MINISTRY OF PUBLIC HEALTH OF UKRAINE
BOGOMOLETS NATIONAL MEDICAL UNIVERSITY
DEPARTMENT OF OPHTHALMOLOGY

WORKBOOK
FOR INDEPENDENT WORK FOR STUDENTS
OF MEDICAL FACULTY
FOR THE COURSE "OPHTHALMOLOGY"
(new edition)

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TOPIC: ANATOMY OF THE EYE

Compentence of the student.
With the help of the eye, a person receives more information about the world around him than with the help of all other organs combined. A doctor of any specialty should know the problem of the eye.
The educational goal.
After studying the topic, students should **know:**

- anatomical and topographic features of the visual organ: eyeball, auxiliary apparatus of the eye, conducting and central elements of the visual analyzer;

be able:

- clearly recognize the anatomical elements of the eye in clinical, radiological, ultrasound and tomographic examinations.

Tasks for the independent preparation for classes.
Approximate map for the independent work with literature.

TASK	ANSWER
Name the layers of the eyeball.	
Name the muscles of the eyelids and the nerves that innervate them.	
Name the anatomical elements of the lacrimal apparatus and lacrimal ducts.	
List the bones involved in the formation of the orbit.	1. 2. 3. 4. 5. 6. 7.
Name the layers of the cornea and its horizontal diameter in newborns and adults.	
Name the parts of the vascular tract. Record the blood supply to the vascular tract.	
Write down the names of the branches of the central retinal artery.	

Name three retinal neurons. Record the histological layers of the retina.	

The list of key terms, parameters, characteristics which the student should learn while preparing for lessons.

TERM	ANSWER
Papilla lacrimalis	
Punctum lacrimalis	
Canaliculus lacrimalis	
Musculi levator palpebrae superioris	
Glandula lacrimalis	
Saccus lacrimalis	
Ductus nasolacrimalis	
Tunica conjunctiva	
Cornea	
Limbus	
Lamina cribrosa	
Sclera	
Iris	
Corpus ciliare	
Choroidea	
Lens	
Zonula ciliaris	
Corpus vitreum	
Retina	
Nervus opticus	

Tasks for independent work.

№	TASK	ANSWER
1.	Name the external muscles of the eyeball, indicate their innervation.	
2.	Which muscles turn the eyeball: a) inside? b) outside? c) up? d) down?	
3.	The patient could not close his eyelids. Which muscle is affected?	
4.	What pathology is observed in case of violation of the sympathetic innervation of the eye?	
5.	What are the symptoms of upper eyelid syndrome?	
6.	Which iris muscles are used to move the pupil? Their innervation?	
7.	Patient has injured his eye with a wire. He has a scleral wound in 4 mm away from the limbus. Which part of the vascular tract can be damaged?	
8.	Patient has injured his eye with a wire. He has a scleral wound in 13 mm away from the limbus. Which part of the vascular tract can be damaged?	
9.	Patient has a penetrating injury of the eye. What is the depth of the anterior chamber? Which part of the vascular tract can be pinched in the wound?	

Literature.

Main:

1. Ophthalmology : Textbook / O. P. Vitovska [et al.] ; ed. O. P. Vitovska. - Kyiv : AUS Medicine Publishing, 2017. - 647 p. : ill., tab. - Ref.: p. 639-644. - Ind.: p. 645-647.
2. Comprehensive Ophthalmology by A. K. Khurana 4th Ed. Anshan Publishers; 4th edition (December 15, 2007). 600 pages
3. Clinical Ophthalmology: A Systematic Approach: Expert Consult: Online and Print (Expert Consult Title: Online + Print) 7th Edition by Jack J. Kanski MD MS FRCS FRCOphth (Author), Brad Bowling FRCSEd(Ophth) FRCOphth FRANZCO (Author). Saunders; 7th edition (May 16, 2011). 920 pages

TOPIC: FUNCTIONS OF THE EYE

Compentence of the student.
The eye is an analytical system in which the reception of light stimuli is realized with their subsequent transformation into a subjective visual image that provides the functions of the visual organ. Mastering the basic methods of studying the functions of the eye allows you to detect pathology of the visual organ in the early stages of the disease.

The educational goal.
After studying the topic, students should **know:**
- functions of the eye;
- methods for investigation of the functions of the eye;

be able:
- determine visual acuity by subjective method;
- determine color perception with the help of Rabkin's polychromatic tables;
- determine the visual field by the control method and by means of an arc perimeter;
- determine the dark adaptation by the approximate method.

Practical work (tasks) performed in class.

1. Determining of visual acuity by subjective method.
2. Determination of color perception using polychromatic tables.
3. Determination of visual field by the control method and using the perimeter.
4. Determination of dark adaptation by the approximate method.

Tasks for the independent preparation for classes.
Approximate map for the independent work with literature.

TASK	ANSWER
What is visual acuity? What is the formula for checking the visual acuity?	
List the methods for checking the visual acuity. What objective method of central vision checking do you know?	
What is the principle for constructing the tables for the study of visual acuity?	
What theory of color vision is recognized now?	
What disorders of color perception do you know?	
What is the principle for construction the Rabkin's tables?	
Define the visual field.	

Methods of visual field examination.	
Describe the control method of visual field examination.	
In what units is the visual field measured? Normal limits of visual field.	
Types of visual field disorders.	
Give a complete description of the physiological scotoma "blind spot".	
What is light perception?	
Types of adaptation. Methods of research of light perception. Describe an indicative method of studying dark adaptation.	
What is hemeralopia? What are the types of hemeralopia?	

The list of key terms, parameters, characteristics which the student should learn while preparing for lessons.

TERM	ANSWER
Anopia	
Monochromacy	
Dichromacy	
Trichromacy	
Protanopia	
Deuteranopia	
Tritanopia	

Protanomaly	
Deuteranomaly	
Tritanomaly	
Scotoma	
Blind spot	
Hemeralopia	

Tasks for independent work.

№	TASK	ANSWER
1.	The patient counts his fingers at a distance of 4m. Calculate his visual acuity.	
2.	The patient has no objective vision. How to check visual acuity?	
3.	The patient sees the light and correctly determines its direction. Record the visual acuity of this patient.	
4.	The patient has no objective vision, he does not feel light. What is the patient's visual acuity?	
5.	The mother brought a 2-month-old baby to the ophthalmologist and wants to know if the baby sees. How will you check the visual acuity?	
6.	You examine the newborn. How to check if he sees or not?	
7.	The patient reads 8 lines of the Golovin-Sivtsev table, making a mistake in 2 characters. What is his visual acuity?	
8.	The patient reads 4 lines of the table Golovin-Sivtsev table, making a mistake in 2 characters. What is his visual acuity?	
9.	The patient reads the 2nd line of the Golovin-Sivtsev table, making a mistake in one character. What is his visual acuity?	

10.	The patient has a reduced perception of red color. Name the type of disorder of color perception.	
11.	The patient does not perceive red color. Name the type of disorder of color perception.	
12.	The patient has a reduced perception of green color. Name the type of disorder of color perception.	
13.	The patient does not distinguish green color. What color perception disorder do you think of?	
14.	The patient does not perceive any color. Name the type of color vision disorder.	
15.	How to characterize the visual field, if in all meridians the numbers are less than normal?	
16.	After maladaptation, the subject looks at the colored squares by Purkinje. Which first square should be visible? After what time?	

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TOPIC: REFRACTION AND ACCOMMODATION

Competence of the student.

One of the conditions of normal vision is to obtain a clear image on the retina. Reducing the distance and near vision, refractive errors and disturbance of accommodation, are observed in almost all people in different periods of life. Knowledge of the physical fundamentals (bases) of refraction of rays optical system of the eye, allows to determine how people see objects at different distances and in different ages, this knowledge helps doctor in their practice.

The educational goal.

After studying the topic, students should **know:**

- types of clinical refraction;

- methods for determining clinical refraction;
- methods for correcting refractive errors;
- clinic and complications of myopia and hyperopia;
- astigmatism, its types;
- accommodation, its age changes;

be able:

- determine the type of ocular lenses of the patient;
- provide sanitary-hygiene recommendations for the prevention of myopia and its complications

Term's dictionary

Accomodation - the ability of the eye to change its focal length by altering the shape of the lens, thereby either near or far objects to be sharply on the retina

Presbyopia - far-sightedness associated with middle age

Refracting - measuring or determining the refraction, i.e. the ability of the eye to focus

Refraction - focusing power of the eye or optical system

Retina - layer of nerve cells at the back of the eye that is responsible for vision and which contains rods and corns

Ametropia - discrepancies between the refractive power of the optics and the length of the eyeball

Axial hyperopia - a hyperopic eyeball is shorter compared to the power (focal length) of the optics.

Refractive hyperopia - an eyeball has the normal size; it is due to the weaker power of the optics.

Myopia - if the axial length of the eyeball is longer and the posterior principal focus of the eye lies in the front of the retina

Axial myopia - a myopic eyeball is longer than the focal length of the optics

Myopic conus - white, crescent-shaped area on the temporal side of the disk, where the sclera is exposed

Posterior staphyloma - the retina in the neighborhood of the disk, especially on the temporal side, becomes atrophic and exposes the white sclera, which stretches and bulges.

Tasks for the independent preparation for classes.
Approximate map of the independent work with literature.

