

Glaucoma Clinical Update

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Objectives

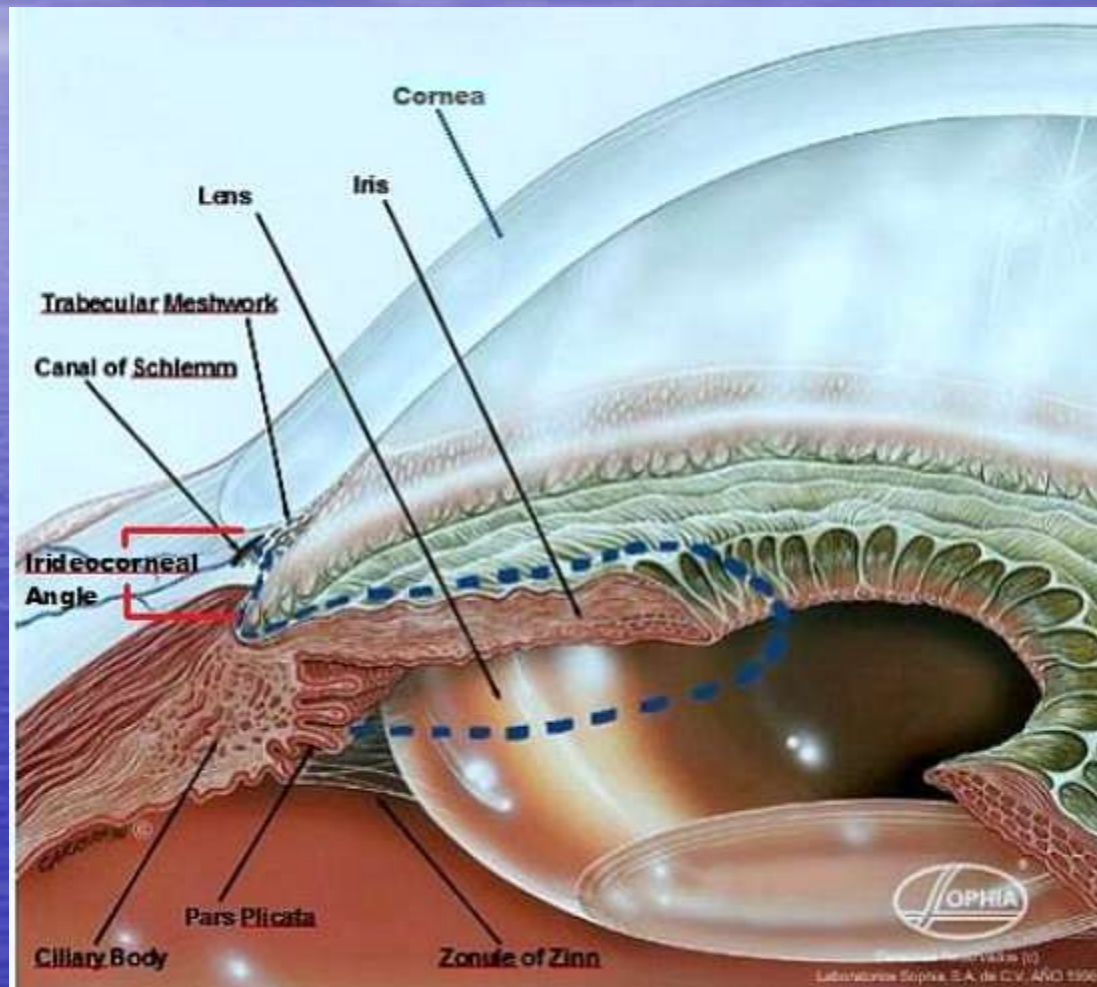
- Understand the different categories of glaucoma
- Recognize the symptoms and signs of open angle and angle-closure glaucoma
- Identify and refer patients at risk for damage caused by glaucoma
- Understand the basic management of open angle and angle-closure glaucoma
- Recognize current testing modalities which assist in early detection

