LECTURE NOTES

For Health Science Students

Ophthalmology

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PREFACE

This lecture note will serve as a practical guideline for the hard-pressed mid-level health workers. We hope that it will be a good introduction to eye diseases for health science students working in Ethiopia.

There are so many books about eye diseases available but hardly any, which are written from the perspective of Ethiopia, where more blind are live.

The lecture note is basically focused on the community as well as clinical ophthalmology to introduce the students on the common causes and burden of blindness and their preventive aspect. So it is written for students who are intended to see patients and need to recognize each disease and recommend possible treatment. When looking at a patient with eye disease, the most important skill is to be able to recognize the appearance of each particular disease.

In the management of diseases which are beyond their scope are recommended to refer as early as possible. They shouldn't urge to start to manage such patients at their level. Their main role is to pick problems early and to have an active role in the prevention of blindness. Selected pictures are used to illustrate some anatomical parts and common eye diseases to make note easier and understandable.

There are several encouraging signs that there is an increasing awareness of the challenge of treatable and preventable blindness throughout the world. Our country is forming prevention of blindness to try to look realistically at the problem locally. NGO's and the government are highly devoted to treat and prevent major cause of blindness in the country specially cataract and trachoma.

In spite of all this, the number of avoidably blind people in Ethiopia continues to increase faster than the population.

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3. LIST OF FIGURES AND COLOR PLATES

List of tables

5. Abbreviation and acronyms

AIDS	- Acquired Immune Deficiency syndrome
CF	-Counting finger
CMV	- Cytomegalovirus
CN	-Cranial nerve
CO	- Corneal opacity
ELISA	- Enzyme linked immuno sorbent assay
HM	- Hand motion
HIV	- Human immune deficiency virus
IOP	-Intra ocular pressure
LP	-Light perception
NLP	- No light perception
OD	- Oculus Dexter(right eye)
OS	- Oculus Sinister (left eye)
OU	

Each chapter contains:

1. Objectives at the beginning of the chapters which are intended to guide the students in their study.
2. The body with detail notes
3. Exercises related to it and suggested references.

UNIT ONE

BASIC ANATOMY AND PHYSIOLOGY OF THE EYE

1.1 PROTECTION OF THE EYE

1.2 THE EYE BALL

- Innervated by facial (7th cranial) nerve

Levator Palpebrae

- Elevator of eye lid.
- Innervated by Oculomotor (3rd cranial) nerve

Muller's muscle

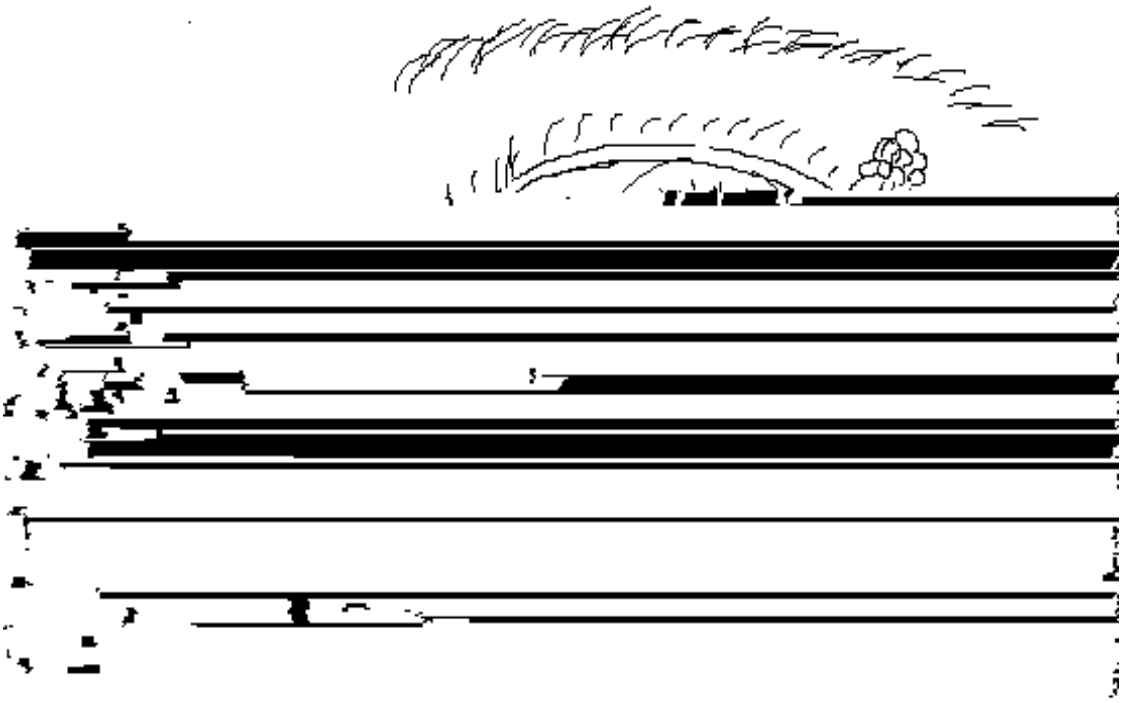
- Help to retract the upper eye lid
-

III. Fornix

-Part in which the tarsal and bulbar conjunctivas are continuous.

The conjunctival epithelium is continuous with the corneal epithelium at the margin of the cornea, which is called lim

Lacrimal apparatus produces and drain tears that forms component of tear film



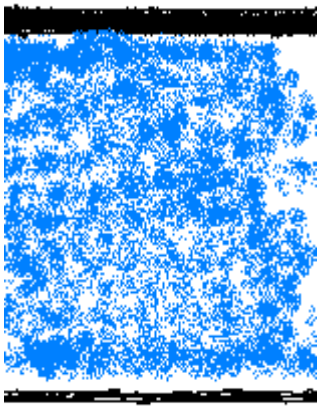


Fig. 1.3. Components of tear firm

D- ORBITAL BONES

The orbit is formed by seven bones and has four walls.

Wall of orbit-

Roof

Frontal bone and sphenoid bone

Floor

Zygomatic, maxillary and palatine bones

Medial

Ethimoid, frontal, Lacrimal and sphenoid bones

Lateral

- The strongest of all walls.

