

Photoplethysmographic Method for Determining Rigidity of Vascular Wall in Patients with Myocardial Infarction with Atrial Fibrillation

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ABSTRACT

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Short Communication

Objective

To evaluate the parameters of the pulse wave contour analysis and endothelial function in patients with myocardial infarction in various forms of atrial fibrillation.

Materials and Methods

138 patients (63 men, 75 women) who were hospitalized in the cardiology department of the City Clinical Hospital No. 7 GBUZ with a diagnosis of myocardial infarction with atrial fibrillation were examined. Depending on the form of atrial fibrillation, the patients were divided into 2 groups: the 1st consisted of 83 (60.1%) patients with a paroxysmal form, the 2nd group - 55 (39.9%) with a constant form

Conducted

General clinical examination, studied the localization of myocardial infarction, its frequency (primary, repeated) [1-6], complications (acute left ventricular failure according to Killip, 1967) [1]. The stiffness of the vascular wall was studied by the photoplethysmographic method (Angioscan-1 apparatus). Based on the contour analysis of the photoplethysmogram [4], the following were estimated: heart rate (PE; bpm), stiffness index (SI - Stiffness index; m / s), reflection index (RI - Reflection Index; %), amplitude occlusion index (IOA ;%), the increase index (Alp - Augmentation index; %), the increase index normalized for heart rate (PP = 75) (Alp 75 - Augmentation index @ HR = 75), age index (AGI - Aging Index), age of the vascular system (VA - Vascular Aging;

years), systole duration (ED - Ejection Duration; m / s), pulse wave duration (PD - Pulse Duration; m / s), central systolic pressure (Spa - Systolic Pressure - Aortic - prognosis, mm Hg), type of pulse wave (A,B,C). To assess endothelial function, a test was performed with reactive hyperemia with the calculation of the amplitude occlusion index (IOA; conventional units) and phase shift (SF; ms) between the channels.

Results

Among patients of the 1st group (age 71.9 ± 8.9 years), anterior myocardial infarction was recorded in 33 (39.7%), the lower one in 20 (24.3%), and the second anterior one in 15 (18.0%), repeated lower - in 15 (18.0%) examined. In patients of the 2nd group (age - 73.7 ± 9.0 years), anterior myocardial infarction occurred in 25 (45.4%) people, lower myocardial infarction - in 17 (30.9%), repeated anterior - in 11 (20.0%) people, repeated lower - in 2 (3.6%). In patients with a paroxysmal form of atrial fibrillation, I and II prevail, less often III and IV, the functional class of acute heart failure, while in patients with a constant form of atrial fibrillation, the frequency of II and III increased, with a decrease in the functional class I and IV.

In patients with a constant form of atrial fibrillation, there was a significant increase in PD 600.9 ± 16.2 m / s ($p < 0.05$), a decrease in RI of $21.2 \pm 2.3\%$ ($p < 0.05$), as well as tendency to increase AGI 1.1 ± 0.4 , SI 8.7 ± 1.8 m / s, decrease ED $40.4 \pm 7.9\%$, compared with patients with a constant form of atrial fibrillation (respectively, PD 541.0 ± 9.4 m / s, RI $32.2 \pm 1.7\%$, AGI 0.8 ± 0.2 , SI 7.8 ± 2.0 m / s,

ED $45.2 \pm 1.0\%$), which indicates a high tone of the small muscle arteries. In the studied groups, an increase in the frequency of a pulse wave of type A and B was observed, which characterizes a decrease in the elasticity of the vascular wall. However, in individuals with a constant form of atrial fibrillation, the frequency of waves A ($78.4 \pm 5.0\%$) and B ($15.1 \pm 3.4\%$) were higher than in individuals with a paroxysmal form (respectively $72.1 \pm 4, 2\%$; $19.2 \pm 3.6\%$), which indicates a significant increase in afterload and a violation of diastolic myocardial relaxation. In patients of the 2nd group there was a statistically significant decrease in SF (-12.2 ± 2.6 ms; ($p < 0.05$), as well as a tendency to decrease IOA (1.15 ± 0.6 conventional units), compared with patients of the 1st group (respectively, 3.7 ± 0.9 ms and 1.4 ± 0.7 conv.ed), which indicates significant impairment of endothelial function in large muscle arteries.

Conclusion

In patients with myocardial infarction with a constant form of atrial fibrillation, in contrast to patients with a paroxysmal form,

endothelial dysfunction is noted with a decrease in the elasticity of the arterial vascular wall, which must be taken into account when developing treatment and prevention programs and conducting medical and social examination.

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