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Evaluation of the Effectiveness of the Use of Guiding Sutures in the Surgical Treatment of Children with Internal Ciliary Body

Kasimov Rayim Erkinovich
Assistant, Department of Ophthalmology, Samarkand State Medical University

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Annotation: Ophthalmoplegia is a paralysis of individual groups or all eye muscles. When the internal groups are affected, the pupils dilate and accommodation is impaired. The external form is manifested by diplopia, ptosis, and the inability to perform coordinated movements of the eyelids. For diagnosis, they use computed tomography of the brain, ultrasound of the eye, proserin test, and angiography of the cerebral vessels. In addition, skull radiography, visometry, and perimetry are used. Treatment tactics are determined by the etiology of the disease and include drug therapy, surgical interventions, and physiotherapy.

Keywords: Causes of ophthalmoplegia, Pathogenesis, Classification, Symptoms of ophthalmoplegia, Complications, Diagnostics, Treatment of ophthalmoplegia, Prognosis and prevention.

Introduction: Ophthalmoplegia is a common nosology in ophthalmology, which is due to the presence of many etiological factors leading to its development. Epidemiological data vary significantly in different forms. Severe infectious diseases lead to paralysis of the external eye muscles in 85% of cases, while the progressive supranuclear form occurs with a frequency of 1:16,000. The first manifestations of ophthalmoplegia against the background of mitochondrial pathology are diagnosed in children as young as 9 months. Other clinical variants can develop at any age. Pathology occurs with equal frequency in men and women.

New formations. The development of this nosology occurs due to tumors located in the cavernous sinus or superior orbital fissure.

Infectious diseases. Damage to the neuromuscular apparatus of the eye is observed in tetanus, botulism, and diphtheria. In rare cases, paralysis of the eye muscles is caused by prolonged

syphilis or tuberculosis of the central nervous system.

Intoxication. The internal form often occurs with prolonged contact with lead, uncontrolled use of barbiturates, and severe alcohol poisoning.

Brain injury. Ophthalmoplegia develops against the background of brain injury, stroke, encephalitis, and a group of demyelinating diseases (multiple sclerosis, Devic's disease).

Endocrine ophthalmopathy. Dysfunction of the eye muscles is detected against the background of hormonal imbalance associated with diabetes mellitus and thyroid pathology.

Mitochondrial diseases. Mitochondrial DNA mutations lead to the development of progressive ophthalmoplegia. Often the paralysis is secondary to myasthenia gravis.

The disease develops in the brainstem area due to damage to the cranial nerves (oculomotor, trochlear, abducens) that innervate the eye muscles, at the supranuclear, radicular, nerve and muscle levels. Disturbance of neuromuscular transmission due to damage to the external muscle fibers leads to a loss of their tone and the inability to perform eye movements. In the internal form, isolated damage to the nuclei of the third pair of cranial nerves occurs. The absence of a pupillary reaction is usually due to dysfunction of the sympathetic and parasympathetic fibers that innervate the sphincter and dilator of the pupil.

Paralysis of the internal rectus muscle leads to reflex narrowing and the inability to dilate the iris of the eyeball, which is manifested by a decrease in the ability of physiological accommodation. In the mitochondrial nature of the disease, gene mutations lead to changes in ATP synthesis and an increase in the content of free radicals in the cell. This leads to a violation of the release of energy by organic substances and its accumulation in the form of macroergic phosphate compounds. The pathology of energy metabolism caused by mutant DNA causes the development of phenotypic manifestations of ophthalmoplegia in the patient.

Unilateral and bilateral ophthalmoplegia, congenital and acquired forms of the disease are distinguished. The congenital variant is often combined with other eye defects (cleft eyelid, epicanthus). Acquired paralysis has an acute or chronic course. Depending on which muscle group is involved in the pathological process, the following forms of the disease are distinguished:

External. This is accompanied by paralysis of the external muscles, which leads to immobility of the eyeball and ptosis.

