Short- and Long-term Clinical Outcome After Q Wave and Non–Q Wave Myocardial Infarction in a Large Patient Population*

Pascal Nicod, MD, Elizabeth Gilpin, MS, Howard Dittrich, MD, Ralf Polikar, MD, Ake Hjalmarsen, MD, A. Robert Blacky, MD, Hartmut Henning, MD, and John Ross Jr., MD

Prognosis for patients with non–Q wave myocardial infarction is controversial although a number of studies have shown a less favorable outlook after hospital discharge for patients with non–Q wave than for those with Q wave infarction. Therefore, the in-hospital and 1-year prognosis was investigated in a sufficiently large patient population (n=2,024) to allow stratification by subgroups, in particular by age and previous myocardial infarction. Patients with non–Q wave infarction (n=444; 22% of the total study population) were somewhat older (65 vs. 63 years, p<0.001) and had an increased incidence of previous myocardial infarction (46% vs. 24%, p<0.001) and congestive heart failure (21% vs. 8%, p<0.001) than patients with Q wave infarction. In-hospital mortality of patients with non–Q wave infarction was lower (8.1% vs. 11.5%; p<0.06), whereas their 1-year mortality after hospital discharge was significantly higher (13.7% vs. 9.2%, p<0.05) than for patients with Q wave infarction. However, total mortalities at 1 year were nearly equal. When patients were subgrouped by presence or absence of a previous myocardial infarction, patients in both subgroups exhibited mortality patterns typical of the entire population with Q wave or non–Q wave infarction. However, when stratified by age and previous infarction, in-hospital mortality for patients with non–Q wave infarction was significantly lower only in patients older than 70 years of age. Similarly, the higher mortality after hospital discharge in patients with non–Q wave infarction occurred only in patients older than 70 years of age without previous myocardial infarction. Recurrent angina was more common in all subgroups with non–Q wave infarction. However, the incidence of major events, such as in-hospital infarct extension, recurrent myocardial infarction after discharge, and coronary bypass surgery in the year after myocardial infarction, was similar in patients with Q wave or non–Q wave infarction. The major findings of this study are that in patients 70 years of age or younger with or without prior myocardial infarction, non–Q wave infarction does not carry an increased risk of death within 1 year after hospital discharge compared with patients with Q wave infarction. Also, despite increased residual ischemia, the slight increase in the incidence of other major coronary events was not significant in patients with non–Q wave compared with the incidence in those with Q wave infarction. However, older patients with non–Q wave infarction have a higher mortality during the year after hospital discharge than those with Q wave infarction, particularly in the absence of prior infarction. (Circulation 1989;79:528–536)

Prognosis after acute myocardial infarction depends largely on myocardial infarction size, left ventricular function, residual myocardium at jeopardy, and the presence of complex ventricular arrhythmias at hospital discharge.**

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tant clinical differences between patients with non-Q wave and Q wave infarction that may have significant prognostic and therapeutic implications. Myocardial infarction size is smaller, and residual left ventricular function is higher after non-Q wave than after Q wave infarction, and angiographic studies have shown that subtotal occlusion of a coronary artery or coronary collaterals are much more frequent in non-Q wave infarction. This angiographic picture may correlate with a high incidence of recurrent ischemic events in patients with non-Q wave myocardial infarction, such as angina pectoris, myocardial infarct extension, and recurrent myocardial infarction. In patients with non-Q wave infarction, in-hospital mortality has been reported to be lower whereas long-term mortality may be similar or higher in patients with non-Q wave than in those with Q wave infarction.

A large percentage of patients with non-Q wave infarction are elderly and have a history of previous myocardial infarction. Therefore, increased complications and mortality rates may occur mostly in the elderly subgroup. On the other hand, young patients with a first non-Q infarction may represent a subgroup having a favorable prognosis. Therefore, in the present study, we analyzed the in-hospital and 1-year clinical outcome in a large population with non-Q wave and Q wave infarction recruited from four centers.

