



## Histochemical Characteristics Of Aneurysms Developing In Cerebral Blood Vessels

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### ABSTRACT

The brain undergoes various secondary changes against the background of chronic damage of arterial blood vessels, atherosclerosis and hypertension. Histochemical staining methods provide reliable information when studying the development of destruction and defragmentation of fibrous structures, which are components of vascular components. In this study, cerebral blood vessels were studied using the Schiff and Van Gieson method. Based on the analysis of the obtained results, it was found that most of the destruction and defragmentation process continues with the accumulation of acidic mucopolysaccharides between the walls of the vessels and sharp swellings between the layers and the decrease of the high pressure tolerance of the vessel wall. As a result, angiosclerosis and angiofibrosis continue with the development of foci.

### Keywords:

aneurysm, histochemical method, cerebrovascular disease, angiosclerosis, atherosclerosis, brain, morphology.

**Relevance of the topic:** Cerebral vascular diseases account for 12.6% of all vascular diseases in the world, of which intracranial aneurysms account for 40% of the internal carotid arteries, 25% of the posterior lateral artery branches and 20% of the middle cerebral artery, and 5% of the vertebral basilar artery. , and the pathological expansions in the arteries have not been studied yet. According to the teaching of English scientists, the main factors of aneurysm of cerebral blood vessels are caused by anomalies of the vascular walls during embryonic development, hypertension, and the separation and expansion of the vascular wall after atherosclerosis.

Morphological changes in the intracranial arteries of the brain continue with various changes mainly against the background of hypertension and atherosclerosis. In particular, at the age of 55-59, atherosclerotic changes occur in the blood vessel wall, narrowing of the vessel diameter, or dystrophic and sclerotic changes occur in the vessel wall in bifurcated or branched branches close to this branch. When

most of the patients with cerebrovascular diseases were studied, the most important of the possible changes in their vessels are compression crushing of private blood vessels feeding the vessel walls, accumulation of sour mucopolysaccharides between elastic and collagen fibers, mucoid thickening of the vessel wall and improvement of fibrinoid structures in atherosclerosis and hypertension. continuation is considered a chain of problem. According to our scientists, most of the organic changes that occur in the blood vessels of our body are thinning of the vessel walls, separation into layers as a result of a sharp increase in acidic structures that break the interrelationship of the layers between them, and they noted that it occurs in the form of an aneurysm. This, in turn, requires the morphological identification of the above processes, the use of special histochemical methods in the examination, and the preliminary assessment of possible changes. The walls of the blood vessels stained with Alzian blue and Wang Gien methods, which are staining methods that provide accurate data for

the assessment of morphological changes occurring in the blood vessels of the brain, show structures with a chaotic arrangement of coarse fibers.

**Purpose:** To clarify the occurrence rate, risk factors, morphogenesis and pathomorphological changes of brain aneurysm.

**Materials and methods:** in 26 cases of acute blood circulation in the brain, the blood vessels of the artery were removed from the surgical practice and in total 21 cases of the autopsies of the dead patients, the autopsy materials of the blood vessels of the base of the brain and aneurysmal ruptured arteries were obtained. In the patients, the aneurysmal enlarged focus isolated from the branch of the brain base of the middle artery was fixed in a 10% formalin solution for 72 hours, and then placed in 96% alcohol for dehydration. Then the tissue pieces were embedded in histamix brand paraffin and left in a thermostat at 57C for 72 hours. The tissues were then placed in cassettes in the form of paraffin blocks. Using a microtome, micropreparations cut with a thickness of 4-8 µm were immersed in xylene and 70, 80, 90, 100% alcohols and stained with Alcian blue and Van Gison dye. Acidic and neutral mucopolysaccharides are stained blue with the help of Altzian blue dye, which gives information about Schiff's positive structure in this area. By Van Gison staining, collagen fibers are colored red, giving information on the analysis of the changes in different levels of collagen fibers developed and destroyed in the vessel wall.