Zygomatic and sphenoid bone

- Has three ocular chambers

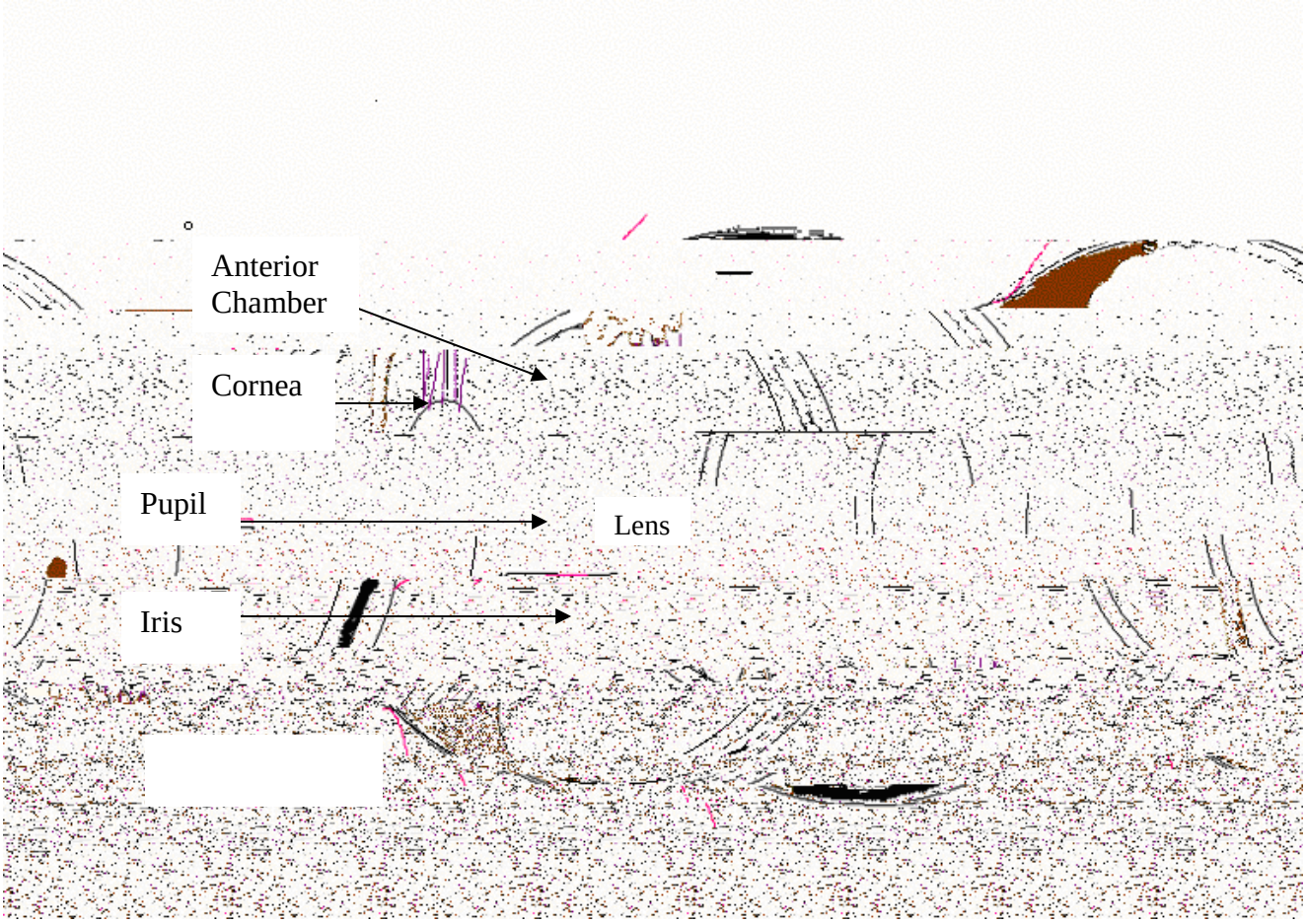
I- Anterior Chamber

II- Posterior Chamber

III- Vitreous Space

-Associated structures (Adnexa)

- Eye lids with all its parts, extra ocular muscles, Vessels, nerves, lacrimal apparatus, adipose and connective tissues.



1.4. The basic structure of the eyeball to show its three layers.

1.2-1 FORM AND FUNCTIONS OF THREE OCULAR COATS

A - THE OUTER COAT

I. Sclera

- Means tough.
- Is an opaque and thick coat made of collagen fibers.

- Is poorly vascularized but is sandwiched between the highly vascularized episclera and choroid.
- The metabolic requirements are met by diffusion.
- Constitutes the posterior 5/6 th of the globe.
- important to protect and keep the shape of the globe

II. Cornea

- Is the main refractive media of the eye (75 % of refractory function of the eye).
- Avascular but obtains its metabolic needs from the vessels of limbus and aqueous fluid, and oxygen from atmosphere.
- Thickness varies from 0.5mm centrally to 1 mm peripherally.
- Has very rich sensory nerve supply from ophthalmic branch of trigeminal nerve.

It has three layers

a) Surface epithelium

.5 or 6 cells thick, of non keratinized stratified Squamous epithelium.

Continuous with conjunctival epithelium

Constantly changing or shedding.

b) The inner stroma

- Main bulk of cornea /accounts for 90% of corneal thickness
- Has two additional membranes
  - I- Bowman's membrane is special support of surface epithelium.
  - II- Descemet's membrane is tough support of endothelium.

c) Inner surface (endothelium)

-Single layer of very active cuboidal cells.

-Transfers fluid out of the stroma and keep the cornea dehydrated.

- can’t regenerate but can expand to adjust damaged cell

B. THE MIDDLE LAYER

-Consists of the iris, ciliary body and choroid.

-They are continuous with one another and are collectively known as the uveal tract (uvea Latin word means grape).

1. Iris

- has central hole (pupil) through which light reaches the retina

- consists of a vascular stroma covered by mesothelium anteriorly and by two pigmented layers of epithelium posteriorly.

-It is continuous with the ciliary body

- Attached to the lens with suspensory ligament and helps to keep it in it’s position.

Circulation of aqueous fluid

Aqueous fluid is produced by ciliary process of ciliary body. It flows from the

C.THE INNER COAT- RETINA

- Thin, transparent, net like membrane with a high rate of oxygen

The yellow color is due to the presence of carotenoid pigment (xanthophylls). This is used to protect the macular cones from the dazzle of incident light, which occurs even with maximal pupillary constriction.

- Visual acuity varies depending on the concentration of cone . Foveal vision is 1.0(20/20) as you move away from it V/A decreases.
- It is the center of visual axis.

2-Blind spot

- Is an area of complete blindness in the visual field.
- Anatomically it corresponds to optic nerve head, which is located nasally and measure 1.5 mm in diameter.
- At this point, there are no photoreceptors.

1.2.2. THE CHAMBERS OF THE GLOBE

A. Anterior chamber

- Delineated anteriorly by the posterior corneal surface and posteriorly by iris.
- Depth- 3-4 mm
- Volume of aqueous humor in the anterior chamber is about 0.25 ml
- Inflow and outflow are balanced so that the entire contents of anterior chamber are replaced every 10 hrs.

B. Posterior chamber

- Limited anteriorly and laterally by the posterior iris surface and ciliary body and posterior by lens & vitreous body

C. Vitreous space

- Filled with vitreous humor
- Transparent, roughly spherical and gelatinous structure occupying posterior 4/5 of the globe with volume of 4 ml.
- Consist of water (99 %), collagen, hyaluronic acid and soluble protein.
- Inert

1.2.3. THE LENS

- Consist of closely packed transparent cells enclosed in a capsule.
- Has unique feature
    - Transparent
    - No blood or nerve supply.
    - Has higher protein content than other body tissues.
    - Continues to grow through out life, new in the top, old compressed to ward the centre.
    - The only solid structure inside the eye.
    - Has biconvex shape.
    - Epithelial cells are not shedding type
    - Has three anatomical parts: capsule, cortex, nucleus

Its nutrition is maintained by the metabolic exchange between itself and the aqueous humor.

1.3 BLOOD SUPPLY, INNERVATIONS AND LYMPHATIC DRAINAGE OF THE EYE

1.3.1 Blood supply of the eye

A- Arterial blood supply

The eye is supplied by anastomosing vessels from internal and external carotid arteries.

* Retina - inner layer gets blood from central retinal artery, a branch of ophthalmic artery and enters the eye with optic nerve and divides on the optic disc into its branches.
* Uvea - is supplied by ciliary circulation, from ophthalmic artery.
* Eye lid gets its blood supply from facial and ophthalmic arteries.

B- Venous Drainage

Almost the entire blood from the anterior and posterior uvea drains through four vortex veins via superior and inferior orbital veins to cavernous sinus.

Eye lid drains through facial vein into cavernous sinus

1.3.2. Lymphatic drainage

There are no lymphatic vessels inside the globe. The lymphatic drainage of the medial eye lid is to sub mandibular lymph node and that of lateral one is to the superficial preauricular lymph nodes and then to deeper cervical lymph nodes.

1.3.3 Innervations of the eye

A- Motor

- Oculomotor (CN III) Innervate- medial rectus, superior rectus, inferior rectus, & inferior oblique.

-Trochlear (CN IV) nerve- innervates superior oblique

-Abducent (CN VI) nerve- innervates lateral rectus.

- Facial nerve (CN VII) - innervates orbicularis oculi muscle

B- Sensory nerve

- Ophthalmic branch of trigeminal nerve is the sensory nerve of the globe & adnexa and has three branches -frontal, lacrimal, nasociliary.

- Optic nerve (CNII) - responsible for vision.

C- Autonomic nerves

I- Sympathetic nerve- supplies Muller's muscles and dilator pupillae.

II- Parasympathetic comes via oculomotor and innervates the ciliary muscle and sphincter pupillae.

1.4 EXTRA OCULAR MUSCLES

- They are six, and their action is so complex.
- Control eye movement
- Form cone behind the eyeball

Table 1.1 Extra ocular muscles and their action (monocular action)

Exercise

1. What is unique character of skin in the eyelid?
2. What are the components of eyelid and their function?
3. Discuss about lacrimal apparatus, anatomical and physiological aspect.
4. List the middle layers of the eyeball with their function.
5. What is the difference between blind spot and fovea?
6. What are the unique

UNIT TWO

BASIC EXAMINATION OF THE EYE

2.1. HISTORY TAKING

2.2. TESTING VISION

2.3. EXAMINING THE EYE

Objective:

In History taking one has to consider the following

Particular environmental or occupational factors

Patients diet, drinking and smoking habits

General health of the patient like diabetes, hypertension & neurological disease affecting the eye.

