

## Speech and Language Dysfunctions in Patients with Cerebrocortical Disorders Admitted in a Neurosurgical Unit

### Abstract

**Introduction:** Speech and language abnormality among brain injury patients are common, especially during the acute stage. The details of same from Andhra Pradesh (AP) state are limited. The present study provides details of speech and language abnormality among brain damage patients, from a tertiary care hospital AP. **Materials and Methods:** This study was conducted at tertiary care hospital, Nellore, AP. Patients with acute brain damage due to traumatic brain injury (TBI), cerebrovascular accident (CVA), and postoperative cases of brain tumors were selected for the study. Detail of speech and language disturbances was accessed using Western Aphasia Battery. All patients were right-handed and Telugu was their first language. **Results:** There were totally 38 patients, of them 28 had TBI, 8 patients were postoperative cases of brain tumor, and 2 cases were of CVA. The mean age was 45.6 years. A total of 22 patients were literate. TBI patients with left cerebral hemisphere damage manifested with anomic, conduction, transcortical sensory, global, and Wernicke's aphasia. Four patients of postoperative brain tumor manifested with anomic and transcortical sensory aphasia had left-sided brain damage and mild dysarthria had right-sided brain damage patient. CVA patients had anomic aphasia and subcortical aphasia having right and left cerebral hemisphere damage, respectively. **Conclusions:** This study reports that acute brain damage due to various causes manifest with speech and language abnormality, especially when the left cerebral hemisphere is involved.

**Keywords:** Aphasia, aphasia, brain tumors, cerebrovascular accident, head injury, language, memory, speech, traumatic brain injury

### Introduction

Damage to the brain tissue impairs a person's ability to perform certain functions and communication based on the damaged area and extent of damage. Traumatic brain injury (TBI), neurosurgical intervention for tumors, cerebrovascular accident (CVA), etc., are known to cause postsurgical complications such as communication difficulties when the areas corresponding to speech and language comprehension and expression are involved. Based on the area and extent of brain tissue damage, a person's ability to communicate can be impaired from mild-to-severe degree. Based on the cortical or subcortical structures damaged, speech and language disturbances vary among neurosurgical patients. Aphasia is a common communication disorder seen in these patients. Aphasia is defined as the impairment of comprehension or production of language in written or spoken forms due to an acquired lesion of the dominant cerebral hemisphere.<sup>[1]</sup> There are many

types of aphasia and they are broadly classified as nonfluent and fluent types. In nonfluent aphasias, comprehension is preserved to some extent, but expression is severely affected. In fluent aphasias, expression is preserved to some extent, but comprehension is more affected. The knowledge on speech and communication abnormality from our state is limited. The present study from a tertiary care hospital discusses its experience among neurosurgical patients visited with speech and communication impairment.

### Materials and Methods

The present study was carried out at Narayana Medical College Hospital in Nellore, AP, India. A total of 38 adult patients (12 female and 26 male) with various etiologies were taken for the study. Among them, 28 were head injury (HI) cases, 2 postoperative CVA (1 ischemic and 1 hemorrhagic), and 8 postoperative tumor patients were included in this study. The study was approved by institutional ethical committee and informed consent

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was obtained from the patients and or their relatives. All the patients were assessed for speech and language disturbances in the acute stage. A pro forma was made to evaluate speech and language disturbances based on Western Aphasia Battery bedside evaluation.<sup>[2]</sup> The pro forma includes demographic details, medical history, radiological findings, and surgical intervention details. Detailed pro forma is attached in appendix.

## Results

The age range of patients was 17 years being minimum and 87 years being maximum (mean age was 45.6 years with standard deviation 16 years). Education levels of the patients were as follows: illiterates 16 and literates 22. Most of the patients were monolinguals with Telugu as their mother language only four patients were bilinguals. All patients were right-handed dominance individuals. Of 28 TBI patients, 10 patients had loss of consciousness. Brain parenchyma contusion was seen among 20 patients, subdural hemorrhage among 13 patients, subarachnoid hemorrhage, and extradural hemorrhage among one patient. Twenty patients had left cerebral hemisphere injury, 6 patients had right cerebral hemisphere and 2 patients had bilateral cerebral hemisphere injury. Eight patients had brain tumor, of them four had in right and four had in left cerebral hemispheres. Two patients had CVA, of them one patient right and one patient had left cerebral hemisphere affected. Details of speech and communication abnormality with side of cerebral hemispheres involved are mentioned in Table 1.