Methods

Two thousand twenty-four patients, 1,510 men and 514 women, aged 18–95 years (mean ± SD, 63 ± 12 years) who had a myocardial infarction between 1979 and the middle of 1984 were analyzed in this study. Q wave infarction was diagnosed when the new Q waves on the electrocardiogram were accompanied by either typical chest pain or elevated creatine kinase. The diagnosis of non-Q wave infarction required both ST segment depression or T wave inversion and creatine kinase elevation. Patients were excluded from the study if 1) they refused to sign a consent form for entry into the study, and 2) coronary bypass surgery was performed within 1 week of admission. The location of infarction could not be determined in 155 patients, who were then eliminated from the study, leaving 1,869 patients for analysis. Only patients admitted within 24 hours from onset of symptoms were entered into the study. None of these patients underwent acute thrombolysis or acute percutaneous transluminal coronary angioplasty. Infarct extension was defined, as previously, by the presence of at least two of the following: 1) recurrent ischemic pain in the hospital more than 24 hours after admission, 2) increase in total creatine kinase level of at least 20% over the last abnormal value or of 100% over the last normal value, and 3) new persistent electrocardiographic changes.

Four centers recruited patients for the study: the University of California, San Diego, Medical Center; the San Diego Veterans Administration Hospital; the Naval Hospital of San Diego; and the Vancouver General Hospital, British Columbia, Canada. All data were stored in a data base at the Specialized Center of Research on Ischemic Heart Disease at the University of California, San Diego, Medical Center.

Clinical Variables

Many variables from the patient’s history, physical examination, laboratory tests, chest radiography, and electrocardiography were stored by methods previously described. Variables such as age, sex, history of previous myocardial infarction, signs of congestive heart failure (i.e., S3 gallop and bibasilar pulmonary rales), maximal creatine kinase level, and maximal degree of pulmonary congestion noted on chest radiography were compared in patients with Q wave and non-Q wave infarction. A subgroup of 1,031 patients underwent a determination of the left ventricular ejection fraction by radionuclide ventriculography (860 patients) or cardiac catheterization (171 patients) at the time of hospital discharge or up to 6 weeks after hospital discharge. One thousand twenty-five patients underwent 24-hour ambulatory electrocardiographic monitoring before hospital discharge. The presence of complex ventricular arrhythmias was defined as frequent ventricular premature beats (more than 1 beat/min or 30 beats/hr), multiform ventricular premature beats, early ventricular premature beats (the R on T phenomenon), or ventricular tachycardia (more than three consecutive ventricular premature beats). Patients were kept on their regular medications, including antiarrhythmic drugs, at the time of 24-hour ambulatory electrocardiographic monitoring.

Determination of left ventricular ejection fraction and 24-hour ambulatory electrocardiographic monitoring were optional and were prescribed by the attending physician. No attempt was made to perform such tests on a particular subgroup of patients. We previously reported only small differences between patients discharged with and without left ventricular ejection fraction determination.

Follow-up

Patients were followed up by telephone interview at 3, 6, and 12 months after initial admission. Information on death was gathered from hospital records or death certificates. Telephone interviews were sometimes conducted with the attending physician or the family to clarify details. A committee reviewed all relevant information and reached a consensus opinion whenever doubt existed as to the cause of death. Death was considered cardiac related when death was secondary to a new myocardial infarction, extension of the myocardial infarction, congestive heart failure, shock, cardiac procedures...
or surgery, or when sudden (due to fatal arrhythmia or sudden unexpected death with exact cause unknown but presumed to be cardiac related). One year follow-up was obtained in 99% of the patients included in the study.

Statistical Analysis

All continuous variables are mean ± SD. Univariate statistical analysis by χ² was applied for discrete variables and by t test for continuous variables to assess the differences between patients with Q wave and non-Q wave infarction. Survival curves for different subpopulations were compared by the Mantel-Cox statistical method as calculated by the survival function program.\textsuperscript{35} Multivariate analyses (linear discrimination) assessed the independent prognostic importance of the type of myocardial infarction (non-Q wave vs. Q wave) after adjusting for other variables.

Results

Of the 2,024 patients entered in the data base, the type and site of infarction could be localized in 1,869. Non–Q wave infarction was present in 444 patients (22% of the entire study population), Q wave was present in 1,425 (70%), and location was indeterminate in 155 (8%). Clinical characteristics of the Q wave and non–Q wave groups are given in Table 1.

