

Chronic wound management

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SYNOPSIS

The cause of a chronic wound must be identified before treatment can begin. This assessment includes an evaluation of the patient's general health, nutrition and medication. The cause of the wound dictates the management including the choice of dressing. Moist wound dressings are now preferred. As ulcers may take months to heal prevention is important. Patients with diabetes particularly need instruction on how to take care of their feet. A multidisciplinary approach is recommended.

Index words: diabetes, dressings, ulcers, infection.

(Aust Prescr 2000;23:6-9)

Introduction

Wound healing is an absolute prerequisite for survival. Without the ability to heal wounds, the body will succumb to haemorrhage or infection. It is no surprise that wound healing practices have been recorded from the time of the Smith Papyrus in 1700 BC.

In the last two to three decades there has been a revolution in wound management. Since the discovery of the first growth factor in 1962 – epidermal growth factor – the science of wound repair and regeneration has advanced enormously. Other research has prompted the change from the outdated 'dry dressing technique' to the moist wound concept of healing.¹ These two major advances have led to a rethinking of the management of wound repair and to an exponential growth in the development of new wound dressings.

Unfortunately, the management of both acute and chronic wounds is inconsistent and thus wounds consume an inordinate amount of the Australian health budget.² Wound care practices can and must be optimised. However, progressive wound management is not inextricably determined by the use of modern wound dressings. To increase wound healing, the clinician must understand the process of wound repair and adhere to the basic principles of wound management.

Principles of wound healing

Before treating a wound, it is essential to find the underlying cause and consider other patient factors which may delay wound healing. After deciding which wound dressing is most appropriate, it is important to plan how to maintain healing and prevent recurrences. The major deficiency in the management of chronic wounds is the failure of clinicians to adhere to these basic principles of wound healing (Table 1).

Define the aetiology

It is remarkable how infrequently objective efforts are made to find the cause of wounds, particularly chronic wounds such as

Table 1

Principles of wound healing

1. Define the aetiology
2. Control the factors affecting healing
3. Select an appropriate moist wound dressing
4. Plan for maintenance of the healed wound

Table 2

Major causes of wounds

Acute	Chronic
Trauma	Ulcers
Burns	Pressure
Crushing injuries	Traumatic wounds
Lacerations	Surgical wounds
	Neoplastic wounds
	Leg ulcers
	Arterial
	Venous
	Vasculitic
	Neoplastic
	Neuropathic

leg ulcers. As a consequence, optimal wound healing rates are not achieved and the ulcer either will not heal or recurs all too quickly. The major causes of wounds are well known (Table 2) and they should be looked for in each patient.

A systematic and rational approach to defining wound aetiology requires a careful history, a complete physical examination and appropriate investigations. Many protocols exist to ensure that the proper diagnosis is made. One such example is the protocol for the investigation of leg ulcers (Fig. 1).³

Control factors affecting wound healing

Both intrinsic and extrinsic factors will affect wound healing rates (Table 3). Optimal control of these factors ensures that the patient's overall health is improved which in turn benefits wound healing.