Internal. It manifests itself as paralysis of the muscles of the iris and ciliary body, resulting from dysfunction of the internal muscle group.

Partial. This is characterized by damage to individual muscle fibers, so only certain movements are impaired.

Done. This is the most severe form of ophthalmoplegia, as all muscle groups of the eye are involved in the process.

Supranuclear. This is accompanied by "paralysis" of vision due to the localization of the lesion at the level of the cerebral hemispheres.

Internuclear. In this form, the process of transmitting impulses along the nerve fibers responsible for the simultaneous movement of the eyeballs in a certain direction is disrupted.

Symptoms of ophthalmoplegia

Clinical signs are determined by the form of the disease. With external ophthalmoplegia, patients complain of immobility of the eyeball, drooping of the upper eyelid, and double vision. Patients report excessive lacrimation. Dry eyes are aggravated due to uneven distribution of the tear film, accompanied by severe discomfort, burning sensation, or itching. Paralysis of the inner group of muscle fibers is manifested by dilation of the pupil. Patients have impaired accommodation and

no reaction to light, but the mobility of the eyeball is preserved. The complete form is characterized by a combination of all of the above signs.

Pain syndrome occurs only in patients with Tolosa-Hunt syndrome or ophthalmoplegic migraine with ophthalmoplegia. With supranuclear lesions, patients cannot voluntarily direct their eyes in the desired direction. Patients with the internuclear form note that they cannot look in the same direction with both eyes at the same time. A common accompanying symptom is involuntary eye movements that are not consciously controlled. Acute acquired ophthalmoplegia is a symptom of meningeal damage, severe poisoning, or infectious pathology. A chronic course indicates progressive paralysis or multiple sclerosis.

Research methods and materials: Paralysis of the internal muscles of the eyeball leads to impaired accommodation and decreased visual acuity. The internuclear form is complicated by nystagmus. Patients with ophthalmoplegia are at risk of developing infectious and inflammatory diseases of the anterior segment of the eye (conjunctivitis, keratitis, blepharitis). This is due to the fact that in some patients the functioning of the eyelids, lacrimal and meibomian glands is impaired. If the disease is based on an isolated lesion of the oculomotor nerve, then there is a high probability of exophthalmos. Paralysis of the eye muscles is accompanied by asymmetry of the face. A common complication of ophthalmoplegia is xerophthalmia. Patients are at risk of traumatic injuries due to spatial disorientation.

Diagnosis requires a physical examination and a set of special ophthalmological studies. During external examination, dilated pupils, ptosis, and impaired symmetry of eye movements can be seen. Diagnostic measures include:

Computed tomography of the brain. Computed tomography is used to view tumors of the brain and orbital cavity.

Ultrasound examination of the eye. The technique allows you to study the condition of the orbital cavity and detect local changes in the eyeball.

Cerebral angiography. The study allows us to identify vascular aneurysms, signs of carotid arteritis, and cavernous sinus thrombosis.

Prozerin test. The results of the Prozerin test are evaluated 30 minutes after it is performed. The diagnosis of ophthalmoplegia is confirmed by a negative test result, in which the severity of ptosis does not change and the pupils do not react.

Skull X-ray. Used to visualize bone lesions and examine the condition of the nasal sinuses.

Perimetry. The study is conducted to determine the boundaries of the visual field. In patients with the external form of the disease, they are significantly narrowed.

Visometry. Visual acuity measurement is indicated because visual dysfunction is observed in a number of patients with internal ophthalmoplegia. Most patients with mitochondrial etiology are diagnosed with myopia.

If the development of the nosology is due to neoplasms, consultation with an oncologist is required. In the presence of severe neurological symptoms, an examination by a neurologist is indicated. If there is suspicion of the mitochondrial genesis of ophthalmoplegia, molecular genetic studies are performed. The diagnosis can be confirmed by biochemical diagnostics (detection of cytochrome C oxidase-negative fibers, reduced activity of respiratory chain complex enzymes).

