

STUDIES IN PLANTAR ULCER

VII. The Results of Treatment of Plantar Ulcer

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In March/April 1962, the leprosarium at Oji River, Eastern Nigeria was revisited by me in order to assess the value of the curative and preventive measures for plantar ulcer begun in 1938, and described in *Lep. Rev.* (1960) 31, 159.

Briefly, this consisted in the healing of ulcers, following a stated classification, by bed-rest or walking-plaster splint; and an endeavour to prevent recurrence by the provision of rigid-soled footwear. At the same time, regular foot-inspection was undertaken in order to recognise the pre-ulcerative state and in particular the necrosis blister, and to treat these by appropriate measures.

It was found that, during the past four years, treatment and prophylaxis have been carried out, with varying intensity, but with fair persistence in the circumstances (common to such leprosaria) of changing medical and assistant staff. The quantities of plaster used and footwear provided annually show that a considerable amount of standard treatment has been carried out. The records of clinical findings were also pursued and enable the natural history to be followed during the period, except for 1960 when unfortunately notes were scanty.

No other treatment was consistently employed so that such results as were obtained are likely to be due to these methods.

Of 100 fully-documented cases seen in 1958, 45 have been traced and re-examined, and this is considered satisfactory in the circumstances of village life in rural Africa; for many had left the leprosarium either as arrested cases, or to continue care under the rural Leprosy Inspector.

The selection of cases covered a wide range, and included early ulceration, ulceration of short duration (6 months to a year) or of long duration (5-10 years), as well as cases known to have complications such as thrombo-phlebitis, infective disorganisation of the foot, osteoarthritic change, or foot drop. The clinical history since 1958 also varied widely—some remain in the leprosarium, others were discharged from leprosy treatment ulcer-free or with a small ulcer, with or without rigid-soled wear, and some were old patients with advanced mutilations in whom the leprosy dated back before existing records.

There are not sufficient records in any one category to make valid numerical comparisons, and it has been thought best to present the

over-all effect of the measures taken on the ulcer-situation in the leprosarium, and then to give details of typical cases.

The *organisation of leprosy treatment in the region* is such that treatment is given either at rural clinics or at the leprosarium where patients are in residence. The present policy is to reserve admission to the leprosarium to lepromatous cases, and to those with lesions due to nerve involvement.

In 1958, there were 6,372 patients under treatment, of whom 560 were in the leprosarium; in 1961 (December) there were 4,530, of whom 439 were in the leprosarium.

The decrease in total leprosy population under treatment does not affect materially the incidence of plantar ulcer at the moment, because of the number of cases found among those who are "arrested cases" and who would not therefore figure in the count of those under treatment. There are 26,000 discharged cases in the region, at present.

Ulcer-situation in the Leprosarium 1958-1962

Plantar ulcer is controlled in the leprosarium by an ulcer-shed and by an ulcer-ward; in addition there is an "infirmery" for the care of derelict cases.

In rural areas, ulcers are dressed by the local Inspector at his regular visits and he sends in to the leprosarium patients who he considers need special care.

Ulcer-situation in 1958

A survey at the beginning of the present management of ulcers in early 1958 showed that 150 of 560 patients had ulcers of which 122 were plantar.

The *ulcer-shed* treated 119 of these, as well as those in the "infirmery" and some ex-patients who had encamped nearby on discharge. Treatment was by frequent eusol dressings, and two nursing attendants were employed full-time for this purpose.

The *ulcer-ward*, of 35 beds, was reserved for those whose ulceration was aggravated by complications, or by patients who were thereby unable to look after themselves. During 1958, 553 ulcer-patients were warded, of whom 318 were leprosarium patients, many spending more than one period in hospital. In the later part of the year, some were warded for the pre-ulcerative state.

Ulcer-situation in 1962

The situation was reviewed in April 1962 and it was found that on the day of survey, 38 of 439 patients in the leprosarium had ulcers of various types of which 19 were plantar ulcers; a further 22 were wearing walking-plasters for the same lesion.

