Endothelial function and testosterone deficiency in men with type 2 diabetes mellitus

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Background. To date, the currently available data about the effect of testosterone (T) on the cardiovascular system of men are highly controversial. The particular interest is its effect on the endothelium in men with type 2 diabetes mellitus (T2DM) having a high risk of vascular complications.

The purpose of this work was to evaluate the effect of endogenous T on function of endothelium in men with T2DM.

Methods. The study included 204 men, aged 40-65 years, with T2DM. Patients underwent clinical examinations, analysis of carbohydrate metabolism, evaluation of biochemical parameters of endothelial function such as nitric oxide (NO), endothelial synthase type 3 (eNOS3), VCAM-1, ICAM-1, p- and e-selectin, endothelin. The ultrasound assessment of flow-mediated dilatation of the brachial artery (FMD-BA) and intima-media thickness (IMT) of brachial arteries were performed. Patients were divided into 2 groups: 1 - 93 men with late onset hypogonadism established according to EAU 2015 criteria and 2 - 111 men having normal level of endogenous T and absence of clinical symptoms of hypogonadism. Statistical analysis of the data was carried out using the Mann-Whitney U-test (STATISTICA 10 software package).

Results.

The parameters of carbohydrate metabolism and the duration of T2DM were comparable in two groups. The concentrations of NO (85.0 [60.4; 210.4] vs 137.5 [87.8; 281.5] µmol/l, p = 0.001) and eNOS3 (192.2 [109.6; 407.3] vs 293.3 [117.1; 686.2] pg/ml, p = 0.03) were lower in the 1st group compared to the 2nd one. There was an increase in the levels of VCAM-1 by 32.6% and ICAM-1 by 43% (p < 0.0001), p-selectin by 19.5% (p = 0.003) in the 1st group compared to the 2nd group. The endothelium-dependent FMD-BA was less pronounced (9.4 [6.9; 13.0] vs 12.2 [10.0; 16.7], %, p=0.0007) and had a delay in time of dilation by 33.3% in patients with hypogonadism compared to eugonadal men. There was an increase in IMT (1.0 [0.9;1.2] vs 0.9 [0.7; 1.1] mm, p=0.03) in the 1st group compared to the 2nd.

Conclusion.

T deficiency in men with T2DM leads to endothelial dysfunction, decreasing secretory and vasomotor function of endothelium. This indicates the raise of cardiovascular risk and predicts progression of vascular complications in men with T2DM and late onset hypogonadism.