Patients with non–Q wave infarction were slightly (but significantly) older, had a somewhat higher percentage of women, and, much more often, had a history of previous myocardial infarction (46% vs. 24%) or congestive heart failure (21% vs. 8%) than patients with Q wave myocardial infarction. Their infarction size was smaller, as assessed by a much lower peak creatine kinase level, the incidence of left ventricular failure in the hospital was somewhat lower (40% vs. 49%), and the residual left ventricular ejection fraction was higher (Table 1). Patients with non–Q wave infarction more often had persistent ischemic pain in the hospital, and significant angina pectoris was more common in the year after discharge (65% vs. 46%). Patients with non–Q wave infarction were more often on β-blockers than patients with Q wave infarction (56% vs. 42%, p<0.0001). Also, the incidence of complex ventricular arrhythmias was higher in the non–Q wave group during predischarge monitoring.

In-hospital mortality tended to be lower in patients with non–Q wave infarction (8.1% vs. 11.5%, NS, p<0.06; Table 1), whereas their 1-year mortality was slightly higher (13.7% vs. 9.2%, p<0.05, Table 1) than in patients with Q wave infarction. However, total 1-year mortalities were nearly equal (Figure 1, top panel).

Because of the higher incidence of previous myocardial infarction and the older age observed in

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Q Wave MI</th>
<th>Non–Q wave MI</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients (n)</td>
<td>1,425</td>
<td>444</td>
<td></td>
</tr>
<tr>
<td>Age (yr)</td>
<td>63±12</td>
<td>65±12</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Male (%)</td>
<td>76</td>
<td>70</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Previous MI (%)</td>
<td>24</td>
<td>46</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Congestive heart failure by history (%)</td>
<td>8</td>
<td>21</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>LV failure (%)</td>
<td>49</td>
<td>40</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Basilar rales (%)</td>
<td>67</td>
<td>62</td>
<td>NS</td>
</tr>
<tr>
<td>Rales above scapulæ (%)</td>
<td>14</td>
<td>15</td>
<td>NS</td>
</tr>
<tr>
<td>S3 gallop (%)</td>
<td>50</td>
<td>39</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Maximum grade pulmonary congestion ≥2 (%)</td>
<td>27</td>
<td>23</td>
<td>NS</td>
</tr>
<tr>
<td>Maximum creatine kinase (IU/l)</td>
<td>1,479±1,067</td>
<td>633±582</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Recurrent pain (%)</td>
<td>19</td>
<td>27</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Extension of MI (%)</td>
<td>6</td>
<td>7</td>
<td>NS</td>
</tr>
<tr>
<td>In-hospital cardiac mortality (%)</td>
<td>11.5</td>
<td>8.1</td>
<td>p&lt;0.06</td>
</tr>
<tr>
<td>Patients discharged and followed for 1 year (n)</td>
<td>1,231</td>
<td>403</td>
<td></td>
</tr>
<tr>
<td>β-Blocker therapy at discharge (%)</td>
<td>42</td>
<td>56</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>LV ejection fraction</td>
<td>0.46±0.14</td>
<td>0.52±0.15</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Complex premature ventricular contraction (%)</td>
<td>45</td>
<td>48</td>
<td>NS</td>
</tr>
<tr>
<td>Recurrent nonfatal MI (%)</td>
<td>4</td>
<td>6</td>
<td>NS</td>
</tr>
<tr>
<td>Nonfatal and fatal MI (%)</td>
<td>6</td>
<td>9</td>
<td>NS</td>
</tr>
<tr>
<td>Angina (NYHA≥II) (%)</td>
<td>46</td>
<td>65</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>CABG (%)</td>
<td>11</td>
<td>13</td>
<td>NS</td>
</tr>
<tr>
<td>Mortality from discharge to 1 year (%)</td>
<td>9.2</td>
<td>13.7</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Total mortality from admission to 1 year (%)</td>
<td>19.5</td>
<td>20.4</td>
<td>NS</td>
</tr>
</tbody>
</table>

MI, myocardial infarction; LV, left ventricular; NYHA, New York Heart Association; CABG, coronary artery bypass graft surgery.
patients with non-Q wave compared with those with Q wave infarction by univariate analysis, patients older or younger than 70 years of age, with and without previous myocardial infarction, were analyzed separately. Because of the small sizes of the subgroups, no attempt was made to categorize patients by the presence or absence of previous congestive heart failure. Furthermore, 75% of patients with history of congestive heart failure had previous myocardial infarction.

