

Three-dimensional display in staging hemodynamic brain ischemia for JET study: Objective evaluation using SEE analysis and 3D-SSP display

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The Japanese EC-IC bypass trial (JET study) was established to evaluate the validity of MCA-STA anastomosis in intracranial arterial occlusive disease aiming at stroke prevention. This study must use an objective method to reliably estimate hemodynamic brain ischemia. We devised a method of objectively classifying the severity of hemodynamic ischemia using quantitatively analytical and display software, stereotactic extraction estimation for stereotactic brain coordinates and three-dimensional stereotactic surface projections (3D-SSP). We analyzed data from 16 patients registered in the JET study. Our method offers quantitative information and 3-dimensional displays of the CBF at rest and after Diamox challenge, vascular reserve and the severity of the hemodynamic brain ischemia. We compared the maximal projection counts with ROI data from tomographic images in the anterior commissure-posterior commissure plane. The maximal counts data correlated closely with the ROI data of rest and with Diamox SPECT images (both $p < 0.0001$). The slopes of the linear regression line were 1.15 and 1.12, respectively. The results of this study indicated that our method could simply and objectively evaluate the severity of impaired brain circulation. This procedure should support the evaluation of hemodynamic ischemia in the JET study although validation is required by several institutions using more study subjects.

Key words: three-dimensional stereotactic surface projections, *N*-isopropyl-*p*-[I-123] iodoamphetamine, stereotactic extraction estimation, major arterial occlusive disease, EC-IC bypass