Outcome of Language-Based Intervention in Persons with Bilingual Wernicke's Aphasia - A Case Study

Veena K.D, Ph.D.
Ayas Muhammed, MASLP
Ms. Niyathi Chopra, MASLP
Venkataraja Aithal U., Ph.D.
Rajashekhar B., Ph.D.

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Abstract

Wernickes aphasia is characterized by jargon utterances with impairment in auditory verbal comprehension, repetition and naming. The goal of the case study was a) highlight characteristic of wernicke's aphasia over the period of therapy b) report the importance of periodic assessment in understanding recovery c) influence of L2 over L1 and overall quality of

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life. We report a case of 47 years old male, diagnosed as Wernickes aphasia as a result of cerebrovascular accident. The case underwent a language based treatment for 6 months and as a result of treatment case improved in communication overcoming with all the linguistic deficits. During the course of therapy, case recovered from wernickes aphasia to conduction aphasia to anomic aphasia equally in both languages. Later, influence of L2 (treated) to L1 (untreated) language noted when therapy was withdrawn in L1 language at the final stage of recovery. A progressive change in the overall quality of life after an intensive speech and language therapy has been documented. This study offers a speech language pathologist with information that motivation of the case and periodic assessment would help to note the progress and consequently plan therapy appropriately.

Key words: *Wernickes aphasia, Recovery Pattern, Cross linguistic generalization, Verb retrieval deficit, Quality of Life.*

Introduction

Aphasia is an acquired neuro-communication disorder caused by brain damage. It commonly occurs due to stroke and is one of the most disabling deficits after stroke in both clients as well as their caregivers. Approximately 18 percent of stroke patients can show persisting communication deficits (Pedersen, Jorgensen, Nakayama, Raaschou, & Olsen, 1995). Wernickes aphasia is one of the types of aphasia, caused by damage to the temporal lobe of the language-dominant area of the brain. It is characterized by often excessively fluent output that contains frequent paraphasic errors and neologisms with severe comprehension difficulty.

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Aphasia treatment efficacy in the past has shown controversy results (Cornelissen, Laine, Tarkiainen, Jarvensivu, Martin & Salmelin, 2003; Robey, 1994). However, speech therapy has shown positive concomitant changes in functional brain organization. Over the last few eras, there have been exhaustive efforts in the area of treatment techniques to improve social communication in aphasia.

The aim of this paper is to highlight a case of Wernickes aphasia, who underwent speech and language therapy for a period of 6 months. Language therapy focused based on the client's specific need was implemented. A detailed report on the recovery pattern, type of errors exhibited in language performance, cross linguistic generalization of speech language therapy and its effect on overall quality of life over a period of first 6 months post onset is highlighted.

Method

Mr. M., A 47 year old male developed, left hemisphere Cerebro-Vascular Accident (CVA) resulting in Wernicke's aphasia. Computed Tomography (CT) scan during the time of insult revealed left parietal lobe sub acute infarcts of the left middle cerebral artery. Second CT scan after a week revealed minimal focal enhancement of left temporal and parietal lobe suggestive of sub acute infarct.

After two weeks, he was referred to a Speech Language Pathologist, with the complaint of having difficulty in speaking. On evaluation, premorbid history revealed that he had education up to 7th grade and was able to speak in three languages (Kannada, Hindi). Client was using Kannada as a social language (L2). Hindi (L1) was his mother tongue and used often at home.

On observation, case was able to speak fluently with severe difficulty in understanding speech, with some irrelevant answers to the questions asked and neologistic utterances. Western Aphasia Battery (WAB; Kertez, 1982; Kannada & Hindi Version of Western Aphasia Battery-

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WAB-K & H) was administered before and after therapy in both L1 and L2. Language intervention was given in both the languages initially.

Test administration was repeated during the course of therapy to assess the recovery pattern of aphasia. After the client showed considerable recovery in his overall language ability, with a little bit of help, early language training kit (Karanth, Manjula,Geetha & Prema, 1999) was used to assess further the residual deficits in various component of language.

