

Apraxic and Dysarthric verbal Rehabilitation

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Abstract

Verbal rehabilitation whether it is apraxic or dysarthric is a process of improving or compensating skills of communication as they have been affected by sensory or motor lesion. Speech pathology, the particularized form of treatment plays an important role in rehabilitation particularly for patients who are treated from accidents or neurological illnesses such as strokes as well as those who suffer from articulators' muscular dystrophy due to motor disorders. Rehabilitation is given by specialized pathologists who face to face deal with patients through therapeutic approaches and compensatory strategies to compensate, retrain or restore their faculties to comprehend, speak and express themselves effectively as well as participating entire wellness and independence.

ملخص

يُعدّ التأهيل اللفظي، سواءً كان عجزاً حركياً أو عسراً في التلفظ، عمليةً لتحسين أو تعويض مهارات التواصل المتأثرة بإصابة حسية أو حركية. ويلعب علم أمراض النطق، وهو شكل متخصص من العلاج، دوراً هاماً في التأهيل، لا سيما للمرضى الذين يُعالجون من حوادث أو أمراض عصبية كالسكتات الدماغية، وكذلك المصابين بضمور العضلات الناتج عن اضطرابات حركية. ويُقدّم التأهيل من قِبل أخصائيي أمراض النطق الذين يتعاملون مباشرةً مع المرضى من خلال مناهج علاجية واستراتيجيات تعويضية لتعويض أو إعادة تدريب أو استعادة قدراتهم على الفهم والتحدث والتعبير عن أنفسهم بفعالية، فضلاً عن تعزيز صحتهم واستقلاليتهم.

Keywords

Apraxia, dysarthria, rehabilitation, lesion, disorder, retrain, pathologist, muscular, compensate, dystrophy, stroke, restore. DTTC, RRC, AAC.

Introduction

To communicate meaningful messages, speakers must have all elements of speech; the concepts, their container in the brain, the track they pass through, the place where these concepts are transformed into words, phrases and sentences as it contains the phonological and morphological competence to form syllables, feet, prosodic words and grammatical words as well as the syntactic knowledge to form sentences. When mental ingredients of speech are ready, they are transmitted through the motor cortex to the articulators and organisms associated with them such as lungs to invest air stream mechanism for phonation and velopharyngeal mechanism for adjusting oral and nasal resonance so as all concepts can be manifested phonetically. Anything wrong or damage to the brain or mental stage that comprises comprehension and phonological processes of speech, a speaker is apraxic whereas a damage to the motor cortex that weakens the muscles of articulators and the associated mechanisms. Such a speaker is called dysarthric. Treating both speakers depends on the case evaluation and severity that the speech- language pathologist (SLP) specifies.

Research problem

Individuals with apraxia and dysarthria suffer from social and emotional problems due to the reduced intelligibility that effects communication.

Research aim

Apraxic and dysarthric rehabilitation including various strategies and therapies aimed at improving the ability of apraxic and dysarthric individuals to speak and communicate.

Research objectives

- 1- To specify the cause and severity of the disorder.
- 2- To make speech impairment more natural and effective during communication.

Research questions

- 1- What are the speech rehabilitation strategies and therapies for apraxic and dysarthric individuals?
- 2- What role do therapies based on technology play in dysarthric and apraxic rehabilitation of speech?
- 3- How does apraxic and dysarthric rehabilitation affect the social and emotional development of individuals?

Motor Speech Disorders

Whether they are physical or mental, motor speech disorders are either inability of muscles of articulators to produce speech which is dysarthria or mental planning to send speech messages to muscles of articulators that is apraxia. Both of these disorders mean disconnecting between mental and physical mechanisms of speech production in a sense a difficulty in matching the mental messages of speech with muscles of articulators and lungs. Motor speech disorders are due to several brain diseases such as strokes, brain tumors, dementia, Parkinson or accidents.

Verbal apraxia

Speech is a process of coordination or communication between mental programs and articulators. Brain programs especially in the left hemisphere that is connected with the comprehension of a language comprises temporal lobe, the concepts reservoir, Broca's area where word - formation process is fulfilled and the motor cortex, the bundles of specialized nerve fibers that transmit words, phrases and sentences with their associated surface and hidden meaning from that area to the articulators and related organs. When we want to speak, concepts are convoked from the temporal lobe as an electrochemical energy due to the firing of specific nerve cells called ligands or neurotransmitters to the anterior part of Broca's area where specific receptors of consonants are ready to be activated to receive the consonant signal held by that ligands and deactivate the others so as the medial part of the area where the vowel receptors are ready to be activated for permitting a vowel signal held by a specific ligand and deactivate the others. This alternative process of receiving consonants and vowels is completed at the posterior part of Broca's area where syllables, words, phrases and sentences are formed and ready.

