# Leprosy (Hansen's disease)

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# Learning Objectives

- Define leprosy
- Explain epidemiology and bacteriology
- Describe classification and clinical features
- Explain reactions and diagnosis of leprosy
- Write about the deformities occurring in leprosy patients and related management
- Explain the multidisciplinary approach in treatment of leprosy

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- ❖Introduction
- ❖Epidemiology
- ❖Bacteriology
- ❖Classification
- ❖Clinical features
- ❖Reactions
- ❖Diagnosis
- ❖Deformities and their management
- ❖Treatment

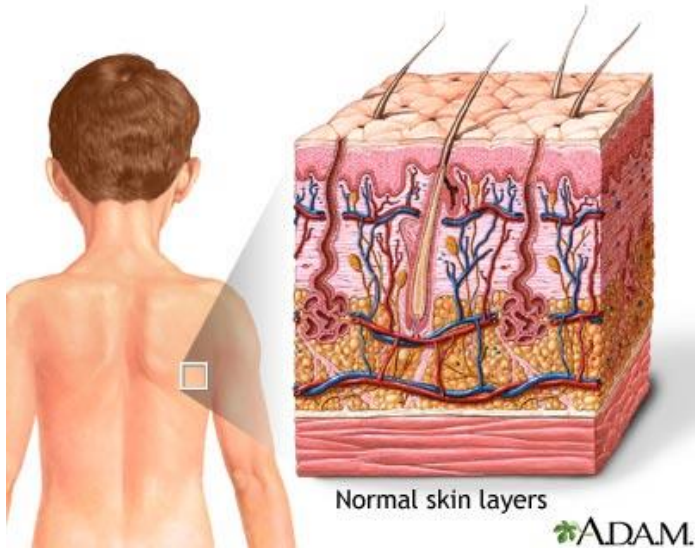
# Introduction

Leprosy;

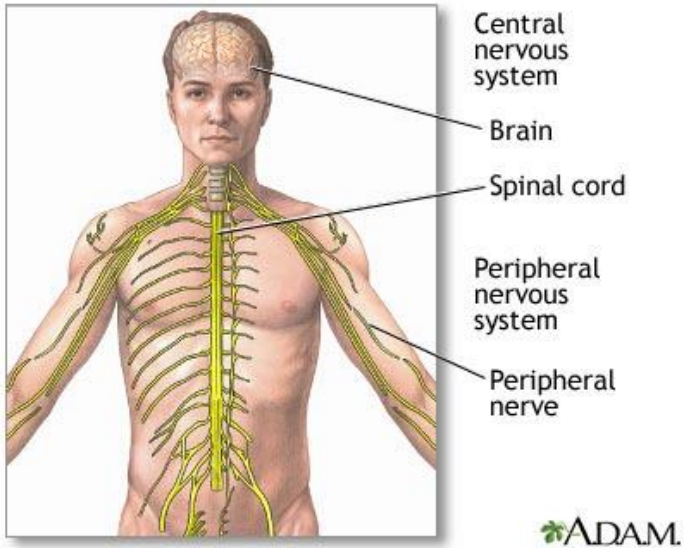
- one of the leading causes of physical disabilities, resulting in discrimination of patients and their families
- 2-3 million individuals are disabled due to leprosy (WHO)
- Early detection and treatment with multidrug therapy (MDT) are key elements to halt transmission of the disease and to bring about cure without disabilities

# Definition

- Leprosy is a chronic infectious disease caused by *Mycobacterium leprae*
- It principally affects the skin and peripheral nerves




Skin

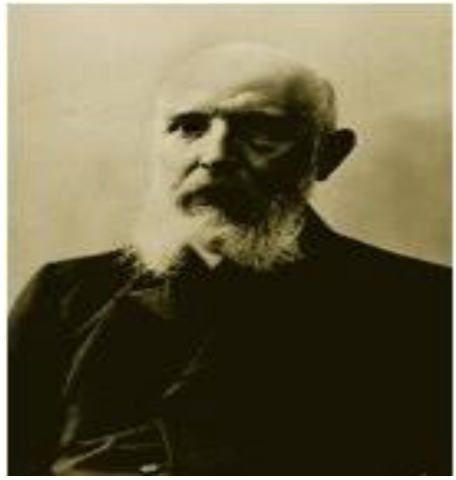



Peripheral Nerves

# Background of Leprosy

- In 1990, the World Health Organization (WHO) launched a campaign to eliminate leprosy as a public health problem by 2000
- Elimination was defined as a reduction of patients with leprosy requiring multidrug therapy to fewer than 1 per 10,000 population
- Goal was achieved in 2002 as global prevalence
- Goal of WHO by the end of 2015 is to reduce the rate of new cases with grade-2 disabilities worldwide by at least 35%
- This will be carried out by enforcing activities to decrease the delay in diagnosis the disease and actuate treatment with multidrug therapy

# History



- Earliest possible account of a disease appears in an Egyptian document written around 1550 BC
- Around 600 BC, Indian writings describe a disease that resembles leprosy
- In Europe, leprosy first appeared in the records of ancient Greece after army of Alexander the Great came back from India
- M.leprae was discovered by **Gerhard Henrik Armauer Hansen** in 1873 in Norway. Hence referred to as Hansen's disease
- Leprosy control started with use of chaulmoogra oil and for the last three decades, MDT has been the main tool against leprosy

