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.¹

Left ventricular catheterization, left ventricular angiography and coronary cineangiography 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)

Key words:

Acute myocardial infarction
Elderly
Acute coronary angiographic findings

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 non-elderly. 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 ($\geq 90\%$) 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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TABLE I CHARACTERISTICS

Elderly	144 patients	Male 98 : Female 46
65 years of age or older		mean ; 71.3 ± 4.3 years of age
Non-elderly	296 patients	Male 256 : Female 40
65 years of age or younger		mean ; 53.7 ± 7.6 years of age
$31.9\% : 13.5\%$ ($p < 0.001$)		

(% of 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

Elderly group	6.8 ± 8.2 hours
Non-elderly group	6.1 ± 5.9 hours

TABLE II KILLIP'S CLASSIFICATION ON ADMISSION

	Elderly group	Non-elderly group
Killip I	121	259
II	14	25
III	6	3
IV	3	9
Killip II, III, IV		
Elderly group	23 (16.0%)	] N.S
Non-elderly group	37 (12.5%)	

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.⁵

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.

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%)	] $p < 0.001$
Non-elderly group	:	143/192	(74.4%)	

TABLE IV CAG FINDINGS AT ACUTE STAGE 2

1. Infarct-related Coronary Artery						
	LAD	LCX	RCA	LMT	B-Graft	unidentified
Elderly group	75	17	43	1	4	4
Non-elderly group	152	38	84	5	2	17
2. Number of Coronary Artery with Significant stenosis						
(Significant $\geq 90\%$) (AHA)						
	3 vessels	2 vessels	1 vessels	0 vessel	LMT	
Elderly group	17	39	78	5	5	
Non-elderly group	30	51	171	37	7	
(If the patients had Significant stenosis ($\geq 75\%$) in LMT; they were classified as LMT group.)						
Multiple Vessels Disease (3 vessels + 2 vessels)						
Elderly group	56 (38.9%)	] $p < 0.005$				
Non-elderly group	81 (27.4%)					

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	: $77 \pm 23\%$ ($n = 52$)] $p < 0.05$

congestive heart failure and cardiogenic shock, reinfarction, supra-or ventricular arrhythmias, atrioventricular block and myocardial rupture.

Older patients with acute myocardial infarction, in Killip's class I and II, have significantly higher mortality than their younger

counterparts.

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 confusion⁸ 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.

Fig.2.

TABLE VI MORTALITY 1

1. Mortality in Hospital		
Elderly group	: 27/144	18.8%
Non-elderly group	: 25/296	8.4%
$p < 0.001$		
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) (lung infarction 1) (renal failure 1) (pneumonia 1) (gastric ulcer 1)	

TABLE VII MORTALITY 2

3. Mortality Rate and Killip's Classification on Admission		
	Elderly group	Non-elderly group
Killip I	14/121	14/259
II	9/14	6/25
III	4/6	1/3
IV	0/3	4/9
3-1. Mortality Rate of Killip I, II group		
Elderly group	: 27/144	(18.8%)
Non-elderly group	: 25/296	(8.4%)
$p < 0.01$		
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.

Wilcox² 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

TABLE VIII COMPLICATIONS

	Elderly group		Non-elderly group
Confusion	30 (54.5%)	— $p < 0.001$ —	9 (23.7%)
Renal failure	8 (14.5%)		3 (7.9%)
Gastro-intestinal hemorrhage	6		9
Pneumonia	4		5
Cerebro-vascular disease	4		5
Lung infarction	1		1
Malignant tumor	2		2

55/144 (38.2%) — $p < 0.01$ — 38/296 (12.8%)

COMPLICATIONS AS CAUSES OF DEATH

Elderly group	Gastric ulcer (hemorrhage)	1 patients
	Renal failure	2 patients
	Lung cancer	1 patients
	Pneumonia	1 patients

mortality.⁹ 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.¹⁰ 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.

Weintraub¹¹ concluded that older patients with postinfarction cardiogenic shock may also benefit from early operation.

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