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Self-healing Leprosy: Report on 2749 Patients*

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Self-healing forms of leprosy account for a considerable proportion of patients suffering from diagnosable forms of the disease among the deeply-pigmented people of Africa. These lesions are described clinically; they are bacteriologically negative to standard methods of examination, and the histopathology is non-specific or frankly tuberculoid. The frequency is unsuspected unless whole-population examinations are regularly undertaken.

The continuing debate on "indeterminate" leprosy prompts the publication of a study made in the former Belgian Congo of a series of patients in whom lesions diagnosed as indeterminate or tuberculoid leprosy spontaneously regressed. Before sulphones became available, treatment by intramuscular or intralesional injections of chaulmoogra oil, or by proprietary derivatives of hydnocarpus oil, was not given to these patients, since the risk of unsightly keloid scarring developing was not inconsiderable and the probability of disappearance of the lesions was thought to be high. During the last 2 years of the 8-year period of the study, most patients diagnosed as suffering from leprosy were placed on treatment, but some with self-healing lesions were left untreated in order to conserve the limited supplies of the sulphones for those suffering from forms of leprosy considered to be progressive.

Basic Data

The average population at risk over the 8 years numbered about 45,035 persons, all of Bantu origin and representing several tribes (mainly Lokele, Torumbu, Foma, Topoke, Bambole). They lived in the medical sector of the Baptist Missionary Society, Yakusu, in small villages scattered along the banks of the River Congo and its tributaries, and in the equatorial rain forest. They were served by 18 health centres (each manned by a national *infirmier* who had had 5 years of training) and 36 treatment centres situated in the larger market villages.

Self-reporting had previously provided little indication of the real prevalence of leprosy, since only those with advanced deformity or peripheral ulceration presented themselves at the dispensaries, but as the result of regular annual whole-population surveys (undertaken originally for trypanosomiasis) complete records (including sketches of the lesions) of all persons suffering from leprosy were obtained, and 6 skin smears were performed on every patient on diagnosis.

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In addition to the patients detected during the annual surveys, the rapport between the *infirmier* and the villagers he served became so mutally helpful that all persons with some persistent non-irritating skin lesion presented themselves voluntarily at the dispensary within a few weeks of its appearance; they were seen by the visiting doctor within the next 6 weeks. The records therefore are reasonably complete and contain the great majority of all patients who, during the 8 years, had leprosy lesions, however transient.

The population was very leprosy-conscious. The skin lesions of active leprosy carried no stigma, but ulcerating extremities were feared because they were thought to be contagious. The older people were very skilled in differentiating leprosy from other conditions, especially fungal infections. They could also readily distinguish pre-tuberculoid skin lesions from the scarcely visible prelepromatous macules, which they called "the mother of the bad leprosy".

Criteria for Inclusion

The various terms that have been used over the years in the literature to denote the early skin lesions of leprosy indicate the clinical appearances, the age-groups predominantly affected, and the prognosis. These are: hazy patches, benign infantile leprosy, juvenile adolescent leprosy, non-malignant leprosy, impermanent hypopigmented patches, abortive leprosy, incipient lesions, *formes frustes,* etc.

History of Contact

Since the prevalence rate of leprosy was extremely high in all the villages within the area, every person was considered to have a history of constant nearness to contagious index cases in the household or compound. It was not necessary to rely on verbal recall either for history of contact or for the occurrence of a leprosy lesion of the skin. The diagnostic criteria adopted were essentially those that were later promulgated by the World Health Organization: they were consistently and uniformly applied during the 8 years of the study.

The problem of definition in subjects with minimal and transient forms of leprosy was resolved by close clinical observation, noting the earliest visible skin abnormality of indeterminate leprosy and the appearance of changes indicating the development of tuberculoid or lepromatous polarity.

Prodromal Symptoms

In the deeply pigmented Bantu skin, loss of pigment proved to be an early and delicate indication of leprosy infection, but some intelligent patients recalled preceding recurrent or persistent paraesthesiae in the area in which pigment loss would subsequently occur. Sometimes these subjective symptoms were noted in the skin surrounding the lesion or in the area of distribution of a local sensory nerve.

The earliest signs observed were slight differences in shininess or reflectability of oblique incident light, accompanied or not by slight impairment of sweating.

