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Is the lumen diameter of peripheral arteries a good marker of the extent of coronary atherosclerosis?

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Dedicated to the memory of Dr. Waldemar Rumiński and Dr. Eng. Tomasz Jerzy Woliński

Abstract

Background: The lumen diameter (LD) of the extracranial carotid arteries determined by B-mode ultrasound has been proved to be associated with most atherosclerotic risk factors and cardiovascular events. This raises the question as to whether LD may also predict coronary artery disease.

Aim: To elucidate whether LD of the common carotid and/or femoral artery could be a clinically useful marker of the extent of coronary atherosclerosis.

Methods: A duplex ultrasonography and a quantitative coronary angiography were used to assess carotid, femoral and coronary atherosclerosis for 204 patients with angina pectoris. Intima-media thickness (IMT) and LD assessments were performed in peripheral arteries. We used three coronary angiographic scores: Vessel, Gensini and Extent. The following parameters were recorded: gender, age, diagnoses of arterial hypertension and diabetes, history of myocardial infarction (MI) and stroke, smoking status, body mass index (BMI) and body surface area (BSA).

Results: Significant correlations between LD, IMT and coronary scores were found, but the strongest correlations were between LD of the common carotid arteries and angiographic scores. In the case of LD in all investigated arteries, and IMT of the right carotid and left femoral arteries, significantly higher values were observed for patients with three-vessel disease (3VD) than for patients without it. Univariate analysis showed the important role played by LD of the carotid arteries in predicting 3VD (OR = 2.7). We obtained two multivariate logistic regression models which could estimate the probability *P* of 3VD.

The first model:

$$\mathit{logit}\ P = 0.05\ \mathit{age} + 0.94\ \mathit{RCCALD} + 0.70\ \mathit{MI} - 9.1;\ \mathit{AUC}=0.80\ (0.03)$$

is based on the value of the right common carotid artery lumen diameter (RCCALD), age and history of MI; the second one is based on LD of the left common carotid artery, gender, age and previous MI. ROC analysis indicated the optimal cut-off value for prediction of 3VD ($P = 0.36$), with high sensitivity (80%) and specificity (70%) for the first model.

Conclusions: According to our results, LD of the common carotid artery appears to be an independent predictor of 3VD. RCCLD turned out to be a basic prognostic variable (called 'risk variable') of the extent of coronary atherosclerosis after adjustment for age and prior MI. Measurements of common carotid artery LD, together with age, history of MI (and gender in the case of the left common carotid artery LD), could estimate the probability of 3VD. Other studies will be necessary to confirm our results before the obtained method can be used in clinical practice as a simple non-invasive diagnostic tool for a specific group of patients.

Key words: lumen diameter, common carotid artery, coronary atherosclerosis, three-vessel disease

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INTRODUCTION

The correlation of coronary artery disease (CAD) with atherosclerosis of peripheral arteries and the determination of noninvasive indices for its existence and extent have been sought by many researchers. Some studies report that the intima-media thickness (IMT) of the peripheral arteries obtained by B-mode ultrasound could play this role, even though more reliable indices exist only for the carotid artery [1–4]. Other studies have claimed that a morphologic classification of carotid and femoral arterial wall changes detected by high-resolution ultrasound may be an early and accurate indicator of global atherosclerotic disease [5, 6]. Khoury et al. [7] have even shown that femoral atherosclerosis was a slightly stronger predictor of CAD than carotid atherosclerosis. However, it is still not clear whether the lumen diameter (LD) of the peripheral arteries correlates with the extent of CAD.

The aim of this study was to find which ultrasound parameters had the best correlation with atherosclerotic lesions in the coronary arteries, which we performed by a complex ultrasound assessment of the peripheral vessels (the common carotid and femoral arteries). Using angiography, we assessed the usefulness of ultrasound parameters of peripheral artery atherosclerotic changes in patients with confirmed CAD.

