ORIGINAL ARTICLE

Differences in presentation, treatment, and prognosis in elderly patients with non-ST-segment elevation myocardial infarction

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KEY WORDS

acute coronary syndrome, elderly, sex

ABSTRACT

INTRODUCTION Advanced age is a significant risk factor for acute coronary syndrome (ACS). Because women live longer than men, they constitute the majority of elderly patients with ACS.

OBJECTIVES The aim of the study was to assess differences in clinical presentation, treatment, and prognosis in elderly women with non-ST-segment elevation myocardial infarction (NSTEMI).

PATIENTS AND METHODS A total of 1219 consecutive patients with NSTEMI (women, 43%) hospitalized during 1 year in a district of 1,300,000 inhabitants were analyzed. Data concerning in-hospital course were obtained from the Polish Registry of Acute Coronary Syndromes (PL-ACS), data on rehospitalization from the local branch of the National Health Fund, and data on mortality from the local register office.

RESULTS There were 387 patients aged under 65 years (women, 27%) and 832 aged over 65 years (women, 50.1%). In both groups, women had more risk factors than men. Coronary angiography and percutaneous transluminal coronary angioplasty were performed less frequently in the age group over 65 years, both in men and women, compared with the younger age group (23.8% vs. 41.9%, $P < 0.001$ and 11.8% vs. 25.6%, $P < 0.01$, respectively). Treatment outcomes were comparable between men and women in both age groups.

CONCLUSIONS In elderly patients with NSTEMI, the percentage of women is higher than that of men compared with the younger age group. Despite the fact that invasive approach was less frequently used in women, long-term prognosis was similar in both sexes.

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INTRODUCTION The progress of civilization has led to a significant improvement in the living conditions and the quality of health care, which translates into a gradual increase of life expectancy. However, old age is associated with a higher risk of developing chronic diseases such as coronary artery disease, arterial hypertension, diabetes, and chronic renal failure. A classic approach of the World Health Organization, which introduced the age ranges of 60–74, 75–90, and over 90 years, has not been commonly applied. Although there is no strict definition of "advanced" or "older age", in the literature it most frequently refers to patients older than 65 years. Irrespective of the definition, one should remember that the risk of cardiovascular disease increases every decade over 50 years of age.[1,2] The available data indicate that advanced age is a powerful prognostic factor in patients with acute coronary syndromes (ACS).[3-7] Poorer prognosis in elderly patients is a result of a more advanced disease process, more frequent comorbidities, later presentation from symptom onset to admission, but also more frequent exposure to complications and side effects of treatments.[2,8] To further emphasize the effect of advanced age on prognosis after non ST-segment elevation myocardial infarction (NSTEMI), a new concept of frailty is currently being discussed. The term "frailty" denotes a multidimensional syndrome characterized by increased

vulnerability and decreased physiological reserves. It is based on clinical judgment of comorbidities, disability, and cognitive impairment, and there is evidence for its significant impact on a negative outcome after NSTEMI.[9] Women not only develop cardiovascular diseases about 10 years later than men but also live longer.[1,10] For this reason, they constitute a much larger proportion of the elderly population. A relatively small number of investigators have assessed the course of disease taking into account both sex and age. The available evidence shows a marked difference in the treatment of men and women also in older populations. Women over 65 years of age are less frequently offered invasive diagnostic procedures although they more often have changes in the coronary arteries than younger women.[3,5,6]

The purpose of the present study was to compare treatment and mortality in men and women with NSTEMI below and over 65 years of age in the Świętokrzyskie Province.

