

Ophthalmology for Primary Care Providers

Bob Avery, MD, PhD

Ophthalmology/Surgery
University of New Mexico School of Medicine
bavery@salud.unm.edu

Preview

- How the eye works
- The red eye
- Acute eye conditions
- Chronic vision loss
- Basic eye exam

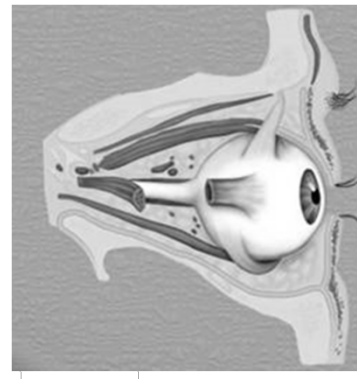
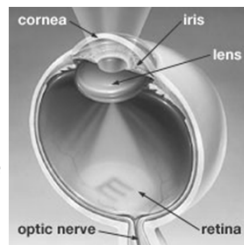
Useful references

- Website: The Eyes Have It
 - <http://www.kellogg.umich.edu/theeyeshaveit/>
- The Physician's Guide to Eye Care,
Jonathon Trobe, AAO

- How the eye works
- The red eye
- Acute eye conditions
- Chronic vision loss
- Basic eye exam

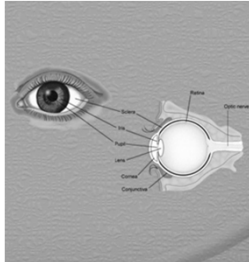
How the eye works

- Front part collects light
- Light is refracted by two surfaces
 - Cornea
 - Lens
- Back part forms the image and sends it to the brain



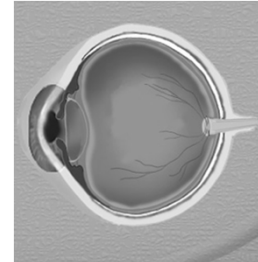
Anterior segment

- Lids
- Conjunctiva/sclera
- Cornea
- Anterior chamber
- Iris
- Lens



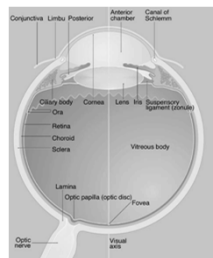
Posterior segment

- Vitreous
- Optic disk
- Vessels
- Retina
 - Macula
 - Periphery
- Choroid



Light path

- Cornea
- Anterior chamber
 - aqueous humor
- Pupil
- Lens
- Vitreous humor
- Retina



- How the eye works
- The red eye
- Acute eye conditions
- Chronic vision loss
- Basic eye exam

Red eye

- | | | |
|--|---|---|
| <ul style="list-style-type: none"> ■ Eyelids <ul style="list-style-type: none"> ■ Blepharitis ■ Stye / Chalazion ■ Dacryocystitis ■ Cornea <ul style="list-style-type: none"> ■ Abrasion ■ Bacterial keratitis ■ Viral keratitis | <ul style="list-style-type: none"> ■ Conjunctiva <ul style="list-style-type: none"> ■ Dry eye syndrome ■ Allergic conjunctivitis ■ Viral conjunctivitis ■ Bacterial conjunctivitis ■ Pingueculitis ■ Pterygium ■ Subconjunctival hemorrhage ■ Episcleritis ■ Scleritis | <ul style="list-style-type: none"> ■ Intraocular <ul style="list-style-type: none"> ■ Acute glaucoma ■ Uveitis / Iritis ■ Endophthalmitis ■ Orbit <ul style="list-style-type: none"> ■ Pre-septal cellulitis ■ Orbital cellulitis ■ C-C fistula |
|--|---|---|

The Red Eye

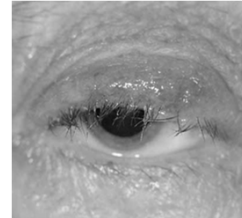
- Red
 - Eyelid or eyeball?
 - Why is eyeball red?
 - Where is it red?
- Pain
 - Foreign-body sensation?
 - Improve with anesthetic?
- Blurred vision

Eyelids

- Eyelids
 - Blepharitis
 - Stye / Chalazion
 - Dacryocystitis
- Conjunctiva
 - Dry eye syndrome
 - Allergic conjunctivitis
 - Viral conjunctivitis
 - Bacterial conjunctivitis
 - Pingueculitis
 - Pterygium
 - Subconjunctival hemorrhage
 - Episcleritis
 - Scleritis
- Intraocular
 - Acute glaucoma
 - Uveitis / Iritis
 - Endophthalmitis
- Orbit
 - Pre-septal cellulitis
 - Orbital cellulitis
 - C-C fistula
- Cornea
 - Abrasion
 - Bacterial keratitis
 - Viral keratitis

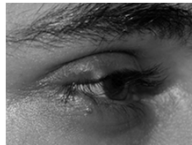
Blepharitis

- Inflammation of eyelids
- Presentation
 - Red, thickened eyelids
 - Crusting
 - Gritty, burning
- Treatment
 - Warm compresses
 - Antibiotic ointment



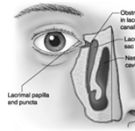
Stye/Chalazion

- Inflammation of lash follicle or oil gland
- Painful bump on eyelid
- Treatment
 - Warm compresses x 6 weeks
 - May need excision/drainage



