Preoperative DWI Lesions and Severe Cerebrovascular Steal are Independent Risk Factors for New Post-Operative DWI+ Lesions Following EC-IC Bypass for Moyamoya

Terry Burns MD PhD; Joshua J Loya BA; Gary K. Steinberg MD PhD

Introduction

EC-IC bypass remains the only treatment known to improve the natural history of Moyamoya disease. A small percentage of patients suffer post-operative infarcts, however, associated risk factors have not been well defined.

Methods

We reviewed all adult Moyamoya patients undergoing direct EC-IC bypass from January 2003-May 2010, for whom pre- and post-operative MRIs were electronically available. Preoperative images obtained within 1 week of surgery were scored for the presence of any DWI+ lesion. Preoperative Diamox SPECT results were scored by hemisphere as “no steal,” or “mild,” “moderate,” or “severe steal,” based on the reported degree of decreased perfusion after diamox. New post-operative DWI+ lesions 1cm or greater were correlated by Chi Squared with preoperative variables.

Results

252 patients undergoing 385 bypass procedures met inclusion criteria. Post-operative DWI+ lesions were identified following 38/385 surgeries (9.87%), a subset of which were symptomatic. Preoperative DWI+ lesions were noted in 13.1% and were associated with preoperative cerebrovascular steal ($p=0.0002$). Among patients with no preoperative DWI+ lesion, risk of a new post-operative DWI+ lesion was low for those in the No steal and mild steal categories (2.2%, and 3.0%, respectively), slightly higher with moderate steal 5.8% ($p=0.07$) and significantly higher with severe steal 16.7% ($p<0.0001$). The risk of a new post-operative DWI+ lesion in each “steal” category was significantly higher for those harboring a DWI+ lesion prior surgery—no steal: 32.0% ($p<0.0001$); mild steal: 23.1% ($p<0.0001$), moderate steal: 38.5% ($p<00001$); and severe steal 55.6% ($p<0.0002$). Cerebrovascular reserve scores improved by 6 months postoperatively ($p<0.0001$) consistent with decreased risk of subsequent infarcts.

Conclusions

We here demonstrate that severe cerebrovascular steal, and pre-operative DWI+ lesions are independent risk factors for new postoperative DWI+ lesions in Moyamoya patients undergoing EC-IC bypass. It remains unknown if delaying surgery for patients with recent infarcts could improve outcomes, or if such patients would incur additional DWI+ lesions prior to delayed surgery.

Learning Objectives

By the conclusion of this session, participants should be able to 1) Describe diamox-induced cerebrovascular steal as a risk factor for both preoperative and postoperative DWI+ lesions; 2) Describe the association between acute pre-operative infarcts and increased risk of post-operative DWI+ lesions in Moyamoya patients undergoing EC-IC bypass

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