Previous eye disease, injuries or treatment

Use of traditional medicine or uses of other treatment.

Family history of similar complaint e.g. myopia and glaucoma.

Major symptom of eye disease given

- Disturbances of vision
- Discomfort or pain in the eye
- Eye discharge

A. Disturbances of vision

- The most common visual symptom
- Can be sudden or gradual

Blurring or reduction of vision

Dazzling/glare/ – difficulty of seeing in bright light, may be caused by opacities in the cornea or lens

Diplopia/ double vision/

Decreased peripheral vision – may be caused by various disorders in the retina, optic nerve or visual pathway pathology up to the visual cortex.

Photophobia – is a fear of light

- It is usually a sign of inflammatory eye disease, especially a corneal ulcer and uveitis.

Distortion of shapes usually indicates a disorder of the retina around the macular.

Haloes (rainbow) colored rings around the light e.g. Corneal edema, Glaucoma.

B. Discomfort or pain in the eye.

- Usually a symptom of inflammation of the eye or of the structure surrounding the eye.
- Discomfort, irritation or grittiness – conjunctival problems
- Pain – related to corneal disease, Glaucoma

Eyestrain and tiredness of the eyes are common complaint usually associated with extra ocular muscles abnormalities and refractive errors.

C. Eye discharge

-

If vision is below 1/60, use the patient to detect motion of hand in front of the eye; 'hand motion' (*HM)*

If the patient can't see *HM,* the final test is to shine a light into his eye

- If he can perceive light – *LP*
- If he can't perceive light – *NLP*

Projection of the light from four quadrants of the eyes should be examined to test the peripheral retina and optic nerve function.

Test for red and/or green color discrimination, macular function test

Pin hole test – If V/A improves with this test, it usually indicates an error of refraction; But if not corrected, then loss of visual acuity is from other eye diseases.

Interpretation of V/A

The WHO classification of Visual impairment and blindness

6/6	-6/18	: Normal
<6/18	-6/60	: Visual impairment
<6/60	- 3/60	: severe Visual impairment
<3/60	- NPL	: blindness

Blindness is defined as visual acuity of less than 3/60 in the better eye with the best possible correction.

B. Visual field

Visual field is that portion of one's surroundings that is visible at one time during central vision

Not a routine test in all patients

Important to do in any patients with suspected glaucoma, diseases of the optic nerves in visual pathways, and certain retinal diseases

Confrontation test

- Simple and no need of special equipment
- Will detect serious visual field defects.
- Works by comparing the patient's visual field with the examiner's

Steps

Sit facing the patient at one meter distance

If the patient's left eye is being tested, he should cover his right eye and you should cover your left eye.

Patient looks straight into your eye and you look straight into his to make sure he is fixing your eye.

Then hold your fingers at an angle equidistant between you and the patient and ask him to say visible or not as your fingers move.

If you can see them and the patient cannot, then he has a defect.

Move in different quadrant

- Do the same with the other eye.

Perimetery

Difficult to test in children, old or non comprehending people.

In all visual field test, each eye is tested separately

The patient must fix his gaze on a target or spot in front of him.

The examiner then sees at what angle objects come into the patients range of vision

A calibrated black screen / Bjerrum screen/

Give a more accurate result

C. Color vision

Done by using a chart called 'Ishihara chart'.

Simple macular test is to ask the patient for red and green color perception

2.3. EXAMINATION OF THE EYE

Nearly all parts of the eye are visible with an appropriate optical instrument.

Anyone who cares for the patients should know how to examine the eye.

Some of ophthalmic diagnostic instruments are very expensive, but a reasonable examination is possible with available simple

instruments. There are two important instrument for examination of the eye

1. To examine the front of the eye, this requires both a good light illumination with bright light, torch and magnifying lens(loupe).
2. To examine the back of the eye, need ophthalmoscope.

Normal eye

- Eye lids should open and close properly
- Eye lashes should grow forward and out ward
- white part of the eye should be white
- Cornea should be clear and transparent
- Pupil is black and reactive to light

During Examination of the Eye One Has to Comment the Following Things

1. Examination of the front aspect of the eye

Eye lids –

In growing eye lash, misdirected

Everted eyelid examinations; follicles, papillary reaction, foreign body, concretions

Any mass, ulcer, discharge

- Characterize it

Opening and closing pattern and defect of eye lid

- Lagophthamos – eye lid that can't close
- Ptosis – eye lid drooping

Nasolacrimal apparatus

Punctum

Mass, Ulcer or discharge over the Nasolacrimal apparatus

Conjunctiva

Color

Growth

Bleeding

Foreign body

Spot - white foamy

Follicles, papillae, scarring

Characterize each findings

Limbus

Herbert's pit

Ciliary /circumcorneal/ injection

Arcus

Cornea

Color and transparency

Size

Ulcer, scar, infiltrates

Foreign body

Laceration, perforation

Blood vessels growth

Sensation to touch

Iris /pupil

- Color

Defect

Reaction to light

Relation with adjacent parts

Pupillary margin: shape, adhesion between lens , iris and cornea

Lens

Transparency

Position, sublaxated or dislocated

Anterior chamber

- look for clarity
- Depth

2. Examining the fundus and using the ophthalmoscope.

Ophthalmoscope is a form of illumination, which allows the examiner to look down the same axis as the rays of light entering the patient's eye.

To see the fundus

- Ocular media must be healthy and transparent
- Dilate the pupil with mydriatic drops
- With the ophthalmoscope it appears 15 times larger than its actual size
- In myopic patient the magnification is greater, but in hypermetropic patient it is less.

How to use ophthalmoscope

Hold closer both to the examiner's and to the patient's eye

E. Position the ophthalmoscope about 6 inches (15cm) in front and slightly to the right(25^0) of the patient and direct the light beam into the pupil. A ‘’reflex’’ should app

Especially in myopic patient. It is difficult to see the fundus clearly so use a strong minus lens in the ophthalmoscope.

2. If the patient has some opacity in the transparent part of the eye i.e. in the cornea, lens or vitreous, this can be detected with plus lens in the ophthalmoscope when the pupil is dilated.

Options of Examining a Young Child

1. Seat the baby on his mother's lap, so that her hands restrain his arms and steady his head

Exercise:

1. What are the major complaints of a patient with eye disease?
2. Discuss about different visual tests.
3. Define blindness.
4. Describe the features of a normal eye.
5. What are the instruments used in the examination of the fundus of the eye?

1. Write down methods used in the measurement of IOP.

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UNIT THREE

EXTERNAL EYE DISEASES

3.1 DISEASES OF THE EYE LIDS

3.2 DISEASES OF THE LACRIMAL APPARATUS

3.3 ORBITAL INFECTION

Objective:

1. To give a basic knowledge on external eye diseases.
2. To give also basic concepts on how to diagnose and treat external eye diseases.
3. At the end of the course the students are expected to have adequate knowledge about eyelid and lacrimal apparatus disease; the diagnosis and management of such diseases.

3.1 DISEASES OF THE EYE LIDS

A. Internal Hordeolum

- a small abscess collection in the Meibomian glands
- Caused by staphylococcus

Symptoms pain, redness, swelling within eye lid

Signs tender, inflamed mass within the eye lid.

Treatment

_ Hot compress

_ Topical antibiotics

_ If the above treatment fails, referral for

. Incision and curettage under local anesthesia

B. External Hordeolum /stye/

An acute staphylococcal infect

Symptom

Pain, redness, lid margin swelling of short duration

Signs

Tender inflamed mass in the lid margin which points anteriorly through the skin

More than one lesion may be present and occasionally minute abscesses may involve the entire lid margin

In severe cases a mild preseptal cellulitis may be present

Treatment

- Warm compression
- Topical antibiotic - Chloramphenicol eye ointment.
- Systemic antibiotic – cloxacillin50mg/kgdivided in four doses for 7 days if secondary eye lid cellulitis develops.
- Epilation of the eyelash associated with the infected follicle may enhance drainage of focus.
- If the above management fails and if there is an abscess, referral for surgical drainage.

C. Chalazion

- A chronic lipogranulomatous inflammatory lesion caused by blockage of meibomian gland orifices and stagnation of sebaceous secretion
- Patient with acne roscea or seborrheic dermatitis are at increased risk of Chalazion formation which may be multiple or recurrent.

