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## Speech Disorders of the Type of Aphasia after Right Hemisphere Stroke in Right — handed People — a Case Study

### Zaburzenia mowy o typie afazji po udarze prawej półkuli mózgu u osoby praworęcznej — studium przypadku

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#### Abstract

**Introduction.** Aphasia is acquired disorder or loss of language skills, following various types of organic brain lesions, e.g.: a result of stroke, craniocerebral trauma, malignancies. It leads to the inability to express thoughts in words, or the inability to understand speech. Speech made in specially prepared speech centers in the brain dominant hemisphere. In right-handed people, these centers are located in the left hemisphere of the brain, with left-handers in most cases are located in the right hemisphere. There are also cases of so-called. Aphasia hybrid, occurring in a right-handed as a result of damage to the right hemisphere of the brain. In clinical practice, neurologists, speech and aphasia are divided into: motor, sensory, sensorimotor, and amnesic total. The issue of aphasia, and its definition, always aroused excitement and controversy.

**Case Report.** The case study concerns the 42 year old woman with a diagnosis of ischemic stroke in the form of left-hand hemiparesis with aphasia mixed, as state after subarachnoid hemorrhage and aneurysm embolization of the middle cerebral artery on the right side.

**Discussion.** There are many factors determining the patients return to full language skills. Among other things, proper identification of the nature of the disorders of speech and correct anamnesis, well-structured speech therapy program, the time of initiation of therapy, frequency of exercise, individual pace of recovery from aphasia. A very important factor determining the healing process of the patient is resistant to stress.

**Conclusions.** In the treatment of people with aphasia should strive for a state in which the patient will be able to communicate with the environment. It should first of all make a diagnosis, gather intelligence, to create a treatment program tailored to the individual patient's situation, begin treatment as soon as possible, to give the patient the opportunity to frequent office visits for speech therapy, take care of his emotional state. (JNNN 2015;4(1):30–34)

**Key Words:** aphasia, speech disorder, stroke, speech therapy

#### Streszczenie

**Wstęp.** Afazja to nabyte zaburzenia lub utrata zdolności językowych w następstwie różnego rodzaju organicznych uszkodzeń mózgu, np.: w wyniku udaru mózgu, urazu czaszkowo-mózgowego, zmian nowotworowych. Dochodzi wówczas do niemożności wyrażania myśli słowami lub niemożności rozumienia mowy. Mowa dokonuje się w specjalnie do tego przystosowanych ośrodkach mowy w mózgu dominującej półkuli. U osób praworęcznych ośrodki te znajdują się w lewej półkuli mózgu, u leworęcznych w większości przypadków zlokalizowane są w półkuli prawej. Istnieją również przypadki tzw. afazji skrzyżowanej, występującej u praworęcznego wskutek uszkodzenia prawej półkuli mózgu. W praktyce klinicznej neurologów, jak i logopedów, dzielą afazję na: motoryczną, sensoryczną, sensomotoryczną, całkowitą i amnestyczną. Zagadnienie afazji i jej definicji, zawsze budziło emocje i kontrowersje.

**Opis przypadku.** Studium przypadku dotyczy 42-letniej kobiety z rozpoznaniem niedokrwiennego udaru mózgu pod postacią niedowładu połowicznego lewostronnego z afazją mieszaną, jako stan po krwawieniu podpajęczynówkowym i embolizacji tętniaka tętnicy środkowej mózgu po stronie prawej.

**Dyskusja.** Istnieje wiele czynników warunkujących powrót pacjentów do pełnej sprawności językowej. Między innymi właściwe rozpoznanie charakteru zaburzeń mowy i prawidłowe zebranie wywiadu, dobrze skonstruowany program terapii logopedycznej, czas rozpoczęcia terapii, częstotliwość ćwiczeń, indywidualne tempo wychodzenia z afazji. Bardzo ważny czynnik decydujący o procesie zdrowienia to odporność pacjenta na stres.

**Wnioski.** W terapii osób z afazją należy dążyć do stanu, w którym chory będzie mógł komunikować się z otoczeniem. Należy przede wszystkim dokonać diagnozy, zebrać wywiad, stworzyć program terapeutyczny dostosowany do indywidualnej sytuacji pacjenta, rozpocząć możliwie jak najszybciej terapię, dać choremu możliwość do częstych wizyt w gabinecie logopedycznym, zadbać o jego stan emocjonalny. (PNN 2015;4(1):30–34)

**Słowa kluczowe:** afazja, zaburzenia mowy, udar, terapia logopedyczna

## Introduction

Speech is the basic form of communication between people. Speech disorders that arose as a result of damage to the speech centers in the cortex are called aphasia.

