Dr. Maria Leide teaching diagnosis of leprosy to a group of health workers in Bahia state (Brazil)

This is an advanced online learning course for clinicians and specialists on classification and differential diagnosis of leprosy.

The course is based mainly on the book *Leprosy in the Light Skin* by D. L. Leiker and E. Nunzi, published by AIFO/Italy.

Some of the pictures used in this online learning course have been taken from different ILEP learning guides, from *Leprosy in Africans* by W. K. Jacyk, published by DAHW & Talmilep and from *A New Atlas of Leprosy*, by A. Colin McDougall & Yo Yuasa, published by SMHF/Japan. Sincere gratitude is expressed to all of them for granting permission for use of this material.
Part 1: Ridley-Joplin Classification of leprosy

Depending upon the immunological resistance of persons to *Mycobacterium leprae*, leprosy can present with different clinical signs. The resistance of individuals varies from very strong to nil, with all possible grades in between.

Thus leprosy can be characterised by high resistance & low number of bacilli (tuberculoid leprosy) or it can be characterised by very low resistance and high number of bacilli (lepromatous leprosy). Between these two ends of the spectrum, there is decrease in resistance and increase in number of bacilli in the body giving rise to borderline tuberculoid, borderline and borderline lepromatous kinds of leprosy. This classification was proposed by Ridley and Joplin.

In addition, an early stage of disease, indeterminate leprosy' is recognised that can be self-healing or may develop any of the above-mentioned forms.
Field programmes for leprosy control prefer to use a simpler classification system - PB & MB leprosy.

**Part 1: Classification of leprosy**

For public health purposes, leprosy control programmes use a more simple classification of leprosy - Paucibacillary leprosy (PB) and multibacillary leprosy (MB).

Correct classification of leprosy is important since it is useful to assess risk of complications such as reactions, kind and duration of treatment, etc. even if it is not used very often these days. Ridley-Joplin classification is also important for research programmes that aim to look at more specific issues linked to leprosy.
Part 1: Classification of leprosy: Indeterminate Leprosy

This is a benign form, relatively unstable, seldom bacteriologically positive, presenting flat, ill-defined, macular lesions on the skin. There is no loss of sensation. The lesions can be hypo-pigmented or erythematous.

They may heal without any treatment, or may persist without progressing indefinitely or may evolve into tuberculoid or lepromatous kinds of leprosy.
Part 1: Classification of leprosy:
Tuberculoid Leprosy (TT)

Tuberculoid leprosy cases usually present well defined skin lesions, clear-cut margins with loss of sensation. The lesions are usually asymmetric and unilateral.

The skin lesions can be macules with smooth and dry surface. Sometimes the margins may be slightly raised with irregularity of the surface.

Sequelae of peripheral nerve involvement can develop in certain proportion of cases, leading to serious and disabling deformity.

The skin smear is usually negative or may show very few bacilli.
Well defined annular lesion of Tuberculoid Leprosy with loss of sensation

Part 1: Classification of leprosy: Tuberculoid Leprosy (TT)

Another example of tuberculoid leprosy with an annular lesion with raised edges and irregular surface on the trunk. The lesion showed clear loss of sensation. The central part of the lesion shows healing.

In tuberculoid leprosy, some times cutaneous nerves near the skin lesion may show enlargement and can be easily palpated.
Part 1: Classification of leprosy: Borderline Tuberculoid Leprosy (BT)

In borderline tuberculoid leprosy the resistance to M. leprae is somewhat less than in tuberculoid patients and this is reflected by the clinical aspects of the lesions.

The lesions are less sharply defined and less hypopigmented than in tuberculoid leprosy.

The healing in centre is absent or slow and incomplete, resulting in broad infiltrated edges. Satellite lesions around the main lesion are common. Often repeated crops of new lesions occur, thus number of lesions is more.

The distribution of the lesions remains asymmetrical. Skin smears may be weakly to moderately positive for acid-fast bacilli in the active stage of disease or may be negative.
Part 1: Classification of leprosy:  
**Borderline Tuberculoid Leprosy (BT)**

Another example of borderline tuberculoid leprosy. There are multiple annular lesions on the back. Some of the lesions have satellite lesions. Skin smear showed a bacteriological index of 1+
Part 1: Classification of leprosy: Borderline Leprosy (BB)

In a proportion of patients the clinical signs suggesting borderline tuberculoid leprosy and borderline lepromatous leprosy are so well balanced that it is difficult to decide if the patient is at tuberculoid side or lepromatous side.

Borderline leprosy tends to be unstable. With time an evolution towards borderline tuberculoid or borderline lepromatous side may be seen.

In active stage the lesions with not so well defined margins, are always moderately strongly positive on skin smear examination, even if without globi (big clusters of bacilli).

The lesions are many and may be extensive with some tendency towards symmetrical distribution.
Part 1: Classification of leprosy: Borderline Leprosy (BB)

Another example of borderline leprosy with annular lesions on the forearm.
Part 1: Classification of leprosy: Borderline Lepromatous Leprosy (BL)

In borderline lepromatous leprosy the lesions are numerous, showing a marked tendency towards symmetrical distribution.

The lesions are moderately well defined and little hypopigmented.

