

## Prognosis of octogenarian patients with acute myocardial infarction – a nationwide analysis from the Hungarian Myocardial Infarction Registry

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### Abstract

Little literature data is available regarding the frequency of the optimal treatment among the octogenarian myocardial infarction patient. The authors investigated the incidence of oldest old patients, comorbidities, hospital treatment and life expectancy of them in a nationwide, mandatory Hungarian Myocardial Infarction Registry (HUMIR). Between 1 January 2010 and 31 December 2015, 55910 AMI patients have registered from 90 hospitals all around in Hungary. At the time of hospital admission, 8065 (14.4%) patients were aged 80 years or older. This was the cohort group for the present analysis. All patients were followed for one year using the national death database. The average age were  $84.8 \pm 3.95$  years. The major part of the whole patient population was a woman (59.5 %), and more old patients (59.7 %) were treated with the diagnosis of non-ST-elevation myocardial infarction (NSTEMI). The comorbidities were more frequent in the NSTEMI patient group compared to the ST-elevation myocardial infarction (STEMI) patients. In the STEMI patient population, 69% of them underwent coronary angiography, in the case of 61 % primary percutaneous coronary intervention (PCI) was also carried out. In the case of 50.5 % of the patients with NSTEMI coronarography was done, at the same time, the rate of the catheter revascularisation was only 36 %. The thirty day and one-year mortality was higher in STEMI group comparing NSTEMI patients regardless of PCI. The STEMI and NSTEMI patients with PCI have better survival at thirty days and one year comparing to whole patient group with the same diagnosis: STEMI 20.6%, 34.2% vs. 28.9% and 43.6% and NSTEMI 10.4% and 22.5% versus 21.6% and 34.2%. Conclusions: In an unselected myocardial infarction patient population, a high number of oldest old patients were found. Octogenarian patients treated with PCI have better short and long term prognosis comparing to patients without revascularization.

## Introduction

The average age of the population is rising in the Western world, and this is also true for patients with acute myocardial infarction [1]. The optimal treatment of patients with ST-elevation myocardial infarction is the catheter opening of the vessel (primary coronary intervention=PCI) carried out on time[2]. It is known that elderly patients are less likely to receive revascularization compared to younger patients [3]. Our previous work has shown that invasive workup declines by age [4]. However little literature data is available regarding the frequency of the optimal treatment among the non-selected octogenarian myocardial infarction patients, the early and the late prognosis of this population. We investigated the frequency of oldest old patients, comorbidities, hospital treatment and life expectancy of them in a nationwide, mandatory myocardial infarction registry.

Methods:

The Hungarian Myocardial Infarction Registry (HUMIR) is a large, prospective, Internet-based registry designed to collect clinical and angiographic data on all consecutive patients treated for an event of myocardial infarction in 90 hospitals all around in Hungary, a country with 9.8 million residents. Since April 2014, HUMIR operates as a mandatory quality assurance system involving all invasive and non-invasive centers of cardiology. At the time of inclusion of patients to the current study, HUMIR operated partly on a voluntary basis[5]. The protocol of the survey is accordance with the Declaration of Helsinki and reviewed by the ethical board. All patients recorded in the HUMIR gave written informed consent. The myocardial infarction was diagnosed according to present guidelines[2]. The type of myocardial infarction was classified using the presenting ECG at the time of hospital admission: (ST elevation: STEMI; non-ST elevation: NSTEMI). All patients with

acute myocardial infarction (AMI) were eligible for enrolment. Between 1 January 2010 and 31 December 2015, 55910 AMI patients were registered. At the time of hospital admission, 8065 (14.4%) patients were aged 80 years or older, and this is the cohort group for the present analysis. In the hospital, we recorded the patient age, sex, co-morbidities, heart rate and blood pressure at the time of admission, serum creatinine, mode of treatment (percutan intervention or conservative treatment), and complications. All patients were followed for one year using the national death database, and all-cause mortality was recorded. Thirty days and one-year mortality were calculated. Statistical analysis: Continuous variables are presented as mean  $\pm$ SD. Categorical variables are expressed as frequencies and percentages. Categorical variables were compared using  $\chi^2$  test. In addition to descriptive statistics, a multivariate logistic regression model was developed for the analysis 30-day mortality according to age, which controlled for sex, PCI, a different type of AMI, various comorbidities, heart rate and blood pressure at the time of admission and serum creatinine.

## Results

During the examined period 14.4 % of the patients were 80-year-old or older. In point of the whole population - in the case of both types of infarctions - the average age were  $84.8 \pm 3.95$ . Examining by gender - both in STEMI and NSTEMI - the women were slightly older: in STEMI the average age of the men and the women were  $84.4 \pm 3.79$  and  $85.0 \pm 3.96$  years, furthermore, in the case of NSTEMI it was  $84.2 \pm 3.6$  and  $85.1 \pm 4.08$ . The major part of the whole patient population was women (59.5 %), and more old patients (59.7 %) were treated with the diagnosis of NSTEMI.

