



Gaza Ophthalmic Centre

5.0 GLAUCOMA

Ophthalmology

FOR GP's & MEDICAL STUDENTS

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Gaza Ophthalmic Centre

2021

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Good morning. This lecture is about glaucoma, the anatomy, the pathology, and the clinical picture with classification

Definition

- **Progressive**
- **Optic Neuropathy**
 - with loss of
- **Retinal neurons and their**
- **Axons (NFL)**
 - Resulting in
- **Blindness**
 - (if left untreated)

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Glaucoma is a progressive optic neuropathy associated with loss of retinal neurons and their axons in the nerve fiber layer, and that results in blindness if it was left untreated

Introduction

□ Ocular disorder characterized by

1. Elevated IOP
2. Optic Nerve Head Changes
 - (Optic Disc)
3. Visual Sensitivity and Visual Field losses



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for glaucoma, three factors have to be there. First, elevated intraocular pressure, second, .optic nerve head damage, and third visual sensitivity and visual field losses

Classification of Glaucoma

1. Primary glaucoma
 1. Open angle
 2. Angle closure
2. Secondary glaucoma
 1. Open angle
 2. Angle closure
3. Congenital glaucoma

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Glaucoma can be classified into primary glaucoma, secondary glaucoma and congenital glaucoma. both primary and secondary glaucoma can have either open angle or narrow, .closed angle

AETIOLOGY

- Factors determining level of IOP

1. The rate of

- Aqueous Humor
- Production

2. Outflow Channels

- Resistance encountered

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Intra ocular pressure is determined by the balance between the rate of aqueous humor production and the rate of and resistance encountered in the outflow channels

Ciliary Body

1. Ciliary Muscle

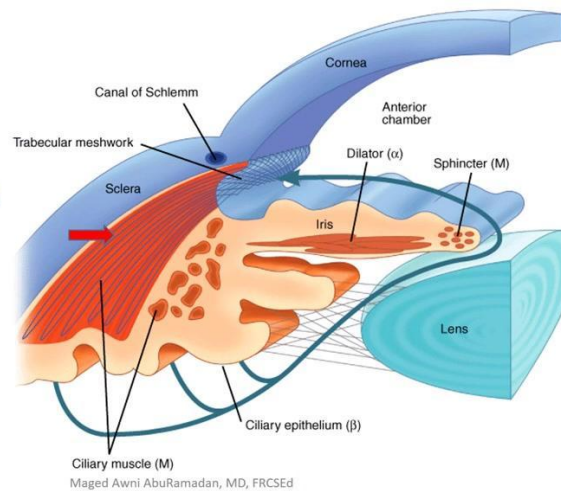
- Accommodation

2. Ciliary Epithelium

- Aqueous production

3. Ciliary Zonules

- Lens suspension



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The ciliary body constitutes of the ciliary muscle which is responsible for accommodation to near vision, the ciliary epithelium, which is the secretory part which secretes the aqueous humor into the posterior chamber and the ciliary zonules which suspends the lens in its place

Ciliary Body

Aqueous flow

1. Excretion by C Ep

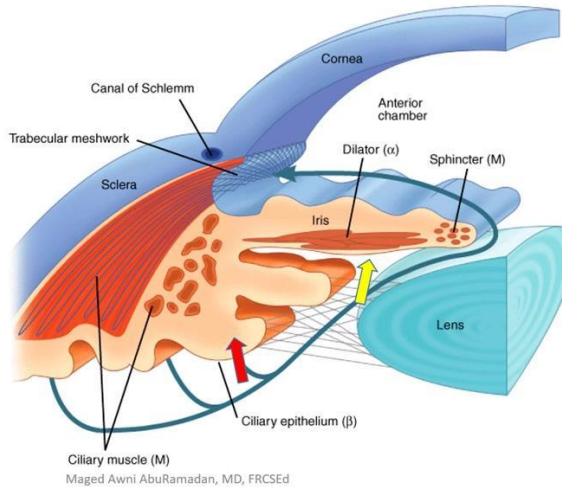
2. Posterior Chamber

3. Pass thru Pupil

4. Anterior Chamber

5. Drainage thru

6. AC Angle TMW



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aqueous is excreted by the ciliary epithelium into the posterior chamber. It passes in front of the lens through the pupil to reach the anterior chamber to finally be drained at the trabecular meshwork at the angle of the anterior chamber between the cornea and the iris