It leads to the inability to express thoughts in words, or the inability to understand speech [1]. According to Barbara Wisniewska, speech is one of the higher nervous activities, and aphasia is one of the forms of their disorders [2].

In literature one can find numerous definitions of aphasia. According to an eminent neuropsychologist Mariusz Maruszewski “aphasia is a partial or total disorder of the mechanism programming human speech acts already mastered by the man, caused by organic damage to relevant brain structures” [3]. Maria Pąchal-ska, in turn, indicates, that: “aphasia is an acquired disorder or loss of language skills resulting from various types of organic brain damage”. According to the aforementioned definition, aphasia always results from brain damage which can be related to various reasons including: stroke of an ischemic and hemorrhagic nature, cerebrovascular and craniocerebral injuries, cancer, degenerative diseases which attack the central nervous system [4].

Speech as a system takes place in a specially adapted speech centers in the brain dominant hemisphere. In right-handed people, these centers are located in the left hemisphere of the brain, with left-handers in most cases they are located in the right hemisphere [5]. Studies indicate that the issue of handedness is not so obvious. Many left-handers were switched to handedness. It happens that these people do not know they are genetically conditioned to left-handedness. Relevant research leads to the observation that the handedness of a person is not a uniform and unambiguous feature. It is difficult to divide people into the right-handed and left-handed, as in many of them there is observed a kind of mixture of preferences. There are known cases of hybrid aphasia. Aphasia occurs in a right-handed person as a result of damage to the right hemisphere of the brain. In these patients since the beginning of the development for the unclear reasons, the right brain hemisphere took over responsibility for speech. It should also be noted that even in the case of classical organization of brain func-

tioning, ie. in a right-handed person, where the areas responsible for producing and understanding speech are located in the left hemisphere of the brain, the right one also plays a role in the language functioning and loss of these functions due to brain damage is not indifferent to speech.

Until recently it was thought that in people with the right hemisphere of the brain damaged, speech and language disorders as such did not occur. Recent years have brought significant changes to these views. Today we know that in patients with the damage to the right hemisphere of the brain, we can observe: dispragmatism, subtle paraphasia, forgetting words, including names and proper names, which often leads to periphrasis [6].

Aphasia is perceived as different states of communication disorders ranging from mild to severe, when the patients are not able to speak and do not understand their own language, as well as writing [7].

Speech disorders are usually accompanied by other cognitive disturbances, including attention, memory, perception, spatial orientation. The loss of language skills destructively affects the thinking [8].

Aphasia has been the subject of numerous studies on the basis of which its various forms are distinguished [9]. Problems with the classification of aphasiac symptoms classification problems have appeared in the first years of research on aphasia. Although this problem has been analysed for more than a century, the issue of the classification or definition of aphasia still has not been resolved. Current classifications largely refer to the classical ones, but also there have been formulated new attempts, with the use of achievements of modern disciplines in the field of neuropsychology, neurosociology, neurolinguistics, linguistics, neuroscience [10]. The issue of aphasia, dysphasia and their definitions, has always raised numerous emotions and controversy among speech therapists. In practice, however, neurologists and speech therapists divide aphasia into the motor, sensory, sensorimotor, total, amnesiac one [11].

Jadwiga Szumska points to the fact that the division into the motor aphasia, sensory and mixed one stood the test of time and all of its forms can thus be dealt with accordingly. One reservation is that the motor and sensory aphasia in its pure form occurs rarely and what we observe is a mixed aphasia [12].

The aim of the study was to describe the clinical picture of a right-handed patient's aphasiac disorders after stroke in the right hemisphere as well as to observe speech and language rehabilitation progress over the five years.

## Case Report

The subject of research is a 42-year-old woman with higher education, right-handed (denies that she that was adjustable for right hand), married, mother of two children, living in the city since she was born. Before the disease she had been professionally active, working as a nurse. She has always been perceived as an emotional, very sociable and helpful person, eager to start new contacts, leading healthy lifestyle, without any bad habits. She had had no problem with health by then. She was at the Hospital Emergency Department due to a severe headache lasting for two days with a stiff neck. Head CT was performed. The description indicated no traumatic change in bones in the field of bones of the cranial vault. In terms of the skull pericerebral base cisterns and in terms of furrows and curves of the cerebral hemisphere, particularly on the right side, blood was visible — the characteristics of subarachnoid hemorrhage. Apart from that, no perceptible lesions in the brain tissue and cerebellum were observed. General cerebral edema of hemispheres was observed, more on the right — smoothing furrows and curves. Ventricular system was not expanded, symmetrical, without displacement. Skull base pericerebral cisterns were clenched. Posterior fossa structures were in normal condition.

