UNIVERSITATEA DE STAT DE MEDICINĂ ȘI FARMACIE
„NICOLAE TESTEMIȚANU” DIN REPUBLICA MOLDOVA

Oftalmology Department

GLAUCOMA

Professor
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Glaucoma

- presents a medico-social problem, because they are one of the main causes that can lead to visual impairment, including severe, such as blindness, of one eye or both eyes

Glaucoma

- This is eye disease characterized by: :
  - harmful increase of intraocular pressure
  - loss of retinal nerve fibers and specific alteration of the optic nerve
  - irreversible and progressive disorders of visual functions

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Production, flow and outflow of aqueous humor

Ciliary body (80 ciliary processes): secretion, ultrafiltration, diffusion in Posterior Chamber (between ciliary body, iris, lens and vitreous body)

Moving of aqueous humor from Posterior Chamber through the pupil to Anterior Chamber (between iris, lens in pupil aria and cornea)

Outflow of aqueous humor from Anterior Chamber in venous system through Anterior Chamber Angle 70% and by Uveoscleral pathway 30%

Pathogenesis

Eye hidrodinamic disturbances: aqueous outflow retention; hipersecretion

IOP increase

Mecanical theory :
cronic compresion of a ganglionare cells, retinal and optic head nervouse fibers

Ischemic theory :
cronic compression of a coriocapilares and vesels with cronic ischemia of a ganglionare cells, retinal and optic head nervouse fibers

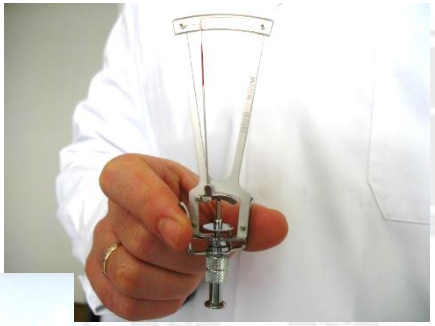
Progressive atrophy of a ganglionare cells, retinal and optic head nervouse fibers with formation of a glaucomatouse excavation

Progressive loss of a visual fonctions , beginning by perimetric defects

Eye Tonometry

- Instrumental:
  - indentation
  - aplanation
  - electronic
  - transpalpebral
  - non-contact (air-push)

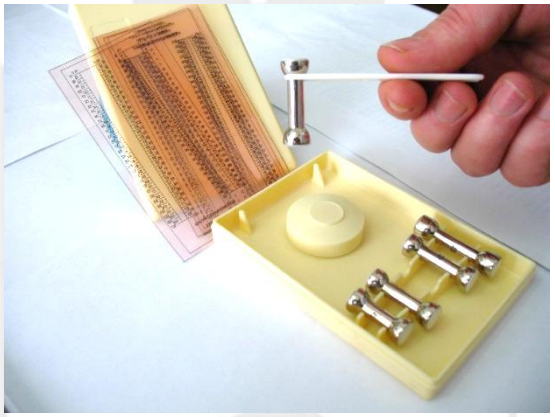
- Tactil:
  - palpatory;

