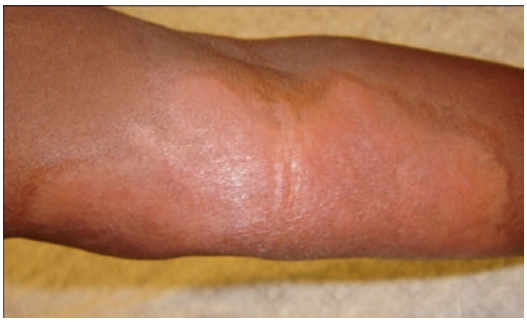
Leprosy

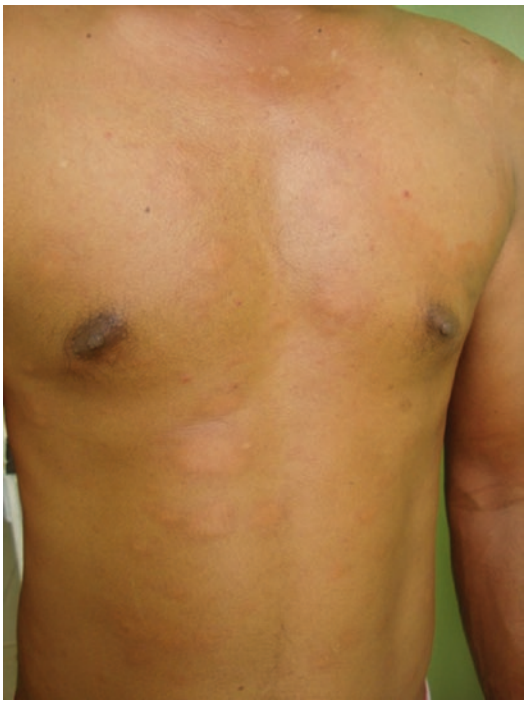
15

Ranthilaka R. Ranawaka

(The clinical photographs in this chapter are photographed by Dr Ranthilaka R. Ranawaka, consultant dermatologist, General Hospital Kalutara, Sri Lanka)



(1) A 54-year-old woman came with this hypopigmented patch which was treated as pityriasis versicolor for more than 1 year. Recently she noticed sensory impairment on the skin patch.
   a. What is your diagnosis?



(2) A 45-year-old man had these hypopigmented patches on the trunk for more than 2 years which were treated as pityriasis versicolor. There was no sensory impairment over the skin patches.
   a. What are the differential diagnoses?
   b. How do you confirm it?
   c. What other tests would you do to assist diagnosis?

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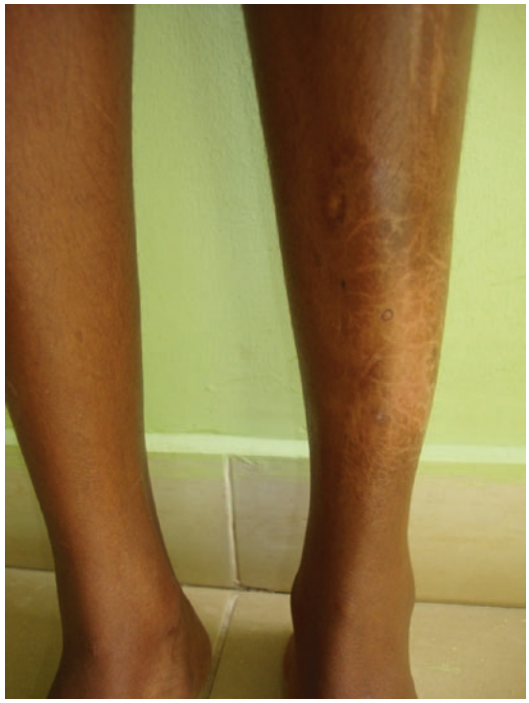
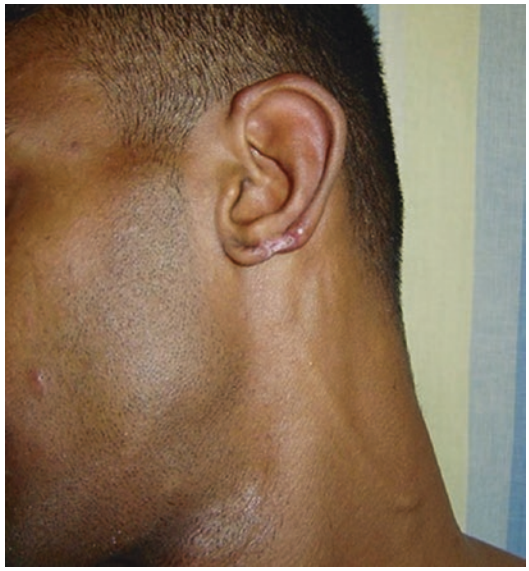
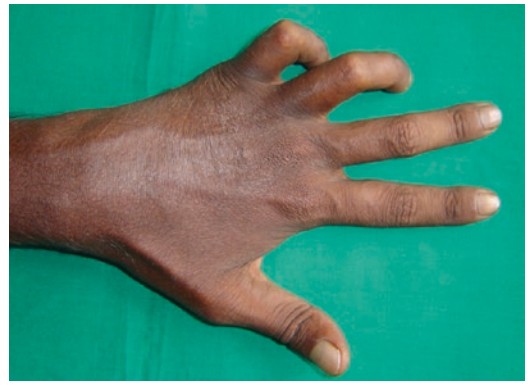


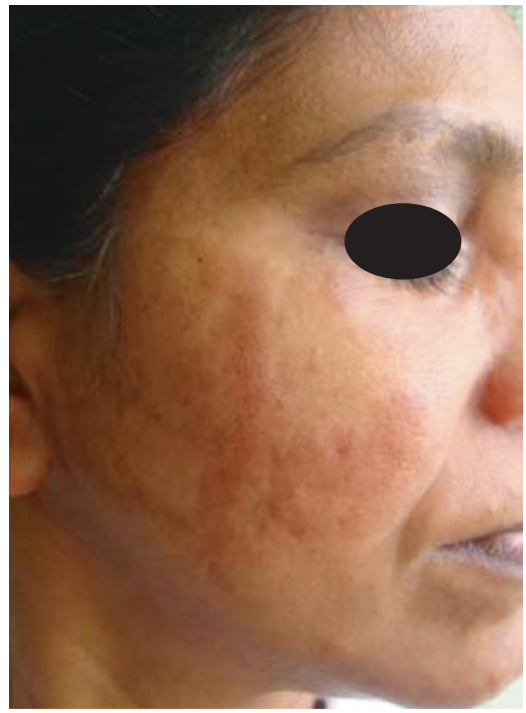
(3) A 15-year-old boy complained of sensory impairment over a skin patch. On examination well-localized area of ichthyosis was noted.
   a. What is the possible diagnosis?
   b. What test would you perform to confirm it?



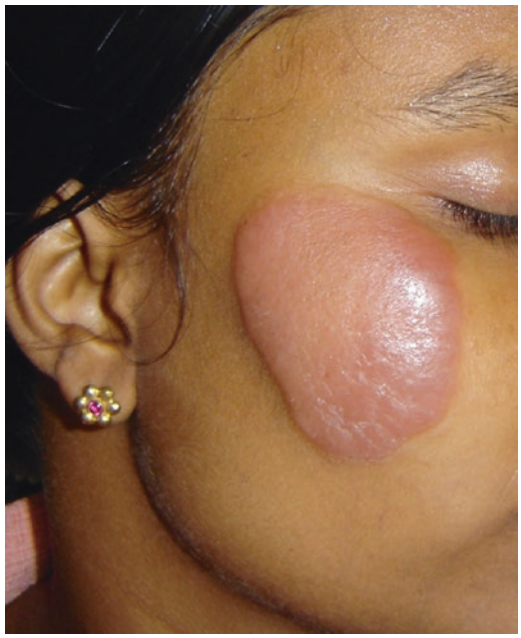
(4) A 29-year-old army soldier was refererd to ENT unit with nodular eruption over the left pinna.
   a. What other clues you can see here to support the diagnosis?
   b. What is the test you would perform to diagnose it?
   c. What is your diagnosis?



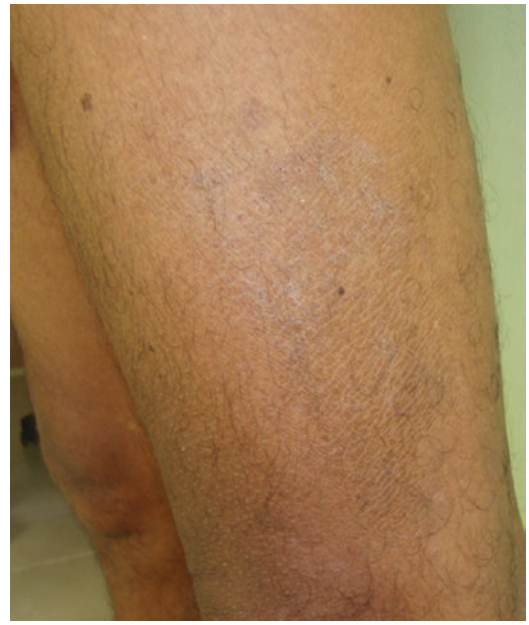
(5) A 19-year-old boy was referred from neurology department after excluding neurological causes for his hand deformity.
   a. What is your diagnosis?
   b. What are the causes for this deformity?



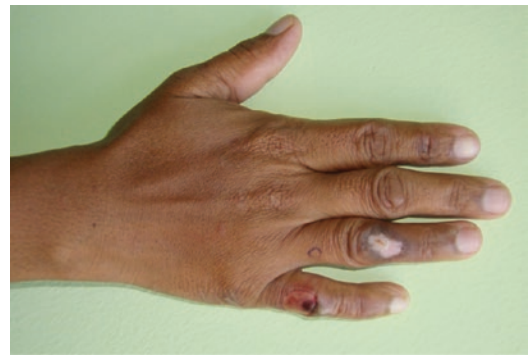
(6) A 47-year-old woman came with this asymptomatic skin patch on the face for more than 6 months.
   a. What are the differential diagnoses?
   b. Where else would you examine, and what signs do you look for?
   c. How do you confirm the diagnosis?



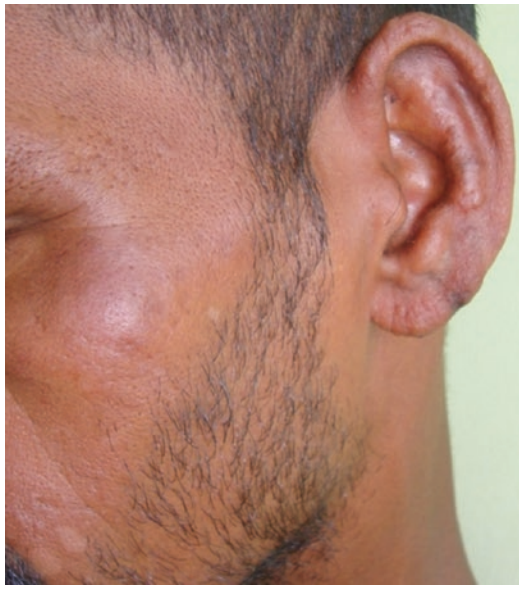
(7) A 21-year-old mother of 9-month-old baby came with this suddenly appeared erythematous patch on the right cheek. She has had "pityriasis versicolor"-like patch on the same site for more than 3 years which she was prescribed antifungal creams.
   a. What are the differential diagnoses?
   b. What tests would you perform to diagnose it?
   c. What is your diagnosis?
   d. She is breast-feeding the baby. What advice would you give her regarding treatments?



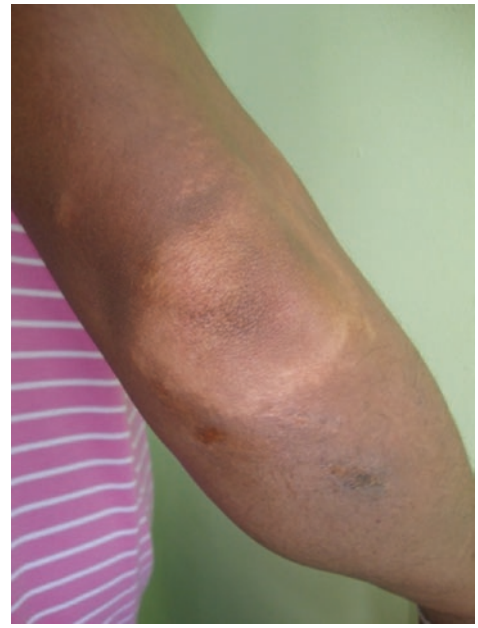
(8) A 19-year-old boy complained of numbness on the left lateral thigh.
   a. What are the important signs in this skin patch?
   b. What is your diagnosis?
   c. How do you confirm it?



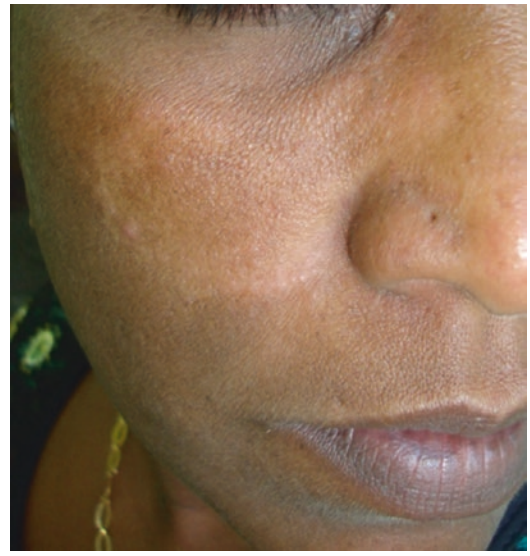
(9) A 37-year-old woman was referred from surgical department since she was getting recurrent unexplained ulcers on fourth and fifth fingers and adjacent skin.
   a. Where else would you examine?
   b. How do you confirm?
   c. What is the explanation for her recurrent ulcers?



(10) A 45-year-old manual labourer complained of swelling of his left ear which he had noticed few months ago. He had sought treatments from several doctors without any improvement.
   a. What are the important clinical features in this picture?
   b. What bedside test would you do for confirmation?
   c. What is the diagnosis?

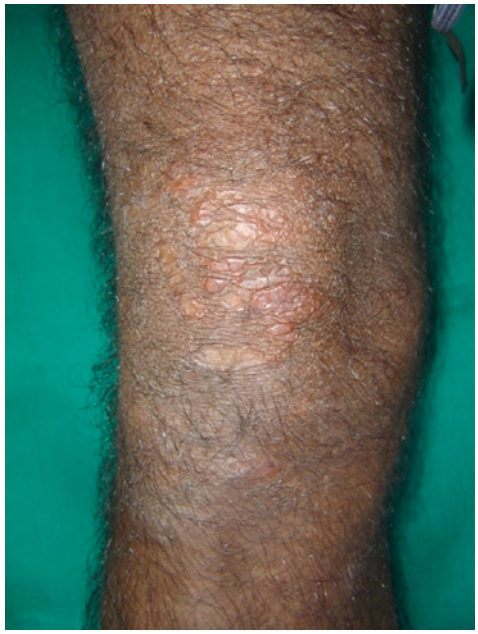


(11) A 43-year-old woman came with this hypopigmented patch with sensory impairment. She noticed that the area is more painful when the elbow joint is hit on a hard surface.
   a. What is your diagnosis?
   b. How do you confirm it?
   c. She complains of pain when the affected joint is hit on a hard surface. What is this sign?



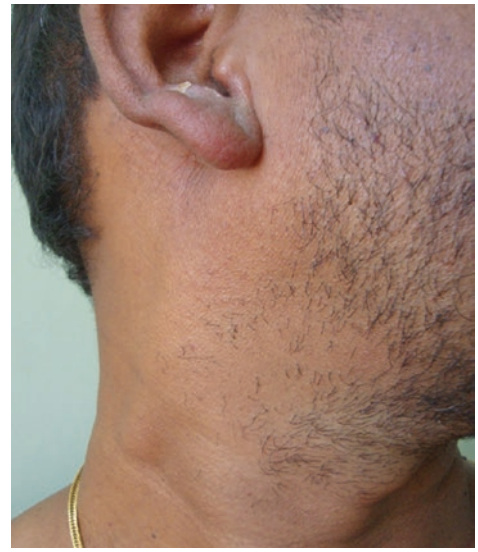
(12)A 45-year-old woman came with this single asymptomatic hypopigmented patch on the face for more than 3 months. There was no sensory impairment over the skin patch.

a. What are the differential diagnoses?
b. How do you confirm it?



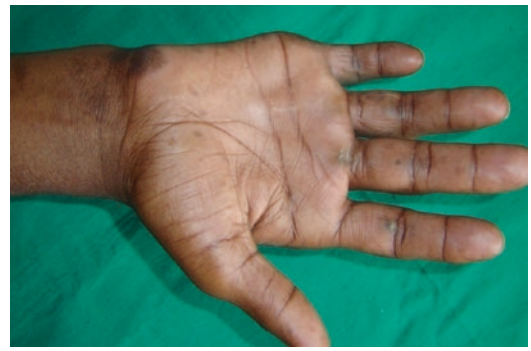
(13)A 29-year-old army soldier complained of pain when his right knee joint is hit on a hard surface. On examination localized area of dry skin is noted.

a. What is the described sign?
b. What other signs you would elicit to confirm the diagnosis?
c. What is the possible diagnosis?



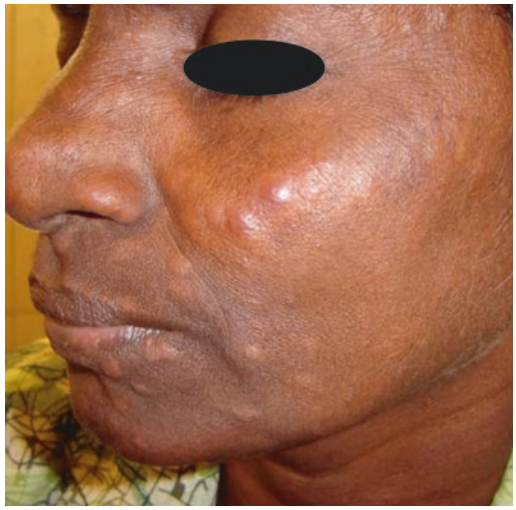
(14)A 36-year-old man came with tender nodule on the side of the neck.

a. What is your diagnosis?
b. What other clues you can see here to support the diagnosis?
c. What test would you perform to confirm diagnosis?

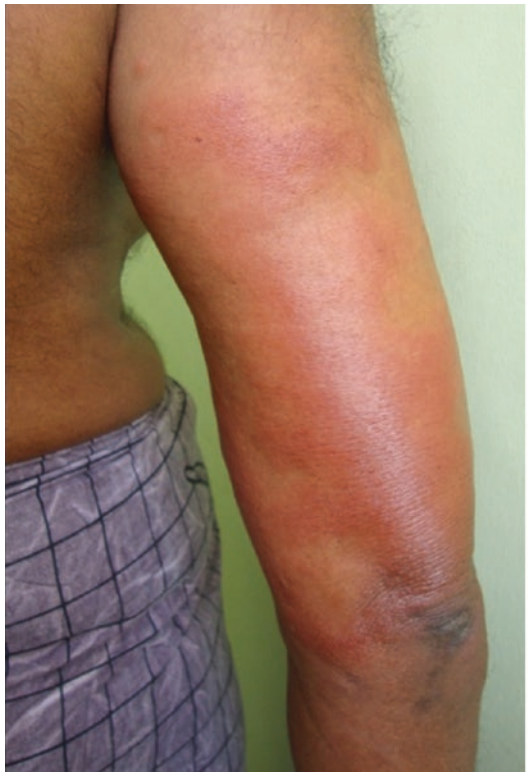


(15)A 19-year-old boy came with this hand deformity to the neurologist.

