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DOI: 10.1159/000368886**TIA and Minor Stroke Patients with Intracranial Occlusions in Both Proximal and Distal Vessels Are Most at Risk for Symptom Progression**Veronique Dubuc^{a, b}, Dilip Singh^{a, b}, Jayesh Modi^c,
Mayank Goyal^{a, c, f}, Michael D. Hill^{a–f}, Shelagh B. Coutts^{a–c, f}^aCalgary Stroke Program, Departments of ^bClinical Neurosciences, ^cRadiology, ^dMedicine and ^eCommunity Health Sciences, and ^fHotchkiss Brain Institute, University of Calgary, Calgary, Alta., Canada

Patients affected by TIA and minor stroke are at a high risk of recurrent events, symptom progression, and disability, especially if an intracranial occlusion is documented on a CT-angiogram (CTA) [1, 2]. Despite a risk of poor outcome, these patients are often excluded from thrombolysis treatment because of mild or improving symptoms [3]. Recurrent events are phenomenologically either distinct recurrent strokes or symptomatic progression of the presenting event [4]. Unlike in major stroke, where proximal occlusion is an independent predictor [5], it remains unclear whether the exact site of vessel occlusion influences outcome in TIA and minor stroke patients [6]. Our aim was to explore the relationship between the location of intracranial occlusion and stroke progression in this population.

The CATCH study [2] prospectively enrolled consecutive patients with minor stroke (NIHSS <4) and high-risk TIA (motor or speech impairment ≥5 min). Patients were excluded if they had pre-morbid mRS >1 or were treated with thrombolysis for this event. All patients had a brain CT and CTA of neck and circle of Willis within 24 h of symptom onset. A neuroradiologist identified the site of vessel occlusion. Stroke progression was defined as clinical worsening referable to the same arterial territory as the baseline symptoms without any imaging evidence of a new infarct separate from the baseline imaging [4]. Experienced stroke neurologists assessed the outcomes within 24 h of the index event. The relationship between vessel occlusion site and stroke progression was explored. If a patient had more than one intracranial occlusion, the most proximal site was used for analysis. Fisher's exact test was used to compare proportions, and interpreted with a Bonferroni correction for multiple comparisons. For each individual comparison, patients with other sites of intracranial occlusion were removed from the analysis.

510 patients were enrolled. Intracranial occlusion was observed in 10% (52/510) of patients. Overall, stroke progression occurred in 4% (19/510) and was more likely to occur in the pres-

ence of an intracranial occlusion (RR 9.6, 95% CI 4–22). Sites of occlusion were as follows: intracranial internal carotid artery (ICA) 12/52 (23%), middle cerebral artery (MCA) 31/52 (60%; MCA-M1 7/52; MCA-M2 15/52; MCA-M3 9/52), posterior cerebral artery (PCA) 5/52 (10%; PCA-P1 3/52, PCA-P2 2/52), and basilar artery (BA) 2/52 (4%). Detailed sites of occlusion and progression rates are shown in table 1. Our analysis was limited due to the small number of patients in each group, but neurological worsening was seen in patients with both proximal and distal vessel occlusions.

In this retrospective sub-study of the CATCH study [2], we did not find any clear pattern in the site of vessel occlusion and risk of stroke progression. This finding leads us to suggest that studies using intracranial occlusion as an entry criterion in a TIA and minor stroke population should not exclude patients based simply on occlusion location. Finally, this study did not allow us to determine the mechanism explaining neurological deterioration, although we suspect that hemodynamic fluctuations [7] or support by the collateral circulation play a determinant role. Future studies could further analyze the relationship between site of occlusion, collateral circulation, and symptom progression.

Table 1. Relationship between different intracranial occlusion sites and rates of symptom progression. For each intracranial occlusion location site the risk of progression or not is shown. For each comparison all other occlusion sites were excluded from the analysis

Occlusion site	Progression, % (n/N)	No progression, % (n/N)*	p value with Bonferroni correction
Intracranial ICA	10 (1/10)	2 (11/449)	0.23
MCA-M1	10 (1/10)	1 (6/444)	0.15
MCA-M2	25 (3/12)	3 (12/450)	0.005*
MCA-M3	10 (1/10)	2 (8/446)	0.18
PCA-P1	18 (2/11)	0.2 (1/439)	0.0016*
PCA-P2	0 (0/9)	0.5 (2/440)	1
ACA	10 (1/10)	0.2 (1/439)	0.044
BA	10 (1/10)	0.2 (1/439)	0.044

ICA = Intracranial internal carotid artery; MCA = middle cerebral artery; PCA = posterior cerebral artery; BA = basilar artery.

The presence of an intracranial occlusion at any site increased the risk of progression (RR 9.6, 95% CI 4–22, $p < 0.0001$).

p value for statistical significance with Bonferroni correction is <0.00625 (0.05/8).

References

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