Khasanov A.Kh.[1], Davletshin R.A.[1], Karamova I.M.[2], Kolchina E.M.[2], Chudnovets L.G.[2], Amirova A.M.[2]

GENDER FEATURES OF EARLY STENOTIC LESIONS OF CORONARY ARTERIES IN HIGH-RISK PATIENTS WITH THE PRESENCE OF MULTIFOCAL ATHEROSCLEROSIS

[1]Bashkir State Medical University of the Ministry of Health of Russian Federation,
[2]Ufa Emergency Hospital,
Ufa, Republic of Bashkortostan, Russian Federation

SUMMARY

The aim of the study was to identify individuals with increased frequency of early symptoms of stenosing atherosclerosis of the coronary arteries with consideration of the peculiarities of comorbid abnormalities in CHD patients high risk with the presence of MFA.

Materials and methods. Patients of middle age were divided into 3 clusters by the method of hierarchical analysis of categorical variables according to the clinical manifestation of atherosclerotic lesions of the heart, brain and arteries of the lower extremities. Patients evaluated the clinical status, ECG, CAG, echodopplerography carotid and lower limb arteries. According to the indications, magnetic resonance imaging of the chest and abdomen, spirography, fibro-gastroduodenoscopy, ultrasound of the abdominal cavity and kidneys, if necessary, ultrasound of the pelvis were performed.

Results. It was found that one of the manifestations of coronary artery disease was ACS with hemodynamically significant PKA stenosis (76-90%), which developed in 50% of women with primary lesion of the 3rd segment of PKA, belonging to the 3rd cluster of the examined. The structure of hemodynamically significant changes in LCA branches was dominated by men of the 1st cluster with lesions of the 6th segment of PHA, DV, 15 segment of OA, while unstable angina was established in 54,2% of them, in the anamnesis – in 51,1%. Frequency of the level of the border of stenosis (50-75%) branches LKA showed a male predominance of the 1-St cluster with a lesion of the 6th segment PMRA involving DV and 15 of the OA segment, coupled with clinic stable angina.

Conclusion. The nature of coronary vessels lesions in men and women of the middle age category revealed persons with an increased frequency of signs of stenotic remodeling, taking into account the clinical symptoms and features of vascular comorbid burden in patients with high-risk IHD with the presence of MFA.

Keywords: *comorbid burden, ischemic heart disease, acute coronary syndrome, myocardial infarction, angina pectoris, cerebrovascular disease, acute and chronic cerebral circulation disorders, arterial hypertension, intermittent claudication, chronic arterial ischemia of the lower extremities.*

Information about authors:

Rashit A. Davletshin	Doctor of Medical Sciences, Professor of the Department of Hospital Therapy №2 of the Bashkir State Medical University of the Ministry of Health of Russian Federation, doctor.dra43@mail.ru
Irina M. Karamova	Doctor of Medical Sciences, Professor, Chief Doctor of the Ufa Emergency Hospital, karamovaim@mail.ru
Emma M. Kolchina	Doctor, Head of the Neurological Department with Stroke of the Ufa Emergency Hospital, kolchina@mail.ru
Lev G. Chudnovets	Doctor, Head of the Department of X-Ray Surgical Methods of Diagnosis and Treatment № 2 of the Ufa Emergency Hospital, xray_ufa@list.ru
Albina M. Amirova	Doctor of the Department of Ultrasound and Functional Diagnostics of the Ufa Emergency Hospital, uzd.ufa@gmail.com
Corresponding author: Azat Kh. Khasanov	Candidate of Medical Sciences, Associate Professor of the Department of Hospital Therapy №2 of the Bashkir State Medical University of the Ministry of Health of Russian Federation, azat.hasanov.71@mail.ru, 450000, Ufa, Lenin Str., 3

INTRODUCTION

Multifocal atherosclerosis (MFA) as a systemic disease prone to continuous progression regardless of localization, hemodynamically significant lesion of several vascular basins, determining the severity of the disease [1], has an unfavorable prognosis of clinical events [2], as well as a high frequency of incidence of ischemic heart disease (IHD) [3-5]. There is a data of the negative effect of MFA on the remote prognosis in the group of patients with stable coronary artery disease and in acute coronary syndrome (ACS). About the half of patients with MFAs with vascular comorbid burdening die mainly from myocardial infarction (MI) and stroke within 7 years after the diagnosis has been established [6].