Picture naming and word fluency tasks were given to determine the word retrieval deficits as well as a few qualitative differences in their phonological errors following which speech therapy was continued.

The syntax protocol (With a little bit of help: Early language training kit; Karanth, Manjula,Geetha & Prema, 1999) was used with line drawing pictures depicting various morpho-syntactic categories. A score ranging from 1-3 were given depending on the complexity of the morpho-syntactic structures used.

In addition, another set of forty colored pictures representing 20 nouns and their relating verbs were prepared for the word retrieval tasks. Every correct answer was given a score of one. Initially baseline scores were obtained for these two protocols in both L1 and L2 languages, following which treatment was given only in L2 language.

The therapy session would commence on a general conversation note, following which the morphosyntactic and word-retrieval task was performed. The pictures were presented first and asked to describe the picture in complete sentences. The clinician modeled the correct response and asked to imitate initially. For the word retrieval task, the noun pictures were presented first followed by verb pictures. If the case was not able to give any verbal output (> 10 seconds) or gave an incorrect response upon showing the verb/ noun picture stimulus, cues

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were given to the case. Initially semantic cues were given and if still the response was not there the phonemic cues were given.

Post-therapy scores were obtained for both L1 and L2 languages in terms of morphosyntactic categories and noun- verb retrieval abilities. Quality of life was also assessed at specific intervals of time during the course of therapy.

Results

Initially, Case presented with jargon utterances of 2-3 words with severe impairment of auditory verbal comprehension. He was able to repeat single words with some paraphasic errors. There was a significant difficulty in naming which is characterized by circumlocutory and paraphasic speech.

Table 1: Results of the WAB-K & H scores were as follows: (First Evaluation)

Sections		Score (K)	Score (H)
1. Spontaneous speech	i. Information content	5	5
	ii. Fluency	5	5
2. Auditory verbal comprehension		5.9	6.2
3. Repetition		2.4	3
4. Naming		5	4
Aphasia Quotient (Wernickes aphasia)		46.6	46.4

Based on the scores on WAB (K & H) (Table1), client was diagnosed as Wernickes Aphasia. Language intervention was initiated immediately after the evaluation and planned for 6 sessions

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(45 minutes each) of therapy per week. The therapy sessions were conducted in both the languages (L1 & L2) alternatively. Therapy commenced with traditional technique i.e. Deblocking (Weigl & Bierwisch,1970) and facilitation. The primary goals were, to reduce jargon utterances and to enhance verbal comprehension. Verbal expressions with special emphasize on mean length of utterance (MLU) and information content, repetition and word recall were worked upon. After 3 weeks of language therapy (16 sessions), WAB-K & H (Table 2), was re administered and following observations were made. There was a significant improvement noticed in terms of overall auditory verbal comprehension except for the complex sequential commands, and better verbal expression (MLU- 4). Client showed reduced jargon utterances with enhanced information content. However, repetition and naming difficulties with circumlocutory errors with phonemic and semantic paraphasias were persisting.

Table 2: Results of the WAB-K & H scores were as follows: (Second Evaluation)

Sections		Scores	
		K	H
1. Spontaneous speech	i. Information content	5	5
	ii. Fluency	6	6
2. Auditory verbal comprehension		7.5	8
3. Repetition		3.4	4
4. Naming		5	5
Aphasia Quotient (Conduction aphasia)		53.8	56

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As per the scores obtained, the client was diagnosed as Conduction Aphasia. Then the goals were focused on to work upon confrontation naming, rotated and generative naming and repetition. Traditional methods with emphasis on phonemic and semantic cueing were continued to stabilize and further enhance the comprehension and expression. On completion of 28 sessions of training (6 sessions per week for a period of 4 months), WAB K-H were re-administered (Table 3). Overall improvement noticed in all the sections with clinically significant progress in repetition and naming skills. However, difficulty in repetition of complex sentences and occasional naming deficits with phonological errors were noted. Spontaneous speech was characterized by inconsistent errors in morphosyntactic structures. The Scores of WAB-K & H indicative of Anomic aphasia.

