Physical Examination in Leprosy: Skin

9

Enrico Nunzi, Cesare Massone, and Salvatore Noto

Leprosy is a disease characterized mainly by involvement of peripheral nerves and the skin. The first signs that lead leprosy patients to medical examination are most often dermatological.

Skin examination has three fundamental steps, namely, general overview of the skin, detailed observation of lesions, and paraclinical tests [1].

9.1 General Overview: Distribution and Shape of Lesions

In leprosy, the spread of bacilli and skin lesion arrangement depend on cell-mediated immunity (CMI).

Lower CMI corresponds to increased bacterial load and number of lesions; at the same time, lesion distribution becomes increasingly symmetric.

In the lepromatous part of the spectrum, the bacilli and lesion distribution also depend on skin temperature. Warmer regions (scalp with hair, axilla, the middle part of back, groin, and inner part of thighs) present no lesions, while cooler parts of the body, such as the nose and nostrils, cheekbones, eyebrows, chin, and earlobes, host many bacilli and lesions.

E. Nunzi (✉)
Departamento de Dermatología, Universidad Técnica Particular de Loja, Loja, Ecuador
e-mail: enrico.nunzi.41@gmail.com

C. Massone
Dermatoloy Unit & Scientific Coordinator, Galliera Hospital, Genoa, Italy
e-mail: cesare.massone@galliera.it

S. Noto
Dermatologist, Private Practice, Bergamo, Italy
e-mail: salvatore.noto.genova@gmail.com

E. Nunzi et al. (eds.), *Leprosy and Buruli Ulcer*,
https://doi.org/10.1007/978-3-030-89704-8_9

In leprosy, according to the CMI, two main patterns of lesion arrangement can be observed (see also Chap. 26).

(a) Asymmetric arrangement (Figs. 9.1 and 9.2)
(b) Symmetric arrangement (Fig. 9.3)

The asymmetric arrangement pattern is peculiar to hyperergic paucibacillary forms. Rarely, a single lesion of hyperergic tuberculoid polar form can appear on the centerline of the body, having a symmetric aspect (Fig. 9.4), so that in such cases, the diagnostic pathway for patients with asymmetric pattern is utilized (see Chap. 26).

The symmetric arrangement pattern is always bilateral by definition. This is peculiar of hypo-anergic multibacillary forms of the leprosy spectrum; decreasing

