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EXPERIMENTS IN THE TREATMENT OF THE TROPHIC LESIONS OF LEPROSY BY INJECTIONS OF HYDNOCARPUS PREPARATIONS*

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One of the commonest manifestations of the severer forms of nerve leprosy is the trophic lesion. It is the cause of much disability and suffering to the patient and of much disappointment to the doctor who is trying to improve the patient's condition. It is noticeable that while other manifestations of leprosy frequently improve, the trophic lesion instead of improving often increases and becomes permanent.

The types of trophic lesion which are most commonly seen in India are as follows:

1. Trophic ulcer of the sole of the foot, most commonly seen below the heads of the metatarsal bones and sometimes below the heel. This type of ulcer is frequently associated with necrosis of the underlying bone.
2. Ulnar paralysis with wasting of the small muscles of the hand and the development of the typical claw-hand.
3. Paralysis of the fifth and seventh cranial nerves causing anaesthesia of the cornea, loss of power of the muscles of the eyelids and face, with inability to close the eye and consequent lachrymation and not infrequently corneal ulcer.
4. Peroneal paralysis and foot-drop.

The cause of trophic lesions.—Trophic lesions are caused by leprosy involvement of the nerves supplying the affected part. The ordinary mixed nerves consist chiefly of motor fibres,

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sensory fibres, and vaso-dilator and constrictor fibres and possibly the somewhat hypothetic "trophic" fibres. It appears that the leprous affection of all these fibres may play a part in the production of the trophic lesion. The affection of motor fibres produces paralysis and wasting of muscles. The affection of sensory fibres causes loss of sensation with consequently a greatly increased risk of trauma to the affected part. The affection of the nerve fibres supplying the blood vessels apparently produces vaso-constriction and a diminished blood supply to the part, and this together with the affection of the trophic fibres (if such exist) causes a lack of vitality and diminished power of healing after trauma.

Trophic ulcer of the foot.—In making a study of the trophic lesions our attention was first directed to the trophic ulcers of the sole of the foot. This lesion is caused by leprous affection of nerves of the leg and with sensory and trophic changes in the tissues of the foot. One of the trophic changes seen is decalcification of the bones of the foot with a marked tendency to necrosis of the bone after trauma, with or without infection, and particularly in parts of the foot which are subject to pressure.

In making a clinical study of the trophic ulcers two important findings are made. The first is well known but the second is little known. The well known finding is that trophic ulcer of the foot is very frequently associated with necrosis of the bone, the dead bone frequently forming a sequestrum. The little known finding is that trophic ulcer of the sole of the foot is very frequently associated with a marked leprous infiltration of the posterior tibial nerve at the ankle. On palpation, this nerve, which is normally difficult or impossible to palpate, is often easily palpable because of thickening which may be marked, and it is nearly always tender and sometimes very tender. The nerve is palpated between the *Tendo Achillis* and the internal malleolus but nearer to the malleolus. The sensation of pain felt by the patient when the nerve is touched is often useful in identifying the nerve.

On the basis of these findings one of us (S.N.C.) made the proposal that we should study the effect of intradermal and subcutaneous injections of hydnocarpus preparations into the tissues around the ulcer combined with subcutaneous injections around, and along the course of the posterior tibial nerve. The other one of us (J.L.) did not think that this type of treat-

ment was likely to produce any benefit because he did not consider that a trophic ulcer could possibly heal at all permanently as long as there was necrosis of bone present, and as long as the ulcerated part was not given complete rest and freedom from pressure, which was impossible in an out-patient clinic. However, the work was undertaken and the results produced have in some cases been promising. It is therefore considered that further study of this subject may be of value.

Results of treatment by injection.—Eighteen cases of trophic ulcer of the sole of the foot have been treated. In some of the cases there was definite evidence of necrosis of bone. The patients were treated as ambulatory out-patients and many of them followed their usual occupation during the treatment: thus any tendency to healing could not be attributed to rest and hospital regime. Some of the ulcers had been present for years before treatment was instituted. The treatment was given weekly. It consisted of injecting about two cubic centimetres of creosoted hydnocarpus oil subcutaneously into the tissues of the sole around the ulcer, and about the same amount into the tissues round the nerve in the neighbourhood of the ankle. Simple dressings were applied to the ulcer. The treatment was continued until healing occurred.

Of the 18 cases, three discontinued treatment after a few injections and the remaining 15 were under treatment and observation for several months and some for over a year. The effect of the treatment was that immediately after injection there was some local pain and swelling but when this subsided there was a tendency to diminished exudation and to healing of the ulcer and to diminution of the pain in the affected nerve. In seven of the cases the ulcers healed completely and remained healed as long as they were under observation which was for at least several months. Most of the ulcers were relatively small. In seven of the eight remaining cases the ulcer had become smaller in size but had not healed completely. One of these ulcers was a very large one and of 16 years' duration and of the others, several were very large ulcers of long duration associated with necrosis of the bone. In one of these cases temporary healing of the ulcer had occurred but relapse followed.

