*Some Causes, other than Leprosy of Loss of Skin Sensation, Paralysis and Deformity J. Lowe and S. N. CHATTERJI.

In some parts of India, it is common knowledge among ordinary people that loss of skin sensation is usually due to leprosy. We have on many occasions been consulted by patients, usually village people, who, because of very slight loss of cutaneous sensibility perhaps in small areas of skin,

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have themselves made the diagnosis of leprosy and come for treatment and advice to a leprosy clinic. Careful clinical examination has usually verified the patients' diagnosis. Enquiries from such patients have revealed that the knowledge that a loss of skin sensation is usually due to leprosy is part of the traditional knowledge of the disease which has been handed down from generation to generation. We have frequently had occasion to remark that many village people know more than many doctors know about the early diagnosis of leprosy.

While skin anæsthesia with or without paralyses and deformities in India is practically always due to leprosy, occasionally we come across cases where it is due to other causes. In this brief article we discuss a few such cases :—

Peripheral neuritis. The commonest example of this 1. condition resembling leprosy is undoubtedly Bernhardt's disease which is a neuritis of the lateral femoral cutaneous nerve, producing partial and sometimes complete loss of sensation in the skin on the lower and outer part of the front of the thigh. This disease has previously been fully described in *Leprosy in India* Vol. VI pp. 89. In the Leprosy Clinic of the School of Tropical Medicine about twelve such cases a year are seen. In the International Journal of Leprosy, Vol. 2, p. 451, there is an interesting editorial note about such a case occurring in a worker on leprosy; this case was regarded for some time as being possibly one of incipient leprosy, but as the direct result of the publication of the article in Leprosy in India, the diagnosis of Bernhardt's Disease was made and subsequent developments have confirmed this diagnosis.

Dr. A. Gupta, Dermatologist of the Medical College, Calcutta, has recently drawn our attention to another cause of neuritis which may be associated with, or followed by, anæsthesia of the skin. This conditon is *herpes zoster*, The notes on Dr. Gupta's case are as follows:—About seven years ago the patient had a typical attack of *herpes zoster*, with neuritis of the intercostal nerves in the affected area on the left side of the chest, and the formation of bullæ in the skin in the distribution of the nerve. After a time the condition subsided, but it was noticed that in the affected area of skin there was loss of sensation, and this has continued till the present time. At present the slight scars of the old lesions of herpes are visible, and in an area measuring about 7 inches by 5 inches there is an almost complete loss of skin sensation (see Fig. 1). Another condition which affects the peripheral nerves and which is reported as causing loss of cutaneous sensibility is *polyneuritis* (*beri-beri*), but this condition is rare in India and we have not actually seen any such cases in Calcutta. In the Far East where polyneuritis is common it may not infrequently be confused with nerve leprosy and one of us (J.L.) has seen two cases of leprosy which had been erroneously diagnosed as polyneuritis.

Still another type of peripheral neuritis which may cause, among other symptoms, paralysis and loss of skin sensation is *lead poisoning*. One definite case and one suspected case of this condition have been seen in the leprosy clinic here during the last few years. The definite case was in a typefounder who showed radial palsy (wrist drop) and some loss of cutaneous sensibility on the radial side of the hand and wrist. He had a definite "blue line" on the gums. The suspected case was in an electric wirer, who stated that sometimes while working he held lead-covered wire in his mouth. He showed signs of neuritis and loss of sensation in the arms, and a definite suggestion of a " blue line" on the gums. In lead poisoning, the paralysis is usually much more marked than the loss of sensation.

Conditions arising outside the nerves but affecting them.

 (a) Trauma. Cutaneous nerves and nerve trunks are subject to trauma and pressure which may damage them and produce anæsthesia in their skin distribution.

We have seen several cases in which *incised wounds* have damaged or severed nerves, with the development of anæthesia and trophic lesions in their distribution, these symptoms having given rise to the mistaken suspicion or to the definite diagnosis of leprosy. A toddy-drawer fell from a tree and the tip of his knife pierced the skin of his arm making a small wound and severing his ulnar nerve. Anæsthesia and claw hand developed and later a diagnosis of leprosy was nearly made when examination revealed the scar of the small wound, and enquiries elicited the history of injury.

In another case, a motor driver had an accident causing incised wounds on the forearm. First anæsthesia and later claw hand developed. About 8 months later, the patient was sent for examination because leprosy was suspected (see Fig. 2).

Occasionally deformity due to trauma, and leprous lesions may be found in the same patient. Figs. 3 and 4 show scarring of the wrist and deformity of the ulnar side of the



- Fig. 1. Scarring and anæsthesia of the skin following an attack of herpes zoster years previously.
- Fig. 2. Deformity and anæsthesia of the ulnar side of the hand due to trauma and injury to ulnar nerve. The scar of the injury can be seen in the arm.
- Figs. 3 and 4. Deformity due to injury and leprous lesions occuring in the same hand. The scar of the injury can be seen on the ulnar side of the wrist in Fig. 3, and the leprous lesions on the radial side of the same hand can be seen in Figs. 3 and 4. The black mark on the wrist in Fig. 4 indicates the markedly thickened nerve.



