Gender differences and early mortality in acute myocardial infarction

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Abstract. *Introduction:* Coronary artery disease (CAD) is the leading cause of cardiovascular mortality in European countries. Despite a lower incidence of acute myocardial infarction (AMI), its mortality is higher in women than in men. The reasons for this phenomenon have been widely discussed in literature.
Aims: To analyse the clinical course, treatment, complications and early (in-hospital) mortality of AMI patients with the focus on identification of sex differences and analysis of their causes. The key question is whether gender is an independent risk factor of mortality in AMI.
Methods and study group: The retrospective analysis of 889 consecutive patients hospitalized with AMI at the Coronary Care Unit of the Brno University Hospital within the period January 2003 to December 2004. The hospital data were studied from medical records and the mortality data were checked from population and insurance registries.
Results: In our study group there was a significant predominance of men (n = 573, 64.5%). Compared to men, in women we found: a higher average age (71 ± 10 vs. 64 ± 12 years), a higher incidence of diabetes and hypertension (36.7% vs. 25.0%, resp. 68.0% vs. 51.1%), more frequently right ventricle ischemia (17.4% vs. 10.5%) and higher complication rates: on admission more common atrial fibrillation (8.5% vs. 4.2%) and heart failure (41.1% vs. 32.9%), during hospitalization a higher incidence of circulatory failure resulting into resuscitation (12.6% vs. 6.9%), artificial ventilation (15.5% vs. 7.8%) or temporary pacing (14.6% vs. 9.4%). In women with STEMI mechanical complications were seen more frequently – especially left ventricle free wall rupture (2.8% vs. 1.0%) and ischemic strokes (3.1% vs. 0.0%). In-hospital mortality was higher in women (13.9% vs. 9.6%). As its strongest predictors were identified: complications (HR 15.0, CI 6.3 – 35.7), poor left ventricle ejection fraction (HR 1.05, CI 1. 02 – 1.08) and age (HR 1.06, CI 1.1 – 1.10). In contrast, no gender differences were observed in the extent of interventional, surgical or pharmacological treatment and in the extent of left ventricle systolic dysfunction. Gender was not identified as an independent predictor of in-hospital mortality.
Conclusion: In our analysis women suffered heart attack at a significantly higher age and a severe comorbidity status. Despite treatment comparable to men, AMI was associated with higher rates of complications in women. Their in-hospital mortality was higher in comparison to men. As the main predictors of in-hospital mortality after AMI identified were: complications, left ventricle ejection fraction and age. Gender was not confirmed as an independent risk predictor of in-hospital mortality in patients with AMI. Tab. 7, Fig. 1, Ref. 35, Online full text (Free, PDF) www.cardiology.sk
Key words: coronary artery disease – acute myocardial infarction – STEMI – gender

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Úvod: Ischemická choroba srdeční (ICHS) je hlavní příčinou kardiovaskulární mortality v evropských zemích. Mortalita akutního infarktu myokardu (AIM) je u žen vyšší navzdory jeho nižší incidenci ve srovnání s muži. Příčiny tohoto jevu jsou v literatuře široce diskutovány.