The *ulcer-shed* had been closed for three years. The dressing of cases that needed it was done outside the plaster-room and occupied

part of the time of the plaster-room staff. The plantar ulcers not in plaster were in patients who were unsuited for plaster treatment because of psychosis, skin sensitive to plaster, or refusal to accept plaster.

The most obvious difference in the *ulcer-ward* is the absence of the strong smell on first entering, an absence which indicates the low incidence of bone infection. In 1961, 350 patients were admitted of whom 200 were leprosarium cases, but on the day of survey only 8 of the beds were occupied by leprosarium patients. Admissions included those with the pre-ulcerative state.

The Sister-in-charge, who was also in charge in 1958, states that the reduction in hospitalised cases is greater than the figures indicate, because patients are now admitted with lesions that would not have been considered serious enough then; also a longer time is now allowed before discharge for healing to consolidate. The fall in leprosarium cases in the wards was off-set by the admission of more from rural clinics, or ex-patients.

The cost of Treatment

An analysis has been made of the cost of achieving this improvement by examining receipts for plaster-of-paris, felt, etc. since the initiation of treatment. This also includes paster used for other purposes such as post-operative care of hands and feet, and some treatment of fractures in healthy villagers nearby. With this proviso, the total cost of treatment over four years was £1,110 for plaster-of-paris, £105 for felt, but this includes material used in a general dispensary treating 60-70 new cases a day, including fractures. As much was used in the first six months, as was used in each year subsequently. Against this cost will be put the amount saved in daily dressings (bandages, wool, etc.).

During the same period, the work-shop produced 575 pairs of rigid-soled footwear, mainly wooden-soled sandals. For deformed feet, these were carved to the shape of a cast of the foot. Experience suggests that the latex boot if used with toes completely covered is not as satisfactory in Africa as Ross found it to be in India.

Effect of Plaster and Rigid-soled Wear on Plantar Ulcer

	1958	1962
No. of patients in the leprosarium ..	560	439
Patients with ulcers (all types) on day of survey	150	39
Plantar ulcers on day of survey	122	41
Leprosarium admissions to the ulcer-ward	318	200
		(1961)

Comments on the above Table

This shows the effect of treatment pursued with varying persistence for four years. The reduction in total ulcers is partly due to therapy and partly to foot-inspection. Not all admissions to the ulcer ward had ulcers; some were admitted for the pre-ulcerative state (see text).

Summary of Results

The statistics indicate that a reduction of plantar ulcer of more than half has occurred during the period under study. It is the general opinion of the staff and patients that such ulceration as does occur is of small size; there are no longer the large, acute smelly feet with which they were familiar. The "foot-inspector" has been the same individual throughout the period. He does not have exact numbers of his weekly findings, but he states that whereas his weekly examination of the whole leprosarium yielded from 30-40 cases of all types of foot-damage in 1958, his present findings vary from 5-10 per week.

It is concluded that the methods of management practised during this period have contributed to a reduction of more than a half in the incidence and also in the gravity of plantar ulcer.

Ulcer-situation in Rural Areas

No attempt has been made to treat ulcers in rural areas other than by dressings, but a random sample was made during the visit.

A rural leprosy clinic had been examined in 1958, when it was found that of 71 patients seen, 9 patients had 18 plantar ulcers among them. In the present survey, 37 patients were seen, of whom 10 had 17 plantar ulcers. The observation underlines the magnitude of the rural problem, at present untouched, where there are 4,500 patients in treatment and 26,000 ex-patients; many of whom have permanent neuropathy of the feet.

The Long-Term History of Plantar Ulcers

The study of the clinical history of various types of plantar ulcer during the past four years has revealed interesting features of the lesion.

Some of these are presented in the following type-cases. Certain tests used in the final assessment in 1962 were not available in 1958, including the dynamic footprint (DFP) and the "mis-localisation" test (MLT).