# Facts about Leprosy

It is an infectious disease but not

- Hereditary disease
- A curse of God
- Result of past sins
- Leprosy is a 100% curable disease, whereas diabetes and hypertension are not
- It is not dependent on caste or class
- Early diagnosis and treatment with MDT prevent deformities

# Epidemiology

## Worldwide Prevalence

- Leprosy is a disease which is still endemic in 120 developing countries
- 80% of the worldwide cases are found in five countries, namely India, Myanmar, Indonesia, Brazil and Nigeria
- Though it is a disease of developing countries, it affects all the races
- 20% of cases results in deformities
- Prevalence rate – 5.7/1000

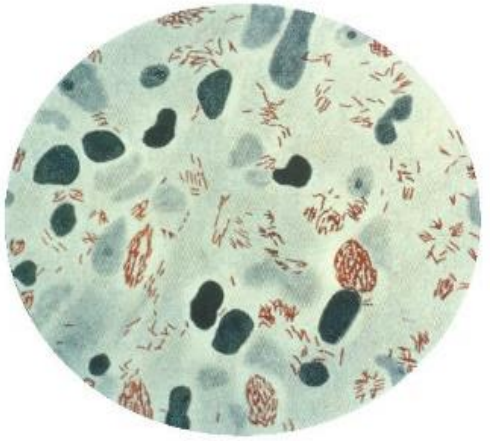
# Top 22 Leprosy endemic countries (2017)

1. Angola
2. Bangladesh
3. Brazil
4. Comoros
5. Côte d'lvoire
6. D R Congo
7. Egypt
8. Ethiopia
9. Micronesia
10. India
11. Indonesia
12. Kiribati
13. Madagascar
14. Mozambique
15. Myanmar
16. Nepal
17. Nigeria
18. Philippines
19. South Sudan
20. Sri Lanka
21. Sudan
22. Tanzania

# Milestones of Myanmar Leprosy Control Programme

- **1952-** Leprosy Control Programme started with **Dapsone Monotherapy**
- **1986-** WHO **MDT was introduced** in Myanmar. At that time, the number of registered leprosy cases was 222209 and prevalence rate was 59.3 per 10000 population
- **1988-**Nationwide MDT Programme started in 6 hyper endemic areas
- **Full integration** with six hyper-endemic regions (1991 onwards)
- **100% area coverage** of MDT services **(1995)**
- **Achieved elimination target at** 2003

# Bacteriology



*Mycobacterium leprae*

- Acid-fast, rod-shaped bacillus, microaerophilic, gram-positive
- The live and dead bacilli can be differentiated in smears by Ziehl-Neelsen method and are stained by Carbon fuchsine
- *M. leprae* grows best in cooler tissues (the skin, peripheral nerves, anterior chamber of the eye, upper respiratory tract and testes), sparing warmer areas of the skin (the axilla, groin, scalp, and midline of the back)

- *M. leprae* remains one of the few bacterial species that still has not been cultivated on artificial medium or tissue culture and produces no known toxins, but can grow in
  - Nude mouse
  - Nine banded armadillos

# Reservoir of Infection

- Main reservoir: Human being
  - Lepromatous case > Non lepromatous cases
- Nonhuman reservoirs
  - 9-banded armadillos
  - Chimpanzees
  - Mangabey monkeys
  - Sphagnum moss

# Portal of Exit

- Major portal of exit: Nasal Mucosa
  - LL cases harbor millions of M.leprae in their nasal mucosa discharged when they sneeze or blow nose
- Ulcerated or broken skin of bacteriologically positive cases

# Mode of Transmission

- Transmission by inhalation
  - Droplet infection (most common)
- Transmission by contact
  - Skin to skin contact with infectious cases
  - Contact with soil or fomites
- Other Routes
  - Insect Vectors e.g., Mosquito, Bedbugs
  - Tattooing needles
- Breast feeding and Transplacental infection do not occur

# Incubation Period

- Long incubation period
  - Ranged: 2 to 40 years or more
  - Average: 3-5 years
- Generation time: 12 days

# Host Factors

- Leprosy affects all age groups but incidence generally rises to a peak between 10 to 20 years of age and then fall
- Higher incidence is seen in males, more marked among adults, more marked among lepromatous cases
- Cell Mediated Immunity is responsible for resistance to infection with M.leprae. In lepromatous leprosy there is complete breakdown of CMI

# Environmental factors

- Humidity favors survival of M.leprae in environment
- M.leprae remain viable in
  - Dried nasal secretion for **9 days**
  - Moist soil at room temperature for **46 days**
- Overcrowding and lack of ventilation within households

# Social factors

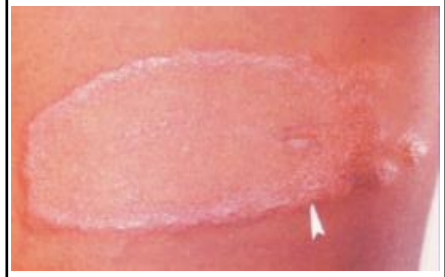
- Often called a “social disease”
- In addition to the physical effects of the disease, patients have also suffered **severe social stigma and ostracism** from their families, communities, and even health professionals to such as an extent that leprosy has been known since ancient times as “the death before death”
- Social factors:
  - Poverty
  - Poverty related circumstances: overcrowding, poor housing, lack of personal hygiene

