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Optimal Algorithm for Diagnosing Early Ophthalmological Changes in the Retina and Optic Nerve of Patients with Type 2 Diabetes Mellitus

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ABSTRACT

In this work, an optimal diagnostic algorithm was developed to identify early ophthalmological changes in the retina and optic nerve in patients with type 2 diabetes mellitus. The algorithm includes screening, clarifying checks, and monitoring stages. Based on modern methods such as fundus photography, ophthalmoscopy, optical coherence tomography (OCT), fluorescent angiography (FAG), OCT angiography (OCTA), and perimetry, it is possible to detect changes in the early stages. This approach serves as an effective means of preventing diabetic retinopathy and optic nerve damage. The proposed algorithm serves to preserve patients' vision, reduce ophthalmological complications, and take timely treatment measures.

KEYWORDS: Type 2 diabetes mellitus, Diabetic retinopathy, Optic nerve, Ophthalmological screening, Optical coherence tomography (OCT), Fluorescent angiography (FAG), Retina, Monitoring, Early diagnosis, Diabetic complications.

Introduction: Type 2 diabetes mellitus (DM) is a metabolic disorder that is often severe with late complications. Its ophthalmological complications, especially diabetic retinopathy (DR) and optic nerve damage, lead to a sharp decrease in vision. Therefore, their early detection and effective monitoring play an important role in maintaining the patient's standard of living.

Purpose: development and implementation of an optimal diagnostic algorithm for early detection of changes in the retina and optic nerve in patients with type 2 diabetes mellitus.

In this study, a step-by-step diagnostic algorithm was developed to identify early ophthalmological changes in the retina and optic nerve in patients with type 2 diabetes mellitus.

The algorithm consists of a primary ophthalmological screening that begins immediately after the diagnosis of diabetes, which includes fundus photography, ophthalmoscopy, visometry, and the Amsler test. Screening is carried out at least once a year.

If diabetic retinopathy or optic nerve changes are detected, clarifying examinations are performed:

optical coherence tomography (OCT), fluorescent angiography (FAG), OCT angiography (OCTA), and perimetry.

At the next stage, monitoring is planned depending on the detected degree of damage: mild NPDR - once every 12 months, moderate/severe NPDR - once every 6 months, PDR or macular edema - every 3-4 months, optic nerve damage - requires observation by a neuro-ophthalmologist.

If necessary, therapeutic measures such as laser coagulation, intravitreal injections (anti-VEGF or steroids), and vitrectomy are used.

This algorithm is an effective approach to the early detection of ophthalmological complications, their monitoring, and preservation of vision.

№	Stage	Measures to be implemented	Notes
1	Diabetes diagnosis	The patient is diagnosed with type 2 diabetes mellitus.	By endocrinologist or therapist
2	Screening (once a year)	- Fundus photography (digital) - Ophthalmoscopy (with or without mydriatics) - Visometry + Amsler test	To assess the initial state of vision
3	If changes are detected	DR or early changes in optic nerve	Moving on to further verification
4	Clarifying checks	- OCT - assessment of retinal layers - FAG - assessment of retinal capillaries - OCTA - non-invasive circulatory analysis - Perimetry - assessment of the field of vision	Complex diagnostics based on complex technologies
5	Monitoring (depending on the degree of damage)	- Mild NPDR → 1 time in 12 months - Moderate/severe NPDR → 1 time in 6 months - PDR or macular edema → 1 time in 3-4 months - Optic nerve damage → neuro-ophthalmologist supervision	Individual observation for each case
6	Therapeutic measures (if necessary)	- Laser coagulation - Intravitreal injections (anti-VEGF, steroids) - Vitrectomy (surgical intervention)	To prevent or stop late complications

Results: The practical application of this algorithm provides the following advantages:

- ✓ Improves the possibility of early detection of DR and changes in the optic nerve.
- ✓ A system of individual patient monitoring will be formed.
- ✓ Increases the likelihood of saving viewing
- ✓ Treatment resources are used for their intended purpose

Conclusion: the proposed algorithm for the early detection of ophthalmological complications in patients with type 2 diabetes mellitus is effective, step-by-step, and practical, including the use of modern visualization methods. This approach is important in preventing vision loss.

LITERATURE:

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