- Fig. 5. Deformity and anæsthesia of the fingers due to incision of the hand for cellulitis.
- Fig. 6. Deformity of the hands due to bilateral cervical rib.
- Fig. 7. Deformity and loss of heat and cold sensation of the hands due to syringo-myelia.
- Fig. 8. Dry gangrene of a toe due to Raynauds' disease.

hand caused by the patient falling on some glass, and a leprous macule on the radial side of the same hand.

In cases of *fracture*, the broken ends of the bone may severely damage nerves, with the development of anæsthesia, paralysis, and trophic lesions. This is most commonly seen in the arm in the musculo-spiral nerve but the ulnar and median nerves may also occasionally be affected. Nerves in close proximity to bone may not be injured at the time of fracture but may be affected as the result of *callus formation* around them. This condition may be seen in the musculospiral nerve in fractures of the humerus, and in the ulnar nerve in fractures round the elbow joint. Usually in such cases paralyses are much more marked than the sensory changes, whereas in leprosy the reverse is usually found.

The cutaneous nerves may be injured as the result of *subcutaneous injections*. One such case came to a leprosy clinic some time ago showing an extensive area of anæsthesia on the ulnar side of the arm. The history was that about a a year previously the patient had had an attack of malaria which had been treated by subcutaneous injections of quinine. One such injection had been given on the anteromedial aspect of the forearm, and there had been a marked local reaction and later anæsthesia had developed. At the time of examination there was still a hard swelling at the site of injection, which was exactly in the course of the medial antebrachial cutaneous nerve, and the damage to this nerve was the cause of the anæsthesia.

In this connection we may relate the personal experience of one of us (J.L.) some years ago. He was a volunteer for certain experiments involving the estimation of blood-sugar before and after severe exercise (a rugby football match) and on two occasions blood was taken with a syringe and needle from an antecubital vein. On the next day anæsthesia of an area on the front of the forearm was noticed, and it was decided that a cutaneous nerve had been severed. During the next few months he verified in himself the results of Head's classical experiments on skin sensation. Sensation did not completely return for about one year.

Anæsthesia and deformity may be the result of *surgical* operations. Fig. 5 shows the hand of a patient who had had incisions made for cellulitis of the hand. Later anæsthesia and deformity of the fingers were found and for some time a suspicion of leprosy was entertained.

(b) Pressure on nerves. Occasionally anæsthesia, paralysis, and deformities are produced by pressure on nerves, the least uncommon example of this being cervical

rib. We have seen only one example of cervical rib giving rise to the diagnosis of leprosy, see Fig. 6, but we have seen two or three cases of leprosy in which cervical rib was suspected or diagnosed wrongly.

One curious case recently came to our clinic. A young man had anæsthesia, muscular wasting and deformity in the left forearm and hand. Cervical rib was suspected by his doctor, an X-ray photograph was taken, and the definitely elongated transverse process of the cervical vertebra, which is called cervical rib, was clearly seen, and a definite diagnosis of cervical rib was made. Later, however, someone noticed a thick cord in the upper arm and the suspicion of leprosy was aroused which was later confirmed in our clinic, the ulnar and radial nerves being very markedly thickened. Thus both cervical rib and leprosy were found in the same arm but leprosy was causing the symptoms.

Another condition which occasionally produces symptoms of pressure on nerves is *neoplasm*. One probable case of this was recently seen in our clinic. A man was examined about nine months ago and he showed a little loss of sensation on the ulnar side of the left hand. There was no nerve thickening and no deformity. Nothing else was noted and leprosy was suspected but not definitely diagnosed. The patient was requested to come again if anything further developed. Six months later he came showing anæsthesia from the shoulder downwards and weakness and some wasting of all muscles of the arm and forearm. There was no nerve thickening. In the axilla was found a large hard swelling almost certainly of neoplastic origin and the nervous manifestations were attributed to involvement in the neoplasm of the nerves in the axilla. We did not have the opportunity of verifying this at operation.

We have seen one case and heard of another in which a tight wrist watch strap has caused numbness of the radial side of the hand due to pressure on the superficial branch of the radial nerve where it lies on the radius. One of these two cases attended our clinic because leprosy was suspected.

3. Lesions of the spinal cord. Various diseases of the spinal cord may produce sensory changes in the skin of the body. Syringo-myelia, sub-acute combined degeneration of the spinal cord, and other rare diseases may occasionally be mistaken for leprosy. One such case recently attended our clinic suspected to be suffering from leprosy. He developed loss of sensation in the feet, extending gradually up the legs which became completely insensitive from the hips down-

wards. There was no nerve thickening but there were exaggerated knee jerks and other signs indicating a lesion of the spinal cord but not of the peripheral nerves.