TASK	ANSWER
What is clinical refraction?	
Write down types of clinical refraction.	
What is accommodation?	
What is presbyopia?	
Write down complications of myopia.	
Write down types of correction of ametropia.	
Give hygiene guidelines for a patient with myopia	
Write down prescriptions for glasses: - for 20-year-old patient with myopia in 2.0 diopters; - for 20-year-old patient with hyperopia in 2.0 diopters.	

Write down prescriptions for glasses (for reading and far distance): - for 60-year-old patient with emmetropia; - for 60-year-old patient with myopia in 3.0 diopters; - for 60-year-old patient with hyperopia in 3.0 diopters.	

The list of key points, parameters, characteristics which the student should learn while preparing for lesson.

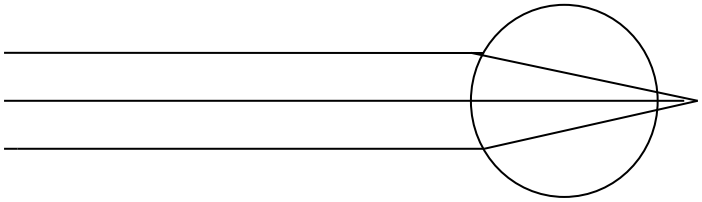
TERM	ANSWER
Accommodation	
Ametropia	
Aniseikonia	
Anisometropia	
Accommodation asthenopia	
Astigmatism	
Hyperopia	
Emmetropia	
Myopia	
Presbyopia	

Tasks for independent work.

№	TASK	ANSWER
1.	20-year-old patient can read the 10th row of the Golovin table. Which type of refraction is present?	
2.	20-year-old patient can see properly near objects but can't see far distance objects. Which type of refraction is present?	
3.	An uncorrected visual acuity of the patient is 0.3. With the help of lens (-1.5 and -1.75 and -2.0 dpt) his visual acuity is 1.0. What type of clinical refraction is present?	

4.	12-year-old schoolgirl has visual acuity both eyes 0.5, best corrected visual acuity is 1.0 with the help of lenses -1.0 diopters. After instillation of 1% mydriatic solution for 3 times each 5 minutes visual acuity has increased to 0.8, and the next day it was 1.0 without correction. What can we think about?	
5.	32-year-old teacher complains about rapidly decreased visual acuity in her left eye. She has been wearing glasses for many years. Visual acuity of the right eye is 0.1, best corrected visual acuity is 1.0 with the help of lens -9.0 diopters; visual acuity of the left eye is 0.05, best corrected visual acuity is 0.2 with the help of lens -11.0 diopters. On the ophthalmoscopy of left eye: there is hemorrhage into the retina in the area of the macula. What is the diagnosis? Which type of refraction is present?	
6.	30-year-old patient complains about of impaired visual acuity in both eyes at distant and near objects. Which type of refraction is present?	
7.	50-year-old patient can see properly at distant objects, but complains about reading, he clearly sees letters only at arm's length Which type of refraction is present based on the age?	
8.	50-year-old patient has myopia in 4.0 diopters. The patient has recently noticed that it is difficult for him to read with glasses. What is the reason? Which glasses should be used so that he can see properly distant and near objects?	
9.	60-year-old patient came to the doctor for annual eyes control. He has refraction: myopia of 3.0 diopters. Does this patient need glasses, which one, for what?	
10.	50-year-old patient has hyperopia of 7.0 diopters. Which glasses does the patient require for clear vision on distant objects and for reading?	

Name the type of refractive error?



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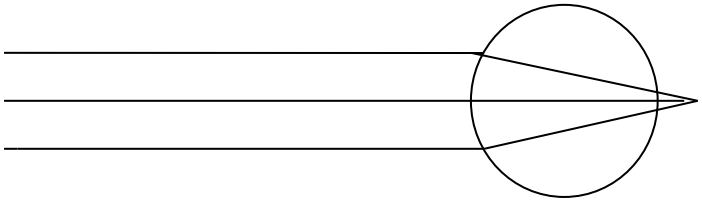

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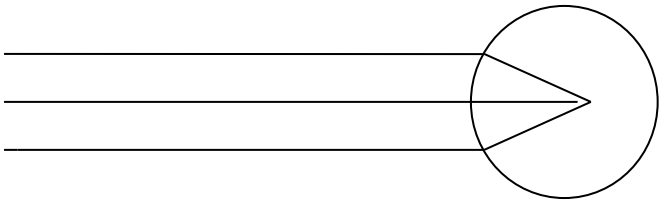

3.

Differential diagnosis of types of clinical refraction
(Marking the sign "+" as presence, and the sign "-" as absence of symptoms).

Criteria	Emmetropia	Myopia	Hyperopia
The main focus of the optical system is in front of the retina			
The main focus of the optical system is at the retina			
The main focus of the optical system is beyond the retina			

A far point of clear vision goes to infinity			
A far point of clear vision is missing			
A near point of clear vision is at a distant position			
Refracting power of the eye is within the normal limits			
Refracting power of the eye is too great			
Refracting power of the eye is too weak			
Can see properly at distant objects, this ability is reduced with aging			
Cannot see properly at distant objects, but can read without glasses with aging			
Can see properly at distant objects, this ability and reading ability is reduced with aging			
Does not require correction			
Require concave lenses for correction			
Require convex lenses for correction			

Literature.

Main:

1. Ophthalmology : Textbook / O. P. Vitovska [et al.] ; ed. O. P. Vitovska. - Kyiv : AUS Medicine Publishing, 2017. - 647 p. : ill., tab. - Ref.: p. 639-644. - Ind.: p. 645-647.
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TOPIC: DISEASES OF THE CONJUNCTIVA

Competence of the student.
Approximately 30% of patients with diseases of the eye, that are visiting the clinic, suffer from diseases of the connective membrane. Paying attention that conjunctivitis is extremely contagious, family doctor should know how to give the correct diagnosis. Early diagnostics allows prescribing treatment in time, isolating patients and preventing the spread of disease.
The educational goal.
After studying the topic, students should **know:**
- clinical picrute and treatment of acute and chronic conjunctivitis;
- clinical picrute, prevention of gonorrhea of babies and adults;
- clinical picrute, diagnostics and treatment of diphtheritic conjunctivitis;
- clinical picrute, diagnostics, treatment and prevention of trachoma;

be able:
- examine the conjunctiva;
- diagnose acute and chronic conjunctivitis;
- provide emergency care for acute conjunctivitis;
- drip drops and put ointment in the eye.

Practical skills (tasks performed in class).

1. Review the conjunctiva.
2. Drip eye drops.
3. Put ointment in the eye.

Term's dictionary

Conjunctivitis – an inflammation of conjunctiva, generally consisting of hyperemia associated with discharge.
Conjunctival injection - irritation of the conjunctiva that is greater near the periphery of the bulbar conjunctiva and became less marked as the limbus is approached.
Hyperemia of the conjunctiva - dilatation of the of conjunctiva vessels.
Pseudomembranous - acute inflammation of conjunctiva, exudate rich of fibrin is formed on the surface of the conjunctiva.
Papillae - the formation of small elevation on the of conjunctival surface that contain newly formed capillaries infiltrated with lymphoid cells.
Parinaud's oculoglandular syndrome - consists of the conjunctivitis associated with marked preauricular gland enlargement.
Pinguecula - raised yellow-gray area at either side of the limbus.
Pterygium - a growth on the cornea, histologically it resembles a pinguecula.

Tasks for the independent preparation for classes.
Approximate map of the independent work with literature.

TASKS	ANSWER
Define conjunctivitis. Classification of conjunctivitis.	
Name the possible ways of contamination with conjunctivitis	
What types of inflammatory eyeball injections do you know? What characterizes the conjunctival injection?	

List the complaints of the patient with acute conjunctivitis.	
What objective evidence of acute conjunctivitis do you know?	
List the objective symptoms of chronic conjunctivitis.	
List the possible complications of conjunctivitis.	
Specify the general principles for the treatment of conjunctivitis.	
Define trachoma. Describe the stages of trachoma.	
What are the complications of trachoma?	
Specify the principles for treatment of trachoma.	
Write prescriptions for: 1. eye drops and ointment: ofloxacin 0.3% 2. eye drops: dexamethasone solution 0.1% 3. eye drops: miramistin solution 0.01%	

The list of key points, parameters, characteristics which the student should learn while preparing for lesson.

TERM	ANSWER
Epiphora	
Xerosis	
Symblepharon	
Chemosis of the conjunctiva	

Tasks for independent work.

	TASK	ANSWER
1.	45-year-old patient complains about feeling heaviness in eyelids, "sand" sensation in the eyes. Symptoms worsen in the evening under artificial lighting, On examination, a small amount of mucous secretions at the inner corner of eye is seen. The conjunctiva of cartilage and fornixes is red, velvety in appearance. The disease lasts several years. What is the diagnosis?	
2.	25-year-old patient complains about gluing eyelids, tearing, unexpressed photophobia, mucopurulent discharge, redness and foreign body sensation on both eyes. On examination, dried mucus on the skin of the eyelids, narrowing of the eye fissure due to swelling of the eyelids; abundant mucopurulent discharge, swelling and redness of the conjunctiva of the eyelids and fornixes, conjunctival injection of the vessels of the eyeball. What is the diagnosis?	
3.	During the examination of newborns at the hospital the doctor has noticed that one child (was born the day before) has swelling and redness of the eyelids. On examination, significant swelling, redness of the eyelids. It is difficult to open the eyelids, mucous discharge; the conjunctiva of the eyelids is hyperemic and swollen; conjunctival injection of the vessels of the eyeball is present. What is the diagnosis?	
4.	50-year-old patient complains about itching, heartburn and tearing in her eyes, redness in the corners of the eyes. On examination: hyperemia of the edges of the eyelids in the outer and inner corners of the eyes, the skin of the eyelids in the outer and inner corners of the eyes is macerated, eczematous, there are single wetting cracks. The conjunctiva of the eyelids is hyperemic, fluffy. There is insignificant viscous mucus discharge. What is the diagnosis?	
5.	6-year-old child complains about sudden temperature up to 38.8°C, increased left parotid gland. On examination, eyelids are swollen, flushed with a bluish tinge, very painful on palpation. The pain increases while you are trying to open the eyelids. A cloudy fluid with flakes is secreted from the	

	conjunctival sac. Dirty-gray films, tightly welded to the underlying tissue are seen on the conjunctiva of the eyelids; after removal of the films, the surface of the conjunctiva bleeds. What is the diagnosis?	