METHODS

Study population

Two hundred and four (204) consecutive patients (127 men, 77 women), with a mean age of 61 years, were admitted to perform an elective coronary angiography. Table 1 lists the characteristics of these patients. The following exclusion criteria were used: a history of transluminal coronary angioplasty, coronary artery bypass surgery, aortic stenosis, cardiomyopathy, carotid endarterectomy and extremities inferioris artery surgery. There were 164 patients with stable angina pectoris (class I–III according to the Canadian Society of Cardiology) and 40 with unstable angina pectoris. Forty four (21%) patients had no significant lesions in the coronary arteries, 41 (20%) had one-vessel disease, 35 (17%) had two-vessel disease, and 84 (41%) had three-vessel disease (3VD). Data on the following parameters was recorded: age, gender, presence of arterial hypertension and diabetes mellitus, history of myocardial infarction (MI) and stroke, smoking status, body mass index (BMI) and body surface area (BSA).

Table 1. Selected parameters of physical, angiographical and ultrasonographical examination with their range for the studied patients (n = 204)

Age [years]	61 ± 10	36–85
Gender, male	127	62%
BMI [kg/m^2]	28.44 ± 4.4	18–40
BSA [m^2]	1.93 ± 0.22	1.41–2.64
Diabetes	37	18%
Hypertension	156	76%
Smoking	149	73%
Prior MI	80	39%
Stroke	8	4%
One-vessel	41	20%
Two-vessel	35	17%
Three-vessel	84	41%
Vessel score	1.8 ± 1.2	0–3
Extent score [%]	69 ± 30	0–100
Gensini score	44 ± 32	0–128
RCCALD [mm]	6.40 ± 0.79	5–9
LCCALD [mm]	6.31 ± 0.82	3.5–9.2
RCFALD [mm]	8.00 ± 0.96	5.6–10.7
LCFALD [mm]	7.95 ± 0.97	5.7–10.8
RCCAIMT [mm]	0.87 ± 0.24	0.5–1.7
LCCAIMT [mm]	0.87 ± 0.25	0.5–2.5
RCFAIMT [mm]	0.88 ± 0.19	0.6–2.0
LCFAIMT [mm]	0.89 ± 0.24	0.6–2.6

Mean values ± SD and ranges or number of patients and percentages are given; BMI — body mass index; BSA — body surface area; MI — myocardial infarction; RCCALD — lumen diameter of right common carotid artery; LCCALD — lumen diameter of left common carotid artery; RCFALD — lumen diameter of right common femoral artery; LCFALD — lumen diameter of left common femoral artery; RCCAIMT — intima-media thickness of right common carotid artery; LCCAIMT — intima-media thickness of left common carotid artery; RCFAIMT — intima-media thickness of right common femoral artery; LCFAIMT — intima-media thickness of left common femoral artery

Coronary angiography

Coronary angiography was performed using Judkins' technique. The coronary angiograms were interpreted visually and were analysed in five orthogonal views. We used three coronary angiographic scores to assess the severity of coronary lesions.

The Vessel score was used to define the number of vessels with a stenosis of 50% or more in one of three major coronary arteries or their major branches.

The Gensini score is a computerised scoring system of coronary atherosclerosis severity that depends on the degree of luminal narrowing, the geographic importance of each stenosis, and the possible collateral circulation of coronary arteries [8].

The Extent score indicated the proportion of the coronary arterial tree involved by angiographically detectable atheroma. The proportion of each vessel involved by atheroma, identified as luminal irregularity, was multiplied by a factor for each vessel [9].

Ultrasound examination

High resolution B mode, colour Doppler, and pulse Doppler ultrasonography of both common carotid and femoral arteries were performed using an ultrasound device (Logic 500; General Electric) equipped with a 7.5 MHz linear-array

Table 2. Risk variables which have the most significant Spearman's rank correlations with three-vessel disease and angiographic scores ($p < 0.005$)

Risk variable	Three-vessel disease	Vessel score	Gensini score	Extent score
Age	0.28	0.29	0.29	0.26
Gender	0.22	0.32	0.33	0.28
Prior MI	0.33	0.39	0.42	0.33
RCCALD	0.37	0.35	0.32	0.32
LCCALD	0.34	0.33	0.30	0.28
RCCAIMT	0.23	0.23	0.27	0.24
LCFAIMT	0.20	0.24	0.25	0.20