PATIENTS AND METHODS

The analysis included 1219 patients with NSTEMI admitted to hospitals in the Świętokrzyskie Province between June 2005 and May 2006. We collected data on age, sex, concomitant diseases, coronary risk factors, previous myocardial infarction (MI) and revascularization, extent of the disease in angiography, initial electrocardiogram (ECG), adjunctive treatment, left ventricular ejection fraction (LVEF), discharge medication, in-hospital complications (recurrent NSTEMI, STEMI, stroke, bleeding), as well as in-hospital, 30-day, and 6-month mortality. NSTEMI was defined according to the current guidelines.[11] Bleeding complications were included to statistics when hemoglobin decrease by 5 g/dl or more or hematocrit decrease by 0.15 or more was observed, or when the complications resulted in hemodynamic instability or required blood transfusion. Data of hospitalized patients were obtained, upon permission, from the Polish Registry of Acute Coronary Syndromes (PL-ACS) collected under the "National Programme for Prevention and Treatment of Cardiovascular Disease" of the Ministry of Health POLKARD 2003–2005 conducted by the Silesian Center for Heart Diseases in Zabrze in cooperation with the National Health Fund. Data on post-discharge treatment were obtained from the local branch of the National Health Fund, while mortality data from the local register office.

Statistical analysis Continuous variables were expressed as mean ± standard deviation. The *t* test or Mann-Whitney test were used to evaluate the significance of differences between group means. The homogeneity of variances was checked with the *F* test. Qualitative variables were compared using the χ^2 test. The Yates' correction was used if an expected number was less than 5. A *P* value less than 0.05 was assumed as significant (2-tailed).

RESULTS

The study population consisted of 387 patients (107 women, 280 men) aged under 65 years and 832 patients (417 women, 415 men) aged 65 years or older. There were 434 patients (35.6%) over 75 years of age (255 women, 179 men). The mean age of younger patients was about 20 years lower than the mean age of older patients (55.6 ±5.9 vs. 75.7 ±6.6 years; $P < 0.0001$). Because of a generally older age of women admitted with NSTEMI, the mean age of women in both groups was about 2 years higher than the mean age of men. The incidence of the disease was decidedly lower among younger women than men (27.7% vs. 72.3%; $P < 0.0001$). In the older group, the proportions of women and men were similar (TABLE 1).

Younger women were significantly more frequently diagnosed with arterial hypertension and diabetes than men, and they were significantly

TABLE 1 Coronary risk factors

Risk factor	Patients <65 years n = 387 (31.7%)			Patients ≥65 years n = 832 (68.3%)			Significance between the groups	
	W n = 107 (27.7%)	M n = 280 (72.3%)	*P*	W n = 417 (50.1%)	M n = 415 (49.9%)	*P*	W *P*	M *P*
age, y	57.1 ±5.2	55.0 ±6.0	0.0033	76.8 ±6.8	74.6 ±6.3	<0.0001	<0.0001	<0.0001
AH	88 (82.2)	190 (67.9)	0.0049	349 (83.7)	320 (77.1)	0.017	0.72	0.0068
diabetes	33 (30.8)	39 (13.9)	0.0001	125 (30)	101 (24.3)	0.068	0.86	0.0008
Chol↑	63 (58.9)	180 (64.3)	0.32	216 (51.8)	219 (52.8)	0.78	0.19	0.0026
smoking	29 (27.1)	141 (50.4)	<0.0001	10 (2.4)	88 (21.2)	<0.0001	<0.0001	<0.0001
BMI >30 kg/m²	22 (20.6)	42	0.19	72 (17.3)	49 (11.8)	0.026	0.43	0.22
prior MI	31	81 (28.9)	0.99	121 (29)	154 (37.1)	0.013	0.99	0.025
prior PCI	3 (2.8)	8 (2.9)	1.0	3 (0.7)	12 (2.9)	0.019	0.19	0.98
prior CABG	9 (8.4)	21 (7.5)	0.76	12 (2.9)	30 (7.2)	0.0042	0.020	0.89

Data are presented as mean ± standard deviation or number (percentage).