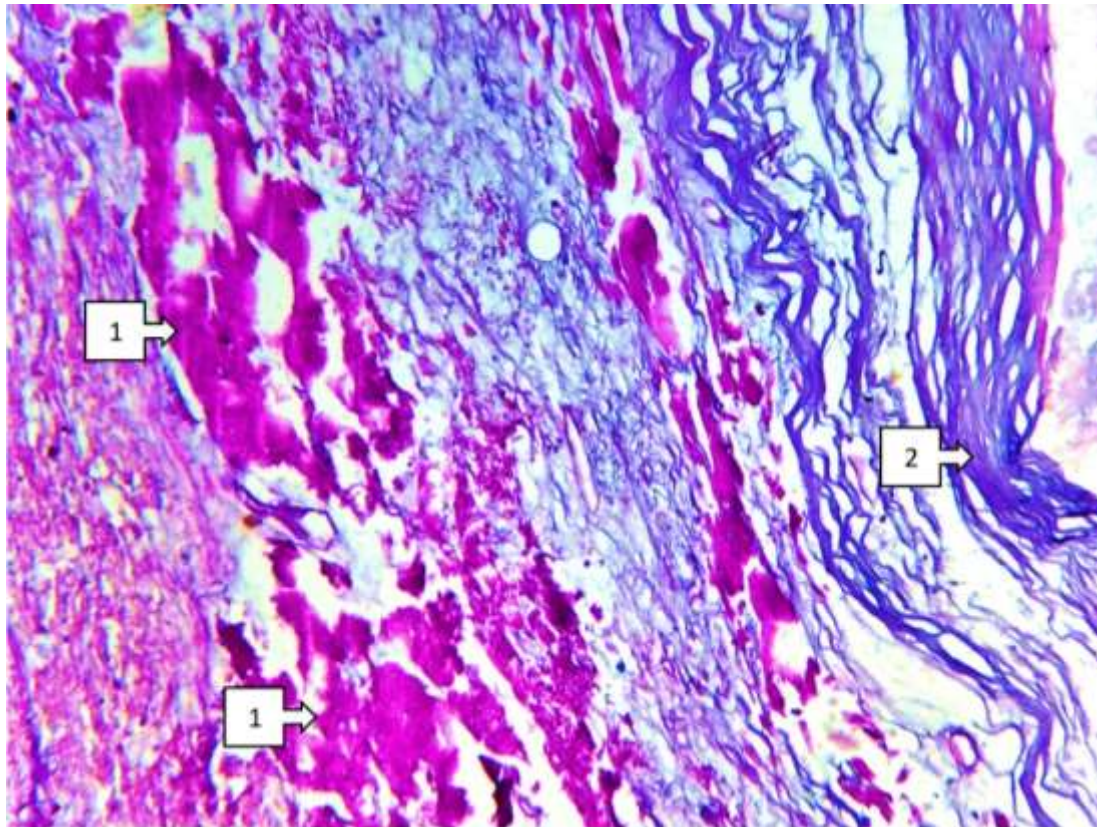
#### **Research results and their discussion:**

According to the data studied in our research work, the main morphological substrate of the changes in the blood vessels of the brain after atherosclerosis and hypertension is elastolysis of fibrous structures, which is manifested by the occurrence of various degrees of swelling. In particular, mucoid thickening of the arterial intima in hypertension causes a sharp accumulation of sour mucopolysaccharides in the vessels of this area, which leads to the