However, in the literature there are no uniform generally accepted criteria for assessing the level of stenosis, which are subject to accounting and the description of methods for their assessment [7], as well as segmental features of coronary vascular lesions in men and women of MFAs of the middle age category [8, 9]. The gender gap in the risk of IHD persists throughout life, but the relative risk decreases with the age [8–11]. In recent years, the early development of IHD in women [12, 13] has been accompanied by a more favorable clinical course, and in men, on the contrary, for that, who younger than 60 years, the risk of coronary course is higher [10, 14].

Based on these conclusions, to solve the problems of identifying the nature of coronary vascular lesions in middle-aged men and women, we conducted research to identify individuals with an increased incidence of signs of stenotic atherosclerosis, taking into account the clinical symptomatology and features of vascular comorbid aggravation in patients with IHD of high-risk with the presence of MFA.

MATERIALS AND METHODS

The study involved 1637 patients who were hospitalized at the Regional Vascular Center No. 1 on the basis of the "Emergency Hospital" of the city of Ufa in the period from 2010 to 2017, of which 288 people of middle age were selected with the presence of MFA. Depending on the predominant lesion of the vascular basin, patients were divided into 3 clusters according to the clinical manifestations of atherosclerotic heart failure (1st cluster – 96 people), head brain (2nd cluster – 96 people) and lower limb arteries (3rd cluster – 96 people), confirmed by coronary angiography (CAG), by ultrasound doppleroscopy (UZDS) of the trunk arteries of the head (MAH) and lower extremities. The average age of patients of the 1st cluster was 50.06±8.49 years, the 2nd cluster – 48.42±9.86 years, the 3rd cluster – 55.06±4.11 years.

The coronary angiography was got by the 288 examined patients with MFA who had acute myocardial infarction, as well as with the clinic for acute coronary syndrome (ACS), vasospastic, unstable and progressive angina pectoris with the predominant use of transfemoral access on the digital monoplanar universal angiographic installation named "Innova 3100". According to the National Clinical Recommendations for Stable Angina 2011, damage to the coronary arteries (CA)> 50% were considered significant, and <50% – hemodynamically insignificant [15]. And also guided by the clinical recommendations of the European Society of Cardiology for the management of acute myocardial infarction patients with ST segment elevation from 2017, the lesion from 50 to 75% was considered as borderline, from 76 to 90% – hemodynamically significant or subcritical [16].

In all patients, the clinical feature of the lesion of the arterial basins was determined taking into account the previous acute myocardial infarction (AMI), stable, unstable, progressive, vasospastic angina pectoris, acute and chronic cerebral circulation disorders (OCCD, CCCD), a chronic arterial ischemia of lower limbs (CAILL) of the middle age category, which were also held echocardiography (ECHO-KG). During the hospitalization of patients in our center, according to indications, magnetic resonance imaging of the chest and abdominal organs (MRI of CO, MRI of AO), ultrasound of abdominal organs and kidneys, and if necessary, pelvic ultrasound were performed. The study was conducted in accordance with the Helsinki Declaration and approved by the Ethics Committee of FSBEI HE "BSMU". Informed agreement was obtained from each patient.

Statistical processing of the obtained data was carried out using the methods of variation statistics using the IBM SPSS Statistics 22 software package for determining the kind of distribution; the

Table 1. General clinical-vascular characteristics of high-risk MFA

index	P	1 cluster (n=96)	2 cluster (n=96)	3 cluster (n=96)
Middle age, year		50,06±8,49	48,42±9,86	55,06±4,11
Gender, men / women	total	48/48	48/48	48/48
Myocardial infarction in anamnesis, total	P1–2,3=0,0000 P3–2=0,0000	49 (51,1%)	4 (4,2%)	14 (14,6%)
OCCD in anamnesis, total	P2–1,3=0,0000 P3–1=0,1032	8 (8,3%)	50 (52,1%)	10 (10,4%)
Intermittent claudication, total	P3–1,2=0,0000 P2–1=0,0861	32 (33,3%)	39 (40,6%)	75 (78,1%)
Arterial hypertension of stage III, total	P1–2=0,0012 P3–2=0,0687	92 (95,8%)	64 (66,7%)	71 (73,9%)

Shapiro-Wilk criterion was used. When comparing more than two groups according to qualitative and quantitative characteristics, the Kruskel-Wallis method of rank analysis was used. The Wilcoxon test was used to compare two related samples by quantitative characteristics with a distribution other than normal. The combination of the values of categorical variables was implemented using a hierarchical algorithm of the three-cluster model using the χ^2 criterion. Based on dendrograms, diagrams and numerical characteristics, the clinical and instrumental data were stratified into MFA clusters with the determination of their number and the percentage calculation. The statistical significance of the differences was determined at a significance level of $p<0.05$.