Abbreviations as in Table 1

transducer. Patients were examined in the supine position with the head tilted backwards. An electrocardiographical signal synchronised the image analysis to the end of diastole. The examined region included a 30 mm long segment of the common carotid artery proximal to the bifurcation. The femoral artery was examined distally to the inguinal ligament at the bifurcation into the superficial and profound femoral arteries. The maximum IMT was measured at the far walls of the common carotid and femoral arteries, and was expressed as a mean value. The IMT was defined as the distance from the leading edge of the lumen-intima interface to the leading edge of the media-adventitia interface of the far wall. The IMT was measured in a 10 mm long segment just proximal to the carotid bulb in the common carotid artery and in a 15 mm long segment just proximal to the bifurcation in the common femoral artery [1]. The IMT was assessed as normal if it did not exceed 0.9 mm. Carotid plaque was defined as a localised intima-media thickening equal to or greater than 1.3 mm [10]. The LD of the common carotid and femoral arteries was measured in plaque free areas. The LD was defined as the distance between the leading edges of the intima-lumen interface of the near wall and the lumen-intima interface of the far wall [1].

Statistical analysis

The statistical analyses were performed with Statistica 10 software. All continuous variables were described by their mean ± SD and categorical variables as absolute numbers or proportions. In univariate analyses, the Kolmogorov--Smirnov test was used for each potential cardiovascular risk variable to compare distributions of the patients with and without 3VD. The differences in distributions of LD and IMT according to number of major affected coronary arteries were tested using the Kruskall-Wallis test. Spearman coefficient R was applied to verify correlations between LD or IMT, and coronary angiographic scores. The relationship between the presence or absence of 3VD, IMT, LD and cardiovascular risk factors was examined using multiple logistic regression analysis. The variables with a value $p < 0.01$ in univariate logistic regression were farther examined by multivariate regression analysis. For risk variables, the odds ratios (OR) were calculated. Logistic regression with backward stepwise selection was used to find the multivariate model to predict the probability of the presence of 3VD. To assess the clinical usefulness of LD as the markers of 3VD, receiver operating characteristic (ROC) curves were also constructed.

Table 3. Significant Spearman's rank correlations between peripheral artery variables ($p < 0.001$)

Variable	RCFALD	LCFALD	RCCAIMT	LCCAIMT
RCCALD	0.42	0.42	0.36	0.34
LCCALD	0.38	0.37	0.32	0.30

Abbreviations as in Table 1

RESULTS

The IMT of carotid and femoral arteries were significantly but weakly correlated with coronary angiographic scores. The Spearmans' rank correlation coefficients were less than 0.28 ($p < 0.01$). There were also very weak correlations between LD of femoral arteries and scores. More significant correlations between LD of carotid arteries and the coronary angiographic scores and 3VD were found — the Spearman's correlation coefficients were above 0.31 ($p < 0.005$) in the case of the right common carotid artery.

The connections between coronary angiographic scores and IMT, LD, cardiovascular risk factors (age, sex, arterial hypertension, diabetes mellitus, cigarette smoking, BMI, BSA, history of MI and stroke) were examined. In the end, only seven variables including age, male sex, history of MI, LD of carotid arteries, IMT of right carotid and left femoral arteries turned out to have significant Spearman's rank correlations with 3VD and angiographic scores (Table 2).

Furthermore, measurements of peripheral arteries were also mutually correlated, as can be seen in Table 3.

