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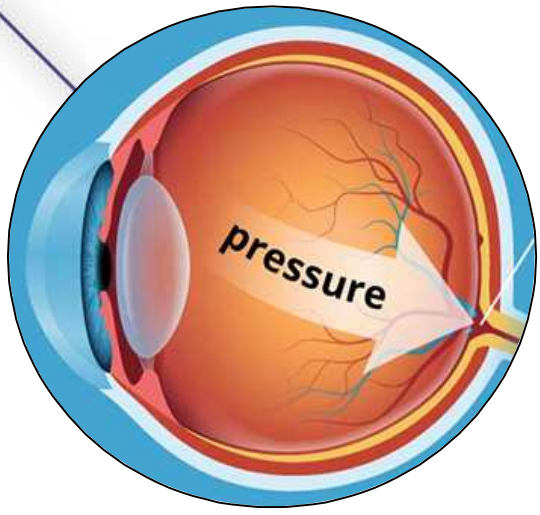
PANTHEO

EYE CENTER

Complex and high-risk Glaucoma
General information



because sight is precious

Complicated and high-risk glaucoma

Glaucoma is a multidimensional condition, and some cases are considered "complicated" due to the difficulty in managing them, which is caused by various factors such as advanced stage of the disease, failure of standard treatments or coexisting conditions that complicate the clinical picture. These cases have a higher risk of complications and often require specialized, multidimensional treatment strategies, such as advanced surgeries, combination therapies, and special treatment. Complicated glaucoma is most often at high risk for blindness.

High-risk glaucoma for blindness refers to forms of glaucoma or patient conditions that increase the likelihood of significant vision loss or complete blindness. Glaucoma is one of the leading causes of irreversible blindness, and certain types or factors increase the risk of rapid worsening of the disease if not treated promptly and adequately.

It is very important that high-risk glaucoma is recognized and treated early. These patients need a personalized approach with a treatment plan tailored to the needs of each one and specialized care by a team of doctors and ophthalmologists depending on the needs of each patient.

A. Which glaucomas are considered complex/high-risk cases:

1. Specific types of secondary glaucoma

Secondary glaucoma occurs as a result of another eye or systemic disease, making it more difficult to treat.

- **Neovascular glaucoma:** It is caused by abnormal growth of blood vessels at the drainage angle due to retinal ischemia, often due to diabetic retinopathy or retinal vein occlusion.
- **Inflammatory glaucoma:** It is caused by inflammation within the eye (uveitis), which can lead to fluctuations in intraocular pressure and make traditional treatments less effective.
- **Post-traumatic glaucoma:** It is caused by trauma to the eye, which can damage the drainage system or change the anatomy of the eye in general.

- **Corticosteroid glaucoma:** Prolonged use of corticosteroids in any way can increase intraocular pressure, leading to glaucoma.
- Various rare syndromes such as ICE, Rieger, Sturge Weber etc

2. Congenital / Pediatric / Juvenile Glaucoma

These types of glaucoma affect children, and their management is particularly difficult due to anatomical differences and the difficulty of cooperation.

- **Congenital glaucoma:** It occurs at birth due to abnormal development of the drainage system. Infants born with glaucoma have a high risk of vision loss due to the difficulty of early diagnosis and the aggressive nature of the disease.
- **Juvenile glaucoma:** It is diagnosed in older children or adolescents and is often associated with genetic or developmental abnormalities.

3. Advanced glaucomas of any etiology

These cases include severe optic nerve damage or very high intraocular pressure which cannot be controlled with standard treatments.