Table 3: Results of the WAB-K & H scores were as follows: (Third evaluation)

Sections		Score (K)	Score (H)
1. Spontaneous speech	i. Information content	07	07
	ii. Fluency	08	08
2. Auditory verbal comprehension		8.8	9
3. Repetition		8	8
4. Naming		7	7
Aphasia Quotient (Anomic)		77.6	78

In order to work upon word retrieval deficit, picture naming (noun category) and word fluency (noun categories e.g : animals, vehicles) tasks were given. During the process certain

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phonological errors were noted. Client exhibited phonemic and semantic paraphasias. In addition to these errors omissions, metathetical and neologisms errors were also observed. Some of the errors are as follows: *E.g: /gareefa/ for giraffe, /garase/ for /garagasa/, /tiger/ for /lion/ (code switching), /papaatel/ & /taatel/ for tractor*. On word fluency task, in addition to the above mentioned errors addition and fronting errors were observed. (Few examples are as follows: /mora/ for Mola (Rabbit), /lottry/ for lorry, /bellu/ for bekku (cat), /aurickshaw/ for auto rickshaw). However, the above listed phonological errors were inconsistent in nature with increased frequency of errors during word fluency task in comparison to picture naming task.

With a little bit of help: Early language training kit (Karanth, Manjula,Geetha & Prema, 1999) was used to assess the various components of language during the stage of anomia. In summary, client exhibited difficulty in semantic discrimination, difficulty in judging tense markers, plurals, confusion between past, future and present, plurals, case markers, transitive/ intransitive verbs, PNG markers, sentence types, conditional clauses and participle constructions. In terms of semantics case showed difficulty in paradigmatic, syntagmatic relations, antonym, semantic similarity & semantic contiguity were affected.

The picture description task, revealed that the client exhibited few neologistic jargons, phonemic & semantic paraphasias, with inappropriate morphosyntactic structures. Topic initiation and maintenance skills were found to be affected and case failed to change the topic or repair communication breakdown. Mean Length of Utterance was found to range between 5 to 6 and rate of speech was 38 words per minute with a total number of words were 66. As per the findings, the therapy was focused on working on the morphosyntactic structures and semantically related tasks (word retrieval deficits). Emphasis was also given to improve his language skills related to his profession.   Now, the therapy was taken in only Kannada language (L2). Therapy focused on working on syntactic and word retrieval abilities. Syntax protocol was administered before and after therapy.

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Details of morphosyntactic structure which were worked upon were as follows: plurals (6 sentences), tenses (8 sentences), conjunctions (2 sentences), transitive verbs (2 sentences), participle constructions (3 sentences), transitive verbs (2 sentences), intransitive verbs (3 sentences), case markers (11 sentences), negatives (2 sentences), and comparatives (3 sentences).

Both the languages were considered for the initial baseline evaluations. There was a significant difficulty noticed in conjunctions, case markers and negatives. (Depicted in figure 1)
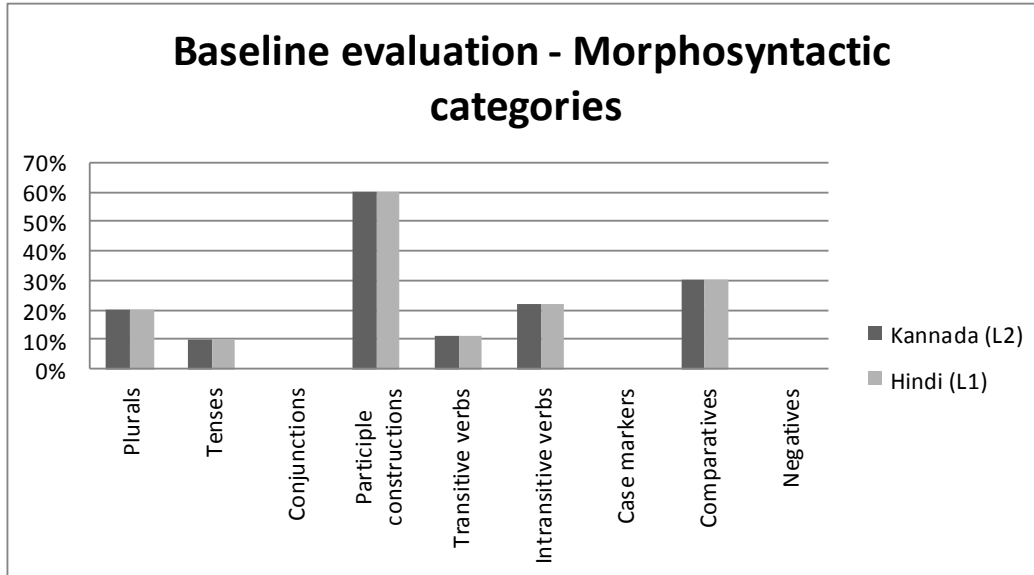

