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Characteristic Features of Changes in Visual Fields in Patients with Brain Tumors

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Relevance of the problem.

Due to a number of negative factors, both in nature in general and in the life of our society, the number of people who suffer from cancer of the central nervous system (CNS) is growing. These circumstances require constant attention to the development of the system for providing medical care to neurosurgical patients, as well as improving the methods of neurosurgical research in the patients being examined.

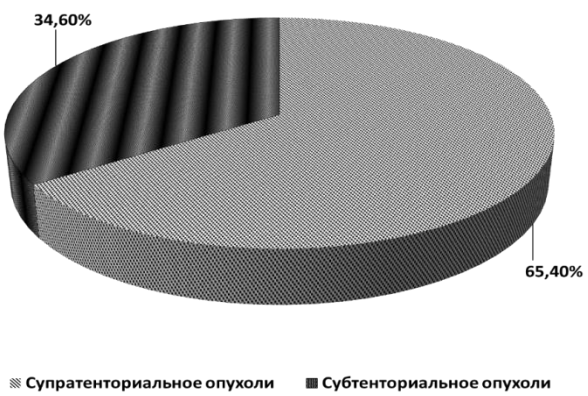
Brain tumors manifest themselves with different signs and are a serious type of neurosurgical pathology that requires early and targeted surgical treatment. Clinically, the progradient course of brain tumors leads to significant impairment of brain function.

With brain tumors, intracranial pressure increases due to an increase in brain volume due to the tumor and perifocal edema or stagnation of cerebrospinal fluid due to difficulty in its outflow from the ventricular system; it is the difficulty in the outflow of cerebrospinal fluid that underlies the formation of internal occlusive hydrocephalus. One of the early symptoms of brain tumors is loss of visual fields.

Purpose of the study. Detection of changes in visual fields depending on the location of brain tumors.

Material and research methods. We studied the state of the central and peripheral visual fields in 136 patients with brain tumors aged from 4 to 76 years, who received treatment at the neurosurgery clinic of the Samarkand Medical Institute, 72 men and 54 women. Of the 136 patients, 89 (65.4%) had a tumor of supratentorial localization and 47 (34.6%) patients of subtentorial localization. In all patients, the diagnosis of brain tumor was verified by pathohistological examination.

Pic.1. Distribution of patients by brain tumor location



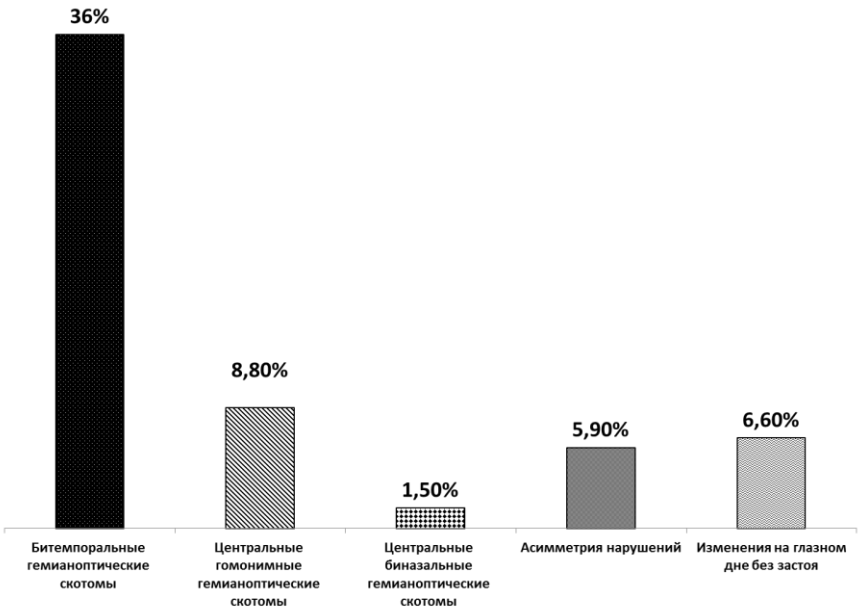
During the examination, individuals whose tumor could directly affect the visual pathway were excluded. Study of the peripheral visual field conductivity at the projection perimeter. The central field of vision was examined using a LamBDA-100 device.

Research results.