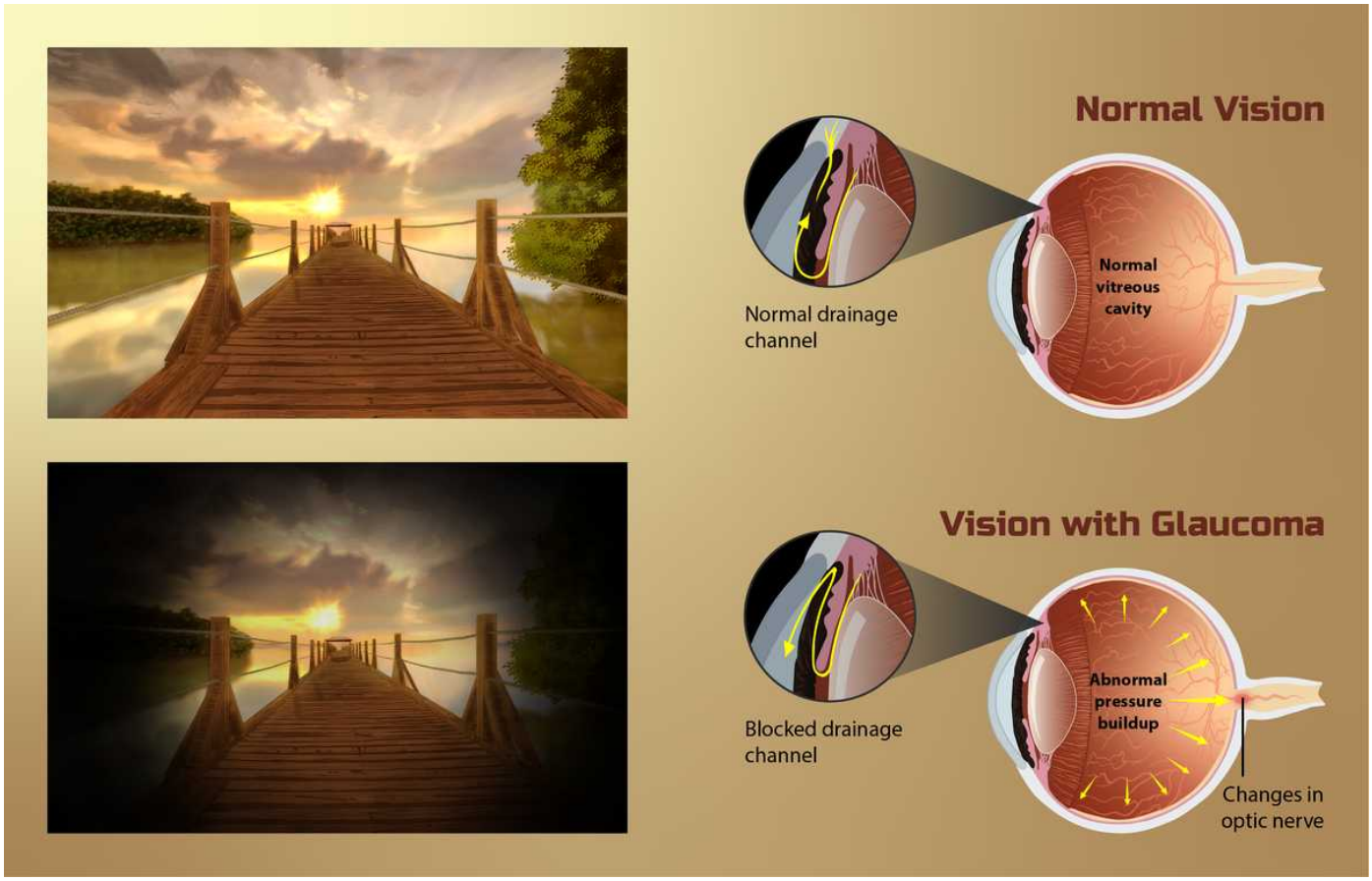
- **Refractory glaucoma:** When the condition does not respond to standard treatments such as eye drops or early surgery.
- **End-stage glaucoma:** Patients with significant vision loss, where intraocular pressure must be tightly controlled to prevent further deterioration.
- **Advanced glaucoma in monocular patients:** Patients who have lost the other eye for any reason are at serious risk of complete blindness if any treatment fails.

4. Postoperative glaucoma

Some patients develop glaucoma after eye procedures, such as

- **Glaucoma after vitrectomy:** Increased IOP may occur after operations for retinal diseases.

