Diagnosis of leprosy

Introduction

Salvatore Noto, Pieter A M Schreuder

Leprosy mailing list, April 2010
Definition of leprosy

Leprosy is a chronic infectious disease caused by *M. leprae*. It affects mainly the skin and the peripheral nerves.
“Proteiform diseases”

Leprosy: the great imitator

Syphilis: ““ “

SLE: ““ “
Leprosy

leprosy mailing list

Courtesy of S. Noto
Leprosy

leprosy mailing list

Courtesy of S. Noto
Leprosy 

Courtesy of S. Noto
Leprosy, BL reactive after pregnancy

Courtesy of B Naafs
Leprosy, BL reactive after pregnancy

Courtesy of B Naafs  leprosy mailing list
Leprosy, BL reactive after pregnancy

 Courtesy of B Naafs
Leprosy

Courtesy of S. Noto

leprosy mailing list

Slide 12
Leprosy
(in reversal reaction)

Courtesy of S. Noto
Leprosy

leprosy mailing list

Courtesy of S. Noto
Leprosy

Courtesy of S. Noto
Leprosy

Courtesy of S. Noto
Leprosy

Courtesy of S. Noto
Slides 15, 16 and 17

• These patients were all treated with multi-drug therapy. Sequelae in themselves are not an indication to start treatment.

• These kind of patients need urgently physical and social-economic rehabilitation.
Leprosy in families: father and child

Courtesy of J A da Costa Nery
How to put order in clinical leprosy

- The 3 cardinal signs of leprosy;
- Ridley and Jopling classification;
- Reactions and nerve damage.
The 3 cardinal signs of leprosy

1. Skin patch with loss of sensation;
2. enlarged peripheral nerve;
3. positive slit-skin smear.
### The leprosy spectrum according to the Ridley and Jopling classification

<table>
<thead>
<tr>
<th>tuberculoid leprosy</th>
<th>borderline leprosy</th>
<th>lepromatous leprosy</th>
</tr>
</thead>
<tbody>
<tr>
<td>TT</td>
<td>BT</td>
<td>BB</td>
</tr>
<tr>
<td>BI</td>
<td>- -</td>
<td>- - , 2+, 3+</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1+,2+)</td>
</tr>
</tbody>
</table>

- **BT** = borderline tuberculoid leprosy
- **BB** = mid borderline leprosy
- **BL** = borderline lepromatous leprosy
- **BI** = bacteriological index
- **- -** = negative
- **+** = degree of positivity
Nerve damage in leprosy

1. dermal nerves;

2. cutaneous nerves;

3. major nerve trunks.

Nerve damage in leprosy

Most of the nerve damage in leprosy takes place during acute exacerbations of the disease called "Reactions".
How to diagnosis leprosy

• history taking;
• physical assessment; and
• laboratory investigations.
• Slides 27 and 28 show the importance of the source of light in clinical examination
Skin lesions must be examined in a good light BUT NOT direct sunlight

Indeterminate leprosy. Compare these photos, same patient, same day, same verandah!
B. examined in bright sunlight. Note shadows and that lesion can hardly be identified.
A. a well defined edge for part of the lesion, is apparent. It is slightly erythematous, when
seen in good light, but not in sun. Appearance of lesion varies with angle of the rays of
light. Tangential light is best, as on front of chin.

Courtesy of Grace Warren
Direct sunlight passing through the foliage of the tree creates false skin lesions!
Diagnosis of leprosy

The 1st cardinal sign of leprosy

Salvatore Noto, Pieter A M Schreuder
Leprosy mailing list, May 2010
The 1\textsuperscript{st} cardinal sign of leprosy

“Skin patch with loss of sensation”
Testing for loss of sensation

Courtesy of B. Naafs
Testing for loss of sensation

1. Explain
2. Demonstrate
3. Test when the patient comprehends fully

Courtesy of: S Noto
• Hypopigmentation
• Distribution
• Margins
• Streaming and satellite lesions

Loss of sensation? Yes

Leprosy

Courtesy of: S Noto
• Distribution
• Margins
• Streaming and satellite lesions
• Surface is dry

Loss of sensation? Yes.

Leprosy

Courtesy of: S Noto
Addendum

The sweat and histamine tests
Loss of sweating in hypopigmented leprosy macules

Borderline leprosy
The big leprosy lesion (arrow) is definitely dry while the normal skin is shiny from the reflection from the moisture of the sweat.

