5. Diagnosis of leprosy

Structure:

5.1 Introduction
5.2 Suspecting Leprosy
5.3 Cardinal signs for confirmation of leprosy
5.4 Clinical Assessment of leprosy affected person
5.5 Eliciting detailed History
5.6 Examination of skin
  5.6.1 Clinical Examination of person with Skin Lesions
  5.6.2 Precautions for examination of skin lesion
  5.6.3 Eliciting sensory loss in skin patches
5.7 Examination of Nerves
  5.7.1 Clinical Presentation in nerve involvement
  5.7.2 Examination of nerves of the face
  5.7.3 Examination of nerves of limbs
  5.7.4 Examination of individual nerve
  5.7.5 Signs of new nerve damage / worsening of already affected nerve
5.8 Examination of Eyes
5.9 Grading of disability
5.10 Recording of findings
5.11 Examination of skin smears
5.12 Diagnosis of Leprosy in difficult cases
5.13 Diagnosis of Relapse
5.14 At confirmation of diagnosis of Leprosy

Objectives:

❖ Identify leprosy-affected person
❖ Describe cardinal signs for diagnosis of leprosy
❖ Test sensory deficit in the skin patch
❖ Palpate nerve
❖ Assess nerve function impairment in the early stages of involvement of the nerve
Teaching method – lecture discussion and Case demonstration, re-demonstration & discussion, group exercises. Trainees are grouped into 4-5 groups, a case is allotted to each group, and trainer observes / facilitates the clinical assessment & its recording.

Case Studies:

Case One: Manoj Kumar 18 year old, a motor mechanic reported to medical officer with weakness in right hand with bent little finger noticed since last two months and pain in the right elbow. On examination medical officer found thick & tender right ulnar nerve, sensory impairment on ulnar side of right hand and clawing of little finger. Apart from these signs, there were two big hypo pigmented patches with four satellite lesions on right arm. On asking again Manoj told that, patches were noticed one and half year ago but no treatment was taken for it. Discuss the diagnosis

Case Two: Mr. Kailash Singh 50 year old agriculture labour reported slipping of his chappal / footwear from right foot, while walking since last ten days, his old record indicated that, seven years ago he had taken MB-MDT for 24 months regularly for the treatment of multiple patches. Discuss the diagnosis.

Write the management of case at this stage

Case Three: Mr. Karupaiyan, aged 38 years, is working as a cook in a hotel He developed nodules allover the body and pain in both the elbow. For which he took treatment from a General Practitioner locally without much improvement. One day his friend came to visit him and found it surprising when noticed that Karupaiyan could hold many moderately hot vessels without any insulator. Karupaiyan told him that it because of the practice of holding hot things but friend did not agree and asked him to consult doctor. Discuss the management of the case.
5.1 Introduction

As already mentioned a leprosy affected person may not come with leprosy related complaint due to various reasons:

- Leprosy related Skin lesions do not hurt due to loss of sensation
- Lack of awareness about the disease and curability of the disease
- May not know that treatment is available at the health centre
- May not know that treatment is available free of cost
- Not able to afford traveling cost
- Hides the disease for the fear of stigma.

Health supervisor, health worker, Angan wari worker, ASHA, community member may refer the person, likely to have leprosy (suspected persons) or persons may come to health centre for some other problem or may report on their own for treatment. Hence, whenever you come across a person having signs and symptoms related to leprosy or its complication talk to the person, examine person to confirm the diagnosis.

You are responsible for confirmation of diagnosis, complete assessment of the affected person and starting treatment after registration of the leprosy affected person.

What is a case of leprosy?

**A person with clinical signs of leprosy and requires treatment for leprosy**

5.2 Suspecting Leprosy

If, any of the following is present, suspect leprosy

- Pale or reddish patch on the skin
- Shiny thick skin of face
- Loss of sensation in the skin patch
- Numbness or tingling of hands or feet
- Weakness of hands, eyelids and feet
- Painful and tender/palpable nerves
- Swelling/nodules in the face and earlobes
- Painless wounds or burns on the hands and feet
- Visible deformities of hands feet & eyes (claw hands and feet)

And confirm the diagnosis by eliciting at least one of the three cardinal signs.
5.3 Cardinal signs for confirmation of Leprosy

Diagnosis of leprosy is confirmed by eliciting at least one of the cardinal signs of leprosy through systematic clinical / bacteriological (whenever required) examination.

The three cardinal (very important) signs for confirmation of diagnosis of leprosy are:

Cardinal Signs

- Hypo-pigmented or reddish skin lesion(s) with definite sensory deficit
- Involvement of the peripheral nerves: Demonstrated by definite thickening of the nerve with/ without loss of sensation and/or weakness of the muscles of the hands, feet or eyes supplied.
- Demonstration of M leprae in the lesions

Diagnosis of leprosy is easy and it is usually diagnosed and classified by clinical examination. The first two cardinal signs can be elicited by clinical examination alone while the third can be identified by examination of the slit skin smear.

Skin smear is examined to demonstrate presence of M. leprae, only to confirm diagnosis of leprosy, in “difficult to diagnose” cases.

Bacteriological Examination

- Usually skin smear taken from the margin of the skin lesion is examined
- Majority of leprosy affected persons can be diagnosed without bacteriological examination
- Bacteriological examination is not mandatory to start treatment of leprosy (as per guidelines of GOI)
- If required, facility for bacteriological examination (skin smear examination) is available at District Hospitals, Referral centre of NGOs, research institutions
5.4 Assessment of Leprosy affected person

Assessing Leprosy Affected Person

- Elicit detailed history
- Examine skin for presence of skin lesions
- Test presence of sensation in the skin patch.
- Palpate nerves for thickening/ tenderness/ fibrosis
- Test sensation in the palms of the hand and the soles of the foot
- Observe for presence of any deformity
- Test for early signs of muscle weakness
- Check power of weak muscles
- Grade the disability and record the EHF score
- Record the findings
- Decide whether skin smear is needed

5.5 Eliciting detailed History

Leprosy affected person may present with any of the following complaints related to affected part of the body.

- Skin lesion lighter than the surrounding skin /Reddish patch with raised border, examine for presence of sensation.
- Shiny, thickened, dry to touch, slightly reddish skin without loss of sensation usually over frontal and maxillary sinuses (Lion faces ) needs confirmation by skin smear
- Nodules / lumps on the skin or earlobes
- Loss of eye brows /eyelashes
- Pain / tenderness at the elbow (Ulnar nerve), at wrist (Radial cutaneous nerve/ Median nerve) at back of Knee (Common peroneal nerve) at ankle (posterior tibial nerve)
- Chronic blockage of nose due to Infiltration and crust formation
- Things tend to fall/ slip out of the hand
- Things feel different while holding in the hand
- Hands or feet feel weak, slimmer with shiny skin , loss of hair
- Loss of sweating in an area
- Inability to retain chappal (foot wear without back strap)
- Big toe coming in way while walking
- Painless wounds or burns on hands and feet/repeated painless wounds/ulcers
- Recent Impairment of vision
- Red painful eye
- Recent / worsening of existing Lagophthalmos (Inability to close eye)
- Trichiasis
- Epiphora
- Epistaxis
- Blockage or crusting of nose
- Hoarseness of voice

**Case History:** Detailed history of the presenting complaint must be elicited (Refer pathogenesis - individual sections on skin, nerve and eyes for details)

**Also ask for:**

- **Presence of any deformity:** If present, time of its onset, and nature of its progress.

- **Treatment history:** Type of treatment taken, name of the drugs taken (show blister packs), duration of treatment taken, place from where the treatment was taken, whether treatment was completed as advised by the treating physician, reason for discontinuing the treatment or coming to this centre.

- **Any other associated illness:** Anaemia (needs treatment of anaemia along with MDT) jaundice (start MDT after jaundice subsides) cough (if patient is taking treatment for tuberculosis; continue Rifampicine in the doses recommended under RNTCP), swelling of the feet at present or in the recent past (Investigate). In case reaction is suspected exclude contraindications for prednisolone (refer lepra reaction)

- **History of allergy:** for sulpha drugs (avoid Dapsone)

- **Family History:** Any other person in the family or close contacts having similar disease or had the disease and was treated for it.

**Suspecting leprosy?**

Ask direct questions related to conditions mentioned above
5.6 Examination of the Skin

Remember cardinal sign:
Hypo-pigmented or reddish skin lesion(s)
with
Definite sensory deficit

Skin lesion(s) is common and may be the only presentation of the disease. Skin lesions in leprosy can appear anywhere and can be:

- One, few / many
- Any size (Small/ large)
- Macular (flat), Papular (raised related to surrounding skin) / nodular/ infiltrative
- Hypo- pigmented (lighter in colour compared to surrounding skin) patch/ Erythematous / reddish or copper coloured
- Well defined / ill-defined margins
- Have reduced / loss of sensation for heat, touch & pain
- Shiny, thickened, dry to touch, slightly reddish skin usually over face

Examine the whole skin and always test the lesion of the skin for presence of sensation

Remember Cardinal Sign
Sensory deficit in a skin lesion is diagnostic of leprosy

Note: In a person with suspected pale patches but normal sensation look for other cardinal signs

- Consider possibility of another disease, wait for 2-3 months and review the skin lesions again or for other cardinal signs
- Refer to a more experienced person and for skin smear examination.
5.1.1 Clinical examination of person with skin lesions

For history related to skin lesions:
Ask for:

**Duration:** Since when is it present? A patch of a few days or one present since birth is not leprosy.

**Progress of skin lesions:** How did it start? Has it changed? Skin lesion/s of sudden onset, are unlikely to be leprosy (except reactions). Leprosy patches usually appear slowly.

