Central Auditory Processing Disorder: A Case Study

Vahideh Soltani
Speech & Language Pathologist Master of Linguistics Tehran, Iran

ABSTRACT
This article is a case report of a ten years patient by diagnosed of central auditory processing disorder. He was evaluating after referring to the Newsha hearing institute. The results of the evaluation showed that he has problem in reading and writing skill in silence and in the presence of noise, as well as short-term memory skills and phonemic awareness is in trouble. According to the treatment protocol for the treatment of twelve meeting his cure began specialization and after mastering all the skills in the normal range, and eventually he was released after twelve sessions.

Keywords Central Auditory Processing Disorder; Reading and Writing Skills; Phonological Awareness; Short-Term Memory.

INTRODUCTION
One of the skills that cause to receive and produce speech and language skills are hearing.

Language development requires healthy senses that one of these senses is the sense of hearing. In addition near those people how suffer from hearing loss there are people that without peripheral hearing loss, sometimes have symptoms like hearing loss or impairment of speech and language develop. These people have auditory processing disorders( CAPD).

(C)APD may be due to abnormal neural representation of speech sounds and speech in the central nervous system and can cause hearing loss in children and adults with normal hearing there. In addition, (C)APD can be associated with, or arising out of hearing environment as well. Therefore (C)APD loss can contain several important functions related to processing problems listening and understanding the language; especially in the presence of background noise is created. Likewise, defects in (C)APD may include difficulty in navigation and positioning, auditory discrimination, recognition of auditory patterns; the problem is the processing time and other disorders.

(C)APD patients are usually children in a classroom are facing with listening problem. They are educational deficiencies. (C)APD may be associated with learning disabilities, especially in the areas of reading, spelling, production, problems with verbal orders, and significant challenges in communication and comprehension. In summary, the following symptoms can be seen in children with (C)APD as follows:

• Difficulty hearing speech in noise message
• Location
• Learning a foreign language, jargon and non-routine
• Constant request to repeat the content
• Difficulty in processing rapid speech
• Poor response to verbal stimuli
• Lacking ability of receiving prosodic Speech features (such as the tone of the words)
• Distraction fast external stimuli
• Difficulty in sustaining attention
• Failure to launch verbal commands
• Poor ability in music
• Difficulty in reading, spelling and learning

(C)APD is often difficult to detect. Test results can be ambiguous or difficult to interpret.

Since (C)APD in brain imaging techniques (eg MRI and CT Scan) are not clear, some experts do not consider it as a clinical nature. However, new scientific findings have shown that cannot be doubt in (C)APD presence.

The ( C)APD patients with hearing problems are significantly negative impact on the educational, social and job. This failure may be due to hearing loss or other factors considered. The results of hearing tests they show the disorder of the central nervous hearing device. Meanwhile, the neural representation of sounds in the brain of people with (C)APD is often different from the norm. (C)APD diagnosis must be made by means of the validity of which is specified in the identification of the central nervous system lesions.

* Corresponding Author
Vahideh Soltani

ISSN 2231-2935
Research Article
Unfortunately, the available diagnostic tools, doesn't possible the evaluation of (C)APD in children younger than 7 years because of variability in brain development and central nervous system there. The best way to determine the effectiveness of treatments is using a random, double-blind study. Unfortunately, treatment is often available for (C)APD, such information is not available.

**CASE REPORT**

Ten-year-old female patient with impaired attention and concentration skills of reading and writing and was referred to a specialized center of Newsha. According to expert assessment of central auditory processing disorder was diagnosed for her. Clinic patients completed a questionnaire at the beginning of the family's original complaint which was investigated as follows.

The main complaint of family dysfunction and difficulty is in reading and writing. The family said they sometimes seem not hear their children voices and while in some cases the smallest sounds that others are not able to hear the conversation. In general, cases that family was mentioned in the questionnaire is as follows:

- slow orders and issue some commands in tandem
- Reading and writing difficulties
- unable to do homework in the presence of noise
- Reducing the TV sound
- hear sounds very poor
- neglect sounds, especially when the family is watching TV
- delayed answering questions
- erratic and forgetful
- problem at the start of communication
- anxiety and low self-esteem

After completing the questionnaire the central tests was done by audiologic to identify and after ensuring that auditory processing disorders existence therapy sessions began by audiologic and also done real-time speech and language pathologist, special assessments to provide the treatment.