Dacryocystitis

- Inflammation of lacrimal sac
- Hot nodule next to nose
- Usually infection secondary to obstruction
- Treatment
 - Referral
 - Systemic antibiotics
 - I&D, Surgery

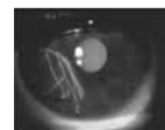
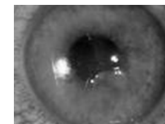


Cornea

- Eyelids
 - Blepharitis
 - Stye / Chalazion
 - Dacryocystitis
- Conjunctiva
 - Dry eye syndrome
 - Allergic conjunctivitis
 - Viral conjunctivitis
 - Bacterial conjunctivitis
 - Episcleritis
 - Scleritis
 - Pingueculitis
 - Pterygium
 - Subconjunctival hemorrhage
 - Episcleritis
 - Scleritis
- Intraocular
 - Acute glaucoma
 - Uveitis / Iritis
 - Endophthalmitis
- Orbit
 - Pre-septal cellulitis
 - Orbital cellulitis
 - C-C fistula
- Cornea
 - Abrasion
 - Bacterial keratitis
 - Viral keratitis

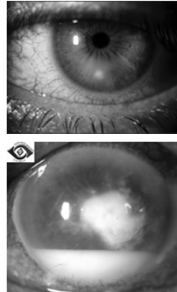
Corneal Abrasion

- Disruption of corneal epithelium
- Extremely painful foreign-body sensation
- Fluorescein staining
- Antibiotic ointment
 - +/- Pain meds
- No need to patch



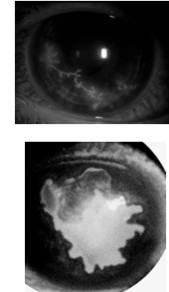
Bacterial keratitis

- Infection of the cornea
- Presentation
 - Photophobia
 - Foreign-body sensation
 - Ciliary flush
- Treat
 - Quinolone drops (Cipro)
 - Referral



Viral keratitis

- Herpetic infection of cornea
 - Simplex or Zoster
- Dendritic or geographic epithelial defect
 - +/- skin findings
- Referral
- Antivirals
 - Topical or systemic

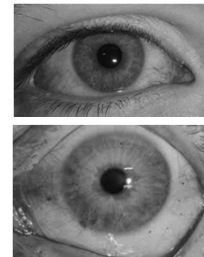


Conjunctiva

- | | | |
|---|---|---|
| <ul style="list-style-type: none"> ■ Eyelids <ul style="list-style-type: none"> ■ Blepharitis ■ Sty / Chalazion ■ Dacryocystitis ■ Cornea <ul style="list-style-type: none"> ■ Abrasion ■ Bacterial keratitis ■ Viral keratitis | <ul style="list-style-type: none"> ■ Conjunctiva <ul style="list-style-type: none"> ■ Dry eye syndrome ■ Allergic conjunctivitis ■ Viral conjunctivitis ■ Bacterial conjunctivitis ■ Pingueculitis ■ Pterygium ■ Subconjunctival hemorrhage ■ Episcleritis ■ Scleritis | <ul style="list-style-type: none"> ■ Intraocular <ul style="list-style-type: none"> ■ Acute glaucoma ■ Uveitis / Iritis ■ Endophthalmitis ■ Orbit <ul style="list-style-type: none"> ■ Pre-septal cellulitis ■ Orbital cellulitis ■ C-C fistula |
|---|---|---|

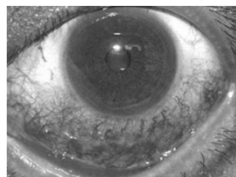
Dry Eye Syndrome

- Very, very common in NM
- Symptoms
 - Wind, smoke, reading, end of day
 - Waxing/waning vision
 - Blinking or resting eyes helps
 - Tearing
- Etiology
 - Inadequate tear production
 - Sjogren's Syndrome
 - Tear film instability
- Treatment
 - Lubricant eye drops (artificial tears)
 - Warm compresses
 - Flaxseed or fish oil



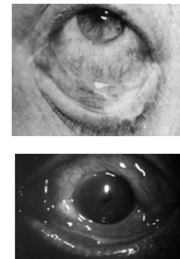
Allergic conjunctivitis

- Often seasonal
 - April and September
- Itchy
- Both eyes
- OTC: Ketotifen
 - Generic, Alaway, Zaditor
- RX:
 - Patanol
 - Cromolol



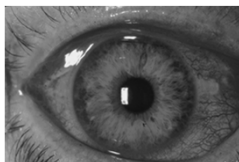
Bacterial conjunctivitis

- Rare and self-limited in adults
- Thick, yellowish discharge
- Treatment
 - Quinolone drops
- Refer if compromised host, significant vision loss, or no improvement in 3 days



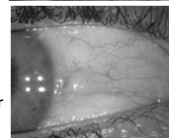
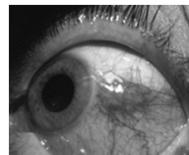
Viral conjunctivitis

