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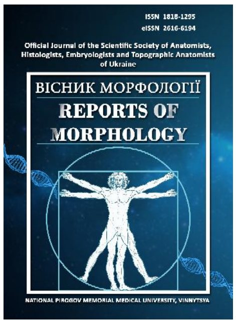

Correlation between aortic root dimensions and biometric indicators in coronary heart disease

Pidvalna U. Ye.

Danylo Halytsky Lviv National Medical University, Lviv, Ukraine

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CORRESPONDING AUTHOR

e-mail: Uljaska.p@gmail.com

Pidvalna U. Ye.

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Aortic root requires preliminary preoperative analysis for coronary artery bypass graft (CABG) in coronary heart disease (CHD). The dimensions of the aorta correlate with anthropometric indicators. The purpose of the study: to establish the relationship between sinuses of Valsalva height, coronary artery ostia height and biometric parameters (age, height, weight, body surface area and body mass index) in men with CHD using computed tomography. Research materials and methods include contrast-enhanced computed tomography images of the aorta of men with verified CHD. According to growth parameters, division into 2 groups was made. The sinuses of Valsalva height and right and left coronary artery ostia height were measured. Clinical data were analyzed: age, height, body weight, body surface area (BSA) and body mass index (BMI). Statistical analysis: Student's t-test, Kendall's rank correlation method, Pearson's linear correlation, Fisher's multifactorial regression analysis. Analysis of the results of computed tomography of 30 men with CHD (average age 60.80±10.63 years) showed that the average values of the three sinuses of Valsalva height were approximately at the same level. The results of the Pearson linear correlation evaluation showed the absence of a proven relationship between biometric indicators and morphometric data according to CT in men with CHD (p>0.05). Multifactor regression analysis proved the inverse significant influence of weight and the direct significant influence of BMI and BSA on the dependence of left coronary artery ostia height. The multiple correlation coefficient was R=+0.55, with p=0.023, SEE=2.74. Prediction of the level of left coronary artery ostia height in men with CHD was carried out with confirmation of the constructed model. In the first group of short men (n=11) with CHD (average age 60.11±12.63 years, height 1.677±0.023 m), an inverse correlation between height and left coronary artery ostia height (τb=-0.56, p=0.034). Reliable direct relationships between the left coronary artery ostia height parameter and several anthropometric indicators were established: with weight - a direct strong relationship (τb=+0.72, p=0.007), with BMI - a direct relationship of medium strength (τb=+ 0.67, p=0.008), with BSA - average strength direct connection (τb=+0.58, p=0.023). The relationship between the value of the right coronary artery ostia height and the BSA indicator - the inverse of the average strength correlation (τb=-0.51, p=0.046) was proved. Relationships between morphometric parameters and age were not proven. Thus, in men with CHD, left coronary artery ostia height correlates with weight, BMI, and BSA. In short men with CHD, there is an inverse relationship between left coronary artery height and height; direct relationships with weight, BMI and BSA.

Keywords: *aorta, coronary artery, anatomy, computed tomography, sinus of Valsalva.*

Introduction

Structural changes in the coronary arteries are a prerequisite for the development of coronary heart disease (CHD). One of the treatment options for CHD is cardiac surgery - coronary artery bypass graft (CABG). Aortic root, in particular the sinuses of Valsalva and coronary artery ostia, require careful preoperative analysis to avoid intraoperative complications (air embolism during deaeration, conduction disturbances during interventions at the aortic-mitral junction, etc.).

The dimensions of the aorta correlate with anthropometric indicators [4, 6]. The widespread implementation of transcatheter aortic valve replacement (TAVI) contributes to the intravital study of aortic root morphology in valvular heart disease [7, 15]. Studies indicate different relationships between sex, age, height, body surface area (BSA) and body mass index (BMI) in severe aortic stenosis [1, 3]. On the other hand, the morphometric parameters of sinuses of Valsalva and coronary artery ostia in CHD have not been sufficiently covered. Although a direct association has been established between the risk of coronary heart disease and human height [12, 13].

Contrast-enhanced computed tomography (CT) is considered the "golden" standard for intravital analysis of aortic anatomy [2, 11]. Measurement of the sizes of aortic root structures, taking into account anthropometric indicators in CHD, is important in the context of preoperative analysis.

The purpose of the study: to establish the relationship between sinuses of Valsalva height, coronary artery ostia height and biometric parameters (age, height, weight, body surface area and body mass index) in men with coronary heart disease using computed tomography.

