

FURTHER EDUCATION

Ulcer surgery for non-specialist surgeons

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Introduction

Despite prevention of disability efforts in the management of leprosy, a high proportion of patients are still presenting with nerve damage of hands and feet. Considerable numbers of cured leprosy patients will for a long time in the future be developing ulcers and septic conditions on their feet in need of surgical treatment.

Surgical interventions in addition to conservative ulcer care play an important part in the prevention and treatment of plantar ulcers.

Many programmes have no access to surgeons trained in leprosy surgery. Traditionally, surgical treatment has been provided only in leprosy institutions. With the increasing integration of leprosy management in general health care, there is a need for integration and decentralization of surgical activities. The work must be shared by many.

In developing countries, where most leprosy patients are, non-specialist surgeons mainly perform surgery in peripheral units. Surgical interventions can be classified into different levels and delegated to different grades of qualified persons in peripheral health units. What is required is adequate planning and training.

This article describes some basic and simple procedures that can be performed by non-specialist surgeons. Trained paramedical workers, provided the rules of the health system permits, could do some of the simple methods.

The basic principle is that after a surgical intervention the quality of the foot should be upgraded, and the risk for a recurrence of the ulcer diminished; the procedure should be preventative and rehabilitative.

A basic understanding of how ulcers are caused, and the diagnosis of the type of ulcers is essential for proper management.

GENERAL PRINCIPLES OF ULCER MANAGEMENT

1. Discuss the cause of the ulcer with the patient.
2. Is there an infection? (Sequestrum, osteoarthritis, tendovaginitis?)
3. Is surgical intervention necessary?
4. Does the patient need hospitalization? (Deep ulcer, severe infection, poor general condition.)
5. Does a specialized surgeon need to be consulted?
6. Immobilize (bed-rest, crutches, POP).
7. Discuss further ulcer prevention with patient.

Indications for surgery

1. To drain a septic focus.
2. To speed up healing.
3. To resurface the sole.
4. To reduce pressure points.
5. To diminish the effect of deformities.

Deep ulcers require surgery. If there is a septic condition, (heat, swelling tenderness, fever, anaemia), the case is an emergency and should be sent without delay to a clinic that has facilities for surgery.

Patients with early signs of tarsal bone disintegration (TD) need urgent attention. A specialist surgeon should preferably see them, who, after evaluation may put the leg in a plaster cast for a long period. Surgery may be needed at a later stage.

Basic procedures

INCISION, DEBRIDEMENT AND SEQUESTRECTOMY

Procedure

- Incisions should be adequate and long enough to ensure that the cavity becomes funnel shaped so that it heals from the bottom.
- Avoid incisions on the sole, Incise on the dorsum of the foot whenever possible. Longitudinal incisions on the forefoot are preferable (Figure 1).
- Incisions on the lateral and medial border of the foot should preferably be dorsal to the border of the glabrous skin.
- Devitalized tissue should be removed. This could include fascia, tendons, joint capsules, ligaments, cartilage and bone. Resection of joints is permitted, even recommended. No attempt to 'fuse' the joint should be made.
- Bone removal should not leave potential new pressure points.

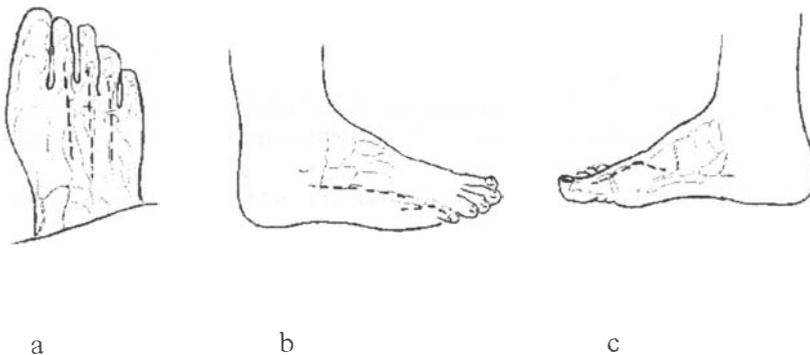


Figure 1. (a) Longitudinal incisions, long enough to ensure enough exposure and proper drainage. (b) Incision for reducing pressure points and excising ulcers caused by the fifth metatarsal head or base should be dorso-lateral and well above the border of the glabrous skin. (c) A dorso-medial incision well above the border of the glabrous skin allows good access to the first metatarsal head and tarso-metatarsal joint, and allows reduction of pressure points and infected tissue without reducing more of the bone length than absolutely necessary.