- **Glaucoma after corneal transplantation:** Surgery for glaucoma in eyes with a previous transplant requires careful management to avoid damage to the graft.
- **Glaucoma after complicated cataract surgery**



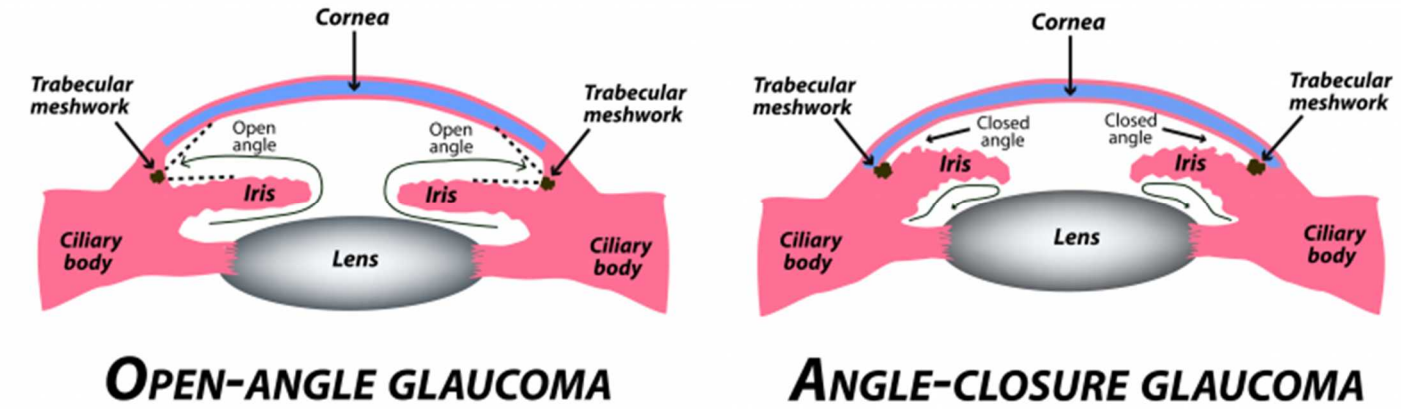
5. Specific types of primary glaucoma

Some types of primary glaucoma are more complicated than others, usually in the context of an ocular or generalized syndrome.

- **Pseudoexfoliative glaucoma:** In pseudoexfoliative syndrome, abnormal material accumulates in the lens and at the drainage angle, causing obstruction and increased pressure. This condition is more aggressive and often requires more complex surgical interventions.
- **Pigmented glaucoma:** This glaucoma is caused by the release of pigment granules from the iris, which block the drainage system, most often in young people with myopia.
- **Glaucoma in patients with high myopia:** Patients with high myopia have an increased risk of developing glaucoma, and their

eyes are very particularly elastic, which makes surgery an increased risk.

- **Angle-closure glaucoma:** This form can progress quickly if left untreated. It involves sudden obstruction of the drainage channels of the eye (drainage angle), causing a dramatic rise in intraocular pressure and direct damage to the optic nerve.



B. Main factors contributing to the risk of blindness

1. Advanced glaucoma at diagnosis:

- **Delayed detection:** If glaucoma is not diagnosed until it has already caused significant damage to the optic nerve, the risk of blindness is much greater. In the advanced stages, it is more difficult to maintain the remaining vision.
- **Severe visual field loss:** When the patient experiences significant loss of peripheral vision, it means that damage to the optic nerve is already extensive, increasing the risk of blindness.

2. Very high intraocular pressure (IOP):

- **Severely elevated IOP:** In cases of very high eye pressure, especially in forms such as acute angle-closure glaucoma, rapid damage to the optic nerve can occur. Without quick intervention, this can lead to permanent blindness.

- **Uncontrolled IOP despite treatment:** If eye pressure remains uncontrolled or continues to rise despite treatment, this increases the risk of optic nerve damage and blindness.

