

# Changes of Asymmetry index in Brain Perfusion Before and After Extracranial-Intracranial Bypass Surgery in Cerebral Atherosclerotic Disease: A Predictor of Cerebral Silent Infarction.

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**Objective:** To assess the change of cerebral perfusion after extracranial-intracranial (EC-IC) bypass surgery in patients with cerebral atherosclerotic disease by means of Technetium Tc-99m Ethyl Cysteinate Dimer brain single photon emission computed tomography (Tc-99m ECD brain SPECT).

**Subjects and Method:** Thirteen patients (10men; median age 63.7 years, range 45-80; all symptomatic) undergoing EC-IC bypass surgery due to cerebral perfusion insufficiency refractory to aggressive medical therapy were included in this study. Digital subtraction angiography (DSA) and Tc-99m brain SPECT before and after the procedure of EC-IC bypass surgery were completed. The patency and filling degree of bypass graft were obtained from postoperative DSA. Asymmetry index (AI), a measure of the interhemispheric asymmetry in brain perfusion, was calculated as [counts in healthy hemisphere-counts in contralateral hemisphere/ counts in healthy hemisphere+counts in contralateral hemisphere] × 100%. Preoperative and postoperative brain magnetic resonance images (MRI) were compared to detect any evidence of new infarction after bypass surgery.

**Results:** There was no clinical ischemic event found in the follow-up period in all patients and the postoperative DSA proved that all the bypass graft were patent with excellent filling grade (Grade III: 11 patients, Grade II: 1 patient and Grade I: 1 patient). However, only nine out of thirteen patients got improved in cerebral perfusion with decreased asymmetry index in SPECT. Four patients with increased asymmetry index developed cerebral silent infarction. Three of them developed memory impairment or dementia. The change of asymmetry index ( $\Delta$ AI) appeared to correlate significantly with the cerebral silent infarction.

**Conclusions:** EC-IC bypass surgery in patients with cerebral insufficiency refractory to aggressive medical therapy can be a safe and effective treatment to prevent

recurrent stroke. Patent bypass graft with excellent filling grade was not equal to augmentative cerebral perfusion in brain SPECT. The change of asymmetry index in SPECT may be used as predictor of cerebral silent infarction which may be related to the memory impairment and dementia.

**Topic:**

- Spine Vascular Trauma Neurointensive Care Infection  
Peripheral Nerves Tumor Functional Skull Base  
Intraoperative monitoring & imaging Basic neuroscience Hydrocephalus  
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