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MORPHOMETRIC FEATURES OF CELIAC TRUNK AND ITS BRANCHES IN AGE AND SEXUAL ASPECTS

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Key words: celiac trunk, splenic artery, common hepatic artery, left gastric artery.
Резюме: *в статье проанализированы морфометрические особенности чревного ствола и его ветвей у мужчин и женщин различных возрастных групп.*
Resume: *the article analyzes the morphometric features of the celiac trunk and its branches in men and women of different age groups.*

Introduction. The abdominal aorta is the main source of blood supply to the abdominal and retroperitoneal organs. The celiac trunk (CT) departs from the anterior surface of the aorta between the inner legs of the diaphragm [1]. The mouth of the celiac trunk is located at the level of the lower edge of the XII thoracic vertebra, which coincides approximately with the upper edge of the pancreas. Sometimes the celiac trunk begins at the level of the upper edge of the I lumbar vertebra, located not above the gland, but behind it [2]. According to some authors [3,4], the celiac trunk departs from the abdominal aorta at the level of the XI thoracic - II lumbar vertebrae. In most cases, the beginning of the celiac trunk is displaced to the left.

The value of the celiac trunk and its immediate branches in the blood supply to the abdominal organs, the isolation of pathological conditions based on a decrease in the lumen of these vessels determines the need to establish morphometric parameters.

Aim: to study the features of the morphometric parameters of the celiac trunk and its branches in men and women of different age groups.

Tasks: 1. Divide patients according to age and gender; 2. Measure the morphometric parameters of the celiac trunk and its branches; 3. Establish statistically significant indicators depending on gender and age.

Material and methods. The study used 190 computed tomograms of the abdominal aorta in cases without detection of vascular and other pathologies in patients who were computed tomography for the appropriate diagnostic indications.

Each subject underwent MSCT on a «LightSpeed 16 Pro» computed tomograph by General Electric, 2006. The thickness of the reconstructive section of the obtained images was 0.5 mm. Bolus intravenous contrast was performed using the «Visipaque» to assess the vessels (CT angiography). The analysis of the obtained data was carried out on an individual computer workstation of a radiologist «AW VolumeShare 7» using a specialized software package for studying the vascular system (Vascular: Aorta CT).

The analysis of morphometric parameters of the celiac trunk and its branches of people belonging to different age groups according to Markosyan's classification [5] was carried out. The tomography cases were divided into three age groups: I - the 1st period of adulthood (34 men and 25 women); II - 2nd period of adulthood (31 men, 30 women); III - old age (28 men and 42 women).

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Morphometric data (vessel length, angles of their divergence, diameter, etc.) were obtained in the most representative projections for each parameter (two-dimensional, curvilinear, multiplanar, maximum intensity projection, volumetric rendering).

Statistical processing of the results was performed with the Statistica software package 13.3. Trial. The normality of the distribution of numerical signs was determined using the Lilliefors test. The results are presented in the format (M±SD), where M is the arithmetic mean, SD is the standard deviation. To identify the significance of the difference between the average values, the Student t-test was determined (for the normal distribution of numerical signs). Analysis results were considered statistically significant at $p < 0.05$. The data obtained are interpreted and presented in the form of tables in the article.

Results and discussion. It was found that individual morphometric parameters celiac trunk and its branches significantly change with age in both men and women (table 1).

Tabl.1. Morphometric characteristics of celiac trunk and its branches in men and women belonging to different age groups, M ± SD

Morphometricparameter	**Sex**	**Age group**		
		1st period of mature age	2nd period of mature age	Elderly age
Length of the CT, mm	M	24.8±1.2	26.7±0.8	27.2±0.8
	W	21.6±0.9×	23.1±0.8*×	27.8±0.7*#
Largest diameter of the CT, mm	M	8.1±0.3×	8.8±0.2	7.2±0.1#
	W	7.1±0.3	7.1±0.2	7.3±0.1
CT Departure angle, °	M	38.2±3.0#	26.4±2.3*#	41.1±2.4#
	W	32.7±2.6×	39.4±2.6	42.3±2.2*#
Diameter of the splenic artery, mm	M	6.5±0.1	6.6±0.3	6.0±0.1
	W	5.8±0.2	5.83±0.1	6.23±0.1
Diameter of the common hepatic artery, mm	M	5.7±0.2	5.9±0.2	5.3±0.2
	W	5.6±0.2	5.1±0.1	5.2±0.1
Diameter of the left gastric artery, mm	M	3.7±0.1	3.6±0.1	3.3±0.1
	W	3.1±0.1	3.2±0.1	3.02±0.1