3. Non-compliance with treatment:

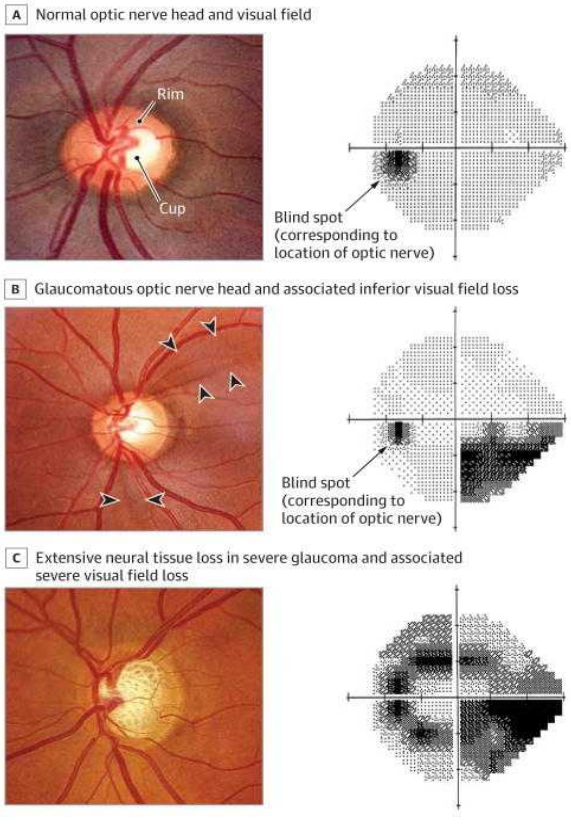
- **Non-adherence to medication:** Glaucoma is usually a lifelong condition that requires constant use of medications to lower intraocular pressure. Patients who do not follow the treatment have a much higher risk of going blind.
- **Inadequate monitoring:** Regular monitoring is essential to monitor disease progress. Lack of follow-up can lead to missed opportunities to adjust treatments before damage becomes irreversible.

4. Specific demographic and genetic factors:

- **Age:** Older people, especially people over 60, are at greater risk of rapid progression and blindness.
- **Ethnicity:** People of African, Latin American and Asian descent are more predisposed to glaucoma and its progression to blindness.
- **Family history:** Those who have a family history of glaucoma with family members who were blind or had significant vision loss are at higher risk.

5. Rapid progression of glaucoma:

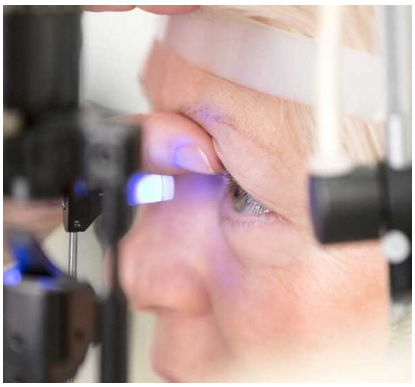
- **Visual field deterioration:** If a patient's peripheral vision deteriorates rapidly despite treatment, they are at high risk of complete vision loss.
- **Optic nerve damage:** Progressive thinning of the optic nerve, as shown in imaging tests (e.g. OCT), indicates a high risk of blindness.



C. Management of complex cases of glaucoma

Effective management of high-risk glaucoma for blindness requires aggressive treatment and close monitoring to avoid irreversible damage to the optic nerve.

1. **Target pressure**



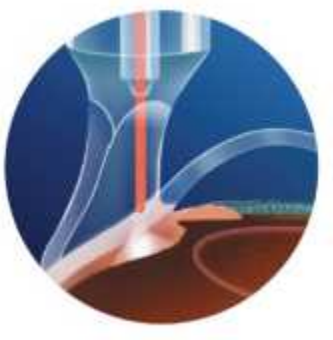
The ophthalmologist will decide which pressure range is acceptable for each individual case in order to preserve vision and avoid worsening the loss. The target pressure is decided depending on the severity of the glaucoma, the age of the patient, the thickness of the cornea, etc.

2. Treatment options

- **Drug therapy** to reduce intraocular pressure with drops:
  - ➢ Prostaglandins (Prostaglandin Analogs) increase fluid drainage. They can worsen macular edema and cause redness and dark circles
  - ➢ Beta-blockers: They reduce fluid production and increase drainage. They can cause asthma or bradycardia.
  - ➢ Alpha-Adrenergic Agonists: Reduce fluid production. May cause toxicity or tachycardia
  - ➢ Carbonic Anhydrase Inhibitors: They reduce fluid production in the eye. They can cause intolerance or worsening of kidney problems.

- **Drug therapy** to lower intraocular pressure with pills:
  - ➢ These are carbonic anhydrase inhibitors. Ptosis is needed in concomitant kidney disease. They can cause fatigue, frequent urination and electrolyte imbalance or kidney stones.

