Combined Effect of Age and Right Ventricular Involvement on Acute Inferior Myocardial Infarction Prognosis

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Background—In patients with acute inferior myocardial infarction (AIMI), right ventricular involvement (RVI) is one of the strongest predictors of in-hospital death. We hypothesized that the impact of RVI on AIMI prognosis depends on the patient’s age.

Methods and Results—The in-hospital clinical outcome of 798 consecutive patients admitted to the coronary care unit within 48 hours of symptom onset with AIMI was analyzed according to patient age and to the presence of RVI diagnosed by ECG and/or echocardiographic criteria. The total incidence of RVI was 37%, and it increased as age advanced. Patients with RVI had a significantly higher incidence of major complications (45% versus 19%, \( P<0.0001 \)) and a higher in-hospital mortality rate (22% versus 6%, \( P<0.0001 \)). The prognostic effect of RVI was independent of sex, smoking, diabetes, shock on admission, left ventricular ejection fraction, and reperfusion therapy, all age-dependent predictors. A multivariate analysis showed a significant (\( P=0.03 \)) interaction between age and RVI on AIMI mortality. RVI increased mortality risk only in the oldest patients.

Conclusions—In patients with AIMI, RVI substantially increases mortality risk in elderly patients, whereas it has a nonsignificant effect in young subjects. (Circulation. 1998;98:1714-1720.)

Key Words: myocardial infarction ■ aging ■ coronary disease ■ mortality ■ prognosis

It has been suggested that among patients with acute inferior myocardial infarction (AIMI), those with right ventricular involvement (RVI) probably benefit most from reperfusion therapy,\(^1,2\) and that maximal efforts should be made to obtain an early patency of the infarct-related coronary artery.\(^3\) These recommendations are based on the observation that the presence of RVI is one of the strongest predictors of in-hospital death in patients with AIMI,\(^4\) a finding that may help to stratify patients with acute inferior-wall infarctions into high- and low-risk groups.\(^4\) Nevertheless, the exponential increase in mortality risk associated with increasing age\(^2\) and the high short-term mortality observed in elderly patients with RVI\(^5\) suggest that the previously reported increase in mortality risk observed in patients with acute MIs of inferior location and RVI compared with those without RVI\(^4\) may reflect the average effect of a large increase in mortality in elderly patients, with a smaller increase in younger subjects. In other words, the deleterious effect of RVI on inferior-wall MI prognosis may depend on patient age. To test this hypothesis, we studied the in-hospital outcome of 798 consecutive patients with acute inferior or posterior MI adhering to the presence of RVI.

Methods

Patients

The population studied consisted of 821 patients with a definite diagnosis of acute inferior or posterior MI, not transferred from other hospitals, consecutively admitted to the coronary care unit of our institution from January 1, 1991, to December 31, 1995. A definite diagnosis was established when at least 2 of the following criteria were present: (1) chest discomfort of \( \geq 30 \) minutes compatible with myocardial ischemia; (2) presence of an ST-segment elevation \( \geq 0.1 \) mV in \( \geq 2 \) of leads II, III, and aVF in the admission ECG and/or appearance of an R wave in V\(_1\) or V\(_2\) \( \geq 0.04 \) second with an R/S voltage ratio \( >1 \); and (3) elevation of serum creatine kinase (CK) level to at least twice the upper normal limit (195 U/L in our institution), with an MB fraction (CK-MB) \( >10 \) of the total CK level. Three patients in whom the presence of RVI could not be determined by the defined criteria were excluded. An MI was considered acute if the time from symptom onset to admission was not longer than 48 hours. Twenty patients admitted with a longer time delay were also excluded. The definitive study group consisted of 798 patients.