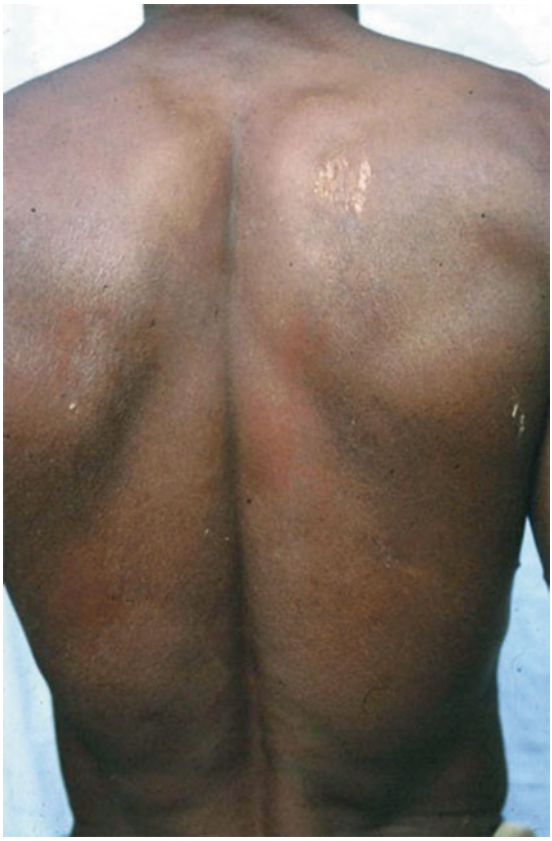

Fig. 9.1 Asymmetric arrangement: monolateral lesions

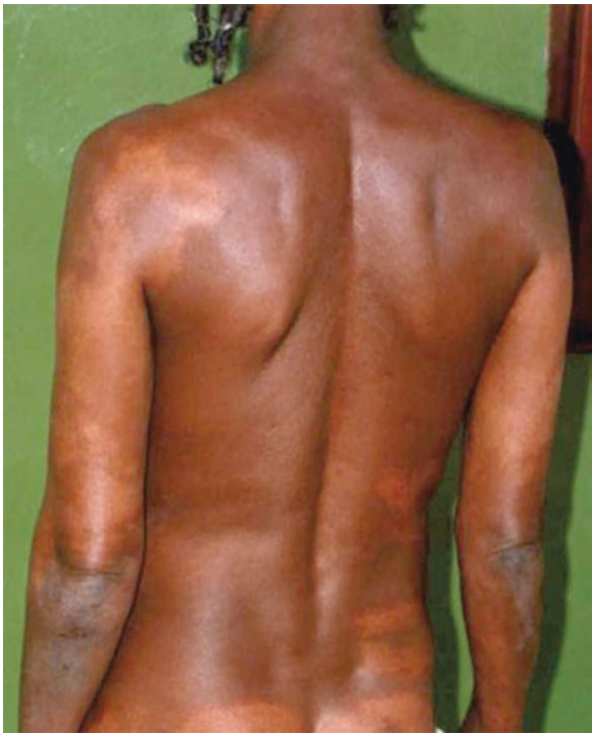

Fig. 9.2 Asymmetric arrangement: bilateral lesions

CMI corresponds to an increasing number of lesions. Their distribution on the body will appear even more symmetric, reaching the greatest symmetry at the anergic lepromatous pole.

In leprosy the shape of the skin lesion can be:

(a) Annular
(b) Targetoid
(c) "Swiss cheese," i.e., macules and plaques with punched-out surface
(d) Linear
(e) Polycyclic

Annular lesions can be seen in the asymmetric pattern due to central immunological healing process, and in the symmetric pattern only in the mid-borderline form of leprosy (BB), in which targetoid or Swiss cheese-shaped skin lesions can also appear. Polycyclic lesions with asymmetrical distribution and elevated papular edges are typical of BT forms.

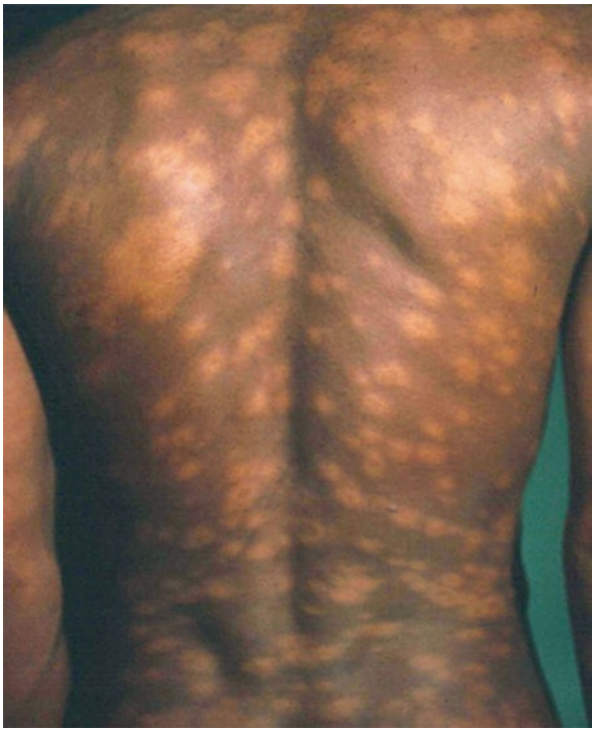

Fig. 9.3 Symmetric arrangement: bilateral lesions

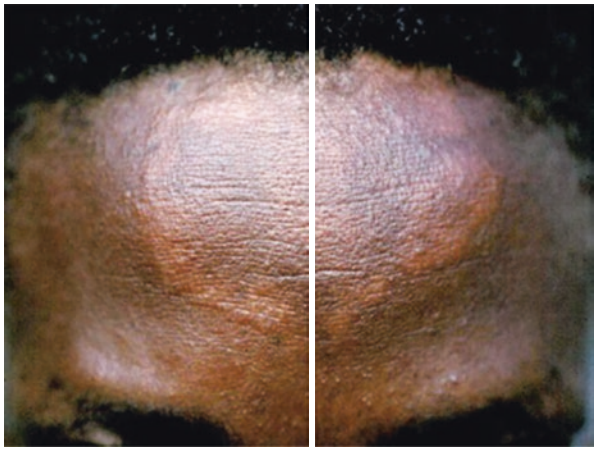

Fig. 9.4 Tuberculoid leprosy: single lesion on the centerline of the body. In such cases, the diagnostic process for the asymmetric arrangement pattern must be used