**Characteristics of skin lesions:** Leprosy patches do not itch and are usually not painful.

**Sweating:** Area of the skin lesion usually does not sweat.

**History of recurrence** - A recurrent lesion which “comes and goes” is not leprosy

---

**Ask leading questions**

Exclude leprosy if following features are present:

- White (de-pigmented), dark red or black in colour
- Scaly lesion
- Present since birth
- Seasonal or appears and disappears suddenly
- Hurts (discomfort may be felt in lepra reaction)/ itches
- Presence of sweating

---

5.6.2 Precautions for examination of skin lesion

- Examine patient under good light (preferably natural light)
- Provide privacy to the patient
- Examine the whole skin from head to toe as much as possible.
- Always use the same order of examination, so that you do not forget to examine any part of the body.
- Ensure presence of an assistant of the same sex as that of the patient to assist you. Especially, if the patient is of the opposite sex.
Note the following:

The following features must be noted when examining a patch on the skin:

**Site:** Noting the site of skin lesion is useful for follow-up, to ensure appearance of fresh lesions later. Note the site of all the lesions on the patient card

**Number:** This is useful for grouping and follow-up. 1-5 lesions means PB, six or more lesions indicates MB type of leprosy

**Colour:** May be hypo-pigmented (lighter in colour than the rest of the skin), or erythematous (red). Lesions of leprosy are never de-pigmented. Erythematous colour can be used to identify disease activity or a reactional state. Active lesions or those in reaction are often red.

**Appearance:** leprosy skin lesions are not scaly, except during the regression phase of type I reaction

**Hairs on the lesion:** may be normal, scanty, small frail or absent

**Sensory deficit:** This is useful for diagnosis. Loss of sensation (over skin lesion or area of nerve distribution or glove & stocking area) is one of the cardinal sign for diagnosis of leprosy.

**Tenderness on gentle tapping:** Tenderness on tapping skin lesion is seen in reactional states.

**Presence of infiltration:** This term refers to skin that is thickened, shiny and erythematous. All three features must be present in the same area. Diffuse infiltration may be the only early presenting sign in severe forms of leprosy. Papule / nodule may develop when infiltration is coarse.

**Presence of Nodules:** Tender nodules may be present during Type II reactions. These are not subcutaneous and skin can not be moved over it.

**Inflammation of skin lesion:** Presence of slight erythema is usually seen in active skin lesions. Swelling, redness, slight discomfort of skin patch is present in type I reaction

Think of lepra reaction if,

- Presence of signs of Inflammation in the Skin Lesion
- Presence of tender nodules
5.6.3 Eliciting sensory loss in skin patches

It is very important to pick up the skill of eliciting sensory loss in skin patch.

- A ball point pen is needed to examine the sensory deficit.
- Make patient comfortable (sitting / lying)
- Explain to the person what you are going to do and demonstrate it with open eyes on normal skin.
- Touch the skin with the pen (pen being perpendicular to the skin) lightly, teach the individual to point to the touched spot with his index finger/ or count on each touch felt by the patient/ say yes on each touch while testing the lesions over inaccessible areas i.e. unapproachable areas of back, buttocks).
- Repeat this procedure a few times until the patient is familiar and comfortable with the procedure.
- Now ask the patient to close his eyes and repeat the procedure over the area to be tested (first on the normal skin then over the affected area).
- Repeat test on insensitive area again.
- Keep varying the pace of touch

Remember: (Precautions to be taken while testing the skin sensation)

- Do not use other “instruments” like pin, cotton wool, feather, etc.
- When testing for sensation, touch the skin lightly with the pen. Do not stroke.
- The pen should be perpendicular to the surface of the skin.
- Do not keep asking the patient whether he feels the touch. Otherwise, you may get misleading results.
- Proceed from the normal skin to the patch.
- Give only one stimulus at a time.
- Vary the pace of testing

**Interpretation of test for loss of sensation:**

- Loss of sensation if no response
- Reduced sensation if person touches >3cm away from the touched point
- Normal sensation if localized within 3cm
Note:

- Leprosy patch may **not** be insensitive on the face because of the overlapping nerve supply of the skin of the face.
- Areas of thick skin which are normal may **not** feel touch. (Soles, elbows).
- It may be difficult to obtain Cooperation in **Children**. Ask the child to sit or run in the sun and examine for sweating and look for loss of sweating in the patch.

- If there is no loss of sensation in the skin patch do not start treatment for leprosy; refer person to higher centre for confirmation of diagnosis
- Loss of sensation in a skin patch is diagnostic of leprosy
- Do not label a person as suffering from leprosy unless diagnosis is confirmed because disease carries stigma

---

All Patches /lesions on skin may not be leprosy
Most of the skin diseases do not have sensory deficit

If in doubt – exclude other conditions

---

**Ethical responsibility in diagnosing leprosy**

If you suspect leprosy but can not confirm the diagnosis,

- Inform the person about common signs and symptoms of the disease. Try to extract history of contact
- Try to extract history or presence of other associated features
- Refer the person to specialist for diagnosis and skin smear examination
- If possible you may also ask person to report back after 3 months for reassessment.
5.7 Examination of the Nerves

Usually peripheral nerves are involved and get thickened with or without loss of sensation in the area supplied by the affected nerve & weakness/paralysis of muscles supplied by the nerve.

Examination of nerves in all the patients is essential for:

- Diagnosis
- Classification/grouping
- Follow-up
- Interventions for prevention of deformity.

5.7.1 Clinical Presentation of nerve involvement

Suspect involvement of nerve in leprosy if leprosy affected person, presents with following complaints or answers in affirmation regarding the following:

- Pain / tenderness at the elbow (Ulnar nerve), at wrist (Radial cutaneous nerve/ Median nerve) at back of Knee (Common peroneal nerve) at ankle (posterior tibial nerve)
- Presence of unusual sensation in hands and feet like tingling, numbness, burning that may be the presenting symptoms of nerve involvement
- Weakness of grip. Things tend to fall/ slip out of the hand
- Things feel different while held in the hand
- Hands or feet feel weak, slimmer with shiny skin, loss of hair
- Painless/ repeated wounds or burns on hands and feet
- Inability to retain chappal (footwear without back strap) in the foot
- Foot interferes/ gets turned while walking
- Person walking with high stepping gait to clear foot from the ground in foot drop.
- Inability to run or jump

If patient does not complain, ask the following leading questions to find the involvement of the nerve

- Do you think skin has become drier in a particular area?
- Do you feel loss of sensation or abnormal sensation in hands and/or feet?
- Do you think that the hands or feet have become weaker?
- Do you have problems with holding, manipulating or lifting things or any other activity?
- Do you have problem in moving their hands and feet?
Remember the cardinal signs
Involvement of the peripheral nerves (hands, feet or eyes):
Demonstrated by

- Definite thickening
- Loss of sensation in area supplied by the nerve
- Weakness/paralysis of the corresponding muscles

If answer to the above questions is yes, ask:
- Time of onset of the mentioned problem
- Nature of its progress

Presence of Disability or Deformity
Confirms involvement of the nerves

Nerves are examined to assess:
- Extent of involvement of nerve
- Extent of disability suffered by the person

At the time of first visit to health center, there may be:
- No nerve involvement
- **Thickening** of the nerve trunk with out any symptom /sign
- Presence of **acute neuritis** in one or more nerves
- **Chronic neuritis** (pain and tenderness has subsided but damage to the nerve is gradually increasing)
- **Complete nerve destruction** (complete paralysis for more than one year)
- **Damaged nerve** healed with fibrosis

On examination nerve may be:
- Normal
- Thickened
- Tender
- Thin & Fibroed
The most commonly affected peripheral nerves in leprosy are Ulnar nerve, Lateral popliteal nerve and Posterior tibial nerve. Other peripheral nerves that may be affected are Median, Radial, Facial and Trigeminal nerve.

- **Definite nerve enlargement with loss of sensation or muscle weakness is diagnostic of Leprosy**
- **If nerve on one side is thicker than the same nerve on the other side, it is sure that person has thickened nerve**

Two aspects are examined during nerve examination

- **Palpation of the nerves**: for thickening, tenderness and consistency
- **Assessment of nerve function**: Sensory, Motor and Autonomic function

---

**Palpate the nerve**: look for:

- Thickness
- Tenderness
- Consistency

Assess nerve function for:

- **Autonomic function**: Presence of sweating, hairs, dry brittle skin, cracks
- **Sensory deficit**: in the area supplied by the nerve called as Sensory Test (ST).
- **Power of muscles**: supplied by the nerve is tested assessing the strength of movement of the Voluntary Muscles and is known as voluntary Muscle Test (VMT)

---

**To assess the nerve function in leprosy affected person**

Examine:

- Face esp for eyes,
- Upper limb
- Lower limb
5.7.2. Examination of nerves of the face

Commonly affected nerves in the face are Trigeminal nerve and Facial nerve. Besides these thickening of Greater auricular nerve and supraorbital nerve can also be noted (Refer Examination of face & eyes below).

5.7.3 Examination of nerves of the limbs

**Examination of Hands and Feet:**

- **Observation:** *Autonomic function of the nerve, deformities and Secondary impairment*
- **Palpation:** *For nerve thickening*
- **Sensory testing:** *For sensory loss of specific nerves*
- **Voluntary Muscle Testing:** *For motor weakness/ paralysis for specific muscles*
- **Range of movement of joints:** *Contractures and fixed deformities*

**Observation:** Observe for

**Autonomic function of the nerve, deformities and secondary impairment:**

Absence of sweating, dry shiny skin, brittle/ absent hair, muscle wasting, deformities like claw fingers/thumb/toes, drop wrist, drop foot and secondary impairments like cracks, callosities, blisters, ulcers, contracture in hands/feet.