Definitions

RVI was diagnosed by the presence of an ST-segment elevation \( \geq 0.1 \) mV in lead V\(_1\), R or V\(_2\),\(^5,10\) in the ECG performed immediately after admission to the coronary care unit and/or by the presence of RV free wall motion abnormalities or RV dilatation detected in a 2-dimensional transthoracic echocardiographic study.\(^11-15\) The determination of the presence of RVI was made by physicians who were unaware of the clinical outcome of the patient. Shock was defined as the concurrence of persistent hypotension and clinical signs of low cardiac output\(^16\) (due to either left ventricular [LV] or RV failure or both) and was considered cardiogenic after the exclusion of hypovolemia, arrhythmias, and mechanical complications. Rupture of free ventricular wall, interventricular septum, or papillary muscle was defined as mechanical complications. Major complications included

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death, cardiogenic shock, mechanical complications, primary ventricular fibrillation, sustained ventricular tachycardia (lasting >30 seconds or causing hemodynamic compromise), complete atrioventricular (AV) block, and reinfarction.

**Variables**

The clinical records of all patients who met the inclusion criteria were studied retrospectively. At the time of patient admission to the coronary care unit, a complete clinical history, physical examination, 16-lead ECG (12 standard leads plus 2 right precordial leads, V₃R and V₄R, and 2 posterior leads, V₇ and V₈), complete blood analysis, and chest radiograph were routinely performed. Serial laboratory studies, including CK and CK-MB and 12-lead ECGs, were obtained at 6- to 8-hour intervals during the first 24 to 48 hours of evolution. The patient’s treatment was determined on an individual basis by the attending physician. Intravenous volume loading was used systematically in patients with RV infarction and systemic hypotension or signs of low cardiac output. Echocardiographic studies were usually performed later than the first 48 hours after admission unless a clinical indication was present. Left ventricular ejection fraction (LVEF) was evaluated by 2-dimensional echocardiography in most patients, and in exceptional cases, only by contrast left ventriculography during cardiac catheterization. The following variables were analyzed according to the patient’s age and the presence of RVI: (1) baseline characteristics: age, sex, cardiovascular risk factors (systemic hypertension, diabetes mellitus, dyslipemia, and current cigarette smoking), and history of previous MI; (2) infarct features: incidence of RVI, time from symptom onset to admission, Killip class on admission, and peak CK and CK-MB values; (3) diagnostic and therapeutic procedures: echocardiography (LVEF, RVI, mitral regurgitation, and mechanical complications), coronary angiography (infarct-related coronary artery, number of coronary arteries with a luminal obstruction ≥70%), and reperfusion therapy (intravenous thrombolysis or primary coronary angioplasty); and (4) in-hospital incidence of major complications. The cause of death was classified into 3 groups: (1) cardiogenic shock, (2) mechanical complications (deaths in patients who were operated on as treatment for any mechanical complication that occurred in the perioperative period were included in this group regardless of the immediate cause of death), and (3) other causes.

**Statistical Analysis**

Continuous variables are expressed as medians (25th to 75th percentiles). The \( \chi^2 \) test was used to assess the significance of the differences between proportions, and Student’s t test was used for comparisons between means. Comparisons between ordinal variables and examination of age-related trends in predictors and outcomes were studied with the Mantel-Haenszel test for linear association. The independent contribution of age and RVI to in-hospital mortality was assessed in 2 multivariate analyses: the first
Effect of Age and RVI on Inferior MI Prognosis

