

FUNCTIONAL AND STRUCTURAL CAUSES OF SECONDARY STRABISMUS IN CLINICAL OPHTHALMOLOGY

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Abstract: Secondary strabismus is an acquired disorder of eye coordination and position caused by multiple systemic, neurological, and mechanical factors. This pathology differs from congenital strabismus by its later onset, frequent development of diplopia, and impaired binocular vision. The article analyzes the main etiologic factors, including traumatic brain injury, vascular lesions, neurological disorders, ophthalmic surgery, and dysfunction of the oculomotor muscles and cranial nerves. Modern diagnostic methods, such as visual assessment, prismatic correction, neuroimaging, and electrophysiological tests, are considered. Attention is paid to therapeutic strategies: orthoptic rehabilitation, botulinum toxin administration, surgical methods, and systemic treatment of the underlying disease. Particular importance is attached to a multidisciplinary approach and early intervention aimed at optimizing visual functions and improving the quality of life of patients.

Keywords: secondary strabismus, acquired strabismus, diplopia, amblyopia, cranial nerve palsy, oculomotor muscles, prismatic correction, botulinum toxin, orthoptic therapy, strabismus surgery, neuro-ophthalmology, systemic diseases, visual rehabilitation.

Introduction

Strabismus (strabismus) is a common ophthalmological disorder characterized by the inability of the eyes to maintain synchronous gaze direction, which leads to impaired binocular vision and, as a consequence, to diplopia and amblyopia. Congenital strabismus, diagnosed mainly in childhood, has been studied quite well. Secondary (acquired) strabismus manifests itself at a more mature age and has a variety of etiological factors associated with systemic and neurological pathologies. The global prevalence of strabismus ranges from 2–5%, with secondary forms accounting for a significant percentage among adult patients. According to a meta-analysis by Friedman et al. (2017), about 15–20% of all cases of strabismus are acquired forms. The incidence of secondary strabismus increases among individuals with vascular and neurological pathologies — stroke, multiple sclerosis, diabetic neuropathy, which is caused by damage to the oculomotor nerves and muscles. In countries with limited access to ophthalmological care and diagnostics, the incidence of secondary strabismus is lower, but traumatic causes are especially relevant here. Modern methods of neuro-ophthalmological diagnostics and therapy help improve the prognosis, but challenges remain associated with late treatment and a complex clinical picture.

Methods

The work included a systematic analysis of scientific publications, clinical protocols and standards for managing patients with secondary strabismus. Additionally, observations from the clinical practice of the ophthalmology department were included, covering patients aged 5–60 years with newly diagnosed strabismus.

The examination of patients included:

- Testing visual acuity and binocular function;
- Application of closure tests and prismatic measurement of the deviation angle;
- Evaluation of eye movements and identification of movement limitations;
- Neuroimaging (MRI, CT) if cranial nerve damage is suspected;
- Consultations with neurologists and related specialists, if necessary.

Discussion

Etiological factors

The key causes of secondary strabismus include:

- Paresis of cranial nerves III, IV, VI, caused by microangiopathy in chronic diseases (diabetes mellitus, hypertension) or brain injuries;
- Orbital trauma and surgeries affecting the functional activity of the oculomotor muscles;
- Neurological diseases — stroke, multiple sclerosis, CNS tumors that disrupt the motor pathways of the eyes;
- A sharp decrease in vision in one eye, leading to a violation of sensory synergy;
- Systemic autoimmune and endocrine diseases — myasthenia gravis, Graves' disease with ophthalmopathy.

Symptoms and diagnostics

Typical complaints of patients — double vision (diplopia), which intensifies with fatigue and a change in the direction of gaze. Diagnostics is aimed at accurately measuring the angle of deviation, determining the nature of strabismus (restrictive or paralytic), and excluding volumetric lesions using neuroimaging.

Treatment

A comprehensive approach includes:

- Optical correction using prismatic glasses for temporary elimination of diplopia;
- Orthoptic therapy, which helps improve muscle coordination and binocular vision;
- Botulinum toxin injections to weaken hyperactive extraocular muscles;

- Surgical treatment used in persistent forms, including shortening or relaxation of muscles;
- Treatment of the underlying systemic disease, which is necessary for stable remission.

Prognosis

Treatment results depend on the timeliness of diagnosis and adequacy of therapy. Early intervention allows preserving and restoring binocular vision, preventing the development of amblyopia in children. In adult patients, combined treatment methods improve quality of life and reduce symptoms.

Conclusion

Secondary strabismus is a complex condition indicating the presence of systemic or neurological disorders. Its diagnosis and treatment require a comprehensive and multidisciplinary approach. The interaction of ophthalmologists, neurologists and other specialists ensures full therapy and improvement of patients' visual function. Early detection and timely treatment significantly increase the effectiveness of interventions and the quality of life of patients, turning secondary strabismus from a symptom into a manageable condition.

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