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Lower limb amputation


Aims and intended learning outcomes

This article focuses on the nursing care of patients undergoing a major lower limb amputation. The aetiology of the underlying condition, involving the patient in the decision to amputate, pre- and post-operative care, pain management, rehabilitation and health education are all considered.

After reading this article you should be able to:

- Identify the common causes of lower limb amputation.
- Describe the levels of lower limb amputation and the advantages and disadvantages of each in relation to the patient’s recovery.
- Outline the physical and psychological nursing care of patients undergoing amputation.
- Identify the components of a successful amputation rehabilitation programme.
- Discuss the ongoing health education needs of patients undergoing amputation.

Introduction

The two most common causes of major amputation are peripheral arterial occlusive disease (PAOD) and infection secondary to diabetic foot ulceration (Ham and Cotton 1991). Other less common causes are trauma, malignancy and congenital malformations. Upper limb amputation is much less commonly performed because PAOD and diabetic ulceration mainly affect the lower limbs.

The main symptom of mild PAOD is intermittent claudication – pain on walking, due to arterial insufficiency. If the disease progresses, rest pain, ulceration and ultimately irreversible ischaemia and gangrene might develop. It is estimated that only 3 per cent of those who experience intermittent claudication will progress to critical limb ischaemia and amputation (Dormandy and Ray 1997), with those who are diabetic or who smoke at higher risk (Palumbo et al 1991). Other patients present with acute critical ischaemia due to occlusion of an artery without having had intermittent claudication.

Chronic critical limb ischaemia (CLI) is defined as the presence of severe rest pain for at least two weeks, or ulceration or gangrene, in a limb with an ankle pressure of less than 50mmHg or toe pressure less than 30mmHg (EWGCLI 1992). The annual incidence of CLI is 500 to 1,000 per million, of whom around a quarter will undergo a major amputation (Hallett et al 1997, Price and Fowkes 1999). Although there have been major increases in the volume of reconstructive surgery undertaken for CLI (Hallett et al 1997), there appears to be a point at which increased surgical activity does not lead to a continued reduction in amputation rates (Fyfe 1999).

Critical ischaemia is characterised by severe pain with a typical burning sensation. The pain is often worse at night due to the drop in systemic blood pressure and tissue perfusion that occurs when the patient is recumbent. Patients might try sleeping in a chair or sitting on the edge of the bed to relieve the pain (Gibson and Kenrick 1998). This can lead to dependent oedema, which will further reduce tissue perfusion.

Diabetic foot ulceration can exist alongside arterial occlusive disease or in its absence. There are three main contributing factors to diabetic foot disease: sepsis, arteriopathy and denervation or diabetic neuropathy (Macfarlane and Jeffcoate 1999).

In brief

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Summary
The decision to amputate is a difficult one, but in some cases, amputation can greatly improve the patient’s quality of life. Jo Gibson discusses the nursing care of patients undergoing amputation, with a view to helping them adjust to their changed circumstances.

Keywords
- Amputation
- Pain and pain management
- Rehabilitation

These key words are based on subject headings from the British Nursing Index. This article has been subject to double-blind review.

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Some patients with diabetic neuropathy present late with severe diabetic foot infections, as they are initially unaware of the presence of an ulcer. It is common for a diabetic foot ulcer to be the first indication that an individual has diabetes mellitus. Many patients with PAOD or diabetes are older and have co-existing illnesses, such as coronary artery disease, cerebrovascular disease or chronic obstructive airways disease. Cardiac failure might contribute to inadequate tissue perfusion and critical ischaemia.

A patient with irreversible ischaemia might be too ill to give informed consent, because systemic infection, toxin release from necrotic tissue and opiate analgesia can lead to an acute confused state. In this case, the consultant and a second doctor should make and document the decision. While the views of relatives should be sought and considered, they should not override the consultant’s opinion of what is in the patient’s best interest. If the patient has previously expressed any views about the prospect of amputation, these should be considered in the decision (Donohue 1997a).

A decision not to amputate a limb where there is irreversible ischaemia and necrosis will inevitably lead to death. This might be the most appropriate option if there is a high risk of peri-operative mortality and little or no chance of a return to an acceptable quality of life. Such decisions are best made in close consultation with the patient and his or her family (Campbell et al 2000).

Level of amputation

The choice of the level of an amputation is a compromise between ensuring primary wound healing and maximising the patient’s function post-operatively. If an AKA is performed, healing is more likely to occur, but this might be at the expense of the patient’s future mobility, since the knee joint is a vital structure in walking. The levels of lower limb amputation are shown in Figure 1.

The choice of the appropriate level is determined by the need to remove all devitalised tissue while optimising future mobility. For below-knee amputation (BKA), the stump must extend 11-12cm below the patella, and for AKA, it must be 22-28cm below the tip of the greater trochanter to fit a functional prosthesis (Green and Rob 1994). Occasionally a through-knee amputation is performed. This makes fitting a functional prosthesis difficult but this is not an important consideration in a previously immobile patient. Through-knee amputation is quicker and heals more readily than BKA. It provides better leverage than AKA, assists balance and aids transfers from bed to chair (Shearman et al 1998).
Assessment for the appropriate level of amputation involves clinical signs, such as the extent of necrosis, and potential function post-operatively. A patient with a fixed contracture of the knee joint will not benefit from having a BKA as he or she will not be able to use an artificial limb. The stump wound in this case is unlikely to heal, as it is difficult to position the patient to avoid pressure on the stump when the knee is contracted (Helt and Jacobsen 1999).