Symptom

Painless nodule within the eye lid

Sign

Non tender, firm, roundish mass within the eye lid.

Treatment

Hot compression

Referral for surgical incision and curettage

D. Molluscum contagiosum

- Uncommon skin infection caused by a poxvirus
- It is common in children and immunocompromized patient.
- In immunocompromized patient, it is multiple, large size, bilateral, recurrent and resistant to treatment.

Symptom – painless, raised, skin lesion.

Sign

Single or multiple

Pale, waxy

Umblicated nodules

If the nodule is located on the lid margin it may give rise to ipsilateral chronic follicular conjunctivitis and occasionally a superficial keratitis

Treatment

Expression

Shaving and excision

Destruction of the lesion by cauterization, cryotherapy

E.Blepharitis

a general term for inflammation of the eyelid

Can be associated with conjunctivitis

There are two main types of blepharitis

1. Staphylococcal – blepharitis

- Caused by Staph. aureus
- Is ulcerative in type with redness of lid margins with scales and easily pluck able lashes

2. Seborrheic blepharitis

Is associated with seborrhea of the scalp, brows and ears

Is non –ulcerative

- The scales are greasy with less marked redness of the lid margin

A patient may present with a mixed type of Blepharitis*(see color plate -12)*

Both types of patients could present with:-

Symptoms

- Irritation

- Burning
- Itching of the lid margins

Signs

- Scales on lid margin
- Eye lid margin ulceration and redness

Treatment

Lid hygiene

Topical antibiotics (erythromycin or Chloramphenicol eye drops QID) – for infectious

Systemic antibiotics-doxcycline50 to 100 mg/day for four weeks for infectious

Topical steroid (terracortril eye suspension once –twice a day) for seborrheic

ABNORMALITY IN THE FUNCTION AND POSITION OF THE EYELIDS

A. Ectropion

- Means eversion of eyelid.

Treatment

- Referral for surgical correction.

B.Entropion

- Means the eyelids turn in wards then the eyelashes rub and damage the globe

Treatment

- Referral for surgical correction

C. Ptosis

Ptosis means drooping of the upper eye lid due to Levator muscle weakness. It can cause ambylopia if it is unilateral

Treatment

- Referral for surgical correction

3.2 DISEASES OF THE

Signs

-Non tender mass on medial aspect of the eye

- Decompressing digitally over the mass drain mucoid or purulent discharge through the punctum.

Treatment

- Referral for surgery (dacryocystorhinostomy)

3.3 ORBITAL INFECTION

Etiology

- H. influenza, S. aureus, S. pneumonae etc.

Predisposing factor:

-trauma, stye, dacryocystitis etc.

Preseptal cellulitis

Definition: it is infection of the tissues anterior to the orbital septum

Symptom

- No visual reduction
- Mild periorbital pain
- Localized eyelid redness and swelling

Sign

- V/A is normal
- Tender and hot eyelid
- Ocular motility is normal

Treatment

- Ciprofloxacillin 500mg po bid for seven days. If no improvement within 48hrs, It needs early referral.

Orbital cellulitis

An infection of orbital tissue posterior to the orbital septum.

Symptom

-Pain

-Proptosis

-Fever

- Limited ocular movement

-Visual reduction

Sign

UNIT FOUR

DIFFERNTIAL DIAGNOSIS OF RED EYE

Objective:

1. To give an idea on the commonest causes of red eye.
2. They will also be alert on the differential diagnoses ranging from self liming to sight threatening cause of red eye.
3. They will be given a clear description on how to approach patients with red eye and what to do at their level.
4. At the end of the course, students are expected to differentiate self limiting condition from sight threatening conditions; and to act early.

THE RED EYE

The differential diagnoses of red eye are protean ranging from trivial conditions like sleeplessness and fatigue to life threatening conditions as cavernous sinus thrombosis and carotid cavernous fistula.

Clinical simple and conventional way of categorizing causes of red eye

1. **Painless red eye**
    i. Conjunctivitis
    ii. Pterygium and others
2. **Painful red eye**
    i. Keratitis and corneal ulcer
    ii. Iridocyclitis
    iii. Acute angle closure glaucoma
    iv. Episcleritis and Scleritis

PAINLESS RED EYE

Causes of painless red eye are mostly self limiting .If they are neglected and mismanaged they will complicate to the extent of sight threatening condition.

Appropriate evaluation and management is recommended. Those patients who will not have improvement in less than 48 hrs need referral to a better center for better management.

Conjunctivitis

Def. Conjunctivitis is a general term for any inflammation of the conjunctiva.

Epidemiology

The prevalence of each is different in pediatric and adult population. The vast majority of pediatric cases are bacteria, while in adult's bacterial and viral causes are equally common.

Bacterial conjunctivitis

- Commonly caused by staphylococcus aureus, streptococcus pneumonia, Hemophilic influenza, and moraxella catarrhalis
- S. aureus is common in adults
- Highly contagious from secretions or with contaminated objects and surfaces.

Symptoms:-

- Patients typically complain of redness and discharge in one eye; although it can also be bilateral.
- The affected eye often is "stuck shut" in the morning
- Purulent discharge continues through out the day.
- The discharge is thick; it may be yellow, white or green.
- No real pain as the conjunctiva has few sensory nerve supplies but complain of irritation, itching and discomfort
- Vision is almost always normal.

Sign: -

- On examination, patients will typically have purulent discharge at the lid margins and in the corners of the eye. More purulent discharge appears within minutes of wiping the lids
- Red eye – due to dilatation of superficial blood vessels as apart of inflammation

- Edema of the conjunctiva (chemosis) and eyelids swelling
- Cornea is mostly clear; but if it is involved, there will be different degree of corneal opacity it is common special in untreated and delayed patients

(see color plate14)

Diagnosis

- Mostly clinical

- Gram stains

Course

- It lasts for 1 - 2 weeks and then it usually resolves spontaneously.

Treatment

- Chloramphenicol eye drop or ointment QID

- Ciprofloxacillin eye drop QID
- If the above drugs are not available, one can use tetracycline eye ointment BID
- Evaluate the patient after 48 hrs and if no improvement, refer to ophthalmic center for better evaluation

Allergic conjunctivitis

- Is caused by air borne allergy contacting the eye.
- With specific IgE, causes local mast cell degranulation and the release of chemical mediators including histamines, eosinophil chemo tactic factors and platelets activating factors.

Symptoms

_ Red eye

_ Severe and persistent ***itching of both eyes***

_ Mucoid eye discharge

_ No visual reduction

Signs

_V/A is normal

_ papillary reaction to hypertrophy on tarsal conjunctiva

Treatment

_ Cold compress

_Vasoconstrictor-antihistamine like cromolyn sodium

_ Topical steroid -Terracortril eye suspension

Neonatal Conjunctivitis (Ophthalmia Neonatorum)

Defn

Prevention

- The eye lids should be cleaned with saline swabs as soon as the head was born and before the infant‘s eyes opened.
- Then apply TTC eye ointment
- Should be applied routinely whenever there is a risk that the mother had these infection during pregnancy.

Pterygium

- Fleshy growth of the conjunctiva that encroaches the cornea and cover cornea (Pterygium means wing)
- It usually starts nasally, but occasionally temporally in the 3 o'clock or 9 o'clock.
- More common in dry, hot and dusty environment
- Patient complains slight cosmetic blemish, irritation of the eye
- If it grows into the pupil, it will cause blurring of vision to blindness (see color plate 1)

Treatment

Protection from sun with eye glass or hat

If irritated, topical steroid-Terracotril eye suspension BID

Extensive crossing the limbus, it needs referral for surgical excision

Painful Red Eye

Those causes of painful red eye are so severe and sight threatening conditions. The diagnosis of such diseases need experienced ophthalmic worker, appropriate instruments and especial diagnostic tests and procedures. They should be evaluated by the ophthalmologist. Their visual out come highly depends on the time interval between onset of the disease and initiation of treatment and subsequent close follow up. So early referral to best center may salvage their vision.

Keratitis and corneal ulcer

The cornea is exposed to the atmosphere, and so often suffers from injury, inflammation or infection.

Common terms used in corneal disease.

- **Keratitis** -is the general word for any type of corneal inflammation.
- **Corneal ulcer**-is loss of some of corneal epithelium and inflammation in surrounding cornea.
- **Corneal scar** is white and opaque cornea, which is the final result of any serious inflammation.

Etiology - Virus, bacteria, fungi.

