

Quantitative Xenon CT Helps Identify Moyamoya Patients at Risk for Major Ischemic Stroke After EC-IC Bypass

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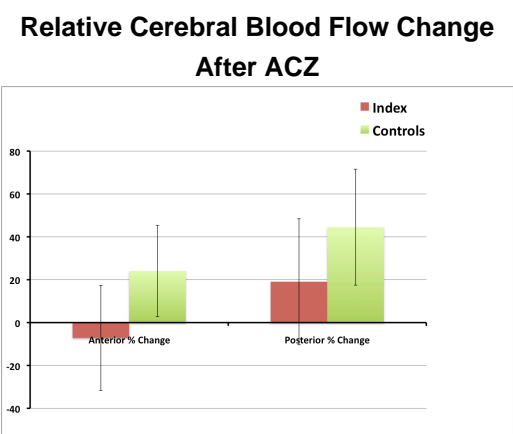
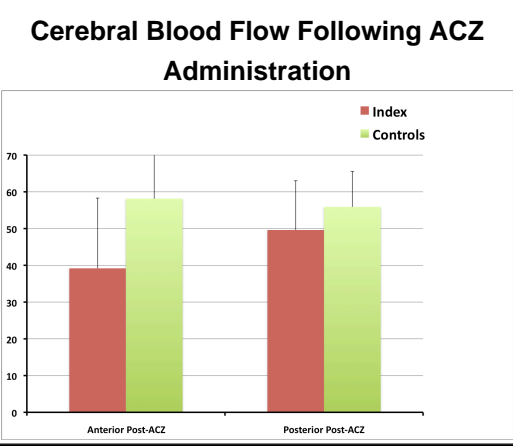
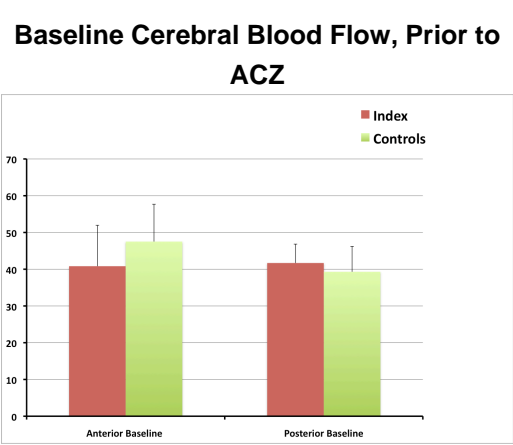


Introduction
Extracranial to Intracranial (EC-IC) bypass may minimize long-term stroke risk in patients with Moyamoya. However, peri-operative stroke is a potential complication. We sought to evaluate whether or not pre-operative vascular reserve, as measured via Xenon-CT may correlate with the incidence of major post-operative stroke.

Methods
MRIs from all adult (18+) Moyamoya patients treated at our institution via a superficial temporal artery (STA) to Middle Cerebral Artery (MCA) branch anastomosis from 2003 to 2010 were reviewed (n=428). Symptomatic patients with large post-operative infarcts and available pre-operative xenon CT imaging (n=6) were compared to a representative cohort of asymptomatic patients with normal post-operative MRIs. Cerebral blood flow (CBF, cc/100, calculated using Kety-Schmidt model during 6 min study) pre-and post 1g IV acetazolamide (ACZ) was measured, based on four 10mm slices to calculate % augmentation.



Results:
Six eligible patients (age 44+/-15) sustained infarcts following 9 STA-MCA bypasses. Collectively, 8 new infarcts occurred 0-3 days after surgery. Two were associated with small intraparenchymal hemorrhages, one intraoperatively, and one post-operatively. Anterior circulation CBF in affected hemispheres was 35.2+/-5.0 pre-, and 29.7+/-8.1 post-ACZ, representing augmentation of -15.2+/-25%, or -24.5+/-17.5% if hemorrhage cases are excluded. These negative augmentation values represent net vascular steal. Of note, 5 of 6 patients had diffusion changes on pre-op scans.



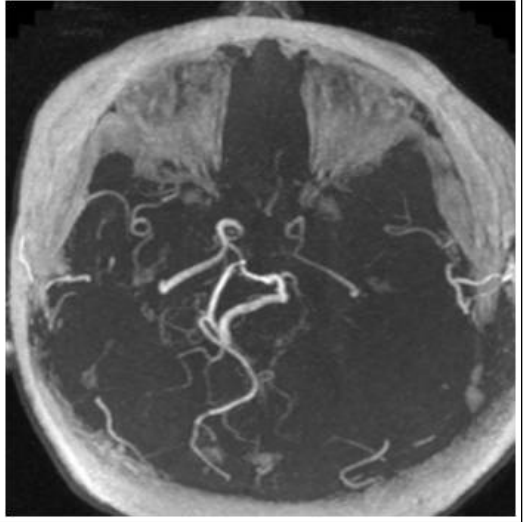
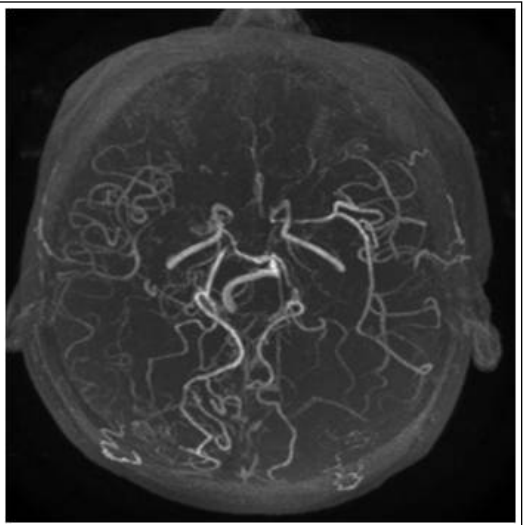
Patients developing post-op infarcts demonstrated decreased anterior CBF after ACZ, ie, net vascular "steal"

Results (cont)
Twenty-six control patients (age 38+/-19) underwent 37 STA-MCA bypasses. Anterior circulation CBF in affected hemispheres was 45.2+/-9.3 pre-, and 53.4+/-10.3 post-ACZ, representing 20.4+/-22.1% augmentation (p<0.001). No control patients had diffusion changes on pre=operative MRIs. Angiography after stroke revealed increased vascular stenosis or occlusion (see MRA in case below). All grafts remained patent. With exception of blood pressure which was higher in the patients who sustained infarcts consistent with their more advanced cerebro-occlusive disease, no other measured parameters were significantly different between groups.

Case: 47F with moyamoya

Decreased perfusion in the bifrontal and left parietal regions following ACZ (lower), compared to baseline (upper).

Small Left DWI lesion preop (upper). Post-operative L MCA infarct (lower).



Compared to preop MRA (upper), post-op MRA demonstrated interval Left ICA occlusion (lower).

Conclusions
Quantitative Xenon-CT may provide a useful method to identify patients at higher risk for post-operative infarcts after EC-IC bypass for Moyamoya. Additionally in our series, preoperative diffusion lesions were frequently present in patients who developed post-operative infarcts.