

An Overview of Neurological Stuttering

by

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Motor Speech Disorders

Com Dis 624

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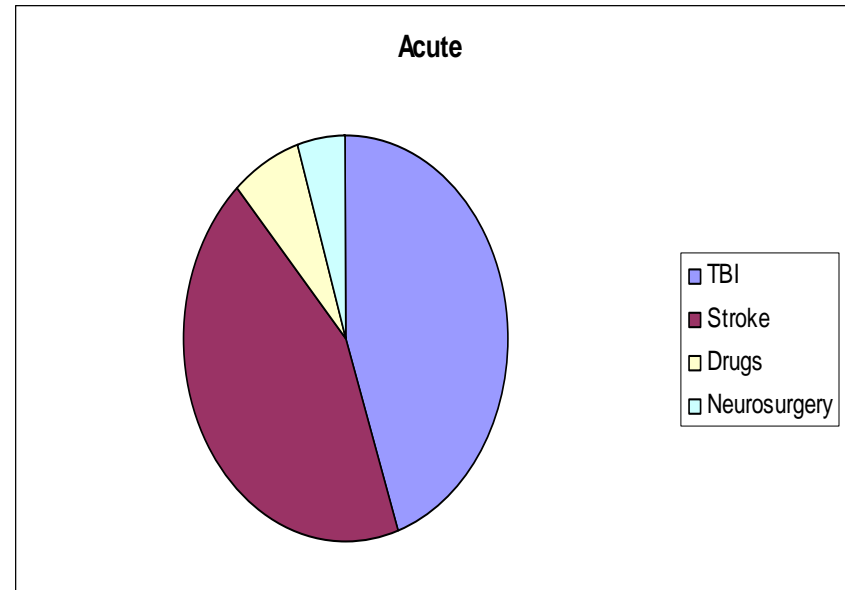
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Introduction to neurogenic stuttering

- Motor speech disorder
- Primary symptom = dysfluent speech
- Differential is difficult because
 - symptoms can overlap with other MSD
 - it can co-exist with other MSD
 - there are other forms of stuttering (i.e. psychogenic and developmental)
- AKA acquired stuttering and cortical stuttering

Etiologies

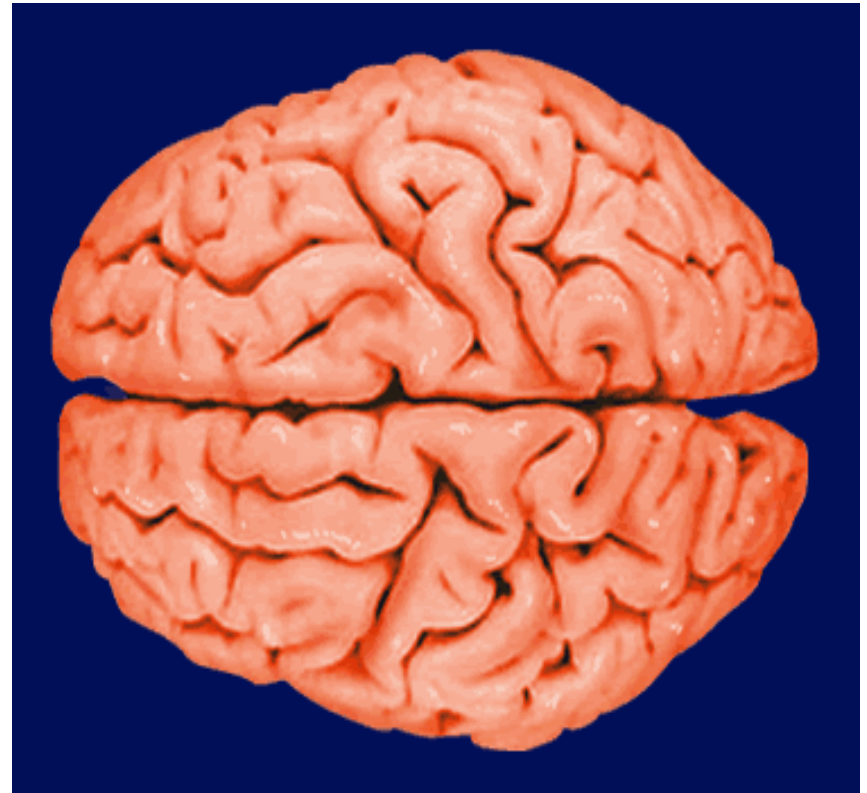
- Acute
 - TBI = 38%
 - Stroke = 37%
 - Drugs = 6%
 - Neurosurgery = 4%
- Degenerative
 - Parkinson's disease
 - Dementia
 - Seizure disorders
 - Brain tumors



