LEPROSY, WITH SPECIAL REFERENCE TO PROGNOSIS.

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Within the last half dozen years our views on tropical medicine have been revolutionized. Great advances in our knowledge have been made, and the advance in the field of leprosy has been one of the most dramatic. From an incurable malady, the spread of which it was almost impossible to prevent, leprosy has become to some extent both a curable and a preventable disease. This being the case, it is all important that we should study the disease, especially with regard to its treatment and prognosis.

Before dealing with the question of treatment, we must consider first the aetiology and signs and symptoms of leprosy. Leprosy is caused almost certainly by the Microbacterium leprae (Hansen, 1874), although this bacterium has never been definitely cultivated, and has not been proved by experiment to be the causative organism, yet it is universally present in all cases of leprosy.

The Microbacterium leprae does not seem to be so pathogenic to man as the allied organism of tuberculosis, and therefore the disease runs a much more chronic and protracted course. It is impossible to be certain of the exact method of transmission of this disease, as all attempts have failed to cultivate the organism and to infect animals. Certain factors are most probably necessary before the bacillus will produce the disease in man. To acquire leprosy one needs to come into close and prolonged contact with an individual in the infective stage of the disease. There is probably another factor which is just as important, if not more so, and that is some predisposing cause which lowers the vitality of the individual. The evidence which is accumulating tends to show that a healthy man, provided he does not come into close contact with the disease, should not acquire leprosy. This then is a possible explanation of the long incubation period of the disease. The Microbacterium leprae may be introduced into the body but may lie latent in some tissue space or lymphatic gland, and if at any future date the health of the patient is lowered, the disease may then manifest itself. Certain factors are more important than others in thus preparing the body; among these are syphilis, hookworm disease, chronic malaria, and constipation, but any debilitating cause will predispose to the acquirement of the disease. The age of the individual is an important factor. Although the bacillus can be found in the placenta of the mother and in the umbilical cord of the infant, as shown by recent work in the
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Philippines, the child at birth does not acquire the disease; but after the first year of birth the susceptibility of children increases very greatly, and between the ages of 3 and 20 this susceptibility is comparatively great; after 20 the body becomes gradually less susceptible.

Let us now pass on to the signs and symptoms of leprosy. Before discussing symptoms in detail it is necessary to remember that leprosy is a self-limiting disease; that is, it runs a prescribed course which varies with each individual, but, unlike many other diseases, it rarely kills the patient. Instead, if the disease continues to the ultimate end, as it usually does in the untreated individual, it leaves the patient deformed and mutilated. In the course of the disease nerves and other tissues are destroyed, and although the disease has died out, deformities and ulcers continue to form as a result of nerve destruction. In India, and apparently in Burma and Siam, the earliest indications of the disease are signs of nerve involvement; it is not until later, in the majority of cases, that skin manifestations appear. It is not infrequently noticed that when the skin symptoms appear and intermittent attacks of fever occur more frequently, the nerve symptoms tend to subside, and in some cases the anesthesia clears up completely. The subsequent course in such a case, if untreated, is that the skin symptoms become worse and worse, nodules appear and the patient becomes more and more infective; he may be described as on the ascent of the disease being represented by a parabolic curve” [1]. Ultimately the patient reaches the point of maximum infectivity (this varies in different individuals) and the body begins to overcome the infection. That is, the patient reaches the crest of the curve, and as he descends the disease begins slowly to subside, skin symptoms disappear, nodules and rashes tend to clear up, and where nodules were wrinkling of the skin takes place. Along with these changes secondary reactions set in which lead to the formation of fibrous tissue. One of the most marked changes in this stage is the formation of fibrous tissue in the nerve-sheath of the affected nerves which contracts down, destroying the nerve-fibres and probably also destroying the bacilli in the nerve. As a result of this nerve destruction trophic ulcers and contractures of muscles occur. If the ulcers are uncared for they progress and extend, involving the deeper structures and bones. The leper has now entered the secondary anesthetic or “burnt-out” stage. Such lepers are no longer infective for the disease has completely died out, but as they are a nuisance to society and in the uncared-for state are the most miserable of men, they should be isolated in homes.

