Ocular leprosy

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Learning Objectives: Learning Objectives: At the end of the session trainees will be able to

- Enlist common lesions of ocular tissue in leprosy
- Describe the precautions one must take as medical officer to preserve vision in a person affected with leprosy

Training Methodology: Lecture Discussion using power point presentation, demonstration and hand on practice for examination of eye.
9.1 Introduction:

Eye is the most important organ to be affected in the disease process. Eyes are affected by direct invasion of bacilli or during lepra reaction. Most eye complications may lead to visual impairment and blindness. Early detection and appropriate treatment of ocular lesions is essential to prevent blindness. During early stages person with ocular lesions may remain asymptomatic. Hence, routine examination of eye is important for detection ocular lesions.

Preservation of Vision is very important in Persons affected with Leprosy

9.2 Causes of ocular involvement in leprosy

Ocular manifestations of leprosy are due to:

- **Direct invasion of ocular tissue:** Infiltration of ocular tissue by M. Leprae is followed, at a much later stage by inflammatory reaction and may lead to conjunctivitis, episcleritis, scleritis, keratitis, Iritis &/or Iridocyclitis. It is common in persons with MB leprosy.

- **Involvement of nerves:** Involvement of trigeminal and facial nerves leads to loss of sensation of cornea & weakness of muscles of eyelid (orbicularis oculi) respectively, predisposing eye to exposure keratitis, repeated injury, secondary infection and other lesions. It is more common among PB leprosy having patch on the face with or without Type I reaction (Unilateral) and MB leprosy of long duration (Bilateral).

Persons with high risk of ocular lesions:
- Skin lesion on face – PB leprosy with or without Type I Reaction
- In untreated MB Leprosy of long duration it is usually bilateral.
- Present or past Type 2 reaction
- Present or past ocular pathology
- Present or past Type 1 reaction and lagophthalmos

9.3 Causes of blindness in leprosy:

- **Three major causes of blindness due to leprosy are:**
  - Corneal opacity due to exposure of cornea associated with lagophthalmos and diminished corneal sensation. Lid abnormalities like entropion and ectropion may also affect cornea.
  - Iridocyclitis and its sequelae especially in persons with multi-bacillary leprosy.
  - Cataract as a complication of disease process. It also occurs due to complication of uveal and corneal disease.
9.4 History & Examination of eye

Involvement of eye must be detected in the early stages to prevent impairment of vision and blindness

9.4.1 History for ocular lesions:

While taking history; ask for:
- Any problem in the eye, pain in the eye & blurring of vision
- Duration of the problem & its progress
- Photophobia – Does light makes eye painful (iridocyclitis)/ uncomfortable
- Blurring of vision: Does blurring clears on blinking the eye (due to discharge/ stickiness of eye)
- Past H/O Red eye and any treatment taken for it
- H/o any surgery in the past for eye problem

Note: While taking history; observe for frequency of blinking of the eye.
☞ Count the no. of Blinks per minute – each eye separately without the knowledge of the patient.

9.4.2 Examination of eye: Look for the following conditions during examinaiton

9.4.3 Lesions due to involvement of ocular tissue

Changes can be seen in almost all the parts of the eye. Some changes are seen only through Slit-lamp bio microscope.

Changes that are of importance and can be detected by simple physical examination of eye are described below:

(i) Eyebrows:
- **Thinning of eyebrows** (lateral half)/ complete loss of eyebrows (Superciliary madarosis) due to deep infiltration.

(ii) Eyelids:
- **Thickening of eyelids** occurs due diffuse infiltration of skin and eyelid structures following invasion by M. leprae & results in loss of elasticity of the skin and heavy **drooping of upper eyelid**
- **Entropion**: In-turning of eyelid margins
- **Ectropion**: Out –turning of Eyelid margin
- **Macule/nodule** on the eyelids
- **Weakness of eyelid movement**
- **Thin floppy upper eyelid** occurring due to atrophy of the tarsal plate & pre-tarsal muscles rendering eyelid less effective in spreading the tears and cleaning of cornea
(iii) Eye lashes:

- **Scanty, small & thin/ loss of eye lashes** due to atrophy of the tissue supporting hair follicles (ciliary madarosis)

- **Trichiasis** - **In turning of** eye lashes rubbing against bulbar conjunctiva & Cornea. Person with insensitive cornea may ignore the situation and may get **corneal abrasions and ulcers**. Persons must be instructed specifically to look for trichiasis. Corneal ulcer may heal leaving **corneal opacities**.

