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The Relationship Between Brain Injury and Behavioural Consequences of Thalamic Stroke

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Statement of Originality

The thesis contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. I give consent to the final version of my thesis being made available worldwide when deposited in the University’s Digital Repository**, subject to the provisions of the Copyright Act 1968.

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I hereby certify that the work embodied in this thesis contains a published paper/s/scholarly work of which I am a joint author. I have included as part of the thesis a written statement, endorsed by my supervisor, attesting to my contribution to the joint publication/s/scholarly work.

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Abstract

Scope

Stroke is a leading cause of death and disability in Australia and indeed the world. Research has consistently demonstrated that factors such as high cholesterol, hypertension, smoking, obesity, and diabetes increase the risk of stroke. These factors can also play a role in mortality and recovery from stroke.

Some recent studies have also begun investigating anatomical factors, and their role in stroke. Anatomical variances in major circulation pathways such as the circle of Willis have been linked with higher disability rates in stroke. Similarly, larger basilar artery measurements have been linked with poorer stroke outcomes.

Stroke generally leads to motor, cognitive and behavioural impairments. The motor and physical results of stroke are well reported and treated. However, post-stroke cognitive and behaviour changes receive much less attention in the literature. Furthermore, outcomes of cognitive and behavioural focused rehabilitation are sparsely reported.

Strokes affecting the thalamus have been given some attention in the literature due to their varied and extensive outcomes. Different outcomes have been reported based on both the specific location of the stroke lesion and the size or volume of the lesion. However, as with general stroke research, the outcomes investigated and reported are generally motor and physical changes. There is only minimal research into the cognitive and behavioural outcomes of thalamic stroke.

Purpose

This study aims to identify susceptibility factors in thalamic stroke including well-known risk factors and more newly identified factors such as anatomical variations. Furthermore, this study aims to examine outcomes in thalamic stroke, with a more detailed focus on cognitive and behavioural outcomes. It is hoped that this information may provide direction for rehabilitation and treatment in the future.
**Methods**

Ten patients with thalamic stroke were identified from the John Hunter Hospital Stroke Unit admission records. These patients participated in a demographic and behavioural data gathering interview. Nine of the 10 patients then completed the Audio Recorded Cognitive Screen (ARCS) to gain meaningful neuropsychological data. MRI scans for all 10 patients were examined to determine localisation and size of the lesion, as well as basilar artery size and anatomical variances in the circle of Willis.

**Results**

Consistent with previous data, risk factors such as high cholesterol, high blood pressure, and pre-existing heart conditions were identified in this small sample. In contrast to well-known risk factors, no participants reported being smokers prior to their stroke.

Circle of Willis variations were found in six of the 10 participants. Patient MRIs indicated that the posterior communication artery (PCOM) was absent or failed to join the posterior cerebral artery (PCA) in these six cases. However, basilar artery measurements were found to be no larger than would be expected in the general population.

Participants and their carers (where applicable) reported post-stroke changes such as decreased coordination, reduced mobility, poor balance, reduced energy, memory deficits, and mood changes. Participants’ overall scaled scores on the ARCS were significantly lower than same age peers.

More specifically, performance on the ARCS domains of memory, fluency, language and attention were all significantly below age norms. Interestingly, only three of the participants recalled having any form of psychological or neuropsychological interventions post-stroke.

**Conclusions**

The findings of this study are primarily consistent with previous research. However, the study’s very small sample size limits the significance and applicability of these findings. The risk factors identified in this study were primarily consistent with those previously identified in the literature. In addition to these, it is possible that variations in the circle of Willis may be an indicator of thalamic stroke susceptibility.
This study has identified cognitive deficits in areas such as memory and attention. Whilst this is consistent with previously reported observations, the present study has been able to provide more detailed cognitive data and age norm comparisons. Several participants also reported mood changes following their stroke. These cognitive and mood changes warrant investigation into the benefits of psychological and neuropsychological rehabilitation in thalamic stroke.