hydrolysis of fibers and destroys the integrity of the vessel. Altian blue, a histochemical staining method, was used to detect these changes. This dye clearly delineates foci by staining acidic mucopolysaccharides in a mauve blue color. At the same time, Schiff's positive (sour mucopolysaccharide) causes swelling of the fibrous structures in the collected branches, mutual interposition of consecutive layers in the artery wall. And this can continue with the occurrence of pseudo-aneurysmal expansions in the aorta and cerebral blood vessels in the young contingent. In this study, the following morphological changes were identified in cases of aneurysms and pre-aneurysms in cerebral blood vessels. In particular, according to the analysis of the data studied with the help of altzian dye, it was found that the different intensity of sour mucopolysaccharides accumulated between the blood vessels increases the hydrophilic property between the collagen and elastic fiber structures, leading to the sharp development of interstitial swelling and the violation of nutrition of the vessel wall. This leads to the destruction of most of the fibrous structures in the vessel wall. As a result, the formation of destroyed fibrous structures in different layers leads to a sharp decrease in the trajectory of the vessel wall and the surface tension and resistance properties, as well as deformation of the wall. At the same time, as a result of the development of small fibrous structures around the centers of mucoid and fibrinoid inflammation in different projections, the contractility of the vessel is severely disrupted from a morphofunctional point of view, and it continues with the formation of microbumps (aneurysmal elevations). As a result, the interstitial swellings that have developed in the space between the vessel wall can lead to deformation of the vessel wall and even rupture. (See Figure 1). Macrophages and fibroblasts are concentrated at different levels between most vascular walls. At the same time, the proliferation of fibroblasts and the location of similar foci along the vascular perimeter confirm the development of angiosclerotic process and the sharp synthesis of tropocollagen fibers. This leads to the development of centers of chaotic arrangement

of collagen fibers of various degrees along the perimeter and wall of normal vessels and the violation of the integrity of the vessel wall. (See Figure 2). A similar situation occurs after atherosclerosis, as a result of sudden accumulation of foamy cells located in the subendothelial layer, bulging of the

endothelium into the vessel cavity, disruption of the interconnected set of fibrous structures, and displacement of the muscle and adventitia layers, the vessel wall causes a violation of the surface tension force, resulting in a turbulent flow. under its influence causes the vessel wall to bulge at different levels.



**Figure 1.** The tissue of the branch of the left lateral artery of the middle brain. Artery wall has different thickness (1). Blue-blue layer saturated with acidic mucopolysaccharides Schiff positive structure this view shows the process of elastolysis in fibrous structures (2) Stain Alcian blue. The size is 40x10.

**Figure 2.** Collapsing aneurysm of the left side of the middle cerebral artery. It is fibrinoid necrosis and interstitial edema of the middle layer and the intima area (1), foci of acidic mucopolysaccharides embedded in fibers and elastolysis (2). Stain Alcian blue. The size is 40x10