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Cíle: Analýza klinického průběhu, léčby, komplikací a časné (nemocniční) mortality pacientů s AIM se zaměřením na identifikaci pohlavních rozdílů a analýzu jejich příčin. Klíčovou otázkou je, zda pohlaví je samostatným rizikovým faktorem mortality u AIM.
Metody a soubor: Retrospektivní analýza 889 konsekutivních pacientů hospitalizovaných pro AIM na koronární jednotce Fakultní nemocnice Brno od ledna 2003 do prosince 2004. Hospitalizační data byla získána studiem chorobopisů, mortalitní data byla pak ověřena v registru obyvatel a pojištěnců.
Výsledky: V našem souboru bylo zastoupeno vice mužů (n = 573, 64,5 %). Ženy byly ve srovnání s muži: starší (71 ± 10 vs. 64 ± 12 let), měly vyšší výskyt diabetu a hypertenze (36,7 % vs. 25,0 %, resp. 68,0 % vs. 51,1 %), častější ischemii v oblasti pravé komory (17,4 % vs. 10,5 %), vyšší počty komplikací – při příjmu častější fibrilaci síní (8,5 % vs. 4,2 %) a srdeční selhání (41,1 % vs. 32,9 %), během hospitalizace vyšší výskyt oběhového selhání s nutností resuscitace (12,6 % vs. 6,9 %), umělé plicní ventilace (15,5 % vs. 7,8 %) nebo dočasné kardiostimulace (14,6 % vs. 9,4 %). U žen bylo pozorováno vice mechanických komplikací, zejména ruptury volné stěny levé komory (2,8 % vs. 1,0 %), a pouze při STEMI vice ischemických cévních mozkových příhod (3,1 % vs. 0,0 %). Hospitalizační mortalita byla u žen vyšší (13,9 % vs. 9,6 %). Jako její nejsilnější prediktory byly identifikovány: komplikace (HR 15,0, CI 6,3 – 35,7), ejekční frakce levé komory (HR 1,05, CI 1,02 – 1,08) a věk (HR 1,06, CI 1,1 – 1,10). Naopak nebyly pozorovány pohlavní rozdíly v rozsahu intervenční, chirurgické i farmakologické léčby nebo ve stupni systolické dysfunkce levé komory. Pohlaví nebylo identifikováno jako samostatný prediktor hospitalizační mortality.
Závěr: V naší analýze ženy utrpěly infarkt v podstatně vyšším věku a při vyšším stupni komorbidity. Přes srovnatelnou léčbu byl u nich infarkt spojen s vyššími počty komplikací a vyšší hospitalizační mortalitou. Nejvýraznějším prediktorem hospitalizačního úmrtí byl výskyt komplikací, nižší ejekční frakce levé komory a vyšší věk. Nepotvrdili jsme, že pohlaví je samostatným prediktorem úmrtí při AIM. Tab. 7, Obr. 1, Lit. 35, Online full text (Free, PDF) www.cardiology.sk
Klíčova slova: ischemická choroba srdeční – akutní infarkt myokardu – STEMI – pohlaví

Cardiovascular diseases are the leading cause of mortality in the Czech Republic. In 2008, they were responsible for 49.8% of all 104.948 deaths. Cardiovascular mortality is characterized by certain gender differences. In 2008, 44.3% of men and 55.4% of women died from cardiovascular causes **(Table 1)**. Coronary artery disease (CAD) is the most common cause of mortality in these patients. In 2008, more women than men died of CAD consequences. Although statistics from 2008 show that Czech women are more likely to die of chronic CAD complications, while men of acute myocardial infarction (AMI), many studies on large groups described higher mortality in women as a result of AMI. Therefore, we analyzed our own group of AMI patients with the focus on identification of sex differences in early (hospital) mortality, and analysis of its causes.

Table 1 Selected causes of mortality in Czech Republic in 2008 (1)

	Men		Women	
	n	%	n	%
General mortality	53.076	100.0	51.872	100.0
Cardiovascular mortality	23.532	44.3	28.748	55.4
CAD	12.243	23.0	13.601	26.2
AMI	3.819	7.2	2.970	5.7
Other CAD types	8.424	15.8	10.631	20.5
Ischemic stroke	4.615	8.7	7.070	13.6

CAD – coronary artery disease, AMI – acute myocardial infarction

Methods and study group

Data were obtained from medical records. For common statistical processing we used standard statistical tests: for survival analysis we performed the log-rank test, and for identifying the mortality predictors and assessment of their influence we used multistep logistic regression analysis. The difference in compared values was considered statistically significant when the likelihood of their parity (p) was less than 5%. The probability of death is in selected cases expressed as the odds ratio (OR), whose value is found with 95% probability inside the confidence interval (CI). The study group itself included all patients consecutively admitted to the Coronary Care Unit of University Hospital Brno with the diagnosis of AMI within the period from January 2003 to December 2004. The total of 889 patients was analyzed with a significant predominance of men (n = 573, 64.5%) over women. The average age was significantly lower in men: 64 ± 12 years compared to 71 ± 10 years in women **(Figure 1)**.