# Classification

- Indian Classification
- Ridley Jopling Classification
- WHO Classification

# Indian Classification

1. Indeterminate
2. Primary (or pure) Neuritic
3. Tuberculoid
4. Borderline
   - Borderline tuberculoid
   - Mid-Borderline
   - Borderline lepromatous
5. Lepromatous

| | Indeterminate (I) | Primary (or pure) Neuritic (PN) | Tuberculoid (TT) | Borderline | Lepromatous (LL) |
|---|---|---|---|---|---|
| Skin lesions | Single, ill-defined hypopigmented or faintly erythematous macule  | Absent | Single or few well-defined annular asymmetric macules or plaques with a tendency toward central clearing, elevated borders  | Ill-defined plaques with an occasional sharp margin; few or many in number  | Symmetric, poorly marginated, multiple infiltrated nodules and plaques or diffuse infiltration; xanthoma-like or dermatofibroma papules; leonine facies and eyebrow alopecia  |

| | Indeterminate (I) | Primary (or pure) Neuritic (PN) | Tuberculoid (TT) | Borderline | Lepromatous (LL) |
|---|---|---|---|---|---|
| Sensory impairment | Slight | Marked in the affected areas | Marked | Slight to marked | None in early cases, extensive in late stages |
| Peripheral nerves | Normal | Asymmetrical enlargement of single or several nerve trunks, resulting in anaesthesia; paresis, deformities and trophic changes; nerve abscesses may be formed | Peripheral nerve trunk related to the lesion may be enlarged; nerve abscess may be formed  | Several peripheral nerves become asymmetrically enlarged; serious wide-spread neuropathy may occur | Many peripheral nerves are affected and result in extensive anaesthesia |

| | Indeterminate (I) | Primary (or pure) Neuritic (PN) | Tuberculoid (TT) | Borderline | Lepromatous (LL) |
|---|---|---|---|---|---|
| Skin smear | Negative | | Negative | Positive (1+ to 5+) | Always positive (5+ to 6+) |
| Course and prognosis | May regress or progress to other definitive types | May shift either way but usually to tuberculoid type | Benign and stable type | Unstable, may progress sub-polar lepromatous (LLs) leprosy; prognosis is variable; prone to reactions | Principal source of infection, prone to ENL reactions; if untreated prognosis is poor |

## Ear Lobe Involvement

## Leonine Facies

## Clinical **Ridley** and **Jopling** Classification

1. Tuberculoid
2. Borderline tuberculoid
3. Borderline
4. Borderline lepromatous
5. Lepromatous

# Skin smear result (**WHO**) classification

1. Paucibacillary leprosy (PB)
    - No or 1 nerve trunk involved with a maximum of 5 skin lesions
2. Multibacillary leprosy (MB)
    - Involvement of more than 1 nerve trunk and 5 skin lesions

# Clinical features

**In early stages:**

- Hypopigmentation/ Skin lesions: It may be dark or light, single or multiple, present in the form of macule (flat), papule (raised) or nodule
- Sensory loss – at the skin lesion is mandatory
- Sensory loss in fingers and toes
- Numbness
- Thickened nerves
- Positive smears


Fig (a) Nodules on the face, (b) skin patch on the face, (c) an enlarged nerve in the neck

**In late stages:**

- Trophic ulcers
- Foot drop/ claw toes
- Claw hand
- Loss of fingers or toes
- Nasal bridge collapse leading to flat and runny nose
- Muscle weakness
- Dry scalp
- Smooth, shiny diffuse thickening of hand, facial skin and ear

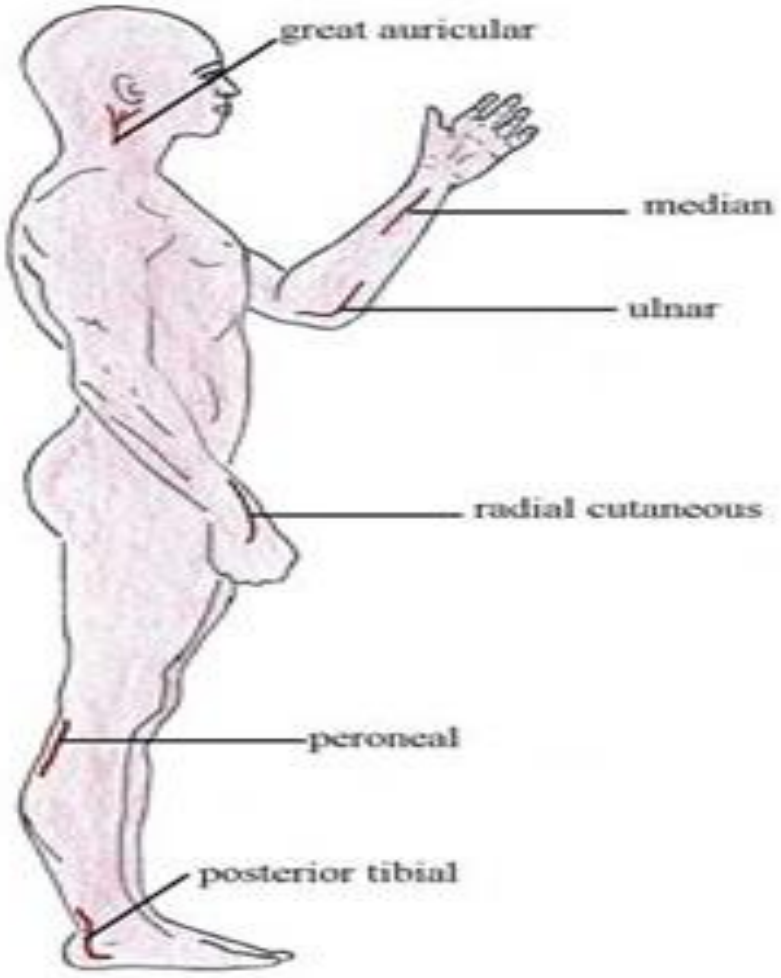
# Other areas of the body affected by Leprosy Disease

- **Nose**: Damage to the nasal passages can result in a chronically stuffy nose and nosebleeds and, if untreated, complete erosion of the nose.
- **Eyes**: Damage to the eyes may lead to glaucoma or blindness.
- **Sexual function**: Men with lepromatous leprosy disease may have erectile dysfunction (impotence) and become infertile. The infection can reduce the amount of testosterone and sperm produced by the testes.
- **Kidneys**: The kidneys may malfunction. In severe cases, kidney failure may occur.