TABLE 2. Hospital Course of Patients According to the Presence or Absence of RVI

<table>
<thead>
<tr>
<th>Incidence, n (%)</th>
<th>RVI (n=296)</th>
<th>No RVI (n=502)</th>
<th>Total (n=798)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major complications</td>
<td>133 (45)</td>
<td>95 (19)</td>
<td>228 (29)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Cardiogenic shock</td>
<td>44 (15)</td>
<td>17 (3)</td>
<td>61 (8)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Mechanical complications</td>
<td>22 (7)</td>
<td>14 (3)</td>
<td>36 (5)</td>
<td>0.004</td>
</tr>
<tr>
<td>Free ventricular wall rupture</td>
<td>11 (4)</td>
<td>13 (3)</td>
<td>23 (3)</td>
<td>0.40</td>
</tr>
<tr>
<td>Interventricular septal rupture</td>
<td>10 (3)</td>
<td>3 (1)</td>
<td>13 (2)</td>
<td>0.006</td>
</tr>
<tr>
<td>Papillary muscle rupture</td>
<td>2 (1)</td>
<td>0</td>
<td>2 (0.7)</td>
<td>0.14</td>
</tr>
<tr>
<td>Complete AV block</td>
<td>75 (25)</td>
<td>34 (7)</td>
<td>109 (14)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Primary ventricular fibrillation</td>
<td>15 (5)</td>
<td>7 (1)</td>
<td>22 (3)</td>
<td>0.003</td>
</tr>
<tr>
<td>Sustained ventricular tachycardia</td>
<td>10 (3)</td>
<td>10 (2)</td>
<td>20 (3)</td>
<td>0.22</td>
</tr>
<tr>
<td>Postinfarction angina</td>
<td>26 (9)</td>
<td>43 (9)</td>
<td>69 (9)</td>
<td>0.90</td>
</tr>
<tr>
<td>Reinfarction</td>
<td>19 (6)</td>
<td>23 (5)</td>
<td>42 (5)</td>
<td>0.26</td>
</tr>
<tr>
<td>Death</td>
<td>64 (22)</td>
<td>30 (6)</td>
<td>94 (12)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Cause of death</td>
<td>0.12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cardiogenic shock</td>
<td>37 (58)</td>
<td>12 (20)</td>
<td>49 (52)</td>
<td></td>
</tr>
<tr>
<td>Mechanical complications</td>
<td>21 (33)</td>
<td>11 (17)</td>
<td>32 (34)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>6 (9)</td>
<td>7 (23)</td>
<td>13 (14)</td>
<td></td>
</tr>
</tbody>
</table>

Results are expressed as absolute numbers and decade percentages.

Clinical Features of AIMI

The clinical characteristics of the patients are shown in Table 1. RVI was diagnosed in 296 patients (37% incidence): in 223 patients by ECG criteria (75%), and in 73 patients with negative or inconclusive ECG, by echocardiography (25%). Major complications appeared during hospitalization in 228 patients (29%). The most frequent were complete AV block (14%) and cardiogenic shock (8%). In-hospital mortality rate was 12% in the entire group. Of the 94 deaths, 49 (52%) were due to cardiogenic shock, 32 (34%) to mechanical complications, and 13 (14%) to other causes.

Prognostic Effect of RVI

Patients with RVI were slightly older and had a higher prevalence of hypertension. They were more frequently admitted in shock and had greater LV systolic dysfunction (Table 1). Reperfusion therapies (thrombolysis and primary coronary angioplasty) were used in similar proportions of patients with and without RVI. Coronary angiography showed that index MI was related to the right coronary artery more frequently in patients with RVI. The presence of RVI was associated with a significantly higher incidence of major complications, cardiogenic shock, mechanical complications, complete AV block, and primary ventricular fibrillation as well as death during hospitalization (Table 2).

Influence of Age

The incidence of RVI, prevalence of prognostic factors, and incidence of most important outcomes are presented according to age groups in Table 3. As age increased, the incidence of RVI as well as the proportion of women, diabetics, patients with shock on admission, and those with a moderately to severely depressed LVEF increased. Conversely, the proportion of smokers and of patients treated with reperfusion therapy decreased. Increasing age was also directly associated with the in-hospital incidences of major complications and

TABLE 3. Relationship Between Age, Incidence of RVI, Proportion of Patients With Prognostic Factors, Reperfusion Treatment, and Major Complications