Outcomes

In women a higher incidence of diabetes and hypertension was observed, from risk factors smoking predominated in men **(Table 2)**. The ST elevation AMI (STEMI) was the reason for admission of 412/569 (72.4%) men and 225/314 (71.6%) women (p = 0.81); the remaining patients were

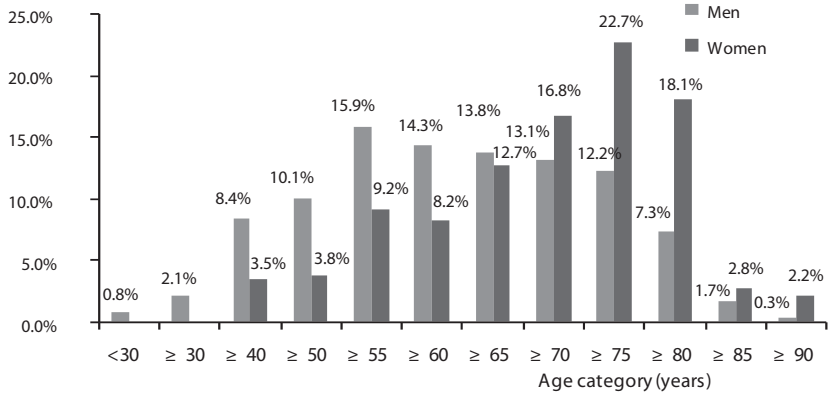

Figure 1 Age subgroups in patients with AMI

admitted for non-ST elevation AMI (NSTEMI). From the ECG records, signs of possible right ventricle infarction (RV MI) were observed more frequently in women, these were present in 55/316 (17.4%) women and 60/573 (10.5%) men (p = 0.003). As regards symptoms of ischemia, there were no differences between men and women in the frequency of typical angina, atypical symptoms, or asymptomatic course of AMI on admission.

Most patients underwent invasive diagnostics. There were no gender differences in the extent of coronary disease. The frequency of negative findings was 1/485 (0.2%) in men and 2/265 (0.8%) in women: the number of insignificant findings was 52/485 (10.7%) in men and 23/265 (8.7%) in women and the frequency of significant findings (meaning 1-2-3-vessel disease) was 432/485 (89.1%) in men and 240/265 (90.5%) in women. The relative numbers of percutaneous coronary interventions (PCI) were identical in men and women regardless of the ACS type, although in women with STEMI a lower number of implanted stents was observed. The complete revascularization during intervention (treatment of all hemodynamically significant stenoses) was more successful in men than in women: 110/477 (23.1%) vs. 42/253 (16.6%), p = 0.04. The number of patients indicated either for surgical revascularization or treated conservatively did not differ in both sexes **(Table 3)**.

Pharmacological treatment assessed at hospital discharge revealed a more frequent use of diuretics and nitrates and less use of thienopyridines in women, while in other drug groups no differences were observed **(Table 4)**.

The factors complicating the course of AMI were on admission more common in women: atrial fibrillation (present in 24/571 (4.2%) men and 27/316 (8.5%) women, p = 0.01), and heart failure (129/314 (41.1%) women and 187/569 (32.9%) men, p = 0.01). In women with NSTEMI and heart failure gender differences took effect in a higher incidence of cardiogenic shock.

Selected life-threatening complications occurred more often in women: they were present in a total of 100/316

Table 2 Selected cardiovascular risk factors and comorbidities

	Men		Women		
	n	%	n	%	p
Hypertension	293/573	51.1	215/316	68.0	< **0.001**
Diabetes mellitus	143/573	25.0	116/316	36.7	< **0.001**
Dyslipidaemia	93/573	16.2	58/316	18.4	0.42
Peripheral arterial disease	50/573	8.7	18/316	5.7	0.10
Cerebral vascular disease	72/573	12.6	38/316	12.0	0.82
Chronic renal insufficiency	33/573	5.8	18/316	5.7	0.97
Familiar history of CAD	107/434	24.7	45/199	22.6	0.58
Smoking	216/545	39.6	47/298	5.8	< **0.001**
Obesity	122/411	29.7	60/229	26.2	0.35

