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OPTIMIZATION OF DIAGNOSTICS, TREATMENT AND PREVENTION OF CONCOMITANT DIVERGENT STRABISMUS WITH A VERTICAL COMPONENT

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Abstract. *Strabismus is a permanent or periodic deviation of the visual axis of the eye from the fixation point, which leads to impaired binocular vision. Strabismus is manifested by an external defect - deviation of the eye / eyes towards the nose or temple, up or down. In addition, a patient with strabismus may experience double vision, dizziness and headaches, decreased vision and amblyopia. Diagnosis of strabismus includes an ophthalmological examination (visual acuity test, biomicroscopy, perimetry, ophthalmoscopy, skiascopy, refractometry, biometric examination of the eye, etc.), neurological examination. Treatment of strabismus is carried out using glasses or contact correction, hardware procedures, pleoptic, orthoptic and diploptic methods, and surgical correction.*

Keywords*: Classification, causes, symptoms, diagnosis, treatment, prognosis and prevention.*

Introduction: In pediatric ophthalmology, strabismus (heterotropia or strabismus) occurs in 1.5-3% of children, with equal frequency in girls and boys. As a rule, strabismus develops at the age of 2-3 years, when the coordinated work of both eyes is formed; At the same time, congenital strabismus can also occur.

Strabismus is not only a cosmetic defect: this disease leads to a violation of the work of almost all parts of the visual analyzer and can be accompanied by a number of visual impairments.

With strabismus, the deviation of the position of one or both eyes from the central axis leads to the fact that the visual axes do not intersect at a fixed object. In this case, the monocular images perceived separately by the left and right eyes in the visual centers of the cerebral cortex do not merge into a single visual image, but a double image of the object appears.

To protect against double vision, the central nervous system suppresses signals from the squinted eye, which over time leads to amblyopia - a functional decrease in vision, in which the squinted eye is almost or completely absent from the visual process. If strabismus is not treated, about 50% of children develop amblyopia and vision loss.

In addition, strabismus negatively affects the development of the psyche, contributes to the development of isolation, negativity, irritability, and also imposes restrictions on the choice of profession and the sphere of human activity.

Research methods and materials

Depending on the time of occurrence, strabismus is divided into congenital (infantile - present from birth or developing in the first 6 months) and acquired (usually developing before the age of 3). Based on the stability of the deviation of the eye, a distinction is made between periodic (transient) and permanent strabismus.

Depending on which eyes are affected, strabismus can be unilateral (unilateral) and intermittent (alternating) - in the latter case, one eye, then the other, is squinted alternately.

According to the severity, strabismus is classified as latent (heterophoria), compensated (detected only during an ophthalmological examination), subcompensated (appears when control is impaired), and decompensated (uncontrollable).

Depending on the direction of deviation of the strabismus, horizontal, vertical and mixed strabismus are distinguished. Horizontal strabismus can be convergent (esotropia, converging strabismus) - in this case, the strabismus deviates towards the bridge of the nose; and divergent (exotropia, divergent strabismus) - the strabismus deviates towards the temple. In vertical strabismus, two forms are also distinguished, with the eye moving upwards (hypertropia, supravergence strabismus) and downwards (hypotropia, infravergence strabismus). In some cases, cyclotropia occurs - a twisting heterotropia, in which the vertical meridian is tilted towards the temple (excyclotropia) or towards the nose (incyclotropia).

In terms of the causes of the occurrence, a distinction is made between combined and paralytic non-combined strabismus. In 70-80% of cases, combined strabismus is convergent, in 15-20% - divergent. Usually, torsion and vertical deviations are found in paralytic strabismus.

With combined strabismus, the movements of the eyeballs in different directions are fully preserved, there is no diplopia, and there is a violation of binocular vision. Combined strabismus can be accommodative, partially accommodative, or ambiguous.

Accommodative strabismus often develops at the age of 2.5-3 years due to the presence of high and moderate hyperopia, nearsightedness, and astigmatism. In this case, the use of corrective glasses or contact lenses, as well as hardware treatment, helps restore the symmetrical position of the eyes.