- Pink eye
- Adenovirus
- Discharge is clear or mucoid
- Discharge is highly contagious
- Contacts
 - Children
 - Other eye few days later
- Self-limited ~ 1 week
 - Hygiene – don't rub
 - Quarantine
- Refer only if worsens



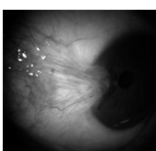
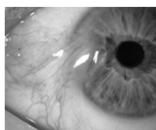
Pingueculitis

- Pinguecula is abundant conjunctival tissue
 - Nasal or temporal globe
 - Very common
 - Often unnoticed until surrounding tissues get inflamed
- Vision unaffected
- Treatment
 - OTC lubricant drops or vasoconstrictor



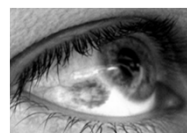
Pterygium

- Fibrovascular proliferation of palpebral conjunctiva
 - Usually nasal
 - Slow-growing
- Extends onto cornea
- Vascularity creates chronic redness
- Treatment – usually none
- Only cure is surgical excision



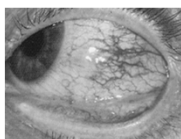
Subconjunctival Hemorrhage

- Blood between conjunctiva and sclera
- No vision changes
- Trauma(rubbing), sneezing, spontaneous
- No treatment



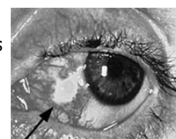
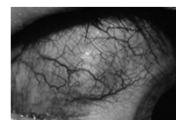
Episcleritis

- Focal inflammation of deep subconjunctival tissue
- Mild pain/redness
- Dilated vessels usually away from cornea
- Self-limited
- Lubricant eye drops



Scleritis

- Inflammation of sclera
 - Focal or diffuse
- Deep, severe pain
- Associated with collagen-vascular/auto-immune diseases
- Referral
 - Systemic meds

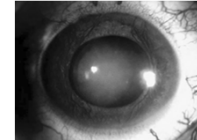
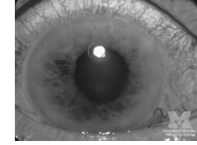


Intraocular

- Eyelids
 - Blepharitis
 - Sty / Chalazion
 - Dacryocystitis
- Cornea
 - Abrasion
 - Bacterial keratitis
 - Viral keratitis
 - Fungal keratitis
- Conjunctiva
 - Dry eye syndrome
 - Allergic conjunctivitis
 - Viral conjunctivitis
 - Bacterial conjunctivitis
 - Episcleritis
 - Scleritis
 - Pingueculitis
 - Pterygium
 - Subconjunctival hemorrhage
 - Episcleritis
 - Scleritis
- Intraocular
 - Acute glaucoma
 - Uveitis / Iritis
 - Endophthalmitis
- Orbit
 - Pre-septal cellulitis
 - Orbital cellulitis
 - C-C fistula

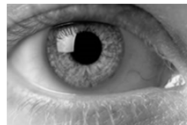
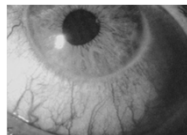
Acute glaucoma

- Sudden increase in intraocular pressure (IOP)
- Red, pain, blurred vision, mid-dilated pupil
- Nauseous
- Emergency – hours count
- This is why you need to know how to check IOP
- Immediate treatment and referral



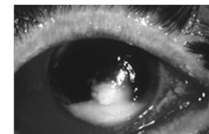
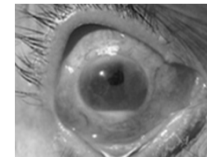
Uveitis / Iritis

- Inflammation inside eye
- Uveitis (iris, ciliary body, choroid)
- Photophobia
- Ciliary flush (near limbus)
- Referral
 - Steroids
 - Work-up



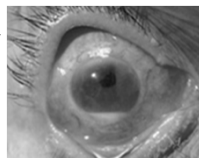
Endophthalmitis

- Infection inside eyeball
- Red, painful eye
- Hypopion
- Sources
 - Surgery
 - Trauma
 - Endogenous

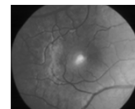


Endogenous Endophthalmitis

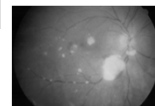
- Sources
 - Endocarditis, GI, urinary tract, indwelling catheters
- If focal source, think bacterial
- If compromised host, think fungal



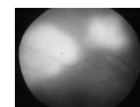
Candidal endophthalmitis progression (from Kanski atlas)



Choroiditis



Endophthalmitis
Vitreal involvement



Risk of advancing to endophthalmitis if on anti-fungals is extremely low

Fungal Endophthalmitis Management

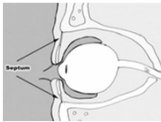
- Candidemia with eye or valve involvement receives a longer course of anti-fungals
- Anti-fungals
- Vitrectomy (especially if *Aspergillus*)
 - Culture
 - Ampho B
 - Recommended if substantial vision loss