Outline

- Anatomy of anterior chamber and optic nerve
- Categories of glaucoma
- Definition
- Epidemiology
- Risk Factors
- Symptoms
- Signs
- Management

Anatomy

Anterior Chamber Anatomy



Anatomy of the Optic Nerve

- Vitreous cavity

- ❖ Large space filled with transparent gel called vitreous humour

- Retina

- ❖ Neural tissue lining the vitreous cavity posteriorly
- ❖ Transparent except for blood vessels on its inner surface

- Macula

- ❖ Area of retina responsible for fine, central vision
- ❖ Depression in centre of macula is called the fovea

- Optic Disc

- ❖ Portion of ON visible within the eye
- ❖ Axons whose cell bodies are located in ganglion cell layer of retina

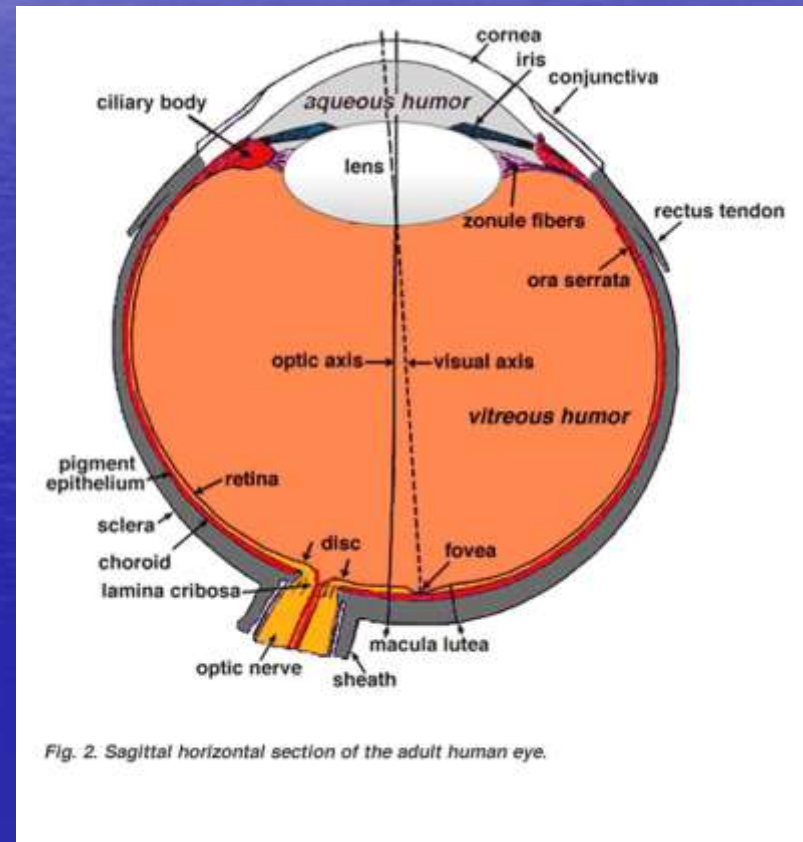
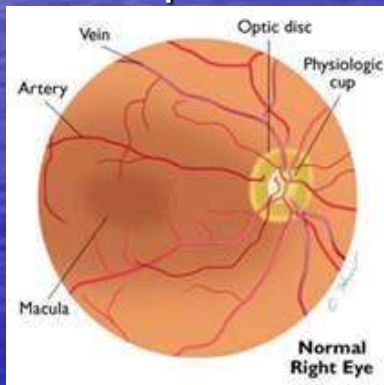


Fig. 2. Sagittal horizontal section of the adult human eye.

