

STUDIES IN PLANTAR ULCERS IN LEPROSY

III. THE NATURAL HISTORY OF PLANTAR ULCERS

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The occurrence of a plantar ulcer on the anaesthetic sole is a serious incident in the course of leprosy. The complications which commonly follow may persist long after the disease itself is arrested by modern treatment, and may in fact lead to the permanent disablement of the patient.

The appearance of a plantar ulcer is the climax of a series of changes that have occurred in the mechanics of the foot, leading to the breakdown of devices which protect the normal foot from damage during the stresses of walking. These changes have been described in a previous chapter and are represented clinically by damage in two areas which correspond to the surfaces on which friction-pressures are maximal.

These surfaces are that between the ground and the plantar skin, and that between the plantar skin and the underlying bone at any given moment of the walking roll. Corresponding to these two areas of stress, it is possible to recognise a deep and a superficial type of damage to the plantar tissues which culminate in a deep and a superficial type of ulceration.

It is much to the benefit of the patient that the condition be recognised in the pre-ulcerative stage, so that ulceration itself be avoided. The natural history of plantar damage therefore falls into three parts:

- i. The pre-ulcerative stage.
- ii. The plantar ulcer.
- iii. The complications of ulceration.

(i) The Pre-ulcerative Stage

The regular observation of the feet of leprosy patients makes it possible to recognise a pre-ulcerative stage. When the importance of early treatment is recognised, it is found that patients themselves draw attention to their own foot-damage at an increasingly earlier time.

Symptoms depend to some extent on the intelligence of the individual, but the following description applies to an average case.

When there is profound and prolonged deep anaesthesia of the sole, there may be no pre-ulcerative symptoms, the ulcer being the first complaint if foot inspection is not being maintained. With less deep anaesthesia, there is first a burning sensation at one of the recognised sites of plantar damage, accompanied by tenderness on walking. If walking is continued, the burning sensation becomes accentuated at night in bed, and may disturb sleep. The patient limps, but may continue to walk until a further stage is reached which may include the cracking of a large callosity, or a swelling at the margin of the glabrous skin of the sole. At this stage, he will seek treatment.



FIG. 1.—An early sign in the pre-ulcerative stage is a spreading of two or more toes, due to localised oedema of the forefoot. Note the clear spaces between the toes. The local swelling is visible on the sole.

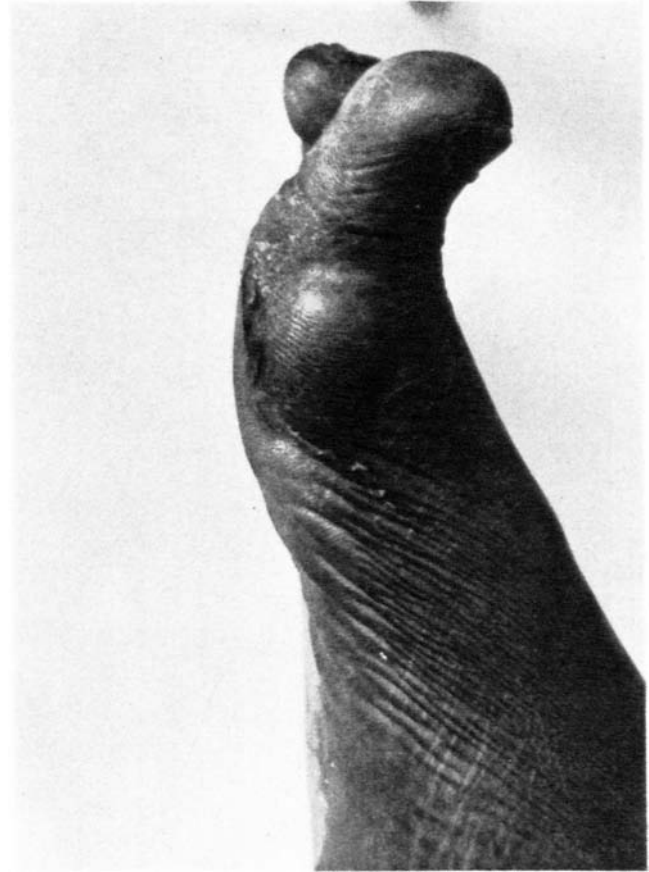


FIG. 2.—A necrosis blister indicating damage to the deep tissues between plantar skin and underlying first metatarsal. The fluid is sterile and will be absorbed if the foot is rested and raised.