**ASSESSMENTS MADE**

1. **Memory:**

One thing that is studied in children with central processing disorder is short-term memory. Short-term memory and conscious awareness of concepts that is active both in terms of capacity and in the limited time. In this section we briefly discuss the types that the client was assessed. The memory assessment, the phonemes, numbers, words, sentences and orders were simple and short texts. Evaluation of the first three auditory - verbal only, and audio visual assessment of the Magnesium in the first as well as audio-visual assessment was performed once. From 3 to 7 phonemes phonological memory was performed.

Single Memory were evaluate word of two to seven items. An evaluation of simple commands from a command started and finally ended to four commands. The memory assessment is in the text. The text was read to the child. Then some parts of text ask her as a single word and the main parts of sentence were removed and he was asked to fill in the blanks. The assessment is begun with three-line text and three words were deleted and ended to the 12 line text and delete nine words.

2. **Phonological awareness:**

Based on the principles and rules of the Persian language a test were planned which includes all the consonants and vowels of the Persian language. Assessment of phonological awareness in first, the middle and final place of the word was used. In this section, fractions and the combination of phonological skills, recognize words rhyme, phoneme deletion beginning, middle and end, and the fractions were analyzed syllable.

3 reading and writing in a quiet environment and acoustics room

In this part of the evaluation was assessed as follows:

- read aloud
- Comprehension of read text
- reading non words
- Text Transcription
- write the text to hear like the audio (dictated by programming)

4. **Reading and writing skills in the presence of noise and environmental sounds**

People with auditory processing dysfunction in noisy environments are facing with more difficulty. That's why part of the assessment and treatment should occur in the presence of noise and noisy environment. In this part of the evaluation of those items that were evaluated on the third item.

5. **The high-level language skills**

In this part of the assessment is evaluated the level and complexity of sentences. The bail application is the use of proper pronouns, verbs and subject agreement, including the length, evaluate the percentage of poor construction and unrole sentences. As well as in this section the child control was assessed in sentence construction with the terms of target.

**THE RESULTS OF CARRIED OUT ASSESSMENTS**

at first briefly mentioned to the tests which conducted by audiologic. About audiological tests which per-
formed on the patient first pure ton audiometry-reflex acoustic-tympanometry tests were carried out and the test results were normal, but normal peripheral auditory system of the same word in noise tests were abnormal in both ears Rating Speech perception in noise was a problem. In dichotic digit and SSW test were the left ear rating in integration was abnormal. So based on the test results of the patients with central auditory processing disorder was diagnosed. According to expert assessments of speech and language pathologist, the following results were obtained:

In the memory test results so that his memory four phonological memory and the memory of two single word number two Bvd.hmchyn understand simple commands, he was only able to do two simple instructions. He was unsuccessful in the assessment of short text memory and the only one to remember. The patient had great difficulty reading and writing skills as follows:

- **Reading:**
  1. Recognize letters in words rhyme was poor. For example, in terms of tours and light
  2. Delete the words, remove the symbols of addition, deletion of prepositions and verbs reduction in his final sentences were combined.
  3. Read in the presence of very weak and full of problem noise.
  4. The word reading speed was much better than text.
  5. Non words reading speed was too low.

- **Writing:**
  1. Remove the whole word, final consonant deletion of verbs in dictation was seen.
  2. Add a vowel consonant instead of voice which seen in it.
  3. Write in silence and in the presence of noise was significant.
  4. Transcription errors in programming, but was less than dictate transcription delete the entire word was immense.

Children phonological awareness skills in phonological fractionation, blending phonemes, words rhyme detection, diagnosis and removal of words called phonemes and phonemes early start was in trouble.

The child was having difficulty in writing a short story. His language skills were normal and not a problem.

**TREATMENT**

According to assessment which was done in both speech and language pathology in audiology session and in each part a twelve-session protocol was defined.

From the fourth meeting of protocol in part of audiology which based on the requirements of the initial hearing, speech and language pathology treatment began.

Twelve session protocol of speech and language pathology department meeting can be seen in Table 1.