In children aged 1 and 2 years of life, signs of partially accommodative and non-accommodative strabismus appear. In these forms of combined strabismus, refractive error is far from the only cause of heterotropia, therefore, surgical treatment is required to restore the position of the eyelids.

Causes of strabismus

The occurrence of congenital (infantile) strabismus may be associated with a family history of heterotropia - the presence of strabismus in close relatives; genetic diseases (Crouzon syndrome, Down syndrome); teratogenic effects of certain drugs, narcotics and alcohol on the fetus; premature birth and low birth weight babies; cerebral palsy, hydrocephalus, congenital eye defects (congenital cataracts).

The development of acquired strabismus can occur acutely or gradually. The causes of secondary strabismus in children are ametropia (astigmatism, hyperopia, myopia); In this case, with myopia, divergent strabismus often develops, and with hyperopia, convergent strabismus.

The development of strabismus can be triggered by stress, high visual loads, childhood infections (measles, scarlet fever, diphtheria, influenza), and general diseases accompanied by high fever (juvenile rheumatoid arthritis).

In old age, including in adults, acquired strabismus can develop against the background of cataracts, leukemia (leukoma), optic nerve atrophy, retinal detachment, macular degeneration, which leads to a sharp decrease in vision in one or both eyes.

Risk factors for paralytic strabismus include tumors (retinoblastoma), traumatic brain injury, cranial nerve palsy (oculomotor, trochlear, abducent), neuroinfections (meningitis, encephalitis), stroke, fracture of the orbital wall and floor, multiple sclerosis.

Results: An objective sign of any type of strabismus is the asymmetric position of the iris and pupil relative to the eye opening.

In paralytic strabismus, the movement of the deviated eye towards the paralyzed muscle is limited or absent. Diplopia and dizziness are noted, which disappear when one eye is closed, and it is impossible to correctly assess the location of the object. In paralytic strabismus, the angle of primary deviation (healthy eye) is smaller than the angle of secondary deviation (healthy eye), that is, when trying to fix the point with the squinted eye, the healthy eye deviates to a much larger angle.

A patient with paralytic strabismus is forced to turn or tilt his head to the side to compensate for the visual impairment. This adaptation mechanism facilitates the passive transfer of the image of the object to the central fossa of the retina, thereby eliminating double vision and providing incomplete binocular vision. The forced tilt and rotation of the head in paralytic strabismus should be distinguished from that in torticollis and otitis media.

When the oculomotor nerve is damaged, eyelid ptosis, pupil dilation, outward and downward deviation of the eye are observed, partial ophthalmoplegia and accommodation paralysis occur.

Unlike paralytic strabismus, diplopia is usually absent with heterotropia. The range of motion of the eyes, both in the direction of the eyeball, is approximately the same and unlimited, the angles of primary and secondary deviation are equal, and the functions of the oculomotor muscles are not impaired. When the eye is directed at an object, one or both eyes are alternately deviated in one direction (towards the temple, towards the nose, up, down).

Combined strabismus can be horizontal (converging or diverging), vertical (supraverging or infraverging), torsional (cyclotropia), combined; unilateral or variable.

Unilateral strabismus leads to a constant suppression of the visual function of the eye by the central part of the visual analyzer, which is accompanied by a decrease in visual acuity and the development of dysbinocular amblyopia of varying degrees. With variable strabismus, amblyopia, as a rule, does not develop or is mildly expressed.

Strabismus diagnosis

In the case of strabismus, a comprehensive ophthalmological examination is necessary, including tests, biometric studies, examination of eye structures, and refractive studies.

When collecting anamnesis, the time of onset of strabismus and its connection with previous injuries and diseases are determined. During the external examination, attention is paid to the forced position of the head (in the case of paralytic strabismus), the symmetry of the face and the position of the eyeballs (enophthalmos, exophthalmos) are assessed.

Then visual acuity is checked without correction and with trial lenses. To determine the optimal correction, clinical refraction is checked using skiascopy and computer refractometry. If strabismus disappears or decreases against the background of cycloplegia, this indicates a combination of pathologies. The anterior segments of the eye, the vitreous humor and the fundus are examined using biomicroscopy and ophthalmoscopy.

