

What role do we play post-amputation?

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Introduction

Amputation of a lower limb, especially in diabetes, places the remaining limb at extremely high risk. Not only does the remaining limb have the same neurological and vascular complications which led to the original amputation, but it also has the added pressure of being the sole supporting limb. This article discusses the careful assessment and treatment methods necessary to preserve the remaining limb, including education, routine footcare, emergency footcare, ulcer care and provision of protective shoes and orthotics.

Due to the combination of neuropathy, vascular disease and infection which are all possible complications of diabetes, lower limb amputation has become one of the most dreaded outcomes of the disease throughout history.

The St Vincent Declaration in 1989 (Workshop Report, 1990) stated that amputations should be reduced by 50% in 5 years. As Deerochanawong et al (1992) showed in their work in Newcastle-on-Tyne, there is more at stake than just the loss of a limb. They monitored patients who had lower limb amputations during 1989–91 and reported a mortality rate of 10% within 30 days of amputation, a 50% survival rate at 30 months and that 19% of patients went on to have a further amputation within the 1–36 month follow-up period.

An amputation is seen as a failure, but in order to reduce the number of future amputations, it should be used as a reflective practice event. Practitioners must be able to learn from this failure in a non-blame atmosphere and any lessons learned should be incorporated into patient care. The use of audit techniques should be encouraged as a tool to examine clinical outcomes, e.g. how many patients have foot ulcers, how many ulcers have healed, how long did they take to heal, how many amputations occurred and at what level: toe, foot, below knee or above knee.

Care of the remaining limb

The remaining limb may be described as being at ultra high risk of ulceration and possibly amputation. For this reason, it is essential that a structured foot care package should be available for the patient; ideally provided by a multidisciplinary diabetic foot care team. In the Newcastle Diabetes Centre, although the core medical foot team comprises a consultant diabetologist, several podiatrists and a diabetes nurse specialist, there are also close links with a vascular surgeon, an orthopaedic surgeon, a consultant microbiologist and an orthotist.

Routine care

Routine care and maintenance of the remaining limb is very important. The remaining limb is subject to the same neurological and vascular problems which caused the original amputation, but is also subject to increased pressure; the remaining foot is extremely fragile. It is important to be very gentle when debriding callus, especially where there is extravasation present, and extra care should be taken to avoid any haemorrhage. It is best to avoid using adhesive padding or tape on fragile skin as this can cause trauma on removal. For alternative pressure relief, specialist shoes and insoles should be used whenever possible.

Shoes and orthotics

When a decision has been made to

ARTICLE POINTS

1 Following amputation the remaining limb is at extremely high risk.

2 An amputation should be used as a reflective practice event.

3 Use of adhesive padding or tape on fragile skin should be avoided.

4 The patient should be carefully assessed before sharp debridement. If there is any doubt, debridement should not be done.

5 Simple person-specific foot-health education messages are most effective.

KEY WORDS

- Lower limb amputation
- Remaining limb
- Specialist shoes
- Debridement

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Figure 1. An example of a diabetic foot in need of protection.

prescribe specialist shoes and/or insoles, the podiatrist should liaise with the orthotist, stating the degree of neuropathy, vascular disease and deformity present. The podiatrist, orthotist and patient should then discuss the possible shoe styles and insoles available to accommodate the deformity and protect the foot. An example of a diabetic foot in need of protection is shown in Figure 1. The hallux has been amputated and the remaining toes are retracted resulting in a foot shape which will not fit into 'shop bought' shoes.

Shoes prescribed for people with diabetes attending the Newcastle Diabetes Centre are made to the following specifications:

- One piece of soft leather (the upper of the shoe). No stitching around the dorsal aspect of the toes or along medial or lateral borders.
- Correct width and deep enough to accommodate toe deformities as well as 1–2 cm thick insoles, usually made from diabetic poron (a polyurethane foam with 100% memory recovery following use);
- Patients are given choice of fastening, e.g. laces or velcro.
- Shoes have a sole grip for year round usage.
- If there is a restriction of movement at the first metatarso-phalangeal joint, then a rocker is built into the sole unit (Figure 3).
- As these patients have sensory neuropathy there is often also evidence of motor neuropathy and widening of base of gait. Flared heels may be fitted to increase stability.

Shoes may also be made to suit the patient's individual circumstances. Figure 4

shows soft leather boots lined with sheepskin made for a patient who was a farmer.

Education

Education is very important. The patient has had an amputation and the patient, patient's family and healthcare professionals will be anxious that it does not occur again. Simple messages are most effective, e.g. check feet daily, what to look for and who to contact, check inside shoes before wearing, contact shoe clinic if there are any rough areas in shoes due to wear. Education can also be specific to an individual patient. A fashion-conscious young businesswoman may need smart but protective footwear, which will mean compromise on both sides.

Any traumatic event which has caused an ulcer in the past must also be discussed with the patient so that it does not happen again, e.g. a patient who regularly returns from holiday with foot ulcers caused by walking on hot sand should be strongly encouraged to wear shoes for protection.

Patients must be advised how to access emergency care for any foot problems. When phoning for an appointment, they should know to inform the reception staff if the foot is bleeding, painful, discoloured or swollen, or if they are worried about the foot for any reason. As part of the education programme in the Newcastle Diabetes Centre, each staff group in turn presents their role to the other staff groups. One advantage of these multidisciplinary education sessions is that the reception staff understand the importance of foot problems and pass urgent calls directly to podiatrists.

Emergency foot care

When a patient contacts podiatrists at the Newcastle Diabetes Centre complaining of an emergency foot problem, or when a doctor refers a patient with a diabetic foot ulcer, the aim is to see that patient within 3 h Monday to Friday 09:00–16:00.