Note: CT – celiac trunk; * – differences with the group of the 1st period of adulthood; # – differences with the group of the 2nd period of adulthood; × – differences with the elderly group ($p < 0.05$)

Changes in the diameter of the celiac trunk and its branches (left gastric and splenic arteries) with age do not occur so significantly and proceed differently depending on gender. So, in older men, the largest diameter of the celiac trunk is 0.9 mm (11.1%) less than in men of the first period of mature age. In women, age-related changes in this parameter are weakly expressed.

The diameter of the left gastric and splenic arteries in men also significantly decreases with age by an average of 10.8 and 7.7%, respectively. In women, the diameter of the left gastric artery does not have statistically significant differences between the groups, and the diameter of the splenic artery increases with age by 7.4%.

The diameter of the common hepatic arterydo not significantly change with age either in men or women ($p > 0.05$).

It has been established that in men the length of the celiac trunk do not significantly change with age ($p<0.05$), while in women the length of the celiac trunk increases by 6.2 mm with age.

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Thus, in women, the relative increase in the length of the celiac trunk with age is 28.7%while in men the length of these vessel does not have age features.

According to Barsukov [6], atrophy of the elastic type arteries increases with age atrophy of the elastic skeleton of the walls with its parallel collagenization, which leads to gradual dilatation of the vessel due to the low ability of collagen fibers to contract after stretching, which leads to an increase in their diameter. In arteries of muscle-elastic and muscle types, this tendency can be observed indistinctly, or it can be reversed [7].

As noted by Zhirnova et al. [8], vessel elongation with age may be due to the fact that as the artery ages, smooth muscle cells diffusely accumulate in its inner membrane and connective tissue grows. This leads to a thickening, first of all, of intimacy. The accumulation of individual lipids (sphingomyelin and cholesterol-linoleate) is also noted. From a functional point of view, these age-related changes lead to a gradual decrease in elasticity and increased vascular stiffness. The arteries at the same time become crimped, can expand and lengthen. The severity of the external supporting frame of extraorgan arteries also determines the ability of the vessels to withstand blood pressure. The walls of the unpaired branches of the abdominal aorta have reduced elasticity. This mechanism of change is most important in hypertension. Apparently, the lengthening of blood vessels in our sample is due to precisely these factors.

There are no clear opinions in the literature as to why age-related changes in blood vessels in women are more pronounced than in men. As noted by Scuteri et al. [9], in women in the postmenopausal period or after surgical and (or) chemical castration, progression of changes in the vascular wall is observed. Also, some authors describe the reduction of thickening of the arterial wall in women during the postmenopausal period against the background of prolonged hormone replacement therapy [10]. It can be assumed that it is hormonal factors that underlie pronounced changes in the length of the visceral arteries in elderly women.

Conclusions: 1. It has been established that a number of morphometric parameters of the celiac trunk and its branches change significantly with age; 2. In women, the relative increase in the length of the celiac trunk with age is 28.7%, while in men the length of this vessel has no age-specific features; 3. In men, the angle of divergence of the celiac trunk changes unevenly with age - first, in the 2nd period of adulthood, it significantly decreases by an average of 11.8 ° (37.5%), then in old age - an increase of 14.7 ° (55.7%); 4. In women, the angle of discharge of the celiac trunk with age has significant differences only between the groups of the 1st period of adulthood and old age and is 9.6 ° (relative increase of 29.4%); 5. The obtained information is of great clinical importance, since it will allow to objectify the diagnostic criteria of various vascular syndromes and to minimize the risk of endovascular interventions.

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