Symptoms

- Pain - sharp, and severe.
- Blurred vision - because the ulcer makes the corneal surface irregular and less transparent.
- Photophobia
- Red eye

Signs

- red eye -circumcorneal injection
- cornea -grayish to whitish infiltrate, hazy with loss of clarity and opacity of different degree(see color plate15)

Treatment

- Start with gentamycin or ciprofloxacillin eye drop frequently
- For proper diagnosis, it needs slit lamp examination and culture. So early referral to ophthalmic center is recommended.

Iridocyclitis

Definition: inflammation of the iris and ciliary body.

Classification:

Etiology

- Associated with systemic diseases
- Infection
- Mostly idiopathic

Duration

. Acute duration less than six weeks

. Chronic duration above six weeks

Symptoms

- Painful red eye.
- Photophobia
- Reduction of vision

Sign

- V*/*A may be reduced
- Cornea is relatively clear
- Circum corneal injection
- Miosis (s

- Periocular pain
- Nausea and vomiting, ipsilateral headache
- Rain –bow (haloes) vision around light

Signs

- V/A is decreased
- Firm to hard eyeball on digital palpation
- Circum corneal injection
- Cornea is hazy or loss of its clarity
- Anterior chamber will be shallow
- Pupil is mid dilated, sluggish and fixed
- Difficult to evaluate the fundus due to cornea edema.

Treatment

- Timolol eye drop 0.25% every 30 minutes
- Acetazolamide (Diamox) 500mg PO stat and then 250 mg po QID

With the above treatment, urgent referral to ophthalmic center

Episcleritis

Inflammation of the episclera below the conjunctiva.

-Ocular redness without irritation or pain and the redness typically persists for 24to 72 hours then resolves spontaneously

- May be localized or diffuse

Treatment

- not sight threatening
- self limiting process
- topical vasoconstricting agent may reduce redness

Scleritis

- Inflammation of the sclera.

Symptoms

- Painful disorder-typically a constant severe boring pain that worsens at night or in the early morning hours and radiates to the face and

periorbital region. Pain is severe enough to limit activity and often to prevent sleep.

- Watering, redness, and photophobia
- Highly associated with systemic disease like rheumariod arthritis,SLE,etc

Signs

-Sclera edema

-Tenderness

Treatment – Early referral for better management.

Table 4.1.Summary of differential diagnosis of the red eye

symptom	conjunctivitis	Corneal lesions, abrasion, FB, abrasion etc	Acute iritis	Acute angle closure glaucoma	Episclerits/ scleritis
pain	discomfort	Pain, photo-phobia	Pain, photophobia	Severe pain	Aching pain localized tenderness
discharge	Muco-purulent	watery	watery	Slightly watery	Slightly watery
vision	Never impaired	May be impaired	impaired	Severely impaired	normal
hyperemia	generalized	Ciliary/ localized nearest to lesion	ciliary	ciliary	Near affected area

n o r m a l

Exercise:

1. Write the clinical features and the management of bacterial conjunctivitis?
2. What are the commonest causes of neonatal conjunctivitis?
3. How can you prevent neonatal conjunctivitis?
4. What are the clinical features of a patient with iridocyclitis?
5. How are you going to manage a patient with iridocyclitis?
6. What are the commonest complaints of a patient with Keratitis of any sort?
7. What is the difference between Episcleritis and Scleritis? Discuss it.

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UNIT FIVE

COMMUNITY OPHTHALMOLOGY

Objective

1. To give a general over view

1.Cataract _ 19.34 million

2.Trachoma – 6 million

3.Glaucoma _2 million

In Ethiopia

- an estimated 1.05 million blind people with the prevalence of 1.5%
- Causes of Blindness in Ethiopia

  1.Cataract(40%)

  2.Trachoma(30%)

  3.Measles/Vitamin A deficiency(4%)

  4.Glaucoma and others(26%)

Vision 2020

WHO and International Agency for the Prevention of Blindness have launched the plan called "vision 2020 the right to sight". 20/20 represents normal visual acuity recorded by the Snellen's method and measured in feet equivalent to 6/6

Epidemiology

- Around 19.34 million people are bilaterally blind (less than 3/60 in the better eye) from age related cataract. This represents 43% of all blindness.
- The number of blind people in the world and the proportion due to cataract is increasing due to:
    - Population growth
    - Increasing longevity.

The result of these two factors means that the population aged over 60 years will double during the next 20 yrs from approximately 400 million now, to around 800 million in 2020. This increase in the elderly population will result in a greater number of the people with visual loss and blindness from cataract that will need eye services. A figure of 1000 new blind people from cataract per million populations per year is used for planning purpose in developing countries.

Risk factors

. Aging
. Trauma
. Ultraviolet exposure
. DM

Classification

Anatomically

Cortical cataract
Nuclear cataract
Posterior sub capsular cataract

Etiologically

Age related / senile/
Congenital cataract

e y e s e r v i c

00Ultravj25 T the woris 4. This represents 43%

Mature cataract is when the whole cortical lens is opaque obscuring the part of the lens, and vision worsen than 3/60.

Progress of the disease

Some patient develops mature cataract only

Exercise:

1. What are the suggested risk factors for the development of cataract?
2. What is the complication of untreated cataract?
3 Discuss about the sign and symptom of cataract.
4. Discuss about different classification of cataract.

2. TRACHOMA

Definitions

Trachoma is a chronic infectious keratoconjunctivitis caused by Chlamydia trachomatis.

It is a Greek word meaning ‘rough’ which describes the surface appearance of the conjunctiva.

Epidemiology

- Very common disease, particularly in developing countries.
- Affects about 600 million people
- About 150 million people suffer from active trachoma
- Operable trichiasis and entropion in 11 million people
- 6 million of whom have gone blind due to the disease.
- The second largest cause of blindness in the world, after cataract.
- Leading cause of preventable blindness

How does the disease develop?

Trachoma tends to be found in dry rural areas, where lack of water and bad living conditions may facilitate the spread of the disease.

In communities where trachoma is common, infection starts in early childhood. The first signs can be found in children of less than one year old.Trachmatos inflammation becomes increasingly intense in children up to the age of six to eight years. Scars on the inside of the eye lids, caused by trachoma, can be found in children from the age of four years. Scarring is increasingly common in older children, but the serious complication of inturned eye lashes and corneal scarring do not usually appear before adult age. Thus, blindness due to trachoma is most common in adults.

Trachoma in the community

The severity of trachoma can vary from one community to another because of differences in the eases of spread of infection. Repeated

infections with C. trachomatis, or other causes of conjunctivitis, increase the intensity of inflammation, which leads to more scarring and blindness.

Children are the main reservoir of Trachomatous infection, as they are commonly and heavily infected. Compared to men, women tend to have more severe trachoma, including inturned eyelashes and blindness, probably re infected by children for whom they care.

Risk factors

- Poverty
- Poor hygiene at individual, family or community level
- Lack of water supply
- Age and sex; common in children and women
- Environmental factors 4 Ds (Dust, Dry, Dirty, Discharge)

Transmission of trachoma

- Flies (Musca Serbans) eye to fly to eye
- Fomite eye to clothing to eye
- Finger eye to finger to eye

Common symptoms

-

Key measures for assessing the importance of trachoma in the community

1. The proportion of Trachomatous inflammation (TF, 20% or more with, or without TI) amongst children less than 10 years; this demonstrates how wide spread the infection is in the community
2. The proportion of intense Trachomatous inflammation (TI, 5% or more) in children less than 10 years; this demonstrates how severe the disease is in the community
3. The proportion of conjunctival scarring (TS); this demonstrates how common trachoma was in the past
4. The number of people with Trichiasis (1%or more); this indicates the immediate need to provide surgical services for lid correction
5. The proportion of people with corneal opacity (corneal blindness more than 0.1%); this demonstrates the impact of trachoma in the community in terms of visual loss.

Management of trachoma

Table 5.1 strategies for treatment of trachoma

Proportion of children (1-10) with trachoma	Basic treatment	Additional treatment
TF: 20% or more or TI: 5% or more	**Mass topical treatment**	**Selective systemic antibiotic treatment of severe cases**
TF: 5% to 20%	**Mass or individual /family topical antibiotic treatment**	**As above**
TF: less than 5%		

Mass treatment (all members of all families in the community)

Tetracycline 1% eye ointment, either twice per day for six weeks or as intermittent treatment with ointment twice a day for five consecutive days per months, or a once daily application for 10 consecutive days, each month for at least six consecutive months per year.