Trabecular Meshwork

Trabecular Meshwork

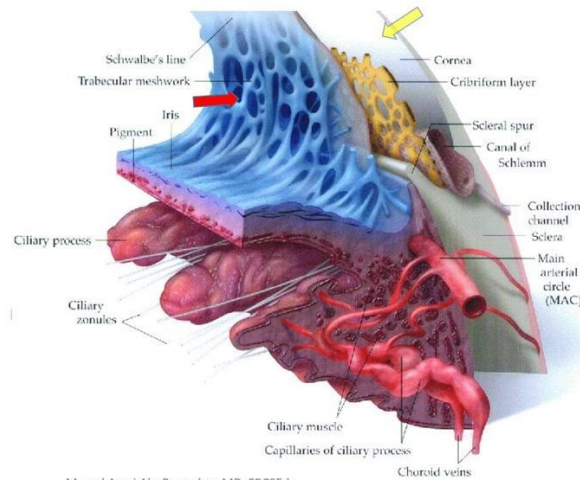
1. Between

1. Cornea

2. Root of Iris

2. Multi layered

3. Sieve like structure

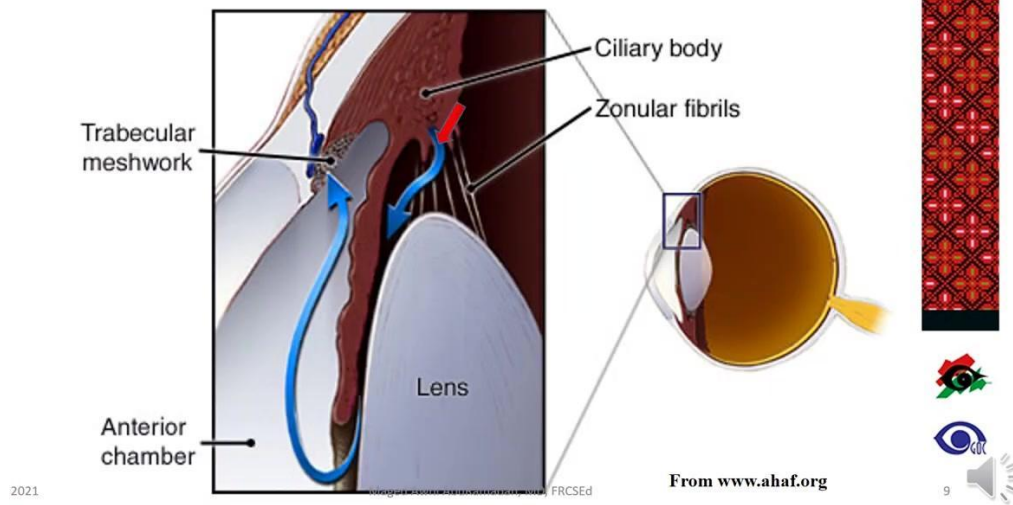


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The trabecular meshwork is an anatomically complex structure present in between the cornea and the root of the iris. It is multi layered and it works as a sieve like structure, which filters the aqueous humor from the anterior chamber into the canal of schlemm and then into collecting channels and the episcleral veins

Flow of Aqueous Humor: A Closer Look at the Trabecular Meshwork



aqueous humor is produced by the ciliary epithelium it pass the posterior chamber and then in front of the lens of course, through the pupil into the anterior chamber to be finely .drained by the trabecular meshwork into the episcleral veins

Etiology

- **Fine balance between**
 1. **Aqueous production**
 2. **Aqueous drainage**
- Necessary to keep the
- Pressure within the eye
- in the range of
- **16 - 21mmHg.**

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fine balance between aqueous production and aqueous drainage is necessary to be .maintained to keep the pressure in between 16 and 21 millimeters mercury