Abbreviations: AH – arterial hypertension, BMI – body mass index, CABG – coronary artery bypass grafting, Chol↑ – hypercholesterolemia, M – men, MI – myocardial infarction, PCI – percutaneous coronary intervention, W – women

TABLE 2 Clinical presentation

		Patients <65 years n = 387 (31.7%)			Patients ≥65 years n = 832 (68.3%)			Significance between the groups	
		W n = 107 (27.7%)	M n = 280 (72.3%)	*P*	W n = 417 (50.1%)	M n = 415 (49.9%)	*P*	W *P*	M *P*
ECG	LBBB	1 (1)	12 (4.4)	0.12	33 (8.3)	74 (9.4)	0.27	0.0086	0.0045
	RBBB	3 (2.9)	13 (4.8)	0.57	17 (4.3)	43 (5.5)	0.13	0.73	0.31
	↓ST	46 (43)	110 (39.3)	0.51	196 (47)	391 (47)	1.0	0.46	0.045
	(–)T	34 (31.8)	80 (28.6)	0.54	107 (25.7)	193 (23.2)	0.092	0.20	0.017
	AF	2 (1.9)	8 (3)	0.73	39 (9.8)	43 (11.1)	0.56	0.0097	0.0001
Killip class	4	1 (0.9)	6 (2.1)	0.68	16 (3.8)	36 (4.3)	0.49	0.23	0.068
	3	1 (0.9)	7 (2.5)	0.45	34 (8.2)	64 (7.7)	0.62	0.0076	0.0065
	1 or 2	105 (98.1)	267 (95.4)	0.25	367 (88)	732 (88)	0.98	0.0018	0.0009
LVEF	>50%	56 (72.7)	155 (72.1)	0.92	161 (60.8)	315 (54.6)	0.0062	0.055	<0.0001
	30%–50%	19 (24.7)	52 (24.2)	0.93	97 (36.6)	232 (40.2)	0.10	0.052	<0.0001
	<30%	2 (2.6)	8 (3.7)	1.0	7 (2.6)	30 (5.2)	0.011	1.0	0.080
diseased arteries	0	11 (24.4)	11 (9.4)	0.012	14 (16.1)	28 (14.1)	0.49	0.24	0.44
	1	12 (26.7)	47 (40.2)	0.11	22 (25.3)	48 (24.2)	0.76	0.86	0.0068
	2	9 (20)	31 (26.5)	0.39	26 (29.9)	56 (28.3)	0.66	0.22	0.93
	≥3	13 (28.9)	28 (23.9)	0.52	25 (28.7)	66 (33.3)	0.22	0.99	0.033

Data are presented as number (percentage).

Abbreviations: AF – atrial fibrillation, LVEF – left ventricular ejection fraction, LBBB – left bundle branch block, RBBB – right BBB, ↓ST – ST-segment depression, (–)T – negative T-waves, others – see TABLE 1

less frequently current smokers. Older women more often were hypertensive and obese, while men more often had a history of smoking, MI, and revascularization (TABLE 1). Apart from smoking, the frequency of cardiovascular risk factors was similar in both female age groups, while the incidence of arterial hypertension, diabetes, hypercholesterolemia, and prior MI was higher in older than in younger men (TABLE 1).

Baseline characteristics (initial ECG or Killip class on admission) were similar in women and men in both age groups. In older age groups, both in women and men, atrial fibrillation, left but not right bundle branch block, and pulmonary edema were more frequent than in the younger groups. ST-segment depression was observed slightly more frequently in older than in younger men, while T-wave inversion was significantly more frequent in younger than in older men (TABLE 2).

Medications used in hospital both in younger and older women more frequently included β-blockers compared with men. Pharmacotherapy of older patients differed from that used in younger age groups. Clopidogrel was used significantly less frequently and diuretics were used more often in elderly patients than in those below 65 years of age. Furthermore, women over 65 years of age were less frequently given statins and angiotensin-converting enzyme inhibitors (ACEIs) (TABLE 3).

Coronary angiography and percutaneous transluminal coronary angioplasty were performed significantly more frequently in younger than in older women: angiography, 20.9% vs. 42.1% (P <0.005); angioplasty, 10.8% vs. 19.6% (P = 0.014). Similar results were obtained for younger and older men: angiography, 26.7% vs. 41.8% (P <0.005); angioplasty, 12.8% vs. 27.9% (P <0.0001).