Other methods of assessing the appropriate level include transcutaneous oxygen measurements (TcO₂), photoplethysmography and ankle Doppler pressures, but there is no evidence that these are more accurate than clinical assessment (Dwars et al 1992, Shearman et al 1998). The surgeon might make the decision based on the appearance of the tissues.

Pre-operative nursing care

The aims of preparation for amputation are to ensure that the patient accepts the need for surgery and is as comfortable and pain-free as possible pre-operatively. It is also important to optimise his or her overall condition. Many patients undergoing amputation are older and have co-existing health problems. They might have been in considerable pain for some time. These factors will affect their fitness to undergo surgery.

An important factor to be considered is the skill of the surgeon and anaesthetist. Amputation has traditionally been viewed as a technically simple operation and might previously have been left to be carried out by a junior member of the team at the end of the operating list. However, the technical performance of the surgery is a vital factor in fashioning a well-formed stump that can be fitted with a prosthesis. An experienced surgeon should always undertake or supervise the operation.

A planned operation might be cancelled at short notice. This can result in prolonged periods of fasting before surgery and in the deterioration of the patient’s condition due to progression of sepsis. It is also demoralising for the patient to prepare for surgery only for it to be cancelled.

Patient information and support is an essential part of pre-operative nursing care. The nurse needs to assess the patient’s understanding of the condition, the proposed surgery and anaesthetic, and the plan for rehabilitation including the environment and the individual’s goals. Patient educational materials are useful, but are only a supplement to talking to the patient about his or her concerns.

Nutrition and fluid balance need close attention pre- and post-operatively. The patient might be malnourished due to poor oral intake as a result of prolonged pain and immobility, as well as having additional post-operative nutritional requirements for wound healing and for the additional energy expended in mobilising. Referral to a dietician should be considered (Helt and Jacobsen 1999).

Patients undergoing amputation are at high risk of pressure sores, due to immobility and poor blood supply. Risk assessment should be carried out pre- and post-operatively. It is advisable to obtain a specialised pressure-relieving mattress or overlay pre-operatively if it is likely to be needed, as even a few hours’ delay could result in pressure sore development (Herbert 1997).

Pre-theatre checks include routine chest X-ray.

**TIME OUT 4**

Many amputations are carried out on emergency theatre lists at short notice rather than as an elective procedure. Make brief notes about how this might affect the patient’s care and how problems could be addressed.
Amputation

CONTINUING PROFESSIONAL DEVELOPMENT

Box 2. Components of successful recovery after amputation

- Recovery from surgery and anaesthesia without complications
- Wound healing to form a well-shaped stump
- Pain management
- Rehabilitation to enable safety in the home environment
- Psychological and social adaptation

and electrocardiogram, full blood count, urea and electrolytes and blood glucose (Herbert 1997). Blood is ‘group and saved’ as transfusion is not routinely necessary unless the patient is found to be anaemic. Amputation can be performed under general or epidural anaesthesia. The latter reduces the risk of post-operative myocardial infarction and is often used for less fit patients.

Pain control before surgery is vital to enable the patient to rest and be as comfortable as possible. Many patients will have experienced severe pain and lack of sleep for some time, especially if they have delayed seeking medical attention. Pain control is usually with opiates such as oral morphine for severe pain or simple oral analgesics for mild pain. Other methods to consider are relaxation, patient-controlled analgesia and epidural analgesia. Fundamental nursing measures to control pain include the use of a bed cradle and foam gutter, since the patient might be unable to tolerate the weight of bedclothes on his or her leg. Careful assistance to change position, lowering the foot of the bed to aid blood flow, and the use of an appropriate dressing and careful dressing technique on any ulcers are vital.

Phantom pain after surgery is related to the intensity and duration of pre-operative pain (Nicolajsen et al 1997a) and is more common in patients whose amputation is due to PAOD than to other causes (Weiss and Lindell 1996). Since phantom pain is difficult to manage, it is important to try to prevent it by alleviating the patient’s pain before surgery. Epidural analgesia is sometimes used pre-operatively for this reason, although it is of unproven benefit in preventing phantom pain (Nicolajsen et al 1997b).

Perhaps the most important factor is to emphasise that the patient must inform staff if he or she is in pain. You should also frequently ask patients if they are in pain. If pain is not identified, nothing can be done to alleviate it.

Post-operative care

There are five important components for recovery after amputation (Box 2).

Recovery from surgery Haemodynamic status is assessed through regular observations of pulse, blood pressure and urine output (Donohue 1997b). Oxygen is given by face mask as prescribed. The patient will have an intravenous infusion in situ, but can eat and drink as soon as he or she feels able. Patients undergoing AKA are usually catheterised, but in all cases it is important to monitor the patient’s urine output because shock and renal failure are possible post-operative complications.

