

Reconstructive Surgery in the Treatment and Prevention of Ulcers of the Foot

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Not enough attention is given to the various mechanical factors in the ulceration and absorption of the foot. Much has been said about the medical treatment of ulcers. The literature on this subject is enormous. A great variety of local applications, local injections and systemic medications have been tried. When these are combined with rest and care they all succeed. When used without these precautions the ulcers either fail to heal or recur when they have healed.

The chief aim in presenting this paper is to stress the importance of understanding the various mechanical factors that cause ulceration and absorption of the feet.

In leprosy this depends on the understanding of the distinction between the trophic changes and the mechanical factors in the causation of various deformities, particularly the ulceration of the feet and the absorption of bones. It is universally agreed that there is trophic change in the denervated tissues and these tissues are less able to bear the normal physiological strains than normal tissues. Unfortunately, this trophic change is not ordinarily reversible. Lumbar sympathectomies were done to produce vasodilatation in the limbs to increase the blood supply. Gokhale and Watt Maney *et al.* have used Hydergin and its alkaloids to produce vasodilatation in the limbs, but we know that the anaesthetic foot is already fully vasodilated because of the destruction of the sympathetic nerve fibres produced by the leprosy neuritis. It is important to differentiate between the arterial changes that lead to ulceration and arterial changes that result from ulceration leading to scarring. In leprosy, the limitation of blood supply to an ulcer in the foot is not due to vasoconstriction but is due to strangulation of vessels by a mass of non elastic fibrous tissue. This is un-

affected by medication either external or internal. It is due to previous ulceration.

Brand emphasised in many of his articles and lectures the doctrine of the first ulcer. The patient's first ulcer is usually due to an excessive amount of walking, a badly fitting shoe, or some trivial injury. When proper care is taken by giving complete rest to the foot it heals; but as it heals it creates fibrous tissue. His second ulcer will be due to the fibrous tissue of his first ulcer plus a smaller amount of trauma. His fifteenth ulcer will be due to his previous fourteen ulcers and an almost negligible amount of trauma.

Hospitalisation and education of all patients with the first ulcer will reduce the recurrence of ulcers to a great extent. There are a number of difficulties in getting the patient with the first ulcer into the hospital. Quite a large percentage of our patients do not pay as much attention as they should to the ulcers on their feet because the pain that drives them to the hospital is not there. The accommodation and care of these patients who obviously are not very sick is woefully inadequate. It is essential to explain to the patient at this stage about his first ulcer and how necessary it is to replan his mode of life. With a few restrictions such as wearing well fitted shoes or changing the place of work or residence avoiding walking long distances, the patient may lead a useful life of reasonable activity.

Some of the mechanical factors which are responsible for the production of ulcers are:

- 1.—Excessive amount of walking.
- 2.—Injuries caused by sharp stones, thorns and nails in the shoes.
- 3.—Type of weight bearing. Normally, the weight of the body is transmitted to the ground through a pad of elastic fibro-fatty substance. This distributes the strain of weight bearing to a large area of skin. After each ulceration, this

elastic fibro-fatty substance is replaced by non-elastic scar tissue which transmits the weight bearing through a very small area of skin thus increasing the danger of recurrence. A vicious circle is created whereby ulcers create fibrous scar tissue which in its turn predisposes to further ulceration.

4.—The concentration of weight at certain points of the foot. The common pressure points are (a) Under the metatarsal heads, (b) the lateral side of the sole of the foot, (c) the heel, and (d) the tips of the toes.

5.—The projection of bone downwards towards the sole of the foot encouraging localised pressure. Ulceration and sepsis loosens the attachments of metatarsal heads and allows them to project into the ulcer. This bone delays the healing and causes recurrence not by its diseased nature but because of its position just under the skin. In claw toes there is hyper-extension at the proximal segment and acute flexion at the distal segment which leave the metatarsal heads uncovered thus exposing them to more pressure and trauma. The acute flexion at the distal segments of the toes also predisposes to ulceration of the tips of the toes.