# Nerve Involvement

- Nerve involvement leads to muscle weakness, muscle atrophy, severe neuritic pain, and contractures of the hands and feet
- **Ulnar** nerve is most commonly involved, least common is radial
- Most common cranial nerve involved is Trigeminal
- >30 percent neural loss required for loss of sensation
- First sensation to go is **thermal** (cold>fine touch)

# Examination of nerves




- Great auricular, supraorbital, ulnar, median, radial, lateral popliteal and posterior tibial nerves - palpated for tenderness, consistency and size
- Affected nerves may be cord-like
- In a reaction state, nerve will be tender to palpation or spontaneously painful

# Nerve Palpation

- Peripheral nerves are examined for enlargement or thickening and for tenderness
- When palpating a nerve always use two or three fingers
- The nerve should be rolled over the surface of the underlying bone
- The same nerve on the left and right sides of the body must always be compared

# Sensory Test

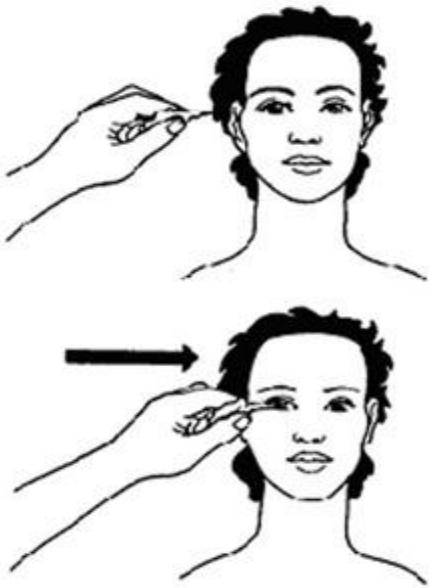
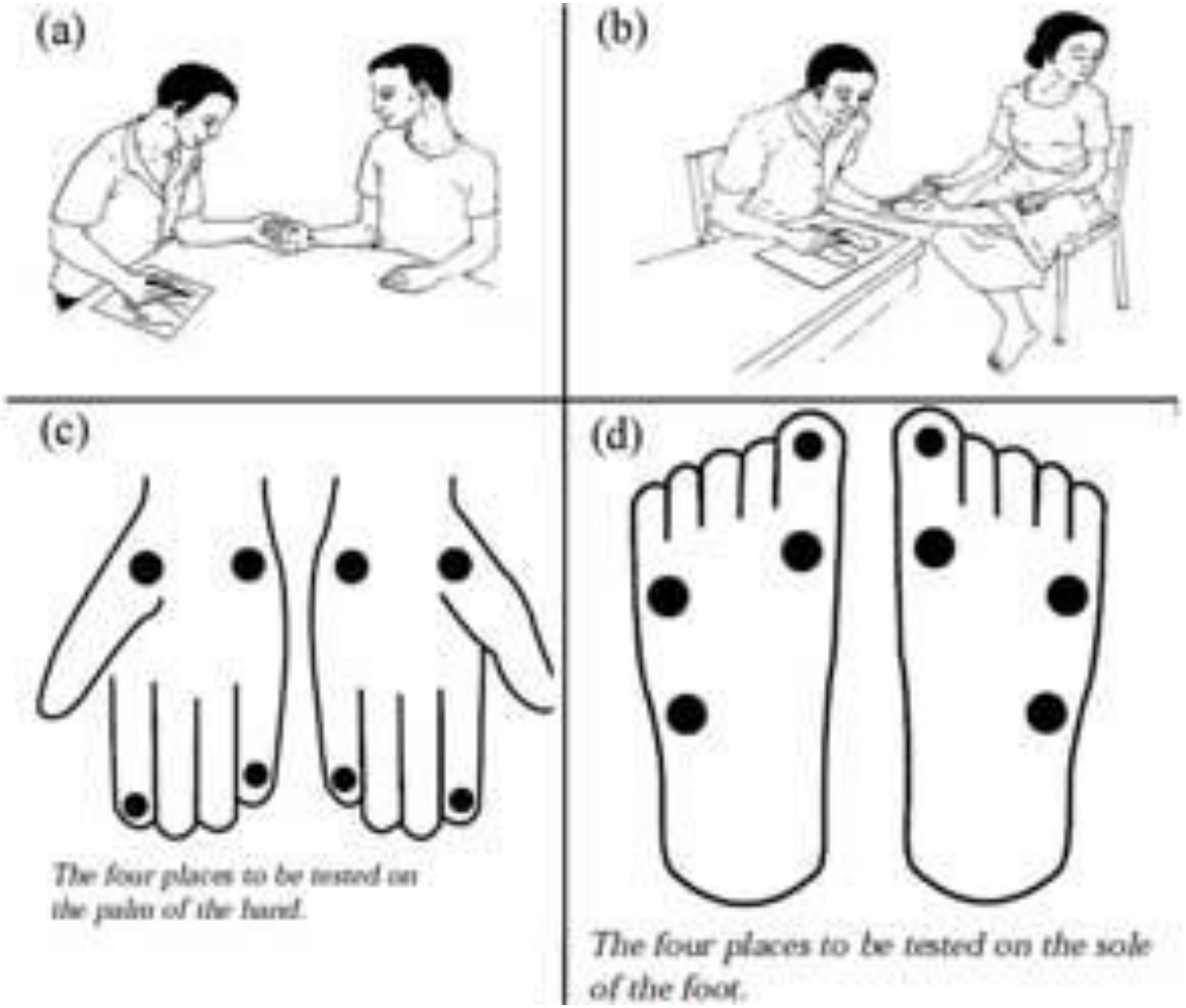


