Effect of heparine during carotid endarterectomy on risk of new ischemic lesion detected using magnetic resonance

Tomáš Hrbáč[1], David Školoudík[1,2], David Netuka[3], Vladimír Beneš[3], Vladimír Beneš Jr[4], Jaroslav Havelka[1], Tomáš Belšán[3], Jiří Fiedler[5], Vladimír Přibáň[6], Roman Herzig[7]

1 – University Hospital, Ostrava, Czech Republic; 2 – Palacký Univertsity Olomouc, Olomouc, Czech Republic, 3 – Military University Hospital, Prague, Czech Republic, 4 – Hospital Liberec. Czech Republic, Hospital České Budějovice, Czech Republic, 6 – University Hospital Plzeň, Czech Republic, 7 – University Hospital Hradec Králové, Czech Republic

Background

Carotid endarterectomy (CEA) is a therapeutic option for patients with severe internal carotid artery (ICA) stenosis, preventing primary and secondary stroke in > 60% and >50% of cases, respectively. The efficacy of CEA depends on the possibility of minimizing the rate of perioperative complications such as stroke, myocardial infarction, or death, which varies between 2%–7%. Several factors can influence the outcome of CEA—i.e., type of anesthesia, use of shunts, monitoring of brain function during the procedure, direct vs. patch closure after endarterectomy, completion imaging, type and dose of antithrombotic treatment. Perioperative application of heparine IV during carotid endarterectomy (CEA) is widely used to decrease the risk of perioperative stroke. Nevertheless, the optimal dose of heparin is not clearly established.

Aim

The aim of the prospective study was to test the effect of perioperative application of heparine IV in different dose scheme on the risk of new ischemic lesions detected on control brain magnetic resonance (MR) after CEA.

Material and methods

Patients with symptomatic or asymptomatic carotid stenosis ≥70% indicated for CEA, aged 40-85 years, functionally independent, without contraindication to MR were included to the prospective study after signing the informed consent. Patients were randomly allocated to the two different heparine dosage scheme groups. Patients in the first (heparine) group received heparine 100 I/kg IV 3 - 5 minutes prior to carotid artery incision. Patients in the second (control) group received standard 5,000 IU of heparine IV 3 - 5 minutes prior to carotid artery incision.

Neurological examination and brain MR including difusion-weighted images were performed in all patients no more than 24 hours prior to CEA and 24±2 hours after CEA.

Results

Totally 259 patients (180 males, 79 females, mean age 68.0±8.3 years) were enrolled to the study. Demographic data are in Table 1. New ischemic lesion on control brain MR were detected in 17 out of 128 (13.3%) patients in heparine group and in 17 out of 131 (12.6%) patients in control group (p = 0.396) – Table 2. Totally 29 patients were on permanent anticoagulation. Warfarin was replaced by nadroparine at least 2 days prior to CEA in all these patients. New ischemic lesion on control brain MR were detected in 9 out of 30 (30%) patients with permanent anticoagulation but only in 23 out of 229 (10%) patients without permanent anticoagulation (p = 0.006).

Table 1. Demographic data

Parameter	Heparine Group	Control Group	P value
Number of patients; n	128	131	NA
Age (years); mean±SD	67.2±7.7	68.0±6.9	>0.05
Gender (males); n (%)	90 (70.3%)	90 (68.7%)	>0.05
Side of stenosis (right); n (%)	63 (49.2%)	70 (53.4%)	>0.05
Symptomatic stenosis; n (%)	56 (43.8%)	67 (51.1%)	>0.05
% of stenosis; mean±SD	78.6±12.0	79.8±9.0	>0.05
Arterial hypertension; n (%)	109 (85.2%)	110 (84.0%)	>0.05
Diabete mellitus; n (%)	46 (35.9%)	32 (24.4%)	>0.05
Hyperlipidemia; n (%)	102 (79.7%)	95 (72.5%)	>0.05
Coronary heart disease; n (%)	41 (32.0%)	31 (23.7%)	>0.05
Myocardial infarction; n (%)	17 (13.3%)	20 (15.3%)	>0.05
Atrial fibrillation; n (%)	9 (7.0%)	8 (6.1%)	>0.05
Smoking; n (%)	43 (33.6%)	62 (47.3%)	>0.05
Statin use; n (%)	113 (88.3%)	95 (72.5%)	>0.05
General anesthesia; n (%)	105 (82.0%)	131 (100%)	>0.05
Shunt use; n (%)	4 (3.1%)	3 (2.3%)	>0.05

Table 2. Results

	Heparine Group	Control Group	P value
New ischemic lesion on brain MR; n (%)	17 (13.3%)	17 (13.0%)	>0.05
Stroke within 30 days; n (%)	7 (5.5%)	6 (4.6%)	>0.05
TIA within 30 days; n (%)	3 (2.3%)	2 (1.5%)	>0.05
Myocardial infarction within 30 days; n (%)	0 (0%)	0 (%)	>0.05
Death within 30 days; n (%)	1	2	>0.05

Conclusion

No significant effect of different heparine dose schemes on risk of new ischemic lesions on control brain MR after CEA was demonstrated. Contrary, patients on permanent anticoagulation had significantly higher risk of new ischemic brain lesions.

Acknowledgement: Study was supported by the Ministry of Health of the Czech Republic grant No. 16-29148A.