Background: Cerebral complications of coronary catheterizations are transient ischemic attack (TIA) and stroke. Silent stroke (SCI) does not cause acute neurological dysfunction. It might cause many disorders including dementia. Sonolysis is therapeutic method. Sonolysis should be the method for reducing the risk of symptomatic and asymptomatic brain ischemic lesions in patients undergoing elective coronary angioplasty or stenting.
Aims: To analyse patients with cardiac disease indicated for elective coronary catheterization: 1) Assess the incidence of acute/subacute SCI on brain magnetic resonance (MR) imaging; 2) Investigate factors influencing the frequency and type of microembolic signals (MES) detected using transcranial Doppler (TCD) in patients undergoing elective coronary intervention, and to correlate the frequency and type of MES with detection of new brain ischemic lesions using MR. Examine changes in cognitive function at 30 days post procedure in relation to pretreatment scores; 3) Test the clinical efficacy and safety of perioperative sonolysis in patients undergoing elective coronary catheterization.
Methods: 1) 144 patients were enrolled to the study. Brain MR was performed before cardiac intervention. The presence of acute and subacute SCI was evaluated, SCI volume was measured and risk factors associated with SCI were investigated. 2) 70 patients underwent bilateral TCD monitoring of middle cerebral arteries (MCAs). We investigated factors influencing the frequency and type of MES, and to correlate the frequency and type of MES with detection of new brain ischemic lesions using MR. 3) Patients were randomized to the sonolysis (n=70; underwent sonolysis of both MCAs) or control group (n=74). We tested the clinical efficacy and safety of perioperative sonolysis for reducing the risk of symptomatic and asymptomatic brain ischemic lesions detected on brain MR in patients undergoing elective coronary catheterization.
Neurologic examination, cognitive function tests, and brain MR were performed prior to intervention. Neurologic examination and brain MR were repeated at 24 hours after intervention and neurologic examination and cognitive tests were realized 30 days after coronary stenting.
Results: 1) Acute/subacute SCI were detected in 9 out of 144 (6,3%) on MR before cardiac intervention. History of stroke or TIA were associated with a higher risk of SCI (P=0,05) and higher volume of ischemic lesion (P=0,008). 2) Diabetes mellitus was associated with a higher frequency of total (P=0,011) and solid (P=0,012) MES counts contrary to atrial fibrillation which was associated with a significantly lower frequency of total MES (P=0,025), and solid MES counts (P=0,028). The number of treated coronary arteries (P=0,001), the number of stents implanted (P=0,0003), the volume of contrast agent (P=0,005), and duration of the procedure (P=0,01) were associated with a significantly higher frequency of both MES in bilateral middle cerebral arteries (MCAs) territories. New ischemic lesions on MR were detected in 18 patients (25,7%). All lesions were asymptomatic. The number and volume of ischemic lesions did not correlate with the frequency or type of MES. 3) No significant differences were observed in the number of patients with new infarcts (25,7 vs. 18,9%, P=0,423), the number of lesions (1,3 ± 1,0 vs. 2,9 ± 5,3, P=0,493), lesion volume (0,16 ± 0,34 vs. 0,28 ± 0,60 ml, P=0,143), and the number of patients with new ischemic lesions in the insonated MCAs territories (18,6 vs. 17,6%, P=0,958) between the sonolysis group and the control group. Clock-drawing test scores at 30 days were significantly higher in the sonolysis group than in the control group (median 3,0 vs. 2,5, P=0,031).
Conclusion: 1) Acute/subacute SCI was detected in 6,3% of patients indicated to elective coronary intervention. History of stroke or TIA were predictors of the presence of SCI and also its volume. No correlation between SCI and cognitive dysfunction was found. 2) Cardiac catheterization is associated with a high risk of cerebral embolism. The incidence of detected MES during elective coronary interventions was 94,3%. Coronary interventions led to silent

stroke in 25,7% of patients, but MES do not cause stroke during elective coronary procedures.
3) Sonolysis does not reduce the risk of new brain infarcts after coronary catheterization.