

Sexual constitution and endothelial function of the cavernous arteries in men with erectile dysfunction

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Abstract : *to evaluate the frequency of endothelial dysfunction of the cavernous arteries, the prevailing type of sexual constitution in men with cardiovascular diseases and risk factors. Eighty-three men aged from 32 to 74 years old with cardiovascular diseases (or CVD) and cardiovascular risk factors were examined. All men underwent a comprehensive examination. In addition, a questionnaire survey was conducted on the ICEF-5 (or International Index of Erectile Function) and on the scale of the vector definition scale of men sexual constitution, the genotypic index (or Kg), phenotypic index (or Kf), and a constitutionally modeled index of sexual constitution (or Ka) were calculated. All patients underwent an original method for studying the endothelial function of the cavernous arteries using ultrasound dopplerography after exposure to infra-red emitter. manifestations of erectile dysfunction (ED) were detected in 79 (95.2%) patients. In 77.1% of men with ED, the vector of sexual constitution was within the middle and weakened middle variants. A correlation was found between the presence of ED and the genotypic index ($g = 0.48$; $p = 0.001$), as well as between the presence of ED and the phenotypic index ($g = 0.42$; $p = 0.001$). In the study of the endothelial function of the cavernous arteries, endothelial dysfunction was detected in 79 (95.2%) patients. In 60 (75.9%) patients, paradoxical vasoconstriction was determined. a weak and weakened version of the average sexual constitution is a predictor of endothelial dysfunction and erectile dysfunction. The obtained results confirm the need for active attention and inclusion in the survey standards of determining the vector of the sexual constitution of men with ED.*

Key words: *endothelial dysfunction, sexual constitution, erectile dysfunction.*

I. INTRODUCTION

Erectile dysfunction (or ED) is a common violation of sexual function, the manifestations of which require timely diagnosis and treatment. The variety of causes of this suffering suggests that ED should be considered more broadly as a symptom complex that is part of the clinical picture of many somatic diseases. Today, there is no doubt that ED is based on endothelial dysfunction. In 80% of patients, the cause of ED is impaired endothelial function. Endothelial dysfunction develops because of oxidative stress. Oxidative stress leads to damage to endothelial cells, which exacerbates vasoconstriction, causing atherosclerosis, thrombosis and ED. Oxidative stress is based on the unbalance of pro- and antioxidant endothelial systems, followed by the development of persistent

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vasoconstriction. ED can serve as a reliable and early predictor of cardiovascular diseases in general and atherosclerosis in particular.

Full sexual life for a man of any age is a subject of special psychological significance [1,5].

Among men with cardiovascular disease (or CVD) and risk factors, a higher incidence of erectile dysfunction is revealed, which increases the interest of many researchers in this important problem [1-4]. Not all patients with CVD or with cardiovascular risk factors develop erectile dysfunction, however, phenotypic differences; the characteristics of the sexual constitution in patients with ED are not taken into account in practice and are not adequately reflected in the literature [1, 3].

It is well known that people belonging to different types of constitution have an uneven morphologically and functionally determined predisposition to certain diseases. In the literature available to us, there is no study of the relationship of the male sexual constitution with endothelial function.

II. STUDY PURPOSE

to evaluate the frequency of endothelial dysfunction of the cavernous arteries and the prevailing type of sexual constitution in men with cardiovascular diseases and risk factors.

III. MATERIALS AND METHODS

Eighty-three men aged from 32 to 74 years old with CVD and cardiovascular risk factors were examined. All men underwent a comprehensive examination, which included a collection of general medical and sexological history, a general examination, a study of hormonal status, lipid spectrum and blood glucose. All patients underwent a survey on ICEF-5 (or International Index of Erectile Function). Vector definition scale of men sexual constitution determined the genotypic index (or Kg); this is the arithmetic average of I - IV vectors (i.e. 1-9 by integer numbers of the upper number series); phenotypic index (or Kf) arithmetic means the I-VII vectors; and a constitutionally modeled index of sexual activity (or Ka) the arithmetic means the V-VII vectors. The phenotypic index Kf characterizes the sexual constitution of a man as follows: 1-1.5 is extremely weak; 1.6-2.5 is very weak; 2.6-3.5 weak; 3.6-4.5 attenuated medium variant; 4.6-5.5 average; 5.6-6.5 strong medium option; 6.6-7.5 strong; 7.6-8.5 is very strong and 8.6-9.0 extremely strong (Table 1.) (Vasilchenko G.S. and co-authors, 2005).