Pigment was lost without preceeding erythema. The colour changes were constant. There was no desquamation of superficial scales, and routine examination of surface scrapings in 25% caustic potash—at once and after 24 h—

revealed no fungal elements. Antifungal preparations had no effect: these were tried on many patients with characteristic lesions, despite knowledgeable protests from the villagers.

Slight tactile impairment, with some misreference, was the commonest evidence of local neurological damage found. Disturbance of temperature sense and of pain sensation came later, if and when the lesion took on tuberculoid characteristics.

The lesions were classified as indeterminate or tuberculoid on clinical grounds. Patients with suspected early macular lepromatous leprosy were excluded from this study on the grounds of the presence of numerous small ill-defined hypopigmented macules and the demonstration of abundant bacilli in some or all of the 6 smears taken (from the lesion or lesions, the earlobes, the apparently normal skin, and the nasal mucosa). Many patients presenting this early clinical picture in whom bacilli could not be found were examined at fortnightly or monthly intervals. After a variable period, many of the lesions suddenly became highly bacilliferous.

As a histopathological control of the clinical diagnostic criteria, specimens of skin were taken from selected patients with characteristic lesions, removed under local anaesthesia, fixed in Zenker's solution, and examined by Dr R. G. Cochrane of the Leprosy Research Unit, London. All gradations of pathology were seen, from a non-specific scanty round-cell infiltration of the dermis to the typical tuberculoid picture of infiltration both around and within the small dermal nerve fibrils. With Fite-Faraco staining, acid-fast organisms were sometimes found when an infiltrated nerve was traced through serial sections.

Criteria for "Self-healing"

The diagnosis of "indeterminate" or "tuberculoid" leprosy having been made on the grounds indicated above, the lesions were included in the category of self-healing or spontaneous regression if at successive examinations they showed progressive repigmentation and resolution, in the absence of any systemic anti-leprosy treatment (prescribed, or clandestine) or local physical treatment (burning, cutting, scarifying, etc.) at the hands of native "healers".

The distribution of these patients with self-healing lesions observed over the 8-year period is given in Table 1.

TABLE 1

Population at risk		Number of patents with self-healing lesions over the 8-year period	Incidence per 1000 over the 8-year period
Age in years	Numbers		
0 - 9	12,319	106	9
10 - 19	10,369	282	27
20 - 29	7,330	410	56
30 - 39	5,258	880	167
40 - 49	4,813	653	136
Over 50	4,946	418	85
	45,035	2749	61

Of the 2749 patients observed with self-healing lesions, 1630 were males and 1119 females. Since the above figures represent the totals observed during the 8-year period, they include patients discovered during the initial surveys who may have had leprosy lesions for several years. However, during the last 2 years of the period under review, the actual incidence of cases of leprosy newly arising in the area could be accurately determined. These, including those seen to be spontaneously regressive, are indicated in Table 2.

TABLE 2

Age in years	Total number of cases of leprosy diagnosed in the last 2 years of the 8-year period	Number of cases of self-healing leprosy	Percentage of leprosy patients with self-healing lesions
0 - 9	115	9	8
10 - 19	140	24	17
20 - 29	141	39	28
30 - 39	135	66	50
40 - 49	98	55	56
Over 50	44	27	61
	673	220	33

Thus, about a third of all patients diagnosed as having leprosy during this 2-year period were considered to have lesions that were spontaneously regressing. In addition, an unknown proportion of those suffering from abacillary or paucibacillary forms of leprosy, diagnosed clinically as "indeterminate" or "tuberculoid", and placed under treatment, had lesions that might have proved to regress spontaneously had they not been given treatment.

Leprosy Patients Placed on Treatment

During the last 2 years of the 8-year period, treatment became available through the network of rural dispensaries and treatment centres; the total numbers (classified on the World Health Organization notation) placed on treatment were as follows (Browne, 1959):

Form of leprosy	Number of patients	%
Indeterminate	187	3.5
Tuberculoid	3889	72.7
Borderline	169	3.2
Lepromatous	1104	20.6
	5349	100.0

(N.B. 'Lepromatous' in this table would include patients suffering from borderline-lepromatous leprosy.)

The total of all patients with indeterminate or tuberculoid leprosy among the population is made up as follows:

Untreated, and resolving spontaneously		2749
Under treatment:		
with "indeterminate" leprosy	187	
with "tuberculoid" leprosy	3889	
		4076
		6825

Since 1273 patients with Borderline-lepromatous leprosy were also under treatment, the total prevalence was 8098 in a population of 40,035, or 180/1000, with a multibacillary/paucibacillary ratio of about 1:6.