6.—Drop foot and inversion caused by paralysis. These factors cause uneven distribution of the weight. The drop foot causes dragging resulting in ulceration. The inversion causes ulceration on the lateral side of the sole of the foot.

It is to be emphasised that by treating all these factors simultaneously one can reduce the incidence of ulceration.

Let me take a single mechanical factor—drop foot and inversion caused by paralysis. Drop foot can be corrected three or four ways. Brand has described the standard procedures in 'Leprosy in Theory and Practice' edited by Dr R. G. Cochrane. A modification of the standard operation was tried by the author during 1958–61 while he was working at Purulia leprosy home and hospital.

Details of the author's modification: An incision is made from the medial condyle to the navicular bone and the tibialis posterior tendon is cut at its insertion. This is withdrawn through another incision made medial to the tibia five inches above the medial epicondyle. The third curved incision is made anteriorly to the front of the ankle joint. The flap is reflected and the deep

fascia longitudinally incised. The muscles are reflected and the interosseous space exposed. A window is prepared by removing the membrane for about two and half inches in its full width. The tibialis posterior is passed to the anterior aspect through the window in the interosseous membrane. The tibialis anterior, extensor digitorum longus and the extensor hallucis longus are identified and freed from the surrounding tissues without interfering with their continuity. With the knee flexed to about sixty degrees and the foot in maximum dorsiflexion the tibialis posterior is passed through the extensor digitorum longus and the extensor hallucis longus by the Pulvertaft method and then into the tibialis anterior tendon. A continuous stainless steel wire is used to suture these tendons and the raw end of the tibialis posterior buried in the tibialis anterior. The assistant should hold the foot in maximum dorsiflexion while the tendons are being sutured. A below the knee plaster is applied to maintain the foot in that position. The plaster is removed after four weeks. The patient is taught exercises for the re-education of the tibialis posterior for ten days without weight bearing and then weight bearing exercises are commenced and should be continued until the patient develops a normal gait.

The author performed over fifty operations on drop feet using the new method before he left for further studies in the United Kingdom in 1961. The range of movement is poor when compared with those done by the standard method. There were no inversion or eversion deformities in any of the cases and the position of the foot at rest was over a right angle.

The advantages of this operation are:

- 1.—The operation is easy to perform.
- 2.—Both the drop foot and the drop toes are corrected at the same time.
- 3.—The tendency to inversion or eversion deformities seems to be less than with the standard operation done by the circum-tibial route. This is due to the direct pull of the tibialis posterior on the foot. It is our impression that the correction of the drop foot by the interosseous route is always a better method than the circumtibial route.
- 4.—Bone is not interfered with as in the standard operation.
- 5.—Plaster is removed after four weeks as com-

pared with six weeks of immobilization following the standard procedure.

The operation by itself does not prevent ulceration but combined with restrictions to counteract the various other mechanical factors described above can reduce the recurrence of ulcers.

REFERENCES

BRAND, P. W. Surgical section in *Leprosy in Theory and Practice*.

DASS, N. N. *Treatment of perforating ulcers with Rivanol Leprosy in India*, **12**, p. 17.

FITE ET AL. Local treatment of leprosy ulcers with crude preparations of streptomycin. *I.J.L.*, **15**, p. 154.

FRITSCH, E. P. and BRAND, P. W. The place of reconstructive surgery in the prevention of foot ulceration in leprosy. *I.J.L.*, **25**, p. 1.

GOHEN, R. H. Sympathetic ganglionectomy for leprosy ulcers. *Leprosy in India*, **5**, p. 4.

GOKHALE. Treatment of trophic ulcers of the soles of feet in leprosy with certain hydrogenated ergot alkaloids. *Dermatologica*, **113**, p. 142.

GUNN, D. R. and MOLESWORTH, B. D. The use of tibialis posterior as a dorsiflexor. *Journal of Bone and Joint Surgery*, 39-B, p. 674.

PRICE, E. W. Studies of plantar ulcers in leprosy. *Lep. Rev.*, **30**, Nos. 2 and 3.

WATT MANEY ET AL. Trophic ulceration of foot treated with intra arterial hydergin. *I.J.L.*, **26**, p. 115.