We compared distributions of peripheral arteries' variables and risk factors in two groups of patients: with and without 3VD, by applying the Kolmogorov-Smirnov test (Table 4). For age, gender, MI in history, LD in all investigated arteries and IMT of

Table 4. Significant risk factors and parameters of peripheral arteries ultrasound imaging for patients with three-vessel disease and without it

Risk variables	Number of diseased vessels		p*
	0–2 vessels (n = 120)	3 vessels (n = 84)	
Age [years]	59 ± 9	64 ± 9	< 0.001
Gender, male	53%	75%	< 0.03
Prior MI	26%	58%	< 0.01
RCCALD [mm]	6.18 ± 0.68	6.73 ± 0.82	< 0.01
LCCALD [mm]	6.11 ± 0.68	6.60 ± 0.92	< 0.01
RCFALD [mm]	7.87 ± 1.03	8.17 ± 0.83	< 0.01
LCFALD [mm]	7.82 ± 1.02	8.12 ± 0.86	< 0.03
RCCAIMT [mm]	0.82 ± 0.20	0.93 ± 0.27	< 0.005
LCFAIMT [mm]	0.85 ± 0.23	0.93 ± 0.25	< 0.05

*Kolmogorov-Smirnov test; abbreviations as in Table 1

right carotid and left femoral arteries, significantly higher values were observed in the group with 3VD than those without it.

The differences in distributions of peripheral arteries' variables according to the number of major affected coronary arteries tested by the Kruskall-Wallis test were the most significant for LD of carotid arteries (Table 5).

Univariate analysis showed the important role of the LD of the carotid arteries in predicting 3VD (Table 6).

Stepwise logistic regression indicated the lumen of the common carotid arteries, age, and prior MI as the strongest independent predictors of 3VD. Moreover, the predictive value of the common carotid arteries LD happened to be higher than the other ones. The ROC curves for LD of the right common carotid artery (RCCALD) and age can be seen in Figure 1. The area under curve (AUC) for RCCALD is greater than the AUC for age (0.72 and 0.67, respectively).

Table 6. Univariate analysis of main variables with significant influence on three-vessel disease

Risk variable	p	Odds ratio (95% CI)
Age	0.0001	1.06 (1.03–1.10)
Prior MI	0.00001	2.01 (1.49–2.70)
Gender (male)	0.002	1.62 (1.19–2.20)
LCCALD	0.001	2.21 (1.49–3.29)
RCCALD	0.000004	2.71 (1.77–4.14)

CI — confidence interval; other abbreviations as in Table 1

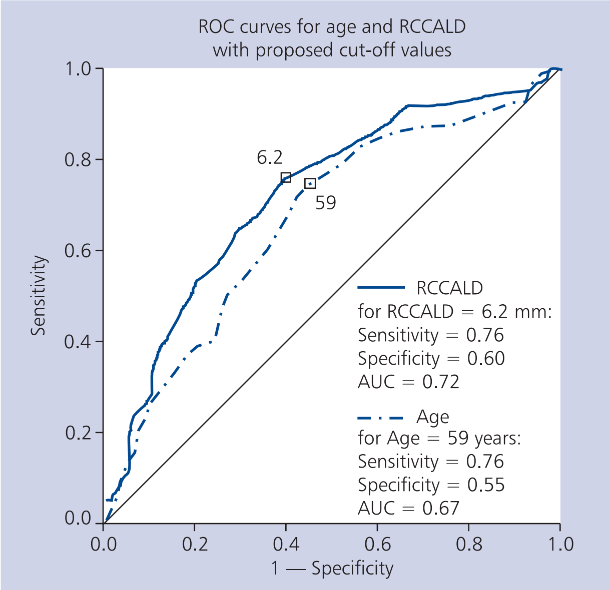

Figure 1. Comparison of receiver operating characteristic curves for age and for right common carotid artery lumen diameter (RCCALD)

Table 5. Mean values of peripheral arteries' variables according to the number of affected vessels with results of the Kruskal--Wallis test

