

FEATURES RELATED TO THE CHANGES OF THE ARTERIES IN OLD PERSONS

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Abstract: We appreciate that the highest mortality percentage, namely half or even more of the deaths is caused by atherosclerosis. This fact is very frequent in the economically developed societies. It is considered that the rate of deaths caused by ischemic cardiovascular diseases decreased in the last years by approximately 50% and the deaths caused by cerebral atherosclerosis by approximately 70%. This decrease is generally due to the prophylaxis process of the vascular atheromatosis and mainly focuses on the removal of the risk factors, such as smoking, food rich in animal grease and cholesterol, alcohol consumption and naturally the fights blood pressure.(14) The complexity of the atheromatosis pathology, even if it presently, includes insufficiently clarified aspects and that have a negative impact on human health, represents a subject highly studied by researchers and clinicians due to objective, theoretical and practical reasons.

Keywords: mortality, arteriosclerosis, risk factors

Rezumat: Se apreciază că cel mai mare procent de mortalitate, respectiv jumătate sau chiar mai mult din numărul deceselor, este dat de ateroscleroză. Acest fapt este întâlnit în proporții foarte mari în societățile dezvoltate economic. Se consideră că rata deceselor prin boli cardiovasculare ischemice a scăzut în ultimii ani cu aproximativ 50% iar prin ateroscleroza cerebrală cu aproximativ 70%. Această scădere se datorează mai ales procesului de profilaxie a aterosclerozei vasculare și are în vedere în primul rând îndepărtarea factorilor de risc, care includ în principal fumatul, alimentația bogată în grăsimi animale și colesterol, consumul de alcool și desigur combaterea tensiunii arteriale.(14) Complexitatea patologiei aterosclerozei, deși cuprinde aspecte care sunt deocamdată insuficient elucidate și care au un impact negativ asupra stării de sănătate a populației umane, constituie un subiect care este în atenția cercetătorilor și clinicienilor din considerente obiective, de ordin teoretic dar mai ales practic.

Cuvinte cheie: mortalitate, ateroscleroză, factori de risc

INTRODUCTION

Atherosclerosis, the most frequent disease of the group, focuses on the big and medium elastic and muscle type arteries and it is featured by the focal, disseminated deposit of the various lipids, hydro carbonated, blood

compounds, fibre tissue and calcium within the arteries, that lose their elasticity and tighten the lumen.

Atherosclerosis includes a group of diseases featured by the thickening and the indurations of the arterial wall, with the progressive reduction of the lumen and the emergence of certain clinical ischemic tables in the concerned arterial territory.

Atheromatosis is defined as the type of atherosclerosis featured by the presence of certain lipids deposits in the walls of the blood vessels.

Atheromatosis, associated with the deposit in the intima of the arteries of a combination of lipids rich in cholesterol esters, was experimentally monitored even from the beginning of the last century.(7)

Studies revealed the deposit tendency of the cholesterol ester with the emergence of certain xanthomatosis changes in the absence of the hyperlipidemia.(13)

We assert that in human beings, certain hyperlipidemias favour the atheromatosis so that the lesions of the atherosclerosis appear in relatively young groups.

The studies made on coronary arteries obtain after deaths caused by violent accidents showed that the first signs of atherosclerosis, namely the vascular necrosis, the accumulations of lipids and fibrin are present even from childhood.(14)

It was found that the extension and the evolution of the lesions are more pregnant for the masculine sex, being accelerated by the risk factors. As well, the lesions can be favoured by certain minor deviations of the basic ramifications of the coronary arteries or by certain terminal stage diseases. In the latter class we may include the sarcoidosis, the kidney complications of the systemic lupus erythematous and certain thesaurismosis that deposit esters of cholesterol and triglycerides.(3)

The formation of the atheromatosis seems to be made by the evolution of a specific cycle. The process implies certain fibromuscular plates, sometimes without intermediate stages between the two types of lesions and namely the deposits of lipids and fibrous plates.(6)

More probable seems to be the theory according to which the lipids deposits transform into mucoid forms, then these transform into plaques rich in foam cells, then in necrotic plaques and finally in fibro-necrotic plaques.(9)

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The development of the atheromatosis lesions in vessels seems to be unequal, in certain areas being more accentuated compared to others, especially in the arterial segments that suffered modifications caused by various agents or diseases.(10)

However, hyperlipemia is an important secondary factor, taking into account the fact that the primary factor of atheromatosis is to be found in the intima of the artery. Thus, it was showed that the signs of atherosclerosis that refer to intimal necrosis, precociously appear at human intra-skull arteries as well, namely with two, three decades before the first fibromuscular plaques and the first lipid striae.(6)

The study carried out on several patients aged over 60 years, hospitalized in specialty departments, allowed the investigation of the atherosclerosis changes in elder persons.

For complex information, the investigated patients were diagnosed with arteriosclerosis with different localizations, in different evolution stages of the disease.