Materials and methods

The study was approved by the Bioethics Commission of the Danylo Halytsky Lviv National Medical University (protocol № 10 dated 12/20/2022).

Study population. The study included male patients of the cardiac surgery department who underwent planned preoperative CT of the aorta. Inclusion criteria: patients referred for coronary artery bypass grafting for CHD. Exclusion criteria: patients with CHD and combined pathology of the heart or aorta; chest injuries or thoracic interventions in the anamnesis; insufficient visualization of the studied structures. It is important to emphasize that patients with CHD and valvular defects were not included in the study. Clinical data, which were considered independent variables, were analyzed: age, height, body weight, BMI and BSA were calculated. BSA was calculated according to Mosteller's formula [9]. Out of the analyzed 168 examinations, 30 people met the specified criteria. According to growth parameters, they are divided into 2 groups: 1st group - with a height of less than 1.7 m (n=11), 2nd group - with a height of 1.71-1.8 m (n=19).

CT assessment. CT was performed on a LightSpeed 64 VCT XT scanner, GE (General Electric) using Ultravist 470 contrast enhancement (Bayer Healthcare). Image analysis and measurements were carried out according to step-by-step recommendations [2].

Statistical analysis. The average values of the basic characteristics of the patients (biometric parameters) were compared according to the Student's t-test. Calculation of interrelationships in small samples of patients was carried out by the method of Kendall's rank correlation, namely, using τb-Kendall's coefficients (Kendall's tau-b), which do not depend on the presence or absence of relationships in ranks. Pearson's linear correlation analysis was conducted between the studied parameters. The relationship between independent variables (biometric indicators) and dependent variables (morphometric indicators of the aorta) was carried out using multivariate regression analysis. When detecting dependencies, the Durbin-Watson autocorrelation criterion checked the correctness of the proposed model ($p<0.05$ was considered reliable). Calculations were performed in R Commander (version 2.7-2, GNU General Public License) and SPSS (version 22.0, IBM Corp., Armonk).

Results

The analysis of the results of computed tomography of 30 men with CHD (average age 60.80±10.63 years) showed that the average values of the three sinuses of Valsalva height were approximately at the same level: the height of the posterior sinus of Valsalva - 22.71±2.07 mm, the height of the left sinus of Valsalva - 21.84±2.69 mm and height of right sinus of Valsalva - 22.21±2.38 mm. The average levels of the departure height of the coronary arteries were: 13.97±3.10 mm for the left coronary artery and 13.81±3.40 mm for the right coronary artery. The level of departure of the coronary artery was considered to be the lower edge of the coronary artery ostia. The left coronary artery ostia height was 18.27±3.13 mm and 17.98±2.95 mm for the right one.

The results of the Pearson linear correlation evaluation showed the absence of a proven relationship between biometric indicators and morphometric data according to CT in men with CHD ($p>0.05$) (Table 1).

A proven direct correlation of medium strength was established between the three sinuses of Valsalva height, namely: left sinus of Valsalva height is interconnected with the height of the posterior and right sinus of Valsalva ($r=+0.39$, $p=0.031$). The interdependence (direct strong relationship) between the left sinus of Valsalva height and the left coronary artery ostia height is also proven: for the lower edge of the ostia ($r=+0.74$, $p=0.000$) and the upper edge of the ostia ($r=+0.78$, $p=0.000$). The level of the right coronary artery ostia height was directly related to the value of the right sinus of Valsalva height ($r=+0.58$, $p=0.001$). The relationship between the values of the sinuses of Valsalva height indicators is visualized (Fig. 1).

Considering the above, it was considered appropriate to conduct a multifactorial regression analysis of the influence of anthropometric parameters on the morphometric parameters of the studied structures in men with CHD. As a result of the study, the dependence of the left coronary artery ostia height on a complex of anthropometric indicators was proven, namely: the inverse significant influence of weight and the direct significant influence of BMI and BSA. The multiple correlation coefficient was $R=+0.55$, with $p=0.023$, SEE=2.74. The adjusted coefficient of multiple determination ($R^2_{adj}=+0.22$) confirmed the dependence of the value of the left coronary artery ostia height in 22.3 % of cases on the specified anthropometric indicators in men with CHD. The Durbin-Watson autocorrelation criterion (1.66) confirmed the correctness of the constructed model (Table 2).