Therapeutic measures are aimed at eliminating the etiological factor of the disease. Regardless of the causes of neuromuscular impulse disorders, patients are prescribed vitamins B6, B12, C and nootropic drugs. The treatment plan includes:

Drug therapy. If the disease is infectious in nature, conservative tactics are used. In such cases, a complex of treatment measures is required to eliminate the underlying pathology. Non-steroidal

anti-inflammatory drugs are prescribed for inflammatory processes. Anticholinesterase drugs are indicated to restore muscle tone. In case of ophthalmoplegia of endocrine origin, it is necessary to correct the hormonal balance using systemic therapy. Instillations of glucocorticosteroids are used locally.

Surgical intervention. Surgical treatment is used when neoplasms of the cavernous sinus and orbital fissures or traumatic injuries of the brain and orbital cavity are detected. Surgical correction eliminates ptosis of the eyelids in the external form of ophthalmoplegia.

Physiotherapy. This is an auxiliary treatment method used after eliminating the etiological factor and stopping the acute pathology. In practical ophthalmology, acupuncture, electro- and phonophoresis with drugs (spasmodics, analgesics) are used.

In cases of mitochondrial genesis of the disease, only experimental treatments are available. Today, natural electron carriers of the respiratory chain are used (succinic acid preparations, cytochrome C). The effectiveness of the use of carnitine and nicotinamide is being studied.

In most cases, the prognosis for ophthalmoplegia is favorable. After the underlying disease is eliminated, the functions of the organ of vision are fully restored. Irreversible changes occur only with the demyelinating nature of ophthalmopathology. Specific prevention has not been developed. Non-specific preventive measures are limited to the use of personal protective equipment (helmets, goggles) at work and timely treatment of infectious diseases. Patients should minimize contact with toxic substances that can lead to the development of ophthalmoplegia (lead, barbiturates).

In the same year, a group of scientists from the Massachusetts Institute of Technology presented the results of scans that showed the peripapillary zone of the retina and the coronary artery [94]. Later, the great potential of this method for various pathologies of the macular region and the optic nerve head (ONH) was shown [3,38]. OCT has come a long way since its invention. Almost every year you can find new design options for devices and new software solutions.

The first step in the development of OCT technology was Timedomain OCT [83]. It is based on the Michelson interferometer [77]. A superluminescent diode is used as a light source, which allows obtaining a low-coherence beam. The beam is then split into two parts [21]. The first beam (the object) is directed at the structure under study (where absorption, scattering, and partial reflection occur). The second is reflected by a moving mirror and forms a reference beam.

The two beams are then combined to form an interference pattern, which is recorded by a photodetector [71]. The result is a one-dimensional A-scan. A two-dimensional image of the area of interest is obtained by summing multiple A-scans. Early OCT devices included the Stratus OCT 3000 (Carl Zeiss Meditec), which was in active use until the mid-2000s.

However, this device had a low scanning speed (400 A-scans/s) and limited resolution (10 μm). For a long time, scientists tried to improve the method. As a result, spectral OCT devices (Spectral – domain OCT; SD – OCT) were created based on the Fourier analysis method (Fourier – domain OCT).

The main device of spectral OCT, a spectral interferometer, allows for much higher scanning speeds and higher axial resolution compared to time-domain OCT, where the data is read by a mechanically moving interferometer [154]. Spectral OCT devices include: Cirrus HD-OCT (Carl Zeiss Meditec), RTVue (Optovue), Solix (Optovue), Topcon 3D OCT (Topcon), Spectralis (Heidelberg Engineering).

Results: Swept-source OCT (SS-OCT) instruments operate in the infrared wavelength range and are analyzed using a special spectrometer [97,107]. In this technology, spectral components are recorded not simultaneously, but sequentially as the wavelength of the probing radiation changes [18]. This technology allows for a clear view of the choroid, vitreous body, and in the case of pathology, such as preretinal hemorrhages, the condition of the underlying retina [102,116].

