

# Effectiveness of Speech and Language Intervention in Closed Head Injury - A Single Case Report

Rahul Kumminimana<sup>1</sup>, Anuradha S<sup>2</sup>

<sup>1,2</sup>Lecturer, Department of Audiology and Speech Language Pathology,  
Institute for Communicative and Cognitive Neurosciences, Kavalappara, Shoranur, Kerala

Corresponding Author: Rahul Kumminimana

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## ABSTRACT

Brain damages due to Closed Head Injuries will lead to several speech and language impairments, hence understanding the communication deficits and the efficacy of speech and language therapy is essential. A 31 years old male with a history of Closed Head Injury following communication impairment was investigated. Following a detailed case history, assessment for Speech and Language skills, Oral Peripheral Mechanism Examination, Aerodynamic Measures, and administration of Western Aphasia Battery (WAB) and Frenchay Dysarthria Assessment (FDA) was done. Furthermore, fine and gross motor skills, semantic skills, pragmatic skills, cognitive skills, and sensory skills was informally assessed. Subsequent to examination, participant had moderate language deficits with a minimal impairment in speech functions. Subject had restricted tongue movements, impaired discourse, and poor pragmatic language. On FDA the subject showed mild dysarthria and WAB showed Aphasia Quotient of 66.4 indicating Transcortical Motor Aphasia. Following an intervention for 3-month period, Aphasia Quotient improved from 81.6 to 91.7 indicating Anomic Aphasia. Based on the above subject presentation, the study explores communication impairment following Closed Head Injury and importance of assessment and rehabilitation of speech language skills in restoring their communication skills.

**Keywords:** *Closed Head Injury, speech and language skills, rehabilitation*

## INTRODUCTION

Traumatic Brain Injury also known as Craniocerebral Trauma is a frequently encountered medical emergency. The young people in all societies are especially prone to Traumatic Brain Injury. It is the most common cause of death and disability in younger populations throughout the world. According to Centers for Disease Control and Prevention Traumatic Brain Injury is defined as; “Craniocerebral trauma, specifically, an occurrence of injury to the head (arising from blunt or penetrating trauma or from acceleration/deceleration

forces) that is associated with any of these symptoms attributable to the injury: decreased level of consciousness, amnesia, other neurologic or neuropsychologic abnormalities, skull fracture, diagnosed intracranial lesions or death”. The Traumatic Brain Injury is classified into two types, Open Head Injuries and Closed Head Injuries. Open Head Injuries involve an open wound in the head due to some crushing or penetrating agent, resulting in fractured or perforated skull, torn brain coverings and various degrees of brain tissue damage. In Closed Head Injuries (also

called as nonpenetrating injury), the skull may or may not be fractured, however the meninges remain intact. Suffering indirect impact, the brain is damaged with or without the skull fracture, no foreign substances enter the brain, however. In Closed Head Injuries the biomechanical forces that a head receives cause both primary and secondary injuries.

The primary effects of Closed Head Injuries are, laceration or fracture of the skull, diffuse axonal injury, primary brainstem injury, diffuse vascular injury, coup injury and contrecoup injury. Secondary effects of Closed Head Injuries are; intracranial hematoma, intrameningeal hematoma, increased intracranial pressure, ischemic brain damage, seizures, and infections. Communication impairments in Closed Head Injury depends on the extend of injury, site of lesion and premorbid communication skills. Patients with minimal injuries may have preserved speech and language skills and most of them will have only temporary issues related to communication skills. Patients with moderate and severe injury usually exhibit lasting communication problems and it includes word retrieval problems which in turns leads to paraphasias and circumlocutions. Generally, their communication is affected in the form of speech deficits (Dysarthria) and language problems (Aphasia). While coming to the management of communication issues, the direct behavioural treatment of communication problems of patients with Traumatic Brain Injury is known to be effective. Communication and behavioural self-management are the two pressing skills for which patients need help. From the standpoint of speech language pathologists, direct work on communication and related behavioural self-management should be the primary concern.

### **NEED OF THE STUDY**

The brain damages due to Closed Head Injuries will lead to several speech and language impairments, although the

appropriate speech and language management on right time will help the affected individuals to restore their communication skills. Hence to understand the communication deficits and the efficacy of speech and language therapy is necessary.

### **Aim**

Aim of the study is to understand the speech and language impairments and effectiveness of speech and language therapy in patients with Closed Head Injuries.