- For absence of sweating, feel palms/ soles of the person with back of your hand to determine whether skin is moist and cool / dry and warmer. Temperature of non-sweating skin is close to the temperature of the surroundings.
- Presence of atrophy of the thenar eminence (median nerve weakness)
- Presence of atrophy of hypothenar eminence (ulnar nerve)
- Claw hand with atrophy of the interossei
- Claw little and ring finger for (ulnar nerve)
- Clawing of lateral 3 ½ fingers (median nerve)
- Drop wrist (radial nerve)
- Claw toes (Posterior Tibial nerve)
- Drop foot (common peroneal nerve)
**Palpation of the nerve:** Nerves are palpated to detect thickening and tenderness of the nerve. (refer - examination of individual nerve)

**Procedure for palpation of a nerve:** Peripheral nerves are also palpable in healthy persons. Hence, look for thickening (compare the thickness of nerves of the two sides), tenderness and consistency of the nerve.

The patient should be properly positioned. The examiners must position themselves correctly.
- Locate the nerve correctly
- Look at the patient’s face while palpating the nerve to elicit tenderness.
- Always palpate across the course of the nerve.
- Feel along the nerve as far as possible in both directions.
- Palpate gently with the pulp of the finger, not the tip of the finger.
- Nerves on the two sides must be compared to detect any abnormality
- Besides nerve truck examination, examine area around / proximal to area of loss of sensation/ around skin lesion for thickening of cutaneous nerves.

**Assessment of sensory function**

Test the sensory loss in the area supplied by the affected nerve. To detect the sensory loss, sensation is tested at six points in the hand as well as in the foot. Reduced or Loss of sensation at any of the point needs testing of the sensation at more points to identify the extent of loss of sensory loss.

**Procedure of assessing the sensory function of the nerve:**
- Conduct the test in a quite place so that person can concentrate
- Ask the person to place the hand with palm upwards on the table or on their knee and keep the hand still
- Tell and demonstrate the person what is going to be done.
- Ask the person close the eyes.
- Touch six places on the palm of the hand with a ballpoint pen keeping the pen upright
- Do not Press the pen on the skin, weight of the pen is adequate (test touch) press gently to make a small depression to test light pressure– but do not press too hard.
- Ask the person to point to the place you have touched.
- Test both hands.
Note whether the person feels anything in each of the places where you have touched with ball point.

If person does not feel the touch at any of the point, test the sensation at more points to identify the extent of loss of sensory loss.

Feet:
- Make the person comfortable on a stool
- Ask the person to keep one leg on the knee of the other the leg / Support the person’s foot with your hand
- Test sensation on the sole of both the feet at five places in the same manner as described in hand

Assess motor function: Motor function of the nerve is tested, by assessing the voluntary function of the muscles supplied by the nerve (VMT)

Assessment of the motor function:
- Check the range of movement performed by the muscle to see whether person is able to move the joint through full range of movement or not.
- If movement is normal, test the strength of movement of the muscle by applying pressure gently in the opposite direction of the movement and gradually increase the pressure while asking the person to maintain the position. Judge whether resistance applied by the person is normal, reduced or absent. Compare the strength of the two sides. Grading of muscle strength is done as follows (for assessment of motor function of individual nerve - refer examination of individual nerve).

<table>
<thead>
<tr>
<th>Medical Research Council (MRC) Scale</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full range of motion; full resistance</td>
<td>5</td>
</tr>
<tr>
<td>Full range of motion; some resistance</td>
<td>4</td>
</tr>
<tr>
<td>Full range of motion; no resistance</td>
<td>3</td>
</tr>
<tr>
<td>Range of motion decreased</td>
<td>2</td>
</tr>
<tr>
<td>Muscle flicker</td>
<td>1</td>
</tr>
<tr>
<td>Complete paralysis</td>
<td>0</td>
</tr>
</tbody>
</table>
Medical Research Council (MRC) Scale may be used to assess the deterioration in the strength of the muscles.

Mild weakness of muscles of the in early stages of involvement can be assessed rapidly by performing certain test (refer examinant of individual nerve)

**Range of Movement of joints:** If the range of voluntary movement is reduces or absent or muscle is weak/ paralysed, perform passive movement of all the adjacent joints to assess stiffness of the joints and development of contractures of weak / paralysed muscle.

**5.7.4 Examination of individual nerve**

**Trigeminal nerve:** look for blinking of the eyes. Corneal sensitivity is not tested under field conditions.

**Supra orbital nerve:** It is a branch of Trigeminal nerve. It may become visibly thickened and can be palpated by passing the finger along the upper border of the orbit.

**Greater Auricular Nerve:** Greater auricular nerve is visually enlarged.

- Site: visible on the side of the neck, below the ear, crossing the upper third of the muscle, lying parallel to the external Jugular vein.
- To palpate the nerve on right side, ask the person to turn head to opposite side (left side) so as to tighten the sterno-mastoid muscle.
- Nerve is seen crossing the upper third of the muscle lying parallel to the external Jugular vein,
- Gently palpate the structure with pulp of two fingers to make sure that it is nerve and not vein (can feel fluid inside vein)

**Facial nerve:** look for lagophthalmos:

**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.

Ask the person to close the eye tightly and try to pull the lower lid down and see whether the patient is able to keep his eyes closed against resistance to assess early orbicularis muscle weakness.

If gap between the two eyelids is more than 1mm; see whether person is able to close the eye completely using 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’

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

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Nerve</th>
<th>Site of palpation</th>
<th>Site of Pain/tenderness</th>
<th>Sensation</th>
<th>Disability/deformity (look for)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Supra-orbital nerve (br of trigeminal nerve)</td>
<td>Upper margin of the orbital cavity</td>
<td>Headache</td>
<td>Forehead, upper eyelid</td>
<td>--</td>
</tr>
<tr>
<td>2.</td>
<td>Trigeminal nerve (Sensory nerve)</td>
<td>-----</td>
<td>Face/forehead and head</td>
<td>Scalp up to vertex, forehead, upper eyelid, conjunctiva, Cornea, root, dorsum &amp; tip of nose.</td>
<td>Infrequent blinking/loss of blinking</td>
</tr>
<tr>
<td>3.</td>
<td>Greater Auricular nerve</td>
<td>In the neck</td>
<td>In the neck</td>
<td>Skin over angle of the lower jaw and parotid gland, lower 1/3rd of lateral surface of auricle (Pinna)</td>
<td>--</td>
</tr>
<tr>
<td>4.</td>
<td>Facial nerve</td>
<td>----</td>
<td>-----</td>
<td>Pure motor nerve</td>
<td>⦿ Loss of nasolabial crease</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>⦿ Lagophthalmos</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>⦿ Facial palsy</td>
</tr>
</tbody>
</table>

Nerves of upper limb affected in leprosy:
Nerves affected in the upper limb are ulnar, Median and radial nerves.

Ulnar nerve: Ulnar nerve in leprosy is affected at the elbow and can be palpated in the olecranon groove, just above and behind medial epicondyl of the elbow

Complaint: Person complaints of clumsiness in use of hand, bent little finger, little finger coming in the way / not cooperating, while working.

Muscle wasting: Flattening of medial side of the palm & hypo-thenar eminence and bulge of muscle in the back of hand between thumb and index finger.
Site of nerve palpation: In the groove above and behind medial epicondyl of the elbow.

Position of patient: Both the patient and examiner facing each other.

- To examine right ulnar nerve, ask the patient to flex the elbow joint slightly. Hold the right wrist with your left hand.
- Using right hand, feel for the medial epicondyl.
- Pass behind the elbow and feel the ulnar nerve in the groove.
- Gently palpate with pulp of 2 fingers (index & middle) and feel across the nerve, constantly watching facial expression for signs of tenderness.
- Trace the nerve proximally as far as to possible to ascertain the length of the swelling.

Deformity: Clawing of little and ring finger (hyperextension at metacarpophalangeal joint and flexion at proximal and distal interphalangeal joint.

Sensory testing: Test the sensation at six points as shown in the fig if loss of sensation is suspected, test the sensation more extensively.

Rapid clinical test to know weakness of the muscles:

Test the ability to hold a sheet of paper firmly between the ring and little finger. Hold the thumb, index and middle fingers as shown. Ask the person to hold a card between ring finger and little finger. Pull the card very gently while person tries to hold it in between the fingers. If person is unable to hold the card, means motor weakness of ulnar nerve.

Test to detect early muscle weakness:

- Ask the person to keep the all the fingers straight and together. In ulnar nerve weakness little finger cannot be kept straight and together with other finger. It stays a little apart from the rest of the fingers and may also get bent or clawed.
- Ask the person to bend all the fingers at the base (at metacarpophalangeal joint). Fingers being perpendicular to the palm and ask the person to keep them in that position (straight and together) for 30 seconds. Little finger will bend in early ulnar nerve paralysis.

If nerve weakness is present, test the functioning of ulnar nerve by Little finger out test and grade the muscle weakness.

VMT for ulnar nerve: Little finger out test:

- Test abduction of the little finger.
- Ask the patient to put out the hand with palm facing upwards and support the hand in your hand or keep it on table
- Ask the person to move the little finger sideways/out i.e away from the other fingers in the same plane as palm.
Push the little finger towards the hand by applying force at the base of little finger while the patient tries to hold it in the test position.

Grade the muscle power as ‘S’, ‘W’ or ‘P’ as described above

If the patient cannot move the little finger at all means complete paralysis of ulnar nerve.

**Median Nerve:**

**Complaint:** Person feels weakness of grip, difficulty in holding and manipulating objects, difficulty in pinching or picking or holding small objects.

**Muscle wasting:** flattening of thenar eminence.

**Site of palpation:** proximal to the wrist, deep to Palmaris longus tendon when joint is semi flexed.

**Palpation of the nerve:** Both the patient and examiner facing each other.

- To examine right median nerve, support the right hand in your left hand
- Using the pulp of index and middle finger of the right hand feel for the palmaris longus tendon in the middle of the wrist.

Gently palpate the nerve lateral to the tendon while flexing the wrist slowly

**Deformity:** Clawing of thumb. Thumb bent backwards at the wrist and forwards in the middle and at the tip see fig

**Sensory test:** Lateral 3 ½ fingers

**Rapid clinical test to know weakness of the muscles:**

- Ability to hold a **sheet of paper** firmly on the palm by thumb or between index and middle finger (Refer ulnar nerve).