Figure 1: Baseline scores (percentage) of morphosyntactic categories in L1 & L2 .

After 20 sessions of language therapy clinically improvement was noticed on plurals, tenses, transitives, intransitives, case markers, comparatives except in other structures such as conjunctions, participle constructions and negatives, not much improvement seen (indicated in figure 2). Post therapy evaluation in both the languages interestingly revealed equal improvement with occasional errors in plurals, tenses, participal constructions, comparatives.

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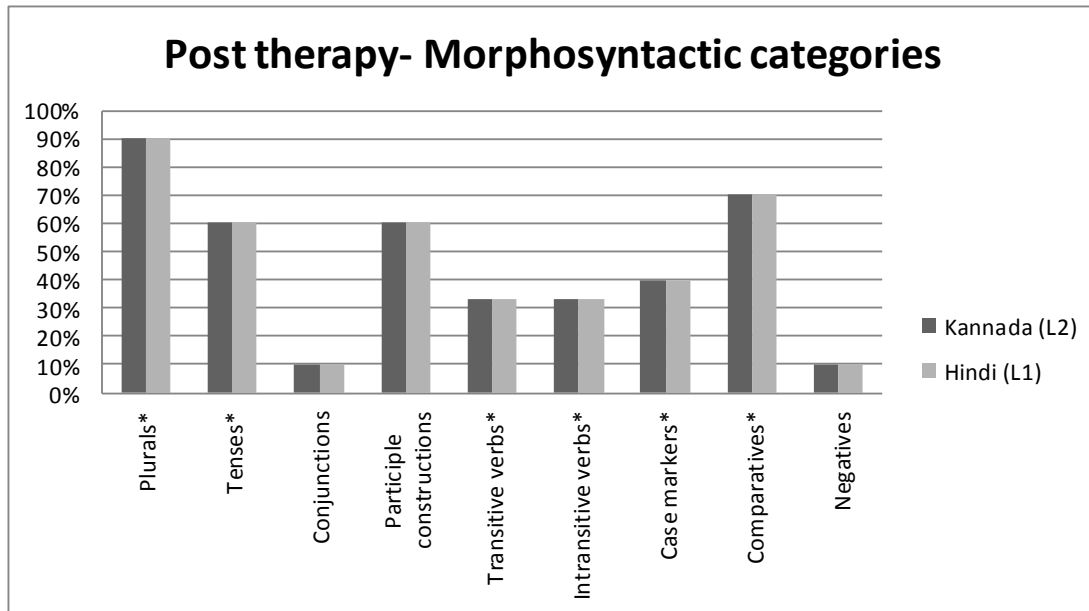Outcome of Language-Based Intervention in Persons with Bilingual Wernicke's Aphasia - A Case Study   734

Figure 2: Indicating post therapy morphosyntactic scores in both the languages

Developed protocol for word retrieval abilities (both noun & verb) were administered before and after therapy. On baseline evaluation of the word retrieval task, verb retrieval deficit was more pronounced than noun retrieval (Depicted in the Figure 3) in both L1 & L2. Verb retrieval in L1 was slightly better than L2; however, the reverse was noted in noun retrieval ability.