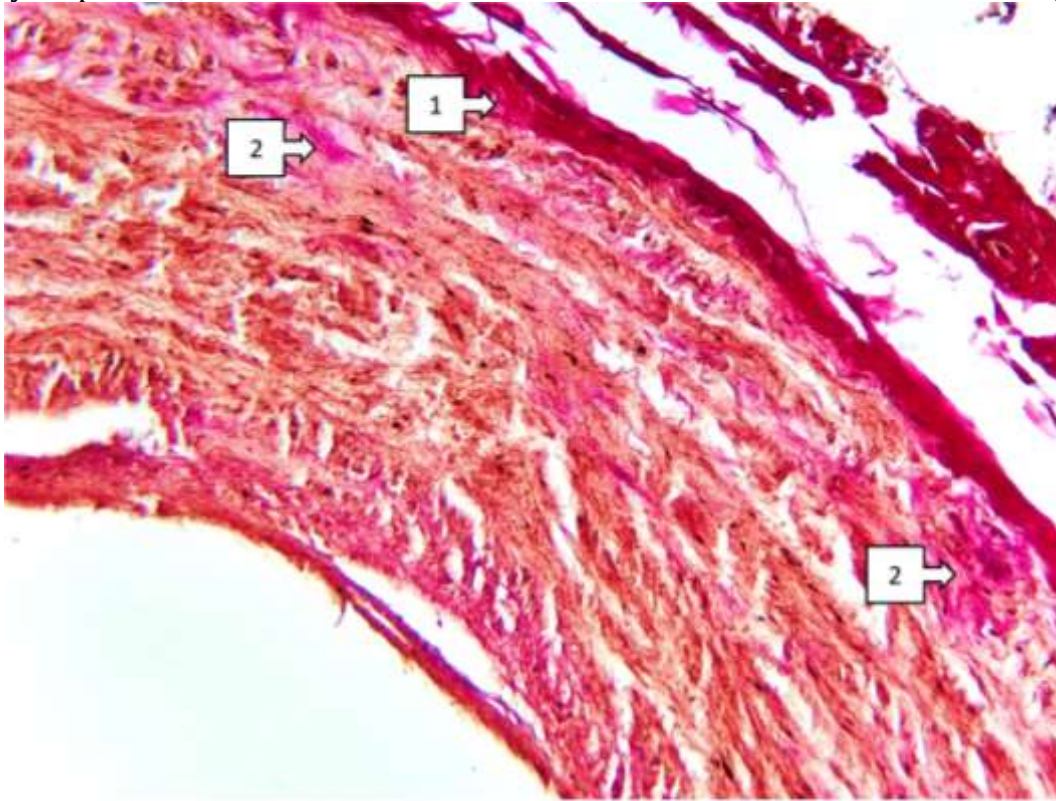
Therefore, in the tests with Alcian blue dye, between different layers of the vascular wall, it is possible to determine the sharp accumulation of Schiff positive structures, destruction and elastolysis in fibers. At the same time, the intensity of the Schiff positive interruptions in the vessels stained with Alcian blue allows for the rapid development, localization, and prospective prognosis of the process.

Our next method of examination is Van Gieson staining, which is an acidic picrofuchsin stain, which

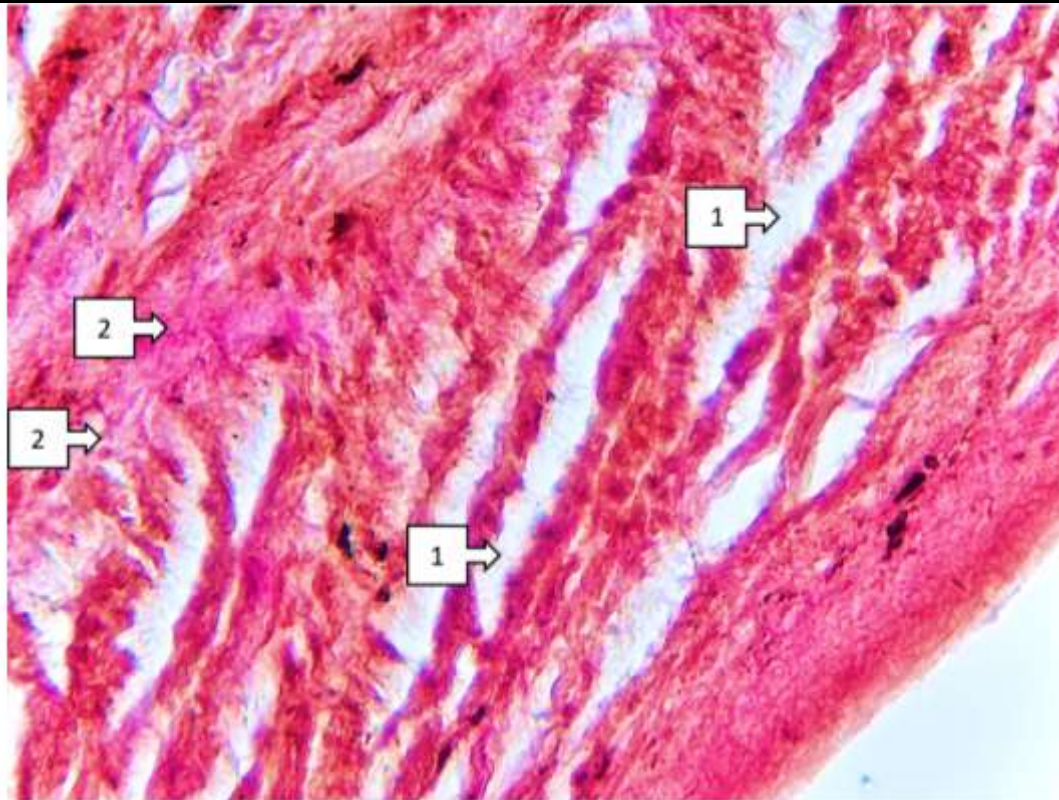
allows us to identify and study collagen and procollagen fibers developed or pathologically synthesized in the vessel wall, showing the position of the fibers in a specific projection. In this study, it was found that in diseases of cerebral blood vessels with atherosclerosis and hypertension, collagen fibers along the vessel wall are stained red and most of them are chaotically arranged, causing a violation of the histoarchitecture of the vessel. In hypertension, it was found that the collagen