Orbit

- | | | |
|--|--|--|
| <ul style="list-style-type: none"> ■ Eyelids <ul style="list-style-type: none"> ■ Blepharitis ■ Sty / Chalazion ■ Dacryocystitis | <ul style="list-style-type: none"> ■ Conjunctiva <ul style="list-style-type: none"> ■ Dry eye syndrome ■ Allergic conjunctivitis ■ Viral conjunctivitis | <ul style="list-style-type: none"> ■ Intraocular <ul style="list-style-type: none"> ■ Acute glaucoma ■ Uveitis / Iritis ■ Endophthalmitis |
| <ul style="list-style-type: none"> ■ Cornea <ul style="list-style-type: none"> ■ Abrasion ■ Bacterial keratitis ■ Viral keratitis ■ Fungal keratitis | <ul style="list-style-type: none"> ■ Bacterial conjunctivitis <ul style="list-style-type: none"> ■ Episcleritis ■ Scleritis ■ Pingueculitis ■ Pterygium ■ Subconjunctival hemorrhage ■ Episcleritis ■ Scleritis | <ul style="list-style-type: none"> ■ Orbit <ul style="list-style-type: none"> ■ Pre-septal cellulitis ■ Orbital cellulitis ■ C-C fistula |

Preseptal Cellulitis

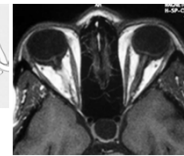
- Peri-ocular skin infection
- Limited to the skin



- Systemic antibiotics
 - Cephalexin

Orbital Cellulitis

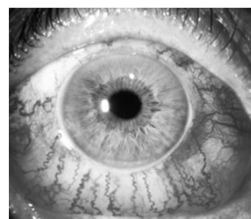
- Infection in the orbit



- Diplopia
- Admission
 - I-V antibiotics
 - Drain abscesses

Carotid-Cavernous sinus fistula

- A-V fistula
 - Carotid-Cavernous sinus
- Orbital vascular congestion
- Chronic redness from corkscrew vessels
- Whooshing sound in head
- Referral
 - Observe
 - Self-limited
 - Embolization



The Red Eye

- Red
 - Eyelid or eyeball?
 - Why is eyeball red?
 - Where is it red?
- Pain
 - Foreign-body sensation?
 - Improve with anesthetic?
- Blurred vision

Red Eye

- Eyelids
 - Blepharitis
 - Sty / Chalazion
 - Dacryocystitis
- Conjunctiva
 - Dry eye syndrome
 - Allergic conjunctivitis
 - Viral conjunctivitis
 - Bacterial conjunctivitis
 - Pingueculitis
 - Pterygium
 - Subconjunctival hemorrhage
 - Episcleritis
 - Scleritis
- Intraocular
 - Acute glaucoma
 - Uveitis / Iritis
 - Endophthalmitis
- Cornea
 - Abrasion
 - Bacterial keratitis
 - Viral keratitis
- Orbit
 - Pre-septal cellulitis
 - Orbital cellulitis
 - C-C fistula

Triage

PCP	REFERRAL Non-urgent	REFERRAL Urgent
Blepharitis Sty Corneal abrasion Dry eyes Allergic conjunctivitis Viral conjunctivitis Bacterial conjunctivitis Pingueculitis Pterygium Subconjunctival heme Preseptal cellulitis	Dacryocystitis Episcleritis C-C fistula	Bacterial keratitis Viral keratitis Scleritis Acute glaucoma Iritis Endophthalmitis Orbital cellulitis

- How the eye works
- The red eye
- Acute eye conditions
- Chronic vision loss
- Basic eye exam

Acute eye conditions

- Emergencies
 - Alkali burn
 - Acute angle closure glaucoma
 - Central retinal artery occlusion (CRAO)
 - Ruptured globe
- Urgencies
 - Lid lac (marginal or canalicular)
 - Retinal detachment
 - Papilledema

Acute eye conditions

- Emergencies
 - Alkali burn
 - Acute angle closure glaucoma
 - Central retinal artery occlusion (CRAO)
 - Ruptured globe
- Urgencies
 - Lid lac (marginal or canalicular)
 - Retinal detachment
 - Papilledema

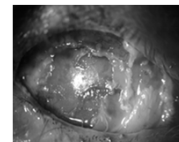
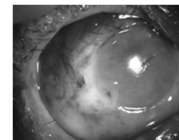
TAKE HOME MESSAGE

Chemical to eye

- All chemical exposures need to be rinsed immediately with

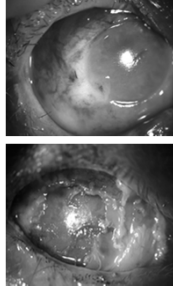
AT LEAST 2L saline

- More if suspect alkali
- Alkali eats through cornea (acid doesn't)
- Must get pH under 8.0 (you'll never get to 7.4)



Chemical to eye

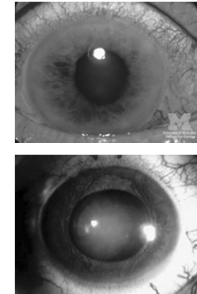
- Severity of alkali burn is judged by
 - corneal opacification
 - size of epithelial defect,
 - limbal ischemia/whitening
- Airbag deployment can release alkali – check pH



TAKE HOME MESSAGE

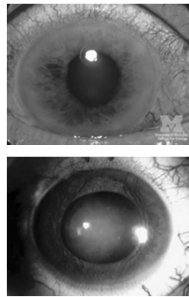
Acute glaucoma

- This is why you have to know how to check IOP
- Eye pain, redness, tearing, blurring (cloudy cornea), mid-fixed pupil, *nausea*