The results of coronary angiography were comparable in both female age groups, while older men significantly more often had multivessel disease (MVD) and less frequently single-vessel disease than younger men. In patients younger than 65 years, the absence of critical coronary stenoses was typically observed in women. Invasive treatment was used significantly less often in older women compared with men (16.5% vs. 21.9%; P <0.049) (TABLE 4).

The complication rate was very low and did not reach significance except for recurrent NSTEMI, which was more frequent in older compared with younger women (12.5% vs. 7.1%; P = 0.0036) and compared with older men (12.5% vs. 7.2%; P = 0.011).

Discharge pharmacotherapy was similar between all study subgroups; however, a number of significant differences were observed. The administration rate of clopidogrel was higher in younger than in older men. Younger women received diuretics more often than younger men. Both older men and women had higher prescription rate of nitrates and diuretics than their younger counterparts (TABLE 5).

The overall mortality, both short- and long-term, was significantly higher in older patients and comparable in women and men in both age groups (TABLE 6). There were no significant differences

TABLE 3 Pharmacotherapy on admission

Medication	Patients <65 years n = 387 (31.7%)			Patients ≥65 years n = 832 (68.3%)			Significance between the groups	
	W n = 107 (27.7%)	M n = 280 (72.3%)	*P*	W n = 107 (27.7%)	M n = 280 (72.3%)	*P*	W *P*	M *P*
ASA	104 (97.2)	268 (95.7)	0.77	394.(94.5)	389 (93.7)	0.65	0.25	0.26
ticlopidine	34 (31.8)	95 (33.9)	0.69	121 (29)	134 (32.3)	0.31	0.58	0.65
clopidogrel	37 (34.6)	105 (37.5)	0.59	88 (21.1)	92 (22.2)	0.71	0.0035	<0.0001
UFH	24 (22.4)	66 (23.6)	0.81	79 (18.9)	90 (21.7)	0.33	0.42	0.56
LMWH	67 (62.6)	173 (61.8)	0.88	269 (64.5)	280 (67.5)	0.37	0.72	0.12
β-blockers	99 (92.5)	221 (78.9)	0.0016	340 (81.5)	315 (75.9)	0.047	0.0060	0.35
statins	89 (83.2)	216 (77.1)	0.19	302 (72.4)	307 (74)	0.61	0.023	0.34
ACEIs	96 (89.7)	223 (79.6)	0.020	334 (80.1)	333 (80.2)	0.96	0.021	0.85
nitrates	71 (66.4)	169 (60.4)	0.28	293 (70.3)	287 (69.2)	0.73	0.43	0.017
diuretics	37 (34.6)	78 (27.9)	0.20	212 (50.8)	202 (48.7)	0.53	0.0027	<0.0001
insulin	23 (21.5)	22 (7.9)	0.0002	84 (20.1)	62 (14.9)	0.048	0.76	0.0050
OHA	12 (11.2)	14 (5)	0.029	46 (11)	40 (9.6)	0.51	0.96	0.025

Data are presented as number (percentage).

Abbreviations: ACEIs – angiotensin-converting enzyme inhibitors, ASA – acetylsalicylic acid, LMWH – low-molecular-weight heparin, OHA – oral hypoglycemic agents, UFH – unfractionated heparin, others – see **TABLE 1**

TABLE 4 Treatment strategy

Treatment	Patients <65 years n = 387 (31.7%)			Patients ≥65 years n = 832 (68.3%)			Significance between the groups	
	W n = 107 (27.7%)	M n = 280 (72.3%)	*P*	W n = 107 (27.7%)	M n = 280 (72.3%)	*P*	W *P*	M *P*
conservative	77 (72)	180 (64.3)	0.15	348 (83.5)	324 (78.1)	0.049	0.0068	<0.0001
invasive	30 (28)	100 (35.7)	0.15	69 (16.5)	91 (21.9)	0.049	0.0068	<0.0001
PCI	21 (19.6)	78 (27.9)	0.097	45 (10.8)	53 (12.8)	0.38	0.014	<0.0001
CABG	9 (8.4)	21 (7.5)	0.76	23 (5.5)	37 (8.9)	0.058	0.26	0.51

Data are presented as number (percentage).

