NEUROGENIC COMMUNICATIVE DISORDERS

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March 28, 2017
Neurogenic Communication Disorders

1. Language Disorders: Aphasia
2. Motor Speech Disorders: Dysarthria
3. Cognitive Communication Disorders: Cognitive-Communicative Impairment
Definition: an acquired neurogenic disorder of language in which all modalities of symbolic communication are affected (speech, comprehension of spoken language, writing, and comprehension of written language) at one or more levels of language processing: sounds (phonemes), rules of grammar, syntax, semantics, discourse.
Handedness and Aphasia

Language is represented in the left hemisphere of most (90+%) of right handed persons. In non-right handers (left-handed and ambidextrous), language functions are more shared, but in most people, regardless of their handedness, language functions are represented more in the left hemisphere than right.
Understanding the classification system used by most aphasiologists

Based on three language characteristics:

1. Fluency of speech
2. Ability to repeat sentences
3. Comprehension of spoken language
## Aphasia Classification Chart (Fluency, Repetition, Comprehension)

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<thead>
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<th>Nonfluent Aphasias:</th>
<th>Fluency</th>
<th>Repetition</th>
<th>Comprehension</th>
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<td>Broca’s Aphasia</td>
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<tr>
<td>Transcortical Motor</td>
<td>+/-</td>
<td>+</td>
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<tr>
<td>Transcortical Mixed</td>
<td>+/-</td>
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<tr>
<td>Global Aphasia</td>
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Classification chart: Fluent Aphasias

<table>
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<tr>
<th>Types</th>
<th>Fluency</th>
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<td>Wernicke’s</td>
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<td>Conduction</td>
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<td>Anomia</td>
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<tr>
<td>Transcortical Sensory</td>
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</tbody>
</table>
Other Terms for Broca’s Aphasia

• Motor aphasia
• Verbal aphasia
• Efferent motor aphasia
• Expressive aphasia
• Anterior aphasia

Anatomical correlates: Usually involves Broca’s area—Brodmann 44 (third frontal gyrus), the lower portion of the motor strip, other cortical fields anterior and posterior to 44. Variable extension into underlying white matter is frequently seen
Broca’s Aphasia: Clinical Description

• Awkward articulation (effortful)
• Limited vocabulary—nouns, number words
• Restricted grammar (agrammatism)
• Sparse output
• Auditory comprehension: relatively preserved
• Reading limited
• Severe writing deficits
Speech Sample: Note telegraphic style

Question: Tell me what happened…

Response: Ah..Monday..uh..uh..Mom and (patient says his own name) …hospital..doctor …2 hours..yes…

hospital ..oh, man..terrible…two..three..

four doctors…five o’clock,,no one o’clock nurse …

come..and ..
Apraxia of Speech (AOS) Facts:

• Anatomically: posterior frontal lobe (in, around or under Broca’s area)
• Almost always accompanied by a Broca’s type aphasia
• Pure cases are rare
• Characteristics: “motor programming” disorder
  Oral postures necessary for production of speech are impaired
  Sequential movement for speech production
  Articulation and prosody particularly speech rate is affected
  Comprehension of speech and written language may be spared
  Speech therapy necessary and effective
Clinical Description: Transcortical Motor Aphasia/Transcortical Mixed Aphasia

• Initial muteness

• \textbf{Reduced speech initiation} (limited intent to communicate)

• \textbf{Superior sentence repetition}

• Preserved confrontation naming of objects, pictures

• Reduced word fluency

• Preserved serial speech

• Preserved oral reading

• Relatively preserved auditory and reading comprehension (except with TMA)

• Spontaneous writing is superior to spontaneous speech
Sample Transcortical Motor Aphasia (Note need to echo part of the interlocutor’s question)

“What happened to you to bring you to the hospital?”

“Well, …I was…It was….I can’t…

“Where you at home when you became ill?”