RESULTS AND DISCUSSION

As a result of the analysis of the data which was made, in patients entering into the high-risk group (Table 1), the incidence of stage III arterial hypertension (AH III) in the 1st cluster was high and amounted to 95.8%, in 2nd – 66.7% (p1–2=0.0012). The stroke in a history in patients of the 2nd cluster was determined in 52.1% of cases, in patients of the 3rd cluster – in 10.4%, in the 1st cluster – in 8.3% (p2–1.3= 0. 0000). The intermittent claudication was detected in patients of the 3rd cluster in 78.1%, 2-nd – 40.6% and 1-st – 33.3% (p 3–1.2=0.0000).

All men of the 1st cluster (n = 48) were combined with the arterial hypertension of the stage III, in 54.2% with unstable angina, in

Table 2. The frequency of lesion of the segments of the right coronary artery in patients with MFA of the middle age category

The degree of stenosing lesion of the coronary arteries,%	Cluster	Men n (%) 1	Women n (%) 2	P 1–2, 2–1
Middle age category (45-60 year)				
the 2nd segment of the right coronary arteria	< 50% 1	28 (58,3%)	39 (81,3%)	P2–1= 0,0201
	2	40 (83,3%)	42 (87,5%)	P2–1= 0,7412
	3	34 (70,8%)	28 (58,3%)	P1–2= 0,0309
	50–75% 1	7 (14,6%)	7 (14,6%)	P2–1= 0,8958
	2	8 (16,6%)	6 (12,5%)	P1–2= 0,0851
	3	–	–	–
	76–90% 1	3 (6,3%)	1 (2,1%)	P1–2= 0,1220
	2	–	–	–
	3	14 (29,2%)	20 (41,6%)	P2–1= 0,0654
the 3rd segment of the right coronary arteria	< 50% 1	37 (77,1%)	46 (95,8%)	P2–1= 0,0135
	2	46 (95,8%)	48 (100%)	P2–1= 0,9112
	3	48 (100%)	6 (50,0%)	P1–2= 0,0000
	50–75% 1	2 (4,2%)	1 (2,1%)	P2–1= 0,9784
	2	1 (2,1%)	–	P1–2= 0,1854
	3	–	–	–
	76–90% 1	2 (4,2%)	–	P1–2= 0,6325
	2	–	–	–
	3	–	24 (50,0%)	P2–1= 0,0000

68.7% with MI in anamnesis. Among male patients of 1st cluster who had an acute myocardial infarction, ST segment elevation was detected in 36.4% of patients examined in combination with atrial fibrillation (21.2%), atherocalcinosis of aorta and its branches (15.2%).

Under the dynamic observation of patients of the 2nd cluster the arterial hypertension of the III stage were found in 66.7% of patients which was combined with stable angina of the 2nd FC in 43.7% of cases, and also in 30.2% with left ventricular hypertrophy (LVH) at the same time, a rather high level of transferred stroke in anamnesis was noted – 52.1%.

Acute cerebrovascular deceases (ACVA) at the time of inspection were found in 43.7% of patients, among them ischemic stroke was detected in 38.5%, intracerebral hemorrhage – in 18.7% of cases. Hemorrhagic stroke in 11.5% of those surveyed developed as a result of MBA aneurysm. Transferred cerebral ischemic seizures were diagnosed in 21.2% of patients; the late recovery period of ACVA is in 11.5%.

Analysis of the clinical symptoms and functional parameters of patients of the 3rd cluster revealed the presence of ACS in 50% of women, the prevalence of grade II hypertension in men with fourth risk (58.3%), stable angina pectoris with FC2 (64.6%), early onset of CEH without transferred stroke in anamnesis (77.1%). Among men and women, intermittent claudication was established in 79.2% of patients, while a functional ECG study revealed a spontaneous ST segment decline in 20.8% of the examined individuals, LVH – in 17.7%, the ventricular extrasystoles in combination with cicatricial changes in LV in 20.8%.

Analysis of the frequency and extent (Table 2) of the stenosing lesion of the 2 RCA segment showed that in patients of middle age group hemodynamically insignificant stenosis (degree of stenosis <50%) was more frequent, prevailing in women of the 1st cluster – 81.3% = 0.0201) and men of the 3rd cluster – 70.8% (P1–2= 0.0309). The nature of stenosing lesions of the 3rd segment of RKA also had a predominant narrowing of <50% in women of the 1st cluster – 95.8% (P2–1= 0.0135) and men of the 3rd cluster – 100% (P1–2= 0, 0000), which indicated a tendency for the subclinical lesion of RKA to be more pronounced with the presence of stable angina pectoris in women of the 1st cluster in 35.4% of cases and men of the 3rd cluster in 33.3% of cases (Table 3). Stable angina according to our data did not manifest itself for a long time. With an increase in the narrowing of the arteries in diameter from 45 to 50%, the patients showed short-term attacks of angina pectoris — the presence of chest pain.