Some authorities suggest that the initial lesion in leprosy appears at the site of inoculation of the bacilli, and that the nerves are affected by an ascending infection from this site. Others maintain that the bacilli lie latent in the body, possibly in the lymph glands, and that surgical trauma or some other factor devitalizes the tissues and then the lesions in leprosy appear. This question I shall not discuss. The first indications
of the disease are generally signs of nerve involvement. The earliest signs take the form of (1) depigmented patches, and (2) anaesthesia; both these may appear simultaneously. Sometimes these signs are preceded by vague aches and pains of a rheumatic nature.

**Depigmented Patches.**

These appear on the outer sides of the body, the outer side of the arm and the leg, the buttocks, and, in fact, all those places which are exposed to pressure, and also exposed to the contact of infective bedclothes, etc. At first these depigmented patches are not anaesthetic, later they may become so. The patches are light in colour but never white, in a dark skin they frequently become a coppery colour. Sometimes this is the only sign that a patient has got leprosy, and therefore it is important to recognize it. As aids to diagnosis one can state that they are on the outer and exposed parts of the body and face, they are light in colour, but never white, and they have a smooth surface. The commonest depigmentation with which it could be confused is that of pityriasis versicolor; the distinction is easy when once recognized, but it is better seen than described. Pityriasis has an irregular surface and an appearance of a tinea, it is not commonly widespread over the body and trunk, and does not pick out so characteristically the outer sides of the limbs and the face. Any depigmentation in a person with a history of leprosy in the family should be looked on with suspicion. The second sign of leprosy is anaesthesia, associated with this the nerve involved may or may not be thickened. The anaesthesia is very superficial at first, therefore any method which tests pressure and not tactile sensation will fail to detect the disease. The best method is to fold a piece of paper into four parts and test anaesthetic areas by lightly stroking the skin, while the patient with his eyes shut indicates the area touched with his index finger [2]. The appreciation of painful stimuli and of slight variations in temperature are affected first, but these can only be tested out in intelligent patients [3]. The nerves that are commonly involved are the ulnar, peroneal, great auricular and facial. It should be remembered that facial nerve involvement gives paralysis and not anaesthesia. The involvement of the great auricular nerve shows itself by thickening and not anaesthesia. The diagnosis of nerve leprosy should be easy, if it is remembered that the only common disease in India to give anaesthesia to superficial touch is leprosy. Any case which shows thickening of a superficial nerve should be looked upon with suspicion, and careful tests applied to exclude leprosy. It should be remembered that nerve leprosy is not infective, and that such a case can carry on his employment without let or hindrance provided that he is treated and kept under observation.

Having considered the diagnosis of early nerve leprosy, let us now pass on to the consideration of skin leprosy. In India many cases commence as pure nerve cases, but if untreated pass on to the skin stage. Skin
leprosy does not necessarily manifest itself by the patient developing nodules. The first evidence may be the appearance at the periphery of a depigmented or anaesthetic patch of raised erythematous rash. This being the case, it is necessary to consider the differential diagnosis carefully. It is not uncommon to find that skin leprosy at this stage is often misdiagnosed; the commonest mistakes in diagnosis to be made are the following: ringworms of all sorts, tertiary syphilis, psoriasis and the various erythemas, but in addition it may be diagnosed as lichen planus, and even skin sarcoma. The crux of the diagnosis rests on the finding of the *Microbacterium leprae* in the serum expressed from the cut surface of the periphery of the suspected rash. To examine for bacilli one can either take a clip from the raised edge of the patch with a pair of scissors curved on the flat, or else make an incision in the periphery and take a scraping, examining the serum exudate in both cases for bacilli. No suspicious case should be discharged without a thorough nasal examination, and if a swab does not reveal bacilli, scraping with the edge of a scalpel may be more successful. If bacilli are found, then the diagnosis is placed beyond doubt. It should be remembered that skin leprosy is not an irritating disease, like many other skin conditions. Because skin leprosy is protean in its manifestations, any lesion in the skin which presents a red raised appearance should be looked upon with suspicion.