**Mortality According to History of Previous Myocardial Infarction**

Figure 1 (bottom panel) shows survival curves from hospital admission to 1 year after discharge in patients after Q wave or non-Q wave infarction grouped by the presence or absence of previous myocardial infarction. In patients without previous myocardial infarction, mortality of patients with Q wave and non-Q wave infarction was similar at the end of 1 year (16% vs. 15%); survival curves again showed a higher in-hospital mortality, but a lower 1-year mortality after hospital discharge, in patients with Q wave than in those with non-Q wave infarction (Figure 1, bottom panel; Table 2). In patients with previous myocardial infarction, mortality in both groups was higher than in those without previous infarction. Mortality was slightly lower, but not significantly, at 1 year in those with non-Q wave than in those with Q wave infarction (26% vs. 31%, NS) due to a slightly lower in-hospital mortality.

**Mortality According to Age and History of Previous Myocardial Infarction**

In patients less than 70 years of age without previous infarction (Figure 2, top panel), mortality was generally low for those with Q wave and non-Q wave infarction. In patients with previous infarction, mortality was not different whether Q wave or non-Q wave infarction was present (total 1-year mortality was 26% and 25%, respectively, NS). No increased early mortality occurred in this age group for those with Q wave infarction.

Patients 70 years of age or older with Q wave infarction had an increased in-hospital mortality compared with those with non-Q wave infarction, whether or not they had a previous myocardial infarction (Figure 2, bottom panel; Table 2). By 1 year, mortality was similar in patients with Q wave or non-Q wave infarction who had no previous
infarction (33% vs. 30%, NS; Figure 2, bottom panel). These nearly equal mortalities by 1 year are due to the increased mortality from the time of hospital discharge to 1 year in patients older than 70 years of age (Table 3). In patients with previous myocardial infarction, those with Q wave infarction had a higher mortality by 1 year compared with those with non-Q wave infarction (46% vs. 29%; *p* < 0.052; Figure 2, bottom panel), and this trend was present both in the hospital (Table 2) and after discharge (Table 3).

### Clinical Events

Clinical events in the hospital, including recurrent chest pain, extension of the myocardial infarction, and death are shown in Table 2 by the presence or absence of a previous myocardial infarction and by age group. Recurrent chest pain tended to be more common in patients with non-Q wave than in those with Q wave infarction (Table 1) although this was not statistically significant in the subgroup analysis (Table 2). In all subgroups, the incidence of infarct extension was similar in patients with Q wave or non-Q wave infarction.

Clinical events after hospital discharge are shown in Table 3 for patients with and without previous myocardial infarction grouped by age categories. Recurrent nonfatal myocardial infarction was more common in patients 70 years of age or less with non-Q wave than in those with Q wave infarction. This was not a trend in patients older than 70 years of age. Recurrent angina was also more common in most subgroups of patients with non-Q wave than in those with Q wave infarction (Table 3) and was significantly different for the total group (Table 1). The slightly increased incidence of coronary bypass surgery between patients with Q wave or non-Q wave infarction was not statistically significant.

### Multivariate Analysis

After other important prognostic factors, particularly age, history of previous myocardial infarction, and history of congestive heart failure, were included in stepwise multivariate analyses, the type of infarction (Q wave or non-Q wave) did not enter the model for either in-hospital mortality, mortality from the time of discharge to 1 year, or overall mortality.

### Causes of Death

Causes of death are listed in Table 4. No significant differences were found between patients with Q wave or non-Q wave infarction during the hospital stay and to 1 year after discharge.

### Discussion

In our population, patients with non-Q wave infarction were somewhat older and had a much higher incidence of previous myocardial infarction and congestive heart failure than those with Q wave infarction as reported previously. Over-all, in patients with non-Q wave compared with those with Q wave infarction, in-hospital mortality was lower, and mortality after discharge was higher. However, total mortality at 1 year was similar in both groups. When the patients were grouped by the presence or absence of previous myocardial infarction, patients with Q wave or non-Q wave infarction and previous myocardial infarction had a higher overall 1-year mortality than those without previous myocardial infarction. Again, in these subgroups, in-hospital mortality was higher in patients with Q wave infarction than in those with non-Q wave wave infarction, and no significant difference remained at 1 year.