The following cases are described:

- A. Simple plantar ulcer healed by the primary use of rigid-soled wear.
- B. The uncontrolled plantar ulcer.

- C. Control of ulceration in anaesthetic feet by intelligent patient.
- D. Control of recurrence by rigid-soled wear.
- E. Avoidance of recurrence by recognition of the pre-ulcerative state.
- F. Ulcers complicated by thrombo-phlebitis of lower leg.
- G. The value of care in derelict cases.
- H. The unexplained success and the unexplained failure.

Finally, reference is made to two unsolved problems in leprosy—the discharged patient with permanent neuropathic feet, and the derelict cases for whom amputation is the only hope of rehabilitation.

Case A

Simple Plantar Ulcer healed by primary use of rigid-soled footwear

O.S. No. Z2696—Male—*Tuberculoid leprosy* since 1952

23.6.58 RMH₅ 2 cms of 4 months' duration. Treated by simple dressing and rigid-soled wear.

2.7.58 1.5 cm.

12.7.58 1 cm.

21.7.58 0.5 cm.

11.8.58 "only a pin-hole remains". Rigid-soled wear continues.

Comment: Several patients have shown that simple cases of ulcer will heal in this way, provided that the patient is sufficiently co-operative not to walk at any time without wearing the sandals.

Case B

The uncontrolled Plantar Ulcer

E.N. No. Z2642 An old *dimorphous* case, discharged as arrested in 1952, but relapsed in 1956. The patient steadily refused help by plaster or footwear.

The following resume includes the lesions as they occurred:

1957 Rt 3rd and 4th MT heads removed for chronic ulcers.

1958 Ulcers at RPPH, RmidMH, RMH₅, LPPH.

1959 RPPH, RmidMH persist.

1960 RPPH and LMH₁.

1961 RMH₁ RMH₄ LMH₁ LPPH.

28.3.62 LMH₁ 1 cm; RPPH 1 cm; RmidMH 1 cm.

Left sole completely anaesthetic.

Right forefoot is anaesthetic, but right heel displays MLT.

Comment: This patient is probably an example of the "leprosarium complex". Healing of the ulcers would entail the risk of discharge, and return to village life from which he had been separated for some years. It serves to enable us to observe the natural history of untreated ulcers, and presents a lesson to be learnt.

Case C

Control of Ulcer in anaesthetic feet by intelligent patient

B.E. Z2465—Male—discharged as arrested case of *dimorphous leprosy* in December, 1958. An intelligent, co-operative hospital attendant.

8.58 RMH₁ in spite of previous removal of metatarsal head. Healed after 3 months in walking plaster. Rigid-soled wear.

1959 No ulcer.

1960 No ulcer.

1961 No ulcer.

27.3.62 No ulcers.

Right foot: complete anaesthesia.

Left foot: MLT.

He now wears ordinary sandals, but keeps rigid-soled wear with him for the times when "he feels he needs them".

Comment: This case demonstrates the recognised fact that the outcome of treatment depends on the intelligence of the patient. For this reason, comparative figures of cases are apt to be misleading.

Case D

Control of recurrence by Rigid-soled Wear

F.E. Z93—Male—who was considered as an arrested case of leprosy before the records which go back to 1950.

3.58 LHL ulcer, present for 5 years without healing. Walking plaster. The leg is swollen from old thrombo-phlebitis.

8.58 Plaster off; ulcer healed. Elastoplast stocking applied. Rigid-soled wear.

1959 No ulcer.

1960 No ulcer, but began to abandon rigid-soled wear.

3.61 Lmid-sole ulcer and LHL. Walking plaster 3 months. Both ulcers then healed. Rigid-wear renewed.

1.62 No ulcers.

5.4.62 No ulcers, but he has a necrosis blister of LMH₁ on medial border of foot. Bed-rest.

Left sole: complete anaesthesia.

Right sole: complete anaesthesia.