**Test for early muscle weakness:** Ask person to hold the thumb abducted that is perpendicular to the palm and tip of the thumb pointing upwards and not forwards for 30 seconds. Inability to do so indicates early stages of involvement of median nerve.

If nerve weakness is present, test the functioning of median nerve by **thumb up test** and grade the nerve disability

**VMT for Median Nerve:** **thumb up test** (see Fig.24)

- Abduction of thumb is tested
- Ask the patient to put out the hand with palm facing upwards, support the hand with your hand,
- Ask the patient to hold his thumb at right angle to the palm (abduct thumb).
- Apply pressure at the base of thumb to push the thumb towards index finger, by the side of the palm while the patient tries to hold it in the test position.
Grade the muscle power as ‘S’, ‘W’, or ‘P’ as described above. If the patient is unable to resist and you can move the thumb down easily muscle is weak, but if patient cannot point the thumb upwards at all, paralysis of muscle is present.

**Radial nerve:** Radial nerve trunk supplies the muscle in the back of the forearm that extends the wrist fingers and thumbs

**Complaint:** Person is unable to use the hand or extend the wrist, fingers & thumb.

**Site:** Thickened nerve can be seen occasionally at the back of the hand

**Area of sensory loss:** skin on the back of the hand.

**Muscle Wasting:** Muscles at the back of the forearm are atrophied.

**Deformity:** Wrist drop (in ability to extend the hand at wrist)

**Motor loss:** Inability to extend the hand at wrist and extend all the fingers and thumb.

**Test for early muscle weakness:**

Ask person to stretch both arms straight in the front and hold wrist and fingers up as much as possible. Keep it in this position for 30 seconds. During early stages, person will not be able to hold hands in this position.

**VMT of Redial Nerve**

- Test dorsi-flexion of hand at wrist.
- Ask the patient to put out the hand with palm facing down
- Support the hand by holding forearm.
- Ask the patient to make a fist and then dorsi-flex the wrist.
- Press the hand downwards as shown in the diagram while the patient tries to hold it in the test position.

Grade the muscle power as ‘S’, ‘W’, or ‘P’ as described above
Table: Commonly affected nerves of upper limb

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Nerve</th>
<th>Site of palpation</th>
<th>Site of Pain/tenderness</th>
<th>Sensation</th>
<th>Disability/deformity (look for)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Ulnar nerve</td>
<td>Just above the elbow just behind the medial epicondyl</td>
<td>Elbow</td>
<td>Little finger, medial ½ of ring finger &amp; corresponding medial portion of hand</td>
<td>Claw deformity of little and ring finger</td>
</tr>
<tr>
<td>2.</td>
<td>Radial nerve</td>
<td>At the wrist</td>
<td>Wrist</td>
<td>Dorsum of hand</td>
<td>Wrist drop</td>
</tr>
<tr>
<td>3.</td>
<td>Median Nerve</td>
<td>At the wrist</td>
<td>Wrist</td>
<td>Lateral 3 ½ fingers &amp; corresponding lateral portion of hand</td>
<td>Claw deformity of thumb, index finger and middle finger, Inability to abduct thumb.</td>
</tr>
</tbody>
</table>

Nerves of the lower limb:
Most commonly affected nerves in the lower limb are:
- lateral popliteal nerve, branch of common peroneal nerve
- posterior tibial nerve, branch of tibial nerve

Common peroneal nerve:

Complaint: During early stages person may complain that big toe gets in way while walking due to weakness of big toe and may find running difficult.

Ask patient walk a few steps and observe. Patient lifts the affected foot high to clear it from the ground (high stepping gait)

Common peroneal nerve and its branch lateral popliteal nerve get affected at the knee. It can be palpated at the back of the knee as it winds around the head of fibula.

Lateral popliteal nerve branch of common peroneal nerve:

Site of palpation: back of the knee, behind the head of fibula.
Position of patient: Patient standing with knees slightly flexed (not total) and examiner squatting.

- Identify the head of fibula on the lateral aspect of knee in line with lower end of patella.
- Pass backwards and feel the nerve just behind the fibular head.
- Gently palpate with pulp of 2 fingers (index & middle) and feel across the nerve, constantly watching facial expression for signs of tenderness. The palpable course of the nerve is very short.

Sensory testing: Area in the anterior-lateral aspect of the leg and dorsum of the foot.

Motor loss: Person is unable to dorsi-flex the foot at ankle joint. Person may not notice any disability until nerve is grossly paralyzed.

Muscle wasting: flattening of the muscle bulge in the upper part of the front of the leg and tibia becomes prominent

Deformity: foot drop at the ankle joint.

Test for early muscle weakness:

- Ask patient to walk 3-4 steps on heel of the foot. Holding the front of the foot up is not possible if muscles are weak.
- Ask the person to put the foot firmly on the ground and lift all the toes keeping them straight and without lifting the foot and hold them in this position for 30 seconds normally tendons of the muscle stand out when toes are lifted. Person with involvement of lateral popliteal nerve is unable to lift the toes and tendons will not stand out.

If nerve weakness is present, test the functioning of common peroneal nerve by testing the dorsiflexion of foot (foot-up test) at ankle

VMT for lateral Popliteal Nerve - Foot up test: (see Fig.)

Position of the patient: Ask the person to lift the foot off the ground and support at calf region or make the person sit on the stool so that the legs are hanging.

- Ask the patient to dorsi-flex his foot fully.
- Push the foot downwards while the patient tries to hold it in the test position.
- Grade the muscle power as S’, ‘W’, or ‘P’ as described above

If you can push the foot down easily, there is muscle weakness. If the patient cannot lift the foot at all, there is paralysis.
**Posterior tibial nerve:**

Posterior tibial nerve is branch of the common tibial nerve

**Complaint:** Person does not experience any noticeable disability in the early stages. As the nerve supplies the small muscles of the foot, uniform distribution of body weight on the foot is disturbed due to disorganization of the internal structure of the foot. Body weight is exerted on bony points of the foot resulting in pressure necrosis of the tissue between the bone and surface and formation of the planter ulcers.

**Site of palpation:** Below and behind the medial malleolus, approximately at the mid point between medial malleolus and heel.

- Identify the medial malleolus. Locate the nerve just below and behind medial malleolus (approximately at the mid point between medial malleolus and heel)
- Palpate with the pulp of finger and feel across the nerve constantly watching facial expression for signs of tenderness.
- The palpable course of the nerve is very short.

**Sensory testing:** It supplies the entire sole but nerve supply of the heel may be spared during the early stages of the nerve involvement. As skin of the sole is thick, perception for deep pressure and pain must be tested with ball point.

**Muscle wasting:** Interossei of the foot.

**Deformity:** Clawing of toes. When the foot is placed flat on ground, instead of pads tips of the toes touch the ground. This may be normal in people wearing tight shoes.

**Test for early muscle weakness:**

Nerve supplies the small muscles of the foot and there may not be any noticeable disability due to involvement of the nerve.

**To test for early weakness of muscles of foot:**

- Ask the patient to place the foot firmly on the ground and to press the ground with the big toe, keeping it straight while lifting all the other toes. Weak or paralyzed big toe will bend
- Ask the patient to place the foot firmly on the ground, lift all the toes, and spread them out. Weak or paralyzed toes cannot be spread out but people habitual of wearing shoes also often cannot spread their toes.
- Ask the person to place the foot firmly on the ground with all the toes touching the ground. Ask the patient to draw back or retract the toes without lifting them off the ground. Normally toes bend like an “S” and the toe pads will be in contact with the ground. Weak or paralysed toes, curl like a “C” because tips of the toes, not the pads, touch the ground while standing.
Table showing affected nerves of lower limb.

<table>
<thead>
<tr>
<th>S No.</th>
<th>Nerve</th>
<th>Site of palpation</th>
<th>Site of Pain/tenderness</th>
<th>Sensation</th>
<th>Disability/deformity (Look for)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Superficial peroneal nerve, br of Common peroneal nerve</td>
<td>As it winds around the neck of fibula</td>
<td>Back of knee</td>
<td>Lateral leg and dorsum of foot</td>
<td>Foot drop</td>
</tr>
<tr>
<td>2.</td>
<td>Posterior tibial nerve</td>
<td>Immediately below medial malleoli</td>
<td>Ankle</td>
<td>Sole of foot</td>
<td>Small muscles of the foot are affected: loss of organisation of foot</td>
</tr>
</tbody>
</table>

4.7.5 Signs of new nerve damage / worsening of already affected nerve:

Sometimes, despite treatment new nerves may get involved/ existing damage may become worse; such cases are referred to higher centre as they may require further investigations and direct supervision.

Damage of new nerve can be recognized if:

- New areas of sensory loss in the hands or feet are noticed where the patient could feel before but cannot feel now.
- Similarly, loss of sweating in previously normal areas is present.
- Previously normal muscles develop weakness/paralysis
- New nerve becomes painful or tender to the touch.
- Increase in weakness of previously weak muscle

Worsening of existing damage

- Increase in area of loss of sweating
- Increase in area of loss of sensation
- Increase in degree of sensory loss
- Increase in weakness of previously weak muscle

5.8 Examination of Eyes & Face

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

Examination of eyes:

- While asking for any problems including those related to eye; observe for blinking of the eye.
- Examine if eye lashes touch the eyeball (trichiasis/in entropion).
Examine the ‘white part’ (conjunctiva and sclera). In the normal eye the ‘white part’ of the eye is ‘white’ (some pigment and slight redness are due to the hot and dusty climate).

Examine the cornea. In the normal eye the cornea is transparent. In case of lid gap on mild closure, look explicitly for opacities in the lower part of the cornea due to exposure keratitis.

Examine the pupil. Whether it is grey black, round and reactive (constricting) to light.