AQUOUS HUMOUR PRODUCTION

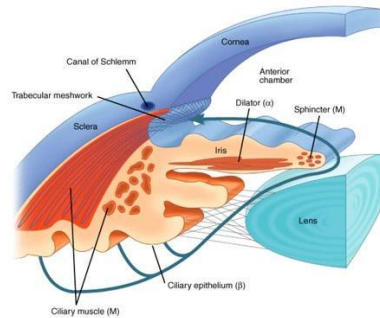
• Ciliary epithelium

1. Secretion

- Active metabolic process

2. Ultrafiltration

- Influenced by the level of
- Blood pressure in the
- Ciliary capillaries



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The ciliary epithelium produces aqueous humor by two processes first secretion which is an active metabolic process and second by ultrafiltration, which is influenced by the level of .blood pressure in the capillary of the ciliary body

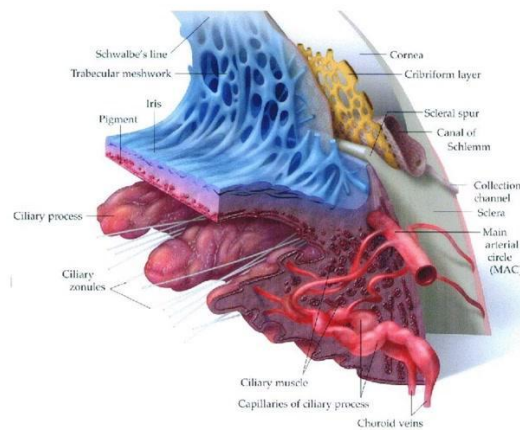
OUT FLOW OF AQUOUS HUMOUR

1. Trabecular meshwork

- 80%
- → Canal of Schlemm
- → the aqueous veins

2. Uveosclera pathway

- 20%
- → Suprachoroidal space
- → venous circulation



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trabecular meshwork drains 80% of the aqueous into the canal of schlemm and then to the aqueous veins to the episcleral veins. The uveoscleral pathway is the non conventional pathway which drains up to 20% of the aqueous humor into the Supra choroidal space and then to the venous circulation



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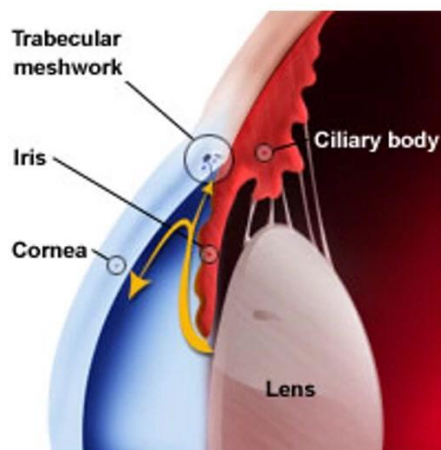


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This is a micrograph of the normal anatomy of the anterior chamber angle where we see the cornea in the top, we see the iris and its root the ciliary body and the muscle and then trabecular meshwork is the triangular sieve like structure in between the cornea and the .Scleral spur

Open Angle Glaucoma

1. Open Anterior chamber angle
 2. Trabecular meshwork Obstruction
-
1. IOP > 21 mmHg
 2. Loss of visual field
 3. Optic disc cupping
 4. Retinal ganglion cell death
-
5. Asymptomatic!



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Open angle glaucoma is characterized by open anterior chamber angle however, the trabecular meshwork is obstructed. Characteristically the intra ocular pressure is more than 21 millimeters mercury and there is in chronic case there is loss of visual field and optic disc cupping, retinal ganglion cell death. usually and unfortunately it is asymptomatic till the .disease is severely advanced

CLINICAL PRESENTATION

Open angle glaucoma

1. **Slowly progressive**
2. **Usually asymptomatic**
 - Until the onset of
 - Substantial damage
3. **Visual field loss**