### **MATERIALS & METHODS**

A 31 years old male with a history of Closed Head Injury was taken as the subject for study. The subject was reported with the complaint of communication problems after head trauma before one and half months when they reported for the speech and language evaluation. The subject's speech and language skills were assessed formally and informally after taking a detailed case history. The case history reveals, the subject is right-handed, educated, multilingual (Malayalam, English, Tamil & Hindi) and his work was under a multilingual situation. The assessment was carried out in two methods; the informal assessment of communication and related skills and formal assessment. The subject underwent detailed evaluation of Oral Peripheral Mechanism, Vegetative Functions, perceptual analysis of voice, articulation and fluency, assessment of maximum phonation duration and s/z ratio, informal assessment of fine and gross motor skills, semantic skills, pragmatic skills, cognitive skills, sensory skills, social skills and behavioural skills. The formal assessment of communication skills included administration of Western Aphasia Battery (WAB) and Frenchay Dysarthria Assessment (FDA). The study correspondingly considered neurological evaluation report and Neuro-imaging studies. The therapeutic efficacy of the subject was assessed through pre, intermittent and post evaluation of his language skills using Western Aphasia

Battery. The subject had attended five speech and language therapy sessions of 45-minutes per week over the course of three months and discharged when his communication skills were at a near normal level.

## RESULT & DISCUSSION

The subject underwent fronto-temporo-parietal decompressive hemicraniectomy and subdural hematoma evacuation followed by Traumatic Brain Injury. He also endured Tracheostomy on the next day. Then the subject underwent left ventriculoperitoneal shunt under neuro navigation. Left fronto-temporo-parietal autologous bone cranioplasty under general anaesthesia was done and on next month he has been readmitted for left ventriculoperitoneal shunt insertion and cranioplasty. The Computerized Tomography result, which was taken at the time of Brain injury reveals; bilateral right temporal intra parenchymal bleed, bilateral acute subdural hemorrhage and left frontal contusion with temporal contusion. The results of communication assessment showed the subject's language skills are moderately affected with a minimal impairment in speech functions. The

subject's Oral Peripheral Mechanism Examination shown in Table 2 was found to be normal in almost all functions except for restricted tongue movements. On informal language assessment shown in Table 4 semantic relations, cognitive skills and the vegetative skills of the subject is found to be normal and the pragmatic skills were inadequate. Subject's voice, articulation and fluency was affected and he has a reduced maximum phonation duration and the s/z ratio shows laryngeal dysfunction shown in table 5. The formal speech language assessment test results are shown in table 7 and 8. The Frenchay Dysarthria Assessment shows mild dysarthric features and on Western Aphasia Battery he has an Aphasia Quotient of 66.4 and the impression was Transcortical Motor Aphasia. The subject attended speech and language therapy for 3 months. The 1<sup>st</sup> re-evaluation was done one month after the therapy was started and the subject's Aphasia Quotient improved to 81.6. Then on the third month before discharge Western Aphasia Battery was administered and the subjects Aphasia Quotient was improved up to 91.7 and the impression was Anomic Aphasia. Post therapy WAB scores are shown in table 9 and 10.

**Table 1: Fine and Gross Motor Skill**

Gait	Normal
Pincer grasp	Present (right and left)
Palmer grasp	Present (right and left)
Eye hand coordination	Present

**Table 2: Oral Peripheral Mechanism Examination**

Organ	Structure	Function
Lips	Normal	Rounding: Possible Spreading: Possible Puckering: Possible (reduced strength)
Teeth	Normal	Biting: Possible Chewing: Possible
Tongue	Normal	Elevation Depression Lateral movements Retraction Protrusion
		} possible with limited range and strength of movement
Hard palate	Normal	
Soft palate	Normal	Symmetrical movements-Possible
Uvula	Normal	
Drooling	Absent	

**Table 3: Vegetative skills**

Skills assessed	Possible / Not possible
Blowing	Possible
Sucking	Possible
Swallowing	Possible
Chewing	Possible
Biting	Possible
Intra Oral Breath Pressure	Adequate

**Table 4: Informal assessment of Language skills**

Appearance / disappearance	Present
Existence / non existence	Present
Location	Present
Agent/object/action	Present
Denial	Present
Rejection	Present
Possession	Present
Social smile	Present
Social interaction	Present
Narration	Inadequate
Topic initiation	Inadequate
Topic maintenance	Inadequate
Topic termination	Inadequate
Discourse	Inadequate
Selection	Present
Sequencing	Present
Cause effect	Present
Reasoning	Inadequate
Judgement	Present
Object use	Present
Object permanence	Present
Categorization	Inadequate

**Table 5: Assessment of Speech skills**

Articulation	Minor articulatory errors present					
Voice	Hoarseness Reduced pitch and loudness					
Fluency	Reduced rate of speech Pauses present Effort full speech					
Maximum Phonation Duration	<table style="display: inline-table; border: none;"> <tr> <td> a: - 9 seconds</td> <td rowspan="3" style="font-size: 2em; padding: 0 10px;">}</td> <td rowspan="3">reduced respiratory effort</td> </tr> <tr> <td> i: - 8 seconds</td> </tr> <tr> <td> u: - 9 seconds</td> </tr> </table>	a: - 9 seconds	}	reduced respiratory effort	i: - 8 seconds	u: - 9 seconds
a: - 9 seconds	}	reduced respiratory effort				
i: - 8 seconds						
u: - 9 seconds						
s/z Ratio	6/2=3 Suggestive of laryngeal pathology					