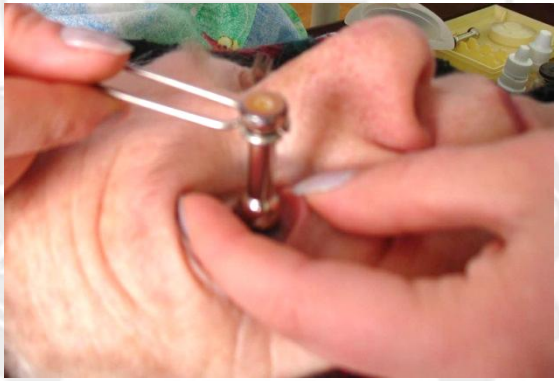


Eye Tonometry by aplanation

- Goldman Tonometry

- Маклаков Tonometry



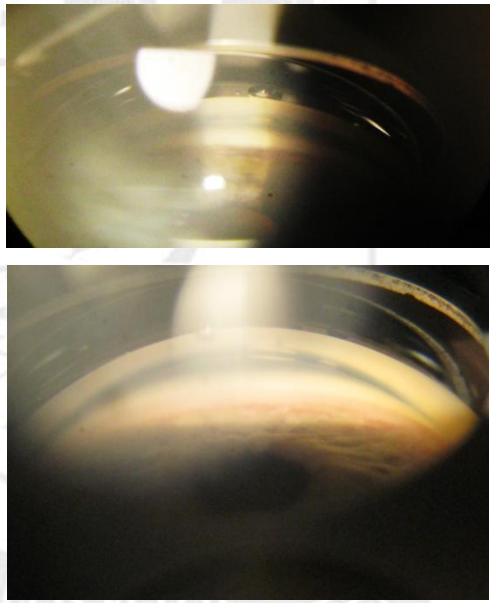


Gonioscopy

- Direct:
  - Koeppe gonioscopic lens
- Indirect:
  - Zeiss gonioscopic lens
  - Краснов gonioscopic lens
  - Goldman three-mirror lens

Gonioscopy

- It allowe the biomicroscopic visualization of the chamber angle and to evaluate:
  - its degree of openness
  - the state of the trabecular meshwork and other adjacent areas
  - presence/absence of structural changes, foreign bodies, etc.



Etiological factors

- the genetic factor is indispensable for pediatric and especially congenital glaucoma;
- adult glaucoma also has a genetic element, which should not be neglected (positive family history); POAG tends to evolve into families, which is explained by increased susceptibility to illness;
- secondary glaucoma appears as a consequence of congenital or acquired ocular abnormalities or disorders, post-traumatic, post-inflammatory, degenerative, systemic disorders, diabetes, etc.

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Morphological changes

- degenerative changes of the trabecula (POAG);
- angle dysgenesis, mesodermal outstanding tissue in the chamber angle (CG);
- anterior and posterior synechiae, goniosynechiae (SG);
- neovascularization, fibrosis at the chamber angle (SG)

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Classification

I. Pediatric glaucoma :

- primary:
  - congenital (hydrophthalmia, buphthalmia)
  - infantil (first year of live)
  - juvenil (in second decade of live)

- secondary (in eye congenital anomalies, systemic diseases, posttraumatic, postinflamatory etc)

II. Adult glaucoma :

- primary:
  - open angle (POAG);
  - Closed angle (PCAG):
    - glaucom acut
- secondary
  - phacogenic – *phacotopic, phacomorphic, phacolytic*,
  - posttraumatic,
  - pseudoexfoliative,
  - pigmentary,
  - tumoral,
  - neovascular,
  - malignant,
  - uveitic etc.

Common signs of glaucoma

- increase of IOP;
- glaucomatous excavation (pathological cupping) of the optic disc;
- loss of vizual fonctions (vizual fields defects)

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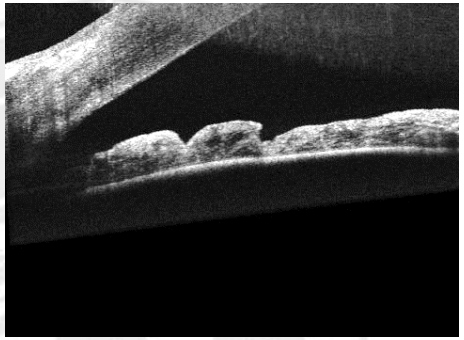
Signs of POAG



- common signs of glaucoma;
- practically asymptomatic evolution (no redness, no eliminations, no pain)
- slow and progressive evolution

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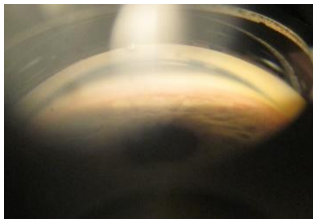
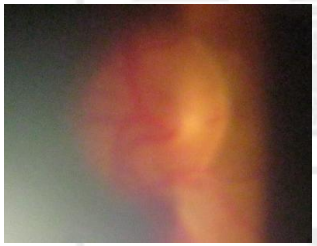
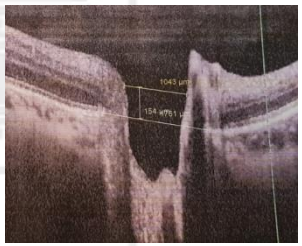
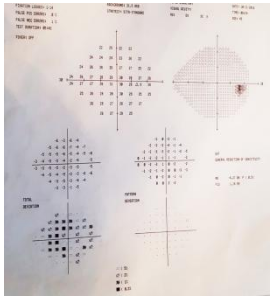
Glaucoma instrumental diagnostic