Glaucoma

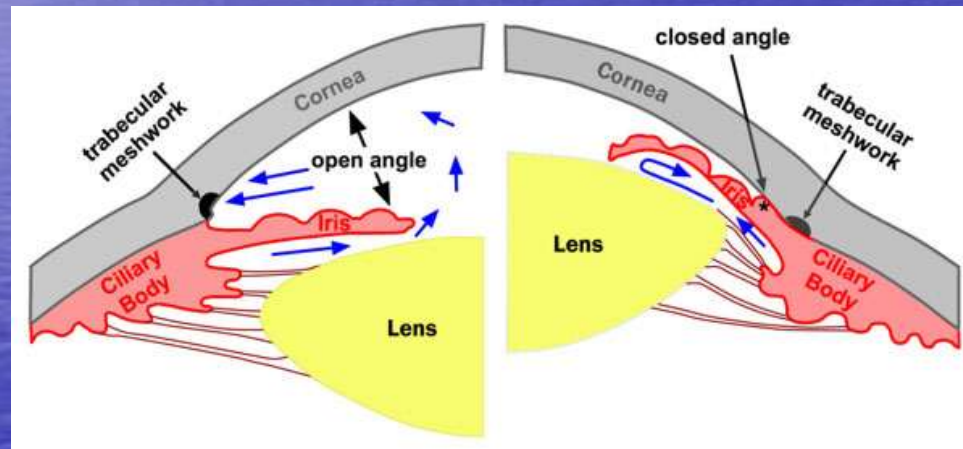


Categories

Glaucoma: Categories

1. Open angle i) Primary ii) Secondary
2. Closed angle i) Primary ii) Secondary

Anterior Chamber Angle



Definitions

Primary Open Angle Glaucoma: Definition

- Primary open-angle glaucoma is a progressive, chronic optic neuropathy in adults in which intraocular pressure (IOP) and other currently unknown factors contribute to damage and in which, in the absence of other identifiable causes, there is a characteristic acquired atrophy of the optic nerve and loss of retinal ganglion cells and their axons. This condition is associated with an anterior chamber angle that is open by gonioscopic appearance.

IN OTHER WORDS....

POAG IS

*OPTIC NEUROPATHY RELATED TO ELEVATED IOP CAUSING
CHARACTERISTIC OPTIC NERVE APPEARANCE WITH ASSOCIATED
VF LOSS WITH OPEN AC ANGLE*

Primary Angle Closure Glaucoma: Definition

- Primary angle closure is appositional or synechial closure of the anterior chamber angle caused by multiple mechanisms, leading to elevated IOP causing a characteristic acquired atrophy of the optic nerve and loss of retinal ganglion cells and their axons

Epidemiology

Open Angle Glaucoma: Epidemiology

- Primary open-angle glaucoma is a significant public health problem
- Affects 1 in 100 Canadians over age 40
- Prevalence of POAG for adults 40 and older in the United States was estimated to be about 2%
- 45 million people in the world have open-angle glaucoma (OAG)
- 8.4 million people blind from glaucoma

Open Angle Glaucoma: Epidemiology

- Open-angle glaucoma affects an estimated 2.2 million people in the United States, and that number is likely to increase to 3.3 million in 2020 as the population ages
- Threefold higher prevalence of OAG in African Americans relative to non-Hispanic Whites in the United States
- Leading cause of blindness in African Americans
- Prevalence of OAG is even higher in Afro-Caribbeans relative to African Americans

Angle Closure Glaucoma: Epidemiology

- Highest rates are reported in Inuit, Chinese, and other Asian populations
- Lower rates are reported in populations of African and African-derived origin and European and European-derived origin
- Primary angle-closure glaucoma may account for nearly as many cases of glaucoma as open-angle glaucoma in some Asian populations
- Worldwide, 0.7% of people over 40 are estimated to have angle-closure glaucoma
- It is estimated that 21 million people worldwide will have angle-closure glaucoma in 2020
- In China, PACG is estimated to cause unilateral blindness (visual acuity $<3/60$ or visual field $\leq 10^\circ$) in 1.5 million individuals and bilateral blindness in another 1.5 million

Open Angle Glaucoma: Natural Course

- Optic disc becomes progressively cupped as axons die off
- Only optic nerve disorder in which severe cupping takes place; in all others, the disc simply becomes pale
- Intraocular pressure is often elevated (higher than 21 mm Hg)
- Visual fields characteristic defects

