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The dependence of central pressure parameters on the dimensions of the abdominal aortic aneurysm

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Introduction: Abdominal aortic aneurysm (AAA) is its local widening by more than 50% of the correct width of the aorta. AAA is the most common pathology of large vessels after atherosclerotic changes, the frequency of which increases with the aging of the population. AAA is the most common type of aortic aneurysm, accounting for up to 90% of all aneurysms. The most important and dangerous complication of AAA is the rupture of the aneurysm wall, causing acute aortic syndrome resulting in high mortality. The formation of aneurysms is associated with the interaction of complex pathological processes occurring in the wall of the aorta and hemodynamic conditions in the lumen of the vessel. Changes in the wall of the aorta, leading to damage to elastin and collagen fibers, loss of smooth muscle cells, incursions of inflammatory cells lead to thinness and damage to the aorta wall. This increases the effect of pressure inside the aorta on the diameter and strength of the vessel wall.

Study objectives: The first purpose of the study is to evaluate the values of central blood pressure parameters in patients with asymptomatic abdominal aortic aneurysm and to investigate the relationship of central blood pressure parameters with the morphology of abdominal aortic aneurysm. The second objective is to evaluate peripheral blood pressure parameters in patients with asymptomatic abdominal aortic aneurysm and to investigate the relationship of peripheral blood pressure parameters with abdominal aortic aneurysm morphology.

Material and methods: Screening for the study group was conducted on a total of 106 subjects aged 75±8 years, including 80 men and 26 women. After verification of the preliminary results, 69 patients with a known abdominal aortic aneurysm (AAA), including 53 men and 16 women, were enrolled in the further analysis, with an average age of 71.99±7.64 years. The dimensions

of the abdominal aortic aneurysm were obtained based on ultrasound of the abdominal cavity. Abdominal aortic aneurysms were evaluated in the presentation of two-dimensional B, in the transverse and longitudinal plane. Within 2 weeks after the ultrasound, an applanation tonometry test was performed. The patient was measured by peripheral pressure.

Results: During my research work, I received the following results:

1. In patients with abdominal aortic aneurysms, the maximum aneurysm diameter for the whole group was 43.27±8.47 mm.

2. The most common abdominal aortic aneurysms were classified as medium size (range 40-55 mm) in 43 (64%) patients, followed by small aneurysms (range 30-39 mm), 22 (32%) patients and least often large aneurysms (maximum diameter > 55 mm), in 3 people (4%).

3. A relationship was found between the mean diameter of the abdominal aortic aneurysm and central diastolic arterial pressure (C_DBP, r=0.256, p=0.033) and central heart rate pressure (C_PP, r=-0.278, p=0.021).

4. A relationship was found between the maximum diameter of the abdominal aortic aneurysm and the central heart rate pressure (C_PP, r=-0.259, p=0.032).

5. A relationship was found between the mean diameter of the abdominal aortic aneurysm and peripheral diastolic blood pressure (P_DBP, r=0.242, p=0.045).

6. In the study population of 69 people, the majority were male (53 people, 76%).

7. Men had a higher absolute maximum width of the abdominal aortic aneurysm (AAA-s-max: male- 44.37±9.00 vs. female- 39.63±5.50, p=0.02). However, the difference in aneurysm size was not statistically significant after considering body surface area (ASI, p=NS).

8. Men differed from a number of parameters of arterial pressure parameters, including: higher, lower diastolic arterial diastolic (C_DBP 80.23±10.69 mm Hg vs 73.00±7.30 mm Hg, p = 0.01), higher half mean arterial pressure (C_MAP 92.24±10.30 mm Hg vs 86.13±7.42, p = 0.03), higher values of the first peak systolic pressure in the aorta (C_P1 104.04±9.84 mm Hg vs 96.88±7.19 mm Hg, p = 0.01), shorter time to the second peak of aortic pressure (C_T2: 227.87±20.43 ms vs 239.94±17.44 ms, p = 0.04), lower popularizing king corrected to heart rate 75 / min (C_AIx_HR75 28.38±6.96% vs 33.56±6.22%, p = 0.01), lower transfer corrected to heart rate 75 / min (C_AP_HR75 9.64±3.48 versus 12.38±5.21, p = 0.018); higher central

mean diastolic (C_MPD 89.72±10.11 mm Hg vs 84.06±8.19, p = 0.05), higher central official of time of contraction (C_DTI 3544.06±474.92 ms vs 3270 00±342.98 ms, p = 0.04).

9. Men differed from women in selected parameters of peripheral arterial pressure, including: higher diastolic blood pressure (P_DBP 79.43±10.88 mm Hg vs 71.94±7.30 mm Hg, p = 0.01), higher mean blood pressure (P_MAP 94.03±10.12 mm Hg vs 87.21±7.32 mm Hg, p = 0.01), higher values of the first peak systolic pressure in the radial artery (P_P1 121.87±16.00 mm Hg vs 115.75±10.90 mm Hg, p = 0.03), longer time to the second peak of radial artery pressure (P_T2: 208.45±23.38 ms vs 192.56±25.24 ms, p = 0.02).

Conclusions: As part of the analysis of the obtained results and the available medical literature, I formulated the following conclusions:

1. Central diastolic blood pressure, peripheral diastolic blood pressure and central pulse pressure correlate with the dimensions of the abdominal aortic aneurysm.
2. Diastolic blood pressure, peripheral and central, is especially important hemodynamic parameter in AAA patients, that is easy to perform, inexpensive but significant for optimal control of the risk factors for development, enlargement, and rupture of an aneurysm. Control of peripheral arterial pressure, especially diastolic pressure, remains one of the simple, cheap, and most important methods of controlling risk factors for the development, enlargement, and rupture of an abdominal aortic aneurysm in the population.
3. Optimal control of diastolic blood pressure in patients with AAA may require lower DBP values than 90 mm Hg, the usual threshold for diagnosis of the diastolic hypertension in general population.
4. In the study group mainly medium and small size abdominal aortic aneurysms were found, qualifying for periodic control with imaging methods.
5. In the study group diagnosed with AAA, most patients were men, that shows higher prevalence of AAA in men when standard threshold for AAA diagnosis is used and no anthropometric parameters are used.
6. Men with AAA had higher values of peripheral and central pressure parameters. In men with AAA, blood pressure should be carefully monitored and blood pressure well controlled, especially diastolic pressure.

7. The parameters of the pulse wave analysis (PWA) by applanation tonometry used in the study, other than central diastolic pressure and central pulse pressure, did not significantly correlate with the dimensions of the abdominal aortic aneurysm.
8. Pulse tonometric analysis (PWA) is a simple, non-invasive measurement of the pulse wave in a peripheral artery but requires careful quality control of the recording.