



Cerebral Revascularization in the Endovascular era: Clinical indications, Surgical results and Outcomes at the Barrow Neurological Institute

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Learning Objectives

To determined and select candidates for cerebral revascularization procedures. To establish the current indications for cerebral revascularization in the endovascular era.

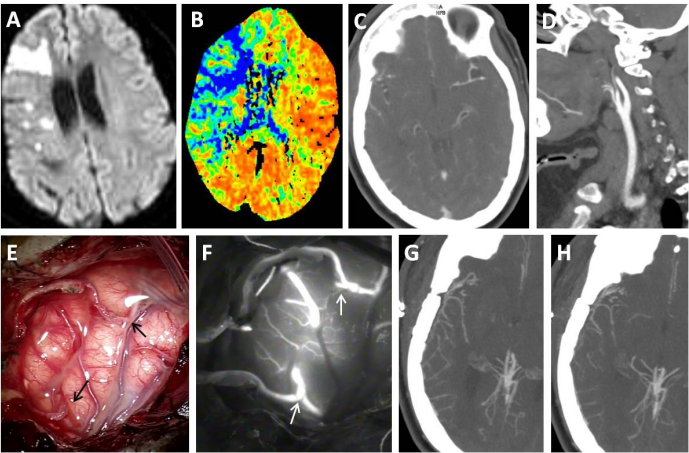
Introduction

There has been a progressive decline in the indications for cerebral revascularization over the past 30 years, particularly with the advance of endovascular techniques. The objective of our work was to define indications for and evaluate outcomes of patients treated with bypass surgery in the modern endovascular era.

Methods

We retrospectively reviewed the charts of all patients who underwent direct cerebral revascularization procedures between January 2006 and March 2013.

Figure 1. Moya-moya Revascularization

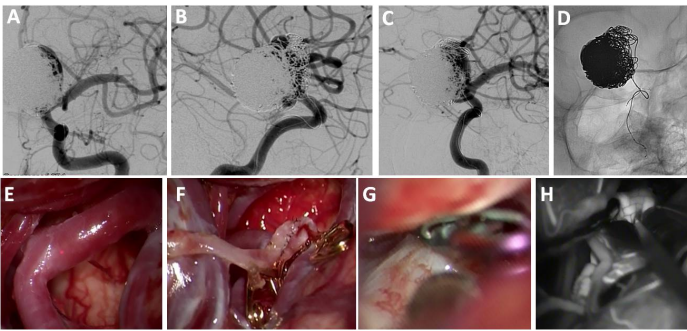


30 y/o female with Down's Syndrome with left hemiparesis. A. DWI MR showed right cerebral CVA's. B, CT perfusion with severe hypoperfusion. C and D, CTA head and neck showed severe intracranial right ICA stenosis and no ICA stenosis. E and F, intraoperative image of a double-barrel STA-MCA bypass (arrows) and intraoperative ICG demonstrating patency. At 1-month follow-up patient slightly improved left-sided weakness. G and H, CTA head with bypasses patent.

Results

A total of 225 bypass procedures were performed in 185 patients. From these 225 bypass procedures, 131 (121 patients) were direct microsurgical revascularization procedures. The indications for bypass surgery were moyamoya angiopathy (40 patients, 47 bypasses), complex aneurysms (54 patients, 56 bypasses), and occlusive vascular disease (27 patients, 28 bypasses). Revascularization resulted in improvement of symptoms in 77.5% of patients with moyamoya angiopathy (mean clinical followup 18.8 months) and 55.5% of patients with occlusive vascular disease (mean clinical followup 10.4 months). Among the aneurysm patients treated with revascularization, 81.5% had a favorable outcome (Glasgow Outcome Scale score 4-5) at long-term follow-up (mean clinical followup 18.5 months). Details of the indications, surgical results and clinical outcomes will be presentend.

Figure 2. Intracranial Aneurysms



54 y/o female with headaches and progressive right homonymous hemianopsia and a large recurrent pcom aneurysm. A-C, recurrent giant pcom aneurysm. D, coil protruding into the ICA from the last endovascular session. Recommendation was parent vessel occlusino and cerebral revascularization. E, middle cerebral artery recipient. F, STA-MCA bypass. G, clip at the intracranial ICA between the ophthalmic and the pcom arteries. H, intraoperative ICG demonstrating patency of the bypass with adequate filling of the intracranial ICA.

Conclusions

Although microvascular cerebral revascularization is no longer performed as commonly as in the past, it remains an essential part of the skill set required to treat select vascular pathologies. Complex aneurysms are the single largest indication for direct bypass procedures. Moyamoya disease is by far the largest indication if indirect bypass procedures are included in the analysis. In experienced hands, the morbidity and mortality of patients undergoing cerebral revascularization procedures are low and long-term outcomes generally excellent.

Figure 3. Intracranial Aneurysms



45 y/o female with a recurrent giant pcom aneurysm (A and B). Because the size and the complexity of the aneurysm, surgical clip ligation was considered challenging and not safe. The recommendation was parent artery occlusion and a cerebral revascularization procedure. Patient failed the balloon-test occlusion and a high-flow bypass was indicated. C-F, using a radial artery graft a high-flow bypass from the external carotid artery to the middle cerebral artery was performed. Observe the patency of the graft and adequate cerebral perfusion. There is no evidence of aneurysm filling.