CAD – coronary artery disease

Table 3 Treatment in ACS

	Men		Women		
	n	%	n	%	p
STEMI					
Coronarography	394/412	95.6	211/225	93.8	0.31
Primary PCI	304/369	82.4	161/200	80.5	0.58
% of stenting in primary PCI	284/301	94.4	142/159	89.3	**0.049**
Technical success of primary PCI	293/302	97.0	153/160	95.6	0.44
Cardiovascular surgery	20/412	4.9	12/225	5.3	0.79
Conservative strategy	18/412	4.4	14/225	6.2	0.31
NSTEMI					
Coronarography	134/156	85.9	72/89	80.9	0.30
PCI	87/134	64.9	50/72	69.4	0.52
% of stenting in PCI	83/87	95.4	46/50	92.0	0.41
Cardiovascular surgery	21/156	13.5	9/89	10.1.	0.44
Conservative strategy	22/156	14.1	17/89	19.1	0.30

ACS – acute coronary syndrome, PCI – percutaneous coronary intervention, STEMI – ST elevation myoardial infarction, NSTEMI – non-ST elevation myocardial infarction

(31.6%) women and 136/573 (23.7%) men (p = 0.01). This especially involved a more frequent usage of artificial ventilation and a higher number of resuscitations. Ischemic stroke occurred only in women, moreover only in STEMI. In contrast, NSTEMI women had more frequently rhythm disturbances requiring temporary pacing. Mechanical complications of AMI were found in 7/573 (1.2%) men and in 10/316 (3.2%) women (p = 0.04). They occurred most frequently in STEMI and involved especially a LV wall rupture with cardiac tamponade **(Table 5)**.

The grade of post-infarction left-ventricular systolic dysfunction expressed by its ejection fraction (LVEF) was evaluated by echocardiography on the 4th or 5th day after onset of AMI. This finding was evident in 440 men (76.7%) and 233 women (73.7%) and no gender difference in the LVEF was found. The mean LVEF for men was 46 ± 13% and for women 45 ± 13% (p = 0.69).

In-hospital mortality was in general higher in women than in men. After adjusting for gender, a worse mortality of women was manifested particularly in the following categories: in STEMI, in spite of treatment by primary PCI, in the absence of heart failure, in preserved sinus rhythm and non-administration of ACE inhibitors and statins **(Table 6)**.

The worse survival of women with a lower risk profile suggests exposure to some other factors which have been looked for in the regression analysis. In this were enrolled 703 patients (243 women, 460 men) with known values of all 14 variables – factors with expected impact on mortality: age, sex, symptoms on admission to the CCU, occurrence of ST elevations, severity of heart failure classified by

Table 4 Pharmacological treatment of AMI at discharge

Drug	Men (n = 534)		Women (n = 292)		
	n	%	n	%	p
Acetylsalicylic acid	495	92.7	267	91.4	0.89
Thienopyridines	401	75.1	199	68.2	**0.03**
Betablockers	466	87.3	249	85.3	0.42
ACE inhibitors	438	82.0	250	85.6	0.18
Nitrates	95	17.8	68	23.3	**0.05**
Statins	455	85.2	238	81.5	0.16
Calcium antagonists	46	8.6	29	9.9	0.53
Diuretics	175	32.8	129	44.2	**0.001**