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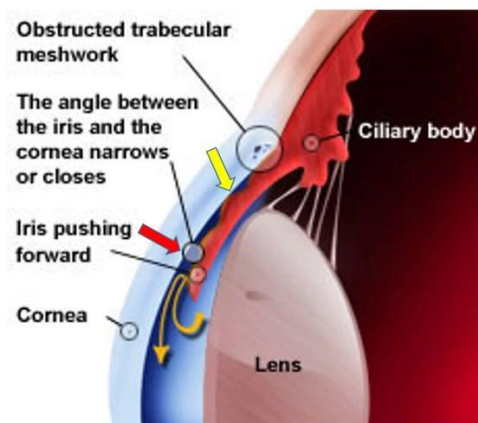


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So clinical presentation of open angle glaucoma is slowly progressive and first it is asymptomatic unless severe damage is already occurred and visual field loss is there

Closed Angle Glaucoma

1. **Apposition of**
 1. Iris and
 2. Trabecular meshwork
2. **Predisposing factors**
 1. Increase risk with age,
 2. increase in lens volume
 3. Hypermetropes
 4. Females
3. **Precipitating factors**
 1. Parasympatholytics
 2. Pupillary dilation



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Closed angle glaucoma, on the other hand is due to apposition of the iris and the trabecular meshwork leading to very narrow and closed anterior chamber angle. This can be predisposed for by the increase age increasing in lens volume, Hypermetropia and it's more common in females. The precipitating factors is usually pupillary dilatation like in darkness, or in parasympatholytic drugs

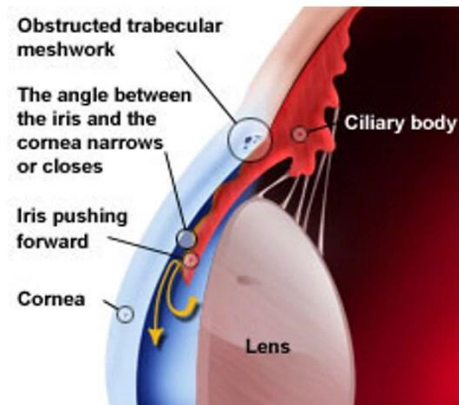
Closed Angle Glaucoma

1. Acute onset

1. Nausea,
2. Headache
3. Malaise
4. General distress

1. Requires

1. Immediate treatment



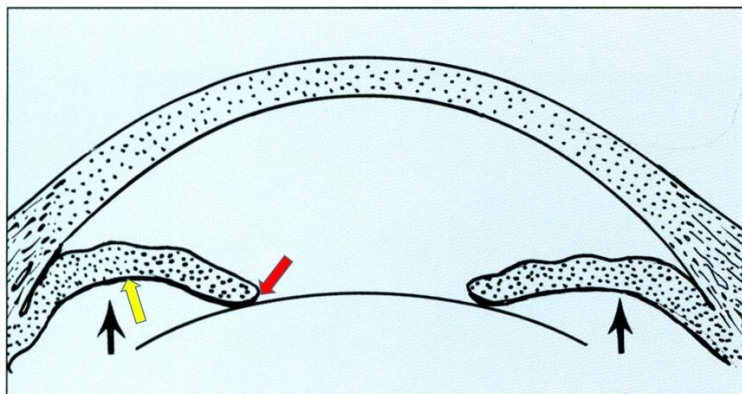
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Closed angle glaucoma is usually presenting in acute scenario with nausea, headache, malaise and general distress. This case it requires immediate treatment

Closed Angle Glaucoma



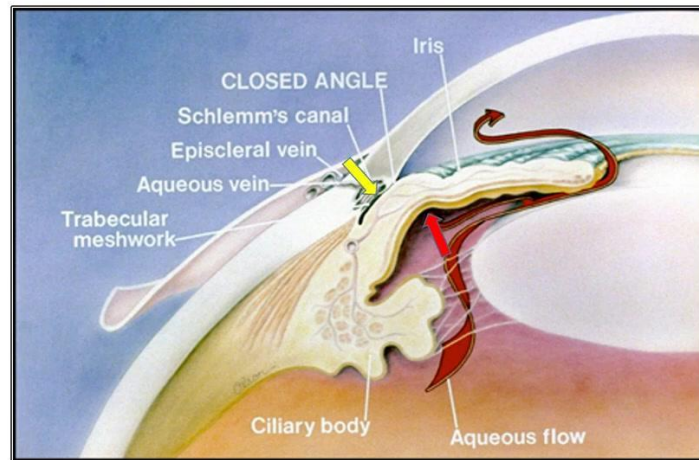
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iris bombay is a clinical picture associated with pupillary block angle glaucoma. The whole story starts by apposition of the iris in the pupil margin to the lens and thus closing the pupillary orifice that leads to build of pressure inside the posterior chamber which boughs and pushes the iris forward which leads to apposition between the root of the iris and the trabecular meshwork with secondary angle closure