9.2 The Elementary Skin Lesions in Leprosy

The elementary skin lesions in leprosy are:

(a) Flat lesions (on the cutaneous surface):
- In active leprosy: erythematous, coppery, or hypopigmented macule
- In cured leprosy: hyperpigmented macule

(b) Elevated lesions (on cutaneous surface):
- In active leprosy: papule, nodule, plaque, and diffuse infiltration. This last lesion characterizes the polar lepromatous anergic form
- In leprosy reactions: plaque, nodule, wheal, scaling, vesicle, and bulla

(c) Depressed lesions (on cutaneous surface):
- In active leprosy: ulcer
- In leprosy reactions: erosion and ulcer
- In cured leprosy: atrophy, sclerosis, ulcer, and scar

9.2.1 Papules and Nodules in Active Leprosy

In dermatology, the difference between papules and nodules depends on the diameter, with papules having diameter smaller than 1 cm. In active leprosy (not in leprosy reactions), the differences between these two lesions cannot be assessed just by measuring size. In leprosy, papules are observed in hyperergic paucibacillary forms, and nodules are present in the hypo-anergic multibacillary form.

Papules show asymmetric arrangement and do not contain acid-fast bacilli (AFB), whereas nodules show presence of AFB and exhibit symmetric arrangement on the body (except in some anecdotal cases). Papules and nodules cannot be present together in the same patient [2, 3].

9.2.2 Morphological Features of Skin Lesions

(a) Edges: well- or ill-defined
(b) Surface: dry and rough or smooth

These features are also conditioned by CMI; well-defined edges depend on hyperergy which contains the infection, while vague edges show hypo-anergy with CMI that cannot repress bacillary spread. A wrinkled surface is caused by anhidrosis and is a sign of strong CMI. In this case, hyperergy provokes early destruction of autonomic nerve bundles that innervate sweat glands.

Lesions disappear when using multidrug therapy (MDT). In hyperergic forms, there can be a restitution of sensitivity. The color of the skin returns to normal; in late-treated multibacillary patients, lesions heal with atrophy.

9.3 Paraclinical Tests in Leprosy

(a) Tests for sensitivity and autonomic nerve function (see Chap. 15) on single lesion or lesions with asymmetric arrangement.

Sensory nerves

- Tactile sensitivity
- Pain sensitivity
- Thermal sensitivity
- Thermal sensitivity is the earliest to be lost. For convenience, in the course of routine tests, tactile sensitivity on lesions is assessed.

Autonomic nerves

- Function of sweat glands
- Integrity of the axon reflex
- It is more complex to test for sweat gland functionality with pilocarpine or the acetylcholine test, or to assess axonic reflex integrity using the triple response of Lewis provoked by histamines (use of which can also provoke some problems in atopic subjects). These tests are useful in children, where sensitivity testing is usually unreliable [4].

(b) Slit-skin smear can be used in lesions with symmetric arrangement or on cooler skin which is apparently normal. The slit-skin smear is carried out on edges of skin lesions (see Chap. 8).

Nasal smear (nasal swab) examination for AFB is performed for epidemiological reasons only; it has no diagnostic importance. The nasal mucosa is the main route of exit of *M. leprae* to the external environment, but bacilli are found in this region only in some BL and LL patients.

9.4 Clinical Examples

Clinical aspect must be examined from a dynamic point of view: each lesion must be assessed according to the full clinical aspect and patient history. This gives information which helps in understanding the natural progression and history of the disease. This is extremely important in leprosy because it helps to evaluate the immunological instability of the patient and the tendency to develop leprosy reactions.

