

Acid-fast Bacilli in the Fingers of Long-Treated Lepromatous Patients

MARIAN RIDLEY, W. H. JOPLING AND D. S. RIDLEY

Hospital for Tropical Diseases, London NW1 0PE

In over 30 long-treated patients with lepromatous leprosy the fingers were found to be the skin site with the highest bacterial load and with the highest number of solid-staining bacilli. It was also the site at which bacilli, solid or otherwise, were most frequently detected. In these patients the nose, as expected, was not a very productive site for bacilli. No clinical lesions were present on the fingers examined. In one amputation specimen of a finger the only site at which bacilli were seen was in a fibrosed structure thought to be a Pacinian corpuscle.

Introduction

Relapse in the lepromatous case is only too well known, and in the past has usually been due to the fact that the patient has stopped treatment against medical advice, but in recent years an additional factor responsible for relapse has been the development of bacterial resistance to dapsone. Both these possibilities (premature cessation of treatment and drug resistance) are likely to occur at a stage in the disease when the patient's skin lesions have disappeared, and it is therefore important that the physician should insist on taking skin smears each time the patient reports for medical check-up so that early intimation of relapse can be obtained, long before any clinical evidence of relapse can be observed. This is shown by the appearance of one or more solid-staining bacilli at one or more sites where previously all skin smears were negative or had shown the presence of granular bacilli only. Our policy is to take skin smears (by the scraped incision method) regularly every 6 months on lepromatous patients in whom the disease appears arrested, the sites for smears being the 2 ear lobes and 4 or 6 sites on face, trunk or limbs at the precise locations where lesions had originally been observed and from which smears had been taken in the past. Ear lobes have always been included because we had formed the impression that these two sites have tended to harbour granular bacilli after other sites (and nasal scrapings) have become negative, and, in addition, have been the most likely sites at which to find early evidence of relapse.

Recently, following a conversation between one of us (M.J.R.) and Dr J. M. H. Pearson, who was interested in the subject of oedema in fingers in leprosy even when there is no clinical lesion there, it was decided to carry out a pilot trial in which 2 skin smears from fingers would be taken in addition to the routine 6 or 8 smears.

Material and Methods

An unselected series of 30 lepromatous (LL) patients attending this hospital was used for the trial. All patients had received treatment for periods of 6 months to 25 years. Twenty-six of the 30 had received treatment for at least 5 years. Slit skin smears were taken from the following sites in all cases: 2 earlobes, lesions (healing or healed) on trunk and limbs (up to 4 if there were 4 lesions) and 2 fingers. The dorsum of the first phalanx of the middle finger of both hands was the site, provided there was no lesion apparent. If a lesion was present a neighbouring, apparently normal, finger was chosen instead. Nasal scrapings were taken in 10 of these patients, and smears from toes in 8.

Smears were fixed and stained with carbol fuchsin at 42°C for 15 min. The Bacteriological Index (BI) and the Solid, Fragmented and Granular (SFG) Index were determined as described by Ridley (1964, 1971). The SFG is a ratio of solid to fragmented to granular bacilli, 10 representing all solid forms and 0 all granular. Below 3 there are never any solids. The presence of any solid forms was invariably noted.

Results

The results are shown case by case in Table 1, and summarized in Table 2. In patients with only a short period of treatment bacilli in the fingers were found to be comparable with those at other sites in respect of numbers and morphology, even though there were no clinically apparent lesions on the fingers. In long standing cases the fingers were found to be the most productive site for bacilli in respect of total numbers of bacilli and also of solid bacilli.

These observations were confirmed by further cases that were examined following the termination of the unselected series. The fingers were the sole site for bacilli in 3 out of 12 cases, and the sole site for solid forms in 2 out of 12. The fingers in these cases were again more productive than any other site, the advantage, however, being confined to long treated patients.

As regards the patients in the series of 30 who received nasal scrapes and smears from the toes, the fingers were more productive of bacilli than the nose in 9 out of 10 cases, and more productive than the toes in 8 out of 8 cases.