Involvement of Trigeminal nerve:

- **Blinking of eye:** While talking to the patient, observe blinking of the eye without making the patient aware of it. Check whether person is blinking the eye with normal/ reduced frequency or not blinking the eye at all. If patient knows that you are examining the eyes s/he may stop blinking and you will not be able to know the actual status.

Person blinking eye for less than three times in one minute has involvement of trigeminal nerve.

- **Corneal sensation:** Whether reduces or lost. Avoid testing corneal sensation in the field. Alternately, infrequent blink or absent blinking means corneal sensation is impaired. Absent and irregular blinking in a patient without lagophthalmos may indicate absent or reduced corneal sensation and are at risk of corneal erosion and ulceration.

- **Corneal ulcer:** Suspect corneal ulcer, if person complains of photophobia. Note presence of white spot on cornea and the shadow of an object on the cornea (corneal reflex), if corneal reflex is regular ie with out any indentation of the shadow, on the cornea means absence of corneal opacity or ulcer. Presence of corneal ulcer needs immediately referral to a tertiary care unit.

**Involvement of Facial nerve:** Test the strength of muscles of the eyelid (refer examination of individual nerve above).

**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 metres.

**Testing Visual Acuity:**

- To test the vision, ask person to stand 6 metres 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 metres, they are visually impaired and have grade 2 disability in that eye.

• This can be due to complication of leprosy.

• Refer the person to someone who can manage the eye complications (eye specialist) of leprosy.

Check for following conditions of eye on every visit:

- Infrequent blinking/ loss of blinking (insensitive cornea)
- Lagophthalmos/ increased weakness of muscles gap >1mm
- Examine for sagging of lowerlid and Dacrocystitis
- Corneal opacity/irregular corneal reflex (corneal ulcer)
- Trichiasis >5 eye lashes/entropion
- Red / painful eye- iritis/ iridocyclitis & complications.
  - Examine iris: Colour of iris, presence of nodule
  - Examine pupil: Shape and reaction to light.
- Recent impairment / recent deterioration of vision
- Cataract

If Red painful eye is present:

- Exclude conjunctivitis in red eye
- Instill atropine if red painful eye
- Pad the eye to protect it and give rest
- Refer immediately to the eye specialist as any neglect can lead to impaired vision and blindness.
### Difference Iridocyclitis Vs Conjunctivitis

<table>
<thead>
<tr>
<th>Sign/symptom</th>
<th>Iridocyclitis</th>
<th>Conjunctivitis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colour of redness</td>
<td>Dull red</td>
<td>Bright red</td>
</tr>
<tr>
<td>Location of redness</td>
<td>Pericorneal redness</td>
<td>Redness more widely spread</td>
</tr>
<tr>
<td>Secretions</td>
<td>No secretions</td>
<td>Secretions present</td>
</tr>
<tr>
<td>Pain</td>
<td>Present</td>
<td>Absent (only discomfort, no pain)</td>
</tr>
<tr>
<td>Photophobia(Inability to open eye in light)</td>
<td>Present</td>
<td>Absent</td>
</tr>
<tr>
<td>Pupil</td>
<td>Pin point</td>
<td>Normal in size</td>
</tr>
<tr>
<td>Shape of pupil</td>
<td>Irregular</td>
<td>Regular</td>
</tr>
<tr>
<td>Reaction to light</td>
<td>Non reactive</td>
<td>Reactive</td>
</tr>
<tr>
<td>Iris</td>
<td>Dull coloured</td>
<td>Normal</td>
</tr>
</tbody>
</table>

**Note:**

- Presence of white spot on cornea with redness of eye & photophobia – corneal ulcer
- Presence of white spot on cornea without redness & photophobia – corneal scar
- Opacity behind iris - cataract

**Note:**

Those who need steroid therapy and have ocular lesions must be referred
5.9 Grading of disabilities

Disability in leprosy is graded to judge the extent of impairment, progress, early detection of any deterioration in the disability status of the leprosy affected person, to decide the line of management for the person, to monitor the quality of services available and plan services for the management of the leprosy in the area.

EFM score is used to grade the disability of the individual organ separately and to give an overall disability grade to the person.

<table>
<thead>
<tr>
<th>Examination of parts</th>
<th>WHO Disability Grades</th>
<th>Sensory Testing (ST)</th>
<th>Voluntary Muscle Testing (VMT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hands</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>Sensation present</td>
<td>Muscle power normal (S)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Sensation absent</td>
<td>Muscle power normal (S)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Sensation absent</td>
<td>Muscle power weak or paralysed (W/P)</td>
<td></td>
</tr>
<tr>
<td>Feet</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>Sensation present</td>
<td>Muscle power normal (S)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Sensation absent</td>
<td>Muscle power normal (S)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Sensation absent</td>
<td>Muscle power weak or paralysed (W/P)</td>
<td></td>
</tr>
<tr>
<td>Eye</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>Normal</td>
<td>No lid gap</td>
<td>Present</td>
</tr>
<tr>
<td>2</td>
<td>Can not count fingers at 6 meters</td>
<td>Gap present /red eye/corneal ulcer or opacity</td>
<td>Absent</td>
</tr>
</tbody>
</table>

The highest grade given in any of the part is used as the Disability Grade for that patient. EHF score i.e. sum of all the individual disability grades for two eyes, two hands and two feet -0-12, should be recorded at each examination.

**EHF score**: The sum of the individual disability grades for each eye, hand and foot

The EHF score is calculated from data being recorded routinely. It is the sum of all the individual disability grades for the two Eyes, two hands and two Feet. Since the disability grade can be scored as 0, 1 or 2, it follows that the EHF score ranges from 0 to 12. A score of 12 would indicate grade 2 disability of both eyes, both hands and both feet. The EHF score has been shown to be more sensitive to change over time than the Disability Grade itself. The simplest way to use the EHF score to calculate the score at diagnosis and then repeat the examination at each visit if person is high risk / after every three months in other persons till MDT is being
given, at the time of release from treatment on completion of the treatment and even after treatment in people with disability. The current score is compared with that of the previous visit. An increase in the score of the individual organ or an over all score would indicate some new or additional disability.

The Impairment Summary Form (ISF) may be used to monitor impairments and disabilities in patients, and to calculate the proportion of patients who develop new or additional disability during MDT. The ISF contains more details about each individual patient’s impairments and disabilities. If used effectively it allows maintenance of higher quality of care for the patient. Nerve function assessment should be done at the first clinic visit of every patient and at least every 3 months during treatment.

**Assessment of Nerve Function must be done at least every three months**

Interpretation of signs and symptoms to decide about activity of disease, reversible or irreversible lesions and their need assessment – immediate and late, essential and optional

Monitoring of disease in a person under treatment is done by recording the clinical finding comparing the finding with that of previous visit, interpreting finding to assess the activity of disease, potential disabilities (at risk of developing disability), presence of reactional state, reversibility of nerve damage and decide further management etc. Disabilities of recent origin (< 6 months duration) will require prednisolone therapy along with MDT (if course of MDT not completed earlier). Irreversible disabilities (of > 6 months duration) will need training in ‘self care’ and referral for their management, just after registration. Some cases may require protective aids, POP cast, splints, grip aid or counseling to protect insensitive body parts along with MDT.

### 5.10 Recording of findings

Clinical finding of all the leprosy cases must be recorded in the case card (LF -01) and the Details of clinical examinations of nerve function impairment must be recorded in form P II. Deterioration of nerve function or damage to new nerve can be detected only by comparing the result of present examination with that of previous examination and must be treated quickly to prevent further damage.
5.11 Examination of skin smear

Skin smear examination requires a suitably equipped laboratory with trained staff to do this test. Leprosy skin smear are available in the specialized centers for treatment of leprosy and District Hospitals. In most persons, a skin smear is not essential for diagnosis of leprosy but in some MB cases with infiltrative lesions of the skin without loss of sensation especially during early stages; positive skin smear may be the only conclusive sign for diagnosis of the disease. Majority of the people with leprosy esp PB leprosy have a negative smear. Hence, negative skin smear does not exclude leprosy but positive skin smear in an untreated person is diagnostic of leprosy.

- Positive skin smear in untreated person: confirms leprosy
- Negative Skin Smear: leprosy can not be excluded

5.12 Diagnosis of leprosy in difficult cases

- Some cases of leprosy don’t manifest by visible skin patches or nodules but with some changes in the skin i.e. redness and swelling of skin, which may be noticed if examined carefully. Such cases (with infiltration) are always multi-bacillary with positive skin smear, they are cases of consequences. In such suspected cases, skin smear examination will help to confirm the diagnosis.

- Some cases of leprosy manifest with thickening / enlargement of peripheral nerves with sensory impairment along the course of affected nerves without skin patches. Careful sensory testing in the area supplied by the thickened nerve will help in establishing the diagnosis.

- Some people may present with deformity such as claw hand, foot drop, lag-ophthalmos or planter ulcer with no confirmatory nerve thickening and no definite sensory loss. In such cases, investigations like skin smears, histo-pathology (biopsy from the skin or nerve) or PCR will help in arriving at conclusion.

- Sometimes hypo-pigmented lesions over the face (? indeterminate leprosy) especially in children with no definite loss of sensation are seen or referred for confirmation. Such cases may be kept under observation, if no cardinal signs are elicited.
First presentation in some cases may be in the form of nodules with fever and lymphadenitis i.e. ENL reaction. Fine Needle Aspiration Cytology (FNAC) from the glands or biopsy from the lesion will diagnose / rule out leprosy. In case, skin smear is reported negative. These cases may be referred to tertiary care unit for investigations and management.

If there is no loss of sensation in the skin lesions and no enlarged nerves, but there are suspicious signs, such as nodules or swellings on the face or earlobes or infiltration of the skin, it is important to try and get a skin smear test done. In these circumstances, a positive skin smear confirms the diagnosis of leprosy while a negative result (in the absence of other cardinal signs) would in practice, rule out leprosy. An alternative diagnosis should then be considered. If still in doubt, wait for 3-6 months and review for loss of sensation that may have appeared by this time.

