

# Therapeutic management of problematic superficial wounds: a patient-centred approach

Wounds involving surface tissue loss often present in clinical practice. These case studies describe how a treatment regimen that allowed practitioners to change from one dressing to another facilitated healing in problem wounds of this type

skin defects; wound management; hydrocolloid dressing

**T**he primary goal of wound management is to restore function as far as possible. This involves minimising the risk of infection and repairing injured tissue with a minimum of cosmetic deformity. To achieve this, the practitioner must provide optimal conditions for wound healing, which consists of the following stages:

- Haemostasis
- Inflammation
- Epithelialisation
- Fibroplasia
- Contraction
- Scar maturation.

Wound management technology is constantly progressing<sup>1</sup> and a number of dressings are now available, including hydrocolloids, hydrogels, films, foams and sodium/calcium alginates. It is generally more effective to leave a dressing intact for up to seven days to aid healing, although a dressing will need to be changed sooner if saturated.<sup>2</sup> If frequent changes are required, use of a more absorbent product should be considered. Wounds should be assessed continually as they move through the stages of the wound healing process.

The following five case studies illustrate the various wounds involving surface tissue loss that commonly present in clinical practice. All are treated with a wound management regimen that includes use of a hydrocellular dressing (HydroSite).<sup>1</sup>

The hydrocellular dressing HydroSite (Smith and Nephew) consists of a layer of soft, hydrophilic, polyurethane foam, approximately 6mm deep, bonded to a pink, semipermeable, polyurethane film. (HydroSite is the registered trademark for Allevyn in Japan.) When applied to an exuding wound, the dressing absorbs excess fluid while maintaining a moist environment, which is conducive to healing.<sup>3</sup> HydroSite is available in Japan and other countries for the treatment of a variety of superficial exuding wounds, including some leg ulcers, minor burns and donor sites.

## Fingertip wounds

These are a common problem that require precise wound management for optimal results.<sup>4</sup> The sensory receptor sites in the glabrous skin of the fingertip are uniquely adapted for digital touch and sensation, and should be preserved whenever possible. The aetiology of injury, the patient's age, the level, angle and type of tip amputation and the patient's anticipated hand use must all be considered when choosing the type of wound closure.

The desired treatment is the simplest and most direct method of obtaining the optimal structural and functional result.<sup>5</sup> Treatment should aim to:

- Save nails
- Reapproximate nail matrix lacerations
- Use natural wound contraction and epithelialisation to advantage
- Restore pulp when necessary with volar innervated flaps from the same finger
- Reduce fracture angulation and displacement
- Use skin grafts when subcutaneous tissue is sufficient
- Replace small, non-crushed, skin-pulp amputations and traumatic flaps.

In recent years amputation stump plasty, V-Y plasty advancement or skin grafting have been augmented by using various wound dressings to achieve closure. The current treatment regimen at the Department of Plastic Surgery, Yamagata Municipal Hospital, Japan includes a combination of an alginate dressing and HydroSite.

## Treatment regimen

Fresh wounds are generally sealed with an alginate wound dressing, which is replaced with HydroSite three to four days later. Although bleeding often occurs immediately after trauma, no specific haemostatic measures are adopted, even when the source is an artery. In most cases bleeding can be stopped by covering the wound with an alginate wound dressing, sealing it with a film dressing, elevating the wounded limb and applying pressure for approximately five minutes.

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When the distal phalanx is exposed, it is not necessary to shorten it unless it protrudes from the wound margin. However, the wound surface must be disinfected. Irrigation can be with physiological saline (even tap water), performed under local anaesthesia if necessary. After cleaning, an alginate dressing is applied. When granulation is observed (two to four days later), the alginate is replaced with HydroSite. This is changed daily for the first five days and then at intervals of several days.

#### Case 1: severed fingertip

A 25-year-old man had sustained the loss of his right fingertip from a machine cut (Fig 1). The fingertip was sealed with an alginate wound dressing as the crushed stump prevented composite grafting (Fig 2). On day 4 the alginate was replaced with HydroSite (Fig 3). Complete wound closure was achieved on day 30 (Fig 4). The patient returned to work without pain or numbness in the fingertip.



Fig 1. Patient presents with severed fingertip



Fig 2. Alginate dressing is applied



Fig 3. Day 4: Alginate replaced with HydroSite



Fig 4. Day 30: complete wound closure achieved

#### Case 2: laceration to right index finger

A 68-year-old man presented with a power saw injury to his right index finger. He had extensive tissue defect on the radial side of the medial to distal parts of the right index finger, with a partial defect of the distal phalanx (Fig 5). The wound was immediately sealed with an alginate dressing. On day 4 this was replaced with HydroSite (Fig 6). Wound closure was almost complete on day 20 (Figs 7 and 8), and the patient was able to use the finger for daily activities.