Syringo-myelia produces sensory changes, particularly in the arms, but we have never seen a case of syringo-myelia diagnosed as leprosy* The reverse is however seen, cases of leprosy being wrongly diagnosed as syringo-myelia. Two such cases have recently attended our clinic after being treated for months in Calcutta hospitals for syringo-myelia.

4. Lesions of arteries. If the blood supply of a limb is reduced owing to narrowing of the lumen of the arteries or to an embolism, a sensation of coldness and numbness is produced in the affected part, although tests for skin sensation often reveal little loss of tactile sensibility. Nevertheless such cases not infrequently are sent to a leprosy clinic because leprosy is suspected. Also in such cases ulceration and gangrene of fingers and toes may be seen and this also may suggest leprosy as a possible diagnosis.

The narrowing of the arteries is usually due either to contraction of the muscular coat of the arteries as in *Raynaud's disease*, or to *obliterative endarteritis*. These two conditions are seen particularly in the feet and hands, the arteries in the neighbourhood of the wrist and ankle being affected, but larger arteries may be affected. In our clinic we recently saw a patient with coldness and partial loss of sensation of the feet and legs, and the lower part of the thigh, which was caused by endarteritis of the femoral arteries which could be felt in the groin as thick hard cords; there was no pulsation felt in the arteries of the lower part of the legs.

Cases of Raynaud's disease with coldness and deadness of fingers or toes often going on later to dry gangrene are not infrequently seen in our clinic. Fig. 8.

We have seen one case of obstruction of the arteries of the arm due to embolism in which a suspicion of leprosy was aroused by occurrence of numbress of the arm and gangrene of the fingers.

5. Lesions of the skin. Conditions which cause marked thickening of the epidermis of the skin (e.g. scleroderma, keratosis) cause also an impairment of cutaneous sensibility

^{*} Since this was written we have seen one such case, a girl showing loss of heat and cold and pain sensation on the ulnar side of both hands and forearms, and some deformity of the hands. There was no loss of tactile sensibility and no thickening of nerves. See Fig. 7.

in the affected area, and this gives rise to the suspicion of leprosy. Scarring of the skin due to burns, trauma or ulceration, also cause a similar impairment of tactile sensation. Such patients not infrequently come to our clinic.

The mere existence of scarring in an anæsthetic area of skin does not exclude the diagnosis of leprosy because leprosy macules are often treated by the patient himself or by his advisers, by the application of strong caustics and by cauterisation which produce ulceration and dense scar formation partly or completely obscuring the original leprous lesion.

Differential diagnosis between these conditions and Leprosy. Leprosy is a very common disease in India. These other conditions are rare, often very rare. When loss of skin sensation occurs with or without paralyses and deformity, it is extremely probable that the cause is leprosy. In diagnosis of such cases, therefore, the first step is to examine the patient thoroughly to see if definite evidence of leprosy is present. Five questions have to be considered : (a) Are the character and the distribution of the anæsthesia like that of the anæsthesia of leprosy? (b) Is the anæsthesia accompanied by other skin changes, depigmentation, erythema, anhydrosis, depilation, etc. which are commonly found in leprosy? (c) Is there any definite thickening of the nerves of the affected part? (d) Can lepra bacilli be found anywhere in the body? (e) Does the clinical picture correspond with that of leprosy? In practice we find the third question often of vital importance. In cases of leprosy with anæsthesia or deformities at all marked, we nearly always find thickening of nerves. A nerve, however, must not be stated to be thick merely because it can be palpated. Many normal nerves can be palpated in some persons. The fifth question is also of importance. After dealing with thousands of cases of leprosy of all kinds, one gets a very clear mental picture of the many various forms that leprosy can take, and then one day one sees a patient with anæsthesia, with or without paralysis and deformity, which looks in some ways like leprosy, but in other ways does not quite fit in with one's mental picture of leprosy. In other words, one's clinical sense and judgment tells one that the case is not quite as simple as it looks. One must always be prepared, in dealing with leprosy, to meet with cases showing unusual features, but in these cases one must ask the question, ' Is there some disease other than leprosy which is causing these symptoms?'.

However, all these five questions are important and only when the answer to these five questions is doubtful or negative, should other causes of anæsthesia with or without paralysis and deformities be considered. Such cases will be found only occasionally in general practice but owing to the widespread knowledge that anæsthesia and deformity are commonly due to leprosy, such cases tend to be seen more frequently in leprosy practice. Doctors doing leprosy practice should realise this and should be able by very careful examination to differentiate between these other conditions and leprosy.