The effects of age, gender and concomitant diseases on patients with atherosclerotic lesions of brachiocephalic vessels

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Summary

Objective
To estimate clinical manifestations and history of patients with atherosclerotic lesions of brachiocephalic vessels, neurological symptoms, and concomitant diseases.

Materials and methods
We registered all cases of atherosclerosis of brachiocephalic arteries in patient with neurological manifestations followed up in the outpatient diagnostic center of the regional hospital. We selected 100 cases of brachiocephalic arteries' atherosclerosis combined with neurological symptoms and comorbid pathologies from the patients undergoing neurological follow-up. Patients were divided into age groups according with the WHO and ILO classifications.

Results
It has been shown that 50% of males and 100% of females in the middle age group have arterial hypertension (AH), in this age group there were no female cases of diabetes mellitus (DM) and all male patients had DM. Only 33%

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of middle-aged women had thyroid diseases. 62% of men and 31% of women of the advanced middle age group had coronary heart disease (CHD). DM was present in 24% of advanced middle age males and 14% of advanced middle age females. In this age group 41% of women and 8% of men had thyroid diseases. 77% of elderly women and 43% of elderly men had CHD. DM was present in 46% of elderly women and 21% of elderly man, whereas thyroid diseases were found in 23% of women and 7% of men of elderly age. Rheumatic diseases were found in 31% of women and 7% of men. Multifocal atherosclerosis takes the leading position between observed concomitant diseases, and it is followed by AH and CHD at the second and third positions, respectively. CHD is more frequent in men.

Conclusion

Results of this study revealed significant gender differences and different prevalence of thyroid diseases, rheumatic diseases, and purinee metabolism abnormalities. Analysis of comorbid structure in atherosclerosis of brachiocephalic arteries revealed prevalence of concomitant cardiovascular diseases in all age groups.

Key words

Brachiocephalic arteries, atherosclerotic lesions, comorbidity

Introduction

Problems of modern time like aging of population, urbanization, global change of lifestyle and social tension increase the burden of chronic non-infectious diseases [1].

Efficiency of treatment of acute conditions has increased significantly, at the same time there is a noticeable growth of number of patients with chronic diseases in particular combining two and more somatic pathologies. At the same time clinical medicine is developing in the direction of further specialization that creates additional difficulties for treatment of comorbid diseases. Nowadays more attention is paid to teamwork, but members of the same team should understand each other well enough and know general strategies of treatment of patients with comorbid diseases.

The frequency of cardiovascular diseases (CVD) in the structure of general mortality in the Russian Federation reaches 56% and 85% of cases are related to coronary heart disease (CHD) and cerebrovascular diseases [2]. During the last decades CVD mortality has decreased by 23% in Russia, and expected life span is increasing, reaching 64 years in men and 75,6 years in women. It leads to the aging of population and consequently increases the frequency of combined pathology for one single person [3]. The problem of comorbidity of diseases related to atherosclerosis acquires particular importance for modern medicine. According to nowadays concepts, atherosclerosis is a systemic disease, and it can be localized in different vascular areas including the vessels of heart, brain, neck, kidney and peripheral arteries [4]. The CAPRIE study that analyzed the results of more than 19 thousands of patients registered multivascular lesions in more than 26,3% of patients, as much often as the lesions of one single vessel [5]. It is particularly important that atherosclerosis is the cause of one third part of all strokes. Atherosclerosis of aortic arc vessels, particularly common carotid artery bifurcation, is the main cause of ischemic strokes that represent 20% of all strokes [6].

According to results of other studies, comorbidity is based on the presence of the same risk factors for different chronic non-infectious diseases within one patient. Arterial hypertension, impaired lipid metabolism, cardiometabolic disorders, smoking, and chronic stress [7-10].

Improvement of comorbidity diagnostics in atherosclerosis of brachiocephalic arteries (BCA) may help to increase the effectiveness of treatment and prevention, and it makes our study relevant.