Naming errors were characterized by substitution, omission or semantic errors. Code-switching errors, paraphasic errors, perseverations, fewer dysfluencies, and incorrect usage of morphosyntactic structures during verb retrieval task and self-corrections were seen. It was found nouns were easier to retrieve than the verbs.

After 12 sessions (1session=45 minutes) of intensive training for word retrieval ability, case was able to name 38 correctly, out of 45 target verbs, not considering the code switching and phonemic cueing, giving him a percentage score of 84% which indicated substantial

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improvement in the word retrieval abilities (Figure 3). Thus improvement seen at the end of 12 sessions were, improved word retrieval ability with reduced paraphasias and occasional neologisms. Case adopted self correction and code switching to enable him to recall the names of pictures or actions depicted in the picture cards. Also, reaction time taken by the patient was less, average of 5-6 seconds for one word which indicated faster word retrieval ability. After 12 sessions of therapy in Kannada (L1), Mr. M's both noun and verb retrieval ability was improved in trained and untrained languages (Depicted in the Figure 3).
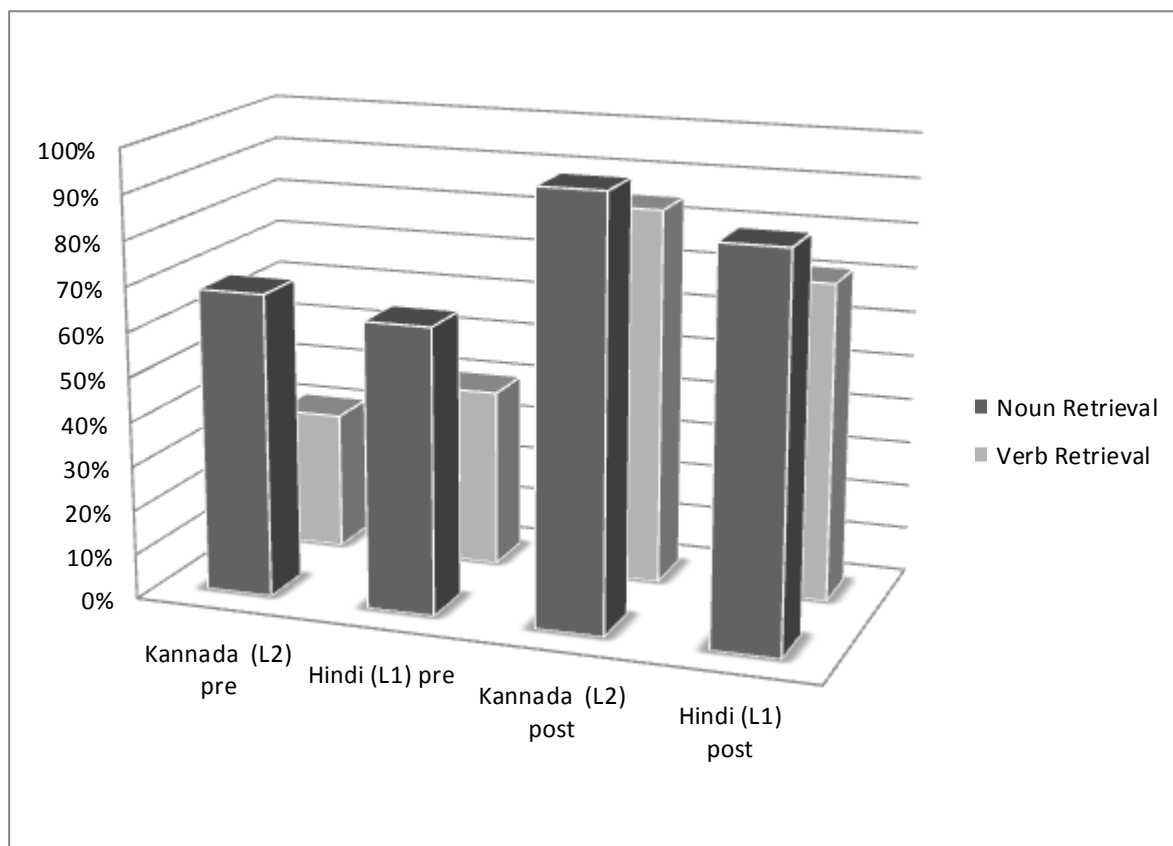