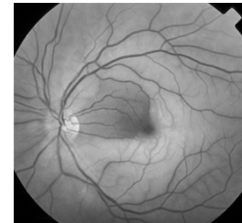
Acute glaucoma

- Refer immediately
 - Give any available pressure-lowering meds (drops or diamox)
 - If secondary to orbital swelling (hematoma, CC-fistula), perform lateral canthotomy/cantholysis
 - Cut lateral eye corner and inferotemporal ligament
 - We can easily repair it later if needed



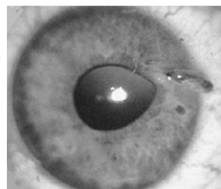
Central retinal artery occlusion

- Acute, painless loss of vision
- Exam shows whitening of retina with cherry-red macula
- Refer immediately



Ruptured globe

- Corneal or scleral full-thickness laceration
- Eye loses pressure and contents shift
- Signs
 - Obvious laceration
 - Collapsed anterior chamber
 - Irregular pupil
 - Low pressure
 - Irregular contour on CT



Ruptured globe

- If diagnosed/suspected:
 - NPO
 - Shield (metal shield or paper cup over eye)
 - *NOT A PRESSURE PATCH*
 - Anti-emetics
 - CT to r/o retained foreign body
- Goal is to avoid pressure changes within the eye
- Surgical priority is to restore integrity of the globe

Acute eye conditions

- Emergencies
 - Alkali burn
 - Acute angle closure glaucoma
 - Central retinal artery occlusion (CRAO)
 - Ruptured globe
- Urgencies
 - Lid lac (marginal or canalicular)
 - Retinal detachment
 - Papilledema

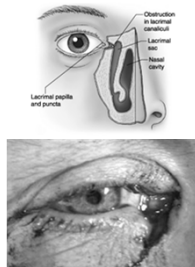
Eyelid lacerations

- Eyelid margin
 - Requires experienced closure to avoid notching



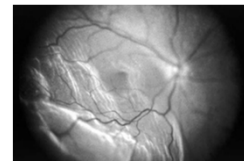
Eyelid lacerations

- Lacrimal canaliculus
 - Suspect if laceration involves eyelid margin between the lacrimal puncta and medial canthus
 - Requires OR, silicone stenting



Retinal detachment

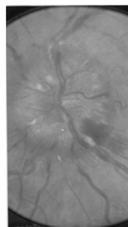
- Retina separates from back of eye wall
- Symptoms are *flashes*, *floaters*, and *curtain* over part of vision
- Starts peripherally
- Requires surgery



TAKE HOME MESSAGE

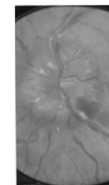
Papilledema

- Optic disk edema *secondary to increased intracranial pressure*
- Not all disk edema is papilledema

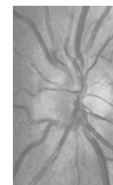


Papilledema - findings

- Burred disk margins
- Obscured vessels
- Flame hemorrhages
- Bilateral



Papilledema



Normal

Acute eye conditions

- Flush all chemical exposures with *at least 2L*
- Acute glaucoma presents with *nausea*
- Papilledema is optic disk swelling *secondary to increased intracranial pressure*

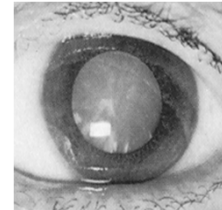
- How the eye works
- The red eye
- Acute eye conditions
- Chronic vision loss
- Basic eye exam

Chronic vision loss

- Cataract
- Diabetic Retinopathy
- Macular Degeneration
- Glaucoma

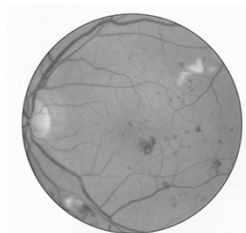
Cataract

- Clouding of the lens
- Usually age-related
- Causes glare problems and blurred vision
- Only treatment is surgery (replacement)



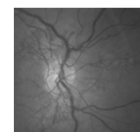
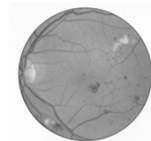
Diabetic retinopathy

- Vasculopathy
- Clinically, yellow and red spots
- Hemorrhages, aneurysms, edema, neovascularization, infarcts/ischemia



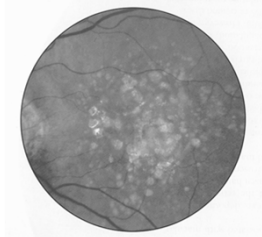
Diabetic retinopathy

- Two stages
- Non-proliferative
 - Red and yellow spots
- Proliferative
 - Neovascularization
 - Retina or iris
 - Serious complications



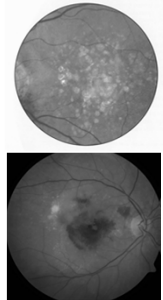
Macular Degeneration

- Age-related
- Degenerative process affecting retina, RPE, and choroid
- Yellow spots (drusen)
 - Lipoprotein deposits



Macular Degeneration

- Two stages
- Dry
 - Atrophic changes
- Wet
 - Choroidal neovascularization
 - Most of severe vision loss