In 2010, Topcon introduced the world's first tunable wavelength optical coherence tomography system for the anterior and posterior segments of the eye: the DRI-OCT-1 Atlantis. Currently, the DRI OCT Triton device is available on the market. Also, based on this technology, in 2016, Zeiss developed the PLEX Elite 9000 tomograph (not registered in the Russian Federation). OCT devices with tunable wavelength for the anterior segment of the eye include the Casia SS-1000 and Casia2 (Tomey, Nagoya, Japan).

To date, significant progress has been made in the development of OCT technologies: scanning speed and resolution have been significantly increased, and new functions have been added [172,183,185]. New light sources, optical systems, and image processing methods are generating high competition, which in turn is giving rise to new medical technologies.

OCT now provides us with a large amount of information [5,9,15,76]. It is possible to perform a qualitative assessment aimed at identifying structural pathology, such as epiretinal fibrosis, drusen, subretinal neovascularization, etc. [8,17,19,20,26,95,118,163].

Quantitative measurements obtained during OCT play an important role in the diagnosis, assessment of progression, and differential diagnosis of various optic neuropathies (glaucomatous genesis, multiple sclerosis, Alzheimer's disease, Devic's disease). In quantitative analysis, the linear dimensions, surface area, and volume of elements are evaluated [67]. Each device has a specific set of protocols that define the region (macular region, optic disc) and the scanning area [35,138].

Retinal thickness can be quantified in the entire macular area or in individual segments. For this purpose, a topographic map (ETDRS grid) is applied to the area of the retina being examined [147]. The ETDRS grid divides the retina into nine regions bounded by three rings: a central foveal ring with a diameter of 1 mm, an inner ring (paracentral) with a diameter of 3 mm, and an outer ring (peripheral) with a diameter of 6 mm.

The inner and outer rings are further divided into four quadrants: nasal, temporal, superior and inferior. The field of view for macular area scanning varies between devices: 6x6 mm (Cirrus HDOCT, Carl Zeiss Meditec), 7x7 mm (DRI OCT Triton, Topcon; Copernicus REVO, Optopol; RTVue XR 100 Avanti, Optovue Inc), 10x10 mm (OCT-HS0, OCT-10).

In the macular region, instruments measure neuroepithelial thickness differently. Some define it as the distance between the internal limiting membrane (ILM) and the retinal pigment epithelium (e.g., 3D OCT-2000, Topcon; Cirrus HD-OCT, Carl Zeiss Meditec, OCTHS100, Canon, etc.), while others define it as the distance between the vitreoretinal interface and the ellipsoid zone (ZeCT strategis, photoreceptors.). It is known that retinal thickness in the macular region measured by different OCT devices shows statistically significant differences [60,89,170].

Modern OCT devices also allow the identification and quantification of individual retinal layers. In particular, the study of the thickness of the ganglion cell layer is crucial in the diagnosis of glaucoma and the assessment of the progression of the disease [101,122,128,155]. A number of devices automatically distinguish the ganglion cell layer (Spectralis OCT, Heidelberg Engineering; 3D OCT-2000, Topcon; OCTHS100, Canon, etc.). Devices such as Cirrus HD-OCT, Carl Zeiss Meditec; Copernicus REVO, Optopol measure it in combination with the inner plexiform layer (ganglion cell layer with inner plexiform layer (GCIL)) or also with the retinal nerve fiber layer (ganglion cell complex) (e.g. RTVue XR 100 Avanti, Optovue Inc.; RS-300, Optovue Inc.; RS-300; topol).