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>RVI</td>
<td>9 (27)</td>
<td>26 (29)</td>
<td>56 (37)</td>
<td>91 (38)</td>
<td>78 (40)</td>
<td>36 (41)</td>
<td>296 (37)</td>
<td>0.032</td>
</tr>
<tr>
<td>Female sex</td>
<td>5 (15)</td>
<td>4 (4)</td>
<td>12 (8)</td>
<td>38 (16)</td>
<td>67 (35)</td>
<td>46 (52)</td>
<td>172 (22)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Diabetes</td>
<td>2 (6)</td>
<td>12 (13)</td>
<td>31 (20)</td>
<td>62 (26)</td>
<td>51 (26)</td>
<td>24 (27)</td>
<td>182 (23)</td>
<td>0.001</td>
</tr>
<tr>
<td>Smoking</td>
<td>32 (97)</td>
<td>82 (90)</td>
<td>124 (82)</td>
<td>160 (66)</td>
<td>80 (42)</td>
<td>23 (26)</td>
<td>501 (63)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Previous infarction</td>
<td>1 (3)</td>
<td>7 (8)</td>
<td>20 (13)</td>
<td>29 (12)</td>
<td>29 (15)</td>
<td>9 (10)</td>
<td>95 (12)</td>
<td>0.20</td>
</tr>
<tr>
<td>Shock on admission</td>
<td>0</td>
<td>1 (1)</td>
<td>5 (3)</td>
<td>7 (3)</td>
<td>17 (9)</td>
<td>12 (14)</td>
<td>42 (5)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>LVEF ≤0.40</td>
<td>2 (6)</td>
<td>12 (13)</td>
<td>20 (14)</td>
<td>37 (16)</td>
<td>44 (24)</td>
<td>23 (29)</td>
<td>138 (18)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Reperfusion therapy</td>
<td>23 (70)</td>
<td>65 (71)</td>
<td>98 (65)</td>
<td>143 (59)</td>
<td>81 (42)</td>
<td>21 (24)</td>
<td>431 (54)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Major complications</td>
<td>4 (12)</td>
<td>14 (15)</td>
<td>29 (19)</td>
<td>67 (28)</td>
<td>68 (35)</td>
<td>46 (52)</td>
<td>228 (29)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Cardiogenic shock</td>
<td>0</td>
<td>0</td>
<td>6 (4)</td>
<td>12 (5)</td>
<td>23 (12)</td>
<td>20 (23)</td>
<td>61 (8)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Mechanical complications</td>
<td>0</td>
<td>2 (2)</td>
<td>1 (1)</td>
<td>11 (5)</td>
<td>14 (7)</td>
<td>8 (9)</td>
<td>36 (5)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Death</td>
<td>0</td>
<td>2 (2)</td>
<td>7 (6)</td>
<td>22 (9)</td>
<td>35 (18)</td>
<td>28 (32)</td>
<td>94 (12)</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>
death in the entire group (Table 3) and in the patients with and without RVI (Figure 1). The causes of death did not change significantly with age (Figure 2).

**Interaction Between Age and RVI**

Age and RVI were confirmed as independent predictors of in-hospital death in patients with AIMI after adjustment for all other predictors available at the time of admission and during hospitalization ($P<0.001$ for both parameters). A significant ($P=0.03$) interaction between the effects of age and RVI on mortality was found in a new multivariate analysis that considered all early predictors (Appendix, saturated model). A final model with a predictive value similar to that of the saturated model (Appendix, final model and graph) was used to perform adjusted mortality predictions (Table 4).

When the adjusted impact of RVI on mortality was analyzed considering different age groups, a gradient in mortality risk increase was found (Figure 3). Thus, the presence of RVI was found to be a significant predictor of in-hospital death only in elderly patients. This finding remained unchanged when patients with only ECG criteria of RVI were analyzed.

**Discussion**

The results of the present study confirm previous investigations showing that RVI is a strong independent predictor of a poorer outcome in patients with AIMI. However, the study shows that the influence of RVI on mortality changes with age, from an insignificant effect in young patients to a severe increase in mortality risk in the elderly.

Our findings may have some clinical implications. Table 4 shows the in-hospital mortality risk estimations for patients with AIMI. If the patient’s age and sex, the presence of RVI, and whether the patient is currently smoking are known, this predictive model allows a simple risk stratification of patients with AIMI that can be performed when they are admitted to the coronary care unit. Assuming arbitrarily a 12% in-hospital mortality risk as the cutoff point to determine high- and low-risk patients, one may notice that most high-risk patients are elderly and have RVI (boldface numbers). Therefore, an accurate diagnosis of RVI should be performed as soon as possible in all patients with AIMI, but particularly in the elderly. Patients in whom the ECG is inconclusive regarding the presence of RVI or who have hemodynamic impairment should have an urgent echocardiographic study.