AMI – acute myocardial infarction

Table 5 Selected AMI complications

	STEMI					NSTEMI				
	Men		Women			Men		Women		
	n	%	n	%	p	n	%	n	%	p
On admission										
Atrial fibrillation	19	4,6	18	8,0	0.08	6	3.8	9	10.1	**0.047**
Heart failure-Killip I	281	68.2	135	60.0	**0.04**	101	64.3	50	54.2	0.21
Heart failure-Killip II	96	23.3	64	28.4	0.15	29	18.5	14	15.7	0.59
Heart failure-Killip III	20	4.9	16	7.1	0.24	24	15.3	17	19.1	0.44
Heart failure-Kilip IV	15	3.6	10	4.4	0.62	3	1.9	8	9.0	**0.01**
During hospitalisation										
Heart failure (unstratified)	21	5.1	15	6.7	0.41	9	5.7	9	10.1	0.20
Temporary pacing	46	11.1	35	15.5	0.11	8	5.1	11	12.4	**0.04**
Artificial ventilaltion	29	7.0	30	13.3	**0.009**	16	10.2	19	21.3	**0.02**
Cardiopulmonary resuscitation	31	7.5	28	12.4	**0.04**	9	5.7	12	13.5	**0.04**
Ischemic stroke	0	0.0	7	3.1	**<0.01**	0	0.0	0	0.0	–
Mechanical complications										
LV wall rupture	5	13.8	8	24.2	0.27	1	7.1	1	14.3	0.59
Ventricular septal defect	1	2.8	1	3.0	0.95	0	0.0	0	0.0	–

AMI – acute myocardial infarction, STEMI – ST elevation myocardial infarction, NSTEMI – non-ST elevation myocardial infarction, LV – left ventricle

Table 6 Significant gender differences in mortality

		Men		Women		
		n	%	n	%	p
In-hospital mortality – unadjusted		55/573	9.6	44/316	13.9	**0.049**
In-hospital mortality – adjusted						
Type of ACS	**STEMI**	34/412	8.3	33/224	14.7	**0.01**
	NSTEMI	19/157	12.1	10/89	11.2	0.84
Heart failure on admission	Killip I	12/382	3.1	13/185	7.0	**0.04**
	Killip II	21/127	16.5	14/79	17.7	0.83
	Killip III	13/46	28.3	8/33	24.2	0.48
	Killip IV	9/18	50.0	10/19	52.6	0.87
Rhythm on admission	Sinus	41/530	7.7	34/277	12.3	**0.035**
	Other supraventricular	13/41	31.7	10/39	25.6	0.05
	Atrial fibrillation	8/24	33.3	5/27	18.5	0.23
STEMI treatment	Primary PCI	21/304	6.9	22/158	13.9	**0.014**
	Non-primary PCI	2/53	3.8	1/28	3.6	0.96
	Catheter diagnostic only	4/35	11.4	4/211	11.4	0.99
	without coronarography	8/18	44.4	7/14	50.0	0.75
Cardiogenic shock	PCI	2/10	20.0	3/10	30.0	0.61
	Without PCI	3/4	75.0	2/3	66.0	0.81
Medication	Without ACEI	14/96	14.6	15/42	35.7	**0.01**
	Without statins	12/79	15.2	16/54	29.6	**0.04**

ACS – acute coronary syndrome, STEMI – ST elevation myoardial infarction, NSTEMI – non-ST elevation myocardial infarction, PCI – percutaneous coronary intervention, ACEI – ACE inhibitors

Killip, levels of urea, creatinine, glucose and hemoglobin on admission, type of treatment, grade of LV systolic dysfunction and complications. From these parameters a special statistical sub-model was constructed allowing identification of factors with the most serious influence on mortality (**Table 7**). The strongest predictors of in-hospital mortality found in this model were (in descending order): complications (defined in **Table 5**), LVEF, age and level of creatinine.

Table 7 Regression analysis: most important predictors of hospital mortality

Parameter	OR	95% CI	p
Age	1.0585	**1.0179** – 1.1007	**0.0044**
Typical symptoms on admission	0.4663	0.2045 – 1.0635	0.0697
Atypical symptoms on admission	1.6967	0.5680 – 5.0688	0.3437
Creatinine	1.0053	**1.0001** – 1.0106	**0.0451**
LVEF	0.9517	0.9234 – 0.9809	**0.0013**
Complications	15.0093	**6.3071** – 35.7181	**<0.0001**
Male gender	1.2432	0.6850 – 2.2565	0.4740

LVEF – left ventricular ejection fraction

Discussion

In-hospital mortality of women with CHD is traditionally higher than in men (1). Although incidence of AMI is higher in men, survival is worse in women. This difference has been observed since the time of thrombolysis, and has an effect on the long-term prognosis as well (2 – 4). The reasons for this phenomenon are very comprehensive. Currently there are two main acknowledged theories explaining the higher mortality of women with AMI. They can be applied separately as well as together. The first one shows the higher age of women as the main cause of their worse prognosis, and the other highlights gender differences in treatment.

