



Results of Revascularization for Moyamoya Patients Presenting with Hemorrhage

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Introduction

Revascularization for moyamoya patients who present initially with hemorrhage may prevent recurrent hemorrhage and subsequent neurological decline, although there is less high-level evidence for this than the already well-known reductions in ischemic risk. Here we examine our institutional experience with revascularization for hemorrhagic moyamoya.

Methods

A database of all patients with angiographically-confirmed moyamoya at VUMC from 2005 to 2014 was screened for patients presenting with hemorrhage that received surgical revascularization. Demographics, clinical variables at presentation, surgical data, and clinical follow up were collected from the medical records for 9 patients. Angiographic result was assessed at >6 months post-operatively semi-qualitatively: good: >2/3 MCA territory, fair: 1/3-2/3 MCA territory, and poor: < 1/3 MCA territory. All statistics were reported descriptively.

Results

There were 9 patients (median age = 32 years [interquartile range (IQR): 25-38 years], 3M/6F) that presented with hemorrhage (intraparenchymal=7, intraventricular=3 [2 with extension from other source], subarachnoid=1). One patient had an associated aneurysm, which was clipped after hematoma evacuation. Two patients required an external ventricular drain. Bilateral disease was present in 6 (67%). Median time to first revascularization was 2 months (IQR: 0.55-2.7). Twelve revascularizations were performed: direct STA-MCA bypass=2, encephaloduroarteriosynangiosis (EDAS)=9 (bilateral surgeries in 3 patients), encephaloduroarteriomyosynangiosis (EDAMS)=1. Of 6 revascularizations with angiographic follow-up (median interval = 19.5 months, IQR: 13-26 months), results were as follows: good (1, 17%), fair (2, 33%), and poor (3, 50%). At a median follow up of 1.40 years (IQR: 0.64-2.91 years), there were no re-bleeds or new strokes; 7/9 (78%) were mRS 0-2, with no mortalities.

Conclusions

In this series there were no re-bleeds or new ischemic events in moyamoya patients presenting with hemorrhage who subsequently underwent revascularization. In addition to the well-evidenced protection from ischemic events, revascularization may also provide protection from recurrent hemorrhage in moyamoya.