The improvement in risk stratification when the patient’s age is considered compared with that when only the presence of RVI is considered may help the selection of a particular therapeutic approach. Zehender and colleagues demonstrated that patients with AIMI and RVI had an in-hospital mortality rate of 31%, compared with 6% in patients without RVI. It was found that the presence of an ST-segment elevation in lead V_4_R is one of the most powerful predictors of in-hospital death in inferior-wall MIs. Our data suggest that the increase in mortality risk associated with RVI observed in that study is the average effect of a significant increase in mortality risk in the elderly and a null increase in young patients. The authors pointed out that most deaths occurred in patients who were not candidates for thrombolytic therapy, a finding that led to the recommendation of making maximal therapeutic efforts to procure the opening of the occluded coronary artery in patients with inferior-wall MIs and RVI. It has even been suggested that higher-risk patients with AIMIs, such as those with RVI, AV block, or precordial ST-segment depression, probably benefit most from reperfusion therapy. This hypothesis was recently reviewed. Unfortunately, none of the placebo-controlled trials have analyzed the benefit of thrombolytic therapy in high-risk versus low-risk subjects with inferior MI. Therefore, there is no convincing evidence that reperfusion therapy results in improved outcomes in such patients. Our study shows that the increase in mortality associated with RVI depends strongly on patient age and, conversely, does not depend so much on the use of reperfu-
sion therapy. In the German study,
the high mortality observed in nonthrombolyzed patients may have been more closely related to their advanced age, because those >75 years old were not considered candidates for thrombolysis. Our results are concordant with the observation that a high proportion of low-risk patients receive reperfusion therapy and that this proportion decreases as age—directly related to mortality risk—increases.21–23 In other words, there is an inverse relationship between the use of reperfusion therapies and patient risk. Because primary coronary angioplasty is available 24 hours a day at our institution, this paradox cannot be explained only by the age-related increase in the proportion of patients with contraindications for thrombolysis.24 This study suggests that the use of a very aggressive treat-

ment in all patients with AIMI and RVI on the basis of selecting high-risk patients may not be needed but that, on the contrary, maximal therapeutic efforts should be focused on elderly patients and on the few young patients with a complicated clinical course. Prospective studies evaluating the efficacy of different therapeutic strategies in elderly patients with AIMI and RVI are needed.

The reasons for our finding are unclear. Although there was an age-related increase in the proportions of women and of diabetics, factors that are associated with higher mortality rates,25–28 and a decrease in the proportion of smokers, a subgroup of patients in whom a better prognosis after acute MI has been described when they are treated with reperfusion therapies,29,30 there were no differences in the prevalence of these predictors between patients with or without RVI. LVEF was lower in patients with RVI and also decreased as age advanced. However, the multivariate analysis, which considered all variables available during hospitalization, confirmed that the impact of RVI on acute inferior-wall infarction mortality is independent of LVEF, as has previously been reported.4,6 The age-related decrease in the proportion of patients treated with reperfusion therapies may contribute to the worse prognosis of elderly patients. However, no differences in the use of thrombolysis or primary coronary angioplasty were found according to the presence or absence of RVI. Furthermore, reperfusion therapy was not identified as an independent predictor of in-hospital death in any of the predictive models analyzed. Therefore, a less aggressive treatment does not seem to explain such poor prognosis of elderly patients with RVI.

Most deaths were caused by cardiogenic shock or by mechanical complications. As Figure 1 shows, the age-related increase in death rate observed in patients with RVI is roughly parallel to the age-related increase in the incidence of cardiogenic shock but not of mechanical complications. In a previous study, we found that the high mortality of patients

