Acute Myocardial Infarction in the Elderly

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Cardiovascular disease is the most common cause of death in the elderly. In fact, the cardiovascular disease is the number one cause of death in women and the number two cause in men of 65 years or over in Japan.

We studied the clinical characteristics and significances of acute myocardial infarction as they relate to the aged.

One hundred and forty four patients over 65 years with acute myocardial infarction were compared with 296 patients under 65 years who had acute myocardial infarction.

A significant increase in acute myocardial infarction in the females of the elderly group was observed.

Left ventricular catheterization, left ventricular angiography and coronary cineangiothraphy were performed on all the patients soon after admission. (Table I)

Left ventricular ejection fraction (LVEF) was calculated by a 45° RAO left ventriculograph. Coronary cineangiography was performed from several angles, initially in the coronary artery not suspected of being responsible for acute myocardial infarction. Degree of stenosis was decided by AHA definition.

Killip's classification. (Table II).

According to Killip's classification on admission, there were no differences in clinical symptoms between the elderly and the non-elderly.

Elderly people do not always suffer from serious symptoms on admission, but some patients become suddenly worse after admission. Past-illness (Graph 1)

Re-infarction is commonly encountered in the elderly and strongly influences their morbidity and mortality.

Coronary cineangiographic findings.

(Table III)

Coronary arteries were cineangiographically examined in those patients at an acute stage of myocardial infarction on admission.

The incidence of total occlusion of the infarct-related coronary artery was not different between the elderly and the nonelderly. But collateral vessels to the completely obstructed infarct-related artery were significantly more poorly developed at acute stage in elderly persons.

On the other hand, severe multiple vessel disease (≥ 90%) was significantly frequently present in elderly persons. (Table IV) Coronary cineangiographic findings in the aged with acute myocardial infarction are characterized by poorly developed collateral vessels to the infarct-related coronary artery and severe multiple vessel disease.

Reperfusion Therapy. (Table V)

All the patients with acute myocardial infarction were mainly treated with intracoronary thrombolysis and percutaneous transluminal coronary angioplasty (PTCA). Intracoronary thrombolysis (70 pts) and PTCA (29 pts) were performed directly and after thrombolysis in 99 elderly patients with total occlusion of an infarct-related artery. PTCA (12 pts) and emergency coronary bypass graft operation (6 pts) were

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454 Japanese Circulation Journal Vol. 52, May 1988
TABLE I CHARACTERISTICS

<table>
<thead>
<tr>
<th></th>
<th>Elderly</th>
<th>Male 98 : Female 46</th>
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<tbody>
<tr>
<td></td>
<td>144 patients</td>
<td>mean ; 71.3 ± 4.3 years of age</td>
</tr>
<tr>
<td>65 years of age or older</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-elderly</td>
<td>296 patients</td>
<td>Male 256 : Female 40</td>
</tr>
<tr>
<td>65 years of age or younger</td>
<td></td>
<td>mean ; 53.7 ± 7.6 years of age</td>
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</table>

31.9% : 13.5% (p < 0.001)

(% or female in elderly group ; % of female in non-elderly group)

Significant increase of acute myocardial infarction of female in elderly group

EVOLVING HOURS FROM CARDIAC ATTACK TO CAG EXAMINATION

<table>
<thead>
<tr>
<th></th>
<th>Elderly group</th>
<th>6.8 ± 8.2 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-elderly group</td>
<td>6.1 ± 5.9 hours</td>
<td></td>
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</table>

TABLE II KILLIP'S CLASSIFICATION ON ADMISSION

<table>
<thead>
<tr>
<th></th>
<th>Elderly group</th>
<th>Non-elderly group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Killip I</td>
<td>121</td>
<td>259</td>
</tr>
<tr>
<td>II</td>
<td>14</td>
<td>25</td>
</tr>
<tr>
<td>III</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>IV</td>
<td>3</td>
<td>9</td>
</tr>
</tbody>
</table>

Killip II, III, IV

<table>
<thead>
<tr>
<th></th>
<th>Elderly group</th>
<th>23 (16.0%)</th>
<th>N.S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-elderly group</td>
<td>37 (12.5%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

performed in 45 aged patients with severe incomplete obstruction.

No difference in the success rate of reperfusion therapy was found for the aged. As one of the aims of this study was to determine the effects on left ventricular function after coronary reperfusion therapy, LVEF was angiographically estimated at acute stage and chronic stage (4 weeks later) in patients with anterior wall infarction. LVEF was shown to be significantly improved between acute stage and chronic stage after successful coronary reperfusion therapy. (Graph 2)

Hospital mortality (Table VI)

Twenty-seven of the 144 aged patients died during hospitalization (18.8%), compared with 25 of the 296 younger patients (8.2%). The in-hospital mortality from acute myocardial infarction rises significantly with advancing age.

The clinical features of acute myocardial infarction in the elderly are quite mild-intense dyspnea, syncopal attacks, pulmonary edema, weakness, atypical chest pain, nausea or vomiting, and a fall in blood pressure. Even if they have milder symptoms on admission, we must take note of their clinical signs.

