

## Thalamic semantic paralexia

Michael Hoffmann

Department of Neurology, Stroke Center,  
James A. Haley VA Hospital, Tampa and  
University of Central Florida, Orlando,  
FL, USA

### Abstract

Alexia may be divided into different subtypes, with semantic paralexia being particularly rare. A 57 year old woman with a discreet left thalamic stroke and semantic paralexia is described. Language evaluation with the Boston Diagnostic Aphasia Battery confirmed the semantic paralexia (deep alexia). Multimodality magnetic resonance imaging brain scanning excluded other cerebral lesions. A good recovery ensued.

### Introduction

The acquired alexias may be categorized into posterior, anterior, central and deep alexias.<sup>1</sup> Analogous to semantic paraphasias, semantic paralexias constitute the substitution of content related words during reading. Unlike the analogous subcortical aphasias such as thalamic aphasia, subcortical syndromes of alexia have rarely been described.<sup>2-5</sup> This report depicts a patient with thalamic alexia with features of deep alexia (or paralexia), the latter which has not been described after review of the English based literature.

### Case Report

#### Index patient

A 57 year old white, right handed, English speaking woman with 13 years of education, presented to our stroke center with mild right sided numbness and weakness (graded +4/5 Medical Research Council grading scale) with the family reporting transient confused conversation and speech difficulty. The clinical evaluation at our center encompasses a cognitive screening evaluation in all patients followed by psychometric assessment in selected patients described in detail elsewhere.<sup>6</sup> No dysnomia was documented. Specifically visual acuity and visual fields were normal and there was no object agnosia, dyschromatopsia, dyscalculia, finger agnosia, right left disorientation, or hemineglect syndrome. The substitution of semantically related words was docu-

mented with only mild slowing in her reading (family corroboration). Cerebrovascular risk factors included a significant smoking history and on investigation hyperhomocysteinemia (15.6 mmol/L). Within 4 days, the reading difficulty had normalized but she remained with mild speech dysfluency, right hand ideomotor apraxia and developed a Dejerine Roussey or post stroke thalamic pain syndrome.

### Neuroimaging

Multimodality magnetic resonance imaging Investigations revealed a left lateral posterior thalamic infarct, well circumscribed on T2 weighted and diffusion weighted imaging without other brain parenchymal lesion (Figure 1). Magnetic resonance angiography revealed a left internal carotid artery stenosis graded 50-74% and basilar artery fenestration.

### Cognitive testing

In view of the isolated reading impairment, additional psychometric examination was performed on day 3 after the stroke onset, with The Boston Diagnostic Aphasia Examination (Third Edition - short form).<sup>7</sup> In addition, the test for semantic paralexia prone words were tested with the standard version of the Boston Diagnostic Aphasia Examination (version III) (Table 1). In comparison to normative data, notable deficiencies were noted only in speech fluency, articulation, oral word and sentence reading, picture word matching and writing.

### Discussion

The commonly referred to syndromic classification of Benson and Geschwind of posterior alexia (alexia without agraphia), central alexia (alexia with agraphia), anterior alexia (alexia in association with expressive dysphasia) and deep dyslexia (primarily semantic paralexia disorder) aptly describes most acquired reading deficiencies.<sup>1</sup> Alexia secondary to isolated thalamic lesion has not been reported other than in combination with left occipital lesions, the latter lesions the usual focus.<sup>8,9</sup> Semantic paralexia due to thalamic lesions has not been reported previously with neuroanatomical lesions mostly referred to as large perisylvian<sup>10-12</sup> and even right hemisphere lesions implicated.<sup>13</sup> Similar to subcortical aphasias, the subcortical (thalamic) alexia reported here is characterized by atypical alexia syndrome components. These include relatively mild deficit, transience, a mixture of syndromic components with rapid recovery.<sup>1</sup> The lack of hemispheric lesions on magnetic resonance imaging using standard T2 weighted images diffusion weighted imaging for infarct exclusion, fluid attenuation inversion

Correspondence: Michael Hoffmann, Stroke Center, James A. Haley VA Hospital, 13000 Bruce B Downs Blvd, Tampa, FL, 33612, USA.  
Tel. +1.813.9722000-7633 - Fax: +1.813.9785995.  
E-mail: michael.hoffmann1@va.gov

Key words: thalamic stroke, paralexia.

Received for publication: 19 August 2011.

Revision received: 15 February 2012.

Accepted for publication: 23 February 2012.

This work is licensed under a Creative Commons Attribution NonCommercial 3.0 License (CC BY-NC 3.0).

