LONG-TERM PROGNOSIS IN PATIENTS WITH ACUTE MYOCARDIAL INFARCTION

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A b s t r a c t

The aim of the study was to investigate the influence of selected risk factors on long-term prognosis in patients with acute myocardial infarction (AMI). A retrospective analysis was made of survival data in 221 patients with AMI (mean age 67±12; range, 27 to 93 years) who were admitted to the coronary care unit of the 1st Department of Internal Medicine in Brno between June 9, 1992 and December 31, 1993. The follow-up period was 5 years. The cumulative mortality in the first year after admission to the coronary care unit was 30% and, in the second, third, fourth and fifth years, it was 35%, 39%, 41% and 43%, respectively. Five years after AMI, 80 (60%) men and 45 (52%) women survived. The younger patients (<65 years) died less frequently that the older ones ((65 years) and this difference was significant (13 of 80 (16%) *vs.* 83 of 141 (59 %), $P< 0.001$). Within 5 years of the observation period, out of 112 patients classified on admission as Killip class I or II of heart failure 41 (37%) died, while, in the patients classified as Killip class III or IV (12 persons), the mortality ratio was 75% ($P=0.051$); significantly more patients with Q-wave AMI died when compared with the non-Q-wave AMI patients (71 of 156 (46%) *vs.* 12 of 49 (24%) , $P< 0.01$). In 25 diabetic patients, the death rate was 84% (21 patients), in 105 non-diabetics, it was only 48 % (50 patients, $P0.01$). Anterior AMI was found in 114 subjects and 54 (47%) of them died, 96 patients had inferior infarction and 35 died (36%, $P=0.11$). Mortality was higher in hypertensives than in normotensives (18 of 81 (22%) and 3 of 43 (7%) patients died). The highest risk of death is within the first year after AMI. Factors negatively influencing prognosis after AMI were: age 65 years, presence of Q-wave on ECG recordings and diabetes mellitus. A trend towards higher mortality was found in the patients with anterior infarction, higher-grade heart failure on admission and arterial hypertension. This trend was generally higher in women than in men.

K e y   w o r d s

acute myocardial infarction, prognosis, hypertension, diabetes mellitus, thrombolysis

INTRODUCTION

Cardiovascular diseases are still the main cause of morbidity and mortality in developed countries as well as in the Czech Republic. There are lots of trials focused on prognosis and therapy, including its effectiveness, of acute myocardial infarction (AMI), but many of them have excluded some groups of patients (older patients, diabetics, etc.) or have choose patients according to their purpose (*12).* That is why real mortality is higher than shown by these projects. The aim of this study was to evaluate long-term prognosis in patients hospitalised with the diagnosis of AMI. We

were also interested to find out to what extent the site and size of AMI and certain associated diseases influence life expectancy after infarction.

MATERIALS AND METHODS

Consecutive patients with AMI admitted to the coronary care unit of the Bohunice Teaching Hospital between 9th June 1992 and 31st December 1993 were included in this retrospective study. The criterion for inclusion was the diagnosis of AMI in the discharge report.

Each of the selected patients received a questionnaire on diabetes, hypertension, smoking habits and revascularisation methods, i. e., percutaneous transluminal coronary angioplasty (PTCA) and coronary artery bypass graft (CABG). Patients were also asked to provide medical reports which resulted in their referral to hospital. In patients who did not respond or who died and their mortality data were not available, the relevant information was obtained from the citizen registry. The results were evaluated using standard statistical methods (chi-square test, t-test, mean and median).

The baseline characteristics of all patients are shown in *Table 1*. The median of the admission-to-death interval in the patients who died was 0.38 years. Cumulative mortality in the first year after admission to the coronary care unit was 30%; in the second, third, fourth and fifth years, it was 36%, 39%, 41% and 43%, respectively (*Fig 1*). Survival of the patients in the first year after admission is presented in *Fig. 2* which shows that 21% of all patients died within the first month of admission. Characteristics of the patients who died in the first year and during 5 years after AMI are shown in *Tables 2* and *3*.

RESULTS AND DISCUSSION

The basic parameters described in our study did not differ from those of similar studies (*2,4,6,12*). The total mortality at five years was also in agreement with the findings of other authors (*4,6*), as was the highest mortality in the first month after admission.

We did not confirm any association between prognosis after AMI and the patient's sex *(12)*. However, in our group, there was an apparent tendency to higher mortality in women than in men (*Tables 5 and* 6). This may be caused by a higher mean age of female patients, which is also considered to be the main factor by several other authors (*1,12*). Age higher than 65 years was also associated with significantly higher mortality (59% *vs.* 16% in younger patients, *Table 4*). The influence of age on short-term and long-term prognosis after AMI is well known (*1,2,4,5,6,9*).