FIG. 3.—A necrosis blister indicating a threatening plantar ulcer over the 5th metatarsal head. There is also a cracked callosity on the plantar surface of the damaged area.

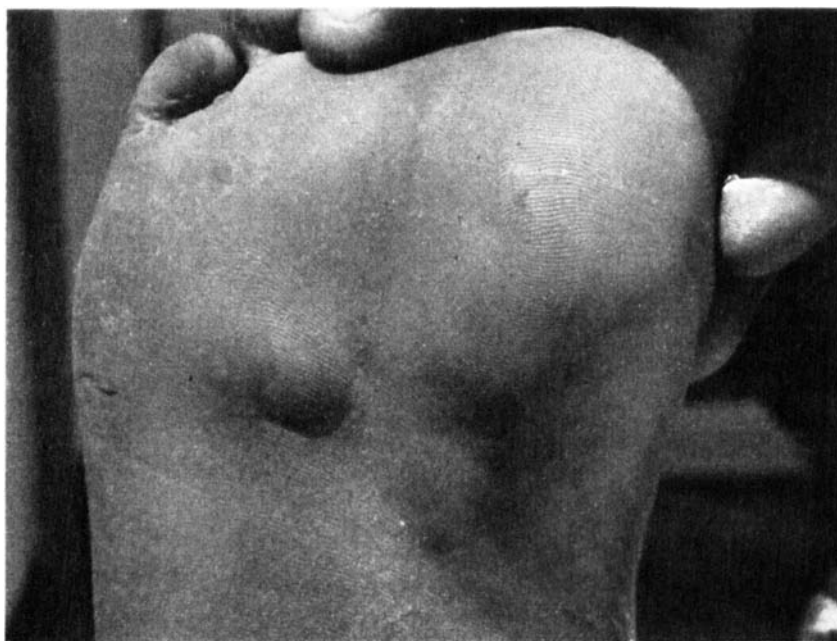


FIG. 4.—Some necrosis blisters derived from the metatarsal heads point on the medial side of the glabrous skin. This one comes from the 5th metatarsal head. Note the cracked callosity nearby, nevertheless the contained fluid is sterile.

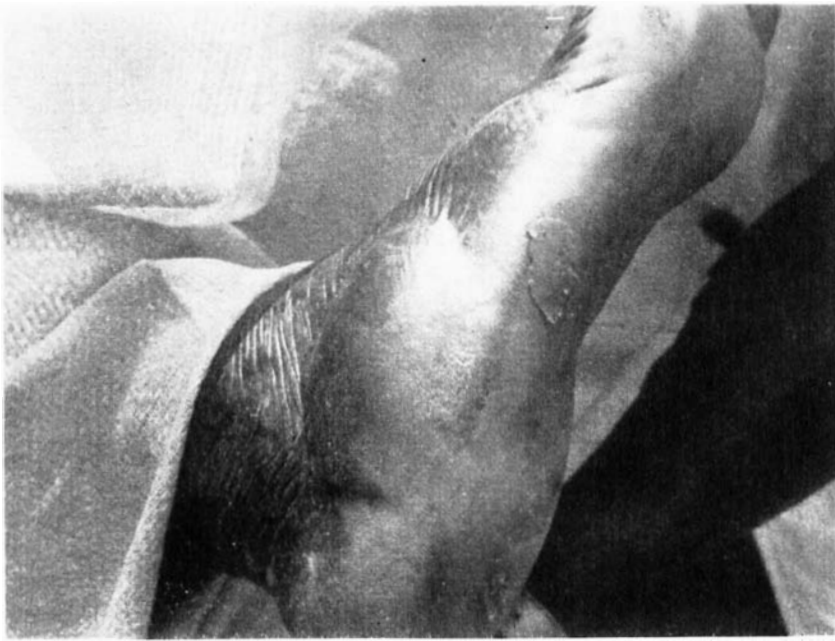


FIG. 5A.—Necrosis blisters arising from damage between the calcaneal tuberosities and plantar skin often track to one side or the other of the heel and are large.



FIG. 5B.—Note that the origin of the necrosis and the track of the blister is visible under a good light. If allowed to break down, this ulcer will be extensive.



FIG. 7.—The superficial type of plantar ulcer. This type involves considerable skin-loss and inevitable serious secondary infection.



FIG. 6.—The deep type of plantar ulcer. This is the common plantar ulcer in leprosy. It is really a sinus leading down to a necrotic area adjacent to the head of the metatarsal bone.

