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Study of the degree of calcification of the coronary arteries after cardiovascular interventions in patients of different ethnic groups of Yakutia

Antipina V.V., Voevoda M.I., Romanova T.A.
(Antipina V.V. – doctor-cardiologist, RH #1–NCM, MCH RS (Y); Voevoda M.I. – MD, corresponding member of RAMS, SRI of therapy, SD RAMS, director, office@iimed.ru; Romanova T.A. – PhD, assistant-director, RH # 1-NCM MHC RS (Y))

The authors analyzed the results of complex examination of patients' of native and non-native nationality of Yakutia with diseases of the cardiovascular system for definition of atherosclerotic coronary artery lesions using tomography techniques (CT of the heart). It was revealed that the degree of calcification of the coronary arteries has no significant differences between native and non-native patients with CHD.

The inclusion of CT coronary heart disease in the algorithm of outpatient examination patients with suspected coronary artery disease will reduce the number of invasive angiography, and provides important prognostic information to clinicians.

Keywords: calcium index, RCT, quantity, calcium volume, atherosclerosis, native, non-native.

Results of complex observation of 189 native, non-native inhabitants of Yakutia have been analyzed to define atherosclerosis affection of coronary arteries with the help of tomographic method heart as a result of X-ray computed tomography average age in the 1st group is 55,1±0,6, in the second group 57,5±0,7 of (D=0,03). Most of the patients (71,9%) are men. Involring RCT of coronary arteries into algorithm of ambulatory monitoring patients with supposed IHD will let cut down interventional procedures (ischemic heart) give important prognosing information to clinical physicians.

Introduction

Standard methods to define risk development of cardio-vascular disease complications are based on finding out and evaluating traditional risk factor, such as sex, age, smoking, artery hypertension, high level of blood cholesterol, diabetes, overweight (T.A. Romanova, 2011). Some climatic, physic-geographical, ethnic factors play a certain role inYakutia. According to the traditional factors most cases of cardio-vascular disease complications are observed in patients with low or middle risk ("prophylaxis paradox" V.S. Sinitsina, D.A. Voronov, C.P. Morosov 2006). It proves that traditional risk factors don`t identify patients with a pre-clinic atherosclerosis coronary artery diagnosis because of limited prognosing value of traditional risk factors of ischemic heart disease development. One of these methods is diagnosing calcinosis amount in coronary artery as a marker of atherosclerosis defect of coronary artery with the help of tomography method (V.E. Sinitsin 2010).

There are several works studying peculiarities of coronary atherosclerosis, its connections with traditional and new risk factors, for ex. significance of calcium index amount measured by tomography methods of native and non-native inhabitants in Yakutia (A.N. Romanova, N.V. Makharova, T.Yu.Tomskaya and et.al., 2005). These obtained results will be able to optimize medical-prophylactic ways concerning ischemic heart disease.

Research objective: studying coronary artery calcinosis (as a result of RCT) in patients suffering from IHD and AH.

Material and methods.

189 patients of native and non-native inhabitants of Yakutia were observed. They suffered from

IHD, stenocardia tension (I-IV by Canadian classification, 1972), infarction myocardium in anamnesis together with hypertension disease. Research was done on the base of Clinical-consulting department (CCD) of RH#1-NCM, Yakutsk.
The patients were selected according to the recommendations of European cardiologist's society, 2008.

10. Patients with IHD to find out changes of coronary artery (and also as a diagnosing test of ambulatory patients till 65 years old having atypical pains in the chest, doubtful results of leading tests or traditional coronary risk factors without IHD diagnosis).
11. Patients after surgical IHD treatment to find out a coronary artery state and permeability of venous and artery coronary shunts.