**Table 6: sensory skills**

Vision	Normal as reported
Audition	Normal as reported
Olfaction	Normal as reported
Tactile	Normal as reported
Taste	Difficulty in taste perception (reported by wife)

### Formal speech language assessment

**Table 7: Frenchay Dysarthria Assessment**

	Reflex			Respiration			Lips			Jaw			Soft palate			Laryngeal			Tongue			Intelligibility					
	COUGH	SWALLOW	DRIBBLE / DROOL	ATREST	INSPECT	ATREST	SPREAD	SEAL	ALTERNATE	INSPERCH	ATREST	INSPECT	FLUIDS	MINTENANCE	INSPECH	TIPTHE	VOLUME	INSPERCH	ATREST	PROTRUSION	ELEVATION	LATERAL	ALTERNATE	INSPECH	WORDS / REPETITION	SENTENCE / DESCRIPTION	CONVERSION
e																											
d																											
c																											
b																											
a																											

**Table 8: Western Aphasia Battery**

	Maximum Score	Subject Score
Spontaneous Speech		
Information content	10	7
Fluency	10	2
Total	20	9
Comprehension		
Yes/no questions	60	60
Auditory word recognition	60	60
Sequential commands	80	70
Total		190
(Divide by 20 for AQ)	10	9.5
(Divide by 10 for CQ)	20	19
Repetition	100	86
(Divide By 10)	10	8.6
Naming		
Object naming	60	44
Word fluency	20	5
Sentence completion	10	4
Responsive speech	10	8
Total		61

(Divided by 10)	10	6.1
Reading and writing		
Reading	100	20
Writing	100	45
Total		65
(Divide by 10)	20	6.5
Praxis	60	60
Total		60
(Divide by 6)	10	10
Construction		
Drawing	30	23
Block Design	9	6
Calculation	24	7
Raven's Score	37	27
Total		63
(Divide by 10)	10	6.3
Cortical Quotient		65.5
Add Totals	100	
Aphasia Quotient	100	66.4

**Table 9: Results of WAB post therapy (first re-evaluation)**

	Maximum Score	Subject Score
Spontaneous Speech		
Information content	10	8
Fluency	10	6
Total	20	14
Comprehension		
Yes/no questions	60	60
Auditory word recognition	60	58
Sequential commands	80	80
Total		198
(Divide by 20 for AQ)	10	9.9
Repetition	100	90
(Divide By 10)	10	9
Naming		
Object naming	60	54
Word fluency	20	9
Sentence completion	10	6
Responsive speech	10	10
Total		79
(Divided by 10)	10	7.9
Aphasia Quotient	100	81.6

**Table 10: Results of WAB post therapy (second re-evaluation)**

	Maximum Score	Subject Score
Spontaneous Speech		
Information content	10	9
Fluency	10	8
Total	20	17
Comprehension		
Yes/no questions	60	60
Auditory word recognition	60	59
Sequential commands	80	80
Total		199
(Divide by 20 for AQ)	10	9.95
Repetition	100	100
(Divide By 10)	10	10
Naming		
Object naming	60	57

Word fluency	20	12
Sentence completion	10	10
Responsive speech	10	10
Total		89
(Divided by 10)	10	8.9
Aphasia Quotient	100	91.7

## CONCLUSION

While summarising the results we can see that the subject's speech and language skills were affected with a predominant involvement of language loss. And this may be due to the damage of cortical regions, which can observe in the result of Computerized Tomography. The subject started speech and language therapy one and half month after the trauma and the outcome was good. The subject was able to restore his communication skills to a near normal level. Hence, the result conclude that the Closed Head Injuries can cause variable communication deficits in the form of speech and language impairments and the speech and language therapy is vastly effective in restoring their communication skills.

### **Declaration by Authors**

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**Conflict of Interest:** The authors declare no conflict of interest.

## REFERENCES

1. Chapey, R. (1994). *Language intervention strategies in adult aphasia*. Williams & Wilkins.
2. Harper, S. (2011). Aphasia and related neurogenic language disorders. *Canadian Journal of Speech-Language Pathology & Audiology*, 35(4), 362-364.
3. Hegde, M. N., & Hegde, M. N. (1998). *A coursebook on aphasia and other neurogenic language disorders*. San Diego, CA: Singular Publishing Group.
4. Murdoch, B. E. (2009). *Acquired speech and language disorders*. John Wiley & Sons.
5. Murdoch, B. E., & Theodoros, D. G. (2001). *Traumatic Brain Injury: Associated Speech, Language, and Swallowing Disorders*. Singular Thomson Learning.

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