Stroke neuroimaging: some language deficit cases with clinico-radiological correlations

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Learning objectives

• To revise basic neuro-anatomy
• To compare normal and abnormal scans with particular reference to stroke pathology
• To be able to relate the imaging report to the scan
• To understand the medical interpretation of scans and the implications for management
• To develop a level of knowledge to be able to understand current research in the area of language processing
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# A classification of the aphasias

<table>
<thead>
<tr>
<th></th>
<th>Production</th>
<th>Comprehension</th>
<th>Repetition</th>
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</thead>
<tbody>
<tr>
<td><strong>Perisylvian aphasias</strong></td>
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<tr>
<td>Broca</td>
<td>Non-fluent</td>
<td>+</td>
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<tr>
<td>Global</td>
<td>Non-fluent</td>
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<tr>
<td>Wernicke</td>
<td>Fluent</td>
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<tr>
<td>Conduction</td>
<td>Fluent</td>
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<td>-</td>
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<tr>
<td><strong>Extrasylvian aphasias</strong></td>
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<tr>
<td>Transcortical motor</td>
<td>Non-fluent</td>
<td>+</td>
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<tr>
<td>Transcortical sensory</td>
<td>Fluent</td>
<td>-</td>
<td>+</td>
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<tr>
<td>Mixed transcortical</td>
<td>Non-fluent</td>
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<td>+</td>
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<tr>
<td>Anomic</td>
<td>Fluent</td>
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</tbody>
</table>
Broca’s aphasia

- Non-fluent language production
- Impaired morphology eg omissions, word-finding difficulty, substitutions
- Relatively preserved comprehension
Global aphasia

- Most severe aphasic syndrome
- Reduced, severely non-fluent speech
- Profound impairment of language comprehension
Wernicke’s aphasia

- Fluent language production marred by phonological and lexical errors
- Auditory comprehension severely affected
Conduction aphasia

• Disproportionate impairment of repetition
• Relatively preserved auditory comprehension
• Fluent production with mostly phonological errors
Transcortical aphasia

• Preservation of repetition in contrast to severe impairment of other aspects of language performance
Anomic aphasia

- Severe disorder of word finding in context of fluent speech, good repetition, and preserved comprehension
Subcortical aphasia

- Patients with stroke apparently sparing left hemisphere cortex
- Thalamus, basal ganglia, neighbouring white matter tracts
- Heterogeneous – clinical features & recovery
- Participation of subcortical nuclei?
- Functional impairment of cortex?
- Disconnection syndrome?
Acute aphasia

- Classical modality for study of vascular aphasia – stable patients, examined several weeks after stroke
- Acute stroke assessment now within first few hours, with acute imaging
- Immediate clinico-radiological correlations
Cases

- a typical story
- cerebral infarct due to AF
- word soup?
- facebook dysphasia
- lost for words
a typical story

- 78 year old lady
- mixed / global dysphasia
- expressive > receptive
a typical story

- acute left perisylvian infarct eloquent for dysphasia
- evidence of further left acute posterior middle cerebral artery territory / MCA-PCA borderzone infarct
cerebral infarct due to AF

- 73 year old right handed gentleman
- abrupt onset right facial weakness
- expressive dysphasia
- known atrial fibrillation but switched from warfarin to aspirin shortly before stroke
- O/E mild right upper motor neurone facial paresis (widening of right palpebral fissure, blunting of right nasolabial fold)
cerebral infarct due to AF

- left perisylvian hypoattenuation consistent with restricted left middle cerebral artery territory infarct (partial anterior circulation infarct)
- consistent with clinical ‘perisylvian aphasia’ – typical Broca aphasia
word soup?

- 63-year-old right handed man
- In supermarket, midday, lightheaded and clammy. Said to appear pale.
- ‘Leek and potato soup’ indistinct, mumbled.
- Recollects knowing what he wanted to say, having intact comprehension, but struggled to get these words out.
Accompanied by ‘thick feeling’ of left side of lips and over lower jaw

After an interval of no more than 10 seconds, when he next spoke, speech was normal

Initial impression when assessed in emergency TIA clinic 5 days after onset of symptoms – probable pre-syncopal event

But diagnostic uncertainty prompted same-day MRI brain + DWI imaging
word soup?

- remains unclear
- dysphasia?
  - apparent word production difficulty but right hemisphere lesion, in unexpected location
- dysarthria?
  - perhaps impaired articulation associated with somatosensory disturbance
• 19 year old (check) young man played football, later whilst on Facebook
  – Abrupt vertigo
  – Fell 2-3 times attempting to walk
  – Preferring to use left hand, suggesting right sided weakness
  – Dysphasic – ‘mumbling’, ‘words without meaning being produced’, ‘random words out of context’
facebook dysphasia

- Four days previously had been involved in fight whilst intoxicated, received head butt, struck on bridge of nose
- Immediate plain CT brain and CT angiogram normal, some 4.5 hours from onset of symptoms
- Fluctuating initial clinical course reported
- Subsequent MRI brain scan showed isolated acute left paramedian thalamic infarct
facebook dysphasia

- example of subcortical dysphasia due to thalamic infarction
- resembles syndrome of unilateral tuberothalamic artery infarction (which includes dysphasia, mild hemiparesis)
lost for words

- 65-year-old left handed lady
- Subarachnoid haemorrhage in April 2008
- Endovascular coiling of left carotid-ophthalmic and basilar artery aneurysms in April 2008 followed by endovascular stenting of left carotid-ophthalmic aneurysm in August 2008
- Untreated (unruptured) right PCOM, small ACOM and right carotid ophthalmic/cavernous aneurysms under surveillance
- Recently noted to have a severe stenosis of the left vertebral artery origin
lost for words

• Ever since subarachnoid haemorrhage, mild dysphasia with occasional word substitutions and letter substitutions such that she misspells words when writing
• Perhaps some visuospatial dysfunction when playing darts for instance
• Also memory impairment
• No symptoms attributable to vertebrobasilar territory ischaemia
lost for words

- Note left handed
- Area of hypoattenuation on CT image
- MRI brain scan shows area of gliosis in the right frontal lobe
- Possibility of dominant right hemisphere from a language perspective
summary

• Review of aphasia classification
• Routine clinical cases including classical aphasia syndromes (and anatomical substrates)
• Typical clinical cases exemplify ‘acute aphasia’, suggesting variety of anatomical substrates