Having briefly described the signs and symptoms of this disease let us now turn to its treatment. In the first place, before considering treatment in detail, one must remember that when a leper has reached the top of the curve the tendency is for him to improve, no matter what treatment he receives. The rapidity of the improvement depends on the care which is taken to see that the patient is placed in good hygienic conditions. Hansen was aware of this when he said, as far back as 1895, “gradually all specific lesions disappear and the patient is healed from his leprosy” [4].

Leprosy being a chronic disease and one of long duration, the success of one’s treatment does not depend altogether on any specific remedy, but depends largely on the care one takes in looking after the general condition of the patient. Therefore, before one considers specific treatment one must dwell on the general treatment. In considering the general condition of a patient one should ask himself five questions.

(1) *Is there any Predisposing Disease?*

As explained, predisposing diseases play a large part in the acquiring of this disease. Therefore, until such diseases as syphilis, hookworm and malaria are attended to, the specific treatment has little chance of success. The injections of hydnocarpus oil or ester can be given while the patient is being treated for some concomitant ailment. It is advisable, however, to withhold the injections while the courses of N.A.B. are being given for syphilis, for N.A.B. itself is liable to produce reactions; but during the subsequent mercurial course the injections should be carried out.
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(2) **Good Food.**

Leprosy being a chronic disease, it is all important to attend to the diet of the patients. They should have a well-balanced diet in which there are plenty of fresh vegetables and fruit; stale and partially decomposed food and highly spiced dainties must be avoided.

(3) **Constipation.**

This is placed in a separate category, because the importance of this ailment is not generally recognized in the treatment of leprosy. A constipated leper will not readily respond to treatment.

(4) **Plenty of Exercise.**

Leprosy, like its sister disease, tuberculosis, depends largely on the general treatment; not the least important part of this treatment is the insistence on graduated exercise. Lepers, especially those in the early stages, are not ill men, therefore they can be gradually trained until they can take comparatively violent exercise, e.g., walking until they reach a maximum of ten or fifteen miles a day. For young adults such games as football and cricket can be indulged in.

(5) **Fresh Air.**

This plays just as important a part in the treatment of leprosy as it does in the treatment of tuberculosis.

After these five things have been taken into account then it is time to think of "specific treatment." Within the last decade the number of remedies used for leprosy has been legion. I shall confine my attention to hydnocarpus oil mixed with creosote (double distilled) to the extent of four per cent of creosote. Another mixture which is more expensive, and can be used with as good effects, is the E.C.O. mixture of the School of Tropical Medicine at Calcutta. This is a mixture of the ethyl ester of hydnocarpus oil, 50 parts; olive oil, 50 parts, and creosote (double distilled) 4 parts. This latter mixture tends to cause greater reactions, and in those cases which have not reached the top of the curve it should be used with care. As the technique is exactly the same in both cases I shall describe that used for the oil. The best method, in my opinion, is that used and advocated by the Calcutta School of Tropical Medicine—the method of subcutaneous infiltration. The technique is as follows: use a ten-cubic-centimetre syringe, with a needle of suitable size; divide the body into eight parts, viz.:

1. The extensor aspect of the left arm.
2. The extensor aspect of the right arm.
3. The extensor aspect of the left forearm.
4. The extensor aspect of the right forearm.
5. The left buttock.
6. The right buttock.
7. The extensor aspect of the left thigh.
8. The extensor aspect of the right thigh.
Never inject the inside of a limb or near a bony surface.