“Yes, I was at home when I became ill…”
Anatomical Correlate of TMA

• Smaller lesion than in Broca’s aphasia
• Location in frontal lobe is anterior and superior lesions to traditional Broca’s area
Global Aphasia Facts:

Severe deficits across all language modalities

Common in the acute stage

Age: no difference in age

Complicated by presence of other symptoms

• Apraxias (ideomotor, speech, ideational)
• Right hemiplegia
• Visual spatial deficits
• Cognitive deficits
Clinical Description: Global Aphasia

- Preserved affect (alert, socially responsive)
- Comprehension of spoken language is limited to processing of intonation and familiar language
- Automatic speech may be preserved
  - “yes” “I don’t know.” etc.
  - Recurrent utterances “what the heck..” or “a-dig-ah-dig-a-dig”
Prognosis in Global Aphasia

Key is time since onset

- *Prediction based on early symptoms is difficult*

If severe symptoms persist after 6 month post onset recovery of clinical abilities is guarded, but functional communication abilities may continue to improve for years

Better when Wernicke’s area is somewhat spared -- evolve to severe non-fluent aphasia (Broca’s)

Comprehension usually improves to some degree
Neuroanatomical Correlate of Global Aphasia

Large perisylvian lesions involving the posterior portions of the frontal lobe, rostral portions of the parietal lobe, superior gyrus of the temporal lobe, i.e. both Broca’s and Wernicke’s areas affected.

Supplied by L-MCA
LEFT MIDDLE CEREBRAL ARTERY

- Prefrontal cortex
- Broca's area
- Motor cortex
- Premotor cortex
- Primary somatic sensory cortex
- Parietal lobe
- Gustatory area
- Wernicke's area
- Primary visual cortex
- Optic radiation
- Cerebellum
- Left middle cerebral artery
- Left cerebral hemisphere
- Primary auditory cortex
- Brain stem
Clinical Description: Wernicke’s Aphasia

• Fluent empty speech (sometimes hyperverbose)
• Meaningless combinations of words (neologisms)
• Normal intonation—good use of grammatical words, (i.e. pronouns, prepositions, articles)
• Difficulty grasping word and sentence meaning
• Severe impairment reading, writing
• Limited or poor awareness
Neuroanatomical Correlate: Wernicke’s Aphasia

Posterior portion of the superior gyrus – temporal lobe

And fiber tracts connecting it with other parts of the brain
Speech Sample: Wernicke’s Aphasia

What do you see in the picture?

“Well this is wickersee…(neologism)..and this and this…These things going in here and that..Oh, here..what.. is doing here? And two kids..oh and here is the other one
Clinical Description: Conduction Aphasia

• **Fluent speech** which may contain words with sound substitutions (literal paraphasia, e.g. tup/cup); primarily nouns affected

• **Compulsive attempts to correct** these errors (tup, no..tuck..no.puk, put, cut)

• **Inability to repeat sentences**, or orally read

• **Preserved auditory comprehension**

• Writing errors
Neuroanatomical Correlate: Conduction Aphasia

• Anatomically located close to Wernicke’s area, deep to supramarginal gyrus of the parietal lobe. \textit{Geschwind thought it was located in the fibers connecting Wernicke’s with Broca’s (arcuate fasciculus)}

• Sometimes found in individuals as Wernicke’s improve

• Rare syndrome
Clinical Description: Anomic Aphasia

• **End stage of many different forms of aphasia**
• As a discrete syndrome (angular gyrus-temporal/parietal junction)
• **Word finding** difficulty in the context of fluent, grammatically well-formed speech
• **Good speech comprehension**
• May or may not have reading or writing deficits. If very posterior lesions, can have syndromes associated with dyslexia.
Transcortical Sensory Aphasia

• Rare syndrome

• Preservation of speech repetition

• Watershed area of the brain

• Well-articulated but irrelevant paraphasia, may contain neologisms.

• Echoic speech (echolia)

• Reading and writing are severely impaired
Atypical Aphasias (example: Subcortical)

Internal capsule and putamen (i.e. basal ganglia strokes i.e. lateral thalamus)

- Sparse output
- Dysarthric speech
- Usually not agrammatic
- Word finding deficits
- Paraphasia in conversation
- Mild comprehension deficits
Treatment Approaches for Aphasia

• Stimulation of language
• Conversational approaches (script practice)
• Melodic Intonation Therapy (MIT)
• Social approaches
• Constraint Intensity Language Therapy (CILT)
• Transcranial direct current stimulation (tDCS)
• Augmentative and Alternative Communication
Neurogenic Mutism: Total Absence of Speech

Motor speech disorders
- Locked-in syndrome
- Anarthria (all types possible)