Entering the obtained data into the model, we get the

Table 1. Correlation data (r) between vascular indicators and biometric indicators in men with CHD.

Parameters		Posterior SoV height	Left SoV height	Right SoV height	LCA height (lower)	RCA height (lower)	LCA height (upper)	RCA height (upper)
age	r	-0.11	-0.17	0.21	-0.02	0.03	-0.17	0.03
	p	*0.573*	*0.380*	*0.262*	*0.897*	*0.892*	*0.368*	*0.867*
height	r	-0.02	-0.11	-0.03	-0.30	0.03	-0.16	-0.11
	p	*0.898*	*0.553*	*0.873*	*0.106*	*0.858*	*0.387*	*0.546*
weight	r	0.07	-0.11	0.22	-0.10	0.24	-0.05	0.06
	p	*0.732*	*0.577*	*0.248*	*0.595*	*0.210*	*0.784*	*0.770*
BMI	r	0.10	-0.06	0.28	0.04	0.25	0.02	0.11
	p	*0.597*	*0.766*	*0.140*	*0.836*	*0.181*	*0.900*	*0.557*
BSA	r	0.05	-0.10	0.19	-0.13	0.21	-0.06	0.02
	p	*0.792*	*0.593*	*0.325*	*0.494*	*0.270*	*0.742*	*0.909*
Posterior SoV height	r		0.39*	0.34	0.21	0.05	0.16	0.03
	p		*0.031*	*0.064*	*0.273*	*0.799*	*0.397*	*0.874*
Left SoV height	r	0.39*		0.39*	0.74**	0.03	0.78**	0.19
	p	*0.031*		*0.032*	*0.000*	*0.875*	*0.000*	*0.304*
Right SoV height	r	0.34	0.39*		0.20	0.58**	0.28	0.67**
	p	*0.064*	*0.032*		*0.288*	*0.001*	*0.139*	*0.000*
LCA height (lower)	r	0.21	0.74**	0.20		0.00	0.77**	0.13
	p	*0.273*	*0.000*	*0.288*		*0.997*	*0.000*	*0.487*
RCA height (lower)	r	0.05	0.03	0.58**	0.00		0.17	0.86**
	p	*0.799*	*0.875*	*0.001*	*0.997*		*0.357*	*0.000*
LCA height (upper)	r	0.16	0.78**	0.28	0.77**	0.17		0.28
	p	*0.397*	*0.000*	*0.139*	*0.000*	*0.357*		*0.134*
RCA height (upper)	r	0.03	0.19	0.67**	0.13	0.86**	0.28	
	p	*0.874*	*0.304*	*0.000*	*0.487*	*0.000*	*0.134*	

Notes: BMI - body mass index; BSA - body surface area; SoV - sinus of Valsalva; LCA height (upper) - left coronary artery, upper edge; RCA height (upper) - right coronary artery, upper edge; LCA height (lower) - left coronary artery, lower edge; RCA height (lower) - right coronary artery, lower edge; * - the correlation is significant at $p<0.05$; ** - the correlation is significant at $p<0.001$.

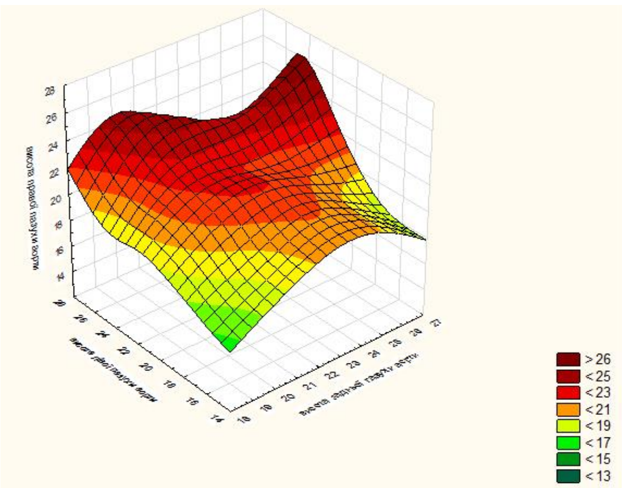

Fig. 1. The relationship between the height indicators of the right, left and posterior sinus of Valsalva in men with CHD.

following linear equation of the model:

the level of the left coronary artery ostia height = -3.676 x A1 + 4.144 x A2 + 194.5 x A3 - 183.05.