Period of selected material is 2008-2011, Research program included: anamnesis studying, anthropometric research, objective observation, electrocardiographic, echocardiographic observation of heart (Echocardiographicroentgen computed tomography of heart and main vasculars (RCT), apparatus Acuson -128/XP-10 HDI-3000 (USA) was used. Final diastolic, final systolic sizes, the thick of ventricular septum, the thick of back of LV were carried out in the M-regime on the level of MC hord on wall of parastenal access along long heart axis. The following points were analysed: final – diastolic size (FDS), final – systolic size (FSS), the thick of ventricular (TVS), the thick of back part of left ventricle (TBPLV).
LV hypertrophy was diagnosed in the extension of VS and BPLV at the end of diastoly more than 1,1 sm myocardium mass of the left ventricle and its hypertrophy were determined by "Penn-cube" formula Devereux R.B., Reichek N., Echocardiographic determination of left ventricular mass in man. Circulation: 55:613 – 618. LVM=1,04 TVS+TBPLV+FDS – 13,6 (Deveroux R.B., Reichek N. Echocardiographic determination of left ventricular mass in man. Circulation: 55:613 – 618. 1977).
RCT of heart and main vasculars was done by apparatus Siemens Medical Solutions. Computed Tomography standartised datum of coronary artery calcinosis is calcium index (Agatston index) helping to diagnose risk development of IHD and coronary complications. Clinical significance singles out four diapasons of calcium index (CI9.0 lowest, 1-10-low, 11-100-moderate, 101-400-highest).
Standard mathematical methods were used to work out statistic data, including correlative analysis, using SPSS program (version 19.0). statistichypothesistsStewdent, x-Pirson, F-Fisher were used as a value criterion. Data are M m, where M is an average value of quantity, m is an average mistake of quantity. A dispersion analysis or non-parameteric criteria were used to value differences of groups. Differences were considered to be significant in $p<0,05$.

Factors value of coronary artery calcinosis of native and non-native inhabitants in Yakutia.
Analyzed results of complex observation of 189 patients are divided into 2 groups: 1 – native inhabitants (the yakut) – 94 people; 2 – non-native (the russian) – 95 people.
An average age of patients: 1 gr. – 55,1±0,6; 2 gr. – 57,5±0,7 (p=0,03). Most of the observed patients (71,9%) were men. Before observation 141 patients (74.6%)were supposed to have diagnosis of IHD on the base of anamnesis data and traditional instrumental methods, IHD was confirmed in 162 patients (85,7%) (Table 1).
Complains of pains, contrained feeling in the chest while being loaded had 80 patients (39%). 9 patients (4,4%) had stenocardia in rest (spontaneous). 15 patients (7,3%) complained of chest pain in load and rest. 116 patients (56.6%) complained of short breath in morement. Heart intermissions were observed in 60% of patients. 9 patients didn`t have clinical IHD symptoms. The reasons of their observation were: 3 of them had artery hypertension and heart intermission during ECG in rest, 4 patients – during daily monitoring, 2 had dislipidaemia in blood plasma, 1 – tumour in the heart, 1 – combination of artery hypertension and heart intermission in daily monitoring.
43 patients (21%) had infarction myocardium, 8 of them had twice, 1-3 times. 5 patients had breach of blood circulation of brain. Artery hypertension was most the frequent risk factor (89,4%). 69

patients (36,5%) suffered from diabetes, 42 patients smoked (20.5%), heredity was burdened with cardio-vascular diseases in 64 patients (31,2%), 115 (60,8%) patients had overweight, 72 patients (35,1%) had dislipideamia, 7 patients had sharp and non-sharp myocardium, 3 of them were examined because of supposed myocardium.
189 patients were examined by ECG method in rest. echoCG-180-RCT of coronary artery – 189, coronary angiography – 98 (51,8%), myocardium scinntigraphy – 97 (51,3%).

Comparative characterictic of risk factors of native and non-native patients in Yakutia.

	Group 1 (n 94)	Group 2 (n 95)	P
Age, year (M+m)	55,1±0,6	57,5±0,7	0,03
Sex, m/f	52,2 (71) /43,4 (23)	56,6 (30)/47,8 (65)	0,278
Kettle index (kg/sm2)	28,9±0,5	31,6±0,5	0,0001
Diabetes	33 (31)	40 (38)	0,488
Artery hypertension	86,2 (81)	92,7 (88)	0,150
Overweight	47,9 (45)	73,7 (70)	0,0004
IHD	84,8 (78)	90,5 (86)	0,233
LVM	245,75±9,4	287,54±12,5	0,008
ILVM	148,17±5,5	169,75±7,5	0,018
Average CI	306,0±66,2	418,4±74,8	0,262
Average V	251,5±52,5	309,4±55,9	0,451

Average CI datum of native patients 306±66,2, V-251,5±52,5 is lower than of non-native patients where CI 418,4±74,8, V-309,4±55,9 ($p>0,0001$), these data are confirmed by previous research (Makharova N.V., 2010).

