BRIEF COMMUNICATION

Size of low-density lipoprotein particles in patients after stroke

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Introduction  Acute stroke is a severe clinical manifestation of atherothrombosis. Atherothrombosis and its complications are currently the most frequent cause of morbidity in the world. The major factors contributing to accelerated atherothrombosis in humans are dyslipoproteinemias and hypertension, among others. The presence of atherogenic lipoproteins in plasma leads to the development of endothelial dysfunction, increases the vessel tone, and contributes to further deterioration of cerebral perfusion leading to cerebral ischemia. The aim of the present study was to evaluate atherogenic lipoproteins in patients with acute ischemic stroke admitted to the intensive care unit.

Patients and methods  We followed up 50 consecutive patients with acute ischemic stroke (24 men and 26 women), aged from 35 to 90 years (mean age, 77.5 years ±11.8 years), and admitted to the 2nd Department of Internal Medicine of the Comenius University in Bratislava, Slovakia. The diagnosis of stroke was confirmed by a neurologist and by computed tomography. After admission, blood samples from the cubital vein were collected to measure routine biochemical parameters, including complete lipid profile in EDTA-K2 plasma.

Lipid parameters included plasma total cholesterol and triglycerides measured by the enzymatic CHOD-PAP method (Roche Diagnostics, Germany). For the determination of a nonatherogenic lipoprotein phenotype A and an atherogenic lipoprotein phenotype B, the Lipoprint LDL system was used (Quantimetrix, United States). The score of atherogenic risk (SAR) was calculated as the rate of nonatherogenic to atherogenic plasma lipoproteins. The SAR over 10.8 characterized a nonatherogenic lipoprotein profile, while the SAR less than 9.8 characterized an atherogenic lipoprotein profile.¹ ²

The obtained lipid results were compared with those of the control group, which consisted of 93 medical students of the Comenius University. The statistical analysis was performed using the t test for unpaired variables. A P value less than 0.005 was considered statistically significant.

Results  Plasma lipid levels, lipid subfractions, and the SAR of patients with stroke and controls are presented in the TABLE.

Patients with acute stroke had significant disturbances in the lipid profile when admitted to the hospital. They had significantly higher plasma lipids (cholesterol and low-density lipoprotein [LDL] cholesterol) and lower high-density lipoprotein cholesterol levels compared with the control group. They also showed high prevalence of atherogenic lipoprotein profile of type B.

Discussion  Acute stroke is a severe condition. In Slovakia, the rate of stroke is nearly 10,000 of new cases a year. Mortality is rather high, and of 50,000 patients who survive, 30% suffers severe, long-lasting deterioration of health. Treatment during hospital stay and after discharge is still expensive. Expenditure constitutes about 1% of the gross national product. Hypertension, smoking, diabetes, and dyslipidemia are the major risk factors that can be modified.³ ⁴

A new laboratory method, the Lipoprint LDL system, quantifies lipoproteins and specifies the types of lipoprotein profile in the examined subjects: atherogenic vs. nonatherogenic.⁵ ⁷

For clinical practice, it is useful to estimate the SAR. It represents the ratio of nonatherogenic to atherogenic lipoproteins in serum. Good correlations were found between SAR and lipoprotein profiles estimated with Lipoprint LDL.⁵ ⁷ The SAR is a newly introduced score that can help assess the atherogenic risk in patients. It is going to be tested in further clinical studies. Its predictive
The differentiation between atherogenic (phenotype B) and nonatherogenic (phenotype A) lipoprotein profile is based on the presence of these lipoprotein entities in blood plasma/serum. Atherogenic spectra are abundant in very-low-density lipoprotein, intermediate-density lipoproteins, and, especially, of small-dense LDL (sdLDL). These are strongly atherogenic LDL particles representing an LDL subfraction 3–7. Their diameter is smaller than 26.5 nm (265 Å) and they flow in density diameter between 1.048 and 1.065 g/ml. The above biological and biochemical characteristics result in strong atherogenic properties of these lipoproteins.

In conclusion, patients with acute stroke may constitute a severe diagnostic and therapeutic challenge due to comorbidities, including dyslipoproteinemias. All diagnostic and therapeutic approaches are expensive and time-consuming. Another modifiable risk factor in this patient group is dyslipidemia. It is common in patients with stroke, which affects their poor outcome. High prevalence of dyslipoproteinemias is also observed in other severe cardiovascular diseases such as coronary heart disease or peripheral arterial disease.

Thus, early hypolipidemic treatment with statins is indicated also among patients with acute stroke as an important part of their complex management. Because the high proportion of patients reveals the presence of sdLDL, not only monotherapy with statins but also combination therapy (statins plus fenofibrate or statins plus niacin) may be indicated. This can lead to the improvement in the endothelial function as well as cerebral blood flow in patients with acute stroke.

**REFERENCES**