In one case there were ulcers on both feet and one was treated and the other was kept as a control. The ulcer in the treated foot improved. The ulcer in the untreated foot got worse and surgical treatment became necessary. The surgical treatment was

followed by healing of the ulcer but later another ulcer developed in the same foot. In two other cases with slight ulcers in both feet, one foot only was treated, but improvement was seen in both feet.

It is noticeable that in some of the cases with ulcers which have remained healed for several months, necrosis of the bone can still be detected, because a forcible movement of the corresponding toe produces a crepitant feeling in the joint.

Other forms of treatment.—In view of the promising results seen in the above series of cases in which injections round the affected posterior tibial nerve was given, it was decided to see if other forms of local treatment of the posterior tibial nerve might produce improvement in ulcers. In a few cases surgical treatment was used, in the form of decapsulation. The posterior tibial nerve was exposed and the thickened nerve sheath was dissected off the nerve. In these cases there was seen considerable relief of the pain and tenderness in the affected nerve, but no marked tendency to permanent healing of the ulcers was observed.

Another form of treatment tried was diathermy to the affected nerve. Here again similar results were obtained, namely relief of pain and tenderness but no marked permanent improvement in the ulcer.

Trophic lesions associated with muscular paralysis.—The three commonest forms of this are ulnar paralysis with claw-hand, peroneal paralysis with drop-foot, and facial paralysis.

Facial paralysis: The effect of intradermal and subcutaneous injections in the skin around the orbit was observed in seven cases. Two patients discontinued treatment after three and five injections. Of the remaining five cases some improvement was observed in three and fairly marked improvement in two. In one of the latter two cases there was paralysis of both eye-lids of five years' duration. On one side injections were given and on the other side no injection was given. After three months of weekly treatment there was considerable increase in the muscular power on the treated side, the lacrymation being diminished. The untreated side was getting worse and therefore injections were given on both sides, with considerable improvement.

Ulnar paralysis: This has been treated by intradermal injections into the area of the distribution of the ulnar nerve combined with injections along the course of the ulnar nerve above elbow.

Improvement has been seen in a few cases but the improvement is not striking.

Drop-foot: This has been treated by injections given into the skin distribution of the peroneal nerve and around the peroneal nerve where it passes round the neck of the fibula. Eleven cases have been treated. One discontinued treatment. Of the remaining 10 cases, two improved markedly, three moderately, three slightly, and two did not improve.

We have found that in cases with paralysis of muscles, as described, some improvement can be produced in some of the cases by treatment with injection but that better results can sometimes be obtained by a combination of injections, diathermy treatment of the affected nerve and galvano-faradism and massage of the affected muscles.

DISCUSSION

The results described suggest that in the treatment of the trophic lesions of leprosy intradermal and subcutaneous injections in the area supplied by the affected nerve and into the tissues around the affected nerve may be of some value. It is true that in some cases the results are not striking but when we consider the bad prognosis of these conditions, without or even with surgical treatment, it does appear that the type of treatment described above may have a definite place in the treatment of leprosy. The treatment of trophic ulcers most often used is rest, if possible in bed, surgical removal of any dead tissue, and daily dressings of the ulcer for which various preparations are recommended by various workers. With these procedures healing of the ulcer can be obtained in many cases, but when the patient gets about again a new ulcer frequently develops which necessitates further surgical treatment and gradually one bone after another is removed until the patient is crippled and deformed. Anything which offers any prospect of preventing this sequence of events should be given a thorough trial.

It is not suggested that injection treatment should replace surgical treatment of cases in which there is definite necrosis of bone, but it is possible that a combination of the two forms of treatment may be an advantage. It is possible that in cases of nerve leprosy when the posterior tibial nerve is involved but in which there is no trophic ulcer, injections around the nerve may help to prevent the development of the trophic lesions in its distribution. It is good practice in leprosy areas,

to test for anaesthesia of the soles of the feet, and to palpate the posterior tibial nerves.

For facial paralysis with lagophthalmos lateral canthorrhaphy is being increasingly used but it is merely palliative. For other trophic lesions with paralysis and deformity diathermy, galvano-faradism and massage had been used but the results are often poor. It is possible that the early institution of injection treatment when these trophic lesions first develop might improve prognosis and prevent the necessity of surgical treatment later on.

The question arises as to what is the mechanism by which improvement may result from the injections given as described. We doubt if the improvement can be attributed to any specific action of hydnocarpus oil on the leprous lesions themselves. There is usually no leprous invasion of the tissues round a trophic ulcer for the leprous lesion is in and around the nerve. Oil injected into the tissues round the ulcer may produce considerable stimulation of these tissues and by lymphatic absorption it may be carried up the perineural lymphatics to the affected nerve. Injection round the nerve itself may stimulate healing processes in the nerve. We think that the injections are merely a convenient way of producing stimulation of the affected nerve and of the tissues involved in the trophic changes.

These notes are published with some hesitation. We realise that the number of cases treated by us is small but we think that it would be a good thing if doctors who have better facilities for studying the effects of this form of treatment could be stimulated to do so. The fact that one of us was extremely sceptical about the value of such work to begin with, but now considers that results obtained justify further trial, may influence other workers who may also be sceptical, to experiment for themselves.