Abbreviations: see **TABLE 1**

TABLE 5 Discharge pharmacotherapy

Medication	Patients <65 years n = 387 (31.7%)			Patients ≥65 years n = 832 (68.3%)			Significance between the groups	
	W n = 107 (27.7%)	M n = 280 (72.3%)	*P*	W n = 107 (27.7%)	M n = 280 (72.3%)	*P*	W *P*	M *P*
ASA	89 (84)	242 (88)	0.3	329 (84.4)	331 (85.8)	0.59	0.92	0.4
ticlopidine	21 (19.8)	63 (22.9)	0.51	80 (20.5)	90 (23.3)	0.34	0.87	0.9
clopidogrel	19 (17.9)	66 (24)	0.2	47 (12.1)	58 (15)	0.26	0.11	0.0036
β-blockers	82 (77.4)	201 (73.1)	0.39	307 (78.7)	303 (78.5)	0.94	0.64	0.11
statins	78 (73.6)	220 (80)	0.17	291 (74.6)	305 (79)	0.15	0.83	0.76
ACEIs	83 (78.3)	208 (75.6)	0.58	300 (76.9)	302 (78.2)	0.66	0.76	0.43
nitrates	51 (48.1)	117 (42.5)	0.33	241 (61.8)	230 (59.6)	0.53	0.011	<0.0001
diuretics	36 (34)	62 (22.5)	0.022	204 (52.3)	179 (46.4)	0.098	0.0008	<0.0001
insulin	18 (17)	13 (4.7)	<0.001	54 (14.8)	39 (10.1)	0.11	0.42	0.011
OHA	12 (11.3)	17 (6.2)	0.09	48 (12.3)	37 (9.6)	0.22	0.78	0.12

Data are presented as number (percentage).

Abbreviations: see **TABLES 1** and **3**

TABLE 6 Age-related mortality

Mortality	Patients <65 years n = 387 (31.7%)			Patients ≥65 years n = 832 (68.3%)			Significance between the groups	
	W n = 107 (27.7%)	M n = 280 (72.3%)	*P*	W n = 107 (27.7%)	M n = 280 (72.3%)	*P*	W *P*	M *P*
in-hospital	1 (0.9)	5 (1.8)	1.0	27 (6.5)	29 (7)	0.77	0.023	0.0018
30 days	3 (2.8)	7 (2.5)	1.0	33 (7.9)	44 (10.6)	0.18	0.062	<0.0001
6 months	7 (6.5)	13 (4.6)	0.45	62 (14.9)	78 (18.8)	0.13	0.023	<0.0001

Data are presented as number (percentage).

Abbreviation: see TABLE 1

in in-hospital mortality in the consecutive decades. During a 6-month follow-up of the patients aged from 41 to 50 years (14 women, 50 men), 2 women died while all men survived (14% vs. 0%, $P < 0.05$).

DISCUSSION The debate on the reasons for the differences in mortality and morbidity between women and men with NSTEMI is still ongoing and no full agreement has been reached so far. Many researchers associate poorer outcomes in women with comorbidities, clinical manifestation, and adverse events.[12-14] However, not many of them focus on sex-related differences in elderly patients.

Randomized trials rarely provide data on the elderly because this group of patients, especially those with many comorbidities, is underrepresented in trials. The FRISC II study[15] did not enroll patients over 75 years of age, while in the TIMI IIIB[16] study they constituted only 3% of the population. The TACTICS TIMI 18[17] study excluded patients with renal failure, advanced heart failure, cardiac rhythm and conduction disturbances, systemic diseases or defected cerebral circulation, which are quite frequent in this patient group. It is estimated that patients over 75 years of age constitute from 27% to 34% of various registries of ACS without ST-segment elevation, while only 10% of them are included in the simultaneously conducted clinical trials.[1,2] The value of nationwide registries, so much criticized for their flaws and limitations, seems to be unquestionable in the context of the full representation of affected patients. In our study, we found that there were not many differences in baseline characteristics between younger and older women, while older men had worse risk profile when compared with their younger counterparts. This is in contrast with the findings of other investigators because in many registries upward trends in the prevalence of risk factors in the elderly have been reported.[5,6,18] Our another important finding is that mortality in older women was not as high as it could be presumed when considering advanced age and poor cardiovascular profile. The unique strength of our analysis is comparison between young and old patients (35.5% of the patients over 75 years), which had not been frequently reported before.