A much higher in-hospital mortality of patients with Q wave compared with those with non-Q wave infarction was apparent in the older patients (>70 years) but not in younger patients. In patients...
who were older than 70 years of age without previous myocardial infarction, only those with non-Q wave infarction compared with those with Q wave infarction had increased mortality after hospital discharge to 1 year. In younger patients with and without previous myocardial infarction, 1-year mortalities after discharge were similar between those with non-Q wave and Q wave infarction. The cause for the overall lower early mortality, but higher late mortality, in patients with non-Q wave compared with those with Q wave infarction (influenced markedly by the elderly age group) is not readily apparent. Residual ischemia was probably more common in patients with non-Q wave than in those with Q wave infarction as assessed by a higher incidence of recurrent angina. However, the higher rates of infarct extension and recurrent myocardial infarction during the hospital stay and coronary artery bypass surgery after discharge were not statistically significant in the younger patients with non-Q wave infarction, and these higher rates were absent in the elderly patients when patients with non-Q wave and Q wave infarction were compared. Our findings indicate that a general policy of invasive management of patients with non-Q wave infarction may not be appropriate in the younger patient population (≤70 years) without ischemic events.

**Previous Studies**

Previous studies have shown various clinical outcomes in patients with non-Q wave infarction. In-hospital mortality has been shown to be lower and mortality after hospital discharge was either similar or higher in patients with Q wave infarction. Furthermore, mortality after hospital discharge was either similar or higher in patients with non-Q wave than in those with Q wave infarction. Differences between studies may be due to a number of factors. Many studies did not separate patients with or without previous myocardial infarction, despite the high incidence of previous myocardial infarction usually seen in patients with non-Q wave myocardial infarction. Similarly, differences in age between groups of patients were often not accounted for. Also, many studies included small numbers of patients, and these reported only in-hospital or postdischarge clinical outcome.

Only a few studies have reported a favorable clinical outcome in patients with a first non-Q wave infarction. Mahony et al reported an excellent

**Figure 2.** Survival curves for patients grouped by age. Top panel, patients 70 years of age or younger; bottom panel, patients older than 70 years of age. See text for comments.
in-hospital and 1-year survival rate in 24 patients without previous myocardial infarction but with a first non-Q wave infarction. Recurrent ischemic events were not reported. Similarly, Coll et al reported a good long-term survival rate in 28 patients with a first non-Q wave (mean age, 46±10 years) compared with 430 patients with Q wave infarction (mean age, 51±7 years). They also reported no significant increase in subsequent coronary events in this small group of patients. Krone et al reported a favorable outcome of 41 patients, less than 60 years of age, after a first non-Q wave infarction. In their study, for the first time, the importance of age was emphasized because patients older than 60 years of age with non-Q wave infarction (n=53) showed a higher late mortality. In these studies, the cause of death was not reported. Recently, the Multicenter Investigation of Limitation of Infarct Size (MILIS) group reported a similar 30-month survival rate between 323 patients with a first Q wave and 148 patients with a first non-Q wave infarction. In their study, only patients less than 76 years of age were included. Furthermore, they did not report the survival rate of patients with previous myocardial infarction. Our study extends the findings of these previous reports in a large patient population with and without previous myocardial infarction. It shows that small overall differences in mortality persist at 1 year between patients with Q wave or non-Q wave infarction in the groups with or without previous myocardial infarction. More important, our study emphasizes the favorable early and late mortality rates in younger patients without prior infarction and non-Q wave infarction (not different from those with Q wave infarction) and emphasizes the lack of difference between types of infarction in younger patients with prior infarction.

A varying incidence of recurrent ischemic events has been reported by others in patients after non-Q wave myocardial infarction. In the Multicenter Diltiazem Postinfarction Trial Research Group (MDPIT) study, the combined event rate (new infarction and death) at 1 year was 9% and 15% for patients receiving diltiazem or placebo, respectively. The incidence of reinfarction alone was not given but was undoubtedly lower. In a study by Krone et al, reinfarction occurred in 8.5% of patients with non-Q wave infarction during the 1st year compared with 4.9% and 8.3% for patients with Q wave infarction (with small and large infarcts, respectively). In the study by Fabricius-Bjerre et al, the 5-year incidence of nonfatal reinfarction was 13.3% for patients with non-Q wave infarction and 11.8% for those with Q wave infarction. Gibson et al reported a high reinfarction rate of 18.4% and 6.5%, an incidence of unstable angina of 36% and 22%, and an incidence of revascularization of 33% and 19% in 241 patients after non-Q wave (n=87) and Q wave (n=154) infarction, respectively. Although we found similar (nonsignificant) trends in younger patients in our study, these differences were not consistent in older patients. Similar nonsignificant trends were noted for myocardial infarct extension. The pattern of our results resembles those reported by the MILIS group. In that study, patients (all less than 76 years of age) with non-Q wave infarction had an incidence of reinfarction of 16% and coronary artery bypass surgery of 10% compared with 14% and 10%, respectively, for patients with Q wave infarction during a longer follow-up of 30 months. The differences in the incidence of recurrent ischemic