The patients with non-Q-wave infarction had a better prognosis; 24% of them died in comparison with 46% of the patients with Q-wave infarction (*P*= 0.008). This may be due to the fact that non-Q infarction is associated with a relatively smaller mass of myocardial necrosis than is Q-wave infarction.
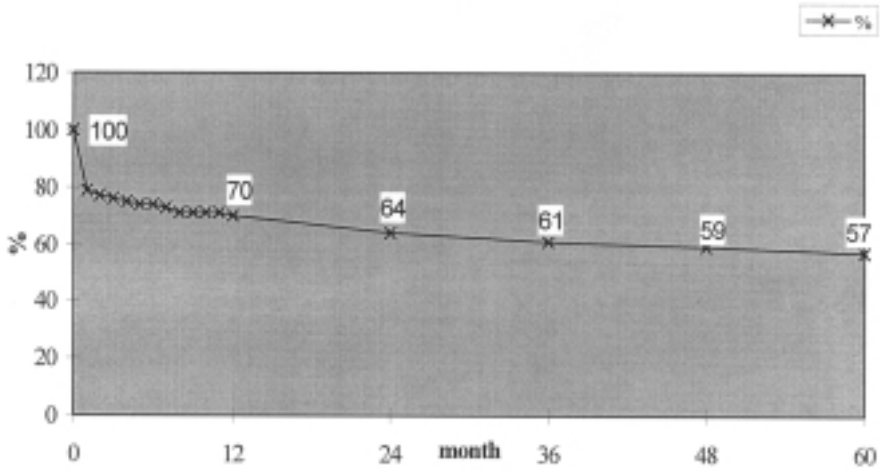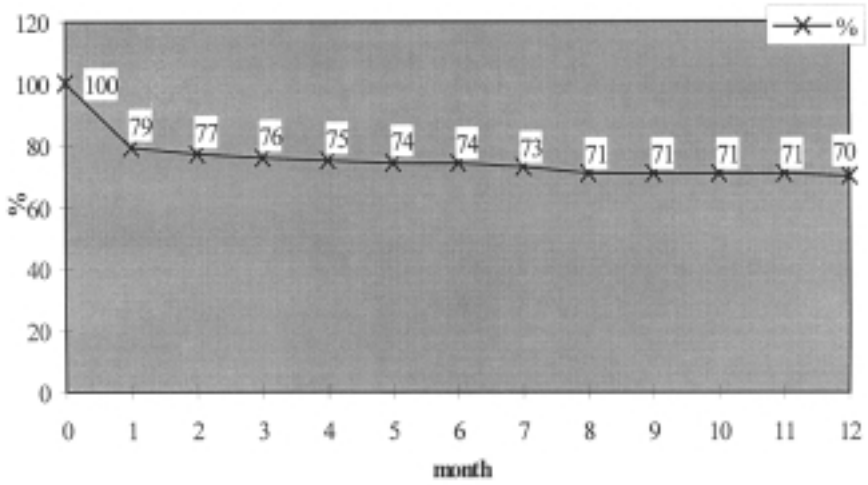
Fig. 1
Survival of patients after AMI

Fig. 2
Survival of patients within the 1st year

The patients with anterior infarction died more frequently than those with inferior AMI. This difference was not significant in contrast to the subgroup of patients who died within the first year (P=0.02).

The following facts may have been influenced by the lack of relevant data in the important part of the file. Reperfusion: Generally, contraindications of thrombolysis may be associated with a worse prognosis after infarction and this may contribute to a decrease in mortality in thrombolysed patients. Pre-hospital delay: This information was available in 117 patients (53 %). In these patients, mortality did not depend on the interval between the onset of first AMI symptoms and admission to hospital. The risk of sudden cardiac death increases with the duration of pre-hospital delay (15). Our study did not include patients who died

Table 1
Baseline characteristics of patients

Characteristic		No. of patients	%
Total no. of patients (221*)	Men	134	61
	Women	87	39
Age (221)	< 65 years	80	36
	≤ 65 years	141	64
Infarction (205)	Q-wave	156	76
	non-Q-wave	49	24
Location (221)	A/AS[3]	114	47
	I/IL[4]	96	43
	undetermined	11	5
Thrombolysis (125)	yes	42	34
Pre-hospital delay (117)	≤ 12 hours	87	74
	> 12 hours	30	26
Heart failure - Killip class (124)	I or II	112	90
	III or IV	12	10
History of AMI (221)		40	18
Diabetes mellitus (130)		25	19
Smoking habits on admission (112)		24	21
Arterial hypertension (124)		81	65
PTCA after discharge from hospital (94)		8	9
Bybass after discharge from hospital (105)		17	16
PTCA or CABG (94)		25	27

* Numbers of patients in whom relevant information was available are given in brackets PTCA, percutaneous transluminal coronary angioplasty; CABG, coronary artery bypass graft; A/AS, anterior site of AMI; I/IL, inferior site of AMI.