- **Laser**



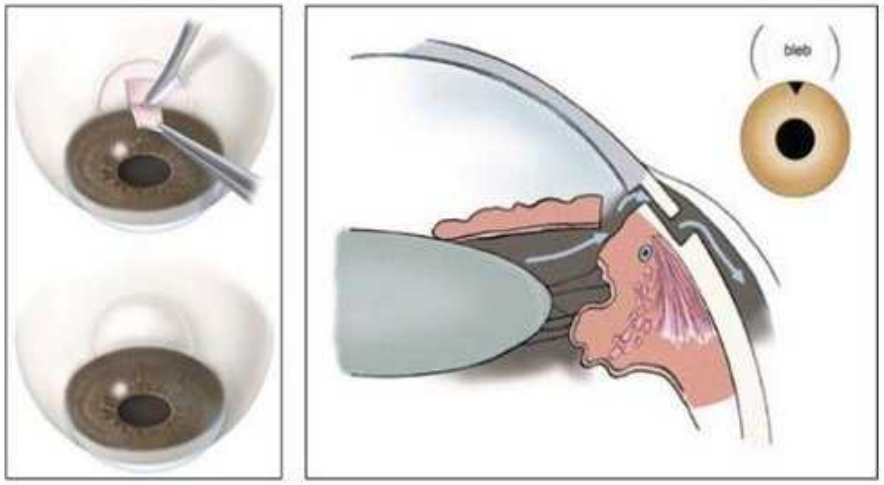
SLT (Selective laser trabeculoplasty): no data on its effectiveness in amyloidosis
  - ➢ YAG laser: in cases of narrow angle for opening and apothesis of acute glaucoma
  - ➢ Cyclodiode laser: good response but transient. May cause hypotonia and worsening of macular edema

- **Micro-Operations for Glaucoma (MIGS):**

These procedures are less invasive than traditional surgeries and have a place in selected cases. Examples are istent, hydrus, gatt etc

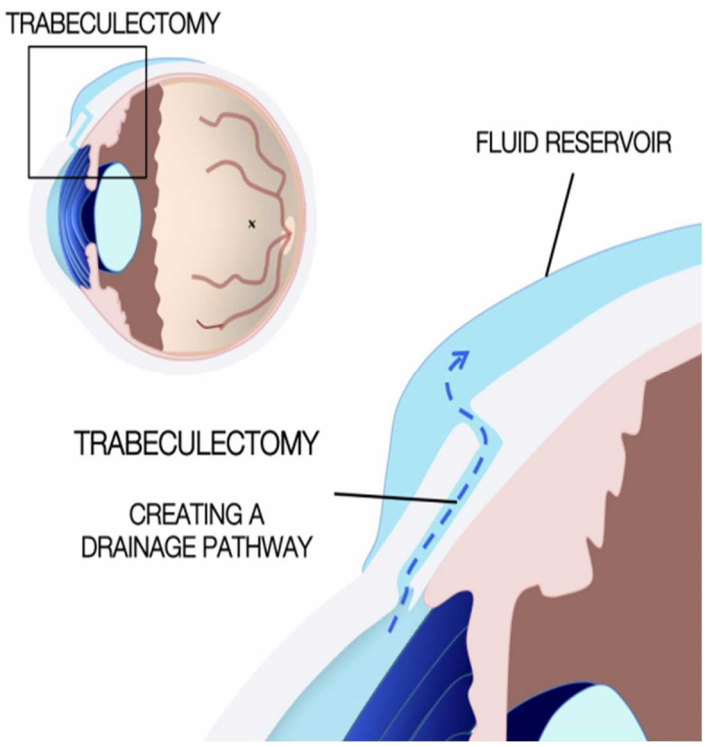
- **Surgical treatment:**

  Surgical treatment is considered the most effective with the best long-term results. Complications that can occur are endophthalmitis (infection), bleeding, vision loss and reduced functionality over time.



➢ **Trabeculectomy:**

Trabeculectomy is an operation that is performed to reduce intraocular pressure in patients with glaucoma. This is achieved through a hole in the sclera of the eye in the upper part, below the upper eyelid. This hole is covered by a layer of the sclera, the flap, which acts as a kind of natural valve through which flows the aqueous humor, i.e. the eye fluid, which cannot be drained and is the reason why the pressure rises.