Table 3

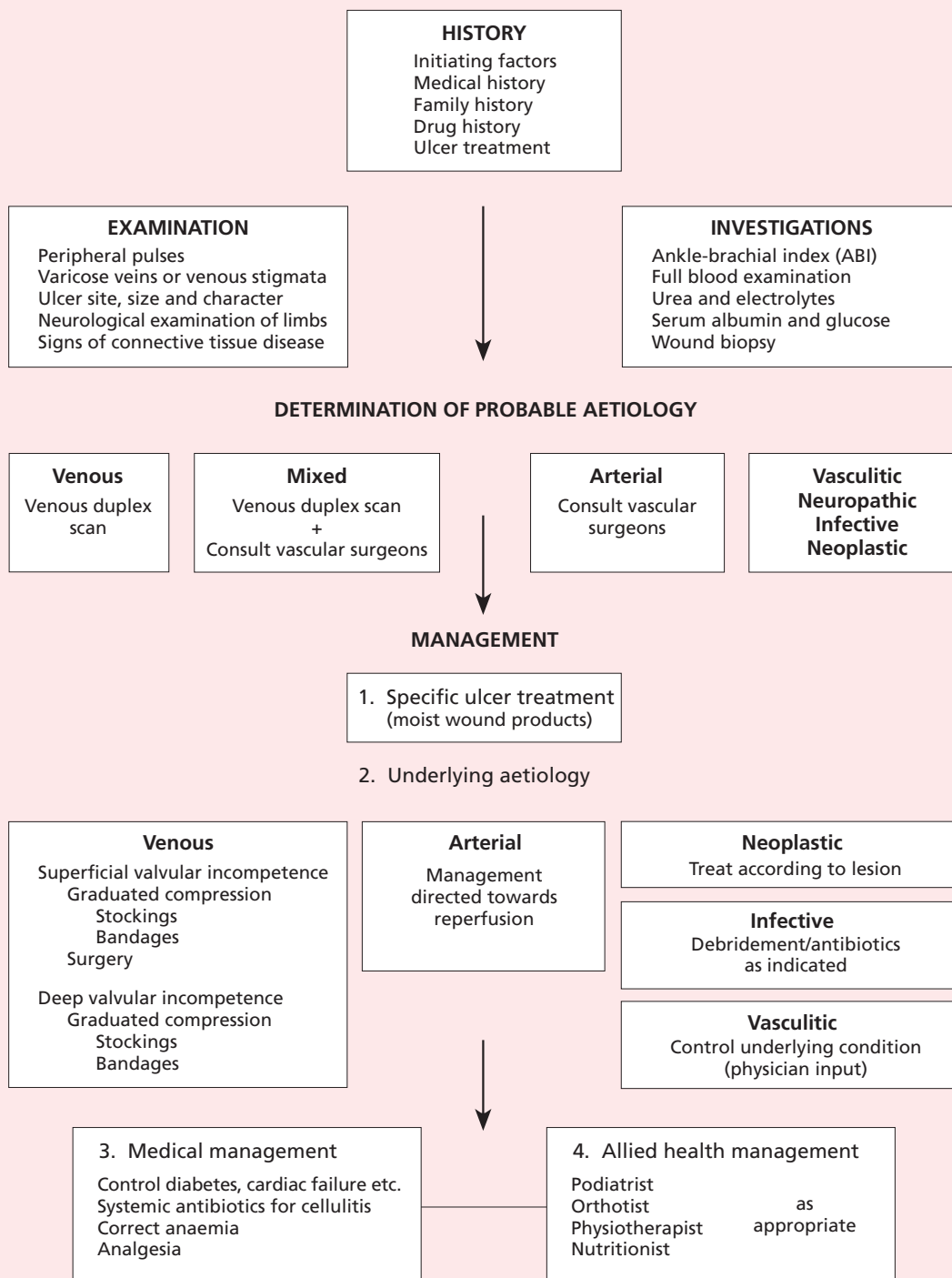
Factors affecting wound healing

Intrinsic factors	Extrinsic factors
Health status	Mechanical stress
Diabetes	Debris
Circulation	Temperature
Anaemia	Desiccation
Immune status	Infection
Age	Chemical stress
Nutritional status	Medication

Fig. 1

The protocol for the investigation of leg ulcers

(Based on the chart devised by D.G. MacLellan for the Wound Foundation of Australia)



Intrinsic factors

The patient's general health has important implications for wound healing. Many medical conditions adversely affect wound healing rates and some cause specific wound healing problems. For example, wounds in patients with diabetes have a poor inflammatory response and a higher rate of infection. Optimising diabetic control improves wound healing.