Figure 3: Comparison of noun and verb retrieval ability between L2 & L1 (Pre & Post therapy)

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Quality of Life

Quality of life assessment was also done to assess the social well being of the individual. The case was given a questionnaire which assessed the effect of his illness on physical, communication, psychological and social aspects of life (Remya,2009). QOL assessment was carried out twice, once during the time of his initial diagnosis as Wernicke's Aphasia and the next evaluation was after 3 months of language therapy, where his scores were 51 and 45 respectively (Table 4) indicating improvement in his quality of life. Interestingly, communication aspect of life to be the most affected domain in comparison to other domains, showing a score of 21 and 18 (Table 4) during first and second evaluation respectively. Post therapy scores of QOL indicated remarkable improvement in the communication domain of QOL. Self- rating of QOL at 4th and 6th months post therapy revealed 75% and 90% scores.

Table 4

Quality of life of client at 0 & 3 months post onset.

Domain	0 months	3 months
Physical	6	6
Communication	21	18
Psychological	12	11

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Social	12	10
Overall score	51	45

Patient reported 90% improvement in his communication ability in Kannada. He reports better communication skills in Kannada than Hindi. At this stage of recovery, therapy was terminated and the case was advised for follow up after a month.

Discussion

Findings of the periodic assessment of the present case with Wernicke's aphasia was discussed to understand the parallel recovery in Kannada and Hindi languages, differences in deficits exhibited during the course of management, cross linguistic generalization of L2 over L1 and overall quality of life.

On assessment it was noticed that Mr. M. recovered from Wernicke's aphasia to conduction aphasia to anomic aphasia as reported in the literature (Vukovic, Vuksanovic, & Vukovic, 2008; Kertesz & McCabe, 1977; Pashek & Holland , 1988; Gloning & Quatember, 1964). Initially, equal recovery pattern was noticed in L1 & L2 languages. Bilingual aphasia demonstrates a variety of recovery patterns which are quite distinct from the monolingual aphasics (Paradis, 1977). It was reported in the literature that approximately 61-65% of bilingual aphasics exhibited parallel recovery pattern (Fabbro, 2001; Paradis & Libben, 1987).

Sarno, Silverman, and Levita (1970) found that in the first 6 months fluent aphasics improved more than non-fluent, who improved more than global aphasics. During the second 6 months of stroke, fluent aphasics improved least and the global aphasics were the most. In the present case, the case progressed towards anomia from Wernicke's aphasia during the first six

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months. This could be attributed to regular specific language therapy approach, home training, age, motivation and family support. Bakheit, Shaw, Carrington, and Griffiths (2007) reported that the prognosis of post-stroke aphasia appears to depend, at least partially, on the type of the language impairment and patients with Broca's aphasia had a better prognosis than those with Global and Wernickes aphasia. They also reported that the rate of improvement in language function is highest in the first four weeks after stroke.

Specific linguistic deficits were noticed during the stage of anomic aphasia which was characterized by paragrammatic errors and word finding difficulty. In word retrieval tasks, case manifested inconsistent phonological errors particularly during word fluency than picture naming tasks.

Earlier it is believed that, verb retrieval problems were accompanying chiefly with agrammatism   and noun retrieval difficulties with fluent aphasia (Berndt, Haendiges, Burton, & Mitchum, 2002; Kambanaros & van Steenbrugge, 2006; Kohn, Lorch, & Pearson, 1989; Shapiro & Caramazza, 2003; Williams & Canter, 1987; Kambanaros , 2008).

, in the present case, we found a significant impairment in the verb retrieval than noun retrieval ability with predominant errors in use of morphosyntactic structures and omission and substitution of incorrect marker with the target noun.