Literature.

Main:

1. Ophthalmology : Textbook / O. P. Vitovska [et al.] ; ed. O. P. Vitovska. - Kyiv : AUS Medicine Publishing, 2017. - 647 p. : ill., tab. - Ref.: p. 639-644. - Ind.: p. 645-647.
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TOPIC: DISEASES OF EYELIDS AND LACRIMAL SYSTEM

Competence of the student.

Peculiar morphological features of the structure of the eyelids, their innervation and blood supply determine the uniqueness of their pathology, which is 10% in the overall structure of ocular morbidity. Patients with diseases of the lacrimal system are 3-6% of all ophthalmic patients. Early diagnostics of diseases of the eyelids and lacrimal system contributes to the timely and correct choice of methods for their treatment.

The educational goal.

After studying the topic, students **should know**:

- methods of investigation of eyelids and lacrimal system;
- clinic and treatment of inflammatory diseases of the eyelids;
- clinic and treatment of anomalies of eyelids position;
- clinic, diagnostics and treatment of acute and chronic dacryocystitis of adults and dacryocystitis of newborns;

be able to:

- examine the eyelids and lacrimal system;
- evert the eyelids;
- diagnose stye and treat it;
- diagnose blepharitis and chalazion;
- diagnose dacryocystitis of newborns and adults.

Practical skills (tasks performed in class).

1. To examine the eyelids
2. To evert the eyelids.

Term's dictionary

Ptosis - malposition of the upper eyelid, in which the lid margin is abnormally low.

Lagophthalmos - an inadequate closure of the eyelids that leaves the cornea exposed.

Horner's syndrome - a combination of ptosis, miosis, anhindrosis, resulting from parasysis of the superior cervical sympathetic chain on the side involved.

Ectropion - the lid margin is everted away from the globe.
Entropion - the lid margin is inverted.
Trichiasis and districhiasis - conditions where eyelashes have an adnormal growth and are directed towards the globe.
Anhidrosis - absence of sweating of the lids.
Sjogren's syndrome - general systemic disease of unknown etiology with decreased tear secretion.
Hordeolum (stye) - focal acute infection of a lid margin gland**.**
External hordeolum - purulent infection of a sebaceous or sweat gland along the lid margin
Internal hordeolum - purulent infection with the swelling appearing on the conjunctival side and intermarginal space of the lids.
Chalazion - chronic inflammation of Meibomian gland**,** histopathologic examination of this lesion shows a granulomatous reaction to liberated fat

Tasks for the independent preparation for classes.
Approximate map of the independent work with literature.

TASK	ANSWER
Define the stye (hordeolum). Ways of treatment.	
Define blepharitis. Ways of treatment.	
Define the chalazion. Ways of treatment.	
Define ptosis of the upper eyelid. Etiology and classification of ptosis. Ways of treatment.	
What is lagophthalmos? What are the causes of lagophthalmos? Ways of treatment.	
Define entropion and ectropion. Ways of treatment.	
List the causes of blepharitis.	
What are the causes of dacryocystitis of adults and newborns?	

What are the signs of chronic dacryocystitis of adults? Witch complications of chronic dacryocystitis do you know?	
List the basic principles of treatment of chronic dacryocystitis of adults.	
What are the signs of dacryocystitis of newborns? Witch complications of dacryocystitis of newborn do you know?	
What are the basic principles of treatment of dacryocystitis of newborn?	
Define the acute dacryocystitis, its symptoms and ways of treatment.	
Write prescriptions for: 1. eye ointment: hydrocortisone 0.5% 2. eye ointment: tetracycline 1%	

The list of key points, parameters, characteristics which the student should learn while preparing for lesson.

TERM	ANSWER
Ankiloblepharon	
Blepharohalasis	
Ectropion	
Entropion	
Lagophthalmos	
Ptosis	
Madarosis	

Trichiasis	

Tasks for independent work.

№	TASK	ANSWER
1.	The patient complains about photophobia, lacrimation, purulent discharge from the right eye, pain in the eye after the common cold. On examination: swelling of the lower eyelid, redness, on the base of the eyelashes in the middle third of the eyelid – a purulent focus. It touches the cornea during blinking. What is the diagnosis?	
2.	34-year-old woman complains about a pea-sized formation on the eyelid of the right eye. The tumor gradually grew to the size of a pea during 2-3 months. On examination: on the upper eyelid – a tumor, not soldered to the skin, round shape, without signs of acute inflammation. When the upper eyelid is everted, a yellowish content shines through, surrounded by a network of slightly dilated vessels. What is the diagnosis?	
3.	42-year-old patient complaints about a bump on the lower eyelid on the left. It has appeared a year ago. On examination: 3 mm below the intermarginal edge of the lower eyelid - a newly formed tissue 5×6mm in diameter with dense edges, excessive keratinization, covered with a crust, after its removal the surface bleeds. What is the diagnosis?	
4.	42-year-old patient complains about tearing, purulent discharge. From history revealed that tearing lasts 2 months. She has been suffering from hypertrophic rhinitis for about a year. On examination: tearing, bean-shaped bulging area in the inner corner of the eye. On the pressing at the area of lacrimal sac the purulent discharge appears from the lacrimal points. What is the diagnosis?	
5.	Mother of newborn (2 months old) has noticed that her child has purulent discharge from the right eye, which appeared a week after birth. On examination: there is the bulging with	

	redness in the inner corner of the right eye, wetting of the eye. On the pressing at the area of lacrimal sac the purulent discharge appears from the lacrimal points. What is the diagnosis?	

Literature.

Main:

1. Ophthalmology : Textbook / O. P. Vitovska [et al.] ; ed. O. P. Vitovska. - Kyiv : AUS Medicine Publishing, 2017. - 647 p. : ill., tab. - Ref.: p. 639-644. - Ind.: p. 645-647.
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TOPIC: DISEASES OF THE LENS

Competence of the student.

Cataract - one of the most common eye diseases and one of the main causes of curable blindness. The family doctor should diagnose cataract, prescribe the necessary treatment and resolve the issue of surgery in a timely manner.

The educational goal.

After studying the topic, students should **know:**

- methods of lens examination;
- classification, etiology and clinic of cataract;
- differential diagnosis of cataract and glaucoma;
- medical treatment and indications for surgical treatment of cataract;
- aphakia; characteristics and methods of correction;
- abnormalities of the lens position. principles of treatment.

be able:

- to examine the lens;
- to diagnose cataract.

Practical skills (tasks performed in class).

1. Examination of the lens in transmitted light.

Term's dictionary

Aphakia – absence of the lens of the eye.

Aphakic eye - when a cataract is removed but isn't replaced.

Phakic - natural lens of the eye.

Pseudophakic eye – when a cataract is replaced with an artificial lens.

Phacoemulsification – surgical procedure to remove a cataract using sound waves to disintegrate the lens which is then removed by suction.

Intraocular lens – an artificial lens made of plastic, silicone, acrylic or other material that is implanted in the eye during cataract surgery (abbreviated IOL).

Lenticonus - localized, cone-shaped deformation of the anterior or posterior lens surface. Posterior lenticonus is more common than anterior lenticonus and is usually unilateral and axial in location.
Lentiglobus - localized spherical deformation of the lens surface.
Microspherophakia - a developmental abnormality in which the lens is small in diameter and spherical in shape.
Photophobia – extreme sensitivity to light. Photophobia is a major symptom of acute uveitis.
Slit lamp – an instrument that combines a binocular microscope with special lights. It allows an eye doctor to examine the front portion of the eye.

Tasks for the independent preparation for classes.
Approximate map of the independent work with literature.

TASK	ANSWER
What is cataract?	
What is congenital cataract? Clinical management of patients suffering from congenital cataract	
Classification of acquired cataract.	
Stages, signs of senile cataract.	
Therapeutical treatment of cataract.	
Indications for surgical treatment of cataract.	
Methods of surgical treatment of cataract.	
List the symptoms of aphakia.	
List methods for aphakia correcting.	

The list of key points, parameters, characteristics which the student should learn while preparing for lesson.

TERM	ANSWER
Aphakia	

Artiphakia	
Luxation of the lens	
Iridodonesis	

Tasks for independent work.