The objective of this study is to estimate clinical manifestations and history of patients with atherosclerotic lesions of brachiocephalic vessels, neurological symptoms, and concomitant diseases

Materials and methods

We registered all cases of atherosclerosis of brachiocephalic arteries in patient with neurological manifestations followed up in the outpatient diagnostic center of the regional hospital during the period from January of 2010 to December of 2012. We selected 100 cases of brachiocephalic arteries' atherosclerosis combined with neurological symptoms and comorbid pathologies from the patients undergoing neurological follow-up. Patients were divided into age groups according with the WHO and ILO classifications [11]. The I group included 5 patients aged 36-45 years (2 men, 3 women), the II group included 66 patients aged 46-60 years (37 men, 29 women), the III

group consisted of 27 patients aged 61-74 years (14 men, 13 women).

Inclusion criteria:

1. Age 18-75 years;

2. Presence of BCA atherosclerosis;

3. Presence of somatic comorbidity;

4. Signed informed consent;

Exclusion criteria:

1. Acute decompensation of chronic diseases;

2. Acute vascular manifestations;

3. Absence of signed informed consent;

Apart from obtaining patients' history and performing physical examination, we obtained results of total blood count and biochemical blood test from the patients. Blood for blood tests was taken during fasting period in the morning. After 15 min of exposure 10 ml of each blood sample was centrifuged with 3000 rpm in order to separate serum and perform the assay using biochemical automatic analyzer SysmexXT 4000, Japan. Urea, creatinine, C-reactive protein (CRP), lipid spectrum characteristics were determined (Cobas 501 apparatus). Levels of glycated hemoglobin (HbA1C) were measured using immune-turbidmety end-point technique.

For estimation of BCA atherosclerotic lesions all patients underwent ultrasound examination using ultrasound equipment Logis C6 CE, USA.

Data are present as mean values (M) and standard deviation (SD). Significance of differences was determined using non-parametric Student's t-test in case of normal distribution, and in case of not normal distribution Mann-Whitney test was used. Differences were considered significant if p-value was < 0,05. Significance of differences of qualitative characteristics was evaluated using χ^2 criterion and exact Fisher's test.

Results and discussion

Average age of general group of males and females was 57±7 years. The majority of patients belonged to the age interval from 50 to 64 years. There were no significant differences in gender distribution between groups (Table 1).

100% of patients of the middle aged subgroup had multifocal atherosclerosis, 80% of them had arterial

Table 1. **Characteristic of patients with atherosclerotic lesions of BCA and comorbid diseases**

Age groups (subgroups)	Disease	Total, n=100		Males, n=55		Females, n=45		Significance of differences (m/f), p
		Abs	%	Abs	%	Abs	%	
n=5 middle adult age 36-45 years	Arrhythmias	3	60	1	50	2	67	0,81
	AH	4	80	1	50	3	100	0,54
	CHD	1	20	0	0	1	33	0,41
	Multifocal atherosclerosis	5	100	2	100	3	100	1
	AVD	0	0	0	0	0	0	
	Diabetes mellitus, 2 type	2	40	2	100	0	0	0,083
	Thyroid diseases	1	20	0	0	1	33	0,35
	Rheumatologic diseases	0	0	0	0	0	0	
	Purine metabolism abnormalities	0	0	0	0	0	0	
	Systemic diseases	0	0	0	0	0	0	
n=66 late adult age 46-60 years	Arrhythmias	14	21	6	16	8	28	0,31
	AH	59	89	33	89	26	90	0,99
	CHD	32	48	23	62	9	31	0,07
	Multifocal atherosclerosis	62	94	35	95	27	93	0,95
	AVD	2	3	1	3	1	3	0,86
	Diabetes mellitus, 2 type	13	20	9	24	4	14	0,33
	Thyroid diseases	15	23	3	8	12	41	0,005
	Rheumatologic diseases	10	15	3	8	7	24	0,09
	Purine metabolism abnormalities	3	5	0	0	3	10	0,050
	Systemic diseases	1	2	0	0	1	3	0,25
n=21 elderly age 61-74 years	Arrhythmias	8	30	5	36	3	23	0,54
	AH	26	96	13	93	13	100	0,85
	CHD	16	5	6	43	10	77	0,25
	Multifocal atherosclerosis	25	93	13	93	12	92	0,99
	AVD	2	7	1	7	1	8	0,95
	Diabetes mellitus, 2 type	9	33	3	21	6	46	0,26
	Thyroid diseases	4	15	1	7	3	23	0,28
	Rheumatologic diseases	5	19	1	7	4	31	0,15
	Purine metabolism abnormalities	0	0	0	0	0	0	
	Systemic diseases	0	0	0	0	0	0	