Closed Angle Glaucoma



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.Here is the bowing anteriorly and here is the close trabecular meshwork

Narrow Angle Glaucoma

C/o

1. Severe eye pain / headache
2. Blurred vision
3. Red eye
4. Haloes
5. Nausea & vomiting

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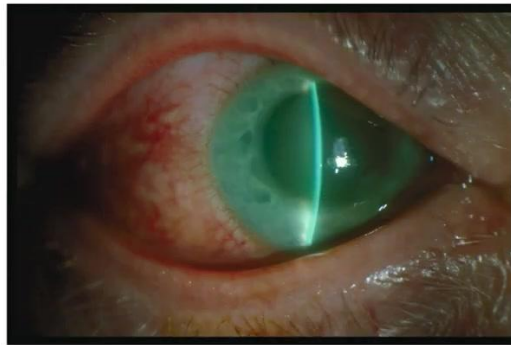
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narrow angle glaucoma is characterized by having severe eye pain and headache blurry vision, Red Eye, halos around lights and its might be accompanied with nausea and vomiting .stimulating acute abdomen

Narrow Angle Glaucoma

O/E

1. Red eye
2. Tearing
3. Corneal edema
4. Shallow AC
5. Iris Bombe
6. Mid dilated pupil
7. AC inflammatory signs



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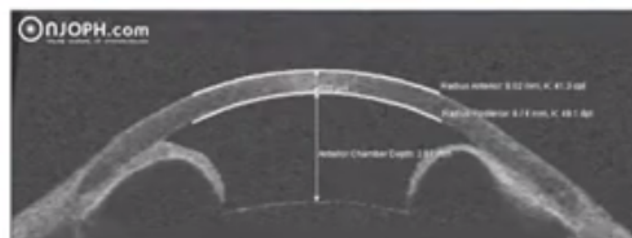
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narrow angle glaucoma on examination shows red eye, tearing, Corneal edema, shallow AC, Iris Bombay if the pupil is blocked, mid dilated, pupil and AC inflammatory signs

Closed Angle Glaucoma

Iris bombé



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.This is Iris Bombay and this is an oct image showing the iris bombe .

Congenital Glaucoma

Pediatric Glaucoma

1. Congenital
 - Onset: Antenatal to 2 years old
2. Developmental
 - Later in childhood

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congenital glaucoma or pediatric glaucoma can be either congenital with onset from . antenatal life up to two years of life or development which presents later childhood

Congenital Glaucoma

Symptoms

1. Irritability
2. Photophobia
3. Epiphora
4. Poor vision

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the symptoms in the child is usually irritability, photophobia epiphora and the family may .notice signs of poor vision

Congenital Glaucoma

Signs

1. Elevated IOP
2. Buphthalmos
3. Haab's striae
4. Corneal clouding
5. OD cupping
6. Visual Field loss



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On examination IOP is elevated. The eye is larger than normal and called Buphthalmos, haabs striae can be seen on slit lamp examination, the cornea is cloud during due to the chronic increase in intraocular pressure and fundus examination will get show optic disc .cupping. if the child is old enough visual field loss may be manifested as well