N	TASK	ANSWER
1.	30-year-old patient, painter, after the hit can't see properly with his left eye (visual acuity is 0.01 and can't be corrected). On examination: opacification of the lens. The right eye is intact. What is the diagnosis?	
2.	6-year-old child has visual acuity 1.0 (20/20) on both eyes. On examination: light opacities scattered through-out the lens without involving the embryonal nucleus of both eyes. What is the diagnosis?	
3.	70-year-old patient was operated a year ago due to the cataract of right eye. Visual acuity after surgery was 1,0. During the last 4 months the visual acuity on the right eye has decreased to 0,4 and can't be corrected. On examination: a thin film in region of pupil behind the lens. What is the diagnosis?	
4.	30-year-old man has opacification of lens in the back capsular region in both eyes. What is the diagnosis? What additional methods of diagnostics should the doctor perform?	
5.	65-year-old man complains about slow gradual vision loss on the right eye, which is not accompanied by pain and inflammation. On examination: visual acuity of right eye is 0.6, can't be corrected. In passing light on the background of the red reflex black strokes are seen. What is the diagnosis?	

Make the differential diagnosis between cataract and glaucoma
(marking the sign "+" as presence and the sign "-" as absence of symptoms)

SIGNS	CATARACT	GLAUCOMA
Intraocular pressure		
Visual field		
Angle of the anterior chamber		
Fundus reflex		
Status of the optic nerve		

Literature.

Main:

1. Ophthalmology : Textbook / O. P. Vitovska [et al.] ; ed. O. P. Vitovska. - Kyiv : AUS Medicine Publishing, 2017. - 647 p. : ill., tab. - Ref.: p. 639-644. - Ind.: p. 645-647.
2. Comprehensive Ophthalmology by A. K. Khurana 4th Ed. Anshan Publishers; 4th edition (December 15, 2007). 600 pages
3. Clinical Ophthalmology: A Systematic Approach: Expert Consult: Online and Print (Expert Consult Title: Online + Print) 7th Edition by Jack J. Kanski MD MS FRCS FRCOphth (Author), Brad Bowling FRCSEd (Ophth) FRCOphth FRANZCO (Author). Saunders; 7th edition (May 16, 2011). 920 pages

TOPIC: DISEASES OF THE CORNEA

Competence of the student.

Diseases of the cornea take about 25% among the diseases of eye. Diseases of the cornea often lead to reduced vision or blindness. Early diagnostics and proper treatment of inflammatory processes of the cornea in the first place contribute to the best course of the disease, prevent serious complications. Knowledge of the structure of the cornea, methods of diagnostics and clinic of diseases is necessary in the practice of family doctor.

The educational goal.

After studying the topic, students should **know:**

- methods of examination of the cornea;
- classification of keratitis;
- clinic and consequences of keratitis;
- principles of treatment of keratitis;
- abnormalities of the cornea;

be able:

- examine the cornea by side lighting;
- determine the sensitivity of the cornea;
- diagnose keratitis.

Practical skills (tasks performed in class).

1. Investigation of the cornea by side lighting.
2. To determine the sensitivity of the cornea.

Term's dictionary

Megalocornea - bilateral, nonprogressive, congenitally enlarged cornea (the diameter may rich 16 mm); myopia, dislocation of the lens, and posterior subcapsular cataracts are frequently associated findings.

Microcornea – often is associated with microphthalmos, The cornea is abnormally small (10mm or less). Patients often are highly hyperopic and predisposed to glaucoma.

Xerophthalmia - refers to the ocular changes caused by vitamin A deficiency. In the late stages of xerophthalmia, exfoliation of the epithelium, corneal clouding, ulceration are seen.

Bitot's spots – gray-white, oval to triangular lesion occurring predominantly on the temporal side of the limbus, associated with the deficiency of vitamin A, but they are also observed in pellagra and in other nutritional deficiencies.

Keratic precipitates - deposits of inflammatory cells on the posterior surface of the cornea.

Arcus senilis - gray, opaque ring about 1 to 1.5 mm wide following the contour of the limbus but separated from it by a clear zone, found among people older 50 years.

Staphyloma - ectasia or bulging of weakened cornea or sclera lined with uveal tissue.

Hypopyon - protein aggregates and debris form a yellow mass on the inferior portion of the anterior chamber.

Tasks for the independent preparation for classes.
Approximate map of the independent work with literature.

TASK	ANSWER
List the layers of the cornea.	
List the properties of the cornea.	1. 2. 3. 4. 5. 6.
What methods are used to examine the cornea?	1. 2. 3.
How to investigate the corneal sensitivity? Check schematically the corneal sensitivity.	
List the abnormalities of the cornea.	1. 2. 3. 4. 5.

Classification of keratitis.	
What is corneal syndrome? Describe the pericorneal injection of the vessels of the eyeball.	
List the symptoms of keratitis.	
What are the consequences of keratitis?	
List the symptoms of corneal ulcer serpens.	
General principles of treatment of keratitis. List the main drugs prescribed for the local treatment of keratitis.	
Write prescriptions for: 1. eye drops: tobramycin 0.3% 2. eye drops: thiotriazoline 1%	

The list of key points, parameters, characteristics which the student should learn while preparing for lesson.

TERM	DEFINITION
Keratoglobus	
Keratoconus	
Keratomalacia	

Keratoplasty	
Xerophthalmia	
Macrocornea (megalocornea)	
Mikrocornea	
Nebula	
Macula	
Leucoma	

Tasks for independent work.

№	TASK	ANSWER
1.	The patient came to a family doctor with complaints about cough, fever. On examination: corneal opacity of the right eye. The right eye can't see properly for 15 years (after trauma). On examination: eyelids are open; the eye is without any inflammatory signs. White clouding 5×6 mm in diameter is seen in the cornea. What is the diagnosis?	
2.	The patient came to a family doctor with complaints about pain in the right eye, photophobia, lacrimation, inability to open eyes, visual loss. On examination: swollen eyelids; eye fissure is closed, blepharospasm, lacrimation, pericorneal injection, gray corneal infiltrates. What is the diagnosis?	
3.	The patient complains about lacrimation, photophobia, decreased vision acuity, pain in the right eye. Two days ago she had a foreign body in the right eye. Woman didn't visit the doctor. On	

	examination: narrowing of the eye fissure, a slight swelling of the eyelids, pericorneal injection, in the center of the cornea a grayish-yellow infiltrate 3×5 mm in diameter is present. The content of the anterior chamber is transparent, pupil is round, iris is clear. The sensitivity of the ciliary body is unpainful. What is the diagnosis?	
4.	Patient complains about pain, photophobia, lacrimation and redness of the right eye after he had injured it with a tree branch. On examination: visual acuity of the right eye is 0.5, can't be corrected. Photophobia, lacrimation, blepharospasm, pericorneal injection, yellow infiltrate on the cornea, the infiltrate area is stained with fluorescein. What is the diagnosis?	
5.	Patient complains about a foreign body sensation, photophobia, lacrimation, redness and decreased vision of the left eye. She had suffered from viral infection. On examination: visual acuity of the left eye is 0.3, can't be corrected. Lacrimation, photophobia, blepharospasm, pericorneal injection; corneal infiltrate is located in the superficial layers, resembling a tree branch, the sensitivity of the cornea is reduced. What is the diagnosis? What is the most likely etiology of the disease?	

Make the differential diagnosis between keratitis, corneal laceration and leucoma (marking the sign "+" as presence and the sign "-" as absence of symptoms)

CLINICAL SIGNS	KERATITIS	LACERATION	LEUCOMA
Pain			
Lacrimation			
Photophobia			
Decreased vision			
Pericorneal injection			
Infiltrate			
Positive fluorescein test			

Literature.

Main:

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TOPIC: DISEASES OF VASCULAR TRACT

Compentence of the student.

Diseases of the vascular tract have 10% among all diseases of the eye, and often lead to reduced vision or blindness. Iridocyclitis (uveitis) often arises due to various infectious diseases of the body. Therefore, knowledge of the clinic, the foundations of early diagnosis and treatment of the diseases of vascular tract, give the ability to provide emergency assistance in the practice of family doctors.

The educational goal.

After studying the topic, students should **know:**

- classification of uveitis;
- clinic and consequences of uveitis;
- diagnosis and treatment guidelines of uveitis;
- emergency care of acute iridocyclitis.

be able:

- assess the state of the iris (color, size and reaction of the pupils);
- determine the sensitivity of the ciliary body;
- diagnose the acute iridocyclitis;
- provide emergency care of acute iridocyclitis.

Practical work (tasks) performed in class.

1. Palpation to determine the sensitivity of the ciliary body.

Term's dictionary

Aniridia – absence of the iris.

Iridodialysis – the iris is torn from its root at the ciliary body

Iridodonesis – is the vibration or agitated motion of the iris with eye movement. It indicates subluxation or dislocation of the lens.

Ciliary flash – refers to a deep, diffuse, dull red injection around the limbus, resulting from dilatation of the vessels supplying the iris and ciliary body.

Posterior synechiae – adhesion of the iris to the anterior capsule of the lens with irregularly shaped pupil.

Seclusion of the pupil –is an annular posterior adhesion or synechia resulting from iritis and shutting off anterior from posterior chamber.

Occlusion of the pupil – posterior synechiae are formed around the entire pupillary margin, they prevent the normal passage of aqueous humor from posterior to anterior chamber.

Iris bomber-the midportion of the iris to bulge forward the inner surface of the cornea.

Tasks for the independent preparation for classes.
Approximate map for the independent work with literature.

TASK	ANSWER
Define uveitis. Write down the classification of uveitis.	
Write down main causes of uveitis.	
The main symptoms of iridocyclitis.	
Record symptoms of choroiditis.	
Principles of treatment of uveitis.	
Name the mydriatic eye drops.	
Complications and consequences of uveitis.	
First aid in case of acute iridocyclitis.	
Write prescriptions for: 1. eye drops: atropine sulfate 1.0%	

The list of key terms, parameters, characteristics which the student should learn while preparing for lessons.