Determination of calcinosis level of different ethnic groups living in Yakutia suffering from IHD (by Agatston).

Spread and seriousness of coronary atherosclerosis in compared groups were observed together with determination of coronary calcium score. Calcium index (CI) according to A.S. Agatston method in age group of 40-49 with IHD is 178,43±27,92 in patients without IHD – 18, 14±3,64, $d<0,001$. All the patients are divided into 5 groups by calcium score depending on CI volume according to the recommendations of Mayo clinic specialist (Rumberger Y.A., at al, 1999).

Table 2.
Patients dividing by sex and nationality (women, men, native and non-native and calcinosis scoring)

Score of calcinosis (CI)		%	0	1-10	11-100	101-400	> 400
Native women	n=23	43,4	28,3	3,8*	3,8*	5,7	1,9
Non-native women	n=30	56,6	24,5	11,3*	15,1*	3,8	1,9
Native men	n=71	52,2	20,6**	5,1	8,1**	6,6**	11,8**
Non-native men	n=65	47,8	10,3**	5,1	6,6**	9,6**	16,2**
Number of patients	n=189	189	70	22	30	27	40
Total (%=)		100,0	37	11,6 1	15,9	14,3	21,2

Notes: *-d (1-2) 0,05 – real significance of n and n-, women
**-d (1-2) 0,05 – n-n-n men

Calcinosis score in analysis by sex CI of native women, men is lower, but there are some peculiarities. Among non-native patients a number of women with CI 11-110 is more than among native ones, the some is among men. Frequency of CI more than 400, is the same in native and non-

native women. Real significance between native and non-native patients by nationality is =0,043 (Manna-Witney criteria), difference between men and women by nationality is d=0,025 (Table 2).
Real statistical datum by nationality is d=0,043 (Manna-Witney criteria), by age CI is d=0,025.
Early diagnosis of IHD with known risk factors helps to work out treatment strategy. The most known risk factor of cardio-vascular diseases is artery hypertension. Most researchers marked the frequency of coronary calcinosis in patients with high AT (V.S. Sinitsyn, D.A. Voronov, S.P. Morosov, 2006). Possible interconnection of coronary atherosclerosis ,calconosis and artery hypertension is complicated and not researched up to the end (Doyle A.E., 1990, Schiffmand A., Lange S. et al, 1992).
Out of total number of women n=53, combination of IHD and AH is n=49 (92,5%), without AH n=4 (7,5%), 9 men with IHD and AH n=113 (59,8%), without AH n=23 (12,2%) (Table 3).
Native men and women with IHD and AH are more than non-native ones.

Table 3.

Dividing of men and women by stages of AH

Stage AH	1 group (n=94)	2 group (n=95)		
Sex	1(1,0)	7(7,4)	8(8,5)	0(0)
1 stage	16(17)*	43(45,7)**	59(62,8)***	17(17,9)*
2 stage	4(4,3)*	11(11,7)**	15(15,9)***	11(11,6)*
3 stage	2(2,1)	10(10,6)***	12(12,8)	2(2,1)
Total without AH	23(24,5)	71(75,5)	94(100)	30(31,6)
Total patients	21(22,3)***	61(64,9)***	82(87,2)	28(29,5)***
With AH	1(1,0)	7(7,4)	8(8,5)	0(0)

