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Non-cardiac sourses of thromboembolic complications in atrial fibrillation

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Background. Thromboischemic stroke is a significant medical problem. The most dangerous arrhythmia that causes the thromboembolism is atrial fibrillation. The source of thrombus mostly located in left atrium appendage or apex of left ventricle. But there're a lot of cases of thromboischemic stroke in patients with atrial fibrillation without any intra-heart thrombus.

Purpose. To study the possibility of thromboembolic complications in patients with permanent form of atrial fibrillation without intra-heart thrombus.

Materials and methods. We included 48 patients with permanent form of atrial fibrillation. Mediana age - 68 ± 4,6 y.o. 32 (66,7%) were men and 16 (33,3%) women. All patients were performed 24-hours ECG monitoring to verify the atrial fibrillation. 34 (70,8%) were regularly took warfarin or NOACs to prevent the thromboembolic complications. We used CHADS-2 scale to make the prognosis of 1-year thromboembolic complications. 0 points - 0 (0%) patients, 1 point - 1 (2,1%), 2 points - 2 (4,2%), 3 points - 8 (16,6%), 4 points - 7 (14,5%), 5 points - 18 (37,5%), 6 points - 12 (25,1%). All patients were made transesophageal echocardiography. Only 3 (6,2%) of them had intra-heart thrombus. Intra-arterial blood flow we measured with Doppler-ultrasound. Most of patients – 39 (81,3%) had atherosclerotic plaques of internal carotid artery on one or both sides. In 22 (45,8%) patients were the signs of non-stability of plaques (heterogenic structure, rough surface). We valued the arterial wall kinetic parameters with sphygmography: speed, acceleration, power, work. We analyzed these parameters in different cardiocycles.

Results. We observed the following patterns:

1. If longer was the pause between cardiocycles in atrial fibrillation then more increase of biomechanical and kinetic parameters was observed.

2. The secondary hemodynamic arterial hypertension at the moments after long pause between cardiocycles. The longest duration of it was observed in bradysystolic atrial fibrillation (up to 38% of time).

3. In patients with hemodynamically important stenosis (about 70%) of internal carotid artery the speed after the long pause in atrial fibrillation is rising up to 4-4,5 meters per second. In comparison with sinus rhythm it is about 2,3 meters per second. Such rising of speed can cause the plaque integrity damage of parietal thrombus fragmentation.

4. Increased arterial wall deformation. The increased biomechanical parameters cause the appearance of additional waves, stand waves that may cause non-stability of plaques with further thromboembolism.

5. During the 1-year observation thromboembolic comlications appeared in 11 (22,9%) patients.

Conclusion. The source of thromboembolic complications can be non-cardiac in patients with multi-focus atherosclerosis and non-stable plaques.