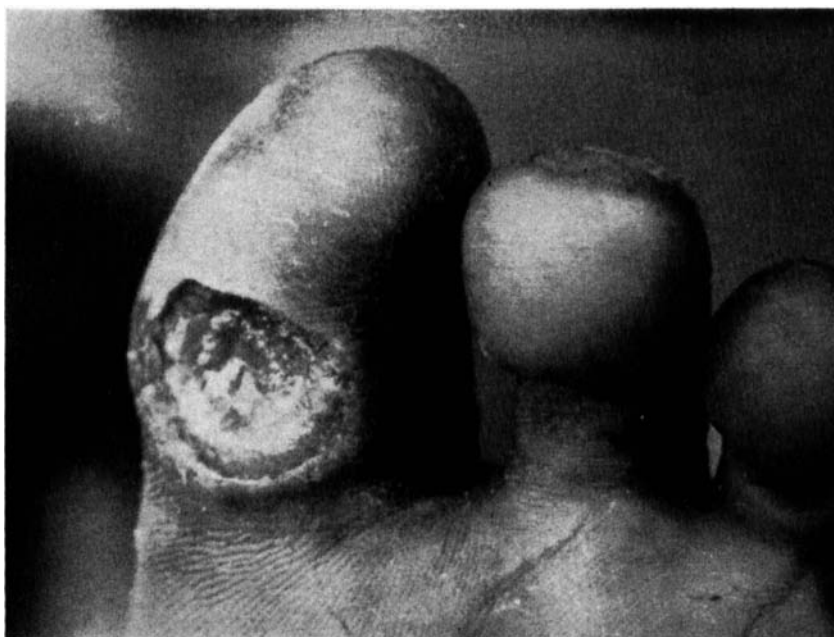


FIG. 8.—The head of the proximal phalanx of the big-toe is not an infrequent site of plantar ulcer in an anaesthetic foot.



FIG. 9.—Toe-tip ulceration is often multiple and represents tissue damage due to stresses at the final push-off of the walking step. They must be distinguished from trauma of the toes in drop-foot, in which the damage is on the anterior surface of the tip, or even on the dorsum.

The *signs* of the pre-ulcerative stage will be noted when the patient first complains, but with increasing experience a careful observer will notice these signs in some cases before symptoms occur. This underlines the importance of the weekly foot inspection at which all feet known to be anaesthetic are observed and palpated. These signs are:

1. *There is a localised swelling of the foot*

In the early stages, this swelling is indefinite and may evade casual inspection; but if the two soles are compared it is possible to notice a difference in the length or width of the affected foot, due to localised oedema. There is a slight rise of local temperature. An affection of the forefoot will be indicated by a spread of the toes, between which a clear space can be seen (Fig. 1); on the unaffected side, the corresponding toes will normally be in contact. In a more advanced stage, the whole forefoot will be oedematous, though the oedema is more marked on the dorsum than on the plantar aspect of the foot because of the deep attachments of the glabrous skin. It is important to distinguish this condition from the general swelling of both feet which occurs in some cases of lepromatous leprosy and which may result in a slight separation of all the toes of both feet. In this latter condition, any tenderness of the sole is generalised and not limited to any one area.

In some cases of pending ulceration, there is a localised and discrete swelling at the edge of the glabrous skin of the sole, indicating the occurrence of deep necrosis, as will be described.

2. *There is localised tenderness, on deep palpation*

At the weekly foot inspection, the danger areas of the foot are systematically palpated with the thumb. In the absence of tenderness and swelling, the foot can be considered undamaged; but the absence of localised tenderness in a foot with localised swelling should lead to further investigation, including an X-ray if possible, to exclude the possibility of a neuropathic joint.

In cases with swelling at the margin of the glabrous skin, the nearest area of plantar ulceration should be carefully palpated and examined in a strong light.

3. *There may be abnormal callosities of the sole*

Callosities of the sole are not uncommon in patients in cases of threatening plantar ulcer. These are distinguished from the generalised thickening of the plantar skin seen in many barefooted people, because the abnormal callosity is limited to special areas, and often to one foot. In addition, the surface of the callosity may be cracked and in severe cases the crack may extend into the dermis.

Although the callosity may itself breakdown into an ulcer, it is not uncommon to find an abnormal callosity in cases where a neighbouring blister indicates necrosis deep to the callosity. (Fig. 3).

In such a case, the ulceration when it occurs may be either at the callosity, at the blister, or include both.

4. *There may be a localised blister at the margin of the glabrous skin*

The existence of an "idiopathic blister" has long been recognised as a precursor of certain types of plantar ulcer.