Many skin diseases such as Post Kalazar Dermal Leishmaniasis (PKDL), Psoriasis, treated fungal infections, Lupus Vulgaris, other forms of cutaneous tuberculosis, sarcoidosis, may mimic leprosy and require lab investigations. Histopathological examination of lesion will help in establishing alternative diagnosis.

Histopathology

Cases that need investigations to confirm the diagnosis of leprosy Or confirmation of relapse. Punch (5mm) biopsy or incision biopsy for histo-pathological examination may help in reaching the conclusion if analyzed along with clinical criteria. Specimen is taken from just inside the edge of the lesion / cutaneous branch of peripheral nerve near suspected lesion and processed. It is examined under microscope after proper staining. Presence of lepra bacilli in or around the nerve is diagnostic, but only granuloma or infiltration without support of clinical signs may mislead. It is probably advisable to give preference to the clinical presentation over the histological picture. If the two are at variance, a situation that is not uncommon.

Fine Needle Aspiration Cytology (FNAC):

FNAC from the lymph glands is usually helpful if patient is in suspected lepra reaction type II.

Polymeraze Chain Reaction (PCR)

Most of the cases can be diagnosed by clinical examination only. Cases with diffuse infiltration or nodules, without nerve thickening or sensory loss will require skin smear examination to confirm the diagnosis. In case of thickened nerve without any impairment of nerves function & to confirm the presence of viable M. Leprae require laboratory investigations e.g. PCR, Tissue biopsy. Facilities for PCR are available at specialized institutions like NICD at New Delhi, JALMA Agra & CLTRI, Chengalpattu.
Radiological examinations

X-rays are helpful in diagnosing osteoporosis, fractures of small bones, absorption of bones, sequestra.

5.13 Diagnosis of relapse

Relapse is defined as the re-occurrence of the disease at any time after the completion of a full course of treatment. Relapse is indicated by the appearance of new skin lesions and in the case of an MB relapse, by evidence on a skin smear of an increase in Bacterial index of 2 or more units. It is difficult to be certain that relapse has occurred, as new lesions may appear in leprosy reactions also (usually lesions previously not obvious become visible during reaction and look like new lesions).

MDT is very effective treatment for leprosy. If a full course of treatment has been taken properly, relapse is generally rare. The use of a combination of drugs has prevented the development of drug resistance in leprosy, so cases of relapse can be treated effectively with the same drug regimen – 12 months MB MDT. MB leprosy persons with high bacterial index at the time of diagnosis are more likely to come with relapse.

The most useful distinguishing feature is the time that has passed since the person was treated: if it is less than 3 years reaction is most likely; while if it is more than 3 years, relapse becomes more likely. A reaction may be treated with steroids, while a relapse will not be greatly affected by a course of steroids, so using steroids as a ‘therapeutic trial’ can clarify the diagnosis. Reaction will show improvement with in two weeks but relapse will not show any improvement.

Following criteria may help in distinguishing a relapse from a reaction:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Relapse</th>
<th>Reaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time since completion of treatment</td>
<td>More than 3 years</td>
<td>Less than 3 years</td>
</tr>
<tr>
<td>Progression of signs and symptoms</td>
<td>Slow</td>
<td>Fast</td>
</tr>
<tr>
<td>Site of skin lesions</td>
<td>In new places</td>
<td>Over old patches</td>
</tr>
<tr>
<td>Pain, tenderness or swelling</td>
<td>No</td>
<td>Yes – skin &amp; nerves</td>
</tr>
<tr>
<td>Damage</td>
<td>Occurs slowly</td>
<td>Sudden onset</td>
</tr>
<tr>
<td>General condition</td>
<td>Not affected</td>
<td>Affected due to inflammation</td>
</tr>
</tbody>
</table>

Suspecting relapse: but can not confirm clinically
Refer to
District Hospital (secondary level)
For further
Investigation & Management
5.14 At confirmation of diagnosis of leprosy

Once diagnosis of leprosy is confirmed:

- Explain the findings to the leprosy affected person
- Counsel the person and tell them that the disease can be cured.
- Examine the person more thoroughly to find out how far the disease has progressed, to know whether additional treatment is needed.
- Record the finding of the examination.
- Register the person in the treatment register
- Prescribe the correct treatment regime.
- Inquire about the person’s family.
- Household contacts should be examined for leprosy.
- Family should be encouraged to help the person complete treatment.
6. Classification & Management of Leprosy

Structure:

6.1 Introduction
6.2 Classification of leprosy
   6.2.1 Criteria for grouping
6.3 Treatment of leprosy
   6.3.1 Drugs used in MDT
   6.3.2 Standard Regimen of MDT
   6.3.3 Duration of Treatment
   6.3.4 Advantages of Multi Drug Therapy
   6.3.5 Indications for prescribing MDT
   6.3.6 Assessing fitness of a LAP for MDT
   6.3.7 Assigning appropriate MDT regimen
   6.3.8 Treatment of leprosy during pregnancy
   6.3.9 Treatment of leprosy and tuberculosis
   6.3.10 Treatment of leprosy in HIV positive persons
   6.3.11 Side effects of anti-leprosy drugs and its management
   6.3.12 Ensuring regularity of treatment
   6.3.13 Accompanied MDT
   6.3.14 Follow up of the patient
   6.3.15 Completion of treatment
   6.3.16 Drug Resistance
6.4 Management of ocular lesions in leprosy
   6.4.1 Basis principles for management of ocular lesions
   6.4.2 Prevention and treatment of lag-ophthalmos
6.5 Management of nerve involvement
   6.5.1 Leprosy with high risk status for nerve involvement
   6.5.2 Thickened nerve without pain / tenderness
   6.5.3 Painful & tender nerves
   6.5.4 Referral of person with nerve function impairment

Objectives:

☞ Assign appropriate regimen to LAP
☞ Enumerate side effects of MDT and describe the management of side effects
☞ Describe Management of Neuritis
☞ Demonstrate method to ensure regularity and completion of treatment
Teaching methods – Exercises, lecture discussion & role play

Case One: Nafeesa 32 years old, diagnosed as PB leprosy was registered for treatment in December, 2007. She took regular treatment for two months and took accompanied MDT for one month in March and left for her village. She came back in the month of June to collect the medicine and told that she has developed two more lesions making it total of five lesions. Discuss the management.

Case Two: Rahman 28 years old, an agriculture worker came to the health center requesting medical officer to prescribe some tonic for him as he is developing weakness. On enquiry he told that he feels weakness in his left hand and since two days, he has noticed that two fingers of his hand (index and ring finger) have become bent (hyperextended at metacarpo-phalangeal joint and flexed at both the interphalangeal joint). Discuss diagnosis and management.

Case Three: Devi, 30 years old woman noticed a few patches on her leg and arm. She showed it to her husband. He took her wife to a general practitioner who after examining the patch told the patient that it was leprosy. He prescribed Rifampicin 300 mg and Dapsone 100 mg daily for 15 days. Devi complied with the doctor’s advice and took the drugs as prescribed.

On the 3rd day of treatment, Devi had high temperature. She saw the patches turned more red with rashes on it. Seeing the lesions worsening, she did not go to the treating doctor again.

So she went to another doctor, where she was given some tablets for fever and sent back. Though fever subsided, few more patches appeared on her back. Deteriorating condition of Devi’s disease put her under mental agony.

A new problem erupted between her husband and Devi. He did not want to live with her any more since he was told by his relatives that Devi’s disease could not be cured. Therefore he sent her back to mother’s home.

Was the diagnosis of the GP correct? Discuss the treatment given by the two doctors.

6.1 Introduction
Very effective treatment is available for cure of leprosy. Person affected with leprosy is treated with combination of drugs called Multi-Drug Therapy (MDT). MDT is available free of cost for all, at all the health care facilities. Drug is taken orally and is available in blisters packs containing drug for 28 days (four weeks taken as one month of regimen)

### 6.2 Classification of leprosy

As already mentioned, leprosy presents in variety of manners and two extremes of the spectrum of the disease are Pauci-bacillary (PB) leprosy with low number of bacilli in persons with high level of immunity and Multi-bacillary (MB) cases with heavy load of bacilli in the body in low level of immunity for the disease. Risk of involvement/damage to nerve is greater in MB cases.

To assign the correct regimen for treatment of leprosy according to the severity of the disease, group the leprosy affected person based on following characteristics. This is important because it helps in selecting the correct combination of drugs (regimen) for a given person.

#### 6.2.1 Criteria for grouping

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Characteristic</th>
<th>PB (Pauci bacillary)</th>
<th>MB (Multi bacillary)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Skin lesions</td>
<td>1 – 5 lesions</td>
<td>6 and above</td>
</tr>
<tr>
<td>2</td>
<td>Peripheral nerve</td>
<td>No nerve / only one nerve</td>
<td>More than one nerve</td>
</tr>
<tr>
<td></td>
<td>involvement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Skin smear</td>
<td>Negative at all sites</td>
<td>Positive at any site</td>
</tr>
</tbody>
</table>

**Note:** If skin smear is positive, disease is classified as MB case but if skin smear is negative it is classified on the basis of the number of lesions.