A neurological and vascular assessment of the foot is performed and any signs and symptoms of infection are noted. The patient is asked to give a history of how and when the problem occurred, and if there is



Figure 2. Insoles made from diabetic poron.



Figure 3. A shoe with a rocker built into the sole unit.



Figure 4. Sheepskin lined boots.

PAGE POINTS

1 Before any sharp debridement of a new ulcer, the foot pulses should be checked.

2 When performing sharp debridement of an ulcer on the remaining limb, be very cautious and consider the whole patient.

3 Cultures from deep swabs and/or tissue samples are more useful indicators of the infecting organism than surface swabs.

any pain. If the ulcer is on the apex of a toe then the toe pulses are checked using doppler ultrasound. If foot pulses cannot be palpated manually, they are checked using a doppler. If they are absent with the doppler, the patient is admitted to hospital for urgent vascular surgery. Depending on the extent of any infection present, the patient may be prescribed oral antibiotics or admitted to hospital for intravenous antibiotics.

Diabetic foot ulcer care

Before any sharp debridement of a new ulcer, the foot pulses should be checked. There should be no sharp debridement performed if dorsalis pedis or posterior tibial pulses are absent on doppler, toe systolic blood pressure is less than 40 mmHg or there is any rest pain.

It is safe to sharp debride an ulcer if dorsalis pedis, posterior tibial and toe pulses are present and if the toe systolic blood pressure is more than 40–45 mmHg as it is likely that the foot will heal. These criteria were originally put forward by Apelqvist et al (1989) and also by Kerstein and Reis (2001).

When sharp debridement of an ulcer is done on the remaining limb, a cautious approach is needed and the whole patient should be considered. The patient may be on aspirin to reduce cardiovascular risk factors. Patients on renal dialysis may be on heparin and patients with atrial fibrillation may be on warfarin. During sharp debridement, try not to traumatise viable tissue. Be aware of your clinical situation. A clinical area with good lighting and a fully adjustable chair would be a good situation in which to carry out debridement, whereas a patient's room in a nursing home with poor lighting would not be ideal. If junior staff are unsure whether to debride or not, they should request help from senior colleagues.

Figure 5 shows a neuropathic ulcer. All vascular tests revealed a good blood supply, so sharp debridement was performed in the clinic. Figure 6 shows the same ulcer post-debridement. This ulcer is now healed.

Wound care

If there is debris in the wound such as pus



Figure 5. Neuropathic ulceration before debridement.

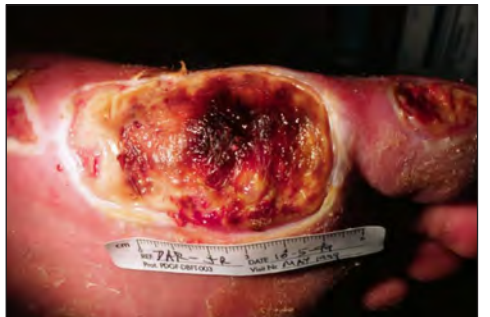


Figure 6. Neuropathic ulceration following debridement.

and slough, warm saline should be used to clean the wound. A swab or sample of debrided tissue should be sent for microbiology if the wound looks infected. If any loose bone fragments are removed from the ulcer, these should be sent to the laboratory as well. Cultures from deep swabs and/or tissue samples are more useful indicators of the infecting organism than surface swabs. It may also be useful to x-ray the foot to check for erosion of the periosteum and osteomyelitis.

There is a vast choice of modern wound dressings available but unfortunately there are few random controlled clinical trials on their effectiveness. Consequently, the information available mainly comes from the manufacturer, published case studies and small simple trials comparing two dressings. As Close-Tweedie (2002) points out in her review of diabetic foot wounds and wound healing, although published trials in this area of wound healing are encouraging there is a need for ongoing quality research.

In the Newcastle Diabetes Centre we use a selection of dressings according to the appearance of the ulcer, i.e. necrotic, sloughy, infected, granulating or epithelialising. When dressing the foot it is

important not to damage fragile surrounding skin. This requires the use of non-adherent, non-adhesive dressings held in place with a soft bandage such as Soffban. We secure this with a layer of tubular bandages such as Tubifast.

We often find that the patient's own footwear will not accommodate the necessary dressings so we provide them with a canvas surgical sandal with a cushioning and/or pressure-relieving insole as a temporary measure until the ulcer heals and surgical shoes are supplied. For plantar ulceration, if the patient is suitable, i.e. following amputation of toes rather than below or above knee amputations, we use Aircast Walkers. Armstrong et al (2001) showed removable cast walkers healed 65% of foot ulcers in a prospective clinical trial. For heel ulcers, we use pressure relieving ankle foot orthoses (PRAFOs). A patient with an ulcer on the remaining foot, following an amputation, would be in a wheelchair and the function of the PRAFO would be to relieve pressure from the foot plate, protect while transferring to and from the chair and may also be worn in bed for pressure relief.

Conclusion

In a person with diabetes who has already had an amputation, the remaining limb is at extremely high risk of ulceration. Careful monitoring and treatment is required. The foot should be assessed for any neurological, vascular or mechanical risk factors. If there is no ulceration present, regular careful routine care and simple person-specific foot-health education should be given. An important aspect of the education should be to inform the patient how to access emergency treatment of a foot problem.

Sharp debridement is a very good method of removing dead tissue from a wound but if, following assessment, there is any doubt as to the suitability of the patient debridement should not be done. The footwear should be assessed and surgical shoes prescribed with pressure relieving insoles or other orthoses as necessary. The whole patient should be considered and the patient should be involved in all treatment decisions as they will be very anxious about the welfare of the remaining limb.

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