### Comorbidities

In the examined patient populations, we indicated the frequency of the comorbidities in Table 1. In spite of the fact that the average age of both patient groups was the same, every examined

comorbidity was more frequent in the NSTEMI patient population. However, the abnormal serum creatinine value was more common in the STEMI group (25 % vs. 21.7 %).

**Table 1: Frequency of co-morbidities in different patient groups (%)**

	STEMI	NSTEMI
Hypertension	81.1	87.7
Diabetes mellitus	26.1	33.1
Peripheral artery disease	13.4	19.7
Previous stroke	13.9	17.1
Previous myocardial infarction	18.4	31.7

### Rate of the invasive treatment

In the STEMI patient population, 69% of them underwent coronary angiography, in the case of 61 % primary percutaneous coronary intervention was also carried out. In the case of 50.5 % of the patients with NSTEMI coronarography was done, at the same time, the rate of the catheter -revascularization was only 36 %.

### Complications during hospitalization

We summarized the complications during hospitalization in Table 2. In the STEMI patient population, the shock developing during hospital stay was more frequent; more resuscitations were carried out, the mechanical respiration and the usage of the intra-aortic balloon pump were more common comparing to NSTEMI patients.

**Table 2 : Complications during the hospital treatment (%)**

	STEMI	NSTEMI
Resuscitation	11.9	6.2
Shock	14.5	8.2
Mechanical ventilation	11.8	7.3
Intraaortic balloon pump	4.5	1.8

### The 30-day and the 1-year mortality

We indicated the mortality of the examined patient populations in Table 3. The mortality of patients with STEMI was higher in both period than the mortality of patients with NSTEMI. Patients treated with PCI have better short and long-term prognosis in both study group.

### Examination of the facts that affect the mortality

The factors that affect the mortality were examined by multi-factorial analysis (Table 4). According to multivariate analysis, age had a linear effect on mortality ( $r=0.6942$ ), with an odds ratio of 1.07 for each year increase (95%CI:1.04-1.09,  $\chi^2=28.8$ ,  $p<0.0001$ ). The effects of further covariates are shown in Table 4.

**Table 3: 30 day and 1-year mortality of different patient groups**

	STEMI patient group N=3249	NSTEMI patient group N=4816	STEMI patient group treated with pPCI N=1998	NSTEMI patient group treated with PCI N=1736
30-day mortality	28,9%	20.6%	21.6%	10.4%
1-year mortality	43,6%	38.6%	34.2%	22.5%

pPCI = primary percutan coronary intervention; PCI= percutan coronary intervention

**Table 4: Multivariate analysis of prognostic factors**

Variable	Odds ratio	95% confidence interval		$\chi^2$	p-value
Sex (female vs. male)	0.93	0.77	1.13	0.57	0.4507
PCI (no vs. yes)	2.30	1.89	2.81	66.8	<0.0001
Previous MI (no vs. yes)	1.09	0.88	1.35	0.61	0.4335
Hypertension (no vs. yes)	1.25	0.95	1.64	2.53	0.1119
Previous stroke (no vs. yes)	0.63	0.50	0.80	14.18	0.0002
Diabetes mellitus (no vs. yes)	0.75	0.61	0.91	8.02	0.0046
Peripheral artery disease (no vs. yes)	0.56	0.44	0.71	23.7	<0.0001
STEMI vs. NSTEMI	2.21	1.80	2.71	57.6	<0.0001

## Discussions

Cardiovascular disease is a leading cause of death in all industrialized countries. [6]. National registries permit assessments of the quality of care and outcomes for unselected patient population. Hungarian Myocardial Infarction Registry a nationwide, mandatory program for all 90 hospitals taking care for myocardial infarction patients. Data from other studies have shown that the increased life expectancy is resulting in a high number of old people with myocardial infarction [7], however we have limited data on hospital care, comorbidities, short and long term prognosis of this population because clinical trials exclude patients aged >75 or 80 years [8]. The aim of our present work was to investigate the real world care of oldest old, unselected patients with myocardial infarction using a database of the Hungarian Myocardial Infarction Registry. In our study, one among seven patients was 80 years old and older. We found the very high proportion of comorbidities, comparing to earlier studies [7, 9, 10]. In our pre-

sent study percutan intervention was performed in every second STEMI patient and every third patient with NSTEMI. In the SCAAR registry[7], the percutan intervention was substantially rare among this age group. Thirty days and one-year mortality were higher in STEMI patient group regardless the mode of treatment (PCI yes or no). Patients treated with PCI have a better prognosis in the STEMI and NSTEMI study group. Several other studies found similar results [7, 9, 11]. Multivariate analysis found that age, PCI, heart rate and blood pressure at hospital admissions, and serum creatinine have prognostic significance for survival.

## Conclusions

1. In an unselected myocardial infarction patient population, a high number of old patients were found.
2. Octogenarian patients treated with percutan coronary intervention have better short and long term prognosis comparing to patients without revascularization.

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