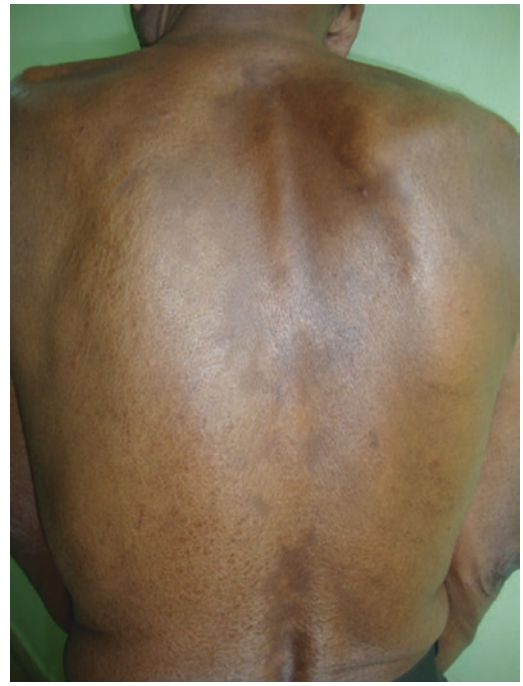
a. What other signs do you look for?
b. How do you diagnose?



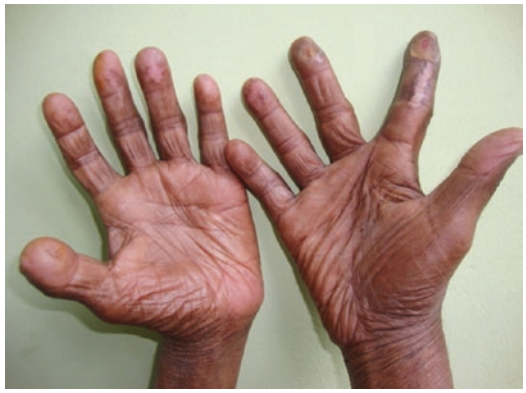
(16) A 47-year-old woman came with this asymptomatic skin nodules and plaques on the face.
   a. What are the differential diagnoses?
   b. Where else would you examine, and what signs do you look for?
   c. How do you confirm the diagnosis?



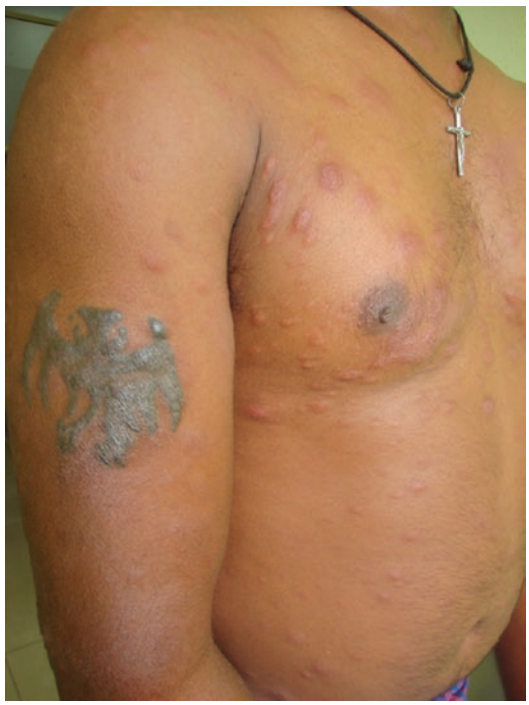
(17) A 54-year-old man came with this painful erythematous patch on the right arm which appeared within 2 days.
   a. What are the differential diagnoses?
   b. What is your clinical diagnosis in this patient?
   c. How do you confirm the clinical diagnosis?
   d. What treatments would you start immediately and why?



(18) A 67-year-old man came with extensive hypopigmentation on the back of the trunk.
   a. What are the differential diagnoses?
   b. What are other clinical features you look for?
   c. What is the diagnosis in this patient?



(19) A 70-year-old man was reffered from the neurology department to exclude leprosy. He complained of recurrent burn injuries on both hands for more than 6 months.
   a. What is the cause for his burn injuries?
   b. How do you confirm leprosy in this patient?



(20) A 37-year-old man had completed antileprosy treatments for lepromatous leprosy four years ago. He came to us with recent onset of painful papular nodular eruption with body aches and pains for 1-week duration. These were not itchy.
   a. What are your differential diagnoses?
   b. Where else would you want to examine?

Answers

(1) Tuberculoid leprosy.
(2) Multibacillary leprosy, hypopigmented mycosis fungoides, pityriasis versicolor.
   Skin biopsy for histopathology.
   Slit-skin smear for bacillary index and morphological index.
(3) Tuberculoid leprosy.
   Skin biopsy for histopathology.
(4) Superficial cutaneous nerve (left greater auricular nerve) is thickened and palpable.
   Check sensory impairment on the skin lesions, skin biopsy for histopathology, slit-skin smear for bacillary index and morphological index.
   Tuberculoid leprosy.
(5) Left ulnar claw deformity.
   Any pathology affecting the ulnar nerve; leprosy or pure neural leprosy is one cause. These patients are first seen by a neurologist.
(6) Leprosy, cutaneous sarcoidosis, lupus vulgaris.
   Examine the whole body for similar lesions, sensory impairment over skin patches, peripheral neuropathy and any motor weakness.
   Skin biopsy for histopathology, slit-skin smear for bacillary index and morphological index.
(7) Tuberculoid leprosy, cutaneous sarcoidosis, lupus vulgaris.

Skin biopsy for histopathology, slit-skin smear for bacillary index and morphological index.

Leprosy with type I reaction.

She can continue breast-feeding while on antileprosy treatments; if clofazimine is included in therapy, the baby also gets skin pigmentation which disappears spontaneously after stopping therapy.

(8) Well-demarcated dry scaly skin patch with sensory impairment.

Tuberculoid leprosy.

Skin biopsy for histopathology.

(9) Right ulnar nerve (thickened, cord-like, tender), ulnar border of the hand and forearm for sensory impairment or any burn injuries.

Skin biopsy from the affected skin.

She gets heat injuries during cooking since the skin is numb on those areas.

(10) He has asymptomatic infiltration of the pinna of the ear, infiltrations on the face.

Slit-skin smear from ear lobes.

Lepromatous leprosy.

(11) Tuberculoid leprosy.

Clinical diagnosis is sufficient, hypopigmented patch with sensory impairment is leprosy. Can perform skin biopsy for histopathology when the diagnosis is uncertain.

Tap sign – more painful when the affected joint is hit on a hard surface.

(12) Tuberculoid leprosy, photodermatitis, pityriasis versicolor (on the face sensory loss is not detected due to overlapping sensory supply).

Skin biopsy for histopathology (this patient's diagnosis was photodermatitis).

(13) Tap sign

Hypopigmentation, sensory impairment, dry skin, loss of sweating, loss of hair over the skin patch.

Tuberculoid leprosy.

(14) Swollen ear lobe, thick tender palpable right greater auricular nerve.

Tuberculoid leprosy.

Skin smear and/or skin biopsy from the ear lobe.

(15) Thickened, cord-like ulnar nerve.

Skin biopsy for histopathology from the affected area.

(16) Allergic reaction, urticarial lesions, lepromatous leprosy.

Examine for peripheral numbness, thickened palpable nerves, ear lobe infiltration.

Skin biopsy from a skin nodule for histopathology.

(17) Urticaria, cellulitis, leprosy with type I reaction.

Leprosy with type I reaction.

Skin biopsy.

Start oral prednisolone for type I reactions immediately (see text); he can develop acute neuritis and nerve palsy.

(18) Pityriasis versicolor, lepromatous leprosy.

Fine scales on the surface which accentuates after a wash, peripheral numbness, sensory impairment over the skin patch, ear lobe infiltration.

Lepromatous leprosy.

(19) He has peripheral numbness and gets injuries due to heat of fire.

Skin biopsy for histopathology from affected skin.

(20) Relapse of leprosy, type I reaction, ENL reaction.

Skin biopsy will differentiate.

Ear lobes for infiltrations.

15.1 Introduction

Leprosy is a chronic granulomatous disease caused by *Mycobacterium leprae*, affecting peripheral nerves and the skin. India dominates the global picture with 60% of the world's leprosy cases; 86% of leprosy patients reside in six countries: India, Brazil, Indonesia, Nigeria, Ethiopia and Bangladesh.

It has a long incubation period; an average time of 2–5 years has been calculated for tuberculoid cases and 8–12 years for lepromatous cases. Bacille Calmette-Guerin (BCG) vaccination protects against leprosy. Nasal discharges from untreated lepromatous leprosy patients, who are often undiagnosed for several years, are the main source of infection in the community. In

patients with the tuberculoid leprosy, *M. leprae* remains within the skin and nerve compartments, and these patients are probably never infectious. *Mycobacterium leprae* has a predilection for neural tissue, and the first evidence of infection is often found in the peripheral nervous system (Lockwood 2016; Polycarpou et al. 2013; Eichelmann et al. 2013).

Mycobacterium lepromatosis is an uncultured human pathogen associated with diffuse lepromatous leprosy and a reactional state known as Lucio's phenomenon (Han et al. 2009; Han and Jessurun 2013; Singh et al. 2015).

Clinical Presentation The various presentations of the disease (Ridley-Jopling and WHO classifications) are correlated with the patient's immune response, bacillary load and the delay before diagnosis. The number of lesions depends on the genetically determined cellular immunity of the patient. Individuals presenting a vigorous cellular immune response and limited humoral immune responses to *M. leprae* usually present few skin lesions. Without treatment, those patients tend to evolve into the polar tuberculoid or borderline tuberculoid form of leprosy. Due to the inability to mount an effective cellular-mediated response to *M. leprae* and the consequent hematogenous spread of the bacilli, some patients may present with numerous and symmetrically distributed hypochromic lesions. Without treatment these patients evolve to a nonresistant form of leprosy, polar lepromatous (Lockwood 2016; Talhari et al. 2015; Fischer 2017).

15.1.1 Diagnosis

Diagnosis is mostly clinical and is made when the patient has at least one of the following three cardinal signs. The guidelines recommend no additional tests in addition to standard methods for diagnosis of leprosy.

Leprosy is diagnosed by finding at least one of the following cardinal signs:

1. Definite loss of sensation in a pale (hypopigmented) or reddish skin patch
2. Thickened or enlarged peripheral nerve, with loss of sensation and/or weakness of the muscles supplied by that nerve
3. Presence of acid-fast bacilli in a slit-skin smear

In 2017, WHO revised the case definitions of PB and MB leprosy:

Paucibacillary (PB) case: a case of leprosy with 1–5 skin lesions, without demonstrated presence of bacilli in a skin smear.

Multibacillary (MB) case: a case of leprosy with more than five skin lesions; or with nerve involvement (pure neuritis, or any number of skin lesions and neuritis); or with the demonstrated presence of bacilli in a slit-skin smear, irrespective of the number of skin lesions. When classification is in doubt, the patient should be treated as having multibacillary disease (https://apps.who.int/iris/bitstream-eng.pdf?ua=1#:~:text=Treatment%20of%20leprosy,12%20months%20for%20MB%20leprosy).

15.1.2 Differential Diagnoses

- Pityriasis versicolor, pityriasis alba, postinflammatory hypopigmentation, early vitiligo, hypopigmented mycosis fungoides (for tuberculoid leprosy)
- Cutaneous tuberculosis, treated psoriasis, cutaneous leishmaniasis, sarcoidosis, treated psoriasis, plaque stage mycosis fungoides, lobomycosis, paracoccidiomycosis (for borderline leprosy and lepromatous leprosy)

15.1.3 Histopathology

The histopathology of lepromatous skin varies according to the cell-mediated immunity of the host against *Mycobacterium leprae*. In tuberculoid and borderline tuberculoid leprosy, epithelioid noncaseating granulomas predominate, and acid-fast bacilli (AFB) are absent or only rarely present. In borderline lepromatous and lepromatous leprosy, the infiltrate is composed of macro-

phages with a vacuolar cytoplasm, lymphocytes and plasma cells. AFB are numerous.

Oedema inside and outside the epithelioid granulomas and the appearance of large giant cells are the main features of type I reactions. A conspicuous neutrophilic infiltrate in the subcutis with or without vasculitis is found in erythema nodosum leprosum (Massone et al. 2015).

15.1.4 Treatments

The WHO 2018 Guidelines recommends the same 3-drug regimen with rifampicin, dapsone and clofazimine for all leprosy patients, with a duration of treatment of 6 months for PB leprosy and of 12 months for MB leprosy. (WHO 2018 Guidelines in leprosy management). Resistant strains are however emerging despite the use of multidrug therapy; identifying and monitoring resistance is still necessary (Reibel et al. 2015; Smith et al. 2017).

15.2 Leprosy in Sri Lanka

15.2.1 History of Leprosy in Sri Lanka

The first incident of leprosy in Sri Lanka was recorded around the year 1670. This was during the Dutch period when several Portuguese soldiers and few Dutch nationals were diagnosed with leprosy. A Dutch doctor, who arrived in Sri Lanka accompanied by Dutch soldiers in the 1670s, stated in a letter that he had been sent by the Dutch Royal Council. The mission given to him was to do a door-to-door search and seek whether there were leprosy patients. The patients who tested positive for leprosy were believed to have been retained in tents prepared on other side of the Kelani River.

The Dutch started the leprosy asylum at Hendala in 1701 to imprison the leprosy sufferers for life. Though dapsone monotherapy was started in late 1940, segregation was the main mode of control carried out till the early 1970s (http://203.94.76.60/departmnt/Dgleprosycampaign.htm).

15.2.2 Elimination of Leprosy in Sri Lanka

During the last two decades, Sri Lanka has made much progress in eliminating leprosy. The introduction and expansion of multidrug therapy (MDT) in 1982, an effective chemotherapy of short-term duration, and the launching of the awareness campaign, the Social Marketing Campaign, in 1990 to educate the general public about early signs of leprosy and to dispel misconceptions surrounding the disease have resulted in the achievement of the leprosy elimination target in 1995 at the national level. This is 5 years ahead of the targeted year 2000, set by WHO (http://203.94.76.60/departmnt/Dgleprosycampaign.htm). Integration of leprosy services to the general health services was started in 2001.

Elimination target is prevalence less than 1 patient for 10,000 population. Five districts in Sri Lanka, two districts in the western province, Colombo and Gampaha, and three in eastern province, Ampara, Batticaloa and Trincomalee, have leprosy prevalence more than the elimination target (Ranawaka and Weerakoon 2009; Dabrera et al. 2016; Wijeratne and Østbye 2017). Since 2001 leprosy is managed and followed up by dermatologists in skin clinics (Ranawaka and Weerakoon 2009; Wijeratne and Østbye 2017).

15.2.3 Leprosy Post-exposure Prophylaxis (LPEP) Programme

The reported number of new leprosy patients has barely changed in recent years. Thus, additional approaches or modifications to the current standard of passive case detection are needed to interrupt leprosy transmission. The WHO 2018 guidelines recommends the use of single-dose-rifampicin (SDR) as preventive treatment for contacts of leprosy patients (adults and children 2 years of age and above), after excluding leorosy and TB disease, and in the absence of other contraindications. (Barth-Jaeggi et al. 2016).

15.3 Clinical Types of Leprosy

15.3.1 Indeterminate Leprosy

In most patients, early leprosy presents as macular and hypopigmented lesions. This initial clinical presentation is known as indeterminate leprosy and occurs in individuals who have not developed cell-mediated immunity against *M. leprae* yet. Therefore, indeterminate leprosy is commonly detected in children (Ranawaka and Weerakoon 2009; Talhari et al. 2015).

Clinical Presentation Indeterminate lesions consist of one or more slightly hypopigmented or erythematous macules, a few centimetres in diameter, with poorly defined margins. Hair growth and nerve function are unimpaired.

Histopathology There is a scattered non-specific histiocytic and lymphocytic infiltration with some concentration around skin appendages (Massone et al. 2015).

Differential Diagnosis Pityriasis versicolor, pityriasis alba, postinflammatory hypopigmentation, early vitiligo, photodermatoses.

Management and Prognosis This phase may last for months or years before resolving or giving way to one of the determinate types of leprosy (Figs. 15.1, 15.2, 15.3, 15.4).

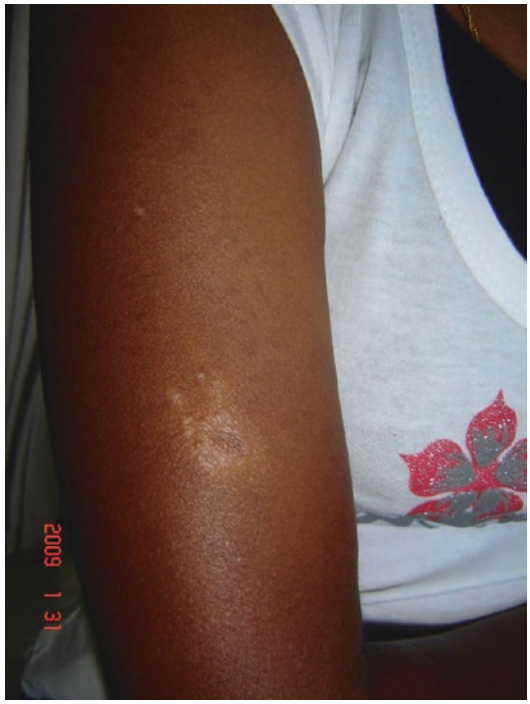


Fig. 15.1 An 18-year-old girl with indeterminate leprosy. Hypopigmented patch with slightly erythematous raised border. No sensory impairment. Histology was inconclusive

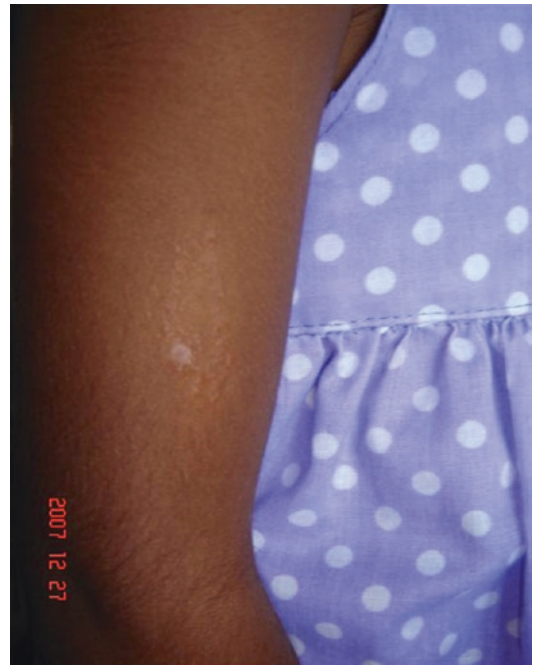


Fig. 15.2 A 5-year-old girl with indeterminate leprosy. Her father had untreated lepromatous leprosy, while the only sister had tuberculoid leprosy. We observed her for 6 months and started paucibacillary child treatments due to strongly positive family history

