

Changes in pattern of complications in acute myocardial infarction over a ten-year follow-up: gender specificities

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Aim. To compare changes in pattern of complications in acute myocardial infarction (MI) among Tomsk population at the age of >20 years over a ten-year follow-up period (2008-2017).

Material and methods. The study was carried out on the basis of the World Health Organization Acute Myocardial Infarction Registry. In 2008, 800 MI cases were recorded (62,4% — men; 37,6% — women ($p<0,001$)). In 2017, acute MI was restarted in 906 patients (58,1% — men; 41,9% — women ($p<0,05$)). According to age pattern in 2008, there were 62,1% of patients >60 years of age (among men — 49,1%; among women — 83,7% ($p<0,0001$)), which after 10 years were 74,5% ($p<0,001$).

Results. In 2008, a complicated course of MI was observed in 49,9% of patients, in 2017, much more often — in 80,4% of patients ($p<0,001$). Over the analyzed period, incidence of acute aneurysm, myocardial rupture, and recurrent MI decreased. At the same time, the number of patients with post-MI heart failure (HF) significantly increased. In 2008, there were no significant differences in the incidence of MI complications in men and women. The most common complication in both men and women was arrhythmias and conduction disorders. After 10 years, the statistics remained virtually unchanged, with the exception of pulmonary embolism, which was significantly more common in women. Noteworthy is a significant increase in the number of HF patients (among men and women).

Conclusion. Over a ten-year follow-up period, significant changes in patterns of MI complications in Tomsk were not revealed. It should be noted that MI became more severe and was more often accompanied by complications, the most common of which was HF. This is due to an increase in the age pattern of elderly and senile patients.

Key words: acute myocardial infarction, complications.

Relationships and Activities: none.

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Introduction

Despite recent advances in the Russian healthcare system in treating cardiovascular diseases, they remain the leading cause of death. Cardiovascular diseases (CVD), and, above all, acute myocardial infarction (MI), still occupy a leading position in the patterns of death and disability in the population of most developed countries, including the Russian Federation (RF) [1].

The prognosis of complications and outcomes of MI has been one of the urgent problems in cardiology for many years. With a wide range of drugs and interventional techniques used in the treatment of acute coronary disorders, the most important task is to identify groups of patients who have a high risk of complications such as cardiogenic shock, recurrent MI, left ventricular failure, ventricular fibrillation, early postinfarction angina, etc. [2-4]. With the development of medical research and improvement of diagnosis and treatment strategies of AMI, some factors, the influence of which was beyond doubt, are ruled out and replaced by others. Consequently, studies aimed at investigating the course of MI, will be of certain interest both for research and for practical health care.

It should be also noted that the increased attention to the course of MI is caused by two important reasons.

At present, the general trend, along with a decrease in the birth rate and an increase in average life expectancy, is a steady increase in the proportion of older age persons. According to the World Health Organization (WHO), the number of people aged >60 is growing rapidly, while the number of those aged 15 to 59 is also rapidly declining. It is predicted that by 2050, 80% of elderly people will live in Europe and North America, and in the RF by this time the number of them will increase significantly and will amount to >35 million people [5]. The population ageing leads to an increase in the age structure of elderly and senile patients with MI.

For a long time, it was believed that the main cause of death for women is endometrial, ovarian, and breast cancers, while men die mainly from CVD. However, in recent years, it has become obvious that CVD, including MI, are in the first place in the mortality structure among men and women [6, 7]. In this regard, the issue of sex characteristics of MI course and outcomes is relevant. This is due, firstly, to a downward trend in MI incidence in young men and increase in older women, and, secondly, to a decrease in mortality due to MI in men, but not in women [6-9].

The aim was to compare changes in pattern of complications in MI among Tomsk population at the

age of >20 years over a ten-year follow-up period (2008-2017).

Material and methods

The study was carried out on the basis of the WHO Acute Myocardial Infarction Registry. The study was performed according to the standard diagnostic (clinical, electrocardiographic, biochemical, pathomorphological) criteria [10]. The MI was established according to the WHO diagnostic criteria at the time of registry creation, as well as taking into account modern clinical guidelines [11]. Statistical processing was carried out using Statistica 9.0 and 10.0 software. To assess the significance of qualitative differences, a nonparametric chi-squared test was used for paired values. The result was interpreted using Bonferroni correction for multiple comparisons. Differences were considered significant at $p < 0,05$.

In 2008, 800 cases of MI were registered (men, 62,4%; women, 37,6%; $p < 0,001$). In 2017, MI developed in 906 patients (men, 58,1%; women, 41,9%; $p < 0,05$). In 2008, the proportion of persons >60 years old was 62,1% (men, 49,1%; women, 83,7%; $p < 0,0001$); after 10 years — 74,5% ($p < 0,001$). Ageing of patients was due to men — 65% ($p < 0,05$). Among women, the increase in the proportion of elderly and senile people was not so significant — 87,6%.