(iv) Meibomian glands:

- **Dryness of eye** occurs due infiltration and atrophy of meibomian glands resulting in poor quality of tears.

(v) Naso lacrimal Apparatus:

- **Dacyrocystitis**: Blockage of naso-lacrimal duct may occur due to bacillary infiltration in the nasal mucosa. Nasal ulceration/ scarring or nasal collapse causes stagnation of the secretions & acute, sub-acute or chronic infection of the lacrimal sac. Pus can be expressed from lacrimal punctum by pressing the fundus of the lacrimal sac between eye & nose, at the medial canthus of the eye. In case of chronic dacyrocystitis redness &/or swelling and tenderness over lacrimal sac (between eye and nose) can be noticed.

(vi) Sclera:

- **Episcleritis**: Benign inflammation of the Tenon’s capsule overlying Sclera is called Episcleritis. Hard, dirty yellow nodule, most commonly on upper outer quadrant is seen with or without any symptom. Sometimes, nodules may become inflamed causing epiphora (overflowing of tears), pain and general ocular discomfort. It is a superficial lesion and rarely has long-term complications.

- **Scleritis**: Inflammation of the sclera. Scleritis in Leprosy is found in Multibacillary cases and is associated with iridocyclitis. Eye is painful and tender. Initially, a deep red, tender, scleral patch may be seen. Repeated episodes of scleritis results in scleral thinning and pigmented tissues of the Uveal tract are seen bulging through sclera and is called Anterior staphyloma, which may even perforate. Person may complain of severe deep circum-orbital pain radiating back to temple.

Ask the patient to look down: Palpate above the upper tarsal plate through the closed eye lids to elicit tenderness in the Red eye.
(vii) **Conjunctiva:**

- **Lepromatous nodule** (ENL) may appear on conjunctiva.

(vii) **Cornea:** Cornea is directly affected by the bacilli in multibacillary leprosy. Common corneal lesions are:

- **Superficial punctate keratitis:** Few punctate greyish superficial spots (miliary leproma – aggregation of leprosy bacilli) like grains of chalk are seen on the cornea especially upper part of the cornea. It is associated with pannus formation (Superficial vascularisation) starting from superior portion of cornea and spreading all around the cornea (Differential Diagnosis- In trachoma, pannus is in the upper part of cornea) Person may complain of mild irritation in the eye and watering.

- **Interstitial keratitis:** A grayish patch is seen extending from limbus towards the center of the cornea. Sometimes, cornea becomes thickened due to excessive infiltration. Vision is severely affected and may lead to blindness.

(viii) **Iris:**

- **Iritis:** Inflammation of iris is more frequent and serious condition. Inflammation may also affect the ciliary body resulting in iridocyclitis. **Iritis may be Acute / Chronic.** Particles resembling chalk particles are seen on the iris, near pupillary margin in early stages called “Iris Pearls”

- **Acute iridocyclitis:** It is part of ENL reaction (type 2 lepra reaction). Person has photophobia, increased lacrimation, pericorneal redness and blurring of vision. Pupil is small, either sluggishly reactive or non reactive to light. If left untreated may rapidly lead to loss of vision.

- **Chronic iritis:** It is a slow degenerative process. In early stages a small round, dull yellow nodule/s around 0.5 to 1.0 mm in diameter (iris pearls) are seen on the surface of the iris. Chronic iritis may lead to atrophy of the iris that presents with dull coloured iris along with pinpoint, non-reactive, irregular pupil due to formation of posterior synaechiae. Person may complain of dull pain in the eye. Person may become blind due to combination of small pupil and mild corneal changes or cataract in the visual axis. Such patients must be referred to ophthalmologist.
### Red Eye - Differential Diagnosis

