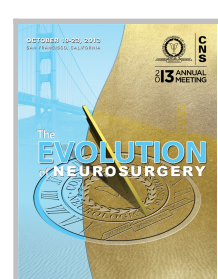


Differing Blood Flow Patterns in Patients With Transient Neurological Deficits After EC–IC Bypass—The Role of Local Hypoperfusion

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Introduction

Object: Hyperperfusion is generally believed to be the cause of transient neurological deficits in patients who have undergone an STA–MCA bypass for Moyamoya disease (MMD). Our objective was to evaluate this on the basis of cerebral blood flow data from thermal diffusion probes used at our center.

Methods

Methods: We studied the cerebral perfusion in 31 patients with MMD who underwent a direct STA–MCA bypass. A Hemedex Q500 flow probe (Hemedex, Inc, Cambridge, MA) with a Bowman cerebral perfusion monitor was placed in the frontal lobe adjacent to the bypass, and the postoperative flow data was analysed using JMP 8.0.2 (SAS Inc, Cary, NC). Seven patients experienced a transient neurological event (TNE) after the left-sided operation, manifesting as dysphasia around 24 hours and improving by 48 hours. Operative details and flow patterns were compared between the left side with TNE, left side with no TNE and the right side.

Results

Results: A detailed analysis of 64980 minute-by-minute flow observations shows that the initial post-bypass flow was higher on the left side where TNEs occurred, followed by a widely fluctuating pattern and a sharp drop in the perfusion corresponding with deficit ($p < 0.001$, mean difference of flow, t-test) when compared to the other groups where deficits were not observed. In the patients without TNE, the initial flow was not high and the flow pattern was quite stable (not fluctuant).

Conclusions

Conclusion: Based on our early observations we demonstrate a pattern of blood flow that suggests local hypoperfusion as the cause of the deficit in the setting of impaired autoregulation and a fluctuating blood flow. Competing flow from the native circulation could be a contributing cause. Further work should confirm these findings, keeping in mind this is not representative of global cerebral perfusion.

Learning Objectives

Understanding the causes of transient neurological events after EC-IC bypass

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