<table>
<thead>
<tr>
<th>Therapeutic Goals</th>
<th>Meetings</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Increase the memory of hearing a single word of two to three items</td>
<td>First session</td>
</tr>
<tr>
<td>• Dictation Writing in the room acoustics and low speed</td>
<td></td>
</tr>
<tr>
<td>• Training fraction syllable</td>
<td></td>
</tr>
<tr>
<td>• understand two-step commands in room acoustics</td>
<td></td>
</tr>
<tr>
<td>• Increase the memory of hearing a single word of three to four items</td>
<td>Second session</td>
</tr>
<tr>
<td>• Connect the pace dictated more from the previous session</td>
<td></td>
</tr>
<tr>
<td>• reading text word for word with the word down the line that reads</td>
<td></td>
</tr>
<tr>
<td>• Training fraction phonological</td>
<td></td>
</tr>
<tr>
<td>Understand three-step instructions</td>
<td></td>
</tr>
<tr>
<td>• Training in the short three-line memory</td>
<td>Third session</td>
</tr>
<tr>
<td>• dictate programming techniques with acoustic emphasis on prepositions</td>
<td></td>
</tr>
<tr>
<td>• The combination of phonological training</td>
<td></td>
</tr>
<tr>
<td>• Understand the four stages of instruction</td>
<td></td>
</tr>
<tr>
<td>Speed reading (still using drag lines each word)</td>
<td></td>
</tr>
<tr>
<td>• Fifteen shorthand story line</td>
<td>Forth session</td>
</tr>
<tr>
<td>• Increase the memory of hearing a single word of four to five items</td>
<td></td>
</tr>
<tr>
<td>• increase the memory in a short five-line</td>
<td></td>
</tr>
<tr>
<td>• dictate programming techniques with emphasis on the final acoustic acts</td>
<td></td>
</tr>
<tr>
<td>• Learning words rhyme</td>
<td></td>
</tr>
<tr>
<td>• Understanding of the four-step instructions</td>
<td>Fifth Session</td>
</tr>
<tr>
<td>• increase the memory in a short six line</td>
<td></td>
</tr>
<tr>
<td>• dictate programming techniques with emphasis on the final acoustic acts</td>
<td></td>
</tr>
<tr>
<td>• Remove phonological skills training aimed at word</td>
<td></td>
</tr>
</tbody>
</table>
According to twelve protocols meeting the children’s cure were treated and he eventually in twelfth session by improving the skills in assessing impairment as well as increased confidence and motivation to study, was released. Registration of short-term memory in normal as well as reading and writing skills in a relaxed environment improved in the presence of noise. The phonological awareness skills he fits his peers. The results of the treatment and comparison of skills before and after treatment in Figure 1, 2 and 3 are separated.

<table>
<thead>
<tr>
<th>Session</th>
<th>Activities</th>
</tr>
</thead>
</table>
| Sixth session | • naming words that begin with the target phonemes  
• Increase the memory of hearing a single word of five to six items  
• Dictate programming with emphasis on acoustic techniques on the final phoneme  
• Remove phonological skills training aimed at word  
• Naming words that begin with the target phonemes |
| Seventh session | • Increase the memory in a short seven-line  
• Twenty-linear narrative shorthand  
• Dictate programming with emphasis on acoustic techniques on the final phoneme  
• Naming words that begin with the target phonemes |
| Eighth session | • Dictate writing in the presence of noise by 30db Frequency  
• Reading the text in the presence of frequency noise 30 db  
• Increase the memory in the eight short lines  
• Naming their final position is the target phoneme words |
| Ninth session | • Dictate writing in the presence of noise by 40db Frequency  
• Reading the text in the presence of frequency noise 40 db  
• Increase the memory in a short ten-line  
• Naming their final position is the target phoneme words |
| Tenth session | • Dictate writing in the presence of noise by 50db Frequency  
• Reading the text in the presence of frequency noise 50 db  
• In the middle is called a target phoneme words |
| Eleventh session | • Dictate writing in the presence of noise by 60db Frequency  
• Reading the text in the presence of frequency noise 60 db  
• Increase in short text twelve linear memory  
• In the middle is called a target phoneme words |
| Twelfth session | Final evaluation  
• Dictate writing in the presence of noise by 70db Frequency  
• Reading the text in the presence of frequency noise 70 db  
• Increase the memory in the eight short lines  
• Naming their final position is the target phoneme words |

**Figure 1: reading and writing skills**
CONCLUSIONS

We can never use this way for all patients. The specific treatment for each patient should be based on existing conditions designed. In the treatment of auditory processing disorders in line with other language disorders treatment is based on the assessment. Part of treatment is accurate and scientific evaluation and with an accurate assessment can be very short treatment time than what is thought, that.

REFERENCES