Risk factors and baseline characteristics In younger age groups, NSTEMI is more common than in men, equally frequent among women and men over 60 years of age, and more common in women over 70 years of age.[15,19,20] There are also more women in the Polish population of patients with STEMI aged over 65 years.[21] In the present study, there were more men in the age group of 65 years, while in the older group the percentage of men and women was practically the same. Women tend to live longer and develop cardiovascular disease at a later age, which means that both in younger and older age groups women are older than men and they have additional risk factors.[2]

In the general population of patients with NSTEMI, there is a discrepancy in the prevalence of conventional risk factors (arterial hypertension, diabetes, dyslipidemia, smoking, obesity, prior MI, and revascularization) between sexes. Women tend to have hypertension, diabetes, and obesity more often, while smoking and prior MI and/or revascularization are more frequent in men. The incidence of the above risk factors increases with age except for smoking and obesity, which are more common in the population under 65 years of age. It seems that these significant differences in cardiovascular risk profile between the age groups[2,5] have a major negative effect on the prognosis in older patients. This tendency is observed in most NSTEMI registries. Data related to both sex and age are scarce. In the available literature, there are some comparisons between men and women with NSTEMI in the general population. In our study, the presence of risk factors increased with age among men but not among women. This unusual pattern has not been previously reported. Moreover, this may indicate the predominant effect of age on cardiovascular risk, although a multivariate analysis revealed that this effect was of borderline significance.[22] Data from other studies confirm our finding that the impact of age on long-term mortality cannot be ignored.

The proportion of smoking in young women was remarkable (27.1%). Although women still smoke less frequently than men (50.4%), the rate

is almost 10-fold higher than in elderly women (2.4%). Smoking women are at a markedly higher risk of MI than smoking men.[23] As cigarette smoking is associated with the development of various diseases, not only atherosclerosis, much attention should be paid to its prevention, especially among younger people in whom potential harms of this bad habit are not detectable as yet.

Electrocardiographic changes on admission A negative prognostic value of ST-segment depression and T-wave inversion in the index ECG is well established.[24] In our study, there were no significant differences in ST-segment changes between men and women within both age groups; however, a T-wave inversion was observed more frequently in older men. In a CRUSADE registry, ST-segment depression at presentation was observed in nearly 40% of the subjects.[8] Unexpectedly, Rosengren et al.[5] reported that normal ECG on arrival was more frequent in younger women than in younger men.[5] In the present study, the incidence of atrial fibrillation significantly increased with age, especially in men, which is consistent with the results of other investigators.[5]

Heart failure The incidence of congestive heart failure increases with age and reaches 12.5% in patients younger than 65 years and 22% to 41% in patients over 65 years.[8] Similar trend has been observed in the incidence of acute heart failure assessed by the Killip class on admission both in our study and those by other investigators. It is well known that the higher the Killip class the higher the mortality.[22,25] In many registries, and also in our study, no differences between young men and women were observed, while older women and men more often presented with Killip class 3 or 4.[5]

Number of diseased arteries Surprisingly, the presence of nonsignificant narrowing in epicardial arteries during an acute phase of NSTEMI is not considered favorable in terms of the prognosis, especially in the young female population. In the present study, younger women had a significantly higher rate of normal angiography when compared with men, which is consistent with the results of Bugiardini et al.[20] The incidence of MVD in patients with acute MI varies from 40% to 65%.[26] Comorbidities, risk factors, decreased LVEF, and cardiogenic shock are frequently accompanied by MVD, which significantly worsens the prognosis. In patients with NSTEMI, the incidence of MVD increases with age in men and women; however, it is lower in women irrespective of age.[5,6] In our analysis, MVD was most frequently observed in older men. In other studies, the results were similar both for MVD and normal angiography[5,20]