Parameters of peripheral artery [mm]	Number of diseased vessels				Kruskal-Wallis test	
	0 (28 f + 16 m)	1-vessel (21 f + 20 m)	2-vessels (7 f + 28 m)	3-vessels (21 f + 63 m)	H(3,204)	p
LCCALD	5.98 ± 0.6	6.29 ± 0.8	6.09 ± 0.7	6.60 ± 0.9	26.9	0.0000
RCCALD	6.08 ± 0.6	6.33 ± 0.8	6.13 ± 0.7	6.73 ± 0.8	30.8	0.0000
LCFALD	7.80 ± 1.1	7.78 ± 1.1	7.90 ± 0.9	8.12 ± 0.9	8.0	0.45
RCFALD	7.84 ± 1.0	7.87 ± 1.1	7.93 ± 0.9	8.17 ± 0.8	7.5	0.06
LCCAIMT	0.83 ± 0.2	0.80 ± 0.2	0.84 ± 0.2	0.94 ± 0.3	10.0	0.02
RCCAIMT	0.81 ± 0.2	0.84 ± 0.2	0.82 ± 0.2	0.93 ± 0.3	11.5	0.01
LCCAIMT	0.81 ± 0.2	0.85 ± 0.2	0.90 ± 0.3	0.93 ± 0.3	10.0	0.02
RCCAIMT	0.83 ± 0.2	0.84 ± 0.1	0.89 ± 0.2	0.91 ± 0.2	9.0	0.03

f — women; m — men; other abbreviations as in Table 1

We would like to propose two multiple logit regression models. The first one (Model 1), based on measurements of only three variables i.e. RCCALD, age, and the history of MI, would estimate the probability (*P*) that a patient has 3VD as a function given by the following equations:

$$P = \frac{1}{1 + \exp(-0.05\ \text{age} - 0.94\ \text{RCCALD} - 0.7\ \text{MI} + 9.1)}$$

or alternatively:

$$\text{logit}\ P = 0.05\ \text{age} + 0.94\ \text{RCCALD} + 0.70\ \text{MI} - 9.1$$

ROC curve for Model 1 with description and validation is presented in Figure 2.

The second multiple logit regression model, Model 2, is based on the measurements of four predictors: LD of left common carotid artery (LCCALD), age, prior MI, and gender. This model would estimate the probability (*P*) that a patient has 3VD as a function given by the following equations:

$$P = \frac{1}{1 + \exp(-0.058\ \text{age} - 0.66\ \text{LCCALD} - 0.65\ \text{MI} - 8.2)}$$

or alternatively:

$$\text{logit}\ P = 0.058\ \text{age} + 0.66\ \text{LCCALD} + 0.65\ \text{MI} + 0.41\ \text{gender} - 8.2$$

ROC curve for Model 2 (with description and validation) is presented in Figure 3.

The AUC is equal to 0.80 for Model 1 and 0.79 for Model 2 (both with AUC standard error 0.03). The cut-off values *P* for prediction of 3VD are nearly 0.4 (for both models), which demonstrated high sensitivity (80–85%) and slightly lower specificity. The goodness of fit was verified by the Hosmer-Lemeshow test (H-L = 5.73, p = 0.68 for Model 1 and H-L = 7.48, p = 0.49 for Model 2). The other estimations and data for both models (standard error, Wald statistic, p) are presented in Table 7.

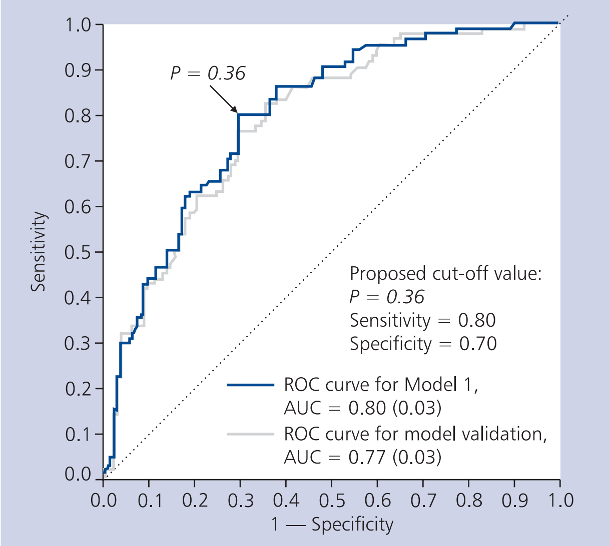

Figure 2. Receiver operating characteristic curve of the first logit regression model for the prediction of three-vessel disease