hypertension (AH), and 60% of them had various arrhythmias, diabetes mellitus was found in 40% of cases in this group, and CHD and thyroid diseases were present in 20% of cases, respectively. There were no acquired valvular defects (AVD), systemic diseases or purine metabolism abnormalities in this group.

In the subgroup of late adult age 94% of patients had history of multifocal atherosclerosis, 89% of patients had AH, 48% of them had CHD, thyroid diseases and diabetes mellitus were found in 23% and 21% of cases, respectively.

In the subgroup of elderly age 96% of patients had AH, 93% of patients had multifocal atherosclerosis, diabetes mellitus and arrhythmias were found in 33% and 30% of cases, respectively. Rheumatologic diseases were found in 19% of cases, thyroid diseases were detected in 15% of patients, AVD were found in 7% of patients, CHD was present in 5% of patients, and purine metabolism abnormalities and systemic

diseases were not registered. There were no significant differences of age distribution between groups.

50% of patients of the middle adult age group had 50% of men and 100% of women, diabetes mellitus was not found in women of this subgroup, but it was detected in 100% of men. Thyroid diseases were found in 33% of women of this subgroup and were absent in men (Figure 1).

62% of men and 31% of women had history of CHD. Diabetes mellitus was found in 24% of men and 14% of women. Thyroid diseases were found in 41% of women and 8% of men. Rheumatologic diseases were registered in 24% of women and 8% of men (Figure 2).

In the group of elderly age 77% of women and 43% of men had CHD, diabetes mellitus was found in 46% of women and 21% of men, thyroid diseases were observed in 23% of women and 7% of men. Rheumatologic diseases were registered in 31% of women and 7% of men (Figure 3).
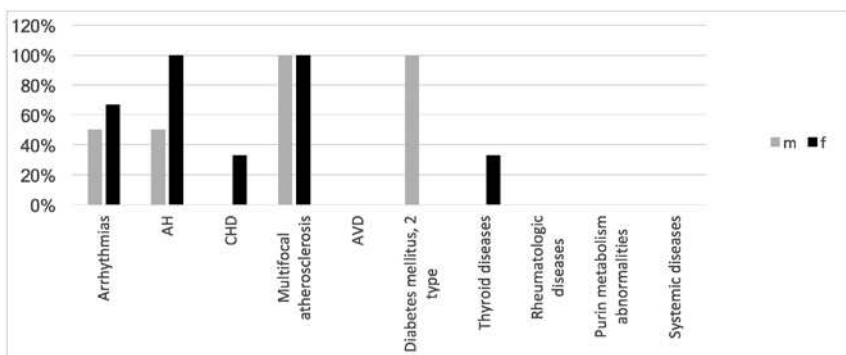

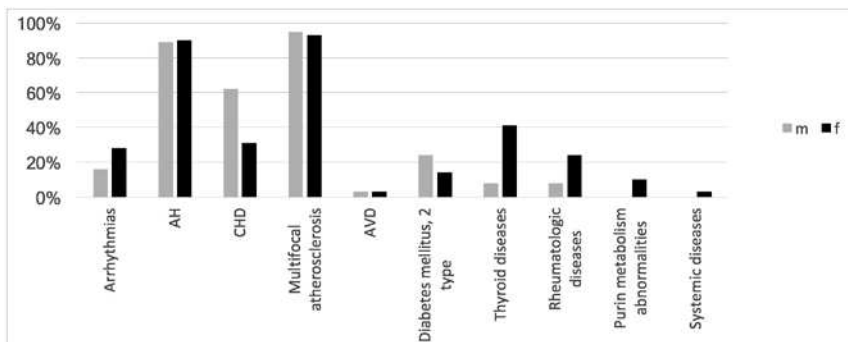**Figure 1.** Gender differences in comorbid diseases distribution in group "Middle adult age"