Topcon devices (DRI OCT Triton, 3D OCT-1 Maestro) allow for the examination of a 12 x 9 mm area, including the macula and optic disc area. This scanning protocol, taking into account the regulatory framework, provides information on the thickness of the neuroepithelium, the nerve fiber layer, the ganglion cell layer, the nerve fiber layer-ganglion cell layer complex, as well as parameters of the optic disc. In addition, there is a protocol that assesses the peripapillary thickness of the retinal layers (Hud report) and projects the data onto a perimetric grid for the

earliest diagnosis of glaucoma [92].

The REVO 80 device (Optopol Technology) also allows for the association of OCT data with a perimetric network.

In addition to the macular area, OCT allows for the assessment of optic disc parameters and peripapillary retinal nerve fiber layer (pRNFL) thickness. According to the 2016 World Glaucoma Association 10th Consensus Edition [179], the detection of progressive RNFL thinning and neuroretinal zone narrowing is the gold standard for the diagnosis of glaucoma.

Discussion: Most device protocols measure pRNFL thickness along a 3.45 mm diameter circle centered on the optic disc (Copernics REVO, Optopol; OCT-HS100, Canon; RTVue XR 100 Avanti, Optovue Inc.; Spectralis OCT Engineering, Hei). Some devices, such as the Spectralis OCT (Heidelberg Engineering), additionally measure pRNFL along two circles with diameters of 4.1 and 4.7 mm [46]. The protocols provide the mean value of RNFL thickness and absolute values in 4 sectors (superior, inferior, temporal, nasal) and 12 o'clock sectors. The RNFL profile is depicted as a TSNIT or NSTI scan plot [93]. Optic disc scan protocols also show parameters such as optic disc area, cup, and neuroretinal rim.

OCT is a very informative test in the diagnosis of many diseases of the fundus [91,137,149]. by. The study of the influence of refractive anomalies on OCT parameters in the works of Shpak AA. and Korobkova MV

In the works of Shpak AA, the study of the influence of refractive anomalies on OCT parameters. and Korobkova MV. The obtained images can be qualitatively and quantitatively analyzed, stored in a database and compared with previously obtained images. This allows obtaining objective information for diagnosing and assessing the progression of the disease.

To interpret the results obtained during OCT, databases based on measurements of healthy eyes have been created. Normative databases for OCT devices are pre-installed by the manufacturer. All data obtained from a particular patient during tomography are automatically compared with the normative database of the device. This allows you to quickly identify pathology and monitor the dynamics.

Comparison with a normative database shows how a given patient's results compare with those of healthy individuals [136]. It is generally accepted to color-code measurement results relative to standards obtained in a similar group of healthy subjects.

Using the example of an OCT device from Carl Zeiss Meditec, the decoding of the color code is presented in Table 1.

The regulatory framework for OCT devices has a number of limitations, in particular, it does not cover the age range up to 18 years. Therefore, in order to correlate the results obtained from the study of a minor patient with the regulatory framework, it is necessary to compare the OCT operator with the 18-30 age group. The validity of such a comparison is actively discussed. Some authors suggest using only the observational method, in which the first OCT image is the "reference point" and all subsequent ones are compared with it [74]. However, it can be difficult to separate changes associated with eye growth from the dynamics of the disease. There have been several attempts to create a regulatory framework for children and adolescents. The most significant is a large multicenter study conducted in Spain. The study included 273 healthy children divided into three age groups: 4-7 years; 8-12 years; 13–17 years. Mean values and 1st, 5th, and 95th percentiles for each age group are provided for all quantitative macular indices as well as for RNFL [47]. Age has also been shown to affect quantitative OCT measurements. For example, retinal thickness in the macular region decreases as a person ages.

Most of the currently available OCT reference databases are diverse and include data from different ethnic groups [117,132,150]. The Spectralis (Heidelberg Engineering) database is not diverse and only includes data from Caucasians. Many studies have shown that the values of

optic disc and macular area parameters vary greatly between ethnic groups [143].