As a result of the calculations, the average predicted value of the left coronary artery ostia height in men with CHD is 13.97±1.69 mm (minimum value 9.77 mm, maximum 18.18 mm), which completely coincides with the actual average value, according to CT data, in men with this pathology: 13.97±3.10 mm.

Figure 2 graphically shows the normal probability of the influence of independent anthropometric predictors on the predicted value of left coronary artery ostia height in men with CHD.

For the purpose of practical development of the obtained model, we present two examples of calculations for different anthropometric parameters of studied patients with CHD.

Example № 1. Patient № 7 from the database: male, 54 years old, height 1.75 m, weight 72.0 kg, BMI 23.51 kg/m^2,

Table 2. Results of logistic regression calculations for predicting the level of left coronary artery ostia height in men with CHD.

Indicators	Conventional designation	b- coefficients	p
Constant		-183.05	0.022
Weight	A1	-3.676	0.011
BMI	A2	4.144	0.005
BSA	A3	194.5	0.015

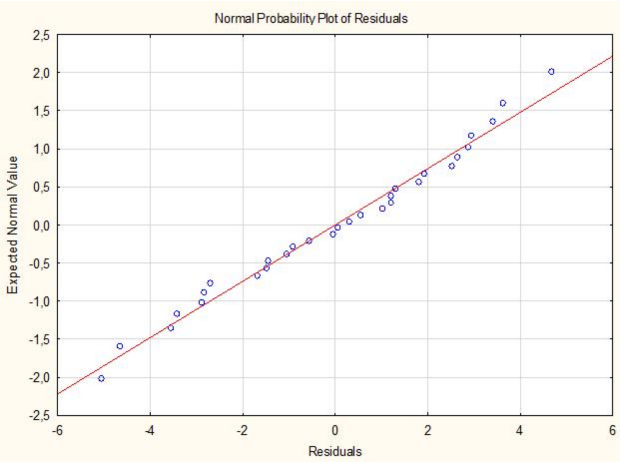

Fig. 2. Normal probability of influence of predictors on the predicted value of left coronary artery ostia height in men with CHD.

BSA 1.870 m^2, left coronary artery ostia height 13.50 mm.

By substituting the given patient data into the presented linear logistic regression equation, we get the result: *level of the left coronary artery ostia height* = -3.676 x 72 + 4.144 x 23.51 + 194.5 x 1.870 - 183.05 = 13.53 mm.

Therefore, the difference between the actual and calculated value is 0.030 mm, which is within the permissible error of 5 %.

Example № 2. Patient № 23 from the database: male, 59 years old, height 1.62 м, weight 80.0 кг, BMI 30.48 kg/m^2, BSA 1.900 m^2, left coronary artery ostia height 18.50 mm.

By substituting the patient's data into the given linear logistic regression equation, we get the result: *level of the left coronary artery ostia height* = -3.676 x 80 + 4.144 x 30.48 + 194.5 x 1.900 - 183.05 = 18.18 mm.

Thus, the obtained calculated value of the left coronary artery ostia height of 18.18 mm practically does not differ (by 0.320 mm) from the one obtained at CT 18.50 mm, which proves the effectiveness of this model in practice.

Table 3. Distribution of vascular parameters (according to CT data) in groups of men with CHD by height (M±SD, mm).

Indicators	Group 1 (1.6-1.7 m) n=11	Group 2 (1.71-1.8 m) n=19	p
Posterior SoV heigh	22.86±2.58	22.48±1.88	*0.683*
Left SoV height	21.90±1.84	21.49±3.08	*0.666*
Right SoV height	22.07±2.22	22.08±2.57	*0.993*
LCA height (lower)	14.98±2.39	13.41±3.50	*0.172*
RCA height (lower)	13.99±2.59	13.42±3.85	*0.645*
LCA height (upper)	18.22±2.93	18.27±3.49	*0.970*
RCA height (upper)	18.39±2.71	17.47±3.14	*0.424*

A comparison of blood vessel data obtained on CT by height in men with CHD showed almost the same parameters of almost all studied indicators (Table 3).

To establish relationships between age-anthropometric data and vessel parameters obtained during CT diagnosis, in 11 short men with CHD (average age 60.11±12.63 years, height 1.677±0.002 m) it was considered appropriate to conduct a correlation analysis using correlation coefficients tb-Kendal (Table 4).