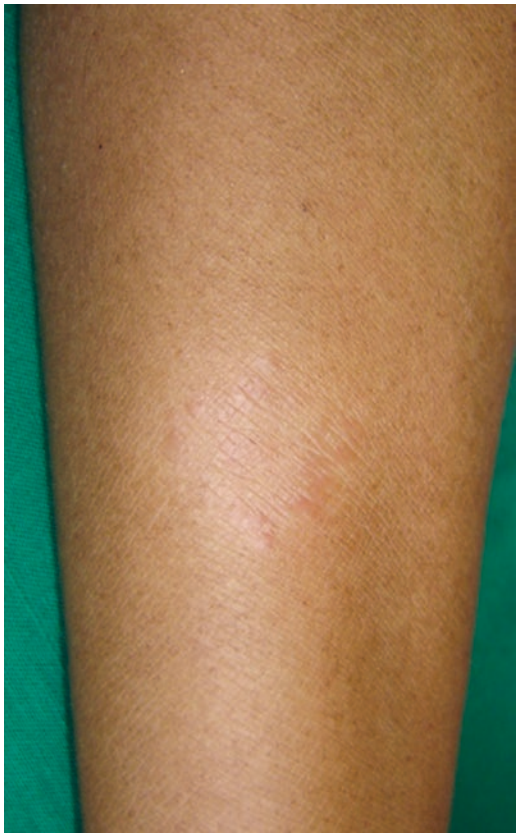


Fig. 15.3 Indeterminate leprosy. Hypopigmented patch with slightly erythematous raised border. No sensory impairment

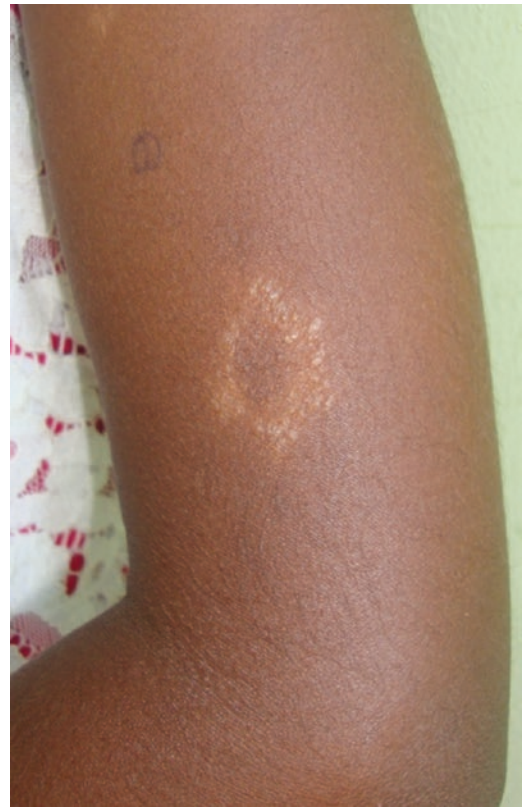


Fig. 15.4 Indeterminate leprosy. This 10-year-old girl had mother with untreated lepromatous leprosy and brother and pregnant sister with tuberculoid leprosy. Therefore, she was started on paucibacillary multidrug therapy (PB-MDT) even the histology was inconclusive

15.3.2 Tuberculoid Leprosy

Clinical Features The typical lesion is a macule or plaque that is obviously hypopigmented with sensory impairment. Some have erythematous or copper-coloured raised and clear-cut edges sloping towards a flattened and hypopigmented centre. The surface is dry, hairless and insensitive, and sometimes scaly. The lesions are few, often solitary (Kumarasinghe and Kumarasinghe 2004; Kumarasinghe 2001; Cheng and Kumarasinghe 2015; Kumarasinghe et al. 2004; Eichelmann et al 2013).

If the examiner runs a finger around the lesion, just beyond the outer edge, a thickened sensory nerve may be palpated, or a thickened nerve trunk may be felt in the vicinity.

A skin lesion may appears with or without evidence of nerve involvement. Sensory impairment may be difficult to demonstrate on the face because of the generous supply of sensory nerve endings.

Diagnosis Clinical diagnosis in most cases, histopathology if only doubtful.

Differential Diagnosis Pityriasis versicolor, vitiligo, photodermatoses (Figs. 15.5, 15.6, 15.7, 15.8, 15.9, 15.10, 15.11, 15.12, 15.13, 15.14, 15.15, 15.16, 15.17, 15.18).

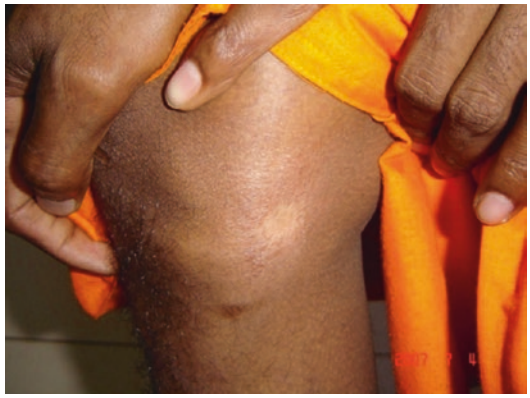


Fig. 15.5 Tuberculoid leprosy in a 44-year-old Buddhist priest with a hypopigmented anaesthetic skin patch

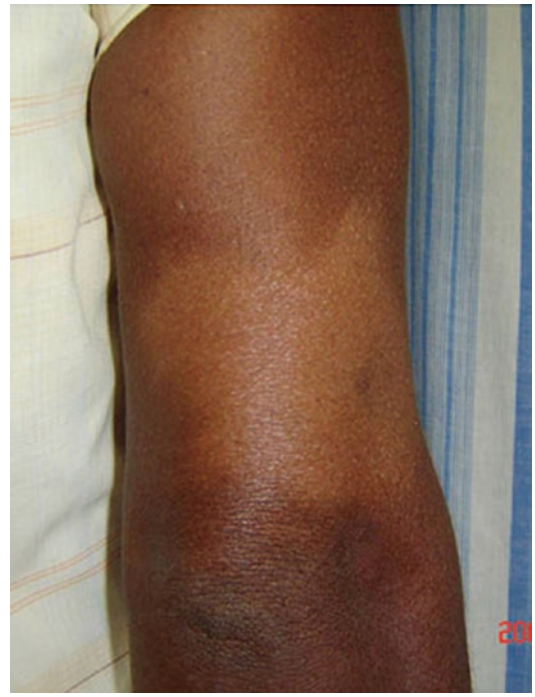


Fig. 15.6 Tuberculoid leprosy in a 45-year-old woman. Hypopigmented anaesthetic solitary skin patch which never depigmented (differentiate vitiligo). These typical lesions are easily suspected by even a layman

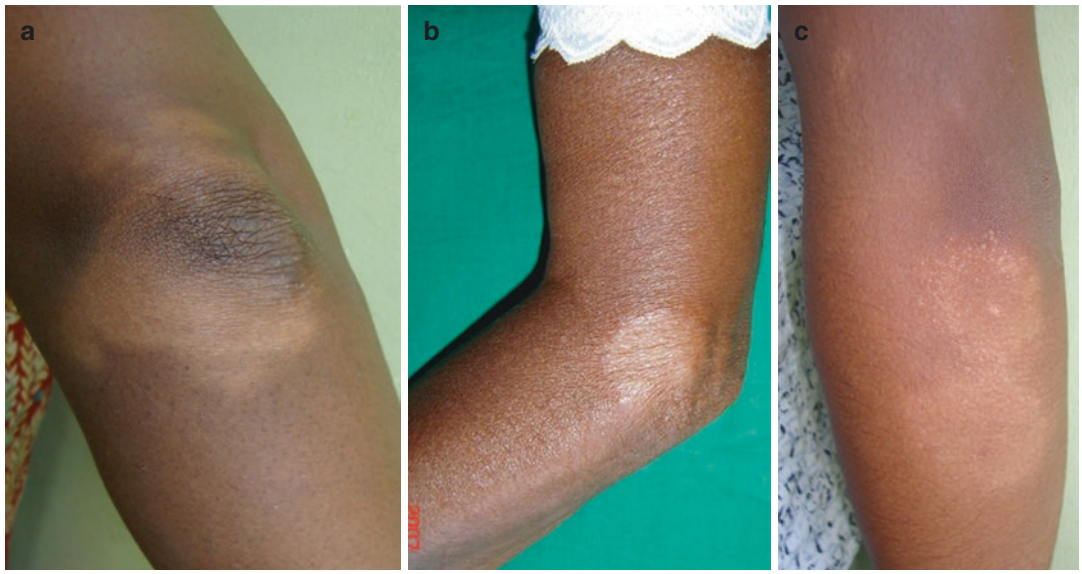


Fig. 15.7 (**a**–**c**) Tuberculoid leprosy; hypopigmented anaesthetic skin patch. This is the typical presentation where further investigations are not necessary to start paucibacillary multidrug therapy (PB-MDT)

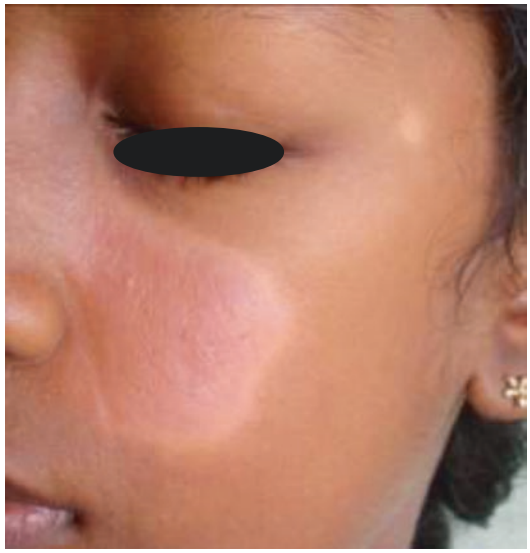


Fig. 15.8 Tuberculoid leprosy. Hypopigmented patch on the face of an 11-year-old girl with a small satellite lesion at the lateral angle of the eye

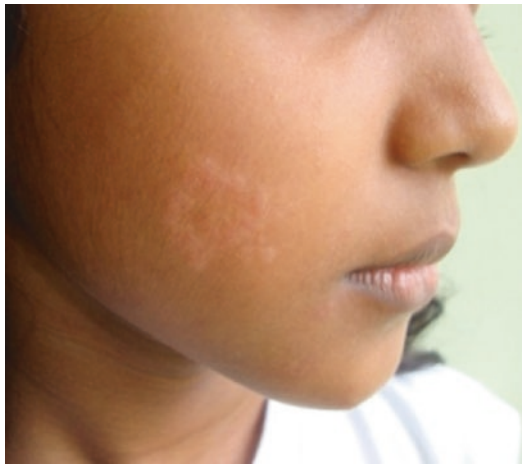


Fig. 15.9 Tuberculoid leprosy. Hypopigmented patch on the face of a 9-year-old girl. Note small satellite lesions around the lesion. Sensory impairment is difficult to demonstrate on the face because of the generous supply of sensory nerve endings. These lesions are commonly misdiagnosed as pityriasis versicolor

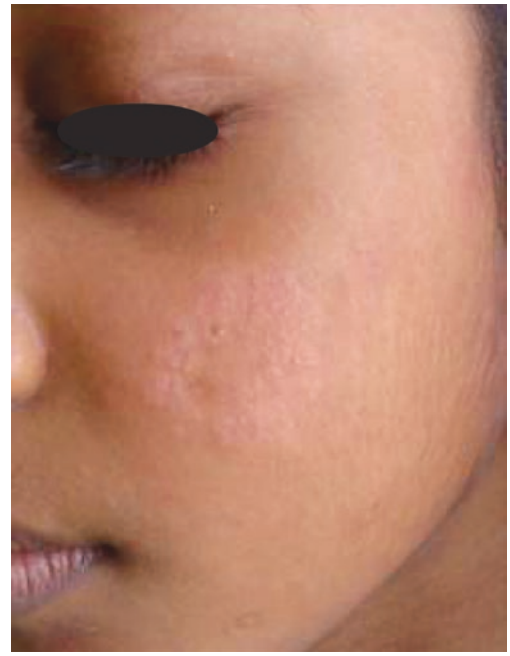


Fig. 15.10 Tuberculoid leprosy. Solitary erythematous plaque with flattened centre. Sensory impairment is difficult to demonstrate on the face because of the generous supply of sensory nerve endings

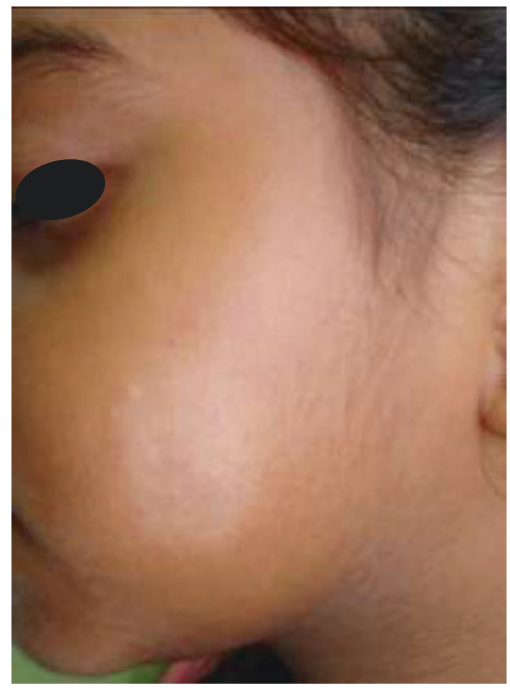


Fig. 15.11 Tuberculoid leprosy. Solitary hypopigmented patch on the face without sensory impairment. These lesions commonly mistaken for pityriasis versicolor, photodermatoses or pityriasis alba

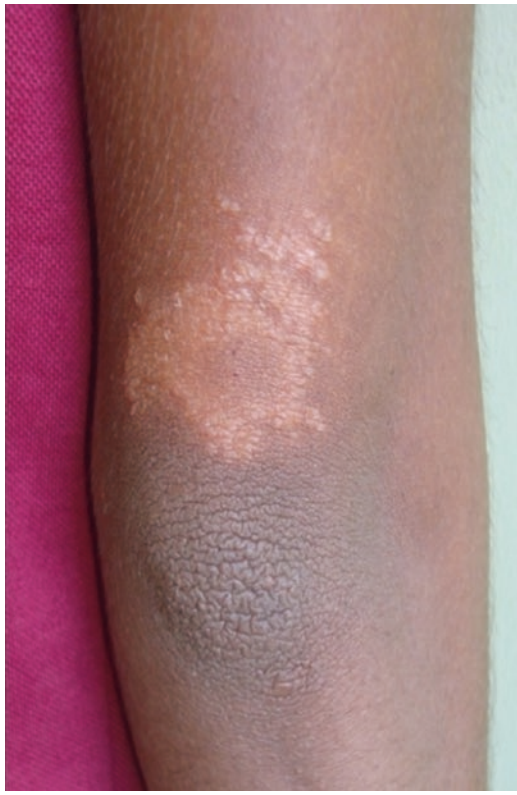


Fig. 15.12 Tuberculoid leprosy. A hypopigmented solitary skin patch with raised erythematous border and central clearing. Note multiple satellite lesions. These typical lesions are common and easily diagnosed clinically

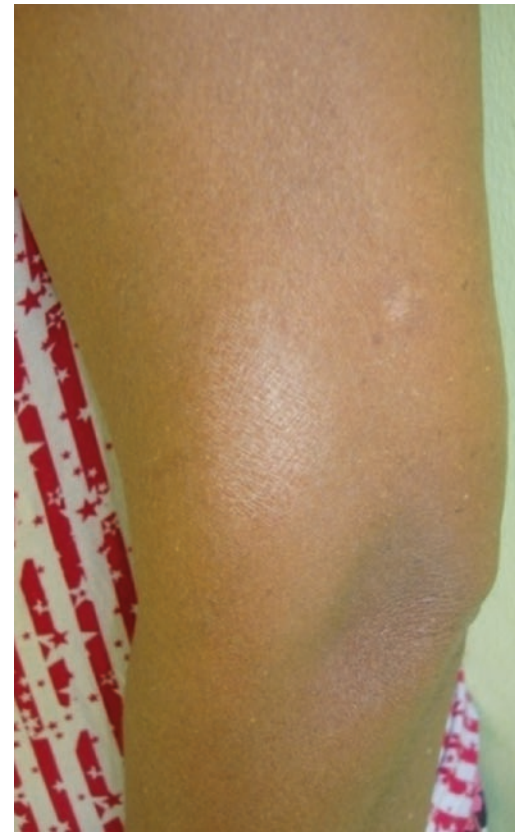


Fig. 15.13 Tuberculoid leprosy. A solitary skin-coloured, dry, scaly skin patch with sensory impairment. Note surrounding skin has normal texture. These lesions tend to miss by less experienced doctors

15.3.3 Lepromatous Leprosy

Lepromatous leprosy may present with very non-specific symptoms. Therefore they are easily missed by less experienced clinicians.

Clinical Features These patients can present with macules, diffuse papules, infiltrations or nodules, or all four. Hair growth and sensation are not initially impaired over the lesions. Papules and nodules usually have normal skin colour but sometimes are erythematous, affecting anywhere of the skin apart from hairy scalp, axillae, groins and perineum (i.e. regions of the skin with the highest temperature). Leprosy bacilli have predilection to cooler areas of the body. Lesions of

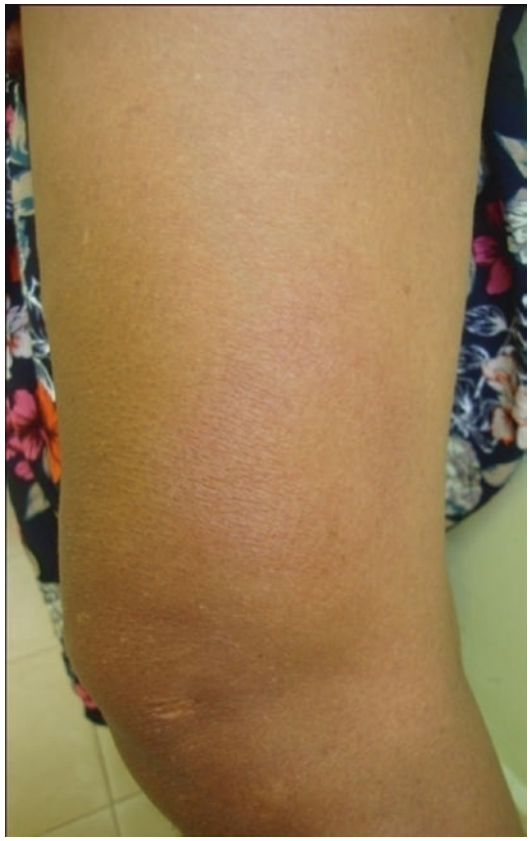


Fig. 15.14 Tuberculoid leprosy. A woman complained of an area of sensory impairment on the left thigh. On careful examination skin-coloured patch with slightly raised margin was noted. Tuberculoid leprosy has many diverse clinical presentations which can be underdiagnosed unless vigilant

oral mucosa occur as papules on lips and nodules on the palate (which may perforate), uvula, tongue and gums. The nasal mucosa is hyperaemic or ulcerated and bleeds easily; epistaxis is common.

They can present with various non-specific symptoms: nasal symptoms of stuffiness, discharge and epistaxis and oedema of legs and ankles (due to increased capillary stasis and permeability). The longest peripheral sensory nerve fibres are first affected, causing numbness and anaesthesia on the dorsal surfaces of hands and feet and later on extensor surfaces of arms and legs and finally over the trunk (Lockwood 2016).