Courtesy of Grace Warren
Loss of sweating in hypopigmented leprosy macula

On the right side of the slide a round dry hypopigmented leprosy lesion.
On the left normally pigmented skin with drops of sweat
The histamine test

Normal response (redness) to injection of histamine = normal skin

Diminished response (reduced redness) to injection of histamine = leprosy lesion

Courtesy of J A da Costa Nery
Diagnosis of leprosy

The second cardinal sign of leprosy

Salvatore Noto, Pieter A M Schreuder
Leprosy mailing list, May 2010
The 2\textsuperscript{nd} cardinal sign of leprosy

“Enlarged peripheral nerve”
Peripheral nerve involvement in leprosy

- thickened;
- small and hard;
- irregular in consistency;
- tender;
- spontaneous pain;
- nerve function deficit (sensory, motor, autonomic).
Peripheral nerves affected in leprosy

1. supra orbital n.
2. facial n.
3. great auricular n.
4. supra clavicular n. (rare)
5. radial n.
6. ulnar n.
7. radial cutaneous n.
8. median n.
9. femoral cutaneous n. (rarely obvious)
10. lateral popliteal (common peroneal) n.
11. superficial peroneal n.
12. sural n.
13. posterior tibial n.
Routinely palpated nerves “of predilection” in leprosy

1. Great auricular n.
2. Ulnar n.
3. Radial cutaneous n.
4. Median n.
5. Lateral popliteal n.
6. Posterior tibial n.
Examination of nerves

• Peripheral nerves may be thin or large, soft or hard, tender or painful, at sites of predilection;

• Record size “−” or “+” or “++” is adequate;

• Record pain or tenderness. Record texture as normal, soft, firm or hard.

Be gentle, look at the patient’s face as you palpate nerves; he will wince if they are tender. (Hastings R, 1985)
Supra orbital nerve
Palpation of the supraorbital nerve

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Courtesy of S. Noto

Slide 46
Cervical plexus, and branch of the supra-orbital nerve

Large cervical plexus and branch of the supra-orbital nerve associated with small lesions beside the eye.

Leprosy patient in Hong Kong.

Courtesy of Grace Warren
Great auricular nerve
Leprosy, enlarged great auricular nerve. (Courtesy of S. Noto)
Leprosy, enlarged great auricular nerve

Courtesy of B. Naafs

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BL leprosy
Enlarged great auricular nerve

Courtesy of B. Naafs
Ulnar nerve
Palpation of the left ulnar nerve

Courtesy of S. Noto
Leprosy, enlarged ulnar nerves

Have you ever seen large ulnar nerves at the elbow? Well here they are. Her right more than the left. But as yet she has no obvious neural deficit in the hands (G. Warren).
Radial cutaneous nerve
Palpation of the radial cutaneous nerve
(see next slide)

- The left hand of the examiner is palpating the right radial cutaneous nerve of the patient while it courses from the lateral border of the radius onto the dorsum of the hand. Note the patient’s forearm, wrist and hand position.
Palpation of the radial cutaneous nerve

Courtesy of B. Naafs

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Enlarged radial cutaneous nerve
Leprosy, patient from Brazil

Courtesy of S. Noto
Enlarged radial cutaneous nerve
Leprosy, patient from Brazil

Courtesy of S. Noto

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Median nerve
Leprosy
The drawings show the position of the enlarged median and radial cutaneous nerves

Courtesy of A. Salafia, India
Leprosy, enlarged left median nerve

Courtesy of B. Naafs
Lateral popliteal nerve
(common peroneal n.)
Palpation of enlarged lateral popliteal nerves

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Courtesy of B. Naafs
Palpation of the lateral popliteal nerves.
Patient’s knees are slightly bent.

Courtesy of S. Noto
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Superficial peroneal nerve
Superficial peroneal n.

Large superficial peroneal nerve, often easily palpable. This one also nodulated. This would imply small abscesses in the nerve. Patient does not complain of pain or discomfort.
Enlarged superficial peroneal and sural nerves (and loss of sensation)

Courtesy of B. Naafs
Posterior tibial nerve
Palpation of the posterior tibial nerve

Courtesy of B. Naafs
Any cutaneous nerve
Thigh nerves

Large superficial nerve on a thigh with a hypopigmented lesion in association

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Courtesy of Grace Warren
Any nerve

Courtesy of B. Naafs
Check all nerves!
Diagnosis of leprosy

The 3rd Cardinal sign

Salvatore Noto, Pieter A M Schreuder
Leprosy mailing list, May 2010
The 3rd cardinal sign of leprosy

“Positive slit-skin smear”
The slit and scrape method

Technique of smear-taking from the ear lobe

Warning: the use of gloves is advised

Courtesy of B. Naafs
The slit and scrape method
Technique of smear-taking from the ear lobe

Courtesy of E Nunzi and A Clapasson
leprosy mailing list
The slit and scrape method

blade is then turned through 90 degrees

Warning: the use of gloves is advised

Courtesy of B. Naafs
Technique of smear-taking

Courtesy of E Nunzi and A Clapasson
1. Smear
2. Dry
3. Fix
4. Stain (Ziehl-Neelsen)

Courtesy of E Nunzi and A Clapasson
Morphology

<table>
<thead>
<tr>
<th>a</th>
<th>b</th>
<th>c</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>F</td>
<td>G</td>
</tr>
</tbody>
</table>