The patient in Fig. 9.3 shows macules with symmetric distributional pattern. On the back, there is a large macule and other macules which are smaller, with vague edges. There are also small, annular lesions. According to the anamnesis, the patient initially developed BT leprosy revealing larger lesions on the left scapular region with well-defined and vague edges. Diagnosis was not achieved, CMI decreased, and bacterial load increased, with the appearance of smaller lesions in symmetric arrangement. The early hyperergic asymmetric arrangement turned into anergic symmetric arrangement. Some lesions have annular shape, meaning that the disease

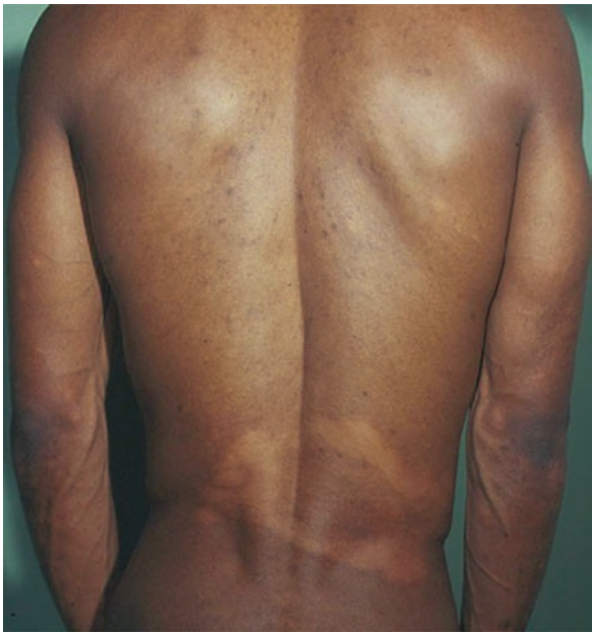

Fig. 9.5 Borderline leprosy (BL). Symmetric arrangement of BL form coexisting with an early asymmetric annular macule with BT aspect

passed through the mid-borderline form to reach the LL pole. This patient is not stable along the disease spectrum. MDT decreased the bacterial load and caused the appearance of leprosy type 1 reaction (edema in lesions).

The patient in Fig. 9.5 shows a large annular BT lesion on the back coexisting with nodules in symmetric arrangement that appeared later. The first lesion that appeared still shows annular shape with well-defined and vague edges of BT leprosy. This large BT lesion remained unchanged in time, while subsequently nodules with symmetric arrangement appeared. This enabled us to presume regional immunity of different levels [5].

This dynamic approach to dermatologic diagnosis of leprosy enables the patient's picture and evolution to be considered from past to present, and estimation of the possible future clinical evolution. This is necessary in order to establish a therapeutic strategy and to prevent leprosy reactions, which are acute inflammatory phenomena that strongly condition prognosis.

9.5 Regional Physical Examination

Localizations on specific body areas are important for diagnosis because they can reveal typical aspects of the disease. Physical examination must be done methodically, including the skin, peripheral nerves, eyes, upper respiratory system, and oral cavity in order to identify all early and late disease symptoms (Figs. 9.6 and 9.7).