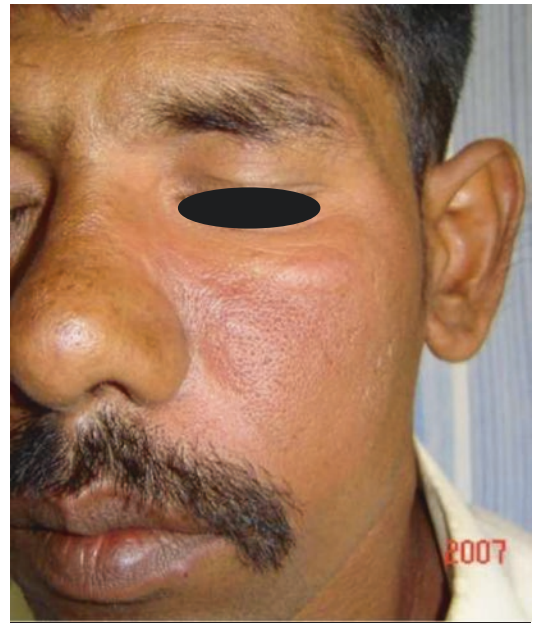


Fig. 15.15 Tuberculoid leprosy. An erythematous plaque on the left cheek which was slowly enlarging over 2 years. No sensory impairment

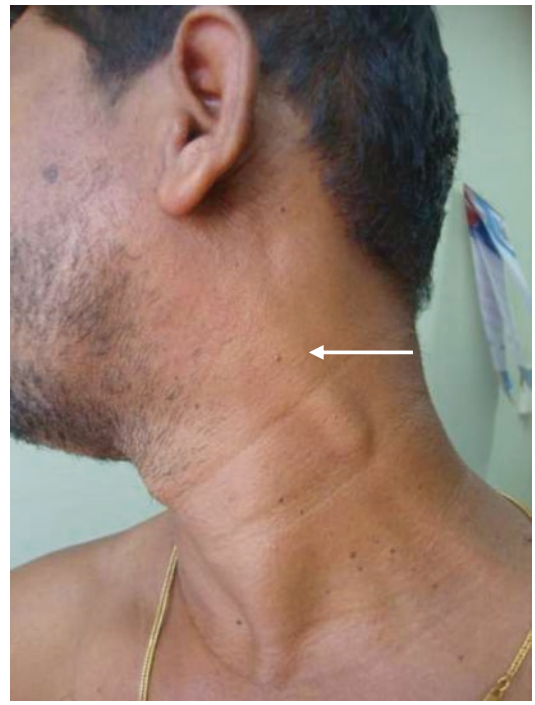


Fig. 15.16 Tuberculoid leprosy. An erythematous plaque on the left ear lobe. Note the thickened left greater auricular nerve which is the sensory nerve in the vicinity. Thickened nerve trunk is clearly visible and palpable

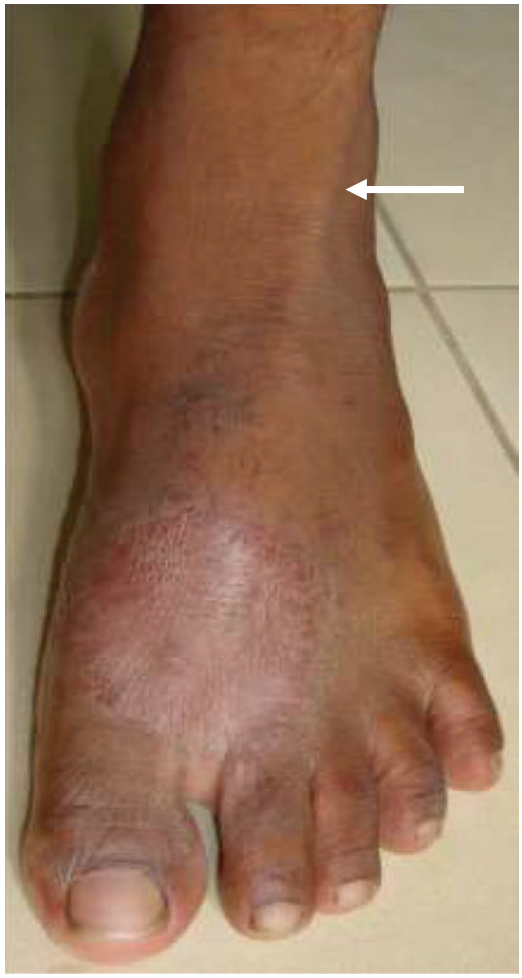


Fig. 15.17 Tuberculoid leprosy. A skin-coloured well-demarcated anaesthetic patch on the left foot. Note thickened palpable superficial cutaneous nerve

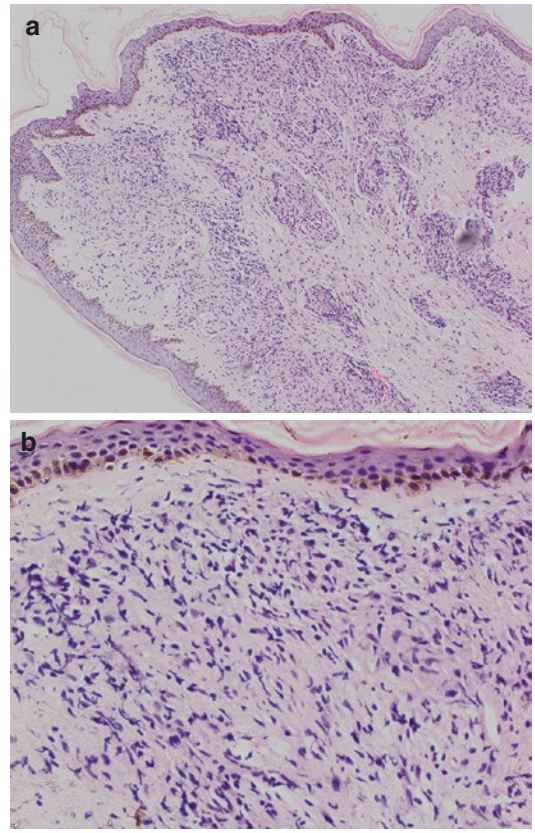


Fig. 15.18 (**a**) Histopathology of borderline tuberculoid leprosy (H&E X100) (**b**) Histopathology of borderline tuberculoid leprosy (H&E X400) (picture courtesy Dr. Priyanka H. Abeygunasekara, Consultant pathologist, Cancer Institute Maharagama, Sri Lanka)

Diagnosis Clinical suspicion confirmed by histopathology, slit-skin smear for bacillary index and morphological index. Slit-skin-smear is done from any infiltrated skin patch, mostly from infiltrated ear lobes (Figs. 15.19, 15.20, 15.21, 15.22, 15.23, 15.24, 15.25, 15.26, 15.27, 15.28, 15.29, 15.30, 15.31, 15.32, 15.33, 15.34, 15.35).

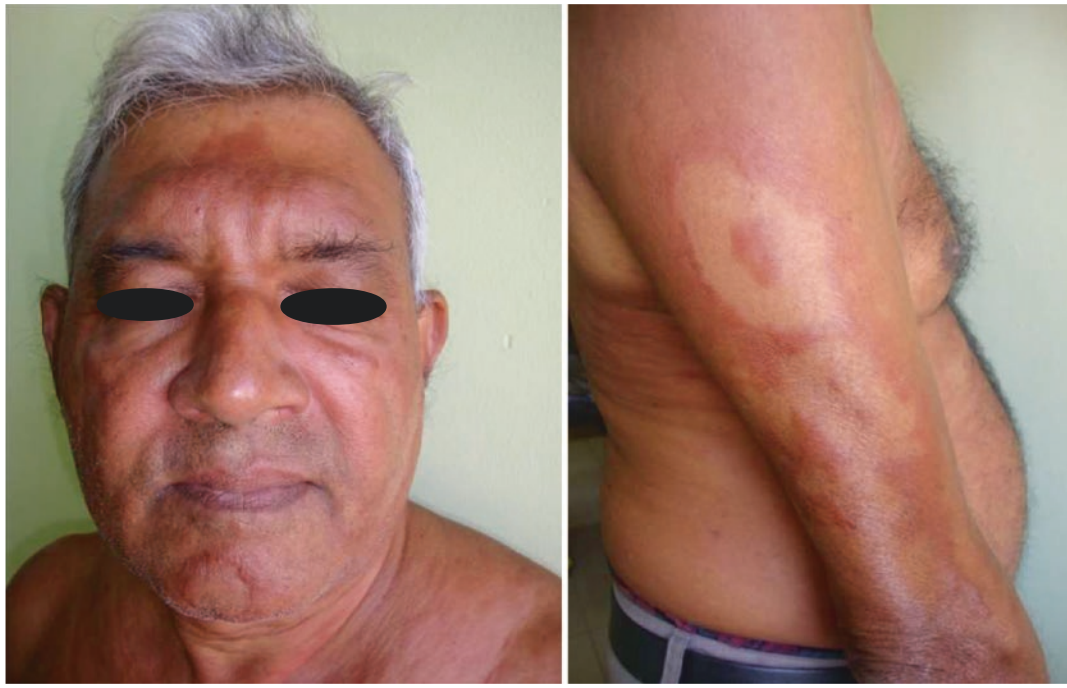


Fig. 15.19 Lepromatous leprosy. Diffuse erythematous infiltration of the face, trunk and limbs. He had peripheral hand and feet numbness, but the skin patches were not anaesthetic

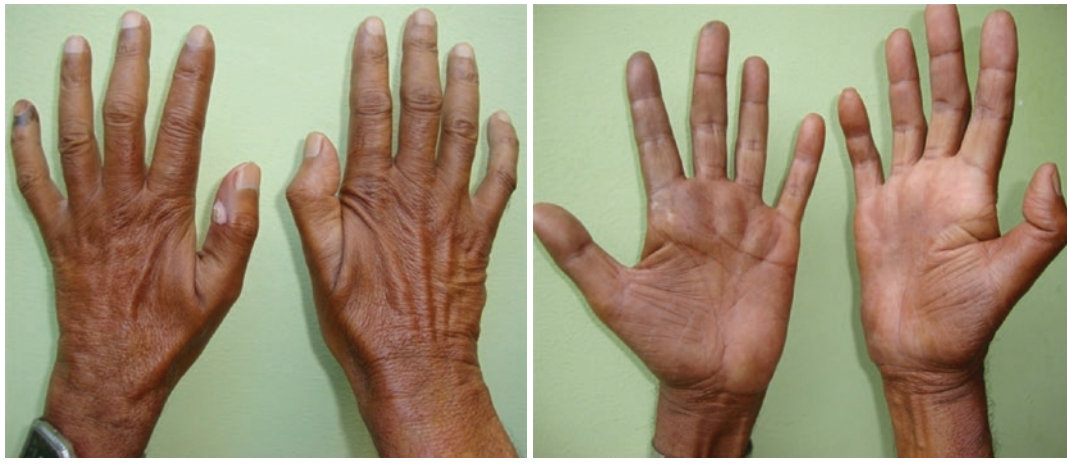


Fig. 15.20 Above patient with bilateral median nerve palsy. Note severely wasted bilateral thenar eminences; the right hand is more affected than the left hand

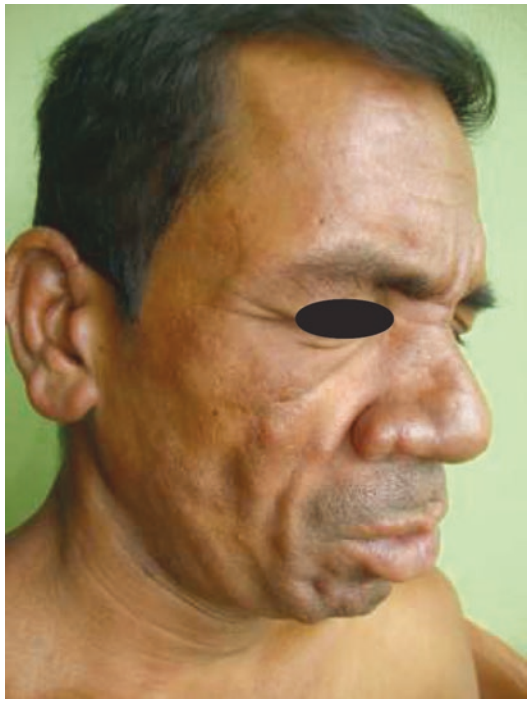


Fig. 15.21 Untreated lepromatous leprosy. Diffuse infiltrations and nodules on the face, nose and ears

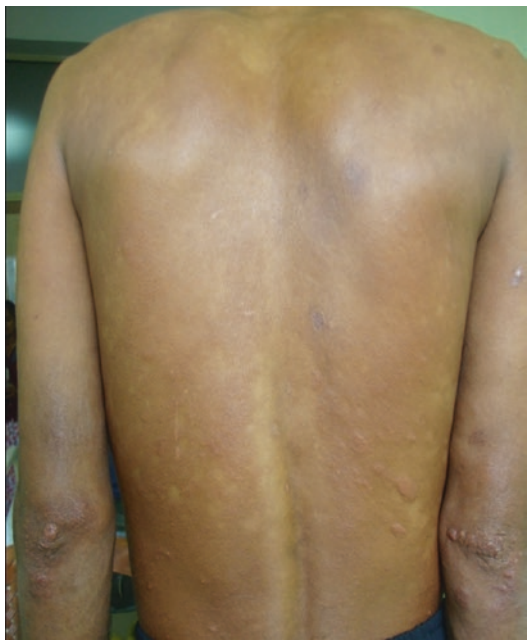


Fig. 15.22 Above patient's trunk showing numerous hypopigmented macules and skin-coloured nodules

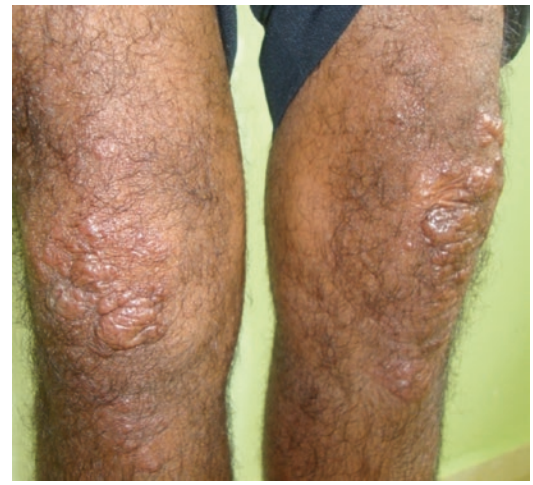


Fig. 15.23 Above patient's knees and elbows had skin-coloured plaques, nodules and papules

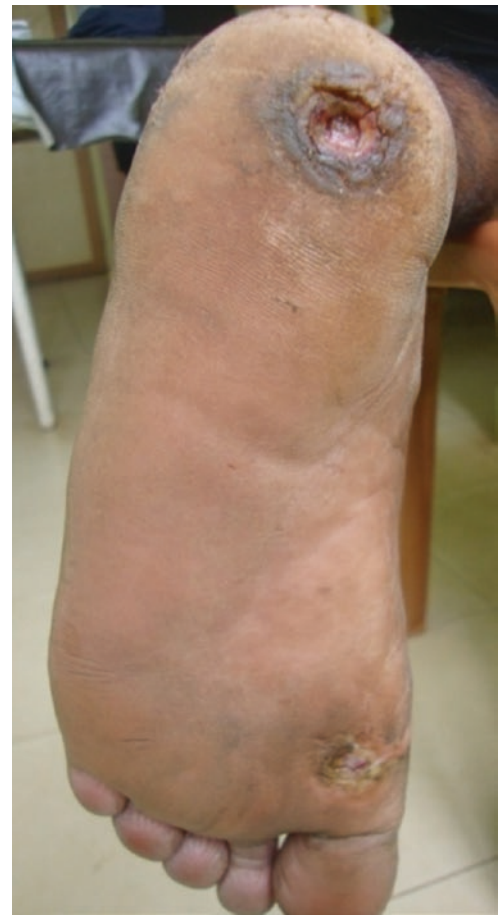


Fig. 15.24 Same patient with trophic ulcers on soles due to peripheral numbness

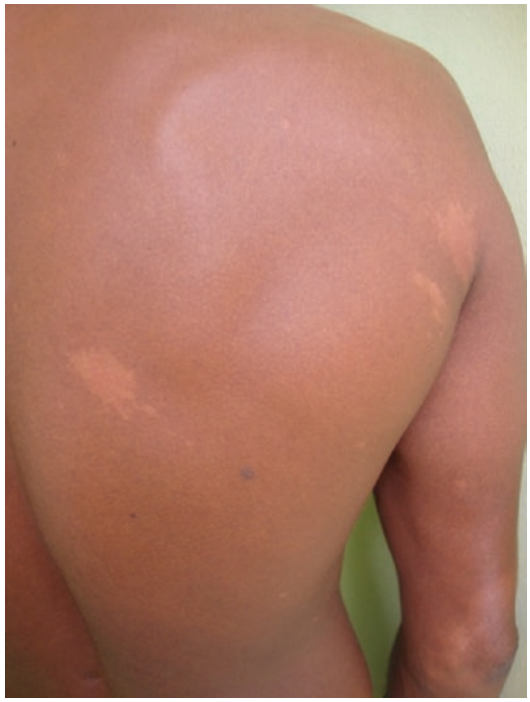


Fig. 15.25 Multibacillary leprosy. More than five localized hypopigmented anaesthetic patches on the trunk and limbs

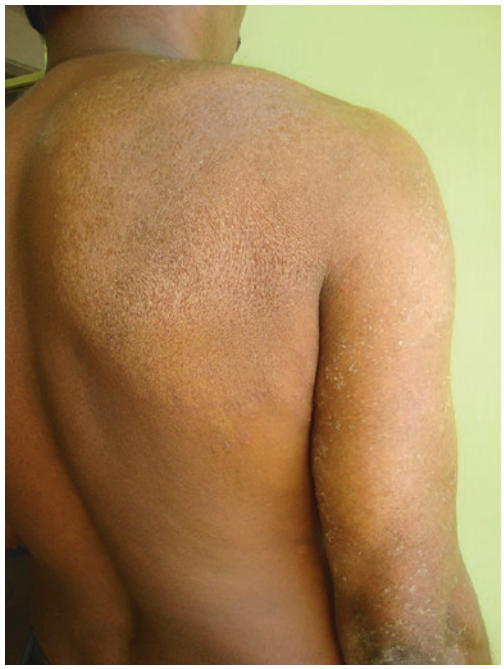


Fig. 15.26 Multibacillary leprosy; large hypopigmented patch with sensory loss involving the right shoulder, arm, forearm and back and front of the chest