It has been reported that Caucasians have a smaller optic nerve head area than Negroids and Asians [84,103]. In addition, Caucasians have a larger mean RNFL thickness [53]. The use of a normative database that takes into account the patient's ethnicity has been shown to significantly reduce abnormal mean RNFL color codes and increase the specificity of glaucoma detection [139]. No significant changes were observed when using an ethnic normative database for the retinal ganglion cell layer thickness protocol. Therefore, some caution should be exercised in evaluating quantitative OCT parameters from different databases (including patients of different ethnic groups).

The greatest difficulty is in evaluating the performance in the presence of refractive errors (especially high levels). [51,55,129] Manufacturers do not usually report the number of people with high refractive errors in the device database. OCT performance is statistically significantly lower in people with myopia, and higher in people with hyperopia [29,30,31,44,110,114].

There have been several attempts to create a regulatory framework for different devices, indicators, and different ethnic groups [42,86,119,131]. A normative database of subjects with the calculation of severe and moderate HDVC thinning thresholds adjusted for RNFL and SGVC was previously created in the Department of Clinical and Functional Diagnostics of the Federal State Autonomous Institution "National Medical Research Center for Eye Microsurgery" named after Academician S.N. Fedorov [13]. However, patients were roughly divided into two age categories: under 40 years and over 40 years. Other OCT parameters were not taken into account.

As the clinical use of OCT continues to expand, it is imperative that the normative databases embedded in the devices are as representative as possible of the populations in which they are used. Either paper or electronic media, there should be standards available for different devices, ethnic groups, and age groups, allowing for accurate and rapid interpretation of the results obtained.

OCT is widely used in the diagnosis of glaucomatous optic neuropathy and other causes of optic nerve atrophy. For this purpose, parameters of the RNFL, optic nerve head, and ganglion cell layer are evaluated individually or as part of two (GCL) or three inner layers of the macular region (ganglion cell complex).

The patient's refraction should be taken into account when evaluating quantitative OCT parameters [27,156,192]. Refractive errors, especially high levels, have been shown to significantly affect OCT measurements [44,109,110,157]. However, simple and convenient methods of correction are not available for clinical practice.

At the Department of Clinical and Functional Diagnostics of the Academic Autonomous Institution of Excellence, OCT and Hyperopia are apparently, for the correct interpretation of the tnfli and neuroretinal rum. Pak AA and Korobova MV Existing calculation methods have been improved and the external length of the myopic eye in Myopia thickness [31]. However, the method of assessing and correcting the effect of short hyperopic eyes. The thickness of the SGCVP remains open. The level of study of the influence of refractive anomalies on OCT parameters is clearly presented in Table 2.

Previously, the dependence of ganglion cell layer thickness on axial length in short-sighted eyes was studied mainly in children and only in combination for all types of myopic to hyperopic refraction [48,6917].

There are no separate studies addressing the effect of the axial length of the hyperopic eye on the thickness of the SRH.

Conclusion: The determination of the average retinal thickness in the macular region is not directly used in the diagnosis of glaucoma, but it is one of the first indicators obtained by the

OCT operator. Given that the ganglion cell layer and the retinal nerve fiber layer together constitute more than 30% of the retinal thickness [87], the total retinal thickness in the macular region is a general indicator of tissue loss due to glaucoma in the absence of other, including focal, pathologies. It has been previously known that as glaucoma progresses, the thickness of the retina in the macular region decreases compared to healthy eyes [87,153,144]. Even before the analysis of the ganglion cell layer and RNFL, retinal thinning in the macular region allows us to suspect glaucoma or other pathology and proceed to advanced diagnostics.

However, the role of retinal thickness as a screening tool is significantly limited in patients with refractive errors. It has been reported in the literature that as the length of the anterior segment of the retina increases, the average thickness of the retina in the macular area decreases [70,88,104,160,191]. However, the information content of this indicator in patients with refractive errors has not been studied, and methods for correcting it to take into account the axial length have not been developed.