Fig: Corneal sensation test



# Nerve function test

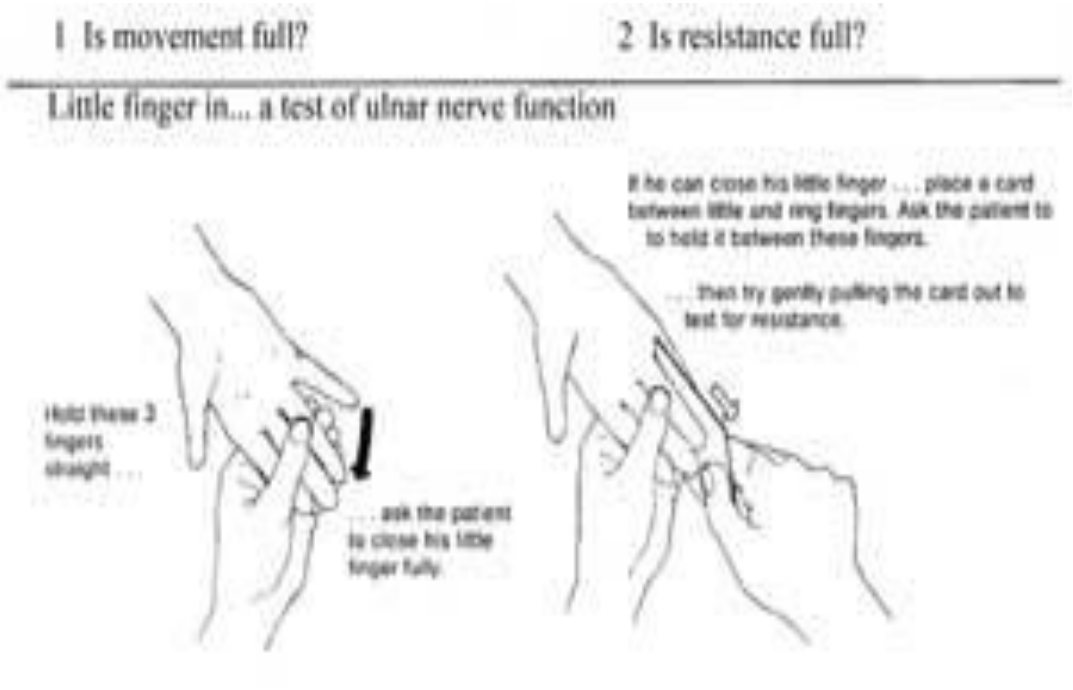



Fig: The ‘little finger out’ test

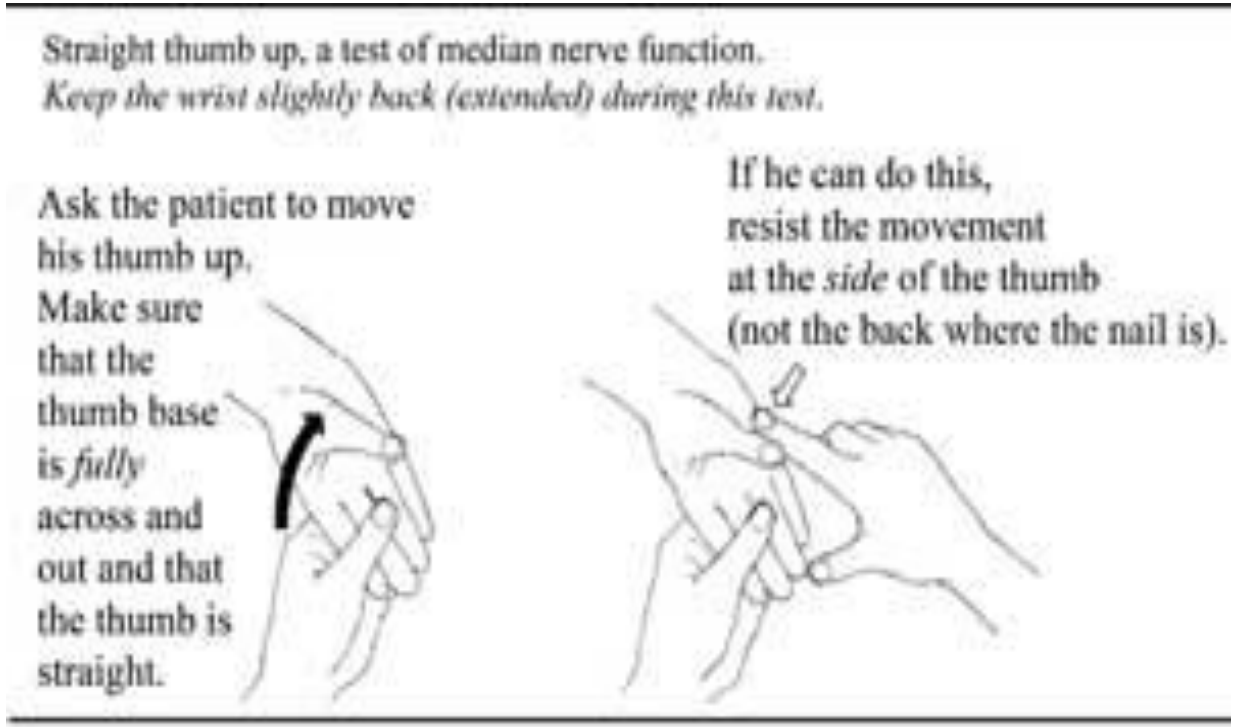



Fig: The ‘thumb up’ test

1 Is movement full? 2 Is resistance full?

## Wrist back: a test of radial nerve function

*This test is sometimes omitted from simple record forms, as radial nerve damage is rare. Where radial nerve damage and nerve drop do occur they usually follow median nerve damage.*

Ask the patient to pull his wrist back fully.
*Support the patient's wrist.*

Press gently but firmly at the back of the hand to test for resistance.

Fig: The 'wrist back' test

## Tests of peroneal nerve function

*This nerve has two main branches and either branch may be damaged, hence there are two tests – one for each branch. However, the second test may be omitted from simple record forms.*

Foot up

Support behind the patient's ankle.
Ask the patient to pull his foot up fully.

Press at the top of the foot to test for resistance.

Foot out

Ask the patient to turn his foot out.

Press at the outside of the foot to test for resistance.

Fig: The 'foot up' test

# Diagnosis

Cardinal signs of leprosy:

- Hypopigmented or erythematous, well-defined skin lesions, e.g. macules or plaques, with definite loss of sensation
- Signs of peripheral nerve damage, such as sensory loss, paralysis or sudomotor dysfunction with or without nerve enlargement
- A positive skin smear

# Differential Diagnosis

Various disease conditions that mimics the leprosy must be ruled out

- Tinea versicolor/ Pityriasis versicolor
- Pityriasis alba
- Early vitiligo
- Nevus anemicus

# Lepra Reactions

- During the course of leprosy, immunological mediated episodes of acute or subacute inflammation known as reaction occur
- There are two types of reactions:
  - Type 1 or Reversal reaction
  - Type 2 or erythema nodosum leprosum
- Both types can occur before the start of MDT, during treatment or after completion of treatment

| | Type 1 Reaction (Reversal) | Type 2 Reaction (erythema nodosum leprosum, ENL) |
|---|---|---|
| Types of leprosy involved | Borderline and tuberculoid leprosy | Lepromatous; borderline lepromatous |