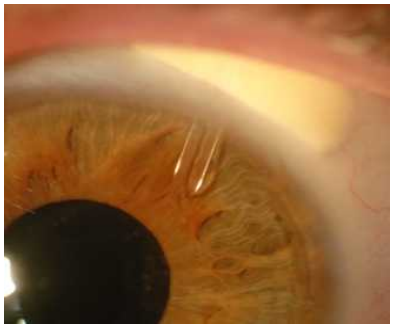


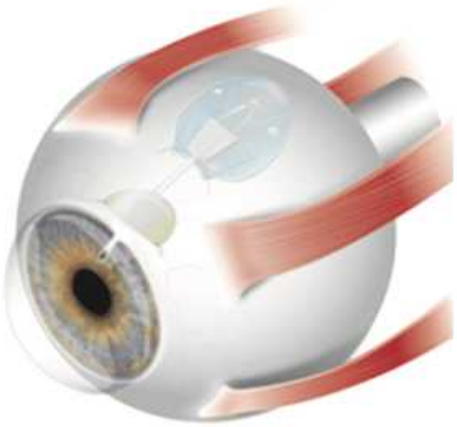
The fluid flowing through these tissues ends up in a reservoir under the surface of the eye and is covered by the upper eyelid. In the flap, stitches are placed in such a way that the flow is regulated through the system, that is, they help to prevent the pressure from dropping excessively after surgery. These are called released or adjustable sutures. The technique we use is called the Moorfields Safer Surgery System

- **Tube Shunt Surgery**:

These are devices in which a small tube is placed in the eye to drain the fluid. There are several types of valves such as Ahmed, Baerveldt and Paul. They are usually used when other treatments, such as eye drops or laser surgeries or trabeculectomy, are not effective enough.

The device consists of a small pipe and a tank. The tube is placed in the anterior chamber of the eye, where the aqueous humor accumulates, and the fluid flows through the tube into the reservoir located outside the eye, under the conjunctiva. The fluid is absorbed by the body, reducing intraocular pressure.





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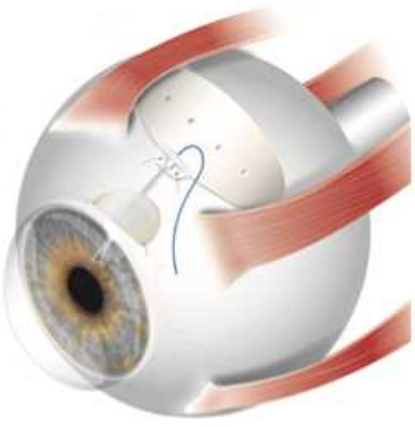

BAERVELDT SHUNT

➢ Combination therapy:

- In some cases, the combined use of medications, lasers and surgical treatment may be necessary to control the pressure inside the eye.

➢ Surgical treatment success rates

According to the literature, most patients achieve low blood pressure without the use of antiglaucoma drops after trabeculectomy, which seems to be clearly superior to drug or laser treatment.

The success rate depends on many factors such as type of glaucoma, age, previous surgeries, race and other factors, but in many studies it reaches 90% for several years. It is important to know that over time the function of the operation may decrease and you may need some kind of surgery again at some stage in your life.

➢ Complications of surgical treatment

Fortunately, serious complications such as infection (endophthalmitis) or bleeding are very rare, but cause a great decrease in vision if they occur, so it is important that patient adheres to postoperative instructions to reduce this possibility.

In the first postoperative period the pressure is expected to be low. Sometimes low pressure may persist and rarely cause bleeding or detachment of the choroid, so it should be treated in surgery either by injecting viscoelastic (gel) or by suturing the incision. Many times the regulation of medications is enough to treat this complication.

The development of scar tissue may close the operation and require minor surgery in the operating room to open it and inject inhibitors such as 5FU.

If you haven't had your cataract surgery before glaucoma surgery, there's a good chance it will get worse after surgery. We usually choose to wait several months before proceeding with cataract surgery afterwards.

Many times medication should be resumed to achieve lower pressures or an additional laser if needed

3. Combination of treatments:

- Combination of multiple drugs (local and systemic) with laser treatments or surgeries.
- Cooperation with other ophthalmological subspecialties such as ocular inflammation specialist, corneal surgeon, vitreous-amphibious surgeon, neuro ophthalmologist, pediatric ophthalmologist etc
- Cooperation with other medical specialties such as internists, rheumatologists, neurologists, diabetologists, cardiologists, radiologists, oncologists, etc.

4. Special Care:

- Long-term monitoring by a glaucoma specialist.
- Increased postoperative care to prevent complications such as scarring, infections or hypotonia (very low intraocular pressure).
- Alternative therapies such as dietary supplements etc

D. Strategies to reduce the risk of blindness:

- **Early/early diagnosis of glaucoma:** Regular eye exams, especially for people with risk factors (e.g. family history, age over 40, or African/Latin American ancestry).