### Table 3. Clinical Events to One Year After Hospital Discharge

<table>
<thead>
<tr>
<th>Clinical event</th>
<th>No previous MI</th>
<th>Previous MI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Q Wave</td>
<td>Non-Q wave</td>
</tr>
<tr>
<td>All patients (n)</td>
<td>950</td>
<td>227</td>
</tr>
<tr>
<td>Recurrent MI (%)</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Recurrent angina (%)</td>
<td>42*</td>
<td>58</td>
</tr>
<tr>
<td>CABG (%)</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>Death (%)</td>
<td>6.8‡</td>
<td>11.7</td>
</tr>
<tr>
<td>≤70 Yr (n)</td>
<td>731</td>
<td>154</td>
</tr>
<tr>
<td>Recurrent MI (%)</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Recurrent angina (%)</td>
<td>42</td>
<td>57</td>
</tr>
<tr>
<td>CABG (%)</td>
<td>15</td>
<td>18</td>
</tr>
<tr>
<td>Death (%)</td>
<td>4.4</td>
<td>5.3</td>
</tr>
<tr>
<td>&gt;70 Yr (n)</td>
<td>219</td>
<td>73</td>
</tr>
<tr>
<td>Recurrent MI (%)</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Recurrent angina (%)</td>
<td>41‡</td>
<td>60</td>
</tr>
<tr>
<td>CABG (%)</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Death (%)</td>
<td>14.8</td>
<td>25.0</td>
</tr>
</tbody>
</table>

MI, myocardial infarction; CABG, coronary artery bypass graft surgery.

* p<0.001; † p<0.01; ‡ p<0.05.
events between studies may be due to a number of factors such as patient selection criteria used to define recurrent ischemic events, or the effects of changing surgical or medical therapy.

Maisel et al\textsuperscript{29} of our institution have previously reported an increased mortality in patients with non–Q wave infarction and infarct extension. In the present analysis, we show that the overall impact of recurrent ischemic events is not significantly different in patients with non–Q wave or Q wave infarction. Furthermore, infarct extension and recurrent infarction were uncommon causes of death in patients with Q wave or non–Q wave infarction. However, because causes of late death were usually determined clinically, we cannot exclude either ischemia or new infarction as the triggering event leading to death in some patients who died suddenly or from congestive heart failure.

**Potential Limitations**

In any retrospective study with many statistical comparisons among subgroups, it is likely that some statistical differences could be due to chance alone. Also, as the subgroup sizes become smaller, the statistical power to detect real differences decreases. However, our results are consistent with other smaller studies that have focused on small subsets of patients.

Coronary artery bypass surgery was performed slightly more often in patients with non–Q wave than in those with Q wave myocardial infarction. However, the difference was small, probably because patients in this study were admitted before 1984 when a less aggressive surgical approach was taken in patients regardless of type of infarction. The extent to which such procedures or the use of medications such as \( \beta \)-blockers influenced clinical outcome is unknown. However, it is unlikely that differences in therapy of the magnitude observed in this study had a greater influence on prognosis in one group than in the other. In the 155 patients with indeterminate infarct location due to conduction abnormalities, some patients could have been included in the non–Q wave infarct group if their atrioventricular conduction had been normal. However, this probably would not have changed the overall results of our study because of the small number of such patients.

Finally, this population includes more older patients than some, in which age limits were set. However, the finding that 23\% of our total population were older than 70 years of age reflects the admission profile in many hospitals, and it has allowed stratification by age and history of myocardial infarction, which are factors that carry important implications for the management of patients with non–Q wave infarction.

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References

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