.2%)	148 (30.8%)	19 (27.1%)				
2–3	413 (50.4%)	306 (63.7%)	42 (60.0%)				

Data are expressed as mean ± SD or as number (percentage).
* STEMI versus NSTEMI.
† STEMI versus NSTEMI versus unclassified MI.
‡ NSTEMI versus unclassified MI.

Table 2
Variables associated with electrocardiographic pattern upon admission: multinomial logistic regression

	STEMI vs NSTEMI		Unclassified MI vs NSTEMI		
Variable	OR (95% CI)	p Value	OR (95% CI)	p Value	Global p Value
Age (×10 years)	0.87 (0.79–0.96)	0.005	1.21 (1.00–1.47)	0.050	<0.001
Female gender	0.86 (0.67–1.11)	0.252	1.06 (0.65–1.74)	0.809	0.432
Diabetes	0.91 (0.72–1.14)	0.400	1.03 (0.65–1.63)	0.888	0.646
Hypertension	0.75 (0.61–0.93)	0.007	1.05 (0.67–1.64)	0.832	0.016
Smoking	1.18 (0.93–1.50)	0.164	1.04 (0.64–1.71)	0.864	0.367
Previous angina	0.56 (0.46–0.69)	<0.001	0.88 (0.58–1.33)	0.537	<0.001

CI = confidence interval; OR = odds ratio.

The variables associated with the electrocardiographic typology of MI in multivariate analysis are listed in Table 2. History of angina, arterial hypertension, and age were associated with a higher probability of NSTEMI than of STEMI. In addition, age was directly associated with a higher probability of presenting with unclassified MI than with NSTEMI.

In contrast, analysis of the patients who received coronary angiography showed that patients with NSTEMI presented with a higher proportion of multivessel disease.

The treatments and procedures implemented during the hospital stay are listed in Table 3. Nearly 70% of the patients had coronary angiography, and 1/3 of these had percutaneous coronary intervention (PCI). Reperfusion therapies (thrombolysis or primary PCI) were primarily used in STEMI patients, and elective PCI and surgical revascularization were more frequent in the NSTEMI group.

With respect to medical treatments, there were no differences between the groups in the proportion of patients treated with antiaggregants or β blockers, although NSTEMI patients received more glycoprotein IIb/IIIa inhibitors and statins, and angiotensin-converting enzyme inhibitors were less prescribed.

The in-hospital evolution of all 3 groups is listed in Table 3. Patients with NSTEMI presented a greater frequency of post-MI angina than those with STEMI but a lower frequency of ventricular arrhythmias and complete atrioventricular block. The 28-day case fatality was higher in STEMI than in NSTEMI patients, although the highest case fatality was observed in those with unclassified MI.

Multivariate analysis showed that patients with STEMI had a higher probability of 28-day case fatality than the NSTEMI group (Table 4). In contrast, patients with unclassified MI had worse 28-day case fatality than patients with STEMI, and this higher mortality was mainly related to a higher proportion of complications, such as Killip class III or IV or ventricular arrhythmias (Table 4).

The interaction between the use of revascularization procedures during hospitalization and the 3 electrocardiographic patterns on 28-day case fatality was statistically significant ($p = 0.025$); therefore, we stratified the analyses by the use of revascularization (79 patients were excluded from this analysis because of missing data in this variable). Unclassified MI patients showed a trend toward higher 28-day case fatality in patients without revascularization compared to NSTEMI patients. This trend toward higher case fatality disappeared in patients treated with revascularization procedures (Table 4). These analyses showed higher 28-day case fatality for STEMI

Table 3
In-hospital treatment and in-hospital and long-term prognoses on the basis of electrocardiographic results on admission