Having selected one of the above points, introduce the needle with a sharp push into the layer between the superficial fascia and the deep fascia (the needle should be freely moveable under the skin), and inject half a cubic centimetre, then withdraw the needle partially until the point is free from fascial entanglements, as the point is becoming free strands of fascia are sometimes felt slipping over the point of the needle, then introduce the needle in another direction and inject another half cubic centimetre, continue this round the arc of a circle, the original needle puncture being the centre. In this way one should be able to inject five to eight cubic centimetres by puncturing the skin once only. Injections are given twice a week, commencing with one cubic centimetre (in bad skin cases with half cubic centimetre) and going up to twelve cubic centimetres, increasing by half cubic centimetre each time. During the treatment a watch should be kept on any reactions which may occur. While one cannot lay down hard and fast rules as to the stoppage of the injections during a reaction, yet the following may serve as a guiding principle: If the temperature persists for more than twenty-four hours after the injection do not increase the dose; if it keeps up for more than forty-eight hours, halve the dose; if it keeps up for more than seventy-two hours stop the injections. As experience is gained one will often find that one can carry on small injections in spite of a small rise in temperature. Withhold injections if there are signs of reaction in the eyes until that reaction has completely subsided.

TREATMENT OF DEPIGMENTED PATCHES, SKIN RASHES, AND NODULES.

All patches should be painted with trichloracetic acid, diluted 1 in 5 for the face, and 1 in 3 for the body. Only paint a few patches at a time, and do not paint the same set of patches more than once in ten days. The acid is a strong irritant and may cause ulceration if used injudiciously. For nodules, 1 in 1 acid may be used, but paint only one or two at a time.

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Having dealt briefly with the treatment, let us now turn to the question of prognosis. Few lepers actually die of leprosy, and if they are not carried off by some intercurrent ailment, such as tuberculosis, nephritis, or some acute illness, the disease ultimately arrests itself. But, as explained, leprosy arrests itself at the expense of the body. A patient is not only desirous of knowing what the chances of getting rid of his disease are, but he is also anxious to have some idea of the likelihood or not of gross deformities setting in. To answer this question one or two general principles may be laid down. Firstly, in the majority of the very early nerve lepers, that is those who have just begun to show signs of the disease in the form of a few depigmented patches or a slight loss of superficial sensation, the disease should become arrested, and at this stage if the disease is...
checked there should be no resulting deformity. The loss of deep pressure sense is of serious import as the recovery of this is not hopeful.

The prognosis as to skin leprosy should be guarded. While saying this, the statement can be made that the response to treatment is better in the pure skin cases than in either the mixed or late nerve cases. The outlook for the early skin leper is very much more hopeful than it was six years ago because of the advance in knowledge and treatment. Naturally, the longer the patient has had leprosy the greater is the likelihood that gross deformities will set in. In the treatment of this disease one cannot lay down hard and fast rules, each case must be taken on its own merits. The treatment of leprosy taxes the patience of both the physician and the patient, but it can be said that a day of hope has dawned for the early leper, and that the physician can take up the treatment of this disease today without the old feeling of utter hopelessness. When a patient has apparently lost all active signs of the disease he should be kept under close observation and treatment for at least six months, and when he is released on parole he should be examined every three months for three years, and every six months for two years after that, and then told that he must keep himself as healthy as possible and report should any suspicious signs reappear. While the position to-day is very much more promising, yet one must ever keep in mind the fact that leprosy is one of the most deceptive diseases with which the practitioner in the tropics is called to deal, and therefore he should not make the mistake of being over optimistic, but on the other hand, if there are no grounds for it he should not be pessimistic, because the keeping up of the moral of the patient is an important factor in treatment.

While it may be many decades, if not centuries, before leprosy is stamped out in any country in the East in which it has been endemic for a long time, one can look forward to the day when leprosy will be as uncommon there as it is in Europe now.

REFERENCES.