Comment: It is not always possible to discover whether or not patients really use their footwear. However, the ready response to rigid-soled wear (plaster or sandal) shows that in this case control is related to the use of it.

Case E

Avoidance of recurrence by recognition of pre-ulcerative state

O.O. Z5246—Female—*lepromatous leprosy* since 1942 at age 12. No record of feet before 1958.

5.58 Ulcers RMH₁ RmidMH, LMH₁ LMH₂ Bilateral walking plaster for four months. All ulcers healed.

10.58 LMH₁ LMH₂ Refuses rigid-soled wear.

11.58 Necrosis blister medial side RMH₁. Bed-rest for 20 days. Blister absorbed, all ulcers healed. Still refuses footwear.

1.59 Necrosis blister: medial side LMH₁. Bed-rest 10 days; blister subsided.

2.59 Necrosis blister LmidMH. Bed-rest 20 days. Blister subsided.

3.59 Infected LMH₄. Bed, penicillin the plaster for 4 months. All ulcers healed.

7.59 RMH₁ and RMH₂ ulcers. Plaster 12 weeks. All ulcers healed.

12.59 Necrosis blister RmidMH. Bed-rest. Blister subsided in 8 days. (1960: scanty notes.)

2.61 Ulcers LMH₁ LMH₂ RMH₁ RMH₄. Plaster for 4 months. All healed except RMH₄ 0.25 cm. rigid-soled sandals accepted.

9.61 No ulcers.

12.61 No ulcers.

4.4.62 All scars dry except LMH₁ scar which seems precarious.

Right sole: MLT all over.

Left sole: Anaesthesia of forefoot, elsewhere MLT.

Comment: This interesting case shows the fight between the foot-inspector and the tendency to ulceration, which at times breaks through the inspector's net. The success of rigid-soled wear is obvious.

Case F

Ulcers complicated by Thrombo-phlebitis

G.M. No. Z5038—Female with *lepromatous leprosy* since 1944 at age 9.

(No record of feet before 1957.)

4.57 "Thrombo-phlebitis of right leg", No record of ulcer. Hospitalised.

12.57 "Ulcer left foot (sic) for six months".

1.58 LMH₃ and swollen left lower leg. Bed, antibiotics, then elastoplast stocking.

3.58 LMH₃ persists, walking plaster for 8 weeks. Healed. Rigid-soled wear.

5.58 Swollen ankles, but no ulcers.

6.58 Necrosis blister RMH₁. Bed, then elastoplast stocking. Blister subsided.

7.58 No ulcers. Tender RPPH and tender LMH₃ scar.

9.58 RPPH "nearly an ulcer". Bed.

10.58 Ulcer of both tendo achilles due to straps. Bed till healed.

12.58 RPPH ulcer with oedema of foot. Bed, then walking cast 6 weeks. Healed.

1.59 Ulcers healed.

8.59 Left tendo achillis again ulcerates. Viscopaste dressing. Bed.

- 11.59 No ulcers.
(1960 no notes.)
- 3.61 Ulcers at RPPH, LPPH and LMH₅.
- 4.61 RMH₅. Left foot healed. Rigid-soled wear.
- 12.61 Relapse of RPPH. Walking plaster.
- 29.3.62 No ulcer on either foot, both lower legs swollen.
Left sole: slow MLT. Right sole: slow MLT medial half, anaesthesia lateral side.

Comment: The occurrence of thrombo-phlebitis is a major set-back, and every effort should be made to control early infection of the foot. The ease with which the foot ulcerates after thrombo-phlebitis is well illustrated above.

Case G

The value of care in derelict cases

A.U. No. Z1091—*Tuberculoid leprosy* since 1944 at age 12.