Family treatment

Identify and treat families where there are one or more members with TF or TI; treat the whole family in accordance with one of the topical antibiotic regimens for mass treatment, as above**.**

Selective systemic antibiotics

A. Doxycycline 100mg po/d for 21 days, don't give for children below 7 years, pregnant and lactating mother
B. Tetracycline 250 mg PO QID for 21 days, don't give children below 7 years, pregnant and lactating mother
C. Erythromycin 250mg QID for three weeks
D. Azithromycin 20 mg/kg PO single dose- don't give to pregnant lady and those less than six months of age. Maximum dose one gm and may require repeat dose after six months.

TS - No treatment

TT - surgical correction called tarsotomy

CO - may benefit from corneal transplant

Trachoma control

SAFE strategy

It stands for

Surgery – Trichiasis surgery

Antibiotics – Tetracycline ointment, Systemic tetracycline or Doxycyclin

It may be given on a community or individual basis

Face washing – regular face washing to keep the eyes and face clear of discharge, health education

Environmental change–provide adequate water supply, improve community sanitation (building and using VIP latri

3.REFRACTIVE ERROR AND STRABISMUS

INTRODUCTION

Emmetropia:

The normal refractive state of the eye. The eye acts as a convex lens and parallel rays of light are focused on the retina. Light rays coming from 6 meter or more is considered to be parallel. For this reason during distance vision testing the patient is seated 6 meters from the test chart. Most of the refraction in the eye is done by the cornea (2/3) the rest being by the lens (1/3)

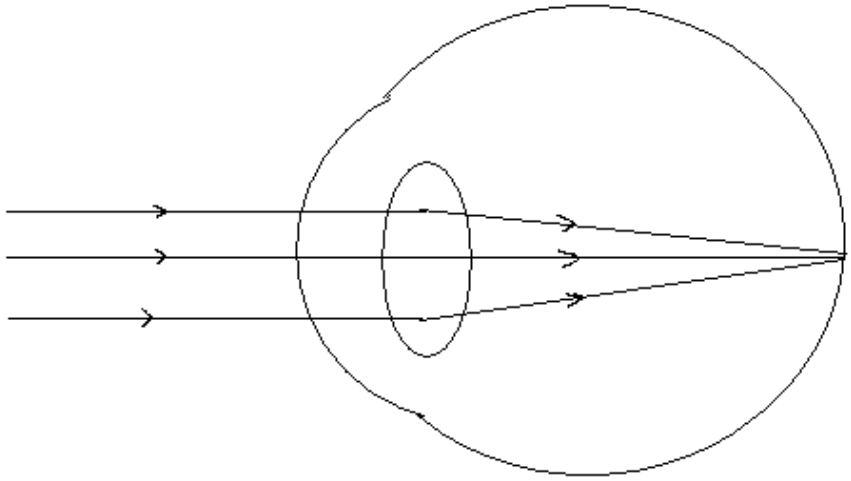

Fig 5.1. Refraction in a normal eye

Accommodation

Rays of light from an object close to the eye is divergent and will be focused behind the retina. The eye adjusts the image by:

-Contraction of ciliary muscles thereby loosens the suspensory ligaments so that the lens will be more spherical and strong.

-Decreasing the size of the pupil.

-Contraction of the medial recti.

All these muscles are innervated by Oculomotor nerve.

Refractive Errors

In states of refractive error rays of light cannot be focused on the retina and the image appears blurred.

The main types of refractive errors are

1. Myopia (short sightedness)

In myopic eye the refractive power is so high that parallel rays of light focused in front of the retina.

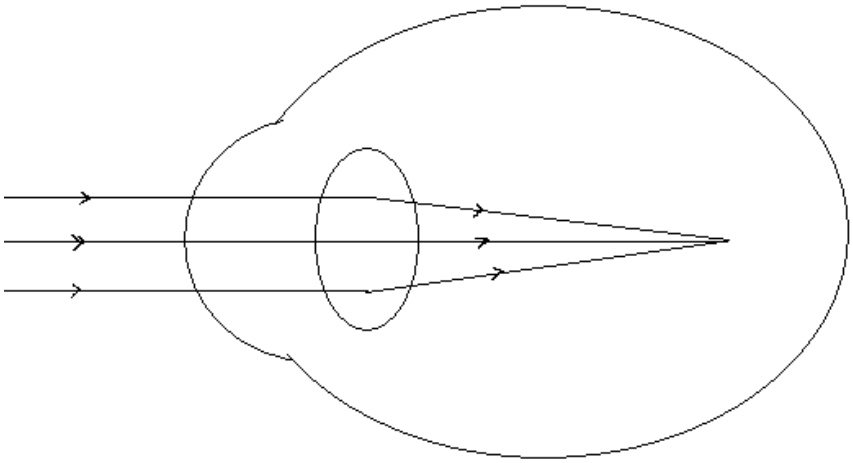

Fig 5.2.Refraction in myopic eye

Symptom

-Poor distant vision

Treatment

- Spectacle- concave or negative lens

2. Hypermetropia (long-sightedness)

In hypermetropia rays of light are focused behind the retina because the power of the optical system is too low for the length of the eye.

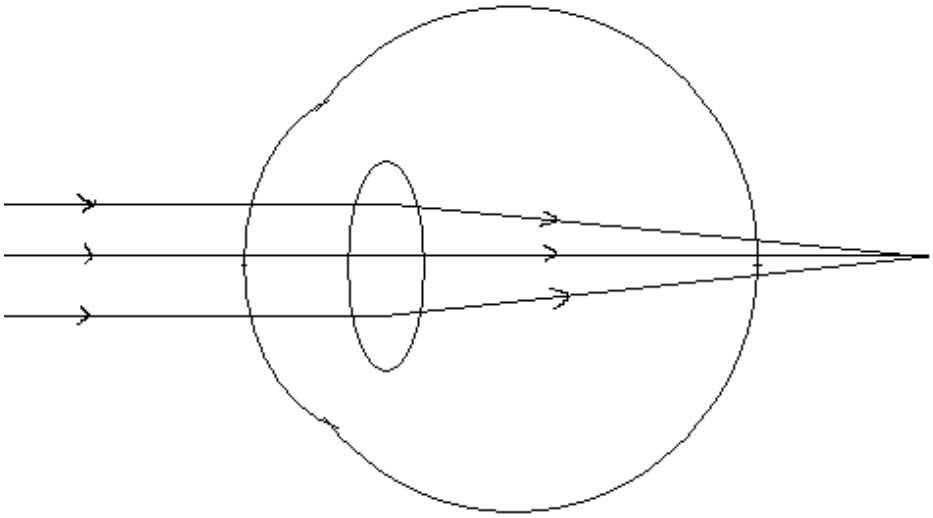

Fig 5.3. Refraction in hypermetropic eye

Symptoms

-Complain about near vision tasks

-In advanced state they will have poor distant vision

Treatment

- Convex lens or positive lens

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Symptom

-Distortion of image

-Poor vision at any distance

Treatment

-Spectacle with cylindrical lens

4. Presbyobia

This is the result of the natural aging process of the lens where it becomes harder and less elastic. Accommodation will be ineffective and the person

Treatment

Early detection and referral for

- Ambylopia treatment
- For spectacle and/or surgery

Ambylopia (lazy eye)

Definition: a reduction of vision of one or both eyes despite normal ocular finding.

Causes

-certain types of refractive error

- Strabismus

-sensory e.g. cataract, Ptosis

Treatment

- Early referral to better center

Exercise:

1. What is the difference between Presbyobia and hypermetropia?
2. Does short sight ness get better when age increase?
3. What are the components of accommodations?

4. CHILDHOOD BLINDNESS

Introduction

The current estimate suggests that there are 1.4 million children blind globally , 22.9% live in sub Saharan Africa making a total number of 320,000 blind children in that part of the world. Many of the causes of blindness in children are also a cause of child mortality(e.g. measles, Vitamin A deficiency, congenital rubella syndrome, cerebral malaria ,head injuries, tumors).This means that many children who become blind die within a few years of becoming blind. As the prevalence of blindness is a measure of those blind children who survive. It underestimates the magnitude of the problem.

4.1.Vitamin A Deficiency Disorder (VADD)

Def'n :It is change in the eye and other systems from vitamin A deficiency.