Kambanaros (2008) reported that Fluent Aphasics had difficulty retrieving the morpho-phonological form of the target word, hence specific information of the syntactic category is also important during word form retrieval. They attributed their findings to lexemes of nouns and verbs are stored in relatively separate components within the mental lexicon or that form retrieval is differentially affected by semantic & syntactic characteristics during morphophonological processing.

The present case had difficulty in getting the morphological forms of the target noun, the result showed grammatically incorrect sentences with inconsistent patterns and dysfluent speech with syllable, part word or word repetitions at times which indicated that these aphasics during

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the recovery would show verb retrieval difficulty more compared to noun retrieval. Therapy was concentrated both on the morphosyntactic categories as well as picture naming of action pictures helped the case to a greater extent in improving the linguistic aspects.

After 3 months post onset, as the patient wanted to improve his linguistic skills only in Kannada language (L2; the language used for his business), later stages of therapy was given only in one language. Still, untreated language (L1) also showed almost simultaneous improvement, though the therapy was more concentrated on the L2 language which was indicated in the baseline and post therapy evaluation sores in morphological structures and noun and verb retrieval task. The aforesaid description of the present Wernickes aphasia also correlated with the literature findings. Brocas aphasia improved only for the treated language while that in Wernicke aphasia improved simultaneously for both the languages (Watamori, & Sasanuma, 1976).

The present Wernicke's aphasic case attended a 6 hours of therapy per week for duration of 6 months. This intensive therapy with specific treatment techniques, motivation and age of the patient in learning could be the possible reason for greater improvement. It was reported in the literature, that intensive Speech & Language therapy (mean 8.8 hour/week) over a short period of time (mean 11.2 weeks) was more effective than less intense therapy (mean 2 hour /week) provided over a longer period of time (mean 22.9 weeks) (Jordan & Hillis, 2006; Bhogal, Teasell, & Speechley, 2003).

Effective treatment will definitely improve the patient's quality of life and hence they can overcome with their limitations and can participate in the social activities effectively.

Conclusion

To conclude from the present Wernickes aphasia client is that motivation to relearn the language is very important. Periodic assessment would give us an idea of the persisting deficits as well as the recovery pattern of language functions and planning appropriate management and

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to monitor step by step progress. It is important to start intense therapy (6-7 hour per week) and should be initiated during the spontaneous recovery itself for a period of first 6 months. Verb retrieval deficit also can be seen with such Wernickes aphasia indicating morphophonological errors. Parallel recovery was noted in both L1 and L2. A later stage of therapy was given in only one language indicated cross linguistic generalization effect on the untreated language. Though the case had poor quality of life in communication domain during the 0 month post onset period, it was improved over the period of 6 month post onset. Self- rating of the patient's quality of life helped the patient communicate in a society with more confidence. The limitations could be only western aphasia battery was used to investigate the recovery pattern and prognosis. However, overall quality of life improved with lesser difficulty in everyday communication.

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Veena K.D., Ph.D.
Associate Professor
Department of Speech and Hearing
Manipal College of Allied Health Sciences
Manipal University
Manipal 576104
Karnataka, India
r.veena@manipal.edu

Ayas Muhammed, MASLP
Assistant Professor
Department of Speech and Hearing
Manipal College of Allied Health Sciences
Manipal University
Manipal 576104
Karnataka, India

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ayas.kp@manipal.edu

Ms Niyathi Chopra, MASLP
Speech and Hearing Clinic
New Delhi, India
niyatichopra@gmail.com

Venkataraja Aithal U., Ph.D.
Professor
Department of Speech and Hearing
Manipal College of Allied Health Sciences
Manipal University
Manipal 576104
Karnataka, India
vrajaithal@manipal.edu

Rajashekhar B. Ph.D.
Professor & Dean
Department of Speech and Hearing
Manipal College of Allied Health Sciences
Manipal University
Manipal 576104
Karnataka, India
b.raja@manipal.edu

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