- eye tonometry;
- gonioscopy;
- ophthalmoscopy/OCT;
- perimetry;
- visometry;



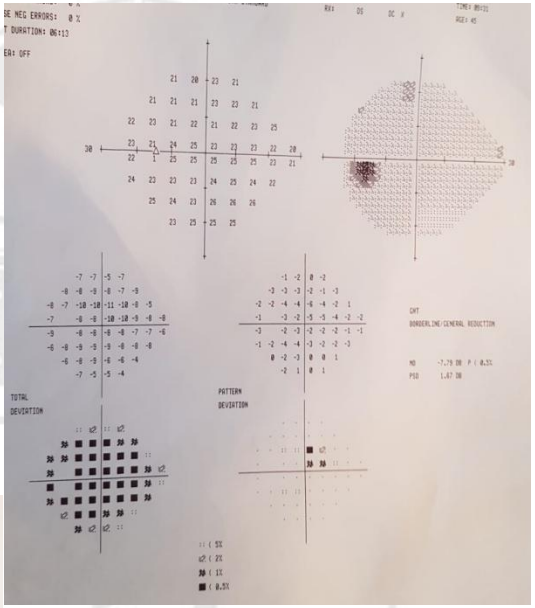


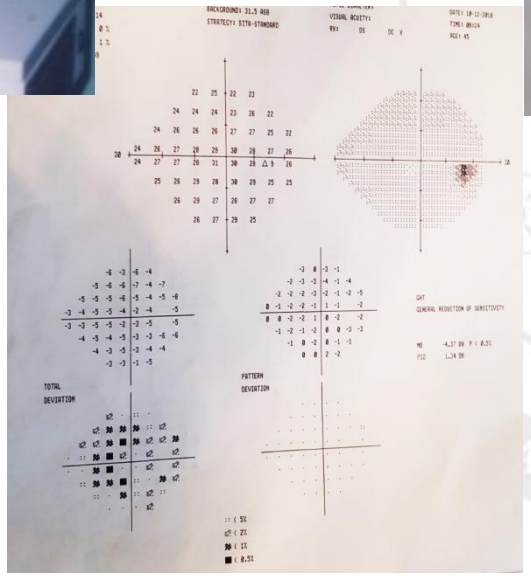




For the purpose of an early diagnosis of glaucoma, it is recommended that the IOP be checked annually in persons aged 40 years.