Angle Closure Glaucoma: Natural Course

- If patients with unilateral AACG and high IOP do not receive treatment, glaucomatous optic neuropathy can occur rapidly
- Untreated fellow phakic eyes are at increased risk for developing acute angle closure
- Untreated patients with AACG and PACG develop progressive vision loss that may result in bilateral blindness

The Risk Factors

Primary Open Angle Glaucoma

RISK FACTORS

- Higher IOP
- Older age
- Family history of glaucoma
- Lower ocular perfusion pressure
- Lower systolic and diastolic blood pressure
- Thinner central cornea
- Disc hemorrhage
- Larger cup-to-disc ratio
- Larger mean pattern standard deviation on threshold visual field testing

Primary Angle Closure Glaucoma

DEMOGRAPHIC RISK FACTORS

- Family history of angle closure
- Older age
- Female sex
- Asian or Inuit descent

Primary Angle Closure Glaucoma

OCULAR RISK FACTORS

- Hyperopia
- Shallow peripheral anterior chamber depth
- Shallow central anterior chamber depth
- Steep corneal curvature
- Thick crystalline lens
- Short axial length

Mechanism: Open Angle Glaucoma

Open angle glaucoma

Mechanism: Angle Closure Glaucoma

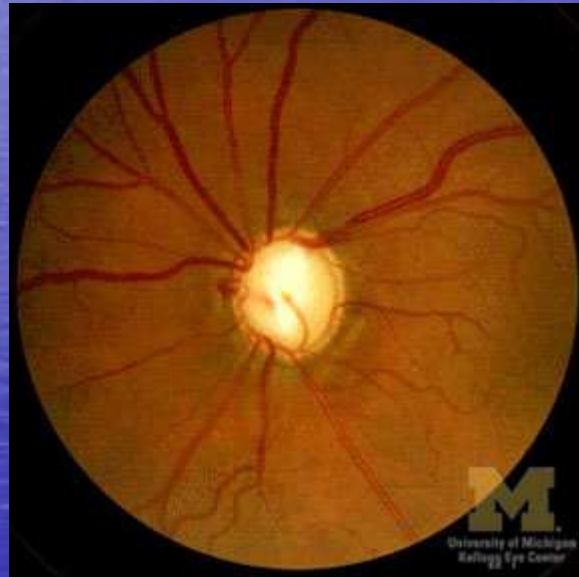
Angle closure glaucoma

Symptoms

Open Angle Glaucoma Symptoms

- Asymptomatic
 - until late in disease

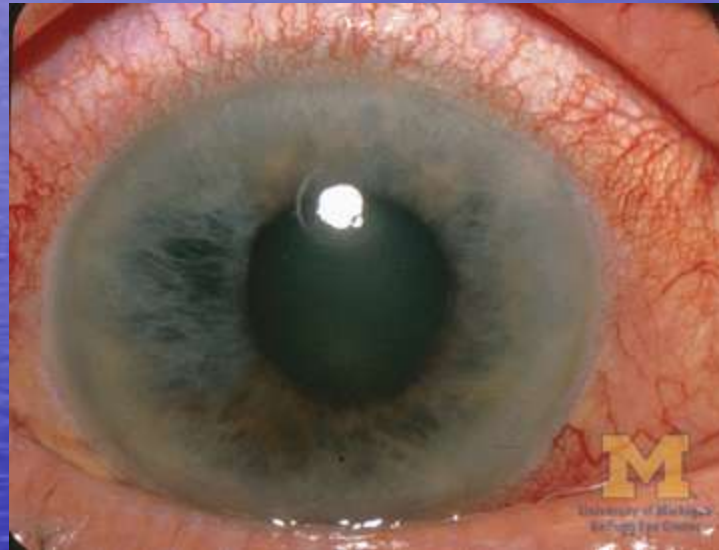
Open Angle Glaucoma



Angle Closure Glaucoma Symptoms

- Patients may be asymptomatic
- Sudden onset of:
 1. pain
 2. redness
 3. nausea/vomitting
 4. decreased vision
 5. haloes around lights