The nutritional status of the patient can often be overlooked in the clinical assessment. An adequate intake of calories is

required for the energy demands of the normal reparative process. Certain vitamins and trace elements (vitamins C, A, K and B, zinc and copper) are also essential for wound healing. These are mostly available in a well balanced diet with plenty of fresh fruit and vegetables.

Painful wounds also can result in vasoconstriction and decreased tissue oxygen. The patient's pain must be treated or it will delay wound healing.⁴

Extrinsic factors

Mechanical stress

Unrelieved pressure on a pressure ulcer will contribute to ongoing tissue destruction. Any patient who is immobile, in bed or in a chair is particularly vulnerable to the development of pressure ulceration.

Debris

Wounds containing necrotic tissue will not heal. Debris and necrotic tissue must be removed. Surgical and autolytic debridement are essential components of wound healing.

Temperature

As cells and enzymes function optimally at body temperature, a temperature fall of 2°C is sufficient to affect biological processes. A simple dressing replacement can drop the wound temperature for up to four hours before it slowly returns to normal. The wound should therefore be insulated and not left exposed for longer than necessary.

Desiccation

Cells, enzymes and growth factors cannot function in a dry environment. Wounds should not be 'dried out' by exposure to the air or the sun, chemical means or dry bandages. Drying kills the surface cells and increases the reparative requirements. Granulation tissue is fragile and is easily damaged. In particular, the removal of dry dressings can disrupt the wound healing process and return it to an earlier (inflammatory) phase of healing. A moist wound significantly enhances the healing process.

Clinical infection

The features of infection include increasing pain and pus at the wound site, lymphangitis, lymphadenopathy and systemic features, such as fever or rigors. Clinically significant infections must be treated with appropriate antibiotics.

There is considerable overuse of wound swabs for microbiological assessment of chronic wounds. Too often this leads to the inappropriate prescribing of antibiotics. As wound swabs generally remove the surface bacteria, they frequently only identify the non-pathogenic colonising organisms on the wound surface. Wound swabs should be confined to ulcers showing clinical evidence of infection which have slough or tissue that can be gathered by the swab. If there is infection, the pathogenic bacteria are in the tissue and a biopsy may be needed to find them.

Chemical stressors

All antiseptics are cytotoxic! They damage cellular elements and the microcirculation of the wound. Although antiseptics may have a role in the topical management of heavily contaminated acute traumatic ulcers, they are often inappropriately used for long periods of time on chronic ulcers. The need to sterilise a chronic ulcer to achieve healing is unproven and there is thus little evidence to support the ongoing use of antiseptics in chronic wound management.

Drugs

Many medications have adverse effects, which interfere with, or delay wound healing. Steroids and anti-inflammatory drugs

are immunosuppressive and reduce the inflammatory phase of wound healing. Although many of these drugs are essential for the patient's continuing health, it is important to realise they can have a deleterious effect on wound healing. Many older patients are on multiple drugs, some of which may affect wound healing, so wound management is an opportunity for a medication review.

Select an appropriate wound dressing

Many types of wound dressings are available (see 'Current concepts in wound dressings' Aust Prescr 1996;19:11-3). The choice of dressing is influenced by the type of wound.

Plan for maintenance of healing

Consideration must be given to the maintenance of healing in order to prevent recurrences. For example, in chronic venous insufficiency due to deep valvular incompetence, maintenance includes the long-term use of measured and fitted graduated compression hosiery. In addition, good skin care, regular exercise, a balanced diet and careful control of other medical conditions will further benefit the patient and assist in the prevention of recurrences.

Chronic leg ulcers

One of the commonest chronic wounds encountered in general practice is leg ulceration. Not only is the prevalence of leg ulcers relatively high but many patients suffer their leg ulcers for many years without healing. Recurrence rates are also depressingly high.

It cannot be over-emphasised that the key to successful healing begins with the accurate determination of the aetiology (Fig. 1). The cause directs the management plan.