Diagnosis of Glaucoma

1. Intraocular pressure (IOP)
2. Optic disc examination
3. Visual Field examination (perimetry)
4. OCT

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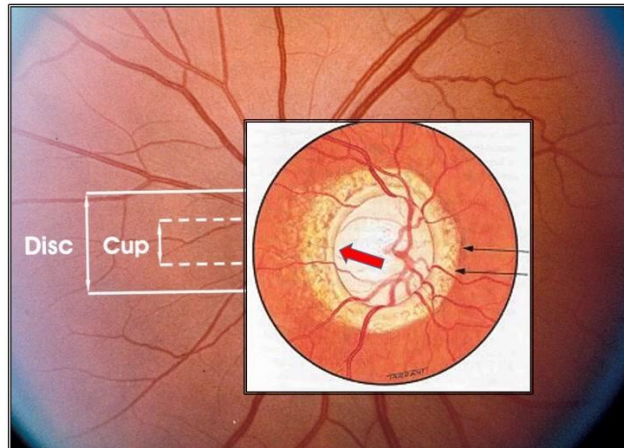
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diagnosis of glaucoma depends on measuring the intraocular pressure ,optic disc .examination, visual field Perimetry and oCT exams the newest camera

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Cup-to-disk ratio



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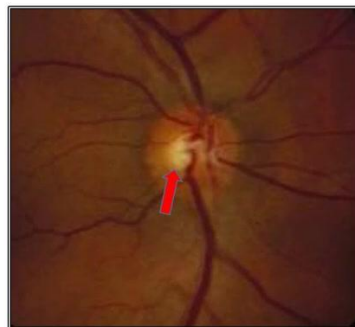
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on exam of the fundus, we have note the optic cup which is the small circle in the middle, and we compare the vertical ratio to the optic disk which is the large diameter. Usually in .normal cases this is 0.3

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DISK CUPPING

Normal



Glaucoma



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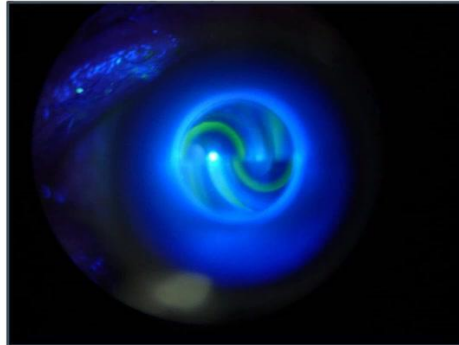
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Here we can see the cup disk ratio of 0.3.while in the glaucoma case we can see that it's .almost more than 0.9

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Goldman applanation tonometer



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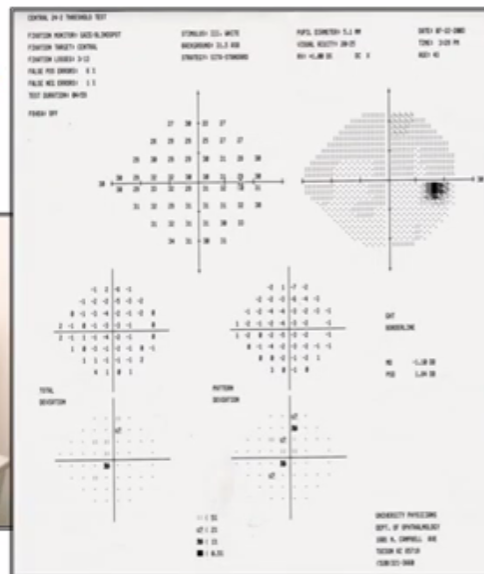
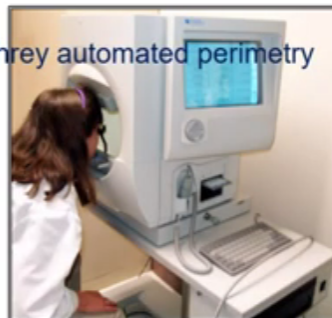
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The golden standard for measuring intraocular pressure is the goldmann applanation tonometry shown in the photograph on the left, on the right is the what we can see through the slit lamp using fluorescein and the cobalt low light and that gives very accurate .measurement of the intraocular pressure

THE VISUAL FIELD

Humphrey automated perimetry



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.This is a form of automated visual field testing. It's an automated Perimetry

Treatment of Open angle Glaucoma

- Treatment is indicated for
- All patients with
 1. Elevated IOP
 2. Characteristic optic disc changes or
 3. Visual field defects