Hemodynamically significant stenoses of PKA (76-90%) were found in patients with 1 and 3 clusters. In a comparative analysis of lesions of the 2nd segment of RKA, no significant differences in men and women were obtained. Among women, a significant change was the primary lesion of the third PKA segment in 50% of patients with acute coronary syndrome (ACS), belonging to the 3rd cluster examined in accordance with a single center study (P2–1=0.0000).

Comparative characteristics of the lesion of the branches of the left coronary artery (LCA) showed (Table 4) the prevalence in women of hemodynamically insignificant stenoses (<50%) of the 6th segment of the PMRA, detected in 93.8% of the examined of the 1st cluster (P2-1 = 0.0000) , also in 100% of patients of the 3rd cluster (P2-1 = 0.0223). When the degree of stenosis of the diagonal branch (DB) is less than 50% among patients belonging to the 1st cluster, were registered in 100% of women (P2-1 = 0.0105), combined with vasospastic angina in 27.1% of cases and

Table 3. The frequency of the occurring different forms of angina pectoris in men and women with MFA of the middle age category

Form of angina pectoris	Cluster	Men n (%)	Women n (%)	P 1–2, 2–1
		1	2	
Middle age category (45-60 year)				
Vasospastic angina pectoris	1	4 (8,3%)	13 (27,1%)	P2-1= 0,0105
	2	3 (6,2%)	3 (6,2%)	P2-1= 0,9521
	3	–	–	–
First-time angina pectoris	1	3 (6,2%)	10 (20,8%)	P2-1= 0,0326
	2	4 (8,3%)	2 (4,2%)	P1-2= 0,5412
	3	–	–	–
Progressive angina pectoris	1	5 (10,4%)	7 (14,6%)	P2-1= 0,4589
	2	7 (14,6%)	3 (6,2%)	P1-2= 0,3361
	3	–	–	–
Angina pectoris of tension	1	1 (2,1%)	–	P1-2= 0,7851
	2	5 (10,4%)	4 (8,3%)	P1-2= 0,7569
	3	–	–	–
Stable angina pectoris	1	20 (41,6%)	17 (35,4%)	P1-2= 0,0698
	2	26 (54,2%)	17 (35,4%)	P1-2= 0,0098
	3	16 (33,3%)	48 (100%)	P2-1= 0,0000
Not stable angina pectoris	1	26 (54,2%)	–	P1-2= 0,0000
	2	4 (8,3%)	–	P1-2= 0,1254
	3	–	–	–

Table 4. The frequency of lesions of the branches and segments of the left coronary artery in men and women of the middle age category with MFA

The degree of stenosing lesion of the coronary arteries,%	Cluster	Men n (%)	Women n (%)	P 1–2, 2–1
		1	2	
Middle age category (45-60 year)				
6th segment of the PMRA	< 50%	1 — 24 (50%)	45 (93,8%)	P2-1= 0,0000
		2 — 42 (87,5%)	42 (87,5%)	P2-1= 0,8257
		3 — 34 (70,8%)	48 (100%)	P2-1= 0,0223
	50-75%	1 — 12 (25,0%)	1 (2,1%)	P1-2= 0,0063
		2 — –	5 (10,4%)	P2-1= 0,0366
		3 — 14 (29,2%)	–	P1-2= 0,0002
	76-90%	1 — 11 (22,9%)	1 (2,1%)	P1-2= 0,0105
		2 — 7 (14,6%)	1 (2,1%)	P1-2= 0,0332
		3 — –	–	–
Diagonal branch	< 50%	1 — 25 (52,1%)	48 (100%)	P2-1= 0,0105
		2 — 42 (87,5%)	42 (87,5%)	P2-1= 0,8257
		3 — 48 (100%)	48 (100%)	P2-1= 0,9635
	50-75%	1 — 10 (20,8%)	–	P1-2= 0,0152
		2 — –	–	–
		3 — –	–	–
	76-90%	1 — 10 (20,8%)	–	P1-2= 0,0149
		2 — 6 (12,5%)	6 (12,5%)	P1-2= 0,8752
		3 — –	–	–
15 segment of the circumflex artery	< 50%	1 — 14 (29,2%)	39 (81,3%)	P2-1= 0,0000
		2 — 48 (100%)	48 (100%)	P2-1= 0,9635
		3 — 34 (70,8%)	24 (50,0%)	P1-2= 0,0171
	50-75%	1 — 15 (31,3%)	1 (2,1%)	P1-2= 0,0000
		2 — –	–	–
		3 — –	–	–
	76-90%	1 — 13 (27,1%)	7 (14,6%)	P1-2= 0,0359
		2 — –	–	–
		14 (29,2%)	24 (50,0%)	P2-1= 0,0228