### 6.3 Treatment of leprosy

#### 6.3.1 Drugs used in MDT

The treatment of leprosy is in the form of Multi Drug Therapy (MDT) which is the combination of two or three of the following drugs:

- Cap. Rifampicin
- Tab. Dapsone
- Cap. Clofazimine

#### 6.3.2 Standard regimen of MDT
Four types of standard regimen are available in blister packs for treatment of leprosy

**PB Adult:** For people with PB leprosy and 15 years of age or more

**MB Adult:** For people with MB leprosy and 15 years of age or more

**PB child:** For people with PB leprosy and 10-14 years of age

**MB child:** For people with MB leprosy and 10-14 years of age

Blister packs are not available for children under 10 years of age. Treatment to children belonging to this age group is given after calculating the dose according to their body weight. Recommended **daily doses** as **per kilogram** of body weight are:

- **Refampicin:** 10 mg
- **Clofazimine:** 1 mg
- **Dapsone:** 2 mg

### 6.3.3 Duration of treatment

Leprosy persons with PB leprosy need 6 months treatment that must be completed in maximum of 9 months. This means PB leprosy person cannot miss more than 3 pulses during treatment. MB leprosy person needs 12 months treatment that can be completed in 18 months. All the efforts must be made to complete 6 pulses in 6 months for PB cases and 12 pulses in 12 months for MB cases.

### 6.3.3 Advantages of Multi Drug Therapy (MDT)

- MDT kills the bacilli (M. leprae) in the body. It stops the progress of the disease, prevents further complications and reduces chances of relapse.

- As the M. leprae are killed, the patient becomes non-infectious and thus the spread of infection in the body is reduced. Moreover, spread of infection to other persons is also reduced.

- Using a combination of two or three drugs instead of one drug ensures effective cure and reduces chances of development of resistance to the drugs.

- Treatment with multi-drug therapy reduces duration of the treatment.

- Duration of treatment is short

- MDT is safe, has minimal side effects and has increased patient compliance

- Available in blister pack; easy to dispense, store and take

### 6.3.5 Indications for prescribing MDT
New case of leprosy: Person with signs of leprosy who have never received treatment before.

Other cases: Under NLEP all previously treated cases needing further treatment are recorded as “other cases”. It has been decided that all migrant cases from another state reporting at any state Health Institution will also be grouped under this category. other cases include PB & MB cases

Categorization of other cases (recorded for PB and MB)

(a) Relapse cases of PB/MB: – Relapse is defined as persons who have developed new lesion at any time after completion after the completion of a full course of treatment. Diagnosis must be evidence based and must be diagnosed after adequate screening.

(b) Reentered for treatment - These are previously treated cases, where clinical assessment shows requirement of further treatment and patient admits that treatment was not completed. Defaulters are included in this category.

(c) Referred cases – patient referred for completion of treatment (remaining doses) by tertiary or second level institutions after diagnosis and issue of first dose, or from another Health centre on patients request or migratory patient from another District/State. All referred cases should have a referral slip showing diagnosis and remaining doses to be given.

(d) Change in classification – Persons with PB leprosy; reclassified to MB due to appearance of more lesions (skin lesions or nerve involvement/ become smear positive) during the treatment and need full course of MB treatment.

(e) Cases from outside the state & Temporary migration or cross border cases.

Before deciding a case to be recorded as from other state, the residential status at the place of diagnosis be carefully examined. A person who is residing for more than six month and is likely to stay till completion of treatment, be recorded as indigenous case and will not be categorized under “other cases”.

Information regarding other cases is shown in separately the monthly progress reports.

Once it has been decided that a person needs treatment, register the person in Leprosy Treatment register and make the Leprosy Record Card. Take care to indicate type of patient (new/others) correctly. Decide the regimen and counsel the person (refer section 7.3.12 and chapter on counselling).

6.3.6 Assessing fitness of a LAP for MDT

Before starting treatment, you must look for the following:

- **Jaundice**: If the patient is jaundiced, wait till jaundice subsides.
- **Anaemia**: If the patient is anaemic, start treatment for anaemia simultaneously along with MDT.
**Tuberculosis:** If the patient is taking Rifampicin, ensure that he continues to take Rifampicin in the dose required for the treatment of tuberculosis along with other drugs in the regimen required for the treatment of leprosy.

**Allergy to sulpha drugs:** If the patient is known to be allergic to sulpha drugs, avoid Dapsone.

### 6.3.7 Assigning appropriate MDT regimen

Based on the grouping, the patients may be given any one of the standard MDT regimens mentioned below.

In children, the dose must be adjusted suitably. When the patient has completed the required number of doses the treatment is stopped and RFT (Released from Treatment) is written against the name of the person in the leprosy treatment register.

#### MDT regimen

<table>
<thead>
<tr>
<th>Type of leprosy</th>
<th>Drugs used</th>
<th>Dosage (adult) 15 years &amp; above</th>
<th>Dosage (Children 10-14 years)</th>
<th>Dosage Children Below 10 years</th>
<th>Frequency of Administration Adults (children in bracket)</th>
<th>Criteria for RFT</th>
</tr>
</thead>
<tbody>
<tr>
<td>MB leprosy</td>
<td>Rifampicin Dapsone Clofazimine Clofazimine</td>
<td>600 mg 100 mg 300 mg 50 mg</td>
<td>450mg 50 mg 150 mg 50mg</td>
<td>300mg 25mg 100mg 50mg (alternate day, not daily)</td>
<td>Once monthly Daily Once monthly Daily (every other day) for adults</td>
<td>Completion of 12 monthly pulses</td>
</tr>
<tr>
<td>PB leprosy</td>
<td>Rifampicin Dapsone</td>
<td>600 mg 100 mg 450 mg 50 mg</td>
<td>300mg 25mg</td>
<td>Once monthly Daily</td>
<td>Completion of 6 monthly pulses</td>
<td></td>
</tr>
</tbody>
</table>

Once in a month dose is given at the start of treatment (Day 1) in front of the health worker (under direct observation) and then every 28th day for 12 months by MB patient and for six months for PB patient. The daily dose is taken from second day of the monthly dose, every day for next 27 days. Six such pulses for PB must be completed within 9 months or less where as 12 pulses of MB must be completed in 18 months or less.
6.3.8 Treatment of leprosy during pregnancy
MDT is safe and can be continued during pregnancy.

6.3.9 Treatment of leprosy & tuberculosis
MDT is continued but rifampicin is given in the doses recommended as per guidelines of RNTCP (Revised National Tuberculosis Control Programme)

6.3.10 Treatment of leprosy in HIV positive persons
MDT for leprosy can be safely given to HIV affected persons
### 6.3.11 Side effects of anti-leprosy drugs and its management

#### Dapsone

<table>
<thead>
<tr>
<th>Common side effects</th>
<th>Signs and symptoms</th>
<th>What to do if side effects occur</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anaemia</td>
<td>Paleness inside the lower eyelids, mouth and fingernails, Tiredness, oedema of feet and breathlessness</td>
<td>Give anti-worm treatment and iron tablets. Continue dapsone.</td>
</tr>
<tr>
<td>Severe skin complication (Exfoliate dermatitis) Sulphone hypersensitivity Haemolytic anemia</td>
<td>Extensive scaling, itching, ulcers in the mouth and eyes, jaundice and reduced urine output</td>
<td>Stop Dapsone. Refer to hospital immediately. Never restart.</td>
</tr>
<tr>
<td>Abdominal symptoms</td>
<td>Abdominal pain, nausea, and vomiting with high doses</td>
<td>Reassure the patient</td>
</tr>
<tr>
<td>Liver damage (Hepatitis)</td>
<td>Jaundice (yellow Colour of skin, eyeballs and urine). Loss of appetite and vomiting</td>
<td>Stop Dapsone. Refer to hospital. Restart after the jaundice subsides.</td>
</tr>
<tr>
<td>Kidney damage (Nephritis)</td>
<td>Oedema of face and feet. Reduced urine output</td>
<td>Stop Dapsone. Refer to hospital</td>
</tr>
</tbody>
</table>

#### Rifampicin

<table>
<thead>
<tr>
<th>Side effects</th>
<th>Signs and symptoms</th>
<th>What to do if side effects occur</th>
</tr>
</thead>
<tbody>
<tr>
<td>p Significance</td>
<td>Reddish coloration of urine, saliva and sweat</td>
<td>Reassure the patient</td>
</tr>
<tr>
<td>Hepatitis (liver damage)</td>
<td>Jaundice (yellow colour of skin, eyeballs and urine). Loss of appetite and vomiting</td>
<td>Stop Rifampicin. Refer to hospital. Restart after the jaundice subsides.</td>
</tr>
<tr>
<td>Flu like illness</td>
<td>Fever, malaise and body ache</td>
<td>Symptomatic treatment</td>
</tr>
<tr>
<td>Allergy</td>
<td>Skin rash</td>
<td>Stop Rifampicin</td>
</tr>
</tbody>
</table>

#### Clofazimine

<table>
<thead>
<tr>
<th>Side effects</th>
<th>Signs and symptoms</th>
<th>What to do if side effects occur</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin pigmentation (Not Significant)</td>
<td>Brownish-red discoloration of skin, urine, and body fluids</td>
<td>Reassure the patient, it disappears after completion of treatment</td>
</tr>
<tr>
<td>Ichthyosis (diminished sweating)</td>
<td>Dryness and scaling of the skin, itching</td>
<td>Apply oil to the skin. Reassure the patient.</td>
</tr>
<tr>
<td>Eye</td>
<td>Conjunctival dryness</td>
<td>Moistening eye drops</td>
</tr>
<tr>
<td>Acute Abdominal symptoms</td>
<td>Abdominal pain, nausea and vomiting on high doses</td>
<td>Symptomatic treatment. Reassure the patient.</td>
</tr>
</tbody>
</table>
6.3.12 Ensuring regularity of treatment

Counsel the person adequately regarding the disease, its curability, duration of the treatment, importance of regular and complete treatment. Encourage the person constantly to complete the treatment.