<table>
<thead>
<tr>
<th>Sign/symptom</th>
<th>Iridocyclitis</th>
<th>Conjunctivitis</th>
<th>Corneal Ulcer</th>
<th>Acute Glaucoma</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of redness</td>
<td>Dull red</td>
<td>Bright red</td>
<td>Dull red</td>
<td>Dull red</td>
</tr>
<tr>
<td>Location of redness</td>
<td>Peri-corneal redness</td>
<td>Redness more widely spread</td>
<td>Peri-corneal redness</td>
<td>Widely spread</td>
</tr>
<tr>
<td>Secretions</td>
<td>No secretions</td>
<td>Secretions present</td>
<td>Watering</td>
<td>Watering</td>
</tr>
<tr>
<td>Pain</td>
<td>Present</td>
<td>Absent(only discomfort, no pain)</td>
<td>Present</td>
<td>Present</td>
</tr>
<tr>
<td>Photophobia (Inability to open eye in light)</td>
<td>Present</td>
<td>Absent</td>
<td>Present</td>
<td>Present</td>
</tr>
<tr>
<td>Anterior Chamber</td>
<td>Normal/ Slightly shallow;</td>
<td>Normal</td>
<td>Normal</td>
<td>Very shallow</td>
</tr>
<tr>
<td>Pupil</td>
<td>Pin point</td>
<td>Normal in size</td>
<td>Normal</td>
<td>Dilated</td>
</tr>
<tr>
<td>Shape of pupil</td>
<td>Irregular</td>
<td>Round &amp; Regular</td>
<td>Round &amp; Regular</td>
<td>Vertically oval &amp; Regular</td>
</tr>
<tr>
<td>Reaction to light</td>
<td>Non reactive</td>
<td>Reactive</td>
<td>Reactive</td>
<td>Non-reactive</td>
</tr>
<tr>
<td>Iris</td>
<td>Dull coloured</td>
<td>Normal</td>
<td>Normal</td>
<td>Dull</td>
</tr>
<tr>
<td>Intraocular pressure</td>
<td>May be high</td>
<td>Normal</td>
<td>Normal</td>
<td>Very high</td>
</tr>
</tbody>
</table>

If Red eye is present:

- Examine the eye, if diagnosed as conjunctivitis, treat it
- Refer all other cases immediately to the eye specialist as any neglect can lead to impaired vision and blindness.

**PAINFUL RED EYE IS AN EMERGENCY**

(ix) Lens:

- **Opacity of lens** (Cataract) occurs due to intraocular invasion by bacilli or is made worse by iridocyclitis &/or use of local &/ or systemic steroids. Development of cataract is more common in persons suffering from multi-bacillary leprosy with evidence of chronic uveitis. Cataract may occur due to any other cause or because of normal ageing process. Person affected with leprosy can undergo cataract surgery with lens implant like any other normal person.
Intra-ocular pressure may rise in patients treated with cortisone (leprosy reactions) and as sequelae to repeated iridocyclitis. Topical cortisone administered as eye drops is more dangerous than systemic cortisone.

Digital tonometry: Intraocular pressure can be estimated by digital tonometry. For this, ask the patient to look down, Elicit fluctuation of the globe by placing two index fingers on the lid skin above the tarsal plate of the upper lid; Compare with the other eye.

9.4.5 Ocular lesions due to involvement of nerves

Most important nerves to be affected are trigeminal nerve and facial nerve

(i) Paresis of Trigeminal Nerve

Reduced sensation / loss of corneal sensation: (neuropathic keratitis):

Sensory part of the trigeminal nerve supplies the cornea and part of the facial skin. Damage to the small branches of trigeminal nerve innervating cornea, causes loss of sensation of cornea and affects blinking of the eye. Blinking protects eyes from dryness by spreading tears. It also protects eye from external injuries and wash away dust or dirt and keep the eyes clean.

Testing of corneal sensation is avoided in field conditions. Hence, observation for blinking rate of the eye is done. Irregular/ infrequent / absent blinking indicates involvement of trigeminal nerve. (Normal blinking rate is 16-20 blinks per minute)

(ii) Paresis / Paralysis of facial nerve

- Lagophthalmos/ sagging of lower eyelid (Ectropion):
  Lower eyelid ectropion: The involvement of Zygomatic and temporal branch of facial nerve causes weakness of orbicularis oculi muscles resulting in incomplete closure of the eye. Lower eyelid is affected first and shows greater degree of
paralysis. Involvement of marginal fibres of Orbicularis Oculi results in sagging of the eyelid with exposure of the lower palpebral conjunctiva and falling away of the eyelid from the eyeball (Ectropion). This leads to over flowing of tears (epiphora) because punctum and lower canalliculi are not in apposition to the eyeball.