Angle Closure Glaucoma

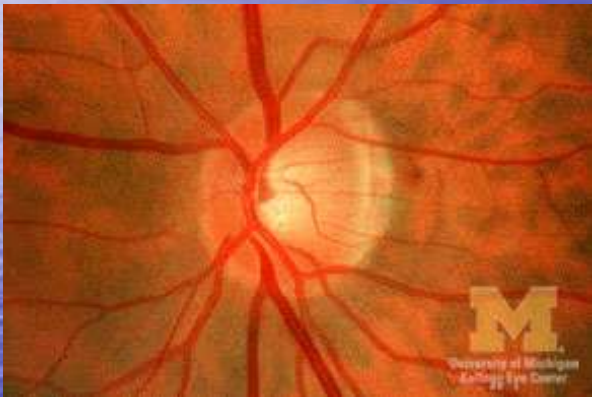


The background of the slide is a photograph of a vast blue ocean under a bright sky. On the left side, the sun is shining, creating a bright, hazy glow that fades into the blue of the water. The sky is a deep blue with some wispy white clouds. The horizon line is visible in the distance.

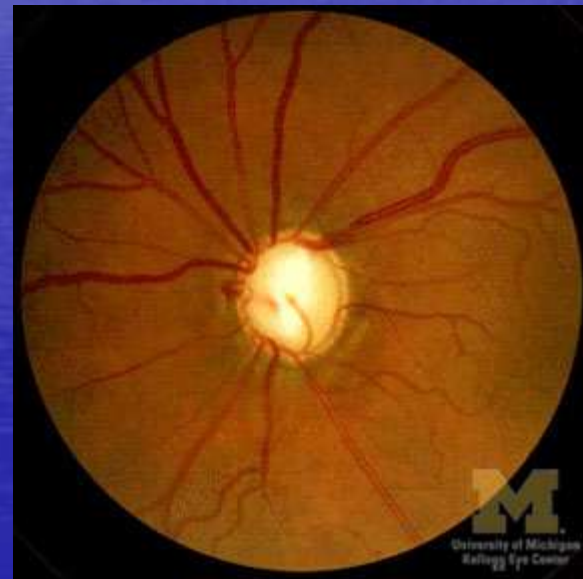
Signs

Open Angle Glaucoma Signs

SUBTLE



- Normal cup-disc ratio

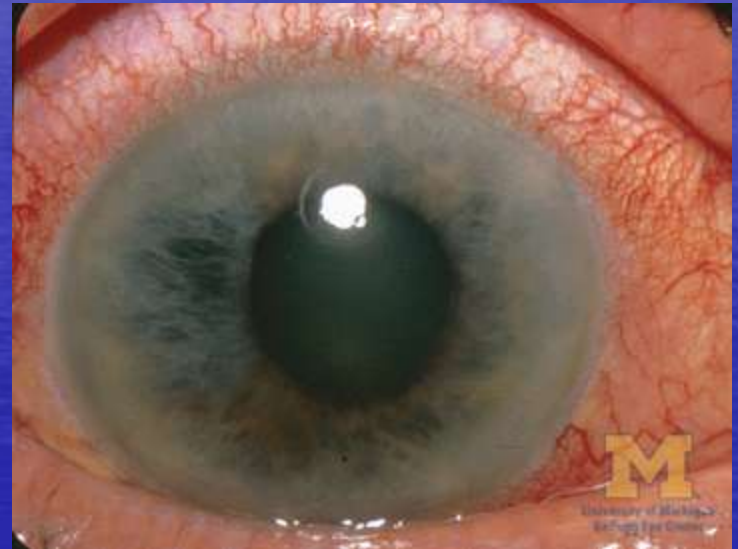


- Increased cup-disc ratio

Angle Closure Glaucoma Signs

DRAMATIC

- Cloudy/steamy cornea
- Fixed mid-dilated pupil
- Conjunctival injection
- Elevated IOP