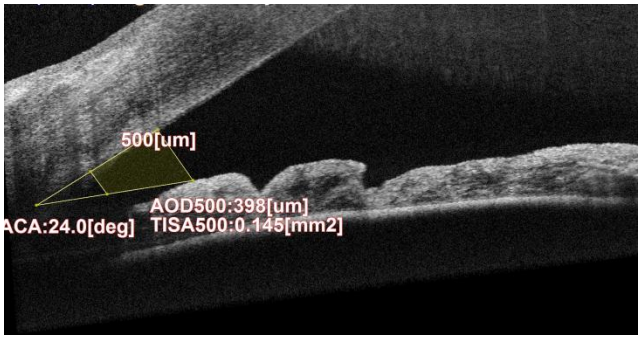
Hamphrey automated perimetry

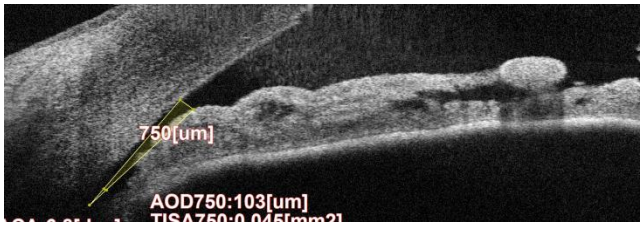




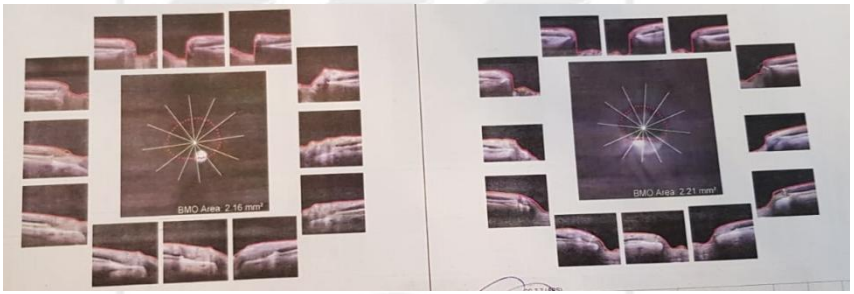
Optical coherence tomography (OCT)

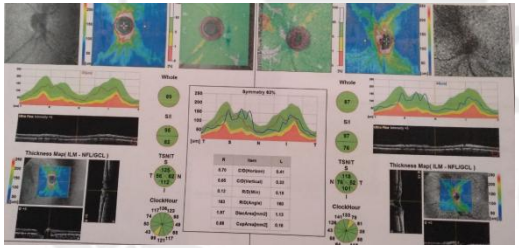
- Anterior segment (ACA)

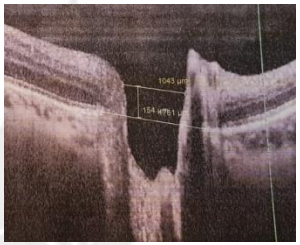




- Posterior segment (HON)



