Title: Extracranial to intracranial bypass surgery for atherosclerotic vessel occlusion with reduced reserve capacity and recurrent TIAs

Background: Controversy surrounds the application of flow augmentation bypasses for stenoocclusive atherosclerotic cerebrovascular disease, particularly following the divisive Carotid Occlusion Surgery Study (COSS) and CMOSS. The selection of patients who benefit from ECIC bypass and perioperative complications remain critical factors. For example the COSS trial showed very high complication rates and the recent trial (CMOSS) included much younger and clinically much stable patients yielding overall negative trial. Despite conflicting evidence, authors argue for the procedure's continued relevance, supported by reduced perioperative complication rates and a distinct contemporary patient cohort. This study contributes to the discourse by presenting our center's experience.

Methods: Data from our EC-IC bypass registry (2007-2024) was analyzed for patients with flow augmentation bypasses for steno-occlusive atherosclerotic cerebrovascular disease with reduced reserve capacity and recurrent TIAs.

Results: Results cover 98 procedures in 89 patients with a mean follow-up of 22 months. Internal carotid artery (ICA) occlusion was most prevalent (88.8%), often coexisting with stenosis in additional intracranial arteries (27.6%). Isolated middle cerebral artery (MCA) occlusion/stenosis and anterior cerebral artery (ACA) stenosis were rare. Symptomatically, 14.3% had single transient ischemic attacks (TIAs), 44.9% experienced multiple TIAs, 26.5% had recurrent strokes, and 14.3% had progressive strokes. Hemodynamic assessments preoperatively showed 62.2% unilateral and 37.8% bilateral impairment cerebrovascular reserve capacity, with cases of ICA stenosis and additional intracranial artery involvement more likely to exhibit bilateral impairment. Postoperatively, the bypass patency rate was 96.9% within 30 days. Perioperative complications including stroke occurred in 4.1% and long-term follow-up revealed a 97.5% bypass patency rate, with 3.7% symptomatic for recurrent TIAs.

Conclusion: Our data showthat flow augmentation bypass surgery is still beneficial in highly selected cases of progressive cerebrovascular disease under intensive medical management. Our center's experience supports the argument and underlines the currently much lower perioperative risk for patients with significantly reduced recurrent stroke.