1. Dietary sources of retinol

Animal foods

-contain the active vitamin retinol

-liver is the best source which stores retinol

-milk products are also very rich in retinol

Plant foods

-are particularly important because they are the staple diet for poor people

-Contain carotene pigment which is converted into retinol

-The best source is red palm oil others carrots, mangoes, papaya

-poor sources rice, cassava, yams, and white maize which are staple diet of the poor

2. Function of vitamin A

.main function is maintenance of healthy epithelium

.formation of visual purple

3.Clinical signs and symptoms

1. XN -Night blindness

-poor dark adaptation and poor night vision (nyctalopia)

-is the earliest symptom of vitamin A deficiency

2. X1A- conjunctival xerosis

- Dryness of the conjunctiva causes to lose its normal shiny luster and look like wax or paint instead

- With treatment it is reversible

3. X1B -Bitot's spot with conjunctival xerosis(see color plate 11)

- Bitot's spot is a foamy plaque on the temporal aspect of bulbar conjunctiva

4. X2 -corneal xerosis

- Corneal surface looks rough, dull and irregular

5. X3A-corneal ulceration with xerosis

- The ulcers are bilateral and central

6. X3B-keratomalecia liquefaction of part of cornea

7. XS-Xerophthalmia scar

-Bilateral, central or lower part of cornea-It is the last and severe sign with melting of the cornea

8. XF-Xerophthalmia fundus

-A pale yellow spot appear near the course of retinal vessels and also in the retinal periphery..

Treatment Indications

All children with any active corneal ulceration.

All children with signs of Xerophthalmia

All children with measles since they are prone to develop Xerophthalmia

All severely ill or malnourished children from areas where Xerophthalmia occurs, even if there is no clinical evidence of Xerophthalmia.

Table 5.2. Recommended dose of vitamin A for age > one year or weight > 8 Kgm

	Mg	IU
Day 1	110	200,000
Day 2	110	200,000
Day 7	110	200,000

Table 5.3. recommended dose of vitamin A for age< one year or weight < 8 Kgm

	Mg	IU
Day 1	55	100,000

Exercise:

1. What are the dietary sources of vitamin A?
2. What is the function of vitamin A?
3. What are the clinical signs of Vitamin A deficiency?
4. Outline the management of vitamin A depending on the age of a patient.

4.2 Congenital cataract

Definition

Cataract noticed at birth.

Etiology

-congenital infection (TORCH)

- Trauma or anoxia at birth

- Genetic disorders

Clinical features

- whitish Pupillary reflex
- increased eye movement(nystagmus)

Treatment

- Early referral for surgical management. It is due to a fear of ambylopia.

4.3. Congenital glaucoma

Cause: mal development of trabeculum including iridocorneal junction

Symptoms

Triad of

- Epiphora
- Photophobia
- Blepharospasm

Signs

Triad of-

- Megalocornea (buphthalmos)
- Haab's striae (descemenet membrane break)
- IOP > 20mm Hg(*see color plate16*)

Treatment

Early referral for surgical management

5. GLAUCOMA

Def'n: It is commonly defined as a condition in which the intra ocular pressure is

UNIT SIX

EYE INJURIES

Objective:

1. To provide the students basic knowledge about different types of eye injuries
2. To give basic concepts on how to suspect, diagnose and act early.
3. At the end of the course the students are expected to diagnose and refer early eye injuries to the ophthalmic centre.

1. Foreign body

- Can be on the conjunctiva or cornea
- Can be metallic or non metallic
- The most common eye injury

Conjunctival foreign body

. Mostly found on the upper tarsal conjunctiva

. It is good to check for FB by everting the upper lid

. Need illumination and remove it by a cotton tip

. Irrigate with normal saline or tape water if foreign body can not be traced

Corneal foreign body

. Can be on the surface or embedded in the cornea

. Patient complains of pain and foreign body sensation

-TAT

-topical eye ointment

-patch

-refer early because it needs to be repaired in three layers and with special sutures.

Conjunctival laceration

Usually self healing but if it is large(>1cm) it needs referral for suturing with special suture.

Conjunctival hemorrhage

Bleeding beneath the conjunctiva

Causes -trauma

-Spontaneously

Treatment

Self limiting, hemorrhage will resolve approximately within two weeks

3. Chemical burn

- Irritation of the eye because of accidental entry of a chemical is a common problem among factory workers
- A various types of acids and alkali are incriminated
- Patients have marked pain with tearing, photophobia and blepharospasm. - Conjunctiva may be red and chemotic with sites of ulceration. Cornea may be edematous and hazy or opaque

Treatment

- Copious irrigation with water immediately after the incident
- Removal of particulate material from the Conjunctival sac
- Prophylactic topical antibiotics
- Cycloplegic agent to relieve pain

4. Non penetrating or blunt eye ball injuries

It can be by a thrown object or a fist

Associated finding in the eye lids would be bruise and /or hemorrhage

Complication

. Hyphema – blood in the anterior chamber

Treatment: patching, semi sitted position and early referral

. Suspensory ligament rupture leads to Sublaxation or dislocation of lens

. Delayed cataract due to concussion damage of lens cells

. Concealed eyeball rupture

5. Penetrating eye injuries

-by sharp object or fragment(*see color plate 13)*

Sign

- V/A reduced
- Hyphema
- Uveal tissue prolapsed
- Distorted pupil
- Shallow or flat anterior chamber
- Corneal tear
- Hypopyon

Treatment

-Ocular emergency

- Eye pad and/or eye shield

-systemic antibiotics ciprofloxacillin 500 mg po BID for 7 days if not available Chloramphenicol 500 mg p. o QID for 7 days.

-T.A.T

- Don't apply topical eye drops or ointment

-Urgently refer to ophthalmic center for surgical management

Complication

-Corneal scar

-Cataract

-Endophthalmitis

- is intra ocular infection

- Sympathetic ophthalmitis

-is rare but serious complication

-it affects the normal eye because of immunologic reaction

Exercise:

1. What is the clinical feature of a patient with corneal foreign body?
2. Outline the management of a patient with penetrating eye injuries.
3. What is the complication of a patient with untreated penetrating eye injuries?
4. How are you going to manage a patient who came to you having chemical injury eyes?

UNIT SEVEN

SYSTEMIC DISEASES AND THE EYE

Objective: -

1. To give the students introductory concept on systemic disease affecting the eye.
2. At the end of the course, students are expected to consider one or more ophthalmic manifestation for most of systemic disease that will range from mild self limiting to sever sight threatening condition.

Most systemic diseases have one or more ophthalmic manifestation that ranges from mild self limiting to sight threatening conditions. Under this chapter some of the commonest systemic diseases will be discussed.

A. DIABETES MELLITUS

Epidemiology

It is the leading cause of legal blindness in developed world. The situation is increasing in our country.

Risk factors

Duration of diabetic mellitus

Age of onset

Blood glucose control

Co morbid illness like pregnancy, hypertension, renal diseases smoking etc

Clinical symptoms and signs

- Normal or reduced vision
- Retinal findings include exudates, hemorrhage, new vessel formation

Management

Strict blood glucose control

Avoid risk factors

Refer to ophthalmic center for evaluation

Follow up

2-Diabetic cataract

3- Others- refractive error, cranial nerve palsy, Neovascular Glaucoma

B. HYPERTENSION

Definition: an acute or chronic elevation of systemic blood pressure leading to characteristic ophthamoscopic alteration over the fundus and other systemic complications.

Hypertensive retinopathy

It will have retinal vascular change with arterial thickening, leakage and hemorrhage over the fundus.

Symptoms

Normal or reduced vision

Nausea

Headache

Vomiting

Signs

Normal or reduced V/A

Elevated blood pressure

Vascular thickening, exudates, hemorrhages ,papilledema etc on the retina

Management

Control of blood pressure

Refer to ophthalmic center for better evaluation

C.HIV/ AIDS AND THE EYE

HIV/AIDS is a disease caused by the human immune deficiency virus/HIV/. Patients will have recurrent opportunistic infections or of unusual tumors in association with a dysfunctional cellular system. HIV has been demonstrated in tears, conjunctival epithelial cells, corneal epithelial cells, aqueous, retinal vascular endothelium, and retina.

Ophthalmic manifestation is classified as

1. Microvasculopathy
2. Tumor e.g. Kaposi's sarcoma, Squamous cell carcinoma
3. Neuro-ophthalmopathy e.g. cranial nerve palsy, optic atrophy
4. Opportunistic infection e.g. herpes zoster ophthalmicus, herpes simplex infection, toxoplasmosis etc

Over 70% of AIDS cases have some form of ophthalmic manifestation.