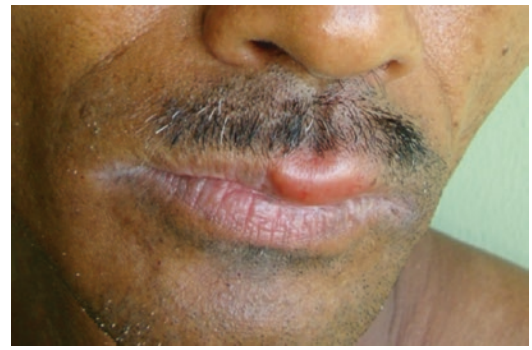


Fig. 15.27 Lepromatous leprosy patient showing infiltration on the upper lip

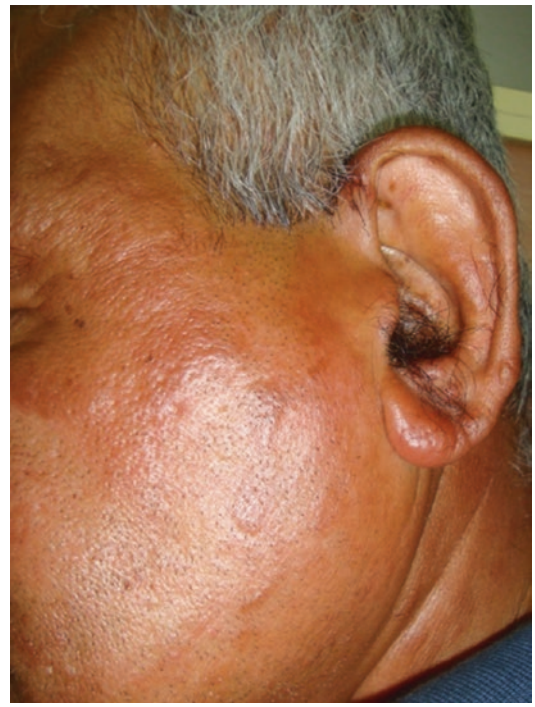


Fig. 15.28 Lepromatous leprosy. Diffuse erythematous infiltration of the face with infiltration of the ear lobe. He had similar infiltrations on the trunk too

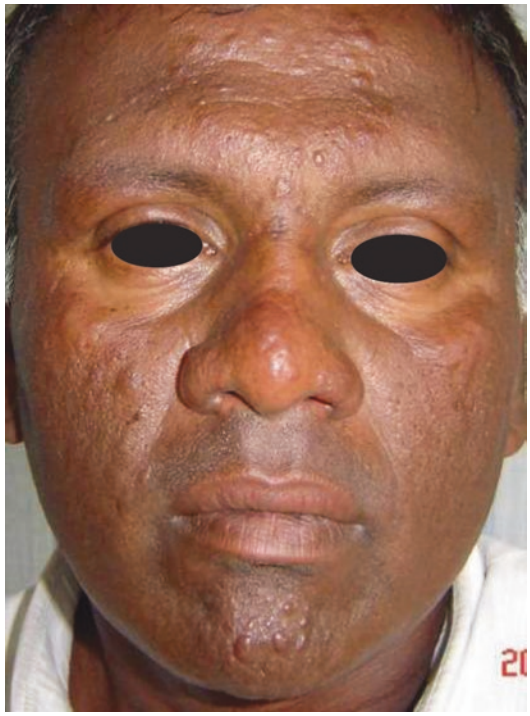


Fig. 15.29 Lepromatous leprosy. Diffuse infiltrations and skin-coloured papules on the face

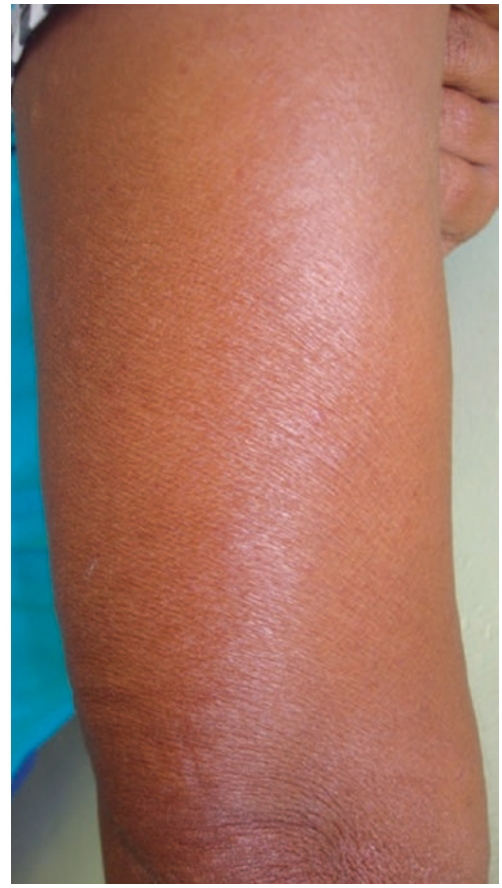


Fig. 15.30 Lepromatous leprosy showing diffuse erythematous infiltration of the upper arm. This patient had similar lesions on the trunk, face and other limbs

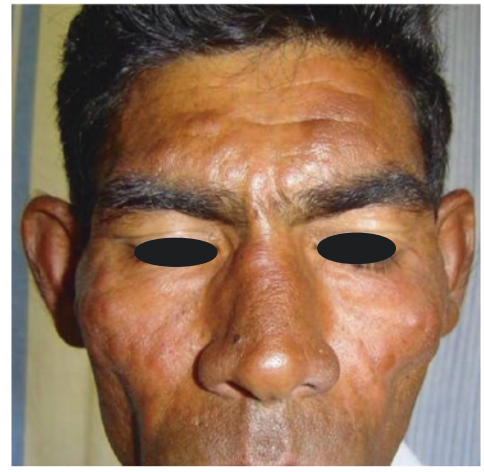


Fig. 15.31 Lepromatous leprosy. Papules, nodules and diffuse infiltrations of the face which appeared gradually over many years; these chronic changes go unnoticed to close relatives

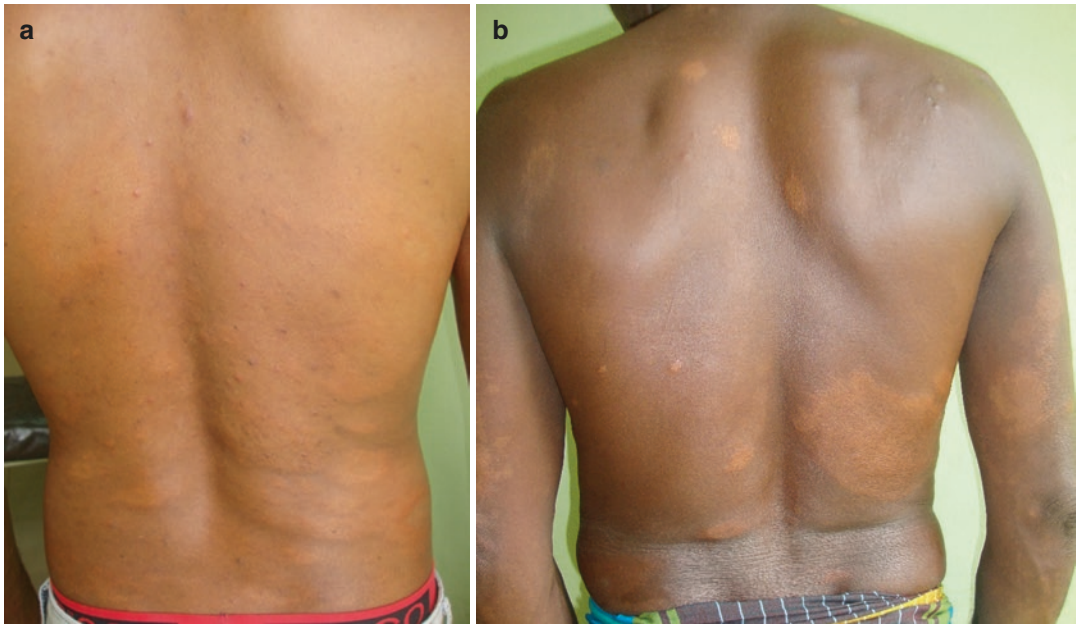


Fig. 15.32 (**a**, **b**) Lepromatous leprosy with numerous hypopigmented patches on the trunk and limbs. Sensation was intact on these skin lesions

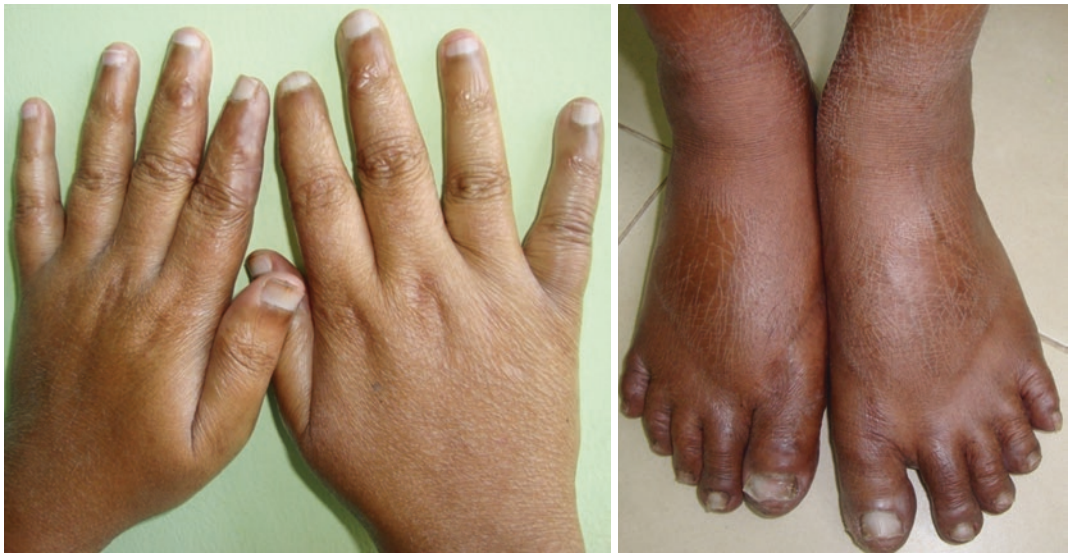


Fig. 15.33 Lepromatous leprosy with swollen hands and feet and peripheral numbness

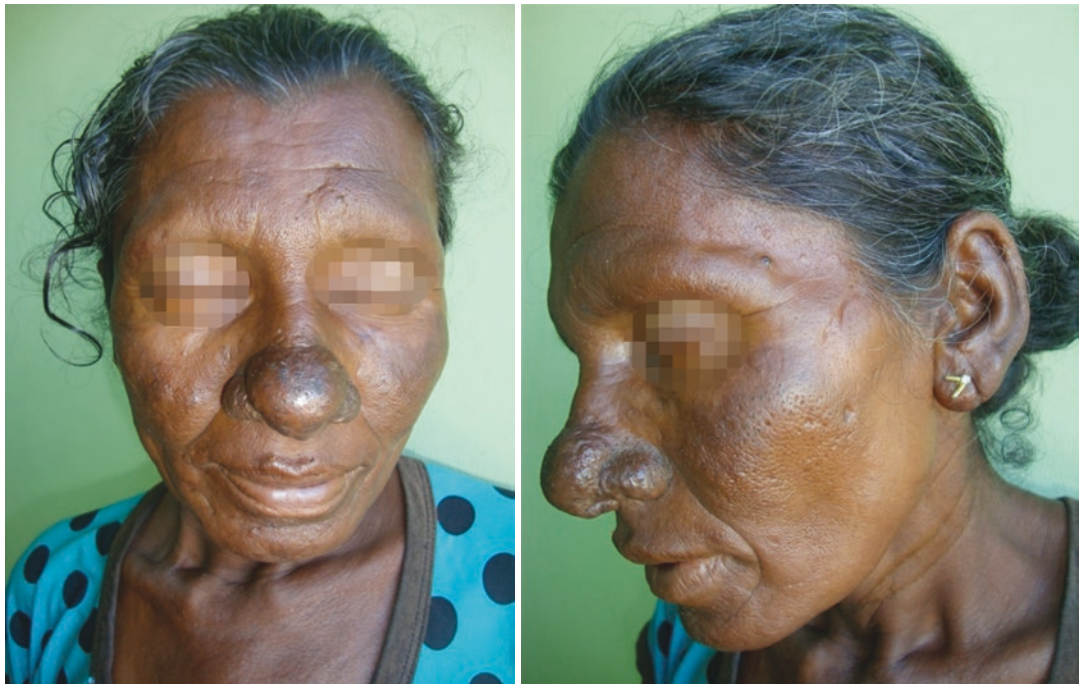


Fig. 15.34 Leonine facies in lepromatous leprosy. These extensive features occur on long-standing untreated disease. These extreme cases are very rare in Sri Lanka now. Diffuse infiltration of the face, ear lobes, nose and lips. This is an untreated lepromatous leprosy patient who had features of leonine facies at presentation. The lines of the forehead are deeper as the skin thickens (leonine facies), eyebrows and eyelashes are lost (madarosis), ear lobes are thickened, the nose is misshapen and collapsed due to septal perforation and loss of the anterior nasal spine, and the voice is hoarse

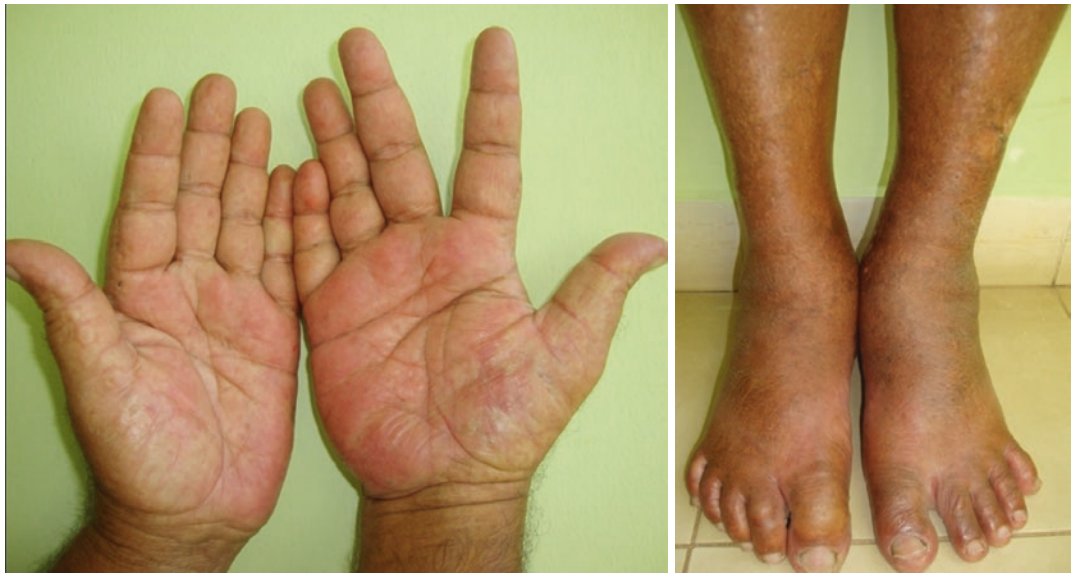


Fig. 15.35 Lepromatous leprosy. A 62-year-old man had swelling of hand and feet for more than 1 year. No peripheral numbness. He was referred to us when he developed erythematous plaques on palms which were tender. Skin biopsy from palmar lesions confirmed lepromatous leprosy

15.3.4 Borderline Leprosy

Skin lesions are intermediate in number between those of the two polar types and are distributed asymmetrically in the form of macules, plaques, annular lesions or bizarre-shaped bands.

Towards the tuberculoid end of the spectrum, lesions are fewer and drier, have more hair loss and anhidrosis, are more insensitive and have fewer bacilli in smears and biopsies, and vice versa towards the lepromatous pole (Kumarasinghe and Kumarasinghe 2004) (Figs. 15.36, 15.37, 15.38).

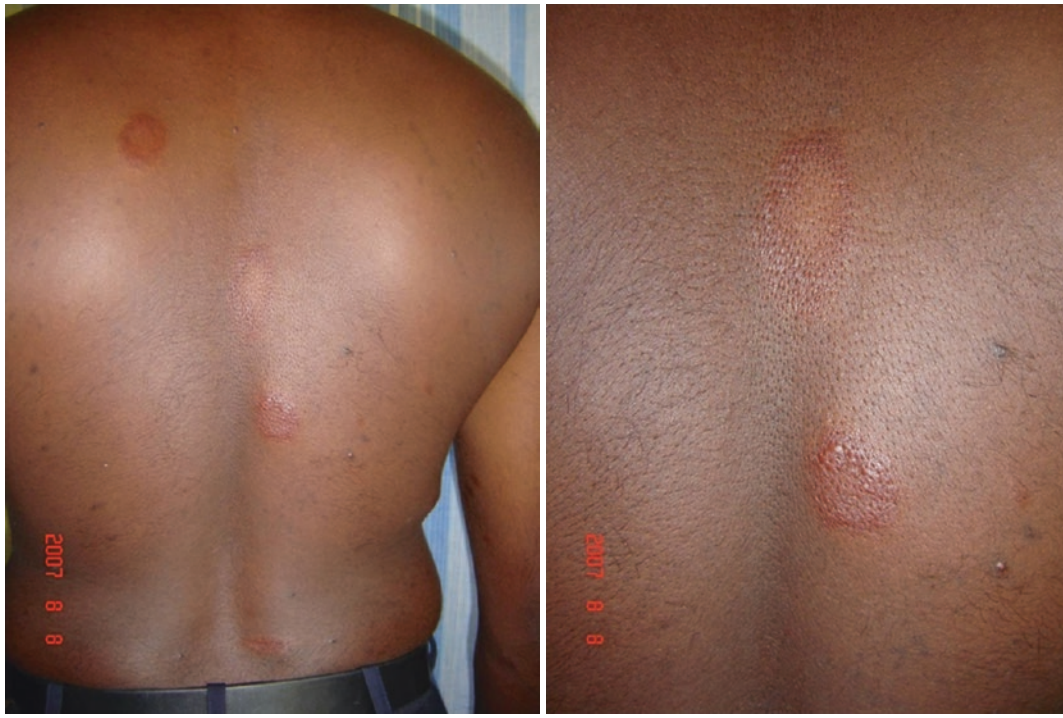


Fig. 15.36 Borderline leprosy. The trunk of a 38-year-old man showing coppery-coloured classical annular lesions with well-defined centre

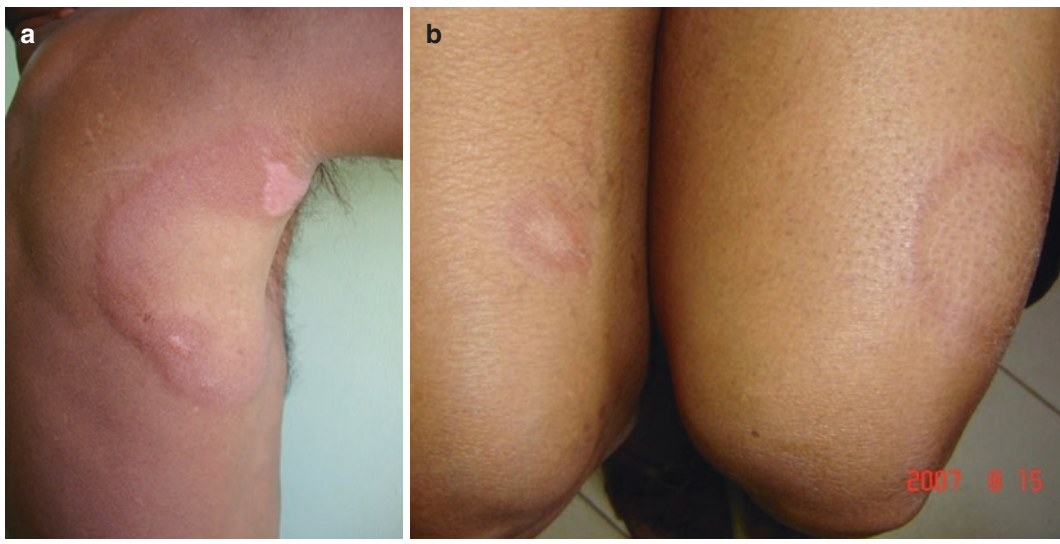


Fig. 15.37 (**a**–**b**) Borderline leprosy showing annular lesions with erythematous well-defined raised margin and central clearance

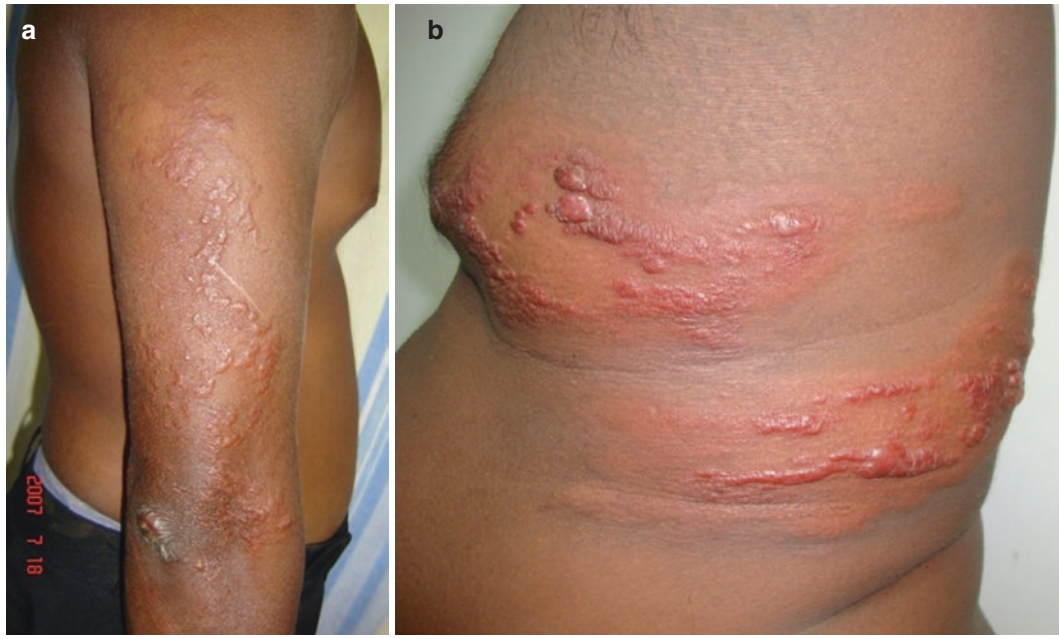


Fig. 15.38 (**a**–**b**) Borderline leprosy can present as bizarre-shaped lesions

15.3.5 Pure Neuritic Leprosy

Pure neuritic leprosy presents with asymmetrical involvement of peripheral nerve trunks and no visible skin lesions; on histology of a cutaneous nerve biopsy, all types of leprosy are seen (Figs. 15.39, 15.40, 15.41, 15.42).