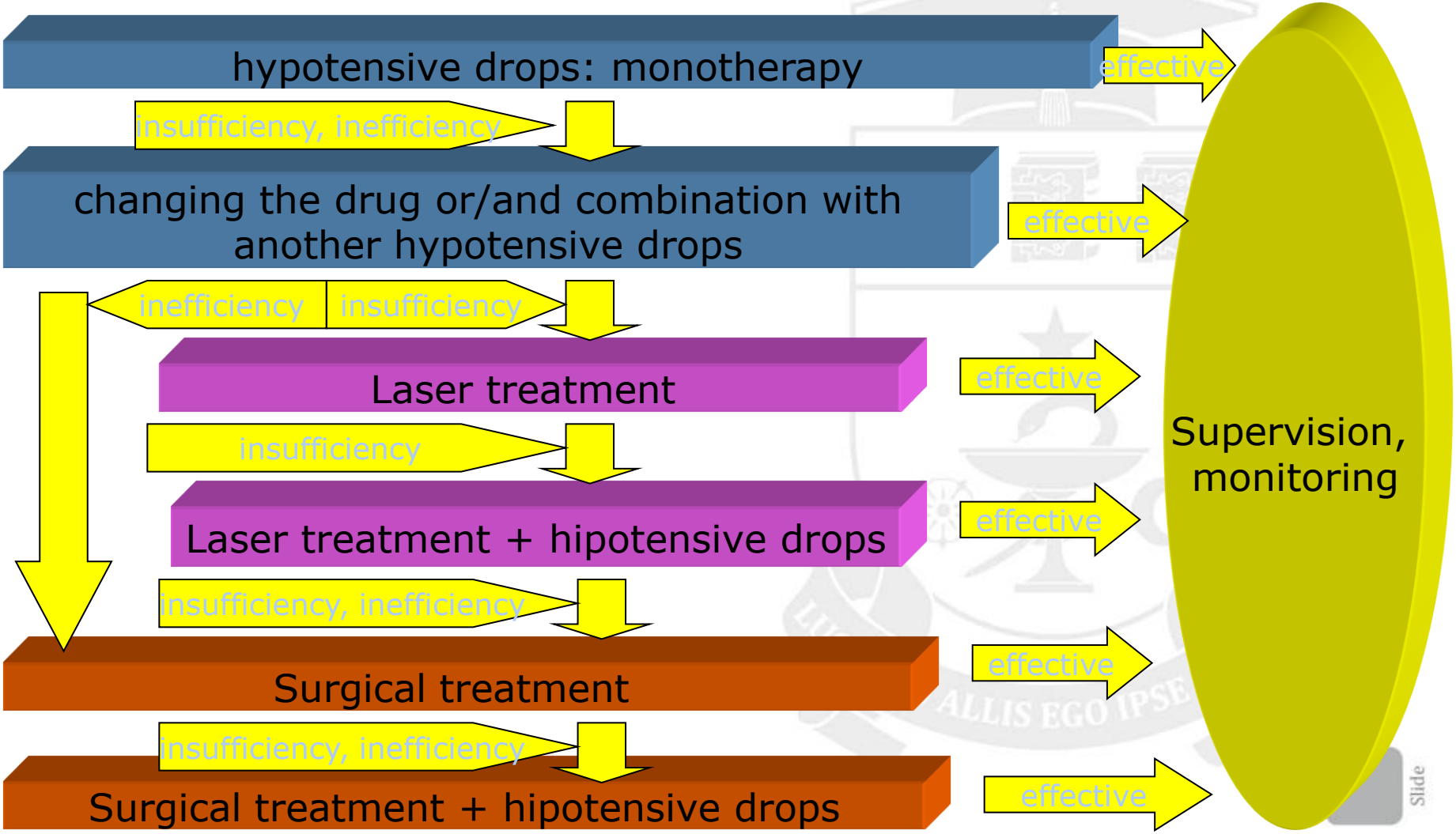




Special investigations for glaucoma diagnostic

- challenge tests (hydric; of obscurity etc);
- tonography;
- elastotonometry

Glaucoma treatment

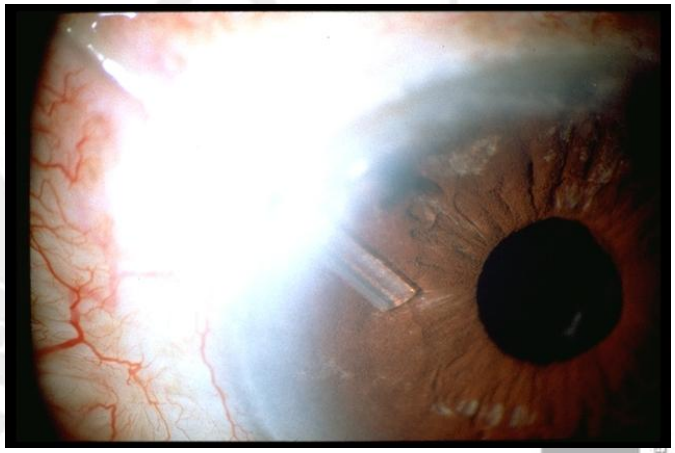


Glaucoma medical treatment

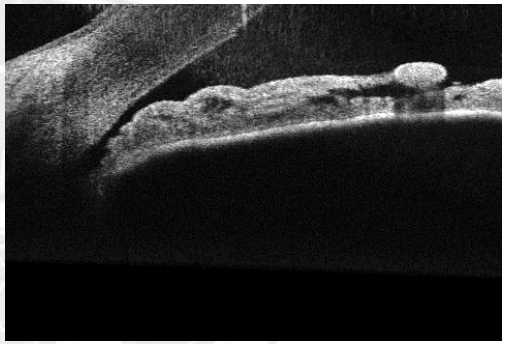
Drugs class name	Action	Side effects
Parasympathomimetics	increase trabecular humor outflow	miosis, blur, retinal detachment, pain
Betablokers	reduce humor production	arrhythmia, bronchospasm
Sympathomimetics	reduce humor production; increase trabecular humor outflow	mydriasis, blood pressure rise
Carbonic anhydrase inhibitors	reduce humor production	electrolyte disturbances (in systemic use)
Prostaglandin analogues	increase uveoscleral humor outflow	hyperpigmentosis, eyelashes growth

Laser and surgical treatment

- laser treatment (trabeculoplasty, iridoplasty, iridotomy, etc);
- surgical treatment (trabeculectomy, valve implant, etc);
- reconstructive surgical interventions (in SG);
- laser or surgical ciclodistructive interventions