In-hospital management Women are less likely to receive modern pharmacotherapy, i.e., ACEIs, β-blockers, and statins,[3,5,6] which was also observed in the present study. Observational studies show that older patients are less frequently referred for early revascularization, and treatment benefit is lower than in younger age groups.[1,2] In the present study, patients over 65 years of age significantly less often underwent coronary angiography and percutaneous transluminal coronary angioplasty, while coronary artery bypass grafting was performed equally frequently in both age groups. This is consistent with the observations by Teixera et al.[27] who reported that female sex and older age were independent predictors of conservative approach for patients with NSTEMI. Less frequent use of novel therapeutic techniques and drugs in elderly patients is usually caused by more common contraindications. However, it has been shown that even in the absence of documented limitations, older patients less often receive aggressive treatment compared with younger subjects.[8] The same study also revealed that in the absence of contraindications guideline-based therapy significantly reduces mortality in all age groups. Although caution in the management of elderly patients is needed, it appears that limitation of therapy is unreasonable and contrary to clinical practice and is not recommended either. Another reason for less frequent use of revascularization in this patient group, especially women, may be refusal of such treatment for fear of invasive procedures; however, the rate of refusal is usually small and cannot be considered as an explanation for the above discrepancies.[28] A relatively low rate of invasive treatment might be associated with low referral rate in the study period when our facility was the only one in the Świętkorzyskie Province. On the other hand, in a multicenter ACOS registry with the data from 2000 to 2002, an invasive approach in patients over 75 years with NSTEMI reached 55% (including emergency and delayed percutaneous coronary intervention). The most important finding was that 1-year survival was significantly better in the invasively treated group.[29]

Complications Women are more prone to complications after cardiovascular interventions than men.[30] The risk of developing side effects increases with age. This is especially true for bleeding, hypotension, and renal failure. Lower efficacy of aggressive therapy is usually associated with a higher percentage of bleeding complications (from about 5% in patients less than 65 years of age to 20% in those over 85 years), especially in patients over 75 years of age, as shown in the OASIS-5 study, meta-analyses evaluating the efficacy of glycoprotein IIa/IIIb inhibitors[2] as well as GRACE (The Global Registry of Acute Coronary Events)[25] and CRUSADE[8] registries. Alexander et al.[8,31] demonstrated that increased bleeding risk in elderly patients results frequently from the dosage not adjusted for body weight or creatinine clearance. The latter is of major importance because the glomerular filtration rate in these patients is frequently decreased although plasma creatinine

concentrations are normal or only slightly increased. In the present study, the rate of bleeding complications was very low (below 0.5%) so it was impossible to include them in the analysis. However, they occurred only in patients over 65 years of age at a similar rate in men and women (unpublished data).

Discharge pharmacotherapy Pharmacotherapy at discharge constitutes an essential part of postinfarction secondary prevention. Yan et al.[32] reported better 1-year outcome in patients after NSTEMI discharged on optimal medical treatment when compared with those on suboptimal pharmacotherapy. Acetylsalicylic acid (ASA), clopidogrel, β-blockers, ACEIs, and statins are recommended for almost every patient after NSTEMI. In the present study, the administration rate of clopidogrel was relatively low. At the time of the study, there was no generic drug available and original clopidogrel was too expensive for all patients and only those who underwent stent implantation received such treatment.[33] In the CRUSADE registry, administration of ASA, β-blockers, and ACEIs did not decrease with advancing age, while, in contrast to our findings, limited use of lipid-lowering agents was observed among discharge medications.[8] Rosengren et al.[6] reported that the use of ASA, ACEIs, β-blockers, and statins was significantly lower in older age groups with small differences between men and women (no significance reported).