Unfortunately, many patients undergoing amputation are unfit and major post-operative complications, such as myocardial infarction or chest infection, are common.

Wound healing The theatre dressing, usually consisting of a non-adherent dressing, orthopaedic wool and crepe bandage, is left undisturbed for several days as long as there is no leakage or sign of infection. The stump wound is usually closed with a continuous absorbable suture. There might be a drain in situ, which will be removed on the first or second post-operative day. After 72 hours, the wound might be left exposed. If necessary, a non-adherent dressing can be applied and secured with a stockinette. It is best to avoid applying adhesive tape to the skin, which might be very fragile. A specially made stump-shrinker (an elasticised, sock-like appliance) should be fitted around 14 days post-operatively. This helps to shape the stump in readiness for a prosthesis, but should only be applied once the wound has healed (Herbert 1997).

Any sign of infection or necrosis at the wound margins should be reported promptly. BKA needs revision in up to 30 per cent of cases, while 90 per cent of AKAs heal without further intervention (Dormandy et al 1999).

Pain management Incisional stump pain in the first few days is usually controlled with an epidural infusion, patient-controlled analgesia pump or intermittent opiate analgesia. The patient should be encouraged to report any persistent or worsening stump pain, as it might be a sign of wound infection or continuing necrosis. Phantom pain affects nearly 80 per cent of people who have had an amputation, with varying duration and degree of severity, and with little relief from conventional analgesia – even strong opiates (Houghton et al 1994). Its aetiology is not well understood. It might originate in the pain-transmitting neurones of the dorsal horn (Davis 1993). Another theory is that it is due to discordance of movement, sensation and proprioception (Harris 1999). The term ‘phantom pain’ should be used with care. It can imply to the patient that it is an imaginary pain of psychological rather than physiological origin. In fact
the pain is real, but the body part is ‘phantom’ (Williams and Deaton 1997). Back pain is another common symptom after amputation, probably arising from the patient’s changed posture and centre of gravity (Smith et al 1999).

### REFERENCES


Box 3. Stages of grieving

- Shock
- Denial
- Anger
- Bargaining
- Depression
- Acceptance

(Kubler-Ross 1969)

Altered body image has a particular impact on patients’ expression of sexuality. You might need to broach the subject to give a patient ‘permission’ to discuss it, or the topic might come up in discussion of other subjects, such as a partner’s reaction to the amputation. Many men with peripheral vascular disease or diabetes also have erectile dysfunction (DePalma and Schwab 1991). In this case, referral to an andrologist might be needed.

The nurse needs to be sensitive to the stages of grieving (Box 3) experienced by a patient with an amputation and must ensure that his or her physical rehabilitation programme is congruent with his or her emotional state.

For example, anger might manifest itself as a difference of opinion with members of the rehabilitation team and a refusal to participate in rehabilitation. The nurse should have well-developed listening and counselling skills to help the patient work through these feelings. If the patient’s grief reaction is prolonged, he or she might benefit from referral to a clinical psychologist. Depression is a common reaction to amputation. If this is prolonged, antidepressant medication and specialist counselling might help.

In the early days after an amputation, the patient might not wish to see the stump. The nurse should support the patient in looking at the stump and handling it when ready. It is also important to respect the patient’s personal space. Sitting in the place on a patient’s bed where his or her amputated leg would have been would be highly insensitive and could even cause phantom pain (Donohue 1997b). Most patients use the familiar term of ‘stump’. The term ‘residual limb’, which is found in the literature, is not often used in the UK and can be misunderstood to mean the opposite leg. Be guided by the patient’s terminology.

Loss of a limb might also lead to social losses, such as loss of employment and leisure activities and changes in personal relationships. It could even precipitate loss of the home. Many older patients have unrealistic views about their potential to return to their homes (Thompson and Haran 1984). Early referral to a medical social worker is essential. Occupational therapists also play a major part in enabling patients to adapt safely to their changed circumstances. A home visit to assess how the patient is likely to function at home is vital.

Ongoing care

After the patient is discharged, follow up is arranged with the limb-fitting centre and the surgical outpatient’s clinic to assess his or her overall recovery and wound healing. Outpatient physiotherapy or other agencies might also be involved. Community nursing services might be required for wound care. For some older patients, amputation can precipitate a move to residential care.

The most important person in the patient’s ongoing care is the patient. Health education encompasses advice on stump care, risk factor modification, such as control of hyperlipidaemia and smoking cessation, and care of the other foot. It is sobering to note that two years after a BKA, 40 per cent of patients are well and using a prosthesis, 30 per cent have had a further major amputation and 30 per cent have died (Dormandy and Ray 1997).

Conclusion

The nurse is essential to the physical recovery and successful rehabilitation of those who have an amputation. Equally important is the nurse’s contribution to helping the patient to adjust psychologically to their changed status. With intelligent, sensitive nursing care, amputation can be a constructive operation, which leads to improved quality of life and successful adjustment on the part of the patient.

TIME OUT 7

Now that you have completed the article, you might like to think about writing a practice profile. Guidelines to help you write and submit a profile are on page 55.