Notes: *-d (1-2) 0,05 real information by sex
**-d (1-2) 0,05 comparative data of both groups be sex
there are no significant differences between 1 and 2 groups of men, 1 stage of AH, but there are differences with and without AH in total number, with AH d=0,022 (d=0,019) by non-parametric method. AH is associated with age of both ethnic groups d=0,0001.
Frequent increase of AH connected with age in non-native men is marked (Klimova T.M., 2001, Yanchenko O.V., 2002, Romanova A.N., 2007). Average CI meaning and amount of IHD with and without AH.
Average meaning of observed patients CI (native and non-native) with AH is much more higher than in patients not suffering from AH. received data are trustworthy.
Average CI of 1 group patients (native) with AH n=81 is 279,4 ±65,9, without AH n=88, CI is 409,9 ±75,8, without AH n=7 CI is 296,2± 84,0 d=0,686 (picture).
In comparing of average meanings CI of non-native patients is much more higher than average CI and data, but it`s not trustworthy. According to some data combination of IHD and AH leads to calcinosis increase of coronary arteries, though achieved statistic results are not trustworthy which confirm results of Cherzog and coauthors (2004) Lau and elat (2005). participation of AH in atherogenesis is possible and it makes worse atherosclerosis process due to artery wall (Doyle A.E., 1990, Schiffand A., Lange S. et al 1992).
it is noticed that calcinosis presence is connected with hypertension duration where as … level doesn`t influence (Megnien J.I., Simon A., Lemaricy M. 1996).
A lot ofresearch data meta-analysis that CI is an independent risk factor of coronary atherosclerosis complications and IHD. In this case a relative risk of cardio-vascular complications is higher than of standard risk factors of IHD (V.E. Sinitsyn, 2010).
In observed women group with IHD native nationality – 23,7%, non-native – 31,2%, men of native nationality – 75,6%, non-native – 68,8%.

Table 4.

	1st group (n=94 women, men, total)	2nd group (n=95) women, men, total		
I FC (n=21)	5(5,3)	14(14,9)*	19(20,2)***	2(2,1)
II FC (n=65)	8(8,5)	23(24,5)	31(33)	12(12,6)
III FC (n=76)	5(5,3)**	25(26,6)**	30(31,9)***	11(11,6)**
Absence of IHD (n=21)	5(5,3)	9(9,6)***	14(14,9)	5(5,3)

Note: Patients of IV FC are not registered in the given research.

- * d=0,05 difference of 1 FC stenocardia between native and non-native men
- ** d=0,05 difference of III FC stenocardia between men and women of native and non-native patients
- *** d=0,05 difference between men of native and non-native patients without IHD

Real significance is determined between men and women with IHD, d=0,004 in non-native patients, in native ones with IHD by sex with IHD, d=0,013.

Carried out analysis confirmed stenocardia FC that II stenocardia FC is a little more in non-native men (33,8% and 35,9%), III stenocardia FC prevails in non-native men and women (37,9%, 57,8% accordingly).

Table 5.

Signisicance of CI, V in native and non-native patients with and without IHD.

Nosology	Native (n=94)		Non-native (n=95)	
IHD	CI	V	CI	V
With IHD	317,4±70,5*	260,7±57,2*	441,3±79,3**,*	340,2±60,8*
Without IHD	12,5±8,5*	11,1±7,2*	21,8±19,3**	18,9±16,3**
Total	306,0±66,2	251,5±52,5	418,4±74,8	309,4±55,9

Note: * d=0,05 significant difference between native patients with IHD and without it
*d=0,05 significant difference between non-native patients with and without IHD

There is no trust in comparing native and non-native patients with IHD a worthy significance of patients with and without IHD of CI is d=0,004, of Vd=0,013, trust is observed in native and non-native patients in total. Patients suffering from IHD got statistically significant data in native patients (n=80), CI-317 70,5 and in non-native (nnn=86 with IHD, CI – 441,3 79,3. Absence of IHD in native (n=14) CI-12,5 8,5, in non-native (n=9) CI – 21.8 19,3 (Table 5).

Thus, patients suffering from IHD have a big average CI, V and trustfully significant differences than patients not suffering from IHD, native and non-native patients.

Conclusions:

1. Average CI, V of patients with IHD and AH in both groups is much more higher than of patients not suffering from AH. In comparing of average CI, V of native and non-native patients with AH, quantitative significance is higher in non-native patients, but received results are not worthy statistically.
2. Patients suffering from IHD have larger average CI than patients without IHD. This fact is kept in native and non-native patients.
3. Calcinosis score of coronary artery hasn`t any worthy differences in native and non-native patients with IHD.

Practical recommendations.

1. RCT of coronary arteries is shown to patients: without coronary symptoms but with risk factor of IHD; pains in the chest, but with negative and doubtful results of stress-tests; before operation by ballonangioplastic and stenting or shunting.
2. CtT-angiography is not shown to patients with CI 400 in artery. It`s better to carry out

invasive CAG to determine tactics of myocardium revascularization.

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