Management

Management

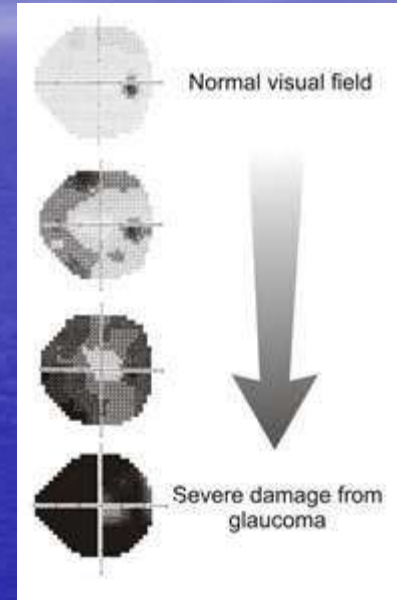
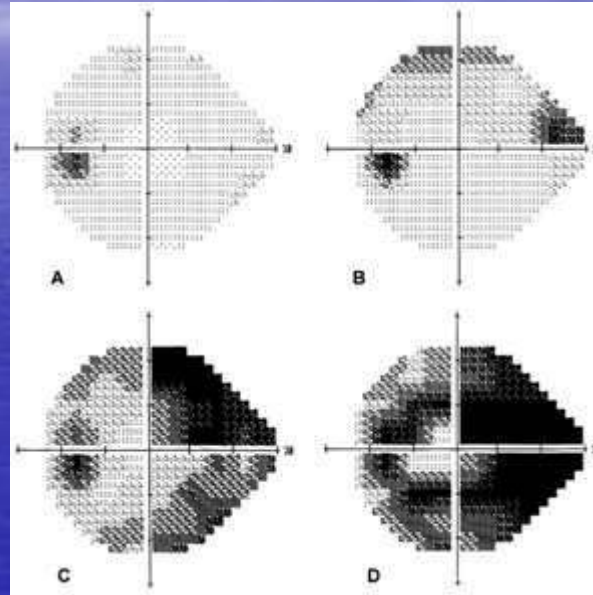
- Primary(Acute) Angle Closure Glaucoma=URGENT REFERRAL
- Primary Open Angle Glaucoma=Non-urgent referral

Goals of Management: Open Angle Glaucoma

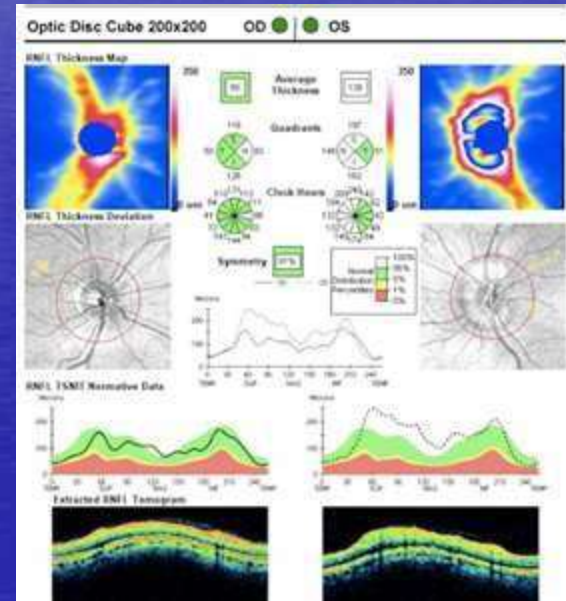
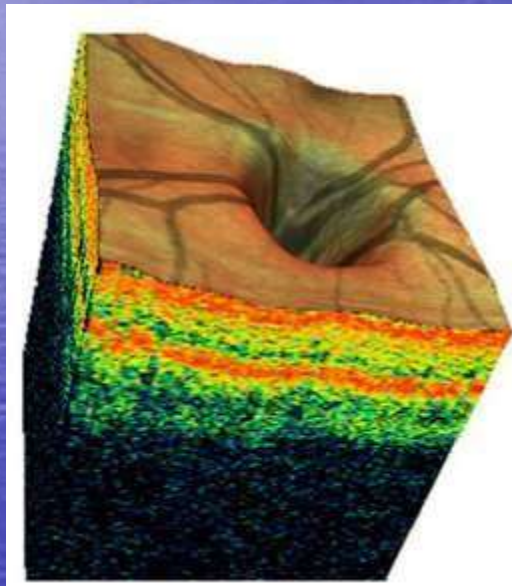
PRESERVE VISION

