COMPARATIVE AND ONTOGENIC PHYSIOLOGY

Verbal Peculiarities at Dysfunction of the Right Brain Hemisphere


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Abstract—Presented are 3 clinical cases of lesion of the right brain hemisphere in the 4-, 7-, and 13-year-old children who, alongside with disturbances of optico-spatial functions, were found to have changes of various verbal characteristics. The presented cases prove on the clinically verified material the universal character of the peculiarities studied by V.L. Deglin and his associates of verbal activity at a weakening of functioning of the right hemisphere as a result of any pathological process. The clinical data are discussed with involvement of data of neuropsychological studies of children with deviations of development of various psychical functions.

INTRODUCTION

The commonly accepted in the neurological and neuropsychological literature are concepts of a peculiar role of the right hemisphere, first of all, in processes of visual and spatial perception. There are known right-hemispheric syndromes of object, facial agnosia, marked constructive apraxia, disorders of orientation in real space, specific disturbances of the body scheme, light-sided ignoring, agnosia for sounds, melodies, etc. The right hemisphere has been assumed to have no relation to organization of the verbal activity [1].

For the last few years, many new studies have appeared; they revealed specific disorders of speech, perception, attention, memory at dysfunctions of the right brain hemisphere. The present work presents some of our own clinical cases with verbal disturbances of different type at the right hemisphere lesions; these disturbances agree with the literature data obtained on other models of the brain pathologic state.

Studies of patients with split brain [2–4] have shown that the right hemisphere, when functions isolated from the left one, provides understanding of the oral and written speech by a specific way. The understanding is suggested to occur based not on the phonematic analysis, but by the method of integrated phonologies and graphologies associated with the corresponding meaning, similarly to understanding of words by animals [5].

Specific disturbances of the verbal function were revealed in the process of performance of unilateral electroconvulsive therapy [6, 7] at inhibition of the right hemisphere. In the expressive speech there were observed an increased verbal activity and loquacity that sometimes reached the degree of verbal disinhibition. Alongside with this, a change of prosodic components took place, such as impoverishment of intonational expressiveness up to monotony and dysphonia. The perception of speech was revealed to be accompanied by disturbances of recognition of voices of familiar people, of differentiation of intonations as well as of the male and female voice. These findings have confirmed experimentally the literature data on changes of the speech intonation coloring in patients with a lesion of the right hemisphere [8]. Besides, they convincingly showed the right hemisphere to provide noise-resistance of the verbal hearing and to inhibit excessive activity of the left hemisphere speech zones. The authors suggested
that at dysfunction of the right hemisphere its inhibitory effect on the left hemisphere was reduced to lead to the non-controlled loquacity.

In studying children with focal lesions of the right hemisphere [9], occasional cases with aphasia as well as specific disturbances of the auditory-verbal memory were revealed. In the right hemispheric defects the peculiarity of the memory disorder consisted in difficulties of memorizing of the order of presented words, whereas in the left hemispheric defects the volume, i.e., the number of the memorized words, was predominantly impaired. The impairment of reproduction of the presented sequence of words-stimuli occurred so regularly that these indexes were included into the topical-diagnostic criteria that are taken into account when evaluating results of neuropsychological studies. There are data in the literature that in the right hemisphere dysfunction the verses are forgotten or learned by heart with difficulty [9] and the tabular counting is disturbed [10].

Our observations have shown that at focal lesions of the right hemisphere of the vascular, traumatic, or neoplastic origin, the above-described general character of the verbal function change also is expressed quite clearly. In adult patients and in children with consequences of focal lesions of the right hemisphere there are often observed loquacity with speech intonational inexpressiveness, which was not characteristic of these patients prior to the disease, as well as some mannerism, floridity of expressions resembling reasoning. As an illustration, here are the following examples.

Example No. 1. Maksim S., a 5-year old, right-hander, was growing and developing normally until the age of 4.5 years. At this age he got a severe craniocerebral trauma: a high degree brain contusion with the right-sided compression caused by epidural hematoma. In 4 months from the start of the disease he was admitted for treatment to the Human Brain Institute of the Russian Academy of Sciences (HBI RAS). Psychics: clear consciousness, he is emotionally labile and capricious. Neurological status: the left-sided hemianopsia with a partial optical nerve atrophy and lesion of the optical tract in the right hemisphere. Pupils: \( S = D \), is worse looking to the left. The left nasolabial fold is smoothed. The pharyngeal reflex is preserved; phonation and swallowing are not impaired. The tongue is in the middle line. Spastics in the left hand and both feet. Spastical flexion contractures of both feet, tetraparesis with predominance of the left-sided hemiparesis. No performance of coordination tests. High reflexes from hands, \( S > D \). Pathological reflexes on the left. An unconvincing left-sided hemihypoesthesia; deep sensitivity without pronounced disturbances.

Neuropsychological status. The boy is contacting, although he is very easily distracted; is exhausted relatively rapidly. He understands the speech addressed to him. Difficulties are noticed in switching from one task to another, which sometimes can look as a defect of understanding of speech. When constructions are presented to him slowly, with pauses, he performs them correctly. Understands complex grammar constructions with difficulty. There is revealed a narrowing of the volume of notions: he forgot generic terms “furniture,” “beasts,” etc.

The expressive speech is by sentences, developed, without agrammatisms, full of cliches of adult phrases. The verbal activity rose with accommodation to the surrounding contest. The boy addressed to somebody of the medical staff magniloquently (although monotonously by emotional expressivity), —“Ah, you, my dear, my pretty, God bless you with health and a good fiancé.” He repeated many times these and similar many-word sentences. The pronunciation from time to time is slightly blurred.

The praxis of concrete actions is impaired: he cannot throw an inflatable ball to a partner and catch it; he picks up the wrong end of a marking pen and is holding it awkwardly; he cannot connect points or stain a square. A rough constructive apraxia with impossibility of drawing, laying together cubes according to a task, copying letters. Praxis of the hand and finger posture is impaired. Visual gnosis is significantly disordered: he cannot recognize fairy-tale character in pictures, often cannot locate and identify individual details of objects in pictures. He does not differentiate colors.

Thus, the leading defects in the psychic sphere are a decrease of the emotional verbal expressiveness on the background of an increased verbal activity with use of verbal cliches; elements of dysarthria; rough ideomotor, constructive apraxia; vi-