Aftercare

- Daily cleaning and deep packing. Keep on packing, thus allowing the ulcer to heal from the inside, avoiding a 'funnel shaped' cavity to become 'barrel shaped'. Simplest possible cleaning techniques should be used.
- Soaking is recommended after a few days.

DRAINING OF A PLANTAR ULCER TO THE DORSUM OF THE FOOT (FIGURE 2)

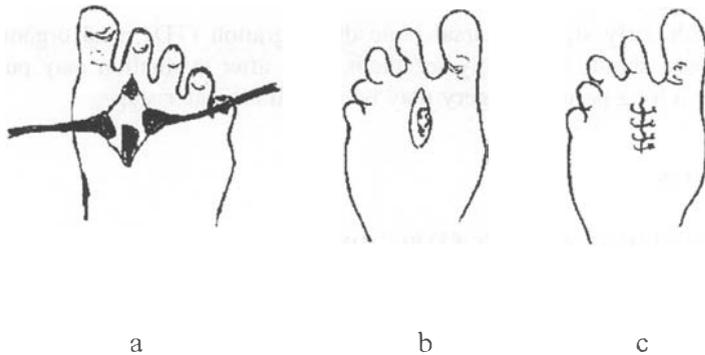


Figure 2. Draining of a plantar ulcer to the dorsum of the foot ('ulcer deviation'). (a) The incision must be long enough to create a funnel shaped cavity to secure drainage. Remove all infected tissue. Do not remove more bone than necessary, but enough to secure good drainage. Do not leave tendons and other tissue exposed which can form sequestra and delay healing. (b) Excise the ulcer and the scar allowing fresh edges to meet without tension. (c) Suture, and keep the dorsal cavity open till the plantar wound has healed properly.

Whenever a plantar forefoot ulcer is debrided, it should be with the aim of upgrading the plantar surface. An ulcer under a metatarsal head, which on healing will leave a hard scar underneath a bony prominence, is better excised so that the scar is better located. Even better is reduction of the bony prominence as well.

Procedure

- A dorsal incision, from the proximal interphalangeal joint in a proximal direction to the middle of the metatarsal bone and down to the bone through the extensor tendon should be made.
- Dissect the tissues from the metatarsal joint all around. Do not denude more bone of periosteum than necessary.
- With a bone cutter or a small osteotome, cut the bone just proximal to the metatarsal head. Resect the joint surface of the base of the phalanx at the insertion of the joint capsule and remove the joint with capsule, ligaments, fibrocartilage and tendons are now exposed. Remove all infected structures.
- Excise the plantar ulcer and scar tissue with perpendicular, oval cuts from the sole aiming at a wound were the edges are easily brought together without tension. The aim is to bring the edges of the sole-wound together to allow the defect to heal to a linear, soft, scar without any underlying pressure point.

- The plantar edges are adapted with a fairly thick suture (2-0 or thicker) without any tension.
- The wound is packed with gauze from the dorsum. The cavity should be funnel shaped, the widest point being the incision of the skin.

Aftercare

- Daily dressing with careful cleaning and packing down to the plantar pad and the suture line is done.
- Do not allow the dorsal incision to close before the plantar wound has healed, which will take a minimum of 2 weeks.
- Take great care to instruct and supervise the dressers.
- Standing or walking ((on the wound)) is not allowed.

'SAUCERIZATION' AND SKIN GRAFT



Figure 3. (a) An ulcer with undermined edges must be trimmed before a skin graft is attempted. In case there is delayed healing and undermined edges because of movements in the area (lateral and medial malleolus, metatarsal heads), the limb also has to be immobilized. (b) After excision, the saucer shaped wound is ready for a skin graft.

Ulcers with undermined and fleshy edges may benefit from being cut into the shape of a saucer, and resurfaced with a split thickness skin graft (Figure 3). A skin graft will speed up healing and give a better covering epithelium than secondary healing, but will not improve the plantar pad. A skin graft is of no advantage where there is no reasonable remaining pad. If a skin graft is not done the wound is dressed and left to heal by secondary intention. Immobilization with a plaster cast can be considered to promote healing if the wound is in an area exposed to movements.