## Discussion

One of the major causes, which impair communication in adult population, is sudden damage to the brain tissue. This damage could be due to trauma to head, CVA, postsurgical complications, etc., This damage can lead to communication disorders such as aphasia (common classification used for aphasia is as follows: Global, Broca's, Wernicke's, transcortical motor, transcortical sensory, mixed transcortical, conduction, anomie, crossed,

subcortical, and primary progressive aphasia),<sup>[3]</sup> dysarthria, and apraxia of speech. CHI cases may exhibit some linguistic difficulties for first few months which can be identified by aphasia battery. These difficulties may not be seen later. Focal lesions cause aphasia, dysarthria, apraxia, dysphagia, amnesia, etc., and may also result in attention, pragmatic, and perceptual disturbances. Diffuse brain injury causes difficulties in attention, long-term memory, perception, problem solving, and pragmatic aspects (poor comprehension and expression of abstract items).<sup>[4]</sup> Difficulties in attention was seen in the present study also as some of the patients were not assessed properly due to lack of attention. The present study reports that irrespective of cause of brain damage left hemisphere damage manifest with conduction aphasia, anomie aphasias, mild dysarthria, transcortical sensory aphasia (TSA), Wernicke's aphasia, global, and subcortical aphasia. Damage to the right side cerebral hemisphere manifest with mild dysarthria, anomie aphasia, and TSA<sup>[4]</sup> reported that in RHD cases there will be deficits in confrontation naming, comprehension of complex information, word fluency, reading, and writing.

Some patients do have auditory perception problems when the auditory cortex is involved. Studies have reported that acute stage of HI patients' exhibit anomie aphasia and verbal paraphasias frequently, along with reading and writing difficulties. In the present study, most of the cases had anomie aphasia than other types. Confused language, irrelevance, confabulation, verbal paraphasias, and memory disturbances were major difficulties reported in majority studies which were done on HI patients. Initial and long-term communication difficulties in TBI are as follows:<sup>[5]</sup> confused language, dysarthria, auditory comprehension difficulties, reading and writing difficulties, word-finding difficulty, and poor pragmatics of language (turn-taking, topic maintenance, selection of topic, being relevant while communicating, etc.). TBI cases exhibit more pragmatic deficits than a typical aphasic patient (CVA). Many TBI cases recover language functions in 1 or 2 months after injury. However, difficulties in

**Table 1: Details of speech and communication abnormality among neurosurgical patients**

Diagnosis	TBI (28 cases)	Cerebral hemisphere (n)	Postoperative details			
			CVA (2 cases)	Cerebral hemisphere (n)	Tumor (8 cases)	Cerebral hemisphere (n)
Normal speech and language	10		0		4	
Mild dysarthria	1	Left	0		1	Right
Anomie aphasia	7	Left	1	Right	1	Left
Conduction aphasia	2	Left	0		0	
TSA	3	Bilateral (1), left (1), right (1)	0		2	Left (1), right (1)
Wernicke's aphasia	1	Left	0		0	
Global aphasia	1	Left	0		0	
Subcortical aphasia	0		1	Left	0	
Incomplete*	3		0		0	

\*Could not be completed as patients were not cooperative. CVA – Cerebrovascular accident; TBI – Traumatic brain injury; TSA – Transcortical sensory aphasia

naming, reading, and writing persist for longer time in many cases. Excerpts of various studies mentioned in<sup>[6]</sup> revealed acute stage of HI patients exhibit anomic aphasia and verbal paraphasias frequently, along with reading and writing difficulties. Most of the cases with anomic aphasia resolved completely in <2 years. Language and memory disturbances which were present following CHI were resolved to major extent in 4 months. Most of the studies mentioned anomic aphasia in majority cases.<sup>[6]</sup>

Diffuse upper motor neuron damage causes spastic dysarthria and damage to cranial nerves due to HI causes flaccid dysarthria. Other cognitive and communication deficits seen in TBI are deficits in concentration, attention, memory, nonverbal problem solving, part/whole analysis and synthesis, discourse comprehension and expression, abstract thinking, and speed of processing.<sup>[6,7]</sup> Identifying these disturbances helps us to frame therapy based on individual needs. Providing rehabilitation at the earliest gives opportunity to utilize the trauma-induced plasticity to maximum and also improves the quality of life of the patients. The present study results replicate the literature; however, this series contains a large mixture of different pathologies and a larger study is needed to further understand the impact of cortical pathologies on speech and language dysfunctions.

## Conclusions

The present study reports that regardless of brain tissue damage, patients' manifest with speech and communication

disturbances. This data add additional knowledge on speech and communication abnormality among neurosurgical patients from AP, India.

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## Conflicts of interest

There are no conflicts of interest.

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