Figure 2. Gender differences in comorbid diseases distribution in group "Late adult age"
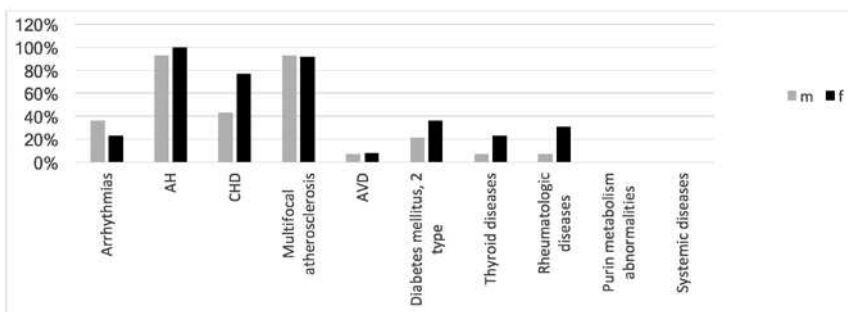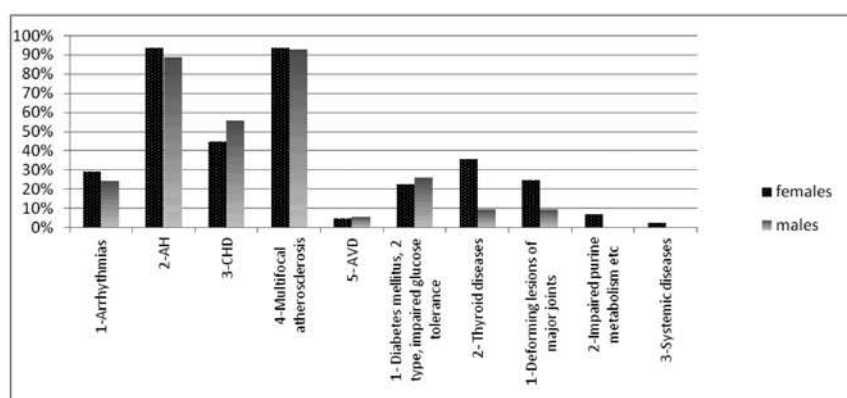

Figure 3. Gender differences in comorbid diseases distribution in group "Elderly age"

Figure 4. Gender structure of comorbidity in general group

Analysis of the structure of comorbid diseases demonstrated that multifocal atherosclerosis of BCA prevailed between them (Figure 4). AH took the second position. The third most frequent concomitant disease was CHD, and this disease was more frequent in men than in women. The fourth position was taken by thyroid diseases in women and diabetes mellitus in men. The fifth frequent comorbidity was arrhythmia. Deforming lesions of major joints followed it in women, and in men the sixth position was taken by deforming lesions of major joints and thyroid diseases. The seventh position in women was present by diabetes, and the eighth position in women was associated with purine metabolism and other metabolic abnormalities, and in men the eights position was taken by AVD.

According to the results of other studies, the prevalence of comorbidity reaches 21-98%. We identified correlation between the frequency of comorbid pathologies and age. The frequency of comorbidity in young patients (18-44 years) was 69%, and it increased up to 93% in middle-aged patients (45-64 years) and reached 98% in elderly patients (above 65 years) [12]. Studies conducted during the last years demonstrated that elderly and old patients started to prevail between all cases of acute myocardial infarction that aggravates severe clinical condition of these patients. Population study of Yu. Shamurova and colleagues registered polypathies in 68,8% of men and 80,3% of women. The prevalence of comorbid pathology in women is more frequent then in men reaching 82% and 72%, respectively [13]. The STERKH study demonstrated that more than 70% of patients who visited cardiologist had a combination of two CVD and more. Combination of CHD and AH was registered in 35,3% of patients, and combination of CHD, AH and any other CVD was found in 23,3% of patients. The most frequent concomitant diseases for CVD were

diabetes mellitus (19,1% of cases) and chronic obstructive pulmonary disease (10,4%) [14].