| Onset | First 6 months of therapy, but longer intervals in BL patients | ENL occurs later when skin lesions appear quiescent |
| Cause | Sudden increase in cell-mediated immunity (CMI) | Immune-complex syndrome due to precipitation of antigen and antibody complexes in tissue spaces and in blood and lymphatic vessels |
| Clinical | Existing leprosy lesions show signs of acute inflammation. Necrosis and ulceration occur in severe cases. New lesions appear occasionally. | Sudden appearance of crops of evanescent pink coloured tender nodules or plaques<br>May become vesicular, pustular, bullous, gangrenous and break down. ENL may be the first manifestation. |

| | Type 1 Reaction (Reversal) | Type 2 Reaction (erythema nodosum leprosum, ENL) |
|---|---|---|
| Systemic disturbances | Unusual | Fever and malaise common, patient may be toxic |
| Associated features | Rapid swelling of nerves with pain and tenderness, oedema of hands, face and nerve abscesses<br>Claw hand, foot drop, facial palsy may occur suddenly | Oedema of hands, feet and face. Paralyses may occur but in Type 2 reactions nerve damage does not threaten so quickly as in Type 1 reactions<br>Commonly associated features are: iritis, iridocyclitis, epistaxis, muscle pain, bone pain, nerve pain, joint pain, lymphadenitis, epididymo-orchitis, proteinuria |
| Course | Seldom persists for more than a few months | Mild ENL usually disappears rapidly but severe ENL may persists for years in chronic recurrent form |

# Deformities and their Management

- Deformities is any deviation from the normal appearance of any part of body
- Primary deformities are directly caused by the tissue reaction to infection with *M.leprae*, e.g. loss of eye brows and eyelashes, facies leonine, gynaecomastia, flat-nose, claw hand, wrist drop
- Secondary deformities occur as a result of damage to the anesthetic parts of the body, e.g. plantar ulcers, loss of toes and fingers, corneal ulcers

- *M.leprae* is the only bacillus to infect peripheral nerves

Sensory fibres → hypoaesthesia or anaesthesia → ulcers on hand and foot,

corneal ulcers, corneal opacities

Motor fibres → muscle weakness or paralysis → claw hand, foot drop etc

Autonomic nerve fibres → lack of sweat and sebum → dry skin, cracked skin, ulcers