Table 1- Vector definition scale of men sexual constitution

	VECTOR									
	CONSTITUTION									
	Weak			Medium				Strong		
	1	2	3	4	5	6	7	8	9	
	0-1,5	1,6-2,5	2,6-3,5	3,6-4,5	4,6-5,5	5,6-6,5	6,6-7,5	7,6-8,5	8,6-9,0	

I	Awakening of libido (years)	17 and later	16	15	14	13	12	11	10	9 and earlier
II	First ejaculation (years)	19 and later	17-18	16	15	14	13	12	11	10 and earlier
III	Trochanter index (TI); height \ leg length	<1,85	1,86-1,89	1,90-1,91	1,92-1,94	1,95-1,96	1,97-1,98	1,99	2,0	>2,0
IV	Pubic hair	Rare Fluffy Hair	Horizontal female type	Horizontal trend	male type					
V	The maximum excess, the number of ejaculations per day	0	2	3	4	5	6	7	8	9 and >
VI	Entry into the physiological rhythm band after marriage (years)	-	'Honeymoon'	1	2-3	4-5	6-10	11-19	20-29	30 and >
VII	Time to enter the physiological rhythm band (absolute age)	-	До 22	23-26	27-31	32-36	37-40	41-45	46-50	51 and more

physiological rhythm - (2-3 intercourse per week)

In addition, all men performed a study of the endothelial function of the cavernous arteries, using the method of ultrasound examination of changes in diameter after exposure to a narrow-spectrum (far range) infrared (or IR) emitter.

The study of the endothelial function of penis cavernous arteries was carried out according to the original method. The patient was lying on his back, the linear sensor LA 523 10-5 was placed longitudinally along the ventral surface of the penis at a distance of 2-3cm from the root (Figure 1).



Figure 1. Ultrasound examination of the cavernous artery diameter

The diameter of the cavernous arteries was evaluated at least two times, measuring the distance between the opposite walls of each vessel, average values were used for calculations. In addition, the following indicators were determined, i.e. peak systolic velocity (or PSV), peak diastolic velocity (or PDS), reactivity index (or RI), pulse index (or PI). Then, the infrared emitter was exposed to the ventral surface of the penis at a distance of 10-12 cm from the root with an exposure of 5 minutes (Figure 2).



Figure 2. The method of infrared emitter exposure to the cavernous arteries

After exposure, a repeated ultrasound was performed with a diameter measurement of the cavernous arteries in the same place. For calculations, the largest values of the diameter obtained by repeated studies were used. The Percent Increase in Cavernous Artery Diameter (or PICAD) was calculated by the formula:

Formula 1.

$$\text{PICAD} = 100\% \times \left(\frac{D_2 - D_1}{D_1} \right)$$

of both cavernous arteries after irradiation.

All studies were $D_2 - D_1 / D_1$

D_1 - average diameter of both cavernous arteries before irradiation with an IR emitter;

D_2 - average diameter carried out in the morning and by an ultrasound diagnostics specialist. Before the study, patients were asked to refrain from smoking and taking medications that act on the cardiovascular system. The PICAD threshold for identifying arteriogenic ED from other forms of ED was 30%.

IV. RESULTS

Manifestations of erectile dysfunction were detected in 79 (95.2%) patients. According to the International Index of Erectile Function (ICEF-5), i.e. mild erectile dysfunction was detected in 26 (32.9%) men; moderate impairment in 46 (58.2%) men; severe in 7 (8.8%) and signs of ED were absent in 4 men.