Table 2
Baseline characteristics in patients who died within the first year after AMI

Characteristic		Number	Deaths (%)	P-value
Total no.		67		
	Men	36	(27)	
	Women	31	(36)	0.15
Age				
	< 65 years	7	(9)	
	≤ 65 years	59	(42)	< 0.001
Infarction				
	Q-wave	48	(31)	
	non-Q-wave	8	(16)	0.045
Location				
	A/AS	41	(36)	
	I/IL	21	(22)	0.02
Thrombolysis				
	yes	6	(14)	
	no	32	(39)	0.005
Pre-hospital delay				
	≤ 12 h		(31)	
	> 12 h		(23)	0.42
Heart failure - Killip class				
	I or II	29	(26)	
	III or IV	9	(75)	0.03
History of AMI				
	yes	13	(33)	
	no	52	(30)	0.73
Diabetes mellitus				
	yes	13	(18)	
	no	1	(2)	NS
Smoking				
	yes	2	(8)	
	no	3	(3)	NS
Arterial hypertension				
	yes	9	(11)	
	no	1	(2)	NS
PTCA or CABG				
	yes	0	(0)	
	no	2	(1)	NS

PTCA, percutaneous transluminal coronary angioplasty; CABG, coronary artery bypass graft; A/AS, anterior site of AMI; I/IL, inferior site of AMI; NS, non-significant.

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Characteristic	Data available on admission	Deaths		
		Number	(%)	*P*-value
Total no.	221	96	(43)	
Men		54	(40)	
Women		42	(48)	0.24
Age	221			
< 65 years		13	(16)	
≤ 65 years		83	(59)	<0.001
Infarction	205			
Q-wave		71	(46)	
non-Q-wave		12	(24)	0.008
Location	221			
A/AS		54	(47)	
I/IL		35	(36)	0.11
uncertain	11			
Thrombolysis	125			
yes		7	(17)	
no		43	(52)	0.0002
Pre-hospital delay	117			
≤ 12 hours		33	(38)	
>12 hours		13	(43)	0.6
Heart failure – Killip class	124			
I or II		41	(37)	
III or IV		9	(75)	0.05
History of AMI	221			
yes		19	(48)	
no		78	(43)	0.61
Diabetes mellitus	130			
yes		21	(84)	
no		50	(48)	0.005
Smoking	112			
yes		2	(8)	
no		11	(13)	0.11
Arterial hypertension	124			
yes		18	(22)	
no		3	(7)	NS
PTCA	94			
yes		0	(0)	
no		7	(8)	NS
CABG	105			
yes		0	(0)	
no		8	(9)	NS
PTCA or CABG	94			
yes		0	(0)	
no		15	(9)	NS

PTCA, percutaneous transluminal coronary angioplasty; CABG, coronary artery bypass graft; A/AS, anterior site of AMI; I/IL, inferior site of AMI; NS, non-significant; AMI, acute myocardial infarction.

Table 4

Major risk factors in relation to patients'age

Risk factor	Patients below 65		Patients 65 and over		P-value
	No.	(%)	No.	(%)	
Infarction					
Q-wave	59	(38)	97	(62)	
non-Q-wave	20	(41)	29	(59)	0.71
Location					
A/AS	36	(32)	78	(68)	
I/IL	42	(44)	54	(56)	0.07
Thrombolysis					
yes	26	(62)	16	(38)	
no	23	(28)	60	(72)	0.0002
Pre-hospital delay					
≤ 12 h	33	(38)	54	(62)	
> 12 h	13	(43)	17	(57)	0.6
Diabetes mellitus					
yes	27	(38)	44	(62)	
no	34	(58)	25	(42)	0.026
Heart failure-Killip class					
I and II	44	(39)	68	(61)	
III and IV	2	(17)	10	(83)	0.36
Arterial hypertension					
yes	37	(46)	44	(54)	
no	23	(53)	20	(47)	0.1