An inverse correlation between height and the value of the upper edge of the left coronary artery ostia height (tb= -0.56, p=0.034) was proved (Fig. 3). Reliable direct relationships were established between the left coronary artery ostia height parameter and several anthropometric

Table 4. Correlation relationships (tb-Kendall) between age and anthropometric data and vascular parameters in short stature person with CHD (n=11).

Parameters		Posterior SoV height	Left SoV height	Right SoV height	LCA height (lower)	RCA height (lower)	LCA height (upper)	RCA height (upper)
age	tb	-0.14	-0.25	0.18	0.16	0.37	0.00	0.13
	p	*0.577*	*0.32*	*0.469*	*0.528*	*0.148*	*1.000*	*0.590*
height	tb	0.16	-0.41	-0.24	-0.39	-0.18	-0.56	-0.10
	p	*0.549*	*0.121*	*0.382*	*0.146*	*0.496*	*0.034*	*0.699*
weight	tb	0.30	0.47	0.10	0.72	-0.26	0.41	-0.41
	p	*0.272*	*0.081*	*0.697*	*0.007*	*0.331*	*0.122*	*0.122*
BMI	tb	0.17	0.42	0.24	0.67	-0.05	0.41	-0.18
	p	*0.510*	*0.101*	*0.360*	*0.008*	*0.855*	*0.102*	*0.468*
BSA	tb	0.42	0.37	0.00	0.58	-0.38	0.28	-0.51
	p	*0.110*	*0.145*	*1.000*	*0.023*	*0.143*	*0.276*	*0.046*

Continuation of table 4.

Parameters		Posterior SoV height	Left SoV height	Right SoV height	LCA height (lower)	RCA height (lower)	LCA height (upper)	RCA height (upper)
Posterior SoV height	tb	-	0.31	0.39	0.29	-0.20	0.12	-0.02
	p	-	*0.226*	*0.135*	*0.264*	*0.455*	*0.643*	*0.926*
Left SoV height	tb	0.31	-	0.41	0.52	-0.28	0.72	-0.09
	p	*0.226*	-	*0.103*	*0.038*	*0.277*	*0.004*	*0.719*
Right SoV height	tb	0.39	0.41	-	0.23	0.30	0.20	0.39
	p	*0.135*	*0.103*	-	*0.365*	*0.237*	*0.417*	*0.125*
LCA height (lower)	tb	0.29	0.52	0.23	-	-0.18	0.63	-0.22
	p	*0.264*	*0.038*	*0.365*	-	*0.469*	*0.012*	*0.369*
RCA height (lower)	tb	-0.20	-0.28	0.30	-0.18	-	-0.11	0.80
	p	*0.455*	*0.277*	*0.237*	*0.469*	-	*0.652*	*0.002*
LCA height (upper)	tb	0.12	0.72	0.20	0.63	-0.11	-	-0.02
	p	*0.643*	*0.004*	*0.417*	*0.012*	*0.652*	-	*0.929*
RCA height (upper)	tb	-0.02	-0.09	0.39	-0.22	0.80	-0.02	-
	p	*0.929*	*0.719*	*0.125*	*0.369*	*0.002*	*0.926*	-

Notes: BMI - body mass index; BSA - body surface area; SoV - sinus of Valsalva; LCA height (upper) - left coronary artery, upper edge; RCA height (upper) - right coronary artery, upper edge; LCA height (lower) - left coronary artery, lower edge; RCA height (lower) - right coronary artery, lower edge.

indicators: with weight - a direct strong relationship (tb=+0.72, p=0.007), with BMI - a medium strength direct relationship (tb=+ 0.67, p=0.008), direct relationship with BSA - medium strength (tb=+0.58, p=0.023) (Fig. 4). Also proven the relationship between the value of the right coronary artery upper edge ostia height and the BSA indicator - the inverse of the average strength correlation (tb=-0.51, p=0.046). Relationships between morphometric parameters and age were not proven.