Age is a very important factor affecting survival, though of course not only in AMI. In AMI patients aged over 75 in-hospital mortality is found to be 6 times higher when compared with those younger than 55 (5). The impact of gender on mortality takes effect up to the age of 65, but at a higher age survival of women and men with AMI becomes comparable (6 – 8). The GRACE registry even gives evidence of an increased death risk in women of any age compared with men (9). Despite the significant age shift between men and women with AMI, our study group did not show a different survival rate even after adjustment by age group. Nevertheless, in the multivariate analysis age was identified as one of the main factors influencing early survival. It is related to the higher morbidity of the elderly population. Especially in women it means a higher coincidence with hypertension and diabetes. This was confirmed by the Worcester Heart Attack Study where diabetic women presented with an in-hospital mortality of about 21.3% versus 14.9% in men (10). Admission blood glucose level in AMI is considered a separate survival risk factor, independently of diabetes diagnosis (11). Regarding increasing glucose during the acute phase of AMI, the higher risk of death in non-diabetics versus diabetics was described: increased blood glucose by 1 mmol/l was accompanied by enhancing mortality by 4% in diabetics and by up to 21% in nondiabetics. This fact highlights the very strong predictive significance of this stress type of hyperglycaemia (12). Unfortunately, in our study the etiology of hyperglycaemia was not studied in detail.

The type of ACS also has an impact on survival of men and women. In our group, women with STEMI had higher mortality than men, although the frequency of STEMI was the same in both sexes. Analysis of the "Get With The Guidelines – Coronary Artery Disease Registry" also showed only half the mortality of STEMI men compared to women, but this was attributed mainly to the different pharmacotherapy (13). But this fact does not explain the differences in our analysis, because the usage of major drugs was comparable. Also, other risk factors such as the incidence of heart failure and the extent of coronary atherosclerosis or intervention treatment failed to explain these differences, because their occurrence was similar in men as in women. Despite comparable occurrence of complications in STEMI as well as in NSTEMI women, the sub-analysis of section findings in deceased women revealed a much higher incidence of mechanical complications in STEMI than in NSTEMI. This may explain the higher mortality of STEMI women, also because other works and meta-analyses suggest a higher incidence of mechanical complications in women (4). LV free wall rupture is usually described with a frequency of about 3.8% in women and only 0.2% in men (14). From the pathophysiological aspect the higher incidence of mechanical complications in women can be explained by a poorer system of collaterals or higher inflammatory activity on the edge of myocardial necrosis leading to high metalloproteinase and neutrophils activity, resulting in the thinning of the myocardial wall (15). Although possible signs of right ventricle (RV) ischemic damage occurred in STEMI women more frequently and mortality of these complications is reported up to 2.5 times higher (16), we have not registered this fact in our analysis. The explanation may be in the underestimation of RV MI, because the diagnosis was based only on ECG signs from the right precordium. These changes are temporary so they need not be registered in all cases (17). Based on the aforementioned facts, it is not surprising that serious complications were determined as the strongest predictor of in-hospital mortality.