Usually large and small plaques, dome shaped lesions and nodules are present, some times with a slightly hypopigmented halo around some lesions.

Skin smears from the lesions are strongly positive. Large globi are absent but small globi may be present.
Part 1: Classification of leprosy:

Borderline Lepromatous Leprosy (BL)

Another example of borderline lepromatous leprosy with moderately well defined lesions on the buttocks and back. Some lesions show incomplete healing in the centre.

Skin smear showed a BI of 3+
Part 1: Classification of leprosy: Lepromatous Leprosy (LL)

Lepromatous leprosy presents with wide spread lesions, sometimes papules or nodules distributed symmetrically. The skin lesions can be more or less infiltrated.

Skin smears are strongly positive for acid fast bacilli with big globi. Skin smears from normal looking skin may also be positive.

In the picture a patient with lepromatous leprosy with numerous nodules and papules distributed symmetrically. Skin smear examination showed a BI of 5-6+.
Part 1: Classification of leprosy: Lepromatous Leprosy (LL)

Another example of lepromatous leprosy. There is diffuse infiltration of the whole face with loss of eyebrows. Skin smear showed a BI of 6+
Part 1: Classification of leprosy: Summary

Leprosy can be classified into indeterminate (I), tuberculoid (TT), borderline tuberculoid (BT), borderline (BB), borderline lepromatous (BL) and lepromatous (LL) types. While indeterminate type is unstable and can self-heal, it can also progress of any of the other types. The TT side of spectrum is characterised with higher body resistance, while LL side has low or absent resistance. The following picture shows the main features of bacterial examination and clinical diagnosis for the different types of leprosy.
Red coloured acid-fast bacilli on Ziehl-Nielsen staining in a skin smear of a case of lepromatous leprosy with globi (big bunches of bacilli)

Part 2: Differential Diagnosis of leprosy

There are many other skin conditions that can look like leprosy. Hypopigmented or erythematous skin patches with definite loss of sensation, thickening of peripheral nerves along with acid-fast bacilli in skin smear examination are confirmatory for leprosy.

Let us take a look at some of those conditions that can be confused with leprosy.
Part 2: Differential Diagnosis of leprosy: Birth marks (*Naevus achromicus*)

Birth marks are well defined white patches, that are present from birth and increase in size with growth of the body. Hairs in the patches are also depigmented.
Part 2: Differential Diagnosis of leprosy: *Tinea versicolor*

*Tinea versicolor* usually starts with small, brownish, scaly lesions, which grow and coalesce into larger lesions. The diagnosis is based on slight scaling, a yellowish green colour under the Wood's lamp and the finding of the fungus in skin scrapings treated with potassium hydroxide under microscope.
Part 2: Differential Diagnosis of leprosy: Tinea corporis

Tinea corporis often presents with well defined, round lesions, with a raised and vascicular edge. Sometimes two or more concentric rings are present. The lesions are usually scaly and itching. The diagnosis can be confirmed by microscopic examination of skin scrappings, treated with 20% potassium hydroxide.
Pityriasis alba is a mild eczematous condition which leaves slightly scaling hypopigmented macules with an ill-defined border. The condition is common on the face of children during the summer time.
Part 2: Differential Diagnosis of leprosy: Seborrhoeic dermatitis

Seborrhoeic dermatitis lesions are yellow coloured and show coarse parakeratotic scaling. Lesions are common on chest and back and they may coalesce into larger polycyclic patches healing in the centre. Itching is usually mild.
Part 2: Differential Diagnosis of leprosy: Lichen planus

Lichen planus presents with papules which may coalesce into larger patches or annular lesions.
Part 2: Differential Diagnosis of leprosy: Vitiligo

Vitiligo presents with depigmented patches and white hair in the lesions.
Fixed drug eruptions show well defined violaceous macules. In the active stage the lesions are more erythematous and infiltrated. They subside after the withdrawal of the causative drug and reappear rapidly at the same site with re-administration of the drug.
Part 2: Differential Diagnosis of leprosy: 
**Psooriasis**

Psooriasis presents with figurate lesions and characteristic shiny gray scaling.
Part 2: Differential Diagnosis of leprosy: Sarcoidosis

Sarcoidosis may show annular lesions, sometimes polycyclic, which may closely resemble tuberculoid leprosy. They can be differentiated by absence of loss of sensation, typically present in leprosy.
Part 2: Differential Diagnosis of leprosy: 
Lupus vulgaris

Lupus vulgaris shows brown-yellowish nodules which may coalesce into plaques. Typically Lupus vulgaris lesions are accompanied with ulceration and scarring.
Part 2: Differential Diagnosis of leprosy: Dermal leishmaniosis

Post kala-azar Dermal leishmaniosis may closely mimic a leonine face in lepromatous leprosy. However, in dermal leishmaniosis, eye brows are intact.
Part 2: Differential Diagnosis of leprosy: Kaposi's sarcoma

Kaposi's sarcoma lesions are often found on the foot or leg. The lesions are shiny, violaceous and nodular.
Thank you for completing the online learning course on classification and differential diagnosis of leprosy.

Your comments, suggestions and criticisms will be greatly appreciated. They will help us to improve this course. Send an email to <sunil.Deepak@aifo.it>

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