TERM	ANSWER
Aniridia	
Hypopyon	

Mydriasis	
Miosis	
Precipitate	
Posterior synechia	
Tyndall phenomenon	

Tasks for independent work.

№	TASK	ANSWER
1.	27-year-old patient complains about pain in the right eye that is worse at night, decreased visual acuity, photophobia, lacrimation. A week ago, he had flu. On examination, pericorneal injection is present, pupil is narrow, iris color is changed. What is the diagnosis?	
2.	40-year-old patient complains about severe pain in the left eye, which worsens at night, decreased visual acuity, photophobia, lacrimation. Patient has been suffering from rheumatic disorder for 5 years. On examination: visual acuity of the left eye is 0.6, can't be corrected. The eye fissure is narrowed, photophobia, lacrimation, ciliary body is painfull, pericorneal injection, the iris is blurred, its color is changed, the pupil is narrow, immobile, in the lower part of the cornea translucent light gray precipitates in the form of a triangle are present. What is the diagnosis?	
3.	Patient has lost visual acuity of the right eye 2 years ago due to a disease. On examination: the right eyeball is smaller in size, severe hypotension is present; the sclera is depressed along the area of the external muscles, the cornea is small, dull. Patient is under the supervision of phthisiater What is the diagnosis?	

4.	Patient has noticed worsening of visual acuity in left eye, a spot in sight two weeks ago. Visual acuity of left eye is 0.4, can't be corrected. On examination, the anterior segment of the eye is unchanged, on the fundus - some yellowish lesions of various sizes, the boundaries are not clear. What is the diagnosis?	
5.	Patient complains about blurred vision in right eye. He was treated in the tuberculosis department. Visual acuity of left eye is 0.3, can't be corrected. On examination, pericorneal injection is present, pupil is narrow, iris color is changed, on the corneal surface there are big greasy precipitates. On the fundus - rounded lesion with fuzzy boundaries. What is the diagnosis?	

Literature.

Main:

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TOPIC: DISEASES OF THE ORBIT

Competence of the student.

Diseases of the orbit - one of the most difficult sections in ophthalmology. Tumors, inflammation, blood vessels' and endocrine diseases can develop in orbit. Orbit is closed for direct examination and palpation with the bony walls and eyeball. Its small volume contains many complex anatomical structures and support functions of the eye. We should remember that orbit is very closely connected with the skull cavity (like thrombosis of cavernous sinus or tumor in the cranial cavity.

The educational goal.

After studying students should **know:**

- clinical picture, diagnostics and treatment of orbital cellulitis;
- clinical picture, diagnostics and treatment of tumors of the orbit;

be able:

- assess the position of the eyeball in the orbit;

- diagnose orbital cellulitis.

Practical skills (tasks performed in class)

1. Assess the position of the eyeball in the orbit.

Tasks for the independent preparation for classes.
Approximate map of the independent work with literature.

TASK	ANSWER
The main symptoms that are due to diseases of the orbit.	
List the malignancies of the orbit.	
List the benign tumors of the orbit.	
What are the distinctive features of malignant and benign tumor growth of the orbit?	
List the names of orbital inflammation.	
What are the signs of orbital inflammation?	
List the etiological factors of orbital cellulitis.	
Clinical picture of orbital cellulitis.	
List the complications of orbital cellulitis.	
Methods of treatment of orbital cellulitis.	

The list of key points, parameters, characteristics which the student should learn while preparing for lesson.

TERM	DEFINITION
Anophthalmos	
Exophthalmos	

Enophthalmos	
Ophthalmoplegia	

Tasks for independent work

№	TASK	ANSWER
1.	20-year-old patient complains about bulging of his right eye. In anamnesis, you have found that exophthalmos is present for 2 years. On examination: the mobility of the right eye is not limited; the anterior segment of the eye is intact. Visual acuity is not deteriorated. Eye fissure is enlarged. What is the diagnosis?	
2.	42-year-old patient complains about bulging of his left eye, double vision, blurred vision. In anamnesis, you find that exophthalmos is present for 4 months and is progressing. On examination: eye fissure is enlarged, the deviation of the left eye outward, limited mobility towards the nose. No signs of inflammation are seen. What is the diagnosis?	
3.	36-year-old patient complains about acute headache, high temperature (38 ° C), pain in the right eye. In anamnesis, you have found that the woman was suffering from chronic sinusitis. On examination: ocular pain, lid edema, chemosis, proptosis and limited ocular movements. Visual acuity is decreased. What is the diagnosis?	
4.	15-year-old patient complains about bulging of his right eyeball. In anamnesis, young man has noticed this phenomenon two years ago. On examination: limited mobility of the right eye towards the nose. Eye fissure is	

	enlarged. Visual acuity is not changed. No signs of inflammation are seen. What is the diagnosis?	
5.	56-year-old patient complains about bulging of his left eyeball for 5 years and its quick progress. On examination: eye fissure is enlarged, limited mobility of the eye in all directions, significant exophthalmos, visual acuity is decreased. What is the diagnosis?	
6.	34-year-old patient complains about headache, fever up to 38°C, pain in his right eye. In anamnesis, two days ago the patient pressed out the stye on the inferior eyelid of the right eye. On examination: redness and swelling of the eyelids, exophthalmos, narrowing of the eye fissure, chemosis, blurred vision, limited mobility of the eye in all directions. What is the diagnosis?	
7.	45-year-old patient complains about retraction of the left eye. In anamnesis, 5 years ago he has suffered from syphilis, and now he is under the supervision of a neurologist. On examination: enophthalmos, partial ptosis and miosis, visual acuity is not changed. What is the diagnosis?	

Literature.

Main:

1. Ophthalmology : Textbook / O. P. Vitovska [et al.] ; ed. O. P. Vitovska. - Kyiv : AUS Medicine Publishing, 2017. - 647 p. : ill., tab. - Ref.: p. 639-644. - Ind.: p. 645-647.
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TOPIC: GLAUCOMA

Competence of the student.

The significant prevalence of primary glaucoma, the complexity of its early diagnostics and a serious prognosis are the reasons for the constant interest to this group of diseases by both scientists and practitioners. Knowledge of methods of early diagnostics, principles of treatment is necessary for the practical activities of a family doctor.

The educational goal.

After studying the topic of subject students to **know:**

- methods of measurement of the intraocular pressure (tonometry);
- classification of glaucoma;
- diagnostics, clinical signs and symptoms of different forms of glaucoma and treatment options;
- etiology, pathomechanism, features of acute angle-closure glaucoma onset, emergency care, differential diagnosis with acute iridocyclitis;

be able to:

- assess intraocular pressure by palpation method;
- evaluate pneumotonometry data;
- provide first aid for acute angle-closure glaucoma attack;
- assess the size of the cornea in newborns.

Practical skills (tasks performed in class).

1. To assess intraocular pressure by palpation method.
2. To provide medical therapy for acute angle-closure glaucoma attack.

Term's dictionary

Open-angle glaucoma - form of glaucoma in which the anterior chamber appears normal. Access to the trabecular meshwork is thus free and the outflow resistance must be due to changes in the meshwork itself.

Congenital glaucoma - a rare form of glaucoma characterized by undevelopment of the anterior chamber during fetal development.

Glaucoma attack - medical emergency; a sudden, massive increase in intraocular pressure that arises due to a blockage in the outflow of the aqueous humor.

Goldmann applanation tonometry - measuring intraocular pressure by applying a force strong to flatten a defined corneal area using a special prism.

Gonioscopy - examination of the angle of anterior chamber.

Ocular Hypertension -elevated intraocular pressure without glaucomatous damage.

Papillary excavation - physiological (normal) or pathological (loss of tissue) depression in the center of the papilla.

Papilla - the site where the axons of retinal ganglion cells converge and then leave the eye; syn. optic nerve head, optic disc

Trabecular meshwork - a meshwork of collagen fibers located in the anterior chamber angle through which the aqueous humor flows out.

Tasks for the independent preparation for classes. Approximate map of the independent work with literature.

TASK	ANSWER
Describe the main pathways of outflow of intraocular fluid.	

What are the anatomical structures and landmarks of the angle of anterior chamber and eye drainage system?	
What are the normal and increased levels of IOP?	
Define glaucoma. Classification of glaucoma.	
What are the clinical features of open-angle glaucoma?	
What are the clinical signs and features of angle-closure glaucoma?	
Consider the steps of medical therapy of the open-angle glaucoma.	
What are the indications for surgical treatment of glaucoma?	
List the clinical symptoms of an acute angle-closure glaucoma attack.	
Provide the management of acute angle-closure glaucoma attack. Indications for laser or surgical treatment?	
List methods of early detection of glaucoma.	
Define congenital glaucoma.	
Define secondary glaucoma.	

Write prescriptions for: 1. eye drops: pilocarpine hydrochloride 1.0% 2. eye drops: timolol maleate 0.5%	

The list of key points, parameters, characteristics which the student should learn while preparing for lesson.

TERM	DEFINITION
Buphthalmos	
Iris bulging	
Glaucoma optic neuropathy	

Tasks for independent work.

