Carotid Occlusion Surgery Study

The Carotid Occlusion Surgery Study (COSS) was conducted to determine if superficial temporal artery-middle cerebral artery (STA-MCA) bypass, when added to the best medical therapy, would reduce subsequent ipsilateral stroke in patients with complete internal carotid artery (ICA) occlusion and an elevated oxygen extraction fraction (OEF) in the cerebral hemisphere distal to the occlusion. A recent publication documented the methodology of the COSS in detail and briefly outlined the major findings of the trial. The surgical results of the COSS are described in detail in this report.

METHODS: The COSS was a prospective, parallel-group, 1:1 randomized, open-label, blinded-adjudication treatment trial. Participants, who had angiographically demonstrated complete occlusion of the ICA causing either a transient ischemic attack or ischemic stroke within 120 days and hemodynamic cerebral ischemia indicated by an increased OEF measured by PET, were randomized to either surgical or medical treatment. One hundred ninety-five patients were randomized: 97 to the surgical group and 98 to the medical group. The surgical patients underwent an STA-MCA cortical branch anastomosis.

RESULTS: In the intention-to-treat analysis, the 2-year rates for the primary end point were 21% for the surgical group and 22.7% for the medical group ($p = 0.78$, log-rank test). Fourteen (15%) of the 93 patients who had undergone an arterial bypass had a primary end point ipsilateral hemispheric stroke in the 30-day postoperative period, 12 within 2 days after surgery. The STA-MCA arterial bypass patency rate was 98% at the 30-day postoperative visit and 96% at the last follow-up examination. The STA-MCA arterial bypass markedly improved, although it did not normalize, the level of elevated OEF in the symptomatic cerebral hemisphere. Five surgically treated and 1 nonsurgically treated patients in the surgical group had a primary end point ipsilateral hemispheric stroke after the 30-day postoperative period. No baseline characteristics or intraoperative variables revealed those who would experience a procedure-related stroke.

CONCLUSIONS: Despite excellent bypass graft patency and improved cerebral hemodynamics, STA-MCA anastomosis did not provide an overall benefit regarding ipsilateral 2-year stroke recurrence, mainly because of a much better than expected stroke recurrence rate (22.7%) in the medical group, but also because of a significant postoperative stroke rate (15%). Clinical trial registration no.: NCT00029146 [1)].

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Grubb RL Jr, Powers WJ, Clarke WR, Videen TO, Adams HP Jr, Derdeyn CP; Carotid Occlusion Surgery Study Investigators. Surgical results of the Carotid Occlusion Surgery Study. J Neurosurg. 2013 Jan;118(1):25-33. doi: 10.3171/2012.9.JNS12551. Epub 2012 Oct 26. PubMed PMID: 23101451; PubMed Central PMCID: PMC4246998.