- **Compliance with treatment:** Strict adherence to medication to reduce intraocular pressure and regular monitoring with the ophthalmologist.

- **Surgical interventions:** When medications or laser treatments fail to control IOP, surgical options such as trabeculectomy or valves may be necessary to prevent further damage.

- **Systemic health management:** Maintaining good general health with good nutrition and exercise and controlling coexisting conditions such as diabetes, hypertension, etc. and avoiding activities such as smoking, weightlifting, wind instruments, etc.)

E. Frequently asked questions (FAQ)

1. Can glaucoma be cured?

- Glaucoma cannot be cured, but it can be treated. The goal of treatment is to slow or stop the progression of the disease and preserve your vision.

2. Will I need surgery?

- Not all patients with advanced glaucoma need surgery. If medications or laser treatments are not enough, surgery may be recommended.

3. How often should I get tested?

- This depends on your situation. In advanced glaucoma, you may need to see your doctor every 1-3 months.

4. Can I drive with glaucoma?

- This depends on the extent of your vision loss. Talk to your doctor about driving safety based on your visual field tests.

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F. What you can do to manage your glaucoma

Know and track your medications: Make your medication part of your daily routine. Keep a record of every medication you take. Note the name, dosage and frequency to be taken each day. You can use an alert system to remind you when to take your medicine (e.g. an app on your phone). Learn about possible side effects. If your side effects are severe, the medicine may not be right for you. Talk to your doctor about any side effects. It's important to tell everyone on your care team (including your family doctor and any other

specialists) that you have glaucoma and what medications you're using. This will help them prescribe treatments that will not interfere with glaucoma medications. Be especially careful with the use of any medication that contains steroids.

Get organized: Schedule your next check-up before you leave the office and put your appointment on your calendar. Write down any questions you have about your eyes, vision, or medications before visiting your doctor. During your checkup, bring this list of questions and note down your doctor's answers.

Your lifestyle matters: Maintaining good overall health is just as important as taking care of your eyes. Eating healthy foods, exercising, not smoking, not consuming too much caffeine, and maintaining a healthy weight are important. Be sure to consult your doctor before starting any strenuous exercise program.
Many people don't know the importance of eye exams and don't know that people with glaucoma may not have symptoms. You can help protect their eye health by encouraging them to regularly check their eye pressure and optic nerves.

Telemedicine tools

1. **Remote Monitoring Systems / Remote Patient Monitoring Devices:** These systems allow remote monitoring of patients' ophthalmological functions.

    - **iCare HOME**: In Pantheon there is the possibility of remote monitoring of intraocular pressure through the icare home system (iCare HOME - iCare (icare-world.com) in which the patient measures his intraocular pressure and the measurements are shown in the special application on the clinic's computer, along with other information, eg date, time, location of the patient, etc. The device is either purchased by the patient or borrowed from the clinic.

2. **Mobile Health Apps (mHealth**): Mobile apps allow patients to enter information about medication adherence and help them recover after surgery.

    - **Medisafe** for medication reminders
    - **Bluelight Filter for Eye Care:** reduces blue light emission from electronic devices by reducing light intolerance, useful especially for postoperative patients
    - **EyecareLive platform**: can the patient measure his visual acuity through his mobile
    - **Eye Chart Pro:** can the patient measure his visual acuity through his mobile phone?
    - **Glaucoma care:** offers information about the condition and the ability to record blood pressure at each visit and a reminder to instill the drops
    - **Glaucoma notebook:** offers information about the condition and the ability to record blood pressure at each visit and a reminder to instill the drops

For more information you can visit reputable web pages such as the following:

Bright Focus Foundation
https://www.brightfocus.org/glaucoma/article/glaucoma-surgery-series-trabeculectomy

Glaucoma Research Foundation
https://glaucoma.org/learn-about-glaucoma/treating-glaucoma/

National Eye Institute
https://www.nei.nih.gov/learn-about-eye-health/eye-conditions-and-diseases/glaucoma

Glaucoma UK
https://glaucoma.uk/about-glaucoma/

Royal College of Ophthalmologists
https://www.rcophth.ac.uk/

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