Fig 5. Injury incurred by power saw



Fig 6. Day 4: Alginate replaced with HydroSite



Figs 7 and 8. Day 20: wound closure almost complete

#### Discussion

Although alginate and hydrocolloid dressings have been used to seal fingertip wounds, HydroSite was found to be superior to other hydrocolloids. First, HydroSite alleviated pain. Wounded fingertips are likely to be stimulated and occasionally bruised, even when patients protect them. HydroSite protects fingertips and minimises pain from external stimuli because the absorbent hydrocellular pad is thick and flexible. The trilaminar structure also enables patients to perform daily activities even before wound closure has been achieved.

#### Palm burns

The isolated palm burn is a typical injury in children.<sup>6</sup> In such cases there is generally a good prognosis. A severe case is characterised by the involvement of the first commissure, associated dorsal burn, deep second-degree burn, poor social conditions and delayed management.<sup>7</sup> Although hand burns in children are not always as deep as those in adults, optimal treatment involves appropriate acute management, with skin grafting, proper splinting and physical therapy playing a large role. Long-term follow-up is also required due to the excessive scar tissue that may form and the continued growth of the child's hand.<sup>8</sup>

#### Case 3: hot water burns

A 14-year-old girl had hot water burns on both palms. The burn on the right hand extended from the palm to the medial phalanges of the index and little fingers. The burn on the left hand was located around the palm side of the medial phalanx of the forefinger. The burns were initially managed by a dermatologist and treated with ointment. Two weeks later, the girl was referred to us at the Department of Plastic Surgery because of the burn depth on the right hand.

On referral, the burns, which were partially evaluated as third degree, were observed on the right palm on the fingers (Fig 9) and the left index finger. The wounds were washed with lukewarm water and covered with HydroSite. On day 6 the burn injury had epithelialised, except on the proximal phalanx of the middle finger (Fig 10). The entire area had fully epithelialised by day 15 (Fig 11). The patient has since been followed for scar contracture.

Initial management with ointments had caused an excessive amount of exudate. A thick layer of gauze was then applied, but this made it impossible for the patient to use chopsticks or pencils. Following the use of HydroSite, the patient was able to use her fingers freely as the dressing's hydrophilic composition alleviated the need for gauze and provided pain relief.



**Fig 9.** Burns, some of which were third degree, on referral



**Fig 10.** Day 6: the injury had mostly epithelialised



**Fig 11.** Day 15: the entire area had epithelialised

### Extensive leg skin defects

Many factors can impair the healing of skin defects. Local factors include the presence of foreign bodies, tissue maceration, ischaemia and infection. Systemic factors as diverse as advanced age, malnutrition, diabetes and renal disease may be important.<sup>9</sup> It is important to evaluate the impact of disease states on healing and to select an appropriate treatment for the patient's needs.

#### Case 4: leg tear in an elderly woman with chronic renal disease

This presents an insight into the difficulty of managing a wound in an elderly patient with a complex underlying pathology. A 70-year-old woman who had been receiving artificial dialysis for chronic renal failure had fallen at home and sustained a tear on her right leg. She had been treated with oral warfarin since undergoing valve replacement surgery five years previously. The anterolateral leg tear (approximately 15cm) was initially sutured because the bleeding did not stop (Fig 12). The patient was then referred to us.

On referral the suture was immediately removed to eliminate extensive subcutaneous haemangioma (Fig 13). Oozing haemorrhage, observed postoperatively from the entire wound area, was controlled with an alginate dressing. Warfarin was discontinued for two days, but reintroduced on day 3 when the haemorrhage was managed.

The treatment regimen included debridement and wound cleansing with lukewarm tap water. The wound surface was covered with physiological saline-soaked gauze. On day 6 only unstable granulation and necrotised tissue were present on the wound surface, and the wound was greatly depressed due to the muscular necrosis outside it (Fig 14). The wound area measured 14 x 9cm. The wound was filled with IntraSite Gel (Smith and Nephew) to rehydrate the necrotised tissue, and the wound surface was covered with HydroSite. Granulation tissue gradually increased (Fig 15) and wound



**Fig 12.** The anterolateral leg tear



**Fig 13.** The sutures are removed



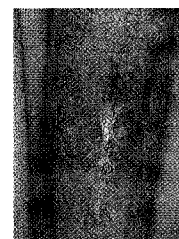
**Fig 14.** Day 6: necrotic tissue is present



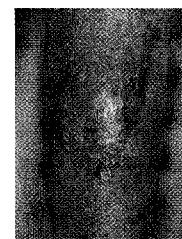
**Fig 15.** The granulation tissue had increased



**Figs 16 and 17.** By this time wound contraction and epithelialisation had also started to occur



**Fig 18.** Day 91: there is complete epithelialisation



**Fig 19.** The wound two weeks later

contraction and epithelialisation started (Figs 16 and 17). The wound had completely epithelialised on day 91 (Fig 18). Fig 19 shows the wound two weeks after complete epithelialisation.

IntraSite Gel is useful for depressed tissue defects as it stimulates granulation.<sup>10</sup> It is usually used in combination with a film dressing to seal the wound. When the surrounding skin is fragile and unstable, as in the present case, HydroSite not only seals the wound but also stimulates epithelialisation in the surrounding skin defects.