### Table 4. Adjusted In-Hospital Mortality Rate Predictions

<table>
<thead>
<tr>
<th>Age, y</th>
<th>30</th>
<th>35</th>
<th>40</th>
<th>45</th>
<th>50</th>
<th>55</th>
<th>60</th>
<th>65</th>
<th>70</th>
<th>75</th>
<th>80</th>
<th>85</th>
<th>90</th>
</tr>
</thead>
<tbody>
<tr>
<td>RVI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No smoking</td>
<td>0.5</td>
<td>0.8</td>
<td>1.8</td>
<td>2.1</td>
<td>3.3</td>
<td>5.2</td>
<td>8.1</td>
<td>12.4</td>
<td>18.6</td>
<td>26.9</td>
<td>37.2</td>
<td>48.8</td>
<td>60.6</td>
</tr>
<tr>
<td>Smoking</td>
<td>0.3</td>
<td>0.5</td>
<td>0.7</td>
<td>1.2</td>
<td>1.9</td>
<td>3.0</td>
<td>4.8</td>
<td>7.5</td>
<td>11.6</td>
<td>17.4</td>
<td>25.4</td>
<td>35.4</td>
<td>46.9</td>
</tr>
<tr>
<td>No RVI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No smoking</td>
<td>1.4</td>
<td>1.7</td>
<td>2.0</td>
<td>2.4</td>
<td>3.0</td>
<td>3.6</td>
<td>4.3</td>
<td>5.2</td>
<td>6.2</td>
<td>7.5</td>
<td>8.9</td>
<td>10.7</td>
<td>12.7</td>
</tr>
<tr>
<td>Smoking</td>
<td>0.8</td>
<td>1.0</td>
<td>1.2</td>
<td>1.4</td>
<td>1.7</td>
<td>2.1</td>
<td>2.5</td>
<td>3.0</td>
<td>3.7</td>
<td>4.4</td>
<td>5.3</td>
<td>6.4</td>
<td>7.7</td>
</tr>
</tbody>
</table>

Numbers in boldface type indicate high-risk patients.

#### Figure 3. Adjusted age-related predictions of increase in in-hospital mortality risk associated with presence of RVI compared with absence of RVI in patients with AIMI. Results are expressed as odds ratios and 95% CIs. Increase is statistically significant when none of the ends of CIs cross equivalent risk line (odds ratio=1).
≥75 years old with AIMI and RVI was essentially due to the high incidence of low-cardiac-output cardiogenic shock.\(^6\) Mortality in those patients was not linearly associated with LVEF, as opposed to patients without RVI. We speculated that LV diastolic dysfunction may play a role in the poor hemodynamic tolerance of acute RV dysfunction observed in elderly patients.\(^6\) In the present nonselected population, the mortality risk associated with RVI increases progressively as age advances (Figure 3), as with LV diastolic dysfunction.\(^31–33\) Therefore, the present study is in agreement with but does not demonstrate the hypothesis that LV diastolic dysfunction plays a role in the poor prognosis for elderly patients with AIMI and RVI. Other age-related changes, such as the increase in pulmonary vascular resistance, may contribute to this behavior.\(^34\)

The results of this study may be limited to some extent because of methodological limitations associated with its retrospective character. There may be a bias in echocardiographic diagnosis of RVI, because echocardiography was usually performed later than the first 48 hours after admission, when features of RV infarction may have improved, particularly after coronary reperfusion. Patients with a complicated clinical course during the acute phase may need an echocardiographic study at an early stage and may have a greater probability of being diagnosed with RVI by that method. However, the exclusion of patients diagnosed by echocardiographic criteria may induce a greater bias because those who have right bundle-branch block or pacemaker stimulation due to complete AV block in the admission ECG, situations frequently associated with RVI but that hamper its ECG diagnosis, would be excluded, and it is known that such patients have a poor prognosis.\(^1,6,35,36\) The use of reperfusion therapy and the type of treatment used (thrombolysis or primary coronary angioplasty) was based on individual clinical decisions; therefore, conclusions about therapeutic management must be interpreted cautiously.

In conclusion, the increase in mortality associated with RVI in patients with AIMI depends on patient age. Young patients, with or without RVI, have a good prognosis. Elderly patients with inferior MI and RVI have a particularly high risk of dying in hospital, whereas their prognosis is relatively benign if there is no RVI.

### Appendix

#### Predictive Models by Multiple Logistic Regression Analyses

The Appendix is shown in Figure 4.

**Figure 4.** Predictive models by multiple logistic regression analyses. Shock indicates shock on admission; pMI, previous MI; diab, diabetes; rep, reperfusion treatment; and ROC, receiver operating characteristic.

### Acknowledgments

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References


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