for the first time arising angina pectoris in 20.8% of cases (table 3). A hemodynamically insignificant change in the 15th segment of the circumflex artery (CA) was a significant predominance of women of the 1st cluster – 81.3% (P2-1= 0.0000), and also a men of the 3rd cluster – 70.8% (P1-2=0.0171).

The frequency of incidence of borderline stenosis (50-75%) of the LCA branches showed the prevalence of men of the 1st cluster with a lesion of the 6th segment of the PMRA in 25.0% (P1-2= 0.0063), with DB involvement in 20.8% (P1-2= 0.0152), as well as 15 CA segment in 31.3% (P1-2 = 0.0000), accompanied by the presence of stable angina in 41.6% of cases (Table 4). At the same time, borderline numbers of stenosis of the 6th segment of PMRA were obtained in 29.2% of men with the 3rd cluster (P1-2= 0.0002) and in 10.4% of women with the 2nd cluster (P2-1= 0.0366).

The majority of patients with hemodynamically significant changes in the branches of LCA (76-90%) belonged to the 1st cluster with damage of the 6th segment of PMRA in 22.9% of men (P1-2= 0.0105), DB at the 20.8% of men (P1-2= 0.0149), 15 segment of CA at 27.1% of men (P1-2= 0.0359), wherein, unstable angina pectoris is established in 54.2% of men (Table 4). A subtotal narrowing of the 6th segment of the PMRA from 76 to 90% was also observed in 14.5% of middle-aged men with the 2nd cluster (P1-2 = 0.0332). Among women, there was a reliable hemodynamically significant narrowing only among the examined 3rd cluster with a lesion of the 15th segment of CA, established in 50% of patients with ACS (P2-1 = 0.0228).

CONCLUSION

The nature of the lesion of the coronary vessels in men and women of the middle age group revealed individuals with an increased frequency of signs of stenotic remodeling, taking into account the clinical symptomatics and features of vascular comorbid aggravation in high-risk coronary heart disease patients with the presence of MFA.

One of the manifestations of ischemic heart disease was ACS with hemodynamically significant stenosis of PKA (76-90%), which developed in 50% of women with a primary lesion of the 3rd segment of PKA, belonging to the 3rd cluster of the patients. In the structure of hemodynamically significant changes in the branches of LKA, were prevailed men of the 1st cluster with a lesion of the 6th segment of the PMRA, DB, 15th segment of CA, while unstable angina pectoris was found in 54.2% of them, MI in the anamnesis – in 51.1%. Among male patients of 1st cluster who had an acute myocardial infarction, ST segment elevation was detected in 36.4% of patients examined in combination with atrial fibrillation (21.2%), the atherocalcinosis of the aortic and its branches (15.2%).

The frequency of meeting of borderline stenosis (50-75%) of the LKA branches showed the predominance of men of the 1st cluster with damage of the 6th segment of the PMRA, with the involvement of DB, as well as 15 segments of CA, accompanied by a clinic of stable angina pectoris. Analysis of the frequency and degree of stenosing lesions of the PKA segments showed that hemodynamically insignificant stenoses (degree of stenosis <50%), which prevailed in women of the 1st cluster and men of the 3rd cluster, were more common in patients, that indicating a tendency for their subclinical lesions of PKA with the presence of stable angina, which according to our data for a long time did not manifest itself. With an increase in the narrowing of the arteries in the diameter from 45 to 50%, at the patients showed short-term attacks of angina pectoris.

Comparative characteristics of the lesion of the branches of the left coronary artery showed the prevalence in women of hemodynamically insignificant stenoses (<50%) of the 6th segment of the PMRA, detected mainly in the 1st cluster examined and also in patients of the 3rd cluster. With the degree of stenosis of the diagonal branch (DB) less than 50% among patients belonging to the 1st cluster, were registered at all women, combined with vasospastic angina in 27.1% of cases and for the first time developed angina pectoris in 20.8% of cases.

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