AMPUTATED FINGER

A finger amputation specimen, part of the terminal phalanx of the index finger from a long treated lepromatous (LL) patient, became available as a result of an accident. This patient gave bacteriological evidence of early relapse at some sites, but there were as yet no clinical signs of relapse. The finger was gangrenous with a fairly heavy neutrophil infiltrate which involved amongst other structures the Pacinian corpuscles, which were otherwise histologically normal. The nerves were mildly fibrosed as frequently happens in this type of leprosy and were free of infiltrate. A search for acid-fast bacilli was made in serial sections. The only site in which they were found was a fibrosed structure of approx. $1\frac{1}{2} \times \frac{1}{2}$ mm, which appeared to be a fibrosed Pacinian corpuscle, which was free of cellular infiltrate. There were many (5+) bacilli in the peripheral zone of this structure, which was about 60 μ m deep, but none in the central area. These bacilli were predominantly short solid forms. No AFB were found in the other Pacinian corpuscles or in nerves.

TABLE 1
Distribution of leprosy bacilli at various skin sites

Patient	Ears		Lesions on trunk or limbs		Fingers		Toes		Nose	
	BI ^a	SFG ^a	BI ^a	SFG ^a	BI ^a	SFG ^a	BI ^a	SFG ^a	BI	SFG
1	0	—	0	—	0	—				
2	0	—	0	—	0	—				
3	0	—	0	—	0	—				
4	0	—	0	—	0	—				
5	0	—	0	—	0	—				
6	0	—	0	—	1+	1	0	—	0	—
7	0	—	0	—	1+	1				
8	0	—	0	—	2+	1				
9	0	—	0	—	1+	10				
10	0	—	1+	1	1+	10			0	—
11	2+	2	0	—	3+	2				
12	1+	1			3+	3	1+	1	1+	10
13	3+	0	3+	1	4+	2	3+	2	0	—
14	3+	3	4+	3	3+	5	3+	2		
15	2+	1	2+	1	4+	3				
16	3+	0	2+	0	3+	3	0	—	0	—
17	4+	2	4+	2	4+	2			0	—
18	5+	2	5+	3	5+	3	5+	2		
19	4+	1	5+	3	5+	3				
20	5+	4	6+	6	6+	5				
21	1+	1	0	—	1+	1			1+	1
22	1+	10	1+	1	1+	10				
23	3+	4	0	—	2+	4	0	—		
24	4+	3	3+	1	3+	2				
25	6+	4	5+	4	4+	2			3+	1
26	4+	8	4+	4	4+	7				
27	4+	5	5+	4	4+	4	3+	5	0	—
28	0	—	3+	3	0	—				
29	4+	2	5+	2	4+	2			0	—
30	4+	2	4+	2	3+	2				

^aHighest readings given.

TABLE 2
Relative values of smears from various skin sites (derived from Table 1)

Skin site	Number of cases	Mean BI	Mean SFG, Index	Sole site showing bacilli	Sole site showing solid bacilli
Ear lobes	30	2.0	1.8	0	1
Lesions (healing or healed)	29	2.0	1.3	1	1
Fingers	30	2.5	4.0	4	4

Discussion

The reason why the fingers of all the sites tested should contain the most bacilli, solid or otherwise, is unexplained; but coolness of the site and exposure to trauma are obviously possible factors. It would be interesting to compare the results between fingers and toes in bare-foot patients.

Another possibility is that the persistence of bacilli in fingers might be connected with their rich supply of nerve endings. Nerve endings in the skin in leprosy have been the subject of studies by earlier authors who are quoted by Klingmüller (1930). Sudakewitsch found the Pacinian corpuscles to be normal or atrophic without bacilli, or swollen with granulations when bacilli were numerous between the lamellae. Bernucci found only a few Meissner or Pacinian corpuscles or free nerve endings in the finger pulp in lepromatous leprosy; they were swollen, clubbed or degenerate, while in other cases they had virtually disappeared. Saijo and Takino noted that the degeneration of Meissner corpuscles was related to *lepra globi* in them or in contact with them. In our amputation specimen we found only one Pacinian corpuscle to be degenerate and fibrosed. Others were involved in the gangrene but not atrophic. The degenerate corpuscle was the only site for bacilli in the whole specimen, and in it bacilli were abundant and probably viable, but only at a distance from the central capillary and axis cylinder. It could be that it was fibrosis in the nerve ending, brought about originally in response to leprosy bacilli, which later protected these bacilli by preventing access of drugs to them.

The fingers are yet another possible site of the persisting bacilli that may be responsible for relapse after prolonged therapy. The public health importance of bacilli in the fingers is difficult to evaluate, but the facts that solid forms are so often present there after they have disappeared from all other skin sites and the nose, and that fingers are one of the most likely sites for skin to skin contact, are hazards that cannot be overlooked.

References

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