Mortality It is surprising then that long-term mortality is slightly higher among elderly men than among women, although the difference is not statistically significant. Age itself is certainly an important factor associated with increased mortality among patients over 65 years. However, Rosengren et al.[6] pointed out that among younger patients, in whom mortality is relatively low, myocardial revascularization is performed significantly more often. As older patients also benefit from this treatment, improved availability of recommended therapies will probably result in decreased mortality in this age group. A number of trials such as TIMI IIIB, TACTICS TIMI 18, or FRISC II have revealed a significant reduction in mortality, both in-hospital and long-term, in patients over 65 years of age although the trials had some limitations.[1] The advocates of using aggressive therapy in the elderly argue that the higher risk of death in these patients increases the potential benefit of such an approach. In fact, in the above studies, the number of patients who should be treated to prevent death is significantly smaller among the elderly. Moreover, myocardial salvage after reperfusion treatment in acute MI is greater in women than in men even when the amount of myocardium at risk is the same as in men,[34] which may partially explain greater benefit in female population in our study.

Limitations Although inclusion was mandatory for all consecutive patients in the country, this is a retrospective nonrandomized study. Treatment strategy was applied at the discretion of the physician and no explanation for selection of different modes of treatment is available. Analysis of the causes of mortality among young women with NSTEMI in the present study was unfeasible due to a relatively small sample size.

Conclusions In the Świętokrzyskie Province, women represent a large population of patients with NSTEMI and over 65 years of age. Despite having more cardiovascular risk factors, women are less frequently offered invasive treatments. Moreover, pharmacotherapy they receive differs significantly from that used in men and younger age groups. Women over 65 years of age tend to have poorer prognosis than younger women, but not significantly different from that of men in the same age group.

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ARTYKUŁ ORYGINALNY

Różnice w przebiegu klinicznym, leczeniu i rokowaniu u pacjentów w podeszłym wieku z zawałem serca bez uniesienia odcinka ST

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SŁOWA KLUCZOWE

ostry zespół wieńcowy, płeć, podeszły wiek

STRESZCZENIE

WPROWADZENIE Zaawansowany wiek jest istotnym czynnikiem ryzyka wystąpienia ostrego zespołu wieńcowego (OZW). W związku z tym, że kobiety żyją dłużej niż mężczyźni, stanowią one większość starszych pacjentów z OZW.

CELE Celem badania była ocena różnic w prezentacji klinicznej, leczeniu i rokowaniu u kobiet w podeszłym wieku z zawałem serca bez uniesienia odcinka ST (*non-ST-segment elevation myocardial infarction* – NSTEMI).

PACJENCI I METODY Przeanalizowano 1219 kolejnych chorych z NSTEMI (43% kobiet) hospitalizowanych w ciągu jednego roku w rejonie zamieszkałym przez 1,3 mln osób. Dane dotyczące przebiegu szpitalnego uzyskano z Polskiego Rejestru Ostrych Zespołów Wieńcowych (PL-ACS), informacje dotyczące ponownych hospitalizacji – z lokalnego oddziału Narodowego Funduszu Zdrowia, a dane o zgonach – z Urzędu Stanu Cywilnego.

WYNIKI Wśród badanych było 387 osób w wieku <65 lat (27% kobiet) i 832 w wieku >65 lat (50,1% kobiet). W obu grupach u kobiet występowało więcej czynników ryzyka niż u mężczyzn. Koronarografię i angioplastykę wieńcową wykonywano rzadziej w grupie >65. rż. zarówno u kobiet, jak i u mężczyzn w porównaniu z młodszą grupą wiekową (odpowiednio 23,8% *vs* 41,9%; $p<0,001$ oraz 11,8% *vs* 25,6%; $p<0,01$). Wyniki leczenia były porównywalne u kobiet i u mężczyzn w obu grupach wiekowych.

WNIOSKI W porównaniu z młodszą grupą wiekową, w grupie starszych pacjentów z NSTEMI kobiet jest więcej niż mężczyzn. Chociaż u kobiet strategia inwazyjna była stosowana rzadziej niż u mężczyzn, rokowanie długoterminowe było podobne dla obu płci.

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