It is known that the number of patients with several chronic diseases increases together with the growth of lifespan. Elderly age is associated not only with more severe clinical course of acute period of a disease but also with poorer post-hospitalization prognosis [15].

Conclusion

Results of this study revealed significant gender differences between patients with thyroid diseases, rheumatic diseases, and purine metabolism abnormalities. Analysis of comorbid structure in atherosclerosis of brachiocephalic arteries revealed prevalence of concomitant cardiovascular diseases in all studied groups. Multifactorial prevention that aims to correct general causes of vascular comorbidity can reduce the risk of cardiovascular catastrophes in general.

Conflict of interest: None declared

References

1. Rumjantseva S.A., Stupin V.A., Oganov R.G. et al. Theory and practice of treatment of patients with vascular comorbidity. Clinical Guideline. Moscow-Spb.: International Publishing Group «Medical Book»; 2013, 360 p. Russian

2. Boytsov S.A., Kukharchuk V.V ., Karpov Yu.A. et al. Subclinical atherosclerosis as a risk factor of cardiovascular events. Cardiovascular therapy and prevention. 2012; 11(3): 82-6. Russian

3. Gavrilova N.E., Metelskaya V .A., Yarovaya E.B., Boytsov S.A. Carotid artery duplex scan in diagnosing coronary atherosclerosis and assessing its severity. Russian cardiology journal. 2014; 4(108):108-12. Russian

4. Nikolsky E. Peripheral arterial occlusive disease in patients with coronary artery disease compromises the recovery and

postoperative quality of life of patients who undergo myocardial revascularization. Am J Cardiol 2004; 93: 153-69.

5. Ferreiro JL, Bhatt DL, Ueno M, Bauer D, Angiolillo DJ. Impact of smoking on long-term outcomes in patients with atherosclerotic vascular disease treated with aspirin or clopidogrel: insights from the CAPRIE trial (Clopidogrel Versus Aspirin in Patients at Risk of Ischemic Events). J Am Coll Cardiol. 2014 Mar 4;63(8):769-77.

6. Rumjantseva S.A., Oganov R.G., Silina E.V. et.al. Cardiovascular pathology in acute stroke (issues of prevalence, prevention and treatment). Cardiovascular therapy and prevention. 2014; 13(4): 47-53. Russian

7. Diagnosis and treatment of patients with arterial hypertension and COPD. Recommendations of Russian medical society of arterial hypertension and Russian respiratory society. Systemic hypertension. 2013; 10(1): 5-34. Russian

8. Mancia G, Fagard R, Narkiewicz K, et al. 2013 ESH/ESC Guidelines for the management of arterial hypertension. Eur Heart J 2013; 34:2159-2219.

9. James P.A., Oparil S., Carter B.L. et al. 2014 Evidence-based guideline for the management of high blood pressure in adults. Report from the panel members appointed to the Eighth Joint National Committee (JNC8). JAMA 2014; 311(5):507-20.

10. De Backer G., Graham I., Taskinen et al. ESC/EAS Guidelines for the management of dyslipidemias. Eur Heart J 2011; 32: 1769-818. 11. Montalescot G, Sechtem U, Achenbach S, et al. 2013 ESC Guidelines on management of stable coronary disease. Eur Heart J 2013;34(38):2949-3003.

11. Tsygankov V. A., Zharkova S. L. Classification and systematization of able-bodied population by age groups. ONV. 2009;4:65-79. Russian

12. Van den Akker M., Buntinx F., Roos S., Knottnerus J.A. Comorbidity or multimorbidity: what's in a name? A review of the literature. Eur. J. Gen.Pract. 1996; 2: 65–67.

13. Shamurova Yu.Yu., Kalev O.F., Tyukov Yu.A. Polypathias at men: problem scale. Problems of social hygiene, health care and history of medicine. 2008; 3: 25–27.

14. Lazarev A.V., Kalininskaya A.A. Necessity of the population of Nizhny Novgorod region in cardiosurgical interventions. Manager of Health. 2016; 2: 21-28. Russian

15. Feinstein A.R. Pre-therapeutic classification of co-morbidity in chronic disease. J. Chron. Disease. 1970; 23(7):455–468.