- Tell the basic facts about the disease e.g. disease is curable, skin patches may not disappear or take some time to disappear after the completion of the treatment
- Explain the method of taking drug. Ask person to swallow first dose in front of the health worker / doctor (Assign a person to observe intake of first dose)
- Tell them that medicine is to be collected every 28 days (1-2 days in advance).
- Tell the person about possible side effects and when to report.
- Encourage person to ask questions
- Ask person to bring the previous blister pack
- Every time patient comes to collect the medicine, examine and record the finding in patient card and register at the health centre
- Assess for any complication or worsening of disability
- Check leprosy register in the end of every month, to make sure that the registered persons are collecting the drug regularly.
- Contact the person who has not reported to collect the monthly blister pack with the help of your team members or members of the community. Find out the reason and try to find a solution to the person’s problem.
- Adapt, accompanied MDT, whenever it is essential

If a LAP misses some months of treatment, they can still continue with the course – as long as they have not missed

- More than three months of treatment for a PB course, or
- More than six months for an MB course.

Patients who miss more months, than this and still have signs of leprosy, 
Start the whole course of treatment again from the beginning
6.3.13 Accompanied MDT

Some people may find it difficult to come to the clinic every month. You may have to give these patients more than one blister pack at a time. In this case, make sure the patient understands how to take the treatment. If possible, ask someone else (a family member, a reliable neighbour or a health worker) to help the patient take the treatment regularly.

**Encourage regular and complete treatment**

- Patients who are not collecting drug regularly should be contacted immediately to identify the reasons and take corrective actions.
- Flexibility in MDT delivery (more than one pulse at a time) may be adapted whenever it is essential.

6.3.14 Follow up of the patient

Every time a patient comes to take their drug, always ask them, how they are feeling? Has there been any change since the last visit? Also reexamined and compare with findings with that of previous month to find any change in the condition of the person.

**The main problems you may find are:**

- Side effects of the drugs.
- Signs of new nerve damage or inflammation of the existing lesions (reaction).

**Side effects of the drugs**

Serious side effects of leprosy treatment are rare. The most serious side effects are:

- A serious allergy to one of the drugs.
- Jaundice.
- If either of these happens, you must stop the treatment and send the patient to a leprosy specialist.

The patient may have other, less serious side effects, but when this happens it is important to continue the treatment. Explain that it is normal to have some side effects, but they are not serious and will go away when the treatment is finished.
Less serious side effects are:

- Rifampicin turns the urine red.
- Dapsone sometimes causes black spots on the skin. These may itch but they are not dangerous
- Clofazimine can change the colour of the skin. In light skinned people, the skin can appear slightly orange; in other people, the skin may look darker. It is not dangerous and will disappear after treatment is completed.

6.3.15 Completion of treatment

- A person is considered to have completed treatment if six pulses of PB leprosy or 12 pulses of MB leprosy are taken with in 9 months and 18 months respectively.
- Person who has completed the treatment is considered cured and is released from the treatment.
- Write RFT (released from treatment) in the treatment register against the name of the person, which means LAP has completed the treatment and is considered cured.
- However, some signs of leprosy may remain For example; skin patches caused by the leprosy will not disappear immediately. In some people, light-colored patches remain on the skin permanently. Persons with residual patches at the time of completion of treatment must be told this otherwise, they may not understand why their treatment has been stopped and may try to take treatment from somewhere else.
- Loss of sensation, muscle weakness and other nerve damage may also remain. Tell the person signs of new nerve involvement, worsening of nerve impairment, reaction, eye involvement and ask the person to report immediately on appearance of these symptoms and signs or any of the previous symptoms come back again.
- Ensure that person with disability (PWD) knows about self care for prevention of disability or its worsening. (For self care refer POD)

After the completion of the course of MDT

New nerve damage may appear due to reaction

- Do not start MDT for such persons.
- Treat such persons for reaction (Refer lepra Reaction)

After completion of treatment, a very small number of patients may get new skin patches because of relapse. Refer such LAP to higher center for confirmation of relapse and treatment.
Criteria to restart course of MDT

- On relapse of disease, MDT is restarted. Relapse must be differentiated from Lepra Reaction. If necessary, help may be taken from laboratory.
- Drop out cases that discontinued MDT for more than 6 months and have active signs of leprosy.
- Activity of disease persists / new signs have developed within a year, after completion of full course of MDT and there is suspicion of drug resistance.

6.3.16 Drug resistance

Although resistance to anti leprosy drugs is rare since use of MDT, but some cases of resistance has been reported. When ever, despite all precautions disease and disability progresses, failure to respond to treatment must be considered. Such persons must be referred to specialized centers of leprosy for treatment.

6.4 Management of ocular lesions in leprosy

6.4.1 Basic principles for management of ocular lesions

- **Check** for conditions that may lead to impairment of vision and refer them immediately. (esp. red painful eye, infrequent blinking, Lag-ophthalmos)
- **Start MDT**, if not taken previously in the presence of ocular lesions due to leprosy.
- **Manage conjunctivitis** by frequent cleaning of eye with clean water, tropical antibiotic application and rest to the eye by padding. If no improvement is observed after 48 hrs, refer the person.
- Look whether **eyelashes** are touching the eyeball, patient may /may not feel the foreign body, if there are less than 5 eyelashes touching the eye ball, epilate the eye lashes but if there are 5 or more than 5 eyelashes, refer urgently for eye lid surgery.
- 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. (Refer POD)
- If there is ‘no perception of light’ (NPL) the eye is incurably blind (dead) and there is no need for referral.

6.4.2 Prevention & treatment of lag-ophthalmos

- **Reversal Reaction (RR) in face** (in particular in patches surrounding the eye or over the course of the facial nerve):
• Course of Prednisolon, as for type I reaction and all precautions as mentioned below.
  • Protect eyes using by (sun)glasses during the day
  • Cover with clean sheet at night

**Recent Lagophthalmos** of ≤ 6 months duration: same as above

**Established mild lagophthalmos** (> 6 months duration, lid gap of ≤ 6 mm on mild closure; no signs of exposure keratitis):
  • Protect eyes using by (sun)glasses during the day
  • Cover with clean sheet at night.
  • Blinking exercises (3x 20 / day) to strengthen the orbicularis muscle. ‘think-blink’ habit to moisten the cornea.
  • Artificial tears if felt feasible (may be expensive).

**Established severe lagophthalmos** (> 6 months duration, large lid gap of > 6 mm in mild closure), or signs of exposure keratitis:
  • Referral to eye department for eyelid surgery
  • Antibiotic eye ointment in case of exposure keratitis (opacity lower cornea, together with redness & pain)
  • Meanwhile as for mild Lagophthalmos

**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 clean sheet at night
  • Practice ‘think - blink’
  • Self-examination for redness of the eye in mirror.
  • Seek treatment if eye becomes red

**Treatment for corneal lesions**
  • Start antibiotic drops/ ointment
  • Refer the person to specialised eye care centre

**Treatment of Acute Iritis/ iridocyclitis:**
  • Start atropine eye drops, never use Pilocarpine,
  • Pad the eye for rest.
  • Can start Tab. Diamox 250 mg four times a day
  • Refer immediately to ophthalmologist,
6.5 Management of nerve involvement

Leprosy affected Person with nerve involvement needs additional precautions to avoid further damage to nerves and those without involvement of nerve at the time of diagnosis must be told to report immediately on any sign/symptom of nerve involvement.

6.5.1 Leprosy affected person with high risk status for nerve involvement

Start MDT, if not taken MDT in the past
Educate and ask person to report immediately in case of reaction/neuritis/NFI (Nerve Function Impairment)

6.5.2 Thickened nerve without any pain/tenderness

Start MDT, If not taken MDT in the past
Monitor for Nerve function impairment every month till taking MDT and every three months after completion of the course
Ask person to report immediately on development of nerve function impairment

6.5.3 Painful & tender nerves

Medical Treatment:

MDT if not taken earlier/continue & complete the course of MDT if registered and already taking MDT

Rest to the nerve: Provide rest to the nerve by applying splint to the adjoining joints in the functional position to prevent further damage to the nerve by repeated movement of the joints. It helps in recovery of the nerve. Splint can be made locally by padding, available firm material like plastic or cardboard.

Functional positions for commonly affected nerves are:

- Ulnar nerve: Elbow flexed at an angle of 90 degree
- Median nerve: Wrist extended by 40 degree
- Common peroneal nerve Knee flexed by 10 degree

Criteria for Referral for eye involvement:

- Lagophthalmos with large lid gaps (> 6 mm and/or exposure keratitis).
- Acute red eyes
- Eyes with more than 5 lashes touching the eyeball
- Poor Visual Acuity A < 6/60 or recent deterioration in vision.
- Cataracts
Course of Steroids: Start Steroids to control inflammation of the affected nerve, analgesics may be added if needed. (Refer treatment of reaction)

Passive exercise and massage: Once acute phase subsides (pain and tenderness subsides) Train person to move the joints of the affected body part for the full range of movement, 2-3 times a day to keep muscles strong and joints supple. Care is taken to prevent over stretching of the joints.

Regular Monitoring & Follow up: Periodic assessment for recovery / worsening of nerve function is essential. Monitor the Nerve function impairment every two weeks till taking steroids and every month till person is reporting to collect MDT and every three months after recovery & completion of the course of steroids. Ask the person to report immediately on reappearance of the similar signs and development of nerve function impairment.

Self-care: Once the acute phase is over, Train patient and at least one of the family members in self-care practices for prevention of disability. Encourage family member to support and monitor self care practices (Refer prevention of disability)

Surgical Treatment

If pain is intractable despite vigorous immunosuppressive therapy, refer the LAP for decompression of nerve

6.5.4 Referral of the person with nerve function impairment

If pain is intractable even after the vigorous immunosuppressive therapy

Deterioration in the functioning of the nerve at any time

Newly diagnosed patients with nerve damage of more than six months duration for investigations and specialized treatment to prevent further damage.

Some people develop nerve damage more than a year after completing MDT. Make sure that these patients are having a reaction rather than a relapse of leprosy, as the symptoms of the two can look similar. You must suspect relapse when new skin lesions occur in different places from the old lesions. These patients should be referred.

Note: While referring
If person is on steroids continue the same dose of steroids and provide rest to nerve the affected nerve by splinting the adjacent joints.