№	TASK	ANSWER
1.	45-year-old patient complains about “fog” in the right eye, iridescent circles, nape pain, nausea, which appeared at 4 AM. Earlier he never complained about vision problems. On examination: right eye - swelling of the eyelids, tearing, mixed injection, the cornea is opalescence, anterior chamber is shallow, pupil is dilated, oval-shaped, reaction on light is absent. Visual acuity of the right eye: hand movement near the face, eye is tight by palpation (IOP is T+3). What is the diagnosis?	
2.	50-year-old patient complains about “fog” in front of left eye, iridescent circles, headache and nausea. This condition has repeated for two times, but all the symptoms gradually passed and visual acuity has recovered. Now all the symptoms last for more than 2 days. On examination: eyelids are swelling, congestive injection of the conjunctiva vessels, cornea is dull, anterior chamber is shallow, pupil is wide and there is no	

	reaction on light. By palpation IOP is T+3. What is the diagnosis?	
3.	60-year-old patient complains about decreased visual acuity of the right eye. The patient noticed this when she accidentally closed her left eye. On examination: visual acuity of the right eye 0.4, can't be corrected; left eye - 1.0. Right eye - anterior ciliary vessels are dilated, tortuous, emissary syndrome is seen. The cornea is transparent, the anterior chamber is of moderate depth, the deposition of pseudoexfoliation are seen along the pupillary edge of the iris and on the anterior surface of the lens, the red reflex from the fundus is normal, pink. On the optic fundus of the right eye: optic nerve disc is gray with clear borders, vessels are displaced, optic nerve excavation is dilated. Left eye - no visible changes. IOP of the right eye - 28 mm Hg, IOP of the left eye - 17 mm Hg. Visual field of the right eye is narrowed from the nasal side up to 30°. Visual field of the left eye is within the normal limits. What is the diagnosis? Prescribe treatment.	
4.	58-year-old patient complains about "flies", "fog", decreased visual acuity in both eyes. On examination: anterior segment of the eyes is not changed. On ophthalmoscopy: the red reflex from the fundus is normal, black pointed stripes, which do not reach the center of the pupil, are present. Visual acuity of both eyes is 0.7, can't be corrected. IOP of the right eye - 20 mm Hg, IOP of the left eye - 21 mm Hg. Visual field of both eyes is within the normal limits. What is the diagnosis? Prescribe treatment.	
5.	10-year-old child sometimes complains about headache. On examination: visual acuity of the right eye is 0.1, moderate myopic refraction (-3.5 diopters), visual	

	acuity of the left eye - 1.0, emetropic refraction. IOP of the right eye - 30 mm Hg, left eye- 16 mm Hg. On gonioscopy: right eye - mesenchymal tissue is seen in the angle of the anterior chamber; left eye - the angle of the anterior chamber is open, all structures are visible. The right eye is slightly enlarged, the cornea is swollen, its horizontal diameter is 12.5 mm, the limbus is up to 2 mm. The anterior chamber is deep; the pupil is wider than in the left eye, the reaction on light is slow. Optic nerve disc of the right eye is gray with clear borders, vessels are displaced, optic nerve excavation is dilated. Left eye – has no changes. The visual field of the right eye is narrowed, of the left eye – within the normal limits. What is the diagnosis? Prescribe treatment.	
6.	40-year-old patient complains that his right eye has become red two weeks ago, severe pain has been present in the eye, especially at night, then the eye became pale and the pain decreased. Yesterday morning there was a severe pain in the back of the head, the eye became red, visual acuity decreased. On examination: eyelids of the right eye are swollen; mixed injection of the vessels of conjunctiva is present. The cornea is swollen; the anterior chamber has moderate depth. The pupil is narrow, does not respond to light. The iris is changed in color, greenish, its image is blurred. Visual acuity of the right eye is 0.1, can't be corrected. IOP of the right eye is 36 mm Hg, visual field is within the normal limits. The left eye is within the normal limits. What is the diagnosis? Prescribe treatment.	
7.	Patient has open-angle glaucoma in his left eye. Visual acuity of the left eye is 0.5, can't be corrected; visual field of the left eye is	

	narrowed from the nasal side up to 30°. On examination: anterior ciliary vessels are dilated, tortuous, emissary syndrome is seen. Atrophy of the iris is present. IOP of the left eye is 32 mm Hg. During re-examination after 6 months: visual acuity of the left eye is 0.3, can't be corrected; visual field of the left eye is narrowed from the nasal side up to 15°. On examination: anterior ciliary vessels are dilated, tortuous, emissary syndrome is seen. Atrophy of the iris has increased. IOP of the left eye is 38 mm Hg What is the diagnosis at the first and second examinations? Prescribe treatment.	

Make the differential diagnosis between different types of glaucoma according to the clinical signs (marking the sign "+" as presence and the sign "-" as absence of symptoms)

	SIGNS	TYPES OF GLAUCOMA			
		Closed-angle	**Open-angle**	**Acute angle-closure glaucoma**	**Congenital**
Injection of the conjunctive	Conjunctival				
	Pericorneal				
	Mixed				
	Stagnant				
	Dilated ciliary vessels				
Cornea	The size is normal				
	The size is increased				
	Transparent				
	Swollen				
Iris	The image is not changed				
	Atrophic changes				
	Rubeosis				
	Bombe				
	The pigmented border of the pupil is seen				
	The pigmented border of the pupil is absent				
	Pseudoexfoliation				
	Size of the pupil is middle				
	The pupil is dilated				
	Posterior synechiae				
c o r	Deep				

	Medium depth				
	Shallow				
Angle of the anterior chamber	Open				
	Narrowed				
	Closed				
	Uneven				

Literature.

Main:

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TOPIC: DISEASES OF THE RETINA AND OPTIC NERVE. EYE CHANGES ASSOCIATED WITH GENERAL DISEASES

Competence of the student.

Pathological conditions of the retina and optic nerve can be caused by many neurological, neuroophthalmological, cardiovascular diseases, as well as endocrine diseases, which often require combined coordinated observation and treatment by both an ophthalmologist and a physician of any specialty. Changes in the fundus are of great diagnostic and prognostic value, as a large number of patients require therapeutic treatment. Hence the need to study the pathology of the retina and optic nerve for their timely diagnosis and development of appropriate treatment tactics.

The educational goal.

After studying the topic of subject you need to **know:**

- picture (image) of normal optic fundus;
- methods of optic nerve and retina examination;
- etiology, clinic and methods of treatment of retinal detachment;
- etiology, clinic and methods of treatment of optic neuritis, differential diagnosis with congestive optic disc;
- etiology, clinic and methods of treatment of optic nerve atrophy;
- clinic and methods of treatment of congenital and acquired retinal degenerations;
- etiology, clinic and methods of treatment of retinal circulatory disorders;
- changes in the fundus due to hypertension and diabetes;

be able:

- to connect the general pathology with changes of the optic fundus.

Practical work (tasks) performed in class.

1. To describe picture (image) of normal optic fundus;

Term's dictionary

Retina - layer of nerve cell at the back of eye responsible for vision; contains rods and cones

Receptor - a structure that receives signals at the target organ
Photoreceptor - light-sensitive sensory cells of the retina. One distinguishes between rods (responsible for dark and night vision) and cons (responsible for daylight and color vision)
Retinopathy - non-inflammatory retinal disease
Retinal angiospasm - pathological constriction of retinal blood vessel
Metamorphopsia - visual disturbance in which images are distorted
Retrobulbar - behind the eyeball
Retrobulbar neuritis - inflammation of the optic nerve behind the eyeball
Trombus - blood clot
Trombosis - formation of a thrombus
Venous stasis syndrome - obstruction of the retinal vein outflow by blood congestion
Proliferative - rampant growth
Ophthalmoscope - instrument that allows a direct view of the optic fundus

Tasks for the independent preparation for classes.
Approximate map for the independent work with literature.

TASK	ANSWER
Describe and draw a picture of the normal optic fundus.	
Name the methods of diagnostics of the retina and optic nerve diseases.	
Identify differences in the clinical picture of central retinal vein thrombosis and central retinal artery embolism.	
Write down the causes of optic neuritis.	
Indicate the main symptoms of optic neuritis.	
Identify the differences in the clinical picture of optic neuritis, retrobulbar neuritis, optic nerve atrophy and congestive optic disc.	
Write down the stages of development of fundus changes due to hypertension.	
Write down the stages of development of fundus changes due to diabetes.	

The list of key terms, parameters, characteristics which the student should learn while preparing for lessons.

TERM	DEFINITION
Macropsia	
Metamorphopsia	
Micropsia	
Photopsia	
Photophobia	

Tasks for independent work.