- Intraocular pressure controlled in the target range
- Stable optic nerve/retinal nerve fiber layer status
- Stable visual fields

Visual Fields



Optical Coherence Tomography



Management: Open Angle Glaucoma

1. Medications
2. Laser
3. Incisional filtering surgery

Pressure Lowering Agents

- Aqueous suppressants
 1. Beta blockers (Timolol, Betagan)
 2. Alpha agonists (Alphagan)
 3. Carbonic anhydrase inhibitors (Trusopt, Azopt)



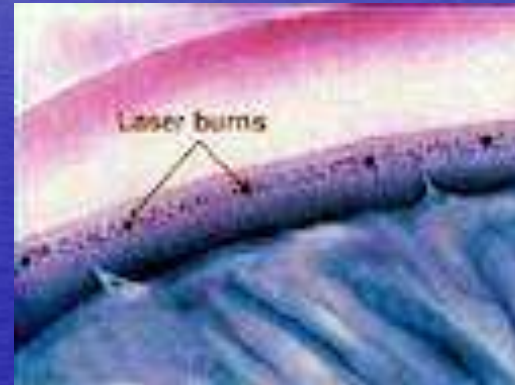
Pressure Lowering Agents

- Increased uveoscleral outflow

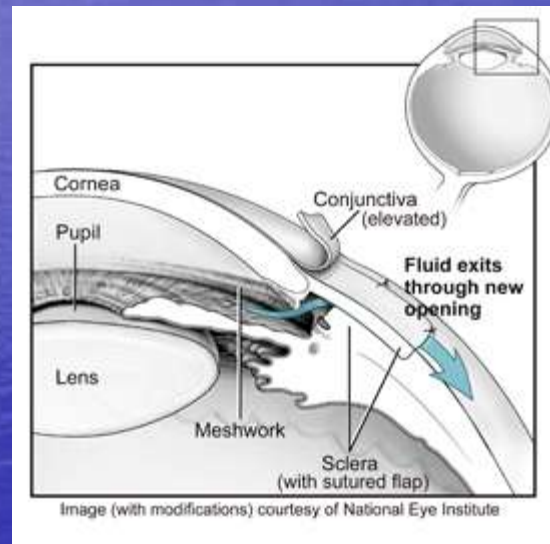
1. Prostaglandin analogues
(Xalatan, Lumigan, Travatan)
2. Cholinergics (pilocarpine)



Laser Trabeculoplasty



Trabeculectomy



Goals of Management: Acute Angle Closure Glaucoma

- Reverse or prevent angle-closure process
- Control IOP
- Prevent damage to the optic nerve

Management: Acute Angle Closure Glaucoma

- 1.** Medications to lower pressure
- 2.** Laser peripheral iridotomy



References

Eye care America, The Foundation of the American Academy of Ophthalmology
(www.eyecareamerica.org)

Canadian Ophthalmological Society website (www.eyesite.ca)

Ophthalmology Study Guide for students and practitioners of medicine.
American Academy of Ophthalmology, 1987.

Albert DM, Jakobiec FA. *Principles and Practice of Ophthalmology*.
Philadelphia, WB Saunders Co, 2000.

Preferred Practice Patterns, Primary Open Angle Glaucoma. www.aao.org

Preferred Practice Patterns, Primary Angle Closure Glaucoma. www.aao.org

The background is a solid blue gradient. On the left side, there is a bright, glowing sunburst or lens flare effect that fades into the blue background. The text "Thank you" is centered in the middle of the image.

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Questions