# Deformities occurring in Leprosy

| | |
|---|---|
| Face | Facies leonine, lagophthalmos, loss of eyebrows and eyelashes, corneal ulcers and opacities, perforated nose, depressed nose, ear deformities, e.g. nodules on the ear and elongated lobules |
| Hands | Claw hand, wrist-drop, ulcers, absorption of digits, thumb-web contracture, hollowing of interosseous spaces and swollen hand |
| Feet | Plantar ulcers, foot-drop, inversion of foot, clawing of toes, absorption of toes, collapsed foot, swollen foot and callosities |
| Other deformities | Gynaecomastia and perforation of the palate |

Damage due to: injury → ulcers

friction → abrasions, blisters, ulcers

heat → burns, blisters, ulcers

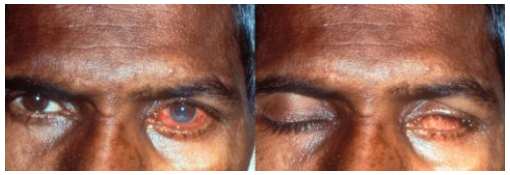
repeated trauma or pressure on bony prominences → corns/callouses → haematomas beneath corns/callouses → infections → ulcers, shortening and loss of toes and fingers

Fig. Consequences of damage to anesthetic hands and feet

# Primary deformities due to paralysis of the nerves

| Nerves | Deformities | Associated sensory changes | Associated motor changes |
|---|---|---|---|
| Ulnar nerve  | Claw hand with hyperextended metacarpophalangeal joints and flexion of interphalangeal joints of ring and little fingers | Anesthesia of little finger, ulnar half of ring finger, ulnar side of hand and forearm | Wasting of hypothenar eminence and hollowing of interosseous spaces |
| Median nerve   | Clawing of index and middle fingers. Association with ulnar paralysis produces clawing of all fingers | Anesthesia of the lateral half of the palm | Wasting of hand and radial site of thenar eminence |
| Radial nerve  | Wrist-drop. Inability or difficulty in extending the wrist and fingers | Sensory loss confined to a small area proximal to the index finger on back of hand | Paralysis of thumb, finger and wrist extensors |

# Primary deformities due to paralysis of the nerves

| Nerves | Deformities | Associated sensory changes | Associated motor changes |
|---|---|---|---|
| Lateral popliteal nerve  | Foot-drop. Patient drags the foot while walking and has a high-stepping gait due to inability or difficulty in dorsiflexing the foot | Anesthesia of dorsum of the foot and outer side of leg | Paralysis of the peroneal muscles and dorsiflexors of the foot |
| Posterior tibial nerve  | Clawing of toes and collapse of foot arches | Anesthesia of the sole of the foot | Paralysis of almost all intrinsic muscles of the foot |
| Facial nerve  | Lagophthalmos (following paralysis of zygomatic branch of facial nerve); mask face | None | Paralysis of orbicularis oculi, paresis of orbicularis oris |

# The Three-grade WHO classification of deformities/disabilities

| Grade | Hands and Feet | Eyes |
|---|---|---|
| Grade 0 | No anesthesia<br>No visible deformity or damage | No eye problems due to leprosy<br>No evidence of visual impairment |
| Grade 1 | Anesthesia present<br>No visible deformity or damage | Eye problems due to leprosy are present<br>Vision 6/60 or better, patient can count fingers at six meters |
| Grade 2 | Visible deformity or damage present | Severe visual impairment (vision less than 6/60, the patient is unable to count fingers at six meters), lagophthalmos, iridocyclitis and corneal opacities |

# Prevention of  Deformities

- Early detection of nerve damage and early and adequate treatment of persons suffering from leprosy
- Continue taking anti-leprosy drugs regularly and in full dosages
- Affected nerve - rested by sling, splint or plaster cast, kept warm by using warm clothing or woollen bandage, may limit further damage and promote healing

# Prevention of  Deformities

- In acute neuritis, active exercises should be started as soon as pain subsides
- Corticosteroid, e.g. prednisolone
- Surgical decompression is indicated in
  - Intractable pain not relieved by medical treatment
  - Nerve abscess
  - Entrapment of the nerve by a constricting band

# Management of Primary Deformities

- Most deformities due to paralysis can be partially corrected by reconstructive surgery and the results are excellent if the limbs are kept mobile by exercises and free from ulceration and stiffness
- Tendon transfer surgery, nerve repair with denatured, autologous muscle grafts
- Surgery on patient with unstable deformities can cause exacerbations of the disease and deterioration of deformity

# Management of Secondary Deformities

❖Anesthesia

- Educate the patient that injuries can be prevented
- Regular daily examination of hands and feet for injuries and prompt treatment of any injuries
- Always use his eyes in order to compensate for the loss of sensation and not to touch hot things

❖Paralysis

- Prevent joints becoming stiff by carrying out passive exercises
- A splint to hold the joints in the corrected position may be supplied, to be bandaged on at night

# Treatment

The treatment of leprosy involves multidisciplinary approach

- ❖Multidrug therapy
- ❖Sensory care
- ❖Surgical approach
- ❖Physiotherapy
- ❖Occupational therapy
- ❖Patient counselling

# Multidrug therapy

For Paucibacillary (PB) Leprosy: Daily dapsone and rifampicin once a month for 6 months

For Multibacillary (MB) Leprosy: Daily dapsone and clofazimine, along with rifampicin 600 mg once a month for 12 months

- The duration of  treatment with the multidrug (chemotherapy) should be at least for 2 years till the smear is negative

# Sensory Care

- Moisturising the skin
- Cleaning the part regularly
- Maintaining proper protection to the skin/ cover the part properly
- Avoid exposure to too hot or cold object; prevent holding/ touching any sharp object
- Avoid barefoot walking
- Avoid too much tight shoes or garments