The features related to the changes of the arteries of the old persons were established after the histopathological examination for which fragments of aorta and of the coronary artery were taken during the surgery, in the specialty services and during necropsy.

The study of the taken fragments, made by classic histological methods, using the hematoxylin-eosin and van Gieson colorations, enabled the establishment of sufficient particularities of the atherosclerosis process.

For complete and experimentally compared investigation, the information specific to the atheromatosis process may be obtained by using laboratory animals. In the context, the histoenzymologic method allowed the study of the aorta and the coronary artery of experimental animal, rabbits, that had a hypercholesterolic diet. According to a pre-established technique, the fragments of those particular arteries were taken after one month, two months and three months after a diet daily made up of 50 grams of cholesterol and 10 grams of vegetable oil.(4)

The histoenzymological technique allowed the "in situ" monitoring of certain enzymes as NADH2-citocrom C-reductases or diaphoresis, mitochondrial aerobic enzyme and Lactate dehydrogenase, anaerobe cytosolic enzyme.

According to the histopathological examination, it was found that the intima of the aorta and of the coronary arteries seem to be totally changed in atheromatosis. As well, the endothelium presents signs of erosion, partially discolorations of the basic membrane and the endothelial cells have unequal sizes, some of them having highly increased diameters. The sub-endothelial chorion seems to be thickened and at its level, the conjunctive fibres are disorganized, non orientated, having different directions.(3)

It was found that in the atheromatosis process, frequently the conjunctive fibres are divided and appear in a highly increased proportion compared to the conjunctive

cells. In the same time, in this process, isolated or grouped, there are adipose cells with classic aspect, yet most of them appear as foam cells specific to atheromatosis.(2)

In the big elastic-muscle type arteries, in the chorion of the internal tunic, we found the emergence of certain edema areas of unequal sizes and areas of hyaline transformation. The intern elastic limit seems to be thinner, being interrupted in certain segments.(4)

We noticed in the intima of certain large arteries, especially in the aorta, vessels of a neo-formation. At these arteries, the lumen generally appears with stenosis of different degrees between 25% and over 50%, the last being the most frequent, sometimes reaching the total reduction of the vascular lumen.(8)

The dystrophic processes appeared as atheromatosis plates with lipid deposits or in its phase of growing decrepit, with necrotic material or in reshuffle with fibrosis and calcifications.

The average of the arteries presents structural alteration processes, especially in its intern third.

We also noticed that among the hystopathological changes there is a specific reaction characterized by the multiplication of the collagen fibers that dislocate and partially replace the muscle fibres.(4)

As well, we emphasized edema striae and isolated lipid cells and rarely grouped, that create spaces of different sizes between the elastic and myocyte compounds of the medium tunic of the vessels. Consequently, these appear at a certain distance, dislocated, without neighbourhood and normal junction.(6)

The structural observations allowed the establishment of two types of morphological changes of the vascular wall, that represents either two evolutive phases of the degenerative process, or two ethiopathogenic aspects of the same pathological process. One of the phases is the one completely constituted, with major changes of the arterial tunics and the other represents a rare particular phase, featured by a fibrous debut and followed by lipid loads and structural alterations, known as secondary arteriosclerosis.(2) Mentioned in the pathology of arteriosclerosis and accepted as special type of degenerative process, the secondary atherosclerosis was scarcely investigated from the hystopathologic point of view.(6)

The hystoenzymologic methods that enabled the study of the aorta and of the coronary artery established observations related to their changes in experimental animals.

The study of the activity of NADH2-citocrom-C-reductase, diaphoresis, offered the possibility of establishing certain important features in the arteriosclerosis process.(4)

The aorta presents an intense enzymatic reaction in the cytoplasm of the endothelial cell and in the inflammatory type cells surrounding the atheromatosis plates.

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The sarcoplasm of the muscle fibres remained of the average of the artery appear with the intense diaphoretic activity. In the medium tunic, the activity of the diaphoresis is intense and very intense in the inflammatory infiltration cells. In the adventitia of the aorta, the activity of the enzyme is intensely carried out in the blood vessels with variable intensities of the enzymatic activities from weak, intense and very intense in the conjunctive cells, namely in the fibroblasts.(3)

The coronary artery presents the endothelium as having diaphoresis activity slightly unequal from the intensity point of view, from one cell to the other. It was noticed that generally, the enzymatic reaction is either intense or very intense. Also, around the atheromatosis plaques we notice the presence of certain macrophage, plasmocytes and lymphocytes agglomerations with medium, intense and very intense reactions in the cytoplasm. The smooth muscle fibres of the medium tunic of the vessel seem to be medium and intensely reactive. In the adventitia the vessels present an intense diaphoresis activity in the intima and average of different degrees, in the conjunctive cells. The intensity of the reaction differs from a cell group to another, according to the area and to the vessel caliber.(4)

The study of the activity of the Lactate dehydrogenase offers data comparable to the activity of the diaphoresis.