Average strength correlation was established without validation. Among the most pronounced are: the correlation between the left sinus of Valsalva height and all biometric

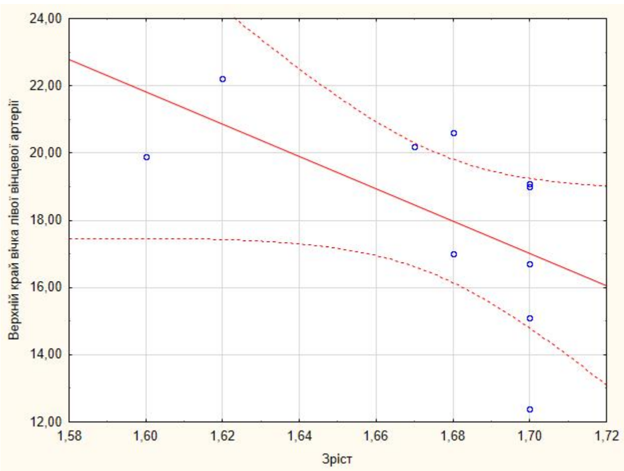

Fig. 3. Correlation between the height indicator and the value of the left coronary artery upper edge ostia height in short men with CHD.

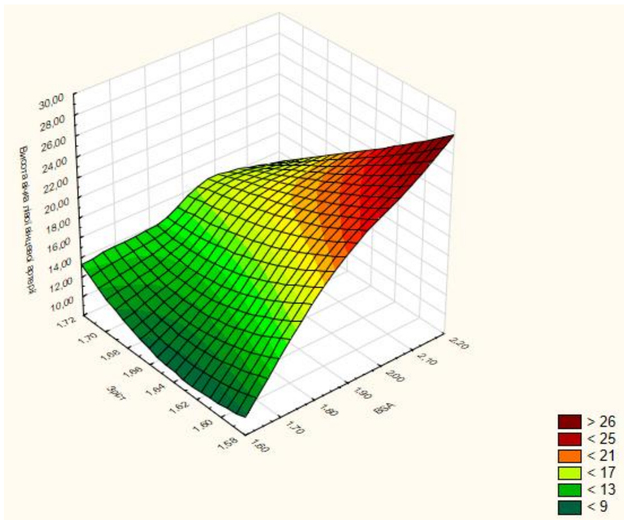

Fig. 4. The relationship between height indicators, BSA and the value of left coronary artery ostia height in a short person with CHD.

parameters (tb from -0.41 (with height) p=0.121 to +0.47 (with weight), p=0.081); between the left coronary artery upper edge ostia height indicator and weight and BMI (tb=+0.41, p=0.122 and p=0.102); between the right coronary artery upper edge ostia height parameter and weight (tb=-0.41, p=0.122).

Also, as a result of the conducted analysis, direct correlations between the values of certain morphometric parameters in short men with CHD were proven. In particular, the indicator of left sinus of Valsalva height was directly related to the parameters of the left coronary artery height: the lower edge of the ostia (medium strength direct connection tb=+0.52, p=0.038) and the upper edge of the ostia (strong direct connection tb =+0.72, p=0.004). No proven correlations were found for the posterior sinus of Valsalva and right sinus of Valsalva height parameters, which again we attribute to the small sample of patients.

Discussion

CT measurement of sinuses of Valsalva height and coronary artery ostia height taking into account age, sex, height, weight, BMI and BSA in men with CHD results in a proven direct correlation of average strength between the three sinuses of Valsalva height. The relationship between the sinuses of Valsalva height and the corresponding coronary artery ostia height is logical [10]. According to the multifactorial regression analysis, there is a dependence of the left coronary artery ostia height on a complex of anthropometric indicators, namely: the inverse significant influence of weight and the direct significant influence of BMI and BSA. As a result, the prediction of the level of the left coronary artery ostia height in men with CHD was confirmed using the constructed model.

In the group of people of short stature, the inverse correlation between height and the height of the left coronary artery was proven. The smaller the height of a patient with CHD, the greater left coronary artery upper edge ostia height. The parameter of the left coronary artery ostia height has reliable direct relationships with weight (strong direct), with BMI (medium strong direct) with BSA (medium strong direct). Right coronary artery upper edge ostia height with BSA (reverse average force). It should be noted that a number of average strength relationships between other morphometric parameters and biometric data were established, which did not have confirmation of reliability due to a small sample (n=11).

It is important to emphasize that all patients were less than 1.80 m tall, which confirms the data that short people suffer from CHD more often [12, 13]. The relationship between the morphometric parameters of the aorta and biometric parameters taking into account body weight in men of group 1 (short stature) is consistent with previously published data [14, 16]. However, the previous studies concerned aortic stenosis. Relationships between morphometric parameters and age were not proven. Although a positive correlation between age and aortic root parameters has been described in men [16].