Procedure

- The ulcer is trimmed, undermined edges are cut. Scar tissue is removed till there is a soft bed of viable tissue. The bed is covered with wet gauze to stop bleeding.
- Granulation tissue transforms into a fibrous scar by time and should be removed. A skin graft on a scarred surface is easily torn open by shearing forces during walking.
- It is technically easy to take a split thickness graft from the anterior and lateral surface of the thigh, a donor site usually accepted by the patient. The area is infiltrated with a local anaesthetic. A large scalpel blade or a skin graft knife using a razor blade gives acceptable grafts. The graft should be larger than the defect to cover.

- Meshing the graft with a knife blade allows expansion and prevents blood and tissue fluid to accumulate under the graft. Meshing lowers the risk of infection.
- The graft is applied, the excess resting on the border of the bed. A very wet gauze is used to press on the graft to get a good contact with the bed.
- The graft is held in place by one layer (only!) of Vaseline gauze, is covered by a wet gauze and some absorbing layers of dry gauze, cotton wool and an elastic bandage to give a gentle compression.
- A plaster of Paris cast can be a useful protection.

Aftercare

- Rest the skin-grafted area in elevation for 10 days.
- Walking is not allowed.
- Leave the dressing on for 10 days. Some prefer to change the dressing already after 3–4 days. After the first inspection, redressing is done as needed.
- After the skin graft has taken, the new skin has to be conditioned gradually (skin care, gradual weight bearing) during a period of a few weeks. In case of failure, the grafting can be repeated when the bed is free from infection.

PINCH GRAFT

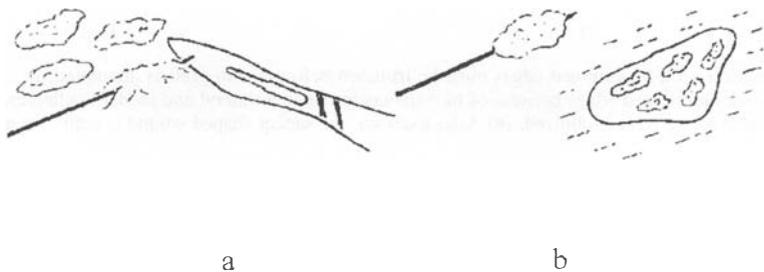


Figure 4. Pinch graft. (a) Insertion of the injection needle superficially into the skin. The skin is lifted up and cut off with a knife. (b) The small split thickness graft, still on the needle, is transferred to the recipient site. (c) It is tempting to put too many grafts too close together. The procedure is easy to perform with a minimum of equipment and resources.

In situations with higher risk of infection, a ‘pinch’ graft is recommended (Figure 4). This method is easily performed under field conditions. It gives a better epithelium than secondary healing and it speeds up healing. But the donor site sometimes heals with an ugly scar.

Procedure

- The donor site is infiltrated with a local anaesthetic.
- An injection needle is inserted intradermally and used to lift up the skin slightly.
- A sharp knife is used to cut a small piece of the skin from the tip of and along the inserted needle giving a small piece of split thickness graft of 5–6 mm diameter.

The graft (still on the needle) is placed on the prepared bed as a seedling for new epithelial growth. Only a few grafts should be transplanted. They should in no way cover the whole surface.

- The grafted wound is covered.
- With a thin layer of Vaseline gauze and dressed as for the split thickness graft.
Aftercare is the same as for a split thickness graft.

CORRECTION OF STIFF OR SEMI-STIFF CLAW TOES

When ulcers on the tips or the dorsum of the toes occur due to fixed clawing of toes and footwear does not solve the problem, the foot can be upgraded by a resection of proximal interphalangeal joints.

Procedure

- Anaesthesia, if necessary, is given by blocking the digital nerves of the toes (infiltration at the base of the toes).
- A dorsal longitudinal incision is made over the proximal interphalangeal joint down to the bone.
- The joint is freed from surrounding tissue and resected with a small bone cutter or bone nibbler. The ends are trimmed.
- If there is no ulcer the wound can be closed with a few sutures, otherwise it should be left open for secondary healing.

Aftercare

Reduced walking for 10–14 days, or till the wound has healed. Then removal of the stitches and later adjustment of footwear is done.

PROCEDURES FOR ULCERS ON THE FIFTH METATARSAL BASE

Procedure

- A longitudinal incision is made along the lateral border of the foot, and above the border of the glabrous skin.
- The pad is freed along the bone and down to the ulcer.
- The ulcer and scar is excised. A bipediced flap has now been created. Make sure the pedicles are wide enough to guarantee proper circulation.
- The bone underlying the ulcer is trimmed (too vigorous trimming may open the tarso-metatarsal joint, which should be avoided).
- The wound is closed without any tension.