They have sometimes been mistaken for burns that have occurred without the patient's knowledge, possibly when he was asleep.

This type of blister is described as a *necrosis blister*, because it contains sterile tissue fluid derived from the necrosis of deep tissues at the area of damage. The blister varies in size from 1 cm. (especially under the base of the toes) to 5 cm. (particularly in relation to the heel)—Figs. 2, 3, 4, 5. It is often possible to see, with a powerful light, the deep track from the necrotic area to the presenting blister (Fig. 5b). In the early stage, the swelling is hard and may be dark from the presence of blood; but it progressively softens as liquefaction occurs.

A necrosis blister indicates that deep damage already exists, and that ulceration is imminent. The worst treatment is to precipitate ulceration by opening or pricking the blister and introducing infection. The contained fluid is sterile, and the condition will subside and the fluid be absorbed if the foot is rested in bed in a raised position, and covered with a simple protective dressing. A usual time for absorption is 7-10 days. No antibiotic is necessary, but can be used as a prophylactic.

Summarising the symptoms and signs of the pre-ulcerative stage, it can be said that the complaint by the patient, or the discovery by the foot inspector, of a foot which has an area of localised swelling and tenderness over the known ulcer-bearing areas of the sole is in danger of ulceration. This danger is imminent, if there is also a localised and cracked callosity, or a necrosis blister; but ulceration can be avoided even at this stage by suitable treatment.

(ii) The Plantar Ulcer

The plantar ulcer of the neuropathic foot of leprosy is only too familiar to all workers. It occurs either as a deep and often chronic hole corresponding to damage to tissues close to bone; or as a superficial and often acute ulcer, corresponding to damage at the superficial area of friction-damage.

Although commonly single, plantar ulceration may be multiple and as many as four ulcers may be present on one sole, excluding associated toe-tip damage. The distribution and frequency of these ulcers has been described in a previous chapter.

a. The deep type of plantar ulcer (Fig. 6)

This is the common chronic ulcer on the sole of the foot in leprosy, though it may be masked by associated longstanding secondary infection. When this infection is minimal, it is seen to be a collar-stud type of hole leading from the skin surface through a funnel which

opens into the necrotic area adjacent to the underlying bone. Frequently, the patient walks on such a foot without any dressing or other protection. The danger of secondary infection of bone and joint is great, but skin loss is minimal.

Neglected necrosis blisters frequently initiate a deep ulcer. In this case, the ulcer may persist at the site of the blister; but often it extends to include the damaged skin directly overlying the affected bony prominence, and the condition then appears as a long ulcer extending from the hard skin of the sole round to the soft skin on the adjacent non-weight-bearing skin.

In leprosy, as in diabetes, there is a frequent association of this type of plantar ulcer with the neuropathic joint of Charcot. Such a joint may be at a distance from the actual ulcer, and is commonly at a tarso-metatarsal or even at the ankle-joint.

b. The superficial type of plantar ulcer (Fig. 7)

This type of ulceration involves a large area of skin and may or may not include deeper tissues. It is fortunate that it is not as common as the deep type, for serious secondary infection is inevitable and the damage to the foot may be considerable. A similar ulcer is also seen under the head of the proximal phalanx of the big-toe (Fig. 8) and at the tips of the toes (Fig. 9) and is not uncommon at the heel.

In this type of ulcer, skin loss is an important factor and some type of skin replacement is necessary to effect an adequate cure of the condition without deformity.

The course of plantar ulceration varies in its outcome. It may lead either to spontaneous and permanent cure, to spontaneous cure with later relapse, to chronicity without complications, or to chronicity with complications.

It is not uncommon to find chronic ulcers on which a patient has walked for years without special treatment. The reasons for the variation in the course of the condition are not fully understood, but undoubtedly include the extent of secondary infection and the degree of deep anaesthesia, as well as the time during which the anaesthesia persists or recovers. The degree and duration of intrinsic palsy of the foot is also a factor. Superficial anaesthesia is always present but may be limited to an area in which the ulcer occurs; however chronic ulcers may persist after partial restoration of plantar sensibility. Chronicity is also related to the use of the foot, for rest and immobilisation will permit healing to occur if maintained long enough.

Summary

In describing the natural history of plantar ulceration in leprosy, stress has been placed on the pre-ulcerative stage, because treatment at this time is relatively easy and effective.

The established ulcer is a problem mainly because of the tendency to relapse and because of the frequency of complications and their gravity. These complications are described in the following section.