Left brain disorders
- Global aphasia
- Apraxia of speech

Diffuse cognitive affective deficits
- Arousal disorders
- Persistent vegetative or minimally conscious (apallic state)
- Akinetic mutism
Dysarthria (the most frequently encountered neurogenic communication disorder)

A group of motor speech disorders that are the result of damage to the central or peripheral nervous system. The damage causes weakness, incoordination, slowness, or diminished range of motion of the muscular involved in speech production. One or more of the five speech production components are affected:

• Articulation
• Voicing (phonation)
• Respiration
• Resonance
• Prosody
The Dysarthrias

- Flaccid dysarthria (PNS disorder)
- Spastic dysarthria (bilateral UMN pathway disorder)
- Ataxic dysarthria (Cerebellar disorder)
- Hypokinetic dysarthria (Basal ganglia disorder)
- Hyperkinetic dysarthria (Basal ganglia disorder)
- Unilateral upper motor neuron dysarthria
- Mixed dysarthria (any combination of the above)
- Apraxia of speech (left hemisphere cortical/subcortical motor speech impairment)
Stroke: the most common etiology of dysarthria

- Bilateral upper motor neuron (pseudobulbar palsy) Spastic dysarthria
- Unilateral upper motor neuron
  - Slurred articulation and reduced vocal intensity
- Brainstem
  - Anything from anarthria (no speech)
  - Flaccid dysarthria due to cranial nerve damage
- Cerebellar (ataxic dysarthria)
  - Slow, awkward articulation
  - Abnormal speech prosody
Dysarthrias associated with neurologic diseases

- Parkinson’s Disease: Hypokinetiс dysarthria
- Multiple Systems Atrophy: Hypokinetiс+ataxic+spastic
- ALS: Flaccid and Spastic dysarthria
- MS: Mixed spastic and ataxic dysarthria
- Huntington’s Chorea: Hyperkinetic dysarthria
- Myasthenia Gravis: Flaccid dysarthria
Dysarthria Treatment

No single treatment depends on cause and nature of the speech disturbance. Language is rarely affected, but cognition is. Emphasis is on: functional effectiveness of speech

Some direct intervention approaches:

- LSVT for hypokinetic dysarthria (Parkinson’s Disease)
- Muscle strengthening
- Rate and phrasing control
- Intelligibility exercises

Alternative and augmentative communication devices
Cognitive-Communicative Impairment

- Right hemisphere damage
- Traumatic brain injury
- Dementias (70 different varieties)
Cognitive-Communicative Impairment associated with Right Hemisphere Damage

- Reduced affectual display (aprosodia)
- Attention deficits (left neglect) affecting reading and writing
- Hypo/hyper responsivity
- Macrostructure deficits
- Concrete interpretation affecting content of expression/difficulty understanding
  - Tangential (inappropriate) verbal content
  - Unable to process inferential content (reasoning affected)
Traumatic Brain Injury

Any combination of SLPs

• 1/3 dysarthric, 1/3 aphasic, 1/3 cognitive communicative impairment
Communication Impairment and Dementia

- Alzheimer’s Disease (cortical dementias)
- Sub-cortical Dementias
  - Dementia associated with Lewy Body disease (Parkinson’s)
  - Progressive Supranuclear Palsy
  - Huntington’s disease
- Vascular Dementia
- Fronto-temporal lobar dementia
  - Primary Progressive Aphasia
Characteristics of Communication abilities in AD

Declarative Memory: the hallmark of AD (speech becomes perseverative, repeats adequately but does not retain information)

- Word retrieval difficulty
- Preserved speech fluency until late stages
- Preserved oral reading until late stages
- Preserved procedural memory until late stages
Vascular Dementia

- Acute onsets (multiple)
- Microvascular disease
- Depends on the site of the lesions
- Stepwise descent
  - Limited progress after each onset
  - Dysarthria
Fronto-Temporal Dementia

Several presentations
Speech-language pathologies if asymmetric to the left side of the brain
  Primary Progressive Aphasia
  Aphasia, Apraxia, Dysarthria
Resources

Academy Neurogenic Communication Disorders and Sciences (www.ANCDS.org)

DVD: Neurology series-Jonathan Howard (Demosmedical publisher)

Youtube: many videos of persons with neurogenic communication disorders

Journals:
  Journal of Medical Speech Pathology
  Seminars in Speech-Language Pathology
  Aphasiology
  Language and Cognition
THANK YOU