- 5.52 "Still has ulcers of feet". Hospitalised for four months.
- 6.53 "Still has ulcers".
- 4.54 Hospital for ulcers. "Dead bone removed". Ulcer healed.
- 8.54 Right 3rd MT head removed.
- 12.55 Hospital with ulcers both feet.
- 3.56 "Dead bone removed to try and heal ulcer".
- 1.57 "More dead bone removed from ulcers. Eventually healed".
- 3.57 Still ulcers both feet.
- 8.57 "Dead bone removed".
- 10.57 "Ulcer of both feet still in spite of all treatment."
- 2.58 Bilateral walking plasters applied for left mid-medial and RMH₁ RmidMH ulcers.
- 17.4.58 Plasters off. Both feet healed.
- 30.5.58 MH₁ and Lmid-med recur. Plaster 3 months. All healed. Rigid-soled wear.
- 10.9.58 Necrosis blister RMH₁. Bed-rest. Blister absorbed in 10 days.
- 10.58 Left mid-sole breaking down. Plaster cast till 2.59. Ulcer then a slit.
- 9.59 Lmid-sole a dry slit; LMH₃ LMH₄ ulcers. Rmid-sole ulcer. Refuses plaster cast.
(1960 no notes.)
- 1.61 RMH₁ RMH₂ RMH₃ RMH₄ Lmid-sole ulcers. Plaster cast for 3 months. All right foot healed. Left mid-sole a slit.
- 11.61 Large ulcers both feet. Plaster cast three months. All ulcers healed.
- 27.3.62 Both feet badly deformed, but no ulcers except two small raw spots on left sole. Complete anaesthesia of both feet. Is wearing tyre-sole sandals, which "suit him better" than rigid-soled wear.

Comment: It appears that further deterioration of the feet is being avoided. But it is problematic whether a more practical result would not be to amputate if adequate prostheses were available. Note that rigid-soled wear is not indicated for feet that are rigid from chronic infection, damage, arthritis, or other cause. It is not yet certain whether sandals with moulded soles (to distribute the weight) or simple soft-soled protective sandals are best for this type of case. Unfortunately, every leprosy settlement has only too many of them.

Case H

The unexplained success and the unexplained failure

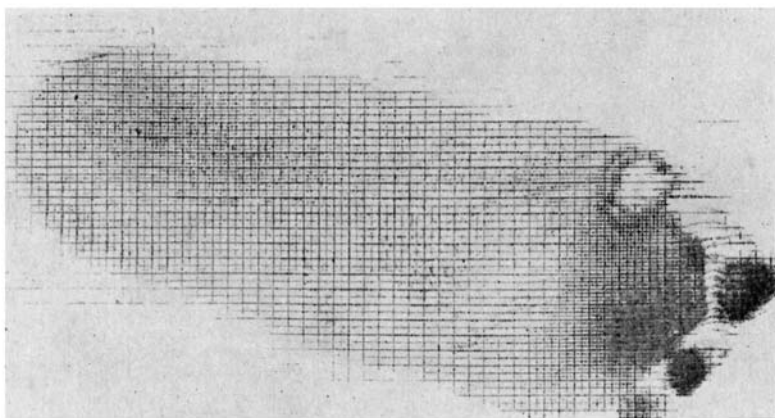
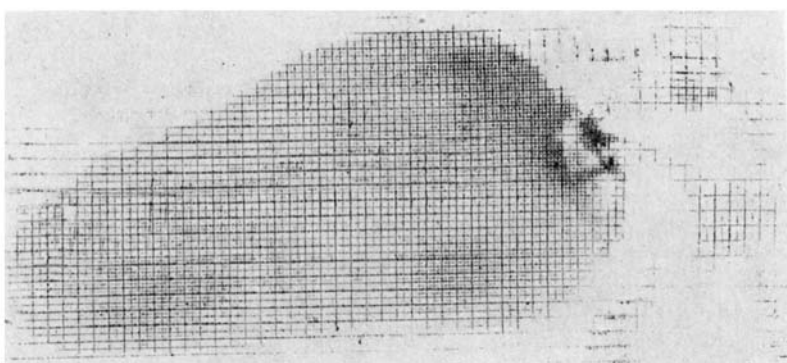
G.N. Z2479—a male case of *lepromatous leprosy*, in treatment since 1957.