These are easily associated with pump failure-

![Fig.1](chart.png)

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TABLE III  CAG FINDINGS AT ACUTE STAGE 1

1. Infarct-related Coronary Artery
   Elderly group: complete obstruction 99 (68.8%)
                 incomplete obstruction 45 (31.3%)
   Non-elderly group: complete obstruction 192 (64.9%)
                      incomplete obstruction 104 (35.1%)

   N. S

2. Collateral to Infarct-related Coronary Artery at Acute Stage
   Elderly group: 50/99 (50.5%)
   Non-elderly group: 143/192 (74.4%)  \[ p < 0.001 \]

TABLE IV  CAG FINDINGS AT ACUTE STAGE 2

1. Infarct-related Coronary Artery

<table>
<thead>
<tr>
<th></th>
<th>LAD</th>
<th>LCX</th>
<th>RCA</th>
<th>LMT</th>
<th>B-Graft</th>
<th>unidentified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elderly group</td>
<td>75</td>
<td>17</td>
<td>43</td>
<td>1</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Non-elderly group</td>
<td>152</td>
<td>38</td>
<td>84</td>
<td>5</td>
<td>2</td>
<td>17</td>
</tr>
</tbody>
</table>

2. Number of Coronary Artery with Significant stenosis
   (Significant \( \geq 90\%)\) (AHA)

<table>
<thead>
<tr>
<th></th>
<th>3 vessels</th>
<th>2 vessels</th>
<th>1 vessel</th>
<th>0 vessel</th>
<th>LMT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elderly group</td>
<td>17</td>
<td>39</td>
<td>78</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Non-elderly group</td>
<td>30</td>
<td>51</td>
<td>171</td>
<td>37</td>
<td>7</td>
</tr>
</tbody>
</table>

   (If the patients had Significant stenosis \( \geq 75\%) in LMT, they were classified as LMT group.)

Multiple Vessels Disease (3 vessels + 2 vessels)

<table>
<thead>
<tr>
<th></th>
<th>Elderly group</th>
<th>Non-elderly group</th>
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<tbody>
<tr>
<td></td>
<td>56 (38.9%)</td>
<td>81 (27.4%)</td>
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</tbody>
</table>

\[ p < 0.005 \]

TABLE V  REPERFUSION THERAPY 1

1. Success Rate
   Elderly group: 68/99 (68.7%)
   Non-elderly group: 136/192 (70.8%)

2. Stenosis of Infarct-related Coronary Artery at Chronic Stage
   (except PTCA therapy group at acute stage)
   Elderly group: 86 \( \pm 13\% \) (n = 32)
   Non-elderly group: 77 \( \pm 23\% \) (n = 32)  \[ p < 0.05 \]

As cause of mortality, the elderly are likely to have congestive heart failure and re-infarction. Non-cardiac death in the aged should not be overlooked, however. (Table VII)

Complications (Table VIII):

The complications of acute myocardial infarction in the elderly are the same as those in younger people but they occur seriously with increased frequency. Acute confusion and worsening of the renal function disturbances are conspicuous in the aged.

If a patient lapses into confusion, the medical schedule for his acute myocardial infarction during early hospitalization has to be disrupted. A strong sedative has to be prescribed for the confusion before any other procedure is carried out.

Table VI MORTALITY 1

1. Mortality in Hospital
   Elderly group : 27/144 18.8%  \( P < 0.001 \)
   Non-elderly group : 25/296 8.4%

2. Causes of Mortality
   Elderly group  Non-elderly group
   Pump failure     11    13
   Re-infarction    7     3
   Cardiac rupture  4     4
   Non-cardiac death 5    1
   (lung cancer 1, renal failure 1, pneumonia 1, gastric ulcer 1)

Table VII MORTALITY 2

3. Mortality Rate and Killip’s Classification on Admission
   Killip I  Elderly group  Non-elderly group
            14/121  14/259
           9/14     6/25
           4/6     1/3
           0/3     4/9
   Killip IV : 27/144 (18.8%) \( P < 0.001 \)
   Killip II : 25/296 (8.4%)

3-1. Mortality Rate of Killip I, II group
   Elderly group : 27/144 (18.8%)
   Non-elderly group : 25/296 (8.4%)

3-2. Mortality causes of Killip I, II group
   Elderly group  Non-elderly group
   Pump failure     9 (6.3%)  8 (2.7%)
   Re-infarction    7 (4.9%)  3 (1.0%)
   Cardiac rupture  3     4
   Non-cardiac death 4    1
   Operative death   9    4

Discussion

The variable presentation of acute myocardial infarction in the elderly is generally well recognized.

Judging from Killip’s classification, there are no age-related differences in their clinical symptoms, but in-hospital mortality rate is significantly higher in the elderly.

Especially in the elderly, mortality according to Killip’s class I and II on admission is significantly higher.

Wilcoxon reported that hospital mortality rose from 8% in the youngest group to 35% in the oldest.

It is important to emphasize the influence of the patient’s age on mortality. Mortality increased suddenly in patients aged 75 years or older and they had a 10 fold higher in-hospital
mortality? These were related to an increased incidence of anterior acute myocardial infarction, healed prior myocardial infarction, multiple vessel disease and extensive myocardial necrosis.

Serious symptoms in the elderly developed during early hospitalization. Congestive heart failure, cardiogenic shock and re-infarction occurred frequently. We would point out the characteristics of the coronary artery during the early phase of myocardial infarction in the elderly as a possible cause.

Pathologically, the main features of atherosclerosis in the elderly are the presence of increased fibrosis, in the plaques and marked calcification of the vessels. From our clinical experiences, aged people with acute myocardial infarction have advanced coronary sclerosis such as severe multiple vessel disease and poorly developed collateral vessels to the completely obstructed coronary artery related to infarction.

In this way, they easily develop severe coronary circulatory problems and become critically ill.

One of the goals in managing any patient with a myocardial infarct to reduce to a minimum the amount of myocardial injury and necrosis.

The possible key to successful limitation of infarct size seems to be early reperfusion of the infarct-related coronary artery. In a comparison of the same region as in myocardial infarction, LVEF in the aged was also thought to be improved after reperfusion. On the other hand, emergency coronary artery bypass graft operation was successfully performed in 6 aged patients who had acute myocardial infarction with severe multiple vessel disease. Advanced age does not preclude successful surgical outcome.

Weintraub concluded that older patients with postinfarction cardiogenic shock may also benefit from early operation.

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