Solid (S)  Granular (G)

Courtesy of A Clapasson
Courtesy of A Clapasson

Granular (G)  
Fragmented (F)
Leprosy (LL)  

Bacteriological index (BI) = 4.83 +  

Morphological index (MI) = 6.1 %  

left  

right  

Courtesy of S. Noto  

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Leprosy (LL)

Bacteriological index (BI)
= 4.7 +

Morphological index (MI)
= 26.4 %
Diagnosis and the clinical spectrum of leprosy

Salvatore Noto, Pieter A. Schreuder

Leprosy mailing list, May 2010
Diagnosis and the clinical spectrum of leprosy

While examining the patient the following 4 points are of help for achieving the diagnosis of leprosy:

1. in some forms of leprosy there is altered sensation in skin patches;
2. in some forms of the disease the leprosy bacilli are demonstrable by slit-skin smears;
3. Always systematically examine the peripheral nerves;
4. In some rare forms of leprosy no cardinal signs are present.
Leprosy BT

In this form of leprosy there is loss of sensation in skin lesions, nerves may be enlarged, skin smear is normally negative. Diagnosis is based on loss of sensation and or enlarged nerves.

Courtesy of B Naafs
Leprosy BL – LL, infiltrated ears

In these forms of leprosy sensation can be normal, nerves enlarged or normal, slit-skin smear should be positive.

Courtesy of B Naafs
Leprosy BL – LL (reactive)

In these forms of leprosy sensation can be normal, nerves enlarged or normal, slit-skin smear should be positive

Courtesy of B Naafs
Leprosy BL – LL
In these forms of leprosy sensation can be normal, nerves enlarged or normal, slit-skin smear should be positive

Courtesy of B Naafs
Leprosy BL – LL

In these forms of leprosy sensation can be normal, nerves enlarged or normal, slit-skin smear should be positive.

Courtesy of B Naafs
Early Lepromatous leprosy

It causes no discomfort, and the patient does not feel sick. It is “just there”. No signs of nerve damage or large nerves. Many bacilli in some lesions.

Case number 3. in the text

Courtesy of Grace Warren
LL leprosy

Infiltrated skin, no loss of sensation, no enlarged nerves. In this case diagnosis is by positive slit-skin smear examination. Mother with LL leprosy.

Courtesy of B Naafs
Difficult cases
Lepromatous leprosy

On palpation diffuse infiltration of the skin of the whole face except upper lip. A vague edge is present along the naso-labial fold. (Upper lip normal skin, rest of face infiltrated.)

Diagnosis was accidentally made on the biopsy of a nodule on the arm.

Slit-skin smear: - bacteriological index 6+ at all sites!

Courtesy of Grace Warren
Leprosy, BT

Testing for loss of sensation may be negative on the face. The patient developed BT as immune reconstitution inflammatory syndrome (IRIS) after leflunamide.
BB-BL leprosy

Teen aged girl presented with painless burns, not diagnosed as leprosy. On careful examination she had well established disease caught from grandmother. If you look at the arm there is a hypopigmented patch covering a lot of the arm which is fairly well defined at the wrist but not the proximal end of the lesion (G. Warren).

Case 4. in the text.

Please think and investigate why there are unusual signs such as NO PAIN.
Indeterminate leprosy

Small European child with a typical lesion. It is basically vague edged, the lesion appearing pinkish against her light coloured skin. It has been there for a few months, there is no detectable sensory abnormality, she appears to feel touch normally. It is not itchy, scaley or irritating. No palpable nerves found and no other lesions. Her general health is good.

She lives in a highly endemic area where there are many untreated cases. It is not reasonable to biopsy a small lesion on the cheek of a small child to diagnose Indeterminate leprosy. So a diagnosis cannot be confirmed but, because of the examination and history I would describe and record fully and treat with routine paucibacillary (PB) therapy for 6 months. However I would not officially register her as leprosy because of the social stigma that could result (G. Warren).
INDETERMINATE LEPROSY

Young boy, son of BL leprosy patient previously untreated with three lesions. One on cheek and one of back are vague edged hypopigmented with apparently no loss in touch on lesion and no abnormal sensation or discomfort typical of leprosy. No abnormal nerves found anywhere.

The lesion on the arm has a well defined infiltrated edge and it is slightly itchy. Skin scrape showed fungus in the arm lesion. Treated with antifungal ointment.

Biopsy is an option but a large biopsy would need to be taken from the back and even then one cannot be sure of diagnosing “Indeterminate” by biopsy. So in view of the contact with BL leprosy I would diagnose as leprosy, treat as PB and watch carefully for a prolonged period after medication ceases (G. Warren).
Typical Indeterminate lesion occurring in endemic areas and in children with contact with active leprosy. Carefully describe and record the suspect leprosy lesion and see the patient back in 3 months.
Diagnosis of leprosy in children may be difficult

Courtesy of J A da Costa Nery