(Duffy 2005)

Site of lesion

- Studies have found left hemisphere lesion is most prevalent
 - 38% among all neurogenic stuttering cases (Duffy 2005)
 - Survey done by Theys et al. found that out of 29 neurogenic stuttering patients, 17 had lesions in left hemisphere
- As a result of left hemispheric damage the right hemisphere becomes overactive for language (Neumann 2003)



More possible lesion sites

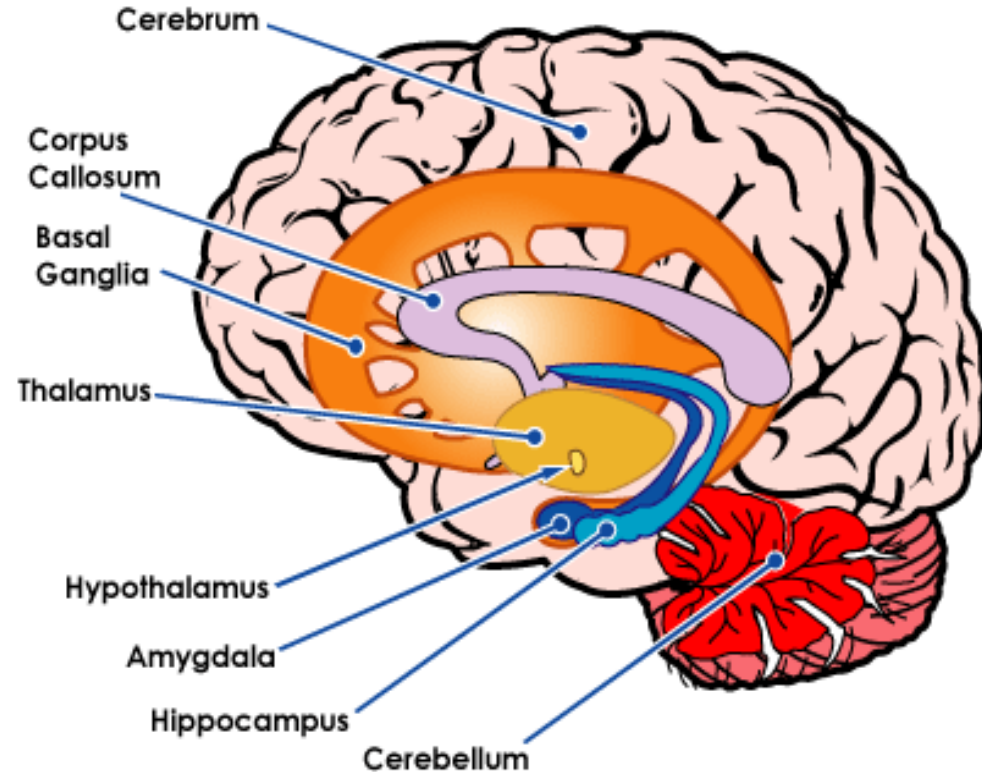
- Sub-cortical structures: basal ganglia

-Breakdown in BG causes an inability to sequence new speech patterns and automatic speech tasks (Smits-Bandstra & DeNil 2007)

-When acquired stuttering is associated with Parkinson's the lesion site is in the BG (Smits-Bandstra & DeNil 2007)