Results

In 2008, a complicated course of MI was observed in 49,9% of patients; in 2017, much more often — 80,4% ($p < 0,001$). Comparison of the structure and frequency of complications are shown in Table 1. According to the presented data, the frequency of cardiogenic shock, left ventricular failure, arrhythmias, pulmonary embolism (PE) did not change significantly over 10 years. Acute aneurysm, myocardial rupture, as well as a recurrent course of disease are recorded much less frequently.

At the same time, the proportion of patients with MI complicated by chronic heart failure (CHF) has significantly increased. Among all types of complications, arrhythmias predominated most often, both in the first and second years of the study. Noteworthy is the fact that in the structure of arrhythmias, the proportion of atrioventricular (AV) block has significantly decreased — from 30,4 to 15% ($p < 0,05$), moreover, due to second- and third-degree AV blocks. Differences in other cardiac arrhythmias were insignificant. Sex differences in the frequency and structure of MI complications in these years

Table 1

Prevalence and patterns of complications
in MI among patients in Tomsk in 2008 and 2017

Complication	2008		2017		p
	n	%	n	%	
Total number of patients	399	49,9	728	80,4	<0,001
Cardiogenic shock	89	22,3	135	18,5	>0,05
Left ventricular failure (Killip III)	98	24,6	191	26,2	>0,05
CHF (NYHA class II-IV)	113	28,3	486	66,8	<0,001
Cardiac arrhythmias	148	37,1	280	38,5	>0,05
PE	19	4,8	22	3,0	>0,05
Myocardial rupture	24	6,0	24	3,3	<0,05
Aneurysm	45	11,3	25	3,4	<0,001
Recurrence	58	14,5	51	7,0	<0,001

Note: NYHA — New-York Heart Association, CHF — chronic heart failure, PE — pulmonary embolism.

Table 2

Prevalence and patterns of complications
in MI in men and women in Tomsk in 2008 and 2017

Complication	2008					2017				
	Men		Women		p	Men		Women		p
	n	%	n	%		n	%	n	%	
Total number of patients	216	43,3	183	60,8	<0,001	396	75,3	332	87,4	<0,001
Cardiogenic shock	48	22,2	41	22,4	>0,05	70	17,7	65	19,8	>0,05
Left ventricular failure (Killip III)	49	22,7	49	26,8	>0,05	95	24,0	96	28,9	>0,05
CHF (NYHA class II-IV)	53	24,5	60	32,8	>0,05	271	68,4	215	64,8	>0,05
Cardiac arrhythmias	87	40,3	61	33,3	>0,05	141	35,6	139	41,9	>0,05
PE	7	3,2	12	6,6	>0,05	7	1,8	15	4,5	<0,05
Myocardial rupture	7	3,2	17	9,3	<0,05	6	1,5	18	5,4	<0,05
Aneurysm	22	10,2	23	12,6	>0,05	15	3,8	10	3,0	>0,05
Recurrence	27	12,5	31	16,9	>0,05	32	8,1	19	5,7	>0,05

Note: NYHA — New-York Heart Association, CHF — chronic heart failure, PE — pulmonary embolism.

are presented in Table 2. In 2008, no significant differences in the frequency of MI complications in men and women, with the exception of myocardial rupture, were found. The most frequent complication in both men and women was arrhythmias. In its structure, premature beats were significantly more frequent in women than in men — 78,7 and 52,9%, respectively ($p<0,002$).

After 10 years, the situation practically did not change, with the exception of PE, which was diagnosed much more often in women. Attention is drawn to a significant increase in the number of patients among men and women with CHF, which exceeded those with arrhythmias.

It was also revealed that the number of male patients with CHF significantly increased from 24,5 to 68,4% ($p<0,001$) and with aneurysm decreased from 10,2 to 3,8% ($p<0,05$). The number of female patients with CHF also increased from 32,8 to 64,8% ($p<0,001$), while the number of those with aneurysm decreased from 12,6 to 3% ($p<0,002$) and with recurrent course of the disease — from 16,9 to 5,7% ($p<0,01$). It should also be noted that over the 10-year period, mortality among patients with complicated MI decreased from 59,9% to 44,1% ($p<0,05$).

Conclusion

Over a ten-year follow-up period, significant changes in patterns of MI complications in Tomsk were not revealed. It should be noted that MI became more severe and was more often accompanied by complications, the most common of which was CHF. This is due to an increase in the age pattern of elderly and senile patients, which is consistent with the literature data [12]. In turn, this fact is a natural reflection of the demographic situation in Tomsk, which is characterized by a tendency towards population ageing [13]. The decrease in the incidence of recurrent MI, acute aneurysm and myocardial rupture is possibly associated with the use of highly effective drugs, as well as with the widespread use of modern interventional techniques. Another factor with a positive effect on the complication rate was the improvement of timely hospitalization of MI patients. Thus, during the analyzed period, the number of patients hospitalized in the first 6 hours from the disease onset increased from 69,1 to 73,8% ($p<0,05$). Probably, the above factors contributed to the reduction in mortality among patients with complicated MI.

Relationships and Activities: none.

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