



The Effect of Indirect Revascularization on the Treatment of Adult Moyamoya Disease

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Moyamoya disease is a progressive, occlusive disease of the supraclinoid segment of the internal carotid arteries associated with collateral vessel formation at the skull base. Direct and indirect revascularizations are commonly used for the treatment of moyamoya disease. Direct bypass provides immediate cerebral perfusion increment after surgery, but the extent of revascularization is smaller than combined revascularization and the long-term efficacy has not been shown to be superior to the indirect revascularization in children. However, the rates of periprocedural ischemia have ranged from 4–31%, and may be as high as 47.5%. The acute hemodynamic shift after direct or combines bypass may play a role in the development of infarction, especially in unstable moyamoya disease. Combined direct and indirect revascularization though provide larger extent of revascularization and better long-term outcome than direct bypass, the rate of perioperative complications caused by the necessity of large craniotomy needed to be considered. Indirect revascularization is simple and safe, but is not commonly used in adult moyamoya disease for its unreliable effect.

The Moyamoya Disease Team of NTUCH conducted a prospective study since Nov. 2013 to evaluate the effectiveness of indirect revascularization on adult moyamoya disease after refinement of the surgical techniques and perioperative cares. The clinical, cerebral angiographic and perfusion studies validate that indirect revascularization is effective and safe in the treatment of adult moyamoya disease. The improvement of perfusion status and angiographic collateral formation are similar to pediatric moyamoya patients, and the rate of postoperative complication though is 12.9%, most of them are mild and transient.

When direct bypass surgery is difficult or the hypoperfusion area is beyond the bypass territory, indirect revascularization can be an alternative treatment with acceptable results and low complication rate. Indirect revascularization can even be considered as one of the standard treatment of adult moyamoya disease.