15.4 Complications and Co-morbidities

1. Type I reaction
2. Type II reaction (erythema nodosum leprosum (ENL) reaction)
3. Lucio's phenomenon
4. Permanent disabilities

Leprosy reactions are expressions of immunological perturbations. Attending to the clinical and histopathological manifestations, leprosy reactions may be separated in two or three different variants: reverse reaction (type I), erythema nodosum leprosum (type II), erythema polymorphous (type II) and Lucio's phenomenon, mainly considered a type II reaction but sometimes designated type III. Type I leprosy reaction, also named "upgrading reaction", occurs in borderline leprosy states and is associated with a shift towards the tuberculoid pole. Type II reaction usually occurs in lepromatous leprosy, and there are three different clinical variants, including erythema nodosum leprosum, erythema polymorphous-like reaction and Lucio's phenomenon (Cuevas et al. 2007; Sehgal 2005; Weerakoon and Ranawaka 2012).

15.4.1 Type I Reactions

Type I reactions occur in borderline disease and are characterized by acute neuritis and/or acutely inflamed skin lesions. Nerves often become tender with loss of sensory and motor functions. Existing skin lesions become erythematous or oedematous and may desquamate or rarely

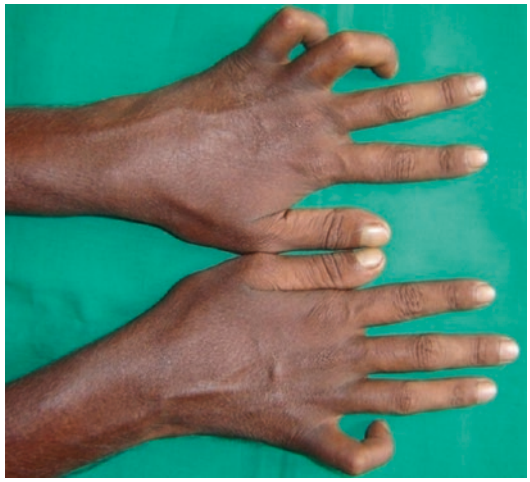


Fig. 15.39 Pure neuritic leprosy. This 20-year-old man referred from the neurologist with bilateral ulnar claw hands. Skin biopsy performed from affected area confirmed leprosy. There were no suspected skin lesions

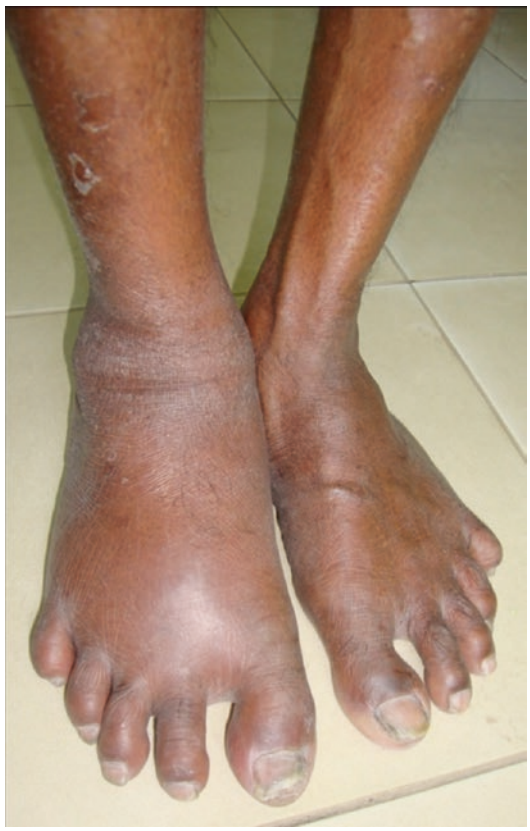


Fig. 15.40 Pure neuritic leprosy. This woman came with swelling and numbness of the right foot. On examination foot drop detected. She did not have sensory loss on affected areas

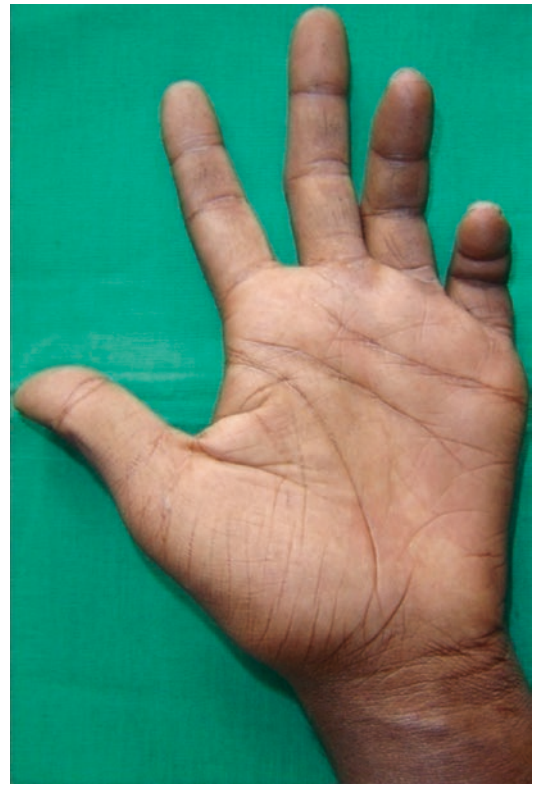


Fig. 15.41 Pure neuritic leprosy showing ulnar claw hand, wasting of hypothenar eminence and scar from heat injuries

ulcerate. New lesions may appear. Constitutional symptoms are unusual. (Figs. 15.43, 15.44, 15.45, 15.46, 15.47, 15.48)

15.4.2 Type II Reactions (Erythema Nodosum Leprosum (ENL))

Type II (ENL) reactions occur in patients with multibacillary disease (LL and BL). They may occur before, during or after treatment. ENL manifests most commonly as painful red nodules on the face and extensor surfaces of limbs. The lesions may be superficial or deep, with suppuration, ulceration or brawny induration when chronic. ENL is a systemic disorder producing fever and malaise and may be accompanied by uveitis, dactylitis, arthritis, neuritis, lymphadeni-

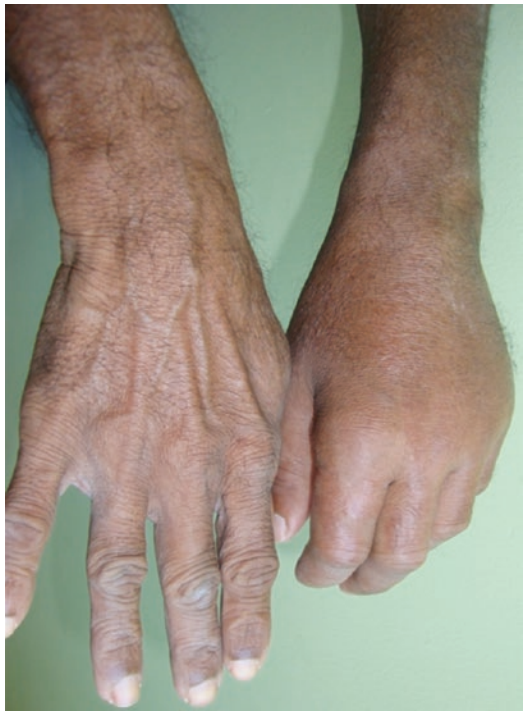


Fig. 15.42 Pure neuritic leprosy. This man came with swelling and numbness of the left hand. On examination wrist drop detected. Other causes for nerve palsies were excluded by the neurologist. Leprosy was confirmed by cutaneous nerve biopsy

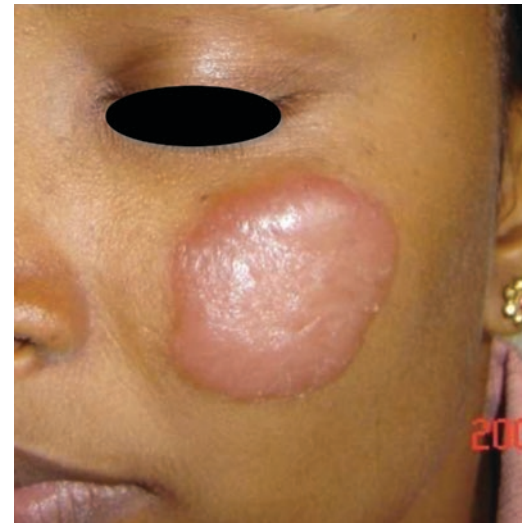


Fig. 15.43 Type I reaction. A 21-year-old woman came with these erythematous plaques on her bilateral cheeks. She has had hypopigmented patches on the face which had been treated as pityriasis versicolor for many years

tis, myositis and orchitis. Peripheral nerve neuritis and uveitis with its complications of synechiae, cataract and glaucoma are the most serious complications of ENL. Erythema nodosum leprosum tends to be more severe in Asian than in African people (Cuevas et al. 2007; Lockwood 2016). (Figs. 15.49, 15.50, 15.51, 15.52, 15.53)

15.4.3 Lucio's Phenomenon

Lucio's phenomenon is an uncommon reaction characterized by severe necrotizing cutaneous lesions that occurs in patients with Lucio's leprosy and lepromatous leprosy. It is considered by some authors as a variant of type II or III reaction. Death can occur because of blood dyscrasia or sepsis. Precipitating factors include infections, drugs and pregnancy (Jurado et al. 2015; Rocha et al. 2016; Sehgal 2005). This is very rare in Sri Lanka.

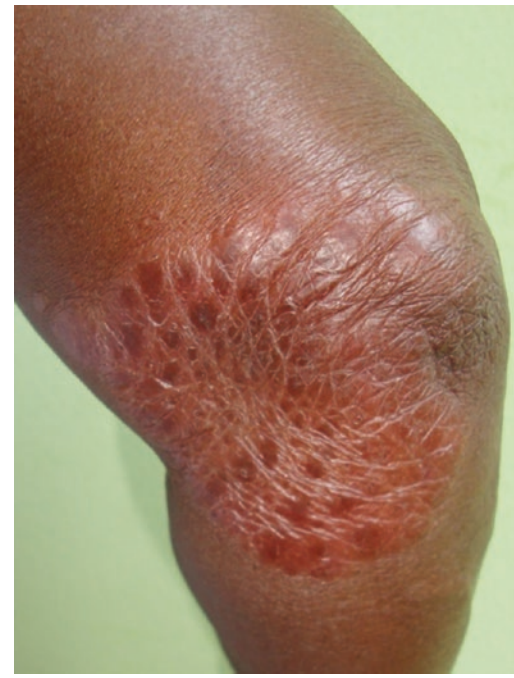


Fig. 15.44 Type I reaction. Previously quiescent lesion became erythematous, oedematous and tender while on treatments for leprosy. She also complained of marked pain on the elbow joint when it is hit on a surface (positive tap sign)

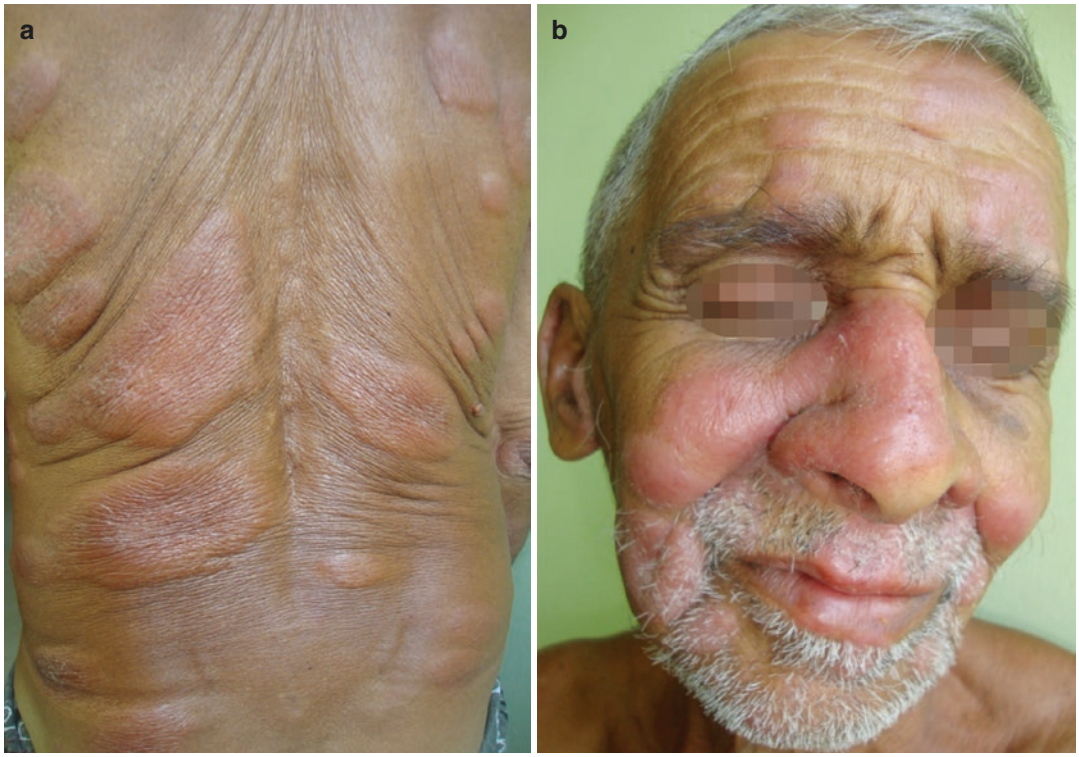


Fig. 15.45 (**a**–**b**) Type I reaction in a patient with lepromatous leprosy. A 77-year-old man came with mildly tender erythematous plaques on the trunk, the face and the limbs which had appeared 1 month ago

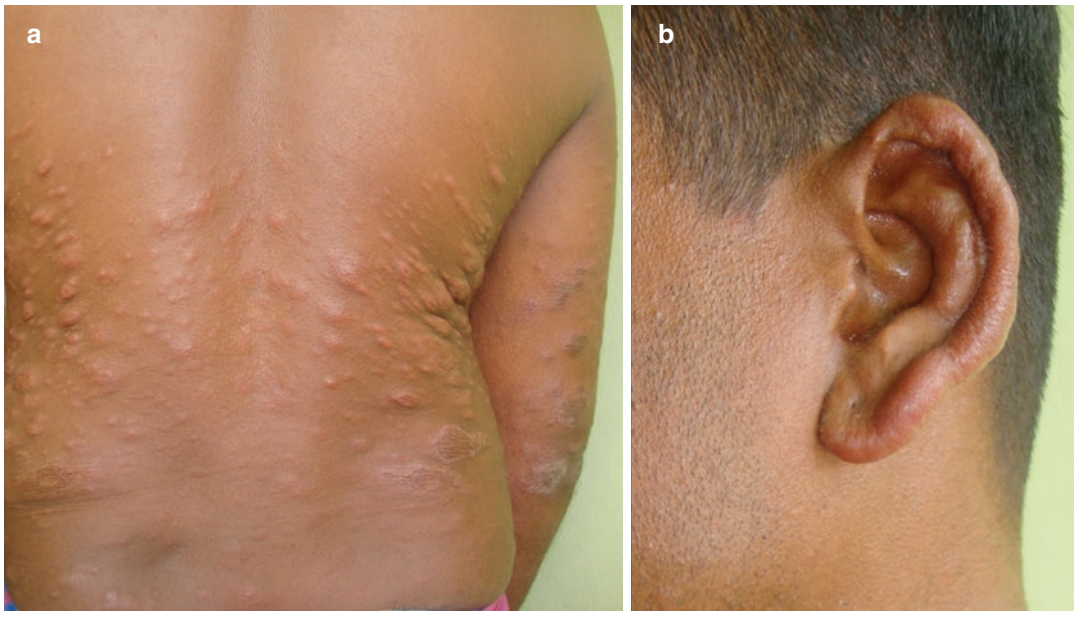


Fig. 15.46 (**a**, **b**) Type I reaction. A 37-year-old man came with tender erythematous papular eruption on (**a**) the trunk and (**b**) the earlobes. Previously quiescent lesions became erythematous, oedematous and tender