**Lagophthalmos** may be partial or complete, unilateral/ bilateral. In mild cases, weakness of the muscle results in widening of the palpebral fissure with out any other disability. In more severe cases, palpebral fissure is widened and on making an attempt to close the eye, there may be little or no movement of the eyelid but eyeball moves up (Bell’s phenomenon). If muscles of the face are not paralysed, eye can be closed using facial muscles exercises. A gap of 1.0 mm or less between the two eyelids is considered normal.

**Note:** Paresis of strong peripheral preorbital part of the orbicularis oculi muscle is not common and this can be used in deliberate closure of eye by force in the presence of lack of protective blink and serious deficiencies in closure of the eye.

**Test the strength of muscles of the eyelid.**
- Make patient comfortable on stool
- Stand by the side of the person
- Raise chin and ask the patient to close the eyes and keep them lightly closed as if in sleep.
- Look for the gap between the two eyelids. It is considered normal if there is no gap or gap of less than 1mm is present. In leprosy this gap is due to sagging of lower eyelid in the early stages. (DD Bell’s palsy)
- To assess early weakness of orbicularis oculi muscle, ask the person to close the eye tightly and try to pull the lower lid down to see whether the patient is able to keep his eyes closed against resistance

If gap between the two eyelids is more than 1mm; see whether person is able to close the eye completely using peripheral part of orbicular oculi muscle (that may remain unaffected) & other facial muscles.

If facial muscles are not weak / paralysed, person is able to close the eye by pushing cheek muscles upwards. Train person to close the eye using facial muscles.

Grade the muscle power as ‘S’, ‘W’ or ‘P’
### Grading muscle power of eye:

<table>
<thead>
<tr>
<th>Condition</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>A gap visible between the upper and lower eyelids (more than 1mm)</td>
<td>‘P’</td>
</tr>
<tr>
<td>Able to keep his eye closed against resistance</td>
<td>‘S’</td>
</tr>
<tr>
<td>Not able to keep the eye closed against resistance</td>
<td>‘W’</td>
</tr>
</tbody>
</table>

Other muscles of the face may also be affected in the late stages of involvement of the nerve and can be recognized by:

- Flat asymmetrical face
- Loss of naso-labial fold and/or all other creases
- Diversion of angle of mouth towards healthy side on smiling or showing teeth
- Inability to raise eye brow on the affected side and absence of wrinkling of the forehead on the affected side

### 9.4.6 Consequences of nerve paralysis

(i) **Conjunctiva:**

- **Conjunctivitis:** Continuous exposure of conjunctiva to dust and heat due to incomplete closure of eye, may lead to chronic inflammation of the conjunctiva

(ii) **Cornea:**

- **Exposure Keratitis:** Absence of blinking and lagophthalmos predisposes eye to injuries, foreign bodies, insect bite & constant exposure of cornea to heat, dust and wind.
- **Corneal ulcer:** Constant exposure of cornea leads to its dryness, abrasion of corneal epithelial and also predisposes it to injury by foreign body, followed by secondary bacterial invasion and corneal ulceration. Cornea looses hard polished surface resulting in blurring of vision. Cornea may also get damaged by trichiasis, get infected and may heal with scarring.
- **Corneal Opacity:** Corneal ulcer may heal by scarring which interferes with vision if central in location, or progresses to perforation leading eventually to blindness

(iii) **Impairment of vision:** Vision may be impaired due to consequences of involvement of the nerve/s like exposure keratitis, corneal ulcer &/ opacity or due to involvement of the ocular tissue by the disease such as iritis, iridocyclitis and cataract.