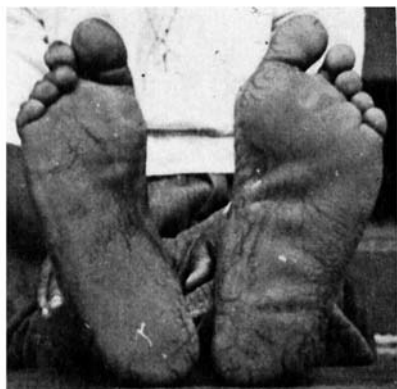
- 1957 Right 5th MT head excised for chronic ulcer.
- 1958 No ulcers, but LMH₁ and LMH₅ have tender callosities.
- 4.59 RMH₅ necrosis blister. Bed. Subsided after 15 days. Rigid-soled wear.
- 1.60 Necrosis blister of left foot (? site). Bed; subsided in 6 days.
(No further notes in 1960.)
- 6.61 RMH₅ ulcer, treated with dressings. Patient not wearing rigid-soled wear.
- 1.62 RMH₅ still present. Patient reluctant to accept plaster cast.
- 1.4.62 RMH₅ 1 cm. Right sole: complete anaesthesia.
Left sole: complete anaesthesia, except for MLT at heel.

Comment: The failure of excision of the metatarsal head is a common observation. It is puzzling to understand why in two feet of similar sensory loss, one foot should continually ulcerate and the other never—though ulceration was

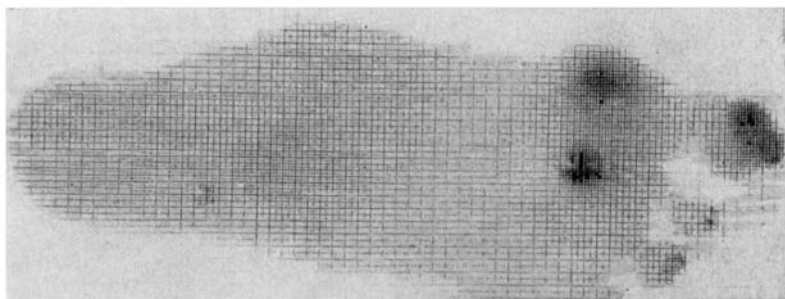
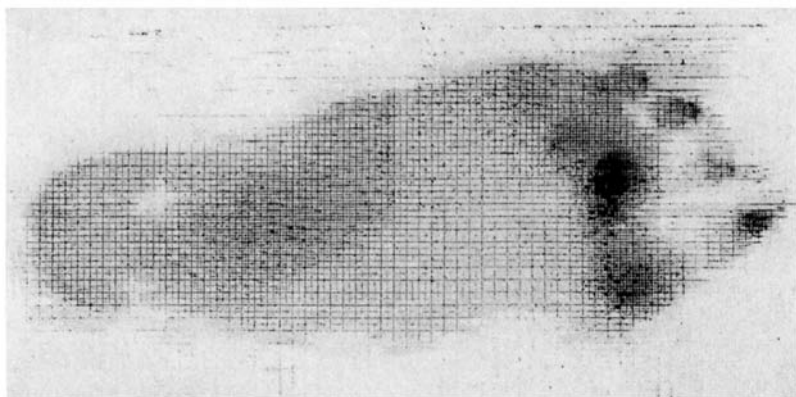