Some of the commonest diseases will be discussed.

1. Ophthalmic herpes zoster

- is caused by varicella zoster
- eye is affected through ophthalmic branch of trigeminal nerve.
- Unilateral
- Common in immunocompromized patient
- 90% are sero positive for HIV infection and most are young

Symptoms

- prodromal symptoms of URTI

- the rash appears 2-3 days after the pain, the rash is not different in sero positive and sero negatives but recurrent in sero positives

Signs – in chronological order

1. Maculopapular rash in the forehead
2. Development of vesicles, pustules and crusting ulceration
3. In severe cases – periorbital edema due to secondary bacterial cellulitis*.(see color plate18)*

It can also cause Keratitis,Uveitis,Keratouveitis,cataract,vitritis etc

Treatment

analgesics

– Aspirin 600mg Q4hr.

- Paracetamol 1gm Q4hr

Gentian voilet– 0.5% to clean the wound

Topical antibiotics to the eye

Antiviral

- *Systemic*
- Should be given within72 hrs after rash because the drug needs active viral replication
- Acyclovir 800mg 5x/day/for 7days

- Refer to ophthalmic center for further evaluation.

2. **Molluscum contagiosum**

- In immunocompromized patient, it is multiple, large size, bilateral, recurrent and resistant to treatment.

Symptom – painless, raised, skin lesion.

Sign

single or multiple

Pale, waxy

umblicated nodules

If the nodule is located on the lid margin it may give rise to ipsilateral chronic follicular conjunctivitis and occasionally a superficial keratitis

Treatment

Expression

shaving and excision

destruction of the lesion by cauterization, cryotherapy

3. Squamous Cell Carcinoma

- a malignant neoplasm of keratinizing cells of the epidermis.
- high chance to metastasize

Symptoms and signs

- Painless plaque or nodule with variable degree of scale, crust and ulceration

Treatment

- Referral for surgical excision and biopsy

4. Kaposi's Sarcoma

a malignant vascular tumor that develops on the skin, mucous

Causes : CMV or other infections

Diagnosis

-serology (ELISA)for HIV

- Clinical

Treatment

-Treatment of opportunistic infection accordingly

-Antiretroviral drugs

-Health education about the syndrome

D. OTHERS

Collagen/vascular disease

Rheumatiod arthritis

Systemic Lupus erythroyosis

Infectious

Tuberculosis

Syphilis

Leprosy etc

Exercise:

1. What are the ophthalmic manifestations of HIV?
2. What are ophthalmic manifestations of diabetes mellitus?

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APPENDIX

I-Eye Preparations

Drugs are prepared in the form of drops, ointment or suspensions. These forms are more effective for the front of the eye, the conjunctiva, cornea, anterior chamber and iris.

Drops are the most convenient and common way of giving topical treatment to the eye. If high levels of the drug need to be maintained, the drops must be applied frequently.

Ointments stay longer in contact with the eye, and are more often used at night. They generally blur vision and are messy than drops.

Side effects of steroids

1. Cataract
2. Glaucoma
3. Corneal thinning
4. Predispose to infection by reducing local immunity

Contra indication of steroids

1. Infection of the eye
2. Corneal ulcer
3. Glaucoma

II-Primary eye care training material

A. Equipment and supplies

- Snellen's E- chart
-Reading chart
- Occluder
- Pinhole
- Torch
-2.5X magnifying loupe
-Scissors
- Tonometer
- Syringe and needle
-dressing, gauze rolls, cotton roll, eye pads and bandage
-ophthalmoscope

B. Drugs

- Tetracycline eye ointment
- Chloramphenicol eye drop or ointment
- Gentamycin
- Diamox, Timolol, dexamethasone
- Local anesthesia- tetracaine 1%

III. How to apply eye medication

- explain to the patient what is to be done
- read the instruction on the eye drop/ointment carefully and sit the patient with the head tilted back.
- ask the patient to keep both eyes open, lookup and hold his/her head back
- Gently pull down the lower eyelid so that you can see the conjunctiva
- squeeze out a small amount of ointment or drop and release one drop of the drop in to one third of the lower conjunctiva.
- If one is to use both drops and ointment one has to apply drops first to be followed by ointment.
- don't allow the tip of the ointment or drop container to touch the eyelid or the eye in order to avoid contamination
- order the patient to close the eyes for about a minute or two to allow drug absorption.
- clean up the excess drop or ointment on the lid with a cotton/ gauze swab
- recap the bottle or tube with out contaminating

IV. Making and Applying an Eye Pad

- Cut the cotton and gauze rolls
- Place layers of gauze on the working bench or table
- Place a thick cotton layer on top of the gauze
- Further place another layer of gauze on top of the cotton
- This makes a three layered patch: gauze-cotton wool-gauze
- Cut the patch in to smaller patches and trim it with scissor to make it oval.

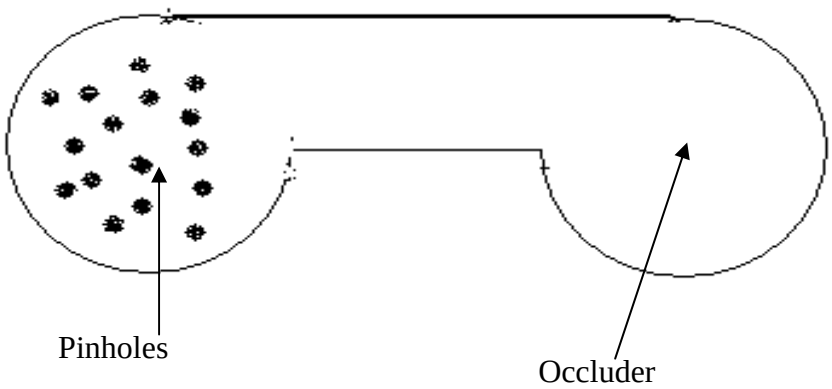
- Ask the patient to close the eye lid
- Apply the patch or pad over the closed eye with adhesive plaster obliquely

V. Making and Applying a Protective shield

- Trace the edge of a drinking cup or gally pot on card board or x-ray film
- Cut a circle of thin card from the card board or used x- ray film from the traced and make a cut to the center of the circle or tip of the fold using one of the radius.
- Make it in to a cone
- Tape or glue together the outside and inside edges
- Tape over the patient's injured eye
- Make sure that the shield rests on the eyebrow and cheekbone; it should not rest on the eyeball.

VI. Making an E card and occluder

- trace the occluder and the E card on the thick cardboard provided
- cut the outlined edges of the cardboard
- paste the two edges of the cut cardboard together and staple or glue together
- with the aid of a pin make multiple pin holes on one side of the occluder
- try using the occluder and the E card



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C.P.1.Pterygium

C.P.2.Corneal foreign body indicated by the arrow

C.P.3. Mature cataract

C.P.4.Mild trachoma with follicle and papilla

C.P.5. severe active trachoma with follicle and papilla

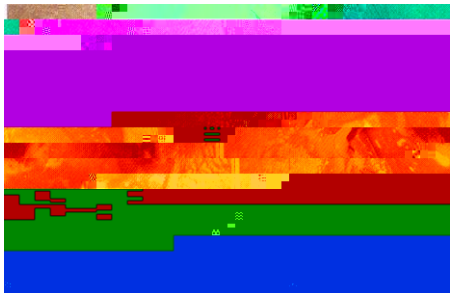
C.P.6.Moderate active trachoma with follicle and papilla

C.P.7.big papilla and follicles

C.P.12. blepharitis

C.P.8. Conjunctival scar in the upper tarsal coniunctiva

C.P.13. Penetrating eye injuries with scleral laceration

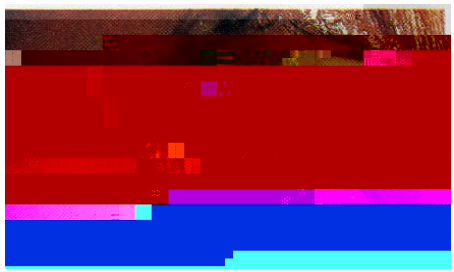


C.P.9. Corneal vascularization and scar

C.P.14 .Bacterial conjunctivitis

C.P.10. Acute iridocyclitis

C.P.15. keratitis



C.P.11.Bitot’s spots with conjunctival xerosis