Check the Visual Acuity of each eye separately, using an E chart / Snellen chart; if chart is not available, ask the person to count fingers at 6 meters.
Testing Visual Acuity:

- To test the vision, ask person to stand 6 meters away and cover one eye.
- Ask the person to read the chart or hold up your hand and ask the person to count the number of fingers shown by you.
- Repeat the procedure with the other eye in the same way.
- If the person cannot read the top line of the chart, or count fingers at 6 meters, they are visually impaired and have grade 2 disability in that eye.
- This can be due to complication of leprosy.
- Refer the person to (eye specialist)

Check for following conditions of eye on every visit:

- Recent impairment / recent deterioration of vision
- Infrequent blinking/ loss of blinking (insensitive cornea)
- Lagophthalmos / increased weakness of muscles gap >1mm
- Examine for sagging of lower eyelid and Dacryocystitis
- Trichiasis &/ or entropion
- Red / painful eye- iritis/ iridocyclitis & complications.
  
  Examine iris: Colour of iris, presence of nodule
  Examine pupil: Shape and reaction to light.
- Corneal opacity/irregular corneal reflex (corneal ulcer
- Cataract

9.4.7 Grading of Disability (WHO): Disability is graded as 0, 1 & 2

Grade 0: No disability found
Grade 1: Eye is not given grade 1.
Grade 2: Visible damage or disability like red eye, corneal ulcer or uveitis in eye
9.5 Management of ocular lesions in leprosy

9.5.1 Basic principles for management of ocular lesions

- Check for conditions that may lead to impairment of vision and refer them immediately. (especially red painful eye, infrequent blinking, Lagophthalmos)
- Start MDT, if not taken previously in the presence of ocular lesions due to leprosy. MOST INFILTRATIVE LESIONS IN THE EYE RESPOND WELL TO MDT.
- Look whether eyelashes are touching the eyeball. patient may / may not feel the foreign body, epilate the eye lashes as a temporary measure and then refer at the earliest to Eye surgeon
- Give follow up treatment as advised by the referral centre to persons referred back.
- Self care: Train person in self care after acute phase is over.

9.5.2 Management of Episcleritis / Scleritis:
- Systemic and topical corticosteroids
- Most cases respond well to MDT with topical steroids.
- Clofazimine may be considered in severe/ recurrent Scleritis
- Refer to ophthalmologist

9.5.3 Management of Acute Dacroyocystitis
- Oral & local antibiotics
- Refer to Eye surgeon for further management

9.5.4 Management of conjunctivitis
- Frequent washing with clean water (boiled and then cooled)
- Local antibiotics
- Rest to the eye
- Refer if does not improve in 48 hours

9.5.5 Management of corneal lesions
- Treatment for hypo/anaesthetic cornea: (Often it occurs in combination with lagophthalmos, sometimes without lagophthalmos)
  - Protect eye by sunglasses, hat or cap during the day and by eye shield at night
  - Practice ‘think - blink’ (Refer self care)
  - Self-examination for redness of the eye in mirror.
  - Seek treatment if eye becomes red
Treatment for corneal lesions (corneal abrasion/ulcer)
- Start systemic and local antibiotic drops/ointment
- Protect the eye with goggles
- Refer the person to a specialized eye care centre

9.5.6 Management of Iritis/iridocyclitis:

Acute Iritis/iridocyclitis
- Can start Tab. Diamox 250 mg four times a day orally to reduce ocular tension if intraocular pressure is found high
- Repeated episodes of Iridocyclitis (cases with ENL reaction) benefit from high doses of Clofazimine (100 mg TID, reduce gradually)
- Cover the eye with a shield and refer immediately to an ophthalmologist

Chronic Iritis/iridocyclitis:
- Local antibiotics
- Systemic steroids as prescribed by a specialist
- Check intraocular pressure periodically
- Continue treatment until no inflammatory cells are visible in aqueous humour or for three months after all the signs and symptoms subside

9.5.7 Prevention & treatment of lagophthalmos

Reversal Reaction (RR)/lagophthalmos occurs particularly when skin patches surround the eye or lie over the course of the facial nerve:
- Course of Prednisolone, as for type 1 reaction and all precautions as mentioned in chapter on lepra reactions.
- MDT if not treated for leprosy in the past
- Protect eyes using (sun)glasses during the day
- Cover eyes with an eye shield at night

Recent Lagophthalmos of ≤6 months duration: same as above. Refer the person to a higher centre.