fibers were surrounded by yellow sparse fibrous structures around the procollagen stage and lost their distinct relief appearance, the anastomosed boundaries of most collagen fibers were sharply expanded, and the interstitial

swellings developed sharply. This mechanism is considered the main pathogenetic link that leads to a sharp loss of the strength of the vessel wall and bulging of the wall under the influence of turbulent flow inside the vessel (see Fig. 3).



**Figure 3.** The tissue of the branch of the left lateral artery of the middle brain. The wall of the artery has different thickness (1). Between the thickened branches, chaotically located bundles of red collagen fibers are identified (2), destruction and defragmentation foci are identified (3). Paint Van Gison Size 20x10.



**Figure 4.** The tissue of the branch of the left lateral artery of the middle brain. Interstitial swelling between the fibrous structures of the intima layer of the artery (1). Foci of coarse sclerosis of collagen fibers are identified in thickened branches (2). Paint Van Gieson. The size is 40x10

Arterial aneurysm is characterized by sudden changes between the middle layer of the vessel and the tuams of the muscle layer, mainly by the hypertrophy of muscle cells, the development of atrophic and sclerotic changes in the muscle tufts in the affected areas. These changes are based on the macroscopically sharp deformation of the vessel wall and the appearance of the morphological signs of the collapsing aneurysm. It is interstitial edema around the hypertrophied foci of the muscle layer, interstitial cysts between all layers of the atrophic and sclerotized branch, sharp separation of the borders of the layers of the vascular wall, destruction and elatolysis in the fibrous structures, almost no detection of the vascular vessels (vasa vasorum) in the adventitial branches, the gap in this area a large accumulation of products is characterized by the formation of dystrophic and necrotic foci. Violation of the sequence of mutual anastomotic connections of different fractions of collagen fibers, causing the appearance of rickets on the vessel wall, spreading the surface tension force at different levels, and putting sharp pressure

on the functional stress points play an important role in the occurrence of aneurysmal dilatations in these areas.

### Conclusions

Therefore, according to the analysis of the results obtained by histochemical tests, the focal increase of fibrous structures from the qualitative changes in the blood vessel wall, the large accumulation of acidic Schiff positive structures in the space, causes the appearance of foci of disorganization in the wall, and the deformation of the vessel wall in various ways. At the same time, it was found that the pathological fibrous structures restored in place of the morphologically lost or damaged fibrous structures form surfaces that lead to a sharp change in the relief of the vessel wall and hemodynamic resistance from the morphofunctional point of view. These changes are studied in advance and serve as a source for the production of instructions to eliminate the foci of pathological disorganization expected through appropriate recommendations. In order to prevent these changes in the 45-55-

year-old contingent, it is first necessary to eliminate the pathogenetic links of hypertension and atherosclerosis diseases, and to prevent the disproportionate location of coarse fibrous structures developing in the vascular wall.

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