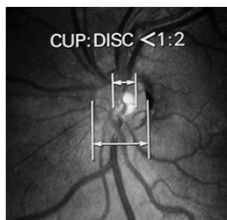
Glaucoma

- Damage to optic nerve
 - Large cup-to-disk ratio
- Risk factors:
 - Increased intraocular pressure
 - Usual IOP 10-20 mm Hg
 - Age
 - Family history of glaucoma

Glaucoma

- Damage to optic nerve
- The P's
 - Painless
 - Permanent
 - Progressive
 - Preventable

Glaucoma



Normal



Glaucoma

Chronic visual loss

- Cataract - opacification of the natural lens
- Glaucoma - damage to the Optic Nerve
 - Progressive, Painless, Permanent, Preventable
- Diabetes in the eye is a retinal vascular disease
 - Non-proliferative and proliferative stages
- Macular Degeneration affects the central retina
 - Dry and wet stages

Eye Exam – components

- Visual acuity
 - Visual fields
 - Pupillary response
 - Motility
 - Intraocular pressure (IOP)
- } Function
-
- Anterior segment
 - Fundus examination
- } Form

TAKE HOME MESSAGE

Visual acuity

- Measures central vision
- One eye at a time
- Force patient to miss at least half
 - They get credit for any line with at least half right
- Notation
 - Near (N) or Distance (D)
 - With (cc) or Without (sc) correction
 - Pinhole (PH)
- Must be reproducible

Visual fields

- Measures peripheral vision
- One eye at a time
- 1,2,or 5 fingers in each quadrant while patient fixates on nose
- Notation: Visual fields full to confrontation (VFFTC OU)

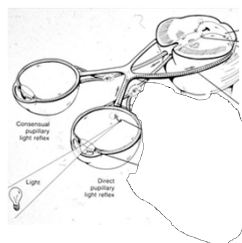
Pupils

- Abnormalities represent dysfunction of the pupil mechanics or the Optic nerve
 - *The Optic nerve is the important one*

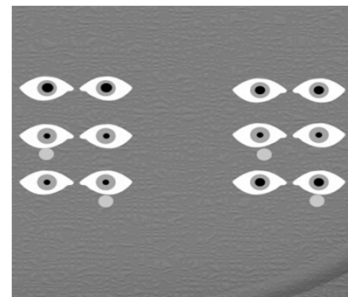
TAKE HOME MESSAGE

Afferent Pupillary Defect (APD)

- Swinging flashlight test
- Pupil *appears* to dilate in response to light
- Suggests Optic Nerve dysfunction



Afferent pupillary defect

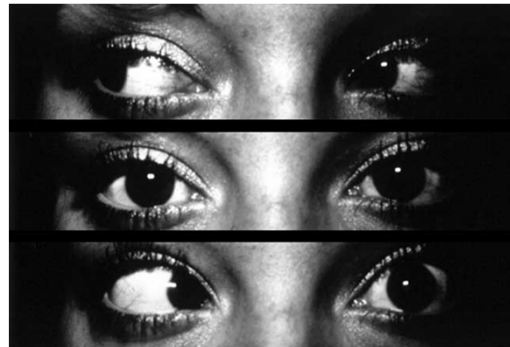


Motility

- Both eyes open (have to hold lids)
- Six cardinal directions of gaze



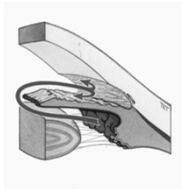
- Notation: Vergences full/conjugate



TAKE HOME MESSAGE

Intraocular pressure (IOP)

- Usual range 10-20 mm Hg
- You must know how to measure the eye pressure
- Can be measured with applanator or Tonopen



How to use the Tonopen

- Anesthetic drop
- New tip cover (always keep tip covered)
- Hold black button until beeps
- Ready to read when double black lines
- Hold lids if necessary
 - Against bone – don't push on globe



How to use the Tonopen

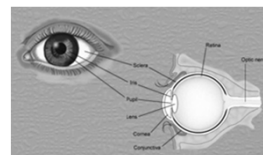
- Tap perpendicular to center of cornea
 - Faint beep with each reading
- Long beep when readings satisfactory or times out
 - Should have <5% deviation (underscore on display)
- Will turn itself off



* If says CAL (needs calibration), hold pointing down for several seconds. When beeps "up", point it up until it says "good"

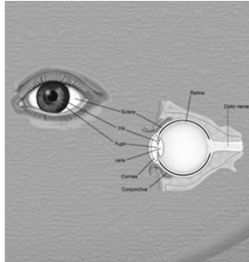
Structure

Anterior segment is best examined with a slitlamp biomicroscope (slit lamp)



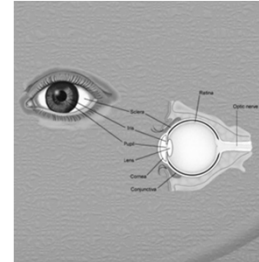
Anterior segment

- Lids
- Conjunctiva/sclera
- Cornea



Anterior segment

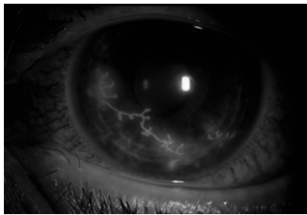
- Lids
- Conjunctiva/sclera
- Cornea
- Anterior chamber
- Iris
- Lens