# Surgical Approach

- **Tendon Transfer**: Moving the distal end of the tendon to a new place so that contraction of muscle belly will produce a needed movements used to replace paralysed muscles. Example- Transfer of forearm muscle to make finger movements
- **Tendon Lengthening**: To permit more movement and reduce contracture, e.g., Tendo Calcaneus lengthening
- **Capsulotomy**: To loosen tight joint capsule often done with tendon lengthening and tendon transfer to improve range of motions
- **Arthrodesis**: Elimination of unstable and deformed joints
- **Tenodesis**: Attach a piece of tendon across the joint to reduce the movement. The tendon then act as ligament, e.g., Tenodesis of MCP joint to prevent hyperextension

# Physiotherapy Management

Started as soon as possible to achieve optimum results

- Restoring the normal tone of muscles and preserving the physiological properties of paralysed or paresed muscles
- Preventing muscle atrophy and the overstretching of paralysed or paresed muscles
- Preventing contractures and keeping joints mobile by improving the range of movements
- Maintaining and improving blood circulation and
- Making the skin soft and supple

# Physiotherapy Management

## Before surgery

- Active assistive or active movement to maintain joint flexibility
- Isometric exercises to increase the strength
- Modalities, e.g., TENS can be given to reduce pain
- Mild mobilization can be done to prevent stiffness of joint

# Physiotherapy Management

**After surgery**

- Passive movement following hydrotherapy helps in increasing the range of motion
- Active and isometric exercises are taught to the patient in order to increase the strength and to maintain joint flexibility
- Manual stretching and gentle mobilization are given to prevent mild contractures
- Facilitated stretching techniques (PNF) are also effective techniques

# Physical Therapy Technique:

- **For increasing/regaining ROM**: ROM can be increased by soaking the skin or part in warm water and then performing passive movement to the part affected
- **To improve strength specially in tendon transfer**: Active exercise in all part in which surgery is performed
- **Clean supple skin**: It is provided by soaking the part in soap water, rubbing off thick skin, oiling, self massage and protecting the part from infection
- **Home care**: teaching skin, hand, foot and eye care to groups and individuals and teaching the patients actual home care

# Physical Therapy Technique:

- **Protect tissue during healing**: Rest, body position and POP cast
- **Prevent/Reduce swelling**: Elevation, active and passive exercise
- **Muscle Re-education after tendon transfer**: Teaching new restored skills in movements provided by tendon transfer
- **Self restored skills in daily work**: Teaching patient to use any new skill safely in specific task. Providing hand, eye and foot protection

## Exercises

- In leprosy, a motor nerve may not be completely destroyed, active exercises or assisted-active exercises enable to regain muscle strength
- Patient with paralysed muscles starts with passive exercises, put joints through their full range of movement to prevent contractures
- 3-5 sessions per day and each exercise for thirty times
- In lagophthalmos due to partial paralysis, the patient should be instructed to close his eyes as tightly as he can  40 times, three times daily

## Massage

- Gentle but firm massage with any oil to increase local circulation, stimulates muscles, makes the skin smooth and supple and reduce stiffness and prevent contractures
- For a few minutes in a downward direction, e.g. from base of finger down to its tip
- Give oil massage immediately before the exercise programme and before the application of splints

## Wax baths

- Hands are dipped in molten wax kept at a temperature of 120° F (49° C). After taking hands out of the wax bath, they are covered with grease-proof paper and wrapped in a woollen blanket
- Wax is removed after 20 minutes
- Wax baths increase blood circulation, effect on  softening the skin, loosen and relax soft tissue contractures. Wax baths are contraindicated in patients with allergy to wax or heat

- **Hydrotherapy:** Hands are dipped in warm water at 109° F (42° C) for ten minutes. During this period, gentle massage is given. Warm water softens the skin and improves the blood circulation.
- **Soaking in water for dry skin**: In patients with dry skin, the hands and feet should be soaked in water for about 30 minutes every day. The oil or Vaseline should only be applied to dry skin after it has first been soaked in water .
- **Electrical Stimulation** of the muscles, **shortwave diathermy** and **ultrasonics**

# Splint

## Indications

1. Proximal interphalangeal flexion contractures,  and claw hand
2. Interphalangeal flexion contracture of the thumb
3. Thumb web contracture
4. Paralysis of short muscles of the thumb
5. The reaction hand
6. Open wounds at the finger flexion creases
7. Foot ulcers, foot-drop and
8. Wrist-drop

## Contraindications and Precautions

- Do not use splints for claw hands without any action of PIPJ, i.e. if fixed flexion deformity of PIPJ is present
- Slightest excess pressure lead to ulcers, splinting should be carried out with care
- Splints should be discontinued if pain, redness, swelling and/or blisters develop at the site of application
- The patient should be referred to a specialist if regular use of splints for 3 months does not result in substantial improvement
- If splints are used appropriately, along with suitable exercises, claw hands become normal in the majority of early cases

# Role of Occupational Therapy

- It enables those affected by disabilities to learn new skills for coping with the lasting effects of their condition
- Learning new job skills, tricks and techniques for managing everyday tools of trade and domestic duties, and adapting to modified protective tools, appliances, and items of clothing to protect themselves from further injury, are its part

# Patient Counselling

- It is an important approach after the first line management in such patients, as these patients, who are prone to so many disabilities require counselling in order to cope with their illness with lot of mental strength

# References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