Clinical Findings

Adequate clinical records are available for the 6-year study group of 2529 persons to form the basis of the following information:

NUMBER OF LESIONS

A single skin lesion was present in 2276 (90.0%); 181 (7.2%) had 2 lesions, and 72 (2.8%) more than 2 lesions (282 in all). Of patients aged under 19 years, 13 out of 255 (3.7%) had more than one lesion, compared with 240 out of 2174 (11.0%) in those over 19.

SITES AFFECTED

Apart from the scalp, the axillae, the inguinal regions, and a band of skin straddling the lumbar region, any area of skin could be affected. The sites were analysed according to the age at onset in an attempt to discern the possible protective role of clothing against contact or inoculation lesions. Children went unclothed up to the age of 3 or 4, and were scantily clothed thereafter; practically all were unshod.

Nerve Damage

The main nerve trunks at the sites of predilection were normal on clinical examination unless the related skin lesion either showed a very vigorous tissue response, or was situated in close proximity to the nerve, for example, near the elbow or knee, in the neck or forehead. The size of the nerve returned to normal as the skin lesion regressed, but an enlarged nerve near a major tuberculoid lesion was observed to remain harder than normal and tender for years after resolution of the skin lesion. Sometimes, small nerve fibrils running from a skin lesion, or across it, were palpable with the finger-nail, and tender.

Lepromin Testing

Lepromin was not available when the series was collected. In 124 cases of spontaneous regression recorded subsequently among 1015 newly-diagnosed leprosy patients in the former Eastern Nigeria, the Mitsuda test readings (taken

TABLE 3

Sites affected	Percentage affected			
	All patients		Patients under 19 years	
Trunk				
lumbar region	20.2		18.4	
scapular region	17.3		12.1	
shoulders	10.6		5.9	
abdomen	7.8		9.6	
buttocks	6.3		16.0	
chest	5.0	67.2	2.7	64.7
Upper extremity				
arms, forearms	15.9		13.4	
hands	1.3	17.2	0.5	13.9
Lower extremity				
thighs	5.9		7.2	
legs and feet	5.9	11.8	7.8	15.0
Face		3.8		6.4
		100.0		100.0

weekly over a period of 2-6 weeks) revealed no significant differences between patients showing spontaneous regression and those with indeterminate or tuberculoid lesions that persisted. The younger the individual, the more likely was the Mitsuda test to be negative or doubtful, even in the presence of a spontaneously resolving minor tuberculoid skin lesion.

The Natural History of a Typical Self-healing Lesion

The earliest lesion encountered is a small, symptomless round area of skin, slightly and uniformly hypopigmented, with limits that may be either well- or ill-defined. The macule enlarges slowly by regular centrifugal extension, the hypopigmentation remaining minimal and uniform. If spontaneous arrest occurs at this stage, the macule ceases to enlarge, its borders become less well-defined, and repigmentation occurs, beginning centrally. In 3 to 12 months, the lesion disappears completely, leaving no detectable abnormality of pigmentation, hair growth, sweating or sensation.

In other cases, the macule continues to enlarge, but the centre repigments and the normal fine architecture of the skin becomes more or less restored. This kind of lesion may ultimately be represented by an indolent, broad, flat, hypopigmented band that very gradually extends centrifugally before it slowly repigments.

The commonest type of regression occurs when the edge becomes sharply defined, and the skin—particularly around the margins—in the macule becomes thicker ("infiltrated"). A regular ring of small papules, discrete or coalescent, slightly or considerably raised, makes its appearance around the margin, or just within the margin, of the lesion. While the lesion is actually extending, the ring of papules may enlarge centrifugally behind an irregularly amoeboid or digitate hypopigmented zone, completely flat. The papules are firm to the touch and the

whole lesion becomes dry and rough. With an increasing depth of dermis affected, tactile sensation becomes impaired, temperature sense is disturbed, sweating is partly or completely lost, and superficial pain sense is diminished. The hairs are shed.

Spontaneous resolution may occur at this stage. Repigmentation and cicatrization proceed from the centre, taking two years or more before the process is complete. Permanent destruction of adnexa has in part occurred, with demonstrable persistent disturbance of sensation, sweating, hair growth and pigmentation. Bizarre relics of this process may remain, such as a ringlike distribution of scattered groups of hypopigmented papules; a puckered hypopigmented scar; linear furrows across an area of thickened dry skin.