TAKE HOME MESSAGE

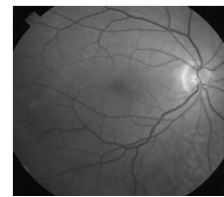
Anterior segment - Cornea

- Fluorescein stains disrupted epithelium
Use as **LITTLE AS POSSIBLE**

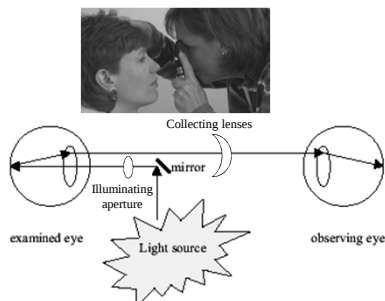


Structure

Posterior segment best examined
with an Ophthalmoscope



Direct Ophthalmoscope



Technique - Dilation



- Makes examination **MUCH** easier
- Red-top eydrops
 - Phenylephrine 2.5%
 - Stimulates iris dilator
 - Tropicamide 1%
 - Inhibits iris sphincter
 - Last 4-6 hours
- Contraindication: need to follow pupil exam

Technique

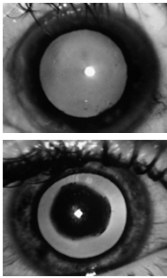
- Dilate
- Examiner and patient at eye level
- Patient +/- examiner remove eyeglasses
- Patient fixates in distance with other eye
- Index finger on focusing wheel
- To examine *right* eye
 - Hold in *right* hand
 - Look with *right* eye

Technique



- Set dial well into the black/green
- Look through aperture
- Focus to get a clear red reflex
 - You will need to dial *counterclockwise*

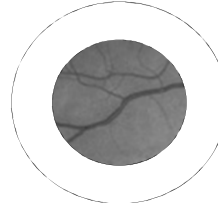
Technique



- Focus to get a clear red reflex
 - You will need to dial *counterclockwise*
- Compare reflex in both eyes
 - Dimness or opacifications represent problems in the light path (the visual axis)

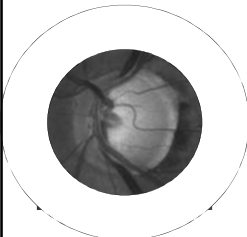
Technique

After assessing the red reflex...



- Stand slightly lateral to patient
 - You'll be looking toward the optic nerve head
- Move in toward patient
- Identify a retinal vessel
- Dial *counterclockwise* to bring vessel into focus

Technique



- Move as close as you can to the patient's eye
 - Wider field of view
 - Less reflections
- Trace the vessel branching pattern back to their origin (optic disk)

Now you are ready to concentrate on the exam – no more adjustments

Exam - funduscopy

Red reflex → Disk → Vessels → Background
→ Macula → Periphery

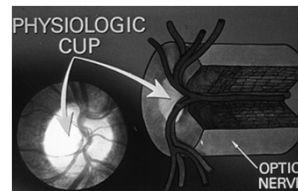


Red Reflex → Vitreous → Disk → Vessels
→ Background → Macula → Periphery

- Disk (nerve head)
 - Cup-to-disk ratio (CDR)
 - Edema or pallor

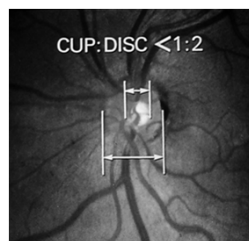
Cup-to-disk ratio

- The cup is the central portion of the nerve, corresponding to the region where the nerve fibers dive deep to exit the eyeball



Cup to disk ratio

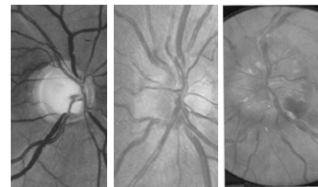
- Normal CDR is < 0.5



Red Reflex → Vitreous → Disk → Vessels
→ Background → Macula → Periphery

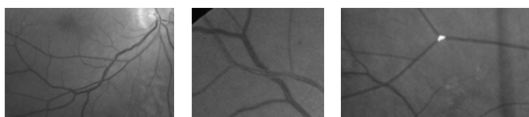
- Cup-to-disk ratio (CDR)
 - > 0.5 suggests optic nerve damage

- Edema
- Pallor



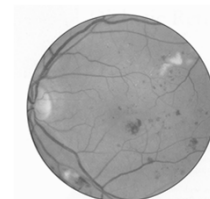
Red Reflex → Vitreous → Disk → Vessels
→ Background → Macula → Periphery

- Vein:Artery diameter ratio should be 3:2
- A-V nicking
- Plaques/occlusions



Red Reflex → Vitreous → Disk → Vessels
→ Background → Macula → Periphery

Look for red or yellow spots



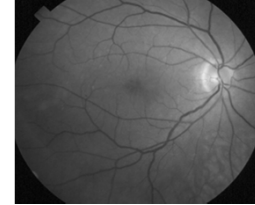
Red Reflex → Vitreous → Disk → Vessels
→ Background → Macula → Periphery