The issue of correlation of morphometric indicators is still debatable [5]. Obviously, this is due to the different groups of individuals included in the study. This includes racial, ethnic, and social affiliation [8]. According to the analysis of the literature, similar studies have not been published in Ukraine. The obtained results are particularly important in the context of aortic analysis for individuals with CHD who are candidates for CABG.

Conclusions

In men with CHD, left coronary artery ostia height correlates with weight, BMI, and BSA. In short men with CHD, there is an inverse relationship between left coronary artery height and height; direct relationships with weight, BMI and BSA.

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КОРЕЛЯЦІЯ МІЖ РОЗМІРАМИ ЦИБУЛИНИ АОРТИ ТА БІОМЕТРИЧНИМИ ПОКАЗНИКАМИ ПРИ ІШЕМІЧНІЙ ХВОРОБІ СЕРЦЯ

Підвальна У. Є.

Цибулина аорти вимагає прецензійного доопераційного аналізу для проведення аорто-коронарного шунтування при ішемічній хворобі серця. Розміри аорти корелюють з антропометричними показниками. Мета дослідження: встановити взаємозв'язок між висотою пазух аорти, висотою відходження вічок вінцевих артерій та біометричними показниками (віком, зростом, масою, площею поверхні тіла та індексом маси тіла) у чоловіків із ішемічною хворобою серця за допомогою комп'ютерної томографії. Матеріали та методи дослідження включають зображення комп'ютерної томографії з контрастуванням аорти чоловіків із верифікованою ішемічною хворобою серця. Згідно параметрів росту здійснено поділ на 2 групи. Проведено вимірювання висоти пазух аорти та висоти відходження вічок правої та лівої вінцевих артерій. Проаналізовані клінічні дані: вік, зріст, маса тіла, індекс маси тіла (ІМТ) та площа поверхні тіла (ППТ). Статистичний аналіз: t-критерій Стьюдента, методом рангової кореляції Кендала, лінійна кореляція Пірсона, мультифакторний регресійний аналіз Фішера. Аналіз результатів комп'ютерної томографії 30 хворих на ІХС чоловіків (середній вік 60,8±10,63 років) показав, що середні значення висоти трьох пазух аорти були приблизно на одному рівні. Результати оцінки проведеного лінійного кореляційного зв'язку за Пірсоном показали відсутність доведеного взаємозв'язку між біометричними показниками та морфометричними даними згідно КТ у хворих на ІХС чоловіків (p>0,05). Мультифакторний регресійний аналіз довів зворотній суттєвий вплив ваги та прямий суттєвий вплив ІМТ і ППТ на залежність висоти відходження вічка лівої вінцевої артерії. Коефіцієнт множинної кореляції становив R=+0,55, при p=0,023, SEE=2,74. Проведено прогнозування рівня висоти відходження вічка лівої вінцевої артерії у хворих на ІХС чоловіків із підтвердженням побудованої моделі. У першій групі чоловіків невисокого зросту (n=11) із ІХС (середній вік 60,11±12,63 років, зріст 1.677±0.023 м) доведено зворотній середньої сили кореляційний зв'язок між зростом та значенням висоти відходження верхнього краю вічка лівої вінцевої артерії (tb=-0,56, p=0,034). Встановлено достовірні прямі взаємозв'язки між параметром висоти вічка лівої вінцевої артерії та кількома антропометричними показниками: із вагою - прямий сильний зв'язок (tb=+0,72, p=0,007), із ІМТ - середньої сили прямий зв'язок (tb=+0,67, p=0,008), із ППТ - середньої сили прямий зв'язок (tb=+0,58, p=0,023). Доведено взаємозв'язок між значенням висоти відходження верхнього краю вічка правої вінцевої артерії та показником ППТ - зворотній середньої сили зв'язок (tb =-0,51, p=0,046). Не було доведено зв'язків між морфометричними параметрами та віком. Таким чином, у чоловіків із ішемічною хворобою серця висота відходження вічка лівої вінцевої артерії корелює з вагою, ІМТ і ППТ. У чоловіків невисокого зросту з ІХС існує зворотній зв'язок між висотою лівої вінцевої артерії та зростом; прямі взаємозв'язки з вагою, ІМТ і ППТ.

Ключові слова: *аорта, вінцева артерія, анатомія, комп'ютерна томографія, пазуха аорти.*