The aorta presents enzymatic reactions that remain the same after certain intervals after slaughtering the experience animals that had a hypercholesterolic diet. The endothelium presents medium reactions, especially located in the peri- and sub-nuclear cytoplasm. It was also noticed that towards the lumen of the vessel, the cytoplasm of the endothelial cells seems clear. Furthermore, between the cells and the sub-endothelial space clear areas appear that can be due to the negativity of the lipid deposits.(4) The medium tunic presents negative enzyme activity in most of the smooth muscle fibres and very weak in certain myocytes. The elastic lamellas with unspecific reaction come out intensely coloured.

The adventitia appears with vascular reactions and weakly reactive fibroblasts.(3)

The coronary aorta presents weakly reactive endothelium, with a slight accentuation of the peri-nuclear reaction. It was noticed that in the medium tunic the smooth muscle fibres are present with a Lactate dehydrogenase average activity, focused around the nucleus. The distance between the myocytes is very highly increased and with weak reactions in rare fibroblasts. The adventitia cell compounds present a weak enzymatic activity and only partially an average activity.(4)

As a conclusion, the histoenzymologic remarks on experimental model on rabbits that had a hypercholesterolic diet, established certain characteristic enzymatic aspects compared to the investigated type of artery and of enzyme. The most active enzymes are noticed in the aorta and next, at a slightly lower value, in

the coronary artery.

It was found that the aerobic oxidative enzyme has a more intense activity compared to the anaerobe cytosolic enzyme.(7)

CONCLUSIONS

The research of the enzymes in the process of the atherosclerosis on the experimental model presented for some authors particular suppositions. In context, the researchers brought forward the idea of the lack of acid esterase in the atheromatosis would be a possible important factor of atherogenesis. This idea supports the fact that the diseases, associated to the lipids deposits or other substances are caused by a weak metabolism, with low or absent enzymatic activities.(1)

Recent studies try to determine if the asymmetric dimethylarginine, DAA, could be considered a marker of the arteriosclerosis.(1)

Also, DAA could be a risk factor for the endothelial dysfunction, playing a role in the hypercholesterolemia.(3) This theory is supported by studies that showed the correlation between the plastic concentration of the asymmetrical dimethylarginine and the thickening of the intima, namely of the average of the studied arteries.(10)

There is also the reserve that DAA inhibits nitric oxide synthases while its stereoisomers, the symmetric dimethylarginine is biologically inactive.(5)

On the other hand, it is considered that atherosclerosis, the most important source of morbidity and mortality in the developed societies, with significant progresses in the knowledge of the fundamental mechanisms involved in the development of atherosclerotic plaques and of the severe cardiovascular events, is featured by inflammatory mechanism with important role in all the stages of the disease.(9)

Recently, one consensus is that the atherosclerosis represents a stage of the increased oxidative stress, featured by lipidic and proteic oxidation in the vascular wall. (11) This includes the production of forms of reactive oxygen and nitrogen by the vascular cells like the oxidative changes, thus contributing to the important clinical manifestations of the atherosclerotic disease, such as the endothelial dysfunction and the break of the athermanous plaque.(9)

To these we add modern researches of immunohistochemistry, of recent immunology observations, that suggest that the activity of the immune responses may favour atherosclerosis, either inducing and perpetuating the inflammation, either selectively suppressing the proatherogenic immune responses by the selective activation of certain immune functions inhibiting atherosclerosis and the artery inflammation.(13)

Genetic studies open new perspectives in the decoding of the ethiopathogenic of atherosclerosis.(8) It is considered that several genetic factors and errors of the lipidic metabolism predispose to atherosclerosis.

In the same time, certain genes different from those involved in the lipidic metabolism have a

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supraimpact, so that they should be identified on the grounds of the family history. Thus the genes predisposing to high blood pressure and diabetes mellitus, to the control of the arterial diameter and of its reactivity to angles of the vascular ramifications, to the plaquetar adhesion, thrombosis and fibrinolysis, to the adjustment of the endothelial function and of the smooth muscle, all these may be considered as candidate genes for the study of the families predisposed to atherosclerosis. In the context, we even assume a selective genic therapy in the proliferative and degenerative diseases.(8)

As a conclusion, in between the consequences generated by the process of demographic aging, we also record the change of the sample indexes of general morbidity, the chronic cardio-cerebro-vascular diseases registering increasingly high indicators. The atherosclerosis determines ischemic clinical events at the level of the cerebral, coronary and peripheral circulation, being the main cause of cardio-cerebro-vascular morbidity and morality in both genders, regardless of the urban or rural environment.

Within the researches with important progresses in the knowledge of the atherogenic process, the attention is focused on its prevention and on its appropriate treatment, taking into account that for most of the researchers and scholars in the field, it is appreciated that atherosclerosis starts from the early childhood.

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