### Radiation-induced skin injuries

As many as 95% of patients given radiation therapy as part of their cancer treatment experience a skin reaction. Some reactions are immediate, while others occur later — for example, months after treatment.<sup>11</sup> Predictive factors for the severity of skin reactions include: weight, breast size, lymphocele aspiration, cigarette smoking, age, skin cancer, tumour stage and radiation dose.<sup>12</sup> Currently, there are no standards of care on the management of these skin reactions for institutions and physicians in Japan, although hydrocolloid dressings have been shown to aid healing in most cases of skin reactions caused by radiation therapy.<sup>13</sup>

#### Case 5: intractable fistula

A 72-year-old woman presented with an intractable fistula following radiation to a surgical site (partial resection of the right breast, due to breast cancer). The wound margin had gradually necrotised and formed an extensive subcutaneous pocket. The patient was referred to us after the

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<sup>11</sup> Dubray, B., Delanian, S., Lefaix, J.L. Late effects of mammary radiotherapy on skin and subcutaneous tissues. *Cancer Radiother* 1997; 1: 6, 744-752.

<sup>12</sup> Porock, D., Kristjanson, L., Nikolett, S. et al. Predicting the severity of radiation skin reactions in women with breast cancer. *Oncol Nurs Forum* 1998; 25: 6, 1019-1029.

<sup>13</sup> Mak, S.S., Molassiotis, A., Wan, W.M. et al. The effects of hydrocolloid dressing and gentian violet on radiation-induced moist desquamation wound healing. *Cancer Nursing* 2000; 23: 3, 220-229.



**Fig 20.** The breast fistula at first presentation



**Fig 21.** Pocket is incised and skin removed



**Fig 22.** Alginate filling and film seal are used



**Fig 23.** Day 12: granulation and contraction visible



**Fig 24.** Rapid epithelialisation then occurred



**Fig 25.** Day 33: complete closure noted



**Fig 26.** After one month, there is a slight scar

wound had failed to improve following three months of conservative management in the department of surgery.

At the first presentation (Fig 20), a right breast fistula with a surrounding pocket was observed. The pocket was incised under local anaesthetic and the skin over the pocket removed to form an open wound (Fig 21). The wound was filled with an alginate wound dressing and sealed with a film dressing (Fig 22). The wound size was 1.5 x 7.5cm.

On day three the wound was filled with IntraSite Gel and a film dressing. However, the dressing caused the skin to ulcerate at the surrounding site of radiation dermatitis. The treatment was changed to a combination of IntraSite Gel and HydroSite, which eliminated the ulceration. On the twelfth day following the incision, granulation and wound contraction were observed (Fig 23). The wound then rapidly epithelialised (Fig 24) and closed completely by day 33 (Fig 25). After one month (Fig 26) the scar was inconspicuous, and the patient was satisfied with the result.

While attending the surgical clinic the patient had been told not to bathe. After admission to our clinic she was permitted to take a bath from day three. As she lived close to the hospital, she was asked to attend the clinic for wound cleansing.

### Discussion

Generally, radiation-induced skin ulcers are intractable. Extensive subcutaneous pocket cases, such as the one described here, are often difficult to heal when managed conservatively. Opening the pocket and removing the skin accelerates wound closure. IntraSite Gel effectively manages skin defects with poor blood circulation and delayed granulation associated with irradiated tissue.<sup>10</sup>

The radiation dermatitis in this patient made it difficult to seal the wound with a film dressing. However, the combination of IntraSite Gel and HydroSite proved effective. The former stimulated granulation in the depressed wound, while the HydroSite treated the radiation dermatitis surrounding it.

### Conclusion

The case studies presented here clearly illustrate the importance of selecting an appropriate dressing for the condition of the wound. Of prime importance is not the cause of the wound but the wound condition, depth, whether there is any contamination by foreign matter or any complications, and the condition of the surrounding skin. All these factors should be considered when selecting a dressing. A flexible approach is required, changing from one technique to another as appropriate, depending on the wound's condition.

We seal fresh wounds with an alginate dressing and then cover with HydroSite a few days later. Dry wounds with little exudate, and depressed wounds are filled and sealed with IntraSite Gel. However, these are only general rules and we always try to select the appropriate dressing for the wound. Disinfecting and covering a wound with gauze is a relic of the past as it causes pain and delays healing. In contrast, management with appropriate wound dressings, as described here, can result in faster wound healing. ■

### Box 1. Summary of the main findings

These five Japanese case studies focus on a variety of wounds involving surface tissue loss. All were treated with a wound management regimen that included the use of a hydrocellular dressing

The wounds include fingertip amputations and lacerations, palm burns, leg tears and radiation-induced injuries incurred during cancer treatment. All were referred to a department of plastic surgery

Wound healing occurred in all cases. The author says the case studies emphasise the need to select an appropriate dressing. This involves focusing not only on the cause of the wound, but also on its condition, depth, whether any foreign matter or complications are present and the state of the surrounding skin

A flexible approach, which gives practitioners the freedom to switch from one dressing to another as appropriate, is also required

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