Of other important factors affecting survival we studied the impact of atrial fibrillation (AF), heart failure and pharmacotherapy. AF is a known factor increasing cardiovascular morbidity and mortality. Despite the twice-higher prevalence of AF in women and its proven association with higher age, we saw paradoxically lower mortality in these women, although AF has a known strong negative effect on the prognosis of AMI (18). Nevertheless the rhythm was analyzed only at admission and we did not examine the onset of new AF paroxysms during hospitalization. Moreover, in general AF killed relatively few patients, which fact could influence the statistics. However, AF occurring in the acute or sub-acute phases of AMI may increase mortality up to 50% and survival can also be influenced by the treatment modality. Some controversial studies on the treatment of AF complicating AMI have demonstrated up to a 3-times-higher incidence of heart failure, thromboembolism, adverse effects of antiarrhythmic therapy and reduced quality of life in women treated with the intention of maintaining the sinus rhythm (19 – 21), but later the same effect on survival was confirmed within rate as well as rhythm control (22). The risk of AF in AMI especially includes the onset of heart failure or ischemic stroke. In the GUSTO-I trial, 3.1% of patients with AF and AMI suffered stroke compared to 1.3% of patients without AF (23). Also, in our study, 3.1% of patients suffered from ischemic stroke, this concerning only women with STEMI. This fact may further explain the higher mortality in this group.

Although heart failure complicating the course of AMI occurred more frequently in women, at the outcome they did not have higher mortality than men. Increased incidence of heart failure in women with AMI has already been confirmed in the Framingham study, and many other studies have shown comparable or better survival of such women against men (24). This fact is probably associated with the etiology of heart failure, because in women there are more common diabetic, hypertensive or valvular cardiomyopathy, while in men it is ischemic cardiomyopathy with the poorer prognosis (25). It is assumed CHD is the cause of heart failure in 40% of women (26). In older women the failure with preserved left ventricular ejection fraction (so called "diastolic failure") is most prevalent, but its prognosis is comparable with the systolic type (27). Acutely decompensated chronic heart failure in AMI increases mortality more than failure developed de novo (28). Our study is limited because we did not differentiate the etiology of heart failure so precisely, and it is possible that the statistics were also influenced by other factors. Men and women in our study had the same frequency of systolic failure and cardiogenic shock within comparable LVEF classes, and so their hospital mortality was similar to that demonstrated in other works (29). Although the SHOCK study evidenced the prognostic effect of PCI only on the long-term survival (30), patients with cardiogenic shock in our group had already reduced mortality after PCI in hospital. Moreover multivariate analysis confirmed heart failure as the second strongest predictor of in-hospital death in AMI.

Some past works reported the dependence of in-hospital mortality on gender differences in treatment (31, 32). However, in our analysis we did not observe gender differences in the quality of treatment. The representation of the main drugs with evidence-based medicine (EBM) was the same in both sexes, as well as the range of intervention or conservative treatment. Incomplete medication, especially exclusion of ACE inhibitors or statins, was associated with very high mortality in both sexes. But the effect of pharmacotherapy is very difficult to compare because the severe clinical status (hypotension, bradycardia, shock, etc.) often contraindicated the start of medication in some patients. Nevertheless, our results confirm the previously published data suggesting reduction of mortality in AMI after the earliest administration of drugs with EBM. For example, data from the AMIS registry documented the reduction of in-hospital mortality by 36% after administration of ASA, by 50% after ACEI and by 56% after BB (33).

The final regression analysis did not show gender as the independent factor predicting the mortality of AMI. The same conclusion has also been evidenced by other authors (32, 34). But sex participates in women´s increased in-hospital mortality indirectly, through a higher number of complications, whose incidence is associated with advanced age (35). Higher age results in a higher incidence of comorbidities such as diabetes, hypertension and heart failure, which significantly limit survival. For example, the risk of death from ACS is almost 15 times higher at the age of 85 than at the age of 55 (5).

Conclusion

Our study demonstrated the worse survival of women in the early phase of AMI. The highest risk group is represented by women with STEMI, in whom, despite treatment comparable with men, was observed a higher incidence of complications (especially mechanical) and ischemic strokes. Both these complications are associated with higher comorbidity in women, which is influenced by their higher age at the time of ACS manifestation. Gender did not prove to be a separate risk factor of mortality in patients with AMI. Women with AMI should be treated with great attention. If there are no existing major medical and social limitations, intervention treatment must be maximally utilized despite women´s older age, and at the same time the careful screening of mechanical complications should be performed in them. In the absence of explicit contraindications, women with AMI should be treated by the principal drugs for which EBM is documented as soon as possible after admission.

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