Arterial ulcers

Assessing the arterial perfusion in patients with leg ulceration is essential. The clinical history will give some indication about the degree of lower limb ischaemia. Palpation of the peripheral pulses and auscultation for bruits will add objective evidence. A hand-held Doppler can be used to assess the presence and characteristics of the arterial flow. With the additional use of a blood pressure cuff and sphygmomanometer, the ankle-brachial index (ABI) may be estimated:

$$\text{ABI} = \frac{\text{ankle systolic pressure}}{\text{brachial systolic pressure}}$$

An ABI of 0.9-1.1 is considered normal, but below 0.8 is an indication of arterial insufficiency. Caution is advised if any compression therapy is being considered in the management of leg ulcers with ABI ratios of less than 0.8.

Venous ulcers

The diagnosis of venous aetiology relies on an appropriate history of venous disease, clinical evidence and objective assessment by venous duplex scanning. A further requirement is the exclusion of significant arterial insufficiency. The optimum method of treating the venous ulcer is with graduated compression therapy using either a high or low

Table 4

Foot care

<i>Do:</i>	<i>Do not:</i>
Wash feet daily – mild soap	Use corn cures
Inspect feet daily	Use hot water bottles
Treat problems urgently (early)	Walk barefoot
Visit the podiatrist regularly	Cut corns/callosities
Wear sensible shoes	Self-treat foot problems

stretch bandage. These bandages are applied from the toes to the knee and require an underfelt of orthopaedic wool or equivalent to protect the skin particularly over pressure points. Compression therapy, particularly multilayer, is highly effective in healing venous ulcers and is thus the mainstay of treatment. Crepe bandages do not deliver or sustain the compression needed to heal venous ulcers.

Once appropriate compression therapy begins patients should be encouraged to walk and exercise. In particular, the calf muscle pump should be active. When not walking or exercising, it is advisable that the feet are elevated. However, elevation of the legs is not an acceptable alternative to walking and exercise.

Diabetic foot ulcers

Foot ulcers in diabetics are preventable! Prevention requires a multidisciplinary approach as does successful management of foot ulcers should they occur. The patient should be educated in foot care and instructed to examine their feet daily (Table 4). Careful and regular examination of the patient's feet by the clinician should also assist in uncovering problems in time to prevent ulcer development (Table 5). A foot ulcer in a diabetic patient can have dire consequences as it can lead to amputation and increased mortality. Three main factors determine the aetiology of the diabetic foot ulcer either individually or in concert: neuropathy, ischaemia and infection.

Treatment is determined by the contribution these three factors make to the ulceration. Weight redistribution using specialised orthoses, arterial reperfusion, surgical debridement and antibiotic therapy may all be required. The multidisciplinary approach to the diabetic patient with a foot ulcer is therefore a prerequisite for a successful outcome and saving the limb.

Conclusion

Successful wound healing requires adherence to the principles of wound management. Healing these persistent ulcers will significantly improve the quality of life of long-suffering patients as well as reducing the enormous burden on the health budget. Wound management practices certainly have to improve! Our patients surely deserve optimal healing rates.

Table 5

Diabetic foot examination

Deformity	Charcot's, pes cavus, claw toes, hammer toes
Infection	crepitus, fluctuation, deep tenderness
Atrophic nails	also fungal infection/subungual ulcers
Breakdown of skin	ulcers, fissures, blisters
Edema	pitting oedema lower limbs
Temperature	cold – ischaemic hot – infection
Ischaemia	pulses may be weak/absent
Callosities	plantar surface, metatarsal heads
Skin colour	red – Charcot's/infection pale – ischaemia pink with pain and absent pulses – ischaemia

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Mixed arterial and venous ulcer



Picture provided by Professor D. MacLellan, Department of Surgery, Canberra Hospital

Self-test questions

The following statements are either true or false (answers on page 23)

1. Swabs should be taken regularly from chronic leg ulcers to detect infection at an early stage.
2. Chronic leg ulcers heal more quickly if they are kept dry.