In individuals with refractive errors, correction of quantitative OCT indicators is required, taking into account the axial length in hyperopia and myopia, which allows for the correct interpretation of the obtained measurement results. In the works of Shpak AA. and Korobkova MV Existing calculation methods were improved for the correct interpretation of RNFL thickness, optic disc area and neuroretinal rim in individuals with refractive errors and presented in the form of original formulas and tables [29,30]. The effect of the axial length of the myopic eye on the SRH thickness has also been studied, and methods for correcting this effect have been developed [31]. Currently, the effect of the axial length of the hyperopic eye on the SRH thickness and the effect of refractive errors on the retinal thickness have not been studied.

List of used literature:

1. БЕЛКА, F. S. P. C. P. (2022). В ПАТОГЕНЕЗЕ СОСУДИСТЫХ ЗАБОЛЕВАНИЙ ОРГАНА ЗРЕНИЯ У БОЛЬНЫХ АРТЕРИАЛЬНОЙ ГИПЕРТЕНЗИЕЙ.
2. Жалалова, Д. З., Кадирова, А. М., & Хамракулов, С. Б. (2021). Исходы герпетических кератоувеитов на фоне лечения препаратом «офтальмоферон» в зависимости от иммунного статуса пациентов. междисциплинарный подход по заболеваниям органов головы и шеи, 103.
3. ЖД, З., and А. БС. "РЕЗУЛЬТАТЫ ОЦЕНКИ УРОВНЯ ЭНДОТЕЛИНА-1 И Д-ДИМЕРОВ В СЛЕЗНОЙ ЖИДКОСТИ У ПАЦИЕНТОВ С АРТЕРИАЛЬНОЙ ГИПЕРТЕНЗИЕЙ." SCIENTIFIC JOURNAL OF APPLIED AND MEDICAL SCIENCES 3.3 (2024): 300-307.
4. Zhalalova, D. Z. OCT angiography in the assessment of retinal and choreoretinal microcirculation in patients with uncomplicated arterial hypertension International Ophthalmological Congress IOC Tashkent 2021.
5. Zhalalova, D. Z. Evaluation of markers of endothelial dysfunction in tear fluid in patients with arterial hypertension. Journal of Biomedicine in Amaliet. Tashkent-2022, Volume No., No. WITH.
6. Жалалова, Д. З. (2021). Эндотелин-1 ва гомоцистеин даражасини артериал гипертензия фонида тур пардв узгаришларида эндотелиал дисфункциянинг маркерлари сифатида текшириш. Биомедицина ва амалиет журнали, 6(5), 203-210.
7. Jalalova, D., Axmedov, A., Kuryazov, A., & Shernazarov, F. (2022). Combined dental and eye pathology. Science and innovation, 1(8), 91-100.
8. Zhalalova, D. Z. (2022). Pulatov US MICROCIRCULATORY DISORDERS IN THE VASCULAR SYSTEM OF THE BULBAR CONJUNCTIVA WITH INITIAL MANIFESTATIONS OF INSUFFICIENT BLOOD SUPPLY TO THE BRAIN. European journal of molecular medicine, 2(5).