The peripheral visual field was studied in 136 patients with brain tumors. A narrowing of the visual field - concentric or bitemporal bias - was noted in 46 (33.8%) patients out of 83 with congestive optic discs. Various disturbances of the visual field in the form of concentric narrowing or uneven narrowing along all meridians, with the presence of scotomas, were observed in 22 (16.2%) patients with the development of secondary atrophy of the optic nerves, out of 32 patients with the absence of congestion in the fundus; bitemporal narrowing of the visual field was noted in 8 patients (5.9%).

When examining the central visual field, changes were found in 71 (52.2%) patients with congestion in the fundus. The nature of the changes was as follows: bitemporal type changeshemianoptic scotomas – 49 (36%) patients; according to the type of central homonymous hemianoptic scotomas – 12 (8.8%) patients; changes in the type of central binasal hemianoptic scotomas – 2 (1.5%) patients; asymmetry of disorders, when there were changes in one eye and no changes in the other - 8 (5.9%) patients; among 32 patients without congestion in the fundus, changes were found in 9 (6.6%).

Pic.2. Distribution of patients according to neuroophthalmological changes.



In 47 (34.6%) patients with tumors in the posterior cranial fossa, changes in the central visual field occurred in 38 (27.9%). Among 37 patients with tumors of supratentorial localization with (accompanied by) non-development of internal hydrocephalus, the peripheral visual field was changed in 6 patients (4.4%). The central field of vision was changed in 8 patients (5.9%).

Thus, in patients with brain tumors not accompanied by internal hydrocephalus, changes in the peripheral and central visual fields are much less common.

The conducted studies give reason to believe that changes in the central field of visionwith tumors of the posterior cranial fossa with the development of internal hydrocephalus caused by the direct effect of the expanded optic recess of the third ventricle on the optic chiasm. It is known that the optic recess is located in the area of the chiasm where the papillomacular bundle and its terminated fibers pass. Therefore, with the development of occlusive hydrocephalus, purely mechanical compression of the fibers by a protruding optical pocket occurs, leading to a

disruption of their conductivity and then, as a consequence of compression, to a disruption of microcirculation and ischemia of this area. As our studies have shown, with internal hydrocephalus, the stretching of the optical pocket is variable, often asymmetrical. This explains the variability and asymmetry of changes in central vision that occurs.

Significantly less common changes in the central field of vision in patients withhypertension syndrome caused by tumors of the cerebral hemispheres, since in these cases there is an increase in intracranial pressure without occlusion of the ventricular system and the direct effect of the expanded optic pocket on the chiasm. In cases where these changes occur, brain dislocation or the direct effect of the tumor on the visual pathways is of great importance.

The conducted studies allow us to express certain thoughts about the dependence of visual impairment on the degree of compression of the optic chiasm by the expanded optic recess:

- with the initial degree of compression, depressions appear in the lower temporal areas of the central visual field;
- in the second degree - further increase in compression leads to a narrowing of the peripheral field of vision and the appearance of absolute paracentral scotomas;
- with the third degree of compression, visual acuity begins to fall, the field of vision changes even more in the absence of atrophy in the fundus;
- with the fourth degree of compression - a sharp drop in vision function with the appearance of signs of atrophy in the fundus;
- at the fifth degree – atrophy of the optic nerves.

In the pathogenesis of the development of the above disorders, an important role is played by the factor of compression by the expanded optical pocket of the optic chiasm withparallel to the flowing disturbance of microcirculation and ischemia of the chiasmatic region. With the initial degree of compression, the mechanical factor is decisive, and with the increase in internal hydrocephalus, circulatory disorders and ischemia in the compression zone are important. Subsequently, dystrophy of the visual nerve fibers begins to occur, which gradually leads to atrophy of the optic nerves.

CONCLUSIONS.

1. Changes in visual fields in brain tumors are determined not by the increase in intracranial pressure itself, but by the development of occlusive hydrocephalus, accompanied by an expansion of the optical recess of the third ventricle and the direct effect of the latter on the chiasm.

2. With tumors of the posterior cranial fossa, changes in the central visual field are more often observed, which are in the nature of bitemporal hemianopsia. Changes in the peripheral boundaries of the visual fields are observed in more than 55% of patients and are bitemporal or concentric narrowing.

3. Disturbance in the central field of vision is caused by stretching of the optical recess, which, acting on the papillomacular bundle, which conducts in the dorsocaudal parts of the chiasm, causes both purely mechanical compression of these structures and disruption of microcirculation in them.

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