Look for red or yellow spots

- Red spots
 - Hemorrhages
 - Microhemorrhages (MH) or Dot-Blot Hemorrhages (DBH)
 - Aneurysms
- Yellow spots
 - Hard Exudates (HEX) - lipid deposits from leaking vessels
 - Cotton-wool spots (CWS) – infarction of nerve-fiber layer
 - Drusen – lipid deposits from poor metabolism (RPE dysfunction)
- Whitening
 - Commotio Retinae = retinal contusion

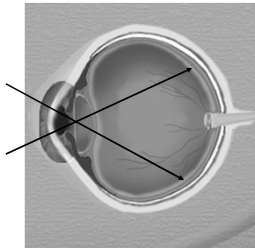
Red Reflex → Vitreous → Disk → Vessels
→ Background → Macula → Periphery

- Macula is true center of posterior pole
 - Central vision
- Temporal and a bit inferior to disk
- Identified by:
 - Slightly darker
 - Absence of blood vessels
 - Foveal Avascular Zone
 - Very light sensitive



Red Reflex → Vitreous → Disk → Vessels
→ Background → Macula → Periphery

- Very difficult to see
- Nasal periphery sees the temporal visual field, inferior retina sees superior visual field, etc



Eye pain

- Ocular surface
 - Helped by anesthetic
 - Foreign-body sensation
- Intraocular
 - Photophobia
 - Ciliary flush
- Extraocular (orbit)
 - Pain with eye movements
 - Diplopia

Eye pain

- If the patient has eye pain, use anesthetic drops
- Note how much it helps
 - Ocular surface pain is quite sensitive and responsive
 - Intraocular or orbital pain will be minimally responsive

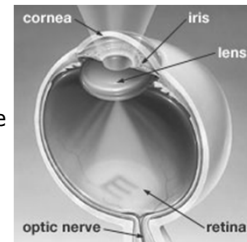
Take home points

- Visual acuity is measured by the smallest line with at least half correct
- An Afferent Pupillary Defect (APD) suggests Optic Nerve dysfunction
- Know how to check pressure
- Use as little fluorescein as possible
- Use anesthetic to exam painful eyes

REVIEW

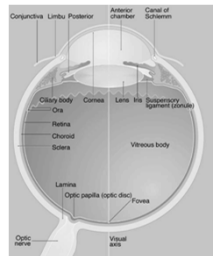
How the eye works

- Front part collects light
- Back part forms the image and sends it to the brain



Light path

- Cornea
- Anterior chamber/aqueous humor
- Pupil
- Lens
- Vitreous humor
- Retina



The Red Eye

- Red
 - Eyelid or eyeball?
 - Why is eyeball red?
 - Where is it red?
- Pain
 - Foreign-body sensation?
 - Improve with anesthetic?
- Blurred vision

Red Eye

- Eyelids
 - Blepharitis
 - Sty / Chalazion
 - Dacryocystitis
- Cornea
 - Abrasion
 - Bacterial keratitis
 - Viral keratitis
- Conjunctiva
 - Dry eye syndrome
 - Allergic conjunctivitis
 - Viral conjunctivitis
 - Bacterial conjunctivitis
 - Pingueculitis
 - Pterygium
 - Subconjunctival hemorrhage
 - Episcleritis
 - Scleritis
- Intraocular
 - Acute glaucoma
 - Uveitis / Iritis
 - Endophthalmitis
- Orbit
 - Pre-septal cellulitis
 - Orbital cellulitis
 - C-C fistula

Triage

PCP	REFERRAL Non-urgent	REFERRAL Urgent
Blepharitis Stye Corneal abrasion Dry eye syndrome Allergic conjunctivitis Viral conjunctivitis Bacterial conjunctivitis Pingueculitis Pterygium Subconjunctival heme Preseptal cellulitis	Dacryocystitis Episcleritis C-C fistula	Bacterial keratitis Viral keratitis Scleritis Acute glaucoma Iritis Endophthalmitis Orbital cellulitis

Primary treatments

- For dry eyes, use artificial tears and warm compresses
- For allergies, use ketotifen eyedrops
- For antibiotic, use a quinolone (Cipro)
- For ointment, use erythromycin
- Don't give topical steroids

Acute eye conditions

- Emergencies
 - Alkali burn
 - Acute angle closure glaucoma
 - Central retinal artery occlusion (CRAO)
 - Ruptured globe
- Urgencies
 - Lid lac (marginal or canalicular)
 - Retinal detachment
 - Papilledema

Acute eye conditions

- Emergencies
 - Alkali burn
 - Acute angle closure glaucoma
 - Central retinal artery occlusion (CRAO)
 - Ruptured globe
- Urgencies
 - Lid lac (marginal or canalicular)
 - Retinal detachment
 - Papilledema

Acute eye conditions

- Flush all chemical exposures with *at least 2L*
- Acute glaucoma presents with *nausea*
- Papilledema is optic disk swelling *secondary to increased intracranial pressure*

Chronic vision loss

- Cataract
- Diabetic Retinopathy
- Macular Degeneration
- Glaucoma

Basic eye exam

- Visual acuity is measured by the smallest line with at least half correct
- An Afferent Pupillary Defect (APD) suggests Optic Nerve dysfunction
- Know how to check pressure
- Use as little fluorescein as possible
- Use anesthetic to exam painful eyes

THANK YOU