Variable	STEMI (n = 1,235)	NSTEMI (n = 670)	Unclassified MI (n = 143)	p Value*	p Value†	p Value‡	p Value
Treatment							
Aspirin	1,115 (93.4%)	605 (91.3%)	119 (92.2%)	0.092	0.625	0.712	0.240
Clopidogrel	464 (38.9%)	254 (38.3%)	33 (25.6%)	0.816	0.003	0.006	0.012
Glycoprotein IIb/IIIa inhibitors	264 (22.1%)	217 (32.7%)	29 (22.5%)	<0.001	0.923	0.021	<0.001
β blockers	919 (77.0%)	517 (78.0%)	82 (62.6%)	0.618	<0.001	<0.001	0.001
Angiotensin-converting enzyme inhibitors	781 (65.3%)	364 (55.1%)	91 (69.5%)	<0.001	0.340	0.002	<0.001
Statins	854 (71.4%)	507 (76.6%)	89 (70.1%)	0.016	0.754	0.118	0.040
Fibrinolysis	561 (45.4%)	16 (2.4%)	8 (5.6%)	<0.001	<0.001	0.055	<0.001
Primary PCI	140 (11.7%)	13 (2.0%)	2 (1.5%)	<0.001	<0.001	1.00	<0.001
Rescue PCI	97 (8.1%)	3 (0.5%)	2 (1.5%)	<0.001	0.007	0.191	<0.001
Elective PCI	259 (21.7%)	227 (34.6%)	25 (19.4%)	<0.001	0.537	0.001	<0.001
Coronary angiography	846 (69.1%)	487 (73.0%)	78 (58.2%)	0.072	0.011	0.001	0.002
Coronary bypass	94 (7.84%)	95 (14.4%)	21 (16.2%)	<0.001	0.001	0.595	<0.001
Prognosis							
Maximum Killip class (III or IV)	149 (12.3%)	77 (11.7%)	39 (29.5%)	<0.001	0.001	0.595	<0.001
MI recurrence	44 (3.7%)	22 (3.4%)	8 (5.9%)	0.752	0.194	0.157	0.352
Angina after MI	104 (8.7%)	84 (12.9%)	15 (11.5%)	0.005	0.301	0.648	0.017
Arrhythmias (ventricular tachycardia/ventricular fibrillation) <48 hours	95 (7.8%)	25 (3.8%)	10 (7.5%)	0.001	0.906	0.055	0.003
Mechanical complications	18 (1.5%)	3 (0.5%)	1 (0.7%)	0.231	0.412	0.527	0.323
Complete atrioventricular block	62 (5.1%)	5 (0.8%)	7 (5.2%)	<0.001	0.949	0.001	<0.001
Stroke	11 (0.9%)	3 (0.5%)	1 (0.7%)	0.643	1.000	0.528	0.710
28-day case fatality	65 (5.26%)	20 (2.99%)	17 (11.8%)	0.022	0.002	<0.001	<0.001
Long-term mortality (per year)§	2.32%	3.42%	6.38%	0.001	<0.001	0.001	<0.001

* STEMI versus NSTEMI.
† STEMI versus NSTEMI versus unclassified MI.
‡ NSTEMI versus unclassified MI.
§ Hazard of death per 1 year among 28-day survivors (log-rank p values).

Table 4
Association between electrocardiographic pattern on admission and 28-day case fatality, adjusted by various covariates in logistic regression models

		STEMI		Unclassified MI	
	NSTEMI	OR (95% CI)	p Value	OR (95% CI)	p Value
All patients	n = 670	n = 1,235		n = 143	
Model 1	1	1.83 (1.10–3.06)	0.020	4.25 (2.16–8.34)	<0.001
Model 2	1	2.07 (1.23–3.50)	0.007	4.30 (2.16–8.55)	<0.001
Model 3	1	1.85 (1.06–3.25)	0.031	2.43 (1.13–5.22)	0.023
Model 4	1	2.09 (1.17–3.74)	0.013	2.27 (1.02–5.07)	0.045
Patients who underwent revascularization	n = 333	n = 573		n = 50	
Model 1	1	2.07 (0.83–5.14)	0.116	0.96 (0.11–8.08)	0.969
Model 2	1	2.04 (0.80–5.23)	0.136	1.09 (0.13–9.30)	0.938
Model 3	1	1.70 (0.62–4.66)	0.298	0.88 (0.09–8.24)	0.910
Model 4	1	1.83 (0.61–5.49)	0.281	1.64 (0.15–17.40)	0.683
Patients without revascularization	n = 323	n = 612		n = 78	
Model 1	1	2.32 (1.15–4.70)	0.019	4.96 (2.01–12.20)	0.001
Model 2	1	2.81 (1.37–5.78)	0.005	4.86 (1.93–12.20)	0.001
Model 3	1	3.05 (1.36–6.82)	0.007	2.54 (0.91–7.10)	0.077
Model 4	1	3.45 (1.51–7.88)	0.003	2.46 (0.85–7.10)	0.096

Model 1: adjusted for age and gender; model 2: model 1 plus diabetes, hypertension, smoking, and angina; model 3: model 2 plus Killip class III or IV and arrhythmias; model 4: model 3 plus β blockers, statins, and angiotensin-converting enzyme inhibitors.

compared to NSTEMI in patients without revascularization, but this difference was not statistically significant in patients in whom revascularization procedures were performed (Table 4). However, the sample size in the stratified analyses limited our statistical power to the detection of an odds ratio >3.2 when comparing STEMI and NSTEMI patients who underwent revascularization.