©Copyright M. Hoffmann, 2012  
Licensee PAGEPress, Italy  
Neurology International 2012; 4:e6  
doi:10.4081/ni.2012.e6

recovery sequences for covert white matter lesions and gradient echo sequences to exclude minor hemorrhagic lesions, implicated the thalamic lesion alone as the critical lesion in the syndrome described. Although not a routine stroke investigative tool, functional magnetic imaging (f-MRI) would have been an important additional neuroimaging modality to

**Table 1. Boston diagnostic aphasia test - version III.**

Subtests	%
Fluency	
Phrase length	30
Melodic line	60
Grammatical form	70
Conversation expository speech	100
Auditory comprehension	
Basic word discrimination	100
Commands	100
Complex ideational material	100
Articulation (agility)	70
Recitation (automatized sequences)	100
Repetition	
Words	60
Sentences	100
Naming	
Responsive naming	100
Boston naming test	100
Special categories	100
Paraphasia	100
Reading	
Matching case and scripts	100
Number matching	100
Picture word matching	40
Oral word reading	40
Oral sentence reading	80
Oral sentence comprehension	100
Sentence/paragraph	100
Comprehension	100
Writing	
Form	20
Letter choice	40
Motor facility	40

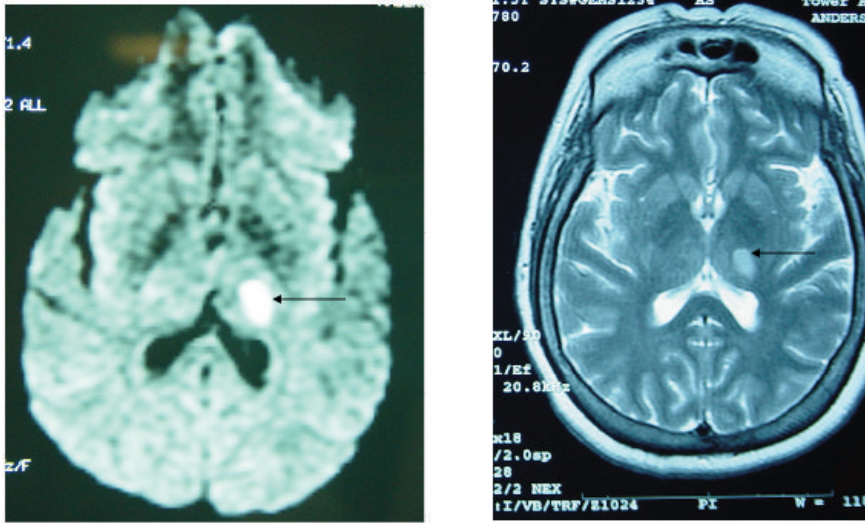


Figure 1. Left thalamic infarct depicted on diffusion weighted and T2 weighted magnetic resonance scan (arrows).

assess whether the right hemisphere had or had not played a role. However, the rapidity of recovery precluded functional magnetic imaging, that may have helped ascertain whether right hemisphere linguistic processing was operative, the contemporary hypothesis of semantic paralexia.<sup>14</sup>

## References

1. Benson DF, Geschwind N. Aphasia and related disorders: a clinical approach. In: Mesulam MM. Behavioral Neurology.

Philadelphia: FA Davis Company; 1983. pp 193-238.

2. Tamhankar MA, Coslett HB, Fisher MJ, et al. Alexia without agraphia following biopsy of a left thalamic tumor. *Pediatr Neurol* 2004;30:140-2.
3. Maeshima S, Osawa A, Sujino K, et al. Pure alexia caused by separate lesions of the splenium and optic radiation. *J Neurol* 2011;258:223-6.
4. Crosson B. Subcortical mechanisms in language: lexical-semantic mechanisms and the thalamus. *Brain Cogn* 1999;40:414-38.
5. Stommel EW, Friedman RJ, Reeves AG.

Alexia without agraphia associated with spleniogeniculate infarction. *Neurology* 1991;41:587-8.

6. Hoffmann M. Higher cortical function deficits after stroke: an analysis of 1000 patients from a dedicated cognitive stroke registry. *Neurorehabil Neural Repair* 2001;15:113-27.
7. Goodglass H, Kaplan E, Barresi B. Boston diagnostic aphasia examination (third edition). Philadelphia: Lipincott Williams and Wilkins; 2001.
8. Michel F, Schott M, Boucher M, Kopp N. Anatomical and clinical correlations in a case of alexia without agraphia. *Rev Neurol* 1979;135:347-64.
9. Araki S, Kawamura M, Isono O, et al. Reading and writing in cases of Localized infarction of the left anterior thalamus. *No To Shinkei* 1990;42:65-72.
10. Marin OSM. CAT scans of five deep dyslexic patients. In: Coltheart M, Patterson K, Marshall JC. *Deep Dyslexia*. London: Routledge and Kegan Paul; 1980. pp 407-411.
11. Marshall JC, Newcombe F. Synctatic and semantic errors in paralexia. *Neuropsychologia* 1966;4:169-76.
12. Marshall JC, Newcombe F. Patterns of paralexia - a psycholinguistic approach. *J Psychol Res* 1973;2:175-99.
13. Henderson VW, Alexander MP, Naeser MA. Right thalamic injury, impaired visuospatial perception and alexia. *Neurology* 1982;32:235-40.
14. Goodglass H, Lindfield KC, Alexander MP. Semantic capacities of the right hemisphere as seen in two cases of pure word blindness. *J Psycholinguist Res* 2000;29:399-422.