Established mild lagophthalmos (>6 months duration, lid gap of ≤6 mm on mild closure; no signs of exposure keratitis): Advise self-care (Refer section 9.6)
- Protect eyes using (sun)glasses during the day
- Cover with eye shield at night.
- Blinking exercises (20 times a day, every time 3-5 times) to strengthen the orbicularis oculi muscle. ‘think-blink’ habit to moisten the cornea.
- Artificial tears if felt feasible
Established severe lagophthalmos (> 6 months duration, large lid gap of > 6 mm in mild closure), or signs of exposure keratitis:

- Referral to ophthalmologist / surgeon for eyelid surgery
- Antibiotic eye ointment in case of exposure keratitis (opacity lower cornea, together with redness & pain)

“Corneal ulcer is an emergency. Do not use corticosteroids. Refer immediately”
“atropine causes photophobia; use of goggles help reduce photophobia”

9.5.8 Management of cataract

- Person affected with Leprosy can safely undergo “Cataract Surgery” with intraocular lens implantation. Patient should be referred to Secondary eye care centre / District Hospital for the same.
- Regular post operative follow up as advised should be followed strictly.

9.6 Self - Care of eye:

Protective mechanism of eye is affected in persons affected with Leprosy who is unable to blink/ close the eyes completely due to damage to the 5th & 7th cranial nerve predisposing it to dryness and injury. Direct involvement of the ocular tissue may also occur due to the disease.

9.6.1 Principles of eye care:

- Protection of eyes from dryness, sun light and dust
- Detection of signs of irritation and injury in early stages
- Detection of signs of involvement of ocular tissue in early stages

9.6.2 Protect eyes from dryness, sun, dust and injury:

People protect their eyes from dryness, dust, insects and external injury by blinking during the day and closing their eyes during sleep. Persons with insensitive cornea cannot blink and those with Lagophthalmos cannot close their eyes and are taught to protect their eyes by:

Keeping the eyes moist and clean: Teach person to wash eyes frequently with clean water/instill oil drops (boiled and cooled)/ sterile liquid paraffin to keep the eyes moistened

Think- Blink: Person affected with leprosy who cannot blink automatically must develop a habit to blink voluntarily i.e think- blink for which they are taught to remember to blink and make an effort to close their eyes forcefully. To remember to blink, person is asked to develop a habit to blink every time they pass a tree/ house/ person/ while eating every
time they swallow the food or when ever they see another person blinking. Even if person affected with leprosy is unable to close the eyes completely, teach them to close eye forcefully, because on closing eyes, eyeball rolls up and get wiped by the upper eyelid. People with normal facial muscles are taught to push their cheeks up/ use other facial muscles to close their eyes.

**Eye shield: person is taught to:**
Protect eyes from dryness, dirt, insects, by using sunglasses with side pieces/ hat with broad rim to shield the eyes during the day.

If face muscles are weak and gap between the lids is present even on forced closure of eyes, person needs passive exercise to keep the eyes healthy and prevent the deformity from worsening. The person is taught to place their fingers at the outer corner of the eye and gently pull outwards and upwards until the eye closes and count till 10. Person must repeat the procedure throughout the day.

- Person is also asked not to rub the eye on irritation and practice the same exercise.
- At night, Eye shield is used to keep the eyes closed
  (Ready made plastic eye shields are available in the market)

### 9.6.3 Early detection of signs of irritation, injury and involvement of ocular tissue

**Tell person to:**
- Inspect eyes daily to detect any redness of the eye /corneal injury/dust/ eyelashes touching the bulbar conjunctiva or cornea / foreign body / any other injury to the eye

**Teach person**
- To inspect the eyes, with clean hands (Wash hands with clean water before touching the eyes).
- Use a mirror / take help of a friend or relative to look for any redness
- Remove any spec of dirt with a piece of clean and soft cloth, gently
- Epilate the eye lash touching cornea and report to eye specialist immediately
- To develop a habit to observe a few selected objects placed at a distance daily, for early detection of any deterioration in the vision.
Report to the health centre if notice any of the following

- Itching, redness, watering
- Unexplained pain in the eye
- Difficulty in keeping eyes open in the sunlight and
- Any deterioration in vision

Criteria for Referral for eye involvement:

- Lagophthalmos with large lid gaps (> 6 mm and/or exposure keratitis).
- Acute red eyes
- Trichiasis, Ectropion, Entropion
- Poor Visual Acuity (VA < 6/60) or recent deterioration in vision.
- Cataract