CASE B



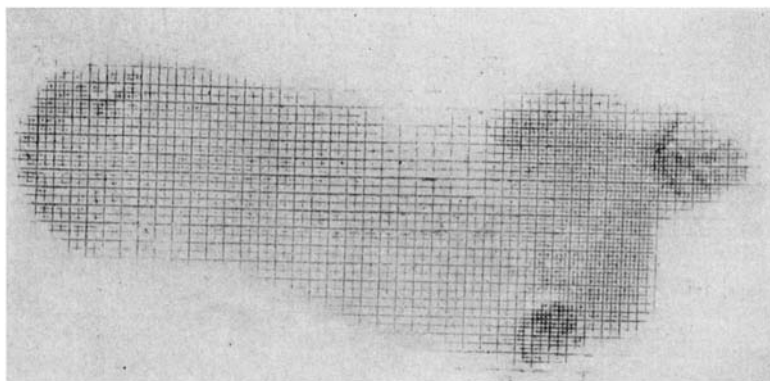
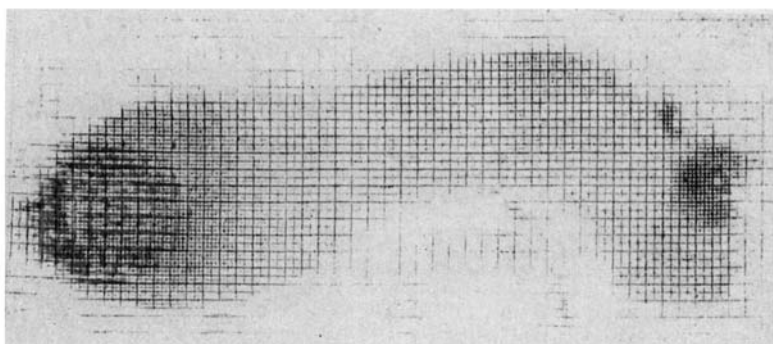


CASE C



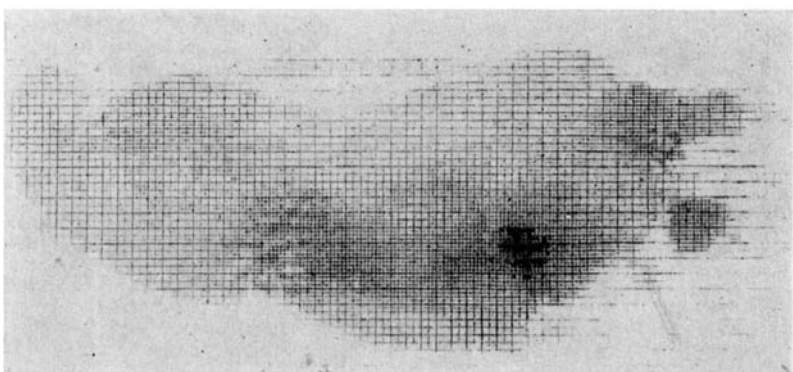
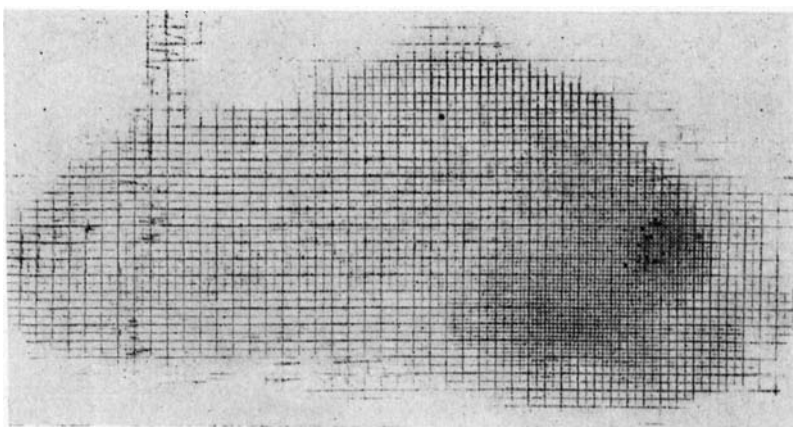