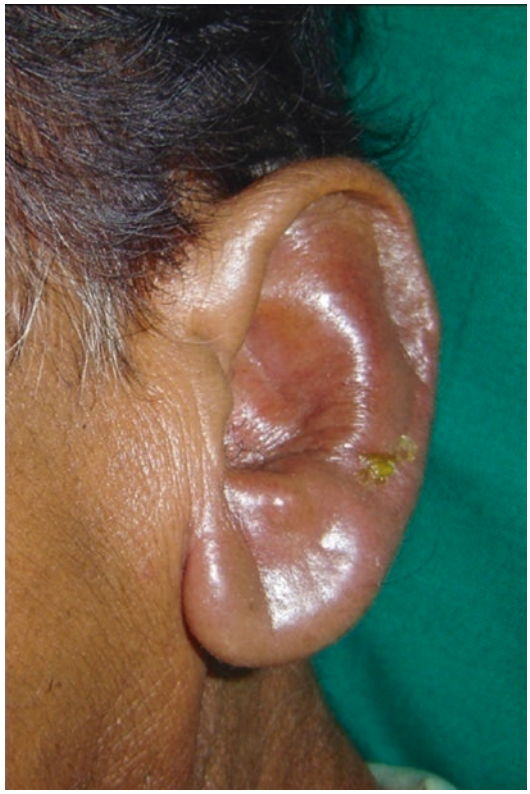


Fig. 15.47 Type I reaction with ulceration of the left pinna

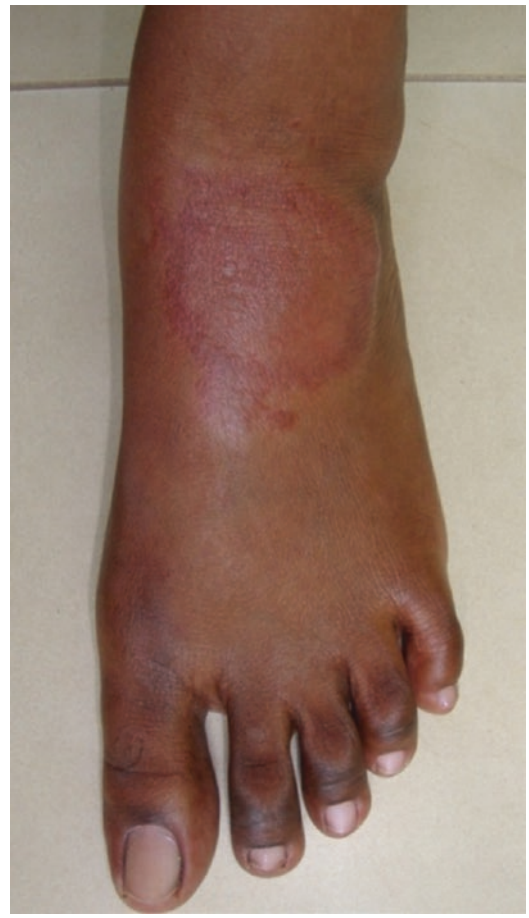


Fig. 15.48 Tuberculoid leprosy with type I reaction. A 17-year-old girl came with this tender erythematous patch on her foot with surrounding oedema. She has had slight depigmentation on that site for many months which she had ignored

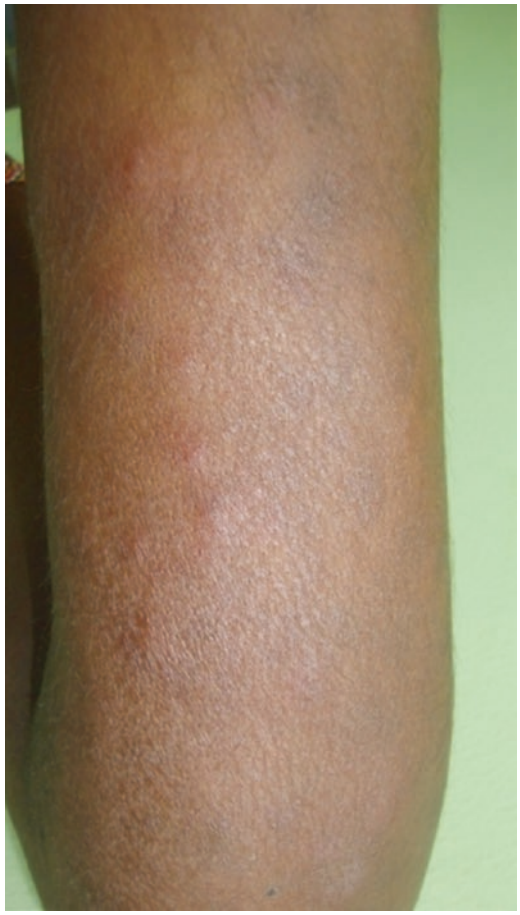


Fig. 15.49 Erythema nodosum Leprosum. Erythematous and skin-coloured tender nodules. These lesions are easily palpable than visible

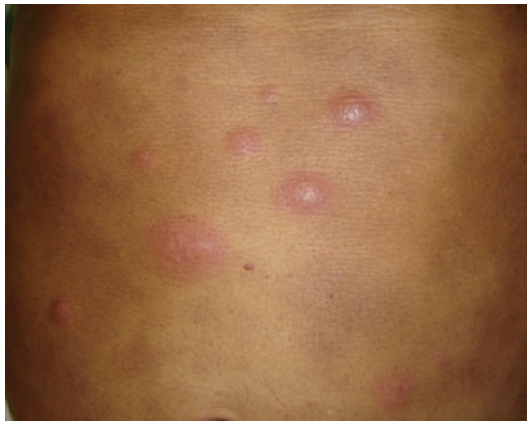


Fig. 15.50 Type II reaction (erythema nodosum leprosum). Erythematous tender multiple nodules appear with fever, myalgia and high ESR. The patients can present with ENL reactions; more commonly this appears while on multibacillary treatments

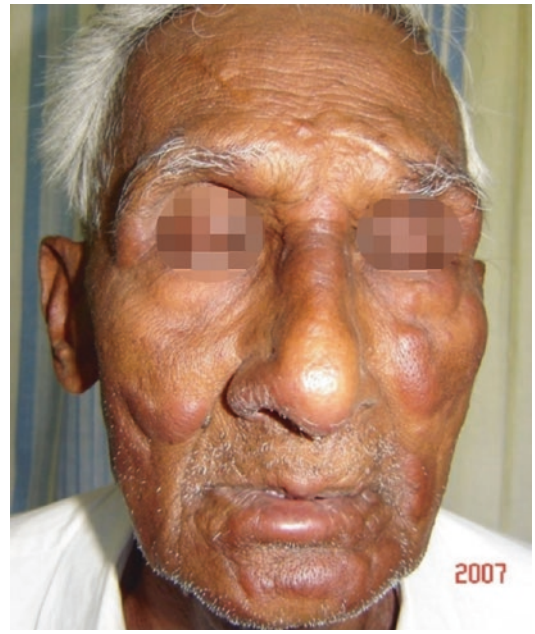


Fig. 15.51 A 75-year-old man with lepromatous leprosy developed mixed reactions while on treatments (both type I and type II reactions)

15.4.4 Permanent Disabilities

(Figs. 15.54a and b, 15.55, 15.56, 15.57, 15.58, 15.59 and 15.60)

15.5 Complications of Treatments

1. Clofazimine pigmentation
2. Acquired ichthyosis
3. Dapsone-induced haemolysis and Methaemoglobinaemia
4. Dapsone hypersensitivity syndrome
5. Dapsone-induced agranulocytosis

15.5.1 Clofazimine Pigmentation

Clofazimine is a brick red, fat-soluble crystalline dye. The most noticeable side effect is skin discoloration, ranging from red to purple black, the degree of discoloration depending on the dose and amount of leprous infiltration. The pigmentation usually fades within 6–12 months of stopping clofazimine, although traces of discoloration may remain for up to 4 years (Figs. 15.61, 15.62, 15.63, 15.64).

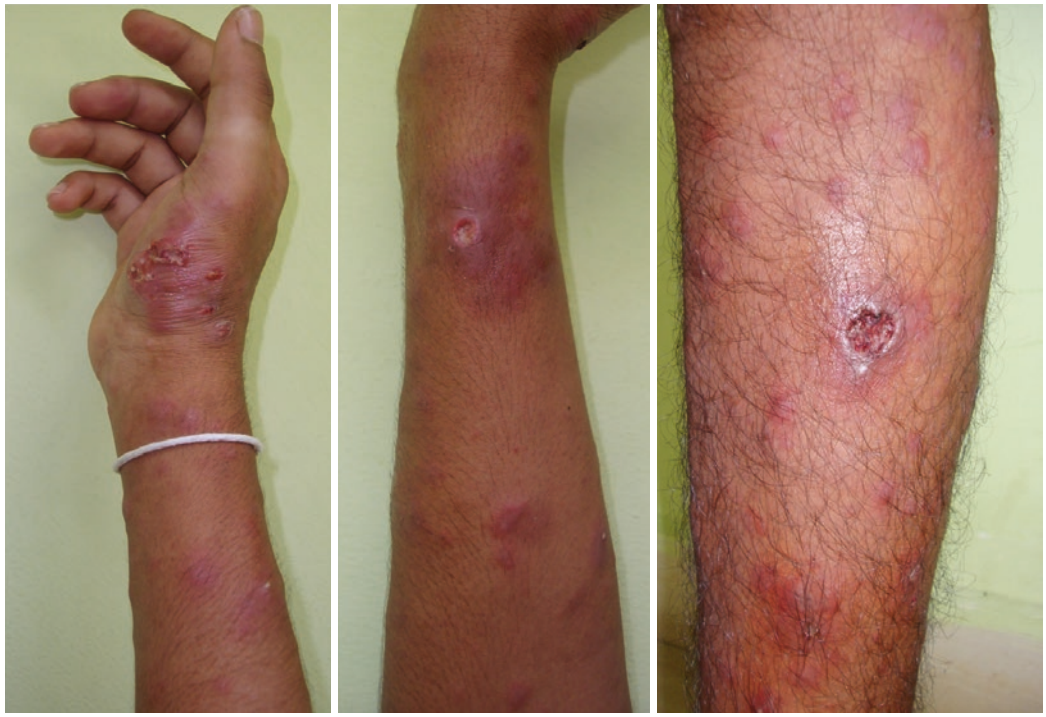


Fig. 15.52 Ulcerated ENL lesions in a 22-year-old boy with lepromatous leprosy. While on MB-MDT for lepromatous leprosy this boy came with high fever, painful papules and nodules, ulcerated nodules, arthralgia and was very ill. He had elevated ESR, leucocytosis with elevated neutrophil count. Skin biopsy from an ulcerated nodule showed histopathology of ENL. He was successfully treated with oral prednisolone and oral thalidomide without any sequele

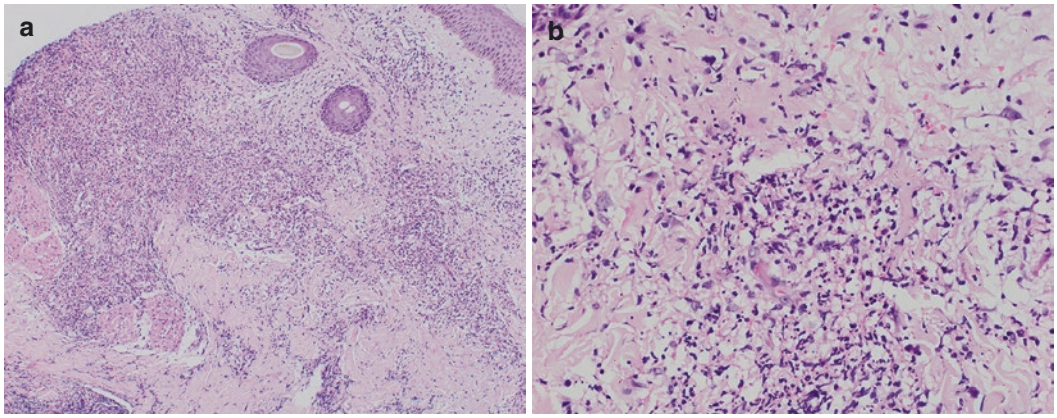


Fig. 15.53 (**a**) Histopathology of erythema nodosum leprosum (H&E X100) (picture courtesy Dr. Priyanka H. Abeygunasekara) Dense granulomatous inflammatory infiltrate in the dermis together with leucocytoclasia and vasculitis. (**b**) Histopathology of erythema nodosum leprosum (H&E X400) (picture courtesy Dr. Priyanka H. Abeygunase). Leucocytoclasia, damaged vascular wall and red cell extravasation are prominent

15.5.2 Acquired Ichthyosis

In leprosy acquired ichthyosis occurs in two occasions:

1. As a manifestation of lepromatous leprosy
2. As a side effect of clofazimine (Figs. 15.65, 15.66)

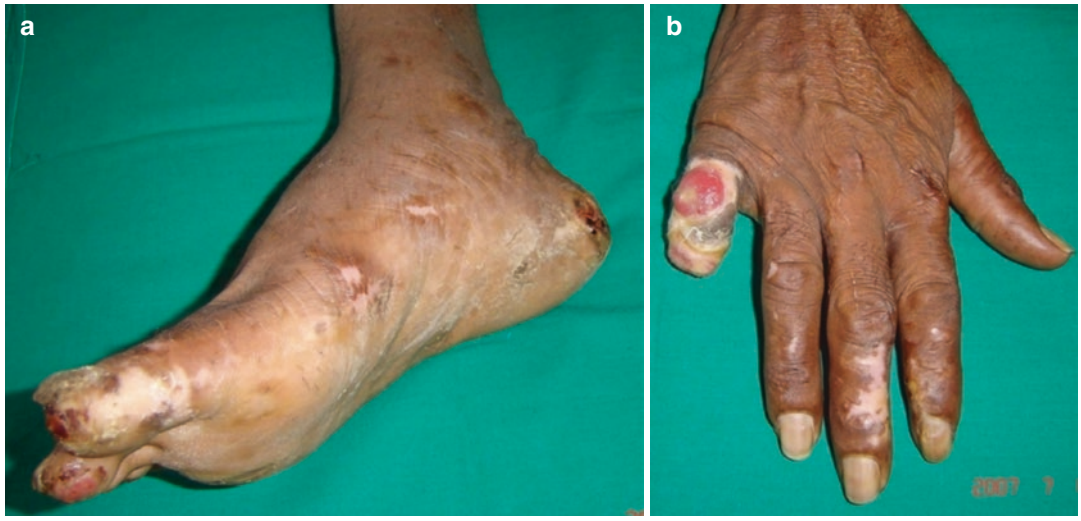


Fig. 15.54 (**a**–**b**) Lepromatous leprosy patient with peripheral numbness. Trophic ulcers, burn injuries and loss of digits are common complications in both (**a**) feet and (**b**) hands

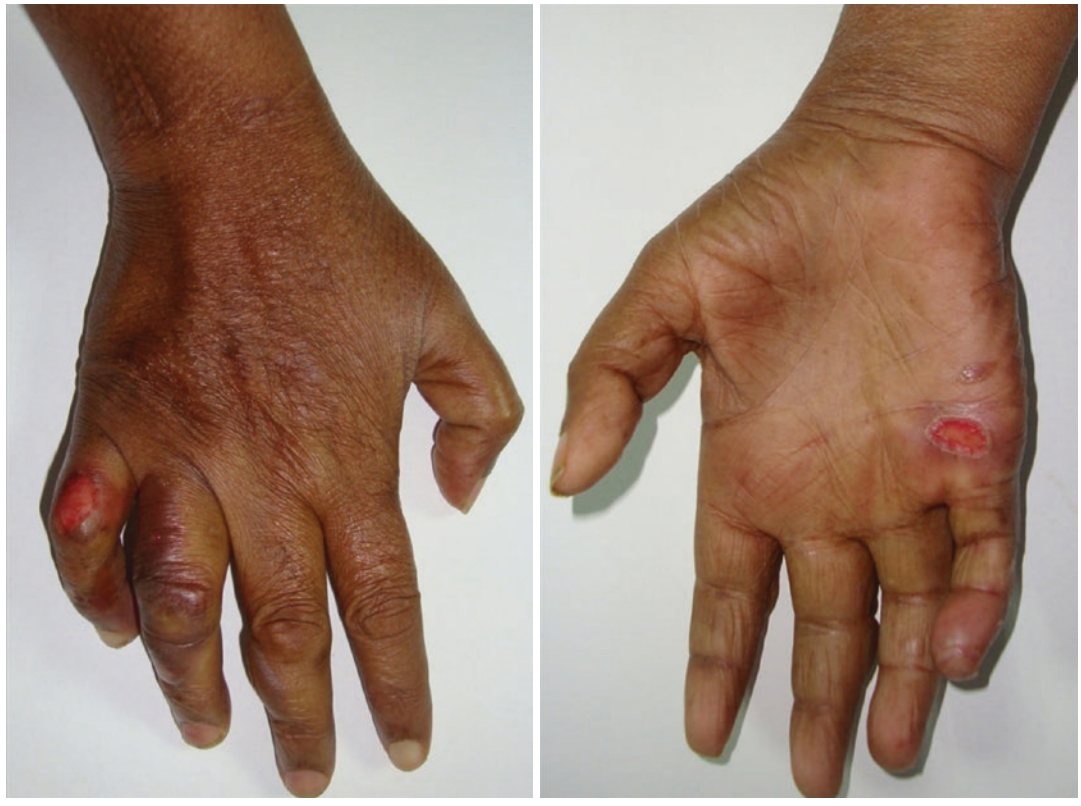


Fig. 15.55 A 49-year-old woman with numbness on the right hand and ulnar claw deformity. She came to us with a history of recurrent blisters and ulcers on ulnar border of the right hand. Healed scars show that it has been a frequent problem. These heat injuries occur while cooking, and they go unnoticed by the patients due to anaesthesia

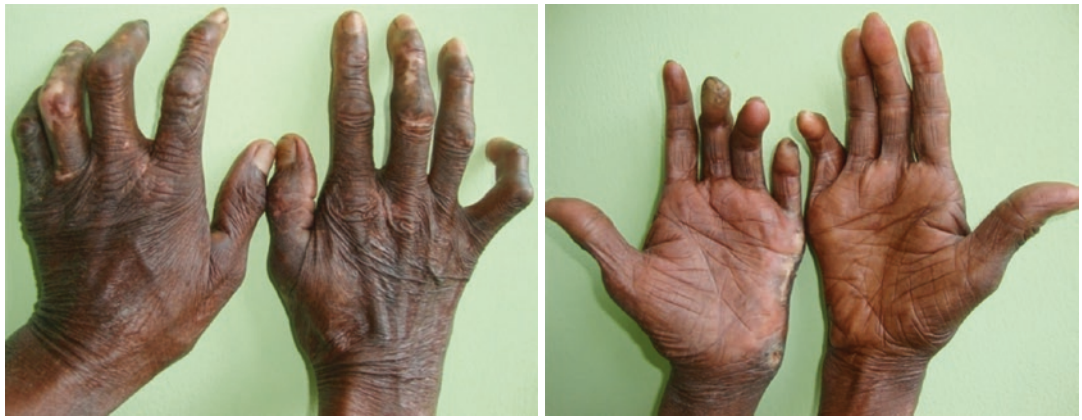


Fig. 15.56 Lepromatous leprosy with deformities in a 70-year-old woman. Her leprosy was inactive and left with extensive deformities of the hands and feet, trophic ulcers and scars

15.5.3 Dapsone-Induced Haemolysis and Methaemoglobinaemia

Haemolytic anaemia and methaemoglobinaemia are dose-dependent side effects, occurring to some degree in all dapsone-treated patients but showing great individual variability. Methaemoglobinaemia is rare and is manifest by lethargy and headache and a cyanotic hue to the skin and mucous membranes. Haemolysis is very common in variable degrees in individuals, and monitored assessing haemoglobin and reticulocyte count.

15.5.4 Dapsone Hypersensitivity Syndrome

This is an idiosyncratic adverse reaction of unknown mechanism, which usually occurs in the first 3–5 weeks of commencement of dapsone (Ranawaka et al. 2008; Liu et al. 2019). Associations between HLA-B*1301 and dapsone-induced cADRs were found in dapsone-tolerant and healthy control groups (Liu et al. 2019; Tangamornsuksan and Lohitnavy 2018) (Fig 15.67).