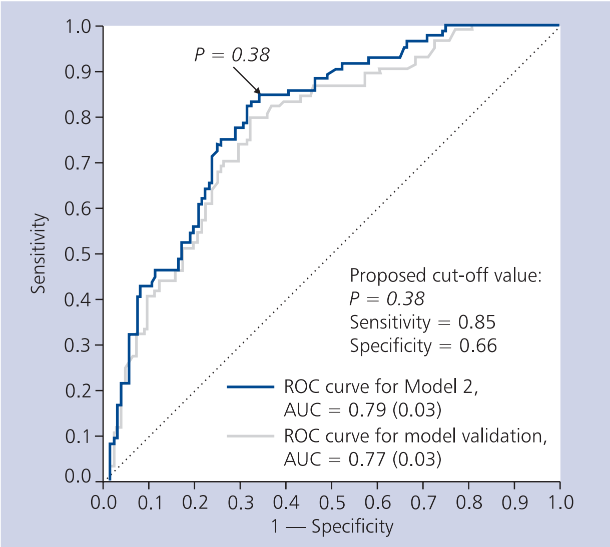

Figure 3. Receiver operating characteristic curve of the second logit regression model for the prediction of three-vessel disease

DISCUSSION

Atherosclerosis is a generalised, progressive disease that may simultaneously affect several arterial trees of the body [11].

The relationship between clinically manifesting carotid atherosclerosis (plaques), as well as its early subclinical form (increased IMT), and the traditional risk factors for CAD has been shown in many previous studies, but the results of some of them have suggested different risk factors impact on carotid and coronary circulation [12]. The different impact of risk factors on carotid and coronary beds probably contributed to a relatively poor correlation between carotid and coronary atherosclerosis, observed also in our research, where the correlations of common carotid IMT with 3VD and coronary scores were weak (R < 0.28). The same results were published by Adams et al. [13] in 1995. On the other hand, other investigators have shown common carotid artery IMT to be a significant predictor of angiographically proven CAD [14, 15]. In our study, we also found a weak relationship between IMT of common femoral artery and coronary angiographic scores (R < 0.26). The available data on the relation of femoral IMT and coronary atherosclerosis is scarce and contradictory. Hulthe et al. [16], in a relatively small study, did not find a significant relation between this IMT and the extent of coronary atherosclerosis as evaluated by angiography. In contrast, Lekakis et al. [17] reported that femoral IMT was a strong predictor of the extent and severity of coronary atherosclerosis; however, this strong correla-

Table 7. Estimations of parameters of both logit regression models

Effect of	Estimation	Standard error	Wald's statistics	p	Odds ratio
Model 1					
RCCALD	0.94	0.22	18.1	0.00002	2.56
Prior MI	0.70	0.17	17.9	0.00002	2.02
Age	0.05	0.02	6.85	0.009	1.05
Model 2					
LCCALD	0.66	0.21	9.7	0.0018	1.93
Prior MI	0.65	0.17	14.8	0.00001	1.9
Age	0.06	0.02	10.4	0.0013	1.06
Gender (male)	0.41	0.18	5.02	0.0251	1.51

Abbreviations as in Table 1

tion was observed only by using the Gensini score, a more general marker for the estimation of the severity of coronary atherosclerosis.

Moreover, in our study, univariate regression analysis determined the following significant risk factors of 3VD: age, male sex, previous MI, and LCCALD and RCCALD. RCCALD had the strongest influence on the occurrence of 3VD ($p = 0.000004$, OR = 2.71) and a significant relationship with angiographic scores ($R > 0.31$). Sosnowski et al. [18] also reported that common carotid artery diameter was positively correlated with the Gensini angiographic index.

According to our results, LD of common carotid arteries appeared to be an independent predictor of 3VD after adjustment for age, sex and prior MI. On the contrary, in a study by Hallerstam et al., the common carotid artery LD was significantly correlated with the extent and severity of myocardial hypoperfusion but failed to be an independent predictor of CAD extent after adjustment for age, sex and BMI [19]. The discrepancy between the results of our study and those reported by Hallerstam et al. [19] could be explained by the different methodologies used to evaluate the extent of coronary atherosclerosis, since they tried to correlate the common carotid artery LD with the extent and severity of CAD evaluated by myocardial perfusion scintigraphy.