Aftercare

- Dressing is applied, care taken to avoid pressure on the flap.
- The lateral incision is kept open by packing till the suture line has healed.
- If the remaining lateral wound does not heal easily, a split thickness skin graft can be applied.

PROCEDURES FOR HEEL ULCERS

Ulcers on the heel are very difficult to heal, because of destruction of the important heel pad. The scars often adhere to bone and recur. The heel is difficult to resurface. Chronic ulcers cause reactions of the heel bone that exaggerate the underlying pressure point. Destruction of the heel bone may occur and will lead to a foot that even the most skilled orthopaedic shoemaker cannot accommodate in a functioning device. Any ulcer on the heel should be given great care as early as possible to avoid further deterioration. Heel ulcers that cannot be healed by simple rest should be referred to a specialist. Plastic surgery procedures using different kinds of flaps are the best way to treat heel ulcers.

AMPUTATIONS

An amputation may include anything from a part of a phalanx to a whole leg. When malignancy is suspected or there are deformities, which may be correctable, it is better to consult a specialist. For larger amputations (forefoot, Syme's, below and above knee) a close co-operation between the surgeon and the prosthetist is essential.

Some basic principles

- The patient should be in full agreement with what is being removed. Counselling should be offered before any amputation.
- Devitalized tissue must be removed.
- Place scar lines away from weight bearing surfaces.
- Weight bearing surface should be preserved.

Indications

- Contracted toes preventing the wearing of a 'non-stigma carrying' protective shoe.
- Cosmetic reason (to reduce stigma).
- Uncorrectable severe deformity not permitting weight bearing.
- Gangrene.
- Chronic ulcers with risk of developing a malignant change:
 - Extensive infection with destructive osteoarthritis.
 - Severe, life-threatening septicæmia caused by an extensive infection.

Comments

- Toe amputations, total or partial: endeavour to place suture lines away from the sole and the tip of the remaining toes. Remaining skin, especially plantar skin, can be useful as a flap to cover plantar or dorsal defects.
- *First and fifth toes*: try to save as much of the metatarsal bones, provided the remaining pad is sufficient. Shortening significantly alters the shape of the foot and the mechanics of walking, inviting new problems.
- *Forefoot amputation* is best done by a trained surgeon.
- *Syme's amputation* has a high failure rate, and should only be attempted by a trained surgeon. The prosthesis is more complicated and difficult to produce. Patients who refuse below knee amputations may sometimes accept Syme's amputation.

- *Below knee amputation:* any surgery trained medical or paramedical person may perform a below-knee amputation after proper instructions. The choice of the shape of the stump should be made in co-operation with the prosthesis makers. The end result, the patient's ability to walk, is more dependent on the skills of the prosthesis maker than the skills of the surgeon.

VARIOUS FLAPS (RESURFACING PROCEDURES)

Due to the special properties of the skin pad of the sole of the foot, it is very difficult to substitute lost pad. Attempts to substitute lost skin with skin flaps from outside the sole itself do not give satisfactory results. Successful resurfacing is best accomplished by flaps within the sole of a foot (rotation flaps, island flaps). Such techniques require some training and experience and patients in need of such surgery should be referred to the specialist, except for forefoot flaps using skin from the toes, which can be done with success by workers in peripheral units.

VARIOUS STRUCTURAL CORRECTIONS BY SURGERY

Deformities, mobile or fixed, increase the risk of ulcer formation. In some cases, corrections are possible such as claw toe correction, tendon transfers for foot drop, lengthening of the Achilles tendon for equinus deformity, corrections osteotomies for fixed inversions. Tendon transfer for foot drop and claw toe correction may be performed by surgeons and general practitioners trained in the procedure. More advanced bony corrections may be necessary for the patient to remain free of ulcers. Such cases should be referred to the specialist.

Summary

In the majority of cases, plantar ulcers in need of surgical intervention can be treated by very simple procedures. Patients benefit from treatment facilities near to their homes. In the process of integration surgery could be made available to leprosy patients in peripheral health units near their homes by training non-specialist surgeons in peripheral health units in basic surgical procedures, aiming at ulcer healing as well as preventing reoccurrence of ulcers.