Clinical Features There are at least two of the four signs: fever, lymphadenopathy, generalized rash and hepatitis. Nausea, vomiting, eosinophilia and leucocytosis are common. Other internal organs (kidneys, heart, lungs and pancreas) may be affected. The prevalence is 1.4% and the fatality rate 9.9%, with liver failure the most frequent cause of death. Mucosal involvement, rash which ranges from a maculopapular eruption to toxic epidermal necrolysis and delayed cessation of dapsone therapy are associated with an increased risk of a fatal outcome (Bucaretchi et al. 2005).

Fatal outcome can be prevented by careful monitoring of blood counts (FBC) and liver transaminases (LFT) specifically during the first 3–5 weeks of commencing dapsone. Prompt cessation of dapsone therapy immediately following an abnormal FBC and/or LFT is mandatory.

15.5.5 Dapsone-Induced Agranulocytosis

Agranulocytosis is a rare, serious adverse effect following dapsone therapy which carries a high mortality rate. The prevalence of dapsone-induced agranulocytosis is 0.2–0.4%. And it is possibly due to its idiosyncratic action. Other common haematological side effects such as haemolytic anaemia and methaemoglobinaemia are dose dependent.

Management of dapsone-induced agranulocytosis includes prompt cessation of therapy and commencement of broad-spectrum antibiotics as per management of febrile neutropenia. GCSF is indicated when ANC is less than 0.1×109/L. All patients taking dapsone should be warned to dis-

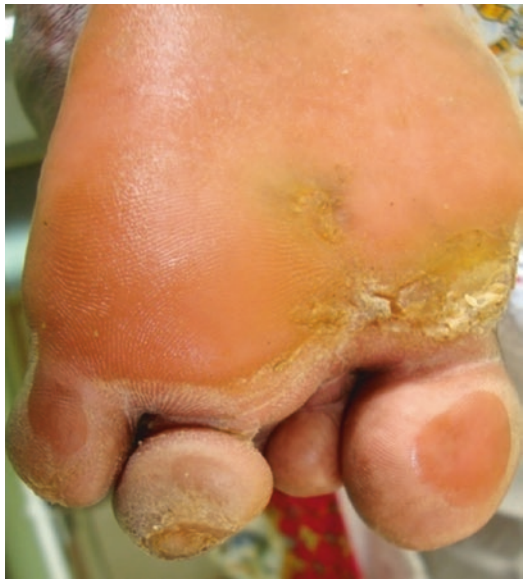


Fig. 15.57 Above patient having callosities on sole and deformed foot

continue the drug immediately in the event of fever, chills and sore throat occurring within the treatment period until further investigations are performed (Ranawaka et al. 2008; Fernando et al. 2019).

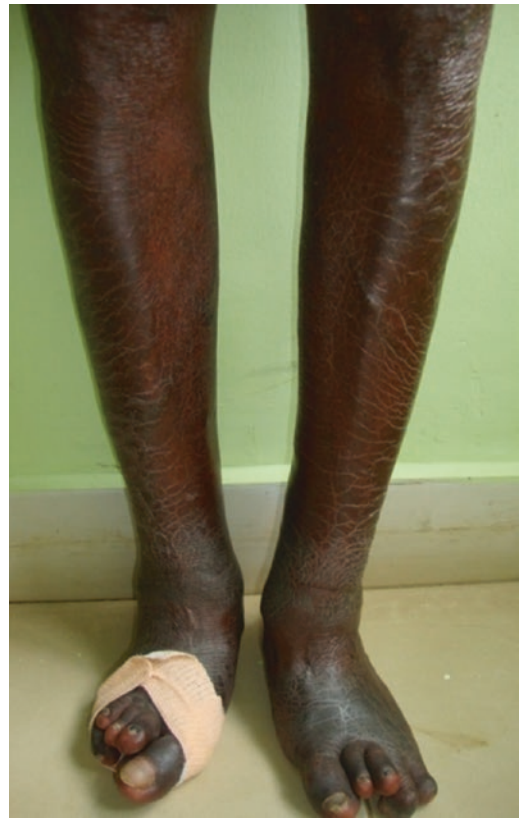


Fig. 15.58 Clawing of toes in a 69-year-old man with lepromatous leprosy. Note callosities on pressure-bearing areas

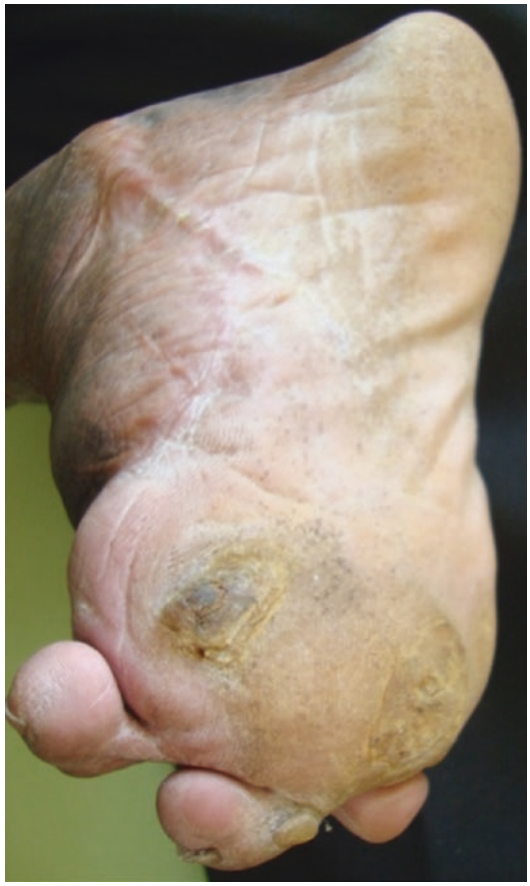


Fig. 15.59 Lagophthalmos. Lagophthalmos results from paresis of the orbicularis oculi due to involvement of the zygomatic and temporal branches of the facial (7th) nerve. Note the hypopigmented patch on the right side of the face surrounding the right eye. In lepromatous leprosy lagophthalmos occurs later and is usually bilateral

Fig. 15.60 This 75-year-old man had diffuse purple-black pigmentation due to clofazimine. Note pigmentation is marked on pinna of the ear

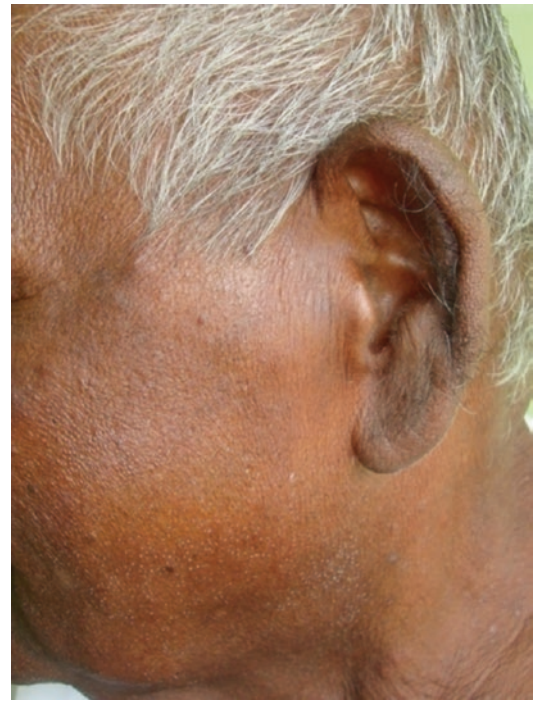


Fig. 15.61 Purple-black uniform generalized pigmentation due to clofazimine. This 11-year-old boy has a well-demarcated skin patch with superficial scaling. Note two small lesions on the left eyelid and near left eyebrow

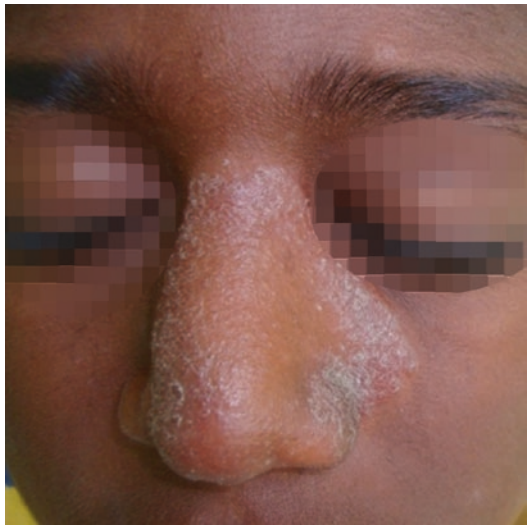


Fig. 15.62 This purple-black pigmentation at the margin of the skin lesion is due to clofazimine

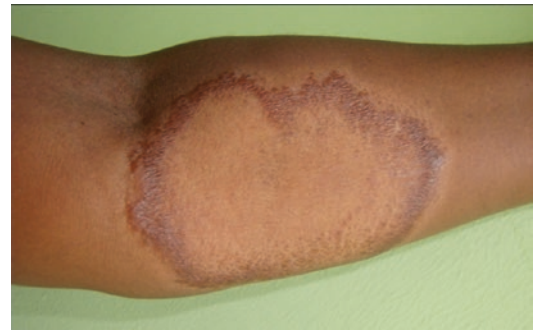


Fig. 15.63 Lepromatous leprosy lesions which were erythematous and skin-coloured earlier (in Fig. 15.46) developed blackish pigmentation when resolved. This is due to clofazimine pigmentation which has predilection to leprosy lesions

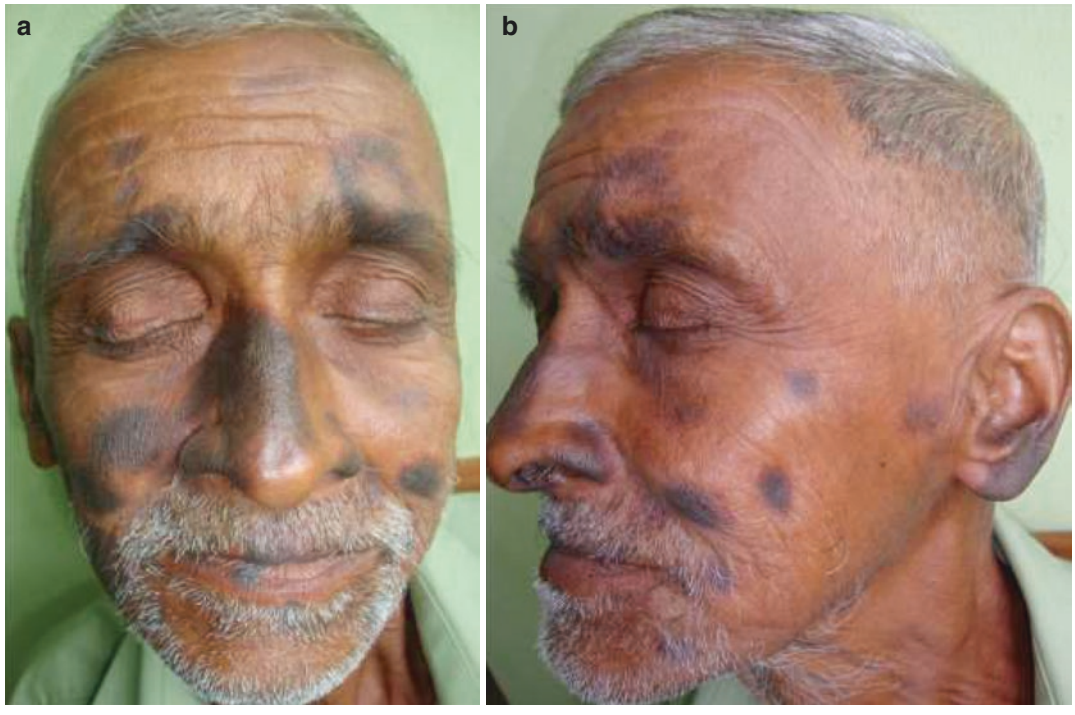


Fig. 15.64 Above man having clofazimine pigmentation on previous leprosy lesions on the trunk

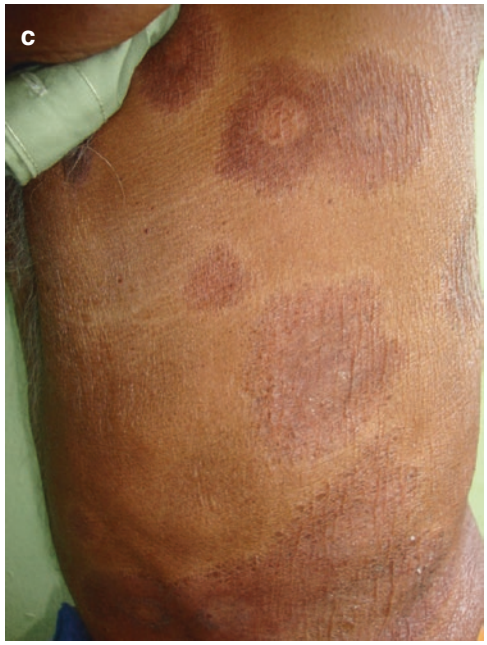
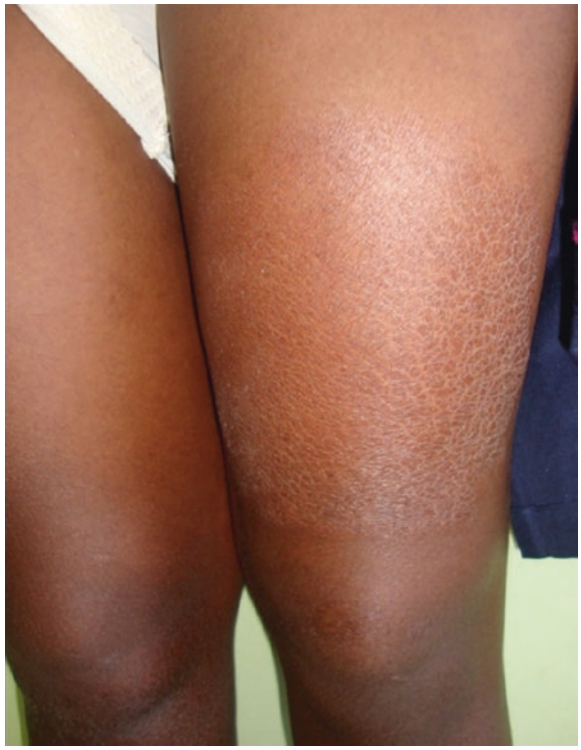


Fig. 15.64 (continued)



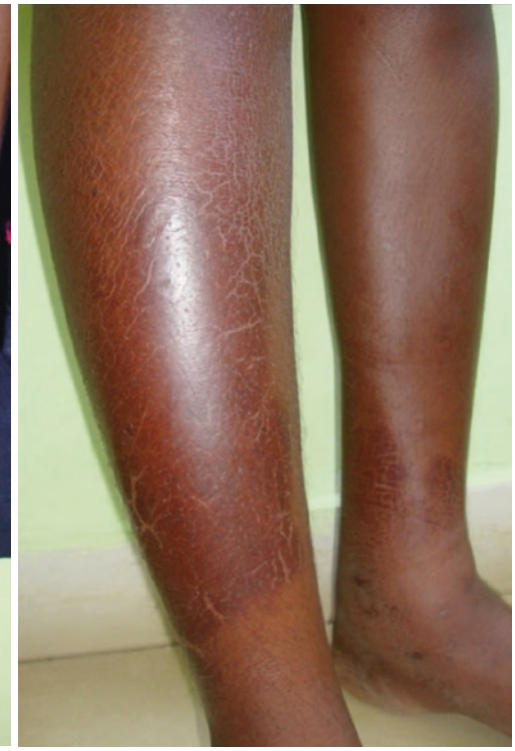


Fig. 15.65 A 20-year-old girl completed multibacillary therapy multidrug (MB-MDT) for 12 months. Five months later she came with these localized well-demarcated patches of acquired ichthyosis. This was considered relapse of leprosy and MB-MDT restarted. Lepromatous leprosy can present as acquired ichthyosis

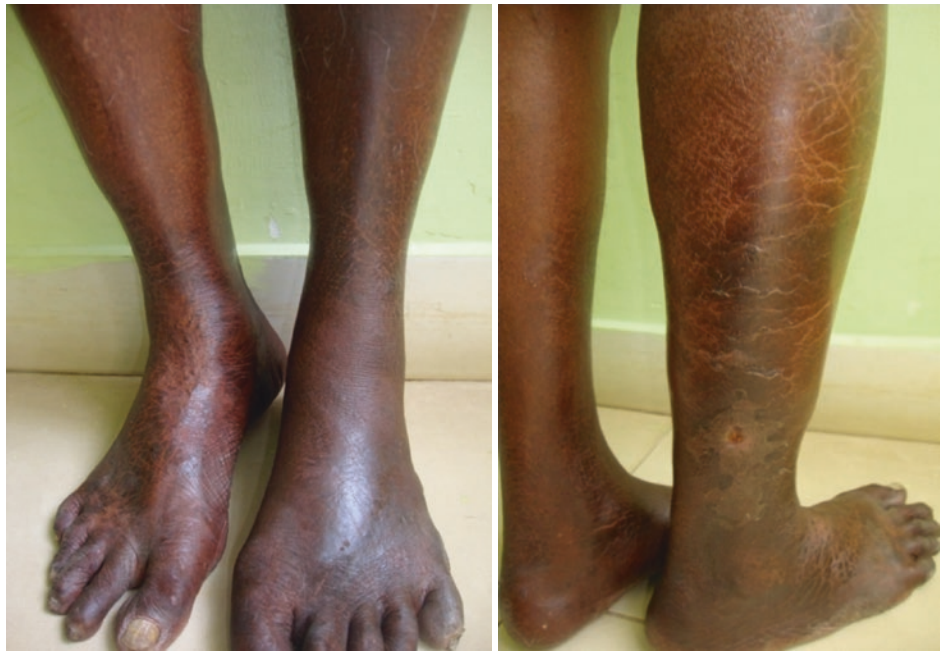


Fig. 15.66 Acquired ichthyosis and clofazimine pigmentation in a LL patient

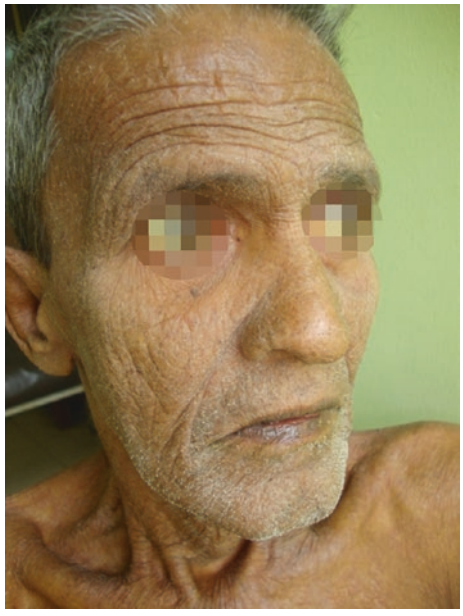


Fig. 15.67 Dapsone hypersensitivity syndrome (DHS). This 76-year-old man developed generalized itchy scaly rash and jaundice while on dapsone for lepromatous leprosy. On investigations he had low-grade haemolysis and moderately elevated liver transaminases. Dapsone was immediately withheld, and with symptomatic treatments and close monitoring as an inward patient, he recovered completely. Although DHS is a rare, fatal side effect of dapsone, early detection and careful monitoring under direct supervision can prevent fatal outcome

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