Several large population studies have confirmed that common carotid artery LD is an indicator of cardiovascular risk and is associated with cardiovascular risk factors and events.

In the EVA (*Etude sur le vieillissement arte riel*) Study, the increase of common carotid artery lumen and interadventitial diameters were found to be associated with male sex, body height and weight, carotid IMT, plaque score, systolic blood pressure, and alcohol consumption [20]. Crouse et al. [21], in a population-based study, suggested that the common carotid artery manifested a larger lumen and interadventitial diameter in relation to most cardiovascular risk factors (namely smoking, hypertension, and diabetes). In the IMPROVE Study (IMT-progression as predictors of vascular events), IMT and the interadventitial diameter of the common carotid artery were significantly associated with the risk of combined cardiovascular events (including MI, sudden cardiac death and angina pectoris), both before and after adjustment for age and sex [22]. Another population study showed that even after adjusting for carotid IMT and vascular risk factors, the right common carotid artery interadventitial diameter was significantly associated with cardiac events [23]. But none of these above mentioned studies looked for an association of common carotid artery LD with the extent of CAD evaluated by coronary angiography.

However, Terry et al. [24], reported that an increase of common carotid artery interadventitial diameters was positively related to CAD detected by coronary angiography, but that common carotid artery LD was not associated with coronary atherosclerosis. Kato et al. [25] also showed common carotid artery enlargement in patients with multiple or diffuse coronary plaques compared to single-plaque patients, whereas LD was similar. On the contrary, the present study showed the RCCALD and LCCALD were larger in patients with 3VD than in those without it.

The differences between the results of our study and those reported by Terry and Kato et al., underline that the process of remodelling of the arterial wall has not been completely understood yet [26–28]. Zarins et al. [29] suggested two explanations of the compensatory dilatation mechanism: (1) Since most plaques are eccentric at the early stage of the disease, a local increase in wall shear stress at the uninvolved vessel wall may stimulate endothelium-dependent arterial dilatation, which represents a normal response to shear stress stimuli; (2) Atheroma formation may lead to degradation of the underlying media and adventitia with outward bulging of the plaque [30].

The common carotid artery LD enlargement, measured in our study, reflects the first process which is independent of the presence of focal atherosclerosis (being measured in a plaque free area). Schott et al. [31] also proposed that the lumen and interadventitial diameters of the common carotid artery might be more sensitive measures of early atherosclerosis in women with rheumatoid arthritis than ultrasonographic measurement of IMT.

In the present study, we tried to establish an association between the common carotid artery LD and the extent of coronary atherosclerosis evaluated by coronary angiography. Our analysis yielded logit regression models which for a given value of the RCCALD and LCCALD, age, gender and a history of MI, could estimate the probability of the presence of 3VD. These two models demonstrated high (80–85%) sensitivity and lower specificity (66–70%), suggesting their clinical usefulness for predicting 3VD.

We have no clear explanation as to why RCCALD is better linked with 3VD than LCCALD. Perhaps it results from anatomical differences: the right common carotid artery originates in the neck from the brachiocephalic trunk, while the left one arises from the aortic arch in the thoracic region.

Our results suggest that common carotid artery LD may be a good marker more clearly associated with 3VD than common carotid and femoral artery IMT and common femoral artery LD. More studies are necessary to confirm these findings.

CONCLUSIONS

Our results provide evidence that LD is a better marker than IMT, and is at least as useful as other known risk factors, in screening patients for the progression of coronary atherosclerosis. According to our results, the LD of each common carotid artery appeared to be an independent predictor of 3VD. Furthermore, it could improve prediction of 3VD. LD of the common carotid arteries turned out to be a basic prognostic variable ('risk variable') of the extent of coronary atherosclerosis.

Common carotid artery LD dilatation may be used as an indicator for 3VD after adjustment for age, prior MI and, if necessary, gender. Measurements of the individual patient's common carotid LD together with age, history of MI (and gender in the case of the LCCALD), could estimate the probability of 3VD.