9. Жалалова, Д. З. (2021). ОКТ-ангиография при оценке сосудистого русла сетчатки и хориоидеи. Биология ва тиббиет муаммолари, 6(130), 211-216.
10. Жалалова, Д. З. (2022). Классификационые критерии изменений сосудов сетчатки при артериальной гипертензии. In Международная научная конференция Университетская наука: взгляд в будущее (pp. 56-64).
11. Долиев, М. Н., Тулакова, Г. Э., Кадырова, А. М., Юсупов, З. А., & Жалалова, Д. З. (2016). Эффективность комбинированного лечения пациентов с центральной серозной хориоретинопатией. Вестник Башкирского государственного медицинского университета, (2), 64-66.
12. Жалалова, Д. З. Оценка маркеров эндотелиальной дисфункции в слезной жидкости у пациентов с артериальной гипертензиейЖурнал «Биомедицина ва амалиет». Тошкент-2022, Том №, №. С.
13. Жалалова, Д. З. (2021). ОКТ-ангиография в оценке ретинальной и хореоретинальной микроциркуляции у пациентов с неосложненой артериальной гипертензией/I Международный офтальмологческий конгресс IOC Uzbekistan, 2021 г. Ташкент, с, 96.
14. Shernazarov, F., Jalalova, D., Azimov, A., & CAUSES, S. A. (2022). SYMPTOMS, APPEARANCE, TREATMENT OF VARICOSE VEINS.
15. Жалалова, Д. З. (2021). Эндотелин-1 ва гомоцистеин даражасини артериал гипертензия фонида тур пардв узгаришларида эндотелиал дисфункциянинг маркерлари сифатида текшириш. Биомедицина ва амалиет журнали, 6(5), 203-210.
16. Shernazarov, F., Tohirova, J., & Jalalova, D. (2022). Types of hemorrhagic diseases, changes in newboens, their early diagnosis. Science and innovation, 1(D5), 16-22.
17. Zhalalova, D. Z. (2022). The content of endothelin and homocysteine in blood and lacrimal fluid in patients with hypertensive retinopathy Web of Scientist: International Scientific Research Journal. ISSUE, 2, 958-963.
18. Shernazarov, F., & Zuhridinovna, J. D. (2022). Microcirculation disorders in the vascular system of the bulbar conjunctiva in the initial manifestations of cerebral blood supply deficiency. Science and innovation, 1(Special Issue 2), 515-522.
19. Zhalalova, D. Z. (2022). Modern aspects of neuroprotektive treatment in hypertensive retinopathy Web of Scientist: International Scientific Research JournalVolume 3. ISSUE, 2, 949-952.
20. Жалалова, Д. З. (2009). Метод комбинированного лечения диабетической ретинопатии. Врач-аспирант, 37(10), 864-868.
21. Жалалова, Д. З. (2023). Результаты оценки эффективности комплексного лечения у пациентов с 3-4 стадиями гипертонической ангиоретинопатии. Miasto Przyszłości, 41, 33-36.
22. ЖД, З., & ИЖ, Ж. (2024). КЛАССИФИКАЦИЯ ГИПЕРТОНИЧЕСКОЙ РЕТИНОПАТИИ НА ОСНОВЕ ДАННЫХ ОПТИЧЕСКОЙ КОГЕРЕНТНОЙ ТОМОГРАФИИ. SCIENTIFIC JOURNAL OF APPLIED AND MEDICAL SCIENCES, 3(3), 336-342.
23. ЗЖД, Ж. (2024). КЛИНИКО-ФУНКЦИОНАЛЬНЫЕ ПОКАЗАТЕЛИ ОРГАНА ЗРЕНИЯ У ПАЦИЕНТОВ С ИШЕМИЧЕКИМИ ИЗМЕНЕНИЯМИ СОСУДОВ СЕТЧАТКИ. SCIENTIFIC JOURNAL OF APPLIED AND MEDICAL SCIENCES, 3(3), 286-293.
24. ЖД, З. (2024). ОЦЕНКА КЛИНИЧЕСКИХ И ФУНКЦИОНАЛЬНЫХ ПОКАЗАТЕЛЕЙ ЭНДОТЕЛИАЛЬНОЙ ДИСФУНКЦИИ В СЛЕЗНОЙ ЖИДКОСТИ У ПАЦИЕНТОВ С

АРТЕРИАЛЬНОЙ ГИПЕРТЕНЗИЕЙ. SCIENTIFIC JOURNAL OF APPLIED AND MEDICAL SCIENCES, 3(3), 330-335.

25. Жалалова, Д. З. (2023). Актуальность проблемы изменений глазного дна при артериальной гипертензии. Miasto Przyszłości, 41, 37-40.