Except the motor cortex (Rutkiewicz, Hanczewska, 2020), any damage to the above mentioned brain centers and their pathways such as the temporal cortex where concepts are stored, the ligands, the energy passes through, the Broca's area, its anterior part where consonant receptors are located, its medial part where vowel receptors are located, its posterior part where syllables, words, phrases and sentences are formed by illnesses or accidents will results in insufficiency or delay in opening and closing all receptors, missing or losing the specific receptor. All these will lead to speech impairment. Though he has a phonological competence, the meaning of the words he wanted to say and healthy articulators and their muscles, apraxic speakers fail to encode messages of those words phonetically (Ziegler, W. 2008) as he can't plan and order the movements suitable for those words. We can observe such disorders in persons who substitute a sound for another, prolong, truncate or add

irrelevant sound to a word or a word to a sentence so the pathologist needs to work on improving apraxic articulatory accuracy and raise his automaticity.

Symptoms of apraxia

- 1-Apraxic patients are unable to produce the correct phoneme in the word such as substituting voiced by unvoiced sounds as in ‘tap’ instead of ‘gap’
- 2-They add, repeat or omit a syllable of the word as in ‘sorder’ instead of ‘disorder’
- 3-They slow speech rate.
- 4-They are unable to start, restart or false start their speech.
- 5-They place the same stress on all syllables of the word.

Techniques for treating verbal apraxia

Apraxic individuals can develop their speech production and communication abilities by applying different treatment techniques and therapies such as Dynamic Temporal and Tactile Cueing treatment (DTTC), Rate and Rhythm Control methods (RRC) and Augmentative and Alternative Communication devices (AAC) (Maas, Neumann, Jakielski and Stoeckel. 2014). DTTC that uses external visual, auditory and somatosensory cues is a mechanism schemed with specific purposes in a real environment to stimulate a patient to perform a definite motor activity. It is integral stimulation as it integrates cues, motor learning and modeling to improve speech target production such as tactile, visual, auditory and proprioceptive cues. DTTC is hierarchical as the more accurate the independent speech movement is the less the support will be.

(RRC) techniques were used to help apraxic speakers to initiate their speech by using regular rate control and hand – beating. They were trained to prolong the first segment or syllable in mono, di, tri or multi-syllable words with different stress placement and to follow the rhythm made by the therapist’s hand-tapping on the table so as to produce each syllable rhythmically. After three sessions of training, the patient is asked to mark each word in a sentence in accordance with rhythm.

(AAC) are two different strategies addressing the patients to communicate meaningful messages. To augment means to add something to your speech such as sign language, pictures, smartphone, tables or picture exchange to clear up your message to your partner. Alternative communication is a different way to communicate if you are unable to speak or your speech is not understood by others in a sense it helps functional communication and reduces frustration.

Verbal dysarthria

It is a case of people suffer from a damage to specific cranial nerve system and part of spinal system that weaken muscles of air stream mechanism, velo-pharyngeal mechanism, voicing or phonation mechanism, lips, tongue, mandible and facial muscles due to brain diseases such as deterioration of brain cortex, brain stem tumor, cerebellum damage, extrapyramidal malfunction, damage of basal ganglia, accidents or exposing to poisonous cases. When such a speaker wants to communicate, the words, phrases and sentences formed in the posterior part of Broka's area are ready to be transmitted by the motor cortex to the neuromuscular junctures of the articulators and lungs where the electrochemical energy is transformed into electric potential to hold the speech signal and send it to the outer sheath of articulators' muscles and activate the air stream mechanism.

Any damage to the bundles of nerve fibers of the motor cortex, the electrochemical energy transmitted, neuromuscular junctures and the electric potential passes through will affect the muscles of the articulators and lungs such as weakness of respiration muscles sends weak puff of air, paralysis of recurrent nerves affect the vibration of the vocal cords, muscles of mandible affect the movement of lips as well as the shape and size of the oral cavity that affect the degree of oral resonance or quality of oral speech, damage to velo-pharyngeal nerves affect differentiating between oral and nasal sounds, a damage the tongue nerves affect its movements to shape consonants and vowels into distinguished syllables and words within which the rhythm and intonation of speech are formed to address the surface and vertical meaning. Lips nerves damage affect the bi-labiality of /p/, /b/, /m/, /w/. A dysarthric person may suffer from one of the following speech defects;

- Unclear monotonous speech with difficulty in starting words or sentences due to the pyramidal malfunction that distorts the movement coordination of subconscious muscles. Such dysarthria is called hypokinetic.
- Slow, quivering, breathy speech with abnormal beats and vibrated movements. Such dysarthria is called hyperkinetic
- Undistinguished and in-coordinated speech due to the damage in the cerebellum that regulates movements is alaxic dysarthria
- Inability to pronoun consonants due to the damage in the brain stem that connects the brain with parts of the body through spinal cord is called flaccid.
- The weakness of the whole body muscles affect the speech due to damage to some brain motor neurons is called spastic.

Speech Language Pathologist (SPL) advises to do some physical exercises and techniques to regulate the process of breathing to correct speech defects, strengthen muscles of articulators and do some pauses to slow down the speech (Perrota, G. 2020).