Regarding the logistic regression model, other studies will be necessary to confirm our results before this model can be used as a diagnostic tool in the specific group of patients.

Conflict of interest: *none declared*

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Czy średnica światła tętnic obwodowych jest dobrym markerem rozległości miażdżycy tętnic wieńcowych?

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Streszczenie

Wstęp: Udowodniono, że średnica światła (LD) zewnątrzczaszkowych tętnic szyjnych oceniana za pomocą ultrasonograficznego obrazowania w trybie B wiąże się z większością miażdżycowych czynników ryzyka i zdarzeń sercowo-naczyniowych. Powstaje pytanie, czy LD może również posłużyć do przewidywania choroby wieńcowej.

Cel: Celem pracy było wyjaśnienie, czy LD tętnicy szyjnej i udowej wspólnej może być klinicznie użytecznym markerem rozległości miażdżycy tętnic wieńcowych.

Metody: Zastosowano ultrasonografię *duplex* oraz ilościową angiografię wieńcową w celu oszacowania miażdżycy tętnic szyjnych, udowych i wieńcowych u 204 pacjentów z dławicą piersiową. Oceniano grubość błony wewnętrznej i środkowej (IMT) oraz LD tętnic obwodowych. Posługiwano się trzema angiograficznymi skalami wieńcowymi: Vessel, Gensini i Extent. Zebrano dane dotyczące następujących parametrów: płeć, wiek, nadciśnienie tętnicze i cukrzyca w wywiadzie, przebyty zawał serca (MI) i udar mózgu, palenie tytoniu, wskaźnik masy ciała (BMI) i pole powierzchni ciała (BSA).

Wyniki: Znaleziono istotne korelacje między skalami wieńcowymi a LD i IMT; najsilniejsze były zależności z LD tętnic szyjnych wspólnych. We wszystkich badanych tętnicach obserwowane wartości LD (oraz IMT w tętnicy prawej szyjnej i lewej udowej) były istotnie większe u pacjentów z chorobą 3-naczyniową niż u pacjentów bez tego schorzenia. Analiza jednoczynnikowa pokazała, że ważną rolę w prognozowaniu choroby 3-naczyniowej odgrywa LD tętnic szyjnych (OR = 2,7). Uzyskano dwa wieloczynnikowe modele regresji logistycznej, które pozwalają oszacować prawdopodobieństwo *P* choroby 3-naczyniowej. Pierwszy model:

$$logit\ P = 0.05\ age + 0.94\ RCCALD + 0.70\ MI - 9.1;\ AUC = 0.80\ (0.03)$$

jest oparty na wartości LD prawej tętnicy szyjnej wspólnej (RCCALD), wieku i przebytym MI, podczas gdy drugi model opiera się na LD lewej tętnicy szyjnej wspólnej, wieku, przebytym MI i płci. Analiza ROC sugeruje optymalny punkt odcięcia dla prognozowania choroby 3-naczyniowej (*P* = 0,36) z wysoką czułością (80%) i specyficznością (70%) dla pierwszego modelu.

Wnioski: Zgodnie z uzyskanymi wynikami, LD tętnicy szyjnej wspólnej jest niezależnym predyktorem choroby 3-naczyniowej. LD prawej tętnicy szyjnej wspólnej okazała się ważną prognostycznie zmienną (zmienną ryzyka) rozległości miażdżycy wieńcowej, skorygowaną przez wiek i przebyty MI. Pomiary LD tętnicy szyjnej wspólnej wraz z wiekiem, przebytym MI (i płcią w przypadku LD lewej tętnicy szyjnej wspólnej) pozwalają oszacować indywidualne prawdopodobieństwo choroby 3-naczyniowej. Należy przeprowadzić dalsze badania przed użyciem tej metody w praktyce klinicznej jako prostego i nieinwazyjnego narzędzia diagnostycznego stosowanego w określonych grupach pacjentów.

Słowa kluczowe: średnica światła, tętnica szyjna wspólna, miażdżyca tętnic wieńcowych, choroba trójnaczyniowa

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