№	TASK	ANSWER
1.	The patient complains about reduced vision, the presence of a spot in front of the left eye. On examination: visual acuity of left eye is 0.1, can't be corrected. The anterior segment of the eye and vitreous body are not changed. On ophthalmoscopy: optic nerve disc is swollen, slightly passes into the vitreous, the boundaries are blurred, in the peripapillary area there are single hemorrhages, varicose veins, tortuous. What is the diagnosis?	
2.	The patient complains about reduced vision, the presence of dark spots spot in front of the right eye. Visual acuity of the right eye is 0.02, can't be corrected. The anterior segment of the eye and vitreous body are not changed. On ophthalmoscopy: optic nerve disc is pale pink, with clear boundaries, the ratio of arteries to veins is 2:3. Macular region is normal. What is the diagnosis?	
3.	The patient complains about reduced vision in both eyes since childhood. Visual acuity of both eyes is 0.1, can't be corrected. The anterior segment of the eye and vitreous body are not changed. On ophthalmoscopy: optic nerve disc is with clear boundaries, gray color, vessels are narrow. What is	

	the diagnosis?	
4.	The patient has no complains about vision loss. Visual acuity in both eyes is 1.0. The anterior segment of the eye and vitreous body are not changed. On ophthalmoscopy: optic nerve disc is enlarged and mushroom-shaped, protrudes into the vitreous, the boundaries of the disc are blurred; retinal vessels, especially veins, are sharply dilated, serpentinely twisted. What is the diagnosis?	
5.	The patient complains about sudden vision loss in the right eye (visual acuity is 0 – zero). The anterior segment of the eye and vitreous body are not changed. On ophthalmoscopy: optic nerve disc is pale, grayish color, arteries are sharply narrow. On a white opaque retina a dark red spot distinguishes clearly in the central area of the fundus. What is the diagnosis?	
6.	The patient complains about reduced vision in his left eye. Visual acuity of the left eye is 0.2, can't be corrected. The anterior segment of the eye and vitreous body are not changed. On ophthalmoscopy: optic nerve disc is swollen, with bright red, shaded boundaries. The veins are dark and expanded; there are multiple hemorrhages of various sizes throughout the fundus. What is the diagnosis?	
7.	Patient complains about a "curtain" in front of the right eye, approaching from the nose, decreased visual acuity, deformation of the objects. On examination: visual acuity of the right eye is 0.3, can't be corrected. On ophthalmoscopy: a gray film is seen in the temporal part of the optic fundus, it fluctuates during eye movements. This area is prominent in the vitreous cavity, has dark tortuous vessels, optic nerve disc is pale pink with clear borders. What is the diagnosis?	

8.	Patient complains about impaired vision at twilight. On examination: visual acuity of both eyes is 0.8, can't be corrected. On ophthalmoscopy: optic nerve disc is waxy, with clear borders, the vessels are narrowed. On the periphery of the fundus pigmented foci in the form of bone cells are identified. What is the diagnosis?	
9.	20-year-old patient complains about decreased visual acuity, appearance of dark spots in the visual field, impaired color vision of both eyes. On examination: visual acuity of both eyes is 0.4, can't be corrected. The anterior segment is not changed. On ophthalmoscopy: optic nerve disc is pale pink, with clear borders; an artery-to-vein (A/V) ratio of about two-to-three (2/3). An oval gray-pink focus is seen in the area of the macula symmetrically on both eyes. What is the diagnosis?	
10.	Picture of the optic fundus: the optic nerve disc is pale pink, with clear borders, the arteries are narrowed, and corkscrew-like tortuosity of small venous vessels is seen in the area of the macula. How do you interpret this picture of the optic fundus? What is the diagnosis?	
11.	Picture of the optic fundus: the optic nerve disc is pale pink, with clear borders, the arteries are narrowed, small veins in the area of the macula are tortuous, symptom of copper and silver wire is present, Salus-Gunn symptom of II-III degree is seen. How do you interpret this picture of the optic fundus? What is the diagnosis?	
12.	Picture of the optic fundus: the optic nerve disc is pale pink, with clear borders, the arteries are narrowed, small veins in the area of the macula are tortuous, symptom of copper and silver wire is present, Salus-Gunn symptom of II-III degree is seen. There are	

	intraretinal hemorrhages; whitish-yellow foci, that are forming a figure of a "star" in the macular area; loose gray-white foci are located along the vascular arcades. How do you interpret this picture of the optic fundus? What is the diagnosis?	
13.	Picture of the optic fundus: the optic nerve disc is waxy, enlarged, with unclear borders, the arteries are narrowed, small veins in the area of the macula are tortuous, symptom of copper and silver wire is present, Salus-Gunn symptom of II-III degree is seen. There are intraretinal hemorrhages; whitish-yellow foci, that are forming a figure of a "star" in the macular area; loose gray-white foci are located along the vascular arcades, retina is edematous. How do you interpret this picture of the optic fundus? What is the diagnosis?	
14.	Picture of the optic fundus: the optic nerve disc is pale pink, with clear borders, the arteries are narrowed, small veins are unevenly dilated and tortuous, dot hemorrhages and microaneurysms are located along the vascular arcades and at the posterior pole. there are, in the form of dots. How do you interpret this picture of the optic fundus? What is the diagnosis?	
15.	Picture of the optic fundus: the optic nerve disc is pale pink, with clear borders, the arteries are narrowed, small veins are unevenly dilated and tortuous, dot and stroke hemorrhages and microaneurysms are located along the vascular arcades and at the posterior pole; white "cotton" and yellow "solid" exudates are present. How do you interpret this picture of the optic fundus? What is the diagnosis?	
16.	Picture of the optic fundus: the optic nerve disc is pale pink, with clear borders, the arteries are narrowed, small veins are unevenly	

	dilated and tortuous, dot and stroke hemorrhages and microaneurysms are located along the vascular arcades and at the posterior pole; white "cotton" and yellow "solid" exudates Newly formed vessels, proliferative tissue are present at the posterior pole. How do you interpret this picture of the optic fundus? What is the diagnosis?	
17.	Picture of the optic fundus: the optic nerve disc is round, pale pink, with clear borders, does not prominent in the vitreous body, the artery-to-vein (A/V) ratio is 2:3. The area of the yellow spot is horizontal oval, red colored. How do you interpret this picture of the optic fundus?	

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TOPIC: INJURIES OF THE EYE

Compentence of the student.

The leading link in the structure of ocular pathology is the damage to the eye and its adnexa, these are penetrating and impenetrable injuries of the eyeball, contusions, corneal and conjunctival burns. The largest number of blind people in the world are people with injuries due to military, industrial and domestic injuries. The future doctor of any specialty should know that the correct diagnosis of eye injuries, prompt hospitalization and timely qualified surgical care to the victim helps to preserve the most important anatomical structures of the eye and the fastest restoration of its functions. The problem of injury control is now one of the most pressing in ophthalmology.

The educational goal.

After studying the topic, students should **know:**

- the symptoms of the penetrating injuries of the eye and the first aid;
- manifestations and treatment of contusions of the eye;
- complications of penetrating eye injuries (endophthalmitis, panophthalmitis, sympathetic inflammation);
- eye burns, their clinic and emergency care;

- foreign bodies of the cornea and emergency care;
- electroophthalmia, its clinical picture and emergency care;

be able:

- diagnose the eye penetrating injury;
- give first aid for the eye penetrating injury;
- remove the foreign body from the conjunctiva;
- render the first aid for chemical and thermal burns;
- apply the monocular and binocular bandage.

Practical work (tasks) performed in class.

1. To provide emergency care for penetrating injures of the eye.
2. To provide emergency care for chemical burns of the eye.

Term's dictionary

Hyphema - blood in the anterior chamber, usually from tears of the ciliary body
Hypopyon - protein aggregates and debris form a yellow mass on the inferior portion of the anterior chamber.
Chemosis - conjunctival edema
Pattern of injection - ciliary flush
Sympathetic ophthalmia - bilateral, granulomatous uveitis that may follow any surgical or traumatic perforation involving the uveal tract.
Enucleation – removing of the eye
Iridodialysis - condition, causes by blunt trauma, appears as an accessory pupil at the iris root.
Emphysema - the sing of the orbital fracture (fracture into ethmoid or maxillary sinus), air infiltrates the tissues, which, on palpation, exhibit a characteristic of crackling or crepitation.
Prolapse of the iris - denotes protrusion of the iris into a wound in the cornea or sclera.

Tasks for the independent preparation for classes.
Approximate map for the independent work with literature.

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TASKS	ANSWER
Name the symptoms of penetrating injures of the eyeball. Record absolute and relative signs of penetrating injury.	
Prescribe first aid for penetrating injuries of the eye.	
List the complications of penetrating injuries of the eye.	
Name the clinical manifestations that may	

occur due to blunt trauma of eye. Describe the severity of an eye contusion.	
Describe severity levels of the eye burns. Clinical picture of the eye burns.	
Emergency help for the chemical eye burns.	

The list of key terms, parameters, characteristics which the student should learn while preparing for lessons.

TERM	ANSWER
Iridodialysis	
Emphysema of eyelids	
Hematoma of eyelids	
Hemophthalmus	
Hyphema	
Endophthalmitis	
Panophthalmitis	
Eye siderosis	
Eye halcosis	
Subatrophy (atrophy) of an eye	
Sympathetic ophthalmia	

Tasks for independent work.

