Predictors of Carotid Artery Atherosclerosis in asymptomatic patients with Coronary Artery Disease

Kamila Florek[1],

Michal Blaszkiewicz[1] ,

Joseph A Moutiris[2] MD, MSc, PhD, FESC

[1] Wroclaw Medical University, Wroclaw, Poland

[2]Cardiology Department, Paphos General Hospital and Medical School, University of Nicosia, Cyprus.

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Background

Coronary artery disease is very common in nowadays population. Atherosclerosis is considered as a

generalized disease and the connection between coronary artery disease and peripheral atherosclerosis is significant.[1] Large vessels stenoses are known as an important cause of stroke, when extracranial part of ICA plays a crucial role.[2] According to current studies 5 years survival rate in patients with asymptomatic carotid stenosis > 50% is 23.6%.[3] There are many guidelines, recommendations

and targets for cases with symptomatic atherosclerosis, but not for the patients with asymptomatic carotid artery stenosis. Assessment of this group of patients considering carotid stenosis can show us the indications to

appropriate therapies including pharmacological and surgical treatment, focused on the statistically important risk factors to prevent the high mortality risk.

The aim of this study is to evaluate the frequency and the predictive factors of carotid artery atherosclerosis in patients with coronary artery disease.

Materials and methods

This was a prospective observational study conducted from July 2022 to September 2022 at the Cardiology Department of Paphos General Hospital, Cyprus. Twenty one patients, with established coronary artery disease (CAD), ie patients who had history of myocardial infarction (MI), percutaneous coronary intervention (PCI) or coronary artery bypass surgery (CABG), were studied prospectively. Their mean age was 71.5 years. Fifteen (15, 71%) of them were males and six (6, 29%) females.

All of them were assessed by carotid ultrasound and doppler. Carotid atherosclerosis was defined according

to the newest guidelines on carotid ultrasound, of the Society of Radiologists.[4] The carotid ultrasound was performed by the pre-trained

medical students under the supervision of an experienced specialist.

We stratified the plaques using visual assessment (grayscale and color Doppler). We defined the carotid artery stenosis as 'mild' if the diameter reduction of the carotid lumen was less than 50% and the velocity was less than 125 cm/s, as 'moderate' when the diamatere reduction was between 50 - 70% and the velocity between 125

- 230 cm/sec and as 'severe' stenosis when the diameter reduction was greater than 70% and the velocity greater than 230 cm/s.

A detailed medical history of the patients was taken and the the risks

such as MI, PCI, CABG, cerebrovascular thrombotic event, positive family history for vascular disease, smoking, body mass index, hypertension, diabetes, dyslipidaemia, chronic heart failure, chronic kidney disease and peripheral vascular disease, were noted. The age and gender of the patients was also noted as well as the heart rate and blood pressure. Blood sample for fasting glucose, urea, creatinine, total

cholesterol, triglycerides, HDL, LDL, CRP, fibrinogen, homocysteine and D-dimers, was obtained the day of the examination.

The results were entered on an Excel database for statistical analysis.

Results

Plaques in the carotid arteries were observed among 14 out 21 patients (67%). These patients were older (74,9±7,9 vs 71,5±10,4 p=0,03) and their BMI was lower than the mean (27,1±3,4 vs 28,6±4,3 p=0,01) as well they were less often obese compared to the whole group (14% vs 43% p=0,02). The subgroup of patients with 'mild plaques' had no statistically differences compared with the group

without carotid atherosclerosis. Patients with 'moderate plaques' were observed less frequenctly among the group of obese patients (14% vs 43% p=0,02) as well in patients who have been taking antiplatelet drugs (33% vs 38% p=0,02).

Table 1. *Parameters significant for Carotid artery stenosis positive population.*

Variable	Whole population	Stenosis present	No stenosis	P value
Age	71,5±10,4	74,9±7,9	64,6±11,9	0,03
BMI	28,6±4,3	27,1±3,4	33,1±3,6	0,01
BMI>=	5(24%)	2(14%)	3(43%)	0,02

30				

Table 2. *Parameters significant for moderate Carotid artery stenosis positive population.*

Variable	Whole population	Moderate stenosis	No stenosis	P value
BMI>=30	5(24%)	2(33%)	0(0%)	0,03
Antiplatlets	13(62%)	2(33%)	5(38%)	0,02
Anticoagulants	2(10%)	0(0%)	2(33%)	0,02

Table 3. *Univariate logistic regression of stenosis positive population.*

Variable	p	Odds ratio	-95% CL	+95% CL
Age	0,04	1,1	1	1,3
BMI	0,05	0,6	0,3	1,02
Obesity	0,05	0,3	0,06	1,01

In 'stenosis present' population univariate logistic regression models revealed: age (OR = 1,1; Cl 1,0 -1,3; p = 0,04) as positive, BMI (OR = 0,6; CL 0,3 - 1,02; p = 0,05) and obesity (OR = 0,3; CL 0,06 - 1,01; p = 0,05) as negative predictors of Carotid atherosclerosis.

In the subpopulation of patients with moderate plaque univariate logistic regression modelst revealed: antiplatelets (OR = 0,25; Cl = 0,6 - 0,97; p = 0,04) as a negative predictor.

Table 4. *Univariate logistic regression of moderate stenosis positive population.*

Variable	p	Odds ratio	-95% CL	+95% CL
Antiplatlets	0,04	0,25	0,6	0,97

The multivariable model showed that age (OR=1,12; Cl 1,001 - 1,25; p = 0,04) was an independent predictor of carotid atherosclerosis in patients with coronary artery disease.

Table 5. *The multivariable model of plaque positive population,*

Variable	p	Odds ratio	-95% CL	+95% CL
Age	0,04	1,12	1,001	1,25

Conclusions

Carotid atherosclerosis is a common finding in patients with coronary artery disease. In fact it was observedoccured in more than every second patient. The results of our analysis showed surprizingly that obesity was a negative predictor for the presence of carotid atherosclerosis. In fact patients with carotid plaques had a lower BMI. Older age was an independent positive

predictor of carotid stenosis but was not found to have an impact on lesion severity. Antiplatelets drugs were revealed as an important negative predictor of moderate carotid artery stenosis, which may recommend using these drugs for additional indications such as prevention of moderate carotid stenosis in patients with coronary artery disease. The predictors of carotid atherosclerosis should be investigated further in the group of asymptomatic patients with coronary artery disease to evaluate the proper guidelines to diagnose the carotid atherosclerosis in that group of patients as well to draw conclusions on the prevention and therapy measures.

The present study, despite the small size, brings new information on the interrelation of carotid artery disease and the common risks, in patients with chronic artery diseaase.

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