CASE E



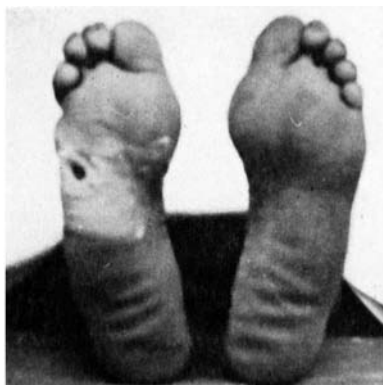


CASE F

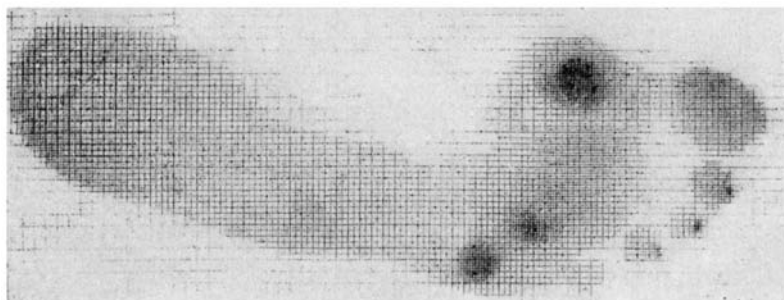
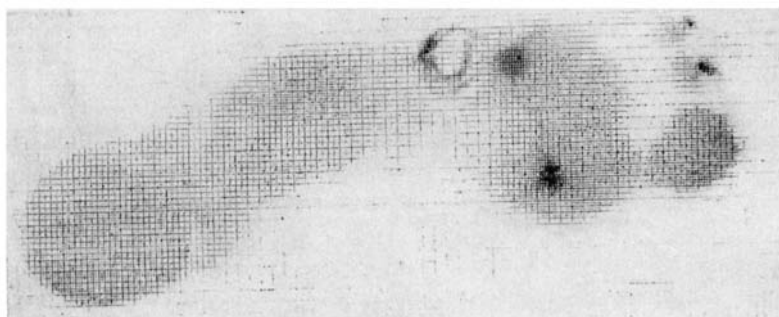




CASE G



CASE H



once avoided by recognition of the pre-ulcerative state. The first ulcer should be avoided at all costs . . . and this can only be ensured by regular foot-inspection.

The Discharged Patient

There is a tendency in leprosy statistics to present only cases that are under treatment, and not those who have been discharged; alternatively, no distinction is made between the discharged case without serious neuropathy and the case with a permanent neural loss. General medical services in many leprosy areas are scanty, and those that exist are often inexperienced in the care of neuropathic limbs. It is likely that "arrested" cases who are exposed to the hazards of permanent sensory and motor loss will need continual care. This work, unfortunately, increases the calls on the already over-burdened leprosy services, but the fact remains that for many thousands the cessation of bacterial activity is in no way an indication of the end of their troubles.

The Derelict Case

The future for cases of advanced foot damage lies in the provision of cheap and satisfactory prostheses for use after amputation of foot or lower leg. This problem remains to be solved though there is promise in the use of polyester resins; a solution is a pressing need if advanced cases are to be rehabilitated.

Summary

1. A survey of the results of treatment in Oji River Leprosarium of plantar ulcer by plaster and rigid-soled wear has been made after four years.
2. In a situation with varying medical staff but with no other method used, there is a reduction of more than half in the incidence of the lesion in leprosarium patients, and a notable diminution in the gravity of those cases that remain.
3. In all existing cases, a reason for persistence of the ulcer is apparent and includes lack of patient co-operation or the presence of a known complication such as irreversible venous blockade.
4. The natural history is given of eight types of cases treated during the period under review.
5. The problems of the discharged patient and the case of advanced foot-damage are underlined.

Acknowledgements.

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patience and skill has achieved the results described. The Settlement is under the direction of Dr. W. F. Ross. I am particularly indebted to Dr. W. F. Ross and Dr. Fern who continued the methods of treatment initiated in 1958 up to the present day.