Evaluation.

Evaluation process of speech- language disorders comprises behavioral observation to specify the person's skills in real life, highly advanced testing tools and apparatus are used to specify the speaker's defects and compare him with his equals and interview of a person and his family to get the case history for identifying the care (Oller, J. 2012).

Therapy of communication disorders.

Therapy, the treatment of disordered people, includes speech therapy and language therapy. Speech therapy is given to people suffer from articulation disorders such as those who have difficulty in making syllables as in deleting, substituting, adding or repeating the consonants of those syllables, those who are producing words in a way that can't be understood by listeners. People suffer from fluency disorders such as stuttering by which speech flow is interrupted by wrong pauses, quick repetition or prolonging of a syllable or segments of a syllable and disorders of voice or resonance as in people suffer from addressing the needed tone to its specific word which misleads the listener and spoil the communication process (Hayes, K. RN. 2022).

Language therapy is given to people suffer from certain problems in understanding or ordering words for communicating concepts due to the disorders in receiving and processing information, socializing or expressing ideas in a suitable way and cognitive disorder that comprises solving problems, regulating and organizing ideas, perception, attention and memory (McNeil, M, 2016)

Physical Rehabilitation

Rehabilitation is the process of developing the nature of life to those people who are suffering from speech disorders and communication problems as well as swallowing. It is accomplished through improving self-confidence, independence, the ability to comprehend- to express ideas-to think and feel. Increasing vocal quality, early language skill, school readiness for children and the function of easy swallowing. Rehabilitation depends on the type and severity of disorder each person has and developing a detailed plan of care for that person. Individuals specialized for apraxic and dysarthric rehabilitation are

called speech-language therapists or pathologists (SLP). They evaluate, diagnose, treat and help along the life of people who suffer from difficulties in communicating with others. After evaluating the case, SLP outlines an individualized therapy program that satisfies each person's communication and swallowing demands and suits their environment, age and sex (Ogar, J. R, Amici, S, Slama, H, Gorno, M. L. 2006).

The speech therapist's aim is to develop the person's functional results through supplying suitable linguistic and cultural services, to blend academic experts with the goals for fruitful treatment, make use of data gathered about treatment and performance to specify effectiveness of program chosen for that treatment and the suitable frequency as well as intensity given to it.

Psychosocial Rehabilitation

Apraxic and dysarthric individuals usually suffer from psychological, emotional and mental problems such as stress, depression and anxiety as a result physiotherapist rehabilitates these problems as well as physical recovery by the regular assessment to the psychological behavior side by side with the physical improvement. Mental illnesses usually influence several fields of life and affects psychosocial and biological systems strongly. During this period of illness, the patient passes through a transitional point that makes him/her lose some of his functionality so programs of psychosocial rehabilitation help him/her feel empowered to achieve his/her goals by developing his/her abilities through practicing in the domain of life in safe physical and social environment in all locations such as cooking under supervision of professionals to embody the ability of interpersonal problem-solving, self-esteem, management of stress, resilience and mental toughness, to connect the patient with his/her family, school, friends and workmates safely. These programs urge the patients to be moralized and hopeful about the future. Professionals also offer patients skills and support they need to build social relationships in their community and make the goal a reality.

Intercession.

To stimulate the development in producing syllables, words or sentences phonetically, speech therapist interacts with individuals by chatting, playing, using objects or pictures, repeating easy structures and showing tongue positions and facial expressions in a clear

way on condition that the level of function is age, sex and need appropriate (Darawsheh, W, Natour, Y.S, Damhoureyeh, M. 2020).

Recommendation

Some features of the rehabilitation process have been the matter of investigation by physiotherapists. Greater research findings on apraxic and dysarthric patients have been summarized by Mass, Neumann, Jakielski and Stoeckel 2014, Perrota, G. 2020, Hayes, K. 2022, McNeil, M. 2016, Orgar, J. R 20006, Darawsheh, W. 2020. Though these findings have developed understanding both the physical and psychological dimensions of rehabilitation process, some cases of apraxia and dysarthria remain for future study, for instance cases due to strokes or cancers. Research is now in his way to detect more about verbal rehabilitation and to specify the effectiveness of obstructed ways in prejudging untimely functional deterioration.

Conclusion

Apraxia and dysarthria are speech disorders that appear on persons due to different causes. Apraxia occurs due to a damage to some of the brain centers that are responsible for comprehension and concepts such as the temporal lobe where concepts are stored and Broca's Area in which words, phrases and sentences are formed. Apraxic speakers though the muscles of their articulators are not affected are unable to produce all forms of speech to communicate with others. Dysarthria, on the other hand happens due to the damage to the motor cortex that activates all muscles of the body and specifically those that are responsible for moving articulators and mechanisms associated with them to complete the process of speech. Rehabilitation depends on the type of disorder that (SLP) evaluates whether it is orally, physically or medically.

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