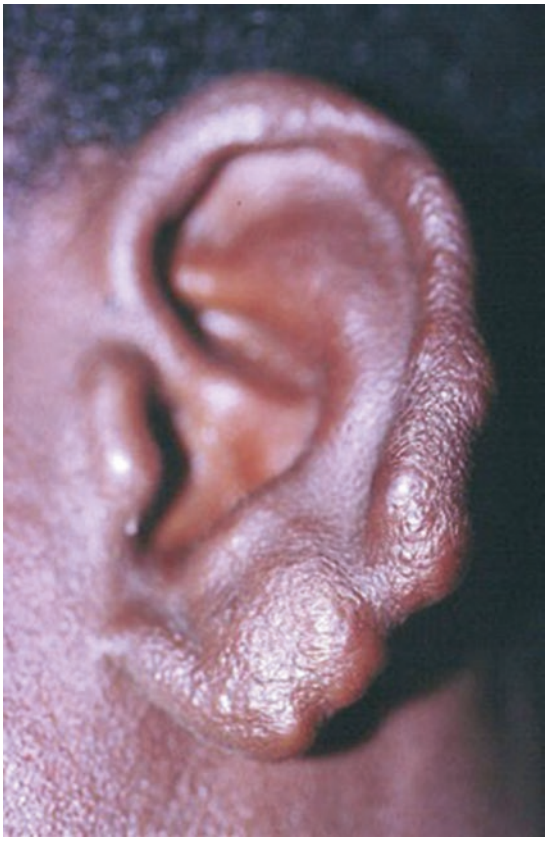

Fig. 9.6 Lepromatous leprosy (LL). Ear infiltration

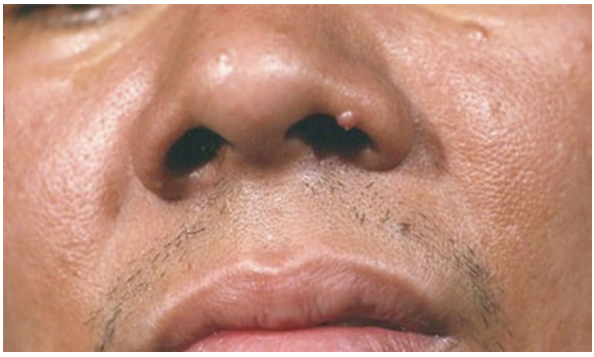

Fig. 9.7 Lepromatous leprosy (LL). Nodule at the nostril edge

Head Forehead – Specific skin lesions – Swelling of upper orbital nerve	Eye – Lagophthalmos – Ectropion, entropion – Conjunctival nodule – Corneal macule – Corneal ulcer – Hypopyon – Synechia – Corneal hypoesthesia – Loss of eyelashes
Eyebrow – Specific skin lesions – Alopecia – Swelling of upper orbital nerve	
Ear – Specific skin lesions – Cutaneous atrophy – Pigmentation	Nose – Nodular lesions on nostril edge – Perforated nasal septum – Nasal pyramid collapse

Oral cavity – Infiltration or perforation of palate – Tongue infiltration – Anterior angulation of the maxillary incisors	Neck – Specific skin lesions – Swollen great auricular nerve
Chin and cheek – Specific skin lesions.	

Upper limbs Arm – Specific skin lesions – Swelling of radial nerve Elbow – Swelling of ulnar nerve Forearm – Specific skin lesions	Trunk and abdomen – Specific skin lesions – Gynecomastia
	Buttock – Specific skin lesions
	Scrotum – Specific skin lesions tumefaction/ testicle atrophy
Wrist – Specific skin lesions – Swelling of the cutaneous branch of radial nerve – Swelling of median nerve	Lower limbs – Specific skin lesions
	Popliteal fossa – Swelling of common popliteal nerve
Hand – Specific skin lesions – Muscular atrophy – Swelling of cutaneous branch of radial nerve – Finger contracture – Ulcers – Scars – Phalanx reabsorption	Internal malleolus – Swelling of posterior tibial nerve
	Foot – Specific skin lesions – Muscular atrophy – Finger contracture – Ulcers – Bone reabsorption

It is extremely important to check eyes, hands, and feet systematically in order to identify onset of invalidity (see “Physical Examination: Nerves”).

References

1. Nunzi E, Fiallo P. La sindrome cutanea tropicale. In: Carosi G, Castelli F, Di Nola F, editors. Manuale di malattie infettive e tropicali. Padova: Piccin Nuova Libraria; 2000. p. 775–802.
2. Nunzi E, Noto S. Observing the skin: papules and nodules in Leprosy. Lepr Rev. 2008;79:118.
3. Fitzpatrick TB, Bernard JD, Cropley TG. The structure of skin lesions and fundamentals of diagnosis. In: Freedberg IM, Eisen AZ, Wolff K, et al., editors. Fitzpatick's dermatology in general medicine, vol. 1. New York: McGraw-Hill; 1999. p. 13–41.
4. Nunzi E, Leiker DL. Valutazione clinica del paziente. Indagini di laboratorio. In: Nunzi E, Leiker DL, editors. Manuale di leprologia. Bologna: AIFO-Italia; 1990. p. 57–68.
5. Fiallo P, Nunzi E, Betto P, et al. Histoid leprosy in early macular lepromatous leprosy: incidental finding or sign of augmented local immunity. Int J Leprosy. 1993;61:471–2.