When the tissue response has been vigorous, resolution is by gradual cicatrization, which involves the whole thickness of the dermis, including the adnexa. Repigmentation—partial and patchy and often irregular, with areas of hyperpigmentation—begins centrally while the periphery is still extending. The margin is papulated, dry and hard; it may be 2 or 3 cm wide, and during an acute phase it may ulcerate or desquamate. The patient may then complain of itching, burning, and painful sensations around the margin, symptoms distinctly uncommon in leprosy. The vigorous tissue reaction subsides gradually and the healing process takes over.

If the related nerve trunk has been damaged, the increasing intraneural cicatrization may show itself by an extension of cutaneous hypoaesthesia and muscle atrophy.

Discussion

The occurrence of spontaneous regression of leprosy has been noted by numerous observers from Hansen onwards, but its commonness is largely unappreciated unless regular and frequent whole-population examinations are done. In the absence of a laboratory test of infection that is applicable in field conditions, the diagnosis of early leprosy lesions is still mainly clinical, confirmed in selected typical patients by histopathological examination: in field work, such confirmation is impossible for every patient. Skin smears carefully performed according to standard techniques will indicate early macular lepromatous leprosy, and the characteristic appearance of tuberculoid lesions with their signs of local nerve damage should suffice for the diagnosis of early tuberculoid leprosy. The third group of early lesions falls into the convenient clinical category of indeterminate. Prolonged examination of serial sections would reduce the size of this group by providing histopathological evidence of the development of characteristics of polar or "determined" leprosy.

While the figures here reported suggest that many more people may actually have leprosy than official statistics indicate, they also imply that the seriousness of the leprosy endemic in Africa is not greatly affected by the large numbers of patients with self-resolving leprosy. The situation may be more serious elsewhere, for although spontaneous regression does occur outside Africa, a higher proportion of early leprosy lesions in the lighter-skinned races may be manifestations of multibacillary leprosy, undeclared because of fear or shame or ignorance.

The apparent success of control measures in Africa reflects the high proportion

of patients with easily curable disease; the leprosy problem elsewhere may be more serious and more intractable, despite relatively lower prevalence rates.

The age distribution of patients with self-healing leprosy here reported suggests that the preponderance of the younger age-groups in other recorded series may be the result of factors (such as family segregation, observation of child household contacts, etc.) that were not operative in an area of very high prevalence where leprosy sufferers remained in their villages.

Whereas among the deeply pigmented the skin would seem to be a delicate indicator of clinically established leprosy, the peripheral nerves may subserve that role in India, where, according to Noordeen (1972), up to a sixth of cases of leprosy may have abnormalities in nerves, the skin remaining clear.

The site of the only or the first lesion observed provides no indication that this is the point of inoculation of the organism; the frequency of these lesions on hands and faces would not support such a suggestion. As reported elsewhere (Browne, 1966), the nasal mucosa only very rarely contains *Myco. leprae* before they are demonstrable in skin lesions.

Since recent investigations provide evidence that persons exposed to leprosy for over 12 months manifest changes in the lymphocytes (Godal and Negassi, 1973), and since many observers have found (by concentration methods) acid-fast organisms in the dermis and in lymphatic nodes, the very high prevalence rates of clinical leprosy reported in some hyperendemic foci cannot be ruled out *a priori.* In one group of villages included in the present investigation, we were assured that "everybody gets leprosy sooner or later"; but the lepromatous rate did not exceed 2%, and most of those with diagnosable leprosy at any one time had self-healing lesions.

The antecedent and subsequent history of the patients in this series would suggest that spontaneously regressing lesions very rarely recur.

Since anti-leprosy treatment accelerates repigmentation, forestalls extension of the lesion and the appearance of new lesions, and usually prevents peripheral nerve damage, and since, moreover, it is difficult or impossible to predict which lesions will spontaneously regress, it is recommended that treatment should be given to all patients diagnosed as having leprosy. Such advice is acceptable to most patients and helps the leprosy campaign. Although in perhaps half of those with indeterminate or tuberculoid leprosy, treatment may not strictly be necessary, the rapid visible repigmentation of lesions following treatment may encourage those with undisclosed leprosy to declare themselves.

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