Angio-CT of cerebral arteries with contrast was performed. In the angio-CT examination of the brain at the site of the middle cerebral artery bifurcation on the right side of the branch (insular part, segment M2) widening of the vascular lumen was visible — a 6 mm aneurysm. Lesions of cerebral arteries in the range not identified.

Neurological examination revealed nuchal rigidity, without disturbance of consciousness. The patient was transferred to the Neurosurgical Department at dr Jan Biziel University Hospital in Bydgoszcz, where embolization of aneurysm of the middle cerebral artery on the right side was performed. In the postoperative period there occurred mixed aphasia with left-sided hemiparesis. A few days after the operation the woman was transferred from the University Hospital in Bydgoszcz to the Department of Neurology with the Stroke Unit at the Provincial Hospital in Włocławek

On the second day of her stay, there occurred massive left-side hemiparesis. Head CT showed in the fronto-temporal lobe and in the right temporo-occipital lobe hypodense areas 27x29 mm and 35x45 mm hypodense

areas, 18 and 22 HU dense — ischemic. Bleeding strips in the fronto-temporal and temporal right areas, of density up to 57 HU, the left hemisphere of the brain was in normal condition. Ventricular system symmetrical not expanded. Pericerebral fluid spaces filled. Posterior fossa structures in norm.

After acute symptoms had subsided, neurologopedic diagnosis was made. The patient was examined with Jadwiga Szumska's test for aphasia testing [12]. She was diagnosed with language dysfunction of significantly advanced sensory type of aphasia, in form of speech disorders at the level of interpreting the meaning of long and complex statements and significant difficulties in building up spontaneous speeches. Sentence scheme was broken, statements were chaotic characterized by excessive detailing.

Often, the patient could not start the speech, because of difficulties with the verbalization of thoughts, she could not arrange the content of thinking in linguistic structures, had considerable problems with abstract thinking. The ability to repeat was somewhat limited. The ability to point to the desired objects, actions and their designates in pictures has been preserved. However, there were reported difficulties with naming, caused by replacement of similar-sounding vowels, the patient was trying to find words which sounded similarly.

There occurred large difficulties in the selection of appropriate vocabulary, particularly in the course of speaking on her own. Having been suggested the first sound or syllable she found it easier to find the appropriate word. Sound distortion and paraphasia could be heard in the speech. present. There has been aphasiac alexia, agraphia, and a significant degree of acalculia disorder. Spatial orientation was a bit difficult, whereas in the scheme of the body it was without any reservation. Praxia and agnosia were correct. Motor efficiency of articulation organs was slightly weakened, mainly lips. The patient showed disturbance of attention. She showed little fatigue and high willingness to take effort.

On the basis of the diagnosis of speech disorders the treatment plan was developed.

After stabilization of health condition, speech improving exercises were commenced. They were performed 2–3 times a day, however no longer than 10–15 minutes. The patient was making a positive contact with a speech therapist, and she willingly participated in the therapy. The set of exercises was selected and adjusted according to current difficulties in understanding and expressing speech. The patient was applied both active and passive exercises aimed at improving motor skills and coordination of the speech organs (with special attention paid to the exercising the lips). There were applied exercises at the level of sounds, words, and sentences. Sounds of similar pronunciation were differentiated. Listening comprehension was being developed.

A practical knowledge of grammar was being improved. Pictures including simple activities were being described, and sentences constructed. Particular attention was focused on names update. Reading and writing exercises were included.

The patient stayed in the Neurological Department for 12 days. On the day of discharge, neurological examination revealed left-sided hemiparesis with a predominance in the upper limb with facial paresis and subsiding mixed aphasia. Still there was a problem regarding the verbalization of thoughts, replacement of similar-sounding vowels and consonants, selection of appropriate vocabulary in the course of speech as well as alexia, agraphia and acalculia.

The patient was sent in good general condition to the rehabilitation ward, where she stayed for three weeks. During this period, paresis significantly subsided, whereas the aphasiac symptoms remained although were slightly softened. The patient showed signs of depression. Therefore, pharmacological treatment and psychological therapy were applied. Having returned home, the woman was subject to speech therapy care in the speech therapy clinic, where she has still been attending. She also participated in three rehabilitation courses. After nearly five years after the onset, aphasiac symptoms are still present, and the patient's mood is often lowered.