The study achieved 100% follow-up of patients who survived the acute phase, with a median follow-up period of 7.16 years. The long-term prognoses of the 3 groups are

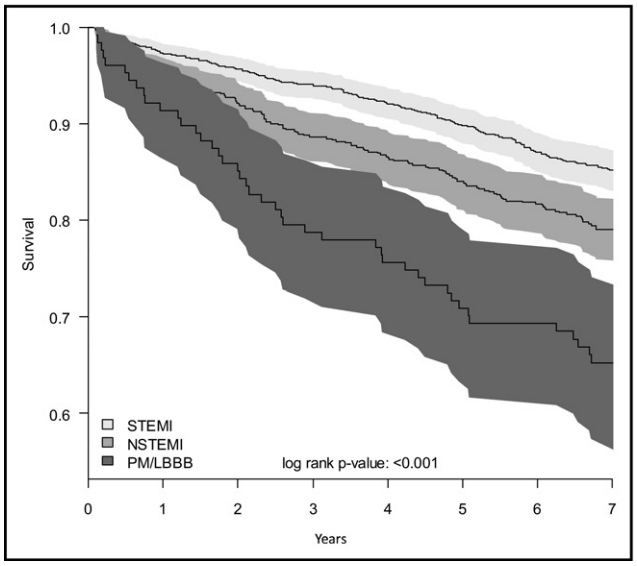

Figure 2. Seven-year mortality curves by electrocardiographic pattern upon admission (STEMI, NSTEMI, or unclassified acute MI) among 28-day survivors. LBBB = left bundle branch block; PM = pacemaker.

listed in Table 3. The Kaplan-Meier curves for 7-year survival with their corresponding confidence intervals for each type of MI are shown in Figure 2.

Multivariate Cox regression models for 7-year mortality according to the characteristics of the admission electrocardiograms were adjusted for various types of variables (Table 5). The 7-year mortality was higher in the NSTEMI group than in STEMI patients. In addition, the group of patients with unclassified MI had a higher mortality rate than the NSTEMI group. These differences in long-term mortality were independent of clinical characteristics, in-hospital acute phase management, and MI severity variables (Table 5).

The interaction between the use of revascularization procedures during hospitalization and the 3 electrocardiographic patterns on 7-year mortality in 28-day survivors was not statistically significant ($p = 0.565$).

In considering the overall mortality of all patients from symptom onset until the end of follow-up, the multivariate model adjusted for age, gender, and history of hypertension, diabetes, and angina showed that NSTEMI patients had a trend toward higher overall mortality, without reaching statistical significance (hazard ratio 1.21, 95% confidence interval 0.98 to 1.49, $p = 0.080$), than the STEMI patients. Patients with unclassified MI continued to be the group with the highest overall mortality (hazard ratio 2.13, 95% confidence interval 1.54 to 2.93, $p < 0.001$) compared to STEMI patients.

The interaction between the use of revascularization procedures during hospitalization and the 3 electrocardiographic patterns on 7-year mortality was not statistically significant ($p = 0.975$).

Discussion

In this prospective, consecutive register of patients with first MI, conducted in 6 Spanish hospitals, we observed that previous angina, cardiovascular risk factors (especially arterial hypertension), and age predisposed to MI in the form of NSTEMI. In patients with STEMI, 28-day case fatality was higher than in patients with NSTEMI, although this difference disappeared in the subgroup of patients treated with revascularization procedures. In contrast, the 7-year mortality rate was higher in NSTEMI patients than in the STEMI group. Furthermore, the worst prognosis at 28 days and at 7 years corresponded to the group of patients with unclassified MI, although the 28-day case fatality excess of risk also disappeared in the subgroup of patients treated with revascularization procedures.

Our study found a high proportion of patients with STEMI (nearly 2/3 of the patients included), a larger figure than that observed in other registers,[10,19–21] although more in line with that reported in the Euro Heart Survey.[22] One possible explanation is the inclusion in these registers of patients with previous MI,[10,20] a variable that is associated with a higher probability of NSTEMI, while our study included only patients with first MI.

As in other registries, age and the presence of cardiovascular risk factors were directly associated with the presentation with MI in the form of NSTEMI.[20] A very important finding in our study is that patients with NSTEMI also had a higher proportion of previous angina. In addition, this group of patients had more diffuse coronary disease, with a higher proportion of multivessel disease. These data could indicate that patients with NSTEMI present a different etiopathogenic mechanism, characterized by a greater burden of chronic, diffuse arteriosclerosis, with atheromatous plaque that, when it ruptures, can affect the smallest vessels or cause thrombus that is nonocclusive or causes less myocardial damage because of an ischemic preconditioning effect.[23] The appearance of nonocclusive thrombosis could also be related to previous treatment with antiaggregant drugs. In this context, some studies have suggested that NSTEMI is a different physiopathologic entity than STEMI, given individual differences in endogenous tissue plasminogen activator levels and activity, fibrinogen VII, and plasminogen activator inhibitor–1 levels.[24] Moreover, an optical coherence tomographic study showed differences in culprit lesion morphologies between STEMI and NSTEMI.[25]