According to the vector of sexual constitution, it was revealed: in 44 (53%) men, a weakened version of the average; the average option in 20 (24.1%); a strong medium variant in 10 (12%); a weak sexual constitution was found in 6 men (7.2%) and a very weak version of the sexual constitution was found in 1 (1.2%) men. In 2 (2.4%) men, a strong version of the sexual constitution was determined.

The analysis of constitutional features in the group of patients with ED was characterized by low indices, i.e. phenotypic index (or Kf), genotypic index (or Kg), and sexual constitution index (or Ka).

A correlation was found between the presence of erectile dysfunction and the genotypic index ($g = 0.48$; $p = 0.001$), as well as between the presence of erectile dysfunction and the phenotypic index ($r = 0.42$; $p = 0.001$).

In 77.1% of men with ED, the vector of sexual constitution was within the middle and weakened middle variants, with phenotypic indices ranging from $Kf = 4.6-5.5$ and $Kf = 3.6-4.5$, respectively.

An analysis of patients with a strong and average sexual constitution ($n = 12$) revealed that in the presence of 5-7 risk factors (such as age, lack of exercise, obesity, smoking, dyslipidemia, androgen deficiency, cardiovascular disease and diabetes mellitus) lead to manifestations of ED in an average of 18.4 months.

Analysis of patients with a very weak sexual constitution ($n = 7$) revealed that signs of erectile dysfunction appeared in the presence of 2-3 risk factors, while patients noted these dysfunctions for 2-5 years before visiting the doctor.

In the study of the endothelial function of the cavernous arteries, endothelial dysfunction was detected in 79 (95.2%) patients. In 60 (75.9%) patients, paradoxical vasoconstriction was determined (PICAD <0%). In 19 (24.1%) patients, PICAD was determined at a level of less than 30% and averaged 17.1%, which indicated cavernous artery endothelial dysfunction. In 3 patients, the endothelial function of the cavernous arteries was normal (PICAD > 30%).

V. DISCUSSION

Many publications and studies on ED do not take into account the sexual constitution of men, which is directly related to genetic factors and characteristics of early and intrauterine development.

The sexual constitution, on the one hand, limits a person's sexual abilities (i.e. with a weak sexual constitution, sexual manifestations are not expressed, the intensity of sexual activity is low), on the other hand, individual resistance to harmful factors acting on the sexual sphere depends on the sexual constitution. Sexual disorders often occur not with gross, narrowly localized breakdowns, but with the defeat of several partial subsystems [Vasilchenko G.S. and co-authors, 2005].

Sexual disorders with a strong sexual constitution can only occur under the influence of a powerful damaging factor that lasts for a long time affecting various aspects of the sexual cycle. With a weak sexual constitution, even a weak harmful effect can be detrimental.

The function of the endothelium is closely related to the features of intrauterine development. One of the first studies in which a relationship was found between low birth weight (intrauterine growth retardation) and early vascular endothelial dysfunction was the work of Leeson C.P. and co-authors (1997; 2001).

Therefore, the type of sexual constitution, which is formed under the influence of hereditary factors and developmental conditions in the prenatal period and early ontogenesis, will determine the endothelial function and its resistance to pathogenic factors.

Thus, in 77.1% of men with erectile dysfunction, the average and weakened sexual constitution are determined. A weak and weakened sexual constitution is a predictor of endothelial dysfunction and erectile dysfunction.

In 95.2% of the examined men, endothelial dysfunction of the cavernous arteries was detected, while the more risk factors, the greater the manifestations of endothelial dysfunction.

VI. CONCLUSION

Thus, the male's sexual constitution will determine the endothelial function of the body and the possibility of resistance to pathogenic factors. Weak and weakened sexual constitution will create the background for the ED pathophysiology. With a strong sexual constitution, sexual dysfunctions can occur only under the influence of powerful damaging factors that have a long-term effect on various aspects of the sexual cycle. With a weak sexual constitution, even a weak and short-term harmful effect can be detrimental.

The obtained results confirm the need for active attention and inclusion in the examination standards of the vector definition scale of men sexual constitution.

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