

PREDICTING CEREBROVASCULAR RESERVE IN ADULT MOYAMOYA ANGIOPATHY

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Background

Moyamoya angiopathy (MMA) is a chronic condition characterised by progressive stenosis of the supraclinoid internal carotid artery (ICA).

‘Moyamoya’ is Japanese for ‘puff of smoke’ and describes the appearance of tiny collateral vessel formation to compensate for narrow ICAs (1,2).

Cerebrovascular reserve (CVR) is the body’s capacity to increase cerebral perfusion from baseline after a vasoactive stimulus (7)

Updated guidance on management of MMA recommends estimation of CVR to guide decision making around revascularisation surgery (REF).

CVR can be measured using flow sensitive techniques such as PET, MRI, CT or transcranial doppler to measure cerebral blood flow before and after a vasodilatory stimulus.

Aims

- At our centre CVR is assessed using CT perfusion with Acetazolamide challenge
- We assessed if cerebrovascular reserve measured by CT perfusion scanning correlated with demographics, vascular risk factors and ongoing symptoms at time of scanning

Methods

We retrospectively reviewed records of patients diagnosed with MMA at a tertiary neurology centre in the Northwest of England who had CT perfusion scans between December 2014-2022.

Inclusion criteria was age >16 years, confirmed MMA diagnosed by a consultant neuroradiologist.

CVR was rated good, average or poor according to CT perfusion scans pre and post acetazolamide challenge.

Demographics such as age, gender, ethnicity, co-morbidity, and cardiovascular risk factors were collected

Incidence of these were looked at in relation to CVR

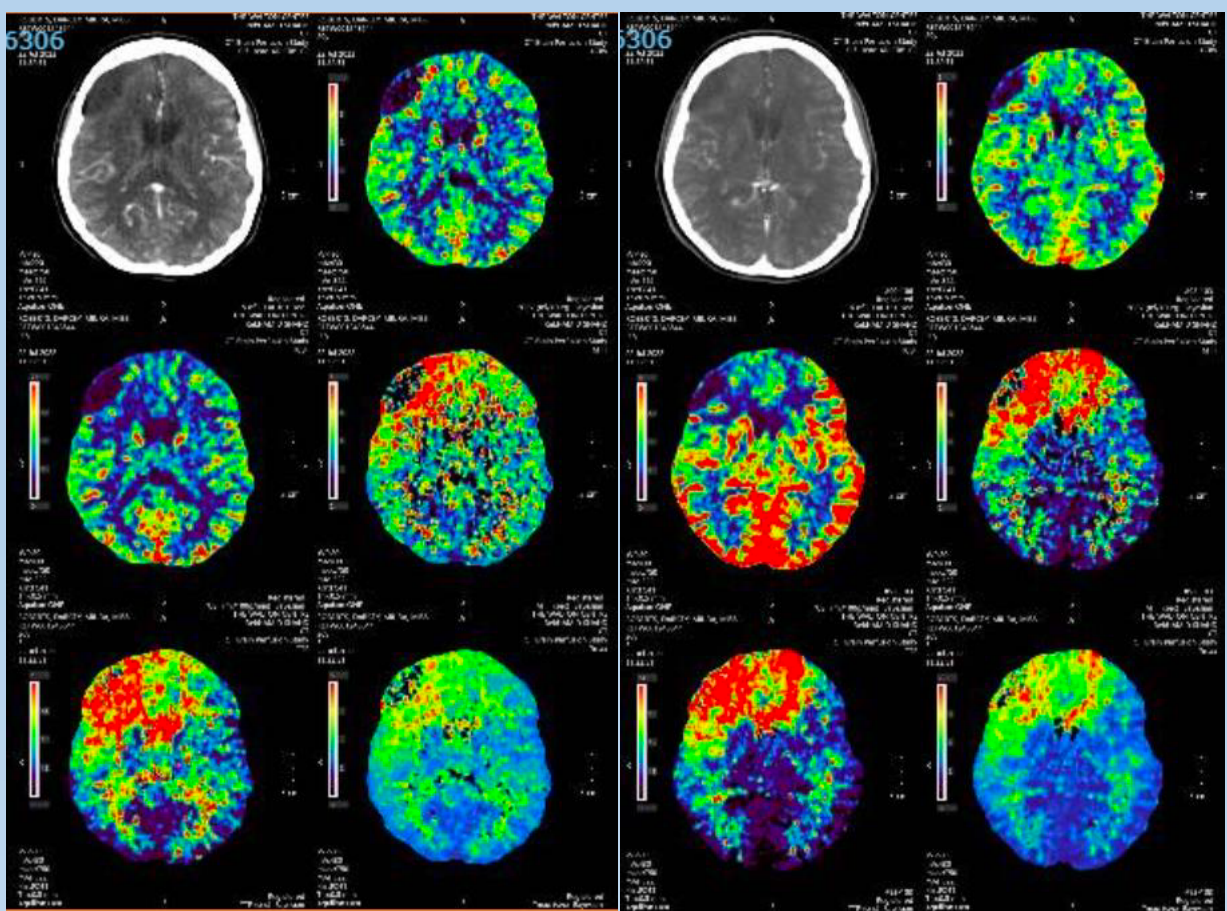


Figure 1: CT Brain perfusion study pre (left) and post (right) acetazolamide. Overall, there is relative decrease in cerebrovascular reserve within the right hemisphere. The worst area of cerebrovascular reserve appears to be around the right frontal lobe infarct, suggesting possibility of further infarct. Relatively normal cerebrovascular reserve in the left hemisphere.

Results

Cerebrovascular Reserve according to CT perfusion scanning



16 patients totalling 29 scans were identified (male=9, female =7). Regarding ethnicity, the majority were White British (13/16) and 3 were Asian.

Mean age at time of diagnosis was 37.5 years (SD=8.1) and CTP was 38.7 years (SD=8.7)

	Cerebrovascular Reserve		
	Good (n=16)	Average (n=4)	Poor (n=9)
Diabetes	75%	13%	13%
TIA	41%	18%	41%
Ischaemic Stroke	44%	19%	38%
Haemorrhagic Stroke	56%	11%	33%
CVA in last 6 months	38%	38%	25%
Seizures	60%	20%	20%
Migraine	71%	7%	21%
Ongoing clinical events related to MMA*	53%	13%	47%

Table 1: Percentages of patients displaying history of co-morbidities related to MMA, displayed in relation to CVR. *Ongoing clinical events related to MMA at time of scan (migraine, TIA, CVA or seizures).

CVR was rated good in 16, average in 4 and poor in 9 scans.
75% of those rated good CVR had diabetes verses 13% rated poor.
56% of those rated good CVR had history of haemorrhagic stroke verses 33% rated poor.
60% of patients rated good experienced seizures verses 20% of those rated poor CVR.
71% of those rated good CVR experienced migraines compared to 21% rated poor.
Roughly equal numbers reported recurrent symptoms of those with good (53%) and poor CVR (47%)

Conclusion

- Our study did not find a greater proportion of co-morbidities or ongoing clinical events at time of scan in patients with poor CVR.
- Three patients with poor CVR had no ongoing clinical events at the time of scan. This suggests that presence of recent clinical events should not be used as the sole determining factor when considering if CT perfusion scanning is indicated.