In our registry, 28-day case fatality was lower than that observed in other contemporary registers, such as Proyecto de Registro de Infarto Agudo de Miocardio Hospitalario (PRIAMHO),[26] in which overall MI mortality at 28 days was 11.4%. Our series also had somewhat lower rates than the Manejo del Síndrome Coronario Agudo Registro Actualizado (MASCARA) registry,[20] which reported 7.6% mortality for STEMI and 3.9% for NSTEMI, and similar to others such as Observatoire sur la Prise en Charge Hospitalière, l'Evolution à un an et les Caractéristiques de Patients Présentant un Infarctus du Myocarde Avec ou Sans Onde Q (OPERA),[27] with a 4.6% rate for STEMI and NSTEMI patients. These differences might also be related to the fact that our registry included only patients with first MI.

Patients who present with STEMI had twice the 28-day case fatality rate of patients with NSTEMI, and this difference cannot be explained by any difference in clinical characteristics, co-morbidities, or the severity of the MI. In the group of patients in whom revascularization was performed, there was a nonsignificant trend to present a higher 28-day case fatality that is concordant with other series[8,13] report-

Table 5
Association between electrocardiographic pattern on admission and long-term mortality rate, adjusted by various covariates in Cox regression models

	STEMI (n = 1,235)	NSTEMI (n = 670)		Unclassified MI (n = 143)	
		HR (95% CI)	p Value	HR (95% CI)	p Value
Model 1	1	1.50 (1.20–1.87)	<0.001	2.77 (1.99–3.85)	<0.001
Model 2	1	1.38 (1.09–1.74)	0.007	2.32 (1.62–3.32)	<0.001
Model 3	1	1.42 (1.11–1.80)	0.005	2.18 (1.51–3.16)	<0.001
Model 4	1	1.37 (1.07–1.75)	0.012	2.13 (1.45–3.12)	<0.001
Model 5	1	1.31 (1.02–1.68)	0.035	1.85 (1.24–2.75)	0.003

Model 1: adjusted for age and gender; model 2: model 1 plus diabetes, hypertension, smoking, and angina; model 3: model 2 plus Killip class III or IV and ejection fraction; model 4: model 3 plus aspirin, clopidogrel, β blockers, statins, and angiotensin-converting enzyme inhibitors; model 5: model 4 plus elective percutaneous coronary revascularization or coronary artery bypass.

ing higher short-term mortality in STEMI compared to NSTEMI patients after PCI.

Curiously, patients with unclassified MI also presented higher 28-day case fatality than STEMI patients, although these differences were due to more severe MI, higher Killip class, and the presence of ventricular arrhythmias and were observed mainly in those patients not treated with revascularization.

There are data to suggest that the midterm prognosis (6 to 12 months) of patients with NSTEMI is worse than in patients with STEMI,[8,10] although very few studies have analyzed the long-term prognosis for these patients.[5,9,13] Some series have suggested that the difference in long-term prognosis after PCI is based on the higher mortality for STEMI patients in the first few months, followed by a course that is more similar to patients with NSTEMI.[28] In our series, when we analyzed global mortality over the entire follow-up period, including the acute phase, we observed that patients with NSTEMI presented a 21% higher risk for dying than STEMI patients, although this difference did not reach statistical significance.

One hypothesis to explain the worse prognosis for NSTEMI with respect to STEMI could be that the higher prevalence of coronary risk factors was associated with a more diffuse coronary disease, more multivessel disease, and a higher number of coronary lesions, as was the case in our series. This fact could lead to a higher rate of future ischemic events (reinfarction or angina) that would increase mortality in these patients. In the patients with STEMI, the obvious benefits of optimized medical treatment with aspirin, statins, β blockers, and angiotensin-converting enzyme inhibitors[29] could be slowing the progression of coronary disease that is less developed than in NSTEMI or unclassified MI patients.

Our registry was aimed at determining the long-term prognosis of patients with acute MI. Therefore, our series of patients was based on recruitment from 2001 to 2003, so treatments and management of this type of patient could be different from current recommendations. Another limitation is related to the fact that we have data regarding hospital management and discharge treatment but no medical data during the follow-up beyond that provided by the National Death Registry for Spain. Moreover, although we know the global 7-year mortality, the causes of death were not available for all patients.

In conclusion, our study confirms the differential clinical and short- and long-term prognostic characteristics according to the initial electrocardiographic pattern even in patients with first MI.

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