

Acute and Subacute Infarctions in Basal Ganglia Involving Insular and Frontal Cortex of the Left Hemisphere: Primary Cause for Subcortical Aphasia in a Post Cerebrovascular Accident Patient – A Single Case Study

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Introduction: Aphasia is a language disorder due to damage in the specific areas of the brain, either of the two hemispheres in the brain when gets damaged due to multiple reasons such as vascular disorders: Cerebrovascular accident (Ischemic or Hemorrhage), Brain damage, tumors, Traumatic Brain Injury, and other brain disorders can affect the specific skills performed by that area in the hemisphere, leading to deficits in performing the regular activities like conversation and motor tasks. In most of the people the language skills are controlled by the left hemisphere of the brain, hence damage in the left hemisphere may lead to problems in speech and language. However, damage in the right hemisphere may cause other problems, like poor attention or memory. Consequently, damage in the anterior part of the brain results in language production impairments (apparently Broca's type Aphasia), while posterior pathology is associated with language understanding difficulties and disturbances in the phonological, lexical and semantic language systems (often Wernicke's type Aphasia). From the past five decades, there has been a debate on a type of Aphasia called the Subcortical Aphasia. The Subcortical Aphasia is defined as a language disorder associated with damage to subcortical brain structures, such as the Basal Ganglia, Thalamus, or the White Matter pathways in general vicinity of these structures. Lesions in the White Matter and the subcortical regions that do not affect the cortical regions may also result in various aphasic symptoms (Fasanaro et.al, 1987). The Subcortical Aphasia diagnosis is defined by the lesion localization rather by the characteristics of the type of Aphasia. Although traditionally Aphasia reflects the dysfunction in the cortical regions for language, lesions in the Subcortical Region can disrupt connections to the language cortex.

Need For Study: The Cortical lesions leading to specific speech and language impairments have been studied for a while now, however the Subcortical Aphasia has been a topic of discussion due to its site of lesion in the basal ganglia accompanied by the Aphasic and Dysarthric features, this also tells us about the involvement of basal ganglia in the language production. Hence this case study supports the previous findings about the Subcortical Aphasia, wherein a patient with acute and subacute infarction in the subcortical regions such as the Basal Ganglia, Insular Cortex and Frontal Cortex on the left hemisphere is been examined with different speech and language tests to determine whether the patient exhibits Aphasic and also Dysarthric features with the above mentioned Subcortical lesion.

Aim and Objectives: The main objective of this study is to analyze the clinical features of speech and language in a Subcortical Aphasic patient with a history of Cerebrovascular Accident (CVA) and also to track the prognosis and examine the quality of life of a stroke patient with Subcortical Aphasia.

Method: A post stroke CVA participant with Right side hemi paresis reported to a speech and hearing institute with the motive of receiving speech and language therapy. The participant had stroke at the age of 45 years, after which the participant took medications for post stroke recovery for two years. Due to speech and language problems the participant had referred for speech and language evaluation. The participant had family history of CVA and was a regular smoker and alcoholic.

The participant in the study was evaluated for speech and language abilities which involved administration of Western Aphasia Battery (Shyamala K. C. et. al, 2002), Franchay Dysarthria Assessment (Pamela Enderby,1980), Cranial Nerve Examination (related to speech and language), Kannada Articulation Test (Babu, Ratna and Bettagiri,1972), Speech intelligibility rating scale (Chennai,2002) and to assess the overall lifestyle of the participant from first assessment till the present reassessment the Stroke Specific Quality of Life Scale (Williams LS et. al, 1999) was administered.

Results and Discussion: In the first post stroke evaluation after 2 years of CVA, the test results for Franchay Dysarthria Assessment revealed spastic dysarthria components in the speech of the participant, whereas no problem in swallowing solids, semi- solids and liquids. The test for language assessment Western Aphasia Battery results revealed no problem in comprehension but expression was limited to one-two word utterances. The speech was intelligible only when heard with concentration and effort by a sympathetic listener and occasionally requires two-three repetitions on a speech intelligibility scale.

In the reevaluation post 4 years of CVA, the test results for FDA showed Dysarthria features but not of a specific type. However, improvement in the motor activities was seen in the oral structures. The results for WAB showed Broca's type Aphasia but the Magnetic Resonance Imaging (MRI) reports revealed acute and subacute infarctions in the Basal Ganglia, Insular Cortex and Frontal Cortex on the left hemisphere. Few dysfluencies like repetitions and blocks were also seen in the phrase level. Further, to check the articulatory errors, Kannada Articulation Test was administered which revealed few articulatory errors which were not frequent and were corrected during repetition. The Cranial Nerve Examination revealed good functioning of Trigeminal nerve, Vestibulocochlear nerve, Glossopharyngeal nerve, Vagus Nerve. In contrast, the cranial nerves originating from the left hemisphere such as the Left Facial Nerve, Left Accessory Nerve and Left Hypoglossal Nerve function was affected causing asymmetric movement on the right side of the body. The overall speech intelligibility rating was same as previous evaluation. Hence based on the localization of the site of lesion and the dysarthria features the participant was provisionally diagnosed with Subcortical Aphasia.

Finally, to assess the overall lifestyle of the participant the Stroke Specific Quality of Life Scale (SS QOL) was administered during both the first evaluation and reevaluation. The participant showed overall development in the energy, mobility, family roles, self-care, thinking, upper extremity function, whereas there was no improvement observed in the language domain. The patient has acquired the skill of writing with the left hand after 4 years post CVA as this could also tell us about the ongoing compensatory plasticity and recovery of patients post CVA in subcortical regions.

Summary and Conclusions: The present study was carried out on a Cerebrovascular Accident participant with left side hemiparesis, to study the type of Aphasia which is caused by the lesions in the subcortical areas such Basal Ganglia, Thalamus, and also the Insular

Cortex and Frontal Cortex. As the lesions were observed only in the left (dominant) hemisphere, the effects were seen on language expression giving the Aphasic features, however the lesions in the Basal Ganglia reflects the Dysarthric components in speech and motor movements in the participant. As this study provides an idea about the clinical features of Subcortical Aphasia which comprises of the partial Aphasic as well as Dysarthric features, apparently the specific Dysarthria type could not be defined in this type of Aphasia. Future studies can focus on analyzing the clinical features of

speech and language for subcortical lesions in the Non- Dominant hemisphere, and also in thalamic and Non- Thalamic lesions.