Table 5
Mean age of admitted men and women

Patients	Mean age	SD	P-value
Women	70.51	12.46	
Men	64.98	11.27	0.0011

Age	Men		Women		*P*-value
	No.	(%)	No.	(%)	
≤ 60	6	14	2	13	0.95
>60 and ≤ 70	22	46	12	44	0.91
>70 and ≤ 80	15	48	11	44	0.74
>80	11	92	17	85	0.58

before admission and this may partially explain that there was no relationship between pre-hospital delay and mortality. Killip class: Grade I or II was linked with a lower death rate (37%), as compared with the 75 % death rate in the patients with Killip grade III or IV (*P*=0.05). A higher degree of heart failure on admission is an unfavorable factor for both short-term and long-term prognosis (*8*). Due to a low number of patients with a known degree of heart failure on admission (124 patients) in our study, this relationship was not significant. We found a trend towards higher mortality in the patients with a previous history of AMI.

In the group of patients younger that 65 years, only 27 (38%) had a history of diabetes, while, in the group of patients 65 years and older we found 44 (62%) diabetics (*P* =0.03) (*Table 4*). We confirmed, in accordance with other studies (*3,4,5,7*), that diabetes was an important risk factor influencing survival after AMI, because 84 % of our diabetic patients died *(P=0.05)*.

The history of arterial hypertension was associated with a trend towards a higher death rate (22% in the hypertensives *vs.* 7% in the normotensives). A high number (64%) of diabetics also had hypertension. In the patients without diabetes, only 26% had a history of hypertension.

Neither PTCA nor CABG influenced prognosis, but the number of patients who underwent revascularisation procedures after AMI was very low because 'in the early 1990s' only a relatively small proportion of patients after AMI underwent coronarography. The direct PTCA was not used in the treatment of AMI in that time (recruitment interval of 1992–1993), therefore, its effect could not be evaluated in our study.

There was no evidence of the effect of smoking on mortality in our study. This negative result can be explained, above all, by the fact that the information on

smoking habits in the patient's medical history is extremely unreliable. In addition, smoking is a habit that can be influenced and many patients change their lifestyles after AMI and stop smoking cigarettes.

Our study was based on a retrospective search and, therefore, we could not evaluate drug administration precisely, especially in the patients who died. It was also obvious that the results of such evaluation would be of low value, because a lot of changes had occurred in medical therapy since that *1992/1993*.

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DLOUHODOBÁ PROGNÓZA PACIENTŮ S AKUTNÍM INFARKTEM MYOKARDU

S o u h r n

Cílem studie bylo posoudit vliv vybraných rizikových faktorů na dlouhodobou prognózu pacientů po akutním infarktu myokardu.

Retrospektivně bylo sledováno po dobu 5–ti let 221 pacientů s akutním infarktem myokardu (střední věk 6712 let, rozmezí 27 až 93 let), hospitalizovaných na I. interní klinice FN Brno od 9.6.1992 do 31.12.1993.

Mortalita 1. rok činila 30%, po dvou letech 36%, po třech 39%, po čtyřech 41% a po pěti 43%. Pět let přežilo 80 (60%) mužů a 45 (52%) žen (p=ns). Úmrtnost do 65 let byla 16% (13 z 80), kdežto ve věku nad 65 let 59% (83 ze 141) (p<0.001). Pacientů s lehkou formou dysfunkce levé komory při přijetí (Killip 1 a 2) zemřelo 41 ze 112 (37%), zatímco pacientů s těžší formou (Killip 3 a 4) zemřelo 9 z 12 (75%) (p=0,051). 71 (46%) pacientů s Q infarktem ze 156 zemřelo, z 49 pacientů s non-Q infarktem 12 (24%) zemřelo (p<0,01). Z 25 diabetiků činil počet úmrtí 21 (84%), ze 105 pacientů, kteří prokazatelně diabetes v době přijetí pro AIM neměli, zemřelo 50 (48%) (p<0.01). Infarkt přední stěny byl zjištěn u 114 pacientů, z nich 54 (47%) zemřelo, zatímco z 96 pacientů s infarktem dolní stěny zemřelo 35 (36%) (p=0,11). Z 81 pacientů s anamnesticky prokázanou hypertenzí zemřelo 18 (22%), ze 43 normotoniků pouze 3 (7%) (nedostatek dat pro statistické zhodnocení).

Nejvyšší úmrtnost byla během prvního roku po AIM. Prognózu negativně ovlivňují věk nad 65 let, přítomnost Q-kmitu v EKG křivce a diabetes mellitus. Trend k vyšší úmrtnosti byl prokázán u pacientů s IM přední stěny, s vyšším stupněm srdečního selhání při přijetí, u hypertoniků a u žen.

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