To study binocular vision, a test is performed with the eyes closed: the squinted eye deviates to the side; The synoptophore apparatus is used to assess fusion ability (the ability to combine images). The angle of strabismus (the amount of deviation of the squinted eye) is measured, convergence is studied, and the amount of accommodation is determined.

If paralytic strabismus is detected, consultation with a neurologist and additional neurological examination are indicated (electromyography, electroneurography, evoked potentials, EEG, etc.).

Strabismus treatment

In the case of combined strabismus, the main goal of treatment is to restore binocular vision, which eliminates the asymmetry of eye position and normalizes visual functions.

Interventions may include optical correction, pleoptic-orthoptic treatment, surgical correction of strabismus, and pre- and postoperative orthoptodiploptic treatment.

During optical correction of strabismus, the goal is to restore visual acuity, as well as normalize the accommodation and convergence ratios. For this, glasses or contact lenses are selected. In the case of accommodative strabismus, this is often enough to eliminate heterotropia and restore binocular vision. However, glasses or contact lenses are required for any form of strabismus.

Pleoptic treatment for amblyopia is indicated to increase the visual load on the strabismus.

For this, occlusion of the fixator eye (exclusion from the visual process) can be prescribed, penalization can be used, hardware stimulation of the amblyopic eye can be prescribed (Amblyocor, Amblyopanorama, software-computer treatment, accommodation training, electrooculostimulation, laser stimulation, magnetostimulation massage or magnetostimulation).

The orthoptic stage of strabismus treatment is aimed at restoring the coordinated binocular activity of both eyes. For this purpose, synoptic devices (Synoptophore) and computer programs are used.

At the final stage of strabismus treatment, diploptic treatment is performed, aimed at developing binocular vision in natural conditions (training with Bagolini lenses, prisms); Gymnastics is prescribed to improve eye mobility, training on a convergence trainer.

Discussion: If conservative treatment fails within 1-1.5 years, strabismus can be treated surgically. Surgical correction of strabismus is optimally performed at the age of 3-5 years. In ophthalmology, surgical reduction or elimination of the strabismus angle is often performed in stages. Two types of operations are used to correct strabismus: weakening and strengthening of the function of the oculomotor muscles. Weakening of muscle regulation is achieved by muscle transplantation (recession) or tendon transection; Strengthening of muscle movement is achieved by resection (shortening it).

Orthoptic and diploptic treatment is indicated before and after strabismus correction surgery to eliminate residual deviations. The success rate of surgical correction of strabismus is 80-90%. Complications of surgical intervention may include overcorrection and undercorrection of strabismus; rarely - infections, bleeding, loss of vision.

The criteria for treating strabismus are the symmetrical position of the eyes, stability of binocular vision, and high visual acuity.

Conclusion: Treatment of strabismus should be started as early as possible so that the child has sufficient rehabilitation of visual functions by the time school starts. Almost all cases of strabismus require continuous, consistent and long-term comprehensive treatment. Late and inadequate correction of strabismus can lead to irreversible vision loss.

The most successfully corrected type is concomitant accommodative strabismus; in the case of late-diagnosed paralytic strabismus, the prognosis for restoring full visual function is unfavorable.

To prevent strabismus, regular examination of children by an ophthalmologist, timely optical correction of ametropia, compliance with visual hygiene requirements and dosage of visual loads are required. Early detection and treatment of any eye diseases, infections, prevention of head injuries are necessary. During pregnancy, it is necessary to avoid negative effects on the fetus.

In the case of the alcoholic nature of the disease, the symptoms develop gradually, and the accompanying manifestations are due to the development of polyneuritis. The characteristic symptoms of iodine poisoning include swelling of the eyelids, redness of the eyes, and the appearance of "floating spots" before the eyes. In methanol poisoning, headache and dyspepsia come to the fore in the clinical picture.

In the congenital variant, diplopia does not occur, the clinical picture of the disease is often similar to the symptoms of strabismus, which often accompany it. Performing visual tasks leads to rapid fatigue. To reduce the severity of symptoms, the patient closes the squinted eye or is forced to turn his head to the affected side.

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