## Discussion

Literature indicates that strokes constitute the third most frequent cause of death and one of major causes of disability. This disease usually occurs mostly in older people, however 25% of strokes regard persons under 55 years of age [13].

The woman, whose case was presented in this paper became ill at the age of 42. There are many factors determining patients' return to full language skills. Appropriate identification of the nature of speech disorders and appropriate information obtained directly from the patient or the patient's family are among those considered [14].

Assessment of the type of speech disorder is a diagnosis, consisting in the determination of the degree and type of defect. The patient was examined by means of the aphasia test by Jadwiga Szumska. Descriptive language, dialogue skills, automatic word strings were evaluated. The diagnosis covered: speech comprehension, repetition, naming, praxis, agnosia, spatial orientation, reading, writing and counting were evaluated. The speech therapist also collected detailed history of the patient's family. Based on research and the interview, a program of therapeutic proceeding was drawn up.

The factors which give optimal opportunities to improve speech include a well-structured speech thera-

py program. Literature provides that determination of the appropriate therapy programme requires adjustment of methods, exertions and exercises. Using the phenomenon of brain plasticity, skills preservation as well as the objective needs of the patient, we try to find appropriate techniques for the reconstruction of disturbed linguistic structures and broken communicational relations [15]. It is worth realising that patients' skills, their physical and mental fitness have the key role in the therapeutic programme. We try to start from the matters which are closest to the patient. We get to know their tastes, interests. The information is gained from the family, and is then used in the prepared exercises. The level of difficulty should be varied, it should be ensured that activities are properly adjusted to abilities [16]. In the case of this patient, speech therapy methods had been adapted to the nature of speech disorders and their degree as well as to her physical and mental abilities, her age, education and interests.

A very important factor deciding on the recovery process, included personality traits of a person suffering from aphasia, such as resistance to stress, positive attitude. Quite often aphasiac disorders are accompanied by emotional disorders, including depression, neutralization, irritability, mood swings, sometimes aggression, self-absorption [17]. The patient showed a depressed mood.

The time of therapy initiation and its frequency also matters. It determines patient's faster return to full communication competence. Literature says about a possibly soonest commencement of rehabilitation and about including the family in the therapeutic collaboration [18]. In this patient's case the therapy started immediately after acute symptoms of the disease had subsided. Exercises were performed 2–3 times a day, not longer, however, than for 10–15 minutes, the patient's husband was included in the cooperation. After returning from the rehabilitation ward, the speech therapy has been taking place extremely rarely, only twice a month. The optimal frequency of exercise is 3–4 times a week, or even every day.

Literature also points to the individual pace of recovery from aphasia. Many patients recover spontaneously without treatment. Maria Pačalska refers to the fact that within a year and a half from the onset of the disease, many patients exhibit spontaneous improvement in speech, regardless of the fact whether or not they receive therapeutic assistance. Speech therapy in the case of patients who do not show rapid, spontaneous recovery, must be carried out for a long time, even for many years, wherein between the periods of significant progress there occur at irregular intervals shorter or longer periods, when the patient does not show visible progress [19].

In the first period after the stroke, patient's recovery was evident almost from day to day. Over time, however,

the improvement was getting slower and slower. After nearly 5 years of illness, despite medical therapy applied, aphasiac symptoms still remain, although they softened significantly. There still occur difficulties in finding appropriate vocabulary. There are also visible problems with the verbalization of complex thought processes, chaotic expression. Currently, the patient is on sickness pension, rehabilitation is still continued.

Antoni Prusiński claims that every tenth patient affected by stroke returns to normal condition, 70% require assistance from others. Approximately 30% suffer from depression [20]. The patient is in both populations.

## Conclusions

In the treatment of people with aphasia we should strive for a condition in which the patient will be able to communicate effectively with the environment. Achieving this therapeutic success, however, requires several conditions to be fulfilled. First of all, the diagnosis should be made and extensive history from the patient's family or if it is possible from the patient himself should be obtained. There should be created a therapeutic programme adjusted to the individual situation of the patient, and then, as soon as possible, therapy ought to be started. The patient should be guaranteed to have an access to frequent visits to speech therapist's office. In this case, the frequency factor of speech therapy did not work. The patient has had too few appointments at the speech therapist's office. Unfortunately, there is also little support from a psychologist, and yet from the very beginning the patient has felt very frustrated because of difficulties in communicating, which resulted in depression.

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