Signs of PCAG



- the general semiology of glaucoma;
- periodic disorders (blurring) of vision;
- periodic appearance of colored halos around the light sources;
- usually slow, progressive evolution, but with the risk of acute glaucoma

Slide

Acute glaucoma (AG)

- acute onset, usually nocturnal;
- severe and rapid disturbances of vision;
- intense eye pain, associated with hemicrania;
- vegetative signs (nausea, vomiting, dizziness);
- excessively high intraocular pressure;
- pronounced eye congestion;
- edema of the cornea;
- shallow anterior chamber;
- dilated pupil;
- possible association with high blood pressure

Treatment of acute glaucoma

- Local:
  - parasympatomimetics;
  - beta-blokers;
  - carbonic anhydrase inhibitors
  - non-steroidene antiinflamatories

- Systemic:
  - diuretics (carbonic anhydrase inhibitors)
  - osmotics

- At the improvement - laser iridotomy;

- In the absence of efficacy of drug treatment (within 24 hours) - surgical treatment (iridectomy, fistulizing surgery)

Signs of secondary glaucoma

- signs of eye pathology, responsable for provocation of glaucoma;
- common signs of glaucoma;
- often– eye pain and redness

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Secondary glaucoma formes

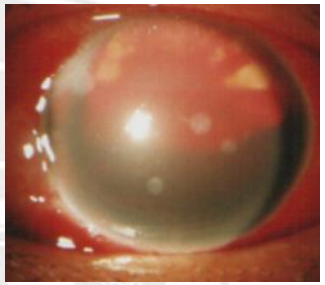
- phacogenic – *phacotopic, phacomorphic, phacolytic*,
- posttraumatic,
- pseudoexfoliative,
- pigmentary,
- tumoral,
- neovascular,
- malignant,
- uveitic etc

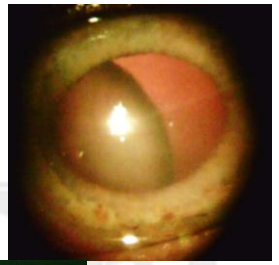
Secondary glaucoma treatment

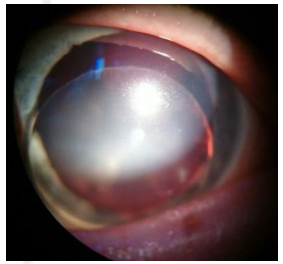
- treatment of the main eye pathology;
- medical ophthalmohypotensive treatment;
- reconstructive and ophthalmohypotensive laser treatment;
- reconstructive and ophthalmohypotensive surgical treatment

Secondary glaucoma treatment

- the blood from the anterior chamber is removed surgically in the case of a secondary eye hypertension caused by total post-traumatic hyphaema;
- anti-VEGF drugs are intraocular introduced in case of neovascular sg, which increase the treatment efficiency;
- in the case of sg caused by a dislocation of the lens it is removed and a iol is implanted;
- laser iridotomy is performed in case of sg caused by a pupillary seclusion/occlusion, which, usually, assure the necessary pressure decrease.







Congenital glaucoma (CG)

- digenesis of anterior chamber angle
- common signs of glaucoma
- increase of eyeball size (hydrophthalmy, buphthalmy)

Congenital glaucoma treatment

- medical ophthalmohypotensive treatment;
- reconstructive and ophthalmohypotensive surgical treatment

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Supervision and monitoring

- Examenation 1 time at 3 months:
  - eye tonometry;
  - perimetry;
  - visometry;
  - oftalmoscopy/OCT

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Possible complications

- progresion of diseases ⇨ loss of visual fonctions ⇨ blindness;
- acute glaucoma AG (in PCAG);
- painful glaucoma (in terminal glaucoma, secundar glaucoma etc)

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Prognostic and evolution

- depends by the earlier diagnosis and treatment:
  - for POAG – relatively favorable;
  - for PCAG – les favorable than in POAG; more often is needed laser/surgical treatment ;
  - for CG and SG – pronostic difficult; medical treatment usually is not-effective; pronostic non-favorable in secondary neovascular, tumoral and malignant glaucoma – very difficult treatment