№	TASK	ANSWER
1.	Patient complains about blurred vision in right eye. It was found that when he worked in the studio a piece of metal hit his right eye. Patient has tearing, photophobia, blepharospasm. On examination: gaping wound of the cornea, shallow anterior chamber, hyphema, hypotension. What is the diagnosis?	
2.	Patient complains about blurred vision in right eye. It was found that when he worked in the studio a piece of metal hit his right eye. Patient has tearing, photophobia, blepharospasm. On examination: gaping wound of the cornea goes to the sclera, conjunctival hemorrhage at the site of injury, iris and ciliary body are seen in the wound, anterior chamber is shallow, pupil is shift towards the injury, hypotension. What is the diagnosis? Prescribe treatment.	
3.	Patient complains about blurred vision in right eye. It was found that when he worked in the studio a piece of metal hit his right eye. On examination: cornea is intact. Anterior chamber is deep; there is a lineal wound and hemorrhage of the sclera. Hypotension is present. What is the diagnosis? Prescribe treatment.	
4.	Patient at work accidentally got a solution of calx in the right eye. She has washed her eyes thoroughly with water. The patient was taken by ambulance to the ophthalmology department. On examination: severe swelling and redness of the skin of the eyelids, tearing, photophobia, blepharospasm. The conjunctiva of the eyelids is hyperemic, in the lower fornix there is local ischemia of the conjunctiva. Conjunctival injection of the vessels of the	

	eyeball is seen. The cornea is grayish, swollen, total corneal erosion, positive fluorescein test. Visual acuity of the right eye is 0.1, can't be corrected. What is the diagnosis? Prescribe treatment.	
5.	Patient complains about decreased visual acuity of the right eye. Patient had a penetrating injury of the cornea of the right eye some years ago. On examination: yellow-brown (rusty) shade of the iris of the right eye, rusty spots on the anterior capsule of the lens, the reaction of the pupil to light is slow. Visual acuity of the right eye is 0.2, can't be corrected. Patient has hemeralopia. Visual field of the right eye is narrowed. On ophthalmoscopy: white atrophic foci are seen on the retina, optic nerve disc has a rusty color. What is the diagnosis? Prescribe treatment.	
6.	A child from a sports boarding school was taken to the ophthalmology department. In the anamnesis - a blow to the eye with a stick. On examination: partial tearing of the eyelids, total corneal erosion, hyphema, uneven anterior chamber, iridodonesis, subluxation of the lens. The central parts of the retina are swollen, milky. Reduction of visual acuity up to 0.1. What is the diagnosis?	
7.	19-year-old patient came to the emergency room at 2 o'clock in the morning with complaints about severe tearing, photophobia, blepharospasm, and eye pain. According to the patient, in the afternoon she visited the solarium in order to get tan. She took off her glasses during the ultraviolet procedure. On examination: lacrimation, photophobia, blepharospasm,	

	mixed injection of the vessels of the eyeballs, corneal edema, anterior chamber has moderate depth, pupil is round. Visual acuity of both eyes is 0.6, can't be corrected. What is the diagnosis?	

Make the differential diagnosis between the penetrating and non-penetrating eyeglobe wounds (marking the sign "+" as presence and the sign "-" as absence of symptoms)

	Symptom	Penetrating injury	Non-penetrating injury
1.	Existence of the gaping wound		
2.	Intraocular pressure		
3.	Loss of internal tissues of the eyes		
4.	The dark dot surrounded with a rusty ring or an infiltrate on the cornea		
5.	Tearing, photophobia, blepharospasm		
6.	The hole in the iris without visible damages of an eyeglobe and existence of an intraocular foreign body.		
7.	Changes in anterior chamber depth.		

Make the differential diagnosis between different types of injuries according to the clinical signs (marking the sign "+" as presence and the sign "-" as absence of symptoms)

	Erosion of a cornea	Non-penetrating injure of a cornea	Penetrating wound of a cornea	Penetrating wound of a sclera	Penetrating wound with existence of a foreign body	Penetrating wounds complica-ted with infections
Pericorneal injection						
Eye hypotension						
Normal anterior chamber						
Deep anterior chamber						
Shallow anterior chamber						
Defect of corneal epithelium						
Corneal infiltrate						
Corneal injury						
Wound of conjunctiva and sclera						
Muddy crystalline lens						

Hole in iris						
Opacification of aqueous humor of the anterior chamber						
Hyphema						
Hemophthalmos						
Irregular pupil shape						
Yellow reflex from the fundus in a passing light						
Loss of internal tissues of eye						
Positive fluorescent test						
Foreign body on X-ray analysis						

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Main:

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TOPIC: DISEASES OF THE OCULOMOTOR APPARATUS (STRABISMUS)

Competence of the student

Among eye diseases, strabismus occurs in 3% of cases. Children are early aware of their cosmetic defect - strabismus, which negatively affects the psychological state, the formation of the child's character, the relationship with the environment. Incomplete visual perception and decreased visual acuity further limits the choice of profession. Therefore, early detection and treatment of this pathology is a social problem in which society is interested.

The educational goal.

After studying the topic, students should know:

- methods of definition the nature of vision (binocular, monocular, simultaneous).
- types of strabismus.
- differential diagnosis of associated and paralytic strabismus.
- the consequences of strabismus.
- the principles of treatment and prophylaxis of strabismus.

be able:

- to define a squint angle by Hirschberg.

- to diagnose a paralytic and associated strabismus.
- to determine the volume of movement of the eyeball.

-

Practical work (tasks) performed in class.

- **1.** To define a squint angle by Hirschberg.

Term's dictionary

Angle Kappa - the angle between the visual axis and the central pupillary line. When the eye is fixing a light, the corneal reflection is centered on the pupil, the visual axis and the central pupillary line coincide and the angle Kappa is zero. Ordinarily, the light reflex is 2-4 degrees nasal to the pupillary center, giving the appearance of slight exotropia (positive angle Kappa). A negative angle Kappa gives the false impression of esotropia.

Conjugate movement - movement of the eyes in the same direction at the same time.

Ductions - monocular rotations with no consideration of the position of the other eye

Adduction - inward rotation.

Abduction - outward rotation.

Supmduction (elevation*)* - upward rotation.

Introduction (depression*)* - downward rotation.

Fusion - formation of one image from the two images seen simultaneously by the both eyes. Fusion has two aspects:

- **Motor fusion**: Adjustments made by the brain in innervation of extraocular muscles in order to bring both eyes into bifoveal and torsional alignment.
- **Sensory fusion**: Integration in the visual sensory areas of the brain of images seen with the two eyes into one picture.

Incyclotropia - inward rotation of one eye about its anteroposterior axis (ie, clockwise right eye, counterclockwise left eye).

Excyclotropia - outward rotation of one eye about its anteroposterior axis (i.e., counterclockwise right eye, clockwise left eye).

Orthophoria - the absence of any tendency of either eye to deviate when fusion is suspended. This state is rarely seen clinically. A small phoria is normal.

Heterophoria (phoria) - latent deviation of the eyes held straight by binocular fusion.

- **Esophoria**: tendency for one eye to turn inward.
- **Exophoria**: tendency for one eye to turn outward.
- **Hyperphoria**: tendency for one eye to deviate upward.
- **Hypophoria**: tendency for one eye to deviate downward.

Heterotropia (tropia*):*

- **Esotropia***:* convergent manifest deviation ("crossed eyes").
- **Exotropia***:* divergent manifest deviation ("walleyes").
- **Hypertropia***:* manifest deviation of one eye upward.
- **Hypotropia***:* manifest deviation of one eye downward.

Strabismus - manifest deviation of the eyes that cannot be controlled by binocular fusion.

Tasks for the independent preparation for classes.
Approximate map for the independent work with literature.

TASKS	ANSWER
To write down the conditions necessary for binocular vision.	

What is strabismus? Give the definition	
List the types of strabismus.	
Describe latent strabismus.	
Characterize the strabismus angle according to Hirschberg scheme	
What are the main signs of paralytic strabismus?	
What are the main signs of assosiated strabismus?	
What are the effects of strabismus? Give the definition of amblyopia.	
Specify the principles of treatment of strabismus.	

The list of key terms, parameters, characteristics which the student should learn while preparing for lessons.

TERM	ANSWER
Amblyopia	
Heterophoria	
Diplopia	
Orthophoria	
Pleoptics	
Orthoptics	

Tasks for independent work.

№	TASK	ANSWER
1.	56-year-old patient complains about sudden twisting. The day before she noticed deterioration in general condition (headache, dizziness). She suffers from hypertension for 10 years. After taking antihypertensive drugs, the general condition has improved, but diplopia appeared. On examination: deviation of the left eye up and inward, restriction of mobility downwards and outwards. What is the diagnosis?	
2.	30-year-old patient complains about deviation of the right eye outside and diplopia. He has a skull injury two weeks ago in a car accident. On examination: the right eye is deviated outward and downward, almost complete ptosis is present, mydriasis; eye mobility towards the nose is absent. Diplopia disappears if to cover the right eye with palm. The left eye is healthy. What is the diagnosis? Prescribe treatment.	
3.	A mother of a 4-year-old child has noticed that the child's right eye occasionally deviates to the nose for 2 years. The angle of strabismus according to the Hirschberg scheme is equal 25°. There is no diplopia. The mobility of this eye in all directions is complete. The secondary angle of strabismus is equal to the primary. What is the diagnosis? Prescribe treatment.	
4.	A mother of a 4-year-old child has noticed that the child's right eye occasionally deviates outside for 2 years. The angle of strabismus according to the Hirschberg scheme is equal 25°. There is no diplopia. The mobility of this eye in all directions is complete. The secondary angle of strabismus is equal to the primary. What is the diagnosis? Prescribe treatment.	
5.	A mother of a 3-year-old child has noticed that the child's right eye occasionally deviates to the nose, than the child's right eye occasionally deviates to the nose and vice versa. The angle of strabismus according to the Hirschberg scheme is equal 30°. There is no diplopia. The mobility of this eye in all directions is complete. The secondary angle of strabismus is equal to the primary. On examination you have noticed that the child can fix the image with right or left eye. What is the diagnosis? Prescribe treatment.	

6.	23-year-old patient complains about decimated alternately one or the other eye inwards, no ghosting. On examination you notice that the patient can record the subjects by right or left eye. The angle of strabismus by Hirschberg scheme is 30°. What is the diagnosis?	

Make differential diagnostics between associated and paralytic strabismus.

Clinical signs/etiological factors	Associated strabismus	Paralytic strabismus
Amblyopia		
Diplopia		
Full volume of the eyeball movements		
Restrictions of mobility or lack of eyeball movements		
Equality of angles of primary and secondary deviation		
The angle of primary deviation is less than the angle of secondary deviation		
The compelled head position		
From the anamnesis: the skull injury, inflammatory or vascular disease of the brain, brain tumor, myasthenia gravis		

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Main:

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