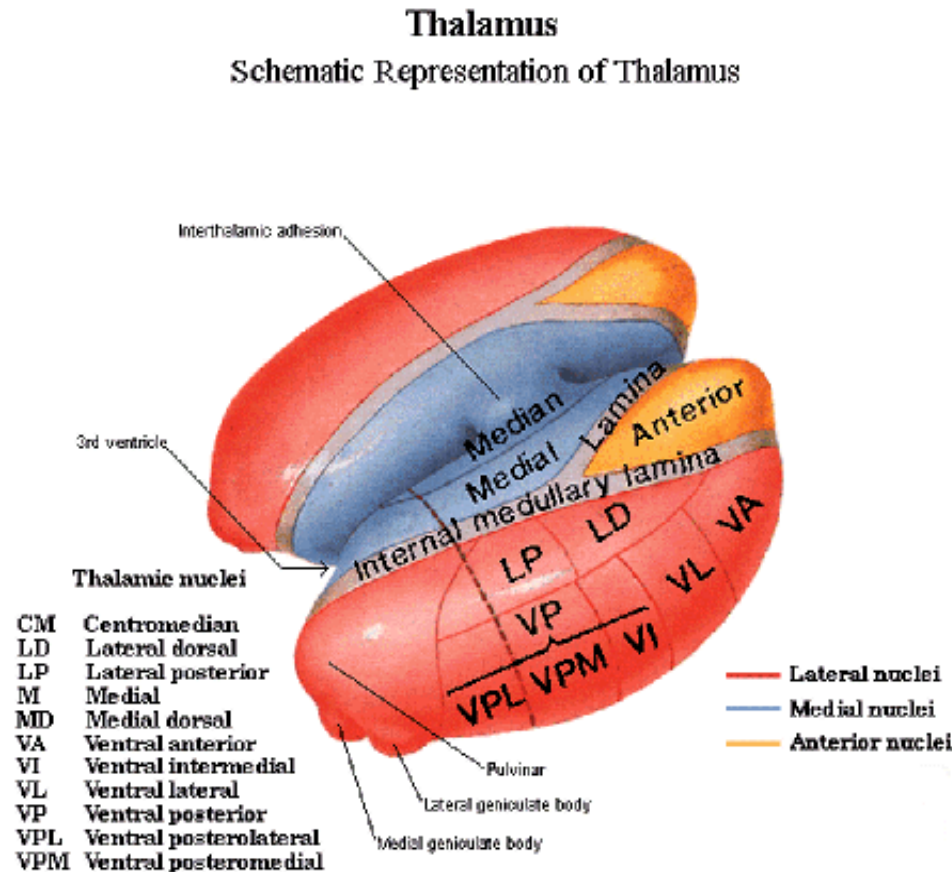
-Contrary to Duffy, sub-cortical neuronal breakdown is directly related to neurogenic stuttering (Giraud et al. 2007)

Basal Ganglia and Limbic System



Sub-cortical structures: thalamus

- Pathways between cortex and thalamus = primary lesion site (Kent 2000)
- Characteristics of stuttering due to thalamus involvement versus “typical” characteristics of neurogenic stuttering suggests distinct clinical entity (Van Borsel 2003)



Common characteristics

- Neurogenic
 - lack of secondary behaviors
 - lack of anxiety
 - lower amount of blocks
 - difficulty producing function and content words
 - difficulty with syllables in all word positions
- Developmental
 - secondary behaviors
 - anxiety
 - higher amount of blocks
 - difficult with content words
 - difficulty with word initial syllables

(Van Borsel 2001 & Theys 2008)

Treatment

- Treat individual according to constellation of symptoms
- Most common techniques applied:
 - slowed and smooth rate of speech movements
 - soft voice onsets
 - continuous phonation
 - light articulatory contacts
 - voice control such as appropriate tone, loudness, resonance
 - appropriate breath support
 - relaxation techniques

Prolonged Speech Patterns

- Patterns focus on phonatory mechanism
 - Patients lengthens sounds with slowed & controlled transitions
- Controversial Findings
 - After treatment, observed unnatural sounding speech (Ingham & Oslow 2001)
 - Effective at behavioral level; unclear effect on brain circuitry (Neumann 2004)

Treatment implications

- Stuttering therapy increased activity in left motor strip
- The patients were able to produce speech more automatically and self-corrected
- Depended less on cognitive and linguistic skills-less conscious thought
- Study concluded treatment should focus on motor speech planning, sequencing, and execution
- (Neumann et al. 2003)

Treatment targeting feedback

- Rate of speech
 - feedback to cerebellum and compensates for problems with basal ganglia
 - i.e. metronomic speech & chorus speech
- Conscious attention of articulatory mechanisms
 - provides sensory & motor feedback leading to increased activation in motor & sensory cortex
 - Compensates for problems with basal ganglia
 - i.e. Muscle tension reduction

Drug Therapy

- Controversy
 - Theophylline = induced stuttering
- Successful treatment
 - Levetiracetan
 - Successful in treatment patients with neurogenic stuttering due to epilepsy
- Needs further research

Timing of Treatment Sessions

- Residential Programs
 - Intensive therapy for short duration
- Outpatient Treatment
 - Longer duration with less intensity
- Pros and Cons
 - Dependent on individual needs

Conclusion

- Limited research
- Controversial Findings
 - No localized lesion vs. localized lesion in brain
 - Characteristics
 - Treatment Approaches
 - Cognitive vs. Motoric
- There is a need for continued research in neurogenic stuttering

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