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treatment is indicated if the pressure is high with characteristic optic disc changes or visual field defect

Treatment of Open angle Glaucoma

Medical

1. Beta blockers
2. Prostaglandin analogues
3. Alpha 2 agonists
4. Miotics
5. Carbonic Anhydrase Inhibitors

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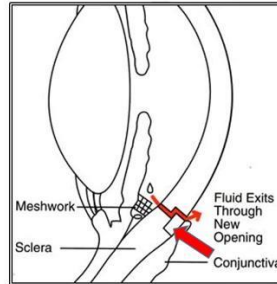
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The treatment of open angle glaucoma can be medical or surgical. medically, we use drops of beta blockers, prostaglandin analogs, alpha 2 agonist, miotics and carbonic anhydrous inhibitor

Treatment of Open angle Glaucoma

Surgical

1. Argon laser trabeculoplasty
2. Trabeculectomy
3. Cyclocryotherapy
4. Iridotomy



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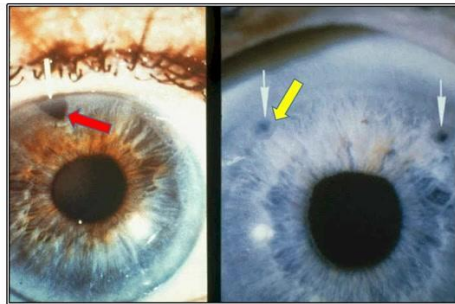
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Surgically we can use argon laser trabeculoplasty. Or we can do filtering surgery like trabeculectomy where we produce an artificial opening for the aqueous to flow out of the anterior chamber. cycloCryotherapy is a measure to freeze and thaw and freeze the ciliary body to damage the Ciliary epithelium to decrease the production of the aqueous. Iridotomy .is used in some selected case

Treatment of Narrow Angle Glaucoma

Requires rapid reduction of IOP .

1. Iridotomy is the definitive treatment
2. Drug therapy of an acute attack
 1. Osmotic agent
 2. Secretory inhibitors
 1. Beta blockers , alpha 2 agonist
 2. latanoprost, or
 3. CAI
 3. Pilocarpine



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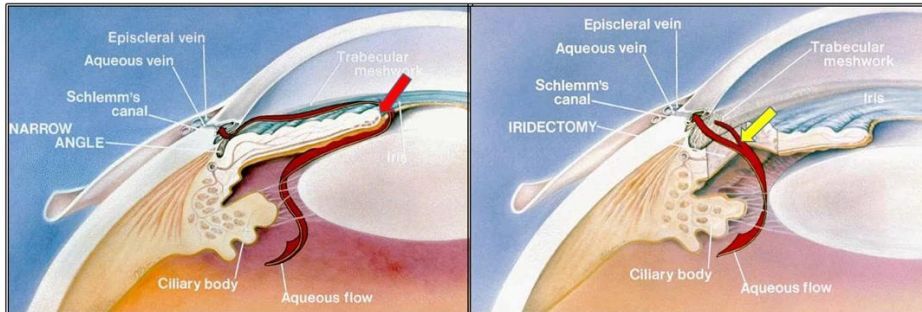
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On the other hand, treatment of the narrow angle closure requires immediate reduction of intraocular pressure. Usually Iridotomy is the definitive treatment it can be done surgically or through YAG or argon laser Iridotomy. drug therapy of the acute attack involves osmotic agents like mannitol 20%, inhibiting the secreting with beta blocker alpha 2 agonists latanoprost or even carbonic anhydrase inhibitor and pilocarpine to constrict the pupil So .pulling the root out of the angle and opening it

Treatment of Narrow Angle Glaucoma



This is where the pupillary block closes the outflow of the aqueous from the posterior chamber to the anterior chamber. And if this is the case, then by having an Iridotomy, we can short cut the pathway and bypass the pupillary block

CONCLUSION

**Increased community awareness of
Glaucoma**

Earlier detection of the condition

**Will result in
Decreased morbidity**

In conclusion, increase community awareness of glaucoma is a must area detection
. .of the condition is the only way to preserve vision and decrease mortality

.Thank you